

# 2017 Vermont Stormwater Management Manual

## Application Requirements for Operational Permits

Version 2.3 5/9/2018

### Table of Contents

Introduction.....	1
Part 1. Application Submittal Requirements .....	2
1.1 Application Format .....	2
1.2 Permit Application Correspondence and Revisions.....	4
1.3 Correspondence for Issued Permits/Authorizations.....	5
Annual Inspections and Restatements of Compliance .....	5
Transfers .....	5
Annual Operating Fees .....	5
General Correspondence.....	5
Part 2: STP Selection Tool.....	5
Part 3: Standards Compliance Workbook.....	6
3.1 Discharge Points.....	6
3.2 Filling out the workbook when using Site Balancing .....	7
3.3 Filling out the workbook when using Net Reduction .....	8
3.4 Terminology .....	8
Part 4: Worksheets .....	9
Post Construction Soil Depth and Quality Worksheet .....	9
STP Worksheets .....	9
Worksheet Format .....	10
Part 5: Runoff Modeling .....	10
5.1 General Model Information.....	10
5.1.1 Time of Concentration ( $T_c$ ) .....	10
5.1.2 Subcatchment Summary .....	11
5.2 Water Quality Treatment Standard .....	11
5.3 Channel Protection Standard ( $CP_v$ ) .....	12
5.4 Overbank Flood Protection Standard ( $Q_{P10}$ ) and Extreme Flood Protection Standard ( $Q_{P100}$ ).....	13
5.5 Wet Ponds/Practices Utilized for Detention.....	15
5.5.1 Outlet Routing .....	16
5.5.2 Starting Elevation .....	17

5.6 Stormwater Treatment Wetlands.....	18
5.7 Infiltration Practices .....	19
5.7.1 Constant Velocity Infiltration.....	19
5.7.2 Constant Flow Rate Infiltration .....	21
5.8 Modeling Open Channel Systems: Pre-treatment Swales and Conveyance Swales.....	23
Part 6: Plan Sheet Guidance.....	24
Part 7: Sediment Offset Calculation Guidance .....	26
7.1 Simple Method Calculations .....	26
7.2 Stormwater Impact Fee Calculations .....	27
Appendix 1: Public Transportation Projects.....	28
A.1.1. Public Transportation Projects Application Format.....	28
Redevelopment – Major Maintenance.....	28
Redevelopment with Expansion .....	30
New Construction .....	31
A.1.2. Public Transportation Workbook .....	31
Discharge Points.....	32
Site.....	33
Appendix 2: Amendments to Existing Stormwater Discharge Permits.....	34
Common Plans of Development.....	34
A.2.1. Water Quality Practice Selection – Use of Existing Stormwater Treatment Practices .....	34
A.2.2. Application Format – Amendments to Existing Stormwater Discharge Permits.....	34
Amendment Application Format .....	35
Appendix 3: ANR Online Instructions for Compliance Report Submittals .....	38
Creating a User Account .....	38
Signing In.....	38
Finding and Completing a Stormwater Compliance Form .....	39
Finding the Form .....	39
Completing a Form.....	40
Form Layout and Navigation .....	41
Form Header.....	41
Form Section List/Navigation .....	42
Form Data Entry Area.....	43
Managing Your Submissions .....	44
Submission History.....	44

Renaming Your Submissions.....	45
Editing a Draft Submission .....	46
Revising and Resubmitting .....	46
Deleting a Draft Submission .....	47

## Introduction

This document is intended to ensure the uniform content, arrangement, and submission of State Operational Stormwater permit applications. The contents of this document represent the Stormwater Program's required format for application organization, required material, and supporting information. Failure to adhere to the application submittal requirements presented herein may delay application processing or result in the return or denial of a permit application. Variations to application submittal requirements may be approved by the Agency in advance of submittal, on a case-by-case basis, in consideration of specific circumstances for a particular project.

**IMPORTANT:** For *Public Transportation Projects*, as defined in Subchapter 6.0 of the 2017 Vermont Stormwater Management Manual, designers should also refer to Appendix 1 of this document for application format requirements, including for specific content of the above listed Attachments, 1 through 6, which may differ and will be inclusive of transportation specific documents.

**IMPORTANT:** For **amendments to existing stormwater discharge permits**, designers should also refer to Appendix 2 of this document, that will provide additional guidance and application requirements for amendments to existing stormwater discharge permits. Designers preparing a stormwater permit application to amend an existing permit should contact the Stormwater Program in advance to discuss proposed changes and applicable requirements.

## **Part 1. Application Submittal Requirements**

All permit applications must be submitted on a CD/DVD by mail. Fee payments must be by check, payable to State of Vermont. Application submittals will not be accepted via email or through external document sharing sites. Unless full scale paper copies of site plans are specifically requested by the Stormwater Program, only electronic versions of site plans are preferred.

It is also encouraged that all correspondence on pending permit applications following the initial submittal of the application be conducted via email. This request applies to all regularly submitted stormwater permit applications, including applications for permit coverage under General Permit 3-9010, 3-9015, 3-9020, 3-9030, 3-9003, or their replacement, and all types of individual stormwater discharge permits. Correspondence with the Stormwater Program on issued permits should also be conducted electronically when possible as directed below in this section.

### **1.1 Application Format**

A complete application is comprised of all the applicable application materials and a check for the applicable administrative review and application review fees. These materials should be organized into 6 separate documents, saved individually as PDFs or spreadsheets. PDFs should not be saved using the “Portfolio” function, as this makes review difficult. The six documents should be named as shown below:

1. NOI
2. Attachment 1 - Narrative
3. Attachment 2 - Workbooks
4. Attachment 3 - Worksheets
5. Attachment 4 - Modeling
6. Attachment 5 - Plans

Each of the above referenced files should contain the following materials. Applications should always be submitted using the most current version of the forms. Current versions of all applications forms can be downloaded from the Stormwater Program website:

1. NOI
  - Signature - The applicant(s) and the application preparer should sign the form electronically before sending the final version. To sign the document, please use the Adobe “Sign” tool to place a signature in the signature block. They may choose from the options under “Place Signature” to either “Type My Signature”, “Draw my Signature” or “Use an Image.” If one has never signed electronically, further help can be found on the [Adobe help site](#). Effective January 1, 2018, applications for Individual Stormwater Discharge Permits (INDS) now require the applicant to provide notice of application to adjoining property owners at the time of application and certify this on the application form (NOI). Specific instructions are provided on the INDS application form (NOI), including a link to a template that can be used for this notification.

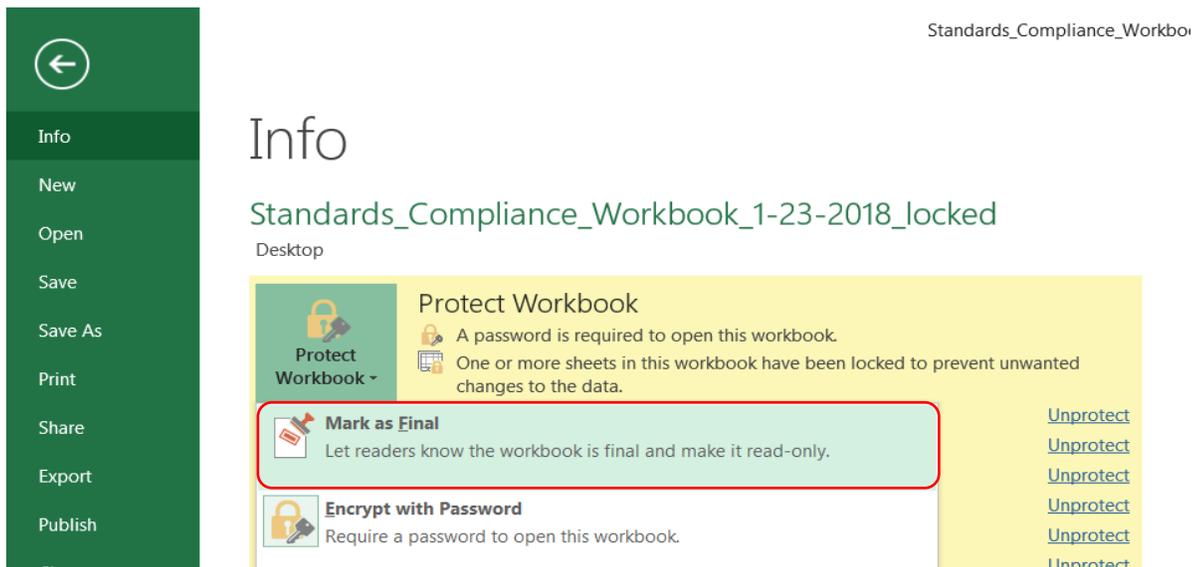
2. Attachment 1 - Narrative

- The project narrative – prepared in accordance with Narrative Template
- Location map – showing the outline of the site, the discharge point(s) and the location of the receiving water(s) on a topographical map.
- Soils map – prepared from the [NRCS online Web Soil Survey](#) or the soils data may be overlaid on the existing conditions plan sheet or other plan sheet.

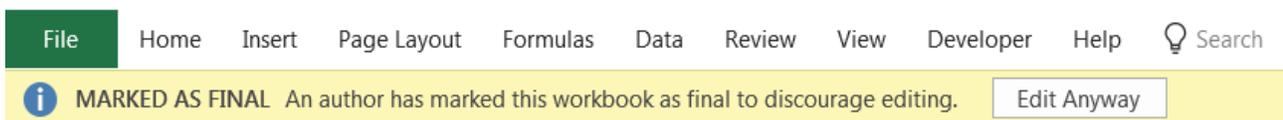
3. Attachment 2 - Workbooks

- STP Selection Tool – more information on completing this workbook can be found in Part 2: STP Selection Tool.
- Standards Compliance Workbook - more information on completing this workbook can be found in Part 3: Standards Compliance Workbook
- Written justification for the use of Tier 3 Practices (if applicable)

Workbooks should be submitted as excel workbooks (xlsx) to aid in the review of applications. Designers may choose to lock workbooks by going to File>Protect Workbook>Mark as Final.



The workbook will then be protected against any changes unless the user selects “Edit Anyway”.



#### 4. Attachment 3 – Worksheets

The following worksheets should be included. Additional information on completing the worksheets can be found in Part 4: Worksheets.

- Post-Construction Soil Depth and Quality Worksheet
- STP Worksheets for each STP
- Standard Waiver Worksheets (if applicable)

STP Worksheets and Standard Waiver Worksheet should be organized by discharge point in that order. Include section breaks between discharge points.

#### 5. Attachment 4 - Modeling

- Hydrologic modeling for all pertinent rainfall events. See Part 5: Runoff Modeling of this document for specific instructions.

#### 6. Attachment 5 - Plans

- Complete plan set including existing condition site plan, proposed condition site plan, detail sheet for all proposed STPs, and an annotated maintenance plan including notes as applicable. See Part 6: Plan Sheet Guidance for details on how plan sheets should be formatted and submitted.

A check shall be included for applicable application fees. Checks should be made payable to the State of Vermont. Do not include a copy of the check on the CD/DVD. **Note:** Please do not combine all the application materials into a single file. Use the above format and file naming convention.

A CD/DVD containing the complete application package can be sent to the following address:

DEC- Watershed Management Division  
Stormwater Management Program  
1 National Life Drive, Main 2  
Montpelier, VT 05620-3522

## 1.2 Permit Application Correspondence and Revisions

Submission of permit-application related correspondence (e.g. response to technical review comments, plan changes, application material revisions) is requested via email following the initial submittal of the application.

If revisions to original application materials are requested by the Stormwater Program, it is expected that a complete attachment will be re-submitted with the response to comments. For example, if an STP worksheet in Attachment 2 needs to be revised, then the entire Attachment 2 should be resubmitted and named as such “Attachment 2: Worksheets\_revised\_4-24-15”. In certain cases that involve large file sizes, the Stormwater Program may consider allowing single sheets to be revised without re-submittal of the entire attachment. It is advised that you consult with Program district staff in this situation.

In the response to comments please indicate the location of any changes to the revised complete attachment (i.e. “bioretention worksheet inserted at p.10 of Attachment 2” or “Modeling revised for 1-year storm event; p. 28-32 of Attachment 4”.)

## **1.3 Correspondence for Issued Permits/Authorizations**

### **Annual Inspections and Restatements of Compliance**

All forms, except for the initial application documents, such as Annual Inspection Reports and Restatement of Compliance forms, now must be submitted electronically via ANR Online.

To access ANR Online and submit compliance reports click the following link:

<https://anronline.vermont.gov/> to set up a user account. Appendix 3: ANR Online Instructions for Compliance Report Submittals provides a step by step guide on how to register and submit your compliance reports. Please contact Megan McIntyre in the Watershed Management Division’s Business and Operational and Support Services Program if you have any questions regarding submittal of these reports via ANR Online. Megan McIntyre may be reached at [megan.mcintyre@vermont.gov](mailto:megan.mcintyre@vermont.gov) or 802-490-6110. If you have questions or issues related to ANR Online, please contact our online support staff at [anr.onlineservices@vermont.gov](mailto:anr.onlineservices@vermont.gov).

### **Transfers**

Parties listed as permittees on issued stormwater permits must request to transfer the permit if they sell the property covered by that permit. Transfer forms can be downloaded from the [Stormwater Program website](#). Requests for Transfer of a Stormwater Discharge Permit shall be submitted by mail with applicable fee, made payable to State of Vermont, to the mailing address above.

### **Annual Operating Fees**

Operating fee invoices are sent annually to the address DEC has on file. All fees must be mailed to the address listed above with checks payable to the State of Vermont for the amount required.

### **General Correspondence**

All general correspondence related to a previously issued permit should be directed to the appropriate district technical staff member via email. A district staff directory can be found here:

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

Your assistance in paper-free permit applications is greatly appreciated. For additional stormwater permitting information, please visit the Stormwater Program website:

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

## **Part 2: STP Selection Tool**

Under the 2017 Vermont Stormwater Management Manual (VSMM), practices acceptable for meeting the Water Quality Treatment Standard have been divided into three tiers: Tier 1, Tier 2, and Tier 3. Tier 1 practices must first be considered, as they provide a higher level of water quality treatment with regard to removal of total phosphorus (TP) and total suspended solids (TSS) and also maximize treatment

volume ( $T_v$ ) credit under the remaining standards as a result of their ability to infiltrate, retain, or reduce stormwater runoff.

The STP Selection Tool provides designers an objective framework to evaluate their projects and determine the highest tier practice that can be used based on site characteristics and the feasibility requirements of each practice. The STP Selection Tool will direct designers through consideration of Tier 1, Tier 2, and Tier 3 STPs for each discharge point. If As indicated by the STP Selection Tool and as required by the 2017 VSMM, the use of Tier 3 Practices requires designers to provide written justification for use of Tier 3 Practices based on feasibility indicating why Tier 1 and Tier 2 Practices cannot be used, along with any relevant supporting information. More information about this justification is provided in the 2017 VSMM (Section 2.2.4.1.).

## Part 3: Standards Compliance Workbook

The Standards Compliance Workbook is designed to guide designers through how to calculate and demonstrate compliance with the Standards in the 2017 Vermont Stormwater Management Manual. The workbook must be completed for each discharge point of the project seeking permit coverage. For designers familiar with stormwater permit application submittal under the 2002 VSMM, the workbook replaces the need for Schedule A's,  $WQ_v$  and  $Re_v$  worksheets. Designers should ensure that the information provided in the workbook is consistent with the impervious surface included for permit coverage on the NOI and the STP Worksheets.

The workbook is comprised of a Summary tab and several discharge point tabs, labeled SN1, SN2, etc. The Summary tab provides an overview of how the Standards are met across discharge points. The workbook contains fields that are to be completed by the designer, fields that will auto-populate based on designer-entered information, as well as optional fields that may be completed by the designer when applicable. The designer will primarily enter information on discharge the discharge point tabs to describe site conditions and treatment used. The Standards Compliance Workbook is supported by the sizing and volume ( $T_v$ ) calculations completed in the STP Worksheets completed for each STP, in addition to hydrologic modeling results prepared by designers. (See Part 4: Worksheets.)

### 3.1 Discharge Points

A **discharge point** is defined as the location where stormwater runoff from the site first encounters Waters of the State. **Waters** means all rivers, streams, creeks, brooks, reservoirs, ponds, lakes, springs, and all bodies of surface waters, artificial or natural, which are contained within, flow through, or border upon the state of Vermont or any portion of it. Wetlands, which are in most cases surface waters, are often identified as an unnamed tributary to "first-named" waters of the State. The **site** is generally defined as the area occupied by the impervious and disturbed pervious areas on the project and may include undisturbed areas proposed for reforestation/tree planting, and undisturbed vegetated buffers or other areas utilized for non-structural treatment. A complete definition of site can be found in Subchapter 7.0 of the 2017 VSMM.

When discharge points are located far from the site boundary, applicants may use **points of interest (POIs)** as locations where compliance is demonstrated. A POI is a location where flow discharges from

the site, but that can be well upslope of the discharge point (Waters of the State). In general, if compliance with the treatment standards is demonstrated at a site boundary POI, then compliance will be assumed at the actual discharge point. A designer may utilize the discharge point tabs in the workbook (SN1, SN2, etc.) for information specific to a POI.

### 3.2 Filling out the workbook when using Site Balancing

The Site Balancing Design Strategy (2017 VSMM, Section 2.1.1.) may be used when control or treatment of certain areas of expanded or redeveloped impervious surface is not reasonably feasible or will have marginal benefits due to site constraints. Under site balancing, the impact from those areas is compensated for by providing equivalent treatment of surfaces within the project limits that would not otherwise be subject to treatment or control requirements. This can be accomplished by providing additional control or treatment beyond what is required for redeveloped impervious surfaces or by controlling or treating impervious surfaces that are not otherwise required to provide stormwater treatment.

When Site Balancing is used, the Standards Compliance Workbook must always be completed to reflect actual pre-development and post-development conditions. If existing impervious is being treated, that area should be identified on the plans and identified in the application narrative, and subsequently reflected in STP Worksheet and STP design and sizing. For example, if you are expanding impervious by 0.25 acres and site constraints prevent you from treating the expanded portion to current standards, treatment may be provided for 0.25 acres of existing impervious, if treatment is otherwise required for that impervious.

For projects that utilize site balancing, the Workbook must be completed as follows:

- List the new impervious under the “Post-Development Land Use” section, even though it is not receiving treatment. This will allow the workbook to correctly calculate the required treatment volumes.
- List the existing impervious in the “Pre-Development Land Use” section.
- Indicate in the “General Notes” field located at the bottom of the “Summary” tab that Site Balancing is used, identify the amount of existing impervious surface treated in lieu of new impervious that cannot be treated, the location of each impervious surface (by discharge point), and a description of the treatment provided.
  - For example, “*Site Balancing was used for discharge point SN1. 0.25 acres of existing impervious surface, also located in SN1 has been treated with a proposed Dry Swale as identified on site plan A1.*”
  - Designers that voluntarily treat more than required under Site Balancing may note this larger impervious area treated.

Please make sure all the areas of new impervious, treated existing impervious, untreated existing impervious, redeveloped impervious, and removed impervious are clearly identified on a site plan as well as in the narrative (a table with areas of each type of impervious is helpful) when utilizing the Site Balancing Design Strategy.

### 3.3 Filling out the workbook when using Net Reduction

The Net Reduction Design Strategy (2017 VSMM, Section 2.1.1.) may be used on developed sites that pre-date modern stormwater design requirements, that may present unique opportunities to greatly improve stormwater treatment and control. Expansion and redevelopment projects often involve reconfigurations of parking, drives, or buildings that can result in a net reduction in impervious surface, despite the creation or redevelopment of impervious that trigger the need for a stormwater discharge permit. A net reduction of impervious surface can have both stormwater quality and volume reduction benefits. While the Water Quality Treatment Standard applicable to redevelopment allows for credit towards removal impervious, an overall net reduction in impervious is not specifically considered.

When Net Reduction is used, the Standards Compliance Workbook must always be completed to reflect actual pre-development and post-development conditions. The workbook calculates the difference between the pre- and post-developed impervious to determine if impervious cover has been reduced by the proposed project. The designer must select whether the reduction will be applied as part of redevelopment standards or net reduction. Based on the selection, the workbook will alter the required  $WQ_v$  for that discharge point. "Net Reduction" may be selected from the dropdowns in the sections for Channel, Overbank, and Extreme Flood Protection as justification why those standards do not apply. The designer should note in the "General Notes" field located at the bottom of the "Summary" tab that Net Reduction is used and shall identify the amount of existing impervious surface being reduced and how the project in general used this design strategy to reduce the overall required Water Quality Volume ( $WQ_v$ ).

All areas of new impervious, treated existing impervious, untreated existing impervious, redeveloped impervious, and removed impervious shall be clearly identified on a site plan as well as in the narrative (a table with areas of each type of impervious is helpful) when utilizing the Net Reduction Design Strategy.

### 3.4 Terminology

Definitions are specified in Subchapter 7.0 of the 2017 Vermont Stormwater Management Manual. Additional information is provided here to assist designers in permit application preparation and design.

Receiving Waters: The receiving water is the name of the Water of the State that stormwater runoff from the site first enters. If the receiving water does not have a name, use the designation of "unnamed tributary to the X," where X is the first named waterbody. "Waters" means all rivers, streams, creeks, brooks, reservoirs, ponds, lakes, springs, and all bodies of surface waters, artificial or natural, which are contained within, flow through or border upon the state of Vermont or any portion of it. If the receiving water is a wetland, be specific as to the wetland's relationship to other waters. For instance: 1) Wetland tributary to X; or 2) Wetland draining into X. In situations where all of the stormwater is discharged to groundwater (infiltrated), the receiving water is "groundwater within the X watershed." In the instance that the site discharges to groundwater, but some overflow is expected via surface runoff into a Water of the State, the receiving water is "groundwater with overflow to X."

Latitude & Longitude of Discharge Point: This is the location in Decimal Degrees (including at least the first five digits after the decimal point) format where the runoff from your site first enters a water for each discharge point.

Existing Impervious Surfaces: Existing impervious surfaces shall be identified in the Standards Compliance Workbook representative of both pre- and post-development conditions. Existing impervious surfaces that are not proposed for permit coverage and do not require permit coverage or treatment may be excluded from the NOI. Existing impervious surfaces that are included for permit coverage must meet applicable treatment standards.

Redevelopment: If you are redeveloping an area of impervious surface whose discharge is covered under an existing stormwater discharge permit (valid or expired) please contact the Stormwater Program to discuss whether coverage of this impervious surface is required under a new stormwater discharge permit or can be authorized under the existing permit. Typically, redeveloped surfaces are held to a reduced Water Quality Standard, however in cases where the areas were previously permitted as new or held to another standard under a previously issued permit, “backsliding” on treatment or control would not be permissible. Please refer to Chapter 18 or Chapter 22 of the Environmental Protection Rules, or their replacement (if applicable), for full definition of redevelopment.

## **Part 4: Worksheets**

### **Post Construction Soil Depth and Quality Worksheet**

Every project application must include a completed Post-Construction Soil Depth and Quality Worksheet, along with a supporting soils plan indicating the areas that will be subject to the standard and locations of the proposed test pits. A single Post-Construction Soil Depth and Quality worksheet shall be submitted for each site.

### **STP Worksheets**

STP Worksheets must be completed for each of the primary treatment STPs that are to be used on the project. Completion of the STP Worksheets will allow for the calculation of the STP’s treatment volume ( $T_V$ ), the volume that will be applied to all standards under the runoff reduction framework of the 2017 VSMM, including the Hydrologic Condition Method of the Channel Protection Standard. The STP Worksheets also cover some of the required design elements for STPs to ensure that the STP is designed according to the Manual. Designers however are urged to review the complete list of required elements in the Manual, as the STP Worksheets are not inclusive of all requirements but focus on key elements.

Most questions on the worksheets refer to required elements in the 2017 Vermont Stormwater Management Manual and therefore must be addressed. An answer of “No” to a required element is subject to Agency approval and must be accompanied by a detailed explanation and certification of why this design element is not met and whether the minor variation from numerical design criteria will not compromise equivalent performance of the STP. Some questions ask if a particular design element,

such as check dams or an underdrain, will be used by the STP. Selection of “Yes” may cause further question to populate the worksheet that must be answered.

## Worksheet Format

Worksheets applicable to each discharge point shall be bundled together. The bundle, is then included in a single PDF called “**Attachment 3: Worksheets.**” The Attachment 3: Worksheets PDF will include the Post-Construction Soil Depth and Quality, STP Worksheets, and Standard Waiver Worksheets (if applicable) in that order. grouped by discharge point.

All worksheets can be found here:

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

## Part 5: Runoff Modeling

The information presented here aims to make the review of operational stormwater application information specific to hydrologic modeling more efficient. This information also sets forth the expected format and methods to be used when completing modeling to ensure application consistency. Below are several figures showing modeling outputs that have been underlined or circled in red indicating that these items are expected to be highlighted on the modeling output summary sheets prepared by the designer and submitted with the application to clearly demonstrate compliance with applicable treatment standards. The below figures depict one type of software that is commonly used for preparing the required modeling. The Agency accepts similar modeling based on TR-20 or approved equivalent for determining stormwater runoff volume, determining peak discharge rates, and for routing of detention STPs. If the project reports are printed directly to PDF the pertinent text can be highlighted or otherwise marked with tools in Adobe without printing a hard copy of the reports, thus this request can be met while maintaining the goal of paperless applications.

### 5.1 General Model Information

#### 5.1.1 Time of Concentration ( $T_c$ )

The 2017 VSMM required that the  $T_c$  for each modeled subcatchment be calculated using the Watershed Lag Method (Lag/CN Method), see Section 2.2.4.3.  $T_c$  may be auto-calculated using the Standards Compliance Workbook, which has Equation 2-4 (Section 2.2.4.3.) embedded within each discharge point/POI tab, thus allowing designers to simply enter the subcatchment hydraulic length ( $L$ ) and the average catchment slope ( $Y$ ) for both pre- and post-development conditions.

The subcatchment **hydraulic length** ( $L$ ) may be simply calculated using the empirical relation presented in Equation 2-5 of the Manual (Section 2.2.4.3.) which only requires the subcatchment area ( $A$ ) to do so.

The subcatchment **average catchment slope** ( $Y$ ) must be calculated using AutoCAD, ArcGIS, or direct plan measurements of contour length ( $C$ ) and contour interval ( $I$ ), or by using any of the methods identified in the Manual. One acceptable method includes calculating the slope of multiple flow paths

through the subcatchment and taking the average. Once average catchment slope ( $Y$ ) is calculated, this value, along with the hydraulic length ( $L$ ) value, can be entered in the Standards Compliance Workbook for auto-calculation of the subcatchment  $T_c$ .

**IMPORTANT: In all cases, the hydraulic length ( $L$ ) and average catchment slope ( $Y$ ) calculations shall be included as an attachment to the modeling, where applicable, or otherwise included with the application materials. In addition, flow paths utilized for calculations shall be labeled and drawn on applicable plan sheets. In cases where the average catchment slope ( $Y$ ) is auto-calculated using AutoCAD or other program, the actual calculation is not required to be provided but the method used can be identified in the application materials.**

### 5.1.2 Subcatchment Summary

On the first subcatchment summary sheet for each storm event please highlight the following information:

- Runoff generation method (shall be flow weighted (Weighted-Q), not area weighted (Weighted-CN)), (Weighted-CN only accepted with prior Agency approval)
- Unit hydrograph used
- Model time span
- Model time step
- Rainfall distribution type
- Rainfall amount

#### Summary for Subcatchment 1e: Existing Basin 1

Runoff = 2.03 cfs @ 12.05 hrs, Volume= 0.128 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 1.00-90.00 hrs, dt=0.01 hrs  
Type II 24-hr 1yr Storm Rainfall=2.20"

Area (ac)	CN	Description
0.033	77	Woods, Good, HSG D
2.626	77	Woods, Good, HSG D
0.099	70	Woods, Good, HSG C
0.046	70	Woods, Good, HSG C
2.804		Weighted Average
2.804		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0					Direct Entry, Watershed Lag

Figure 1: Subcatchment summary sheet showing the general model information that should be highlighted on the first subcatchment summary sheet for each rainfall event.

## 5.2 Water Quality Treatment Standard

When modeling the Water Quality Storm (1.0”) with NRCS methods a modified CN must be used. On the subcatchment summary sheet for the Water Quality Storm please highlight the modified CN that was calculated using Equation 2-3 in the 2017 VSMM, found in Section 2.2.4.2.

Area (ac)	CN	Description
* 1.200	88	Modified CN
1.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
----------	---------------	---------------	-------------------	----------------	-------------

Figure 2: Subcatchment summary sheet for the Water Quality Storm showing the use of a Modified CN.

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

Discharge points that meet the Channel Protection Standard entirely by use of the Hydrologic Condition Method (HCM) may not require the above modeling when STPs have been sized for the required T<sub>v</sub> based on infiltration rate, contributing drainage, and practice geometry, in consideration of all applicable design requirements. Designers may opt to provide modeling to demonstrate exfiltration of the required T<sub>v</sub>.

Discharge points that partially meet the Channel Protection Standard by use of the HCM, will use an adjusted Curve Number (CN) (2017 VSMM, Section 2.2.5.3) in the model to account for any T<sub>v</sub> that was provided and shall demonstrate extended detention for any remaining channel protection volume.

To demonstrate compliance with the Channel Protection Standard when met with Extended Detention (ED) please highlight the Center of Mass detention time on the pond/practice summary sheet. The Center of Mass detention time should be as close to 720 minutes as possible for a 12-hour detention time for or 1440 minutes if a 24-hour detention time, depending on the fisheries designation of the receiving water.

The model time span must be long enough so that the pond elevation returns to the permanent pool elevation for the 1-year, 24-hour storm. Otherwise, the center of mass detention time reported by the software may be truncated. This can be confirmed by verifying that the inflow and outflow volumes are the same.

If the STP has a permanent pool, the model shall only consider the area above the permanent pool for compliance with the Channel Protection Standard. This can be accomplished by setting the starting elevation at the permanent pool elevation, or by not defining the permanent pool storage.

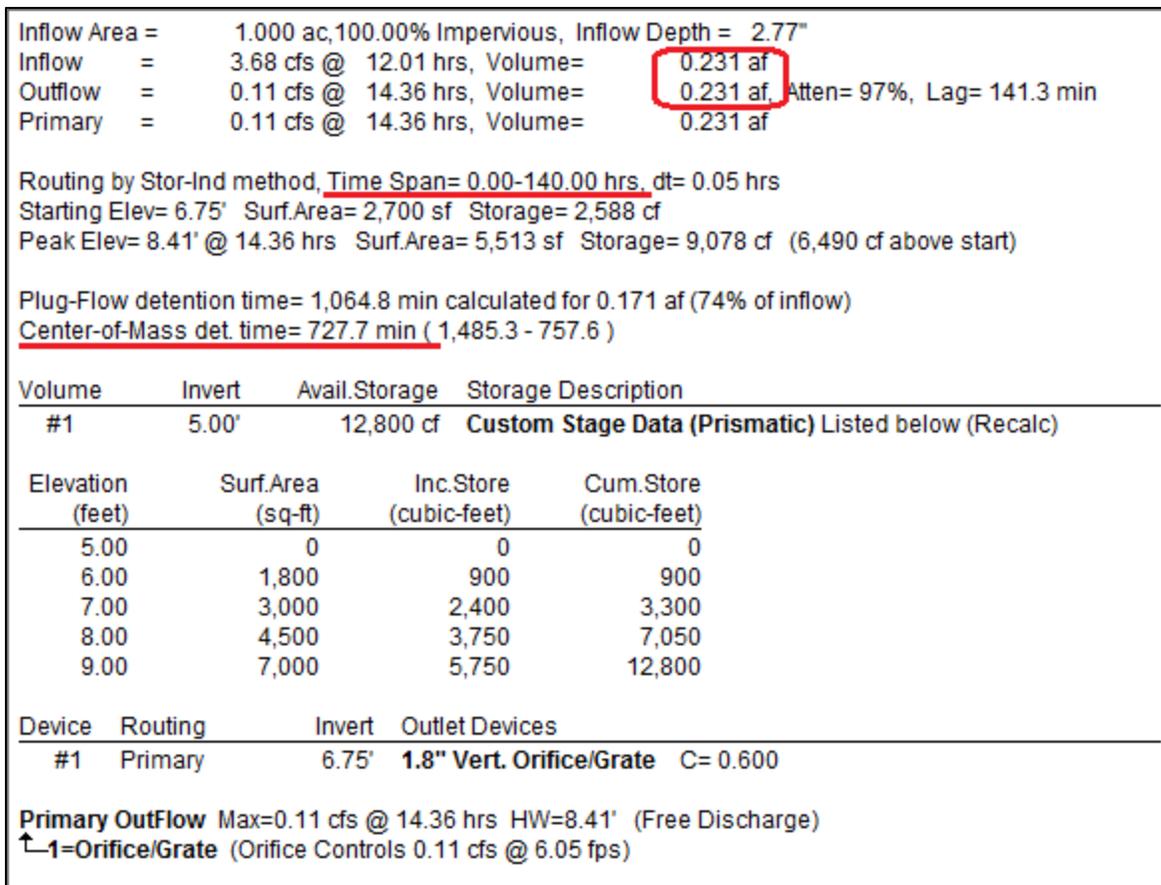


Figure 3: Subcatchment summary sheet showing an appropriate model time span and center of mass detention time, verified by equivalent inflow and outflow volumes.

The minimum orifice size is 1 inch; designers will not be required to demonstrate more detention time than a 1 inch orifice can provide. However, to maximize the detention time provided by the 1 inch orifice, the pond should have the available storage to contain the CP<sub>V</sub> between the 1 inch orifice and the next highest outlet control (i.e. there should be no discharge through the next highest outlet control for the 1-year storm.)

## 5.4 Overbank Flood Protection Standard (Q<sub>P10</sub>) and Extreme Flood Protection Standard (Q<sub>P100</sub>)

Compliance with these standards is met by demonstrating that the routed post-development peak discharge rate does not exceed the pre-development peak flow rate for the 10-year, 24-hour and 100-year, 24-hour storms, under the Type II rainfall distribution ( $Q_{P10post} \leq Q_{P10pre}$  and  $Q_{P100post} \leq Q_{P100pre}$ ). To demonstrate this in the modeling output, highlight the peak flow rate from the most downstream node in the pre-development/existing condition and the most downstream node in the proposed condition to show that the flow rate from the proposed condition is less than or equal to the existing condition. In the example below, the peak flow rate from node 5S would be compared to the peak flow rate from node 3P

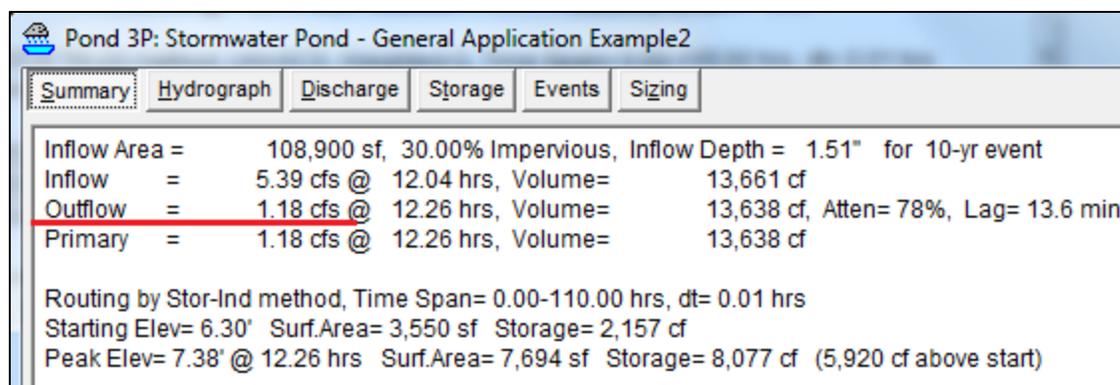
for demonstrating compliance with the Overbank Flood Protection ( $Q_{P10}$ ) and Extreme Flood Protection ( $Q_{P100}$ ) Standards.



Figure 5: Routing diagram for the Overbank Flood Protection and Extreme Flood Protection Standards example.

Subcat 5S: Existing Meadow - General Application Example2			
Summary		Hydrograph	Events
Runoff	=	1.48 cfs @ 12.14 hrs,	Volume= 6,036 cf, Depth= 0.67"
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-110.00 hrs, dt= 0.01 hrs Type II 24-hr 10-yr Rainfall=3.70"			
Area (ac)	CN	Description	
2.500	61	>75% Grass cover, Good, HSG B	
2.500		100.00% Pervious Area	

Figure 6: Subcatchment summary sheet showing peak flow rate for the pre-development condition for node 5S.



**Figure 7: Subcatchment summary sheet showing the peak flow rate for the proposed condition.**

Note that for practices with multiple outflow designations (primary and secondary) the flows should be combined. For ponds with exfiltration specified as an outlet control (discarded flows) this flow will be considered in the total Outflow calculation, but does not need to be considered for compliance purposes with the  $Q_{P10}$  and  $Q_{P100}$  standards. In these cases, the total flow rate for compliance purposes is the outflow less the discarded flow.

Discharge points that partially meet the Overbank Flood Protection Standard and/or Extreme Flood Protection Standard by use of the HCM, will use an adjusted Curve Number (CN) (2017 VSMM, Section 2.2.5.3) in the model to account for any  $T_v$  that was provided, rather than representing by exfiltration (discarded flows).

In addition to demonstrating compliance with each standard, conformance with stormwater treatment practice requirements should also be demonstrated by highlighting pertinent information on the modeling summary sheets for the specific practice being used to meet the standards. If a “Required Element” in VSMM is possible to demonstrate in the modeling, it should be highlighted in the modeling to demonstrate compliance. This will facilitate the efficient review of a permit application.

## 5.5 Wet Ponds/Practices Utilized for Detention

The following elements for wet ponds and stormwater treatment practices that provide either a permeant pool and/or detention volume should be highlighted in the modeling output:

- 1-year peak flow rate from the pond outlet
- Volume of the permanent pool
- Starting elevation (based on elevation of permanent pool and lowest outlet control)
- Outlet control structure type, size, and invert elevation (including barrel), consistent with the provided outlet control structure detail
- Outlet routing diagram demonstrating proper routing of the various outlet control structures through the riser barrel

Summary Sheet:

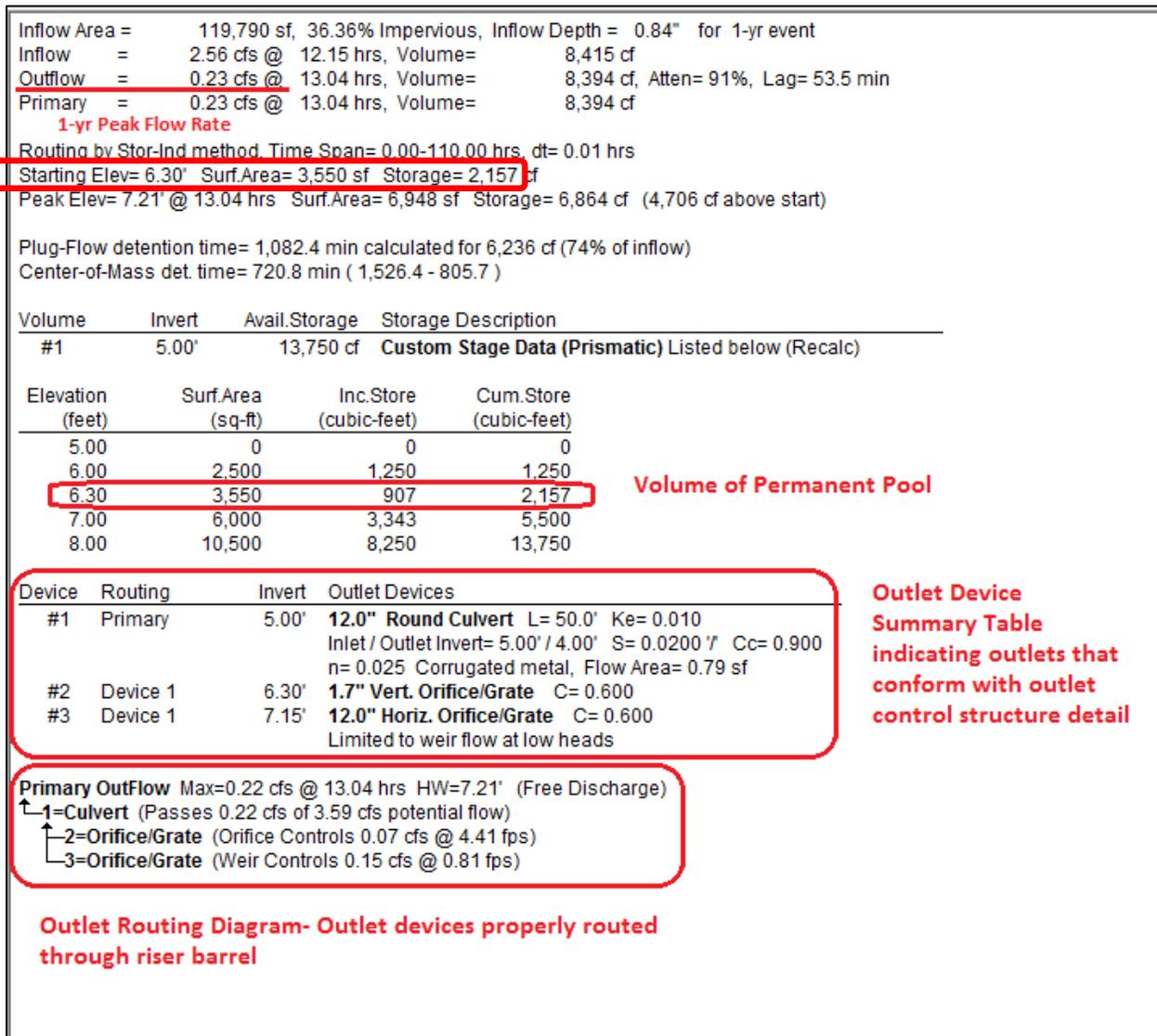


Figure 10: Summary sheet showing pertinent information that needs to be highlighted

### 5.5.1 Outlet Routing

The use of compound outlet structures is common for stormwater treatment practices. When modeling a compound outlet structure, it is important to include not only the various outlet control structures on the

riser, but also the riser barrel where flows from the individual outlet control devices combine before discharging to a stable conveyance or receiving body.

Designating an outlet device as Primary assumes free discharge for that device. In compound outlet structures (risers with multiple outlet control devices) this is often not a valid assumption, as the barrel can act to control flow rate even if the sum of individual outlet control devices could potentially pass more flow.

Proper outlet routing involves specifying the barrel as an outlet control device, designating it as the primary outflow, and then routing the other outlet control devices on the riser (orifices, weirs, overflow grates) through the barrel. The easiest way to do this is to enter the barrel (as a culvert) as Device #1 in the “Outlet” table and then route the other devices through Device #1, as shown below:

Device	Routing	Invert	Outlet Devices
#1	Primary	5.00'	<b>12.0" Round Culvert</b> L= 50.0' Ke= 0.010 Inlet / Outlet Invert= 5.00' / 4.00' S= 0.0200 /' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Device 1	6.30'	<b>1.7" Vert. Orifice/Grate</b> C= 0.600
#3	Device 1	7.15'	<b>12.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow** Max=1.18 cfs @ 12.26 hrs HW=7.38' (Free Discharge)

↑1=Culvert (Passes 1.18 cfs of 3.72 cfs potential flow)

↑2=Orifice/Grate (Orifice Controls 0.08 cfs @ 4.83 fps)

↑3=Orifice/Grate (Weir Controls 1.11 cfs @ 1.56 fps)

**Figure 11: Outlet summary table and routing diagram showing inclusion of the barrel and proper routing of the other outlet control devices.**

This will ensure that flows are properly combined in the barrel and will allow for barrel control if necessary. Note that the barrel should be modeled at the size specified in the outlet structure detail.

Stormwater Wet Ponds or stormwater Shallow Surface Treatment Wetlands that require the use of a Gravel Outlet Trench, modeling may consider only the outlet size and elevation as it exits the trench and will not be required to consider porosity through the stone associated with the gravel outlet trench in route to the outlet.

### 5.5.2 Starting Elevation

Practices, such as Wet Ponds and Shallow Surface Treatment Wetlands, with established permanent pools must also include the elevation of the permanent pool in the modeling. This is done by specifying a pond starting elevation to ensure that the volume of the permanent pool is not counted toward the available storage volume of the pond. The inflow and outflow volumes should be the same for a given rainfall event. If the outflow is significantly less than the inflow, this may indicate that the starting elevation has not been appropriately set. The starting elevation of the pond is established by the

elevation of the lowest outlet control in the pond. The pond summary sheet below illustrates a properly established starting elevation for a wet pond with a permanent pool.

Inflow Area =	2.000 ac,	0.00% Impervious,	Inflow Depth = 4.16"	for 100-yr event		
Inflow =	13.41 cfs @	11.98 hrs,	Volume=	0.693 af	<b>Inflow and outflow</b>	
Outflow =	1.34 cfs @	12.41 hrs,	Volume=	0.693 af	<b>volumes are</b>	
Primary =	1.34 cfs @	12.41 hrs,	Volume=	0.693 af	<b>equivalent</b>	
<b>Routing by Stor-Ind method. Time Span= 0.00-120.00 hrs dt= 0.01 hrs</b>						
<b>Starting Elev= 814.00'</b>				<b>Surf.Area= 3,000 sf</b>	<b>Storage= 2,500 cf</b>	<b>Starting elevation listed</b>
<b>Peak Elev= 816.14' @ 12.41 hrs</b>				<b>Surf.Area= 12,830 sf</b>	<b>Storage= 17,718 cf</b>	<b>between routing info and</b>
<b>Peak elevation</b>						
Plug-Flow detention time= 277.2 min calculated for 0.635 af (92% of inflow)						
Center-of-Mass det. time= 201.0 min ( 990.5 - 789.4 )						
Volume	Invert	Avail.Storage	Storage Description			
#1	812.00'	31,000 cf	Custom Stage Data (Prismatic) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)			
812.00	0	0	0			
813.00	1,000	500	500			
814.00	3,000	2,000	2,500			
815.00	6,000	4,500	7,000			
816.00	12,000	9,000	16,000			
817.00	18,000	15,000	31,000			
Device	Routing	Invert	Outlet Devices			
#1	Primary	812.00'	<b>12.0" Round Culvert</b>			
L= 50.0' CMP, square edge headwall, Ke= 0.500						
Inlet / Outlet Invert= 812.00' / 811.50' S= 0.0100 /' Cc= 0.900						
n= 0.025 Corrugated metal Flow Area= 0.79 sf						
#2	Device 1	814.00'	<b>3.0" Vert. Orifice/Grate C= 0.600</b>			
#3	Device 1	815.00'	<b>6.0" Horiz. Orifice/Grate C= 0.600 Limited</b>			
<b>Primary OutFlow Max=1.34 cfs @ 12.41 hrs HW=816.14' (Free Discharge)</b>						
1=Culvert (Passes 1.34 cfs of 4.45 cfs potential flow)						
2=Orifice/Grate (Orifice Controls 0.34 cfs @ 6.83 fps)						
3=Orifice/Grate (Orifice Controls 1.01 cfs @ 5.14 fps)						

Figure 12: Summary sheet showing a properly established pond starting elevation to represent the permanent pool. Please highlight these items if using a pond with a permanent pool.

Notice that the inflow and outflow volumes are equivalent, and that the starting elevation corresponds with the elevation of the lowest outlet control on the compound outlet structure.

## 5.6 Stormwater Treatment Wetlands

Stormwater Shallow Surface Treatment Wetlands share many of the same required elements as Stormwater Wet Ponds. Unless specified in the 2017 VSMM, all of the pond criteria listed above also apply to Shallow Surface Treatment Wetlands including: conveyance criteria, outlet control device routing, forebay depths, and ponding depths for permanent pools. Refer to the above pond section for a

list of requirements that can be demonstrated in modeling output for Shallow Surface Treatment Wetlands.

Stormwater Wet Ponds or Shallow Surface Treatment Wetlands that require the use of a Gravel Outlet Trench, modeling may only consider the outlet structure sizing and elevation located within the trench and will not be required to consider porosity through the stone associated with the gravel outlet trench in route to the outlet.

## 5.7 Infiltration Practices

Designers may not require the above modeling when Infiltration Practices (including dry swales, filters, and bioretention practices designed to infiltrate) have been sized for the required  $T_V$  based on infiltration rate, contributing drainage, and practice geometry, in consideration of all applicable design requirements. Designers may opt to provide modeling to demonstrate exfiltration of the required  $T_V$ .

When modeling infiltration practices to demonstrate  $T_V$  infiltrated or compliance with other standards, the designer shall not use a  $CN_{Adj}$  that takes into account the practice being modeled. For example, if the designer is attempting to demonstrate that outflow from an infiltration basin will satisfy  $Q_{P10}$ , the adjusted curve number shall not reflect  $T_V$  credit from the infiltration basin. The CN may be adjusted based on any upstream Tier 1 practices, provided they are not explicitly modeled.

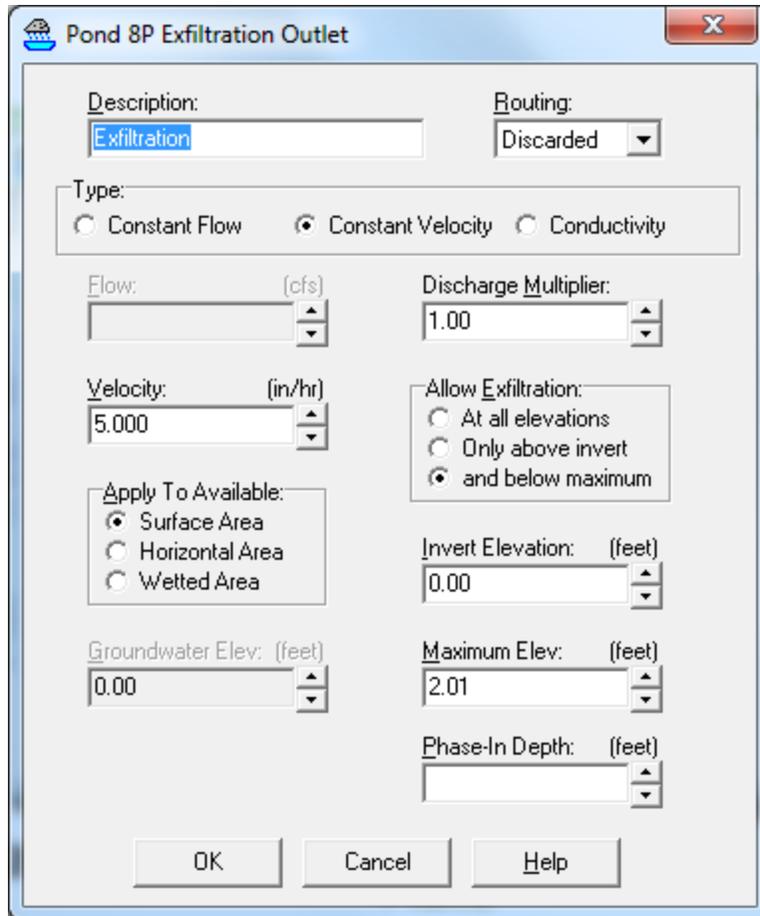
The following required elements for infiltration practices should be highlighted in the modeling output when modeling in necessary:

- Exfiltration by constant velocity limited to 0.01 ft. above the floor of the practice OR by constant flow rate at all elevations by calculation from the infiltration rate and the bottom area of the practice (see example below).

Infiltration is typically modeled by selecting “Exfiltration” as the outlet control device and specifying “Discarded” as the routing option. Exfiltration can correctly be modeled using either a constant velocity (infiltration rate) over the surface area of the bottom of the practice or constant flow rate (product of infiltration rate and bottom area of practice). Both approaches are demonstrated below.

### 5.7.1 Constant Velocity Infiltration

This approach involves entering the field verified infiltration rate into the model as the velocity term and limiting infiltration to a very small height (0.01 ft.) above the bottom elevation of the practice. This will restrict infiltration to the bottom of the practice only. If side slopes are to be considered, this height may be adjusted. If an infiltration basin has a bottom surface area of 2,000 sf, a bottom elevation of 2.00 ft. and an infiltration rate of 5.00 in/hr the correct way of setting this up using HydroCAD modeling software would be as follows:



**Figure 13: Exfiltration screen showing constant velocity exfiltration.**

Note that although the bottom elevation of the basin is at 2.00 ft., the invert elevation is specified as 0.00 ft. This is because the model treats the invert elevation as an impervious layer, through which there is no infiltration. Because of this, the invert elevation specified on the infiltration screen must be less than the actual bottom elevation of the infiltration basin. In effect, it doesn't matter how much less; the invert elevation could be 1.99 ft. and the model will respond in the same manner as if it were 0.00 ft.

Specifying the invert elevation less than the bottom elevation of the basin allows for infiltration through the entire bottom surface area of the basin, and specifying the maximum exfiltration elevation as 0.01 ft. above the bottom elevation of the basin minimizes exfiltration through the side slopes of the basin. The 2002 VSMM previously specified that only the bottom of the basin could be considered for infiltration area, which may be advisable and a conservative design approach, dependent on site and project specifics, however this may be adjusted to consider infiltration through side slopes under the 2017 VSMM. The output summary for the example model is included below:

Inflow Area =	119,790 sf, 36.36% Impervious, Inflow Depth = 0.84" for 1-yr event		
Inflow =	2.95 cfs @ 12.01 hrs, Volume= 8,415 cf		
Outflow =	0.23 cfs @ 11.59 hrs, Volume= 8,415 cf, Atten= 92%, Lag= 0.0 min		
Discarded =	0.23 cfs @ 11.59 hrs, Volume= 8,415 cf		
Routing by Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.01 hrs			
Peak Elev= 3.01' @ 12.72 hrs Surf.Area= 4,024 sf Storage= 3,048 cf			
Plug-Flow detention time= 93.3 min calculated for 8,414 cf (100% of inflow)			
Center-of-Mass det. time= 93.3 min ( 879.6 - 786.3 )			
Volume	Invert	Avail.Storage	Storage Description
#1	2.00'	15,000 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2.00	2,000	0	0
3.00	4,000	3,000	3,000
4.00	6,000	5,000	8,000
5.00	8,000	7,000	15,000
Device	Routing	Invert	Outlet Devices
#1	Discarded	2.00'	5.000 in/hr Exfiltration over Surface area below 2.01'
Discarded OutFlow Max=0.23 cfs @ 11.59 hrs HW=2.03' (Free Discharge)			
↑-1=Exfiltration (Exfiltration Controls 0.23 cfs)			

Figure 14: Pond summary sheet demonstrating constant velocity exfiltration. Items in red should be highlighted on the final output.

### 5.7.2 Constant Flow Rate Infiltration

The other acceptable option is Constant Flow Rate Infiltration. With this method, the field verified infiltration rate is multiplied by the surface area of the bottom of the practice to produce a volumetric flow rate. Through unit conversion the rate can be entered into the model in cfs and applied to all water surface elevations in the basin. This will produce a comparable result as the Constant Velocity Infiltration method. Using the previous example of a basin with a bottom area of 2,000 sf, a bottom elevation of 2.00 ft., and an infiltration rate of 5.00 in/hr the same result should be achieved:

$$Q = V \times A$$

$$Q = 5 \frac{\text{in}}{\text{hr}} \times 2000 \text{ ft}^2 \times \frac{1 \text{ ft}}{12 \text{ in}} \times \frac{1 \text{ hr}}{3600 \text{ s}} = 0.23 \frac{\text{ft}^3}{\text{s}}$$

The calculated flow rate can then be entered into the model using the Constant Flow Rate option as follows:

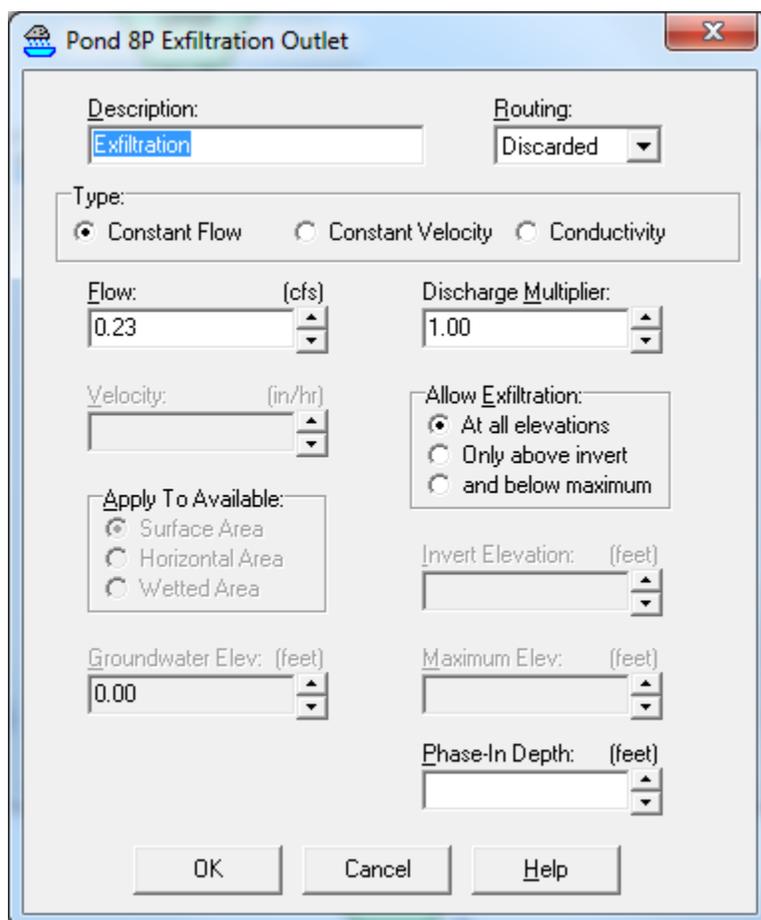


Figure 15: Exfiltration screen showing constant flow rate exfiltration.

Running the model with the calculated flow rate will yield an almost identical result to the Constant Velocity Infiltration method:

Inflow Area =	119,790 sf, 36.36% Impervious,	Inflow Depth = 0.84" for 1-yr event	
Inflow =	2.95 cfs @ 12.01 hrs, Volume=	8,415 cf	
Outflow =	0.23 cfs @ 11.57 hrs, Volume=	8,415 cf, Atten= 92%, Lag= 0.0 min	
Discarded =	0.23 cfs @ 11.57 hrs, Volume=	8,415 cf	
Routing by Stor-Ind method, Time Span= 0.00-110.00 hrs, dt= 0.01 hrs			
Peak Elev= 3.02' @ 12.75 hrs Surf.Area= 4,032 sf Storage= 3,065 cf			
Plug-Flow detention time= 96.0 min calculated for 8,414 cf (100% of inflow)			
Center-of-Mass det. time= 95.9 min ( 882.3 - 786.3 )			
Volume	Invert	Avail.Storage	Storage Description
#1	2.00'	15,000 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2.00	2,000	0	0
3.00	4,000	3,000	3,000
4.00	6,000	5,000	8,000
5.00	8,000	7,000	15,000
Device	Routing	Invert	Outlet Devices
#1	Discarded	2.00'	0.23 cfs Exfiltration at all elevations
Discarded OutFlow Max=0.23 cfs @ 11.57 hrs HW=2.03' (Free Discharge)			
↑1=Exfiltration (Exfiltration Controls 0.23 cfs)			

Figure 16: Pond summary sheet showing constant flow rate exfiltration. Compare to Figure 14. Items in red should be highlighted on the final output.

## 5.8 Modeling Open Channel Systems: Pre-treatment Swales and Conveyance Swales

When modeling is necessary to demonstrate design conformance with the Required Elements for Pre-Treatment Swales and Conveyance Swales (where applicable), the following should be highlighted in the modeling output:

- Peak velocity associated with the Water Quality Storm and the 1-year storm. Must be  $\leq 1$  fps for the Water Quality Storm and non-erosive for the 1-year storm.
- Minimum Travel Time (residence time) for the Water Quality Storm
- Channel Geometry (length, bottom width, side slopes)
- Flow Depth
- Manning's Number (varied with depth for different storm events)

- Longitudinal Slope
- Freeboard during 10-year storm (must be at least 6" during peak depth)

An example for a Pre-Treatment Swale is included below:

Inflow Area =	2.150 ac, 18.60% Impervious, Inflow Depth > 0.13" for WQ event		
Inflow =	0.38 cfs @	12.00 hrs,	Volume= 0.024 af
Outflow =	0.26 cfs @	12.17 hrs,	Volume= 0.023 af, Atten= 32%, Lag= 10.1 min
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs			
Max. Velocity= 0.35 fps, Min. Travel Time= 6.3 min			
Avg. Velocity = 0.13 fps, Avg. Travel Time= 16.4 min			
Peak Storage= 99 cf @ 12.06 hrs			
Average Depth at Peak Storage= 0.17'			
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 27.77 cfs			
4.00' x 2.00' deep channel, n= 0.150			
Side Slope Z-value= 3.0 'r Top Width= 16.00'			
Length= 130.0' Slope= 0.0154 'r			
Inlet Invert= 10.00', Outlet Invert= 8.00'			

**Figure 17: Reach summary sheet showing the conformance with the required elements of a Pre-Treatment Swale. Items highlighted are representative of required design elements, however may require other storm event modeling in addition to the WQ storm event.**

## Part 6: Plan Sheet Guidance

Site plans and maps shall be drawn at an appropriate scale to clearly depict stormwater management design and details. Plans should be in a single separate pdf called "Attachment 5: Plans". They should be in the following order: Existing condition, proposed condition, construction details.

All plan sheets must include:

1. Legend
2. Scale bar
3. North arrow
4. Site boundary
5. Labeled discharge points and points of interest (if applicable)
6. Labeled locations of STPs including Pre-Treatment Practices

7. Subcatchment boundaries and labels that correspond with subcatchment/reach/pond names in the runoff modeling
8. Delineation of impervious types including new impervious, treated existing impervious, untreated existing impervious and redeveloped impervious
9. Time of concentration information for each subcatchment (average catchment slope (Y) and hydraulic length (*l*))
10. Dated plans including current revision dates (as applicable)

- **Existing conditions site plan:** Depict all existing features and existing condition subwatershed delineations and time of concentration information utilized in modeling, and shall depict discharge points and points of interest (if applicable). This plan sheet may include an overlay of the soil series and hydrologic soil groups. Infiltration evaluation and testing locations may be identified on this plan sheet or other site plans.
- **Proposed conditions site plans:** Identify existing impervious, redeveloped impervious, removed impervious, and new (expanded) impervious clearly in the legend. Label Discharge Points (and POIs) and all STPs and Pre-Treatment Practices that are utilized for treatment, including disconnection areas. Proposed conditions plans shall also depict post-development subwatershed delineations and time of concentration information utilized in modeling. Identify access points for maintenance of STPs where necessary. Identify areas that are subject to the Post-Construction Soil Depth and Quality Standard, including areas that will remain undisturbed and protected from compaction during construction, and verification testing locations. Multiple plan sheets may be necessary to provide the required information.
- **Detail sheet:** Include all applicable STPs for the project, including Pre-Treatment Practices, and disconnection details (if applicable) demonstrating adherence to the required design criteria including; pond cross sections, outlet structures with orifice placement, barrel dimension, and all applicable design details. Also include typical details when and where practices requiring specific criteria will be utilized to meet applicable treatment standards. Methods proposed for compliance with the Post-Construction Soil Depth and Quality Standard, along with notes for contractor shall be included as applicable. The detail sheet shall also include construction notes regarding phasing and routing of stormwater to sensitive practices such as infiltration practices prior to their completion.
- **Annotated Maintenance Plan:** Include a plan sheet identifying all STPs, including pre-treatment practices and disconnection areas, that are included in the stormwater treatment system design. For each practice, identify maintenance activities that should be regularly performed and specific conditions that indicate that maintenance is needed. This plan is to aid the permittee in maintaining their stormwater practices and performing annual inspections, and should be organized with them in mind.
- Other plan sheets may be included if they are applicable to stormwater management.

## Part 7: Sediment Offset Calculation Guidance

This guidance is offered in addition to the information provided in 10 V.S.A. §1264, and Appendices A and B of Chapter 22: Stormwater Management Rule for Stormwater-Impaired Waters. A new discharge or the expanded portion of an existing discharge must meet the requirements of the Vermont Stormwater Management Manual and must not increase the sediment load in the receiving stormwater-impaired water. In cases where a project will result in an increase, a sediment offset may be required. An existing discharge, including for redevelopment must show no increase in sediment load over the existing condition. The individual discharge permits in conjunction with permitted offset projects in stormwater-impaired watersheds will result in the statutorily established no increase in sediment load to stormwater-impaired waters. No increase in sediment load can be established through on-site treatment, an on-site or off-site offset project, or through payment of a stormwater impact fee, as stated in Appendix B of Chapter 22, when sediment capacity is available under an existing permitted stormwater offset project. If your project falls within the watershed of one of the [Stormwater-Impaired Waters](#) listed on the 303(d) list, please contact your [District Analyst](#) to determine if an offset is necessary, and if applicable, whether capacity is available in an existing permitted offset project. Projects that discharge to stormwater-impaired waters with an EPA-approved TMDL may not be required to provide a sediment offset, and designers are urged to contact the Stormwater Program for applicable requirements for a particular stormwater-impaired watershed.

If all runoff from the site can be infiltrated into the ground up to the 1-year, 24-hour storm, no offset will be required, and the no increase in sediment load will be considered met. Guidance on the calculation of sediment loading for pre- and post-development conditions is provided below.

### 7.1 Simple Method Calculations

The Simple Method is used to estimate sediment loading from stormwater runoff for urban and developing areas. Results of the sediment loading calculations show the net increase or decrease in sediment loading over pre-development or existing conditions and are used to determine the total sediment load that must be offset.

The Stormwater Program has made available a spreadsheet for the purpose of calculation of sediment loading which can be found here with other application materials:

<http://dec.vermont.gov/watershed/stormwater/permit-information-applications-fees/operational-stormwater-discharge-permit-application-materials>. Specify each land use type and the pollutant concentration (C) value you chose to represent that use. Be sure to include a reference for where the C value was obtained and a reference for where the annual precipitation information was obtained. To the extent possible, specify uniform land use areas with individual C values as they will generate more accurate loading calculations. For example, identify the amount of parking, roads, lawns and rooftop along with their individual C values rather than using one C value for commercial or residential development. Include in the calculations what if any margin of safety was considered in the calculation. Designers are advised to consult with Stormwater Program staff on any questions related to characterization of existing or pre-development land use ahead of permit application submittal.

Chapter 8 of the New Hampshire Stormwater Manual provides a good technical reference for sediment loading calculations, including pollutant concentration values. [http://des.nh.gov/organization/divisions/water/stormwater/documents/wd-08-20a\\_ch8.pdf](http://des.nh.gov/organization/divisions/water/stormwater/documents/wd-08-20a_ch8.pdf). This provides background on the simple method calculations and how they should be used in estimating sediment loads from pre- and post-development conditions.

The final simple method calculations must identify between the pre- and post-development loading as well as call out the margin of safety used. Write a short summary of your findings in the Narrative document under a new heading called Sediment Offset Calculations. After calculating pre and post development loads, please include the following information on a sediment offset calculation sheet:

- Annual Pre-Development Sediment Load: \_\_\_\_\_ lbs.
- Annual Post-Development Sediment Load: \_\_\_\_\_ lbs.
- Post-Development Load Including Proposed Stormwater Treatment Practices (80% reduction in TSS for areas meeting Water Quality Treatment Standard): \_\_\_\_\_ lbs.
- Margin of Safety \_\_\_\_\_
- Net Change in Annual Sediment Load: \_\_\_\_\_ lbs.
- Percent Change: \_\_\_\_\_%

If runoff from the site can be infiltrated into up to the 1-year, 24-hour storm, that portion of the site can apply a 100% reduction in sediment loading rather than 80% that is assigned for non-infiltrating stormwater treatment practices.

## 7.2 Stormwater Impact Fee Calculations

If you choose to meet the offset requirement by paying a stormwater impact fee rather than providing an on-site or off-site stormwater offset project, you must first check with the [District Analyst](#) to make sure that there is available offset capacity within the same stormwater-impaired water as the project. Some of the stormwater-impaired watersheds have established offset projects that have available sediment offset capacity that can be purchased. If there is available capacity in a particular offset project within the same stormwater-impaired watershed, and the proposed project design meets the following standards set forth in the VSMM (Water Quality, Groundwater Recharge and Channel Protection), a stormwater impact fee for sediment offset capacity may be calculated as follows:

$$\text{Area of proposed impervious in acres} \times \$6,000 \text{ per acre} = \$ \text{ Total Stormwater Impact Fee}$$

This calculation must be included in the Narrative. The applicant may wait to submit the stormwater impact fee until technical review is complete, however the stormwater impact fee must be paid before a final permit can be issued. Stormwater impact fees for projects that do not meet the specified standards may be greater as set forth in Chapter 22: Stormwater Management Rule for Stormwater-Impaired Waters, Appendix B.

# Appendix 1: Public Transportation Projects

## A.1.1. Public Transportation Projects Application Format

The 2017 VSMM defines a *Public Transportation Project* as 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. Subchapter 6.0 of the 2017 VSMM categorizes three types of Public Transportation Projects, each for which application requirements and format will vary to some degree. These types include Redevelopment – Major Maintenance (Section 6.1.1.), Redevelopment with Expansion (Section 6.1.2.), and New Construction (Section 6.1.3.).

Like applications for other project types, a complete application is comprised of all the applicable application materials and a check or other form of payment for the applicable administrative review and application review fees. Similarly, these materials should be organized like other applications into 6 separate documents, saved individually as PDFs or spreadsheets. In some cases, certain types of Public Transportation Projects may not require modeling, or other materials, which will be dependent on the specific project design and applicable design criteria and requirements found in Subchapter 6.0, based on site and project specific conditions. For more specific detail on preparation of certain application materials, designers are encouraged to review this entire document.

A check shall be included for applicable application fees. Checks should be made payable to the State of Vermont. Do not include a copy of the check on the CD/DVD. For projects which are programmed by the Vermont Agency of Transportation (VTrans) that have an active EA (expenditure account), a check should not be provided but rather the VTrans Environmental Services will coordinate an interagency transfer between VTrans and the VT DEC Financial Operations office.

Note: Please do not combine all of the application materials into a single file. Use the referenced format and file naming convention noted below.

A CD/DVD containing the complete application package can be sent to the following address:

DEC- Watershed Management Division  
Stormwater Management Program  
1 National Life Drive, Main 2  
Montpelier, VT 05620-3522

### Redevelopment – Major Maintenance

1. NOI
2. Attachment 1 - Narrative
3. Attachment 2 - Workbooks
4. Attachment 3 - Worksheets
5. Attachment 4 - Modeling
6. Attachment 5 - Plans

Each of the above referenced files should contain the following materials:

1. NOI

- A signed Notice of Intent. The most current version can be downloaded from the Stormwater Program website. The applicant(s) and the application preparer should sign the form electronically before sending the final version. To sign the document, please use the Adobe “Sign” tool to place a signature in the signature block. They may choose from the options under “Place Signature” to either “Type My Signature”, “Draw my Signature” or “Use an Image.” If one has never signed electronically, further help can be found on the [Adobe help site](#).

2. Attachment 1 - Narrative

- The project narrative – prepared in accordance with Narrative Template which may be adapted accordingly for Public Transportation Projects and applicable requirements.
- Location map – showing the outline of the site, the discharge point(s) and the location of the receiving water(s) on a topographical map.
- Soils map – prepared from the [NRCS online Web Soil Survey](#) or the soils data may be overlaid on the existing conditions plan sheet or other plan sheet.

3. Attachment 2 - Workbooks

- Public Transportation Workbook
  - i. Project Classification Tool
  - ii. Design Worksheet 6.1.1. tab, completed project-wide.
- STP Selection Tool
  - i. The STP Selection Tool will be completed for Redevelopment – Major Maintenance projects that are incorporating STPs where practicable, per the requirements of Subchapter 6.0.
- Written justification for the use of Tier 3 Practices (if applicable)

4. Attachment 3 - Worksheets

- Post-Construction Soil Depth and Quality Worksheet
- STP Worksheets for each STP (if applicable)

Where applicable, STP Worksheets should be organized by discharge point. Include section breaks between discharge points.

5. Attachment 4 - Modeling

- If applicable, hydrologic modeling should be included for all pertinent rainfall events. See the Modeling section of this document for specific instructions. Modeling may not be required in all cases for Redevelopment – Major Maintenance projects, particularly in cases where additional STPs are not practicable or where STPs are volumetrically sized based on Water Quality volume (WQ<sub>v</sub>) only.

6. Attachment 5 - Plans

- Complete plan set including existing condition site plan, proposed condition site plan, detail sheet for all proposed STPs, and any proposed practices or site modifications that

will be used to improve pre-existing stormwater runoff conditions, including notes as applicable. An annotated maintenance plan will be required for projects that are not subject to other routine inspection maintenance schedule as part of required transportation infrastructure oversight, specifically through MS4 or TS4 permit conditions.

## **Redevelopment with Expansion**

1. NOI
2. Attachment 1 - Narrative
3. Attachment 2 - Workbooks
4. Attachment 3 - Worksheets
5. Attachment 4 - Modeling
6. Attachment 5 - Plans

Each of the above referenced files should contain the following materials:

1. NOI
  - A signed Notice of Intent. The most current version can be downloaded from the Stormwater Program website. The applicant(s) and the application preparer should sign the form electronically before sending the final version. To sign the document, please use the Adobe “Sign” tool to place a signature in the signature block. They may choose from the options under “Place Signature” to either “Type My Signature”, “Draw my Signature” or “Use an Image.” If one has never signed electronically, further help can be found on the [Adobe help site](#).
2. Attachment 1 - Narrative
  - The project narrative – prepared in accordance with Narrative Template which may be adapted accordingly for Public Transportation Projects and applicable requirements.
  - Location map – showing the outline of the site, the discharge point(s) and the location of the receiving water(s) on a topographical map.
  - Soils map – prepared from the [NRCS online Web Soil Survey](#) or the soils data may be overlaid on the existing conditions plan sheet or other plan sheet.
3. Attachment 2 - Workbooks
  - Public Transportation Workbook
    - i. Project Classification Tool
    - ii. Design Worksheet 6.1.2., each tab completed individually for each point of interest/discharge point on the project.
  - STP Selection Tool
    - i. The STP Selection Tool will be completed for Redevelopment with Expansion project individually for each discharge point/point of interest that will include STPs for meeting the applicable Treatment Standards, per the requirements of Subchapter 6.0.
  - Standards Compliance Workbook

- i. The Standards Compliance Workbook will be completed for Redevelopment with Expansion projects where the net increase in impervious surface exceeds 1 acre discharging to any one receiving water, per the requirements of Subchapter 6.0.
  - Written justification for the use of Tier 3 Practices (if applicable)
4. Attachment 3 - Worksheets
    - Post-Construction Soil Depth and Quality Worksheet
    - STP Worksheets for each STP

STP Worksheets should be organized by discharge point. Include section breaks between discharge points.

5. Attachment 4 - Modeling
  - If applicable, hydrologic modeling should be included for all pertinent rainfall events. See the Modeling section of this document for specific instructions. Modeling may not be required in all cases for Redevelopment with Expansion projects, particularly in cases where STPs are volumetrically sized based on Water Quality volume (WQ<sub>v</sub>) only.
6. Attachment 5 - Plans
  - Complete plan set including existing condition site plan, proposed condition site plan, detail sheet for all proposed STPs, and any proposed practices or site modifications that will be used to improve pre-existing stormwater runoff conditions, including notes as applicable. An annotated maintenance plan will be required for projects that are not subject to other routine inspection maintenance schedule as part of required transportation infrastructure oversight, as would be included specifically through MS4 or TS4 permit conditions.

## **New Construction**

Public Transportation Projects that are considered to be New Construction, per Subchapter 6.1.3. of the 2017 VSMM, are subject to the full suite of stormwater treatment standards, as applicable, set forth in Subchapter 2.0 of 2017 VSMM.

For Public Transportation Projects that are considered to be New Construction designers shall refer to Part 1.1 of this document for applicable format and required application materials.

### **A.1.2. Public Transportation Workbook**

The Public Transportation Workbook is designed to guide designers of these specific types of project through the applicable Standards in the 2017 Vermont Stormwater Management Manual, in consideration of the type of Public Transportation Project, specifically applicable for Redevelopment – Major Maintenance and Redevelopment with Expansion. Public Transportation Projects that are categorized as New Construction do not complete this workbook and must follow the standard application instructions at the front of this document. In cases where a Public Transportation Project involves a net increase in impervious surface of 1 acre or more to any one receiving water, the Standards Compliance Workbook will also be required for completion for full assessment of applicable Standards.

For designers familiar with stormwater permit application submittal under the workbooks replace the need for Schedule A's, WQ<sub>v</sub> and Re<sub>v</sub> worksheets. Designers should ensure that the information provided in the workbook is consistent with the impervious surface included for permit coverage on the NOI and the STP Worksheets, where applicable.

The workbook is comprised of a Project Classification Tool tab and Design Worksheets 6.1.1. and 6.1.2.

The Project Classification Tool in the workbook will summarize project site impervious surfaces, including existing, redeveloped, and new/expansion and explicitly ensures that projects utilizing the workbook are Public Transportation Projects as defined in the 2017 VSMM and will allow the designer to classify the type of project; Redevelopment – Major Maintenance, Redevelopment with Expansion, or New Construction. The Project Classification Tool will then instruct the designer to complete the applicable Design Worksheet, either 6.1.1. or 6.1.2., when applicable, and as necessary the respective Justification tabs, 6.1.1. and 6.1.2.

The workbook contains fields that are to be completed by the designer, fields that will auto-populate or provide instructions based on designer-entered information, as well as optional fields that may be completed by the designer when applicable. Some fields may also be shaded in gray in response to answers to identify these fields as not applicable based on designer-entered information.

In addition to the Project Classification Tool, **Redevelopment – Major Maintenance** projects will be required to complete Design Worksheet 6.1.1. and Justification 6.1.1. For these projects, the Design Worksheet 6.1.1. is completed once, collectively for the entire project inclusive of all discharge points.

In addition to the Project Classification Tool, **Redevelopment with Expansion** projects will be required to complete Design Worksheet 6.1.2. and Justification 6.1.2. If the project will result in 1 acre or more of net expansion to any one receiving water, the designer must also complete the Standards Compliance Workbook that is explained in more detail in Part 3 of this document.

## Discharge Points

A **discharge point** is defined as the location where stormwater runoff from the site first encounters Waters of the State. **Waters** means all rivers, streams, creeks, brooks, reservoirs, ponds, lakes, springs, and all bodies of surface waters, artificial or natural, which are contained within, flow through, or border upon the state of Vermont or any portion of it. Wetlands, which are in most cases surface waters, are often identified as an unnamed tributary to “first-named” waters of the State.

When discharge points are located far from the site boundary, applicants may use points of interest (POIs) as locations where compliance is demonstrated. A POI is a location where flow discharges from the site, but that can be well upslope of the discharge point (Waters of the State). In general, if compliance with the treatment standards is demonstrated at a site boundary POI, then compliance will be assumed at the actual discharge point. A designer may utilize the discharge point tabs in the workbooks (SN1, SN2, etc.) for information specific to a POI.

## Site

For Public Transportation Projects, the site typically extends from either end of the project and is inclusive of all areas in between and within the right-of-way, but excluding any resurfacing areas or areas limited to paving or crack-sealing, routine maintenance, that may lead up to the project reconstruction or expansion area. **Site** is defined as either the drainage area that includes all portions of a project contributing stormwater runoff to one or more discharge points, or the area that includes all portions of disturbed area within a project contributing stormwater runoff to one or more discharge points. The choice of either of these two methods of calculating the site area shall be at the discretion of the designer. In cases where there are multiple discharges to one or more waters, “site” shall mean the total area of the sub-watersheds. For linear projects, including public transportation projects, the term “site” includes the entire right-of-way within the limits of the proposed work, or all portions of disturbed area within the right-of-way associated with the project. The method of calculating the site area for public transportation projects shall be at the discretion of the designer. Calculations of a site are subject to the Secretary’s review.

## **Appendix 2: Amendments to Existing Stormwater Discharge Permits**

Projects that propose modification or expansion of previously permitted impervious surfaces will often require a permit amendment. In advance of application submittal, designers are encouraged to discuss with Stormwater Program staff whether an amendment to the existing permit is the most efficient and acceptable path forward. The degree and type of change may affect the applicable application review fee, whether the change is subject to the 2002 VSMM or the 2017 VSMM, Designers must submit a complete application that is representative of the entire project site, including application materials pertaining to the new or amended portions of the project as well as areas of the project that remain unchanged. This requirement is to ensure a complete permit record is maintained in DEC records going forward.

**Designers are urged to contact District Staff prior to considering an amended project design under the 2002 VSMM design standards.**

### **Common Plans of Development**

When an application proposed to expand impervious associated with a previously permitted common plan of development, an amendment application is required if the new impervious will utilize a previously permitted treatment system. If the expansion will be treated separately, then the applicant may choose to apply for a new permit that only covers the new impervious and associated treatment. The total resulting impervious from the entire common plan may still affect the jurisdictional thresholds and waiver applicability, even if new site areas is covered under a separate permit from the previously permitted. Designers are urged to contact [District Staff](#) prior to considering an amended project design under the 2002 VSMM design standards.

### **A.2.1. Water Quality Practice Selection – Use of Existing Stormwater Treatment Practices**

Designers must refer to the 2017 VSMM, Section 2.2.4.1. when considering what practices will be used to meet the applicable Water Quality Treatment Standard (WQTS). Designers must first consider the use of higher performing practices, starting with Tier 1 Practices, prior to considering use of a Tier 2, or Tier 3 Practice which may be a pre-existing and previously permitted STP on the site. In addition, 2002 VSMM stormwater treatment practices (STPs) that are no longer considered acceptable STPs in the 2017 VSMM, such as grass channels and wet swales, would not be eligible for use under the 2017 VSMM to meet the WQTS. Use of an existing 2002 VSMM STP may require written justification as part of an amendment application, similar to new permit applications.

### **A.2.2. Application Format – Amendments to Existing Stormwater Discharge Permits**

Like standard applications, a complete application is comprised of all the applicable application materials and a check for the applicable administrative review and application review fees. An amendment application often only affects a portion of the project site, in which case new materials and

forms need only be submitted for those portions of the project that are being revised under the amendment. All previously permitted materials that are not changing must be packaged separately and included as a separate attachment. This ensures that the Department will have a complete permit record for the amended application. In some cases, these additional materials may have been initially prepared and submitted by a different designer, and thus this separate attachment distinguishes the materials from the current designer that may only be preparing and certifying the amended or updated materials applicable to the most recent project or design change. In advance of amendment application submittal, the designer may contact the Stormwater Program to request an electronic copy of the previously authorized application materials and any additional information as necessary.

A check shall be included for applicable application fees. Checks should be made payable to the State of Vermont. Do not include a copy of the check on the CD/DVD. The degree and type of change may also affect the applicable application review fee. Typically, any increase in impervious or change to treatment or discharge for specified impervious area will be subject to application review fee, but otherwise previously permitted surfaces would not typically be subject to new application review fee when the previously issued permit remains valid. Designers are encouraged to contact Stormwater Program district staff with any questions regarding application review fees.

Note: Please do not combine all the application materials into a single file. Use the referenced format and file naming convention noted below.

A CD/DVD containing the complete application package can be sent to the following address:

DEC- Watershed Management Division  
Stormwater Management Program  
1 National Life Drive, Main 2  
Montpelier, VT 05620-3522

## **Amendment Application Format**

1. NOI
2. Attachment 1 - Narrative
3. Attachment 2 - Workbooks
4. Attachment 3 - Worksheets
5. Attachment 4 - Modeling
6. Attachment 5 - Plans
7. Attachment 6 - Previously Permitted Materials

Each of the above referenced files should contain the following materials. Current versions of all applications forms can be downloaded from the Stormwater Program website:

1. NOI:
  - The applicant(s) and the application preparer should sign the form electronically before sending the final version. To sign the document, please use the Adobe “Sign” tool to

place a signature in the signature block. They may choose from the options under “Place Signature” to either “Type My Signature”, “Draw my Signature” or “Use an Image.” If one has never signed electronically, further help can be found on the [Adobe help site](#).

- The designer must identify on the NOI that the application is an amendment to a previously issued permit and describe the amendment in the field provided.
- Designers shall also include the written manner of discharge for the amended discharge point(s) and for all previously permitted discharge points, which can be copied from the previously issued stormwater discharge permit.
- Designers shall also specify the complete plan set to be referenced for both new and previously authorized plans that remain applicable to the project site.
- The amount of previously permitted impervious surface listed on the NOI that will remain permitted in the amended authorization shall match the amount specified on the previously issued permit, which in many cases will be listed on the previously issued permit or can be found using the Department’s Environmental Research Tool: <https://anrweb.vt.gov/DEC/ERT/StormWater.aspx>. In no case should the existing previously permitted impervious surface amount exceed the amount listed in the previously issued permit.

## 2. Attachment 1: Narrative

- The project narrative – prepared in accordance with Narrative Template which may be adapted accordingly to highlight the reason for the amendment application.
- Location map – showing the outline of the site, the discharge point(s) and the location of the receiving water(s) on a topographical map. The location map shall include both existing, new, and amended discharge point information.
- Soils map – prepared from the [NRCS online Web Soil Survey](#) or the soils data may be overlaid on the existing conditions plan sheet or other plan sheet. The amendment application may rely on previously submitted materials for areas of the project site that will remain unchanged from previously permitted conditions.

## 3. Attachment 2: Workbooks

- STP Selection Tool – only required for those discharge points or points of interest that are changing under the current amendment application.
- Standards Compliance Workbook - only required for those discharge points or points of interest that are changing under the current amendment application.
- Written justification for the use of Tier 3 Practices (if applicable).

## 4. Attachment 3: Worksheets

- Post-Construction Soil Depth and Quality Worksheet
- STP Worksheets for each STP – only those STPs that are being revised or added under the current application are required in Attachment 3. STPs that were previously approved and not being altered under the current application can be submitted in Attachment 6.
- Standard Waiver Worksheets (if applicable)

STP Worksheets and Standard Waiver Worksheet should be organized by discharge point in that order. Include section breaks between discharge points.

5. Attachment 4: Modeling

- Hydrologic modeling for all pertinent rainfall events. See the Modeling section of this document for specific instructions.

6. Attachment 5: Plans

- Complete plan set including existing condition site plan, proposed condition site plan, detail sheet for all proposed STPs, and an annotated maintenance plan including notes as applicable.

7. Attachment 6: Previously Permitted Materials

- Complete submittal of any previously submitted application materials that are unaffected by the current project. These may be submitted in the same order or organizational structure as provided to the designer by the Stormwater Program, saved as a single PDF.

## Appendix 3: ANR Online Instructions for Compliance Report Submittals

The following instructions should help you through the process of submitting your Stormwater Permit Compliance Forms. This includes the Designer's Initial Statement of Compliance, Designer's Restatement of Compliance, and Annual Inspection Report. The online submittal system, ANR Online, can be accessed at <https://anronline.vermont.gov>.

If you have any questions related to completing the compliance forms, please contact the Stormwater Program at [anr.wsmdstormwatergeneral@vermont.gov](mailto:anr.wsmdstormwatergeneral@vermont.gov) or 802-490-6110. If you have questions or issues related to the ANR Online system, please contact the ANR Online support staff at [ANR.OnlineServices@vermont.gov](mailto:ANR.OnlineServices@vermont.gov).

### Creating a User Account

In order to access forms in ANR Online (<https://anronline.vermont.gov>), you need to have an account in the website. The first time you use ANR Online you will need to register to create an account. Follow these steps to create an account:

1. Click the **Register** button in the top menu bar.



2. The **Create User Profile** page will open, complete the user profile form. Fields marked with a red asterisk \* are required. After entering your mailing address, click the **Validate Address** button and then click the **Save** button. If the address validation fails you can still click the **Save** button to create your account.
3. Once you save your User Profile, the system will send you an email that includes a link. You need to click that link to activate your account. If after a few minutes you have not received the email, check your junk mail folder. If the message is not there, contact the ANR Online Administrator at [ANR.OnlineServices@vermont.gov](mailto:ANR.OnlineServices@vermont.gov).

### Signing In

Once you have activated your account you can Sign In. To sign in to ANR Online:

1. Click the **Sign In** button in the top menu bar.



2. In the Sign In window, enter your User ID (this is your account email address) and your password (the password you entered when creating your account) and click the OK button.

## Finding and Completing a Stormwater Compliance Form

### Finding the Form

Once you sign in, the easiest way to find the form you want to complete is to use the site's **Form Finder** tool. To use the Form Finder:

1. Click the **Finder** button in the top menu bar.



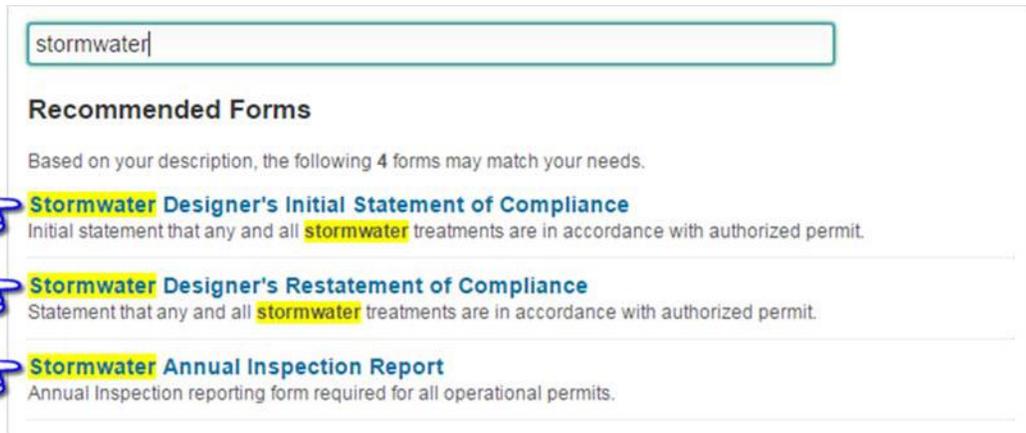
2. Enter the name of the form if you know it. Otherwise, enter a word or phrase that describes the topic associated with the form (i.e. stormwater). The system will begin trying to find a match for what you type after you have entered the third character.

### Form Search

Looking for a form? Please enter the name of the form below.

Don't know the name of the form? Not a problem. Please tell us about the type of activity you need to perform and we will recommend the form which may need to be submitted.

A list of recommended forms will be displayed below the search box under Recommended Forms. Click the link to the form you want to complete.



3. Clicking the blue link will take you to the form's landing page.
4. Another way to access Stormwater forms is to visit the Stormwater Program page in ANR Online. All of the Stormwater Program forms that are currently available for online submittal will be listed at the bottom of this page:

[https://anronline.vermont.gov/home?OrganizationCode=WSMD\\_SW](https://anronline.vermont.gov/home?OrganizationCode=WSMD_SW)

## Completing a Form

When you click a link to access one of the Stormwater compliance forms, you will be taken to the form's landing page. This page includes general information/instructions for the form and contact information for the Stormwater Program.

To access the form and begin filling it out, scroll down to the bottom of the page and enter your Permit Number (in the format described below) and then click the **Begin Form Entry** button. The form will open and will include some prefilled information based on the Permit Number you entered. Your permit number will be indicated at the top of your issued permit. If you do not know what your permit number is, refer to the Environmental Research Tool at <https://anrweb.vt.gov/DEC/ERT/StormWater.aspx> to find it.

**NOTE:** Verify that the permit information displayed is for your permit before continuing to complete the form.

Please enter your Permit Number (the permit number will be formatted similar to this ####-XXXX and may or may not be followed by a period and a series of letters/numbers. For example, 3125-9015; 4646-INDS; 5577-INDS.AR; 3380-9010.T; 7412-9015.1)

 3685-9010

## Form Layout and Navigation

Forms in ANR Online are divided into three areas. Those are the Form Header, the Form Section List/Navigation, and the Data Entry area as shown in the figure below.

The screenshot shows a web form interface. At the top is the 'Form Header' containing the title 'Stormwater Designer's Initial Statement of Compliance', revision information 'Revision 1 v1.0 HN5-2V6X-W6E3H 5/24/2017', a gear icon, and a 'SAVE PROGRESS' button. On the left is the 'Form Section List/Navigation' with a vertical list: 'Initial Statement of Compliance' (selected), 'Review', and 'Certify & Submit'. The main area is the 'Form Data Entry Area' titled 'Initial Statement of Compliance', which contains fields for Permit Number (3125-9015), Permit Name (Okemo North Mountain Ski Area Chairlift Replacement and Storage building on the Mountain Road in Ludlow), Permit Location (77-845 Okemo Ridge Road, Moon Shadow Rd., Day Break Rd.), Permit Status (Issued), Designer's Name (text input), and Title (text input).

## Form Header

The **Form Header** includes the following items:



1. The name of the submission (by default this is the form name, you can change this to anything you want, see Renaming Your Submissions below).
2. The revision number of the submission you are currently working on. Forms that you have submitted in ANR Online can be revised and resubmitted if you need to make a change after you submit your form. The first submission is identified as “Revision 1”, subsequent revisions will have the same “Submission Number” (see item 4 below) but will be identified as “Revision 2”, “Revision 3”, etc.
3. The current published version of the form you are filling out. This number will change over time as ANR makes changes to the form and publish updated versions.
4. The unique Submission Number the ANR Online system generates for each new

submission created. This number is often used as a reference to identify a specific submission in the ANR Online system. As mentioned in item 2 above, the Submission Number will not change if you create a revision to a previous submission.

5. The date the submission was created.
6. The Tools menu. There are currently two functions that you can access by clicking this button; you can use the “Delete Draft” function to delete the submission you are currently working on and you can use the “Manage Shared Access” feature to share the submission with other users of ANR Online.
7. Clicking the “Save Progress” button will save the current state of your submission in case you need to leave it before its complete and return to it at a later time. The system also saves your work automatically as you move through the form. An indication of when your work was last saved will be displayed in text above the button.

## Form Section List/Navigation

The **Form Section List/Navigation** area (left column) lists all of the sections and steps included in the form completion and submission process. You can use this area to move to the different sections or steps in the form by just clicking on the one you want to move to. The example on the right includes the following sections and steps:



1. This form includes only one section and that section is titled “Initial Statement of Compliance”.
2. “Review” is not a section, it is a step in the submission process. Most, but not all, ANR Online forms include this review step. It is provided as an opportunity to review all of the information you entered in all of a form’s sections on a single screen before proceeding to the Certify & Submit step.
3. The “Certify & Submit” step is the final step in the process and is where you actually submit the form.

The **Form Section List/Navigation** area also will indicate of whether all of the required fields have been completed. When you leave a section, if there are required fields that are missing data, the section title will turn red and there will be a red circle with an “X” in it displayed. Once you return to that section and fill in the missing data, the section title will turn green and a check will be displayed indicating the all required fields are complete.



## Form Data Entry Area

The **Form Data Entry** area is where you will be entering your data. Depending on the form you are filling out, some of the data on the form may be prefilled for you. This data may be editable or it may be read-only. Any required fields in a section will be marked with this  symbol in the left corner of the field. You must complete all fields before being able to submit the form. You will know when these sections are complete by seeing a green check, as mentioned above. In addition to being able to navigate through the sections/steps of the form using the form section list/navigation area, there are also buttons at the bottom and top of each section that you can click to move to the next or previous section/step of the form. Those buttons look like this:



Once you finish entering data in all of the form's sections you will move to the **Review** step. Review the information that you have entered in the form. If you need to make any changes, use the **Previous Section** button or the **Form Section List/Navigation** area to move back to the section/field you need to change, otherwise, proceed to the **Certify & Submit** step. Once in the **Certify & Submit** step, if you are ready to submit the form, click the **Submit Form** button. If you are not ready to submit the form, click the **Save and Exit** button and your work will be saved to work on later.



Once you click the **Submit Form** button you will be taken to a submission confirmation/receipt page. It is recommended that you click the Print Receipt button to either print or save a copy of this confirmation page for your records.

## Stormwater Designer's Initial Statement of Compliance

version 1.0

(Submission #: HN5-7E4Y-V54XC, revision 1) **1**

### Thank you for your submission!

Your submission has successfully been submitted. A confirmation message has been issued to you at [greg.lutchko@vermont.gov](mailto:greg.lutchko@vermont.gov). We recommend that you retain a copy of your receipt for this transaction by using the [Print Receipt](#) function.

### RECEIPT

Submission # HN5-7E4Y-V54XC **2**

Submitted on 5/30/2017 1:34 PM **3**

Thank you for your submission!

[Print Receipt](#) **4**

The submission confirmation/receipt page includes the following information:

1. The unique Submission # for the submission, including the revision number.
2. The unique Submission # (without the revision number).
3. The date and time of submission.
4. A button to print the receipt.

## Managing Your Submissions

### Submission History

All of your draft and completed submissions are available in your History. To access your History, **Sign In** to ANR Online and then click on the **History** button in the top menu bar. The History includes the following items and features:

### Submission History

Total records: 336 Showing 336 (filtered from total records)

1 Submission #	2 Alternate ID	3 Created	4 Submitted	5 Submission Name	6 Status	7 Locked	8 Actions
HN5-7K35-X4XST		05/30/2017 04:16 PM		Stormwater Annual Inspection Report	Draft	No	  
HN5-7J9Y-3XEHS	3125-9015	05/30/2017 03:31 PM	05/30/2017 04:16 PM	My Initial Compliance Statement	Submitted	No	

9 Filter:

1. The Submission # column displays the unique submission identifier assigned by the system.
2. The Alternate ID column displays a value that can be used to identify your submission. For the Stormwater Compliance forms this value is your Permit Number. This value is only displayed after the form is submitted.
3. The date and time the submission was created.
4. The date and time the submission was submitted.
5. The name of the submission (this can be changed, see Renaming Your Submissions below).
6. The current Status of your submission in the system. This status will change as your submission is processed.
7. The Locked status of your submission. We sometimes lock a submission to prevent the submitter from making changes to it while we are reviewing it.
8. The Actions column may contain as many as three buttons depending on the current status of the submission. While your submission has a Status of “Draft”, there are three buttons available, **View**, **Edit**, and **Remove**. Once its submitted there will only be a **View** button.
9. The Filter feature can be used to filter the submissions displayed in your History list. You can filter on any of the information displayed in the History table.

## Renaming Your Submissions

By default, the system gives your submission the same name as the form you are filling out. It’s helpful to give your submission a more specific name so you can more easily distinguish it from other submissions in your list, especially as the number of submissions in your list grows. To change the name of a submission, follow these steps:

1. Go to your History.
2. Find the submission you want to change the name of in your History list.
3. Click on the Submission Name for the submission, that will turn it into an editable field.

Submission #	Alternate ID	Created	Submitted	Submission Name	Status	Locked	Actions
HN5-7J9Y-3XEHS		05/30/2017 03:31 PM		Stormwater De	Draft	No	  



4. Type the new name for the submission.
5. Click outside of the Submission Name field and the new name will be saved.
- 6.

### Editing a Draft Submission

The system allows you to partially complete a submission and return to it at a later time to complete and submit it. To return to a previously started submission:

1. Go to your History.
2. Find the submission you want to edit and click the **Edit** button, the one that looks like a pencil.

HN5-7K35-X4XST		05/30/2017 04:16 PM		Stormwater Annual Inspection Report	Draft	No	  
----------------	--	---------------------	--	-------------------------------------	-------	----	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------



### Revising and Resubmitting

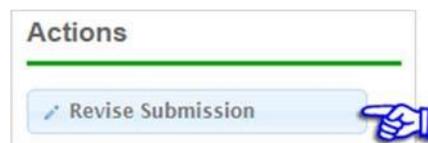
If you need to make changes to something you have already submitted, the system has a Revise Submission feature that is used to do that. To revise a submission:

1. Go to your History.
2. Find the submission you want to revise and resubmit.
3. Click on the **View** button, the one that looks like a magnifying glass, in the Actions column for the submission.

HN5-7J9Y-3XEHS	3125-9015	05/30/2017 03:31 PM	05/30/2017 04:16 PM	My Initial Compliance Statement	Submitted	No	
----------------	-----------	---------------------	---------------------	---------------------------------	-----------	----	---------------------------------------------------------------------------------------



4. The Submission View page will open. Click on the **Revise Submission** button in the Actions menu on the left.



5. You will be asked to confirm that you want to create a revision, click OK.
6. A revised submission will open. The revision will have the same Submission # as the

original but will have a different revision number. The revision will include all of the data and any attachments you included in the initial submission.

## **Deleting a Draft Submission**

If you want to delete a draft submission that you do not need from your History list:

1. Go to your History.
2. Find the draft submission you want to delete.
3. Click **Remove**, the one that looks like a trash can, in the Actions column right of the submission.