Tuesday, September 19, 2023

Response to Comments for the Draft Stormwater Quality Manual and Draft Guidelines on Soil Erosion and Sediment Control

Purpose and Organization

This document contains the comments provided during the public comment period (January 25th to March 1st, 2023) and the resolution of each comment, to support the Draft Stormwater Quality Manual and Draft Guidelines for Soil Erosion and Sediment Control Guidelines.

The comments in this document are organized by topic. Comments are both summarized (Comments Summary) and have been provided verbatim (Verbatim Comments) so not to mis-quote/mis-represent the commenter, and the commenter has been noted in italics.

Note the CTDOT also provided summary letters in addition to the verbatim comments. Since the verbatim comments are taken directly from the summary letters, only the comments (verbatim) are included herein.

This is a compilation of response to comments on both the Draft Stormwater Quality Manual and the Draft Guidelines for Soil Erosion and Sediment Control Guidelines, a continued collaboration between CT DEEP and the Connecticut Council on Soil and Water Conservation, with technical expertise provided by Fuss and O'Neill.

Additions to the draft documents are noted in red underlined text and deletions to the draft documents are noted in ~~strike through~~ text and [ ] provide reference to the section that was amended .

Stormwater Quality Manual

Topic: Editorial

Comments Summary:

The following edits were noted:

- Add "of" Construction "of" Soil Erosion
- Two Table 2-1's
- Enhance color contrast
- Match legend to key with adding () in table's of Chapter 8
- Make table 13-1 fit on one page.

Verbatim Comment(s):

Table of Contents, Add "of" to Chapter 3's Construction "of" Soil Erosion. *(Christopher Koproski, US Navy)*

Response:

Accepted

Verbatim Comment(s):

It may seem minor, but the blue, green and white color contrast is difficult to read and may provide challenges to persons with color vision impairment (I am not an expert on this, I'm curious if someone was consulted). Also, for the covers of the manuals, why not use something nicer, like maybe a photo of the CT River or the Long Island Sound? They look very aged, and they are brand new! *(Alex Kloze, Town Engineer of East Lyme)*

Response:

A student graphic artist provided her training and insight into font for readability, color choices, design, and redrawing many of the manual's figures to get as many updated into a crisp clean look. Blues and greens were chosen to create an accessible document for readers who may be color blind. We concur that enhancing contrast will benefit the readers, and we have darkened the tones for the final version. Final covers have also been enhanced.

Verbatim Comment(s):

There are two tables identified as "Table 2-1". *(Jonathan Thiesse, Bloomfield Town Engineer)*

Response:

Update to captions made.

Verbatim Comment(s):

In the legends of the tables in Chapter 8, the "see notes" legend items should be in parentheses to match how the references are presented within the table; i.e. "(see notes)". To me, this makes it more clear as to what these legend items refer to. *(Jonathan Thiesse, Bloomfield Town Engineer)*

Response:

Accepted

Verbatim Comment(s):

It would be more convenient if Table 13-1 (p. 222-223) was on one page rather than divided onto two pages. (It is preferable to me to see all of the options at one time.) Reducing the margins between categories, and not listing "Rain Barrel" and "Cistern" as specific [non-link] items under a heading link "Rain Barrel and Cistern", might be enough to make this work? *(Jonathan Thiesse, Bloomfield Town Engineer)*

Response:

Accepted

Verbatim Comment(s):

Overall, this is an excellent revision. It should be a great assistance to municipalities in administering stormwater regulations.

Seems like Chapters 12 and 13 should be swapped. "Structural Stormwater BMP Design Guidance" ties in closely with chapters 7 through 11; and "Stormwater Management Plan" breaks that up. *(Jonathan Thiesse, Bloomfield Town Engineer)*

Response:

We appreciate the idea. However, then intent to add the Structural Stormwater BMP Design Guidance to the end of the guidance is to eliminate the tendency to be drawn towards a single BMP solution and to encourage wholistic site planning. By demonstrating the entirety of the process and planning and concluding with elements that can be a piece of site planning we are hopeful to facilitate and encourage better wholistic design and approaches.

Topic: Additional Content

Comment Summary:

The addition of cost information from installs to maintenance would be helpful.

Verbatim Comment(s):

In short, we appreciated the careful thought that went into the work-- so thank you to the many collaborators. However, given you asked for feedback, we did also wish that in the SWQM there could've been added content, to whatever degree, on cost as a factor for consideration. Whether that be-- basic information on maintenance costs; where in the analysis that factor is best inserted; and/or introductory info on cost benefit analysis. We all support and cheer the spirit of the updates, but as they will certainly present challenges to municipalities, anything that will help make our work easier will be appreciated. *(Michelle Maitland, Project Management Specialist, MS4 Coordinator Public Works Department, Town of Groton)*

Response:

We concur that the consideration of cost is an important factor. Unfortunately, in the development of the scope and priorities we quickly realized evaluating cost would be:

1. Costly and would require most of the budget, and
2. would be outdated quickly

Therefore, it is not included in more definitive ways in these guidance documents. However, DEEP has on-going collaborations that may provide some resources to address this concern. When these become available CT DEEP will coordinate communication with the users of these manuals.

Verbatim Comment(s):

A significant opportunity to improve Storm Water Quality is the availability of tree cover in the urban environment. Practices should include methods to increase the canopy cover, and the survivability of the trees. Such practices may include practices to assure appropriate volumes for tree root systems. Such practices may be structural, or through manufactured soils, or other methods as best determined by the project landscape architect. *(Āris W. Stalis, ASLA, LEED AP, Aris Land Studio)*

Response:

We concur with the commenter that increasing tree canopy, especially in the urban. We also concur that assuring practices allow for appropriate volume for tree roots and other practices to ensure the viability of trees is essential. The value of tree canopy is included in Chapter 5, Low Impact Development Site

Planning and Design, Chapter 12, Stormwater Management Plan and Appendix E, Chapter 13, Stormwater Management Plan Checklist. We have made the following amendment to Chapter 13 to clarify the importance of sizing appropriately for root systems.

- Bioretention Soil Depth
  - Engineered bioretention soil media should have a depth of 24 to 48 inches ,or as necessary to accommodate the required sizing, vegetation species and root establishment/growth, and subsurface conditions. The volume should be adequate to ensure root systems and thereby the tree will be viable and able to grow.

Additionally, while beyond the scope of this manual, DEEP is ensuring coordination between the department's Urban Forestry program and the Water Planning and Management Divisions to support further implementation of this critical LID practice.

Topic: Applicability

Verbatim Comment(s):

Per CTDOT comment summary letter, if chapters with specific design requirements remain in the manual, then alternative, language should be added here [Applicability and Regulatory Basis of the Manual 2nd paragraph]:

Add text: Although this manual will be used for guidance immediately upon its publication, any reference in DEEP General Permits for adherence to the guidelines, criteria, recommendations and/or recommendations and/or requirements specified in the Manual, is only specific to the guidelines, criteria, recommendations and/or requirements present in the Manual that existed at the time of a permit's issuance. *(CT DOT)*

Response:

To address the needs of this guidance and the requirements posed by the Governor' executive order 21-3 we must retain and update design recommendations. However, we concur the premise of the suggestion and a modified version of the statement has been adapted to account for the outreach that will precede the manuals use/effective date and the Agency's intent to ensure this is utilized going forward not retroactively.

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) as of the effective date, however, 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. All projects received or permitted after one year of 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.

Verbatim Comment(s):

[Applicability and Regulatory Basis of the Manual 3rd paragraph] Add text: 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 and in the supporting materials that CTDOT has developed. *(CT DOT)*

Response:
Texted suggested has been accepted with minor revisions, see below.

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, as summarized in Standard 1 (Runoff Volume and Pollutant Reduction) of Chapter 4 (Stormwater Management Standards and Performance Criteria), 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.

Topic: Guiding Stormwater Management Principles

Verbatim Comment(s):
[In the previous section] Impervious cover includes man-made waterbodies—when creating these, are the "multi-objective" benefits listed on pg 29 (including recreation, aesthetics, and habitat) weighted equally to the water quality benefits? *(Christopher Koproski, US Navy)*

Response:
These guidance documents are in place due to the need for permitting programs that, in large part, are under CWA Section 401 and 402 to evaluate and limit discharge of pollutants to waterways. Therefore, water quality benefits are a driving mechanism and priority for each site consideration. It is important to note that water quality benefits are not exclusive benefits. Many of the LID and structural BMP options can also provide habitat, aesthetic, recreation, climate resilience (i.e., resilience to flooding, extreme heat, and other climate-related impacts), and other community benefits. Therefore, when evaluating funding opportunities or weighing the benefits to the cost of implementation, these considerations can open further opportunities than providing water quality benefits alone.

We have also revisited the language referenced in the comment. Specifically, the definition of Impervious Area and DCIA later in Chapter 2 and made the following edit to the first paragraph of the "Impervious Cover" section of Chapter 2 for consistency:

"Impervious cover is any impervious surface in the landscape that cannot effectively absorb and infiltrate rainfall. For the purpose of this Manual, impervious surfaces include, but are not limited to roads, parking lots, driveways, roofs, sidewalks, and patios (i.e., solid or open-joint patios or decks with an underlying impervious surface); ~~water surfaces (i.e., ponds, manmade and natural waterbodies, etc.),~~ water surfaces of manmade impoundments (i.e., stormwater ponds and swimming pools) only if they are hydraulically connected to a storm drainage system, receiving waterbody, or wetland; and compacted gravel surfaces and highly compacted soils. These surfaces disrupt the natural hydrologic cycle, increasing surface runoff and decreasing infiltration of rainfall into the soil."

Verbatim Comment(s):

Focus on stormwater retention. We commend CTDEEP on the site design and Best Management Practice (also known as SCM) site selection requirements requiring site designers to retain as much water on site as possible before putting in treatment only SCMs to meet pollution reduction requirements when retention requirements cannot be met onsite or met through offsite mitigation. Recent modeling data of current rain event patterns and runoff generated from increasingly intense rainfall indicates that groundwater recharge of runoff from the 90th percentile storm event on all sites, regardless of hydrologic soil group, is needed to sustain river and stream baseflows, and replenish our drinking water aquifers to prevent water shortages during sustained drought periods. The approach taken by CTDEEP in the SWQM focuses on retention first with treatment as a last resort to meeting the standards; this will be a key element to help return our developed environment to a more natural hydrologic condition over time through redevelopment and help mitigate the groundwater recharge loss that occurs from new development. *(Michele Vuto, EPA Region 1)*

Response:

We appreciate the comment.

Topic: Water Quality Volume

Verbatim Comment(s):

Increasing the volume retention/treatment standard from 1.0 inch of runoff to 1.3 inches of runoff. We commend CTDEEP on the updating of the retention/treatment standard for new and re-development projects from a 1.0-inch storm to a 1.3-inch storm to reflect our changing climate more accurately. This is a much-needed update reflecting current rainfall patterns in New England. However, the calculation of Water Quality Volume (WQV) in the manual is inconsistent with the SCM performance calculations in the same chapter of the SWQM, and the term WQV is easily misconstrued as the volume of water required to be treated by each SCM built instead of an overall site design standard. Instead of calculating a retention/treatment volume requirement based on percent impervious of the site, CTDEEP should consider changing the retention/treatment standard to be consistent with the crediting of SCMs in the SWQM, that is, based solely on the amount of runoff from impervious cover on site generated by a 1.3 inch rain event (approximately 1.2 inches of runoff). Volume reduction credits can then be given for simple disconnection of impervious cover as well as for structural SCMs. This approach could streamline the SWQM and increase the ease of implementation by having simplified equations built into the SWQM. *(Michele Vuto, EPA Region 1)*

Response:

We appreciate the suggestions and concur there is a need to resolve the inconsistencies. However, we are maintaining the WQV equation, so that the volume maintains its site specificity consistent with the permit program and the WQS (currently 1.3") can be updated more regularly in the future to reflect updated rainfall data. We have made the following amendments to address the conflicting terms:

- Replaced the term "Design Retention Volume" with "Required Retention Volume" to eliminate the inference that this is the volume to design the individual BMP to.
- Added "site's" when we are referring to the site's water quality volume versus the volume to be treated by each SCM.

- Provided the following clarification to the Water Quality Volume Calculation section of Chapter 4:
  "As described above, the WQV is a key factor in determining the ~~Design~~ Required Retention Volume and any additional treatment requirements. The WQV is the volume of stormwater runoff from a given storm event that must be retained and/or treated ~~in order~~ to remove most of the post-development stormwater pollutant load on an average annual basis and to help maintain pre-development site hydrology in terms of duration, rate, and volume of stormwater flows including groundwater recharge. The WQV is calculated using the following equation:" …
    - "For the WQV calculation, impervious area (*I*) should be measured from the post-development site plan and includes all directly connected impervious surfaces (DCIA as defined in this Manual) within the boundaries of the site or for the drainage area of ~~the~~ each ~~stormwater BMP or~~ design point for sites with multiple design points ~~(DCIA as defined in Chapter 2 - Stormwater Impacts).~~ "

- Provided the following clarification and terminology corrections to the Demonstrating Compliance with Standard 1 Section of Chapter 4:
  "Figure 4-2 shows a typical set of BMP performance curves for an infiltration basin in Type B soils. In this example, ~~capturing and retaining~~ an infiltration basin designed with a physical storage volume equivalent to 1 inch of runoff over the contributing impervious area will result in average annual load reductions of approximately 100% for TSS, 92% for TP, and 98% for TN. ~~n this example, capturing and retaining 1 inch of runoff from the of impervious area will result in average annual load reductions of approximately 100% for TSS, 92% for TP, and 98% for TN.~~ The curves also demonstrate that:"

Verbatim Comment(s):

Are any other states using a 1.3" (or the local 90th percentile rainfall WQV)? *(Alex Kloze, Town Engineer of East Lyme)*

Response:

Other states are using the 90th percentile, the calculation of 1.3" is specific to Connecticut's observed 90th percentile. The development of this manual considered several of our neighboring states. The summary of the comparison is noted below. Note NY has since updated, and MA is currently under review. It is also important to note that for states using 1 inch of **runoff** from the impervious area as their WQV, their water quality storm is closer to 1.1 inches since most impervious surfaces actually store a small portion of the early part of a storm (initial abstraction in NRCS terminology) and their equations ignore any runoff from pervious surfaces.

Component	Connecticut	Massachusetts	Rhode Island	New Hampshire	Vermont	Maine	New York	New Jersey
State Stormwater Management Guidance								
Stormwater Manual	Connecticut Stormwater Quality Manual (2004, Update in progress)	Massachusetts Stormwater Handbook (2008, update in progress)	Rhode Island Stormwater Design and Installation Standards Manual (2015)	New Hampshire Stormwater Manual (2008, update in progress)	Vermont Stormwater Management Rule and Design Guidance (2017)	Maine Stormwater Management Design Manual (2016)	New York State Stormwater Design Manual (2015)	New Jersey Stormwater BMP Manual (2021)
Stormwater Quantity Control Design Storm	Depth: TP-40 (24-hr) Distribution: NRCS Type III	Depth: TP-40 (24-hr) Distribution: NRCS Type III	Depth: NRCC (24-hr) Distribution: NRCS Type III	Depth: TP-40 or NRCC (24-hr) Distribution: NRCS Type II or III	Depth: NOAA Atlas 14 (24-hr) Distribution: NRCS Type II	Depth: Northeast Regional Climate Center (NRCC) (24-hr) Distribution: NRCS Type II or III	Depth: NRCC (24-hr) Distribution: NRCS Type II or III	Depth: NOAA Atlas 14 (24-hr) Distribution: NOAA_C and NOAA_D
Stormwater Quality Control Design Storm or Water Quality Volume (New Development)	Runoff volume generated by 1.0 inch of rainfall over entire drainage area	0.5 to 1.0 inch of runoff from impervious area depending on discharge source and receiving water	1.0 inch of runoff from impervious area (equivalent to 1.2 inches of rainfall over impervious area) Minimum of 0.2 inches of runoff from entire disturbed/developed (pervious and impervious) area	Runoff volume generated by 1.0 inch of rainfall over entire drainage area (same as CT)	Runoff volume generated by 1.0 inch of rainfall over entire drainage area (same as CT). Minimum of 0.2 watershed inches is required to treat the runoff from pervious surfaces on sites with low impervious cover (similar to RI)	1.0 inch of runoff from impervious area plus 0.4 inch of runoff from developed (landscaped/lawn) pervious area	Runoff volume generated by 90th percentile rainfall (1.0 to 1.5 inches) over entire drainage area	Depth: 1.25 inches of rainfall (2-hr) Distribution: custom
Water Quality Volume Equation	WQV = (P)(Rv)(A)/12 Rv = 0.05 + 0.009(I) P = 1 inch (90th percentile rainfall) A = drainage area to design point (square feet) Rv = Runoff Coefficient I = impervious area (percent)	WQV = (P)(A)/12 P = 0.5 to 1.0 inch (90^{th} percentile rainfall) A = impervious area to design point (square feet)	WQV = (1")(A)/12 A = impervious area to design point (square feet) Min WQV = (0.2")(A)/12	Same as CT	WQV = (P)(Rv)(A)/12 Rv = 0.05 + 0.009(I) P = 1 inch (90th percentile rainfall) A = drainage area to design point (square feet) Rv = Runoff Coefficient I = impervious area (percent) Min WQV = (0.2")(A)/12	WQV = (1")(AI)/12 +(0.4")(AP)/12 AI = impervious area to design point (square feet) AP = developed pervious area (square feet)	WQV = (P)(Rv)(A)/12 Rv = 0.05 + 0.009(I) P = 1.0 to 1.5 inches (90^{th} percentile rainfall) A = drainage area to design point (square feet) Rv = Runoff Coefficient I = impervious area (percent)	Use rainfall runoff model to calculate runoff generated by 1.25 inch, 2-hour rainfall event

Verbatim Comment(s):

From a regulation standpoint, it would be helpful if it was specifically stated that water quality volume treatment within a dry detention basin is not acceptable. (Jonathan Thiesse, Bloomfield Town Engineer)

Response:

We concur with the comment. The manual includes "Dry Extended Detention Basin" but only as a suitable practice for Peak Runoff Attenuation (See Chapter 13). We have amended this section of Chapter 13:

"Dry extended detention basins are not suitable as infiltration or groundwater recharge measures, and therefore do not reduce runoff volumes and cannot be used to meet the Standard 1 retention or treatment performance criterion of this Manual."

Topic: Peak Flow

Comment Summary:

A reference to the Inland Wetland and Watercourse authority with regards to flow requirements should be added.

Verbatim Comment(s):

Seems to me (though it's possible there is and I missed it) that there should be a qualifier regarding retention and small storm peak flow attenuation something to the effect of: "subject to any requirements from the Inland Wetlands and Watercourses authority to maintain certain flow levels with respect to a downstream wetland, shallow water body, vernal pool, or small watercourse, etc." *(Jonathan Thiesse, P.E. Bloomfield Town Engineer)*

Response:

We concur with the commentors suggestion; the draft only presented the local wetlands and watercourses authority in Appendix A, and with regards to setbacks/buffers. Therefore, had not mentioned with respect to flows. We concur that this should be mentioned and therefore the following amendment was made to the introduction of Chapter 4, Stormwater Management Standards and Performance Criteria:

"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 maintaining certain flow levels with respect to a downstream wetland, shallow water body, vernal pool, or small watercourse, etc. These requirements are not explicitly stated in this Manual and a site plan would be subject to those requirements. Additionally, 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."

Topic: Stormwater Management Standards and Performance Criteria Summary. – Introduction & General

Verbatim Comment(s):

Terminology in the SWQM. The terms "Maximum Extent Practicable", "Furthest Degree Possible", and "Maximum Extent Achievable" are all used throughout the SWQM. CTDEEP should consider streamlining these terms to rely on one clearly defined term used throughout the SWQM. *(Michele Vuto, EPA Region 1)*

Response:

We concur, Maximum Extent Achievable (MEA) has replaced the use of the other terms with the exception of their use to define the MEA. An overarching definition has been added to Chapter 4 and the other definition boxes have been noted as how one might demonstrate meeting that term.

The revised definition box is noted below:

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

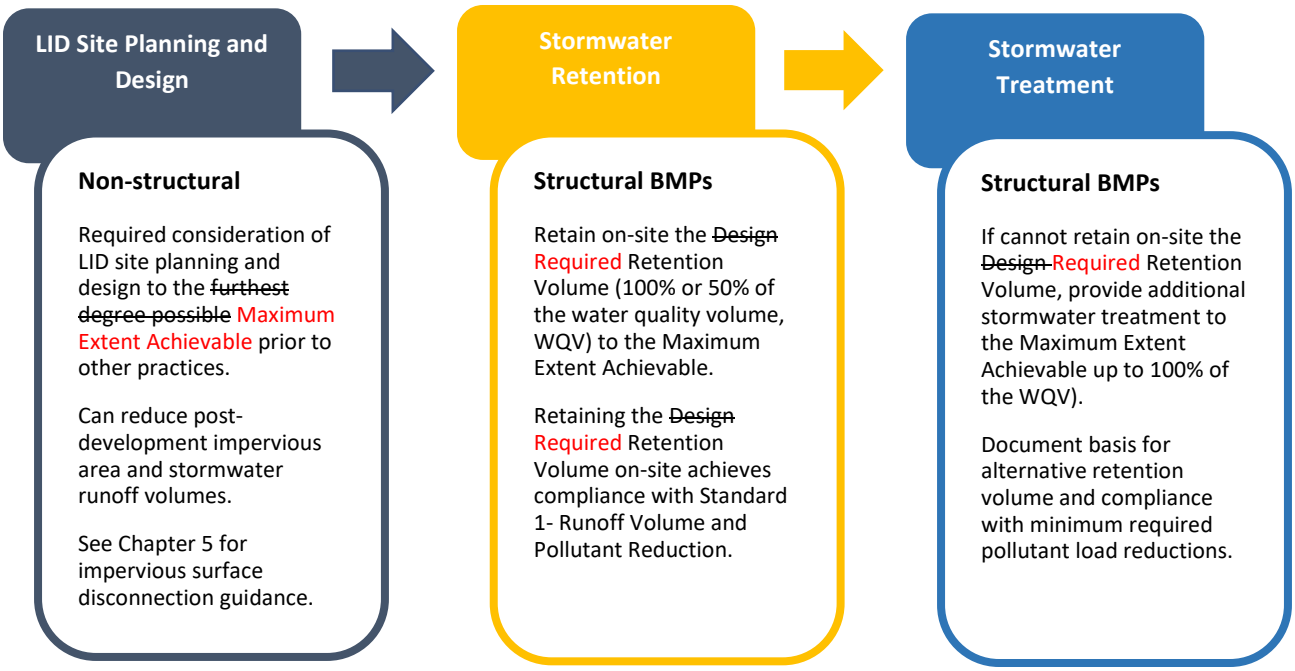
Maximum Extent Achievable (MEA) – Stormwater Retention

***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.

Chapter 4- Table 4-1

Consider the use of non-structural LID site planning and design strategies, to the ~~furthest degree possible~~ maximum extent achievable, prior to the consideration of other practices, including structural stormwater BMPs.

Chapter 4- Figure 4-1



Chapter 4- Standard 1 Runoff Volume and Pollutant Reduction – LID Site Planning and Design (non-structural)

Consider the use of non-structural LID site planning and design strategies, to the ~~**furthest degree possible**~~ MEA (see the text box below for the definition) prior to the consideration of other practices, including structural stormwater BMPs, consistent with the CT DEEP stormwater general permits.

~~Furthest Degree Possible~~ Maximum Extent Achievable (MEA) – LID

For demonstrating "maximum extent achievable" regarding the LID Site Planning and Design requirement, ~~"furthest degree possible" means~~ a project proponent should demonstrate the following:

Chapter 4- Standard 1 Runoff Volume and Pollutant Reduction – Stormwater Retention and Treatment (structural)

After application of non-structural LID site planning and design strategies to the ~~MEP~~ MEA, select

Chapter 5 - Low Impact Development Site Planning and Design Strategies- LID Site Planning and Design Techniques

The remainder of this chapter focuses on non-structural LID site planning and design techniques, which should be applied to the MEA ~~furthest degree possible~~ (see Standard 1 in…

Chapter 5 - Low Impact Development Site Planning and Design Strategies- LID Site Planning and Design Credits

Standard 1 requires project proponents to consider the use of LID site planning and design strategies, to the MEA ~~furthest degree possible~~,

Chapter 8 – Selection Considerations for Stormwater BMPs- Stormwater Selection Process

- LID site planning and design approaches have been considered and applied to the MEA ~~furthest degree possible~~ (Chapter 5 - Low Impact Development Site Planning and Design Strategies).

Verbatim Comment(s):

[RE Table 4.1, Standard 1] The additional stormwater treatment should be provided using structural stormwater BMPs to achieve minimum long-term average pollutant load reductions for sediment, floatables, and nutrients. [Should this be] maximum? maximum reductions or minimum loads *(Theresa McGovern, VHB)*

Response:

The intent is minimum load reductions, we ask permittees to create a site plan that first minimizes site disturbance, maximizes LID, maximizes retention and then treat to a minimum standard.

We concur this is confusing; the sentence has been amended as indicated below:

"The additional stormwater treatment should be provided using structural stormwater BMPs to achieve ~~minimum long-term~~ annual average pollutant load reduction targets for sediment, floatables, and nutrients per Table 4-3."

Verbatim Comment(s):

[RE Table 4.1, Standard 2] Analyzing and controlling storm events from every discharge location along a linear project is not feasible. Add Footnote: 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 and in the supporting materials that CTDOT has developed. *(CT DOT)*

Response:

Foot note accepted with minor revisions.

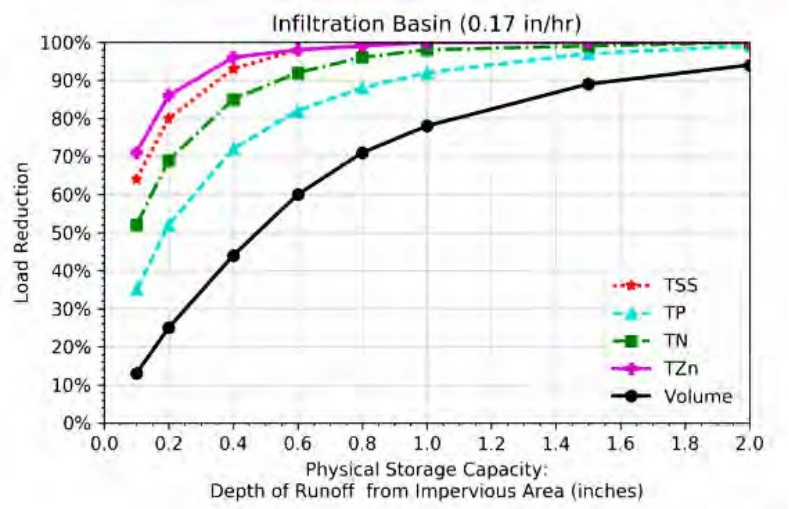
Per the CTDOT MS4 Permit, linear projects have alternative standards and may take an alternative approach to address constraints that are different than those that affect traditional parcel development projects. These alternative linear project standards can be found in the CTDOT drainage manual, the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

Topic: Stormwater Management Standards and Performance Criteria Summary. – Standard 1

Verbatim Comment(s):

[RE Supporting text for Figure 4-1 (corrected version Figure 4-2). Example Stormwater BMP Performance Curves for Infiltration Basin in Type B Soils, Standard 1, "Figure 4-2 shows a typical set of BMP performance curves for an infiltration basin in Type B soils. In this example, capturing and retaining 1 inch of runoff from the impervious area will result in average annual load reductions of approximately

100% for TSS, 92% for TP, and 98% for TN."] We need to be clear about the difference between "capture / retention" and "physical storage volume". These are different concepts can't [and] shouldn't be used interchangeably. *(Theresa McGovern, VHB)*



Response:

We appreciate the catch and have added the amended the following:

"Figure 4-2 shows a typical set of BMP performance curves for an infiltration basin in Type B soils. In this example, ~~capturing and retaining~~ an infiltration basin designed with a physical storage volume equivalent to the runoff volume created by the first ~~1~~ inch of precipitation ~~runoff from~~ over the contributing ~~the~~ impervious area will result in average annual load reductions of approximately 100% for TSS, 92% for TP, and 98% for TN. The curves also demonstrate that:"

Verbatim Comment(s):

Table 4-2, footnote 3: Is the definition of Redevelopment consistent with existing permits? Seems it would make more of our operations fall under Stormwater-specific "Retrofits" and drive a reporting admin burden…can you please differentiate between the two? *(Koproski, Christopher, US Navy)*

Response:

Footnote 3 of table 4-2 is verbatim to the definition of Redevelopment in the MS4 permit.

Verbatim Comment(s):

[RE Standard 1 Stormwater Retention] Analyzing and controlling storm events from every discharge location along a linear project is not feasible. Add Footnote: 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 and in the supporting materials that CTDOT has developed. *(CT DOT)*

Response:

Foot note accepted with minor revisions.

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 Construction General Permit and in the supporting materials that CTDOT has developed.

Verbatim Comment(s):

Was consideration given to setting a higher standard for Land Uses with a Higher Pollutant Loading? *(Alex Kloze, Town Engineer of East Lyme)*

Response:

During workgroup discussions we did not specifically consider requiring a more stringent retention or treatment standard for structural stormwater BMPs for sites with LUHPPLs. However, we did discuss site specific pollutant needs/concerns. The manual does include various restrictions on the siting and design of infiltration systems (Chapter 12) when LUHPPL land uses are involved to be protective of groundwater. In this sense, the manual does set a higher standard for stormwater management for LUHPPL land uses.

Verbatim Comment(s):

[Table 4-3] The MS4 permit doesn't spell out this need for additional testing (if design retention volume requirements aren't met). There are other impacts, including off-site projects and reason-reports…also, how would this sampling apply/be conducted for linear projects (roadways)? *(Koproski, Christopher, US Navy)*

Response:

This table isn't representative of standards for sampling requirements, but rather to help facilitate design. We appreciate the comment and have noted this is a repeating misunderstanding of our intent. As such the title of the table has been edited to clarify the intent.

Table 4-3. Minimum ~~Required~~ Average Annual Pollutant Load Reduction Targets When Evaluating BMP Sizing (Only needed when additional stormwater treatment is needed)[1]

Verbatim Comment(s):

[Table 4-3] Requiring every project to track and summarize five water quality metrics will add complexity and time for seemingly little benefit. For linear projects at a minimum, in lieu of tracking nitrogen, phosphorus and sediment for every project, CTDOT anticipates only being able to track specific pollutants of concern when discharging to an impaired waterbody. The EPA retrofit curves would be used for this circumstance to ensure that the most efficient BMP is selected for limiting discharge of a particular pollutant of concern to an impaired waterbody. *(CT DOT)*

Response:

We disagree that there is significant complexity and time added, and that there is little benefit. However, we think this conclusion is derived from misconception regarding the use of the minimum reductions noted in table 4-3. The title has been amended to add clarity, noted in the above response. It is important to note treatment and thereby the use of these minimum reductions is only recommended when retention standards cannot be met, and only for the portion that cannot be met. The long-term average load reduction targets provided in table 4-3 are reflective of the annual averages represented in the curves, no monitoring or tracking is required for this aspect. Monitoring may be a permit requirement and permit conditions must be followed, but that is not this design requirement. Additionally, we are not requesting intensive tracking but rather the simplified use of the curves to assess the best BMPs for the location. In other words, it is not recommended that a BMP be selected or sized that will be known to only achieve less than 30% reductions for retrofit sites and so on. We concur that a site contributing to an impaired waterbody would be a priority. However, it is also important to note that nitrogen is a statewide impairment, due to it's adverse impact on the Long Island Sound.

With regards to the benefit, this approach of documenting adequate BMP sizing to achieve target pollutant load reductions for multiple pollutants (only when the retention standard cannot be fully achieved) allows for site specific flexibility while directing design efforts towards ensuring that stormwater BMPs achieve water quality benefits. A lesson learned, that was articulated during the workgroup development of this manual, was that relying on total suspended solids/sediment only, often neglected finer sediments and other pollutants of concern that are often attached to finer sediments or are present in a dissolved form. This method allows for achieving the true intent of the program. To alleviate the tracking burden, CT DEEP has opted to rely on the modeling results that produced the EPA curves.

Verbatim Comment(s):

Incorporation of pollution reduction estimates from stormwater controls using EPA's performance curves. We commend CTDEEP on incorporating stormwater control performance information developed by EPA Region 1 into the SWQM. The performance curves were developed using a long-term precipitation record in New England to generate hydrograph and pollutant time series using a land-based hydrologic and water quality model. Stormwater control measures' (SCM) hydraulic and treatment processes were then simulated to develop these performance curves which provide pollutant load reduction estimates for SCMs. A performance curve tells a stormwater practitioner how much of a given pollutant may be controlled on an average annual basis simply based on the size of the SCM. This is important because the practitioner need not spend time and resources monitoring SCMs to assess pollutant removal (i.e., treatment) efficiency. Rather, practitioners need only (a) construct SCMs to specification and (b) operate and maintain the SCMs to function as designed. The incorporation of these performance curves into the SWQM provides a scientifically valid and consistent way to credit SCM performance across the State. *(Michele Vuto, EPA Region 1)*

Response:

We appreciate the comment.

Verbatim Comment(s):

[Referencing procedure to use the performance curves, “Calculate the runoff depth from the impervious area draining to the stormwater BMP using the following equation:

1. Calculate the runoff depth from the impervious area draining to the stormwater BMP using the following equation:

$$Depth\ of\ Runoff\ from\ Impervious\ Area\ (inches) = \frac{V}{DCIA} * 12\frac{inches}{foot}$$

where:

V = static storage volume (cubic feet)

DCIA = post-development Directly Connected Impervious Area (square feet) after application of non-structural LID site planning and design strategies”]

[The underlined portion] this could be misleading. All the runoff is draining to the BMP unless it's situated offline. I think what we want to say, is to calculate the runoff dept from the impervious area the BMP is can statically store.

[Regarding V Definition Insert BMP to read] BMP static storage volume.

[Regarding DCIA definition] Here's where you can said "draining to the BMP". We don't want to confuse this with the whole site's DCIA.

(Theresa McGovern, VHB)

Response:

We concur, depth per area will not change on a particular site, regardless if the BMP is in series, alone or intended to capture a portion of the impervious areas flow. The following amendments have been made:

1. Calculate the runoff depth from the impervious area the BMP can statically store ~~draining to the stormwater BMP~~ using the following equation:

$$Depth\ of\ Runoff\ from\ Impervious\ Area\ (inches) = \frac{V}{DCIA} * 12\frac{inches}{foot}$$

where:

V = BMP static storage volume (cubic feet)

DCIA = post-development Directly Connected Impervious Area (square feet) draining to the BMP after application of non-structural LID site planning and design strategies”]

Verbatim Comment(s):

[Regarding bullet "The static storage volume is the volume of stormwater a structural stormwater BMP can physically hold. It includes.."] This is a helpful bullet in providing clarity. (Theresa McGovern, VHB)

Response:

We appreciate the comment.

Verbatim Comment(s):

[Regarding bullet #4, If the pollutant load reduction percentages provided by the BMP are less than the minimum required pollutant load reductions in Table 4-3 (for any of the three pollutants), then the proposed stormwater management system does not meet the pollutant reduction performance criteria, and the system should be increased in size to] or choose a different type of BMP which gets different performance. (Theresa McGovern, VHB)

Response:

We have included the addition with the amendment below:

If the pollutant load reduction percentages provided by the BMP are less than the minimum required pollutant load reductions in Table 4-3 (for any of the three pollutants), then the proposed stormwater management system does not meet the pollutant reduction performance criteria, and the system should be increased in size to achieve the minimum required pollutant load reduction(s) or another BMP should be selected that can achieve the load reduction targets.

Topic: Stormwater Management Standards and Performance Criteria Summary. -Standard 2

Verbatim Comment(s):

[Regarding Figure 4-2 and text] Add text for site development and redevelopment projects. Add text if suggested language above [same text in the Table 4-1] was not added. "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 and in the supporting materials that CTDOT has developed." *(CT DOT)*

Response:

The amendment below was made for consistency with Figure 4-3 (formerly Figure 4-2) as suggested as well as the foot note added to table 4-1, see above comment and response.

Verbatim Comment(s):

In the box at the top of page 52, I'm not sure the explanation of TP-40 is helpful or necessary, since it is being replaced. To my reading, this explanation only makes the sentence more confusing and required 2 readings to digest. *(Jonathan Thiesse, Bloomfield Town Engineer)*

Response:

We concur, this has been removed.

Verbatim Comment(s):

Standard 2, 5th paragraph reads "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." Should that read "100-year…", same as the emergency outlet sizing section below that sentence? For example, our central base parking area has sand filters coupled with raised catch basins for overflow. We would need dual conveyances from the BMP if designed to the 10-year standard? Also, pg. 58 gives qualifiers for what this applies to (such as detention systems and other stormwater quantity control structures), but that's not included on pg 35. *(Koproski, Christopher, US Navy)*

Response:

Stormwater BMPs designed in an "on-line" (also referred to as "in-line") configuration (i.e., designed to manage and convey peak flows larger than the water quality storm) should be sized to convey the 10-year, 24-hour storm event, at a minimum, including a primary outlet to the storm drainage system or stabilized channel. Standard 2 requires control of the 10-year post-development peak flow rate to the 10-year pre-development peak flow rate. The review authority may require peak flow rate attenuation for up to the 100-year peak flow. On-line stormwater BMPs should be designed to convey peak flow rates corresponding to the largest storm for which peak runoff attenuation is provided (i.e., 10-yr, 24-hour storm event or larger up to the 100-year, 24-hour storm). For on-line systems, an emergency spillway is required to convey the 100-year storm event (assuming the primary outlet is not designed to pass the 100-year storm event), or larger storm events at the discretion of the review authority. Off-line stormwater BMPs (i.e., designed to manage and convey peak flows up to the water quality storm and bypass higher flows) should be designed with a bypass or overflow for flows larger than the water quality storm.

The Standard 2 narrative has been revised accordingly, as follows:

Conveyance Protection

For structural stormwater BMPs designed in an "on-line" configuration, design the conveyance system leading to, from, and through the BMP based on the 10-year and 24-hour ~~storm event or larger magnitude design storm~~. At a minimum. On-line stormwater BMPs should be designed based on the peak flow rate of the largest storm for which peak runoff attenuation is provided (i.e., 10-yr, 24-hour storm event or larger up to the 100-year, 24-hour storm). This criterion is designed to prevent erosive flows within internal and external conveyance systems associated with stormwater BMPs such as channels, ditches, berms, overflow channels, and outfalls.

The review authority may also require the use of larger magnitude design storms for conveyance systems associated with stormwater BMPs, including stormwater drainage systems upstream or downstream of the BMPs. Such drainage systems should be designed in accordance with the Connecticut Department of Transportation Drainage Manual as well as applicable local and state design and permitting requirements.

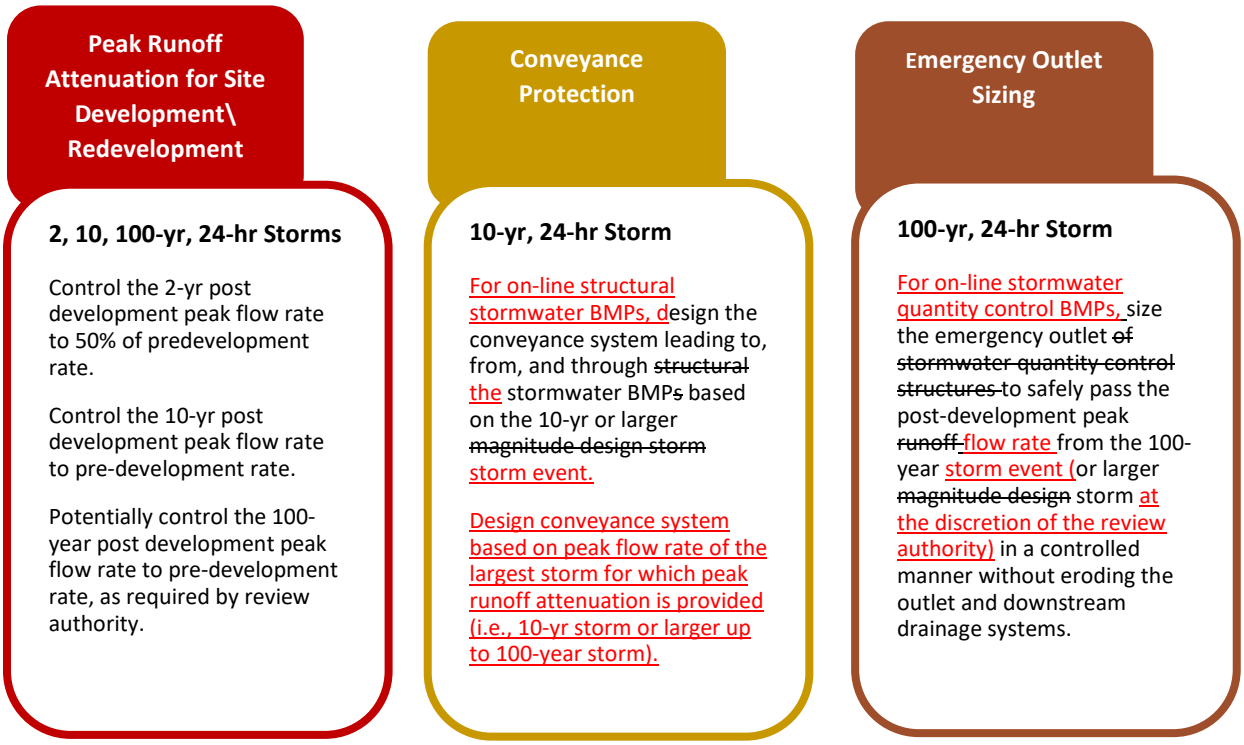
Off-line stormwater BMPs (i.e., designed to manage and convey peak flows up to the water quality storm and bypass higher flows) should be designed with a bypass or overflow for flows larger than the water quality storm.

Emergency Outlet Sizing

Size the emergency outlet of stormwater quantity control BMPs ~~structures~~ to safely pass the post-development peak flow rate ~~runoff~~ from the 100-year, 24-hour storm event (or larger storm events at the discretion of the review authority) ~~or larger magnitude design storm~~ in a controlled manner without eroding the outlet and downstream drainage systems. Emergency outlets constructed in natural ground are generally preferable to constructed embankments. This requirement is only applicable to stormwater management facilities that are designed in an "on-line" configuration ~~to manage peak flows up to the 100-year storm event, such as detention systems and other~~ and for the purpose of providing stormwater quantity control ~~structures~~.

Figure 4-2 has also been revised accordingly, as follows:

Figure 4-1. Stormwater Runoff Quantity Control (Standard 2) Elements



Verbatim Comment(s):

Where did the choice to reduce the 2-year post-dev flow rate to 50% of pre-dev rate, why 50% and not some other percentage? Are any other states doing this? This will be difficult where retention standards cannot be meet and may encourage outlet control that gets easily clogged and cannot be maintained. Perhaps it would be better to address scour control through protection devices like level spreaders, plunge pools, aprons, etc. Rather than through the treatment or attenuation BMPs. *(Alex Kloze, Town Engineer of East Lyme)*

Response:

This was not an element that was included in the scope of revisions for this update and was retained from the original guidance. The 2-year "over-control" method described in the 2004 CT SWQM is intended to provide stream channel protection. The rationale for this choice was noted in Chapter 7 of the original manual:

> *"**Rationale** A number of design criteria have been developed for the purpose of stream channel protection. The earliest and most common method relied on control of post-development peak flows associated with the 2-year, 24-hour storm event to pre-development levels based on the assumption that bankfull discharge for most streams has a recurrence interval of between 1 and 2 years (Leopold, et al., 1964 and Leopold, 1994). More recent research indicates that this method does not adequately protect stream channels from downstream erosion and may actually contribute to erosion since banks are exposed to a longer duration of erosive bankfull and sub-bankfull events (MacRae, 1993 and 1996, McCuen and Moglen, 1988). The two-year "over-control" methods recommended above were developed as a modification of the original two-year control approach to provide additional protection. These methods require larger detention volumes than the traditional two-year approach, but reduce the duration of bankfull flows. More recent research has shown that extended detention of the 1-year, 24-hour storm event and a method referred to as Distributed Runoff Control (DRC) potentially provide the highest level of stream channel protection. In the extended detention method, the runoff volume generated by the 1-year, 24-hour rainfall (2.6 to 2.7 inches in Connecticut) is captured and gradually released over a 24-hour period to control erosive velocities in downstream channels. However, this method results in extremely large detention storage requirements (comparable to the storage volume required for 10-year peak discharge control), and the incremental benefits of this approach over the two-year over-control approach are undocumented. The DRC method involves detailed field assessments and hydraulic/hydrologic modeling to determine hydraulic stress and erosion potential of stream banks. This level of detailed, site-specific analysis is not warranted for use as a general stream channel protection criterion."*

The Rhode Island stormwater design manual (last updated in 2015) includes a similar Channel Protection criterion (24-hour extended detention of the post-development runoff volume from the 1-year, 24-hour storm event). The New Jersey Stormwater BMP Manual also includes similar and even more stringent stormwater quantity control criteria, including an option to design stormwater management measures so that the post-construction peak runoff rates for the 2-, 10- and 100-year storm events are 50, 75 and 80 percent, respectively, of the preconstruction peak runoff rates (in addition to other more stringent options).

However, we concur that practices like level spreaders are useful, beneficial and at times can be preferential practices. Note the overarching theme of this guidance is first avoid impacts, second employ as much natural solutions (non-structural LID) as possible, third provide as much retention as possible and then lastly utilize structural BMPs for treatment. The following sections of the manual call out these practices specifically, and often recommend them as a preferential or necessary method:

1. Chapter 5-Low Impact Development Site Planning and Design- Avoided Impacts

2. Chapter 5- Low Impact Development Site Planning and Design-Impervious Area (Simple) Disconnection
3. Chapter 9-Retrofit Types- Impervious Area (Simple) Disconnection
4. Chapter 13 Structural Stormwater BMP Design Guidance- Pretreatment Vegetated Filter Strip
5. Chapter 13 Structural Stormwater BMP Design Guidance- Pretreatment Swale
6. Chapter 13 Structural Stormwater BMP Design Guidance- Inlet and Outlet Controls

Verbatim Comment(s):

With this reduction of 50% (which likely will be controlled through retention versus outlet control for a smaller storm event), coupled with the retention requirements of the WQV are there any concerns with matching volumes or water budgets for existing natural wetlands (not just constructed wetlands) to ensure they remain hydrated during the most frequent rain events, especially with larger groundwater fed wetlands? *(Alex Kloze, Town Engineer of East Lyme)*

Response:

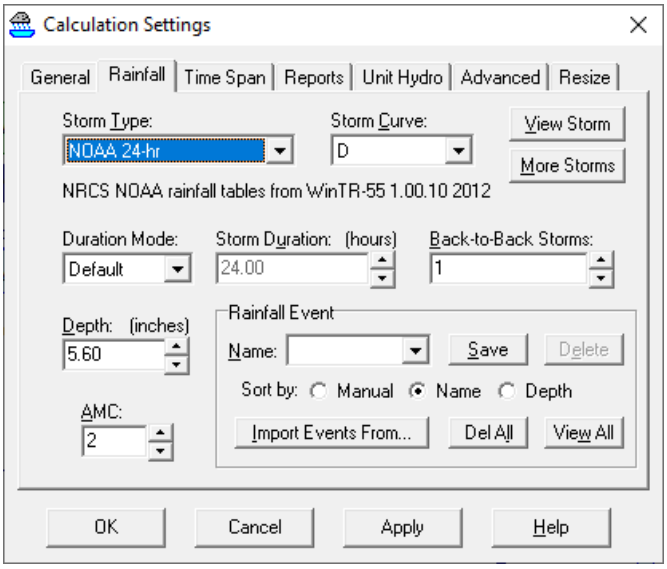
The 2-year "over-control" peak runoff attenuation requirement will be accomplished through retention, outlet control, or some combination thereof. Use of retention to meet some portion of this requirement will likely involve infiltration of stormwater, which will serve to recharge groundwater and ultimately feed existing natural wetlands, if present on or downstream of a site. The stormwater retained will largely consist of post-development runoff from new or expanded impervious surfaces on a site. Retaining and recharging this additional runoff will help preserve existing site hydrology in terms of runoff volume, peak flow rates, and groundwater recharge. Furthermore, use of an outlet control structure to attenuate increases in post-development peak flows from the 2-year storm will reduce the peak and extend the duration of the runoff hydrograph but will not reduce the runoff volume. Any reduction in post-development runoff volume will primarily be due to runoff retention and infiltration, which will serve to recharge groundwater.

The strong emphasis in the manual and the stormwater management standards on implementing LID site planning and design strategies as the first solution, to avoid and minimize impacts on site hydrology, will also help to address this concern.

Topic: Standard 2- Rainfall Distribution

Verbatim Comment(s):

The latest build for HydroCAD (ver. 10.20-2g) contains all 4 NOAA-14 Rainfall Distributions; including type D. It's housed within the Calculation Settings panel see screenshot below:



I just skimmed the rainfall appendix in one of the manuals, but I would like to understand better why Distribution D was used for CT. *(Terrance Gallagher, P.E., Luchs Consulting Engineers, LLC)*

Response:

The rationale behind the choice NOAA-14_D was based on the recommendation of NRCS. Refer to the following policy document published by CT NRCS (see footnote 51 in the Manual):

"USDA Natural Resources Conservation Service. 2018. Connecticut Instruction 210-397 – Using NOAA Atlas 14, Volume 10 Extreme Precipitation Data with WinTR-55 in Connecticut, January 24, 2018. file:///F:/P2020/0636/A11/Background%20Documents/Climate%20Change%20and%20Precipitation/Win%20TR-20%20Rainfall%20Distributions/CT_INSTRUCTION_210-397-WinTR-55_NOAA.pdf"

As explained in the CT NRCS policy document cited above, plots and a map of the four rainfall distributions (A, B, C, and D) are included in Appendix B of the CT NRCS document. Two of these distributions (C and D) extend into Connecticut as shown on the map below. **In order to simplify the use of this data with county/sub-county rainfall values,** Connecticut NRCS recommends the use of the Type N10_D rainfall distribution to represent the entire state.

If a project is located in the few regions of CT mapped as Type C rainfall distribution (portions of New London, Hartford, and Tolland Counties), then Type C distribution could be allowed by the review authority.

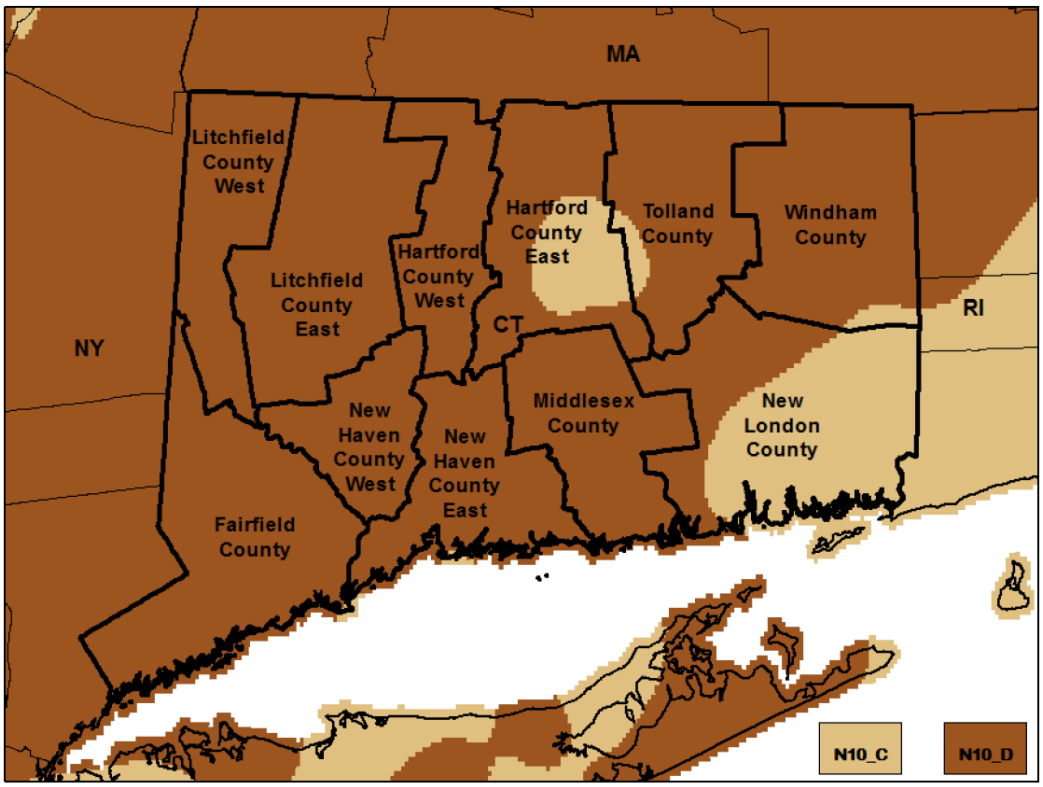


Figure B.1. NOAA Atlas 14 Vol. 10 Rainfall Distribution Regions and County\Sub-County Boundaries in Connecticut

Topic: LID- Avoid Impacts

Verbatim Comment(s):

Limits [to avoiding disturbance] seem arbitrary. May require flexibility. Suggest adding these are recommendations. *(CT DOT)*

Response:

These are recommendations; text suggestion was accepted. They are consistent with LEED design and therefore, consistent with the direction from the Governors Council on Climate Change for the updates to these guidance documents.

Topic: LID- Reduce Impacts

Verbatim Comment(s):

Table 5-2 (p. 72): I question the practicality of some of these road widths, especially as having to do with bicycle traffic and, to a lesser degree, drainage (where curbed.) Certainly, they are not consistent with the recommended roadway widths in the CTDOT Highway Design Manual. (How are we to resolve the conflicting guidance?) While I understand these are presented as "minimums", they are presented as "recommended"; I believe that what is recommended should be practical. *(Jonathan Thiesse, Bloomfield Town Engineer)*

Response:

We acknowledge that the recommended minimum local road widths presented in draft Table 5-2 are inconsistent with the recommended roadway widths in the CTDOT Highway Drainage Manual, even though they are generally consistent with minimum road widths recommended by AASHTO and ITE for roads with lower traffic volumes and lower density development. We have updated the table for consistency with the CTDOT Highway Design Manual, using the low end of the range of acceptable design widths (travel lane, shoulder, and parking lane) contained in the CTDOT Highway Design Manual for rural and urban local roads. For simplicity, we have excluded bicycle facilities from the revised Table 5-2 but have included a footnote explaining that bicycle facilities are excluded from the table and are typically 5 feet wide.

- Design local roads for the minimum required ~~travel~~ width needed to support travel lanes; on-street parking; and emergency, maintenance, and service vehicle access. These widths should be based on future traffic volumes without compromising safety. Table 5-2 provides recommended minimum road width standards for new construction and major reconstruction of rural and urban local roads as classified by CTDOT. The values in the table reflect the low end of the range of acceptable design widths (travel lane, shoulder, and parking lane) contained in the CTDOT Highway Design Manual (2003 Edition including Revisions to February 2013). Note that these recommended minimum road widths do not account for bicycle facilities, which are typically 5 feet wide for local roads.

Table 5-1. Recommended Minimum Road Widths (in feet) for Local Roads

Rural Local Roads (1)			
Annual Average Daily Traffic (AADT)	Type of Roadside Development		
	Open (Rural)	Moderate Density	High Density
<400	22	N/A	N/A
400 – 1,500	24	24	N/A
1,500 – 2,000	26	26	26
>2,000	28	28	28
Urban Local Roads			
On-Street Parking	Type of Area		
	Suburban	Intermediate	Built-Up
None (2)	24	24	24
One Side (3)	29	29	29
Both Sides (4)	34	34	34

Source: Adapted from CTDOT Highway Design Manual (2003 Edition including Revisions to February 2013)

Notes:

(1) Includes two travel lanes (9 to 12 feet in width) and two 2-foot shoulders.
(2) Includes two 10-foot travel lanes and two 2-foot shoulders.
(3) Includes two 10-foot travel lanes, one 2-foot shoulder, and one 7-foot parking lane.

(4) Includes two 10-foot travel lanes and two 7-foot parking lanes.
(5) Table excludes bicycle facilities, which are typically 5 feet wide.

Topic: LID Impervious Area (Simple Disconnection)

Verbatim Comment(s):

Consider allowing for Simple IC Disconnection as a greater measure and only allowing full removal from the WQV as a QPA when certain size criteria are met. Otherwise, this measure is overlooked when these criteria are not met. Especially since it's in the LID section vs. the BMP section.

We have been calling this measure a BMP to help support and value it's use and also it's tracking and reporting for credits and maintenance. *(Theresa McGovern, VHB)*

Response:

The comment is appreciated as our intent is to prioritize LID and thereby simple disconnection. We believe amendments made with respect to other comments will alleviate this concern.

Verbatim Comment(s):

[Regarding crediting, pg 90] "..required Water Quality Volume and Design Retention Volume and the size of the structural stormwater BMPs needed to meet the runoff volume and pollutant reduction requirements of Standard 1." we are mixing terms here again. Do we want to say that areas that meet the QPA criteria do not need to meet the pollutant reduction criteria? Or are assumed to have met it?

It appears we are NOT using EPA's IC disconnection curves and instead subtracting out of the area that triggers treatment requirements (Either WQV or Pollutant Reduction) *(Theresa McGovern, VHB)*

Response:

True we have taken a simplified approach to ensure the useability of our recommendations. We are not using EPA's IC disconnection curves and are instead subtracting the QPA from the WQV and Design Retention Volume, reducing the retention and treatment requirements. Tools that offer more direct method are under development and can provide the apples-apples comparison that VHB is seeking. However, this simplified method is still sufficient to direct the appropriate BMP selection and estimated water quality benefit; thus we did not feel it appropriate to introduce additional accounting and tracking in this platform at this time. We appreciate VHB's expertise and recommendations and do intend to provide more tools for our stakeholders to address these concerns.

The terminology was amended as noted below:

If stormwater runoff from an impervious area is directed to a QPA that meets the minimum criteria described below, the area can be deducted from the ~~total~~ impervious area, reducing the Water Quality Volume and ~~Design~~ Required Retention Volume and the size of the structural stormwater BMPs needed to meet the ~~runoff volume and pollutant reduction~~ retention and treatment requirements of Standard 1.

Verbatim Comment(s):

Regarding General Criteria. Some of these criteria can be overly-restrictive and discourage IC Disconnection when it is a viable and cost effective solution. See notes below.

> Setbacks of General Criteria. these setbacks can sometimes be overly restrictive and prohibitive for situations where you have dispersed infiltration (which acts differently than concentrated infiltration like in structural controls the setbacks are based on) (*Theresa McGovern, VHB)*

Response:

We appreciate the comment, however the setback mentioned in the General Criteria section of the Impervious Area (Simple) Disconnection is 10 feet from building foundations and is necessary to prevent basement seepage.

Verbatim Comment(s):

QPAs shall be located on relatively permeable soils … of General Criteria.

Although lower infiltration capabilities, EPA research has shown benefit to directing disperse runoff to even HSG D soils. When this is not allowed, designers are forced to concentrate flow into structural controls which is less ideal. *(Theresa McGovern, VHB)*

Response:

We concur and have amended the language referenced and related reference in subsequent chapters as indicated below.

[Chapter 5]

- QPAs ~~shall be located on relatively permeable soils (NRCS Hydrologic Soil Groups A, B, and C soils) and the~~ should have a depth to the seasonal high groundwater table ~~shall~~ of ~~be~~ 18 inches or greater. HSG classification will influence infiltration rates; see Chapter 10 for guidance regarding the classifications and expected rates. HSG classifications and depth to seasonal high groundwater table must be field verified by a Qualified Professional through field evaluation (i.e., test pits or soil borings) (refer to soil evaluation guidance in Chapter 10 - General Design Guidance for Stormwater Infiltration Systems).

[Chapter 7]

Unlike the Filtering BMPs described in the next category, the Infiltration BMPs in this category are not designed with underdrains (unless located in Hydrologic Soil Group C or D soils) and therefore are not considered "filtering" practices.

[Chapter 8 – Soil Infiltration Capacity]

As described in Chapter 10 - General Design Guidance for Stormwater Infiltration Systems, stormwater infiltration systems are most suitable in soils with infiltration rates of 0.3 inch per hour or greater, at the location of the proposed infiltration system (or within the allowable horizontal testing distances as described above) and at or below the bottom of the system. Soils with infiltration rates of

0.3 inch per hour or greater generally correspond to Natural Resources Conservation Service Hydrologic Soil Group (HSG) A and B soils. Stormwater infiltration systems can also be suitable in soils with lower infiltration rates, including HSG C and D soils, provided the recommended sizing, drain time, horizontal setbacks, and vertical separation criteria are met and the system is designed with an underdrain. Research by the University of New Hampshire Stormwater Center and EPA Region 1 has shown that substantial stormwater infiltration and recharge can occur in lower infiltration rate soils. Ultimately, providing some infiltration is better than none, particularly for retrofit applications. ~~stormwater infiltration systems are most suitable in soils with infiltration rates of 0.3 inches per hour or greater (generally corresponding to Hydrologic Soil Group A and B soils). Stormwater infiltration systems are also acceptable in soils with lower infiltration rates, down to a minimum of 0.17 inch per hour (HSG C soil) provided that the required sizing and maximum drain time criteria can be met and with an underdrain system. Infiltration is not allowed in soils with field infiltration rates less than 0.17 inch per hour (HSG D soils) due to high potential for failure from clogging, groundwater mounding, etc.~~

[Table 8-4] Was also updated to reflect the intent of the revision.

BMP Category	BMP Type	Hydrologic Soil Group (HSG)			
		A	B	C	D
Infiltration BMPs	Infiltration Trench	💧	💧	(4)(5)	
	Underground Infiltration System	💧	💧	(4)(5)	
	Infiltration Basin	💧	💧	(4)(5)	
	Dry Well	💧	💧	(4)(5)	
	Infiltrating Catch Basin	💧	💧	(4)(5)	
	Porous Asphalt	💧	💧	(4)(5)	
	Pervious Concrete	💧	💧	(4)(5)	
	Permeable Concrete Interlocking Pavers	💧	💧	(4)(5)	
Filtering BMPs	Bioretention	💧	💧	(4)(5)	(4)(5)
	Sand Filter	💧	💧	(4)(5)	(4)(5)
	Tree Filter	💧	💧	(4)(5)	(4)(5)
Stormwater Pond BMPs	Wet Pond	(1)	(1)	(1)	💧
	Micropool Extended Detention Pond	(1)	(1)	(1)	💧
	Wet Extended Detention Pond	(1)	(1)	(1)	💧
	Multiple Pond System	(1)	(1)	(1)	💧
Stormwater Wetland BMPs	Subsurface Gravel Wetland	(2)	(2)	(2)	💧
	Shallow Wetland	(1)	(1)	(1)	💧

BMP Category	BMP Type	Hydrologic Soil Group (HSG)			
		A	B	C	D
	Extended Detention Shallow Wetland	(1)	(1)	(1)	♦
	Pond/Wetland System	(1)	(1)	(1)	♦
Water Quality Conveyance BMPs	Dry Water Quality Swale	♦	♦	(4)(5)	(4)(5)
	Wet Water Quality Swale	(3)	(3)	♦	♦
Stormwater Reuse BMPs	Rain Barrel	Not Applicable			
	Cistern	Not Applicable			
Proprietary BMPs	Manufactured Treatment System	Not Applicable			
Other BMPs and BMP Accessories	Green Roof	Not Applicable			
	Dry Extended Detention Basin	♦	♦	Liner recommended to prevent groundwater inflow	
	Underground Detention (no infiltration)	♦	♦	♦	♦

Notes:

NRCS Hydrologic Soil Group (HSG) as determined from field-verified soil textural class of the soil (refer to Chapter 10 - General Design Guidance for Stormwater Infiltration Systems for soil evaluation methods).

(1) An impermeable liner is required if the bottom of the system does not intercept groundwater.
(2) The system should be lined with an impermeable liner to prevent groundwater exchange with runoff in the subsurface gravel bed.
(3) Feasible if constructed with an impermeable liner but wet water quality swales are generally impractical in HSG A and B soils
(4) Underdrain Recommended
(5) Dispersed/She

Legend		
	♦	Suitable
	(See notes)	Suitable under certain conditions or with design restrictions as noted
		Generally not suitable or very limited suitability

[Chapter 10- Soil Evaluation-Initial Screening]

- Natural Resources Conservation Service (NRCS) soil mapping showing ~~a~~ Hydrologic Soil Groups (HSG) ~~with low infiltration potential such as HSG D soils~~

[Chapter 10- Soil Evaluation-Field Testing]

- Stormwater infiltration is proposed in HSG C or D soils, as field verified through test pits or soil boring

[Chapter 10- Soil Evaluation-General Design Guidance]

Soil Infiltration Rate

- Stormwater infiltration systems are most suitable in soils with ~~Soils should have a minimum~~ infiltration rates of 0.3 inch per hour or greater, at the location of the proposed infiltration system (or within the allowable horizontal testing distances as described above) and at or below the bottom of the system. Soils with infiltration rates of 0.3 inch per hour or greater generally correspond to Natural Resources Conservation Service Hydrologic Soil Group (HSG) A and B soils~~. Soils should generally have a clay content of less than 20% and a silt content of less than 60%.~~

- Stormwater infiltration systems can also be suitable in soils with lower infiltration rates, ~~Lower infiltration rates may be acceptable down to a minimum of 0.17 inch per hour~~ including HSG C and D soils, ~~)~~ provided ~~that~~ the ~~required~~ recommended sizing~~, and maximum~~ drain time, horizontal setbacks, and vertical separation criteria are met and the system is designed with an underdrain~~. An underdrain should be included for infiltration systems in HSG C soils.~~ Research by the University of New Hampshire Stormwater Center and EPA Region 1 has shown that substantial stormwater infiltration and recharge can occur in lower infiltration rate soils. Ultimately, providing some infiltration is better than none, particularly for retrofit applications.

- ~~Infiltration is not recommended in soils with field infiltration rates less than 0.17 inch per hour (HSG D soils) due to high potential for failure due to clogging, groundwater mounding, etc.~~

Pretreatment ~~needs to~~ should be evaluated on a case-by-case basis but ~~should~~is generally ~~be~~ required for all infiltration systems that collect runoff from impervious surfaces. If the infiltration rate of the underlying soils is greater than 8.3 inches per hour[1], the entire volume of runoff to be infiltrated should be treated, prior to infiltration, using one or more of the Filtering BMPs, Stormwater Pond and Wetland BMPs, or Water Quality Conveyance BMPs presented in Chapter 7 - Overview of Structural Stormwater Best Management Practices. Treatment BMPs that precede an infiltration system may be an integral part of the system (e.g., an unlined bioretention system) or a stand-alone treatment BMP such as a sand filter. In areas with higher ~~drain~~ infiltration rates, a larger separation distance to the SHGT may be needed to attain adequate treatment prior to discharge to groundwater. The soil infiltration rate should be determined from an acceptable field evaluation of the soils at the site of the proposed infiltration system, which consists of test pits/soil borings to determine the USDA textural soil classification and, when necessary, field infiltration testing.

Table 10-1. Determining Design Infiltration Rates[4] for Stormwater Infiltration Systems

Sizing Method	NRCS Hydrologic Soil Group (HSG)			
	A	B	C	D

[1] The primary concerns with infiltration rates above 8.3 inches per hour are a diminished ability to attenuate pollutants due to the relatively short contact time between the soil and infiltrating stormwater and a higher potential for rapid contaminant transport to groundwater.

Static Method	Default Infiltration Rate[1] (Table 10-2) USDA Soil Textural Class[3]	Default Infiltration Rate[1] (Table 10-2) USDA Soil Textural Class[3]	50% of Slowest Field Measured Infiltration Rate[2] Field Infiltration Testing	50% of Slowest Field Measured Infiltration Rate[2] Field Infiltration Testing ~~Infiltration Not Recommended~~
Dynamic Method	50% of Slowest Field Measured Infiltration Rate[2] Field Infiltration Testing	50% of Slowest Field Measured Infiltration Rate[2] Field Infiltration Testing	50% of Slowest Field Measured Infiltration Rate[2] Field Infiltration Testing	50% of Slowest Field Measured Infiltration Rate[2] Field Infiltration Testing ~~Infiltration Not Recommended~~

Notes:

[1] Default infiltration rate of the most restrictive USDA soil textural class below the bottom of the proposed infiltration system.

[2] 50% of the most restrictive (i.e., slowest) field measured infiltration rate below the bottom of the proposed infiltration system.

[3] USDA soil textural class as determined from test pits or soil borings and textural analysis.

[4] If a loam surface is proposed for a surface infiltration system, use a design infiltration rate of 0.5 inch per hour (1 foot per day) for the loam surface when considering the most restrictive layer and the appropriate design infiltration rate. For Filtering BMPs (bioretention, tree filters, and sand filters) that rely on infiltration and for dry water quality swales, the design infiltration rate should be equal to 50% of the slowest field measured infiltration rate of the soils beneath the filtering system or the infiltration rate of the bioretention soil media (0.5 inch per hour, which is typical for bioretention soil) or sand filter media (1.75 inches per hour for a typical sand filter), whichever is lower.

Table 10-2. Default (Rawls) Infiltration Rates for Use as Design Infiltration Rates with Static Method Sizing

USDA Soil Textural Class[1]	Hydrologic Soil Group	Default Infiltration Rate (inches/hour)
Sand	A	8.27
Loamy Sand	A	2.41

USDA Soil Textural Class[1]	Hydrologic Soil Group	Default Infiltration Rate (inches/hour)
Sandy Loam	A	1.02
Loam	B	0.52
Silt Loam	B	0.27~~30~~
Sandy Clay Loam	C	50% of Slowest Field Measured Infiltration Rate Determined from Field Infiltration Testing
Clay Loam	D	50% of Slowest Field Measured Infiltration Rate Determined from Field Infiltration Testing ~~Infiltration Not Recommended~~
Silty Clay Loam	D	50% of Slowest Field Measured Infiltration Rate Determined from Field Infiltration Testing ~~Infiltration Not Recommended~~
Sandy Clay	D	50% of Slowest Field Measured Infiltration Rate Determined from Field Infiltration Testing ~~Infiltration Not Recommended~~
Silty Clay	D	50% of Slowest Field Measured Infiltration Rate Determined from Field Infiltration Testing ~~Infiltration Not Recommended~~
Clay	D	50% of Slowest Field Measured Infiltration Rate Determined from Field Infiltration Testing ~~Infiltration Not Recommended~~

Source: The infiltration rates shown in this table are saturated hydraulic conductivities for uncompacted soils adapted from Rawls, Brakensiek, and Saxton (1982).[2]

Notes:
[1] Soil textural class as determined from field soil evaluation described in Soil Evaluation Guidance.

[Chapter 10- Sizing Methods]

Underdrained Systems

An underdrain should be included for infiltration systems in HSG C and D soils. Underdrains may also be used with some Infiltration BMPs and Filtering BMPs, regardless of soil type, to account for potential

[2] Rawls, W. I., D. L. Brakensiek, and K. E. Saxton. 1982. Soil water characteristics. Transactions of the American Society of Agricultural Engineers, 25(5):13l6-1328.

infiltration failure due to clogging, groundwater mounding, and periods of hydraulic over-loading due to excessive rainfall.

[Chapter 13- Bioretention- Design Guidance]

Bioretention System with Underdrain (Partial Infiltration Bioretention System): Most bioretention systems should be designed with an underdrain to account for potential infiltration failure due to clogging, groundwater mounding, or periods of excessive rainfall. Underdrained bioretention systems can be used with any soil type or soil infiltration rate, although bioretention systems in HSG C or D soils an underdrain is necessary.

Verbatim Comment(s):

QPAs must be owned or controlled … of General Criteria.

I understand the purpose of this requirement although it does take away several opportunities especially for projects that include linear features such as roadway *(Theresa McGovern, VHB)*

Response:

We appreciate and understand the concern, however, the site must be able to keep up with proper maintenance and operations and thereby, must at minimum have some agreement for future maintenance and site control.

Verbatim Comment(s):

Roof Runoff and Driveway, Road and Parking lot Runoff- Length/width ratios

These length / width criteria can be restrictive. See EPA's IC Disconnection credits to see how treatment changes based on the ratio of contributing area to receiving area. If using EPA's curves then these size criteria should go away because they don't allow for certain size ratios. *(Theresa McGovern, VHB)*

Response:

Accepted amended as below:

- If designing for retention of the full WQV it is recommended that t~~T~~he length of the QPA (in feet)~~shall~~ should to be equal to or greater than the contributing rooftop area (in square feet) divided by 13.3 (e.g., for 1,000 ft^2 roof/13.3 = 75 ft). Treatment can be achieved at varying lengths and widths.

- If designing for retention of the full WQV it is recommended that ~~For roof runoff,~~ the width of the QPA ~~is recommended~~ should be to be equal to or greater than the roof length. For example, if a roof section is 20 feet wide by 50 feet long (1,000 ft^2 roof), the width of the QPA shall be at least 50 feet. Treatment can be achieved at varying lengths and widths.

Topic: Source Control Practices and Pollution Prevention
Verbatim Comment(s):

4th bullet: Recommend providing quantitative distance to clarify "near" in the statement, "Snow should not be stored near drinking water areas, waterbodies, or wetlands." *(Koproski, Christopher, US Navy)*

Response:

Further clarification was added. See amendment below:

Snow should not be stored near drinking water areas, waterbodies, or wetlands. A minimum of 100 ft is recommended (the review authority may require more if site conditions are not adequate).

Verbatim Comment(s):

Regarding Street Sweeping Sources: Would be good to see if you want to pull any information or least the UNH SW Center's Clean Sweep panel findings: https://www.unh.edu/unhsc/news/clean-sweep-tech-memo-outreach-toolkit-developed *(Theresa McGovern, VHB)*

Response:

Concur, provided link directly.

Topic: Functional BMP Classes

Verbatim Comment(s):

Where does IC Disconnection type BMPs appear? These are highly effective measures that keep stormwater dispersed and value pervious areas on the site. Having them be only in the LID section or as a pretreatment measure (as vegetated filter strips) might not help support there use as much. *(Theresa McGovern, VHB)*

Response:

Agreed that the IC disconnection BMPs should not be in LID only. However, while we have emphasized them as LID (and thereby the first option) they are also in their functional class. Specifically, the BMPs that also serve as disconnection are also found in the infiltration, filtering and re-use. We appreciate this comment and have noted that this may need additional support and outreach for clarification too.

Verbatim Comment(s):

A BMP that is becoming more common (especially in the linear roadway setting) are swales with check dams that retain the water. If the check dams are impermeable, the swales becoming infiltration systems, similar to several smaller infiltration basins in series. It might be good to address these very effective BMPs in the manual and not have them confused with the "water quality swales" which are focused more on flow-through and are conveyance oriented. *(Theresa McGovern, VHB)*

Response:

We concur this and many other combinations of the functional types presented in the Manual are highly effective. The rearrangement of the Manual is intended to provide the functions and overarching design guidance and is intended to be utilized as combinations and site-specific alterations to each BMP. We have added descriptive text to clarify this intent.

[Chapter 7]

As described in Chapter 3 - Preventing and Mitigating Stormwater Impacts of this Manual, structural stormwater BMPs are one element of a comprehensive stormwater management approach and should be selected and designed only after consideration of Low Impact Development (LID) site planning and design strategies (see Chapter 5 - Low Impact Development Site Planning and Design Strategies) and in combination with operational source control practices and pollution prevention (see Chapter 6 - Source Control Practices and Pollution Prevention). Such an approach can reduce the need for or the size and cost of structural stormwater BMPs and related structural drainage system components, as well as reduce maintenance needs. This Manual does not provide the details regarding every BMP type but rather the functional classes, general design guidance for each class and a few examples. It is anticipated that using these guiding principles will open the door for a multitude of BMP options and provide maximum flexibility for the best site design.

[Chapter 13]

Topic: Selection Considerations for Stormwater BMPs

Verbatim Comment(s):

[Table 8-1] Missing "No" [at step 6] *(CT DOT)*

Response:

Correction made.

Verbatim Comment(s):

Chapter 8 Selection Considerations; the greatest consideration for selecting a BMP is not the soils, groundwater, ledge, etc. It's what does the Owner want to build and maintain properly. If the Owner doesn't want it, then it doesn't matter how well designed the BMP is it will not be constructed or maintained over time. I've had multiple times where I've had Owners or employees tell me take the hoods ou

t of the catch basins, take the hydrodynamic separators off the plans, eliminate the rain gardens, we don't want to spend the money to build them, and we don't want to maintain them. If you can't get buy in from the owner, you can't get them approved. I would suggest that coming up with annual maintenance costs and efforts might be a good on-line resource as a follow up task. Maybe with demonstration projects around the State so that Owners, and maintenance staff can see what costs and effort is for maintenance. Mike Dietz at UConn has been effective with their maintenance, maybe something similar could be expanded around the state.

Some secondary BMP's, like SNOUT hoods in catch basins, are easy, low-cost methods to add to drainage systems, and they can be very effective in controlling a variety of pollutants – see attached photo from a job in Derby. Having a simple BMP that an Owner will accept and maintain is often more effective over time than a more expensive and complicated solution. *(Terrance Gallagher, P.E. Luchs Consulting Engineers, LLC, DeCarlo & Doll, Inc.)*

Response:

We appreciate this comment and the complexity of this selection aspect. It is our hope that by enabling flexibility in choices that work with the natural site conditions they will be more appealing to project owners. We concur the resource noted is a valuable approach. We intend to continue coordination and will include this suggestion through continued education and outreach efforts.

Summary of Comment(s):

Adding cost information both with regards to installation and maintenance

Verbatim Comment(s):

Chap. 8, Fig. 8-1, pg. 122 – Selection process >>> A welcome addition here would be acknowledgement of the complexity of cost in this equation, however the author sees fit. We do suggest below that design/install & maintenance costs be inserted in Table 8-1, which might then call for mention in Step(s) 2, 9, and/or 13. *(Michelle Maitland, Project Management Specialist, MS4 Coordinator Public Works Department, Town of Groton)*

Chap. 8, pg. 123 -- Stormwater BMP Selection Factors, Stormwater Management Suitability >>>The space left on this page might allow for addition of copy related to cost considerations (design/install + maintenance) *(Michelle Maitland, Project Management Specialist, MS4 Coordinator Public Works Department, Town of Groton)*

Chap. 8, Table 8-1, pgs. 124-125 - Stormwater Management Suitability >>> Add two Cost columns to aid suitability comparisons: Design/install & Maintenance. These could simply be 1, 2, or 3 "$" scales, or a single column with design-install grades and asterisks noting costly maintenance. *(Michelle Maitland, Project Management Specialist, MS4 Coordinator Public Works Department, Town of Groton)*

Chap. 8, pg. 137, following Physical Feasibility conclusion >>> Add a stand-alone section on Financial Feasibility to complement the in-depth Physical Feasibility information. Depending on how this would be done, it might negate any need for shoe-horning suggestions above. OR As an alternative, you could add Cost Considerations to look out for. (i.e. Are there known fiscal sinkholes associated with any BMPS? You could offer a few examples of things gone wrong and how they could have been avoided.) *(Michelle Maitland, Project Management Specialist, MS4 Coordinator Public Works Department, Town of Groton)*

Response:

We acknowledge that cost can be an important consideration. However, cost was deemed to be beyond the scope of these revisions and too variable for this guidance to remain up to date. The suggestions are valuable and though all could not be added to this document we have noted them for the development of additional tools and resources.

Verbatim Comment(s):

"Depth to Bedrock" Request examples of situations for when the distance can be reduced from the "minimum separation distance of 3 feet between the bottom of the system and bedrock or other impermeable material or subsurface layer is required for most BMPs." 3 feet seems optimistic for our area. *(Koproski, Christopher, US Navy)*

Response:

We can appreciate the limitations of some site locations and have options in Table 8-5, whereby there are resolutions for sites with less than 3 feet to bottom of the system and bedrock.

Verbatim Comment(s):

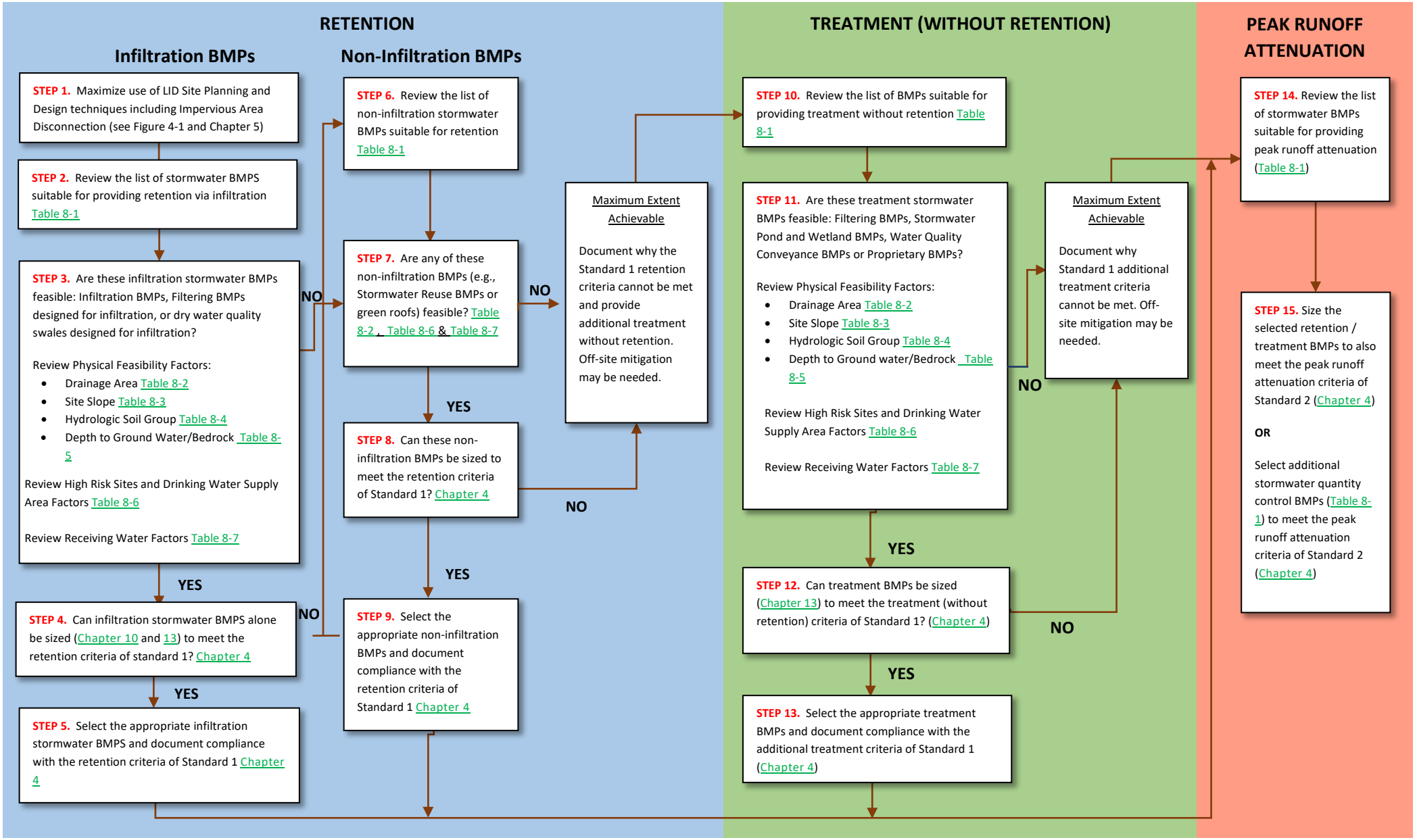
[With regards to Table 8-1] It might be helpful to have a step at the beginning that triggers review for LID measures and/or IC Disconnection. *(Theresa McGovern, VHB)*

Response:

Accepted. Table 8-1 and text preceding the figure was amended as noted below.

- LID site planning and design approaches, including the use of Impervious Area (Simple) Disconnection, have been considered and applied to the MEA ~~furthest degree possible~~ (Chapter 5 - Low Impact Development Site Planning and Design Strategies).

Figure 8-1. Recommended Stormwater BMP Selection Process



Verbatim Comment(s):

Consider latest research / findings from UNH SW Center and EPA's modeling which shows long-term infiltration capacity and recharge benefit for systems in HSG C and D soils scenarios. *(Theresa McGovern, VHB)*

Response:

We concur, and have amended Chapters 5, 7, 8, 10, and 13 to allow stormwater infiltration in HSG C and D soils provided that all other recommended sizing, drain time, horizontal setbacks, and vertical separation criteria are met and the system is designed with an underdrain.

Verbatim Comment(s):

Regarding table 8-4: The UNH SW Center research and latest EPA curves show the value of infiltration BMPs in HSG C and even D soils. This is some of the prescriptive guidance the retrofit manual was trying to get away from because it makes people believe these BMPs are not useful in these conditions. *(Theresa McGovern, VHB)*

Response:

We concur and have amended Table 8-4 to allow stormwater infiltration in HSG C and D soils provided the system is designed with an underdrain.

Topic: Receiving Waters

Verbatim Comment(s):

Coldwater stream discharges are especially a location where you don't want to limit people choosing infiltration BMPs. (Theresa McGovern, VH)

Response:

Agreed.

Topic: Why Retrofit

Verbatim Comment(s):

Add text: Permit holders and/or municipalities [to last paragraph in this section] *(CT DOT)*

Response:

Accepted change.

Permit holders and/or municipalities-can also identify stormwater retrofits as part of an off-site mitigation program for new development and redevelopment projects that are unable to fully comply with stormwater management requirements on-site.

Topic: Retrofit Types

Verbatim Comment(s):

Table 9-2 Indicates some disconnection credit is available for treatment BMPs only. Revise text above this table to read: .."treatment alone does not retain the WQV and strategic planning is necessary to do so" …*(CT DOT)*

Response:

Accepted change. We appreciate this comment as it also illustrated where we needed additional guidance and a correction. See the modified text and table below:

However, it is important to note that not all structural BMPs will disconnect DCIA, ~~treatment alone does not constitute disconnection~~ treatment alone does not retain the WQV and strategic planning is necessary to do so.

Table 9-1. Stormwater Retrofit Criteria for DCIA Disconnection and Reduction Credit

Retrofit Type	When is DCIA Considered Disconnected?	DCIA Reduction Credit
Impervious Area Conversion	➢ Existing excess impervious surfaces (pavement, buildings, etc.) are removed and replaced with pervious vegetated surfaces (lawn, meadow, woods), AND ➢ The infiltration rate and porosity of the underlying soils are restored to pre-development conditions through scarification, ripping (tilling), or use of a shatter-type soil aerator, as necessary, AND ➢ The soil is amended, as necessary, to support vegetation. ➢ Soil testing or other documentation to the satisfaction of the review authority is needed to classify / demonstrate the permeability of the restored pervious area.	**Full Credit (100% Reduction)** Impervious area[1] (in acres) converted and restored to pervious area.
Impervious Area (Simple) Disconnection	➢ Stormwater runoff from impervious surfaces is re-directed as sheet flow onto adjacent vegetated pervious areas (i.e., lawn, meadow, or woods), AND ➢ The contributing impervious area and the receiving pervious area meet the design criteria for simple disconnection as described in Chapter 5 - Low Impact Development Site Planning and Design Strategies ➢ Soil testing is needed to classify the permeability of the receiving pervious area.	**Full Credit (100% Reduction)** Impervious area[1] (in acres) from which runoff is re-directed to adjacent vegetated pervious areas.
New or Modified Structural Stormwater BMPs	➢ The applicable post-development stormwater runoff volume (i.e., Design Retention Volume) is fully retained on-site using suitable stormwater retention practices as described in Chapter 4 - Stormwater Management Standards and Performance Criteria.	**Full Credit (100% Reduction)** Impervious area[1] (in acres) from which stormwater is retained using new or modified stormwater BMP.

Retrofit Type	When is DCIA Considered Disconnected?	DCIA Reduction Credit
	➢ The applicable post-development stormwater runoff volume retained on-site does not fully meet the Design Retention Volume due to physical site constraints or other factors, but runoff is retained on-site to the "Maximum Extent Achievable" (see Chapter 4 - Stormwater Management Standards and Performance Criteria), ~~and additional stormwater treatment without retention is provided for the post-development runoff volume above that which can be retained up to 100% of the Water Quality Volume,~~ AND ➢ The proposed retrofit meets or exceeds the minimum required average annual pollutant load reductions (TSS, TP, TN) as demonstrated using stormwater BMP performance curves.	**Partial Credit (X% Reduction)** The amount of DCIA reduction is determined using the stormwater BMP performance curves. • Obtain DCIA (also called "Effective IA" in the BMP performance curves) reduction percentage from the appropriate performance curve based on the type of BMP and the appropriate Hydrologic Soil Group. • Multiply the DCIA reduction percentage by the impervious area[1] draining to the stormwater BMP. If a stormwater BMP performance curve for DCIA or Effective IA does not exist for a given BMP type, estimate the DCIA reduction percentage based on the most representative curve. Table 4-2 of the Regional Retrofit Manual describes a crosswalk of appropriate representative curves. Should a BMP not be mentioned in this table justification for choosing the appropriate curve should be based on function and where necessary HSG.
	~~➢ In cases where the additional stormwater treatment requirement cannot be achieved on-site, but stormwater is treated to the "Maximum Extent Achievable" (see Chapter 4 – Stormwater Management Standards and Performance Criteria.)~~	~~**Partial Credit**~~ ~~Partial impervious area[1] (in acres) from which stormwater is retained or treated using new or modified stormwater BMP. Amount of partial credit (percentage) based on the ratio of the combined alternative retention and treatment volumes (actual) to the Design Retention Volume (required).~~

Verbatim Comment(s):

Integrating much of the New England Stormwater Retrofit Manual funded by the SNEP Network in October 2022. We commend CTDEEP on the integration of the New England Stormwater Retrofit Manual which focuses on the disconnection and reduction of directly connected impervious cover (DCIA). It is important to encourage retrofits to reduce stormwater impacts, and CTDEEP's use of the retrofit manual to walk through the two approaches a site can take to effectively implement stormwater retrofits will help practitioners begin the process. Furthermore, EPA commends CTDEEP on integrating the performance curves for retrofit sizing and crediting for retrofits. The use of the performance curves for retrofits encourages sites to use smaller scale SCMs if larger SCMs are not feasible and provides a uniform way to credit the SCMs. *(Michele Vuto, EPA Region 1)*

Response:

We appreciate the comment.

Verbatim Comment(s):

[M]aybe put it [Modifying Existing Structural Stormwater BMPs] before [New Stormwater BMPs]? Since you would consider that before building something new. *(Theresa McGovern, VHB)*

Response:

We appreciate the recommendation; this is simple recommendation furthers the Manual's intent to support minimum disturbance of a site. Accepted.

Verbatim Comment(s):

[Considering adding] off-line systems that take a prescribed amount of flow for treatment and allow the rest to continue downstream. Those can be placed within the drainage system or at the outfall [to the list of common examples of drainage systems in retrofits]. *(Theresa McGovern, VHB)*

Response:

We appreciate the comment and agree these are valuable systems. While they are not explicitly in Chapter 9, they are contained in structural stormwater BMP sections of Chapters 7-13.

Verbatim Comment(s):

[With regards to the **Conversion to Dry Water Quality Swale or Linear Bioretention.**] Again, want to promote the infiltration swale design. It is like the dry WQ swale but fully retains the designed volume. *(Theresa McGovern, VHB)*

Response:

We concur and encourage applicants to utilizes the guiding principles to incorporate designs that best utilize their site. We have amended the Dry Water Quality Swale Section of Chapter 13 to reference the CT DOT's guidance for recommendations regarding linear projects.

Topic: Retrofit Applications

Verbatim Comment(s):

[Consider adding] small infiltration trenches or leaching basins set offline from CBs. [to the list of common retrofit approaches for urban roads] *(Theresa McGovern, VHB)*

Response:

Stormwater BMPs designed in an off-line configuration are already described throughout the structural stormwater BMP sections of the Manual (Chapters 7 through 13).

Verbatim Comment(s):

[Consider adding] eliminating curbs and close drainage system all together - IC disconnection [to the list of common retrofit applications for residential subdivisions] (Theresa McGovern, VHB)

Response:

Accepted, Added bullet noted below to list referenced:

- Elimination of curbing and closed drainage systems.

Verbatim Comment(s):

[With respect to curb cuts and grading for parking lot retrofit applications] this is great but need to give them flexible way to credit when not meeting all QPA requirements. *(Theresa McGovern, VHB)*

Response:

Amendments to the QPA section were made. See above.

Topic: Retrofit Selection

Verbatim Comment(s):

If this guidance is followed for screening opportunities, then retrofit opportunities might be overlooked because these are the NEW development requirements/ guidance which can be challenging to meet on a retrofit site. For example, if they were doing an upgrade to an existing BMP but couldn't meet the something like the pretreatment or soil requirement, they would just have to skip it vs. doing their best and improving the BMP.

We have a different message in following paragraphs so maybe just need to be clear. *(Theresa McGovern, VHB)*

Response:

We concur that line is out of place and leads to mis-communication. We have moved it to end to add clarity to the intent.

Topic: Retrofit Sizing Guidance

Verbatim Comment(s):

So retrofit scenario DO need to meet or exceed certain pollutant reductions? The last bullet above says "maximum extent achievable". I feel like people will be discouraged from doing retrofit projects if that triggers minimum performance standards. *(Theresa McGovern, VHB)*

Response:

We had a similar concern; this was the rational for the simplified approach for documenting meeting the performance standard. We also appreciate the confusion noted in this comment period around this topic and have made the amendment below to this bullet to clarify how to document this compliance.

- Document that the proposed retrofit meets or exceeds the minimum required average annual pollutant load reductions for TSS, TP, and TN, as described in Chapter 4 - Stormwater Management Standards and Performance Criteria and Appendix C- BMP Performance Curves and Static Storage Volume.

Topic: Retrofit – Credits

Verbatim Comment(s):

[with respect to new or modified structural BMPs] Providing disconnection credit when specific treatment metrics are met is very helpful and will assist all MS4 permit holders working towards disconnecting of the 1 % per year metric as currently in the permits. *(CT DOT)*

Response:

We appreciate the comment and complexity of disconnection. We have added clarification to table 9-2 in response to a comment in "Retrofit Types" section of this document.

Topic: General Design Guidance for Stormwater Infiltration Systems Sizing Guidance

Verbatim Comment(s):

Let's be clear this is NOT the same as how infiltration sizing is represented by the curves. The curves are based on long-term continuous simulation modeling of runoff reduction and treatment based on a certain physical storage volume of a BMP. *(Theresa McGovern, VHB)*

Response:

We recognize the difference in the methodology, and have addressed this concern with edits addressing similar concerns noted in "Stormwater Management Standards and Performance Criteria" sections of this document.

Topic: General Design Guidance for Stormwater Infiltration Systems- Test Pits and Soil Borings

Verbatim Comment(s):

[with respect to excavating test pits] If water levels are to be determined at the time of drilling then hollow stem auger borings are better than cased washed borings. Insert text: "or hollow stem auger.." *(CT DOT)*

Response:

Accepted.

- Excavate test pits or install encased soil or hollow stem auger borings at a frequency of:

Verbatim Comment(s):

[with respect to bullet .."1 test pit or boring per 100 linear feet.."] This seems excessive if geology is consistent based on other field soil data. *(CT DOT)*

Response:

As a recommendation, we expect if a qualified soil erosion and sediment control professional makes the justification that additional testing is excessive that site plan would be considered.

Topic: Stormwater Management Plan

Verbatim Comment(s):

The Stormwater Management Plan seems to be focused for large scale construction permits, but I didn't see an "out" for small projects—for example, a simple curb cut is mentioned as a retrofit, but would drive a tremendous admin burden…can you include language for scope? *(Koproski, Christopher, US Navy)*

And

Verbatim Comment(s):

[Regarding the introduction] Stormwater Management Plan for MS4 permittee's is programmatic not project specific. *(CT DOT)*

Response:

We appreciate the comments, we have addressed the concern and amended an error in the text below:

Chapter 12 – Stormwater Management Plan

Introduction

A Stormwater Management Plan~~, known as a Stormwater Pollution Control Plan under the Construction Stormwater General Permit (hereafter referred to as the Stormwater Management Plan only),~~ documents ~~the stormwater management design for a proposed land development project or activity. The plan documents~~ 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 this Manual, as well as other local, state, and federal stormwater management requirements.

A Stormwater Management Plan is required as described in Chapter 4 - Stormwater Management Standards and Performance Criteria, ~~a Stormwater Management Plan is required (Standard 5 – Stormwater Management Plan)~~) for all new development, redevelopment, and other land disturbance activities that require a local, state, or federal permit or approval ~~that are subject to the guidelines contained in this Manual~~. A Stormwater Management Plan is not required for retrofit projects that do not require review and approval, although designers are encouraged to document the design basis for all stormwater retrofits following good engineering/design practice.

A Stormwater Management Plan should be prepared by the project proponent and ~~design engineer and submitted for review by the local or state reviewing authority.~~ designing qualified professional, as defined in the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities and submitted for review by the local or state reviewing authority.

The chapter presents the recommended minimum content for a Stormwater Management Plan. Many municipalities and state agencies have stormwater management submission requirements as specified by municipal land use regulations and state permit programs. The recommended Stormwater Management Plan presented in this chapter is provided as guidance only and does not replace other local and state submission requirements. Municipalities or state agencies may adopt this or similar Stormwater Management Plan requirements into future updates of municipal land use regulations and state permit programs.

Topic: Stormwater Management Plan - Summary of Compliance with Stormwater Management Standards and Criteria

Verbatim Comment(s):

[RE footnote 75 & 76 formerly 71 & 72] Replace with: 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 and in the supporting materials that CTDOT has developed. *(CT DOT)*

Response:

Foot note accepted with minor revisions.

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 Construction General Permit and in the supporting materials that CTDOT has developed.

Topic: Structural Stormwater BMP Design Guidance

Verbatim Comment(s):

[RE Design requirements in the introduction] Add footnote: 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 and in the supporting materials that CTDOT has developed. *(CT DOT)*

Response:

Foot note accepted with minor revisions.

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 Construction General Permit and in the supporting materials that CTDOT has developed.

Verbatim Comment(s):

[RE Pretreatment Swale Schematic] Add footnote: 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 and in the supporting materials that CTDOT has developed. *(CT DOT)*

Response:

Foot note accepted with minor revisions.

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, the Construction General Permit and in the supporting materials that CTDOT has developed.

Verbatim Comment(s):

[RE Proprietary Devices- Design Recommendations] Add footnote: 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 and in the supporting materials that CTDOT has developed. *(CT DOT)*

Response:

Foot note accepted with minor revisions.

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 Construction General Permit and in the supporting materials that CTDOT has developed.

Verbatim Comment(s):

[RE Proprietary Devices- Maintenance Needs] Add footnote: To be consistent with MS4 Permits, maintenance interval should be once per year unless inspections indicate a more frequent schedule is needed. *(CT DOT)*

Response:

Accepted with one minor revision.

- Perform inspections of proprietary devices a minimum of once per year. However, 2 times per year – in late Spring after snowmelt and in late Fall after leaf fall and before the first snowfall is recommended to prevent BMP failure.

Verbatim Comment(s):

[RE Underground Infiltration & Dry Well & Infiltrating Cath Basin] Infiltration systems below CT DOT roads are not permitted. Infiltration systems adjacent to CTDOT roads shall be directed exfiltration away from pavements base, subbase and subgrade. An impermeable barrier may be required. *(CT DOT)*

Response:

We concur this is an important distinction and has been added as note as written.

Topic : Structural BMP Guidance- Deep Sump Catch Basins

Verbatim Comment(s):

Page 251, The chapter on Deep Sump Catch Basins does not indicate that the hood must seal to the side of the catch basin. Typical DOT hoods are cast iron and do not seal to the side of the basin allowing hydrocarbons and very small floatables to enter the drainage system.

Please consider requiring the hood to seal to the sides of the basin. *(Chuck Eaton, PE*, LEED-AP, NICET, NETTCP, Senior Project Manager)*

Response:

We appreciate the comment, however, maintain the text as it is. Sealing the hood is essential to floatable oil removal.

Topic: DOT Drainage Manual References

Verbatim Comment(s):

I understand that the CTDOT drainage manual sizes drainage for the 10-year storm. But with the expected increased in rainfall intensity with climate change why not begin to design conveyance for the 25-year storm. For our local storm network, I often find that pipes even up to 12" can get clogged, blocked, deformed, develop unexpected tailwater conditions and reduce conveyance capacity easily. *(Alex Kloze, Town Engineer of East Lyme)*

Response:

We appreciate the observation, and concur if the updated definitions of the 10-yr storm are inadequate for the site it is logical to design for a higher magnitude storm to assure the longevity of the infrastructure and ability to manage the needed maintenance. Standard 2 in the revised Manual allows for use of the 10-year, 24-hour or larger magnitude design storm for design of conveyance systems leading to, from, and through structural stormwater BMPs. The Manual also states:

"The review authority may require the use of larger magnitude design storms for conveyance systems associated with stormwater BMPs, including stormwater drainage systems upstream or downstream of the BMPs. Such drainage systems should be designed in accordance with the Connecticut Department of

Transportation Drainage Manual as well as applicable local and state design and permitting requirements."

Verbatim Comment(s):

Is there discussion of updating the drainage manual? *(Alex Kloze, Town Engineer of East Lyme)*

Response:

The timing of a CTDOT Drainage Manual Update is unknown.

Soil Erosion and Sediment Control Guidelines

Topic: Editorial

Verbatim Comment(s):

Page 270 – 271: first paragraph (and bullet point) on page 271 is the same as the last paragraph on page 270. *(Jonathan Thiesse, Bloomfield Town Engineer)*

Response:

Amended as recommended, thank you.

Verbatim Comment(s):

What is the official title of the E&S Guidelines? I recommend the title should be "Connecticut Guidelines for Soil Erosion and Sediment Control." The first / title page says "Soil Erosion & Sediment Control Guidelines" but the subsequent headers say "Connecticut Guidelines for Soil Erosion & Sediment Control" Because the E&S Guidelines are referenced in numerous municipal regulations and DEEP permits, the title should be consistent with its predecessor. I don't see a problem with dropping the "2002". However, I don't understand the reasoning for re-structuring the name. I do believe that maintaining the original title minus the "2002" helps to avoid confusion. Note that there are many states and organizations that have erosion and sediment control guidelines. Try Googling "Erosion and Sediment Control Guidelines" and see what you get. (Marla Butts, Wetlands Agent, Thompson CT)

Response:

Amended as recommended, thank you.

Verbatim Comment(s):

In the Table of Contents (pgs 1-2) individual measures should be identified as to their page location for Section 5 with perhaps a hyperlink to the measure. The current document structure does not allow for an easy location for individual measure in relation to their functional groups. Remember, this document will need to be used by zoning enforcement officer, wetlands agents and the public at large as a resource document and they may have limited knowledge of what measure is in what functional group. This document was meant to be an educational tool for the regulated community as well as guidance to meet EPA requirements. *(Marla Butts, Wetlands Agent, Thompson CT)*

Response:

Easy location of individual measures can be located by searching for the term and the table of contents are hyperlinked. The format of the document allows for searches and has increased hyperlinks throughout.

Topic: Additions

Verbatim Comment(s):

Inspection- I wish the CT DEEP hired a dozen extra inspectors to visit construction sites around the State on a regular basis, and cited people where necessary. I know it's probably not going to happen, but not all enforcement can be outsourced. If the State visited construction sites more regularly, and were necessary handed out fines for mud going downstream or excessive tracking out into roads, like a speeding ticket, and then published the list of fines on-line every week. *(Terrance Gallagher, P.E. Luchs Consulting Engineers, LLC, DeCarlo & Doll, Inc.)*

Response:

We appreciate the recommendation.

Topic: Introduction

Verbatim Comment:

The Connecticut Department of Energy and Environmental Projection (CTDEEP) published its draft update to the Connecticut Guidelines for Soil Erosion and Sediment Control (the Guidelines) with a public comment period that closes on March 1, 2023. The Connecticut Department of Transportation (CTDOT) has widely utilized the Guidelines as the basis for the approach to erosion and sediment controls on its projects. As such, it is anticipated that some of the proposed modifications could influence the CTDOT's activities and the opportunity to comment on the proposed modifications to the Guidelines is appreciated.

The Guidelines have been a valuable document to aid project developers, as well as local and state review authorities, to ensure that construction activities are performed in manner that is protective of the state's water resources. It is understood that the amount of development that occurs within the state is predominantly performed on a parcel basis, as opposed to linear development, and the Guidelines appropriately reflect that. CTDOT's standard practices are generally, very consistent with the Guidelines, and where the CTDOT's standard practices slightly deviate it is because of the nature of linear development projects have different constraints, considerations, and opportunities than most traditional parcel development projects. CTDOT has developed erosion and sediment (E&S) Best Management Practices, details, specifications, standard notes, operating procedures, templates, and manuals specific to linear projects. CTDOT also has standard practices to conduct regular E&S inspections of its construction projects through its own compliance staff to address any E&S issues which may arise. The proposed revisions enhance what the Guidance has already provide to construction activities in general. As such, in collaboration with CTDEEP and in accordance with good engineering practice, CTDOT will look to update its current standards and procedures so that they dovetail better with the applicable portions of the revised Guidelines. (*CT DOT)*

Response:

We appreciate the collaboration and CT DOT's effort to dovetail with the Guidelines.

Verbatim Comment:

Chapter 1, Introduction (pg 1) - I recommend placing a beginning clarification statement that this document amends and replaces the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control as opposed to placing that in the header. The reason for this is that many municipal regulations and DEEP permits reference the "2002 Connecticut Guidelines for Soil Erosion and Sediment Control, as amended." For example, in Section 2 Definitions of DEEP's "General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems" states "'Guidelines' means the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, as amended, established pursuant to Section 22a-328 of the Connecticut General Statutes." *(Marla Butts, Wetlands Agent, Thompson CT)*

Response:

This recommended statement is consistent with what we have on title page. Amended as recommended.

The Connecticut Guidelines for Soil Erosion and Sediment Control (hereafter referred to as "the Guidelines") amends and replaces the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control. The Guidelines are intended to provide information to government agencies and the public on soil erosion and sediment control.

Verbatim Comment:

Pg.. 2 – add Contractors, and Municipal and State staff to the list in paragraph 2 – mark-up attached. Means and Methods is generally left to contractors, and they can have often have a multitude of ways to build something. They can be key in success or failure of S&EC measures. Sometimes Contractor's options for construction range from simple to sometimes very elaborate – see photos for temporary access. It would be nice if one of the on-line references showed various good and bad S&EC examples similar to the NEMO BMP Atlas as an help to staff and contractors. Possibly this could be a follow-up item done in conjunction with the manual. *(Terrance Gallagher, P.E. Luchs Consulting Engineers, LLC, DeCarlo & Doll, Inc.)*

Response:

Amended with minor edit to include other potentially applicable professions, thank you.

The Guidelines are intended to assist landowners, developers, commission members, engineers, contractors, municipal staff, state staff and landscape architects to control sediment pollution caused by land disturbing activities.

Topic: Solar Array Projects

Verbatim Comment:

[Re Bullet #5 Page 54, Install the construction entrance, perimeter fencing, and temporary and permanent safety and construction signage.] Perimeter fencing usually does not get installed at this time because it would interfere with construction activities. *(Burgess, Paul, PE ECCD)*

Response:

We can appreciate the complexity, however, during construction phase should be protected and safety should be ensured. Exits/Entrances should be designed to account for construction needs. If exceptions are necessary, this should be pursued per individual project by describing site specific conditions that allow for this exception and addressed with the appropriate review authority.

Verbatim Comment:

[Re Bullet #6 Page 54, Install perimeter erosion and sediment controls in accordance with the E&S plan.] Need to specify that tree and stump removal should be limited to that required to install perimeter control and related activities (topsoil stockpile and tree/stump handling area) *(Burgess, Paul, PE ECCD)*

Response:

Accepted with minor revision applied to bullet 7, text amended as noted below.

If tree clearing is necessary, cut trees within the defined clearing limits and remove cut wood. If tree clearing and stump removal is required beyond installing permitter controls, permitter controls must be stabilized first. Tree and stump removal should be limited to that required to install perimeter control and related activities (i.e., topsoil stockpile and tree/stump handling area).

Verbatim Comment:

[Re Bullet 7 Page 55, If tree clearing is necessary, cut trees within the defined clearing limits and remove cut wood. Chip brush and slash and stockpile chips for on-site use or remove off site. Remove tree stumps from the solar array area and chip for on-site use or remove off site. No felled timber shall be left on the project area upon completion.] This tree cutting/stump removal, can only occur after perimeter controls (e.g. swales, basins) are stabilized. [and recommended to insert] “beyond that required for installation of perimeter controls, “[after the first comma] (Burgess, Paul, PE ECCD)

Response:

Accepted with minor revision, text amended as noted below.

7. If tree clearing is necessary, cut trees within the defined clearing limits and remove cut wood. Chip brush and slash and stockpile chips for on-site use or remove off site. If tree clearing and stump removal is required beyond installing permitter controls, permitter controls must be stabilized first. Tree and stump removal should be limited to that required to install perimeter control and related activities (i.e., topsoil stockpile and tree/stump handling area).
8. Remove tree stumps from the solar array area and chip for on-site use or remove off site. No felled timber shall be left on the project area upon completion.

Verbatim Comment:
[Re Bullet 14 Page 55, Install solar arrays (e.g., supports, racking materials, and array modules), concrete pads or electrical equipment, and site features (e.g., permanent fencing and gates).] This can occur after stabilization of any exposed soils. (Burgess, Paul, PE ECCD)

Response:

Accepted, text amended as noted below.

15. Install solar arrays (e.g., supports, racking materials, and array modules), concrete pads for electrical equipment, and site features (e.g., permanent fencing and gates). This can occur after stabilization of any exposed soils.

Topic Chapter 5 Function Groups and Measures- Preserve and Conserve Soil

Verbatim Comment:

"Grade Slope Length": This [quasi] table is confusing. The lead in discusses avoiding development on steep slopes; then the "table" has categories for 0%-7% and 7%-15%, which are hardly categorized as "steep". Then it groups everything over 15% together, when the effects of steepness are considerably different for a 2:1 slope than for a 15% slope. What is the purpose of these proposed limitations; i.e. what effects are they trying to limit? (At first blush, it would seem to be related to overland flow distances; but, reading on, these are not consistent with the guidance given on the next page for surface water flows.) What do the distances mean? 300/150/75 feet between what and what and under what circumstances? As presented, I get no value out of this section. *(Jonathan Thiesse, Bloomfield Town Engineer)*

Response:

Agreed, this table has been deleted slopes were addressed elsewhere with greater context to each scenario/practice.

Verbatim Comment:

Pages 92 & 93 – "Surface Water": Much of this section is also confusing

In the box, "B" is defined as "[m]aximum horizontal distance (of something, I'm not entirely sure of what – though I presume it is of the slope, as that is what makes sense. But, I should not have to presume this; it should be clearly stated.) In the discussion on page 93, "B" is defined as "slope distance". These are not the same thing. Which is it?

In the example, "B" (maximum, presumably, though not indicated) is calculated, but then not explained as to its significance or how to use this value. Also, the example does not appear to check if "A" + "B" exceeds 15X to determine if flow diversion is needed due to slope height/length. (In the "Therefore" of the example, it states "then A+XY". I presume what is meant is "and A + XY = 45<= B" and …" – which would be the check.)

If a diversion channel is installed above the slope, is there any guidance on when to provide overland flow measures on a slope flatter than 3:1? It would appear that flow diversion is required for any slope with a height greater than 15' (or, a horizontal length greater than 15X); but I have to assume this. If this is actually the intent, it should be stated as such. *(Jonathan Thiesse, Bloomfield Town Engineer)*

Response:

Agreed, the equation box and text has been amended as below:

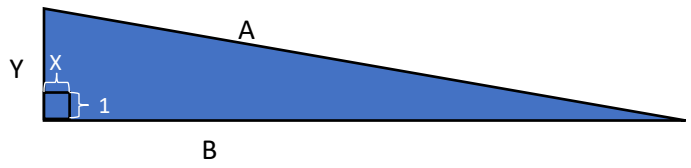
$$A = X(15 - Y) \ \& B \leq 15X \quad where;$$

$$A = Maximum\ overland\ flow\ distance\ in\ feet\ above\ the\ crest\ of\ the\ design\ slope$$

$$B = \ Maximum\ horizontal\ distance\ in\ feet, shall\ not\ exceed\ 15X$$

$$X = Side\ slope; horizontal\ distance\ in\ feet\ to\ one\ foot\ vertical\ (e.g = 2\ designed\ for\ slope\ 2{:}\ 1)$$

$$Y = Height\ of\ designed\ slope\ in\ feet\ measured\ vertically\ from\ toe\ elevation\ of\ the\ designed\ slope\ to\ top\ of\ cut\ or\ fill\ for\ the\ designed\ slope$$



- the length of overland flow (in feet) to the crest of the designed slope does not exceed the distance "A".
- the face of the slope is already stable, or the face of the slope is protected from surface runoff until it is stabilized (stability can be predicted by applying the Revised Universal Soil Loss Equation. See Appendix B).

- the face of the slope is not subjected to any concentrated flows of surface water from natural drainage ways and structures such as graded drainageways and downspouts; and
- the maximum total horizontal overland flow (A) plus maximum horizontal ~~slope~~ distance (B) (does not exceed 15 times the side slope (X)) of the cut or fill slopes.

Example Problem: Determine the maximum allowable overland flow distance, A, for a 3:1 side slope with a vertical interval of 7 feet.

Given: X = 3 Y = 7

Solution: A = X(15-Y)

A = 3(15-7)

A = 24'

Summary: A = 24' and B = 15(X), Since X=3 then 15'(3') = 45'

Therefore: If the overload flow distance is <24, then A+XY and no diversion or cross slope bench is required. If overload flow distance is ≥24 feet, then a diversion or cross slope bench will be needed.

Verbatim Comment:
Page 94 – "Subsurface Water": This guidance seems inadequate. In my decades as an engineer, the majority of slope failures (mostly minor) that I have encountered have been the result of a relatively steep cut slope interacting with groundwater. What are the circumstances (slope steepness, slope height/length, closeness of ground water to the slope surface (or slope base) where groundwater investigations should be performed prior to design and/or a geotechnical engineer should be consulted? The average municipal regulator does not have expertise in this; and the guidance would be helpful. *(Jonathan Thiesse, Bloomfield Town Engineer)*

Response to Comment:

We appreciate the comment and have included this as a recommendation for continued education and outreach to help support implementation of the manual.

Topic Chapter 5 Function Groups and Measures- Vegetated Soil Cover

Verbatim Comment:
Pages 120-122, Crown Vetch and Birds-foot Trefoil are listed in the seed mixture charts. I believe these plants are invasive. Consider removing them or using substituting other plants for these. I have not been specifying them because of this. If these are no longer considered invasive in Connecticut, please let me know. *(Chuck Eaton, PE*, LEED-AP, NICET, NETTCP Senior Project Manager, CHA)*
Response to Comment:

We appreciate this comment and have coordinated with the CT Workgroup for invasive species (specifically the UCONN Extension Office) and NRCS. The review of this comment has also prompted additional review of seeding rates, mixes and some of the recommendations for turfgrass, these changes will be included in the final.

Neither of the species noted are invasive in Connecticut, however, Crown Vetch can spread quickly and can cause problems for mowers. If this is a concern white clover can be used instead. Birds-foot Trefoil is not invasive in Connecticut and can still be an option with inoculation should it be deemed the most appropriate option.

Topic Chapter 5 Function Groups and Measures- Drainageways and Watercourses

Verbatim Comment:
Page 214 – Table 5.17 [Table 5. 17 Channel Lining Recommended Side Slopes]: Top 3 entries are confusing. Does this mean:

The lining for the first item is not to be used if over 1.5 feet in height regardless of side slope?

The lining for the second item is not to be used if over 2 feet in height regardless of side slope?

What type of lining is the third item referring to? What if the lining height for whatever type of lining this is referring to is less than 2 feet?

(Jonathan Thiesse, Bloomfield Town Engineer)

Response to Comment:

We appreciate the comment and have reordered the table and amended to the below version to provide some clarity. Specific answers to the questions are also below:

The lining for the first item [Rip Rap, but believe Mr Thiesse meant the 2nd one, Non-Reinforced Concrete - Hand placed, formed concrete Height of lining 1.5 feet or less] is not to be used if over 1.5 feet in height regardless of side slope? Correct, exceeding 1.5 feet with these materials a lining would not support vertical side slope.

The lining for the second item [Believe Mr Theisse was referring to Hand-placed, screened concrete or mortared in-place flagstone Height of lining less than 2 feet] is not to be used if over 2 feet in height regardless of side slope? Correct with the materials specified, exceeding the height of 2ft the lining would not support this side slope.

What type of lining is the third item referring to? What if the lining height for whatever type of lining this is referring to is less than 2 feet? Appreciate the catch, amended below.

	Lining	Steepest Recommended Side Slope (horizontal to vertical)
Increasing Slope ↓	Riprap	2 to 1
	Turf reinforcement matting	2 to 1
	Gabions	2 to 1
	Hand-placed, screened concrete or mortared in-place flagstone Height of lining more than 2 feet	2 to 1
	Articulating concrete block	2 to 1 (no steeper than the side slope used in the hydraulic stability test of the product)
	Hand-placed, screened concrete or mortared in-place flagstone Height of lining less than 2 feet	1 to 1
	Reinforced slip form concrete - Height of lining less than 3 feet	1 to 1
	Non-Reinforced Concrete - Hand placed, formed concrete Height of lining 1.5 feet or less	Vertical

Topic Chapter 5 Function Groups and Measures- Energy Dissipaters

Verbatim Comment:
Page 264 – Riprap apron design: The draft document carries over the design procedure from the 2002 edition. In 2006, FHWA/NHI issued HEC 14 (referenced on page 267 for stilling basins). The procedure for sizing riprap aprons in HEC 14 (pages 10-17 & 10-18) results in considerably shorter aprons. Is it necessary for Connecticut to be that significantly conservative compared to HEC 14 for the design of riprap outfall aprons?

Subsequent comment supplied, provided solution that was designed for town of Bloomfield

Proposed Solution:

Unless otherwise approved by the Town Engineer, energy dissipation for erosion control at culvert and other storm drainage conduit outlets shall be in accordance with Chapter 10 ("Riprap Basins and Aprons") of the most recent edition of the Federal Highway Administration Hydraulic Engineering Circular No. 14 (HEC-14), "Hydraulic Design of Energy Dissipators for Culverts and Channels". Said Chapter 10 of the Third Edition of HEC-14 (2006) is attached hereto as part of this standard.

Riprap aprons may be used for any outlet where the outlet rise/height is less than 60 inches, the conduit cross-section area is less than 20 square feet, and there exists a defined channel downstream of the apron capable of carrying the entire design flow within its banks (an "adequate" downstream channel) or there exists adequate energy dissipation/erosion protection downstream of the apron (or otherwise extenuating circumstances justify the use).

The following values and parameters shall be used for Connecticut Department of Transportation defined riprap specifications from Form 818:

- Modified riprap: D_{50} = 6 inches; minimum apron depth = 18 inches; apron length = 4 x pipe rise
- Intermediate riprap: D_{50} = 10 inches; minimum apron depth = 24 inches; apron length = 5 x pipe rise
- Standard riprap: D_{50} = 18 inches; minimum apron depth = 36 inches; apron length = *

* Determine apron length from calculated D_{50} value applied to Table 10.1 of HEC-14.

The width of the downstream channel bottom at the end of the conduit (including any end section) shall be a minimum of 3 times the width of the conduit, and shall be centered on the conduit.

Where there exists an adequate downstream channel:

- The bottom width of the channel within the apron length shall not be less than 3 times the width of the conduit;
- The longitudinal slope of the channel within the apron length shall be less than the average channel slope for the initial 30 feet of the downstream channel.
- Channel side slopes within the apron length shall be 2H:1V maximum;
- Riprap shall be extended up the channel side slopes to an elevation at least 0.5 feet above the surface elevation for the design flow in the channel and,
- The transition channel from the riprap apron to the downstream channel, if necessary due to the bottom width of the downstream channel being less than the bottom width of the apron channel, shall be treated with riprap similar to the riprap apron.

Where a riprap apron is being used without an adequate downstream channel:

- The width of the apron and effective bottom width of the channel shall increase by 1 foot on each side of the channel for each 3 feet of apron length; and,
- The longitudinal slope of the channel within the apron length shall be less than the erosion-safe slope for the channel/surface material/conditions that the apron discharges to directly downstream of the apron.

The riprap apron shall be underlain by 8" minimum of compacted granular bedding with an appropriate geotextile filter fabric between the bedding and the existing soil.

(Jonathan Thiesse, Bloomfield Town Engineer)

Response to Comment:

We appreciate the comment and suggestion. As the recommendations included in the draft are applicable to temporary installations we are retaining the recommendations. However, we acknowledge there may be appropriate times to utilize these for permanent use and in such cases, we recommend following the CTDOT drainage manual and have added this reference for those cases.

Verbatim Comment:
Page 270 – Table 5.27: I know this is being picky, but the table (and design criteria discussion below) does not address drainage areas of less than 2 acres and a length of use of greater than 6 months, but less than 1 year. *(Jonathan Thiesse, Bloomfield Town Engineer)*

Response to Comment:

Amended as indicated below

Design Requirements	Drainage Area	Length of Use
no engineered design	0-2 acres	<6 months
2-yr, 24-hour storm	0-2 acres	>6 months, <1 year
2-yr, 24-hour storm	>2 acres	>6 months, <1 year
25-yr, 24-hour storm	any drainage size	>1 year

Verbatim Comment:
Page 270 – "Non-Engineered" check dams: I am confused by the "should not exceed 10 acres" in the first bullet point, given the 2 acre limit in the table and paragraph directly above this reference. When is it OK to use one of these check dams for a drainage area between 2 acres and 10 acres? *(Jonathan Thiesse, Bloomfield Town Engineer)*

Response to Comment:

Amended as indicated below

The drainage area of the ditch or swale being protected should not exceed ~~10~~ 2 acres.

Topic: Chapter 5 Function Groups and Measures-Sediment Impoundments, Barriers, and Filters

Verbatim Comment:
Unless physical, on-site S&E stabilization controls are biodegradable, I would like to see a guideline included that requires the entity that installed the stabilization controls (or other appropriate party) to return and remove non-biodegradable controls from the site (eg. – plastic silt fence), as appropriate, once the site has stabilized. (Context: I am thinking about old silt fences/stakes I have seen that have fallen over, etc. and remained in place long after the site has stabilized. I asked someone why it wasn't removed and was told that it was because there was no requirement to remove it.) Not only are these types of materials unsightly, they may also be a hazard to wildlife (eg. – entanglement), etc. Many of the silt fences I have seen are made of plastics, etc.) (*Susan Peterson, CT DEEP 319 Program)*

Response to Comment:

Amended as indicated below:

Maintenance
Inspect silt fence at least once a week and within 24 hours of the end of a storm that generates a discharge[3] to determine maintenance needs. When used for dewatering operations, inspect frequently before, during and after pumping operations.

Remove the sediment deposits or, if room allows, install a secondary silt fence upslope of the existing fence when sediment deposits reach approximately one half the height of the existing fence.

Replace or repair the fence within 24 hours of observed failure. Failure of the fence has occurred when sediment fails to be retained by the fence because:

a) the fence has been overtopped, undercut, or bypassed by runoff water,
b) the fence has been moved out of position (knocked over), or
c) the geotextile has decomposed or been damaged.

When repetitive failures occur at the same location, review conditions and limitations for use and determine if additional controls (e.g., temporary stabilization of contributing area, diversions, stone barriers) are needed to reduce failure rate or replace fence. See Table 5. 39 for trouble shooting failures.

Maintain the fence until the contributing area is stabilized.

After the contributing area is stabilized determine if sediment contained by the fence requires removal or regrading and stabilization. If the depth is greater than or equal to 6 inches, regrading or removal of the accumulated sediment is required. No sediment removal or regrading is required if sediment depth is less than 6 inches.

[3] For storms that end on a weekend, holiday, or other time after which normal working hours will not commence within 24 hours, a routine inspection is required within 24 hours only for storms that equal or exceed 0.5 inches. For storms of less than 0.5 inches, an inspection shall occur immediately upon the start of the subsequent normal working hours

Once the site is stabilized r~~R~~emove the fence by pulling up the support posts and cutting the geotextile at ground level. Regrade or remove sediment as needed and stabilize disturbed soils. To reduce these maintenance needs consider biodegradable options.

Comments Applicable to Both Draft Guidance Documents

Topic: Timing of Adoption of Final Guidance Documents

Comment Summary:

A request to consider the timing of the release and how to approach projects in progress.

Verbatim Comment(s):

I understand the publication is this Spring, with comments due by Mar 1st…can you please say if there's a general "Grandfather" clause for projects already developed and nearing execution, or will they be subject to the new provisions for WQV and so on, from day one? *(Christopher Koproski, US Navy)*

Response:

It is not our intent to require revisions to existing permitted projects. If someone already has a stormwater permit by the time the final guidance documents' effective date, they would not be subject to the new guidance and can rely on the previous version.

The final effective date of the manual will allow for significant advance warning, communication, and, where possible, supporting materials to clarify when project designs must start reflecting the new manual. See the response under applicability for the Stormwater Quality Manual for further detail.

Topic: Manual Applicability/Users

Summary Of Comments: Commentors noted that both Manuals appeared to be biased towards or in some cases recommending exclusivity of practices to be completed by engineers only.

Verbatim Comments:

Comment 1: I read through the drafts of the Soil Erosion and Sediment Control Guidelines, as well as the CT Stormwater Quality Manual. While I have no issues with the large majority of what has been written, I will say that banning licensed Landscape Architects from preparing grading/drainage plans' and 'soil erosion/sediment control plans' is incredibly short-sighted. Landscape Architects do far more than select trees and shrubs for planting plans. We design roads, parking areas, walkways, athletic fields, parks, playgrounds, courtyards, gardens, and golf courses...just to name a few. Each one of these designs requires us to understand and implement grading and drainage strategies to ensure there are no stormwater related issues. This has been going on for hundreds of years, so why would the State of CT want to remove that from our typical scope of work? I love my engineer friends, but they're not the only ones competent enough to do this work. I strongly encourage you to rethink this idea as it's not going to help anyone. *(John McMeeking RLA, ASLA, Landscape Architect)*

Comment 2: Our firms is extremely concerned with draft guidelines as presented, in that it will result in a significant barrier to practice for landscape architects in the State of Connecticut. The Guidelines do not permit the preparation of Erosion and Sediment Control Plans or Grading Plans by landscape architects. We hope to meet with DEEP to review these barriers, and hope to amend the draft to permit

the practice of landscape architecture without barriers being imposed that are against Connecticut General Statutes. *(Āris W. Stalis, ASLA, LEED AP, Aris Land Studio)*

Comment 3: The Connecticut Chapter of the American Society of Landscape Architects is extremely concerned with the current version of the Draft Guidelines for Soil Erosion + Sediment Control (E+S). As currently written, the Draft appears to create significant barriers to practice for landscape architects. Additionally, the Stormwater Quality Manual appears to lead readers that the work must be completed by engineers. If accepted as written, all landscape architects within the State of Connecticut will be disproportionally affected, resulting in a loss of the ability to practice. Landscape architects regularly prepare grading plans and erosion and sediment control plans. We request an in-depth review of the proposed Draft E+S with DEEP, to address our concerns and seek solutions that will not result in barriers to practice for landscape architects in Connecticut. *(Āris W. Stalis, Chair, Advocacy Committee, Connecticut Chapter of American Society of Landscape Architects)*

Comment 4:

[with respect to the Stormwater Quality Manual]

1. Page 175 - Qualified Professional shall include "landscape architect"

2. Page 213 - 2nc paragraph: Stormwater Management Plan could be prepared by a landscape architect. Implication of language is a PE.

3. Page 218 - Design Drawings can also be prepared by a "landscape architect".

4. General - Use of term "design engineer" implies Professional Engineer, that can become a barrier to practice for landscape architects.

5. General - Term use "Engineered" is utilized, and implies work by a Professional Engineer. Most engineers do not understand soils, and is more in the professional knowledge base of landscape architects. The term should be revisited, and modified.

(Āris W. Stalis, ASLA, LEED AP, Aris Land Studio)

Comment 5: It seems to me that the engineer lobbyists are doing a great job at protecting Engineer's professional practices. These calculations are not rocket science, but a series of simple mathematics that Landscape Architects are well trained and licensed to perform with great success.
Additionally, Landscape Architects have the knowledge of both functional drainage combined with aesthetic considerations that clearly are not included in engineering practices, but are also taught how perform grading and drainage such that the existing and proposed plants will survive and thrive. This is what makes beautiful and functionally draining properties and communities.
Landscape Architects should continue to have the right to practice the knowledge that is included in our licensure and profession. *(Nancy King, ASLA, Principal, Landscape Architect, LEED AP)*

Comment 6: I recently saw the updated practices and guidelines and must tell you the Landscape Architects typically receive as much or more grading and drainage education as civil engineers. A major difference is that LA's have to make sure the plants, both indigenous and contract planted, must be able to survive AND thrive. Landscape architects should be included in the professionals that are permitted to practice grading and drainage in CT. As I read your descriptions it appears that you have clearly been lobbied by an engineering mind set and are unaware of current environmental practices. The use of computer modeling (for drainage or visual simulation) can now be done by high school students. To exclude Landscape Architects for practice in 2023 is a mistake and overreach (or over protection) for or by engineers. *(Stuart Sachs)*

Comment 7: I strongly urge you to revise the drafts of Stormwater Quality Manual draft and the Connecticut Guidelines for Soil Erosion and Sediment Control to provide landscape architects with the ability to prepare Grading plans and Erosion and Sediment Control Plans (E & S Plans).

This legislation would will create a profound barrier to practice for landscape architects. There is no justification for undermining the landscape architect profession by eliminating their ability to prepare and stamp Grading and E & S Plans Connecticut landscape architects compete with engineers in Connecticut for projects where the elements of the respective practices overlap. For example, the preparation of site plans, grading plans, erosion and sediment plans can be prepared by either discipline. This can occur because the Board of Landscape Architects can demonstrate that these and other tasks undertaken on a routine basis in the practice of landscape architecture are fully qualified as a result of their:

> Education Connecticut requires a candidate for licensing to have a 4-year degree in landscape architecture from a college that is accredited by the Landscape Architecture Accreditation Board
>
> Experience – Connecticut requires a candidate to have two years of practical experience under the direction of a landscape architect.
>
> Examination- The purpose of requiring an examination of all candidates is to be sure that an individual is minimally competent to practice landscape architecture without peer review so as not to jeopardize the public health, safety and welfare. Consistent with all other states, Connecticut requires that all candidates pass the national Landscape Architects Registration Examination (LARE).

Landscape architects will be placed at a significant competitive disadvantage and will no longer be able to fairly compete for a significant amount of work.

Denying landscape architects the ability to stamp Erosion and Sediment Control Plans would cause severe financial hardship for the landscape architect profession, especially for small to mid-sized firms and their employees.

Thank you very much for your attention on this matter and please support the revision of the Stormwater Quality Manual and Soil Erosion and Sediment Control Guidelines draft to allow landscape architects the ability to prepare Grading and E & S Plans for their clients. *(Debra De Vries-Dalton, LEED AP, ASLA, Land Canvas Landscape Architecture)*

Comment 8: I am writing to express my extreme disappointment with the proposed revisions to the guidelines for Erosion and Sediment Control being considered by the DEEP. As a licensed landscape architect who has been providing sedimentation and erosion control plans in the state of Connecticut for over 30 years and a member of the American Society of Landscape Architect's College of Fellows, I take personal umbrage at what appears to be an attempt to exclude Landscape Architectural professionals from this work. This amounts to nothing short of the state erecting a new barrier to practice my profession at a time when many state legislatures are attempting to remove such barriers. As I understand the language in the proposed regulations would require that only a "licensed engineer" or an ill-defined "qualified professional" could prepare the same plans that landscape architects have been trained to prepare and having been preparing since our licensure legislation was signed into law years ago. It would even restrict our ability to prepare grading plans, something at the very heart of our practices as landscape architects. Not only do licensed landscape architects have the knowledge, skills and abilities required to conduct this work, we are expressly permitted to do so by our original licensure legislation. In short as written the proposed regulations are in violation of that statute and as such run the risk of a legal challenge. While the word engineer appears almost 200 times in the regulations, the few mentions of "landscape architect" are insultingly limited to the discussion of tree protection. Clearly, either the author lacked a full knowledge of the breadth of the landscape architectural profession or has been intentional in excluding it. I urge you to revised these regulations to make it perfectly clear that LICENSED LANDSCAPE ARCHITECTS ARE QUALIFIED PROFESSIONAL for this work. *(Robert J. Golde, PLA, FASLA Principal, TOWERS|GOLDE LLC)*

Comment 9: As a landscape architect in Connecticut, I am concerned with draft guidelines as presented, in that it will result in a significant barrier to practice for landscape architects in the State of Connecticut. The Guidelines do not permit the preparation of Erosion and Sediment Control Plans or Grading Plans by landscape architects although this is an integral part our of professional training and the work we do daily. We hope to meet with DEEP to review these barriers and hope to amend the draft to permit the practice of landscape architecture without barriers being imposed that are against Connecticut General Statutes. *(Jeff Olszewski, RLA, ASLA, Associate/Landscape Architect)*

Comment 10: I am writing in regards to the Draft Soil Erosion and Sediment Control Guidelines. I have been a practicing Professional Landscape Architect in CT for over two decades having worked on site development projects of various sizes and scope. Many times my office is the prime consultant on a project and often times we work side by side with other professional consultants including architects, civil engineers, structural engineers, surveyors, etc.

Over the years, on hundreds of often complex projects, I have produced master plans, detailed site plans, grading plans, soil erosion and sediment control plans, layout plans, and similar documents including construction details and specifications to the necessary very high level of detail required to obtain permits and produce high quality site improvements that protect the public health, safety, and welfare as defined by the licensed profession of landscape architecture in Connecticut.

I also am a former executive board member, including past president, of the American Society of Landscape Architects, CT Chapter. While on the board I worked with hundreds of other landscape architects within CT and nationwide who similarly work regularly on design of complex site development

projects in our state. Landscape architects are educated, experienced, and licensed to provide these design services.

I urge you to ensure that language is updated in these guidelines to include landscape architects as being able to continue to prepare grading plans, soil erosion and sediment control plans, site plans and related documents.

Thank you for your attention to this matter. *(William Pollack, PLA, ASLA)*

Comment 11: I would like to note that as a Landscape Architect I am highly qualified to prepare Erosion and Sedimentation control plans. This is something we are trained to do. We are, as a profession, stewards of the land. It is our job to protect the natural environment. I hope that the rewriting of this document will of course include Landscape Architect. Again, my apologies on the lateness and the fact that this is not a more indepth letter, but wanted to voice my displeasure at the direction this is headed to only include Engineers. *(Abigail Adams, RLA, Owner/Principal A2 Land Consulting, LLC)*

Comment 12: I am writing to you as a CT State Licensed Landscape Architect concerned about the new document being proposed related to Soil and Erosion control guidelines. As a practicing landscape architect, I am concerned that these guidelines do not account for Landscape Architects as professionals capable of providing these plans. This creates a barrier to our providing an important service for which we are educated, trained and licensed.

Landscape Architects are highly qualified professionals who have extensive knowledge and expertise in managing natural resources, including soil and water, which makes them extremely qualified to develop Soil Erosion and Sedimentation (S&E) plans.

It is important to recognize that Landscape Architects are just as qualified as civil engineers to perform this task. In fact, in some cases, Landscape Architects may be better suited to develop these plans, especially when it comes to managing soil erosion and sedimentation in in conjunction with planted spaces.

Landscape Architects have a deep understanding of the natural environment and how to design landscapes that are both aesthetically pleasing and ecologically sustainable. They have expertise in the use of plants, trees, and other vegetation to stabilize soil and prevent erosion, which is a crucial aspect of S&E planning. Landscape Architects also have knowledge of stormwater management and can design strategies to manage water runoff and prevent sedimentation in ecologically sensitive ways.

In addition, Landscape Architects play a unique role in working with many different stakeholders of a project, including property owners, builders, engineers, architects and government agencies. They are trained to analyze complex situations and develop creative solutions that meet the needs of all parties involved.

Licensed Landscape Architects must be allowed to develop S&E plans because it is an integral part of their work. Their work contributes to more effective and creative planning and management of soil erosion and sedimentation issues, ultimately benefiting the environment and the public at large.

Licensed Landscape Architects must be allowed to be a primary provider of this type of work and to develop and sign S&E plans in an official capacity. They have the knowledge and expertise to do so and to manage the natural resources that are both functional and sustainable.

Thank you for your consideration of my comments. *(John R. Conte, RLA, ASLA, Principal Landscape Architect)*

Comment 13: I have recently been made aware that draft changes to the Connecticut Soil Erosion and Sediment Control Guidelines are under consideration, and that your office is coordinating that work for CT DEEP.

I am a Professional Landscape Architect and have had a professional office here in the State for over

40 years. My office has been involved in the design and implementation of site work for innumerable very extensive and complex projects involving millions of dollars of site construction. My office works as the prime consultant on our projects often working side by side with other professional consultants including architects, soil scientists, civil engineers, structural engineers, surveyors, and others as necessary.

I attach a press report about a major project which we very recently completed and Governor Lamont came to open.

On several hundred, often very complex, projects such as this one, we have produced soil erosion and sediment control plans, site master plans, detailed site plans, grading plans, layout plans, vegetation stabilization and other planting plans and similar documents including construction details and specifications.

Our plans and drawings have been received, accepted, reviewed and approved Federal, CT State and local municipalities.

We recognize the very high level of detail needed to obtain such permits and that they are necessary to protect the public health, safety, and welfare, as is required for licensed professions of landscape architects in Connecticut.

I am also a past president, of the American Society of Landscape Architects, CT Chapter and have known and worked with hundreds of other landscape architects within Connecticut, and nationwide, who also work regularly on design of complex site development projects within our state, and nationwide. The rigorous licensing process for landscape architects in Connecticut, and in other states, requires that they are educated, experienced, examined and licensed to provide these design services. In your reviewing, and amending, the State's regulations and guidelines, we urge you to ensure that language updated therein includes the provision that landscape architects continue being able to prepare grading plans, layout plans, soil erosion and sediment control plans, and site plans as well as other site planning related documents.

If you interested in receiving more information about of the broad range of site related matters that landscape architects are routinely engaged in, I would suggest contacting any of the leading

landscape architects on the board of the Connecticut Chapter of ASLA or I would, personally, be pleased to discuss our profession any time you chose to call.

Thank you for your time and consideration of this matter. *(Keith E. Simpson, Fellow American Society of Landscape Architects)*

Comment 14: It was recently brought to my attention that DEEP is seeking to have all grading and Erosion Control plans signed by Licensed Engineers. This would be a limitation of practice to the landscape architects licensed in CT. This should be heavily thought through before pushing forward with this. There are numerous small landscape architect firms that do these plans along with their hardscape and landscape plans. Since this was part of our testing exam this should be something we are allowed to submit as part of our plans. I urge you to take more time with this decision. *(Amy Winberg CT Licensed Landscape Architect)*

Comment 15: In undertaking a quick review of the proposed new manual updates for the Sediment Control Guidelines and Storm Water Control, it is very apparent the whole of the document (s) is skewed toward the need for engineers to undertake all aspects of the professional services, particularly the Soil Erosion and Sediment Control Guidelines where Landscape Architect are relegated to tree protectors. Ironically, it is the landscape architect who shapes the landform on projects. We work by site design and grading, fully versed in the engineering principles that address storm water management for the longevity of the project that avoid the use of high impact erosion control structures and armored systems. Licensed landscape architects are fully capable of designing soil erosion and sediment controls, knowing when collaboration with an engineer is best for the project.

The proposed documents as they stand are exclusionary, and in my opinion burden the approvals process and likely increase project cost.

As a Member of the CTASLA I would ask that the bias toward engineers as the only soil practitioners who are capable of addressing these issues be reconsidered and the documents be revised accordingly. *(Peter F. Viteretto, PLA, FASLA, Principal)*

Comment 16: Thank you for soliciting feedback regarding DEEPs work in revising and updating the Erosion and Sediment Control Guidelines. The team at Richter & Cegan - a team of licensed Landscape Architecture professionals serving a mix of public, private, institutional, and agency clients across Connecticut - has reviewed the draft “Soil Erosion and Sediment Control Guidelines” (E&S Guidelines). We offer the following feedback:

As written, the E&S Guidelines limit the preparation of an Erosion and Sediment Control (E&S) Plan to Qualified Profession Engineers. This language is in violation of existing CGS 20-369 and HBO0640006477HDO, each clearly identifying that the preparation of E&S Plans and their monitoring can also be performed by “Qualified Soil Erosion and Sediment Control Professions” and “Qualified Landscape Architects”.

As written, the E&S Guidelines may hinder a Landscape Architects ability to prepare grading plans as part of their professional services. This is in violation of CGS 20-369 which clearly states that Grading Plans may be prepared by Licensed Landscape Architects.

As written, the E&S Guidelines will cost the state and its citizenry more money and result in the creation of less effective solutions to E&S. As evident by these draft E&S Guidelines, solutions to addressing Erosion and Sediment Control are exceedingly varied. A solution might entail detention basins, drainage swales, soil bioengineering, slope stabilization through biological means, protection of vegetation, restoration and conservation, climate change considerations, living shorelines, and many others. The mathematical, chemical, biological, and social considerations that may or may not come into play for a particular project, require communities to be able to deploy a wide range of licensed professionals to meet the unique needs of their projects. When faced with the challenge of Sediment and Erosion Control, communities must be able to hire the most appropriate professional for their project's particular needs and not be forced to hire a professional whose expertise may not have any relevance.

We strongly recommend the use of the term "professional engineer" be limited to only those tasks explicitly requiring their expertise. While professional engineers play an important role in many E&S systems, they should not be required to be involved in all E&S plans. State statutes define the knowledge, skills, and abilities of the various qualified professionals who can engage in E&S work. These E&S guidelines should reference those statutes for more information and more frequently use the term "Qualified Professional" when defining the preparers of a given plan or E&S measure. These changes are critical in meeting the State's needs and delivering diverse solutions to the important issues addressed by these E&S Guidelines. Thank you very much for your thought and consideration. *(Josh Egnatz, PLA, LEED-ND, SITES, ISA, Michael A. Cegan, PLA, ASLA, APA, Gary J. Guimond, PLA, ASLA, LEED BD+C, SITES AP, PIC, Rachel E. Meier, PLA, ASLA, Richter & Cegan Inc.)*

Comment 17: I'm aware of a Draft Erosion and Sediment Control Guideline Regulation that excludes Landscape Architects from sealing these plans. This can be seen as a barrier to practicing our profession as many of our members produce these plans every day in offices statewide.

You may not be aware that Landscape Architects have education and expertise in producing these plans as well as grading, soil conservation, surface drainage, and tree preservation plans. Landscape Architecture has been recognized around the country as a STEM profession involved in all aspects of site planning . Please reconsider and include our many expert professionals in the ability to seal these drawings. *(Whitney A. Talcott FASLA, PLA, LEED AP BD+C Landscape Architect)*

Comment 18: It is brought to my attention that the Agency is considering excluding Landscape Architects as professionals who may sign and seal grading plans and erosion and sediment control plans in the State of Connecticut. I am a Professional Landscape Architect, licensed in seven states, and have been in practice for over 35 years. I work with engineers and allied professionals every day. I know first-hand that landscape architects are well educated and trained to perform these services, as I have been doing as a licensed professional for decades. A PE license alone does not prepare an engineer, solely, to perform these services. Landscape Architects have continuing education requirements and have access to exceptional training, as engineers do, to integrate best practices within their work. Additionally, landscape architects often take the optimum systems-based approach to implementing erosion and

sediment control in their projects as they consider limited ground disturbance and incorporating sustainable vegetation techniques to achieve project success. Landscape architects are best prepared to implement nature based solutions in conjunction with traditional measures. Please support the practice of landscape architecture in these new guidelines.
Thank you for your consideration. *(Gary Sorge FASLA, AICP, ENV SP)*

Comment 19: Thank you to you and DEEP for the opportunity to offer comments regarding the manual. I do not support the draft manual in its current state. I have been licensed to practice and have practiced Landscape Architecture in Connecticut for approximately 30 years. I have prepared many soil erosion and sediment control plans over those years and plan to continue to do so in the future. As noted on page 76 of the draft manual, the practice of Landscape Architecture includes the preparation of soil erosion and sediment control plans. I have not had the opportunity to complete a thorough review of the manual. Based on a preliminary review, I am very displeased to see that apparently the manual does not include CT licensed Professional Landscape Architects as a one of professionals suitable for preparing soil erosion and sediment control plan. If this is true, it is unacceptable and the final manual should include LAs in the list of suitable professionals.

Thank you for the opportunity to comment. Please don't hesitate to contact me if you have any questions or comments. *(Bill Kenny, WILLIAM KENNY ASSOCIATES)*

Comment 20: The draft guidelines are heavily weighted to Engineers and by default will be a barrier to Landscape Architects. Would you please include Landscape Architects along side the Engineers so clients can decide who they want to provide these services? *(Eric Rains, PLA, ASLA, Principal)*

Comment 21: It has been brought to my attention that there are changes being made to the Erosion and Sediment Control Guidelines for the state which eliminate Landscape Architects from providing services we are legally entitled to provide by our licensure, specifically grading plans. As a licensed Landscape Architect I am deeply concerned as the proposed changes will eliminate services I am allowed by law to provide. The proposed Draft Erosion and Sediment Control Guidelines as written do not allow for Landscape Architects to provide these services and are thus a barrier to practice. The Draft Erosion and Sediment Control Guidelines need to be updated to be in compliance with the laws and regulations to include Landscape Architects that allows us provide services we are licensed to provide. *(David W. Verespy, ASLA, Devore Associates)*

Comment 22: As a practicing landscape architect for over thirty years in Connecticut I am concerned about the new proposed legislation that limits grading and erosion control plans to engineers. As a licensed Landscape Architect I took three days of exams to practice grading in Connecticut and find it appalling that we are not licensed as a profession that can prepare erosion and sediment plans along with grading. *(Diane Devore, Devore Associates)*

Response: We concur and apologize for this significant oversite. It was our intent to include all “qualified soil erosion and sediment control professionals” as defined in the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, and only specific circumstances whereby a qualified professional engineer (also defined in the permit) would be needed. However, we failed to appropriately define this. We concur that the expertise of Landscape Architects are not only

capable, but instrumental in the direction we propose for nature based solutions first and foremost in both draft guidance documents. We appreciate the time each commenter took to illuminate this oversite and have made the amendments noted below to ensure the inclusion of Landscape Architects and other professionals essential to the stormwater management team.

Points of clarity: A few of the commenters noted proposed legislation; what is proposed here is not legislation, but rather guidance. Each commenter then noted legislation was contacted to ensure the appropriate comment forum was contacted. A couple of commenters noted lobbyists involvement in the development of the guidance documents. The acknowledged authors of the documents are the list of contributors who provided their expertise from implementation, permitting, review and planning perspectives. No lobbyist involvement was included in the draft guidance development.

Amendments: The draft guidance has been amended in the follow ways to ensure the inclusion of all qualified and necessary expertise for stormwater management:

Soil Erosion and Sediment Control Guidelines

[Chapter 3- Erosion and Sediment Control Plans, Part I General Guidelines, Plan Adequacy] E&S plans are site specific, and as such may require a variety of expertise. E&S plans shall be signed and sealed by a qualified professional to meet the needs of the plan at hand, such as those defined as a qualified soil erosion and sediment control professional in the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, including landscape architects or professional engineers that meet certain qualifications as outlined in the General Permit. ~~E&S plans using measures that contain "DESIGN CRITERIA" shall be signed and sealed by a professional engineer licensed to practice in Connecticut.~~

Stormwater Quality Manual

[Chapter 5 Low Impact Development Site Planning and Design Strategies- Impervious Area (Simple) Disconnection-Minimum Criteria for Credit- Solar Array Runoff]

- For slopes equal to or greater than 10% and less than 15%, use engineered[1] stormwater control measures designed to provide permanent stabilization and non-erosive conveyance of runoff to the property line of the site or downgradient from the site.

[1]Engineered stormwater control measures does not refer to practices exclusively implemented by engineers, but rather the consideration that natural solutions may not solely provide the benefit needed.

[Chapter 8 Selection Consideration for Stormwater BMPs]

The recommended process incorporates the BMP selection factors and summary matrix tables that are presented in the following sections of this chapter. This process is meant to help the designing qualified professional[1] select stormwater BMP(s) using good engineering/design judgement and a consistent and repeatable approach that also demonstrates compliance with the stormwater management standards and performance criteria, while promoting creative and site-specific stormwater management design.

[1] As defined in the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities.

[Chapter 10 General Guidance for Stormwater Infiltration Systems- Soil Evaluation Guidance]

The soil evaluation should be conducted by a Qualified Professional, which is an individual with demonstrated expertise in soil science, including, but not limited to:

- a Connecticut Registered Professional Engineer,
- a Connecticut Registered Landscape Architect,
- a Qualified Professional Engineer as defined in the CT DEEP MS4 General Permit,
- a qualified soil erosion and sediment control professional as defined in the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities,
- a Certified Soil Scientist,
- or a Professional Geologist.

[Chapter 12 Stormwater Management Plan-General Information]

A Stormwater Management Plan should be prepared by the project proponent and designing qualified professional, as defined in the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, ~~engineer~~ and submitted for review by the local or state reviewing authority.

[Chapter 12 Stormwater Management Plan-Design Drawings]

Design drawings should be prepared by a ~~professional engineer licensed to practice in the State of Connecticut~~ designing qualified professional, as defined in the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities. Design drawings should be signed and sealed by the appropriate design professionals (landscape architects and/or professional engineers) responsible for the project design and consistent with their areas of expertise, including LID site planning and design elements and structural stormwater BMPs.

[Chapter 13 Structural Stormwater BMP Design Guidance- Introduction]

- Construction Requirements. Recommended construction procedures and methods, as well as recommended stages of construction to be inspected by ~~the design engineer~~ a qualified inspector as defined in the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, to ensure that stormwater BMPs are constructed as designed.

[Chapter 13 Structural Stormwater BMP Design Guidance- Infiltration Trench – Construction Recommendations]

- The ~~design engineer~~ designing qualified professional should develop a detailed, site-specific construction sequence.

- The ~~design engineer~~ designing qualified professional should inspect the installation during the following stages of construction, at a minimum:
  - After excavation of the infiltration trench and scarification of bottom and sidewalls of excavation

- After installation of observation well
- After placement and leveling of stone storage media
- After installation of bypass, outlet/overflow, and inlet controls
- After pea gravel or loam/topsoil and grass surface cover have been installed

- The ~~design engineer~~ designing qualified professional should provide an as-built plan of the completed infiltration trench along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans.

[Chapter 13 Structural Stormwater BMP Design Guidance-Underground Infiltration System Construction Recommendations]

- The ~~design engineer~~ designing qualified professional should develop a detailed, site-specific construction sequence.

- The ~~design engineer~~ designing qualified professional should inspect the installation during the following stages of construction, at a minimum:
  - After excavation and scarification of bottom and sidewalls of excavation
  - After placement and leveling of stone below the chambers, placement of the chambers and inspection ports/manholes, and placement of stone above the chambers
  - After installation of bypass, outlet/overflow, and inlet controls
  - After infiltration system has been backfilled

- The ~~design engineer~~ designing qualified professional should provide an as-built plan of the completed infiltration system along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans and manufacturer's guidelines.

[Chapter 13 Structural Stormwater BMP Design Guidance-Infiltration Basin-Construction Recommendations]

- The ~~design engineer~~ designing qualified professional should develop a detailed, site-specific construction sequence.

- The ~~design engineer~~ designing qualified professional should inspect the installation during the following stages of construction, at a minimum:
  - After excavation of the infiltration basin and scarification of bottom and side slopes of excavation
  - After installation of bypass, outlet/overflow, and inlet controls
  - After pea gravel or loam/topsoil and grass surface cover have been installed

- The ~~design engineer~~ designing qualified professional should provide an as-built plan of the completed infiltration basin along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans.

[Chapter 13 Structural Stormwater BMP Design Guidance-Dry Well & Infiltrating Catch Basin-Construction Recommendations]

- The ~~design engineer~~ designing qualified professional should develop a detailed, site-specific construction sequence.

- The ~~design engineer~~ designing qualified professional should inspect the installation during the following stages of construction, at a minimum:
    - After excavation and scarification of bottom and sidewalls of excavation
    - After placement and leveling of stone
    - After placement of precast concrete structure
    - After installation of bypass, outlet/overflow, and inlet controls
    - After infiltration system has been backfilled
- The ~~design engineer~~ designing qualified professional should provide an as-built plan of the completed infiltration system along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans and manufacturer's guidelines.

[Chapter 13 Structural Stormwater BMP Design Guidance-Permeable Pavement-Construction Recommendations]

- The ~~design engineer~~ designing qualified professional should develop a detailed, site-specific construction sequence.

- The ~~design engineer~~ designing qualified professional should inspect the installation during the following stages of construction, at a minimum:
    - After excavation of the system and scarification of bottom and sidewalls of excavation
    - After placement of each gravel layer and drainpipes (if any)
    - After installation of bypass, outlet/overflow, and inlet controls
    - Before and during placement of the pavement material (porous asphalt, pervious concrete, or pavers)
    - After pavement and pavers have been installed

- The ~~design engineer~~ designing qualified professional should provide an as-built plan of the completed permeable pavement system along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans.

[Chapter 13 Structural Stormwater BMP Design Guidance-Bioretention-Description]

Bioretention systems are shallow, vegetated depressions that capture, temporarily store, and filter stormwater runoff. Bioretention systems have an engineered soil[4] media below the surface of the system that facilitates stormwater filtration and vegetative growth.

[1] Engineered soil is a manufactured soil consisting of specified ratios of sand, silt, clay, and organic amendments such as compost and designed for a specific application.

[Chapter 13 Structural Stormwater BMP Design Guidance-Bioretention-Construction Recommendations]

- The ~~design engineer~~ designing qualified professional should develop a detailed, site-specific construction sequence.

- The ~~design engineer~~ designing qualified professional should inspect the installation during the following stages of construction, at a minimum:
  - After excavation of the bioretention system and scarification of bottom and sidewalls of excavation
  - After placement of gravel layer
  - After placement of underdrain before covering by the pea gravel layer
  - After placement of bioretention soil media
  - After installation of bypass, outlet/overflow, and inlet controls
  - After plants have been installed

- The ~~design engineer~~ designing qualified professional should provide an as-built plan of the completed bioretention system along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans.

- The bioretention soil mix should be tested prior to placement according to the specifications in this section (at least one test per bioretention system). The ~~design engineer~~ designing qualified professional should certify that the bioretention soil mix meets the specifications in the previous section based on soil testing results.

[Chapter 13 Structural Stormwater BMP Design Guidance-Tree Filter-Construction Recommendations]

- The ~~design engineer~~ designing qualified professional should develop a detailed, site-specific construction sequence.

- The ~~design engineer~~ designing qualified professional should inspect the installation during the following stages of construction, at a minimum:
  - After excavation of the system and installation of the concrete chamber
  - After placement of gravel layer
  - After placement of underdrain before covering by the pea gravel layer
  - After placement of bioretention soil media
  - After installation of bypass, outlet/overflow, and inlet controls
  - After tree has been installed

- The ~~design engineer~~ designing qualified professional should provide an as-built plan of the completed system along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans.

- The bioretention soil mix should be tested prior to placement according to the specifications in this section (at least one test per bioretention system). The ~~design engineer~~ designing qualified

professional should certify that the bioretention soil mix meets the specifications in the previous section based on soil testing results.

[Chapter 13 Structural Stormwater BMP Design Guidance-Sand Filter-Construction Recommendations]

- The ~~design engineer~~ designing qualified professional should develop a detailed, site-specific construction sequence.

- The ~~design engineer~~ designing qualified professional should inspect the installation during the following stages of construction, at a minimum:
    - After excavation of the sand filter and scarification of bottom and sidewalls of excavation
    - After placement of gravel layer
    - After placement of underdrain before covering by the pea gravel layer
    - Inspection of sand material prior to placement
    - After placement and leveling of sand layer
    - After installation of bypass, outlet/overflow, and inlet controls
    - After grass and/or pea gravel surface cover have been installed

- The ~~design engineer~~ designing qualified professional should provide an as-built plan of the completed sand filter along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans.

[Chapter 13 Structural Stormwater BMP Design Guidance-Stormwater Pond-Construction Recommendations]

- The ~~design engineer~~ designing qualified professional should develop a detailed, site-specific construction sequence.

- The ~~design engineer~~ designing qualified professional should inspect the installation during the following stages of construction, at a minimum:
    - After excavation of the pond
    - After internal grading of microtopography, berms, safety benches, etc.
    - After installation of bypass, outlet/overflow, and inlet controls
    - After vegetation and wetland plants/seed mix has been installed

- The ~~design engineer~~ designing qualified professional should provide an as-built plan of the completed system along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans.

[Chapter 13 Structural Stormwater BMP Design Guidance-Stormwater Wetland-Construction Description]

Stormwater wetlands are ~~engineered~~ man-made wetland systems that incorporate marsh areas and permanent pools to provide treatment and attenuation of stormwater flows. Stormwater wetlands

differ from stormwater ponds in that wetland vegetation is a major element of the overall treatment mechanism as opposed to a supplementary component. This section addresses four types of stormwater wetlands:

[Chapter 13 Structural Stormwater BMP Design Guidance-Stormwater Wetland-Construction Recommendations]

- The ~~design engineer~~ designing qualified professional should develop a detailed, site-specific construction sequence.

- The ~~design engineer~~ designing qualified professional should inspect the installation during the following stages of construction, at a minimum:
    - After excavation of the wetland
    - After internal grading of microtopography, berms, safety benches, etc.
    - After installation of bypass, outlet/overflow, and inlet controls
    - After vegetation and wetland plants/seed mix has been installed

- The ~~design engineer~~ designing qualified professional should provide an as-built plan of the completed system along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans.

[Chapter 13 Structural Stormwater BMP Design Guidance-Dry Water Quality Swale-Construction Recommendations]

- The ~~design engineer~~ designing qualified professional should develop a detailed, site-specific construction sequence.

- The ~~design engineer~~ designing qualified professional should inspect the installation during the following stages of construction, at a minimum:
    - After excavation of the swale and scarification of bottom and sidewalls of excavation
    - After placement of gravel layer
    - After placement of underdrain before covering by the pea gravel layer
    - After placement of bioretention soil media
    - After installation of bypass, outlet/overflow, and inlet controls
    - After grass or other vegetation has been installed

- The ~~design engineer~~ designing qualified professional should provide an as-built plan of the completed system along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans.

- The bioretention soil mix should be tested prior to placement according to the specifications in this section (at least one test per bioretention system). The ~~design engineer~~ designing qualified professional should certify that the bioretention soil mix meets the specifications in the previous section based on soil testing results.

[Chapter 13 Structural Stormwater BMP Design Guidance-Wet Water Quality Swale-Construction Recommendations]

- The ~~design engineer~~ designing qualified professional should develop a detailed, site-specific construction sequence.

- The ~~design engineer~~ designing qualified professional should inspect the installation during the following stages of construction, at a minimum:
    - After excavation of the swale and scarification of bottom and sidewalls of excavation
    - After installation of bypass, outlet/overflow, and inlet controls
    - After vegetation and wetland plants/seed mix has been installed

- The ~~design engineer~~ designing qualified professional should provide an as-built plan of the completed system along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans.

[Chapter 13 Structural Stormwater BMP Design Guidance-Rain Barrel and Cistern-Construction Recommendations]

- The ~~design engineer~~ designing qualified professional should develop a detailed, site-specific construction sequence.

- The ~~design engineer~~ designing qualified professional should inspect the installation during the following stages of construction, at a minimum:
    - After excavation of the system (underground systems)
    - After placement and leveling of any necessary bedding or foundation below the cistern
    - After placement of the cistern(s) and any pretreatment devices and secondary storage tanks
    - After the installation of bypass, outlet/overflow, and inlet controls
    - After connection of the cistern and harvesting system to secondary water sources
    - After the system has been backfilled (underground systems)

- The ~~design engineer~~ designing qualified professional should provide an as-built plan of the completed system along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans.

[Chapter 13 Structural Stormwater BMP Design Guidance-Green Roof-Construction Recommendations]

- The ~~design engineer~~ designing qualified professional should develop a detailed, site-specific construction sequence.

- The ~~design engineer~~ designing qualified professional should inspect the installation after placement of each roof layer, plantings, modular units, and outlet/overflow structures.

- The ~~design engineer~~ designing qualified professional should provide an as-built plan of the completed system along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans.

- The green roof planting media should be tested prior to placement according to the specifications in this section. The ~~design engineer~~ designing qualified professional should certify that the planting media meets the specifications based on soil testing results and soil weight requirements.

[Chapter 13 Structural Stormwater BMP Design Guidance-Dry Extended Detention Basin-Construction Recommendations]

- The ~~design engineer~~ designing qualified professional should develop a detailed, site-specific construction sequence.

- The ~~design engineer~~ designing qualified professional should inspect the installation during the following stages of construction, at a minimum:
    - After excavation of the basin
    - After internal grading of basin bottom, low-flow channel, microtopography, berms, etc.
    - After installation of outlet/overflow and inlet controls
    - After seeding and final stabilization of the basin

- The ~~design engineer~~ designing qualified professional should provide an as-built plan of the completed system along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans.

[Chapter 13 Structural Stormwater BMP Design Guidance-Underground Detention-Construction Recommendations]

- The ~~design engineer~~ designing qualified professional should develop a detailed, site-specific construction sequence.

- The ~~design engineer~~ designing qualified professional should inspect the installation during the following stages of construction, at a minimum:
    - After excavation of the system
    - After placement and leveling of aggregate below the storage structure, placement of the structure(s) and inspection ports/manholes, and placement of backfill above the structure(s)
    - After installation of bypass, outlet/overflow, and inlet controls
    - After the system has been backfilled

- The ~~design engineer~~ designing qualified professional should provide an as-built plan of the completed system along with a certification that the system was designed in accordance with the guidance contained in this Manual and other local or state requirements and that the system was installed in accordance with the approved plans.