VERMONT

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RESPONSE SUMMARY
PROPOSED 2017 VERMONT STORMWATER MANAGEMENT MANUAL RULE

The Department of Environmental Conservation (Department or DEC) filed the proposed 2017 Vermont Stormwater Management Rule with the Vermont Secretary of State's office on September 16, 2016. The public comment period on the proposed rule opened on September 16, 2016 and closed on November 1, 2016. The Department held a public hearing to solicit public comments on the proposed rule on October 25, 2016, from 9:00 A.M. until 11:00 A.M. at the Pavilion Building Auditorium in Montpelier.

The Department received both verbal and written comments on the proposed 2017 Proposed Vermont Stormwater Management Manual Rule. The following is a summary of the public comments received by the Department and the Department's responses to comments. Comments may have been combined where appropriate and paraphrased as necessary for clarity.

Commenters: Table 1, below, shows the abbreviation and affiliation of each entity that provided comment during the public comment period. The entity that provided the comment is indicated in parenthesis following the comment. The list below is not inclusive of individual commenters.

Table 1: Commenter Affiliation and Abbreviations.

Abbreviation	Affiliation
CAV	Composting Association of Vermont
CLF	Joint Comments submitted by Conservation Law Foundation (CLF) on behalf of CLF, Sierra Club, Trout Unlimited, Lake Champlain Committee, Connecticut River Watershed Council, Lewis Creek Association, Lake Champlain International, and the Lintilhac Foundation
Krebs & Lansing	Krebs & Lansing Consulting Engineers
Contech	Contech Engineered Solutions
CCRPC – CWAC	Chittenden County Regional Planning Commission – Clean Water Advisory Council
LCI	Lake Champlain International
UVM	University of Vermont, Plant and Soil Science Department
South Burlington	City of South Burlington
VNRC	Vermont Natural Resources Council
Williston	Town of Williston
WCA	Watershed Consulting Associates

§2.2.2 Runoff Reduction Framework

1. **Comment:** 2.2 – 2.2.2. Runoff Reduction Framework - Consider adopting graphical representation of this framework to clarify this new process for practitioners. An example from the NY State Stormwater Management Design Manual is included for reference. (WCA)

   Response: For purposes of rulemaking, most schematics and graphics were removed from the proposed 2017 VSMM. Following adoption of the 2017 VSMM, the Manual is to be repackaged in manual format, inclusive of schematics and graphics that will serve as additional guidance. This will allow for guidance to be modified and improved as necessary in response to public feedback, which could occur outside of the rulemaking process. The Department expects the guidance to include graphical representation pertaining to STP selection and the runoff reduction framework.

§2.2.4 Water Quality Treatment Standard

2. **Comment:** Approximately twenty comments were received from various individuals through an automated email, submitted on behalf of CLF as follows: I am writing as a clean water advocate and as a Vermonter who is tired of seeing toxic blue-green algae blooms on Lake Champlain and other public waters each summer. Stormwater runoff from rooftops, parking lots, and roadways is a major contributor to phosphorus pollution a trend that will only worsen with increased rainfall from climate change. Green practices can remove 80 percent or more of the phosphorus running off of development sites. We urge the Department of Environmental Conservation to adopt this 80 percent standard in the Stormwater Manual. Treating stormwater is necessary for clean water. I hope the State acts quickly to address this growing concern. (CLF)

   Response: The 2017 VSMM includes a revised Water Quality Treatment Standard (WQTS) that established a tiered stormwater treatment practice (STP) approach that will require, when feasible, the use of higher performing practices capable of meeting an 80% total phosphorus (TP) removal goal. These STPs, such as an infiltration basin, are identified as Tier 1 STPs. The 2017 VSMM also incorporates green infrastructure STPs. See response to Comments 3, 4, and 5.

3. **Comment:** The Manual should incorporate a clear, numeric phosphorus removal standard. The VSMM is an essential tool to meet the Lake Champlain TMDL targets for developed land. The Environmental Protection Agency (EPA) has affirmed that a 70% or higher total phosphorus (TP) standard is necessary to achieve waste load allocations and be consistent with the reasonable assurance that phosphorus reductions from stormwater sources will actually occur. Accordingly, DEC has committed to updating the VSMM "to employ state-of-the-art stormwater BMPs designed to *maximize* phosphorus removal" (emphasis added).

   In addition, the VSMM is read and interpreted by a broad community – not only as standards for stormwater designers, but also as a key milestone in the accountability framework for the Lake Champlain TMDL. It is critically important that requirements in the Manual are clear to multiple stakeholders with varying backgrounds.

   The Manual should therefore clearly state that the Water Quality Treatment Standard (WQTS) for TP is at least 80%– the expected removal efficiency for Tier 1 Practices. If Tier 1 Practices are infeasible,

designers must seek a variance to the WQTS. The permit application materials (e.g., the STP Selection Tool) would serve as the paperwork required to seek either a Tier 2 or Tier 3 Practice variance. This approach – where Tier 1 Practices are the only STPs that actually meet the WQTS – makes it clear to designers and the public that Tier 1 Practices, where feasible, must always be used over other practices. For specific language suggestions, please refer to Appendix B.

In addition to a permit-by-permit WQTS, the Manual should include an average 70% phosphorus removal standard for new development for each lake segment as referenced in the Lake Champlain TMDL. This will ensure that variances from the WQTS are appropriately limited and that wasteload allocations for each lake segment will be met. For specific language suggestions, please refer to [Comment 5]. (CLF)

Response: The Manual includes a strong Water Quality Treatment Standard to achieve removal of total phosphorus. The WQTS requires the use of Tier 1 STPs, unless use of such practices is infeasible. Supporting application materials will guide an applicant through a series of questions to determine if the applicant's site and proposed project can accommodate Tier 1 STPs (the specific criteria for utilizing and implementing individual STPs are included in the Rule). If application materials demonstrate that a site and project can accommodate Tier 1 STPs, the applicant must use Tier 1 practices, which are infiltration-based practices that generally exceed 80% TP removal (USEPA BMP Performance Curves, National Stormwater Database, International Stormwater Database).

If application materials show that a site and project cannot accommodate Tier 1 STPs, a designer must evaluate the use of Tier 2 STPs, which are filtration based practices that have a TP removal rate of 60-80%, and include bioretention systems and gravel wetlands. *Id.* An applicant that cannot use Tier 1 practices must use Tier 2 STPs, unless the designer provides a detailed justification explaining the site and design constraints that prevent the use of Tier 2 STPs; cost may not be used as a justification.

Tier 3 STPs may only be used as a last resort after a designer has clearly demonstrated that a site and project cannot accommodate Tier 1 and Tier 2 STPs. Tier 3 STPs have a TP removal rate of 50-60%. *Id.*

The Department does not believe it is necessary to incorporate the term "variance" in the VSMM to clarify the foregoing process.

The WQTS is a best management practice (BMP) standard, not a numeric phosphorus removal standard. The presumed pollutant removal efficiencies associated with BMPs in the 2017 VSMM Rule are not intended to be standards in, and of, themselves. Given the variable nature of stormwater, including variations in waste stream concentration and volume, the Department does not support establishment of a numeric standard.

Additionally, in the U.S. Environmental Protection Agency's (EPA's) comment letter dated August 8, 2016, in which EPA commented on the pre-rulemaking VSMM draft dated March 1, 2016, EPA encouraged the State "to establish no less than a 70% removal efficiency for phosphorus … A 70% removal efficiency would be consistent with the assumption DEC used in the future growth analysis for the Lake Champlain TMDLs … The future growth analysis calculated an average removal efficiency of 71.2% across all soil types, based on the "standard treatment scenario." (emphasis added). The pre-rulemaking draft VSMM included a WQTS with a 50% TP removal efficiency; the draft did not use the

tiered approach, described above. It is the Department's position, that the tiered approach, when implemented in total, will be consistent with EPA's recommendation.

4. **Comment:** The VSMM should set the water quality treatment standard at removing 80%of the TP load. The draft VSMM sets the water quality treatment standard at removing 50 percent of the total phosphorus (TP) load, a mere 10 percent increase from the 2002 VSMM. This minimal increase in TP removal is neither sufficient to meet the significant phosphorus reductions laid out in the Lake Champlain TMDL nor does it reflect "state-of-the-art stormwater BMPs designed to maximize phosphorus removal," as promised by DEC in the Phase I Plan. Rather, an 80 percent TP removal standard is justified by the substantial mandates set forth in the Lake Champlain TMDL and is supported by DEC's commitments in the Phase I Plan. "State-of-the-art" stormwater treatment practices (STP) that infiltrate and filtrate can achieve an 80%TP removal rate. The draft VSMM indirectly embraces an 80% removal standard by requiring that infiltration – practices known to have high removal efficiencies – be "first considered." However, this vague statement has unclear outcomes and cannot substitute a strong water quality standard. Where infiltration alone is infeasible, a stringent TP removal standard will drive greater implementation of enhanced filtration practices, multiple STPs in series (including infiltration practices where possible in combination with filtration practices), and practices with soil amendments. A promising soil amendment is water treatment residuals (WTRs), which bind to phosphorus to further improve the removal efficiency. According to the Minnesota Pollution Control Agency; soil amendments to enhance phosphorus sorption typically do not increase bioretention maintenance needs. In addition, since WTRs are byproducts of the water treatment process they can often be procured at little or no cost. Setting a stringent water quality treatment standard is beneficial for a number of reasons. First, it lifts the burden from DEC to prioritize certain practices over others – since phosphorus removal efficiencies will dictate acceptable STPs. Second, all acceptable STPs remain within the toolbox for developers to use, only now practices with poor TP removal efficiencies must be developed in series, often referred to as a "treatment train," or with amendments to improve their performance. Third, a progressive phosphorus standard accommodates the static nature of the VSMM and will remain relevant into the future. Finally, and most importantly, strict controls on phosphorus discharges are necessary to clean up Lake Champlain and meet water quality standards.

   In recognition of possible site constraints, DEC may allow for variances where the 80% standard simply cannot be met. However, in this case, DEC should be prescriptive in dictating which STPs are acceptable. We recommend DEC establish a hierarchy of STPs, in which practices that infiltrate and provide filtration are prioritized over retention and detention practices. Specifically, DEC should mandate that bioretention, dry swales, gravel wetlands, infiltration trenches and basins, filtering systems, green roofs, and permeable pavement practices be prioritized over wet swales and wet ponds. We believe DEC is already developing a prioritization scheme, and we welcome the opportunity to engage in this process. (CLF)

   Response: See response to Comment 3. The Department takes issue with the statement that the proposed WQTS requires only 50% TP removal. While the pre-rulemaking VSMM draft, dated March 1, 2016, had a WQTS with a 50% TP removal rate, the final proposed VSMM includes a tiered approach that *requires* use of Tier 1 STPs (which have an 80% total phosphorus removal rate), unless use of such STPs is infeasible.

   In developing the final proposed WQTS, the Department established requirements that are both protective and achievable on Vermont sites. The VSMM Rule has been revised to require the use of

infiltrating practices where soil properties allow and where they will not pose a risk to groundwater. The Department also understands that certain constraints and conditions will exist on a significant number of sites, thus limiting the use of infiltrating practices (Tier 1 STPs). Based on the Department's analyses of the NRCS soil survey, approximately 19% of sites currently covered by an operational stormwater permit are classified as hydrologic soil group (HSG) D, clay soils, which will typically not meet the minimum infiltration rate requirements of the highest performing practices. Another 23%of permitted sites have a dual HSG classification (A/D, B/D, or C/D). These soils are coarser in texture with higher hydraulic conductivity, but have a seasonal high water table of less than 24 inches from the surface, so the use of infiltration is limited under the feasibility criteria of the infiltrating practices in the Manual. Combined, these factors suggest that over 40%of sites requiring permits are likely to have significant barriers to providing water quality treatment through use of infiltrating practices. The VSMM must accommodate for development projects that cannot infiltrate due to site or project characteristics, which is reflected in the final proposed VSMM.

One proposed treatment is the amendment of bioretention or filter media with materials such as water treatment residuals or iron to improve dissolved phosphorus treatment. While there have been several column studies showing promising results, in field performance data is limited for these systems. The Department is not aware of any studies that have documented TP removal efficiency at or near 80 percent under field conditions. One study performed by the University of New Hampshire (UNH) Stormwater Center showed a mix with 10% water treatment residuals achieved 86-99% TP removal in column studies (Stone, 2013). The same mix exhibited 55% TP removal under field testing. Additional research is needed into the design specifications, installation, maintenance, and performance under variable climate conditions to confirm that this practice can be used to meet a higher TP standard with confidence. The Department understands that local field studies are underway. The VSMM includes revisions that more readily allow for the incorporation of additional practices, provided monitoring data is available.

Gravel wetlands are another practice cited as a higher performing practice that could be applicable on sites with poor infiltration capacity. The UNH Stormwater Center (2012) reported a 58% TP removal efficiency for their submerged gravel wetland. The National Stormwater Database (Winer, 2000) cites an TP removal efficiency of 63%, based on two studies. Both are significantly below the proposed 80% removal standard. The Department is not aware of additional design variations for gravel wetlands that would provide significant performance improvement. The VSMM now identifies gravel wetlands as Tier 2 STPs.

Regarding the use of BMPs in series, also referred to as a "treatment train" approach, there is a lack of evidence that this approach will provide reliable treatment to the levels theorized. As explained by Schueler (2000), STPs that rely on sedimentation or filtration exhibit irreducible pollutant concentrations. Whether due to internal loading of the practice or limitations on the pollutant removal pathway, pollutant concentrations cannot be reduced below a certain point. Further, per Schuler, adding a second or third practice won't necessarily provide additional water quality benefit where the first practice reduces pollutant concentrations to this irreducible point. The Department is not requiring the widespread use of treatment trains for meeting the WQTS given the uncertainty surrounding their benefit. Again, a designer may propose a treatment train approach under the Alternative STP provisions included within the VSMM, which require supporting information and Department approval.

5. **Comment 5A:** The VSMM is read and interpreted by a broad community – not only as standards for stormwater designers, but also as a key milestone in the accountability framework for the Lake Champlain Total Maximum Daily Load (TMDL). It is therefore critically important that requirements are clear to multiple stakeholders with varying backgrounds. Our recommendations seek to eliminate ambiguity in the Manual and maximize consistency of standards across projects and landscapes. CLF limits the suggested drafting revisions contained herein to the water quality treatment standard (WQTS). Phosphorus removal is our top priority. Second, it is our understanding the Agency and CLF agree regarding substance on this point (i.e., that the Manual intends to maximize phosphorus reductions on every site to achieve TMDL mandatory limits). Accordingly, it is mutually beneficial to incorporate CLF's drafting revisions to more clearly articulate this intention of the Manual. We suggest changes to two sections in the Manual (Introduction and Site Design). Within those two sections, we recommend drafting edits to the following subsections: the introductory reference to the 70 percent phosphorus removal standard, the manual review, the water quality treatment standard, and the water quality practice selection. Our rationale is as follows:

   Reasons for suggested changes to introduction, including manual review: The Manual's introduction should clearly state that an average 70 percent phosphorus removal standard will be achieved for each lake segment in order to meet TMDL limits, and to be consistent with the reasonable assurance that phosphorus reductions from stormwater will be achieved. The Manual Review provision must contain clear instructions for what exactly the Secretary is reviewing every five years, as well as a metric against which the Manual will be reviewed. Furthermore, this provision should set forth actions the Secretary shall pursue should the Manual be determined an inadequate strategy to meet TMDL targets.

   CLF urges the Agency to make the following edits to Subchapter 1.0 (Introduction and Purpose):

   Page 1-1, paragraph 4
   The 2017 VSMM is a key component of Vermont's program to protect waters from the impacts associated with developed land. The standards in this Manual, when applied pursuant to a stormwater permit, are effective in managing stormwater from new development and redevelopment. The 2017 VSMM is also an important strategy associated with Total Maximum Daily Load (TMDL) implementation in impaired waters, such as Lake Champlain. When the practices in the 2017 VSMM are applied to new development in the Lake Champlain watershed, *[the]* phosphorus load from new development will be reduced by at least 70%, on average [*for each of the 13 lake segments in the Vermont portion of the Lake Champlain watershed as referenced by the Lake Champlain TMDL]*. Act 64 of 2015, also known as the Vermont Clean Water Act, directs the Agency to regulate all existing parcels with three or more acres of impervious surface and gives the Agency the authority to designate smaller parcels if the Secretary of Natural Resources (Secretary) determines treatment is necessary to reduce adverse impacts to water quality; the 2017 VSMM will serve as the design standard for these statutory provisions. The 2017 VSMM and the associated operational stormwater permit program applied in conjunction with the state stormwater programs, including construction, industrial, municipal, and the newly created municipal roads permitting authority will serve to protect, maintain, and restore Vermont's waters.

   Response: While the Department will be tracking data by lake segment, the Department does not believe that additional edits to this paragraph are necessary. The Department stands by its statement that, "When the practices in the 2017 VSMM are applied to new development in the Lake Champlain

watershed, the Vermont Agency of Natural Resources estimates that the phosphorus load from new development will be reduced by at least 70%, on average."

Comment 5B: Page 1-2, paragraph 1
Manual Review. [*To*] ensure the standards in the VSMM remain the highest and best, and *to accommodate evolution in* the field of stormwater management, the Agency shall review the standards in the VSMM at least every five years. [*At the time of review, the Secretary shall determine whether the phosphorus load from new development has been reduced by at least 70% on average for each lake segment. If this TMDL reduction mandate is not met, the Agency shall revise the VSMM to increase phosphorus removal capacity and increase the acreage of existing developed land subject to stormwater permit.*]

Response: The Department agrees that this section would benefit from further clarification. The Department has added the following language to further describe what the Department will analyze as a part of its five-year review of the Manual.

Manual Review. Because of the importance of the VSMM, the Agency's goals to ensure the standards in the VSMM remain the highest and best, and the understanding that the field of stormwater management continues to evolve, the Agency shall review the standards in the VSMM at least every five years to determine if the VSMM needs be revised to incorporate changes. At the time of review, the Secretary shall determine the average phosphorus load reduction from new development across the entire Lake Champlain Basin and within each lake segment, since implementation of this Manual. If the phosphorus loads from new development are not being reduced by at least 70%, on average, the Secretary shall determine whether changes are needed to this Rule or other statutory or regulatory schemes to achieve the necessary phosphorus reductions.

Comment 5C: Reasons for suggested changes to water quality treatment standard and practice selection: The Manual should clearly state that the Water Quality Treatment Standard (WQTS) for phosphorus is at least 80 percent – the expected removal for Tier 1 Practices. If Tier 1 Practices are not feasible, designers must seek a variance to the WQTS. The permit application materials (e.g., the STP Selection Matrix) would serve as the paperwork required to seek either a Tier 2 or Tier 3 Practices variance. This approach – where Tier 1 Practices are the only STPs that actually meet the WQTS – makes it clear to designers and the public writ large that Tier 1 Practices, where feasible, must always be used over other practices. We believe the term "variance" works better than "exemption or "waiver," since those latter terms imply that the site is no longer subject to the WQTS.

Subchapter 2.0 (Site Design and Stormwater Treatment Practice Sizing Criteria)

2.2.4 Water Quality Treatment Standard (WQTS)

Page 2-7, paragraph 1
Except for redevelopment [,] which shall comply with Section 2.4, to comply with the Water Quality Treatment Standard (WQTS), the runoff resulting from the 90th percentile rainfall event, which is equivalent to the first inch of rainfall, shall be captured and treated [*to remove 98% of the average annual, post-development total suspended solids (TSS) load, and at least 80% of the total phosphorus (TP) load*]. This runoff contains the majority of pollutants. [*As explained in Section 2.2.4.1, where*

attainment of the WQTS is not feasible, designers shall use permit application materials provided by the Agency to seek either a Tier 2 or Tier 3 Practices variance to the WQTS.]

2.2.4.1 Water Quality Practice Selection
Page 2-7, 2-8, 2-9
(a) Practices [*that meet*] the WQTS are [designated as Tier 1 Practices in this Manual]. The STPs [in Tier 1 provid[*e*] the greatest degree of water quality treatment and runoff reduction. [All sites shall use Tier 1 Practices, unless a Tier 2 or Tier 3 Practices variance to the WQTS is sought (see 2.2.4.1(b), (c), and (d) below)].
(b) Designers shall use permit application materials provided by the Agency [*to*] evaluat[*e*] *whether Tier 1 Practices are feasible for a site. If such Practices are not feasible pursuant to the application materials, the designer must seek a variance to the WQTS. As justified by permit application materials, designers must first seek a Tier 2 variance and, only if Tier 2 Practices are infeasible, may a designer seek a Tier 3 Practices variance. Designers*] shall certify in the permit application to the [*STP*] evaluation and analyses, and, if required, justification that they provide pursuant to the requirements of this Section 2.2.4.1. [*Cost shall never be used as a justification*].
(c) When no STPs already exist on a site [*or the designer proposes not to use the pre-existing STP*], the designer shall evaluate use of Tier 1 STPs, pursuant to permit application requirements. If, based upon completion of the permit application materials, use of Tier 1 STPs is infeasible, then the designer shall evaluate use of Tier 2 Practices. Tier 3 Practices may only be used if Tier 1 STPs cannot be used and the designer provides a detailed justification for why Tier 2 Practices cannot be used. The designer's detailed justification shall explain the site or design constraints that require use of Tier 3 Practices; cost may not be used as a justification.
(d) When an STP already exists on a site, and the designer proposes to use the pre-existing STP, the designer shall evaluate whether the STP can be modified in-line or off-line of pre-existing infrastructure to meet [*the WQTS. If meeting the WQTS is* infeasible], the pre-existing STP shall be modified to the highest Tier pollutant reduction level that the STP can accommodate. [*Designers shall use permit application materials to justify seeking a variance of the WQTS and use of a Tier 2 or Tier 3 Practice*]. If the pre-existing STP cannot accommodate modifications to meet 2017 STP design requirements, but the STP meets the 2002 Manual STP design requirements, and is identified as an acceptable STP for meeting the WQTS in the 2017 VSMM, then the project shall continue implementing the pre-existing STP. The 2002 STP shall be modified, if necessary, to accommodate applicable treatment standards for new and redeveloped impervious surfaces. If the pre-existing STP cannot accommodate modifications and does not meet the STP design requirements of the 2002 VSMM, then the designer shall follow the STP evaluation process in 2.2.4.1(c).

Tier 1 Practices
Tier 1 Practices are the practices that can be designed to provide water quality treatment and infiltrate the water quality volume (WQV), and include practices such as infiltration basins, unlined bioretention cells, and other practices that treat and infiltrate stormwater runoff. These practices, when properly constructed and maintained, are expected to achieve the highest pollutant removal and runoff reduction of all the practices identified in this Manual; generally exceeding 80% TP and 98% TSS removal (USEPA BMP Performance Curves, National Stormwater Database, International Stormwater Database). In addition, TV credit towards the Hydrologic Condition Method (HCM) under the Channel Protection Standard is equivalent to the volume of stormwater infiltrated, which can exceed the WQV when designed to accommodate larger volumes. Infiltration feasibility and soil testing requirements for infiltrations are specified in Section 4.3.3.

Tier 2 Practices
When infiltration is infeasible, a designer shall evaluate use of Tier 2 Practices to [*determine whether a Tier 2 variance to*] the WQTS [*is justifiable*]. Tier 2 Practices include high performance practices, such as gravel wetlands and lined bioretention cells that may provide a sump with stormwater storage at the base of the practice. These practices will often be lined and underdrained due to a high seasonal groundwater table, hotspot land uses, or other design limitations. These practices, when properly constructed and maintained, are expected to achieve a high pollutant removal rate ranging from 60% - 80% TP and 80-97% TSS removal (USEPA BMP Performance Curves, National Stormwater Database, International Stormwater Database).

Tier 3 Practices
If [*the use of*] Tier 1 or Tier 2 Practices specified above [is infeasible as justified through permit application materials], then a designer may [*seek a*] Tier 3 Practices [*variance to*] the WQTS. Tier 3 Practices include lined dry swales, lined filters, wet ponds, and shallow surface wetlands. These practices, when properly constructed and maintained, are expected to achieve a pollutant removal rate ranging from 50-60% TP and approximately 80% TSS removal (USEPA BMP Performance Curves, National Stormwater Database, International Stormwater Database). (CLF)

Response: See responses to Comments 3 and 4. While the Department has not incorporated the suggested edits regarding use of a variance approach, the Department has incorporated the following edits to strengthen and clarify the WQTS section (2.2.4.1):

* * *

(c) When no STPs already exist on a site or the designer proposes not to use the pre-existing STPs, the designer shall ~~first~~ evaluate use of the Tier 1 STPs listed in the table below, pursuant to permit application requirements. If, based upon completion of the permit application materials, use of Tier 1 STPs is feasible, then the designer shall use Tier 1 STPs. If, based upon completion of the permit application materials, use of Tier 1 STPs is ~~not possible or is~~ infeasible, then the designer shall evaluate use of Tier 2 Practices. Tier 3 Practices may only be used if Tier 1 STPs listed in the table below cannot be used and the designer provides a detailed justification for why Tier 2 Practices cannot be used. The designer's detailed justification shall explain the site or design constraints that require use of Tier 3 Practices; cost may not be used as a justification.

(d) When an STP already exists on a site, and the designer proposes to use the pre-existing STP, the designer shall evaluate whether the STP can be modified in-line or off-line of pre-existing infrastructure ~~to meet the Tier 1, 2, or 3 Practice pollutant reduction levels~~. If the pre-existing STP can be modified, the STP shall be modified to the highest Tier pollutant reduction level that the STP can accommodate. If the pre-existing STP cannot accommodate modifications to meet 2017 STP design requirements, but the STP meets the 2002 Manual STP design requirements, and is identified as an acceptable STP for meeting the WQTS in the 2017 VSMM, then the project shall continue implementing the pre-existing STP. The 2002 STP shall be modified, if necessary, to accommodate applicable treatment standards for new and redeveloped impervious surfaces. If the pre-existing STP cannot accommodate modifications and does not meet the STP design requirements of the 2002 VSMM, then the designer shall follow the STP evaluation process in 2.2.4.1(c).

* * *

Tier 2 Practices
When infiltration is ~~not possible or is~~ infeasible, a designer shall evaluate use of Tier 2 Practices to meet the WQTS, as listed in the table below. Tier 2 Practices include high performance practices, such as gravel wetlands and ~~lined~~ bioretention cells that may provide a sump with stormwater storage at the base of the practice. These practices ~~will often~~ may in some cases be lined and underdrained due to a high seasonal groundwater table, contributing hotspot land use~~s~~, or other design limitations. These practices, when properly constructed and maintained, are expected to achieve a high pollutant removal rate ranging from 60%-80% TP and 80-97% TSS removal (USEPA BMP Performance Curves, National Stormwater Database, International Stormwater Database).

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6. **Comment:** DEC should clarify how it will address the following case studies. (CLF)

   Scenario 1: A designer applies for a stormwater permit for a new development. The site is comprised entirely of Class D soils. Due to the hydrologic soil group, infiltration is infeasible. The designer decides to utilize two areas of lined bioretention, an accepted Tier 2 Practice, for some treatment. The designer then justifies the use of a wet pond, an accepted Tier 3 Practice, to treat the remainder of the volume. The justification provided is that space is too limited to meet the WQTS and the Channel Protection Standard with the bioretention system. Will DEC accept this justification? In this case, how much of the water quality volume must be treated with a Tier 2 Practice?

   Scenario 2: A site has a pond present as the current STP. There is insufficient space to implement an STP prior to the pond, but there is an adjacent parking lot. The designer proposes using the existing pond as treatment. Will DEC accept this justification? Or, assuming that elevations allow for subsurface storage to drain without requiring pumping, will DEC require the designer to tear up the parking lot to install subsurface storage? (CLF)

   Response: The Department cannot offer a determination on hypothetical scenarios where all site or project specific information may not be available. STP selection is based on feasibility to meet the Water Quality Treatment Standard, and thus use of a Tier 3 STP is allowable for meeting the other standards, such as the Channel Protection Standard, when applicable. See response to Comments 3, 4, 5, and 8.

7. **Comment:** The woefully inadequate 40% phosphorus removal standard in the 2002 Vermont Stormwater Management Manual helps explain why nearly 1/5th of the phosphorous pollution flowing to Lake Champlain still comes from developed lands even though Vermont law has long required stormwater permits for many types of development and redevelopment. Existing development that Vermont and federal officials have for too long held-harmless, despite the documented contributions to water quality standards violations from these unpermitted discharges, deserves its share of the blame. Nonetheless, Vermont can no long authorize new development to add more phosphorous pollution to stormwater discharges than it removes.

The current draft of the Manual moves Vermont's permitting standards in the right direction, but not nearly far enough to satisfy the state's commitments contained in the Lake Champlain TMDL. The various state and federal models and plans underlying the ambitious pollution reduction targets and future growth assumptions contained in the Lake Champlain TMDL depend on phosphorus removal efficiencies of at least 70%. To support the reasonable assurances Vermont has made and that EPA will soon test as part of the TMDL's "Accountability Framework" process, the 2017 Manual—as the centerpiece of Vermont's stormwater regulation—must set forth enforceable standards to get us there. As currently drafted, the Manual sets forth a preference for stormwater treatment practices that can achieve even higher rates of phosphorous removal, but falls short of establishing a performance standard that holds developers fully responsible for their fair share of pollution reduction.

LCI has reviewed the Department's response to the comments LCI filed in conjunction with other like-minded organizations in 2016. LCI is disappointed in the pessimism contained in DEC's response and finds it hard to reconcile with the commitments DEC has made as part of the Lake Champlain TMDL process. When promoting the TMDL and its "Reasonable Assurances" package, both the Department and EPA clearly believed that, in the vast majority of cases, developers throughout the basin could achieve the level of phosphorous pollution removal reflected in the future growth analysis on which Vermont's assurances are based. In moving from high-level analysis to enforceable standards, DEC cannot now bait and switch.

The TMDL's "Accountability Framework," requires EPA to test Vermont's resolve in fulfilling its commitments both in terms of timeliness and substance. To pass this test—and the ultimate test of cleaning up our waters—the final 2017 Manual should go beyond the proposed "Tier" approach to selecting stormwater treatment practices. Rather, DEC must adopt a performance standard for site-wide phosphorus removal of no less than 70% removal consistent with the assumptions of the Lake Champlain TMDL. LCI is confident that Vermont developers and the design community that serves them are creative and resourceful enough to achieve the pollution reductions we need by using a range of proven structural and nonstructural approaches. But LCI is also confident that many will not do so unless required to by a clearly stated performance standard that is consistent with the commitments in the TMDL. (LCI)

Response: See response to Comments 3, 4, and 5.

8. **Comment:** What would make the various lined practices included in the VSMM infeasible? There are no tables provided specifically for lined practices (e.g. lined bio-retention). These practices are grouped in a table with their unlined counterparts and anything in the feasibility section of the table relates only to the version that is unlined (i.e. designed to infiltrate). Is it correct to assume that there is nothing that would result in these practices being considered "infeasible"? (South Burlington)

Response: The Department is not aware of all potential site or project characteristics that would make use of a Tier 2 STP for meeting the WQTS, such as a bioretention practice, infeasible. The Department will expect designers, through permit application materials, to justify Tier 1 or Tier 2 STP infeasibility based on the WQTS, as required by the Manual. There are many design elements and existing site conditions that must be considered when siting and sizing a STP. Therefore, feasibility will be based upon required treatment volumes, storage requirements, and specific STP design requirements. The

Department expects that there will be situations where a Tier 2 STP can be justified as infeasible for meeting the applicable WQTS, thus allowing a designer to propose use of a Tier 3 STP.

9. **Comment:** How can a designer propose a Tier 3 Wet pond? An example of such is for a pending local development. This development is proposing two small bioretention STPs and a large wet pond which will perform most treatment. An excerpt is below.

We have reviewed the draft stormwater management manual and the list of Tier 1, 2, and 3 treatment practices. This site is comprised entirely of Class D soils which are defined as clay loam, silty clay loam, sandy clay, silty clay or clay. This HSG has the highest runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface and shallow soils over nearly impervious material. Due to the heavy soils and difficulty infiltrating the use of Tier 1 treatment practices (infiltration basins, trenches, chambers, dry wells, unlined bioretention, unlined dry swales, unlined filters, simple disconnection of disconnection to filter strip or vegetated buffers) is not feasible. The site has been designed to utilize two areas of lined bioretention which is an accepted tier 2 practice, and a large wet pond, an accepted tier 3 practice, will provide the bulk of the treatment and storage requirements of the site in accordance with the current VSMM. So here is the concern, a designer can get out of Tier 1 due to soils, implement a small token tier 2 practice, and then continue to rely on wet ponds. How will the Department respond in these situations? Will it be:

A) The Business as usual response: Proposed project approved.
B) The Treatment Train response: In order for this submittal to be acceptable you must expand your use of lined bioretention or other Tier 2 STPs so that they provide treatment of the Water Quality Volume (WQ_v) for all new impervious surfaces. Then you are allowed to use a wet pond for compliance with the Channel Protection Standard, Overbank Flood Protection Standard, and Extreme Flood Protection (as required).
C) The Hardline response: The proposed project demonstrates that use of Tier 2 practices is possible. Therefore, there is no reasons that Tier 3 practices should be implemented on this site. Please revise the proposal to remove all tier 3 practices and resubmit.
D) Something else?

Whatever the response, I still think they should revise the wet pond design requirements so that they achieve increased P removal. Something like requiring the wet pond design to route the first inch of rain to lined bio-retention before it heads to the main pond body may do the trick. Flows larger than this could bypass the bio-retention and go straight to a forebay as they do now. As long as the "first flush" goes to bio-retention, I think this would be a significant improvement in P removal for a wet pond design.

The STP selection process is required for the WQV or the first inch. As this scenario includes the treatment of the first inch in a lined bioretention, then this scenario would be considered a the use of a Tier 2 practice. In other words, this scenario would be viewed as identical as scenario B as you have described above, without necessitating changes to the wet pond requirements. (South Burlington, Williston)

Response: See the response to Comments 3, 4, 5, and 8.

10. **Comment:** The Chittenden County Regional Planning Commission – Clean Water Advisory Council recognizes the important role stormwater designers have with regards to STP design and ongoing inspection efforts. Knowing this, the CWAC encourages the Department to develop and implement a "Designer Training" program as part of the Manual upgrade. (CCRPC - CWAC)

    Response: Following adoption of a final 2017 VSMM, the Department plans to provide statewide training and outreach opportunities for the design community and public at large, to cover the changes, including anticipated changes to permit application material requirements. The Department also expects to develop inspection/maintenance materials specific to STPs that will be incorporated into application requirements and will support ongoing permit compliance. The Department would welcome an opportunity to coordinate with the CWAC and other stakeholders on scheduling needed training prior to the effective date of the adopted Manual.

11. **Comment:** While the municipal representatives for the CWAC may disagree on the nuances of increased P control, further clarification of the Tiered system is required in the following areas (CCRPC-CWAC);
    - Define "infeasibility" for Tier 1 and Tier 2 projects.
    - Define "feasibility" for individual STPs
        - It appears feasibility and design criteria for lined systems are assumed to be the same as that of un-lined systems. These should be broken out and treated separately.
    - What scenario/argument would allow a designer to choose a Tier 3 lined dry swale as opposed to a Tier 2 lined bioretention?
    - What scenario/argument would allow a designer to utilize a Tier 3 wet pond?

    Response: See response to Comments 3, 4, 5, 6, 8 and 9. In addition, the Department expects to further refine and finalize the draft STP Selection Tool and develop new application materials that will aim to support designers in the selection of STPs in consideration of feasibility, reflective of the requirements set forth in the 2017 VSMM. The Department has further made revisions the 2017 VSMM pertaining to when practices are lined or not lined in response to comments.

12. **Comment:** The Department should provide a clear link between the Vermont manual and the cited sources for the removal efficiencies of each Tiered practice. (CCRPC-CWAC)

    Response: The Department relied upon multiple sources, including USEPA Performance Curves, the National Stormwater Database, and the International Stormwater Database, as stated in the 2017 VSMM, for determining STP pollutant removal efficiencies and for the purpose of grouping of STPs in Tiers 1 through 3. In some cases, data on a STP type was limited, or the practice design slightly differed from the STP design as it appears in the 2017 VSMM, and thus the Department's placement of the STP within a particular tier may have been reflective of these factors to ensure that STP pollutant removal efficiencies were not overestimated. Additional information the Department relied upon for establishing Tier 1, 2, and 3 STPs is available upon request.

13. **Comment 13A:** A major focus of water quality in Vermont is phosphorus (P) reduction. This is primarily due to the P loading that occurs in Lake Champlain which results in algae blooms and related issues. The 2017 VSMM includes a new tier structure that requires the use of certain STPs be put in place unless their installation is not feasible due to site conditions. The tiers are structured such that

those STPs providing greater P removal must be considered first. We support this approach with certain caveats, and would like to make the following comments: (South Burlington)

The VSMM includes tables for each STP. These tables contain STP feasibility criteria for various site conditions (e.g., an infiltration STP would not be feasible if there is a hot spot land use upstream). Some STPs can be designed as either "lined" or "unlined" (e.g., bio-retention areas). Both versions of these STPs are contained in the same table, but information related to feasibility is only provided for those versions of the STP that are "unlined" (intended to infiltrate stormwater). We strongly recommend that additional tables be created for each version of an STP (i.e. lined or unlined) so that the feasibility of each can be understood by designers. This is also important because before an STP in a lower tier can be considered for installation the designer must show that those of a higher tier are not feasible. The difference in the P reduction expected from Tier 3 practices is significantly lower than those expected from Tier 1 or Tier 2 practices. Therefore, the feasibility of lined STPs will be critical to ensuring the consistent application of this procedure and ensuring that practices with the best P removal rates are installed.

Response: The Department removed the STP Design Summary tables from the rulemaking version of the Manual because they were duplicative of the requirements provided in the text. The tables as presented in the March 1, 2016 draft of the VSMM will be revised, reformatted, and reinserted into the Manual as guidance in support of the requirements established in the 2017 VSMM. The Department expects that the revisions made will address the concerns raised in the comment.

Comment 13B: We would like to know what changes the Department considered to the design requirements for wet ponds and why only a minor change to the outlet structure (i.e. gravel bench) is proposed in the new VSMM? This design change is not anticipated to result in improved P removal for this particular STP. Wet ponds are typically the least expensive STP to construct (which is part of the reason they have been so popular in the past), but they provide poor P removal when compared to other STPs. If DEC has not done so already, new requirements for wet ponds that are designed to improve P removal should be investigated and, if appropriate, included in the revised VSMM.

- One potential solution is to require that the first inch of rain be directed to a lined bio-retention area before discharging to the pond's main body. During larger storm events, additional runoff would bypass the bio-retention area and be routed into a forebay before flowing into the pond's main body.

Response: Changes to the Wet Pond STP design requirements were not limited to the gravel trench outlet. Wet Ponds must now also be designed for longer flow paths (length to width ratio of 3:1), must be designed with 25% of the WQv in deep water zones which shall be surrounded by an aquatic bench, and safety bench as applicable. Wet Pond STP design is also now required to include a planting plan for both aquatic and terrestrial areas. The Department expects that these proposed changes to design requirements for Wet Ponds will improve residence time, improve vegetative uptake, and limit the effects of temperature on receiving waters from stormwater discharges. In accordance with the new requirements for selecting a STP for meeting the WQTS, designers must still identify that a Tier 1, and subsequently, a Tier 2 practice is infeasible before relying on a Tier 3 practice such as a Wet Pond which may align with the solution presented in the comment.

Comment 13C: We do not support the inclusion of a strict P removal requirement (e.g., require that a site remove a minimum of 80% P) in the VSMM. The tier approach proposed by DEC prioritizes those

STPs that provide the highest P removal over those that provide lower P removal. This will significantly improve the P removal required by STPs in the VSMM for many sites. If combined with improvements to the wet pond design (see comment 3b) this would result in even greater P removal on individual sites. Our endorsement of the tier approach comes with two important caveats: (1) DEC must make consistent determinations regarding whether or not a certain type of STP is feasible and these determinations must be based on what is contained in the manual. We recommend that DEC take a careful look at the feasibility requirements for each STP and make changes/additions as necessary before the VSMM is finalized. For example, a project should not be allowed to propose buildout of a site to maximize the number of residential units that can be placed on the site and then claim that there is not enough space to implement Tier 1 or Tier 2 STPs. In this case, the proposed project must be scaled back so that it can include a STP that provides better P removal. "Not enough space for stormwater treatment", must mean that there is not enough space for the project as proposed on the site, and (2) the VSMM must make accommodations for stormwater retrofit projects that will provide improved treatment of runoff from impervious area that currently exists. In these instances, we cannot let "the perfect become the enemy of the good" and lose opportunities to make significant improvements to water quality. Many of the water quality issues we face today are due to development that existed before the VSMM and/or the State stormwater permitting program. If we are going to address these issues we must be provided with some flexibility in design that allows us to utilize a "best fit" approach when designing stormwater treatment. When it comes to treatment of runoff from non-jurisdictional impervious surfaces, the VSMM should allow for the implementation of flow based treatment practices, in order to allow for municipalities to meet the flow reduction targets of Flow Restoration Plans (FRPs). (South Burlington)

Response: The Department agrees that the new tiered STP framework proposed for the WQTS will greatly improve stormwater treatment where feasible. The Department considers the revised STP selection framework to allow for needed design flexibility referenced in the comment, particularly for redevelopment and retrofit sites with existing 2002-design stormwater infrastructure. When these designs align with STPs included in the 2017 VSMM and site conditions otherwise limit the use of Tier 1 and Tier 2 STPs, existing STPs may be modified to meet the WQTS under Tier 3. The Department expects to incorporate further guidance in regards to feasibility evaluation for designers in the Manual once repackaged with guidance, and provide more guidance through application materials and training. The Department will expect designers to consider stormwater treatment and control requirements early in a project design phase, so as not to limit space for the most effective STPs, when feasible.

14. **Comment:** The language in the revised VSMM should clearly indicate that designers are only required to consider Tier 1 water quality practices that are listed in the Tier 1 Practices Table on page 2-13. There are Tier 1 water quality practices that are not listed in the Tier 1 Practices Table on page 2-13, which are not required to be considered by designers before Tier 2 water quality practices. (South Burlington)

    Response: In response to the comment, the Department has modified to the Manual to state that designers are only required to consider Tiered STPs listed in the respective tables.

15. **Comment:** Tiered System of Stormwater Treatment Practices - The success of the proposed three-tiered system (Tier 1 requiring the highest level of pollutant treatment and Tier 3 requiring the least level of treatment) for determining stormwater treatment practices hinges upon how DEC determines which tier applies to a particular project. VNRC understands that DEC will rely on the draft tool for determining stormwater treatment practices (STP Selection Tool) to determine which tier applies to a project. VNRC is concerned that the draft STP Selection Tool is not actually part of the proposed rule. Accordingly, the

method for determining what level of treatment will be applied to projects can be changed by DEC at any time without any public input. The STP Selection Tool is in draft form, and it has not been tested. VNRC is concerned that the STP Selection Tool will not work as envisioned. If the STP Selection Tool does not function as DEC intends, the tiered approach, which is arguably the heart of the VSMM, will not be effective in reducing water pollution. In addition, VNRC is concerned that DEC is allowing projects to avoid meeting the highest treatment rates, for phosphorous in particular, if they fall into tiers 2 and 3. Given the impaired condition of Lake Champlain, the highest levels of phosphorous removal should be required for all projects. To address these issues VNRC proposes that DEC require that an applicant provide an offset if the tier 1 level of phosphorus removal cannot be achieved. Stormwater offset practices have proven to be useful in ensuring that a project will not contribute addition pollutants to a receiving water when treatment practices will only remove a percentage of the pollutants. For example, in the St. Albans and Bennington Wal-Mart cases and the Jay Peak case VNRC successfully advocated that offsets be applied to stormwater projects to make up for limits in treatment practices and constraints of a particular site. This same approach can be used by DEC in situations where tier 1 level of removal is determined to not be feasible for phosphorous. (VNRC)

Response: The STP Selection Tool will be based upon the substantive requirements of the Manual. The Manual already includes the specific requirements to implement every STP. For example, infiltration basins require soils with an infiltration rate of at least 0.2 inches per hour. If a site does not have soils meeting that infiltration rate, it would be infeasible to use an infiltration basin on the site.

As to offsets, the use of offsets is required when a project is discharging to either a stormwater-impaired water, Lake Champlain, or a tributary to Lake Champlain, and where there is no TMDL. Expanding the use of offsets, and developing a system of impact fees or pollutant credit trading, will be evaluated by the Department during the development of new stormwater rules and a general permit, as required by 10 V.S.A. § 1264(f) and (g)(3)(D), respectively.

§2.2.5 Channel Protection Standard

16. **Comment:** 2.2.5 – Channel Protection Standard - Referring to rainfall data – will data from the Northeast Regional Climate Center be generally acceptable or will data obtained from NOAA Atlas 14 server be the only acceptable data? Additionally – how should data from NOAA's Atlas 14 project be used? Should data be downloaded from site-specific stations or used by county? Which rainfall distributions should be used? Finally, should generation of synthetic rainfall distributions be used? (WCA)

    Response: NOAA's Atlas 14, or its replacement is identified as the acceptable precipitation data in the 2017 VSMM Rule. NOAA's Atlas 14 allows for the ability to generate the 1-year, 10-year, and 100-year, 24-hour storm events based on geographic location. For modeling purposes, it is expected that a Type II distribution be used for these events, consistent with TR-20 methodology. The 2017 VSMM was modified in response to the comment.

17. **Comment:** The Department should update sections of the VSMM that still indicate that designers must consider the Hydrologic Condition Method (HCM) before the Extended Detention Method for meeting the Channel Protection Standard. (South Burlington)

Response: The revised framework of the Manual requires the use of Tier 1 STPs for meeting the WQTS when feasible. Tier 1 STPs are runoff reduction practices that would establish a treatment volume (T_v) credit under the new HCM of the Channel Protection Standard. The Department expects that this emphasis on Tier 1 STPs for the WQTS will result in Tier 1 STPs to also be designed to meet other standards when a site is able to utilize these STPs for larger volumes such as the channel protection volume (CP_v), rather than propose and construct an additional STP. The Department also considers this approach will provide for greater flexibility on sites that cannot infiltrate volumes in excess of the WQ_v or fully infiltrate the CP_v, and still be able to gain the benefit of providing water quality treatment through infiltration of 90% of all storm events captured under the WQTS. The Department did not make any changes to the Manual in response to this comment.

§2.4 Redevelopment

18. Comment: The VSMM should set the water quality treatment standard at capturing and treating 100 percent of the WQ_v from redeveloped impervious areas. The WQTS is the only standard the draft VSMM applies to redevelopment. To meet this standard, developers may design a stormwater treatment practice that captures and treats 50% of the water quality volume from the redeveloped impervious area. While this is a marked improvement over the 20% requirement in the 2002 VSMM, it misses the opportunity to significantly reduce phosphorus loading from redevelopment. To meet this standard, developers may collect runoff from and treat only half of the redevelopment area, thereby allowing half of the stormwater to remain untreated. This poses an unacceptable risk for pollutant loading into Vermont's waterways. Setting a strict water quality standard for redeveloped land is necessary to meet the State's water quality targets and is appropriate considering water quality is the only standard applied to redevelopment.

If DEC sets this standard to anything less than 100%, the VSMM should clarify that STPs must treat runoff from the entire contributing impervious area even if designs do not capture and treat to a 1-inch event. For example, a 50% standard would allow STPs to treat the volume from the entire site for the 0.5-inch storm. (CLF)

Response: See response to Comment 19.

19. Comment: Redevelopment - The draft VSMM allows an applicant to address storm water runoff from redevelopment by either: Reducing the existing impervious surface by 25% and restore the area to meet the Soil Depth and Quality Standard (Section 3.1) where applicable; or Designing an STP to capture and treat 50% of the WQv from the redeveloped impervious area; or Implementing a combination of water quality treatment and impervious surface reduction proportional to the above options. VNRC commented on this provision in the draft pre-rulemaking version of the VSMM. In sum, VNRC commented that it is crucial to update stormwater controls at existing sites when they are redeveloped. DEC provided the following response to VNRC's comment on redevelopment:

The Department considers the increase in water quality treatment established in the draft VSMM for the redevelopment of impervious surfaces to be adequate to update stormwater treatment and control for existing development. In addition, Act 64 established permitting authority for projects with greater than or equal to 3 acres of impervious surfaces not currently subject to a stormwater discharge permit, or that have coverage under a stormwater discharge permit subject to the pre-2002 VSMM requirements.

Additionally, the Department has what is *known as "residual designation authority" (RDA) under 10 V.S.A. § 1264(e), under which the Department may designate existing unpermitted impervious under 3 acres as requiring permit coverage. Impervious that is 3-acres or greater and RDA'd sites will require stormwater treatment upgrades through a feasibility analysis to be included in the applicable permit. The feasibility analysis will be used in conjunction with the requirements of the draft VSMM. The Department further notes the draft VSMM now requires STPs be sized to provide treatment for all contributing stormwater runoff to a practice, which had not been required in the 2002 VSMM. The Channel Protection Standard has also always required sizing based on the on-site and off-site contributing drainage to a STP. The Department has not made any further revisions in response to the comment.*

VNRC is aware that DEC has RDA authority under state and federal law to designate stormwater discharges that are causing or contributing to a violation of the VWQS. However, the fact that ANR has the authority to implement RDA provisions of state and federal law does not address VNRC's concerns regarding redevelopment under the VSMM. VNRC's concern is that the VSMM will allow existing sites with inadequate or outdated stormwater controls to continue to discharge even when a site is being redeveloped. Rather than waiting to designate the existing discharge as an RDA at some future time, VNRC recommends that DEC require that existing stormwater discharges be upgraded to the greatest extent possible to meet the enhanced VSMM standards while an investment is being made in developing other parts of the same site, including implementing new stormwater controls. VNRC understands that existing sites have constraints that may make full compliance with VSMM infeasible. However, to the extent that existing stormwater discharges at a redeveloped site cannot meet the upgraded practices in the VSMM, offsets could be required as described above to further achieve pollution reduction at a minimum for phosphorous removal. (VNRC)

Response: The Department agrees that redevelopment of a site may present an important opportunity to address existing stormwater discharges. As such, the treatment standard for redevelopment has been increased under the 2017 VSMM, including more than doubling the water quality volume that shall be captured and treated from 20% under the 2002 Manual to 50% under the proposed Manual. However, to impose a blanket requirement to address all stormwater discharges on any site that undertakes any level of redevelopment is not justified and would have major implications for landowners seeking to redevelop sites, rather than build in undeveloped areas. Additionally, imposing an even stricter redevelopment standard could have the unintended consequence of preventing redevelopment and revitalization of Vermont's downtowns and already developed area.

Rather, the Department will require upgrade requirements on sites with more than three acres of impervious surface and on smaller sites as necessary to implement TMDLs or to reduce the adverse water quality impacts of a given discharge upon a determination such action is necessary. The role redevelopment activities will play in the schedule for these required upgrades will be addressed by the Department during the development of new stormwater rules and a general permit, as required by 10 V.S.A. § 1264(f) and (g)(3)(D), respectively

§3.0 Post-Construction Soil Depth and Quality

20. Comment: 3.3 – Post-Construction Soil Depth and Quality Vegetation and Landscaping - This section contains inadequate direction regarding vegetation types to employ. We recommend clarifying the statement 'A dense and vigorous vegetative cover shall be established over turf areas' to at least state

that 'a dense and vigorous vegetative cover of native species consisting of at least 3-5 different species appropriate to the growing zone and soil type shall be established over turf areas.' (WCA)

Response: The Post-Construction Soil Depth and Quality Standard is not intended to regulate the type or variety of vegetation, but aims to restore healthy soils. No changes to Manual were made in response to this comment.

21. Comment: LCI applauds the draft 2017 Manual's recognition of the many important functions that naturally occurring, undisturbed soil and vegetation can play in reducing pollution and flood hazards. LCI strongly supports the Manual's establishment of a mandatory Post-Construction Soil Depth and Quality standard. LCI is, however, disappointed that the Department has chosen to reduce the standard requirement from 8" of topsoil post-construction proposed in a previous draft of the rule to 4."

The arguments offered by regulated entities in opposition to the 8 inch standard appear to turn largely on cost. Alternatively, some argued that 8 inches of high-quality topsoil would well exceed the pre-development/redevelopment status quo on many sites. Absent, however, is empirical evidence that the Department's initial requirement for 8 inches of topsoil would not yield the meaningful additional water quality and flood prevention benefits that led the Department to propose the 8 inch standard initially. Rather, the Department has simply stated that 4 inches is a "reasonable" standard.

The standards in the 2017 Manual will regulate development for at least five years if not longer. The Department should hold the line in establishing the standard it believes will maximize opportunities to reduce pollution and prevent flooding under current conditions as well as the more extreme conditions we can anticipate from a changing climate. Healthy soils are an important piece of the stormwater management puzzle. The final 2017 Manual should establish an 8" topsoil requirement. (LCI)

Response: The Department welcomes feedback in regards to the new Post-Construction Soil Depth and Quality Standard, which aims to restore healthy soils disturbed during development. The Department received comments on the 8-inch soil depth standard established in the March 1, 2016 draft of the Manual, which specifically indicated that this standard would be extremely costly. However, the Department did not modify the standard in consideration of cost. As noted in the Department's response to comments on the March 1, 2016 draft of the Manual, the Department conducted further analysis of common Vermont soils and the commonly developed soils in Vermont. The topsoil depth in the Post-Construction Soil Depth and Quality Standard has been decreased from 8 inches to 4 inches, which the Department considers to be more representative of the mean depth of O and A soil horizons for the variable soils found throughout the State. Sites with mapped soils that naturally have less than 4 inches of topsoil will have the option to meet the depth of topsoil indicated by the sum of the O and A horizons on the NRCS Official Soil Series Description for the mapped on-site soils. The information that the Department relied upon to make this change is available upon request.

In addition, recent research on compacted soils has suggested that while sediment and runoff volumes can be reduced by approaches to restore compacted soils, these benefits do not necessarily increase by increasing the depth of the restoration[1].

22. Comment: Section 3.0, Post-Construction Soil Depth and Quality Standard, pg. 47 treatment summary table, Amend Option 4: "Import topsoil or compost to meet the depth and organic matter."
Note: Compost is typically cheaper than high organic matter topsoil (3%+) and a lesser volume of material needs to be trucked to meet the 4% minimum. (CAV)

Response: The Department has modified Option 4 in Section 3 of the 2017 VSMM in response to the comment.

23. Comment: Section 3.2 The compost or other materials shall have an organic matter content of 40% to 65%, and a carbon to nitrogen ratio below 25:1. There is a wide range in the organic matter content of composts, from 15% to 65%, depending on the source of the compost (leaf, manure, food, biosolids), and therefore the total amount required to accomplish 4 percent will vary depending on the type of compost. Allowing a wide range of compost organic matter reduces costs associated with purchasing and transporting compost to the site. (CAV)

Response: The language in Section 3.2 was not intended to prohibit the use of compost with an organic content outside the range of 40 to 65%. The restriction is applicable to pre-approved mixing rates only. A custom soil mix utilizing compost or other material with a range outside of 40 to 65% is allowable provided the end soil mix meets the 4% minimum organic content requirement. The Manual was revised in response to the comment. See response to Comment 78.

§4.1 Pre-Treatment Practices

24. Comment: 4.1.2.2 – Filter Strip Design - Design guidance states that 'A layer of filter fabric shall be placed between the stone and the underlying soil in the trench.' Please clarify what type of fabric – permeable or impermeable – there are many different types. Stone types – stone size is not defined in this section at all. 'Roughly uniform clean stone' could mean washed Type I stone, or mostly clean ¾" stone. 'Larger stone' for steeper slopes could mean many things when the initial 'smaller' size is not defined. (WCA)

Response: The Department does not consider it necessary to include the term "permeable" ahead of the reference to filter fabric. Although there are varying types of filter fabrics, including woven and non-woven, the term filter fabric implies a permeable material. The exact type and specification of filter fabric used in a particular design will be at the discretion of the designer, but is expected to be permeable. In regards to the comment on stone size, the intent was that stone size would be left to the discretion of the designer based upon the application and design preference, but is meant to ensure that a uniform stone size is specified, regardless of size, rather than a crushed stone or gravel material. The reference to "clean" stone has been removed from the Manual in response to the comment.

[1] F. Mohammadshirazi, V.K. Brown, J.L. Heitman, and R.A. McLaughlin. 2016. Effects of tillage and compost amendment on infiltration in compacted soils. Journal of Soil and Water Conservation. Vol. 71, No. 6. http://www.jswconline.org/content/71/6/443.abstract.

25. Comment: 4.1.3 Sediment Forebay - Using gabion baskets is not similar to using an earthen berm or concrete weir – the latter two will only allow water over the top, while the former will allow water through. While some filtration may take place through gabion baskets depending on stone size, if the intent is to encourage ponding in forebays (generally the intent) then gabion baskets should be omitted or the criterion should be edited to stipulate that no flow-through can take place if gabions are used. (WCA)

Response: The Department agrees that gabion baskets do not function similarly to earthen berms or concrete weirs and has therefore removed gabion baskets from the list of eligible materials for forebay barrier construction in Section 4.1.3.

26. Comment: 4.1.4.1 Deep Sump Catch Basin Feasibility - Please consider allowing the 'off-line' connection to take place from a deep sump CB to a buried pipe junction. While generally not considered a best-practice, requiring a 1:1 connection from a deep sump CB to a manhole structure will generally increase the cost of these device by $2-3K. However, if a small lateral can be installed with manholes reasonably spaced for pipe inspection to these laterals, it would provide designers with additional flexibility to use deep sump CBs as treatment in constrained, redevelopment situations. (WCA)

Response: The Department agrees that deep sump catch basins do not need to be configured in a catch basin-to-manhole configuration and that the off-line catch basin connection can take place at a buried pipe junction rather than at a manhole. Section 4.1.4.1 of the 2017 VSMM has been revised to indicate this.

27. Comment: Page 4-9: The 3" drop from pavement section has not been removed from the diagram, as it was in the same diagram depicted on 4-30. (South Burlington)

Response: Figures and schematics are largely considered design guidance and therefore not included in the Rule. Updates to figures will be made when the Department incorporates the 2017 VSMM following adoption through rulemaking.

28. Comment: Page 4-11: Similar to previous comment, Figure 4-5 has not been updated to address Notes in marked up version: 2:1 side slopes and forebay depth. (South Burlington)

Response: See response to Comment 27.

§4.2.1 Reforestation and Tree Planting

29. Comment: 4.2.1.2 – Reforestation and Tree Planting Treatment - We would recommend that for projects that are making extensive use of this practice, consultation with a forester should be part of the design process to ensure that adequate numbers and types of species are chosen and planted, primarily in order to prevent monocultures of attractive but non-native species of trees. (WCA)

Response: The intent of the practice is not to require or distinguish type or species of tree planted, but to provide stormwater treatment volume credit (T_v) through the interception and storing of precipitation. Therefore, the Department does not consider the need to require forester consultation in the Manual. The Department may consider adding guidance pertaining to the benefits of planting native species and

consulting with a forester or other professional for reforestation and tree planting. No changes were made to the Manual in response to the comment.

§4.2.2 Simple Disconnection

30. **Comment:** 4.2.2.5 – Simple Disconnection Vegetation and Landscaping - Guidance is not sufficient in this section. Simple disconnection depends largely on the surface roughness of the sheet flow path – so establishing dense and vigorous canopy vegetation will not help with disconnection. Establishing a low-lying (3-8" tall) dense and vigorous vegetation with a high stem-count at the ground surface is more important. This vegetation should be deep-rooted, and perennial. (WCA)

    Response: The practice is not intended to regulate the type or variety of vegetation, but aims to establish a vegetated disconnection area. No changes to Manual were made in response to this comment.

31. **Comment:** Section 4.2.2.1 Simple Disconnect, Design Guidance: Add: "increasing the % organic matter above the 4% minimum to no more than 10% is an option to increase volume of infiltration/site storage." (CAV))

    Response: The Department will be adding guidance to the Manual following adoption of a final 2017 VSMM. The Department may consider adding guidance that identifies additional voluntary opportunities that may be available for maximizing infiltration/stormwater retention. No changes were made to the Manual in response to the comment.

§4.2.3 Disconnection to Filter Strips and Vegetated Buffers

32. **Comment:** 4.2.3.1 – Disconnection to Filter Strips and Vegetated Buffers Feasibility Infiltration rate stipulation of 0.5"/hour – is this a published (i.e. NRCS soil map unit) rate or a tested (per infiltration testing guidelines) rate? (WCA)

    Response: The reference to 0.5 inches per hour has been modified in the Manual in response to comment. Qualification for shorter disconnection lengths will be entirely reliant on HSG of the filter strip or vegetated buffer, or in cases of urban or otherwise fill soils, require a site-specific soil evaluation, which could include an infiltration test or comparable evaluation, to qualify for shorter disconnection flow paths.

33. **Comment:** 4.2.3.2 – Disconnection to Filter Strips and Vegetate Buffers Conveyance - Please include specifications on what is meant by 'clean stone' – size/washed or reasonably clean? Please clarify what is meant by filter fabric – permeable or impermeable? (WCA)

    Response: See response to Comment 24.

34. **Comment:** 4.2.3.4 – Disconnection to Filter Strips and Vegetated Buffers Treatment - 'Vegetated buffers and filter strips shall be fully vegetated' – type of vegetation is important. This section should specify that vegetation should be low-lying, stem-dense at the ground interface, deep-rooted, and perennial. (WCA)

    Response: See response to Comment 30.

§4.2.4 Watershed Hydrology Protection

35. **Comment:** 4.2.4.2 – Watershed Hydrology Protection Conveyance and Treatment - Please consider including additional guidance for cross-drainage culverts including headwall structure protection at inlet/outlet, as well as stabilization guidance for culvert outlets. Referring at minimum to the VT Better Backroads Guidance manual for this would be good. (WCA)

    Response: In response to the comment, the Department has added language that requires headwall structure protection at inlet/outlet, and stabilization requirements for cross-drainage culvert outlets. The Department however did not include reference to the VT Better Backroad Guidance manual that is subject to change.

§4.3.1 Bioretention

36. **Comment:** On page 2-14 it is stated that the removal expectation for Tier 2 practices is 60-80% TP removal. What research is this number based on? There is now a large body of research showing that bioretention cells often achieve much lower rates of TP reduction. There is in fact a growing list of studies where bioretention cells export TP and in some cases heavy metals as a result of the breakdown of organic material within the media mix. We suggest a comprehensive review of the research available on bioretention performance and a reassessment of performance assumptions. (Contech)

    Response: The Department relied upon the research and data published by a number of sources including USEPA Performance Curves, the National Stormwater Database, and the International Stormwater Database, as indicated in the 2017 VSMM. The Department is aware of the potential for bioretention to export phosphorus and has limited the available phosphorus content for bioretention soil mix. The Manual includes a 5-year review cycle for considering changes in the future as necessary.

37. **Comment:** Page 4-23 (just before the beginning of Section 4.3.1.5), third bullet: "--The designer shall identify on the plan sheet that a soil phosphorus test using the Mehlich-3 method, or equivalent, is required for facilities with underdrains, to ensure that bioretention soil media will not leach phosphorus. The phosphorus index (P-index) for the soil must be low, between 10 and 30 milligrams per kilogram. The plan shall also identify that the record of the phosphorus test shall be maintained with design or permit records for subsequent design certification requirements."

    My first comment is that soil test fertility recommendations in Vermont are based on the Modified Morgan extractant, not Mehlich-3. Although some private labs in the area will do Mehlich-3 tests the closest State labs using it for recommendations are Penn State and Rutgers (NJ). Modified Morgan is a weak acid solution of ammonium acetate, pH 4.8. Mehlich-3 is a strong acid solution, containing fluoride, so it tends to dissolve more out of a given soil than MM (~5-10x). But the recommendations for each extracting solution are based on crop yield responses to added fertilizer, so what is an Optimum range varies—for Modified Morgan, it is 4 to 7 ppm, for Mehlich-3 it is 30 to 50 (given in the Penn State Soil Test Recommendations for Agronomic Crops). Since the recommendation given in the manual is for 10-30, it falls just below the Optimum range. The corresponding range in the UVM recommendations based on Modified Morgan would be 2-4 ppm. I would suggest changing the wording in the Manual to recommend using the Modified Morgan test, with an available P of 2 to less than 4 milligrams P per kilogram of soil ppm) {use that wording, because some labs express results in P2O5

units, not P} "to ensure that bioretention soil media will not leach phosphorus"; then add, "If some other test is used, the measured P should be in the Medium or Below Optimum range."

My second comment regards use of the term "phosphorus index (P-index)". The appropriate term would be Available Phosphorus. Phosphorus Index refers to something completely different (if you're not familiar with it, it is an index to express the degree of risk that runoff from a field will carry phosphorus to a surface water body). The P Index incorporates many other things besides soil test P, including manure and fertilizer rates and methods of application, and RUSLE soil erosion. It is very confusing to use "P Index" in the Manual in this way. (UVM)

Response: The Department has modified the Manual in response to comment. The Manual will now reference "available phosphorus" rather than the "phosphorus index" and further limit the phosphorus content of bioretention soil mix. Furthermore, the Manual was revised to reflect the use of the "Modified Morgan" method as opposed to the Mehlich, which is more reflective of the testing available locally. See response to Comment 42.

38. Comment: 4.3.1 – Paragraph has some confusing definitions, mainly regarding difference between bioretention and rain garden. While the general definition of a rain garden is fine, the statement that bioretention usually needs some sort of 'structural drainage design components' is confusing. Unlined bioretention does not necessarily need that. Also, consistency with terms – 'Bioretention practice' is used in the beginning while the last sentence uses 'Bioretention facilities'. (WCA)

Response: In response to the comment, the language in Section 4.3.1 has been revised, particularly as it relates to rain gardens.

39. Comment: Section 4.3.1. Bioretention - As worded, in the second paragraph it appears that "bioretention" and "rain gardens" are defined, and yet not defined. In the entire manual, rain gardens are mentioned only here, so the term potentially could be omitted completely. Alternatively, I would rephrase second sentence to say: "The term raingarden is sometimes used to describe small bioretention systems." and omit the rest of the pseudo-definition as it suggests that infiltrating, native soils are the only place "raingardens" can work. In fact, some raingardens require modifying existing soils with imported media, and on sites with fill material, raingardens may be appropriate, but one cannot describe this fill as "native". I would avoid the distinction between raingardens and bioretention as a defined feature of the manual by inserting only the above sentence mentioning the term raingarden and otherwise not split hairs to define when it is a raingarden and when bioretention. (Really, they can all safely be called bioretention systems, regardless of the use of certain design features.) Alternatively, if a deliberate distinction is made, you may wish to look at the Western Washington Stormwater Manual (2014) for definitions and guidance. Again, through lack of precise language, this second paragraph also suggests that (by contrast with raingardens) all bioretention systems require an underdrain and/or liners and overflow inlets. In the third sentence of the paragraph, I would change this to "where structural drainage design components may be needed" (instead of "are" needed). There are numerous studies indicating that, for phosphorus removal as well as other nutrients and stormwater pollutants, the use of underdrains should be avoided, as they short-circuit treatment, reducing retention time and preferentially exporting dissolved/soluble pollutants. Similarly, the use of liners, which are intended to eliminate the possibility of infiltration, should be limited to when they are indicated as truly necessary. (UVM)

Response: See response to Comment 38. In addition, additional changes to language regarding underdrains and the use of liners was made in response to the comment.

40. Comment: Section 4.3.1.2 Bioretention Conveyance – Last Bullet. Agreed that the underdrain should be separated from bioretention media by coarse stone (are you saying 3"-diameter stone or a 3" layer of stone?), but the underdrain also should not be placed directly on the bottom of the bioretention cell, particularly if there is a liner at the bottom; it should be at least 2" above the cell bottom within the middle of the stone layer, to avoid clogging with fines that penetrate the stone layer and settle on the bottom. (UVM)

Response: Section 4.3.1.2 was clarified in response to the comment.

41. Comment: Section 4.3.1.4 Bioretention Treatment - Someplace in this section, or a similar appropriate section, it should be very clear when a liner is required, *and this should only be in cases where infiltration is not an option* (stormwater hotspots, or locations in close proximity to groundwater, perhaps certain dense urban areas where bioretention is proposed immediately adjacent to buildings). Stormwater designers should not interpret the manual in such a way that liners and underdrains are used automatically, as a default because these two elements both increase short-circuiting of treatment (reduce residence time) and can add cost to projects; instead the conditions where these two are necessary should be the starting point, and they should otherwise be considered unnecessary, particularly the liners. Also, one could argue for use of an underdrain as an overflow outlet-- in the case where native soils have slower infiltration rates as they become more saturated/during bigger storm events—i.e. use an underdrain without the project also requiring a liner. (UVM)

Response: See response to Comment 39 and 40.

42. Comment: Section 4.3.1.4 Bioretention Treatment - 4th bullet point. This constrains the bioretention media to a very specific mix of sand, silt, clay, and "organic matter in the form of compost," and potentially limits innovation in soil media design. Could you add "or other approved soil media mix"? Further, the various combinations of sand, silt, and clay listed may or may not add up to 100% so it is unclear if a media that contained for example 88% sand and 12% silt would be able to omit the clay and organic matter (compost). This is seemingly adopted from other manuals, but some have lower percent compost (e.g. Minnesota 2-5% organic matter), and other manuals specify simply "Fines (silt + clay)" instead of dividing out silt and clay into separate categories. My research has shown that less than 3% compost can effectively grow bioretention vegetation in some cases, and effectively requiring the compost seems risky for nutrient leaching. Mixing compost throughout the soil media layer/profile is also problematic. Another technique that could be used to minimize leaching from compost is "spot applying" compost only at the location of individual bioretention plants, in a way that the roots can reach the nutrients and water-holding capacity of the organic matter, rather than mixing compost thoroughly throughout the soil media profile such that the nutrients and (water-holding capacity) of the compost are flushed through to downstream locations without the plants being able to access the compost's resources and undoing any benefits of compost for plant growth. Please consider revising the compost to a lower percent and/or recognizing one of the following in the manual:

(A) Not all composts are created equal. Depending on compost feedstocks, certain composts --and bioretention mixes made from compost-- are more prone to leaching nutrients. A "low-phosphorus"

compost, typically composed of leaf-litter and yard waste only (no manures or food scraps), is recommended for any stormwater treatment projects that call for compost in the soil media. [See Hurley et al. 2014 Compost Leaching Study Final Report to VT ANR & forthcoming publication, Hurley et al. (in press) 2016. (Research funded by VT ANR concerning leaching of compost and bioretention media under varying saturation durations from 10 minutes to 10 days; results indicate that as composts become increasingly saturated, nutrient leaching continues.)] We suggest that this "low P" definition be less than 0.2% Phosphorus.

(B) If compost cannot be qualified as to feedstock (or even if it can) spatial considerations for siting of stormwater BMPs, STPs, GSI, etc. could be taken into account, such that proximity receiving water with phosphorus impairment or to a storm sewer that outfalls to an impaired water would limit the use of compost. An example of language below, from Western Washington.

From Western Washington Stormwater Manual 2014 edition: Bioretention constructed with imported composted material should not be used within one quarter mile of phosphorus-sensitive waterbodies if the underlying native soil does not meet the soil suitability criteria for treatment in Chapter III-3 - Flow Control Design. Preliminary monitoring indicates that new bioretention facilities can add phosphorus to stormwater. Therefore, they should also not be used with an underdrain when the underdrain water would be routed to a phosphorus-sensitive receiving water.
Source: http://www.ecy.wa.gov/programs/wq/stormwater/manual/2014SWMMWWinteractive/2014%20SWMMWW.htm#Topics/VolumeV2014/VolV%20Ch7%202014/VolV%20BMPt730%202014.htm?Highlight=compost (UVM)

Response: In response to the comment, the Manual was modified to require use of a "low P" compost when used in a bioretention soil mix, defined as less than 0.2% phosphorus. The Department did not modify the Manual in regards to STP selection based on proximity to receiving water. Following adoption through rulemaking, the Manual will be repackaged with additional design guidance that speaks to the siting of STPs.

43. Comment: Section 4.3.1.4 Bioretention Treatment - 5th bullet point, describing the soil P test. This is a relatively complicated comment, but critical to effective reduction of P leaching from bioretention practices, i.e., specifically from the compost in the bioretention media. My colleagues and I would be happy to have a meeting to discuss appropriate laboratory protocols in more detail, but I will summarize here. The laboratory tests suggested are not an accurate indicator of P leaching, nor are they methods (Mehlich-3) typically used in VT by our local laboratories.

"The designer shall identify on the plan sheet that a soil phosphorus test using the Mehlich-3 method, or equivalent, is required for facilities with underdrains, to ensure that bioretention soil media will not leach phosphorus. The phosphorus index (P-index) for the soil must be low, between 10 and 30 milligrams per kilogram." One challenge of the soil media testing procedure is that the suggestion is that the media (mix of sand, fines, etc.) would need to be mixed prior to being sent for testing in a laboratory. Usually --rather than pre-preparing the soil media to spec, then sending it for tests-- what I see is the mixing of ingredients occurring on site to match the prescribed ratio/percent, using one pile of sand, one pile of compost, etc. If the media needs to be prepared well ahead of time, on-site mixing will not be possible, and we should encourage local providers of compost and bioretention media ingredients to stock approved mixes that meet lab tests. That said, if the mix is prepared, sent to the lab, and comes back too high in P, what is the contractor to do? Add more sand and try again?

As an alternative to testing the whole pre-prepared media mix, one could instead test the source of compost as to its available P (i.e. the phosphorus available for *plant growth*, be it bioretention vegetation or downstream blue-green algae/eutrophication). If the compost is found to be high-P it could be mixed in at lower proportions within the media (or as stated above, spot applied only at site of individual plants. Following up on this email, and my subsequent discussion with Joel Tilley (UVM Agricultural and Environmental Testing Laboratory), a potential recommended course of lab testing would be to calculate the water-extractable P from the compost itself, using a weak-acid Modified Morgan method. Regardless of the method selected, and whether the media or just the compost is laboratory tested, the end result of the soil media and/or compost testing should be at the "very low" end of the acceptable range for plant growth (1 ppm P using the Modified Morgan's method). As currently phrased, the manual suggests a goal for P in the soil media that is just below the "optimum range" for plant growth, which is far from the target we should list if we want to avoid P-induced eutrophication in downstream waters.

And, to reiterate, the term "P-index" is not being used accurately in the manual, nor appropriate to this context. "Available P" would be more appropriate. P-index is used to evaluate the existing capacity of agricultural soils to inform planned manure and fertilizer incorporation regimes. (UVM)

Response: See response to Comment 37 and 42.

44. Comment: 4.3.1.4 – Bioretention Treatment - The stipulation that requires the use of a mulch surface layer should be reconsidered. Mulch could act as a source of phosphorus and will physically float during storms. This can block overflow outlets and result in bioretention system failure during those events – localized flooding may occur. Please do not include the use of mulch for weed suppression. Instead use an inert mulching layer such as pea or crushed stone, or specify that, if weed-suppression is a goal for aesthetics, frequent hand-weeding will be necessary. Weed suppression, apart from eliminating invasive species, is not a part of the treatment of stormwater. It is a landscaping function. If the goal is treat stormwater runoff for phosphorus content, then mulch will not help with that. Consider not making mulch a required element. (WCA)

Response: The Department has modified Section 4.3.1.4 in response to the comment.

45. Comment: 4.3.1.5 – Bioretention Vegetation and Landscaping - Nutrient uptake in bioretention, while potentially important, is virtually worthless with respect to phosphorus if plants are not cut back annually and the cuttings composted. Plants use P to build cells and grow. Certain plants will reach their max growth and stay that size, using very little P to add additional growth unless cut back. Therefore, cutting back certain species will contribute positively to P uptake. Other species that continue to grow, such as shrubs and trees, may not require annual cutting back. If the manual is claiming that nutrient uptake via plants is a vital part of bioretention function, then specifications for proper disposal of cuttings must be made. Regulating they must be composted off-site (i.e. out of the bioretention practice) is a minimum as vegetative matter left in the garden will decompose and contribute dissolved P to underdrains or into groundwater. (WCA)

Response: Cutting and managing vegetation within a practice pertains to annual maintenance. Inspection and maintenance requirements were removed from Manual, as had been presented in the

March 2016 draft. The Department expects to address inspection and maintenance requirements for particular STPs through application requirements and through permit conditions. Therefore, no changes were made to the Manual in response to the comment.

46. Comment: Page 4-45: Section was renamed from "Bioretention and Rain Gardens" to just "Bioretention". Consider revising title of table accordingly. (South Burlington)

Response: The table referenced is guidance that does not appear in the Rule so no change will be made to the 2017 VSMM in response to the comment. The Department will correct the table name in the final merged version of the Manual that incorporates additional design guidance.

§4.3.2 Dry Swales

47. Comment: 4.3.2.5 – Dry Swale Vegetation and Landscaping - Mowing of dry swales and leaving the clippings in place will negatively affect both P and N downstream as the nutrients that those grasses have taken up into their cellular structure will then decompose in place or be transported downstream and into the receiving water (much the same way leaves and grass clippings dumped into streets contributed negatively to P and N runoff in urban catchments). Specifying that swales for runoff treatment be mowed and the clippings bagged will make a huge difference in treatment achieved. (WCA)

Response: See response to Comment 45.

§4.3.3 Infiltration Trenches and Basins

48. Comment: 4.3.3.1 – Infiltration Feasibility - Terms are mixed in this section – infiltration practice versus infiltration facility.

Response: The Department has revised the Rule to employ consistent terminology.

49. Comment: What is the logic behind the required 3 feet of separation from SHWT for infiltration practices but not for unlined bioretention practices under a certain size and with a certain impervious cover? The regulation should be the same for both. (WCA)

Response: Infiltration basins rely on three feet of unsaturated soil beneath the floor of the practice to provide treatment. Bioretention and filter practice include a minimum depth of a filter media where treatment occurs. Separation for bioretention and filter practices is intended only to preserve hydraulic performance and to prevent mounding of groundwater into the practice. No response was made to the proposed Manual in response to this comment.

50. Comment: 'Infiltration practices shall not be placed in locations that cause water-intrusion problems for downgradient structures' – while this should be the case, in confined re-development sites or urbanized situations, this may completely nullify the use of infiltration practices. This stipulation should be rewritten to reflect the reality that it may be possible to place infiltration practices in locations adjacent to down-gradient structure with measures that will alleviate water-intrusion problems (impermeable barriers, etc.). Providing this flexibility in design would be wise. (WCA)

Response: The Department doesn't consider the referenced statement to prohibit the use of measures such as impermeable liners and will consider proposals for the use of such measures on a case-by-case basis.

51. Comment: Snow storage – the stipulation that infiltration practices cannot be used for snow storage is a virtual deal-killer in Vermont as many sites adjacent to parking lots are ideal for infiltration. Requiring instead that if a site wishes to push snow into an infiltration practice, that they then conduct a thorough spring cleaning involving extensive sediment removal is a more feasible option. (WCA)

Response: The Department does not support infiltration practices to be used for snow storage. Snow is stormwater even if runoff occurs some time after the precipitation event through a melt even. This regulated stormwater runoff is subject to the same water quality treatment and pre-treatment requirements as rainfall produced runoff. Snow storage in infiltration practices, beyond creating additional maintenance issues, allows runoff to bypass pre-treatment. Snow storage in pre-treatment practices is not prohibited under the manual provided it does not interfere with the function and effectiveness of the pre-treatment practice. Inspection and maintenance requirements will be provided in guidance separate from the Manual, and as part of application materials and through permit condition.

52. Comment: 4.3.3.2 – Soil Testing Requirements for Infiltration Practices - The definition of qualified professional is vague. The stipulation should state that soil testing should be conducted according to the specified guidelines and using the specified accepted practices. This is more important than amorphously defined qualifications. (WCA)

Response: The reference to qualified professionals has been removed from Section 4.3.3.2 in response to the comment.

53. Comment: 4.3.3.4 – Infiltration Pre-treatment - What is the logic behind requiring such large pre-treatment volumes for infiltration practices? An area that will treat up to 50% of the WQv is in essence, a treatment practice, not a pre-treatment practice. The potential size of such an area could make maintenance of that area much more difficult – removal of sediment may have to be accomplished by running machinery over the 'forebay' surface area, compacting the soils, versus being able to reach in from the side with an excavator. Or material removal may be accomplished by hand – more time-consuming. In any event, the sizing seems to be excessive. Also, forebay separation of 3' from SHWT should follow bioretention guidance for unlined systems. (WCA)

Response: The forebay sizing requirements are designed to preserve infiltration rates in the main basin. The risk of sedimentation adversely impacting infiltration rates is greater where infiltration rates are higher. The pre-treatment volume requirements are therefore tiered to the infiltration rate and are consistent with other state stormwater manuals. The Department removed a third tier that existed from the 2002 VSMM, which required the pre-treatment of 100% of the WQ_V if infiltration rate exceeded 5.0 inches per hour.

The sizing requirement only applies to volumetrically sized pre-treatment practices. Any pre-treatment practice defined in Section 4.1 of the Manual may be used, giving the designer flexibility in design. As explained in the response to Comment **Error! Reference source not found.**, the purpose of the 3-foot separation is to ensure that adequate treatment of infiltrated water occurs prior to discharging to

groundwater. As a forebay does not contain a media filter the separation requirements are consistent with those for infiltration trenches and basins.

54. Comment: Thanks for the opportunity to respond to comments during the public hearing last week. I thought it might be best to reiterate those thoughts in writing, particularly as it relates to the infiltration testing requirements for infiltration systems. It is my opinion that the requirements as presented are too restrictive, and may prove unfeasible during the design process. It seems that part of the intent for infiltration systems was to create a soil profile, similar to Wastewater System and Potable Water Supply (WSPWS) Rules. If that is the case, I would ask that the Department consider allowing the infiltration rates to be established based on soil morphology, which is the direction that the WSPWS Rules are going, rather than the field tests outlined in Section 4.3.3.2.5. (George N. McCain Jr., McCain Consulting, Inc.)

Response: Soil morphology may be used in initial screening and design of STPs. The creation of a soil profile is intended to identify depth to groundwater and other infiltration limiting layers. The Department still considers the importance of characterizing the infiltration rate of a proposed system through direct observation, which is not captured by soil morphology alone. Based on feedback on the 2002 VSMM and research of other state stormwater manuals the number of infiltration tests per practice were reduced from the 2002 VSMM. The Department may consider field soil morphology data on a case-by-case basis and may further consider additional changes to the Manual as part of the periodic review considering any proposed changes to the WSPWS Rules.

§4.3.4 Filtering Systems

55. Comment: 4.3.4.3 – Filtering Pre-Treatment - What is the basis for requiring 25% of the WQv for treatment for filter systems. (WCA)

Response: The sizing of volumetric pre-treatment in the proposed 2017 VSMM is unchanged from the 2002 VSMM and is consistent with requirements for many state manuals.

§4.3.5 Treatment Wetlands

56. Comment: 4.3.5.5 – Treatment Wetland Landscaping and Vegetation - Donor organic soils may not be removed from a natural wetland – can the manual specify where such soils might be obtained? (WCA)

Response: The Manual doesn't specify specific suppliers or sources for donor soils. The Department does not dictate the source of any material, but the manner in which materials are obtain cannot violate any other rule or regulation, such as the Vermont Wetlands Rules.

57. Comment: Page 4-80: The Treatment Wetland Design Summary on page 4-80 indicates treatment wetlands are a Tier 3 Water Quality practice. While Shallow Surface Wetlands are Listed in the Tier 3 Practices Table on page 2-14, Gravel Wetlands are listed in the Tier 2 Practices Table on page 2-13. Consider revising the design summary table to specify the separate Tiers for the two practices. (South Burlington)

Response: The Design Summary Tables included in the March 2016 draft of the VSMM were considered to be design guidance and therefore do not appear in the Rule. As gravel wetlands are considered Tier 2 practices, the summary table will be updated when the Department incorporates the Rule with design guidance following adoption of the Manual.

58. Comment: Section 4.3.5.2 Treatment Wetland Conveyance Organization of the section is confusing as it intermixes gravel wetlands and surface wetlands, which have different design considerations- separate into two different wetland types with appropriate bullet points beneath, as was done in section 4.3.5.4. This intermixing also leads to confusion in the subsequent section 4.3.5.5 on Treatment Wetland Landscaping. (UVM)

Response: The contents of this section have been re-ordered in the Manual in response to this comment.

59. Comment: Section 4.3.5.5. under first bullet, second sub-bullet describes an aquatic bench with an "irregular configuration"- it is unclear as to whether the elevation of the bench or its lateral width should vary throughout… clarify what the irregularity is meant to do, and how varied it needs to be to meet the design goals. (UVM)

Response: The Department agrees that the "irregular configuration" is poorly defined. The intent of this requirement was to maximize the flow path in the practice, which is stated in another requirement. The language was removed from the treatment wetland and wet pond practice requirements.

§4.3.6 Wet Ponds

60. Comment: What other/alternate wet ponds designs beyond the gravel bench outlet were considered for the new version of the Manual? Since wet ponds (as designed now) remove the least amount of P, was any consideration given to modifying the design requirements so that they obtain improved P removal? Perhaps the required design would include an area where the WQv goes into a lined bioretention area, but larger storms flow into the pond body per the current design? (South Burlington)

Response: While the Department did seek to identify design variations of wet ponds that would provide better performance, there was limited information found to demonstrate that which specific design variations result in higher phosphorus removal. In the described scenario, the bioretention practice would be considered to be the water quality practice on its own. As a tier 2 practice, use of a lined bioretention would be need to be considered according to the water quality practice selection process in §2.2.4.1 of the Manual, prior to the use of a wet pond for treatment of the water quality volume.

61. Comment: Wet Ponds should have their design updated to achieve improved phosphorus removal. For example, the wet pond design could be required to route the first inch of rain to a lined bioretention before it heads to the main pond body. Flows larger than this could bypass the bio-retention and go straight to a forebay as they do now. As long as the "first flush" goes to bioretention. (CCRPC-CWAC)

Response: See response to Comment 60.

62. Comment: As part of the formal public record I would like to request that Wet Extended Detention Ponds be allowed as a BMP in the manual. I may be mistaken but it appears that only Wet Ponds are currently allowed. We want to be sure that extended detention is allowed for Water Quality treatment. We discussed the idea of requiring the permanent pool to contain at least 50% of the WQv. (Krebs & Lansing Consulting Engineers)

Response: The "Wet Extended Detention Pond" was a design variant of stormwater ponds in the 2002 VSMM. The Department determined that there was little distinction in design requirements among the

design variants apart from the required percentage of the WQ_V that must be contained in a permanent pool. In the proposed 2017 VSMM, a minimum of 50% of the WQ_V shall be contained a permanent pool, which is consistent the "Wet Extended Detention Pond" requirements under the 2002 VSMM. Therefore, a wet pond designed as a wet extended detention pond would still be allowable in the Manual as a Tier 3 STP.

63. Comment: Previous Department Response to Comment 255 on previous March 2016 draft of the Manual: "Figure 4-33(A) is a generalized detail of the stone outlet trench. The perforated underdrain shown in the detail would tie into an outlet structure located in the embankment, as indicated in Figures 4-30 through 4-32. Schematics and graphics included in the draft provided guidance only and have been removed from the draft VSMM for purposes of rulemaking." The Maine wet pond referenced specifies "a single outlet" in the underdrain trench. Consider making this clarification in the manual as so designers do not place the outlet structure in the middle of the trench, creating two outlets. (South Burlington)

Response: The design of a gravel trench outlet with more than one outlet is acceptable so long as those outlets are sized so that the required detention time for the pond is met. The Maine Stormwater Best Management Manual (2016) lists prescribed orifice diameters based on storage volume, whereas the proposed 2017 VSMM requires the designer demonstrate compliance with the applicable standard. To allow for design flexibility, the Department will not specify the number of outlets, but has added language in wet pond conveyance (§4.3.6.2) to state the orifice or orifices must be sized to meet the required detention times.

64. Comment: Page 4-94: "The low-flow orifice should be adequately protected from clogging by either an acceptable external trash rack (recommended minimum orifice of 3") or by internal orifice protection that may allow for smaller diameters (recommended minimum orifice of 1"). The preferred method is a submerged reverse-slope pipe that extends downward from the outlet control structure to an inflow point one foot below the normal pool elevation. Alternative methods are to employ a broad-crested rectangular, V-notch, or proportional weir, protected by a half-round pipe or "hood" that extends at least 12 inches below the normal pool. Vertical pipes may be used as an alternative where a permanent pool of sufficient depth is present." Consider clarifying if these designs are permitted in lieu of or in addition to the gravel trench outlet. (South Burlington)

Response: The language referenced in the comment is design guidance and therefore doesn't appear in the proposed rule. The Department acknowledges that this guidance could be confusing with the addition of the gravel trench outlet requirement. Low-flow outlet protection guidance would be advisable where a gravel trench outlet is not required in warm water fisheries.

65. Comment: In recognition of the fact that the field of stormwater management is evolving the draft VSMM contains sections for the use of proprietary pre-treatment devices and alternative STPs. We recommend that the revised VSMM also include simple language in Section 2 that enables designers to utilize "Smart Valves". This technology, sometimes called Continuous Monitoring and Control, utilizes a valve that is connected to the internet and a water depth sensor in the STP to control stormwater flow in real time. When combined with weather forecast information these valves are also capable of releasing water from an STP ahead of a storm in order to make more volume available for detention and treatment. We recommend that simple language be included in Section 2 of the VSMM that describes how these valves can be programmed so that they achieve the detention and treatment goals specified for

the existing water quality, channel protection, and flood control standards in the VSMM. One simple option would be to specify that the valves may not release water at a rate greater than what a traditional outlet structure would achieve for a similar storm event. If this were the requirement designers could submit modeling for a traditional outlet structure (with modeled peak flow rates) and also submit information regarding the programming of the smart valve and the resulting flow rates. (South Burlington)

Response: There is currently insufficient information on the water quality performance of wet ponds or other STPs equipped with "Smart Valves" to include them as acceptable STPs under the 2017 VSMM. The Department will evaluate these systems as alternative stormwater treatment practices per §4.4.

66. Comment:
Section 4.3.6.2 Wet Ponds - Top line on p 4-39 has typos in it. (UVM)

Response: The Department corrected a punctuation error in the Rule.

67. Comment: Section 4.3.6.2 Wet Ponds - Cold water fisheries are mentioned in this section and under constructed wetlands, but not for other treatments. Not sure why. (UVM)

Response: Research by the University of New Hampshire Stormwater Center[2] (UNHSWC) has shown that STPs that employ surface ponding for detention and retention of stormwater runoff can exacerbate temperature variations and extremes of that runoff. Wet ponds and treatment wetlands are those STPs that require design modification in cold water fisheries to protect the thermal regime of the receiving water. Other STPs rely on infiltration or filtration, which was show by UNHSWC to moderate the potential for temperature impacts.

§4.3.8 Permeable Pavement

68. Comment: 4.3.8 – Permeable Pavement - Consider revision name of practice generally to Permeable Hardscapes as this more adequately captures the breadth of potential practices available. Use of the word 'facilities' as in Infiltration Facilities and Detention Facilities is confusing – revise to 'practice(s)' to be consistent with other parts of manual.

Response: The Department does consider the term "Permeable Pavement" to cause confusion and has not revised the Manual in response to this comment. In response to Comment **Error! Reference source not found.**, the term "facility" has been replaced with either "practice" or "STP" throughout the proposed Manual.

69. Comment: Bottom of infiltrating permeable pavement practice shall be separated at least 3' vertically from SHWT or bedrock. While bedrock makes sense, why require separation from SHWT? If the permeable practice is only treating precipitation (or rooftop runoff) that falls on it, that water is relatively

[2] University of New Hampshire Stormwater Center. 2011. Examination of Thermal Impacts from Stormwater Best Management Practices. Obtained November 11, 2016 from https://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/progress_reports/UNHSC%20EPA_Thermal_Study_Final_Report_1-28-11.pdf

clean. Separation should not be required to this degree. It should be consistent with guidelines for unlined bioretention.

Response: While direct precipitation may contain relatively low concentrations of most pollutants, stormwater pollution is more often attributed to sources that occur at or near the surface. Permeable pavements are subject to pollution from vehicular and other sources like any other type of pavement. Since the stone course that underlays a permeable pavement is primarily designed for temporary storage prior to infiltration, rather than treatment, the separation to the SHGWT is consistent with infiltration trenches and basin treatment requirements to ensure adequate treatment occurs prior to discharge to groundwater.

70. **Comment:** Permeable pavements should not be installed where road sanding is performed in winter or where tracking may occur – this will effectively kill this practice from being adopted in Vermont. Instead, specify that cleaning of the permeable hardscape must occur when infiltration testing (ASTM C1781 (M)) indicates that clogging has occurred. Cleaning with a high-suction vacuum and brush combination will be necessary. This is the solution to adopting permeable hardscapes in VT, not specifying that if they will get sand on them, that they are infeasible as research has shown this to be not be the case (UNH Stormwater Center and others). (WCA)

    Response: The prohibition on road sanding has been removed from the Manual. While there is a risk of clogging, it still may be an important design consideration, and therefore the Department may consider addressing in separate guidance related to inspection and maintenance.

71. **Comment:** Section 4.3.8.4 – Permeable Pavement Landscaping and Vegetation - Not allowing trees to overhang permeable hardscapes is going to discourage the use of trees in urbanized settings, which is net-negative. Instead, require that leaves and leaf litter removal. (WCA)

    Response: The language regarding tree overhanging has been removed from the Manual in response to this comment. While there is a risk of clogging, it still may be an important design consideration, and therefore the Department may consider addressing in separate guidance related to inspection and maintenance.

§4.4 Alternative Stormwater Treatment Practices

72. **Comment:** Alternative Systems - It appears that since the last pre-rulemaking draft of the VSMM, DEC has added the following provision regarding alternative stormwater systems: *Alternative STPs shall achieve a minimum of 50% TP and 80% TSS removal.* VNRC requests clarification on why this provision was added to the proposed changes to the VSMM. Further, VNRC questions why alternative systems are only required to remove 50% of phosphorous, rather than meet tier 1 removal standards. Consistent with VNRC's comments herein, if tier 1 levels of phosphorous removal cannot be achieved with alternative systems, either alternative systems should not be allowed, or offsets should be required to achieve maximum phosphorous reduction for stormwater discharges from such systems. (Contech)

    Response: The language was added in response to comment received on the pre-rulemaking draft. Consistent with the Department's response to VNRCs previous comments, the minimum performance standards cited §4.4 of the propose 2017 VSMM are consistent with the tiered approach to water quality practice selection.

73. **Comment:** In Section 4.1.5 on page 4-13 it states the following: *Three general types of proprietary devices are most often considered for stormwater applications: oil/grit separators, hydrodynamic devices, and filtering systems. These proprietary devices may not be able of achieving the level of water quality performance required by this manual and as such, are only allowable for pre-treatment provided an independent third-party monitoring program such as one of the programs identified in Section 4.4.1, verifies that it removes a minimum of 50% TSS for the WQv including during the maximum flow during the water quality event (Qwq).*

    It is highly unlikely that anyone would propose a filter system as a pre-treatment practice. Additionally, this provision implies these devices essentially all work the same and in some ways contradicts the language presented later in the manual that defines what is required to approve a proprietary practice for standalone use. We propose the following changes to the language.

    Three general types of proprietary devices are most often considered for stormwater applications: oil/grit separators, hydrodynamic devices, and filtering systems. Some types of proprietary devices may not capable of achieving the level of water quality performance required by this manual and as such, are only allowable for pre-treatment provided an independent third-party monitoring program such as one of the programs identified in Section 4.4.1, verifies that it removes a minimum of 50% TSS for the WQv including during the maximum flow during the water quality event (Qwq). (Contech)

    Response: The suggested change was made to the proposed Manual in response to comment.

74. **Comment:** Additionally, I would recommend that the guidance in this section state that the device must be designed so that it does not exceed the hydraulic loading rate it was verified at during the peak flow from the water quality event (Qwq). If this requirement is not stated manufacturers tend to route more flow to their technologies than they were tested for which reduces the performance. We suggest including graphics/examples of actual devices which fall into this category versus the baffle box and wastewater technology currently included. We can provide a graphic is desirable and point to any number of others. (Contech)

    4.1.6.2 Most proprietary devices are sized based on flow not volume as they are flow through practices without appreciable storage. Design criteria should be revised to mandate they be sized to handle the WQv or the Qwq. Additionally, criteria should note that they device should not exceed its tested/verified hydraulic loading rate during the Qwq. (Contech)

    Response: A requirement was added that the performance of the proprietary practice must be verified for the Qwq in response to this comment.

§6.0 Public Transportation Projects

75. **Comment:** 6.3 Post Construction Soil Standard - Add: **"**Revegetation Performance Standard. For example: 70% vegetation established before final payment to contractor. Consider a 'prewinter' revegetation standard for flood prone sites." Colorado DOT, Revegetation Practices for Highway Construction Projects https://www.codot.gov/programs/research/pdfs/2015-research-reports/assessment-of-cdot-revegetation-practices-for-highway-construction-sites/view
    Excerpt from study: "In general, greater rates of compost should be added to the revegetated areas…. *Compost application on the disturbed areas should be highly monitored* [under the contract] *since it is*

one of the most important items identified to reach maximum revegetation success. (Emphasis added) (CAV)

Response: It is beyond the scope of this Manual to specify contract provisions between VTrans and their contractors. The guidelines referenced in the comment are also more applicable to requirements during construction activity, whereas the proposed Manual is intended to establish standards for the design of post-construction stormwater treatment. The Department did not revise the Manual in response to the comment.

76. Comment: 6.4.1.4. Infiltration Berm Feasibility, Guidance: Include compost filter berms per US-EPA specifications. http://www.filtrexx.com/application/files/5514/6196/0980/7.26_-_EPA_National_Menu_of_BMPs_-_Filter_Berms.pdf (CAV)

Response: It is unclear from the comment how a compost filter berm would be incorporated into the infiltration berm practice. The infiltration berm included in the proposed Manual is primarily intended to serve as a narrow but long infiltration basin. Furthermore, the EPA factsheet referenced in the comment discusses the use of compost filter berms as an erosion prevention and sediment control practice during construction activity. The update to the VSMM is not intended to manage or control construction stormwater discharges. The reference does not contain sufficient documentation of the TSS or phosphorus removal efficiencies of compost filter berms to evaluate their inclusion as an acceptable water quality treatment practice. The Department did not revise the Manual in response to the comment.

77. Comment: Add Compost Filter Socks to list of materials to construct check dams. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1048852.pdf See 'Check Dam" definition below (Comment #92) for proposed revision to definition.
Additional documentation:
https://archive.epa.gov/region5/waste/solidwaste/compost/web/html/bmp.html (CAV)

Response: The Department does not support including compost sock check dams as an acceptable water quality STP due to concerns of phosphorus leaching by the compost media and lack of field performance data. Compost socks may be proposed and evaluated for approval under the Alternative Stormwater Treatment Practice requirements in §4.4.

78. Comment: Subchapter 6, Section 6.3.1(755.05): The organic matter content of the final soil should be no less than 4% in the top 4 inches. The organic matter content of the existing soil should be tested, and then the total amount of compost that is required to achieve 4% will be calculated based on the organic matter content of the recommended compost.

NOTE: There is a wide range in the organic matter content of composts, from 15% to 65%, depending on the source of the compost (leaf, manure, food, biosolids), and therefore the total amount required to accomplish 4 percent will vary depending on the type of compost. Allowing a wide range of compost organic matter reduces costs associated with purchasing and transporting compost to the site. (CAV)

Response: Section 6.3.1 largely relies on the requirements in Section 3.0, which is largely consistent with recommendations put forth in this comment. Where the comment departs from language in the Manual is the organic requirement for compost. The proposed Manual includes the option to use either a pre-approved compost amendment rate or a custom calculated rate. While the version of the proposed

Manual submitted for public comment appeared to require compost with a 40-65% organic matter content in all cases, that requirement was only intended to apply when a pre-approved compost amendment rate was used. In response to comment, Section 3.0 of the proposed Manual has been revised to allow compost with a wider range of organic matter content when topsoil is amended at a calculated rate to achieve a final 4% organic matter content.

General Comments

79. Comment: There needs to be a more robust requirement for operation and maintenance, perhaps as a function of permitting and annual inspection. Additionally, we would recommend adopting a framework for operation and maintenance criteria, and considering making an O&M plan a central and enforceable part of a stormwater permit. For certain practices, especially infiltration or permeable pavements, O&M is critical. (WCA)

Response: Maintenance requirements were discussed in many of the stakeholder meetings prior to development of the proposed Manual and the Department agrees that proper maintenance is of great importance to the long-term performance of the STPs presented in the Manual. Inspection and maintenance requirements were removed from the March 2016 draft of the VSMM and in response to comments and further consideration by the Department. The Department expects to develop inspection/maintenance materials specific to STPs that will be incorporated into application requirements and will support ongoing permit compliance. The Department considers that both inspection and maintenance requirements are more appropriately addressed through application requirements and through permit conditions.

80. Comment: Chloride runoff from developed lands is an emerging pollutant of concern in Vermont. Chloride runoff is directly related to impervious cover. The BMPs included in the draft manual will generally not be effective for managing chloride. The manual should include technical standards for managing chloride from new impervious surfaces to reduce chloride runoff. These standards should be both structural and non-structural in nature. (WCA)

Response: The Department and its consultants identified chloride as a pollutant of concern during the stakeholder process and during the development of the proposed Manual but were unable to identify any practices that effectively manage chloride levels other than restricting its application[3]. The Department did not modify the 2017 VSMM in response to the comment.

81. Comment: As President of the Rutland County Audubon Society, I am writing to support LCI's position on the need for stronger water quality. For too long I have heard excuse after excuse for not facing up to the challenge of the clean water responsibility I feel we all must accept. For example, Rutland City is the single biggest polluter in Vermont yet the only plan to cure it that I have heard is the "100 Year Plan". That is just unacceptable. We must do better than that and we are hoping you will consider this as a mandate while rewriting the rules. I believe the manual should be worded strongly so

[3] Stone Environmental. 2011. Advance Standards Compilation Report. http://dec.vermont.gov/sites/dec/files/wsm/stormwater/docs/ManualUpdate/sw_advanced_standards_compilation.pdf

that it cannot be misinterpreted (easily). I believe it is essential for Vermont to start cleaning up our stormwater. (Marvin Elliott, Rutland Town)

Response: Through the proposed Manual, the Department has sought to establish the most protective standards and most effective stormwater BMPs. The comment was not specific to the content of the proposed 2017 VSMM Rule, and therefore no changes were made in response to this comment.

82. Comment: The reliance on obsolete standards over a long period of time that saw significant new development represents a major missed opportunity to restore and protect water quality and aquatic habitat. Vermont cannot afford to miss such opportunities going forward. For that reason, LCI applauds the Department's commitment to reviewing the Manual on a five-year basis. Unfortunately, the proposed rule lacks clarity regarding the Department's proposed five-year review. This lack of clarity—or really any detail about the review process at all—raises questions about whether the review will be meaningful. Moreover, the checkered history of the current Manual overhaul process, which ramped up and tailed off a few times over a roughly 5-year period, provides little confidence that the promise of timely, periodic review—as currently stated—will be kept.

The Department's final rule must contain a clearer expression of the process the Department will engage every five years to ensure that the Manual remains consistent with the state of the science and is tailored to meet or exceed the pollution-control and flood prevention needs of Vermont. The Manual rule should be set to expire automatically five years after its enactment and the Department should thus be required to refrain from issuing permits until a new Manual is adopted by rule. The Department could, after notice and comment, decide to keep the then-extent Manual, or to make enhancements that would ensure a level of treatment and flood prevention that is no less stringent what is in place at the time of review. Such a provision would incentivize all stakeholders to advocate for the resources the Department needs to avoid the fits-and-starts Manual revision process that has resulted in the broken status quo we are only now moving past years after near-universal recognition of the need for progress in this critical area. (LCI)

Response: See response to Comment 5 regarding language that the Department is adding to the five-year review requirement.

The Department disagrees with the assertion that the standards in the 2002 VSMM are obsolete. While stormwater management approaches continue to evolve and improve, the existing standards remain effective. Hundreds of new projects have gone forward relying on the 2002 VSMM while maintaining compliance with the Vermont Water Quality Standards. Existing development has been retrofitted to these standards resulting in mitigation of impairments. With that said, the Department fully supports inclusion of the most effective BMPs in the 2017 VSMM. To that end, although not required by state or federal law, the Department has included a requirement in the Manual to review the standards in the Manual at least every five years. This process will include a review of available monitoring data, including any available local data, the International Stormwater BMP database, UNH Stormwater Center monitoring results, US EPA publications, and other leading national reports. This information will be used to determine the relative effectiveness of the BMPs in the 2017 VSMM.

The absolute effectiveness of the BMPs in the 2017 VSMM will be assessed against the Department's requirements for implementation of TMDLs and the Anti-degradation Policy. In the Lake Champlain basin, the Department's tracking and reporting under the "accountability framework" under the TMDL

provides an important framework for assessing the effectiveness of the performance of the standards in the Manual. Although the Department has discretion regarding which developed lands regulation mechanisms are revised over time to ensure that the reductions in the waste load allocation are achieved, ensuring that the VSMM continues to include the most effective BMPs, both in terms of minimizing new sources and reducing existing discharges, will likely remain the highest priority.

83. Comment: Page 2-10, Page 4-16, and Page 4-24: Three instances of "**Error! Reference source not found**". (South Burlington)

Response: These errors do not appear in the proposed 2017 VSMM submitted for rulemaking, so no changes will be made in response to this comment as part of the rulemaking process. The Department will package the final rule with additional guidance materials after adoption. These errors appeared in an example of the merged rule and guidance that the Department made available during the public comment period. The errors will be addressed in the final merged version.

84. Comment: We strongly support the Vermont Department of Environmental Conservation's (DEC's) efforts to revise the VSMM. Stormwater management has been and continues to be an evolving field. The VSMM was last updated in 2002 and does not currently reflect some best management practices that have been developed over the last 14 years. The proposed revisions will result in positive changes to the way that we manage stormwater in Vermont and improve the overall efficacy of the stormwater treatment control practices required for development. We also believe that the proposed changes meet the intent of Vermont's Stormwater Management Rule and that they will serve as a good starting point as we work to reduce the amount of Phosphorus (P) flowing to Lake Champlain from developed land. (South Burlington)

Response: The Department acknowledges the comment in support of the proposed changes to the VSMM.

85. Comment: The VSMM uses the term "designer" throughout when describing the individuals who will use the document. It would be inappropriate for the VSMM or Vermont Stormwater Management Rule to define the term "designer" as a licensed engineer. (South Burlington)

a. Many of the tasks related to stormwater management can be competently completed by individuals who are not licensed engineers. The term "designer" is used broadly within the VSMM and Vermont's Stormwater Management Rule. To make all work related to stormwater management in Vermont the province of licensed engineers would be exclusionary and a mistake. It also has the potential to add significant expense to simple tasks that can be completed by other professionals. This could also have significant impacts on municipalities. Municipalities are subject to a considerable amount of stormwater regulation and defining a designer as a licensed engineer would prevent many municipalities from completing permit required tasks utilizing competent and qualified municipal employees.
b. If DEC feels that certain specific tasks require an independent third party (e.g., completion of "Restatement of Compliance" reporting) then I recommend that DEC call out these specific tasks and require that a "licensed engineer" conduct them.
c. We strongly recommend that Vermont DEC develop training on the VSMM and provide this training to designers on a regular (annual) basis. (South Burlington)

Response: The Department is not modifying who may submit applications, inspections, or certifications as part of this rulemaking. The Department will address these issues through adoption of new stormwater rules pursuant to 10 V.S.A. §1264(f). The Department agrees regarding the importance of training and will be making every effort to develop a training program to coincide with the implementation of the 2017 VSMM.

86. Comment: Consider elaborating on the definition of "Impervious Surface" to clarify any discrepancies in its interpretation, including, but not limited to, temporary impervious surfaces. (South Burlington)

Response: "Impervious surface" is defined in statute at 10 V.S.A. § 1264(b)(6). Further elaboration on the definition, or procedures for addressing temporary impervious surface, are better addressed through the aforementioned rule.

87. Comment: Anti-degradation - The proposed amendments to the VSMM states that the:
VSMM development process took into account anti-degradation requirements and the socioeconomic effects of requiring certain practices. The practices in the Manual will be reviewed in cycles not to exceed five years to ensure that the required practices remain the highest level of cost-effective STPs. Where warranted based on this review, the Agency will revise the 2017 VSMM to add, remove, or modify practices to ensure ongoing compliance with the anti-degradation requirements of the Vermont Water Quality Standards. In the vast majority of cases, application of the practices and BMPs in this Manual will maintain and protect the higher quality of the State's high quality waters, will prevent limited reductions in the existing higher quality of those waters, and will minimize risk to the existing and designated uses of those waters. Therefore, compliance with the 2017 VSMM affords a rebuttable presumption of compliance with the Anti-Degradation Policy.

The Vermont Agency of Natural Resources (ANR) is in the process of developing an anti-degradation rule. The rule will set forth how ANR will implement the antidegradation policy in the Vermont Water Quality Standards (VWQS). The Antidegradation Policy broadly provides that waters shall be managed to maintain existing higher levels of water quality, and more than a limited lowering of higher levels of water quality is only allowed when it is shown that:
a. the adverse economic or social impacts on the people of the state specifically resulting from the maintenance of the higher quality of the waters would be substantial and widespread;
b. these adverse impacts would exceed the environmental, economic, social, and other benefits of maintaining the higher water quality; and
c. there shall be achieved the highest statutory and regulatory requirements for all new or existing point sources, and all cost effective and reasonable accepted agricultural practices and best management practices, as appropriate for nonpoint source control, consistent with state law.

VWQS § 1-03 (C) (a-c).
The above test for determining whether more than a limited lowering of water quality is allowed is known as Social and Economic Justification (SE)) test. It is inappropriate for DEC to state in the VSMM that the manual itself incorporates the SEJ test. This implies that the VSMM includes standards that DEC knows will allow more than a limited lowering of high quality waters, but is justified based on the test set forth in VWQS § 1-03 (C) (a-c). The Anti-degradation Rule ANR is developing will set forth how ANR will determine what is a high quality water, when an activity or activities will result in more than a limited lowering of water quality, how to mitigate more than a limited lowering of water quality, and how ANR will apply the SEJ test if more than a limited lowering is not avoidable. When it is

proposed, the Anti-degradation Rule will appropriately set forth the parameters for analyzing the impact of an activity- a proposed discharge - or the cumulative impact of multiple activities on Vermont's waters. It is premature for DEC to broadly state that the VSMM complies with the Anti-degradation Policy before the Anti-degradation Rule is even proposed. Moreover, the Anti-degradation Policy applies on a discharge by discharge basis, not to entire regulatory schemes themselves, like the VSMM. As noted, even if regulatory programs are designed to maintain water quality, the cumulative effect of multiple discharges and activities must be considered to determine if an individual stormwater discharge will result in more than a limited lowering of water quality. In other words, complying even with a strong VSMM could still lower water quality if the discharge in question becomes the proverbial straw that breaks the camel's back.

In addition, and importantly, there is no evidence in the record of this rulemaking that DEC has weighed the factors VWQS § 1-03 (C) (a-c) in proposing the amendments to the VSMM. There is no analysis of what provisions of the VSMM DEC knows will not maintain higher levels of water quality because there is a SEJ not to. Absent such an analysis there is no basis for DEC to state in VSMM that the manual meets the Anti-degradation Policy "for the vast majority of cases." VNRC further opposes the policy that it is built into the VSMM that DEC will allow the further degradation of Vermont's waters in certain undefined cases. Given the condition of Lake Champlain, Vermont must focus on restoring water quality, not allowing further degradation. Accordingly, VNRC requests that the Anti-degradation provision of the proposed amendments of the VSMM be stricken. The provision was not part of earlier drafts of the VSMM, and it is not necessary for the VSMM to be effectively implemented. (VNRC)

Response: The VSMM does not incorporate the SEJ test. The VSMM has been drafted in accordance with the 2010 Interim Anti-Degradation Implementation Procedure, Section IX, which was adopted to implement the State's Anti-Degradation Policy in the Vermont Water Quality Standards, and the Manual will be revised, as necessary in the future, to comply with any relevant requirements in the forthcoming Anti-Degradation Rule.

Under Section IX(C) of the Interim Procedure, "If a manual takes into account anti-degradation requirements, including a consideration of the socioeconomic effects of requiring certain BMPS or treatment and control requirements, then a permittee implementing such identified BMPs or other treatment and control requirements through an authorization under a *general permit* shall be presumed to meet the Policy absent credible and relevant project or site-specific information rebutting the presumption." (emphasis added). Thus, projects eligible for coverage under a stormwater operational general permit[4] are presumed not to cause a limited lowering of the water quality of high quality waters, unless project- or site-specific information is available to rebut the presumption. If information indicates that a limited lowering would occur, then general permit coverage would not be available, and the Secretary would need to undertake an SEJ analysis before granting coverage under an individual permit.

To address the concerns raised in this comment about SEJ and the forthcoming Anti-Degradation Rule, the Department is making the following edits to the Section 1.2 Anti-Degradation statement:

[4] Stormwater discharges to stormwater-impaired waters without a TMDL are <u>not</u> eligible for coverage under a general permit, rather they must get individual permit coverage.

"The 2017 VSMM is adopted in conformance with the Anti-Degradation Policy of the Vermont Water Quality Standards and the Department's Interim Anti-Degradation Implementation Procedure (October 2010).

The development of the 2017 VSMM was informed by an extensive stakeholder process and review of existing stormwater standards in place nationally. As a result of this process, this Manual includes the highest practicable level of ~~cost-effective~~ STPs. Additionally, the 2017 VSMM development process took into account anti-degradation requirements and the socioeconomic effects of requiring certain practices.

The practices in the Manual will be reviewed in cycles not to exceed five years to ensure that the required practices ~~remain the highest level of cost-effective STPs~~ continue to be sufficiently protective of water quality. Where warranted based on this review, the Agency will revise the 2017 VSMM to add, remove, or modify practices to ensure ongoing compliance with the anti-degradation requirements of the Vermont Water Quality Standards.

~~In the vast majority of cases, application of the practices and BMPs in this Manual will maintain and protect the higher quality of the State's high quality waters, will prevent limited reductions in the existing higher quality of those waters, and will minimize risk to the existing and designated uses of those waters.~~

~~Therefore, compliance with the 2017 VSMM affords a rebuttable presumption of compliance with the Anti-Degradation Policy. The overall presumption of compliance with anti-degradation requirements for projects designed in conformance with this Manual may be rebutted on a case-by-case basis if warranted by credible and relevant project- or site-specific information available to the Agency during the review of an application for a proposed discharge.~~"

88. Comment: Water Supply and Groundwater Protection - VNRC commented on this provision in the draft pre-rulemaking version of the VSMM. In sum, VNRC commented on its concerns about the setbacks proposed in Section 2.2.3 for water supplies and groundwater from infiltration of stormwater. VNRC requested that DEC provide the basis for the setbacks and that DEC explain how the manual amendments will assure that infiltration of stormwater will not violate applicable groundwater protection standards, including ANR's obligation to manage groundwater as a public trust resource.

DEC responded to VNRC's comment as follows: *In the revised draft of the VSMM, the Department has updated the setbacks for structural infiltration practices from potable water supplies that rely upon groundwater and for groundwater source protection areas. The Department relied upon existing and proposed Vermont Drinking Water and Groundwater Protection regulations in support of these established distances that are determined to be protective of groundwater. The Department further articulates how the revised draft VSMM* is *protective of groundwater in Section 1.3 of the revised draft.* VNRC appreciates the efforts DEC has taken to clarify how DEC will ensure that stormwater discharges will not have an adverse impact on groundwater. VNRC recommends that DEC through the Drinking Water and Groundwater Protection Section evaluate the impact of increased stormwater infiltration on groundwater as the proposed changes to the VSMM are implemented to determine that existing groundwater protection standards are sufficiently protective. VNRC supports efforts to increase infiltration to reduce stormwater pollution to receiving waters. However, as DEC is aware, one action to address a particular problem has the potential to create new problems as humans continue to tinker with

the natural environment. VNRC recommends that the existing Groundwater Coordinating Committee at DEC make part of the work plan assessing the impact of greater stormwater infiltration on groundwater and drinking water. (VNRC)

Response: The Department has availed itself of the best available information in formulating its determinations regarding the appropriateness of stormwater infiltration as proposed in the 2017 VSMM. Any additional monitoring data or information that may be provided by the Groundwater Coordinating Committee or any other entity would be welcomed and duly considered.

89. Comment: Given the likely learning curve for many practitioners (contractors, engineers, designers, etc.) to adopt soil---based Stormwater Treatment Practices (STPs), CAV supports ANR led outreach and training for professionals affected by the revisions to the VSMM. (CAV)

Response: See response to Comment 10.

90. Comment: The Manual should clarify concepts and terms. (CLF)

a. ***Manual Review*:** The Manual Review provision should contain clearer instructions on the process as well as the substance of the review. CLF agrees with our colleagues at Lake Champlain International that the Manual rule should set to expire automatically after five years from its enactment with a suspension in permit issuance until a new Manual is adopted by rule. The Manual Review provision should also clarify the metrics against which the Manual will be reviewed and what actions the Secretary will pursue should the Manual be determined an inadequate strategy to meet TMDL targets. These actions should include revising the VSMM to increase the phosphorus removal standard, increase the acreage of existing developed land subject to stormwater permit, and/or using the Department's residual designation authority pursuant to DEC's Stormwater Management Rule section 18(302)(a)(5). For specific language suggestions, please refer to Appendix B.

Response: See responses to Comments 5 and 77. Additionally, the Department's obligations regarding implementation of the Lake Champlain TMDLs are included in the accountability framework of the TMDLs, as well as state statute, not this Manual.

b. ***Infeasible*:** The Manual relies on permit application materials, including but not limited to the STP Selection Tool to define what is feasible. CLF has two concerns with this approach: first, the STP Selection Tool's definition of feasible is contentious. For example, while the Selection Tool determines Tier 1 Practices are infeasible when a site's soils have an infiltration rate of less than 0.2 inches per hour, EPA disagrees. With the addition of underdrains, EPA argues Tier 1 Practices are feasible despite low infiltration rates.4 Second, DEC has yet to develop many of the accompanying permit application materials. As a result, we are forced to comment on the VSMM without fully understanding the implications of this rule. Actual phosphorus removal will largely depend on DEC's interpretation of what is feasible. We would welcome further engagement as these materials are crafted, and highlight DEC's commitment to maximize phosphorus removal.

Response: See response to Comment 15. The Department has relied on an extensive review of existing standards in place nationally in determining appropriate feasibility standards. Notwithstanding EPA's considerable experience contemplating implementation of a post-

construction rule that includes such standards, we are not persuaded to modify the proposed feasibility terms. The Department welcomes input on existing and future application materials, as well as comment on projects applying for permit coverage.

c. ***Not possible***: The Manual includes two standards for allowing designers to implement Tier 2 or Tier 3 Practices: "infeasible" and "not possible." For clarity, DEC should remove reference to "not possible" and rely solely on "infeasible" to determine which tier of STP is implemented.

Response: See the response to Comment 5. The words "not possible" have been removed.

d. ***Designer***: Designers are entrusted to certify what is feasible. Currently, however, there is no certification process to ensure consistency of knowledge, education, or professional experience across the designer community. In addition, without certification there is no method of reprimanding an individual for misrepresenting information within a permit application. We urge a clear and transparent definition of designer within the Manual.

Response: The Department is not intending to modify who may submit applications, inspections, or certifications as part of this rulemaking to update the VSMM. The Department will address these issues in the forthcoming adoption of new stormwater rules pursuant to 10 V.S.A. § 1264(f).

e. ***Anti-degradation***: It is unclear why the State has chosen to emphasize a cost-benefit analysis in the anti-degradation section of the Manual. Cost should not justify implementing poorer performing practices. While cost is excluded as a justification for using Tier 2 or Tier 3 Practices within the WQTS, the reference to cost in the anti-degradation section is unclear and misleading.

Response: See the response to Comment 82.

f. ***Removal Efficiencies***: The Manual acknowledges the range in removal efficiencies for STPs. To ensure DEC's accounting and tracking tool does not overstate the amount of phosphorus removed, we strongly urge DEC to rely on conservative removal efficiencies. Incorporating low removal rates into any tracking mechanisms will help maintain honest accounting.

Response: The Department agrees regarding the range of removal efficiencies and the importance of using conservative estimates and margins of safety. The presumed efficiencies stated in the 2017 VSMM may be modified by best available information as part of the Department's TMDL implementation tracking efforts.

g. ***Tier 3 Practices***: DEC staff has repeatedly told us that they cannot imagine a justification that would warrant the use of a Tier 3 Practice in lieu of a Tier 2 Practice. To manage expectations, maintain clarity, and achieve the highest water quality outcome, we encourage DEC to remove Tier 3 Practices from section 2.2.4 (WQTS and Water Quality Practice Selection).

Response: The comment infers that the Department informed CLF that there was unlikely to be any scenarios where there would be justification for use of a Tier 3 Practice. The Department considers the comment to misrepresent discussions held with CLF regarding the draft 2017 VSMM Rule. The Department simply noted that it is difficult to know all possible site or project

constraints that may restrict feasibility of a Tier 2 Practice and noted that they expect some projects will need to utilize Tier 3 Practices when these constraints exist, which could include design improvements to existing infrastructure such as a wet pond. The Department has not removed Tier 3 Practices from the Manual in response to the comment.

h. ***Redevelopment***: It is unclear what the WQTS is for redevelopment. While capturing and treating 50 percent of the water quality volume from the redeveloped impervious surface area appears to be one acceptable approach, it is unclear what Tier of Practice must be applied. The inclusion of a numeric phosphorus removal standard would clarify the redevelopment standard. We also remain concerned that the entire water quality volume is not treated.

Response: See previous responses regarding the Department's position regarding the use of numeric standards. See response to Comment 19.

91. Comment: Add: Option to use Compost Blanket/seeded Compost Blanket material to protect bare soil and establish vegetation. Require use of Compost Blanket on highly erodible soils. https://www3.epa.gov/npdes/pubs/compostblankets.pdf

Response: Stabilization requirements pertaining to construction and construction related activity is addressed through the Department's construction stormwater discharge permit program. Therefore, the use of compost blankets is more appropriate as a site stabilization strategy under a construction stormwater permit, and erosion prevention and sediment control requirements applicable to construction activity, which is beyond the scope of this Manual.

92. Comment: Definitions; "check dam": add compost filter sock to list of options per NRCS recommendations: http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1048852.pdf

"Check dam" means a small dam constructed in a gully, swale, or other channel to decrease the flow velocity, by reducing the channel gradient; minimize channel scour; and promote deposition of sediment. Check dams may be constructed of wood, small diameter stone, compost filter sock, concrete, or earth.

"Topsoil' --- amend to include a minimum SOM content. "Topsoil" means fertile or desirable soil material (minimum 4% organic matter) used to top dress road banks, subsoils, parent material, etc. (CAV)

Response: See response to Comment 77 regarding the addition of "compost socks."

The Department will rely on the requirements of the Post-Construction Soil Depth and Quality Standard to define minimum organic matter content for areas subject to the standard, rather than including it in the definition of topsoil, which may otherwise vary.

93. Comment: My comments pertain to the new Stormwater Runoff Manual. We need to control our stormwater runoff. I expect and demand that the new clean water initiative include provisions and stringent requirements to control this incredible health risk. There have been too many overflows of sewage treatment plants this summer and in years past. We cannot survive without clean water. Water is life! We need to institute the strongest measures possible to insure that toxins do not end up in our streams, rivers, ponds and lakes. (Berney Skutel, North Hero)

Response: The Department regulates sewage overflows under the Combined Sewer Overflow Rule (Environmental Protection Rules, Chapter 34).

94. Comment: The stated purpose of the proposed VSMM identifies both water quality and water quantity controls. The proposed VSMM appears to overemphasize water quality over water quantity. More quantity control is needed for regulated projects to offset much of the stormwater runoff volume associated with non-regulated stormwater discharges throughout the state. The VSMM should require stormwater detention on all levels to prevent combined sewer overflows and to ensure that green stormwater infrastructure is no overwhelmed by large flows. Projects shall also be designed in consideration of additional stormwater flow from pervious developed areas such as lawns. Allowing for net reduction does not get at any of these water quality or water quantity goals. Related to water quantity, the proposed VSMM does not speak to the protection of river corridors, which are vital to managing stormwater during large and catastrophic events. (Malcom Fitzpatrick, Braintree, Vermont)

Response: The proposed Manual includes a suite of standards that addresses both quantity and quality. The Groundwater Recharge Standard requires that a minimum amount of runoff be retained onsite through infiltration, either via an infiltration STP or through disconnection. The Channel Protection, Overbank Flood Protection, and Extreme Flood Protection Standards require control of the 1, 10, and 100-year storm events respectively, unless the required volumes can be infiltrated on site. Even the Water Quality Treatment Standard prioritizes runoff reduction over other methods to achieve water quality goals. Calculations to demonstrate compliance with these standards typically includes pervious areas being developed and the associated increased in runoff associated with the conversion to lawn. The addition of the Post-Construction Soil Depth and Quality Standard is designed to ensure that developed pervious areas retain the ability to store precipitation, which will minimize the impact from the establishment of developed pervious areas.

Apart from the question of quantity control versus water quality treatment, the comment refers to issues beyond the scope of the proposed Manual. The proposed Manual does not seek to redefine jurisdictional thresholds, which are more commonly addressed through statute. Combined sewer overflows (CSO) are addressed through the CSO Rule (Environmental Protection Rules, Chapter 34). River corridor protection is addressed through Municipal participation in the National Flood Insurance Program (NFIP), the River Corridor & Floodplain Protection Rule, and Act 250 or Section 248 review, when applicable.

95. Comment: Approximately fifteen comments were received from various individuals through an email campaign, submitted on behalf of LCI. (LCI)

Response: Many of the comments advocated generally for clean water and cleanup of Lake Champlain. Additional comments highlighted issues related to combined storm-sewer overflows, not specific to the proposed 2017 VSMM Rule. The Department acknowledges the comments.

96. Comment: Comments delivered to the Department through contract with Otter Creek Engineering, in concert with the preparation of stormwater design examples designed in accordance with the 2017 VSMM Rule.

Response: Through collaborative discussions with Otter Creek Engineering as described above, various typographical changes, corrections and clarifications were made, including practicality changes for applying the new runoff reduction framework to actual project design. Many of these changes were specific to design equations, modeling requirements, and practice selection for meeting the Water Quality Treatment Standard (WQTS), for applying the new Hydrologic Condition Method (HCM) of the Channel Protection Standard and additional standards.