



# **2017 Vermont Stormwater Management Manual**



**Designer Training**

**May 24, 2017**



**Presented by the Vermont DEC Stormwater Program**

# Agenda

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- I. 2017 VSMM Rule and Design Guidance
  - Introduction, Authority, and Purpose
  - Site Planning and Design
  - Treatment Standards & STP Siting Criteria
  - Acceptable STPs
- II. Permit Application Materials
- III. Permit Application and Design Example
- IV. Questions and Comments

# Introduction, Authority, and Purpose

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# 2017 Vermont Stormwater Management Manual Rule and Design Guidance

10 VSA §1264: Authority for establishment of post-construction treatment standards for stormwater discharges from:

- New development
- Redevelopment
- Existing development

...when subject to Vermont stormwater discharge permits.

2017 VSMM Rule does not change regulatory thresholds.

## 2017 Vermont Stormwater Management Manual Rule and Design Guidance

Vermont Agency of Natural Resources

This document combines the duly adopted 2017 Vermont Stormwater Management Manual Rule (Environmental Protection Rule, Chapter 36, effective July 1, 2017) and the Agency's Design Guidance for applying the Rule. All design guidance elements of this document include a title or heading indicating "Design Guidance" and are highlighted in gray. In addition, figures, tables, and drawings that are labeled as "Design Guidance," are not components of the adopted Rule, but serve as design guidance for applying the Rule. Tables or figures that are not labeled as "Design Guidance" are required elements of the adopted Rule, which must be complied with.

# 2017 VSMM Rule and Design Guidance

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- Sets forth treatment standards for regulated stormwater discharges from impervious surfaces for:
  - Water quality treatment
  - Groundwater recharge
  - Water quantity control
  - Healthy Soils
- Identifies acceptable stormwater treatment practices (STPs).
- Establishes design requirements for STPs
- Provides stormwater management design guidance





# Surface Water Protection

## Vermont Water Quality Standards (VWQS)



- Discharges must meet the applicable Treatment Standards in the Manual, which relate to compliance with VWQS.
  - Water Quality Treatment Standard
  - Channel Protection Standard
- 2017 VSMM was adopted in conformance with the Department's Interim Anti-Degradation Implementation Procedure (October 2010).
- Adoption process considered a review of other existing stormwater standards and STPs, to include the highest practicable level of treatment.
- STPs in the VSMM will be reviewed in cycles not to exceed 5 years.



# Protection of Groundwater

## GW Protection Rule and Strategy

### Underground Injection Control Regulations

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- Treatment Standards include Water Quality and Groundwater Recharge, to ensure that stormwater is treated for groundwater protection and groundwater sources are not depleted by development.
- Infiltration is prohibited for runoff from hotspot land uses or activities.
- Stormwater infiltration includes requirements for pre-treatment and separation to groundwater.

# Rule and Design Guidance

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## Key Words:

- **must, shall, and required** → NOT optional, IS a requirement.
- **should** → well-accepted, satisfactory and advisable option or method, but IS optional and IS NOT required.
- **may** → recommended for consideration, but IS optional and IS NOT required.
- **Design Guidance** → not components of the Rule, but serve as additional guidance for applying the Rule.

# Examples of “Design Guidance”

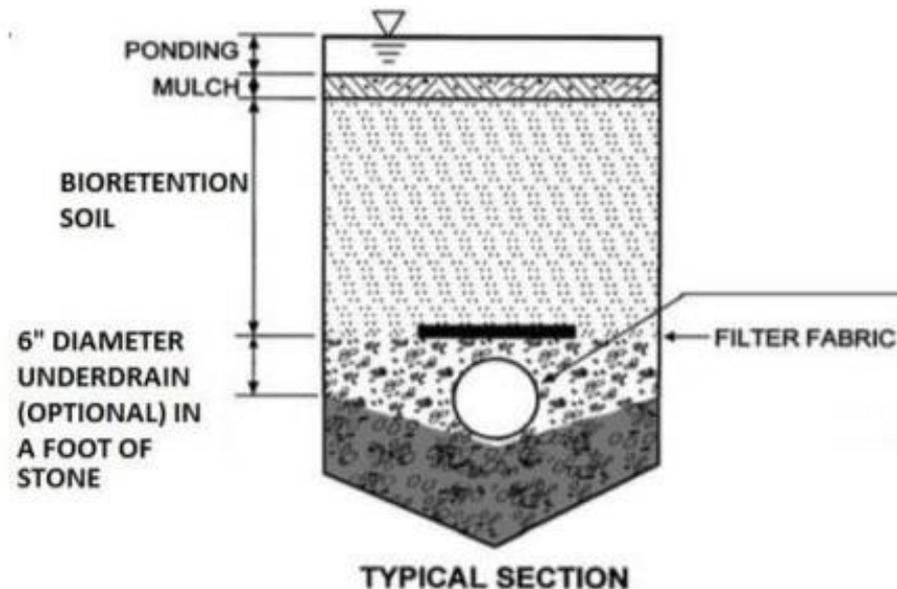
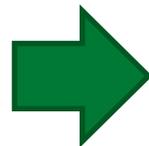
## Design Guidance:

- Bioretention systems should be designed off-line whenever possible. A flow splitter should be used to divert excess high flows away from the filter media to a stable conveyance.
- Bioretention practices should be designed to completely drain or dewater within 48 hours (2 days) after a storm event to reduce the potential for nuisance ponding conditions.



Within the text Design Guidance is clearly labeled and highlighted in grey.

Figures, pictures, and tables are indicated as Design Guidance in the caption



*Figure 4-9: Bioretention, Design Guidance*

# Effective Date and Transition

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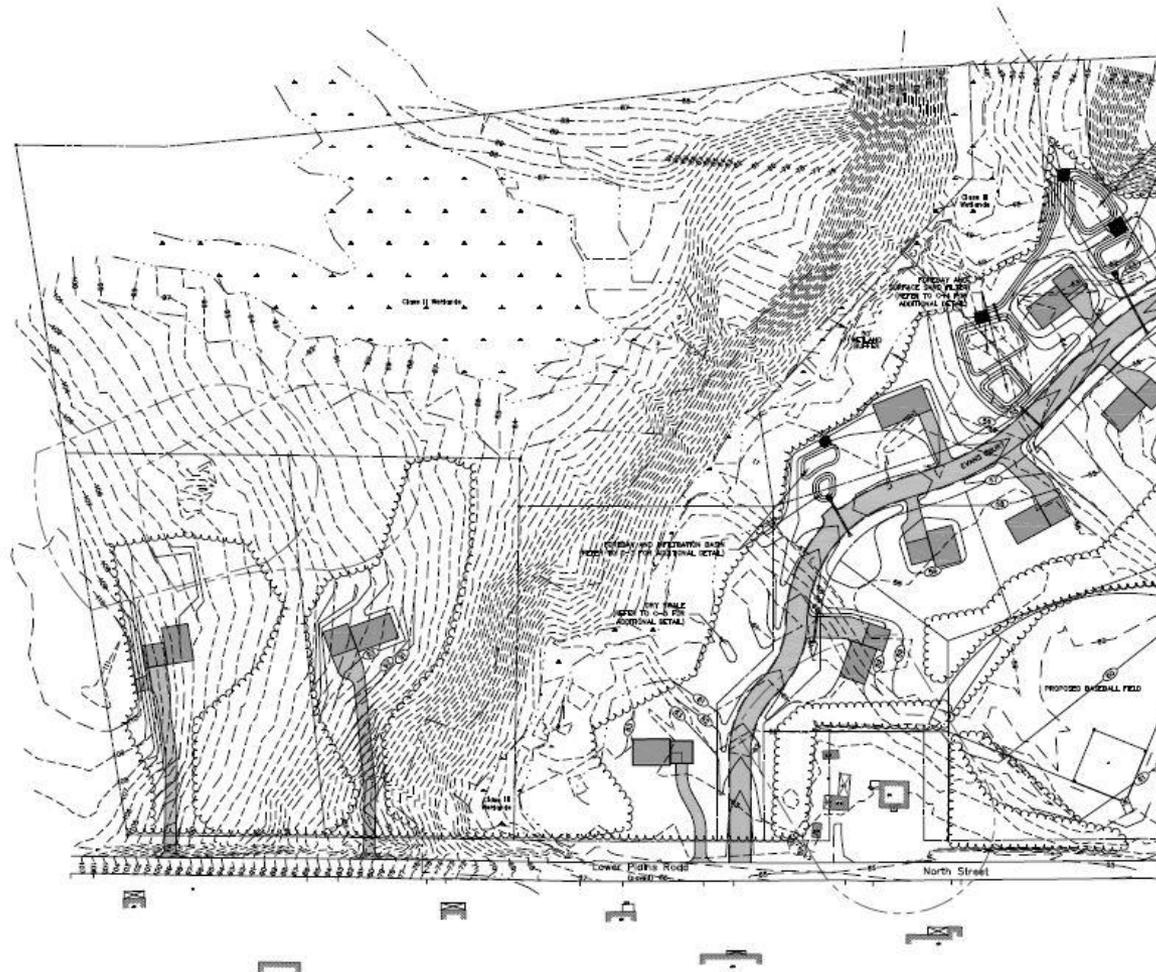
## 2017 VSMM Rule becomes effective on July 1, 2017

**Transition:** Administratively complete permit applications received (not post-marked) by the Department no later than Friday, June 30, 2017, 4:30 PM may design to the 2002 VSMM.

**Public Transportation Projects** may apply the standards in the 2002 VSMM if:

- 1) Documentation that ROW valuation activities have been initiated or a determination was completed indicating that ROW acquisition was not necessary for the project as of July 1, 2017;  
AND
- 2) Substantial construction of the project commences within 5<sup>10</sup> years of effective date.

# Site Design



# Site Planning and Design

## Site Layout

### Design Guidance

- Initial site layout
- Conserving natural vegetation
- Minimizing impervious cover
- Avoiding sensitive areas, natural resources and buffers

#### 2.1. Site Planning and Design

##### Design Guidance: Initial Site Layout

During initial site layout, the designer should carefully consider the locations of existing drainage features, forest blocks, stream buffers, lake shorelands, wetlands, floodplains, river corridors, recharge areas, habitat, steep slopes, zero-order streams, and other natural areas present on the site. Working to minimize impervious cover and mass grading and the retention of forest cover, natural areas, and undisturbed soils will reduce the generation of stormwater runoff from the site that will ultimately need to be managed and will reduce stream instability. Further, all disturbed areas of the site will be subject to a post-construction soil depth and quality standard (see Section 3.0), whereas undisturbed areas are presumed to comply with the standard without additional requirements.

##### Design Guidance: Conserving Natural Vegetation and Minimizing Impervious Cover

In the 2002 Vermont Stormwater Management Manual (VSMIM), several of the site-design approaches described below were offered as optional “credits” that could be applied to reduce the required water quality and groundwater recharge volumes. In this manual, site planning and design practices are not credited as explicitly. Rather, the strategies for site planning and design discussed below can result in smaller development footprints that will reduce the need for building and maintaining structural STPs in order to meet the treatment standards in Section 2.2.

##### **Natural Area Conservation**

- Consider conserving trees and other existing vegetation at each site or establishing new natural areas by planting additional vegetation, establishing no-mow zones, clustering tree areas, and promoting the use of native plants.

##### **Natural Drainage, Buffer and Floodplain Protection**

- Where possible, establish and protect a naturally vegetated buffer system along all perennial streams and other water features that encompass critical environmental features such as the 100-year floodplain, steep slopes (in excess of 15%), lake shorelands, and wetlands.
- Preserve or restore riparian stream buffers with native vegetation. Buffers are most effective when maintained in an undisturbed condition, mowing and brush hogging should not take place within a buffer.

## Site Planning and Design

# Setbacks for Water Resource Protection & Restoration

### Design Guidance

- Highlights other regulatory requirements and goals for water resource protection and restoration, including:

- Wetlands
- Lake Shorelands
- Floodplains
- River Corridors



- Provides awareness of other local, state, federal regulatory requirements during initial site design.
- Water resource consideration in advance of application submittal minimizes conflicts and potential permitting delays.

## Site Planning and Design

# Design Strategies on Already Developed Sites

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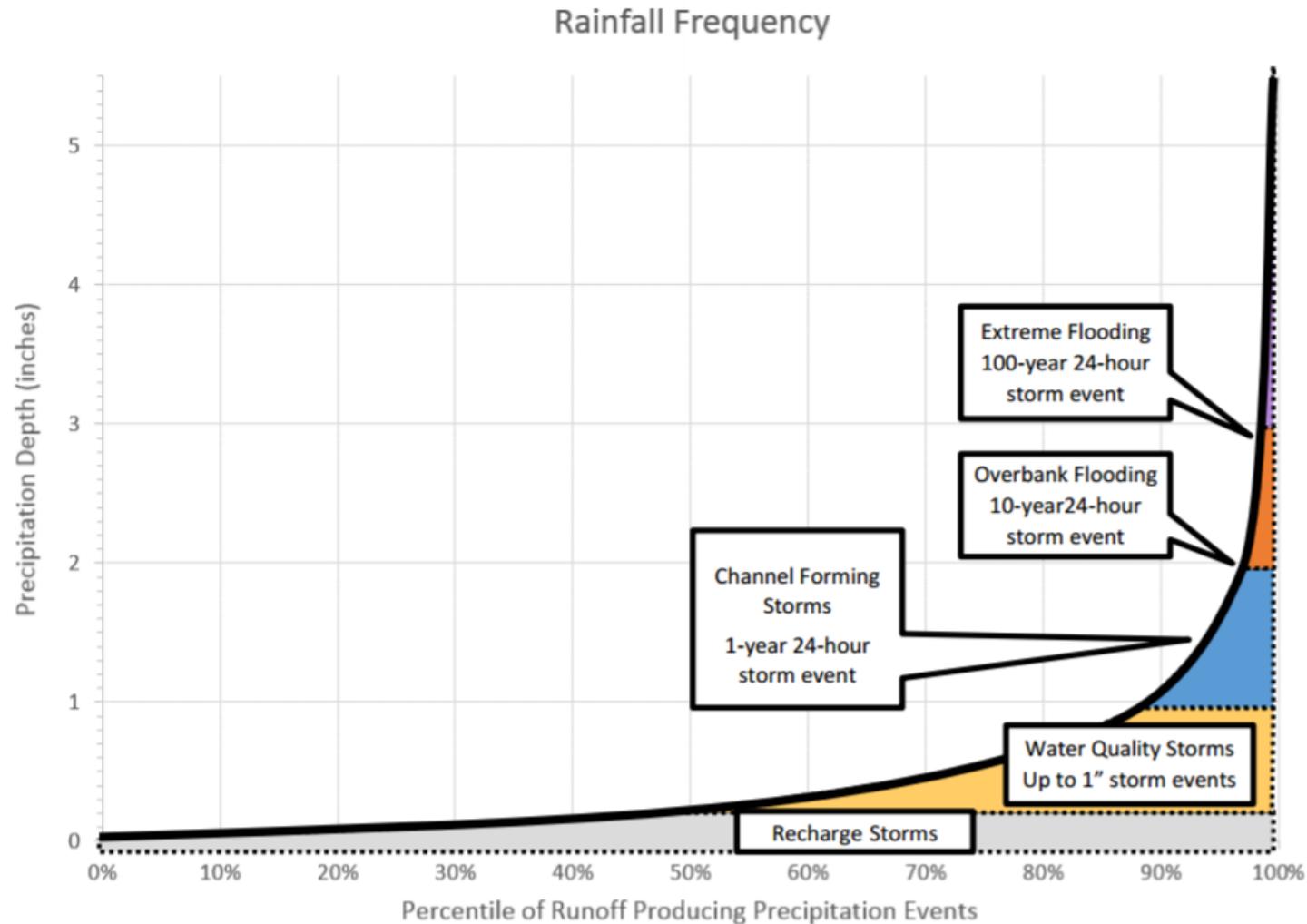
**Site Balancing** → Treatment of existing impervious areas not subject to permit requirements as compensation for new or redevelopment that can't be treated due to site constraints.

**Net Reduction** → Projects that result in a net reduction in impervious surfaces will gain credit towards the WQTS and those expansions shall not be subject to Channel Protection, Overbank Flood Protection, or Extreme Flood Protection Standards.

### Prerequisites

- Site constraints
- Pre-application Agency consultation required (subject to approval/denial)
- Same receiving water / watershed

# STP Sizing Criteria and Treatment Standards



## Treatment Standards

# Post-Construction Soil Depth and Quality (SDQ)

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**New standard** aimed at maintaining and restoring healthy soils associated with development.

Top soil must be a minimum of 4 inches deep and be 4% organic matter.

The standard applies to **all disturbed soils** on the site **except:**

- Areas on slopes  $>33\%$
- Impervious surfaces
- Structural STPs
- Engineered as structural fill

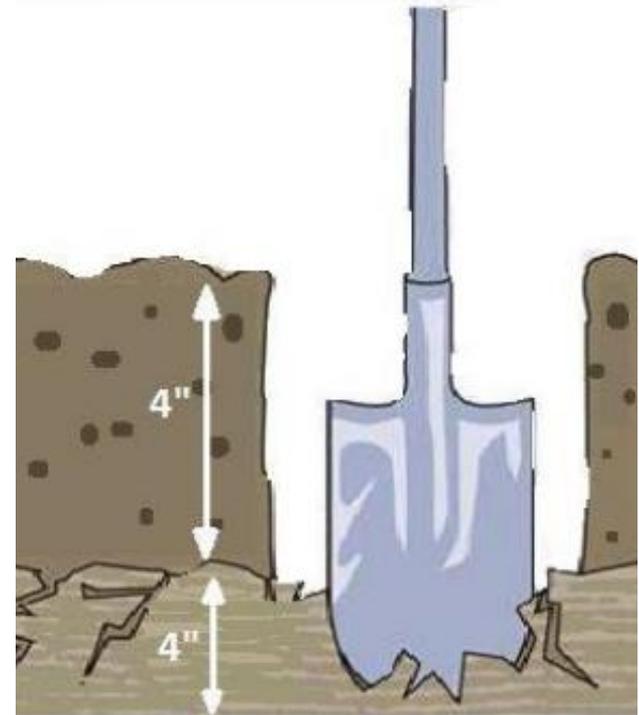


# Treatment Standards

## Soils

### Compliance with SDQ:

- **Option 1:** Leave native vegetation and soil undisturbed, protect from compaction.
- **Option 2:** Amend existing site topsoil or subsoil in place.
- **Option 3:** Remove and stockpile existing topsoil during grading.
- **Option 4:** Import topsoil mix, or other materials for mixing, including compost (or EQ biosolids), of sufficient organic content (4%) and depth (4").



Modified from: WCOE 2012

# Treatment Standards

## Soils

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Designers must include site-specific soil management plan sheet that:

- Identifies all areas subject to the Standard.
- Identifies all areas not to be disturbed and areas exempt from Standard.
- Includes construction details and notes on the methods the contractor may use to meet the Standard.
- Includes instructions for contractor verification of the Standard, including a sampling scheme that identifies nine 8-in. deep test holes per acre.



# Treatment Standards

## Runoff Reduction



Achievement of the Standards is now considered under the framework of **Runoff Reduction** with the goals of:

- Reducing pollutant export
- Retaining stormwater on site and reducing runoff, mimicking natural hydrology

2017 VSMM **requires** consideration of practices that rely on infiltration, based on feasibility

**Treatment Volume ( $T_v$ )** – Credit assigned to STPs based on their ability to infiltrate or reduce runoff.

# Treatment Standards

## Groundwater Recharge Standard ( $Re_v$ )

Existing standard aimed to maintain the average annual recharge for to preserve existing water table elevations.

The Standard has been REVISED to require more recharge, reemphasizing runoff reduction the use of infiltrating practices.

Hydrologic Soil Group (HSG)	2017 Recharge Factor	2002 Recharge Factor	Change
A	<b>0.60</b>	0.40	+50%
B	<b>0.35</b>	0.25	+40%
C	<b>0.25</b>	0.10	+150%
D	<b>Waived</b>	Waived	No change



## Groundwater Recharge – Stormwater Hotspots



Groundwater Recharge Standard **waived** for site areas contributing from hotspot land use or activity.

Stormwater Hotspots – Potential for higher concentrations of pollutants than in typical stormwater runoff.

- Petroleum distribution centers
- Hazardous material loading and storage facilities
- Subsurface contamination from prior land use

Stormwater runoff from hotspot land use or activity **shall not** be treated with structural or non-structural STPs that rely upon infiltration.

## Treatment Standards

# Water Quality Treatment Standard (WQTS)

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Existing standard that requires treatment of stormwater runoff from the 90<sup>th</sup> percentile (1.0 inch) 24-hour storm event

Accounts for runoff containing the majority of pollutants including, but not limited to, phosphorus (TP) and suspended solids (TSS).

$$WQ_V = \frac{(P)(R_V)(A)}{12}$$

$P = 1.0$  inch Revised from 0.9 inch

$R_V = 0.05 + 0.009 * \% \text{ Site Impervious}$

# Treatment Standards

## Redevelopment

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Redevelopment required to treat **a portion** of the calculated  $WQ_V$ .

- Treat 50%  $WQ_V$ ,
- Remove 25% of existing impervious surfaces & restore soils; or
- Combination of above two methods.

STPs must be sized to treat  $WQ_V$  for on-site AND off-site areas that get routed to a practice.

# Treatment Standards

## **Water Quality**

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WQ<sub>v</sub> for must be met with Acceptable STPs identified in Subchapter 4.0; or with

- Agency approved Alternative STP; or
- Public Transportation Project practices identified in Subchapter 6.0, only if applicable.

The 2017 VSMM has removed select STPs from the list of Acceptable STPs for meeting the WQTS, including:

- Grass Channels
- Wet Swales

## Treatment Standards

# **NEW - Water Quality Practice Selection**

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Acceptable STPs for meeting the WQTS are divided into Tier 1, 2, and Tier 3 Practices, organized by order of design preference based upon:

- Pollutant removal efficiencies
- Runoff reduction potential

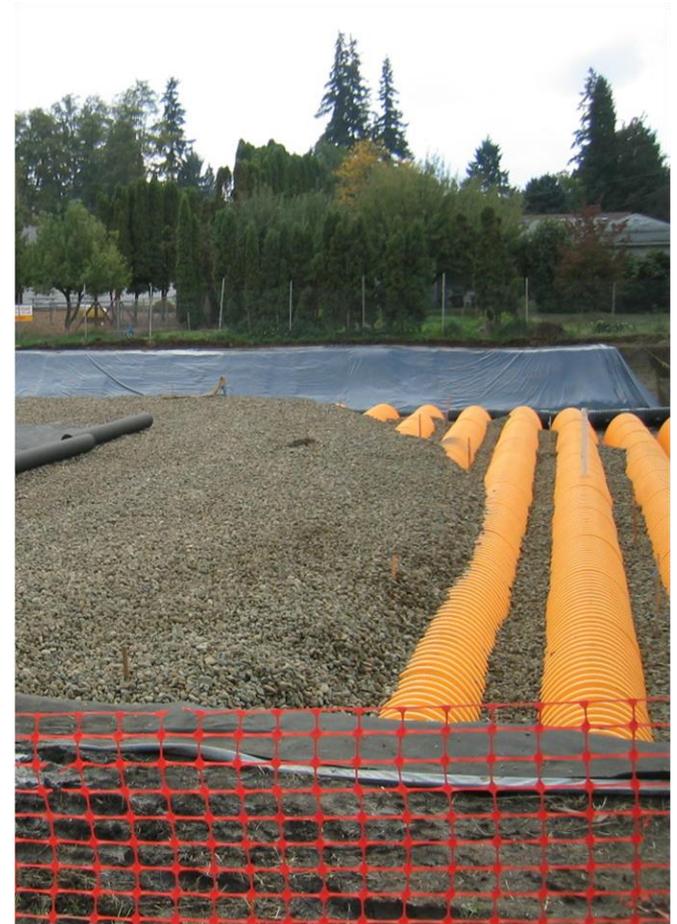
STP Selection for both New Development and Redevelopment projects must consider the higher perform practices first, based on site feasibility.

# Treatment Standards

## Water Quality Practice Selection

### Tier 1 Practices:

- $\geq 80\%$  TP and  $\geq 98\%$  TSS removal
- Reduce Runoff primarily by infiltration
  - Infiltration Basins, Trenches and Chambers & Dry wells
  - Bioretention (designed to infiltrate)
  - Dry Swales (designed to infiltrate)
  - Filters (designed to infiltrate)
  - Simple Disconnection
  - Disconnection to Filter Strips or Vegetated Buffers



# Treatment Standards

## Water Quality Practice Selection

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### Tier 2 Practices:

- 60 - 80% TP and 80-97% TSS removal
  - Bioretention (not designed to infiltrate)
  - Gravel Wetlands



# Treatment Standards

## Water Quality Practice Selection

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### Tier 3 Practices:

- 50 - 60% TP and 80% TSS removal
  - Dry Swales (not designed to infiltrate)
  - Filtering Systems (not designed to infiltrate)
  - Wet Ponds
  - Shallow Surface Wetlands)



## Treatment Standards

# Water Quality Practice Selection

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- Designers to use STP Selection Tool for evaluating feasibility of using Tier 1, 2, 3 STPs.
- Consideration given for use of existing STPs when:
  - Existing STP is identified as a Tier 1 Practice for in the 2017 VSMM;
  - Evaluation completed for modifying the existing STP to meet 2017 VSMM STP design requirements; and
  - Evaluation if existing STP can be used in conjunction with highest feasible tier practice.

# Treatment Standards

## **Water Quality – Feasibility**

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### Feasibility Constraints for use of Tier 1 Practice

- Soils
- Proximity to drinking water source or wastewater disposal field
- Presence of groundwater source protection areas
- Depth to seasonal high groundwater table
- Hotspot land use or activity

# Treatment Standards

## **Water Quality – Feasibility**

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Feasibility Constraints for use of Tier 2 Practice, excluding costs

- Natural Resource Protection and Restoration
- Existing or Proposed Utilities
- Existing Stormwater Infrastructure
- Existing topography or site grading
- Existing zoning bylaws
- Interference with Materials Conditions of Existing Land Use Permits
- Safety Considerations

# Treatment Standards

## Channel Protection Standard (CP<sub>v</sub>)

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Existing standard aimed to protect stream channels from scour and erosion caused by stormwater runoff volume.

The three methods for meeting the Channel Protection Standard include:

- **NEW** - Hydrologic Condition Method (HCM) – considers runoff reduction
- Extended Detention (ED) Method
- Alternative ED Method

# Treatment Standards

## Channel Protection - Waivers

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Channel Protection shall be waived for:

- Pre-routed, post-development discharge from site less than 2 cfs\*; or
- Direct discharge to waters with drainage area  $\geq 10$  sq. mi.\*

\*Waiver eligibility shall be determined on a “per receiving water basis”, and waters are only considered separate if the drainage areas at their downstream point of confluence is  $\geq 10$  sq. mi.

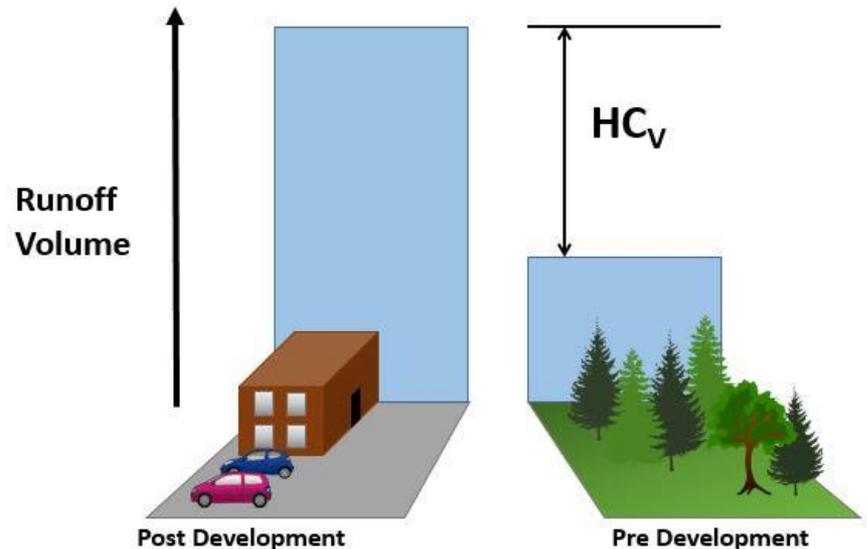
Revised: Waiver for < 1 acre expansion has been removed.

# Treatment Standards

## Hydrologic Condition Method

HCM when implemented will approximate runoff characteristics of “woods in good condition” for the 1-year, 24-hour storm event.

$$HC_V = \frac{(Q_{1Post} - Q_{1Pre}) \times A}{12}$$



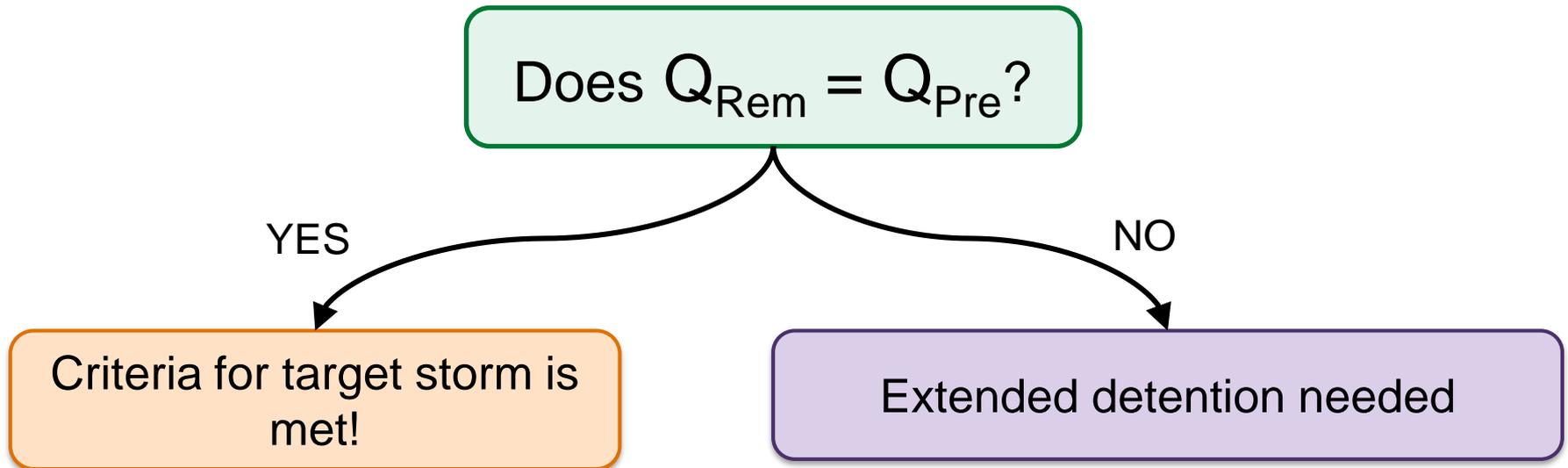
$HC_V$  is the difference between the pre-development and post-development site runoff **volume** for the 1-year, 24-hour storm.

# Treatment Standards

## Modeling Runoff Reduction STPs

$T_v$  credit is given for STPs that reduce runoff

$$Q_{Post} - T_V = Q_{Rem}$$



## Treatment Standards

# Channel Protection – Extended Detention Method

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When a site doesn't fully meet HCM, Channel Protection can be met by Extended Detention (ED) of the 1-yr 24 hour storm.

- Cold-water fisheries: 12-hours ED
- Warm-water fisheries: 24-hours ED

Where some  $T_v$  is provided on site, hydrologic modeling can take advantage of the reduction by use of a Reduced Curve Number ( $CN_{Adj}$ ):

$$CN_{Adj} = \frac{200}{P + 2Q_{Rem} + 2 - \sqrt{5PQ_{Rem} + 4Q_{Rem}^2}}$$



## Treatment Standards

# Hydrologic Modeling – Time of Concentration ( $T_c$ )

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2017 VSMM Requirement:  $T_c$  – Watershed Lag Method

$$T_c = \frac{l^{0.8} \left[ \left( \frac{100}{CN'} - 10 \right) + 1 \right]^{0.7}}{1140Y^{0.5}}$$

$l$  = hydraulic length =  $209A^{0.6}$

$CN'$  = retardance factor  $\cong CN$

$Y$  = average catchment slope (%)

More information on calculating hydraulic length ( $l$ ) and slope ( $Y$ ) in Part 630.1502 (a) of the National Engineering Handbook.

# Treatment Standards

## Time of Concentration ( $T_c$ )

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### *Advantages of the Watershed Lag*

- Faster
- More objective than Velocity Method
- Works in concert with runoff reduction and  $T_v$  credit
- Can be used with  $CN_{Adj}$

NOTE:  $T_c$  Velocity Method accepted only with prior approval in consideration of site/project specific circumstances (i.e. amended model for previously issued permit).

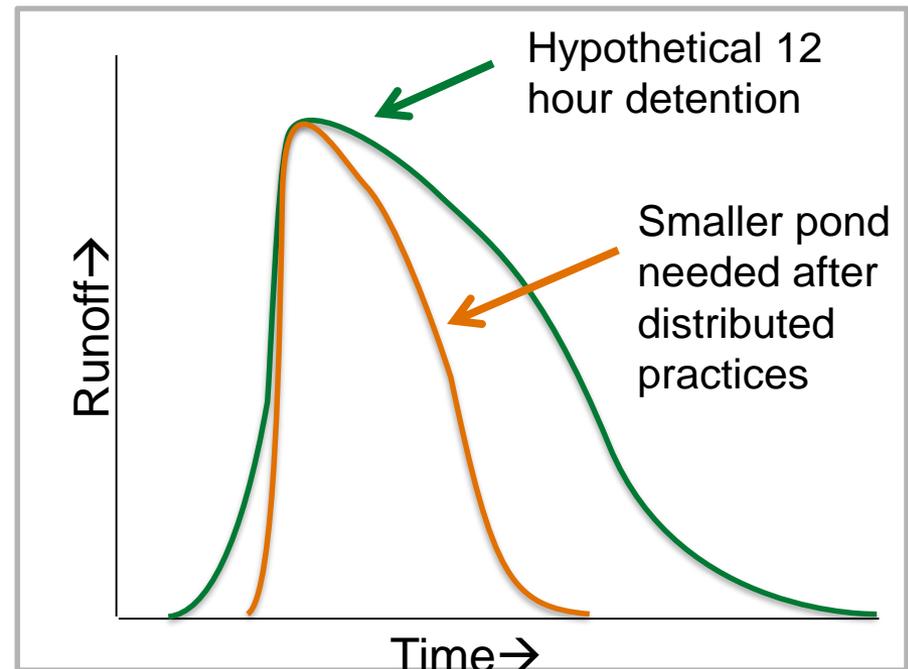
## Treatment Standards

# Channel Protection – Alternative ED Method

Sites that will use distributed STPs for the majority of a site may consider the use of the Alternative ED Method.

Compares 1-year, 24-hour storm event in two post-development scenarios:

- Hypothetical: Post-development peak discharge AS-IF extended detention
- Actual: Post-development peak discharge with distributed runoff reduction STPs
- Actual must not exceed Hypothetical.



## Treatment Standards

# Overbank Flood Protection Standard ( $Q_{P10}$ )

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Existing standard to protect against flooding from the 10-year, 24 hour storm event.

$$Q_{10Post} \leq Q_{10Pre}$$

Overbank Flood Protection shall be waived for:

- Direct discharge to waters with drainage area  $\geq 10$  sq. mi.\*;
- A downstream analysis is completed that indicates overbank flood control is not necessary for the site; or
- **NEW:** Pre-routed, post-development discharge from site less than 2 cfs\*

## Treatment Standards

# Extreme Flood Protection Standard ( $Q_{P100}$ )

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Existing standard to protect against extreme flooding from the 100-year, 24 hour storm event.

$$Q_{100Post} \leq Q_{100Pre}$$

Extreme Flood Protection shall be waived for:

- Direct discharge from site to waters with drainage area  $\geq 10$  sq. mi.\*;
- The impervious area on site or otherwise associated within a common plan of develop, constructed after 2002, is less than 10 acres; or
- A downstream analysis is completed that indicates extreme flood control is not necessary for the site.

# Treatment Standards

## Downstream Analysis for $Q_{P10}$ and $Q_{P100}$

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Require for sites seeking waivers or when required by the Agency in cases of known drainage problems or flooding issues.

- Involves a hydrologic and hydraulic analysis extended downstream to the point where the site represents 10% of the total drainage area (i.e. study point).
- Allowable increases in flow and velocity is now scaled to site area relative to drainage area of receiving water at discharge point.
- The 2017 VSMM includes more detailed steps for completing this analysis.

# Acceptable Stormwater Treatment Practices (STPs) - Subchapter 4.0

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- Pre-Treatment Practices (Section 4.1)
- Non-Structural Practices (Section 4.2)
- Structural Practices (Section 4.3)
- Alternative STPs (Section 4.4)



In addition:

- Detention and Conveyance Practices (Subchapter 5.0)
- Public Transportation Projects (Subchapter 6.0)

# Acceptable STPs

## Pre-Treatment, Non-Structural, and Structural Practices

### Required Elements

#### Design Guidance

- Additional recommended design elements
- Figures
- Design Summary Tables



#### Vermont Stormwater Treatment Standards

#### Design Guidance: Filtering Systems Design Summary

Treatment Standard Applicability:	
Groundwater Recharge	Yes. (if designed for infiltration)
Water Quality	Yes. Tier 1 Practice (designed for infiltration) / Tier 2 Practice (designed for infiltration and lined)
Channel Protection	Limited. Hydrologic Condition Method (if designed for infiltration) / Detention Method (underdrained and/or lined)
Overbank Flood Protection (Open Channel) and	Limited. CN <sub>Adj</sub> may provide partial credit for volume i

Minor Variations from Numerical Design Criteria: Allows for minor variations from exact numerical criteria specified under required design elements due to site constraints, with designer certification of equivalent performance.

## Acceptable STPs

# Pre-Treatment Practices

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- Required for non-rooftop runoff
- Improve water quality and enhance effective design life of STP
- Consolidate maintenance to specific location
- Do not meet water quality pollutant removal goals on their own

## Acceptable STPs

# Pre-Treatment Swale

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Shallow, vegetated, earthen channels that aim to remove larger sediment particles as result of settling and contact time in the vegetated channel.

### Design Requirements:

- Sized for peak flow rate of WQ storm
  - Minimum residence time of 5 minutes
  - Peak flow rate of  $< 1$  fps at depth  $\leq 4$  inches
- Max. longitudinal slope of 5%, or 6% with check dams
- Bottom width between 2 and 8 feet
- Side slopes  $\leq 2H:1V$
- 6 inches freeboard for 10-year, 24-hour storm event

## Acceptable STPs

# Pre-Treatment Filter Strip

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Vegetated filter strips treat distributed flow from adjacent impervious areas by slowing runoff velocities and filtering out sediment.

### Design Requirements:

- Maximum average slope of 6%
- Soils of filter strip area must meet SDQ Standard
- Filter strip must abut entire length of contributing impervious area
- Max contributing flow path from impervious surfaces of 75 feet
- Max contributing flow path from pervious surfaces of 150 feet
- Stone diaphragm required for contributing impervious with slope of  $> 5\%$

## Acceptable STPs

# Pre-Treatment Sediment Forebay

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Forebays provide treatment by settling out sediment particles at the inflow to a STP and minimize STP maintenance needs.

### Design Requirements:

- Sized to contain  $\geq 10\%$  of the  $WQ_V$ , depending on downstream STP
- Min. depth 2 feet, advisable depth 4-6 feet
- Side slopes  $\leq 2H:1V$
- Min. L:W ratio of 1:1
- Fixed vertical sediment depth marker
- Direct access for maintenance equipment



## Acceptable STPs

# Pre-Treatment Deep Sump Catch Basin

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Deep Sump CBs are modified inlet structures that provide treatment by settling out coarse sediment particles at the piped inflow to a STP.

### Design Requirements:

- 4 foot minimum depth (or 4X pipe diameter, if greater)
- Located “off-line,” and not connected to other inlet pipes from other structures
- Contributing area to each CB shall not exceed 0.25 acres of impervious cover
- Hooded outlets
- Maintenance access

## Acceptable STPs

# Proprietary Pre-Treatment Devices

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Manufactured systems that use proprietary settling, filtration, adsorption, vortex principles, vegetation, or other processes.

### Design Requirements:

- Requires Agency review and approval
- Must remove  $\geq 50\%$  TSS for WQ storm peak flow or for required pre-treatment volume, independently verified
- Located “off-line,” or designed with bypass
- Maintenance access
- Inspection/maintenance requirements specified by manufacturer

## Acceptable STPs

# **Non-Structural Practices**

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Non-structural designs are now identified as Acceptable STPs for meeting the water quality and groundwater recharge, rather than credits.

Most also provide  $T_v$  credit under the runoff reduction framework and the HCM, as Tier 1 Practices.

## Non-Structural Practices

# Reforestation and Tree Planting

Trees act as natural reservoir by intercepting and storing rainfall.

Practice Type	Description	Credit
Active Reforestation	Planting a stand of trees	0.1" per acre
Passive Reforestation	Protect areas from mowing, allowing native vegetation to reestablish	0.05" per acre
Single Tree Credit	Planting Individual Trees	5 ft <sup>3</sup> per tree

### Design Requirements:

- Reforestation – Min. contiguous area of 2,500-sq.ft. and min. width of 25 feet
- Active Reforestation and Single Tree Credit – Planting Plan

# Non-Structural Practices

## Simple Disconnection

Directing distributed flow from residential or small commercial rooftops, sidewalks, and residential driveways to pervious areas.

### Design Requirements:

HSG of soil in disconnection area	Disconnection Area Slope	
	Less than 8%	8-15%
A/B or infiltration rate $\geq 0.5$ in./hr	35 feet	50 feet
C/D or infiltration rate $< 0.5$ in./hr	65 feet	85 feet



- Impervious areas of  $\leq 10$  feet may disconnect to equivalent length
- $T_V$  credit = 1 inch X disconnected impervious area
- $T_V$  credit on A soils with infiltration rate  $\geq 1$  inch/hour =  $HC_V$

## Non-Structural Practices

# Disconnection to Filter Strips & Vegetated Buffers

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Directing distributed flow to establish vegetated filter strips and undisturbed buffers from roadways, parking lots, and other impervious surfaces that are subject to pre-treatment.

### Design Requirements:

- Stone diaphragm/level spreader may be required
- Same required disconnection lengths as Simple Disconnection
- $T_v$  credit = 1 inch X disconnected impervious area
- $T_v$  credit on A soils with infiltration rate  $\geq 1$  inch/hour =  $HC_v$

# Non-Structural Watershed Hydrology Protection

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Applicable to certain high elevation projects, or comparable settings with significant topographical relief. It consists of a group of practices that collectively can be used to meet WQ,  $Re_v$ , CP Standards.  $T_v$  not applicable.

## Design Requirements:

- Impervious cover shall not exceed 5% per watershed
- Contributing watershed shall be maintained at a minimum of 90% forested
- Undisturbed protective strips required along streams and other waters, except necessary/permitted crossings
- Maintain existing site hydrology
- Treatment of runoff through disconnection, distributed flow/level spreaders



# Structural Practices

## **Bioretention**



STP used to capture and treat runoff and passing it through a vegetated filter bed. May discharge via underdrain (Tier 2) or may be designed for infiltration (Tier 1).

### Design Requirements:

- Bottom of STP located above SHGWT, unless designed to infiltrate more the  $WQ_v$ , then dependent on CDA and % impervious (Varies from 1-2 feet)
- Min. infiltration rate of 0.2 inches/hour if designed for infiltration (See Infiltration – Soil Testing)
- Bioretention soil media must be less than 0.2% phosphorus, confirmed through testing
- Landscaping plan



# Structural Practices

## Dry Swales



The dry swale is a shallow channel covered with turf or other material, using amended or native soils to filter runoff through the bed of the swale. May be designed to discharge via underdrain (Tier 3) or to infiltrate (Tier 1).  $T_v$  = volume infiltrated or storage in sump.

### Design Requirements:

- Bottom of STP located above SHGWT, unless designed to infiltrate more the  $WQ_v$ , then dependent on CDA and % impervious (Varies from 1-2 feet)
- Min. infiltration rate of 0.2 inches/hour if designed for infiltration (See Infiltration – Soil Testing)
- Dry swales that will use bioretention soil media, rather than sand, must be less than 0.2% phosphorus



# Structural Practices Infiltration



Basins, trenches, and underground chambers that capture and retain stormwater runoff before allowing it to infiltrate into the soil (Tier 1). Infiltration feasibility requirements apply to other structural STPs that are designed for infiltration.  $T_v$  = volume infiltrated.

## Design Requirements:

- Underlying soils must have infiltration rate  $\geq 0.2$  inches/hour
- Soil Testing Requirements for Infiltration Practices
- Setbacks and prohibitions for groundwater source protection
- Bottom of infiltrating STP separated by at least 3 feet vertically from SHGWT or bedrock
- Volumetrically sized pre-treatment requirement dependent on infiltration rate (25%-50%  $WQ_v$ )

## Structural Practices

# Soil Testing Requirements for Infiltration Practices

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Infiltration Feasibility Analysis – Initial step to screen unsuitable sites and reduce testing costs

- NRCS Soil Survey mapping
- Test pit(s) or soil boring(s)
- Previous written geotechnical reporting for the site

### Soil Characterization and Infiltration Testing

- Infiltration STPs: 1 infiltration test & 1 test pit per 2,500 sq. ft.
- Linear Infiltration STPs: 1 infiltration test & 1 test pit per 100 ft. length

## Structural Practices

# Soil Testing Requirements for Infiltration Practices

---

### Test Pit Requirements

- Test pit or soil boring to depth of at least 1 foot below the required separation depth to the SHGWT
- Soil profile descriptions
- Verification that depth to SHGWT and bedrock meet STP separation distance requirements

### Infiltration Testing Methods

- “Field-saturated” condition assessment
- Infiltration rate shall be determined using a factor of safety of 2
- Multiple acceptable testing methods are specified in Manual

# Structural Practices

## Filtering Systems

---

STPs that capture and temporarily store runoff for filtering through a bed of sand. Filters include surface sand filter, underground sand filter, and perimeter sand filters. May be designed to discharge via underdrain (Tier 3) or to infiltrate (Tier 1). Proprietary filter systems may be considered for Agency approval under Alternative STPs.

### Design Requirements:

- Bottom of STP located above SHGWT
- Must be designed off-line so as not to direct larger flows to the practice
- Volumetrically sized pre-treatment requirement 25%  $WQ_v$



## Structural Practices Treatment Wetlands



Designed stormwater wetland systems that maximize pollutant removal and the uptake of nutrients through wetland vegetation and settling, and include Gravel Wetlands (Tier 2) and Shallow Surface Wetlands (Tier 3). No  $T_v$  credit.

### Design Requirements:

- May require liner to sustain permanent pool or subsurface water level.
- Shallow surface wetlands draining to cold-water fisheries require stone outlet trench for discharges  $\leq CP_v$
- Design must accommodate variable depth requirements and soil conditions to accommodate and support wetland vegetation
- Planting plan



## Structural Practices

# Wet Ponds

Stormwater ponds (Tier 3) maximize pollutant removal through settling, biological uptake and microbial activity, and function through displacement of the permanent pool stores from prior storms. No  $T_v$  credit.

### Design Requirements:

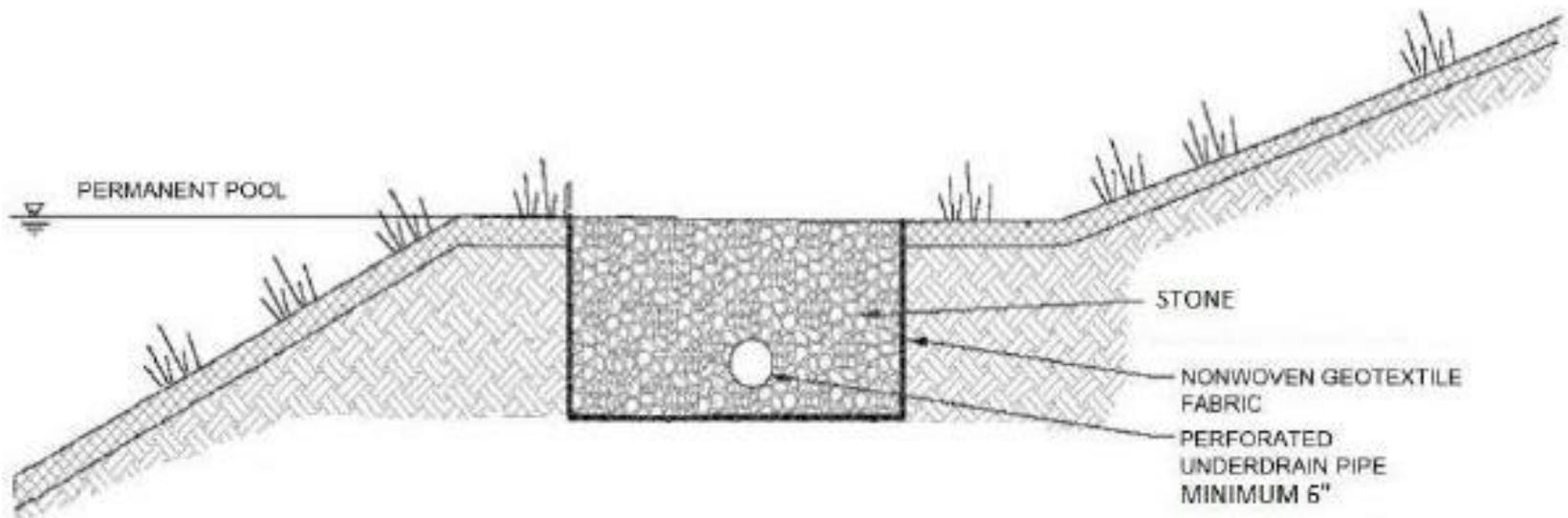
- Wet ponds may require liner to sustain permanent pool
- Wet ponds draining to cold-water fisheries require stone trench outlet for discharges up to and including  $CP_v$  → **NEW**
- Design must accommodate variable depth requirements and soil conditions to accommodate and support aquatic bench and deep pool areas
- Planting plan

## Structural STPs

# Shallow Surface Wetlands and Wet Ponds

- Trench must be 4 feet wide with 2 feet of stone over a perforated pipe
- Trench length: 3 ft per 1,000 ft<sup>3</sup> of ED volume

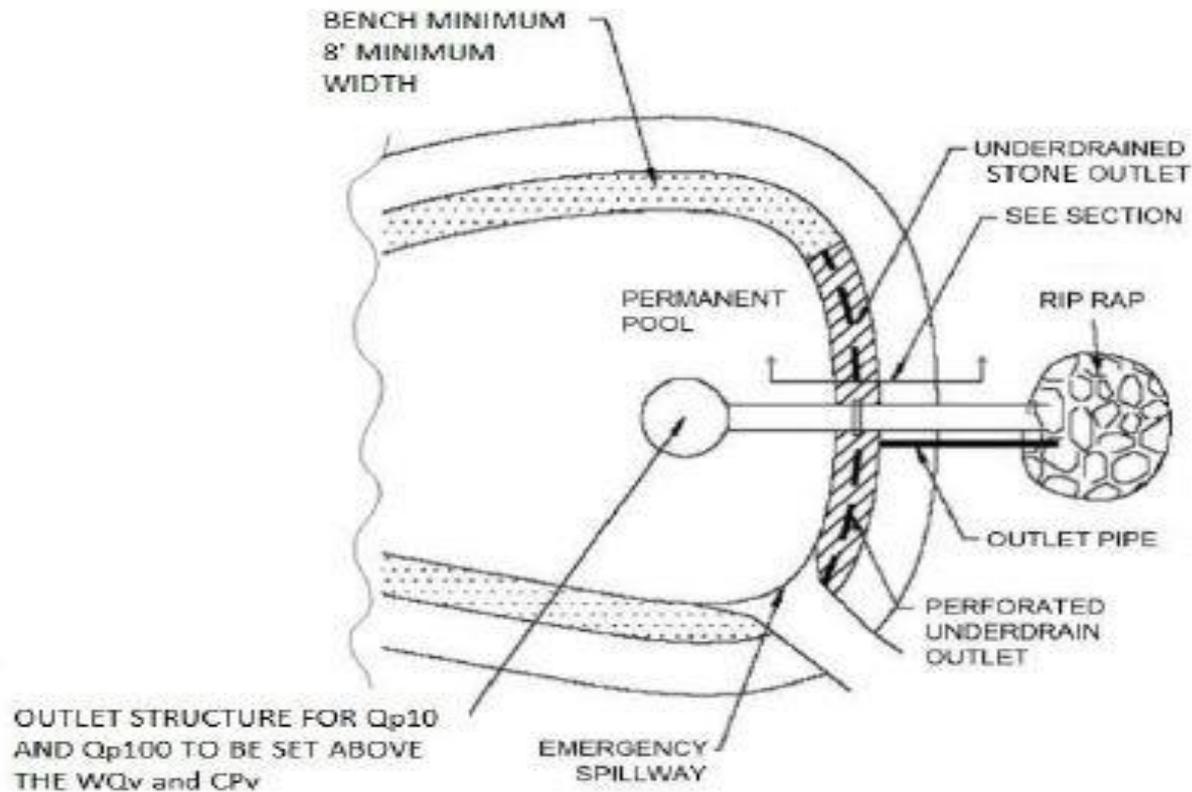
### Stone Trench Outlet (Section)



# Structural STPs

## Shallow Surface Wetlands and Wet Ponds

### Stone Trench Outlet (Plan)



# Structural STPs

## Green Stormwater Infrastructure

---



### Green Roofs –

- Runoff retained through storage & evapotranspiration.
- Does not meet WQ or GR requirements.
- $T_V$  credit provided for volume retained in the system.

### Permeable Pavement –



- Typically not jurisdictional if designed to infiltrate runoff from 1-year, 24-hour storm event.
- May be utilized as infiltrating STP for rooftop runoff.
- $T_V$  credit = volume of rooftop runoff infiltrated by system.

### Rainwater Harvesting –



- Designed stormwater water reuse systems.
- Does not include small scale harvesting, such as rain barrels.
- $T_V$  credit = volume stored for reuse.
- Water reuse plan required.

# Alternative STPs

---

Consideration of new stormwater management technologies that provide adequate water quality treatment.

- Requires application under an individual permit
- Requires Agency review and consideration for approval
  - Recommended to seek approval in advance of application submittal to avoid permit application processing delays or denial.
- Agency may now consider approval of proprietary and other alternatives base on other acceptable BMP verification protocols and program, with supporting independent system verification. Subject to review.
- Agency will maintain list of approved Alternative STPs

# Detention and Conveyance Practices

---

## Dry Detention Ponds & Storage Vaults

- Stormwater detention through storage.
- Does not meet WQ or GR requirements. No  $T_v$  credit.

## Conveyance Swales

- Stormwater conveyance only, must accommodate design storm, with 6" freeboard through 10-year, 24-hour storm event.
- May be designed with outlet structure to provide extended detention.
- Does not meet WQ or GR requirements. No TV credit.

Detention and Conveyance Practice include some required design elements to ensure practices can be inspected and maintained and safely convey applicable design storms.



# Public Transportation Projects

## Subchapter 6.0



**Public Transportation Project** means a state highway project, town highway project, or other public road project; or a linear public transportation project, such as a trail, bicycle path, or sidewalk project.

Intent: To provide flexibility in the design of STPs for public transportation projects while maximizing water quality protection in consideration of:

- Existing ROW limitations
- Water resources/buffers, areas sensitive to development

**DOES NOT APPLY TO:** maintenance garages, park & ride facilities, and airports located outside linear rights-of-way.

**DOES NOT:** change the permitting thresholds or change the Treatment Standards.

# Public Transportation Projects

## Subchapter 6.0

---

### ■ **Redevelopment – Major Maintenance**

Restoring an existing roadway to its original condition, including replacement of pavement to subgrade, with no net increase in total impervious surfaces.

### ■ **Redevelopment with Expansion**

Reconstruction projects that involve renovation of existing public transportation project along existing alignment with a net increase of existing impervious surfaces, and do not generally change the direction of runoff.

### ■ **New Construction**

Project that involve new impervious surface on undeveloped rights-of-way.

# Public Transportation Projects

## Subchapter 6.0

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In partnership with the ANR, the Vermont Agency of Transportation (VTTrans) is expected to hold additional training for Subchapter 6.0 of the 2017 VSMM, for designers specifically involved with public transportation design and permitting.

VTTrans is also working with ANR to design application materials tailored to public transportation projects.

# Permit Application Materials

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Per Chapter 18 and 22 of the Environmental Protection Rules, an applicant for a stormwater discharge permit shall submit a completed application form (Notice of Intent) with all necessary attachments and fees and all other application information required by the Agency.

2017 VSMM stormwater discharge permit application materials are now available:

[http://dec.vermont.gov/watershed/stormwater/manual\\_update](http://dec.vermont.gov/watershed/stormwater/manual_update)

2017 VSMM application materials subject to revision prior to and subsequent to July 1, 2017. Please ensure you have most up to date materials!

# 2017 VSMM Application Requirements for Operational Permits

## Application Submittal Requirements

1. NOI
2. Attachment 1: Narrative
3. Attachment 2: Workbooks
4. Attachment 3: Worksheets
5. Attachment 4: Modeling
6. Attachment 5: Plans
7. Application Fee

**2017 Vermont Stormwater Management Manual**  
**Application Requirements for Operational Permits**  
Version 2.0 5/2017

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# Permit Application Materials

## **Notice of Intent (NOI)**

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### ■ General Permit 3-9015:

- Site Balancing and/or Net Reduction design strategies eligible under GP.
- 10-day public notice

### ■ Individual Permit:

- Discharges to stormwater-impaired waters, proposed use of Alternative STP, or if otherwise required by the Agency.
- 30-day public notice

# Permit Application Materials

## **Notice of Intent (NOI)**

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Include all applicant and requested project information, including electronic applicant signature and designer certification.

Applicants must identify whether the project involves:

- a stormwater hotspot land use or activity
- activities within a regulated wetland or wetland buffer (ANR contact)
- activities within a regulated floodplain or river corridor (ANR contact)
- activities within a perennial stream channel (ANR contact)

# Permit Application Materials

## Attachment 1: Narrative

- Template serves as guide for providing the required information
- Includes
  - Project Location Map
  - Soils Map

### Attachment 1: Narrative, Location Map, and Soils Map [Project Name]

The following can be used as a template for the narrative or general guidance for how the narrative should be set up. If used as a template, please replace all brackets [ ] in this document with information specific to the proposed project and delete this paragraph.

#### 1. Introduction

[Application Preparer] are writing on behalf of [Applicant] to apply for a State Stormwater Discharge Permit pursuant to [General Permit 3-9015 or an Individual Discharge Permit] for the above referenced project.

#### 2. Project Description

[Name of project, type of project (new, redevelopment, expansion), location/address, type of land use (e.g. residential, commercial, etc.), number of buildings, project access (from public road, private road, etc.), phasing (if applicable). Description as to specifically why the proposed project requires permit coverage (i.e. under jurisdiction of stormwater management rules – Environmental Protection Rules, Chapter 18 or 22) In addition to this sentence add any information we may want to know up front, such as why a project requires an individual permit or if site balancing or net reduction are employed in this application.]

#### 3. Existing Condition

[Describe the existing condition of the site; land cover / land use, existing impervious surface, current location of discharge points, drainage description, soils (description, hydrologic soil group classification), and slopes.]

#### 4. Existing Stormwater System (remove if not applicable)

[A description of the existing stormwater system (if any) and its current condition, identification of any existing stormwater permits, identification of impervious areas treated by the existing stormwater system]

#### 5. Proposed Stormwater System:

- Description of Impervious Area: [State the amount of impervious area, include existing, redeveloped, and new, also if there is any previously permitted impervious on site]
- Receiving Body: [Receiving Water Name (not Waterbody ID)]
- Fish Habitat Designation for Receiving Water: [Warm/Cold (Appendix A of Vermont Water Quality Standards):

# Permit Application Materials

## **Attachment 2: Workbooks**

---

### ■ STP Selection Tool

- Written Justification for the use of Tier 3 Practices (if applicable).

### ■ Standards Compliance Workbook

The Workbooks attachment eliminates the need for many of the forms required under the 2002 VSMM including:

- Schedule As
- Water Quality Calculation Worksheets
- Groundwater Recharge Calculation Worksheets

# Permit Application Materials

## Attachment 2: Workbooks

### STP Selection Tool (MS Excel)

- Preface
- STP Evaluation Flowchart
- STP Matrix (SN1, SN2, etc.)
- Complete for each discharge point

Add header

Project Name:

Discharge Point:

**STP Selection Matrix**  
Version 5/8/2017

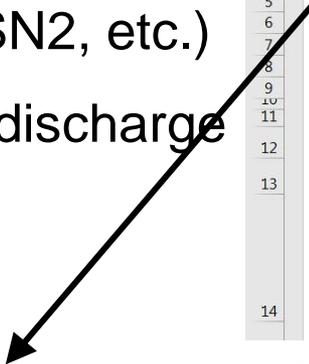
**Step 1: Is the Water Quality Treatment Standard entirely managed with one or more of the following Tier 1 practices?**

Infiltration Basins/ Trenches/ Chambers	Simple Disconnection	<input type="radio"/> Yes <input checked="" type="radio"/> No <b>Proceed to Step 2</b>
Drywells	Disconnection to Filter Strips and Vegetated Buffers	
Bioretention (designed to infiltrate)	Dry Swales (designed to infiltrate)	
Filters (designed to infiltrate)	Permeable Pavement <sup>1</sup>	
Reforestation <sup>1</sup>		

1. These practices do not require specific justification due to feasibility limitations

**Step 2: Assess the feasibility of using Tier 1 Practices**  
Complete the matrix below in its entirety for each drainage area.

Tier 1 Practices are available to meet the Water Quality Treatment Standard. If using one of these practices, stop here. If additional site constraints exist other than those listed here, proceed to Step 3.	Infiltration Basin/ Trench/ Chamber	Drywell	Bioretention (infiltrating)	Simple Disconnection	Disconnection to Filter Strips or Vegetated Buffer	Dry Swales (infiltrating)	Filters (infiltrating)
	Yes			Yes	Yes	Yes	Yes



**Step 1: Is the Water Quality Treatment Standard entirely managed with one or more of the following Tier 1 practices?**

- |   |  |
|---|--|
| Infiltration Basins/ Trenches/ Chambers | Simple Disconnection                                 |
| Drywells                                | Disconnection to Filter Strips and Vegetated Buffers |
| Bioretention (designed to infiltrate)   | Dry Swales (designed to infiltrate)                  |
| Filters (designed to infiltrate)        | Permeable Pavement <sup>1</sup>                      |
| Reforestation <sup>1</sup>              |  |

Yes    No  
**Proceed to Step 2**  
**2**

1. These practices do not require specific justification due to feasibility limitations

# Permit Application Materials

## Attachment 2: Workbooks

### STP Selection Tool (*MS Excel*)

*1. These practices do not require specific justification due to feasibility limitations*

#### Step 2: Assess the feasibility of using Tier 1 Practices

Complete the matrix below in its entirety for each drainage area.

<p><b>Tier 1 Practices are available to meet the Water Quality Treatment Standard. If using one of these practices, stop here. If additional site constraints exist other than those listed here, proceed to Step 3.</b></p>		Infiltration Basin/ Trench/ Chamber	Drywell	Bioretention (infiltrating)	Simple Disconnection	Disconnection to Filter Strips or Vegetated Buffer	Dry Swales (infiltrating)	Filters (infiltrating)
<p><b>Practice Availability for Water Quality Treatment?</b> </p>		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Feasibility Restriction	Response	Practice Availability Based on Restrictions						
Do underlying soils have an infiltration rate of less than 0.2 inches per hour, as confirmed by field geotechnical tests or are classified as Hydrologic Soil Group D according to the NRCS	<input type="radio"/> Yes <input checked="" type="radio"/> No	Available	Available	Available	n/a	n/a	Available	Available
Will runoff to the practice include discharge from a hotspot landuse or activity?	<input type="radio"/> Yes <input checked="" type="radio"/> No	Available	Available	Available	Available	Available	Available	Available
Is the site a brownfield or contaminated site where infiltration is restricted or where infiltration would increase the threat of pollution migration, as confirmed in writing by the Department's Waste Management and Prevention Division?	<input type="radio"/> Yes <input checked="" type="radio"/> No	Available	Available	Available	Available	Available	Available	Available
Is the slope of the vegetated buffer greater than	<input type="radio"/> Yes <input checked="" type="radio"/> No	Available	Available	Available	Available	Available	Available	Available

# Permit Application Materials

## Attachment 2: Workbooks

### STP Selection Tool (*MS Excel*)

#### Step 3: Other feasibility constraints for remaining Tier 1 and Tier 2 practices

If, following completion of Step 2 of the STP Selection Tool there are no Tier 1 Practices available for use on the project site, designers shall consider the use of Tier 2 practices for treatment of the Water Quality Treatment Standard.

Is the Water Quality Treatment Standard entirely managed with Tier 2 Practices?

Yes  No

**Provide written site specific justification below. Tier 3 Practices may be used to meet the Water Quality Treatment Standard.**

If the the use of a Tier 1 or Tier 2 Practice is infeasible for reasons beyond those listed in Step 2 of the STP Selection Matrix, a designer may submit site specific detailed feasibility justification that such practices are not feasible following the guidance in Section 2.2.4.1 of the 2017 VSMM. Only after completion of the STP Selection Matrix and determination that Tier and Tier 2 Practices are infeasible shall a designer consider Tier 3 Practices or existing stormwater infrastructure for meeting the Water Quality Treatment Standard (WQTS) on the project site.

**Provide written feasibility justification below or list attachments**

# Permit Application Materials

## Attachment 2: Workbooks

### Standards Compliance Workbook (*MS Excel*)

- Instructions
- Summary
- Complete for each discharge point

Vermont Operational Stormwater Permit - Standards Compliance Workbook					
<b>General Discharge Point Information</b>					
Project name					
Discharge point serial number (e.g. S/N 001)					
Name of receiving water					
Latitude (decimal degrees to five decimal places)					
Longitude (decimal degrees to five decimal places)					
<b>Precipitation Data</b> * Precipitation values shall be obtained from <a href="#">NOAA Atlas 14</a>					
	<b>Storm</b>	<b>WQ Storm</b>	<b>1 yr, 24 hr</b>	<b>10 yr, 24 hr</b>	<b>100 yr, 24 hr</b>
	Precipitation (inches)	1.0	0.0	0.0	0.0
<b>Drainage Area Information</b>					
Pre Development Land Use (acres)					
			<b>Group</b>		<b>Total (acres)</b>
			C	D	
			0.00	0.00	0.00
			0.00	0.00	0.00
			0.00	0.00	0.00
			0.00	0.00	0.00

Vermont Operational Stormwater Permit - Standards Compliance Workbook		
<b>Instructions</b>		
This workbook is designed to guide you through how to calculate and demonstrate compliance the standards in the 2017 Vermont State Stormwater Manual.		
Blue boxes		must be filled out by the designer
Yellow boxes		may be filled out by the designer, but are optional
Grey boxes		contain values calculated from the information entered in the blue boxes
This workbook is protected so that the user can only edit blue and yellow boxes.		
This workbook is comprised of a "Summary" tab and several discharge point tabs labelled SN1, SN2, etc. Fill out one tab for each discharge point in your project. This workbook will be supported by sizing calculations and treatment volume ( $T_V$ ) information completed via specific STP worksheets that must also be completed for each		

# Permit Application Materials

## Attachment 2: Workbooks

### Standards Compliance Workbook (MS Excel)

#### Vermont Operational Stormwater Permit - Standards Compliance Workbook

<b>Project Name</b>		
	<i>The name above will appear on all the discharge point tabs</i>	
<b>Site Summary</b>		
<i>Do not fill this tab out, apart from the project name and notes. It will auto-populated based on the values on the discharge point tabs. Discharge points (SN) will only show on the summary if an area has been entered on that tab.</i>		
	<b>Total</b>	
Impervious	New	0.00
	Redeveloped	0.00
	Existing	0.00
	Removed	0.00
	<b>Total</b>	<b>0.00</b>
Site Area	0.00	
<b>Recharge</b>		
	<b>Total</b>	
Required	0.000	
Provided	0.000	
Standard met?	Yes	
Notes:		

# Permit Application Materials

## Attachment 2: Workbooks

### Standards Compliance Workbook (MS Excel)

#### Vermont Operational Stormwater Permit - Standards Compliance Workbook

<b>Water Quality Treatment Standard (WQ)</b>					
WQ <sub>v</sub> to treat New	0.000	ac-ft	% Reduced Impervious	0.0%	
WQ <sub>v</sub> to treat Redevelopment	0.000	ac-ft			
Total WQ <sub>v</sub>	0.000	ac-ft	Is all impervious treated by disconnection?	<input checked="" type="radio"/> No <input type="radio"/> Yes (WQ <sub>v</sub> met)	
WQ <sub>v</sub> met with Tier 1 practices	0.000	ac-ft	WQ <sub>v</sub> to be met with Tier 2 and/or Tier 3 practices	0.000	ac-ft
			Tier 2 & 3 Water Quality Practice	WQ <sub>v</sub> Provided (ac-	Tier
				▼	
			Total WQ <sub>v</sub> Provided (ac-ft)	0.000	ac-ft
			Is the WQ <sub>v</sub> Standard met?	Yes	
Water Quality Notes:					
<b>Channel Protection Standard (CP)</b>					
Standard Applicable?	<input checked="" type="radio"/> Yes <input type="radio"/> No				

# Permit Application Materials

## **Attachment 3: Worksheets**

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- Post-Construction Soil Depth and Quality Worksheet (for project)
- STP Worksheets for each STP
  - All STP worksheets revised
- Standard Waiver Worksheets (CP, Q<sub>P10</sub>, Q<sub>P100</sub>)
  - All waiver worksheets revised
- Soils Characterization and Testing Information

# Permit Application Materials

## **Attachment 4: Modeling**

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- Hydrologic modeling for all pertinent rainfall events
  - WQ storm modeling required for use of Pre-Treatment Swale or Practices sized in consideration of WQ storm peak flow
  - CP modeling required for use of ED Method or Alt. ED Method
  - $Q_p$  modeling required, if applicable through detention
  - Downstream Analysis modeling required, if applicable

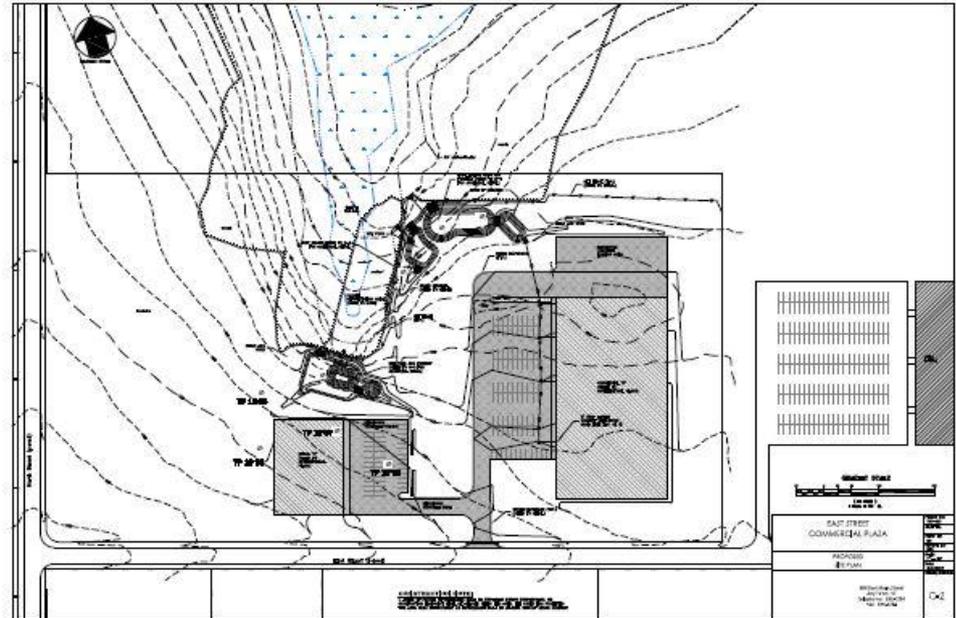
# Permit Application Materials

## Attachment 5: Plans

- Existing Condition
- Proposed Condition
- Construction Details
- Annotated Maintenance Plan

### Key Highlights:

- Subcatchment boundaries
- Delineation of impervious surface type, new, redevelopment, existing
- Time of Concentration ( $T_c$ ) information for each subcatchment
- Water resources, buffers, sensitive areas, drinking water sources/SPAs



# Permit Application Materials

## **Application Fee**

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### Application Fees

Current application fee schedule can be found here:

<http://dec.vermont.gov/watershed/stormwater/permit-information-applications-fees>

Application fees do not change on July 1, 2017

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# **2017 VSMM**

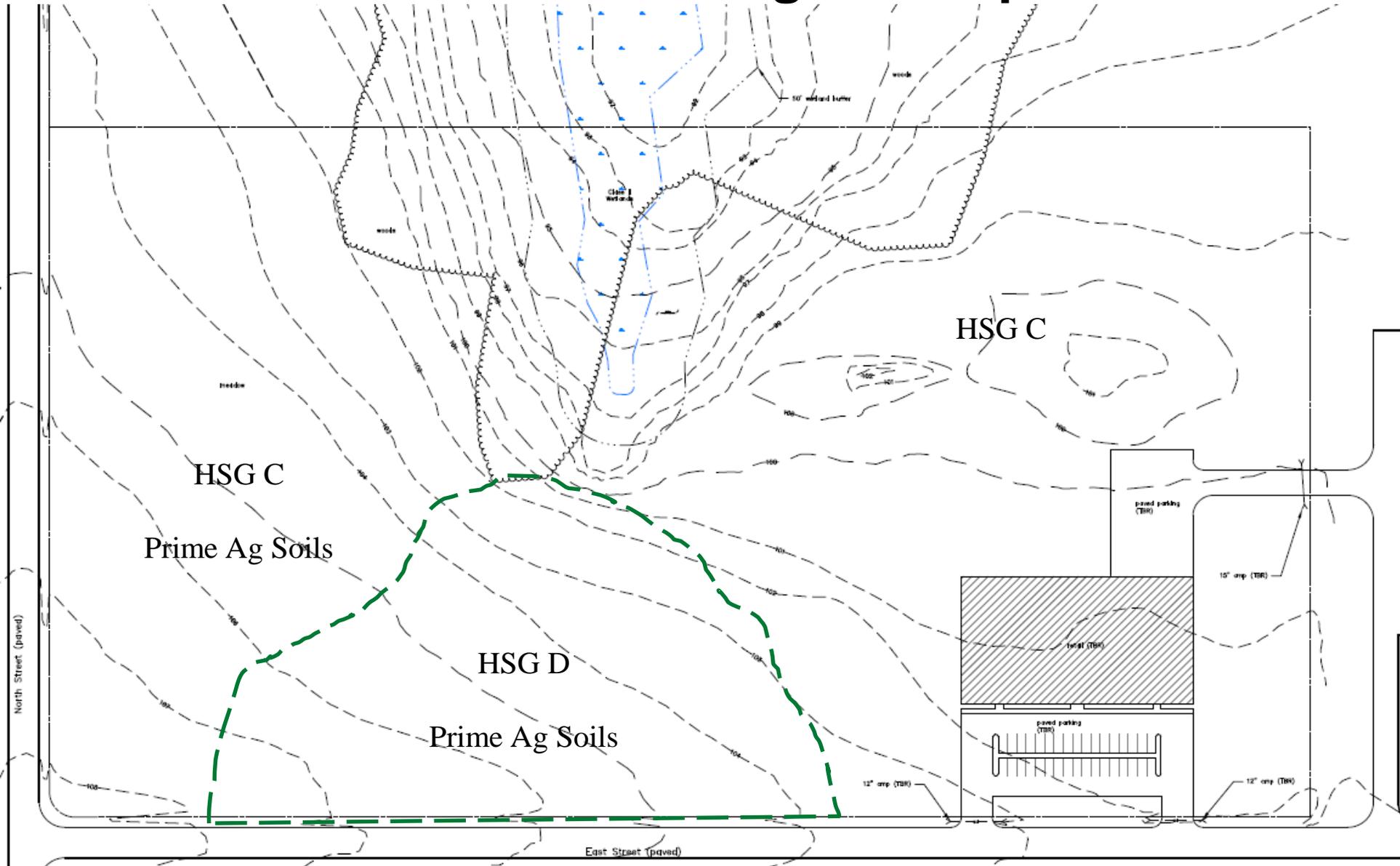
## **PERMIT APPLICATION AND DESIGN EXAMPLE**

# Design Examples

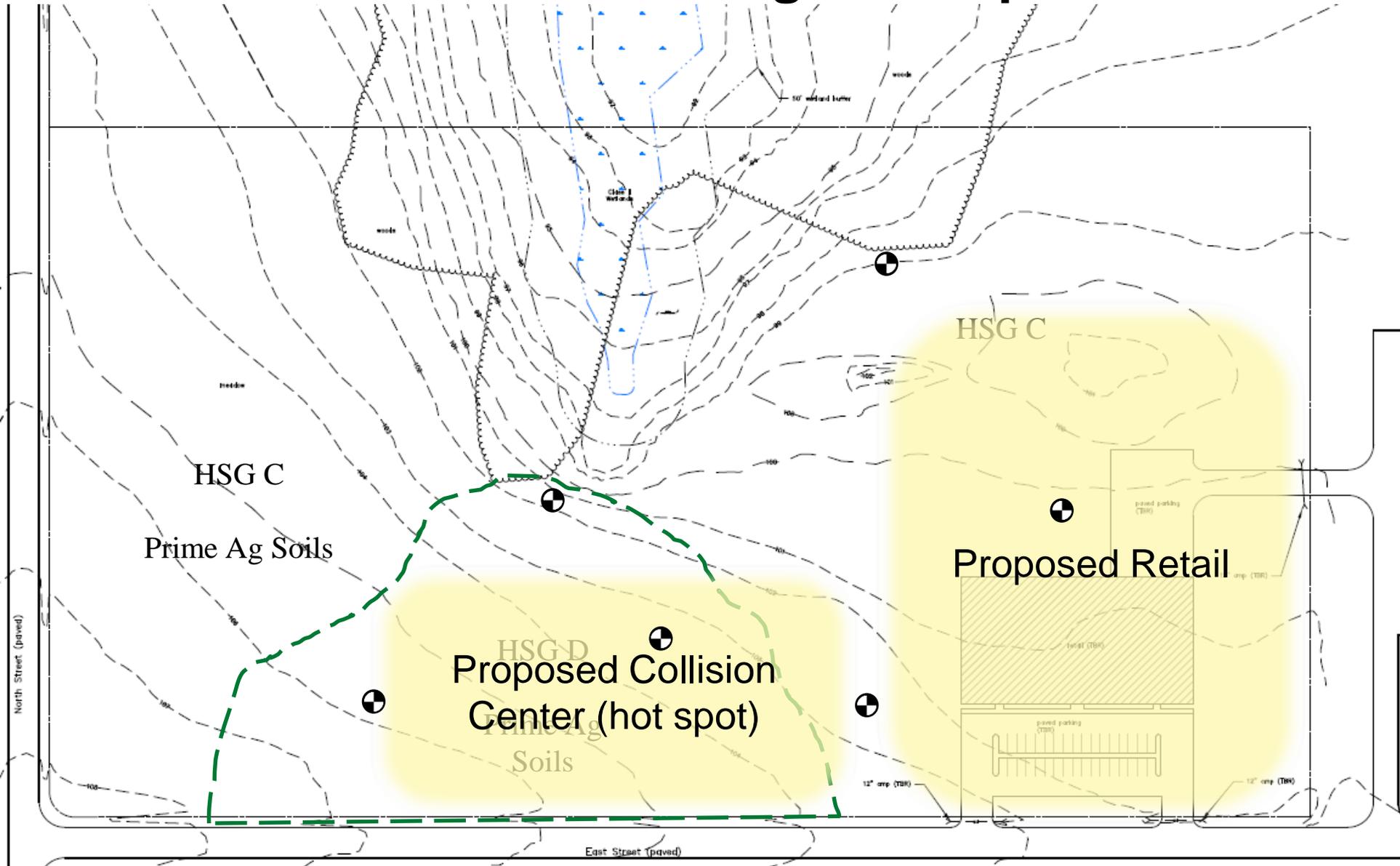
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- Agency contracted with Otter Creek Engineering to prepare three design examples:
  - Low Density Residential
  - High Density Residential
  - Commercial
- Design examples prepared prior to and concurrent with final development and adoption of the 2017 VSMM Rule, and are being adapted to conform with revised permit application requirements.
- Complete design examples for all three scenarios expected to be posted to Agency website in June 2017.

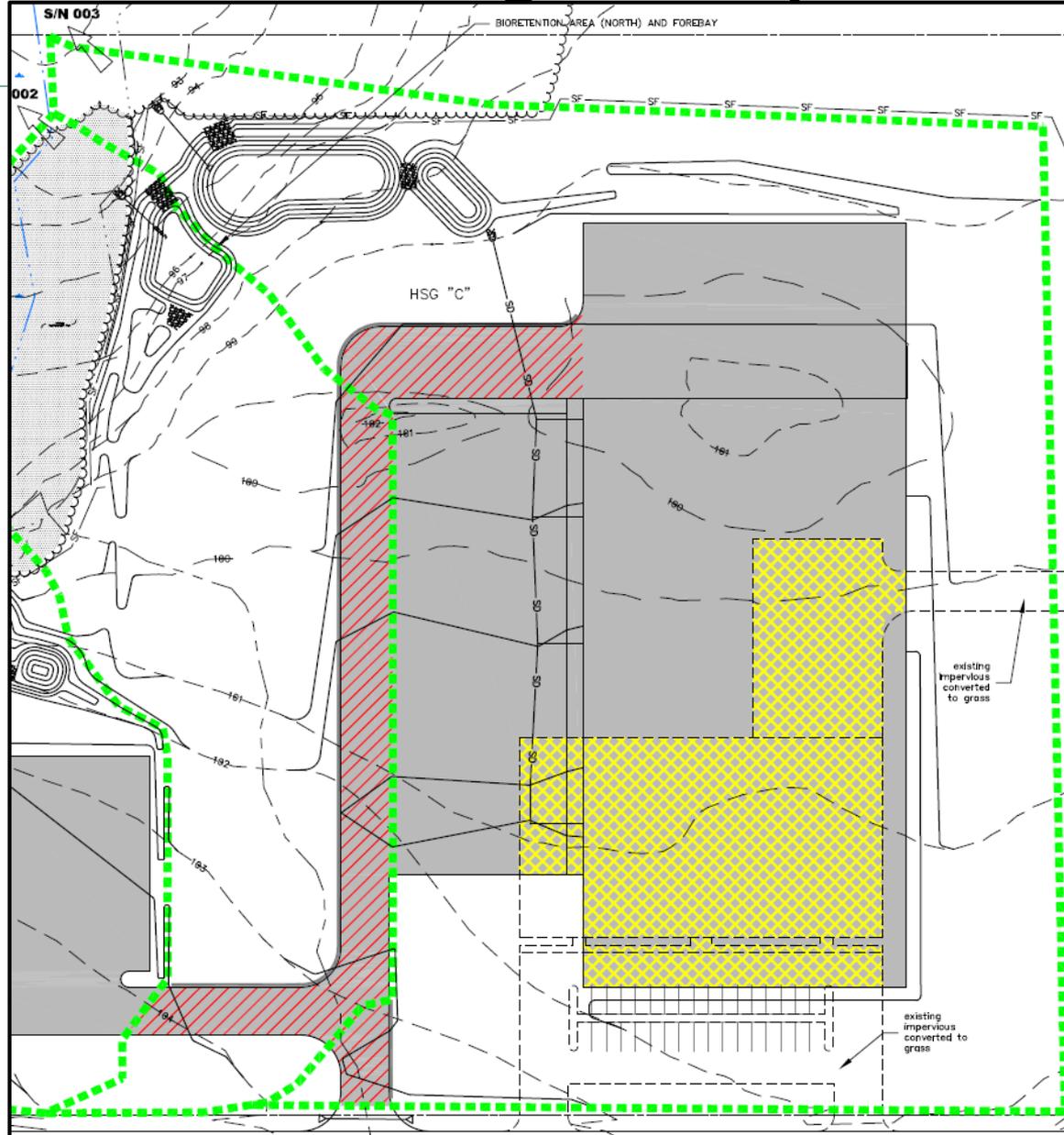
# Commercial Design Example



# Commercial Design Example



# Commercial Design Example: SN003



# Commercial Design Example: SN003

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- Infiltration Feasibility Testing supports feasibility for Tier 1 Practice
  - Depth to SHGWT also acceptable for infiltration practice or other practice such as bioretention designed for infiltration
  - Slopes may support stormwater disconnections
  - Previously impacted wetland buffer may offer opportunities for passive reforestation
  - Complete STP Selection Tool, select STP

**SEE STP Selection Tool (S/N 003)**

# Commercial Design Example: SN003

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- Stormwater Bioretention (designed for infiltration)
  - Standards Compliance Workbook
  - Design Bioretention for infiltration of  $WQ_V$ , and  $CP_V$ ,  $Q_{P10}$  ( $T_V$ )
  - STP Worksheet for Bioretention
  - Complete Waiver worksheet for  $Q_{P100}$

**SEE Standards Compliance Workbook (S/N 001)**

**SEE STP Worksheet for Wet Pond**

## Commercial Design Example

# Post Construction Soil Depth & Quality Standard

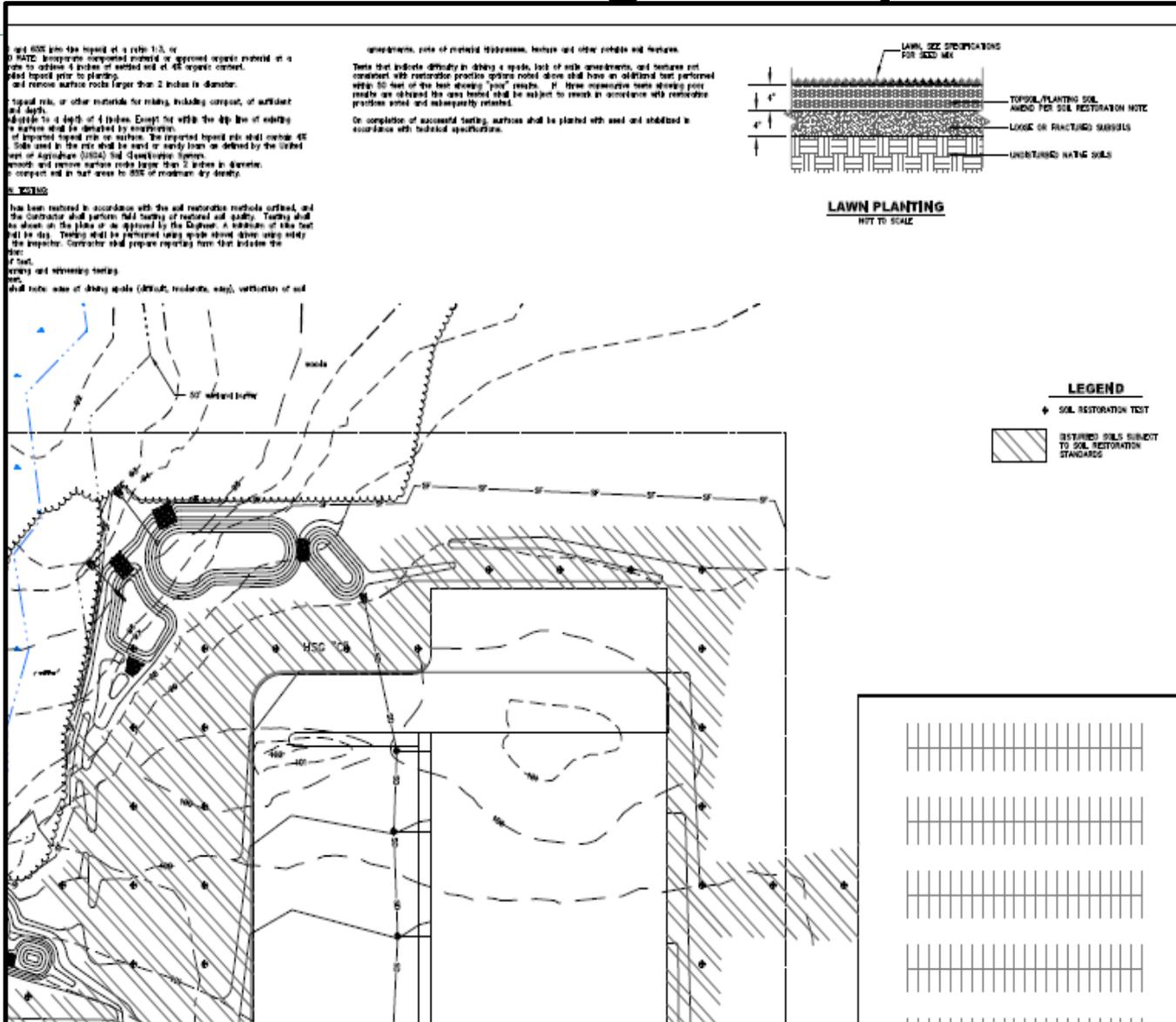
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### Applicable Project-Wide

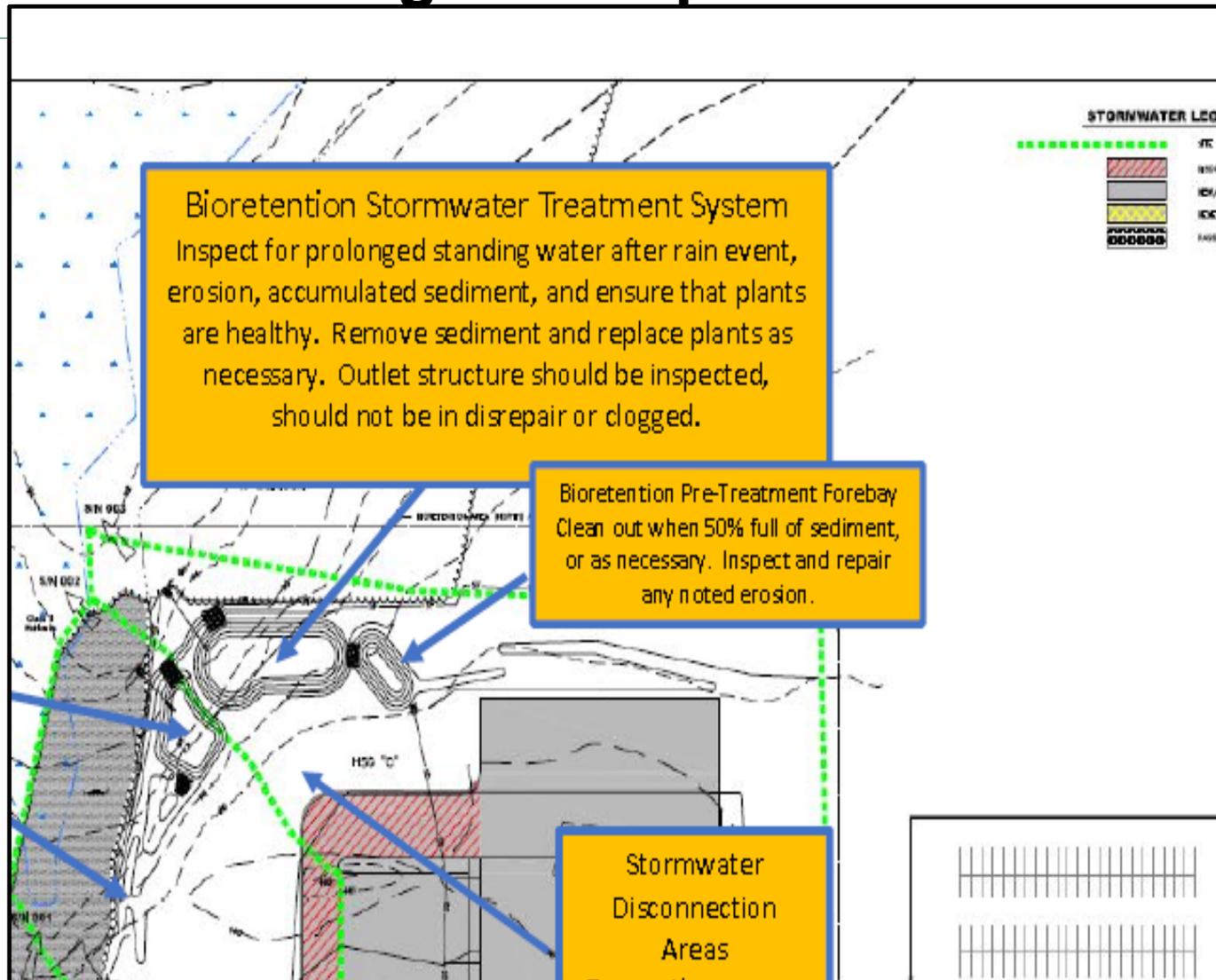
- Identify areas subject to the standard
- Identify areas that are not to be disturbed (Passive Reforestation/Buffer)
- Identify methods for soil restoration for contractor
- Identify verification locations to be used by contractor as necessary to verify compliance with Standard

**SEE Soils Management Plan – Plan Sheet C-6**

# Commercial Design Example: SDQ



# Commercial Design Example: Maintenance Plan



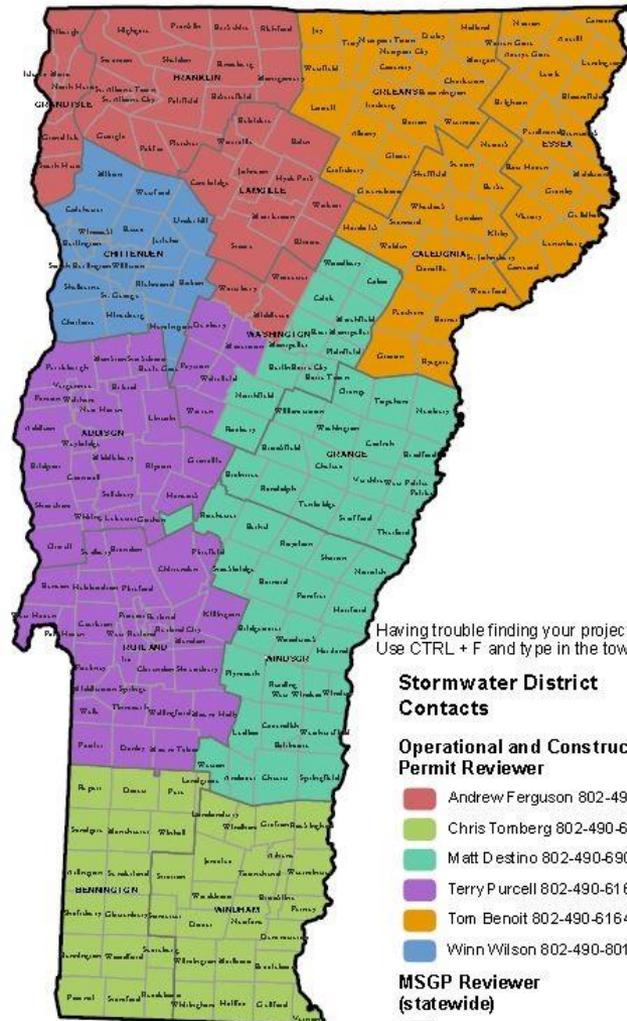
# Additional Information

## VT DEC Stormwater Program

### District Staff

### Contact Information

<http://dec.vermont.gov/watershed/stormwater/contacts>



Having trouble finding your project town?  
Use CTRL + F and type in the town name

#### Stormwater District Contacts

#### Operational and Construction Permit Reviewer

- Andrew Ferguson 802-490-6167
- Chris Tomberg 802-490-6917
- Matt Destino 802-490-6906
- Terry Purcell 802-490-6166
- Tom Benoit 802-490-6164
- Winn Wilson 802-490-8019

#### MSGP Reviewer (statewide)

- Jamie Bates 802-490-6159



# Questions/Comments...

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**Kevin Burke**  
VT DEC, Stormwater Program  
[Kevin.Burke@Vermont.gov](mailto:Kevin.Burke@Vermont.gov)



**Emily Schelley**  
VT DEC, Stormwater Program  
[Emily.Schelley@Vermont.gov](mailto:Emily.Schelley@Vermont.gov)

**Chris Gianfagna**  
VT DEC, Stormwater Program  
[Chris.Gianfagna@Vermont.gov](mailto:Chris.Gianfagna@Vermont.gov)