July 8, 2016

Ref: 57762.00

Ms. Helen Carr
Southern Chittenden County District Reviewer
Vermont Department of Environmental Conservation
Watershed Management Division
Main Building - 2nd Floor
One National Life Drive
Montpelier, VT 05620-3522

Mr. Kevin Burke
Environmental Analyst
Vermont Department of Environmental Conservation
Watershed Management Division
Main Building - 2nd Floor
One National Life Drive
Montpelier, VT 05620-3522

RE: Vermont Railway, Inc. Shelburne Transload Facility
Shelburne, Vermont
Multi-Sector General Permit Application

Dear Helen and Kevin:

On behalf of Vermont Railway, Inc. ("VTR"), VHB is submitting this letter and attached Notice of Intent ("NOI") seeking authorization for stormwater discharges associated with industrial activity under the Multi-Sector General permit 3-9003 ("MSGP"). The Shelburne Transload Facility ("Project"), located on Catamount Road in Shelburne, VT, will offload rail-transported bulk rock salt. Once offloaded, this salt will be stored on site in a 140 foot by 360 foot covered salt shed until transferred to over-the-road trucks for local distribution. Salt may also be off-loaded directly from rail cars into over-the-road trucks using a conveyor system installed in the off-loading pit.

A stormwater pollution prevention plan ("SWPPP") has been developed in accordance with the requirements of the MSGP and following coordination and input from representatives of DEC's Stormwater Program. In addition to describing the steps that VTR and its subcontractors will follow to avoid and minimize stormwater pollution, the SWPPP narrative and its appendices identify the structural stormwater treatment practices that have been developed on the site (Appendix A), describes the best management practices ("BMPS") that will be employed to minimize exposure of pollutants to stormwater, provides information about the additional water quality sampling that will be performed both on-site and within the LaPlatte River (Appendix F), presents information regarding the coordination and monitoring that will be conducted for rare, threatened, or

Engineers | Scientists | Planners | Designers

40 IDX Drive, Building 100
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South Burlington, Vermont 05403
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endangered species (Appendix H), and provides details of a chloride loading analysis which has been performed to evaluate the potential impact on water quality within the LaPlatte River (Appendix I).

Following the guidelines set forth in Section 1.4 of the MSGP, VTR is submitting the attached NOI and SWPPP a minimum of 60 days prior to the commencement of operational discharges from the Project.

Please do not hesitate to contact us if you have any questions related to these materials.

Sincerely,

Robert Wildey
Water Resources Consultant

RAW/pwe

Attachments:
1. Notice of Intent
2. SWPPP

cc: David Wulfson, VTR (electronic copy only)

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Vermont Agency of Natural Resources

Notice of Intent (NOI)

for Stormwater Discharges Associated with Industrial Activity under the Vermont Multi-Sector General Permit (MSGP) 3-9003

For Department Use Only

NOI Number:

Submission of this NOI constitutes notice that the entity in Section A intends to be authorized to discharge pollutants to waters of the State from the facility or site identified in Section B under Vermont's Stormwater MSGP. Submission of this NOI also constitutes notice that the party identified in Section A of this form has read, understands, and meets the eligibility conditions of Part 1 of the MSGP; agrees to comply with all applicable terms and conditions of the MSGP; understands that continued authorization under the MSGP is contingent on maintaining eligibility for coverage, and that a Stormwater Pollution Prevention Plan (SWPPP) will be implemented at the facility. In order to be granted coverage, all information required on this form must be provided, including the requirement to prepare and implement a SWPPP as well as payment of the **$680** fee to the State of Vermont.

A. Facility Operator Information

1. Name: Vermont Railway, Inc.

2. Title: _____

3. Mailing Address: Street: One Railway Lane

City: Burlington State: VT Zip Code: 05401

Phone: 802-656-2250 Fax: 802-658-2553 Email: _____

B. Facility/Site Information

1. Facility/Site Name: Shelburne Transload Facility

2. This facility is ☒ New or ☐ Existing

3. Project number for previously authorized stormwater discharge (if applicable): _____-9003

4. Location Address Street: Catamount Road

City: Shelburne County: Chittenden State: VT Zip Code: 05482

Latitude: 44 ° 23 ' 23.7" Longitude: 73 ° 13 ' 43.6" (at or near the center of the facility)

C. Industrial Activity Information

1. List the Standard Industrial Classification (SIC) code(s) that best represents the facility's industrial activity:

a. Primary SIC code: 4011 b. Secondary (if applicable) _____

2. Applicable sector(s) of industrial activity, as designated in Appendix D of the MSGP, that include associated discharges that you seek to have covered under this permit:

☐ Sector A	☐ Sector F	☐ Sector K	☒ Sector P	☐ Sector U	☐ Sector Z
☐ Sector B	☐ Sector G	☐ Sector L	☐ Sector Q	☐ Sector V	☐ Sector AA
☐ Sector C	☐ Sector H	☐ Sector M	☐ Sector R	☐ Sector W	☐ Sector AB
☐ Sector D	☐ Sector I	☐ Sector N	☐ Sector S	☐ Sector X	☐ Sector AC
☐ Sector E	☐ Sector J	☐ Sector O	☐ Sector T	☐ Sector Y	☐ Sector AD

3. For Sector G, H, I and J facilities: Is over 1 acre of new earth disturbance planned at the facility? ☐ Yes ☐ No
If yes, complete the Construction General Permit, 3-9020 Appendix A "Risk Evaluation" and associated erosion control plans and submit these with this NOI.

D. Receiving Water Information Use DEC's Waterbody Identification (WBID) ArcGIS webpage. Go to ArcGIS Explorer located at: http://www.arcgis.com/explorer/. Use the search tool in the upper right hand corner and type "DEC WBID."

1. Name of the facility's receiving water: Shelburne Bay Direct Discharge / VT05-11 (LaPlatte River)

2. Does stormwater from your facility drain to a Municipal Separate Storm Sewer System (MS4)?

☐ Yes ☒ No If yes, name of MS4 operator (state/ city/ or town name): _____

3. Are any of your discharges directly into any segment of an "impaired" water (listed on the State's 303(d) List*)?

☒ Yes ☐ No If yes, list the pollutant causing the impairment: Mercury and *E. coli*

Is the pollutant present in your discharge? ☒ Yes ☐ No Presence of mercury is due to atmospheric deposition; Presence of *E. coli* is due to birds and other wildlife.

Has a TMDL been completed for the pollutant causing the impairment? ☒ Yes ☐ No

4. Are any of your discharges into an Outstanding Resource Water (ORW)? (for new dischargers only)

☐ Yes ☒ No

ORWs include 1) Batten Kill River, Towns of East Dorset and Arlington, 2) Pike's Falls/Ball Mountain, Town of Jamaica, 3) Poultney River, Towns of Poultney and Fair Haven, and 4) Great Falls, Ompompanoosuc River, Town of Thetford.

*See http://www.vtwaterquality.org/stormwater/htm/sw_msgp.htm for the State's 303(d) list and list of ORW segments.

E. Public Notice Requirement

You must provide a copy of this completed NOI form and the "Instructions for Public Comment, Appeals, and Posting the NOI" to the municipal clerk for posting in the municipality in which the discharge is to be located at the time your NOI is submitted to the Secretary. The municipal clerk must post the completed NOI. You must include the date on which the NOI was posted.

Date of Posting at Municipal Office(s): July 8, 2016

Information for the Municipal Clerk regarding posting instructions can be found on Page 3 of this NOI.

F. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I certify that I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Printed Name: David Wolfson

Title: President

Signature: _____ Date: 7/8/16

Submit this completed form with the $680 fee (a $240 administrative processing fee and a $440 application fee) made payable to the State of Vermont:

VT Department of Environmental Conservation
Watershed Management Division, Stormwater Program – MSGP
1 National Life Drive, Main 2
Montpelier, VT 05620-3522

Instructions for Public Comment, Appeals and Posting the NOI

PUBLIC COMMENT

Public comments concerning this Notice of Intent to discharge under General Permit No 3-9003 are invited and must be submitted within 10 days of receipt of this Notice by the Municipal Clerk. Comments should address how the application complies or does not comply with the terms and conditions of General Permit No. 3-9003. A letter of interest should be filed by those persons who elect not to file comments but who wish to be notified if the comment period is extended or reopened for any reason. All written comments received within the time frame described above will be considered by the Department of Environmental Conservation in its final ruling to grant or deny authorization to discharge under General Permit No. 3-9003.

Send written comments to:

VT Department of Environmental Conservation
Watershed Management Division, Stormwater Program – MSGP
1 National Life Drive, Main 2
Montpelier, VT 05620-3522

Please cite the Facility Operator and Facility/Site name in any correspondence.

PUBLIC HEARING REQUEST

During the notice period, any person may submit a written request to this office for a public hearing to consider the proposed permit authorization. The request must state the interest of the party filing such request and the reasons why a hearing is warranted. A hearing will be held if there is a significant public interest (including the filing of requests or petitions for such hearing) in holding such a hearing. If the Secretary determines that useful information and data may be obtained thereby, the Secretary may hold a public hearing any time prior to the issuance of the authorization. Notice of a public hearing will be circulated 30 days prior to the hearing. (40 C.F.R. § 124.12 and Vermont Water Pollution Control Permit Regulations, Chapter 13.3G)

APPEALS

Pursuant to 10 V.S.A. Chapter 220, any appeal of this decision must be filed with the clerk of the Environmental Court within 30 days of the date of the decision. The appellant must attach to the Notice of Appeal the entry fee of $250.00, payable to the state of Vermont.

The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Court; and must be signed by the appellant or their attorney. In addition, the appeal must give the address or location and description of the property, project or facility with which the appeal is concerned and the name of the applicant or any permit involved in the appeal.

The appellant must also serve a copy of the Notice of Appeal in accordance with Rule 5(b)(4)(B) of the Vermont Rules for Environmental Court Proceedings.

For further information, see the Vermont Rules for Environmental Court Proceedings, available on line at www.vermontjudiciary.org. The address for the Environmental Court is 32 Cherry Street, 2nd Floor Suite 303 Burlington, Vermont 05401 (Tel. # 802-951-1740).

A copy of General Permit No. 3-9003 may be obtained by calling (802) 338-4835; by visiting the Department at the above address between the hours of 7:45 am and 4:30 pm; or by downloading from the Watershed Management Division's Web site at www.vtwaterquality.org.

INFORMATION FOR MUNICIPAL CLERK

Title 10 Chapter 47 §1263(b) provides for the public notice of an applicant's intent to discharge stormwater runoff associated with an industrial activity. Please post this notice and instruction sheet in a conspicuous place for 10 days from the date received. If you have any questions, contact the Watershed Management Division of the Department of Environmental Conservation at (802) 338-4835.

Stormwater Pollution Prevention Plan

for

Vermont Railway, Inc.

Shelburne Transload Facility

Shelburne, Vermont

Permit Number _____-9003

Date Written: July 8, 2016

Last Update: August 6, 2016

Table of Contents

Appendices

Site Plans and Figures

1.0 Introduction

This Stormwater Pollution Prevention Plan ("SWPPP") addresses the proposed operations at the Vermont Railway, Inc. ("VTR") Shelburne Transload Facility ("Project") located on Catamount Road, Shelburne, VT 05482. This SWPPP has been developed as required under Vermont's Multi-Sector General Permit ("MSGP") (General Permit 3-9003) issued by the Vermont Department of Environmental Conservation ("DEC") in August 2011.

This SWPPP describes the facility and its operations, develops an inventory of potential pollutant sources ("PPSs"), identifies controls and best management practices ("BMPs") for reducing the discharge of pollutants in stormwater runoff, and outlines measures for implementing and reviewing this plan. A Notice of Intent ("NOI") for coverage under the NPDES MSGP 3-9003 for Stormwater Discharges Associated with Industrial Activity is being submitted to DEC concurrent with the development of this SWPPP.

Future improvements at the facility would require modification of this SWPPP to address any changes to PPSs or BMPs that would be used to manage the site. Such improvements may include those structures identified in the erosion prevention and sediment control plans submitted in support of the Notice of Intent ("NOI") filed under the Vermont Construction General Permit 3-9020 (NOI Number 7514-9020). Such improvements and any associated modifications to the SWPPP would not require filing an updated Notice of Intent, so long as the applicable industrial sector does not change.

2.0 Pollution Prevention Team

The Pollution Prevention Team (PPT) will be in charge of developing, implementing, and revising the SWPPP and ensuring that it is in compliance with the general permit.

Leader: Brion Muzzy

Office Phone: (802) 658-2550

Title: Operations Manager.

Cell Phone: _____

Responsibilities: Site Operations

Member: Matt Young

Office Phone: (802) 775-4356

Title: Rules Coordinator and Hazmat Specialist

Cell Phone/Beeper: _____

Responsibilities: Site Operations

3.0 Site Description

3.1 Facility Information

Street Address: Catamount Road

City: Shelburne State: Vermont Zip: 05482

Latitude: 44° 23'23.7" N Longitude: 73° 13'43.6" W

SIC Code: 4011 (Railroads, Line-Haul Operating) MSGP Sector: P

Phone: (802) 658-2550 Fax: (802) 658-2553

3.2 Narrative Site Description

The VTR facility will be used for the delivery, off-loading, storage and distribution of rail transported salt. These activities will occur year round. A rail spur that ties into the existing railroad follows the southern edge of the site and will be used to deliver salt. Salt is offloaded from bottom hopper cars into an unloading pit. From the unloading pit the salt is conveyed to trucks which will then be transported off site or dumped inside the salt storage shed. Adjacent to the unloading pit is a scale, and the end of the rail spur contains a split track that will be used for storing rail cars. A second scale and a temporary office trailer are located east of the southern interior wetland.

3.2.1 Area of Site, Impervious Area, Buildings

- The overall parcel size is 35.59 acres, which includes developed impervious areas such as buildings, paved driveways and loading areas, as well as vegetated buffers and other undeveloped areas.
- Total impervious cover is approximately 5.59 acres which includes buildings, paved areas, and driveways, resulting in site coverage of 16 percent impervious area.
- The facility consists of two buildings: a salt storage shed (140 feet by 360 feet) and a temporary office trailer.
- Additional structures at the site include a scale for weighing over-the-road trucks, a salt offloading pit to receive product from bottom dump hopper cars, and a Conex box (20 feet by 8 feet) for additional covered storage of maintenance equipment and materials.

- The locations of the structures are shown on the Stormwater Pollution Prevention Plan Site Map located in the SWPPP map pocket. Potential future buildings are shown on the

Table 1: Building and Structure Inventory	
Building Description	**Building Function**
Salt Storage Shed	Covered Salt Storage
Temporary Office Trailer	Office
Structure Description	**Structure Function**
Scale	Weigh over-the-road trucks
Salt Offloading Pit	Unload product from rail cars
Storage Trailer (Conex Box)	Maintenance equipment and liquid drum storage (motor oil, hydraulic oil)
Double-walled skid tank	Refueling diesel equipment

3.2.2 Hours of Operation, Vehicles, Outdoor Activities

- The facility will be staffed year round and typical operating hours are from 5:00 a.m. to 7:00 p.m., 7 days a week. The facility may operate 24 hours per day and 7 days per week if required.
- Vehicles used in daily operations of the facility include:
    - Truck and trailer transports (30 during the winter season and approximately 6 during the summer season).
    - Three front end loaders
    - 10 railcars located on-site for unloading.
- Primary outdoor activities consist of:
    - Salt offloading and loading

3.2.3 Stormwater System

The stormwater collection and treatment system has been designed to meet the requirements of the Vermont Stormwater Management Rule (2011) and of DEC General permit 3-9015.

This facility has two discharge points. Both discharge points receive water quality treatment via infiltration and vegetative filtering before reaching the Class II wetlands and the LaPlatte River. S/N 001 discharges stormwater from impervious surfaces within the loading area, including the salt storage shed and office trailer. Runoff from these areas is directed to perimeter swales that convey flows to a stormwater pond, where it will receive water quality treatment and water volume control before discharging to a stone sediment trap at the ground surface. These features have been designed to accommodate the additional runoff that would be generated by a second salt storage shed and associated impervious surfaces that are proposed for future phases the Project. In addition, stormwater from the gravel parking area at the eastern portion of the site is also directed to S/N 001 via a grassed treatment swale that runs along the perimeter of the facility.

S/N 002 discharges stormwater collected from a segment of the access road at the eastern portion of the site. Runoff from this area flows through a grass-lined swale design to provide water quality treatment before being discharged via a level spreader. The level spreader has been designed to dissipate energy and provide non-erosive velocities before it discharges to the ground surface.

Additional information regarding the stormwater management system is provided in Appendix A.

3.3 General Location Map

A general location map (Figure 1) is provided which shows the site boundaries on a topographic map background, with receiving waters and other significant landmarks within a one-mile radius.

3.4 Site Map

The VTR facility Stormwater Pollution Prevention Plan Site Map (see map pocket) depicts the following features, in accordance with permit instructions:

- Delineation of all impervious surfaces including buildings, driveways, and loading areas.
- Access roads
- Rail cars and tracks

- All surface water bodies
- Direction of stormwater flow
- Location of existing structural stormwater controls including:
    - Vegetated swales
    - Retention / detention ponds
    - Flow diversion structures: None in the vicinity
    - Sediment traps: None in the vicinity
- All areas which may be pollutant sources and are exposed to precipitation (including areas identified in section 3.7 of this plan)
    - Loading/unloading areas
    - Material handling areas
    - Fueling stations
    - Liquid storage tanks
    - Machinery: None in the vicinity
    - Areas of exposed soil: None in the vicinity
- Past significant leaks or spills (as identified in section 3.8 of this plan):

    No significant leaks or spills have been identified that originated at the Transload facility. However, an adjacent parcel (4474 Shelburne Road) has been identified as a hazardous waste site (CERCLIS ID: 10409110) due to soil and groundwater contamination associated with prior industrial manufacturing activities. The groundwater plume resulting from this contamination crosses through the southeastern portion of the parcel. Based on a subsurface investigation conducted at the Transload facility, the contamination plume is approximately 6 feet below ground surface. As a result, the contamination would not be impacted by activities at the facility nor exposed to stormwater. Remediation activities at the upgradient (source) parcel are anticipated to reduce the contaminant plume in the future.

    - Location and description of each non-stormwater discharge: None in the vicinity
    - Location and source of run-on from adjacent properties containing significant quantities of pollutants: None in the vicinity. The railroad embankment prevents stormwater runoff from entering the site.

3.5 Description of Receiving Waters

Primary receiving waters: LaPlatte River

Secondary receiving water: Shelburne Bay

3.5.1 Discharge Points and Applicable Vermont Water Quality Standards

Discharge Points flowing to primary receiving waters: S/N 001, S/N 002

Applicable Vermont Water Quality Standards: Class B, Warm Water Fishery

Impaired Status: The LaPlatte River is listed on the Clean Water Action Section 303 (d), Part D – Impaired surface waters with completed and approved TMDLs. The River is impaired for *E. coli* bacteria with an approved TMDL as of September 30, 2011 and impaired for mercury in walleye, with an approved TMDL as of December 20, 2007.

3.6 Precipitation Information

- Location: Division 2 (Western)
- Average annual precipitation: 39 inches
- Wettest months: July and August
- Expected rainfall in the wettest month: 4.07 inches in July and 4.29 inches in August
- Types/intensity of storms: short duration downpours, day-long drizzles, day long intermittent rainfall.
- Facility activities are only affected by severe precipitation events, in which case the facility may choose not to operate.

Table 2: Rainfall Depths (inches) for Various Storm Events in Chittenden County, Vermont.

1-Year, 24-Hour	2-Year, 24-Hour	10-Year, 24-Hour	100-Year, 24-Hour
2.1	2.3	3.2	5.2

3.7 Inventory of Exposed Materials and Potential Pollutant Sources

Table 3: Inventory of Site Areas and Activities Exposed to Stormwater				
Map Key	**Activity/ Area of the facility**	**Significant Materials**	**Amount (Approx.)**	**Discharge Point**
PPS-1	Salt loading and handling area	Salt	varies	S/N 001
PPS-2	Vehicle Fueling / Maintenance	Oil, Hydraulic Fluid, Diesel Fuel	varies	S/N 001
PPS-3	Truck/trailer/equipment parking	Sediment and/or Oil	varies	S/N 002

Table 4: Significant Materials Used Onsite		
Trade Name Material	**Chemical/ Physical Description**	**Stormwater Pollutants**
Sodium chloride (Rock Salt)	Solid crystalline powder	Chloride
Hydraulic oil	Colored liquid with petroleum odor	Petroleum
Motor oil	Colored liquid with petroleum odor	Petroleum
Diesel fuel	Colored liquid with petroleum odor	Petroleum

3.8 Inventory of Past Spills and Leaks

No spills have been reported or are known to have occurred at the facility.

Table 5: Inventory of Past Spills and Leaks				
Date	**Source/Cause of Spill**	**Material**	**Quantity**	**Discharge Point**
No spills to report	N/A	N/A	N/A	N/A

4.0 Non-Stormwater Discharges

4.1 Certification of Non-Stormwater Discharges

A worksheet for describing non-stormwater discharge testing and certification can be found in Appendix A, Worksheet 1 at the end of this document. This worksheet is blank as no non-stormwater discharges are present.

If non-stormwater discharges are identified in the future, outfalls which could not be evaluated will be listed in Appendix A, Worksheet 2.

4.2 Allowable Non-Stormwater Discharges

There are no non-stormwater discharges at the site.

5.0 Best Management Practice (BMP) Identification

5.1 Source Protection BMPS

Stormwater controls and BMPs to prevent (preferable) or control pollutants in stormwater discharges from the site have been chosen with the following considerations: appropriateness for identified potential pollutant sources, feasibility of on-site implementation, and cost.

Good Housekeeping:

Good housekeeping practices will be implemented to minimize the risk of stormwater contact with potential pollutant sources by keeping exposed areas clean and orderly. Good housekeeping practices to be implemented at the site include, but are not limited to:

- Ensure all outdoor dumpsters, trash cans, and other waste containers are adequately covered.
- Recycle, or properly dispose of waste materials regularly. Do not dispose of waste in unapproved areas (i.e., do not pour fluids down storm drains, in sewer or septic systems, or on the ground).
- Store potential pollutant materials (i.e., oils, hazardous waste, chemicals etc.) inside in the appropriate, sealed, and labeled containers.
- Regularly maintain equipment and vehicles and inspect for leaks.
- Include the inspection of all containers, drums, and tanks stored outdoors as part of the routine facility inspection.
- Loading and unloading areas will be swept regularly in addition to sweeping up any spills.

<u>Minimizing Exposure:</u>

Visiting industrial vehicles will be inspected regularly for leaks. Hazardous materials will be handled and stored inside a contained area, and waste materials disposed of promptly.

<u>Preventative Maintenance:</u>

All stormwater management devices (stormwater detention and treatment pond, grass-lined swales, level spreader, and stone outlets) and facility equipment will be inspected monthly and

regularly receive maintenance, as needed, to prevent system failures and reduced performance that could cause contamination of stormwater runoff.

Spill Prevention and Response:

The risk of pollutant release will be reduced through the following measures:

- Hazardous material handling procedures will be followed by all personnel handling any such materials.
- Containers will be regularly inspected and maintained as needed (see MSGP Section 5.1.5 Schedules and Procedures). Emergency spill kits are available where materials are commonly handled.
- Material handlers will be trained in spill prevention and response procedures.

Table 6. Vehicle and Equipment Storage Areas		
BMP	**Implementation Date**	**Responsible Party**
Use drip pans under vehicles/equipment when necessary	Ongoing	
Indoor storage of vehicles and equipment	Ongoing	
Use absorbents, roofing or covering storage areas	Ongoing	
Clean pavement surfaces to remove oil and grease	Ongoing	

Table 7. Material Storage Areas		
BMP	**Implementation Date**	**Responsible Party**
Maintain all material storage vessels (e.g., for used oil, oil filters, spent solvents, paint wastes, hydraulic fluids)	Ongoing	
Label storage vessels (e.g., "Used Oil", "Spent Solvents", etc.)	Ongoing	
Store materials indoors	Ongoing	
Minimize runoff of stormwater to the area	Ongoing	
Use dry cleanup methods	Ongoing	
Treat and/or recycle the collected stormwater runoff	Ongoing	

Table 8. Vehicle and Equipment Maintenance Areas		
BMP	**Implementation Date**	**Responsible Party**
Use drip pans	Ongoing	
Keep an organized inventory of materials used in the shop	Ongoing	
Drain all parts of fluid prior to disposal	Ongoing	
Prohibit wet clean up practices if they would result in the discharge of pollutants to the stormwater drainage systems	Ongoing	
Use dry cleanup methods	Ongoing	
Treat and/or recycle the collected stormwater runoff	Ongoing	
Minimize run on/runoff of stormwater to maintenance areas	Ongoing	

Table 9. Site-wide BMPs		
BMP	**Implementation Date**	**Responsible Party**
All applicable environmental and construction permits will be obtained and complied with.	Planning phase through operation.	
All spills will be cleaned up immediately using dry methods. Spill areas are never washed down with water.	Ongoing	
Domestic trash containers and dumpsters will be tightly covered when not in use.	Ongoing	
Domestic trash will be removed offsite on a weekly basis.	Ongoing	
Stabilize exposed soil with seed/mulch and or gravel where feasible.	Ongoing	
Clean out accumulated sediment from paved areas before sediment is exported/tracked off-site.	Ongoing	
Maintain vegetated areas onsite, correct erosion as needed.	Ongoing	

5.2 Spill Response

Spill response procedures shall be implemented when a hazardous material is released to land or water and meets the following criteria:

1. A spill of two (2) gallons or more;
2. A spill that is less than two (2) gallons, but poses a threat to human health or the environment; or
3. A spill that exceeds a CERCLA reportable quantity.

The appropriate spill response procedures, which are adapted from the DEC Environmental Fact Sheet: Hazardous Material Spill Response (2006), are as follows:

1. Hazard Assessment and Initial Response:
    a. For spills that can be safely managed without assistance:
        i. Stop the spill at its source
        ii. Prevent spilled material from entering storm drains, waterways, drainage ditches, etc.
        iii. Contain spilled material using a barrier (absorbent pads or socks), temporary dike or trench
    b. For all other spills, a cleanup contractor will likely be hired since they have the training and equipment necessary to safely respond to dangerous hazardous material spills.

2. Report the Spill

Any hazardous material spill to the land or water that meets the following criteria must be immediately reported to the Department of Environmental Conservation (DEC) Spill Response Team (spill team) by calling the 24-hour Hazardous Materials **Spills Hotline at 1-800-641-5005.** *If there is any question about whether a spill is reportable, call.*

a. A spill of 2 gallons or more;
b. A spill that is less than 2 gallons, but poses a threat to human health or the environment (for example, a gallon of gasoline spilled to a wetland); or
c. A spill that exceeds a CERCLA reportable quantity

Any person who has knowledge of a spill and who may be subject to liability for that spill, is responsible for reporting the spill. In addition to reporting to the DEC, any spill of hazardous material that impacts (or threatens) surface water (e.g., lakes, streams, wetlands, must also be reported to the U.S. Coast Guard via the National Response Center at **1-800-424-8802.**

3. Clean up and Follow up

Any business or municipality which may be responsible for a spill must:

a. Ensure that the spill is cleaned up to the extent that it no longer presents a threat to human health or the environment
b. Make a hazardous waste determination for all spill cleanup materials
c. Ensure that contaminated soil/water/debris is collected and managed appropriately
d. For any reportable spill, submit a written follow-up report within 10 days if requested, detailing how the spill was cleaned up and how waste was managed.

The SWPPP will be modified within 14 days of knowledge of a spill, to include information regarding the nature, date, and cause of the release. The plan will be modified with measures to prevent reoccurrence and to improve response.

5.3 Vehicle and Equipment Washing

No vehicle or equipment washing will occur on site.

5.4 Sediment and Erosion Control

There will not be any areas of erosion, the site is fully stabilized with vegetation or impervious surfaces. Construction phase erosion and sediment control will be conducted according to the Vermont DEC Construction Stormwater Permit, that will be obtained for the project prior to construction. Post-construction erosion and sediment control will be accomplished through the use of the permanent stormwater system as well as approved EPSC measures listed in the Vermont Standards and Specifications for Erosion and Sediment Control (2008).

5.5 Structural BMPs

Structure:	West Pond (Stormwater Detention Pond)
Date of Implementation:	Once site has been stabilized
Discharge Point:	S/N 001
Area(s) Treated:	Impervious areas, including salt storage shed, office trailer, Conex box and double-walled fuel tank (PPS-1 and PPS-2)
Pollutants Removed:	Sediment, nutrients
Maintenance Requirement(s):	Inspection, removal of accumulated sediment and debris, and correction of erosion, if any. Any additional maintenance as needed.
Inspection / Maintenance Frequency:	Inspect quarterly as part of quarterly visual monitoring (see Section 7.1), Maintain as needed, at least annually.
Reporting Requirements:	Annually, as part of comprehensive site evaluation (see Section 8.0).

Structure:	Northeast Grassed Treatment Channel
Date of Implementation:	Once site has been stabilized
Discharge Point:	S/N 001
Area(s) Treated:	Impervious areas, including gravel parking area (PPS-3)
Pollutants Removed:	Sediment, nutrients
Maintenance Requirement(s):	Inspection, removal of accumulated sediment and debris, and correction of erosion, if any. Any additional maintenance as needed.
Inspection / Maintenance Frequency:	Inspect quarterly as part of quarterly visual monitoring (see Section 7.1), Maintain as needed, at least annually.
Reporting Requirements:	Annually, as part of comprehensive site evaluation (see Section 8.0).

Structure:	Rail Spur Grassed Channel and Level Spreader
Date of Implementation:	Once site has been stabilized
Discharge Point:	S/N 002
Area(s) Treated:	Impervious project areas, including access drive and vehicle storage area (PPS-3)
Pollutants Removed:	Sediment, nutrients
Maintenance Requirement(s):	Inspection, removal of accumulated sediment and debris, and correction of erosion, if any. Any additional maintenance as needed.
Inspection / Maintenance Frequency:	Inspect quarterly as part of quarterly visual monitoring (see Section 7.1), Maintain as needed, at least annually.
Reporting Requirements:	Annually, as part of comprehensive site evaluation (see Section 8.0).

6.0 BMP Implementation

6.1 Routine Inspections

Facility inspections will be performed monthly by qualified personnel with at least one member of the Pollution Prevention Team. The inspection will occur while the facility is in operation. At least once each calendar year, the routine facility inspection will be conducted during a period when a stormwater discharge is occurring. If stormwater BMPs are found to be functioning incorrectly, maintenance will be performed before the next anticipated storm event, or as necessary to maintain effectiveness of the stormwater controls. A sample inspection form and records of past inspections will be kept in this SWPPP in Appendix B. During an inspection the following will be documented/inspected (at a minimum).

1. The inspection date and time
2. The name(s) and signature(s) of the inspector(s)
3. Weather information and a description of any discharges occurring at the time of the inspection
4. Any previously unidentified discharges of pollutants from the site
5. Any control measures needing maintenance or repairs
6. Any incidents of noncompliance observed
7. Storage areas for vehicles/equipment awaiting maintenance
8. Fueling areas
9. Indoor and outdoor vehicle/equipment maintenance areas
10. Material storage areas
11. Loading/unloading areas
12. Any additional control measures needed to comply with the permit requirements

If stormwater BMPs are found to be functioning incorrectly, maintenance will be performed before the next anticipated storm event, or as necessary to maintain effectiveness of the stormwater controls. A sample inspection form and records of inspections will be kept in Appendix B of the SWPPP.

6.2 Employee Training

An employee training program will be developed and implemented to educate employees about the requirements of the SWPPP. This education program should be implemented into the SPCC annual training program. Training will include background on the components and goals of the SWPPP as well as training in the following topics:

- Introduction of Pollution Prevention Team and discuss need for the SWPPP
- Spill response procedure
- Review of past spills
- Review of good housekeeping procedures
- Proper material handling procedures
- Proper disposal or recycling of domestic waste materials
- Be sure employees know where cleaning materials and spill kits are located
- Review sources of stormwater pollutants used on-site
- Familiarize employees with drainage routes near areas where industrial materials are handled
- Proper handling (collection, storage, and disposal) of potential pollutants and hazardous materials
- Maintenance of structural BMPs
- Used oil and spent solvent management
- Fueling procedures
- General good housekeeping practices
- Proper painting procedures
- Used battery management
- Minimizing stormwater run on/runoff

All employees involved in stormwater management, hazardous materials handling, and buildings and grounds maintenance will attend a training session annually. New employees will be trained within 30 days of their hire date. Records of attendance are to be kept with this plan using Appendix C, found at the end of this plan.

7.0 Monitoring Requirements

To evaluate the effectiveness of the SWPPP, the following monitoring activities will be conducted on the stormwater discharge from the Project. Monitoring results will be used to regularly reassess the impact of pollutant sources and the need for BMPs. The SWPPP will be updated and improved throughout the term of the permit, as per Section 5.4 of the MSGP. These updates will be informed by the results of monitoring.

7.1 Quarterly Visual Monitoring

As required by the MSGP, Section 4.2, the stormwater discharge point on the site will be examined each quarter by qualified personnel for evidence of contamination during a runoff event. Monitoring will take place within the first 30 minutes of a precipitation or snowmelt event if possible, but no more than 60 minutes after onset. Precipitation events must be greater than 0.1 inches in magnitude and occur at least 72 hours after the last runoff producing event. The examiner will document the presence or lack of:

- color
- odor
- turbidity
- solids
- foam
- oil sheen
- other obvious forms of contamination

Results of quarterly visual monitoring will be recorded on forms included in Appendix D.

7.2 Benchmark Monitoring

No sector-specific benchmark monitoring is required for this site under the requirements for Sector P facilities. Discharge points will be inspected quarterly per section 7.1 of this SWPPP and all areas of the facility where industrial materials or activities are exposed to stormwater will be inspected at least once a month per Part 4, Section A through Section AD of the permit.

7.3 Effluent Limitations

No effluent limitations are associated with this site.

7.4 Monitoring Associated with Discharges to Impaired Waters

The LaPlatte River (VT05-11) is identified on the Clean Water Action Section 303(d) list of Impaired Waters due to high concentrations of bacteria (*E. coli*) associated with agricultural runoff. The Transload Facility would not involve agricultural operations and would not be anticipated to significantly increase bacteria loading in the watershed. The LaPlatte River is also impaired for mercury, which is associated with atmospheric deposition and would not be affected by the Project. No monitoring is proposed for *E. coli* or mercury.

7.5 Supplemental Monitoring

Although the LaPlatte River is not identified as being impaired for phosphorous, it discharges to a portion of Lake Champlain that is impaired for phosphorous and has an approved total maximum daily load ("TMDL"). Due to atmospheric deposition, the increased amount of impervious surface at the site may result in higher concentrations of phosphorous in stormwater runoff from the site. Similarly, although the LaPlatte River has not been identified as impaired for chloride, the industrial material handled at the site (rock salt or sodium chloride) could result in the discharge of stormwater containing elevated concentrations of chloride.

In order to evaluate these potential pollutants, a monitoring program will be conducted to evaluate water quality in the LaPlatte River as well as stormwater runoff discharged from the facility. This monitoring will be conducted in accordance with the *LaPlatte River Water Quality Monitoring Plan*, which is included in Appendix E. The results from these monitoring efforts will be inserted into this Appendix once obtained.

8.0 Compliance Evaluation

A comprehensive site evaluation will be performed every year by qualified personnel as required by the MSGP, Section 4.3. This inspection will include all exposed industrial areas identified in Table 3 of Section 3.7 of this plan for evidence of stormwater pollution.

The results of the plan will be documented in a report containing at minimum: the date, the person(s) making the inspection, the scope of the inspection / locations inspected, observations relating to the discharge of pollutants from the facility, BMPs needing maintenance, BMPs which failed to operate as designed, locations where additional BMPs are needed, corrective actions taken, and any updates to the SWPPP. Copies of past inspection reports are kept in Appendix F.

9.0 Endangered Species

According to the publically-available information in the Vermont Agency of Natural Resources ("ANR") Natural Resources Atlas and the associated Natural Heritage Inventory, 21 element occurrences ("EOs") of uncommon, rare, threatened, or endangered species were identified within 1 mile of the Project area based on a June 15, 2015 database query. Of these, two species are protected in Vermont: the channel darter (*Percina copelandi,* Endangered) and the obedient plant (*Physostegia virginiana,* Threatened). The channel darter record notes that this species has only been observed more than 1 mile upstream from the site, but the ANR Atlas polygon drawn for the occurrence was extended all the way downstream to the mouth of the LaPlatte River. The obedient plant, last observed around 1994, is mapped on the western side of the LaPlatte River to the west of the site, and it was included as a target species for VHB's field investigation on July 16 and 17, 2015. It was not observed during the field survey. A complete description of VHB's methodology and findings regarding rare, threatened, and endangered species is included in Appendix H.

In addition to the above and after the Project's application for a Construction General Permit, ANR indicated that two state-protected species have been found in the LaPlatte River upstream from the site: stonecat (*Notorus flavus*) and speckled pocketbook (*Lampsilis ovata*) for which there was concern relating to the Project. As of a database query on February 2, 2016, VHB confirmed that the state endangered stonecat is recorded more than 1 mile upstream from the Project site, however the EO database did not include any record of the speckled pocketbook within at least 2 miles of the Project.

Based on the EO reporting by the Vermont Fish and Wildlife Department ("FWD") for the closest known upstream occurrence of the stonecat, there would likely not be suitable habitat in the LaPlatte River at or below the Project site. Despite the lack of EO database records, FWD has indicated that potential habitat for the speckled pocketbook may exist at or below the Project site. In response to this information, two steps are being taken in order to address this concern and to demonstrate that the site meets MSGP Section 1.2.4.5 Criterion D, and is therefore eligible for coverage under the MSGP. The first is to perform a detailed field survey of the LaPlatte River in the vicinity of the Project to identify what organisms are present. The second is to conduct an evaluation of the potential pollutant load that would be associated with runoff from the facility to demonstrate the range of conditions that may be expected during the operation of the facility.

Appendix H provides documentation and supporting materials regarding endangered species, including a copy of the initial RTE assessment memorandum submitted in conjunction with the 3-9020 application, e-mail correspondence with VT DEC, the Response to Comments letter submitted during the 3-9020 application process, the work plan which outlines the freshwater mussel survey that will conducted during July 2016, and the analysis of potential chloride loading to the LaPlatte that would result from the Project. This Appendix will be updated with additional information as it becomes available.

10.0 General Requirements

10.1 Record Keeping and Reporting

A copy of this SWPPP will be sent to the Stormwater Section and the original will be maintained onsite. Records pertaining to inspections, monitoring, maintenance, employee trainings, compliance evaluations, and spills will be kept onsite with the SWPPP. These records must be retained for at least five years after the expiration of the permit. This plan will be made available upon request to the Agency, operator of a municipal separate storm sewer receiving the discharge, and to the public if requested in writing to do so.

10.2 Maintaining the Updated SWPPP

This SWPPP will be amended if inspections or monitoring should indicate a deficiency, or Agency personnel determine that it is not effective at controlling stormwater pollutant discharges. The plan will also be amended if changes occur to the facilities layout or operations. A history of amendments will be kept with this plan in Section 11.

10.3 Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name (print):_____ Title: _____

Signature: _____ **Date Signed:** _____

11.0 Summary of Updates

Date Plan Amended	Summary of Updates

Memorandum

To: Shelburne Transload Project File Date: July 8, 2016

Project #: 57762.00

From: Marla Keene
Tyler Shedd

Re: Shelburne Transload Facility Project
Stormwater Technical Memo

1.0 Introduction

On behalf of Vermont Railway, Inc., VHB has prepared this memorandum to provide technical information related to the construction and operational phases of the planned Shelburne Transload Facility Project ("Project"), as they apply to stormwater discharge permitting from the Vermont Department of Environmental Conservation ("DEC").

2.0 Project Overview

Vermont Railway, Inc. ("VTR") plans to construct a new rail offloading, storage and distribution facility to be located on Catamount Drive, Shelburne, VT. This facility will have bulk salt delivered by rail, which will be stored on-site, and distributed by trucking. On site, there will be a salt shed, truck scales and office facilities to support the operations. This memorandum addresses only the components of the project currently planned for construction; future project components are not addressed.

The Project is located on an undeveloped parcel of land west of US Route 7 and to the north of the LaPlatte River, on generally flat to moderately sloping terrain. As mapped by the Natural Resources Conservation service ("NRCS"), the underlying soil is primarily Adams and Windsor loamy sand, which has a NRCS Erodibility Index K-value of 0.15 and a hydrological soil group ("HSG") of A. The receiving waters are to the north of the Project site and include the LaPlatte River, which is tributary to the Shelburne Bay area of Lake Champlain. The LaPlatte River is impaired for *E. coli* and Shelburne Bay is impaired for PCB's in Lake Trout, while the larger receiving body of Lake Champlain is impaired for phosphorus. Neither the LaPlatte River nor Shelburne Bay are impaired for stormwater.

Project components to be constructed at this time include the following:

- Prefabricated salt storage building (140-feet by 360-feet)
- Office trailer
- Two truck weighing scales
- Parking for employees, 35-foot trucks, and 75-foot trucks

3.0 Operational Phase Stormwater discharge management

3.1 Summary of Vermont Stormwater Management Standards

This Project is owned by VTR and therefore subject to a federal preemption, which precludes the Project from being required to meet applicable criteria of the Vermont Stormwater Treatment Standards. However, the Project will be designed to meet the relevant standards of the 2002 Vermont Stormwater Management Manual in order to provide appropriate stormwater treatment and control, and to protect downstream natural resource areas (see Natural Resources Map in Appendix). Though the Vermont Stormwater Management Standards do not apply to this Project, VHB has performed a review of the stormwater standards and whether

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they would apply if the Project were not eligible for preemption, and how they would be met, as presented in Table 1.

Table 1: Vermont Stormwater Management Standards Project Applicability and Approach

Criteria	Treatment Standard	Project Approach
Water Quality Volume	This standard is to capture 90 percent of the annual storm events, and remove 80 percent of total suspended solids (TSS), and 40 percent of the total phosphorus (TP) from stormwater runoff.	Stormwater runoff from paved and roof surfaces will be conveyed to either a grassed channel for water quality treatment or a pretreatment grass channel before entering a pond sized to have a permanent pool with a volume greater than the Water Quality Volume of 10,213 cubic feet.
Recharge	This standard is to preserve existing water table elevations post-development by detaining stormwater and allowing infiltration.	This standard would not be applicable because of stormwater runoff from hot spot land usage.
Channel Protection	This standard is to protect stream channels from degradation by means of 12 to 24 hours of extended detention storage for the 1-year, 24-hour rainfall event.	This standard would not be applicable because the LaPlatte River drainage area upstream of site is greater than 10 square miles and Site is less than 5-percent of the LaPlatte River drainage area.
Overbank Flood	This standard is to ensure that there will be no increase in flood threat downstream, by limiting the post-development peak discharge rate to no more than the pre-development rate for the 10-year, 24-hour rainfall event.	This standard would not be applicable because the LaPlatte River drainage area upstream of site is greater than 10 square miles.
Extreme Flood	This standard is to prevent flood damage from infrequent but very large storm events (100-year) and to maintain the boundaries of the 100-year floodplain.	This standard would not be applicable because the LaPlatte River drainage area upstream of site is greater than 10 square miles.

3.2 Description of Project Impervious Area and Flow Patterns

The development of this site involves the construction of 5.59 acres of impervious surfaces, which will be divided into four subwatersheds with below described characteristics. The areas of the Project subwatersheds are summarized in Table 2 below. Page 1 of the Attachment shows the Project subwatershed boundaries and stormwater treatment practices.

3.2.1 Subwatershed 1

Subwatershed 1 encompasses the gravel parking lot adjacent to the access road and the length of the water quality treatment swale and conveyance swale. The runoff from the gravel

parking lot will sheet flow across the parking lot and be captured by a conveyance swale and directed to a treatment swale ("North Swale"). The treatment swale runs northwest for 1,100 feet and discharges to the LaPlatte River. The treatment swale discharges into an existing into a naturally established channel that is tributary to the LaPlatte River.

3.2.2 Subwatershed 2

Subwatershed 2 encompasses the 450 feet of the access road, 200 feet of the rail spur, and the treatment swale ("South Swale"). Runoff from the access road sheet flows across the pavement and flows across the railroad, through the ballast, and into a grass treatment swale. A level spreader at the outlet of the treatment swale dissipates concentrated flows, which flow overland to the LaPlatte River.

3.2.3 Subwatershed 3

Subwatershed 3 encompasses the western half of the site, including the salt shed, unloading pit, scale, office trail, area for future salt storage shed, and the stormwater conveyance and treatment practices. Runoff from the paved driveway around the scale and office trailer are conveyed east to west by site grade to paved conveyance channels on either side of the salt shed. The paved conveyance channels flow to a grass channel for pretreatment before entering the treatment pond ("West Pond"). The pond detains the runoff before out letting via a stone lined overflow into a naturally established channel that is tributary to the LaPlatte River.

3.2.4 Subwatershed 4

Subwatershed 4 includes approximately 280 feet of the access road, a portion of the truck turning area east of the salt shed, 1,020 feet of rail spur and adjacent grading, and the pervious grading areas outside of the north and west treatment swales. Runoff from impervious surfaces within Subwatershed 4 flows by sheet flow to adjacent pervious areas where it is treated by overland vegetative filtering. All impervious surfaces and adjacent pervious surfaces within Subwatershed 4 meet the criteria for disconnection of non-rooftop runoff.

Table 2: Area of Post-Development Land Covers for Subwatersheds

Project Subwatershed	Description	Impervious (ac)	Pervious (ac)	Total (ac)
Subwatershed 1	Gravel Lot	1.44	0.99	2.43
Subwatershed 2	Access Road	0.36	0.14	0.50
Subwatershed 3	Salt Shed	3.16	2.48	5.64
Subwatershed 4	Disconnected	0.29	3.68	3.97
	Total	5.59	7.31	12.54

Supporting computations for the stormwater management approach are included in the Attachment.

3.3 Soil Infiltration Potential

VHB performed a soil evaluation to determine the potential for infiltration of runoff via the stormwater practices. Based on review of geotechnical data and soil explorations conducted in the location of the stormwater treatment practices at the elevation of the bottom of the practices, it appears that the majority of the site, and in particular the locations of the stormwater treatment practices, is underlain by clay loam. The thickness of the clay loam layer was not determined, though geotechnical borings showed a depth greater than 100-feet below existing ground surfaces. Because the stormwater features will be located above this confining clay layer, the potential for stormwater runoff to infiltrate into the deep groundwater aquifer via the stormwater practices is limited. Instead, any stormwater runoff infiltrated into the upper soil layers will run along the top of the confining layer. The infiltrated water will then flow along the groundwater gradient with other infiltrated groundwater as perched infiltration. Because of the confining layer, it is unlikely that stormwater will penetrate to the deep aquifer.

The north grass channel, capturing flow from Subwatershed 1, will to be located in a combination of shallow cut and fill. In locations where the channel is in cut, it was confirmed by soil exploration that the planned cut will not penetrate the underlying clay loam confining layer. The soil underlying the north grass channel is silt loam. The south grass channel, capturing flow from the access road, will be located in a shallow cut. Geotechnical borings indicate that there bottom of the channel will be located above the confining layer. The west grass channel, capturing flow from Subwatershed 3, will be located in fill. The west stormwater pond will be located in cut, and it was confirmed that the planned cut will not penetrate the underlying clay loam confining layer. The material to be located at the bottom of the west stormwater pond is a coarse loamy sand.

4.0 List of Attachments

- Subwatershed Map
- North Grass Channel Worksheet
- WQv Worksheet for North Grass Channel
- HydroCAD (WQv, 1 yr, 10 yr) for North Grass Channel
- South Grass Channel Worksheet
- WQv Worksheet for South Grass Channel
- HydroCAD (WQv, 1 yr, 10 yr) for South Grass Channel
- West Pond Worksheet
- WQv Worksheet for West Pond
- Disconnection Worksheet

ATTACHMENT

0 75 150 300 Feet

1 SUBWATERSHED ID

DISCONNECTED SUBWATERSHED (SUBWATERSHED 4)

SUBWATERSHED BOUNDARY

vhb

Shelburne Transload Facility Project
Subwatershed Map

Figure 1

June 24, 2016

Version: 4/10

Project Name: Shelburne Transload
Discharge Point: S/N 001

Grass Treatment Channel (O-3)

Grass Treatment Channel #_1_____

Line **Treatment Standards**

Indicate the treatment standards met for the site area draining to this practice:

1 WQv ☒
2 Rev ☐ This practice automatically meets Rev if you have met the WQv treatment standards
3 Cpv ☐
4 Qp10 ☐ { Grass channels are not typically appropriate to provide Cpv, Qp10 or Qp100 except under ideal conditions.
5 Qp100 ☐

	Modified Curve Number	Modified CN*
6	What is the modified curve number (CN) for both on and off-site areas draining to this facility?	96

	Water Quality Volume (WQv)	WQv (Cubic Feet)
7	Provide the WQv for both on and off-site area draining to this facility (from WQv worksheets)?	4631

		WQ Peak (Cfs)
8	What is the peak discharge rate associated with the WQ storm?	1.24

	Feasibility (2.7.5.A)	Response	Attachment location
9	Is the maximum longitudinal slope of the channel 4% or less?	yes	

	Conveyance (2.7.5.B)	Response	Attachment location
10	Is the peak velocity for the 1-year storm non-erosive?	yes	
11	Are the channel slopes less than or equal to the 2:1 maximum?	yes	
12	Does the channel safely convey the 10-year storm with a minimum of 6 inches of freeboard?	yes	
13	Was the Manning's n value adjusted for the depth of water in the channel for larger storm events?	yes	

	Pretreatment (2.7.5.C)	Response	Attachment location
14	Has pre-treatment been provided for non-rooftop runoff?	no	runoff is via sheet flow

	Treatment (2.7.5.D)	Channel Width (Feet)
15	What is the bottom width of the channel? (no greater than 8 feet, but no less than 2 feet)	3

		Response	Attachment location
16	Is the average residence time of the WQv peak discharge at least 10 minutes?	yes	
17	Is the velocity of the WQv peak discharge less than 1 foot/second?	yes	
18	Is the depth of the WQv peak discharge 4 inches or less?	no	approximately 5 inches
19	Were check dams used to meet the requisite treatment design criteria?	no	

	Cold Climate Design Considerations (2.7.5.G)	Response	Attachment location
20	Have the potential impacts of Vermont's severe winter climate been addressed in your design?	yes	

Grass Channel: Cpv, Qp10 and Qp100

Channel Protection Treatment Standard (Cpv)

		Response
21	Check which detention time standard must be used, based on the fisheries designation of the receiving water:	☐ 12 hours for cold water ☐ 24 hours for warm water

		Response	Attachment location
22	Did you use the Storage Volume Estimation Method? If yes, skip to Line 25.*	yes / no	

*Please review the guidance sheet "Channel Protection Storage Volume Estimation" and attach the specified information. This method is not appropriate if more than a one subwatershed drains to the practice. Using the center of mass detention time calculated by a hydrologic model that accounts for pond routing is the preferred method.

23	What storage volume (cubic feet) necessary to meet the Channel Protection Standard?	
24	What is the calculated average release rate (cfs)?	
25	What is the controlled peak release rate (cfs) during the 1-year storm as indicated by the model?	

Overbank Flood Protection Treatment Standard (Qp10)

		Response	Attachment location
25	Have you demonstrated that Qp10 post is less than or equal to Qp10 pre at the discharge point?*	yes / no	

*Please include runoff and routing calculations of the 10-year storm event.

Extreme Flood Protection Treatment Standard (Qp100)

		Response	Attachment location
26	Have you demonstrated that Qp100 post is less than or equal to Qp100 pre at the discharge point?*	yes / no	

*Please include runoff and routing calculations of the 100-year storm event.

*Grass channels provide rate-based treatment and must be designed to provide 10 minutes of residence time for the peak WQ discharge (a 0.9 inch storm). Traditional methods underestimate the volume and rate of runoff for storms of less than 2 inches. Modified curve numbers must be used. Because this practice is rate-based, both on and off-site water reaching the grass channel must be included in the calculations. This additional water will affect the velocity and residence time of the water in the channel. The average residence time for the peak discharge corresponds to the residence time calculated at the peak/maximum velocity, which is reported as the minimum residence time.

Attachment location: Please indicate the specific location (i.e. appendix, page, plan sheet) where the requisite support documentation has been provided within the application

Page 1 of 2

Version: 9/06

For the area draining to*: North Grass Channel

Located in drainage area for S/N: 001

WQ Volume and Modified Curve Number Calculation for Water Quality Treatment in Flow-Based Practice

Use *this worksheet to calculate your WQv if you need to determine the Peak Q for the WQ storm (i.e. designing a grass channel, flow-splitter or other flow based practice) and you are not using any of the site design credits in section 3 of the 2002 VSWMM. See page 2 for "Calculating Peak WQ Discharge Rate (0.9" storm) using the Modified Curve Number." Please note that in the case of grass channels you must include any off-site area draining to the practice as this will affect the peak discharge rate which will ultimately affect the hydraulics, and thus residence time, in your channel.*

Water Quality Volume Calculations

Line			value/calculation	units
1	Area draining to practice	A=	2.43	acres
2	Impervious area		1.44	acres
3	Percent Impervious Area = [(line 2/line 1) * 100] =	I =	59.26	% (whole #)
4	Precipitation	P =	**0.9**	inches
5	**Runoff coefficient calculation** = (0.05 + (0.009*I))	Rv =	0.583	
6	**WQ Volume (in watershed inches) Calculation =**(P * Rv) =		0.525	Qa (watershed inches, a.k.a. inches of runoff)
7	Minimum WQ Volume[1]		**0.2**	watershed inches
8	Enter the greater of line 6 or line 7	**WQv =**	0.525	watershed inches
9	**WQ Volume Calculation =** (line 8 *A)/12 =	**WQv =**	0.106	ac. ft.
10	**WQ Volume Calculation =** (line 9 * 43560) =	**WQv =**	4631	cu. ft.

Notes:

1: Sites with low impervious cover (~19%) but that do not employ a **significant** use of the stormwater design credits in Section 3 of the VSWMM are required to treat the minimum water quality volume of 0.2 watershed inches. Sites that have a **significant** portion of their impervious cover addressed via the stormwater credits (section 3 of the VSWMM) will be able to reduce this WQv and will only be required to treat the volume calculated on the "WQ Volume (with credit reduction)" worksheet which will be less than the 0.2 watershed inches.

* Enter the name of the STP (both type and label) which has been designed to treat this particular WQv (e.g. Wet Pond #2)

For the area draining to*: North Grass Channel

Located in drainage area for S/N: 001

Calculating Peak WQ Peak Discharge Rate (0.9" storm) using the Modified Curve Number

Because NRCS methods underestimate the peak discharge for rainfall events of less than 2", simply plugging in 0.9" of rainfall into your hydrologic model with the standard curve numbers will not produce the correct peak discharge during the WQv storm, nor will it produce a volume of runoff equivalent to that which you have calculated using the WQv formula (WQv = P*Rv*A/12). In order to calculate the peak discharge for the 0.9" storm, a modified curve number must be calculated. This modified curve number is based on the runoff (in inches) calculated using the short cut method formula (WQv = P*Rv) that is also the basis of the familiar WQv calculations provided in the 2002 VSWMM (and on the WQv calculation worksheets). Essentially, the curve number that is calculated using the methods below is the curve number that will generate the volume of runoff calculated using the WQv formula.

Above, you should have calculated the **WQv in watershed inches draining to the facility/practice** for which you need to calculate the WQ-peak discharge. As provided in the guidance listed on the grass channel worksheet, please remember that the WQv calculation should include runoff from on-site as well as **off-site area** draining to the grass channel since this will have an impact on the channel hydraulics and thus the velocity and residence time.

Steps:

1. Transfer information from WQv calculation worksheets.

Enter the Qa (line 8 from WQv sheet)

Qa = 0.525 inches

Enter the area (site +off-site draining to practice) used in calculating the percent impervious (I)

A = 2.4 acres

2. Use the following equation to calculate a corresponding curve number

where P = 0.9 inches

CN = 1000/(10 +(5*P)+(10*Qa) - (10*(Qa^2 + (1.25*Qa*P))^0.5))

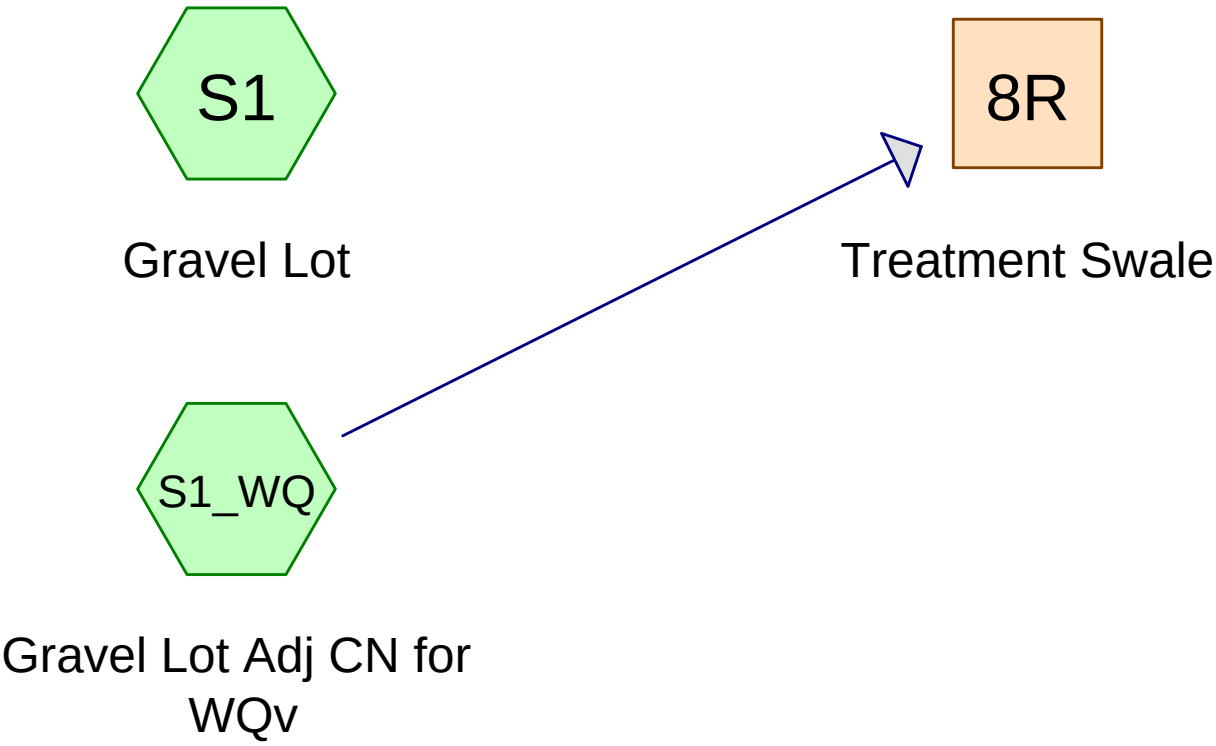
CN = 95.8

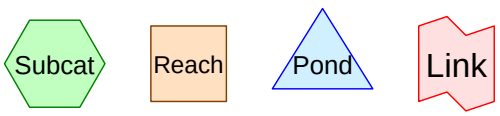
3. If you are using **hand hydrologic runoff calculations,** use the computed CN above along with your calculated time of concentration and the drainage area (A) to calculate the peak discharge (Qwq) for the water quality storm using the TR-55 Graphical Peak Discharge Method.

OR

3. If you are using a computer aided hydrologic model, simply revise the curve number for your subwatershed(s) draining to the practice using the curve number calculated above; the computed curve number should be applied to the total area (A) used in the WQv calcuation. As a check, you should note that now when you run the 0.9" storm, your runoff depth should be roughly equal to Qa (WQ runoff in inches) and your total runoff volume roughly equal to your WQv (in ac. ft.). If this is not the case, make sure that the time span for your modelling run is long enough to capture the entire storm. Small variations are likely due to having to round your computed CN to a whole number. Remember that for storms larger than 2", you do not need to use the modified curve number and you should calculate your composite curve number based on the accepted values for different types of land-use (see TR-55).

* Enter the name of the STP (both type and label) which has been designed to treat this particular WQv (e.g. Wet Pond #2)





Routing Diagram for BMP Size - Gravel Lot BMP
Prepared by VHB, Printed 7/6/2016

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment S1: Gravel Lot Runoff Area=2.430 ac 0.00% Impervious Runoff Depth=0.32"
Flow Length=370' Slope=0.0250 '/' Tc=2.5 min CN=82 Runoff=1.55 cfs 0.065 af

Subcatchment S1_WQ: Gravel Lot Adj CN Runoff Area=2.430 ac 0.00% Impervious Runoff Depth=0.54"
Flow Length=370' Slope=0.0250 '/' Tc=2.5 min CN=96 Runoff=2.61 cfs 0.110 af

Reach 8R: Treatment Swale Avg. Flow Depth=0.40' Max Vel=0.61 fps Inflow=2.61 cfs 0.110 af
n=0.126 L=1,125.0' S=0.0124 '/' Capacity=11.26 cfs Outflow=0.93 cfs 0.110 af

Total Runoff Area = 4.860 ac Runoff Volume = 0.174 af Average Runoff Depth = 0.43"
100.00% Pervious = 4.860 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment S1: Gravel Lot

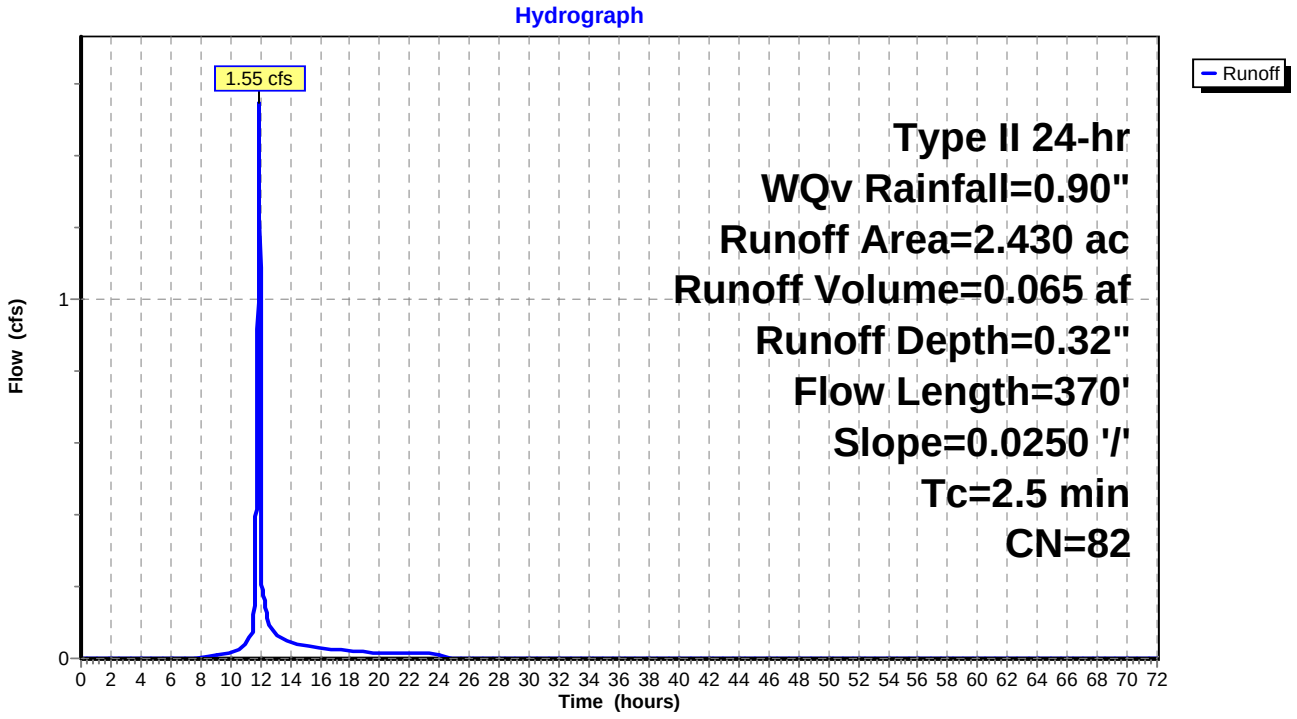
Runoff = 1.55 cfs @ 11.93 hrs, Volume= 0.065 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Rainfall=0.90"

Area (ac)	CN	Description
1.440	96	Gravel surface, HSG B
0.990	61	>75% Grass cover, Good, HSG B
2.430	82	Weighted Average
2.430		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0250	1.11		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.30"
1.7	320	0.0250	3.21		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.5	370	Total			

Subcatchment S1: Gravel Lot



Summary for Subcatchment S1_WQ: Gravel Lot Adj CN for WQv

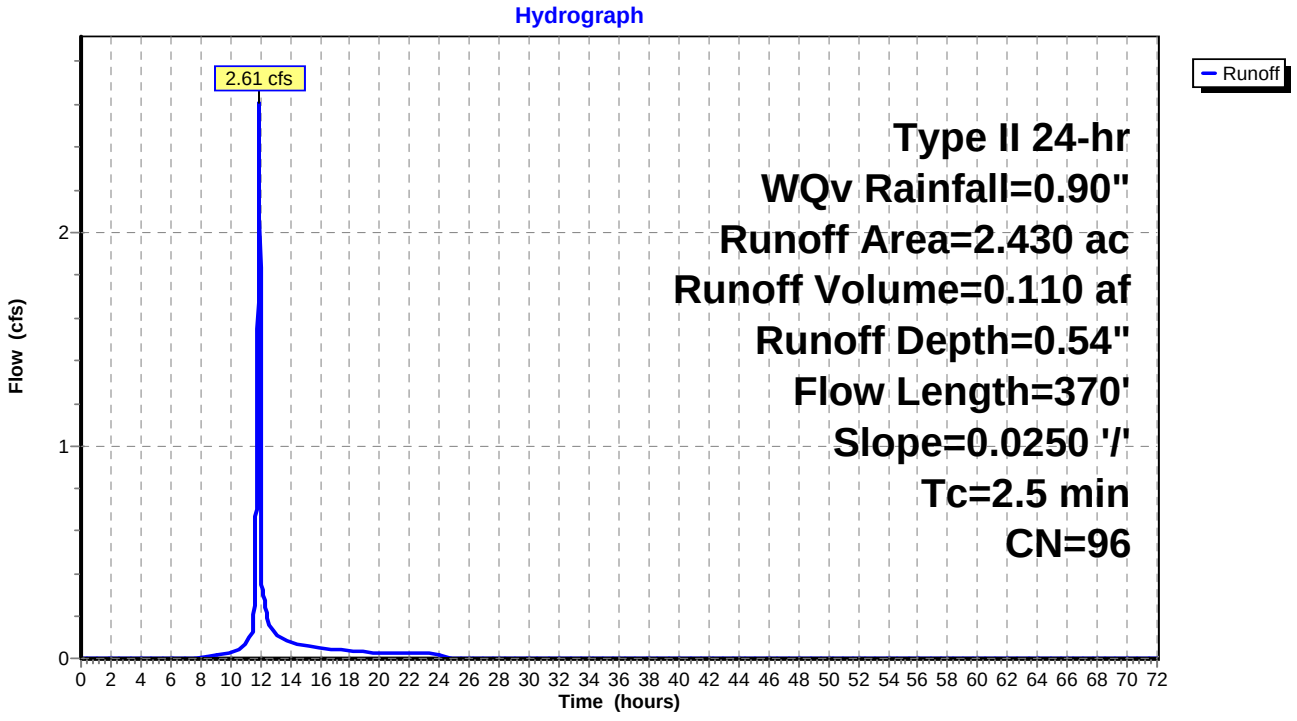
Runoff = 2.61 cfs @ 11.93 hrs, Volume= 0.110 af, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Rainfall=0.90"

	Area (ac)	CN	Description
*	2.430	96	Gravel surface, HSG B
	2.430		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0250	1.11		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.30"
1.7	320	0.0250	3.21		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.5	370	Total			

Subcatchment S1_WQ: Gravel Lot Adj CN for WQv



Summary for Reach 8R: Treatment Swale

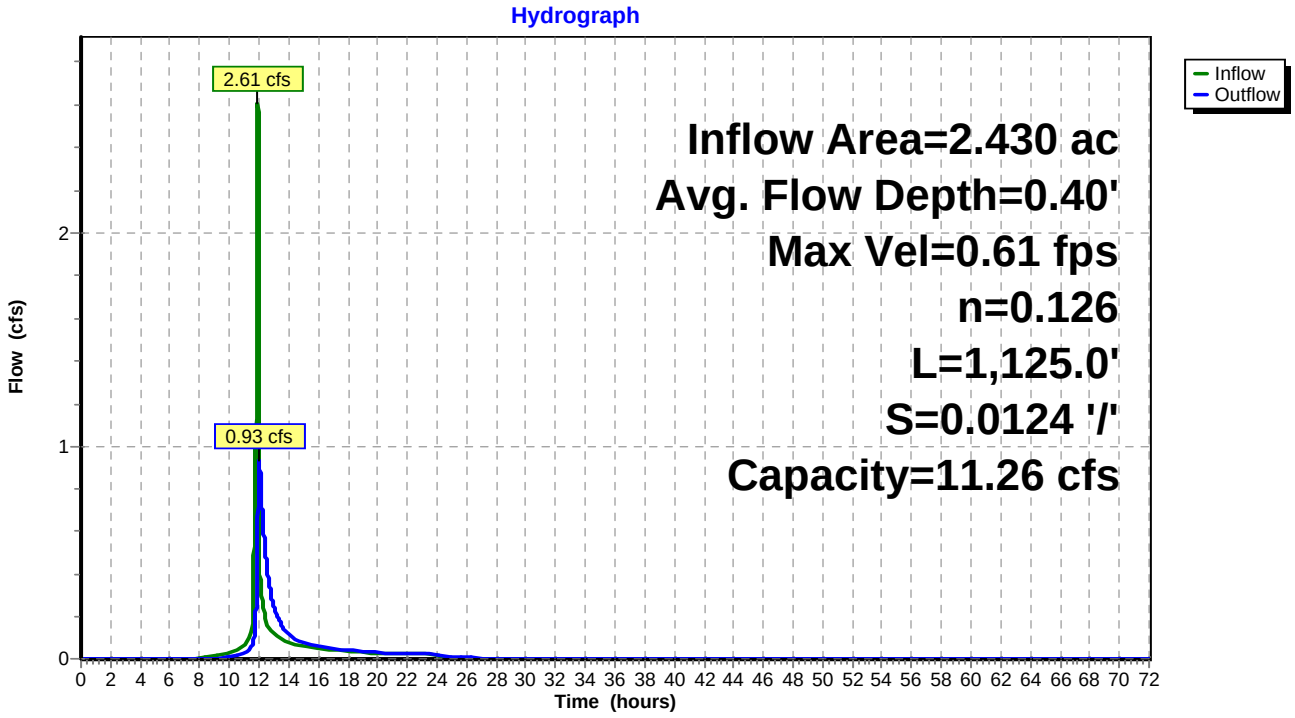
Inflow Area = 2.430 ac, 0.00% Impervious, Inflow Depth = 0.54" for WQv event
Inflow = 2.61 cfs @ 11.93 hrs, Volume= 0.110 af
Outflow = 0.93 cfs @ 12.02 hrs, Volume= 0.110 af, Atten= 64%, Lag= 5.2 min

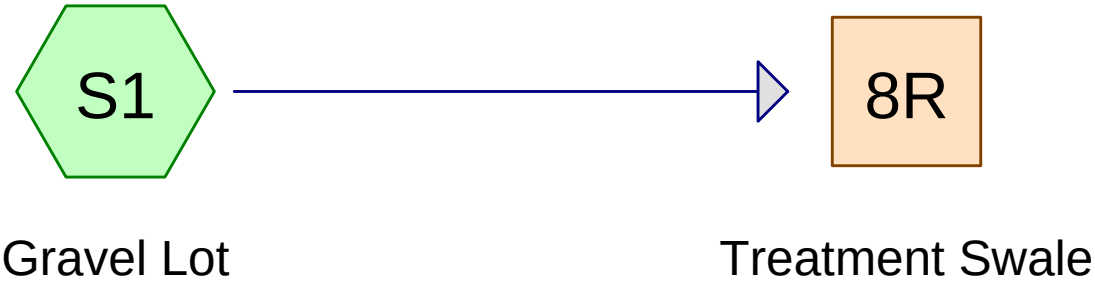
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.61 fps, Min. Travel Time= 30.7 min
Avg. Velocity = 0.13 fps, Avg. Travel Time= 143.0 min

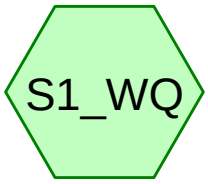
Peak Storage= 1,707 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 1.50' Flow Area= 9.0 sf, Capacity= 11.26 cfs

3.00' x 1.50' deep channel, n= 0.126
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 1,125.0' Slope= 0.0124 '/'
Inlet Invert= 121.00', Outlet Invert= 107.00'

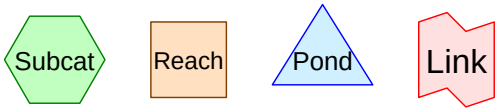
Reach 8R: Treatment Swale







Gravel Lot Adj CN for WQv



Routing Diagram for BMP Size - Gravel Lot BMP
Prepared by VHB, Printed 7/6/2016

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment S1: Gravel Lot Runoff Area=2.430 ac 0.00% Impervious Runoff Depth=1.03"
Flow Length=370' Slope=0.0250 '/' Tc=2.5 min CN=82 Runoff=4.45 cfs 0.208 af

Subcatchment S1_WQ: Gravel Lot Adj CN Runoff Area=2.430 ac 0.00% Impervious Runoff Depth=1.67"
Flow Length=370' Slope=0.0250 '/' Tc=2.5 min CN=96 Runoff=7.50 cfs 0.338 af

Reach 8R: Treatment Swale Avg. Flow Depth=0.56' Max Vel=0.93 fps Inflow=4.45 cfs 0.208 af
n=0.100 L=1,125.0' S=0.0124 '/' Capacity=14.18 cfs Outflow=2.18 cfs 0.208 af

Total Runoff Area = 4.860 ac Runoff Volume = 0.547 af Average Runoff Depth = 1.35"
100.00% Pervious = 4.860 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment S1: Gravel Lot

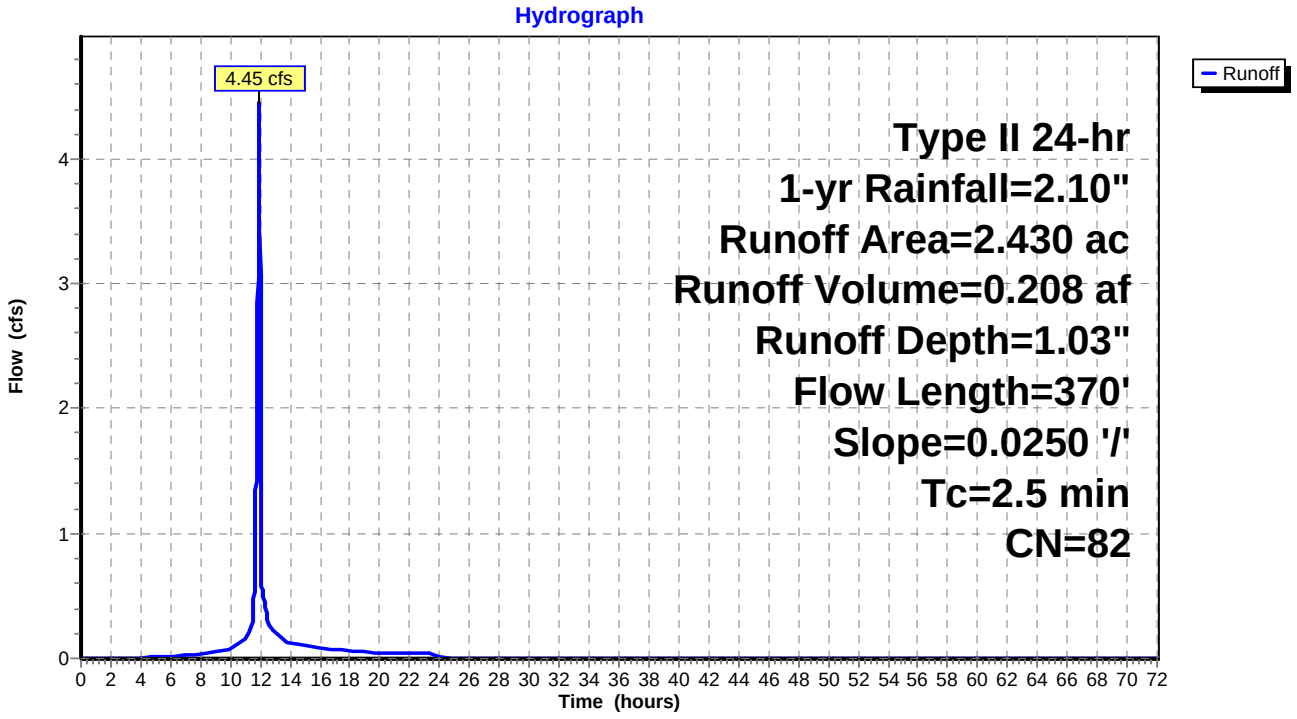
Runoff = 4.45 cfs @ 11.93 hrs, Volume= 0.208 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=2.10"

Area (ac)	CN	Description
1.440	96	Gravel surface, HSG B
0.990	61	>75% Grass cover, Good, HSG B
2.430	82	Weighted Average
2.430		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0250	1.11		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.30"
1.7	320	0.0250	3.21		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.5	370	Total			

Subcatchment S1: Gravel Lot



Summary for Subcatchment S1_WQ: Gravel Lot Adj CN for WQv

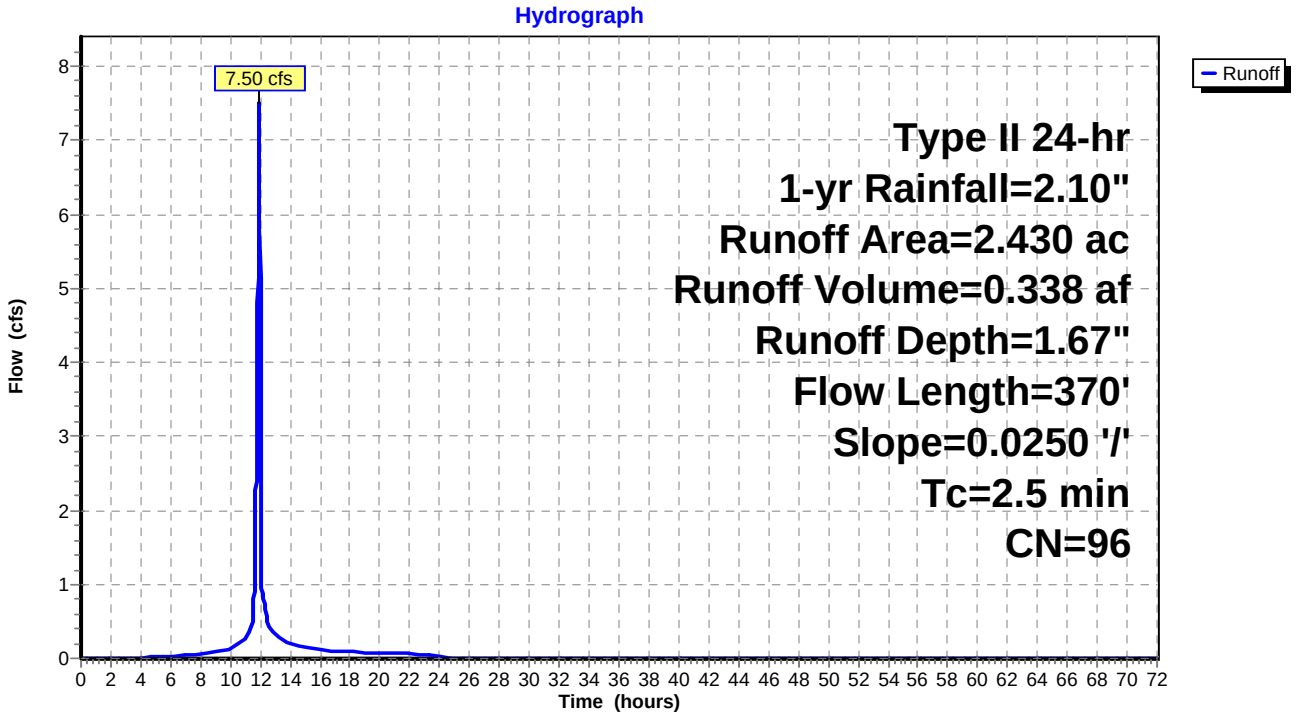
Runoff = 7.50 cfs @ 11.93 hrs, Volume= 0.338 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=2.10"

	Area (ac)	CN	Description
*	2.430	96	Gravel surface, HSG B
	2.430		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0250	1.11		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.30"
1.7	320	0.0250	3.21		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.5	370	Total			

Subcatchment S1_WQ: Gravel Lot Adj CN for WQv



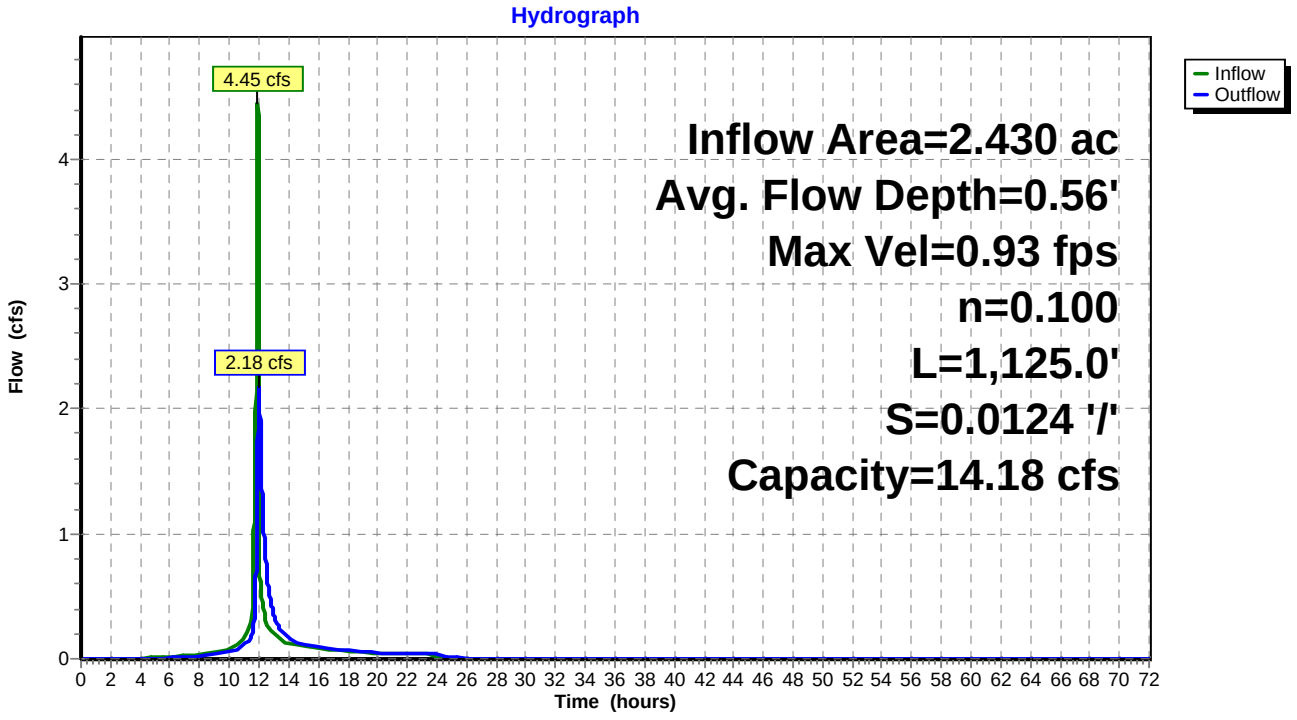
Summary for Reach 8R: Treatment Swale

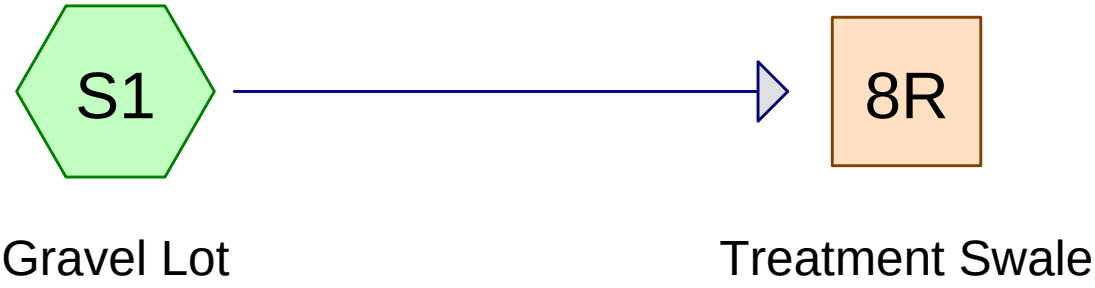
Inflow Area = 2.430 ac, 0.00% Impervious, Inflow Depth = 1.03" for 1-yr event
Inflow = 4.45 cfs @ 11.93 hrs, Volume= 0.208 af
Outflow = 2.18 cfs @ 12.00 hrs, Volume= 0.208 af, Atten= 51%, Lag= 4.4 min

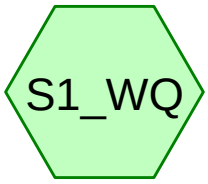
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.93 fps, Min. Travel Time= 20.1 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 98.3 min

Peak Storage= 2,624 cf @ 12.00 hrs
Average Depth at Peak Storage= 0.56'
Bank-Full Depth= 1.50' Flow Area= 9.0 sf, Capacity= 14.18 cfs

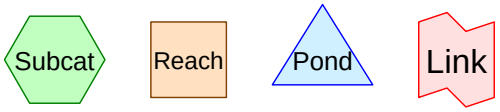
3.00' x 1.50' deep channel, n= 0.100
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 1,125.0' Slope= 0.0124 '/'
Inlet Invert= 121.00', Outlet Invert= 107.00'







Gravel Lot Adj CN for WQv



Routing Diagram for BMP Size - Gravel Lot BMP
Prepared by VHB, Printed 7/6/2016

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment S1: Gravel Lot Runoff Area=2.430 ac 0.00% Impervious Runoff Depth=1.81"
Flow Length=370' Slope=0.0250 '/' Tc=2.5 min CN=82 Runoff=7.76 cfs 0.367 af

Subcatchment S1_WQ: Gravel Lot Adj CN Runoff Area=2.430 ac 0.00% Impervious Runoff Depth=2.75"
Flow Length=370' Slope=0.0250 '/' Tc=2.5 min CN=96 Runoff=11.91 cfs 0.557 af

Reach 8R: Treatment Swale Avg. Flow Depth=0.72' Max Vel=1.44 fps Inflow=7.76 cfs 0.367 af
n=0.074 L=1,125.0' S=0.0124 '/' Capacity=19.17 cfs Outflow=4.64 cfs 0.367 af

Total Runoff Area = 4.860 ac Runoff Volume = 0.923 af Average Runoff Depth = 2.28"
100.00% Pervious = 4.860 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment S1: Gravel Lot

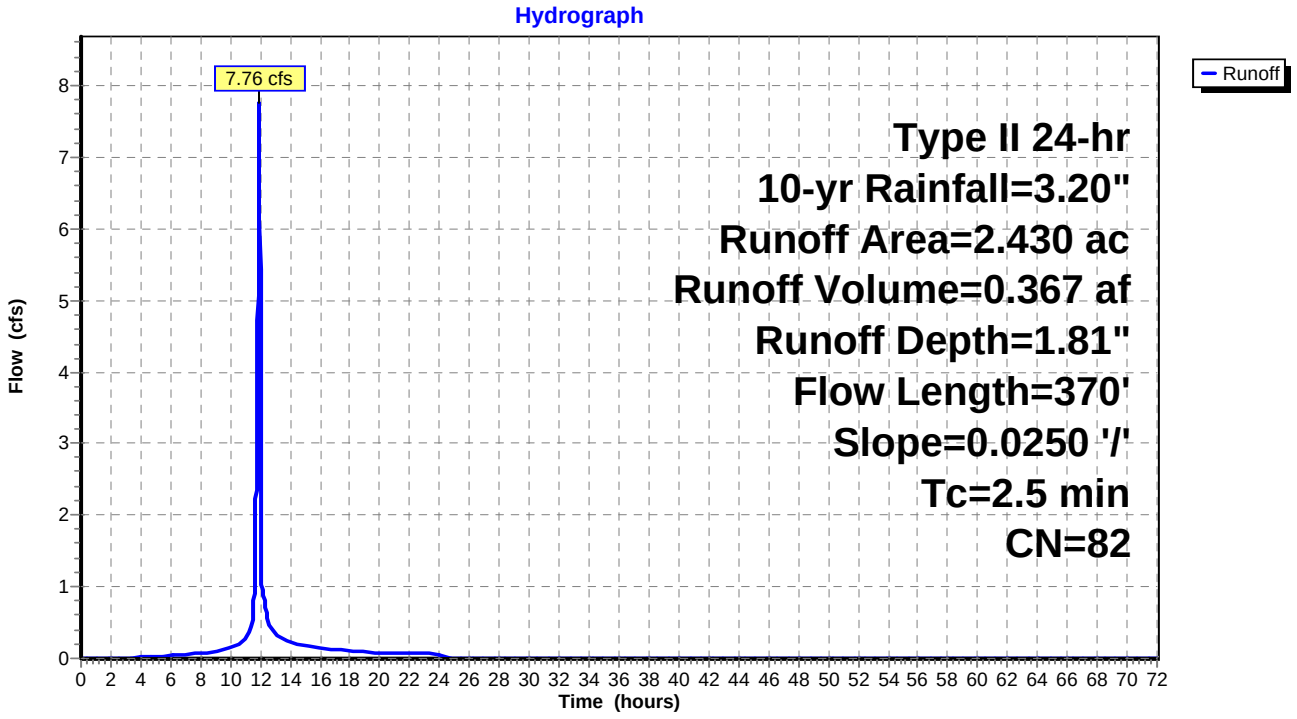
Runoff = 7.76 cfs @ 11.93 hrs, Volume= 0.367 af, Depth= 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-yr Rainfall=3.20"

Area (ac)	CN	Description
1.440	96	Gravel surface, HSG B
0.990	61	>75% Grass cover, Good, HSG B
2.430	82	Weighted Average
2.430		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0250	1.11		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.30"
1.7	320	0.0250	3.21		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.5	370	Total			

Subcatchment S1: Gravel Lot



Summary for Subcatchment S1_WQ: Gravel Lot Adj CN for WQv

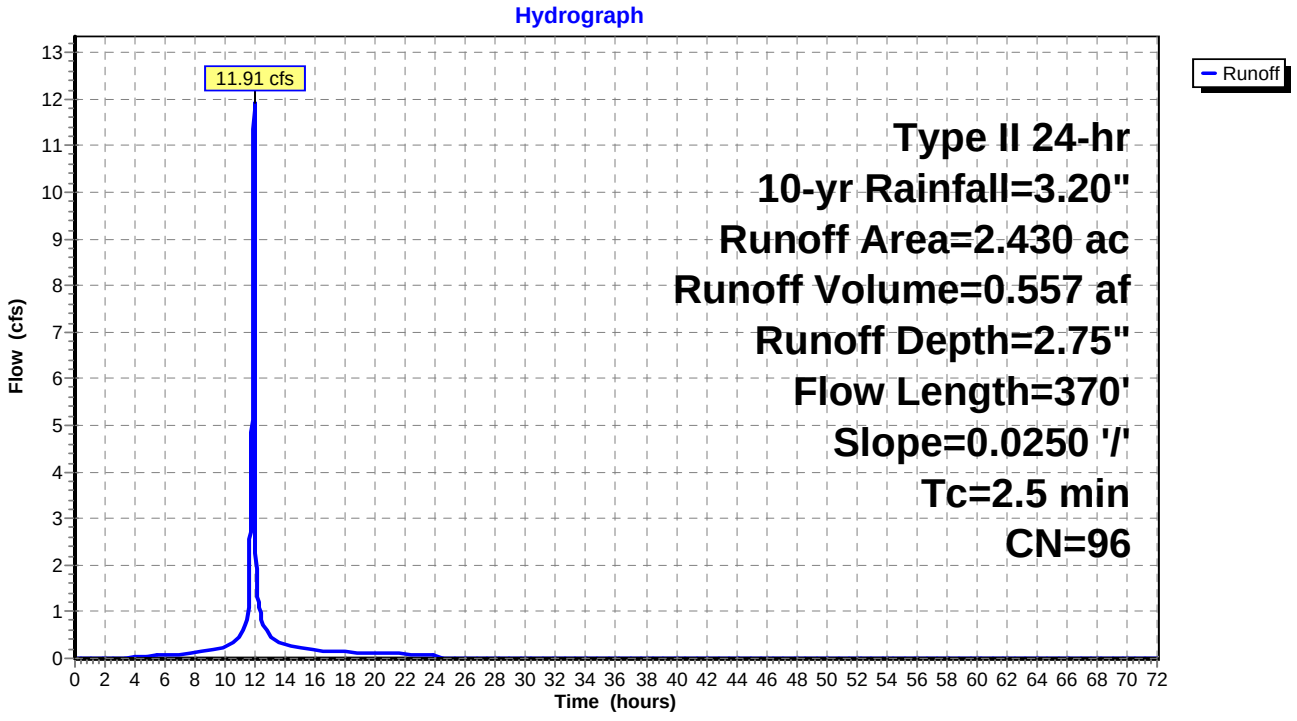
Runoff = 11.91 cfs @ 11.93 hrs, Volume= 0.557 af, Depth= 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-yr Rainfall=3.20"

	Area (ac)	CN	Description
*	2.430	96	Gravel surface, HSG B
	2.430		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0250	1.11		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.30"
1.7	320	0.0250	3.21		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.5	370	Total			

Subcatchment S1_WQ: Gravel Lot Adj CN for WQv



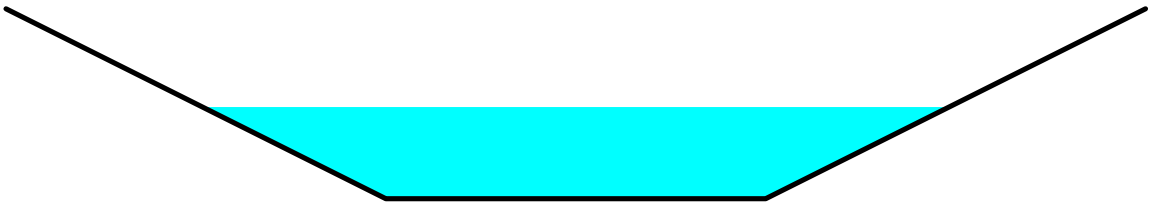
Summary for Reach 8R: Treatment Swale

Inflow Area = 2.430 ac, 0.00% Impervious, Inflow Depth = 1.81" for 10-yr event
Inflow = 7.76 cfs @ 11.93 hrs, Volume= 0.367 af
Outflow = 4.64 cfs @ 11.99 hrs, Volume= 0.367 af, Atten= 40%, Lag= 3.7 min

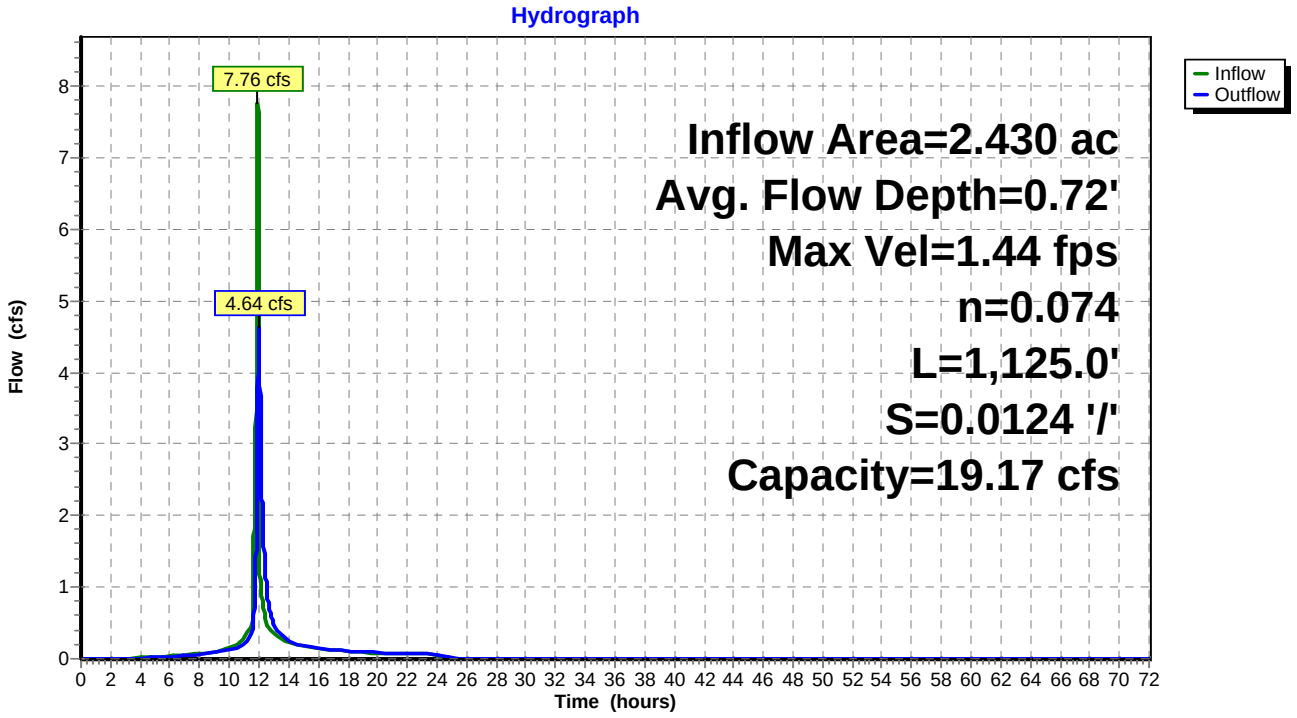
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.44 fps, Min. Travel Time= 13.0 min
Avg. Velocity = 0.30 fps, Avg. Travel Time= 63.2 min

Peak Storage= 3,620 cf @ 11.99 hrs
Average Depth at Peak Storage= 0.72'
Bank-Full Depth= 1.50' Flow Area= 9.0 sf, Capacity= 19.17 cfs

3.00' x 1.50' deep channel, n= 0.074
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 1,125.0' Slope= 0.0124 '/'
Inlet Invert= 121.00', Outlet Invert= 107.00'



Reach 8R: Treatment Swale



Version: 4/10

Project Name: Shelburne Transload
Discharge Point: S/N 001

Grass Treatment Channel (O-3)

Grass Treatment Channel #_2_____

Line **Treatment Standards**

Indicate the treatment standards met for the site area draining to this practice:

1 WQv ☒
2 Rev ☐ This practice automatically meets Rev if you have met the WQv treatment standards
3 Cpv ☐
4 Qp10 ☐ { Grass channels are not typically appropriate to provide Cpv, Qp10 or Qp100 except under ideal conditions.
5 Qp100 ☐

	Modified Curve Number	Modified CN*
6	What is the modified curve number (CN) for both on and off-site areas draining to this facility?	97

	Water Quality Volume (WQv)	WQv (Cubic Feet)
7	Provide the WQv for both on and off-site area draining to this facility (from WQv worksheets)?	1140

		WQ Peak (Cfs)
8	What is the peak discharge rate associated with the WQ storm?	0.5

	Feasibility (2.7.5.A)	Response	Attachment location
9	Is the maximum longitudinal slope of the channel 4% or less?	yes	

	Conveyance (2.7.5.B)	Response	Attachment location
10	Is the peak velocity for the 1-year storm non-erosive?	yes	
11	Are the channel slopes less than or equal to the 2:1 maximum?	yes	
12	Does the channel safely convey the 10-year storm with a minimum of 6 inches of freeboard?	yes	
13	Was the Manning's n value adjusted for the depth of water in the channel for larger storm events?	yes	

	Pretreatment (2.7.5.C)	Response	Attachment location
14	Has pre-treatment been provided for non-rooftop runoff?	no	runoff is via sheet flow

	Treatment (2.7.5.D)	Channel Width (Feet)
15	What is the bottom width of the channel? (no greater than 8 feet, but no less than 2 feet)	4

		Response	Attachment location
16	Is the average residence time of the WQv peak discharge at least 10 minutes?	yes	
17	Is the velocity of the WQv peak discharge less than 1 foot/second?	yes	
18	Is the depth of the WQv peak discharge 4 inches or less?	yes	
19	Were check dams used to meet the requisite treatment design criteria?	no	

	Cold Climate Design Considerations (2.7.5.G)	Response	Attachment location
20	Have the potential impacts of Vermont's severe winter climate been addressed in your design?	yes	

Grass Channel: Cpv, Qp10 and Qp100

	Channel Protection Treatment Standard (Cpv)	**Response**
21	Check which detention time standard must be used, based on the fisheries designation of the receiving water:	☐ **12 hours for cold water** ☐ **24 hours for warm water**

		Response	**Attachment location**
22	Did you use the Storage Volume Estimation Method? If yes, skip to Line 25.*	**yes / no**	

*Please review the guidance sheet "Channel Protection Storage Volume Estimation" and attach the specified information. This method is not appropriate if more than a one subwatershed drains to the practice. Using the center of mass detention time calculated by a hydrologic model that accounts for pond routing is the preferred method.

23	What storage volume (cubic feet) necessary to meet the Channel Protection Standard?	
24	What is the calculated average release rate (cfs)?	
25	What is the controlled peak release rate (cfs) during the 1-year storm as indicated by the model?	

	Overbank Flood Protection Treatment Standard (Qp10)	**Response**	**Attachment location**
25	Have you demonstrated that Qp10 post is less than or equal to Qp10 pre at the discharge point?*	**yes / no**	

*Please include runoff and routing calculations of the 10-year storm event.

	Extreme Flood Protection Treatment Standard (Qp100)	**Response**	**Attachment location**
26	Have you demonstrated that Qp100 post is less than or equal to Qp100 pre at the discharge point?*	**yes / no**	

*Please include runoff and routing calculations of the 100-year storm event.

*Grass channels provide rate-based treatment and must be designed to provide 10 minutes of residence time for the peak WQ discharge (a 0.9 inch storm). Traditional methods underestimate the volume and rate of runoff for storms of less than 2 inches. Modified curve numbers must be used. Because this practice is rate-based, both on and off-site water reaching the grass channel must be included in the calculations. This additional water will affect the velocity and residence time of the water in the channel. The average residence time for the peak discharge corresponds to the residence time calculated at the peak/maximum velocity, which is reported as the minimum residence time.

Attachment location: Please indicate the specific location (i.e. appendix, page, plan sheet) where the requisite support documentation has been provided within the application

Page 1 of 2

Version: 9/06

For the area draining to*: South Grass Channel

Located in drainage area for S/N: 002

WQ Volume and Modified Curve Number Calculation for Water Quality Treatment in Flow-Based Practice

Use *this worksheet to calculate your WQv if you need to determine the Peak Q for the WQ storm (i.e. designing a grass channel, flow-splitter or other flow based practice) and you are not using any of the site design credits in section 3 of the 2002 VSWMM. See page 2 for "Calculating Peak WQ Discharge Rate (0.9" storm) using the Modified Curve Number." Please note that in the case of grass channels you must include any off-site area draining to the practice as this will affect the peak discharge rate which will ultimately affect the hydraulics, and thus residence time, in your channel.*

Water Quality Volume Calculations

Line			value/calculation	units
1	Area draining to practice	A=	0.50	acres
2	Impervious area		0.36	acres
3	Percent Impervious Area = [(line 2/line 1) * 100] =	I =	72.00	% (whole #)
4	Precipitation	P =	**0.9**	inches
5	**Runoff coefficient calculation** = (0.05 + (0.009*I))	Rv =	0.698	
6	**WQ Volume (in watershed inches) Calculation =**(P * Rv) =		0.628	Qa (watershed inches, a.k.a. inches of runoff)
7	Minimum WQ Volume[1]		**0.2**	watershed inches
8	Enter the greater of line 6 or line 7	**WQv =**	0.628	watershed inches
9	**WQ Volume Calculation =** (line 8 *A)/12 =	**WQv =**	0.026	ac. ft.
10	**WQ Volume Calculation =** (line 9 * 43560) =	**WQv =**	1140	cu. ft.

Notes:

1: Sites with low impervious cover (~19%) but that do not employ a **significant** use of the stormwater design credits in Section 3 of the VSWMM are required to treat the minimum water quality volume of 0.2 watershed inches. Sites that have a **significant** portion of their impervious cover addressed via the stormwater credits (section 3 of the VSWMM) will be able to reduce this WQv and will only be required to treat the volume calculated on the "WQ Volume (with credit reduction)" worksheet which will be less than the 0.2 watershed inches.

* Enter the name of the STP (both type and label) which has been designed to treat this particular WQv (e.g. Wet Pond #2)

Version: 9/06

For the area draining to*: South Grass Channel

Located in drainage area for S/N: 002

Calculating Peak WQ Peak Discharge Rate (0.9" storm) using the Modified Curve Number

Because NRCS methods underestimate the peak discharge for rainfall events of less than 2", simply plugging in 0.9" of rainfall into your hydrologic model with the standard curve numbers will not produce the correct peak discharge during the WQv storm, nor will it produce a volume of runoff equivalent to that which you have calculated using the WQv formula (WQv = P*Rv*A/12). In order to calculate the peak discharge for the 0.9" storm, a modified curve number must be calculated. This modified curve number is based on the runoff (in inches) calculated using the short cut method formula (WQv = P*Rv) that is also the basis of the familiar WQv calculations provided in the 2002 VSWMM (and on the WQv calculation worksheets). Essentially, the curve number that is calculated using the methods below is the curve number that will generate the volume of runoff calculated using the WQv formula.

Above, you should have calculated the **WQv in watershed inches draining to the facility/practice** for which you need to calculate the WQ-peak discharge. As provided in the guidance listed on the grass channel worksheet, please remember that the WQv calculation should include runoff from on-site as well as **off-site area** draining to the grass channel since this will have an impact on the channel hydraulics and thus the velocity and residence time.

Steps:

1. Transfer information from WQv calculation worksheets.

Enter the Qa (line 8 from WQv sheet)

Qa = 0.628 inches

Enter the area (site +off-site draining to practice) used in calculating the percent impervious (I)

A = 0.5 acres

2. Use the following equation to calculate a corresponding curve number

where P = 0.9 inches

CN = 1000/(10 +(5*P)+(10*Qa) - (10*(Qa^2 + (1.25*Qa*P))^0.5))

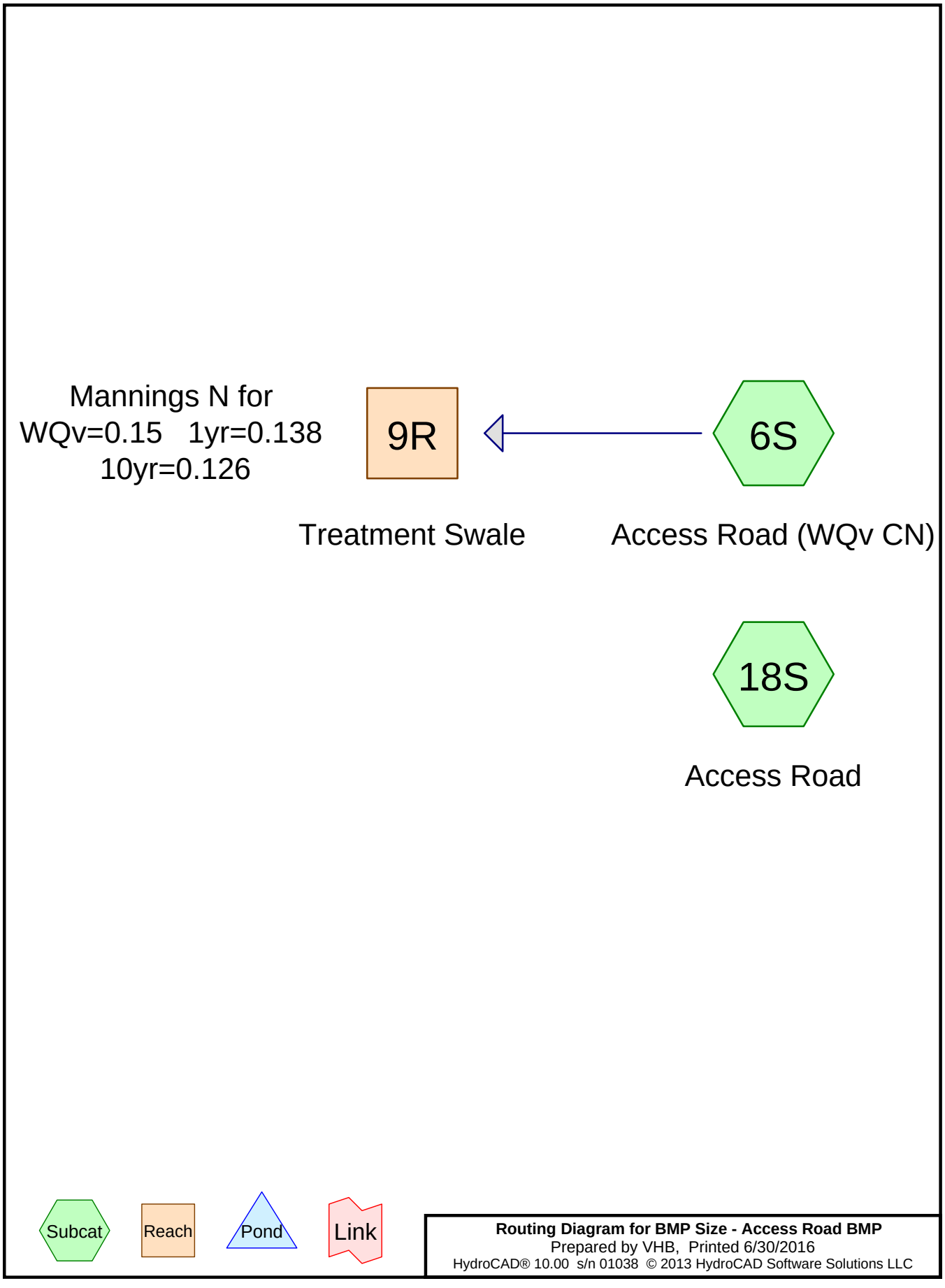
CN = 97.2

3. If you are using **hand hydrologic runoff calculations,** use the computed CN above along with your calculated time of concentration and the drainage area (A) to calculate the peak discharge (Qwq) for the water quality storm using the TR-55 Graphical Peak Discharge Method.

OR

3. If you are using a computer aided hydrologic model, simply revise the curve number for your subwatershed(s) draining to the practice using the curve number calculated above; the computed curve number should be applied to the total area (A) used in the WQv calcuation. As a check, you should note that now when you run the 0.9" storm, your runoff depth should be roughly equal to Qa (WQ runoff in inches) and your total runoff volume roughly equal to your WQv (in ac. ft.). If this is not the case, make sure that the time span for your modelling run is long enough to capture the entire storm. Small variations are likely due to having to round your computed CN to a whole number. Remember that for storms larger than 2", you do not need to use the modified curve number and you should calculate your composite curve number based on the accepted values for different types of land-use (see TR-55).

* Enter the name of the STP (both type and label) which has been designed to treat this particular WQv (e.g. Wet Pond #2)



Routing Diagram for BMP Size - Access Road BMP
Prepared by VHB, Printed 6/30/2016

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 6S: Access Road (WQv CN) Runoff Area=0.500 ac 0.00% Impervious Runoff Depth=0.61"
Flow Length=375' Tc=3.8 min CN=97 Runoff=0.57 cfs 0.026 af

Subcatchment 18S: Access Road Runoff Area=0.500 ac 72.00% Impervious Runoff Depth=0.50"
Flow Length=375' Tc=3.8 min CN=81 Runoff=0.45 cfs 0.021 af

Reach 9R: Treatment Swale Avg. Flow Depth=0.22' Max Vel=0.48 fps Inflow=0.57 cfs 0.026 af
n=0.150 L=121.0' S=0.0207 '/' Capacity=13.64 cfs Outflow=0.50 cfs 0.026 af

Total Runoff Area = 1.000 ac Runoff Volume = 0.046 af Average Runoff Depth = 0.56"
64.00% Pervious = 0.640 ac 36.00% Impervious = 0.360 ac

Summary for Subcatchment 6S: Access Road (WQv CN)

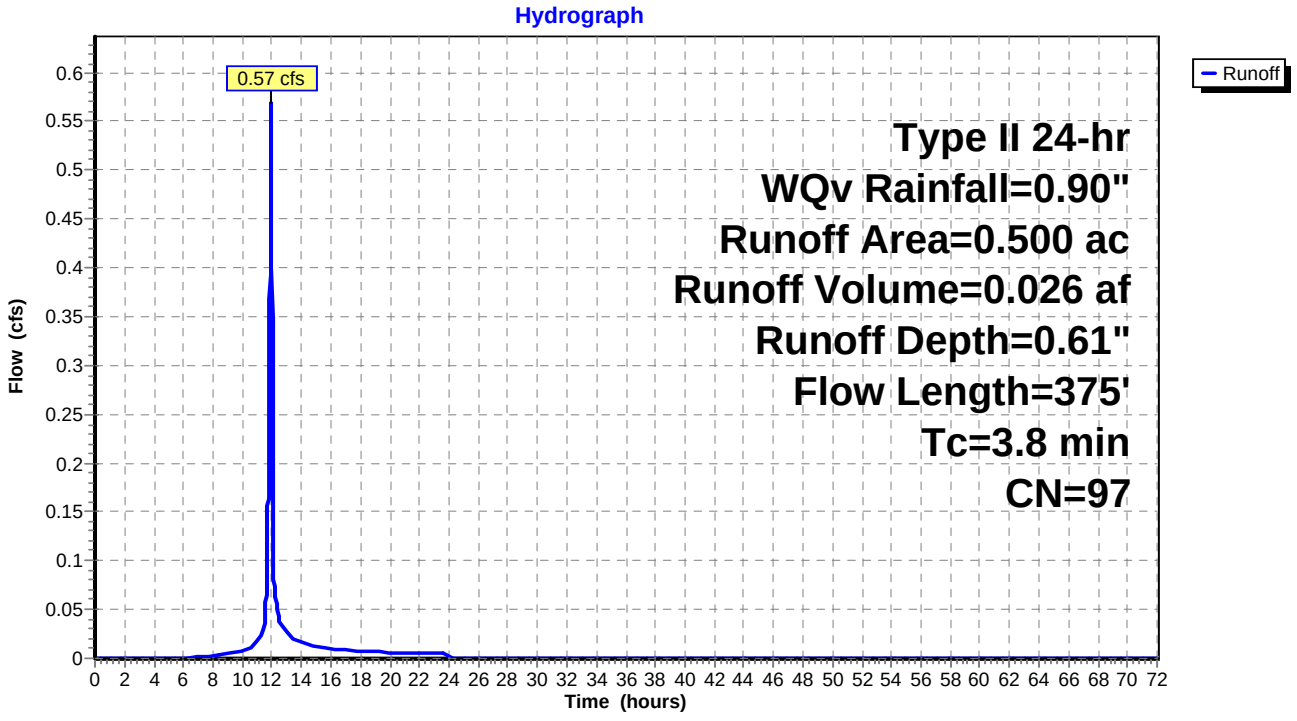
Runoff = 0.57 cfs @ 11.95 hrs, Volume= 0.026 af, Depth= 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Rainfall=0.90"

	Area (ac)	CN	Description
*	0.500	97	Modified CN from WQv_flow calc sheet
	0.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	25	0.0005	0.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.30"
1.7	350	0.0280	3.40		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	375	Total			

Subcatchment 6S: Access Road (WQv CN)



Summary for Subcatchment 18S: Access Road

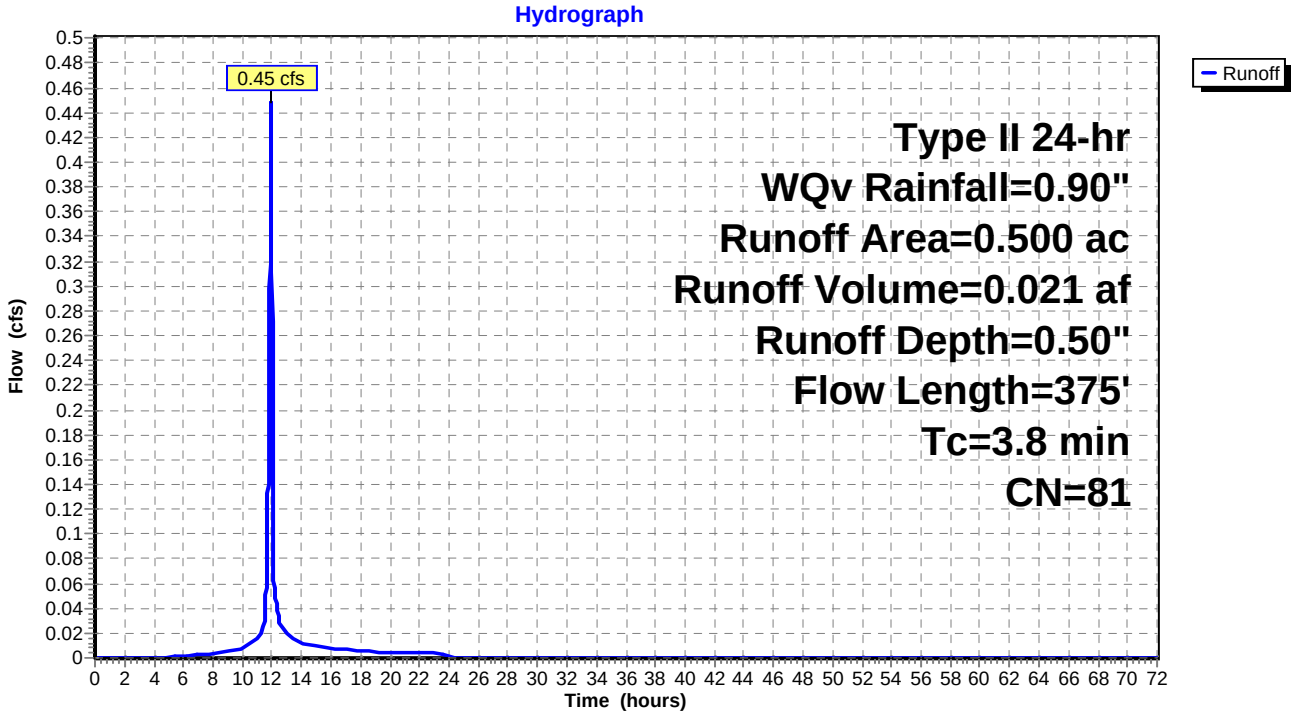
Runoff = 0.45 cfs @ 11.94 hrs, Volume= 0.021 af, Depth= 0.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Rainfall=0.90"

Area (ac)	CN	Description
0.360	98	Paved parking, HSG A
0.140	39	>75% Grass cover, Good, HSG A
0.500	81	Weighted Average
0.140		28.00% Pervious Area
0.360		72.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	25	0.0005	0.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.30"
1.7	350	0.0280	3.40		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	375	Total			

Subcatchment 18S: Access Road



Summary for Reach 9R: Treatment Swale

Inflow Area = 0.500 ac, 0.00% Impervious, Inflow Depth = 0.61" for WQv event
Inflow = 0.57 cfs @ 11.95 hrs, Volume= 0.026 af
Outflow = 0.50 cfs @ 11.98 hrs, Volume= 0.026 af, Atten= 12%, Lag= 1.9 min

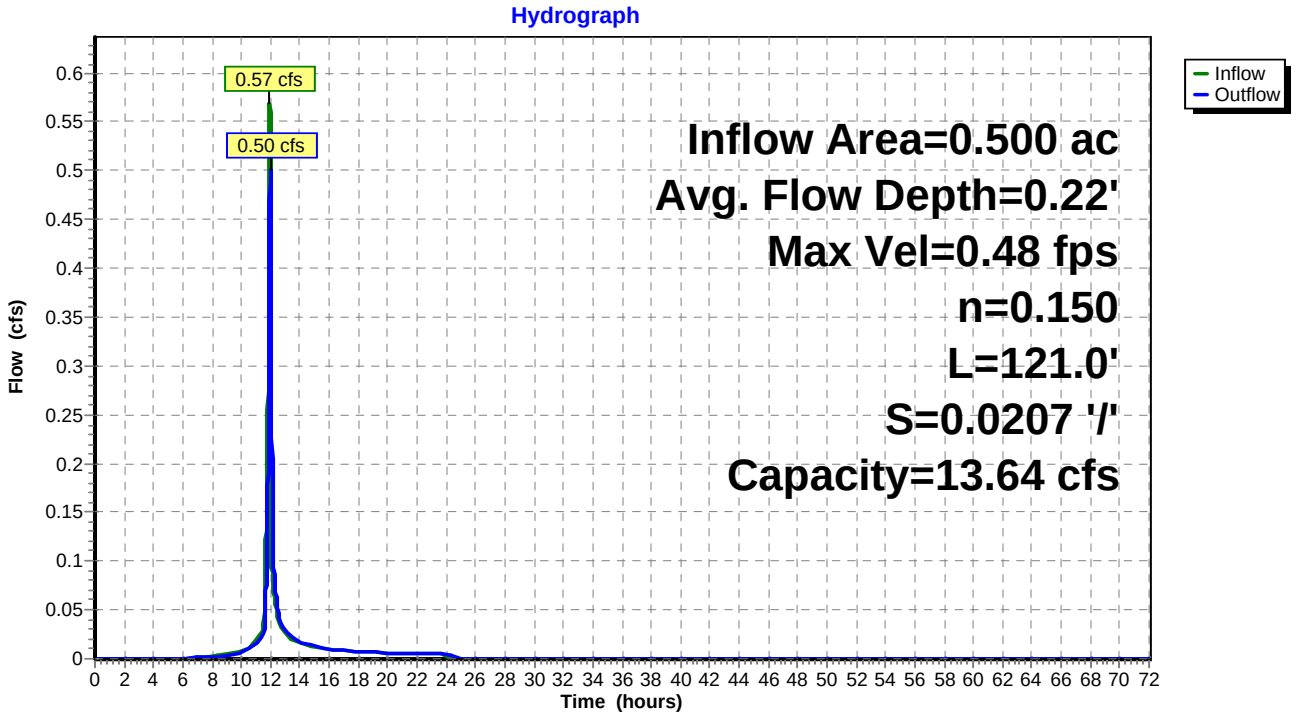
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.48 fps, Min. Travel Time= 4.2 min
Avg. Velocity = 0.11 fps, Avg. Travel Time= 18.5 min

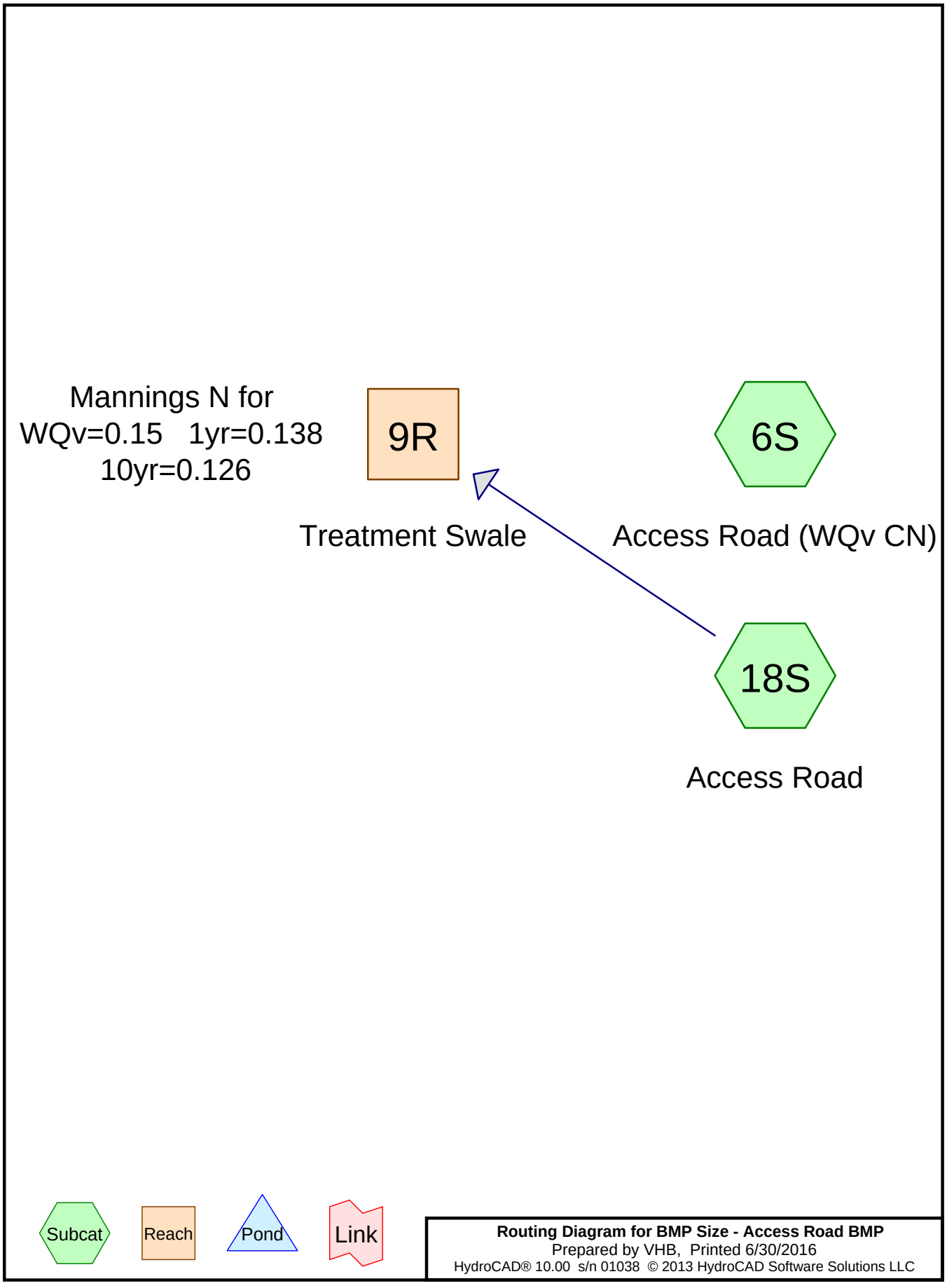
Peak Storage= 127 cf @ 11.98 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 1.33' Flow Area= 10.6 sf, Capacity= 13.64 cfs

4.00' x 1.33' deep channel, n= 0.150
Side Slope Z-value= 3.0 '/' Top Width= 11.98'
Length= 121.0' Slope= 0.0207 '/'
Inlet Invert= 123.50', Outlet Invert= 121.00'

‡

Reach 9R: Treatment Swale




Mannings N for
WQv=0.15 1yr=0.138
10yr=0.126
9R
Treatment Swale
6S
Access Road (WQv CN)
18S
Access Road
Subcat
Reach
Pond
Link
Routing Diagram for BMP Size - Access Road BMP
Prepared by VHB, Printed 6/30/2016
HydroCAD® 10.00 s/n 01038 © 2013 HydroCAD Software Solutions LLC

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 6S: Access Road (WQv CN) Runoff Area=0.500 ac 0.00% Impervious Runoff Depth=1.77"
Flow Length=375' Tc=3.8 min CN=97 Runoff=1.53 cfs 0.074 af

Subcatchment 18S: Access Road Runoff Area=0.500 ac 72.00% Impervious Runoff Depth=1.35"
Flow Length=375' Tc=3.8 min CN=81 Runoff=1.13 cfs 0.056 af

Reach 9R: Treatment Swale Avg. Flow Depth=0.33' Max Vel=0.64 fps Inflow=1.13 cfs 0.056 af
n=0.138 L=121.0' S=0.0207 '/' Capacity=14.83 cfs Outflow=1.04 cfs 0.056 af

Total Runoff Area = 1.000 ac Runoff Volume = 0.130 af Average Runoff Depth = 1.56"
64.00% Pervious = 0.640 ac 36.00% Impervious = 0.360 ac

Summary for Subcatchment 6S: Access Road (WQv CN)

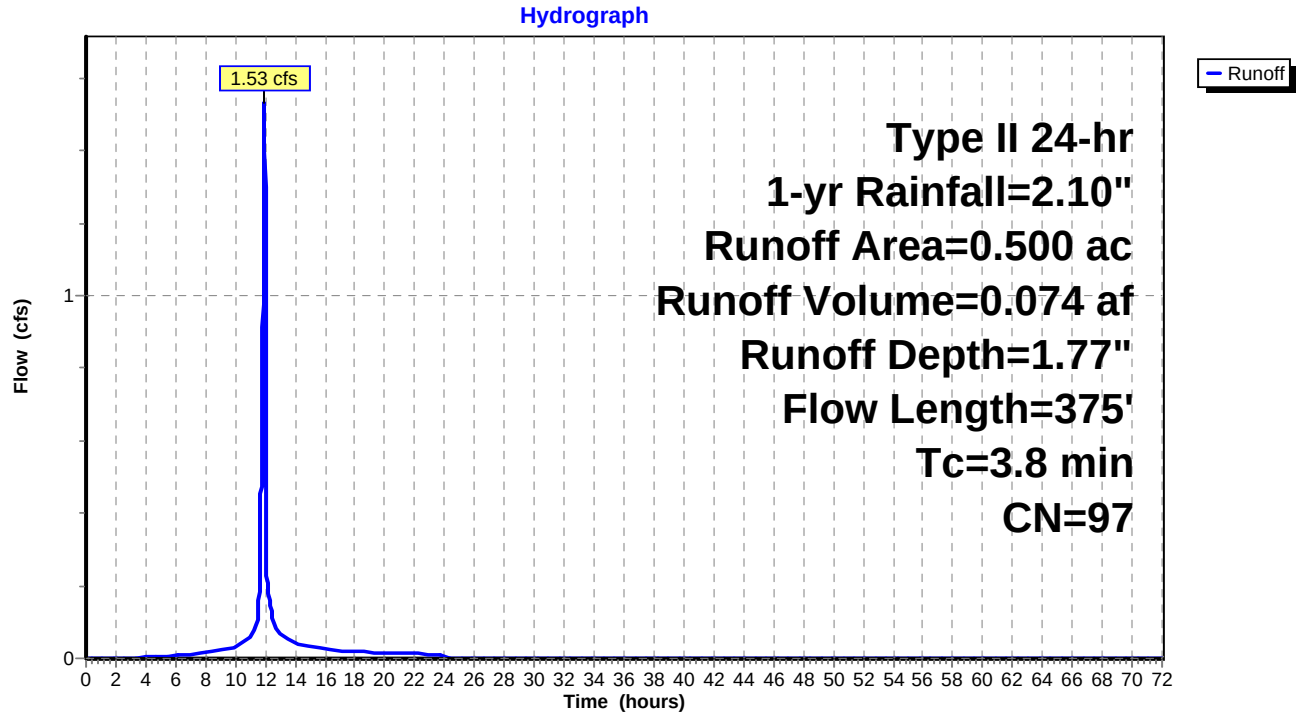
Runoff = 1.53 cfs @ 11.94 hrs, Volume= 0.074 af, Depth= 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=2.10"

	Area (ac)	CN	Description
*	0.500	97	Modified CN from WQv_flow calc sheet
	0.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	25	0.0005	0.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.30"
1.7	350	0.0280	3.40		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	375	Total			

Subcatchment 6S: Access Road (WQv CN)



Summary for Subcatchment 18S: Access Road

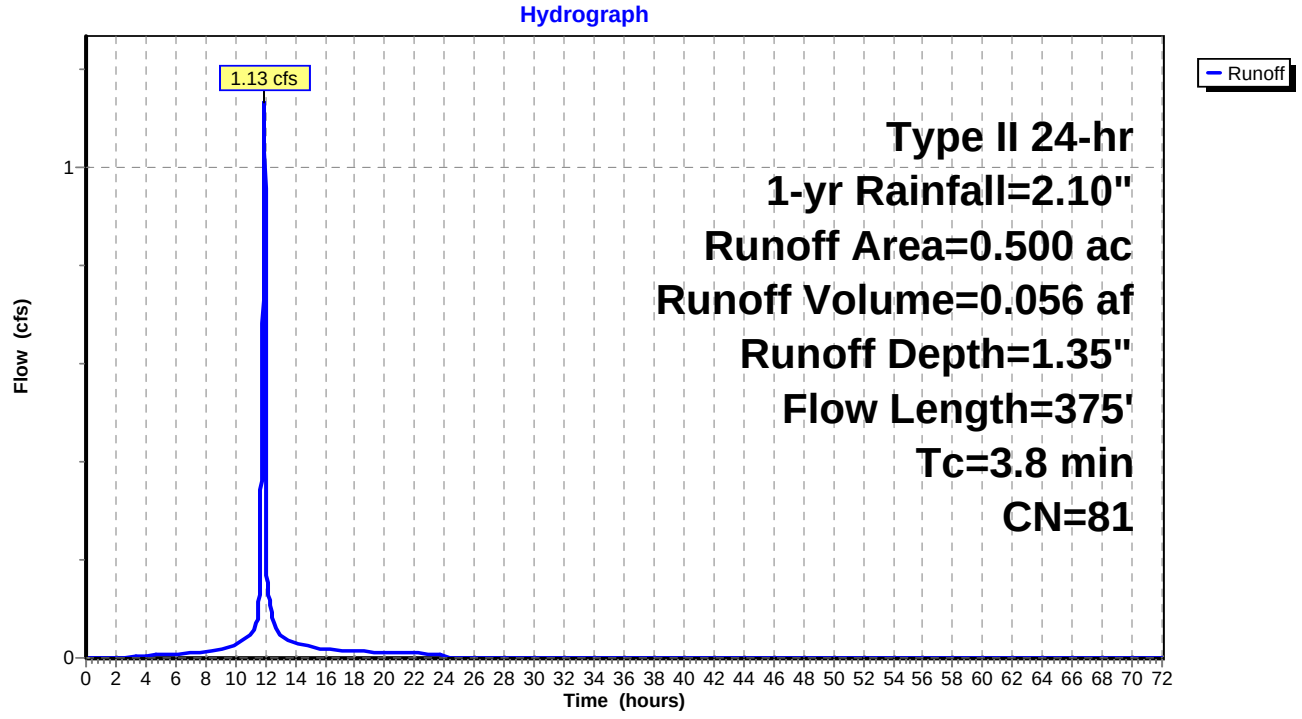
Runoff = 1.13 cfs @ 11.94 hrs, Volume= 0.056 af, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=2.10"

Area (ac)	CN	Description
0.360	98	Paved parking, HSG A
0.140	39	>75% Grass cover, Good, HSG A
0.500	81	Weighted Average
0.140		28.00% Pervious Area
0.360		72.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	25	0.0005	0.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.30"
1.7	350	0.0280	3.40		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	375	Total			

Subcatchment 18S: Access Road



Summary for Reach 9R: Treatment Swale

Inflow Area = 0.500 ac, 72.00% Impervious, Inflow Depth = 1.35" for 1-yr event
Inflow = 1.13 cfs @ 11.94 hrs, Volume= 0.056 af
Outflow = 1.04 cfs @ 11.97 hrs, Volume= 0.056 af, Atten= 8%, Lag= 1.5 min

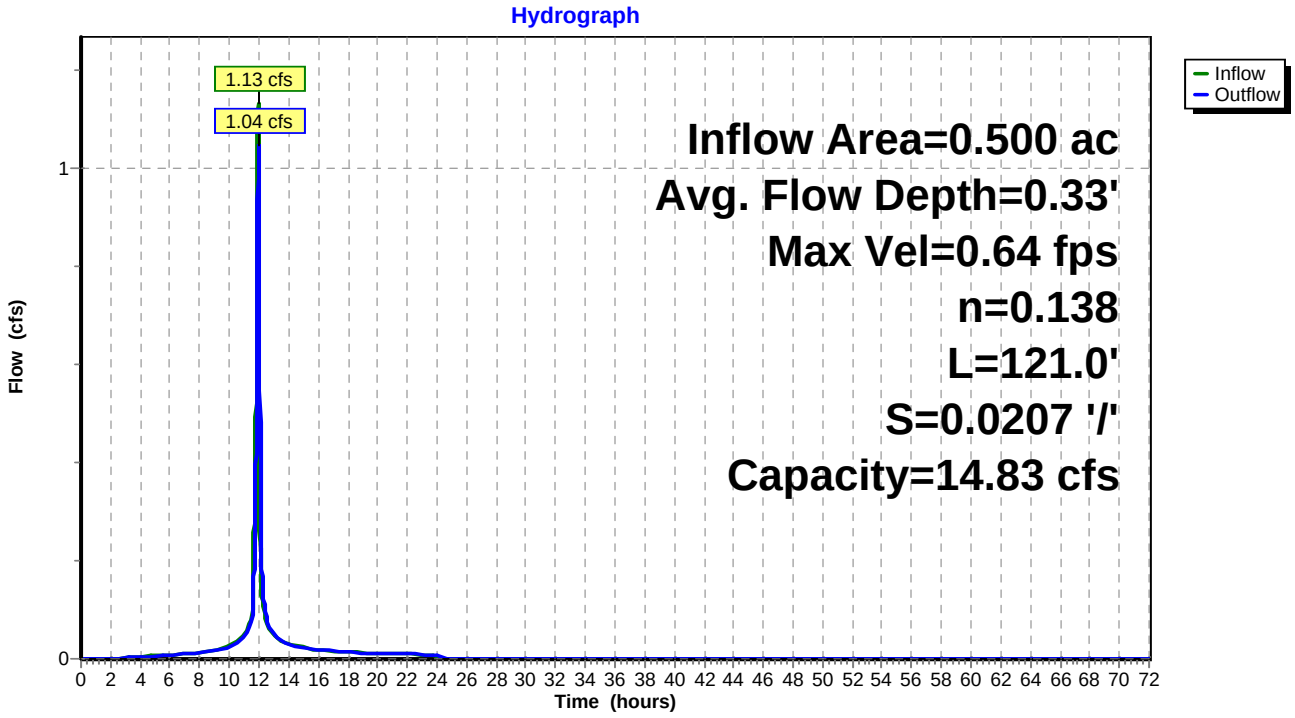
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.64 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 0.14 fps, Avg. Travel Time= 14.3 min

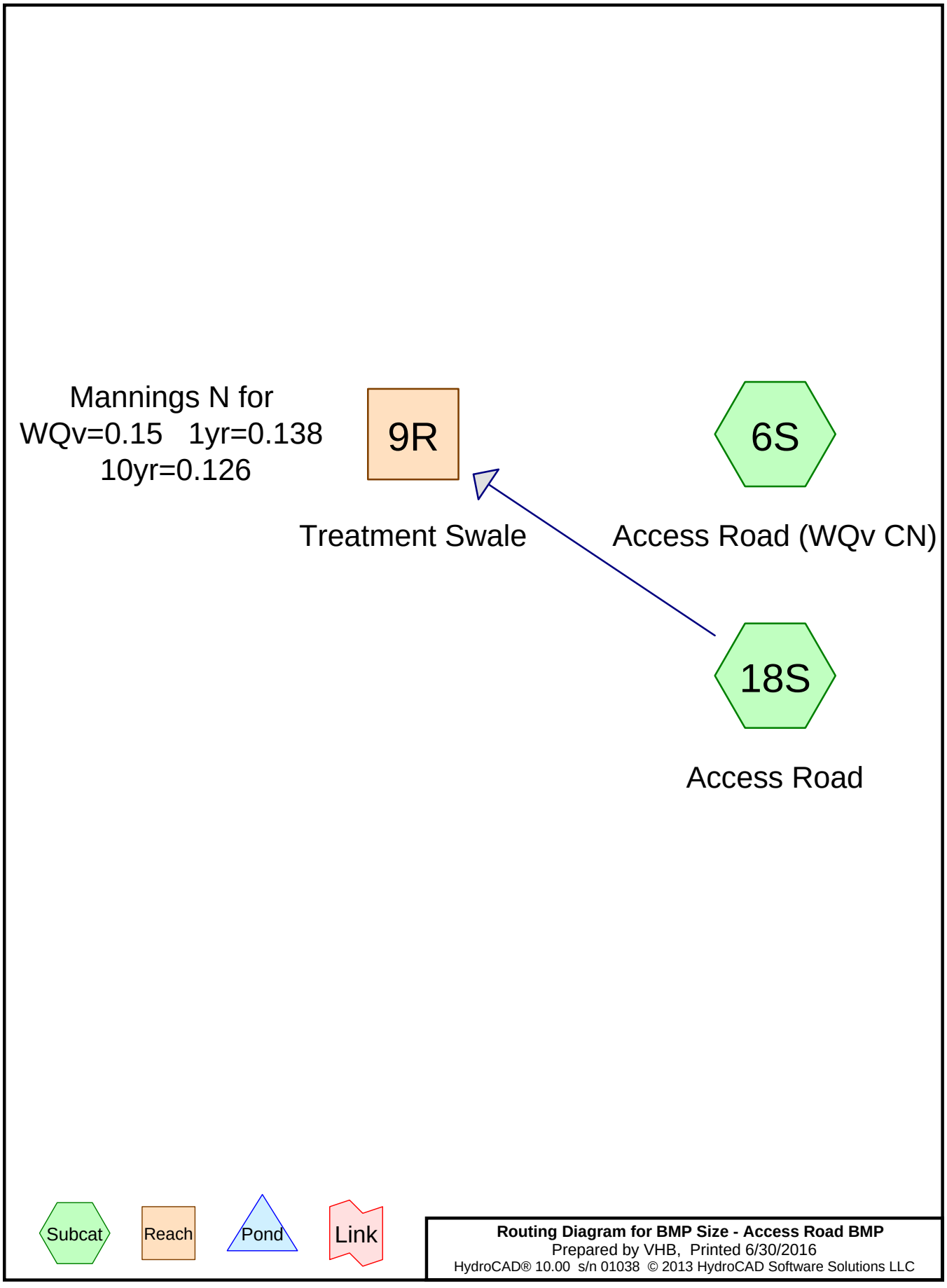
Peak Storage= 196 cf @ 11.97 hrs
Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 1.33' Flow Area= 10.6 sf, Capacity= 14.83 cfs

4.00' x 1.33' deep channel, n= 0.138
Side Slope Z-value= 3.0 '/' Top Width= 11.98'
Length= 121.0' Slope= 0.0207 '/'
Inlet Invert= 123.50', Outlet Invert= 121.00'

‡

Reach 9R: Treatment Swale




Mannings N for
WQv=0.15 1yr=0.138
10yr=0.126
9R
Treatment Swale
6S
Access Road (WQv CN)
18S
Access Road
Subcat
Reach
Pond
Link
Routing Diagram for BMP Size - Access Road BMP
Prepared by VHB, Printed 6/30/2016
HydroCAD® 10.00 s/n 01038 © 2013 HydroCAD Software Solutions LLC

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 6S: Access Road (WQv CN) Runoff Area=0.500 ac 0.00% Impervious Runoff Depth=2.86"
Flow Length=375' Tc=3.8 min CN=97 Runoff=2.39 cfs 0.119 af

Subcatchment 18S: Access Road Runoff Area=0.500 ac 72.00% Impervious Runoff Depth=2.14"
Flow Length=375' Tc=3.8 min CN=81 Runoff=1.75 cfs 0.089 af

Reach 9R: Treatment Swale Avg. Flow Depth=0.40' Max Vel=0.79 fps Inflow=1.75 cfs 0.089 af
n=0.126 L=121.0' S=0.0207 '/' Capacity=16.24 cfs Outflow=1.64 cfs 0.089 af

Total Runoff Area = 1.000 ac Runoff Volume = 0.208 af Average Runoff Depth = 2.50"
64.00% Pervious = 0.640 ac 36.00% Impervious = 0.360 ac

Summary for Subcatchment 6S: Access Road (WQv CN)

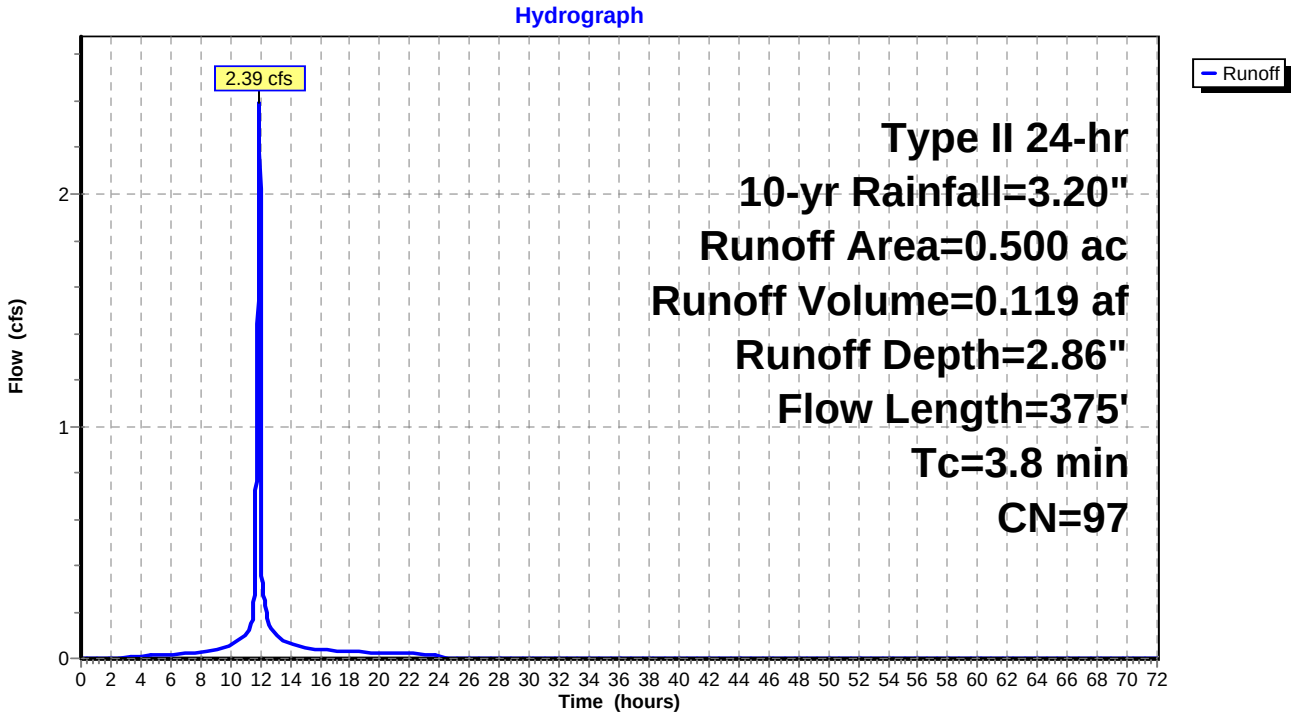
Runoff = 2.39 cfs @ 11.94 hrs, Volume= 0.119 af, Depth= 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-yr Rainfall=3.20"

	Area (ac)	CN	Description
*	0.500	97	Modified CN from WQv_flow calc sheet
	0.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	25	0.0005	0.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.30"
1.7	350	0.0280	3.40		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	375	Total			

Subcatchment 6S: Access Road (WQv CN)



Summary for Subcatchment 18S: Access Road

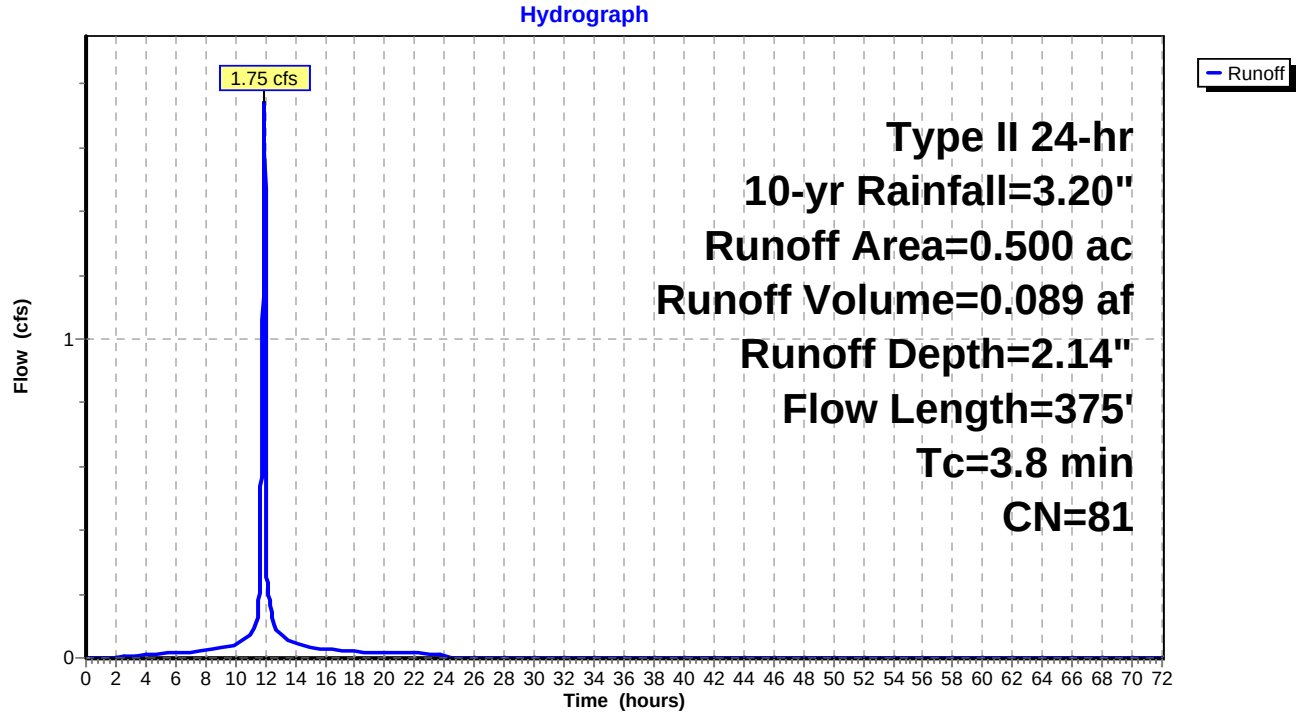
Runoff = 1.75 cfs @ 11.94 hrs, Volume= 0.089 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-yr Rainfall=3.20"

Area (ac)	CN	Description
0.360	98	Paved parking, HSG A
0.140	39	>75% Grass cover, Good, HSG A
0.500	81	Weighted Average
0.140		28.00% Pervious Area
0.360		72.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	25	0.0005	0.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.30"
1.7	350	0.0280	3.40		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	375	Total			

Subcatchment 18S: Access Road



Summary for Reach 9R: Treatment Swale

Inflow Area = 0.500 ac, 72.00% Impervious, Inflow Depth = 2.14" for 10-yr event
Inflow = 1.75 cfs @ 11.94 hrs, Volume= 0.089 af
Outflow = 1.64 cfs @ 11.96 hrs, Volume= 0.089 af, Atten= 6%, Lag= 1.3 min

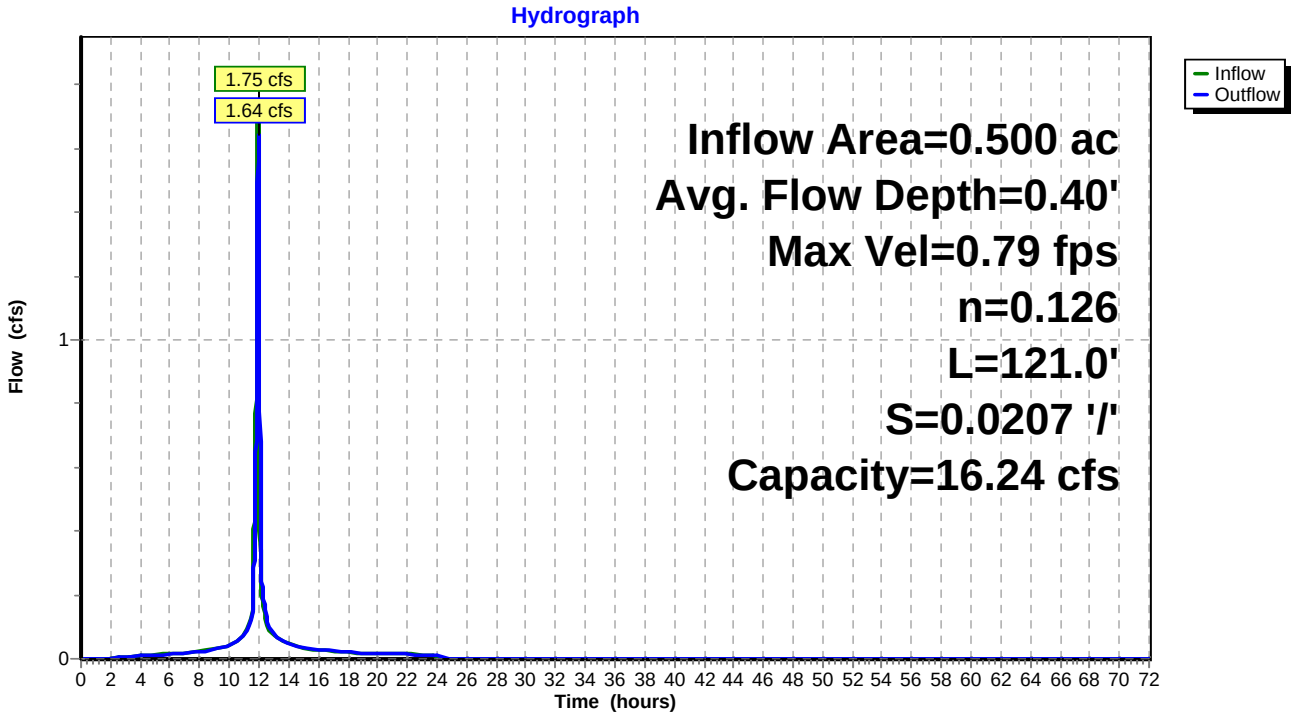
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.79 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 0.17 fps, Avg. Travel Time= 11.5 min

Peak Storage= 252 cf @ 11.96 hrs
Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 1.33' Flow Area= 10.6 sf, Capacity= 16.24 cfs

4.00' x 1.33' deep channel, n= 0.126
Side Slope Z-value= 3.0 '/' Top Width= 11.98'
Length= 121.0' Slope= 0.0207 '/'
Inlet Invert= 123.50', Outlet Invert= 121.00'

‡

Reach 9R: Treatment Swale



Wet Pond (P-2)

Wet Pond #__1_____

Line **Indicate the treatment standards met for the site area draining to this practice:**

1 WQv ☒
2 Cpv ☐
3 Qp10 ☐
4 Qp100 ☐

Water Quality Volume (WQv)

5	What is the WQv (cubic feet) for the site area draining to this practice (from WQv worksheets)?	10213

	Feasibility (2.7.1. A)	Response	Attachment location
6	Have you performed a site evaluation to establish the Hazard Classification of the pond?	yes	Class A - pond is in cut
7	Have you determined depth to bedrock and soil properties using geotechnical investigations?	yes	

	Conveyance (2.7.1.B)	Response	Attachment location
8	Have forebays been provided at every inlet with 10% or more of the total inflow to the pond?	no	grass swale for pretreatment
9	Have the outfalls been designed/protected to avoid erosive velocities?	yes	

	Pretreatment (2.7.1.C)	Response	Attachment location
10	Has pretreatment been provided for non-rooftop runoff?	yes	
11	Is the forebay 4 to 6 feet deep?	N/A	grass swale for pretreatment
12	Has the forebay been designed with non-erosive outlets?	N/A	grass swale for pretreatment
13	Has direct access to the forebay been provided for maintenance?	N/A	grass swale for pretreatment

14	What volume (cubic feet) of water is the forebay (or equivalent upstream pretreatment) sized to contain?	1021

	Treatment (2.7.1.D)	Response	Attachment location
15	Is the length to width ratio for the main cell of the pond equal to or greater than 1.5:1?	yes	

16	What volume (cubic feet) of the WQv is contained within the permanent pool?	15006

	Landscaping (2.7.1.E)	Response	Attachment location
17	Is the main cell of the pond four feet or greater (do not include pretreatment forebay)? If no, skip to Line 23.	no	
18	Are the side slopes of the pond 4:1 (h:v) or flatter?	yes / no	
20	Is the pond fenced?		
20a	yes → Does the pond have a safety bench of at least 6% grade extending at least 6 feet from the normal water edge?		yes / no / not applicable
20b	no → Does the pond have a safety bench of at least 6% grade extending generally 15 feet from the normal water edge?		yes / no / not applicable
21	Does the pond have an aquatic bench with an irregular configuration at a maximum depth of 18 inches, extending up to 15 feet from the normal water level edge?	yes / no	
22	Have all the required elements of the landscaping plan been addressed?	yes / no	

	Maintenance (2.7.1.F)	Response	Attachment location
23	Is the principal spillway accessible from land and equipped with a removable trash rack?	yes & no	spillway is an open weir

	Cold Climate Design Considerations (2.7.1.G)	Response	Attachment location
24	Have the potential impacts of Vermont's severe winter climate been addressed in your design?	yes	pipes not used

Pond Stage Storage and Outlet Information

25	At what elevation (feet) does the storage begin during the larger (> 0.9") storm events?	

		Response	Attachment location
26	Does the application include oultet elevation and size information for the pond?.	**yes / no**	
27	Has peak storage volume and elevation information for the 1, 10 and 100-year storms been included?	**yes / no**	

	Channel Protection Treatment Standard (Cpv)	Response
28	Check which detention time standard must be used, based on the fisheries designation of the receiving water:	☐ **12 hours for cold water** ☐ **24 hours for warm water**

		Response	Attachment location
29	Did you use the Storage Volume Estimation Method? If yes, skip to Line 37.*	**yes / no**	

*Please review the guidance sheet "Channel Protection Storage Volume Estimation" and attach the specified information. This method is not appropriate if more than a one subwatershed drains to the practice. Using the center of mass detention time calculated by a hydrologic model that accounts for pond routing is the preferred method.

30	What storage volume (cubic feet) is necessary to meet the Channel Protection Standard?	
31	What orifice size (inches) is necessary to meet the required detention time?	
32	What is the calculated average release rate (cfs)?	
33	What is the controlled peak release rate (cfs) during the 1-year storm as indicated by the model?	

	Overbank Flood Protection Treatment Standard (Qp10)	Response	Attachment location
34	Have you demonstrated that Qp10 post is less than or equal to Qp10 pre at the discharge point?*	**yes / no**	

*Please include runoff and routing calculations of the 10-year storm event.

	Extreme Flood Protection Treatment Standard (Qp100)	Response	Attachment location
35	Have you demonstrated that Qp100 post is less than or equal to Qp100 pre at the discharge point?*	**yes / no**	

*Please include runoff and routing calculations of the 100-year storm event.

See VSMM-Vol. II, Appendix D7 for guidance about maintaining non-erosive conditions. Forebays should be a minimum of 10% of the WQv. They can be more, but the main cell of the pond should still contain a minimum of 90% of the WQv. Larger storm volumes should begin at the level of the permanent pool. They does not need to be at the elevation of the total WQv, since a portion of the WQv is being addressed through extended detention. While the Channel Protection Treatment Standard only applies to the site, ensure that appropriate overflow outlets are designed to safely release off-site water that may also be entering the pond.

Attachment location: Indicate the specific location (i.e. appendix, page, plan sheet) where the requisite support documentation has been provided within the application

Project Name: Shelburne Transload **Discharge Point:** S/N001

3.3 – Disconnection of Non-Rooftop Runoff Credit

Fill out this worksheet for each discharge point drainage area in which you have disconnected all or a portion of your non-rooftop runoff.

Line	Disconnection of Non-Rooftop Runoff Credit Criteria:	Response	
1	Has a typical disconnection detail been included on the site plans?	☐ Yes	☑ No*
2	Is the disconnection on a slope less than or equal to 5%?	☑ Yes	☐ No*
3	Is the maximum contributing length of non-rooftop 75 feet or less?	☑ Yes	☐ No*
4	Is the maximum contributing area less than 1000 square feet? Note: This criterion applies to collected, routed non-rooftop runoff.	☐ Yes	☑ N/A
5	Is the length of the disconnection at least equal to the contributing length?	☑ Yes	☐ No*
6	Does the disconnected runoff drain either as sheet flow or into a subsurface drain that is not directly connected to the drainage network?	☑ Yes	☐ No*
7	Have disconnections located on HSG C or D soils been evaluated to determine if disconnection is appropriate?	☐ Yes	☑ N/A
8	Does the disconnected non-rooftop runoff drain from a "hotspot" land use area?	☐ N/A	☑ No

***If No**, please explain why below?

9 8. the disconnection areas are located along the access road, where low potential for salt spillage exists.

Note: To be eligible for the credit all minimum criteria must be met.

Appendix B: **Non-Stormwater Discharges**

Non-stormwater discharges can include discharges of process water, air conditioner condensate, non-contact cooling water, vehicle wash water, or sanitary wastes, and are typically the result of unauthorized connections of sanitary or process wastewater drains to storm sewers. These connections are common, yet often go undetected. Typically these discharges are significant sources of pollutants, and unless regulated by an NPDES permit, they are also illegal. [1]

Record the results of the Non-Stormwater Discharge Assessment and Certification in Worksheet 1.

If evaluation of any discharge points is impossible, then the discharge points of concern and the reasons they could not be evaluated should be recorded on Worksheet 2.

[1] US EPA, 1999. Stormwater Management Fact Sheet: Non-Stormwater Dischargers to Storm Sewers. EPA 832-F-99-022. September 1999.

Worksheet 1: Assessment and Certification of Non-Stormwater Discharges

Date of Test	Outfall	Method Used to Evaluate Discharge	Test Results	Potential Sources	Person or Party Conducting the Test

CERTIFICATION

I _____ (responsible corporate official) certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name & Official Title	Area Code and Telephone No.
Signature	Date Signed

Worksheet 2: Non-Stormwater Discharge Failure to Certify Notification

Outfall Not Tested/Evaluated	Why Certification is Infeasible	Potential Sources of Non-Stormwater Pollution

CERTIFICATION

I _____ (responsible corporate official) certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name & Official Title	Area Code and Telephone No.
Signature	Date Signed

Appendix C: **Routine Facility Inspections**

Keep records of all routine facility inspections here. A sample inspection form has been included.

Routine Facility Inspection Form

Date: _____ Completed by: _____

Area Checked	Checked for…	Problems?		If yes, describe	Corrective Actions to be Taken	Schedule for Corrective Actions
		Y	N			

C

Appendix D: **Employee Training Records**

Keep a sign in sheet for each employee training session your facility holds and retain them with this SWPPP.

Refresher Course Employee Sign-In Sheet Date:_____

Employee Name	Employee Signature

D

Appendix E: **Quarterly Visual Monitoring Inspection Forms**

Keep the completed inspection forms with the SWPPP here.

Quarterly Visual Inspection Form

Inspections at each outfall should be made within the first 30 minutes of the runoff event.

Observations should note color, odor, turbidity, solids, foam, oil sheen, or any other obvious form of contamination.

Date/ Time	Outfall	Weather Conditions	Observations	Probable Sources of contamination	Action Taken to Prevent in Future

Date Completed: _____ Complete by: _____

Appendix F: **Analytical Monitoring**

The monitoring plan and results from the benchmark, effluent limitation, and impaired waters monitoring should be kept in this section of the SWPPP.

Memorandum

To: Vermont Railway, Inc.
Project File

Date: July 6, 2016

Project #: 57762.00

From: Robert Wildey, CPESC

Re: Shelburne Transload Facility
LaPlatte River Water Quality Monitoring Plan

INTRODUCTION

In support of Vermont Railway, Inc. ("VTR", or "Applicant") proposal to develop the Shelburne Transload Facility ("Project"), located to the north of the Village of Shelburne and west of U.S. Route 7 and a VTR track and approximately 0.5 southeast from the mouth of the LaPlatte River, VHB proposes the implementation of the following water quality monitoring plan.

PURPOSE AND OBJECTIVES

The purpose of the water quality monitoring program is to provide a baseline determination of existing water quality of the receiving waters prior to the operation of the Project. Such monitoring would continue following commencement of Project operations to measure water quality conditions on an ongoing basis. The monitoring program would include two monitoring stations, one upstream and one downstream of the project site on the LaPlatte River.

MONITORING LOCATIONS

The monitoring sites selected coincide with monitoring sites that have been previously established by the Vermont Department of Environmental Conservation Watershed Management Division. These sites are included in the Vermont Integrated Watershed Information System (IWIS) which publishes water quality and chemistry results throughout the State. The sites to be monitored for this project, shown on the attached Water Quality Monitoring Locations and Potential Pollutant Source maps prepared by VHB, include the following sites on the LaPlatte River:

DEC ID #500789: Upstream of the Project site. Located near the intersection of the LaPlatte River and Shelburne Road (U.S. Route 7).

DEC ID #500785: Downstream of the Project site, upstream of the confluence of the LaPlatte River and McCabes Brook. Located off the trail at the end of Yacht Haven Drive.

S/N 001: Outlet from the stormwater treatment pond near the northwest corner of the site.

S/N 002: Outlet from the water quality swale to the level spreader near the southeast corner of the site.

MONITORING METHODS AND PARAMETERS

Monitoring will be conducted during dry weather conditions (Baseflow) as well as during wet weather storm event conditions (Event Flow). Weather conditions at the time of sampling would be recorded and reported rainfall depths for the 72 hours prior to sampling would be provided using publicly-available sources (e.g., National Weather Service, US Geological Survey or other nearby rain gages). Stream flow data from the USGS gage on the LaPlatte River (Station

ID 04282795, LaPlatte at Shelburne Falls) would also be provided. Water quality parameters to be collected by VHB and analyzed by Endyne, Inc. (Endyne), include the following:

- pH (field measurement only)
- Temperature (field measurement only)
- Conductivity (field measurement only)
- Total Suspended Solids (TSS)
- Chloride
- Total Phosphorous

MONITORING SCHEDULE

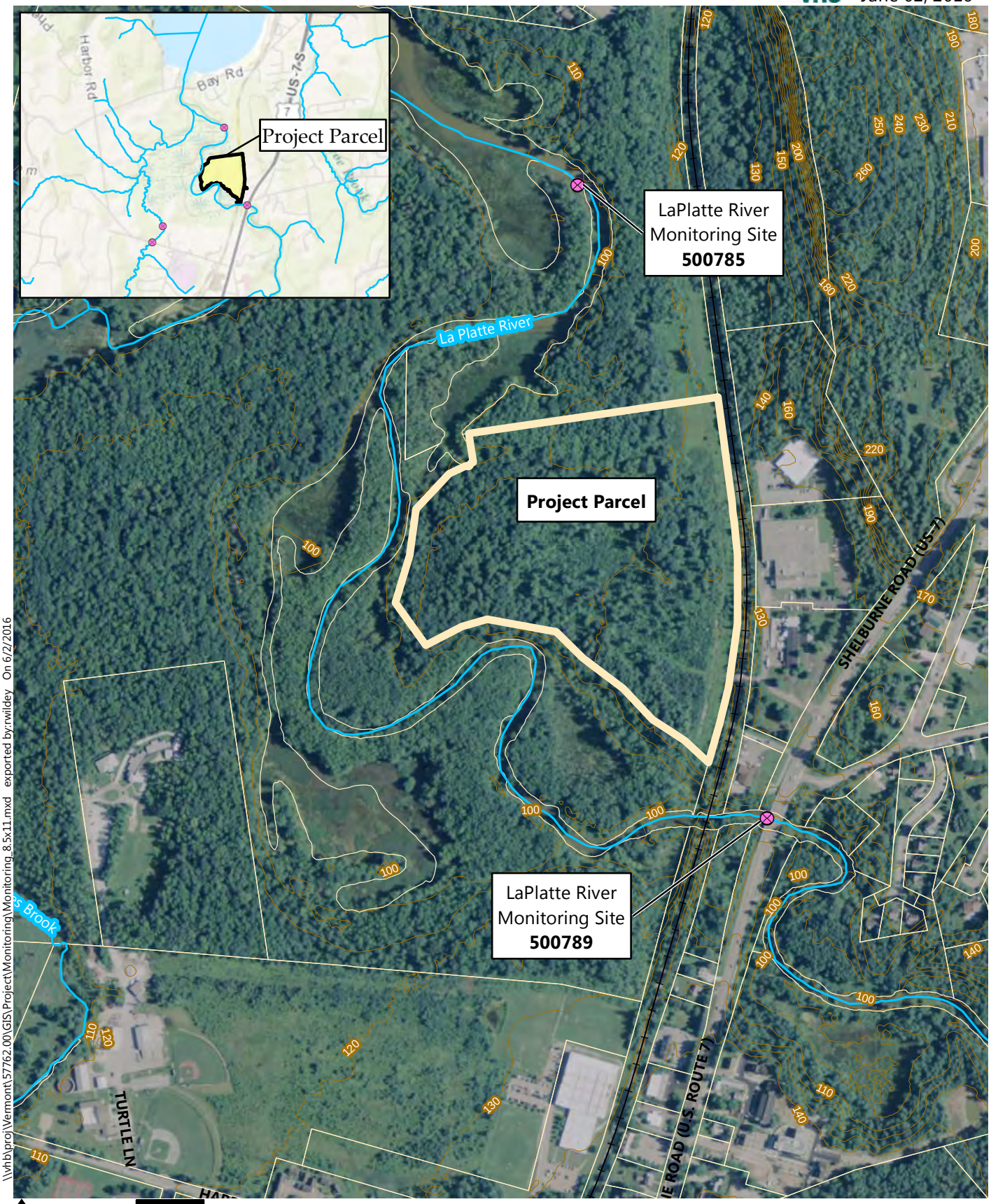
Between June and September 2016, i.e. prior to the facility becoming operational, a minimum of four dry weather sampling events (grab samples) would be conducted at the monitoring stations. These samples would provide an updated baseline for comparison with historic data.

Once the facility begins operations (anticipated to occur in September 2016), the Project would conduct two baseflow (dry weather) and two event flow (wet weather) each year at the LaPlatte River monitoring stations. Two wet weather samples would be collected at the stormwater treatment practices outlets; no dry weather flow is anticipated at these locations. These samples would be collected between May 1 and October 1 of each year.

ATTACHMENTS

Attachment 1 – Water Quality Monitoring Locations Map
Attachment 2 – Potential Pollutant Source Map
Attachment 3 – Existing IWIS Water Quality Data Summaries

ATTACHMENT



\\vhb\proj\Vermont\57762.00\GIS\Project\Monitoring\Monitoring_8.5x11.mxd exported by:rwildey On 6/2/2016

600 300 0 600 Feet

Legend

- Project Parcel (VCGI)
- DEC Monitoring Site
- 10 ft. Contour
- Railroad (VTrans)
- Stream (VHD)
- Parcel Boundary (VCGI)

Shelburne Transload Facility | Shelburne, Vermont

Sources: Background - NAIP (2014);
DEC monitoring sites from IWIS report (2016);
VHD Streams (2008); VCGI (Vermont Center for Geographic Information - Various Dates);
VTrans (Vermont Agency of Transportation - Various Dates)

Water Quality Monitoring Locations

July 8, 2016

Shelburne Transload Facility | Shelburne, Vermont

Potential Pollutant Source Map

Sources:
Background Imagery by VCGI (2013)
VTrans (Vermont Department of Transportation - 2014)
VHB: 2015 - 2016

IWIS

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION

Monitoring Site Summary - River/Stream

LaPlatte River

Location ID 500789

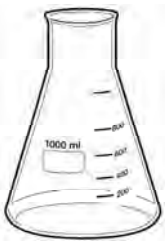
A total of 225ft surveyed along south side of river, surveyed 75ft downstream and 150f upstream of bridge at Route 7.

Shelburne, VT (44.38707, -73.22515)

Water Quality Measurements

Chemical and physical parameters provide a "snapshot" of current cond and are used to detect changes in water quality and to make determinati about a waterbody and its watershed. (For More Details)

Raw Data



Characteristic	Description	Trend	Max	Mean	Min
Chloride (mg/L)	At elevated values mostly from deicing		117.0	49.7	13.5
Conductivity (umho/cm)			367.0	367.0	367.0
E. Coli Bacteria (#/100ml)	Indicator of pathogens		2419.0	339.6	2.0
Nitrogen (mg/L)	Nutrient that may fuel algae blooms		1.7	0.5	0.3
pH	Acidity		8.5	8.5	8.5
Phosphorus (ug/L)	Nutrient that may fuel algae blooms		302.0	65.5	22.3
Turbidity (NTU)	Measure of suspended sediment		170.0	19.5	3.4

Habitat Observations

Observations on the physical condition of the waterbody can be useful i determining the habitat type present and if watershed stressors have degraded its ability to support a healthy community of aquatic biota. (F More Details)

Observation Date: 7/24/1997

Habitat Type: Run

Embeddedness Estimated %: 87.5

Canopy %: 70

IWIS

Monitoring Site Summary - River/Stream

LaPlatte River

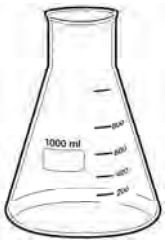
Location ID 500785

Trail from end of Yacht Haven Drive
Shelburne, VT (44.3945, -73.22879)

Water Quality Measurements

Chemical and physical parameters provide a "snapshot" of current cond and are used to detect changes in water quality and to make determinati about a waterbody and its watershed. (For More Details)

Raw Data



Characteristic	Description	Trend	Max	Mean	Min
Chloride (mg/L)	At elevated values mostly from deicing		117.0	43.8	15.1
E. Coli Bacteria (#/100ml)	Indicator of pathogens		2419.0	316.2	4.0
Nitrogen (mg/L) (Total)	Nutrient that may fuel algae blooms		2.0	0.6	0.3
Phosphorus (ug/L) (Total)	Nutrient that may fuel algae blooms		340.0	88.2	26.4
Turbidity (NTU)	Measure of suspended sediment		217.0	21.9	2.5

Instructions

- A separate DMR form must be submitted for each outfall sampled at your facility.
- List monitoring results for the type(s) of sampling you are reporting in the appropriate section. If your sampling event was used to satisfy more than one type of monitoring (e.g. Effluent Limitation and Benchmark monitoring) you may submit results for each type using the same form.
- For benchmark monitoring, be sure to indicate which quarter the sample was taken in.
- For effluent limitations, the permit may specify that a single grab sample is adequate, or that a daily maximum and a 30 day or monthly average is necessary. Circle the kind of value that you are reporting under the "Sample Type" heading.
- Write additional information about the sample collection and processing in the notes section, such as if the samples were taken more than 30 minutes after the start of discharge and the reason for the delay.
- Keep a copy of your DMR onsite with the SWPPP.
- DMR's must be sent to the Vermont Water Quality Division within 60 days of the sampling event at the following address:

Attn: MSGP Coordinator

Water Quality Division

103 South Main Street

Building 10 North

Waterbury, Vermont 05671-0408

Storm Event Data

Information on the storm events sampled should be recorded here. This information does not need to be submitted to the Agency, but should be available upon request.

Monitoring Period: ______________ to ______________
MO/DAY/YEAR MO/DAY/YEAR

Date of Storm Event: ______________ Type of Monitoring: ______________
MO/DAY/YEAR Effluent limitation/ Benchmark

Storm Duration : ______________ Total Precipitation: ______________
Hours Inches

Time Since Last Measurable Storm Event: ______________
Hours or Days

Monitoring Period: ______________ to ______________
MO/DAY/YEAR MO/DAY/YEAR

Date of Storm Event: ______________ Type of Monitoring: ______________
MO/DAY/YEAR Effluent limitation/ Benchmark

Storm Duration : ______________ Total Precipitation: ______________
Hours Inches

Time Since Last Measurable Storm Event: ______________
Hours or Days

Monitoring Period: ______________ to ______________
MO/DAY/YEAR MO/DAY/YEAR

Date of Storm Event: ______________ Type of Monitoring: ______________
MO/DAY/YEAR Effluent limitation/ Benchmark

Storm Duration : ______________ Total Precipitation: ______________
Hours Inches

Time Since Last Measurable Storm Event: ______________
Hours or Days

MSGP	Vermont Multi-Sector General Permit	Permit Number:
		SIC Code(s):
	Discharge Monitoring Report (DMR)	Outfall Number:
	Facility Name: Green Mountain Railroad Corp.	Sample Date:

Benchmark Monitoring Quarter: ☐ Jan – Mar ☐ Apr – Jun ☐ Jul – Sept ☐ Oct - Dec Monitoring Year:

Parameter	Cut-off Concentration (mg/L)	Sample Result (mg/L)

Effluent Limitation Monitoring (additional space is available on the back)

Parameter	Sample Type (circle one)	Limitation (mg/L)	Sample Result (mg/L)
	1x year / Daily Max		
	30 day avg / Monthly avg		
	1x year / Daily Max		
	30 day avg / Monthly avg		
	1x year / Daily Max		
	30 day avg / Monthly avg		
	1x year / Daily Max		
	30 day avg / Monthly avg		

Impaired Waters Monitoring

Parameter	Cut-off Concentration (if applicable)	Sample Value

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Effluent Limitation Monitoring (continued)			
Parameter	Sample Type (circle one)	Limitation (mg/L)	Sample Result (mg/L)
	1x year / Daily Max		
	30 day avg / Monthly avg		
	1x year / Daily Max		
	30 day avg / Monthly avg		
	1x year / Daily Max		
	30 day avg / Monthly avg		
	1x year / Daily Max		
	30 day avg / Monthly avg		
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	30 day avg / Monthly avg		
	1x year / Daily Max		
	30 day avg / Monthly avg		
	1x year / Daily Max		
	30 day avg / Monthly avg		
	1x year / Daily Max		
	30 day avg / Monthly avg		

Notes:

Name:		Phone Number:	
Signature:		Date:	

Appendix G: **Comprehensive Site Compliance Evaluation**

Annual Compliance Evaluation Report for

Vermont Railway, Inc. Shelburne Transload Facility

Name of Person(s) completing evaluation: _____

Date of evaluation: _____

Weather conditions during inspection: _____

Areas inspected during evaluation:

Inspect all exposed areas of the facility for evidence of contamination of runoff. Areas that need to be inspected include:

- industrial materials, residue or trash that may have or could come into contact with stormwater
- leaks or spills from industrial equipment, drums, tanks and other containers
- offsite tracking of industrial or waste materials, or sediment where vehicles enter or exit the site
- tracking or blowing of raw, final or waste materials from areas of no exposure to exposed areas
- evidence of, or the potential for, pollutants entering the drainage system
- evidence of pollutants discharging to surface waters at all facility outfall(s), and the condition of and around the outfall, including flow dissipation measures to prevent scouring.
- Structural stormwater management measures
- erosion control measures
- any equipment necessary to implement the SWPPP (e.g. spill response equipment)

Inspectors must consider the results of the past year's visual and analytical monitoring when planning and conducting inspections. Stormwater BMPs identified in your SWPPP must be observed during active operation, i.e., during a stormwater runoff event, to ensure that they are functioning correctly. If discharge locations are inaccessible, nearby downstream locations must be inspected.

G

Evidence of Stormwater Pollution

As each of the areas above is investigated, look for the problems listed in the table below. The existence of these problems on the site may indicate that the SWPPP is not being followed or that it is inadequate for preventing stormwater pollution. Should these problems be present, describe their nature and location(s) and create a plan to prevent their reoccurrence.

Is there evidence of the following problems?	Yes	No	Describe problem and location	Corrective Actions	Schedule for corrective actions
Industrial materials, residue, or trash coming in contact with stormwater					
Leaks or spills from industrial equipment, drums, tanks or other containers					
Offsite tracking of industrial or waste materials, or sediment where vehicles exit or enter the site					
Tracking or blowing of raw, final, or waste materials from areas of no exposure to exposed areas					
Evidence of, or the potential for the pollutants entering the drainage system					
Evidence of pollutants discharging to receiving waters at facility discharge points					

G

Scouring around facility discharge points, or any other degradation of these structures					

Structural Best Management Practices

Structure	Is maintenance needed? (Y/N)	Does it function as expected? (Y/N)	Describe the problem	Corrective actions to be taken	Schedule for completion

Are there any new sources of potential stormwater pollutants not previously identified in the SWPPP?

YES / NO

If you circled yes, how will the SWPPP be modified to prevent these sources from contaminating runoff?

Have either visual inspections or monitoring during the past year indicated pollution of stormwater which have not yet been addressed? YES / NO

If so, describe the potential sources of any pollutants found in runoff

What actions or modifications to the SWPPP are needed to prevent these pollutants from reaching the receiving waters?

Describe any other places where the site inspection indicates noncompliance with the SWPPP and the conditions of the general permit

What other changes to the SWPPP are needed to ensure that the site is in compliance?

Certification of Compliance

This Compliance Evaluation Report has been prepared by qualified personnel who properly gathered and evaluated information submitted for this Report. The information in this Report, to the best of my knowledge, is accurate and complete. After inspection of all exposed industrial areas, BMPs, and stormwater systems, and review of the SWPPP and required monitoring I find that this facility is in compliance with the SWPPP and the permit.

Name (print):_____ Title: _____

Signature: _____ Date: _____

Appendix H: **Rare, Threatened and Endangered Species Coordination**

This appendix contains the following information:

- Stormwater Permit 7514-9020 - Rare, Threatened, and Endangered Species Assessment Memorandum dated January 18, 2016 (VHB)
- Email from Helen Carr to VHB dated February 2, 2016 (DEC)
- Response to Additional Comments Regarding Appendix E – Letter to Helen Carr dated February 4, 2016 (VHB)
- Application for Endangered & Threatened Species Taking Permit (State-designated Mussel Survey Permit) dated June 30, 2016 (VHB)
- Supplement to the Stormwater Permit 7514-9020 - Rare, Threatened, and Endangered Species Assessment Memorandum dated July 8,, 2016 (VHB)

Memorandum

To: Shelburne Transload Facility Project File

Date: January 18, 2016

Project #: 57762.00

From: Carla A. Fenner, Environmental Scientist

Re: Stormwater Permit 7514-9020 - Rare, Threatened, and Endangered Species Assessment

---

INTRODUCTION

In support of Vermont Railway ("VTR", or "Applicant") proposal to develop the Shelburne Transload Facility ("Project"), VHB performed natural resource inventory and assessment work on the Project site and environs, located to the north of the Village of Shelburne and west of US Route 7 ("US-7") and a VTR track and approximately 0.5 southeast from the mouth of the LaPlatte River. The closest E911 address to the Project site is 4740 Shelburne Road, which is the commercial address of Harbor Industries and is depicted on the Natural Resources Map (Attachment 1). The Study Area for the natural resource inventory and assessment is approximately 43 acres and includes the parcel wherein the Project is proposed (32.8 acres) and abutting areas. VHB conducted desktop and field surveys to assess the presence and extent of natural resources within the Study Area.

As described in the Erosion Prevention and Sediment Control ("EPSC") Plan narrative submitted in support of application #7514-9020, the proposed development would include the construction of:

- access road and rail spur;
- two (2) new 35-foot by 350-foot storage buildings;
- 75-foot long truck, 35-foot long truck and employee parking areas;
- shop, office and two additional storage buildings;
- truck weighing scales; and
- above-ground storage tank fuel pad and Fleet Fuel island facility.

Components of the Project construction include clearing of the existing vegetation, removal of trees, earthwork and site grading to support the proposed infrastructure, and a surface stormwater collection and management system.

This memorandum does not represent a full evaluation of the suite of natural resources that were assessed during VHB's studies, but rather presents a discussion of applicable survey methodologies and findings pursuant to Appendix E of the Vermont Department of Environmental Conservation ("VT DEC") General Permit 3-9020 ("GP 3-9020") for Stormwater Runoff from Construction Sites (2008). The contents of this memorandum support the Project application file #7514-9020 ("Project Application") and addresses VT DEC comments provided on January 14, 2016 by documenting the measures taken by the Applicant, which satisfy the applicable criteria and designated process as defined in Appendix E. Specifically, Section I Criterion A and Criterion E are applicable to the Application; the sections below summarize relevant studies and findings as documentation of compliance with the process outlined in Appendix E Section II.

40 IDX Drive
Building 100, Suite 200
South Burlington, VT 05403

Memorandum

SURVEY METHODS AND FINDINGS

In order to identify occurrences of known rare, threatened, and endangered ("RTE") plant and animal species, particularly those that are federally- or Vermont-listed threatened or endangered,[1] VHB researched the Vermont Natural Heritage Inventory ("NHI") database for the presence of known Element Occurrences ("EOs") of RTE species within and adjacent to the Study Area. Although not directly applicable to Appendix E, in order to assess the potential for RTE species typically associated with any onsite natural communities, VHB also conducted a database review of Significant Natural Community EOs in or in the vicinity of the Study Area. Additionally, VHB reviewed the U.S. Fish and Wildlife Service ("USFWS") Information, Planning, and Conservation System ("IPaC") database for a list of federally-listed Endangered and Threatened species within Chittenden County, Vermont.

A one-mile radius was initially used when querying the NHI database and information specific to each EO identified within the radius was reviewed. After the list of known EOs from within the one-mile vicinity was acquired, it was then referenced against the known habitat criteria for each species and compared to available habitats within the Project site or Study Area. The list of known EOs, in combination with rare plants and animals often associated with any onsite natural communities that may occur within the Study Area, were considered for targeted onsite vegetation surveys.

The desktop survey was combined with field investigations, during which VHB also reviewed onsite natural community and vegetative assemblage types using descriptions found in *Wetland, Woodland, Wildland- A Guide to the Natural Communities of Vermont* by Thompson and Sorenson[2] (2005) and the updated Agency of Natural Resources ("ANR") Vermont Natural Community Ranking Specifications[3] (2014) so that the potential for RTE species typically associated onsite natural communities were fully assessed.

RTE Plants

Results of IPaC Database Review

From the IPaC database review, no federally-listed plant species or critical habitats of protected plants were identified within the Project vicinity (see *USFWS Species of Concern- Trust Resources Report*, Attachment 3).

Results of NHI Database Review

From the EO database search, there are three RTE plant EOs mapped within the Study Area: the S2 (rare) but otherwise not protected species false hop sedge (*Carex lupuliformis*) is mapped near the confluence of McCabe's Brook with the LaPlatte River; the S2S3 (rare/uncommon) but otherwise not protected broad beech fern (*Phegopteris hexagonoptera*) is mapped in a transmission line right-of-way ("ROW") near the bank of the LaPlatte River; and the S2S3 (rare/uncommon) but otherwise not protected narrow blue-eyed grass (*Sisyrinchium angustifolium*). There are 12 documented RTE plant species occurrences within a one-mile radius of the Study Area as detailed in the summary table entitled *Potential Rare, Threatened, and Endangered Species and Significant Natural Communities Summary in the*

[1] Federally-listed species are protected under the U.S. Endangered Species Act and Vermont-listed species are protected under 10 V.S.A. §123.

[2] Thompson, E.H, E.S. Sorenson. 2005. *Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont*. Vermont Department of Fish and Wildlife and the Nature Conservancy. Hanover, NH.

[3] Vermont Fish and Wildlife Department (VT FWD). 2014. "Vermont Natural Community Ranking Specifications". Received from VT FWD.

Memorandum

Project Region and Onsite Habitats (see "Summary Table" in Attachment 3). Of all EOs within one mile of the Study Area, only the obedient plant (*Physostegia virginiana*) is protected; it is listed as Threatened in Vermont.

The list of all known RTE plant and animal species mapped within or in the immediate vicinity of the Study Area from the NHI database is included in the Summary Table in Attachment 3.

Results of Field Survey
VHB conducted a targeted field survey within the Study Area on July 16 and 17, 2015 for four plants known to occur within a one-mile radius according to the criteria for targeted survey described above and included on the Summary Table (Attachment 3). Field surveys were conducted by a qualified botanist and staff environmental scientist during the portion of the growing season appropriate for the target RTE species and many of the other known occurrences in the vicinity. Field methods included conducting irregular transects across all portions of the Study Area and collecting a general floristic inventory of all vegetative species observed. Within mapped EO polygons, a thorough survey of the area for the target known species was also conducted, and all RTE occurrences identified in the field were located using a Trimble® GPS unit capable of sub-meter accuracy and post-processed using Trimble® Pathfinder software, and both qualitative and quantitative data at each occurrence was collected. The results of VHB's floristic inventory are included in the table entitled *Species Checklist – Partial Floristic Inventory* in Attachment 4.

VHB identified two occurrences of rare, but otherwise non-protected RTE plants within the Study Area that were previously unknown at this site but which are known to occur in similar habitats within the Champlain Valley. Both the green arrow arum (*Peltandra virginica*) and the hairy hedge nettle (*Stachys pilosa*), as shown on the Natural Resources Map (Attachment 1) were observed during the field survey. Green arrow arum is ranked in Vermont to be S2S3 (rare/uncommon) and is not listed in Vermont or federally. Hairy hedge nettle is ranked in Vermont to be S2? (rare, uncertain) and is not listed in Vermont or federally. Observed RTE occurrences are depicted on the Natural Resources Map (Attachment 1) as point features; both populations were observed as small, concentrated distributions within a localized area. Both of these species occur within a wetland complex extending inland from the LaPlatte River up a small intermittent drainage that is itself fringed by wetlands. No existing or cumulative impacts to the plants or their habitat observed during the July 2015 surveys and their habitat is anticipated to persist following Project construction, as this wetland area is not within the Project's limit of disturbance ("LOD").

No listed threatened or endangered plants are known to occur or were identified during detailed field surveys within VHB's Study Area, which includes the Project site.

<u>RTE Animals</u>

Results of IPaC Database Review
From the USFWS Trust Resources List, (see Attachment 2), no federally-listed animal species were identified specific to the Project Study Area. However the Project lies within the range of the northern long-eared bat (*Myotis septentrionalis*), which is federally-listed as threatened and Vermont-listed as endangered. No critical habitat for this or any species is listed by USFWS within the Study Area.

Memorandum

Results of NHI Database Review
Additionally, in order to further assess the potential occurrence of RTE animal species in the Study Area, particularly those that are either federally- or Vermont-listed threatened or endangered, VHB researched the NHI public database for the presence of known EOs of RTE animals within or adjacent to the Study Area. A radius of one mile was used when querying the NHI database for RTE animal EOs, and the information specific to each EO was reviewed (see Summary Table in Attachment 3). The list of known animal EOs from within the vicinity was then referenced against the known habitat criteria for each species and compared to the available habitats within the Study Area. There are 5 EO reports for RTE animals within one mile of the Study Area. Of these, three are aquatic species known from the LaPlatte River and Lake Champlain, one is a bird species, one is a moth species, and two are salamander species. None of the RTE animals known to occur within one mile of the Study Area are protected in Vermont or federally. Details of EOs within one mile of the Study Area ares included in the Summary Table in Attachment 3.

Results of Field Surveys
A general habitat survey for potential summer roosting areas for the northern long-eared bat was conducted in the Study Area on July 16 and 17, 2015. Per USFWS guidance[4] (2014), potential summer habitat for this species can include trees as small as three-inches diameter at breast height ("DBH") that contain cracks, crevices or cavities. Because the Study Area included areas dominated by mature and successional forest cover, it is assumed that potentially suitable habitat for summer maternity roosting is present within the Study Area.

Although there are no known occurrences of either winter hibernacula or summer roosting habitat within the Study Area or a one mile radius recorded in the NHI database, VHB conducted additional due diligence to investigate the potential for *Myotid* bat habitat by direct consultation with the Vermont Fish and Wildlife Department ("VTFWD") in order to request any additional, unpublished data and solicit questions or concerns regarding potential impacts to bats on this site. Through this consultation, VHB understands that VTFWD has no concerns about a project at this site provided that building demolition is not proposed. VTFWD confirmed the information available on the NHI database that there are no known occupied hibernacula or known northern long-eared bat summer colonies in the vicinity of the Project[5]. Additionally, VTFWD confirmed that the Project site is outside of the known range of the Indiana bat (*Myotis sodalis*), another bat species that is protected in Vermont and federally. As such, the Project does not propose any direct impacts to protected bats or indirect impacts by way of impacts to critical habitat.

No listed threatened or endangered plants are known to occur or were identified during detailed field surveys within VHB's Study Area, which includes the Project site.

CONCLUSIONS
Pursuant to Appendix E of the VT DEC GP 3-9020, VHB concludes that the Applicant is eligible for coverage under the Permit, as the Project activities and discharges would not result in an impact or place in jeopardy the continued

[4] Department of the Interior. U. S. Fish and Wildlife Service. 2014. Northern Long-Eared Bat Interim Conference and Planning Guidance: Regions 2, 3, 4, 5, & 6. January 6, 2014.

[5] VTFWD (Alyssa Bennett). Personal communication, electronic mail, August 14, 2015.

Memorandum

existence of a known Vermont- or federally-listed threatened or endangered species, nor would it result in the destruction or adverse modification of known critical habitat. This memorandum summarizes the numerous measures undertaken by VHB on behalf of the Applicant to assess the presence of threatened or endangered species or their habitats. As described in the sections above, the results of both desktop and field surveys, as well as consultation with the VTFWD conclude that there are no known occurrences of protected species that would be impacted by the Project at its proposed location. Based on the findings of these surveys and consultation, the Project would be eligible for coverage as stated in Step 1 of the process contained in Section II of Appendix E as no listed species or critical habitats are present in the Project area.

ATTACHMENTS

Attachment 1 – Natural Resources Map
Attachment 2 - IpaC Trust Resources List
Attachment 3 – Summary Table: Potential Rare, Threatened, and Endangered Species and Significant Natural Communities Summary in the Project Region and Onsite Habitats
Attachment 4 – Species Checklist – Partial Floristic Inventory
Attachment 5 – Vermont Fish and Wildlife Department (Alyssa Bennett) electronic mail, August 14, 2015.

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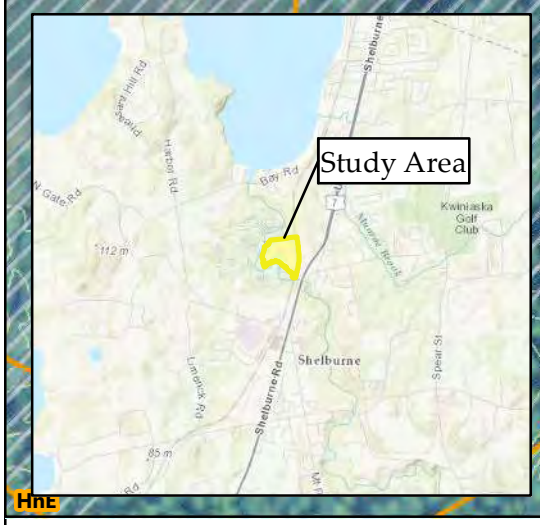
Wetland and Waters Delineations Conducted by VHB (C. Martin, C. Fenner and M. Jackman) on May 19th, May 27th, June 16th and June 19th, 2015.
Partial Floristic Inventory/Rare, Threatened, and Endangered Plant Survey conducted by VHB (C. Fenner) on July 16-17, 2015.

VHB Study Area
Approximately 43 Acres
73°13'40.971"W 44°23'30.558"N

Proposed Limit of Disturbance: 18.7 Acres



Soil Symbol	Soil Name	K Value	Erodibility	Agricultural Value	Acreage
AdA	Adams and Windsor loamy sands, 0 to 5 percent slopes	0.15	Not Highly Erodible	Statewide	18.61
Cv	Covington silty clay	0.49	Highly Erodible	Statewide (b)	0.01
ScA	Scantic silt loam, 0 to 2 percent slopes	0.32	Not Highly Erodible	Statewide (b)	0.03

Study Area (VHB)
Proposed Limit of Disturbance (VHB)
Utility Pole (VHB)
Culvert (VHB)
USACE Data Point (VHB)
RTE Plant (VHB)
Delineated Streams (VHB)
Delineated Wetlands (VHB)
Wetland Continues (VHB)
Wetland (VSWI)
Stream (VHD)
100-Year Flood Zone (FEMA)
NRCS Soil Boundary (VCGI)
2' Contours

Vermont Railways, Inc.
Shelburne Transload Facility
Shelburne, VT
Wetland and Stream Delineation Map

December 23, 2015
Revised: January 18, 2016

200 100 0 200
Feet

Sources: NAIP Background Imagery by USDA (2014); Contours generated from LiDAR DEM (2007); The following statewide datasets are provided by VCGI: NRCS Soils (2011), VHD Streams (2008), VSWI Wetlands (ANR, 2010): Study Area, Utility Poles, Culverts, Delineated Wetlands & Streams, and Proposed Limit of Disturbance by VHB (2015); Flood zone by FEMA (2014).

\\vhb\proj\Vermont\57762.00\GIS\Project\Shelburne Transload_DelinMap_working.mxd exported by: acoplin On 1/18/2016

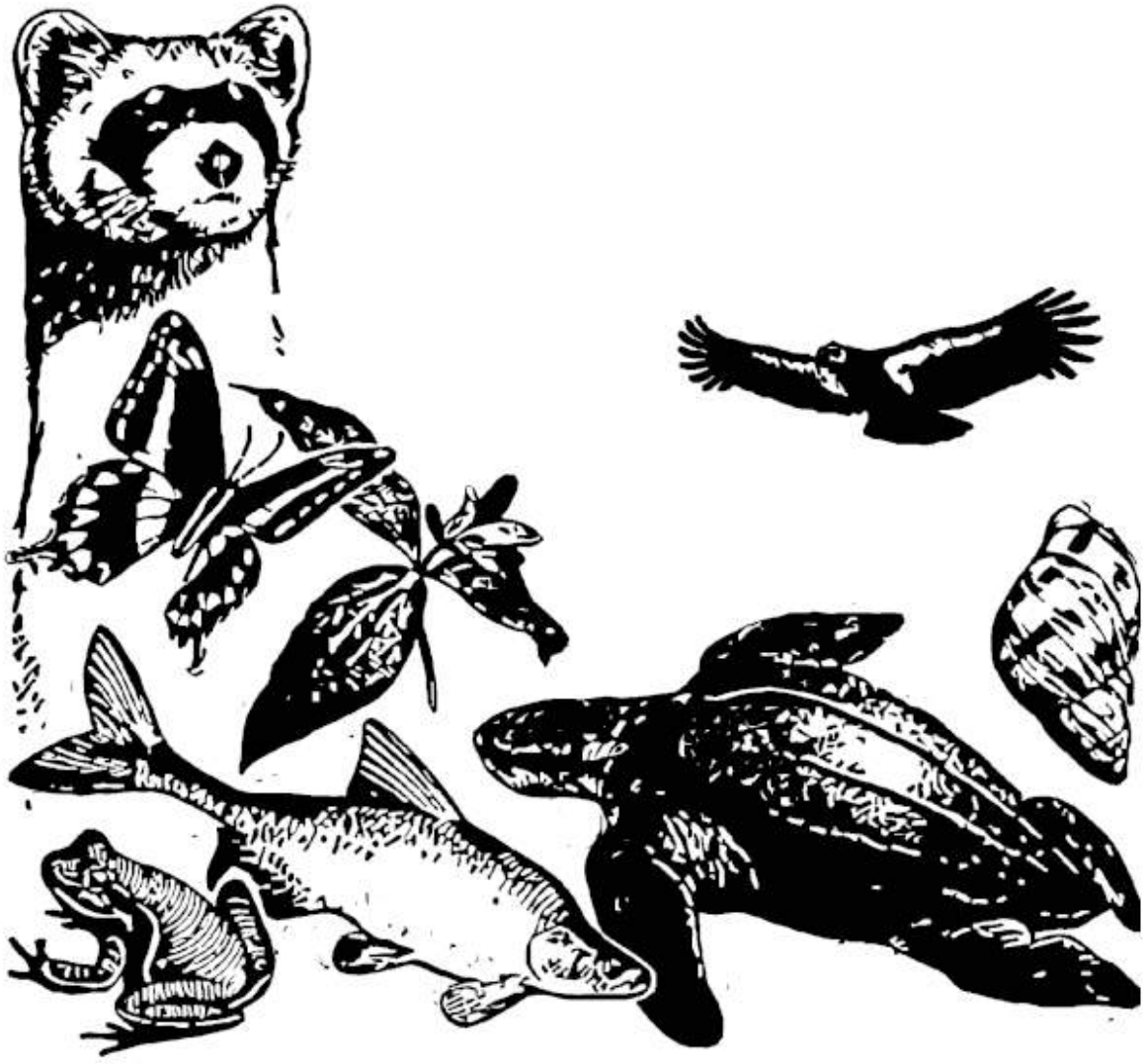
U.S. Fish & Wildlife Service

Shelburne Transload Facility

IPaC Trust Resource Report

Generated January 18, 2016 12:03 PM MST, IPaC v2.3.2

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



IPaC - Information for Planning and Conservation (http://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish & Wildlife Service environmental review process.

US Fish & Wildlife Service

IPaC Trust Resource Report

NAME

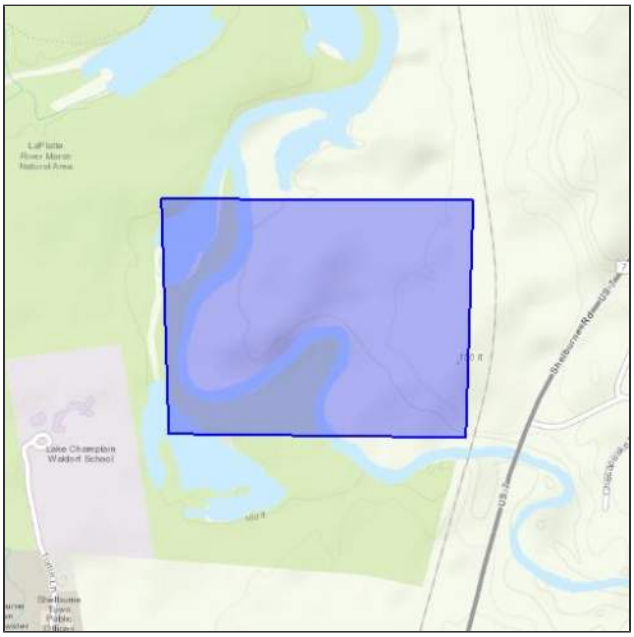
Shelburne Transload Facility

LOCATION

Chittenden County, Vermont

IPAC LINK

http://ecos.fws.gov/ipac/project/GDDFG-GBLDV-BSNM7-IPJ2F-N5KJTA



U.S. Fish & Wildlife Contact Information

Trust resources in this location are managed by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

Endangered Species

Proposed, candidate, threatened, and endangered species are managed by the Endangered Species Program of the U.S. Fish & Wildlife Service.

This USFWS trust resource report is for informational purposes only and should not be used for planning or analyzing project level impacts.

For project evaluations that require FWS concurrence/review, please return to the IPaC website and request an official species list from the Regulatory Documents section.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list from the Regulatory Documents section in IPaC.

The list of species below are those that may occur or could potentially be affected by activities in this location:

Mammals

Northern Long-eared Bat Myotis septentrionalis — Threatened

CRITICAL HABITAT

No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A0JE

Critical Habitats

There are no critical habitats in this location

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity which results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service (1). There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

Additional information can be found using the following links:

- Birds of Conservation Concern
  http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/akn-histogram-tools.php

The following species of migratory birds could potentially be affected by activities in this location:

American Bittern Botaurus lentiginosus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F3

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B008

Black Tern Chlidonias niger — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B09F

Black-billed Cuckoo Coccyzus erythropthalmus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HI

Black-crowned Night-heron Nycticorax nycticorax — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0EU

Canada Warbler Wilsonia canadensis — Bird of conservation concern
Season: Breeding

Common Tern Sterna hirundo — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B09G

Olive-sided Flycatcher Contopus cooperi — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0AN

Peregrine Falcon Falco peregrinus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU

Pied-billed Grebe Podilymbus podiceps — Bird of conservation concern
Season: Breeding

Short-eared Owl Asio flammeus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD

Willow Flycatcher Empidonax traillii — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F6

Wood Thrush Hylocichla mustelina — Bird of conservation concern
Season: Breeding

Refuges

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

Refuge data is unavailable at this time.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

This location overlaps all or part of the following wetlands:

Freshwater Emergent Wetland

PEM1/UBF 10.0 acres

Freshwater Forested/shrub Wetland

PFO4/1A 69.7 acres

PFO1E 40.5 acres

Freshwater Pond

PUBH 3.78 acres

Riverine

R2UBH 18.3 acres

A full description for each wetland code can be found at the National Wetlands Inventory website: http://107.20.228.18/decoders/wetlands.aspx

Vermont Potential Rare, Threatened, and Endangered Species and Natural Communities in the Project Region and Onsite Habitats Summary
Client: Vermont Railway
Project: Shelburne Transload Facility
Date: January 16, 2016
Survey Date(s): July 16 and July 17, 2015
Surveyor(s): VHB (C. Fenner, O. McEnroe)
Prepared by: VHB (C. Fenner, M. Jackman)

Natural Heritage Element Occurrence (1- mile Radius)

Species	Common Name	Type	State Rank	Global Rank	VT Status	Federal Status	Habitat Description[1]	Occurrence Description [2]	Potential for Habitat to Occur Onsite?	2015 Target Survey Recommended? (Y/N)	Comments
Ambystoma laterale	Blue-spotted Salamander	Animal	S3	G5			Moist woodlands with sandy soils	From Shelburne Road (Route 7) in Shelburne take Bay Road to fishing access. TNC Preserve is across the road. Specimen found along the bank of the LaPlatte River	Yes	No	Not mapped within Study area; Not listed species
Asclepias exaltata	Poke Milkweed	Plant	S3	G5			Dry forest edges, forests	On west side of Route 7 and in back of (to west of) Rice Lumber	No	No	No suitable habitat
Carex lupuliformis	False Hop Sedge	Plant	S2	G4			Marshes, shores of rivers or lakes, swamps	Plants located in floodplain forest about 10 feet into the upland from marsh/upland interface. near junction of McCabe's Brook and LaPlatte River	Yes	Yes	EO Polygon mapped within the Study Area; potential onsite habitat
Euphyes dion	Dion Skipper	Animal	S2	G4			Sedge meadows	Near river and utility line at SW end of preserve	No	No	EO Polygon mapped within the Study Area; no suitable habitat
Hemidactylium scutatum	Four-toed Salamander	Animal	S2	G5			Mature, mesic forests with dense canopy cover to preserve body moisture, an abundance of downed woody debris for cover and foraging opportunities, and vernal pools, ponds, bogs, shallow marshes, or other fishless bodies of water for nesting and larval success; wooded wetlands such as seepage swamps or cedar swamps with moss mats	LaPlatte River wetlands; on west side approx. 0.75 mile from mouth of river	Yes	No	Not mapped within Study area; Not listed species
Hybognathus regius	Eastern Silvery Minnow	Animal	S3S4	G5			Quiet weedy inshore waters of lakes, and pools and backwaters of low gradient creeks and small to large rivers	LaPlatte River just upstream of Route 7 (Shelburne Road) crossing.	No	No	Not mapped within Study area; Not listed species; No suitable habitat
Ichthyomyzon unicuspis	Silver Lamprey	Animal	S2	G5			Lakes, reservoirs, large rivers	LaPlatte River about 300 meters upstream of Route 7.	Yes	No	Not mapped within Study area; Not listed species; No suitable habitat
Lycopus virginicus	Virginia Bugleweed	Plant	S2	G5			Floodplain woodlands, marshes, borders of lakes and streams, gravelly seeps, soggy meadows, and ditches	East side of Rte. 7 south of the LaPlatte River, in wet woods by the pull-off.	Yes	No	Not mapped within Study area; Not listed species
Notropis rubellus	Rosyface Shiner	Animal	S3	G5			Large creeks and small rivers with clean gravel or rubble; usually in or around riffle or flowing pools	LaPlatte River just upstream of Route 7 (Shelburne Road) crossing	No	No	No suitable habitat
Nycticorax nycticorax	Black-crowned Night-heron	Animal	S1B	G5			Large marsh wetland systems	Shelburne, near mouth of the LaPlatte River at Lake Champlain, south of Bay Road. Exact location at site not reported.	No	No	EO Polygon mapped within the Study Area; no suitable habitat
Paellaea glabella ssp. Glabella	Smooth Cliff-brake	Plant	S3	GNR			Dry rocky oak-hickory woods with west facing outcrop overlooking LaPlatte River. Disturbance from survey lines and roads and past grazing.	On west side of Route 7 and in back of (to west of) Rice Lumber.	No	No	No suitable habitat
Percina copelandi	Channel Darter	Animal	S1	G4			Rivers and large creeks in areas of moderate current over sand and gravel substrates; wave swept nearshore areas of lakes Huron and Erie in coarse-sand, fine-gravel beach and sandbar habitats	Approximately 400-500 meters downstream of Shelburne Falls on the LaPlatte River.	No	No	No suitable habitat
Phegopteris hexagonoptera	Broad Beech-fern	Plant	S2S3	G5			Forests, swamps, wetland margins	LaPlatte River floodplain west of the transmission line centerline under a single Carpinus caroliniana tree	Yes	Yes	EO Polygon mapped within the Study Area; potential onsite habitat
Physostegia virginiana	Obedient Plant	Plant	S2	G5	T		Meadows and fields, shores of rivers and lakes	LaPlatte River Marsh. Plants on wetland bank that was probably an old river channel. A TNC trail goes within a few feet of the population.	Yes	Yes	Not mapped within Study area; State-listed species
Polygala sanguinea	Field Milkwort	Plant	S3	G5			Dry or wet situations in prairies, old fields, meadows, and glades, often on poor or acid soils	Fields near Shelburne Town Garage	Yes	No	Not mapped within Study area; Not listed species
Quercus muehlenbergii	Yellow Oak	Plant	S3	G5			Forest, ridges or edges, talus or rocky slopes	On west side of Route 7 and in back of (to west of) Rice Lumber	No	No	No suitable habitat
Ranunculus aquatilis var. diffusus	White Water-crowfoot	Plant	S3	G5T5			Rivers and ponds, lakes or streams	Mouth of the LaPlatte River.	No	No	No suitable habitat
Ranunculus flabellaris	Yellow Water-crowfoot	Plant	S3	G5			Lacustrine habitats and edges, riverine habitats and edges, swamps, wetland margins	LaPlatte River Marsh, approx. 0.5 mile south of Shelburne Bay along the river; on both east and west side of the river.	No	No	No suitable habitat
Sisyrinchium angustifolium	Narrow Blue-eyed-grass	Plant	S2S3	G5			Meadows and fields, shores of rivers and lakes, wetland margins	LaPlatte River Marsh, approx. 0.5 mile south of Shelburne Bay along the river	Yes	Yes	EO polygon mapped in Study Area; potential onsite habitat
Thalictrum venulosum	Border Meadow-rue	Animal	S2S3	G5			Shores of river or lakes	LaPlatte River Marsh, approx. 0.5 mile south of Shelburne Bay along the river	Yes	No	Not mapped within Study area; Not listed species
Utricularia geminiscapa	Hidden-fruited Bladderwort	Plant	S3	G4G5			Sunny/exposed, slow moving or still water, lakes, bog pools, fens	LaPlatte River Marsh, approx. 0.5 mile south of Shelburne Bay along the river	Yes	No	Not mapped within Study area; Not listed species

[1] Potential sources for habitat information

Conant, Roger and Collins, Joseph T. 1998. *Peterson Field Guides: Reptiles and Amphibians* . Houghton Mifflin Company, Boston.
EFloras.org. http://www.efloras.org/index.aspx
Gleason, Henry A. and Cronquist, Arthur. 1991. *Manual of Vascular Plants of Northeaster United States and Adjacent Canada* . The New York Botanical Garden.
Haines, Arthur. 2011. *Flora Novae Angliae* . New England Wildflower Society/Yale University Press, New Haven, CT . 973 Pp.
Illinois Natural History Survey. http://www.inhs.uiuc.edu/animals_plants/mollusk/musselmanual/TofC.html
Langdon, Richard W., Ferguson, Mark T. and Cox, Kenneth M. 2006. *Fishes of Vermont* . Vermont Department of Fish and Wildlife.
Maine Department of Agriculture, Conservation and Forestry. Accessed: http://www.maine.gov/dacf/mnap/features/rare_plants/plantlist.htm on 5-1-14.
Newcomb, Lawrence. 1977. *Newcomb's Wildflower Guide* . Little, Brown, and Company, Boston
Northern Prairie Wildlife Research Center. http://www.npwrc.usgs.gov/resource/distr/insects/tigb/usa/49.htm
Seymour, Frank Conkling. 1982. *The Flora of New England* . 2d ed. Phytologia Memoirs 5. Plainfield, NJ: Harold N. Moldenke and Alma L. Moldenke. 611 p. [7604]
Thompson, Elizabeth H. and Sorenson, Eric R. 2005. *Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont* . Vermont Department of Fish and Wildlife and The Nature Conservancy.
Vermont Natural Resources Atlas, Accessed July 2015. Element Occurrence Reports

[2] Sources for occurrence description listed below:

Vermont Natural Heritage Inventory - Vermont Fish & Wildlife Department - Element Occurrence Reports.

Vermont Potential Rare, Threatened, and Endangered Species and Natural Communities in the Project Region and Onsite Habitats Summary
Client: Vermont Railway
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	Species	Common Name	Type	State Rank	Global Rank	VT Status	Federal Status	Habitat Description[1]	Occurrence Description [2]	Potential for Habitat to Occur Onsite?	2015 Survey Recommended? (Y/N)	Comments/ Potential RTE Species Associates
Natural Community Element Occurrence (1- mile Radius)	Button Swamp	NA	Natural Community	S2	GNR	NA	NA	Buttonbush strongly dominant, with approx. 90% cover. Few other plants are present, but can be locally abundant.	Backwater marsh along LaPlatte River, around .35 miles west of Route 7 bridge.	Yes	Yes	Potential onsite habitat; Auricled twayblade (*Listera auriculata*) Wild garlic (*Allium canadense*)
	Deep Bulrush Marsh	NA	Natural Community	S4	GNR	NA	NA	Occurs in deep water, and is dominated by bulrushes (Scirpus/Schoenoplecus spp.). Cattails (Typha spp.) are also present with duckweed (Lemna sp.) forming a floating mat on the water surface.	LaPlatte River Marsh, near mouth of river and south end of Shelburne Bay	No	No	No potential onsite habitat
	Dry Oak-Hickory-Hophornbeam Forest	NA	Natural Community	S3	GNR	NA	NA	Dry to dry-mesic uplands on generally poor/acidic soils and sometimes calcium rich soils hallow to bedrock.	On west side of Route 7 and in ledgy area in the back of (to west of) Rice Lumber.	No	No	No potential onsite habitat
	Lakeside Floodplain Forest	NA	Natural Community	S3	GNR	NA	NA	Lakesides, shorelines, floodplains, flat topography and hydrologic regime dominated by annual/seasonal flooding in well drained to poorly drained soils.	LaPlatte River Mouth at the south end of Shelburne Bay, extending through LaPlatte River Marsh in low, frequently flooded areas	Yes	Yes	Potential onsite habitat; Cattail sedge (*Carex typhina*) Gray's sedge (*Carex grayi*) Yellow water-crowfoot (*Ranunculus flabellaris*) Green dragon (*Arisaema dracontium*) Black gum (*Nyssa sylvatica*) Lance-leaved loosestrife (*Lysimachia hybrida*) False hop sedge (*Carex lupuliformis*) Mild water-pepper (*Polygonum hydropiperoides*)
	Mesic Clayplain Forest	NA	Natural Community	S2	GNR	NA	NA	Lakesides, shorelines, floodplains with flat topography and hydrologic regime dominated by annual/seasonal flooding in poorly drained soils with a high clay content.	In LaPlatte River Marsh area, mostly north of McCabe Brook with another patch between McCabe Brooke and LaPlatte River.	Yes	Yes	Potential onsite habitat; Short-styled snakeroot (*Sanicula canadensis*) Harsh sunflower (*Helianthus strumosus*) Buxbaum's sedge (*Carex buxbaumii)* Leafy bulrush (*Scirpus polyphyllus*) Grove sandwort (*Arenaria lateriflora*) Loose sedge (*Carex laxiculmis*) Yellow bartonia (*Bartonia virginica*) American hazelnut (*Corylus americana*) Drooping bluegrass (*Poa saltuensis*) Umbellate sedge (*Carex umbellata)* Rough avens (*Geum laciniatum*) Broad beech fern (*Thelypteris hexagonoptera)* Minnesota sedge (*Carex albursina*) Gray's sedge (*Carex grayi*) Folliculate sedge (*Carex folliculata*) Handsome sedge (*Carex formosa*) Stout woodreed (*Cinna arundinacea*) Fragrant sumac (*Rhus aromatica*) Spicebush (*Lindera benzoin*)
	River Mud Shore	NA	Natural Community	S3	GNR	NA	NA	Exposed, unvegetated mud along the banks of large, low order, slow moving river and stream waters.	Immediate banks of LaPlatte River near its outlet into Lake Champlain	No	No	No potential onsite habitat
	Sand-Over-Clay Forest	NA	Natural Community	S2	GNR	NA	NA	Generally small patch sizes where sandy soils have been deposited atop clay dominated soils, associated with fluvial processes and results in a highly variable vegetative community, sometime in complexes with Wet-Sand-Over-Clay and other floodplain forests	LaPlatte River mouth at the south end of Shelburne Bay. Mainly on the low terrace between McCabe Brook and the LaPlatte River	Yes	Yes	Potential onsite habitat; potential species similar to Mesic Clayplain Forest
	Silver Maple-Sensitive Fern Riverine Floodplain Forest	NA	Natural Community	S3	GNR	NA	NA	Floodplains and low, flat topography largely in the Champlain Valley; dominated by silver maple in the overstory, closely related to silver maple-ostrich fern and other floodplain forest types with well or moderately well drained soils	Stretches along LaPlatte River from just downstream of Shelburne Falls to just upstream of the junction of McCabe Brook with the LaPlatte River	Yes	Yes	Potential onsite habitat; Green dragon (*Arisaema dracontium*) Gray's sedge (*Carex grayi*) Stout woodreed (*Cinna arundinacea*)
	Temperate Calcareous Outcrop	NA	Natural Community	S3	GNR	NA	NA	Calcareous cliff and bedrock outcrops with dry, dry-xeric and sometimes exposed conditions	On west side of Route 7 and in back of (to west of) Rice Lumber.	No	No	No potential onsite habitat
	Wet Clayplain Forest	NA	Natural Community	S2	GNR	NA	NA	Floodplains and low, flat topography largely in the Champlain Valley; dominated by hardwoods in the overstory, and commonly a fern or mixed fern/herbaceous understory	Larger portion of EO is in southwestern portion of LaPlatte River Marsh near McCabe Brook. A smaller section occurs between McCabe Brook and the LaPlatte River near and south of their confluence	Yes	Yes	Potential onsite habitat; potential species similar to Mesic Clayplain Forest
	Wet Sand-Over-Clay-Forest	NA	Natural Community	S2	GNR	NA	NA	Generally small patch sizes where thin deposits of sandy soils have been deposited atop clay dominated soils, associated with fluvial processes and results in a highly variable vegetative community, sometimes in complexes with Sand-Over-Clay and other floodplain forests	LaPlatte River mouth at the south end of Shelburne Bay. In scattered small patches, mainly on the low terrace between McCabe Brook and the LaPlatte River	Yes	Yes	Potential onsite habitat; potential species similar to Mesic Clayplain Forest

[1] Potential sources for habitat information
Conant, Roger and Collins, Joseph T. 1998. *Peterson Field Guides: Reptiles and Amphibians* . Houghton Mifflin Company, Boston.
EFloras.org. http://www.efloras.org/index.aspx
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Illinois Natural History Survey. http://www.inhs.uiuc.edu/animals_plants/mollusk/musselmanual/TofC.html
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Newcomb, Lawrence. 1977. *Newcomb's Wildflower Guide* . Little, Brown, and Company, Boston
Northern Prairie Wildlife Research Center. http://www.npwrc.usgs.gov/resource/distr/insects/tigb/usa/49.htm
Seymour, Frank Conkling. 1982. *The Flora of New England* . 2d ed. Phytologia Memoirs 5. Plainfield, NJ: Harold N. Moldenke and Alma L. Moldenke. 611 p. [7604]
Thompson, Elizabeth H. and Sorenson, Eric R. 2005. *Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont* . Vermont Department of Fish and Wildlife and The Nature Conservancy.
Vermont Natural Resources Atlas, Accessed July 2015. Element Occurrence Reports
[2] Sources for occurrence description listed below:
Vermont Natural Heritage Inventory - Vermont Fish & Wildlife Department - Element Occurrence Reports.

Species Checklist1 - Partial Floristic Inventory
Client: Vermont Railway
Project: Shelburne Transload
Date: January 18, 2016
Survey Date(s) July 16 and 17, 2015
Surveyor(s): VHB (C. Fenner, O. McEnroe)
Prepared by: VHB (C. Fenner)

Scientific Name [1]	Common Name	Family	VT Rarity Rank[2]	Non-Native Invasive Species [3]
Acer negundo L.	boxelder	Aceraceae		
Acer rubrum L.	red maple	Aceraceae		
Agrostis gigantea Roth	redtop	Poaceae		
Alnus incana (L.) Moench	gray alder	Betulaceae		
Amphicarpaea bracteata (L.) Fernald	American hogpeanut	Fabaceae		
Anemone quinquefolia L.	wood anemone	Ranunculaceae		
Apios americana Medik.	groundnut	Fabaceae		
Apocynum cannabinum L.	Indianhemp	Apocynaceae		
Aralia nudicaulis L.	wild sarsaparilla	Araliaceae		
Arisaema triphyllum (L.) Schott	Jack in the pulpit	Araceae		
Asclepias incarnata L.	swamp milkweed	Asclepiadaceae		
Asclepias syriaca L.	common milkweed	Asclepiadaceae		
Athyrium filix-femina (L.) Roth ssp. angustum (Willd.) R.T.	subarctic ladyfern	Scrophulariaceae		
Berberis vulgaris L.	common barberry	Berberidaceae		
Betula alleghaniensis Britton	yellow birch	Betulaceae		
Betula papyrifera Marshall	paper birch	Betulaceae		
Betula populifolia Marshall	gray birch	Betulaceae		
Bidens cernua L.	nodding beggartick	Asteraceae		
Boehmeria cylindrica (L.) Sw.	smallspike false nettle	Urticaceae		
Carex annectens (E.P. Bicknell) E.P. Bicknell	yellowfruit sedge	Cyperaceae		
Carex baileyi Britton	Bailey's sedge	Cyperaceae		
Carex blanda Dewey	eastern woodland sedge	Cyperaceae		
Carex conoidea Schkuhr ex Willd.	openfield sedge	Cyperaceae		
Carex crinita Lam.	fringed sedge	Cyperaceae		
Carex gracillima Schwein.	graceful sedge	Cyperaceae		
Carex gynandra Schwein.	nodding sedge	Cyperaceae		
Carex intumescens Rudge	greater bladder sedge	Cyperaceae		
Carex lupulina Muhl. ex Willd.	hop sedge	Cyperaceae		
Carex lurida Wahlenb.	shallow sedge	Cyperaceae		
Carex scoparia Schkuhr ex Willd. var. scoparia	broom sedge	Cyperaceae		
Carex vulpinoidea Michx.	fox sedge	Cyperaceae		
Carpinus caroliniana Walter	American hornbeam	Betulaceae		
Carya ovata (Mill.) K. Koch	shagbark hickory	Juglandaceae		
Cephalanthus occidentalis L.	common buttonbush	Rubiaceae		
Cerastium arvense L.	field chickweed	Caryophyllaceae		
Cinna arundinacea L.	sweet woodreed	Poaceae		
Circaea lutetiana L. ssp. canadensis (L.) Asch. & Magnus	broadleaf enchanter's	Onagraceae		
Cirsium vulgare (Savi) Ten.	bull thistle	Asteraceae		
Clematis virginiana L.	devil's darning needles	Ranunculaceae		
Cornus amomum Mill.	silky dogwood	Cornaceae		
Cornus racemosa Lam.	gray dogwood	Cornaceae		
Dennstaedtia punctilobula (Michx.) T. Moore	eastern hayscented fern	Dennstaedtiaceae		
Equisetum fluviatile L.	water horsetail	Equisetaceae		
Equisetum variegatum Schleich. ex F. Weber & D. Mohr	variegated scouringrush	Equisetaceae		
Eupatorium perfoliatum L.	common boneset	Asteraceae		
Festuca rubra L.	red fescue	Poaceae		
Fragaria virginiana Duchesne	Virginia strawberry	Rosaceae		
Fraxinus pennsylvanica Marshall	green ash	Oleaceae		
Galium asprellum Michx.	rough bedstraw	Rubiaceae		
Galium palustre L.	common marsh bedstraw	Rubiaceae		

Scientific Name [1]	Common Name	Family	VT Rarity Rank[2]	Invasive Species [3]
Geum canadense Jacq.	white avens	Rosaceae		
Glyceria canadensis (Michx.) Trin.	rattlesnake mannagrass	Poaceae		
Glyceria grandis S. Watson	American mannagrass	Poaceae		
Hackelia virginiana (L.) I.M. Johnst.	beggarslice	Boraginaceae		
Hamamelis virginiana L.	American witchhazel	Hamamelidaceae		
Hieracium pratense Tausch	yellow hawkweed	Asteraceae		
Hypericum perforatum L.	common St. Johnswort	Clusiaceae		
Hypericum punctatum Lam.	spotted St. Johnswort	Clusiaceae		
Impatiens capensis Meerb.	jewelweed	Balsaminaceae		
Juncus canadensis J. Gay ex Laharpe	Canadian rush	Juncaceae		
Juncus effusus L.	common rush	Juncaceae		
Juniperus virginiana L.	eastern redcedar	Cupressaceae		
Laportea canadensis (L.) Weddell	Canadian woodnettle	Urticaceae		
Leersia oryzoides (L.) Sw.	rice cutgrass	Poaceae		
Lobelia spicata Lam.	palespike lobelia	Campanulaceae		
Lonicera canadensis W. Bartram ex Marshall	American fly honeysuckle	Caprifoliaceae		
Lonicera morrowii A. Gray	Morrow's honeysuckle	Caprifoliaceae		B
Lycopus americanus Muhl. ex W.P.C. Barton	American water horehound	Lamiaceae		
Lysimachia nummularia L.	creeping jenny	Primulaceae		
Lysimachia quadrifolia L.	whorled yellow loosestrife	Primulaceae		
Lysimachia terrestris (L.) Britton, Sterns & Poggenb.	earth loosestrife	Primulaceae		
Lythrum salicaria L.	purple loosestrife	Lythraceae		B
Maianthemum canadense Desf.	Canada mayflower	Liliaceae		
Matteuccia struthiopteris (L.) Todaro	ostrich fern	Dryopteridaceae		
Medeola virginiana L.	Indian cucumber	Liliaceae		
Melilotus officinalis (L.) Lam.	sweetclover	Fabaceae		
Mentha arvensis L.	wild mint	Lamiaceae		
Mitchella repens L.	partridgeberry	Rubiaceae		
Moneses uniflora (L.) A. Gray	single delight	Pyrolaceae		
Onoclea sensibilis L.	sensitive fern	Dryopteridaceae		
Osmunda cinnamomea L.	cinnamon fern	Osmundaceae		
Osmunda claytoniana L.	interrupted fern	Osmundaceae		
Osmunda regalis L.	royal fern	Osmundaceae		
Oxalis corniculata L.	creeping woodsorrel	Oxalidaceae		
Parthenocissus quinquefolia (L.) Planch.	Virginia creeper	Vitaceae		
Peltandra virginica (L.) Schott	green arrow arum	Araceae	S2S3	
Phalaris arundinacea L.	reed canarygrass	Poaceae		WL
Phragmites australis (Cav.) Trin. ex Steud.	common reed	Poaceae		B
Phryma leptostachya L.	American lopseed	Verbenaceae		
Pilea pumila (L.) A. Gray	Canadian clearweed	Urticaceae		
Pinus strobus L.	eastern white pine	Pinaceae		
Polygonum sagittatum L.	arrowleaf tearthumb	Polygonaceae		
Polystichum acrostichoides (Michx.) Schott	Christmas fern	Dryopteridaceae		
Populus tremuloides Michx.	quaking aspen	Salicaceae		
Potentilla norvegica L.	Norwegian cinquefoil	Rosaceae		
Prenanthes altissima L.	tall rattlesnakeroot	Asteraceae		
Prunus pensylvanica L. f.	pin cherry	Rosaceae		
Prunus serotina Ehrh.	black cherry	Rosaceae		
Pteridium aquilinum (L.) Kuhn	western brackenfern	Dennstaedtiaceae		
Pyrola rotundifolia auct. non L. p.p.	American shinleaf	Pyrolaceae		
Quercus alba L.	white oak	Fagaceae		
Quercus bicolor Willd.	swamp white oak	Fagaceae		
Quercus rubra L.	northern red oak	Fagaceae		
Rhus typhina L.	staghorn sumac	Anacardiaceae		
Rubus allegheniensis Porter	Allegheny blackberry	Rosaceae		
Rubus canadensis L.	smooth blackberry	Rosaceae		
Rubus occidentalis L.	black raspberry	Rosaceae		
Salix bebbiana Sarg.	Bebb willow	Salicaceae		
Salix petiolaris Sm.	meadow willow	Salicaceae		
Salix sericea Marshall	silky willow	Salicaceae		
Sambucus racemosa L.	red elderberry	Caprifoliaceae		

Scientific Name [1]	Common Name	Family	VT Rarity Rank[2]	Invasive Species [3]
Sanguinaria canadensis L.	bloodroot	Papaveraceae		
Scirpus atrocinctus Fernald	blackgirdle bulrush	Cyperaceae		
Scirpus atrovirens Willd.	green bulrush	Cyperaceae		
Scirpus cyperinus (L.) Kunth	woolgrass	Cyperaceae		
Solanum dulcamara L.	climbing nightshade	Solanaceae		
Solidago canadensis L.	Canada goldenrod	Asteraceae		
Solidago rugosa Mill.	wrinkleleaf goldenrod	Asteraceae		
Sparganium americanum Nutt.	American bur-reed	Sparganiaceae		
Spiraea alba Du Roi var. latifolia (Aiton) Dippel	white meadowsweet	Rosaceae		
Stachys pilosa	hairy hedge-nettle	Lamiaceae	S2?	
Symphyotrichum cordifolium (L.) G.L. Nesom	common blue wood aster	Asteraceae		
Symphyotrichum lateriflorum (L.) Á. Löve & D. Löve	calico aster	Asteraceae		
Symplocarpus foetidus (L.) Salisb. ex W.P.C. Barton	skunk cabbage	Araceae		
Taraxacum officinale F.H. Wigg.	common dandelion	Asteraceae		
Thalictrum pubescens Pursh	king of the meadow	Ranunculaceae		
Thelypteris noveboracensis (L.) Nieuwl.	New York fern	Thelypteridaceae		
Thelypteris palustris Schott	eastern marsh fern	Thelypteridaceae		
Trifolium pratense L.	red clover	Fabaceae		
Trillium L.	trillium	Liliaceae		
Tsuga canadensis (L.) Carrière	eastern hemlock	Pinaceae		
Typha latifolia L.	broadleaf cattail	Typhaceae		
Ulmus americana L.	American elm	Ulmaceae		
Urtica dioica L.	stinging nettle	Urticaceae		
Vaccinium angustifolium Aiton	lowbush blueberry	Ericaceae		
Valeriana uliginosa (Torr. & A. Gray) Rydb.	mountain valerian	Valerianaceae		
Verbena urticifolia L.	white vervain	Verbenaceae		
Veronica americana Schwein. ex Benth.	American speedwell	Scrophulariaceae		
Viburnum acerifolium L.	mapleleaf viburnum	Caprifoliaceae		
Vicia cracca L.	bird vetch	Fabaceae		
Viola blanda Willd.	sweet white violet	Violaceae		
Viola renifolia A. Gray	white violet	Violaceae		
Viola sororia Willd.	common blue violet	Violaceae		
Vitis aestivalis Michx.	summer grape	Vitaceae		
Zanthoxylum americanum Mill.	common pricklyash	Rutaceae		

[1] Nomenclature follows USDA-NRCS PLANTS database (plants.usda.gov/) and/or Haines (2011).

[2] The Vermont State Rank from the "Rare and Uncommon Native Vascular Plants of Vermont - Vermont Natural Heritage Inventory - Vermont Fish & Wildlife Department", version dated June 15, 2015.

[3] Quarantine #3- Noxious Weeds (2012);
Vermont Wildlife Action Plan- Appendix K Exotic Invasive and Pest Species (2005). Vermont Fish & Wildlife Department

Fenner, Carla

From: Bennett, Alyssa <Alyssa.Bennett@vermont.gov>
Sent: Friday, August 14, 2015 12:27 PM
To: Fenner, Carla
Cc: Ketterling, Brad
Subject: RE: Shelburne - bat occurrence information request

Hi Carla,

You are out of Indiana bat summer range and not near any known occupied hibernacula or northern long-eared bat known occupied summer colony sites. There is a long-established and still in existence colony of state endangered little brown bats out at Shelburne Farms. Unless this project includes building demolition I do not see any further bat concerns.

Alyssa

Alyssa B. Bennett
Small Mammals Biologist
Vermont Fish & Wildlife Dept.
271 North Main Street, Suite 215
Rutland, VT 05701
Tel: 802-786-0098
e-mail: alyssa.bennett@vermont.gov
Help Vermont's Bats at
http://www.vtfishandwildlife.com/wildlife_bats.cfm

From: Fenner, Carla [mailto:CFenner@VHB.com]
Sent: Tuesday, August 11, 2015 11:30 AM
To: Bennett, Alyssa <Alyssa.Bennett@vermont.gov>
Cc: Ketterling, Brad <BKetterling@VHB.com>
Subject: Shelburne - bat occurrence information request

Hi Alyssa,

To follow on my phone calls, here's hoping an email will reach you during your busy time of year!

I'm trying to get information on any hibernacula or known summer habitat use in the area of a potential project I'm working on. The approximate coordinates for the project are 44°23'16.07"N, 73°13'42.74"W, which is near the mouth of the LaPlatte River in Shelburne, to the west of Harbor Industries on Rte 7. Based on the geology in that area, I'm guessing there aren't any hibernacula, but I see that summer mist net surveys have been done nearby on the Shelburne Farms property. I queried the NHI database for a 2 mile radius and came up with a single report (EO ID 7409, EO# 16) for 2 small footed bats caught in a 2005 survey. Can you tell me if there is any more recent survey data or other reports for state or federally protected bats in this area?

Thanks,
Carla

Carla A. Fenner
Environmental Scientist

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Wildey, Robert

From: Carr, Helen <Helen.Carr@vermont.gov>
Sent: Tuesday, February 02, 2016 10:45 AM
To: Burbank, Scott
Cc: Monks, Padraic; Cronin, Briana; Hakey, Christopher; dwulfson@vrs.us.com
Subject: RE: Stormwater Permit 7514-9020 Shelburne Transload Facility TECHNICAL REVIEW

Scott and all,

Thank you for sending the updated plan sheets. We have had Fish and Wildlife review the memo you sent regarding threatened and endangered species as well as reviewing other species in the area. We have determined that there are two species that weren't addressed in your initial review of threatened and endangered species. The following two species are listed as noted under the Vermont Endangered Species Law, and are known to occur in the LaPlatte River upstream of the project site:

Stonecat (Noturus flavus) – Endangered
Pocketbook (Lampsilis ovata) – Endangered

These species have been documented to be found in the LaPlatte River upstream of the site, thus there is potential for them to be found near the proposed rail facility site or downstream. In order to ensure these species are not impacted by construction you may survey the project area for these species or you can assume that these species are present within the project area. If you choose not to conduct a survey, you must determine if the construction related discharges are likely to adversely affect these listed species as laid out in Appendix E, part II. The MSGP also requires a review of the potential impact to these threatened and endangered species. As such you are advised to evaluate whether the operational phase discharge, as well as the construction phase discharge, are likely to adversely affect the listed species. Please respond with the assessment of the hydrological (including temperature, salinity and pH), habitat and toxicity impacts and any determinations from Fish and Wildlife.

Thank you,
Helen

Helen Carr, *District Manager*
Southern Chittenden & Addison Counties
Vermont DEC- Stormwater Program
P: 802-490-6170 /New email: Helen.Carr@vermont.gov
W: www.watershedmanagement.vermont.gov

February 4, 2016

Ref: 57762.00

Ms. Helen Carr
Environmental Analyst
Vermont Department of Environmental Conservation
Watershed Management Division, Stormwater Section
1 National Life Drive, Main 2
Montpelier, VT 05620-3522

Re: Vermont Railway
Shelburne Transload Facility
Shelburne, Vermont
General Permit 3-9020 Application and Authorization (#7514-9020)
Response to Additional Comments Regarding Appendix E

Dear Helen:

On behalf of Vermont Railway ("Applicant"), VHB has prepared this response to comments received from you via email on February 2, 2016 regarding the pending application to the Vermont Department of Environmental Conservation ("VT DEC") for authorization under General Permit ("GP") 3-9020, for discharge of regulated stormwater runoff from construction activities associated with the Shelburne Transload Facility Project ("Project"). Your comments are provided in **bold** text below, followed by our response.

ANR Comment: We have determined that there are two species that weren't addressed in your initial review of threatened and endangered species. The following two species are listed as noted under the Vermont Endangered Species Law, and are known to occur in the LaPlatte River upstream of the project site:

Stone cat (*Notorus flavus*) – Endangered
Pocketbook (*Lampsilis ovata*) – Endangered

These species have been documented to be found in the LaPlatte River upstream of the site, thus there is potential for them to be found near the proposed rail facility site or downstream.

VHB Response: The process specified in Appendix E, Part II, Step One (page A-24 of GP 3-9020) directs applicants to use a web site maintained by the Vermont Agency of Natural Resources ("ANR") to determine if state or federally-listed species or critical habitat are present in the Project area. As described previously in VHB's memorandum entitled *Rare, Threatened, and Endangered Species Assessment* ("RTE Memo"), which was submitted to VT DEC on January 18, 2016, VHB performed a detailed review of publically accessible information through the ANR Natural Resources Atlas and the associated Natural Heritage Inventory

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("NHI") database for all Element Occurrences ("EOs") of RTE species within 1 mile of the Project. This was done to assess potential impacts to RTE species or habitat, as well as identify target species or habitats for field surveys. This search radius is typically used by VHB in performing natural resources assessments so that known occurrences in the vicinity can be considered during on site assessments of ecological conditions and potential habitat features and to determine if potentially suitable habitat for those species are present within a Project site.

A list of EO records available at the time of VHB's initial database review (June 15, 2015) was included as an attachment to the RTE Memo. Neither a stonecat nor pocketbook EO record were identified in the NHI database within 1 mile of the Project site during the initial database query of June 15, 2015. Similarly, no EO record for either species was found within 1 mile of the Project during a follow up database query conducted on February 2, 2016.

Based on your comments dated February 2, 2016, VHB performed further evaluation of publically accessible databases with respect to information on occurrences of the pocketbook and stonecat within the LaPlatte River.

Pocketbook

According to available NHI records as of February 2, 2016, there is no EO record for pocketbook on the LaPlatte River.

Based on the process identified in Appendix E, Part II, Step One, which include that ANR "maintains a web site showing the location of all State and Federally listed species in Vermont," and that the web site is to be used to "obtain the necessary information, [emphasis added]" we conclude that because the database review determined that there are no mapped occurrences of pocketbook within the Project area, no further action is required with respect to this listed species.

Stonecat

According to available NHI records as of February 2, 2016, the closest occurrence of stonecat is EO#2 (EO ID 4713), located approximately 1.8 mile (9,940 feet) upstream from the nearest edge of the Project as measured along the centerline of the LaPlatte River (see enclosed map entitled Location of Stonecat Element Occurrence Relative to Project Location). Upon review of the EO ID 4713 record, VHB understands that stonecat have been observed or caught during sampling efforts in 1999, 2000, and 2010 at two discrete locations, both of which are located within approximately 2,000 feet downstream from the Irish Hill Road Bridge crossing of the LaPlatte River. General Comments made by the Vermont Fish and Wildlife Department ("VT FWD") in 1999 for the EO ID 4713 record include the following:

"This is likely the lowest extent of usable stonecat habitat on the LaPlatte River."

Based on this statement and the fact that the Project is located approximately 1.8 miles farther downstream from this location, VHB does not believe that there is potential for the stonecat to be found in the LaPlatte River near the proposed Project or downstream, as suggested by your comment included in bold above. Based on both the initial and follow up review of the NHI database, VHB concludes that the Project is not likely to have an adverse impact on stonecat or stonecat habitat within the LaPlatte River.

Conclusion

Based on the review of available information, following the process specified by Appendix E, Part II, Step One of GP 3-9020, VHB concludes that the pocketbook and stonecat are not present in the Project area and therefore the Project is eligible for general permit coverage.

Thank you for your timely review of this permit application. Please do not hesitate to contact me if you have any further questions.

Sincerely,

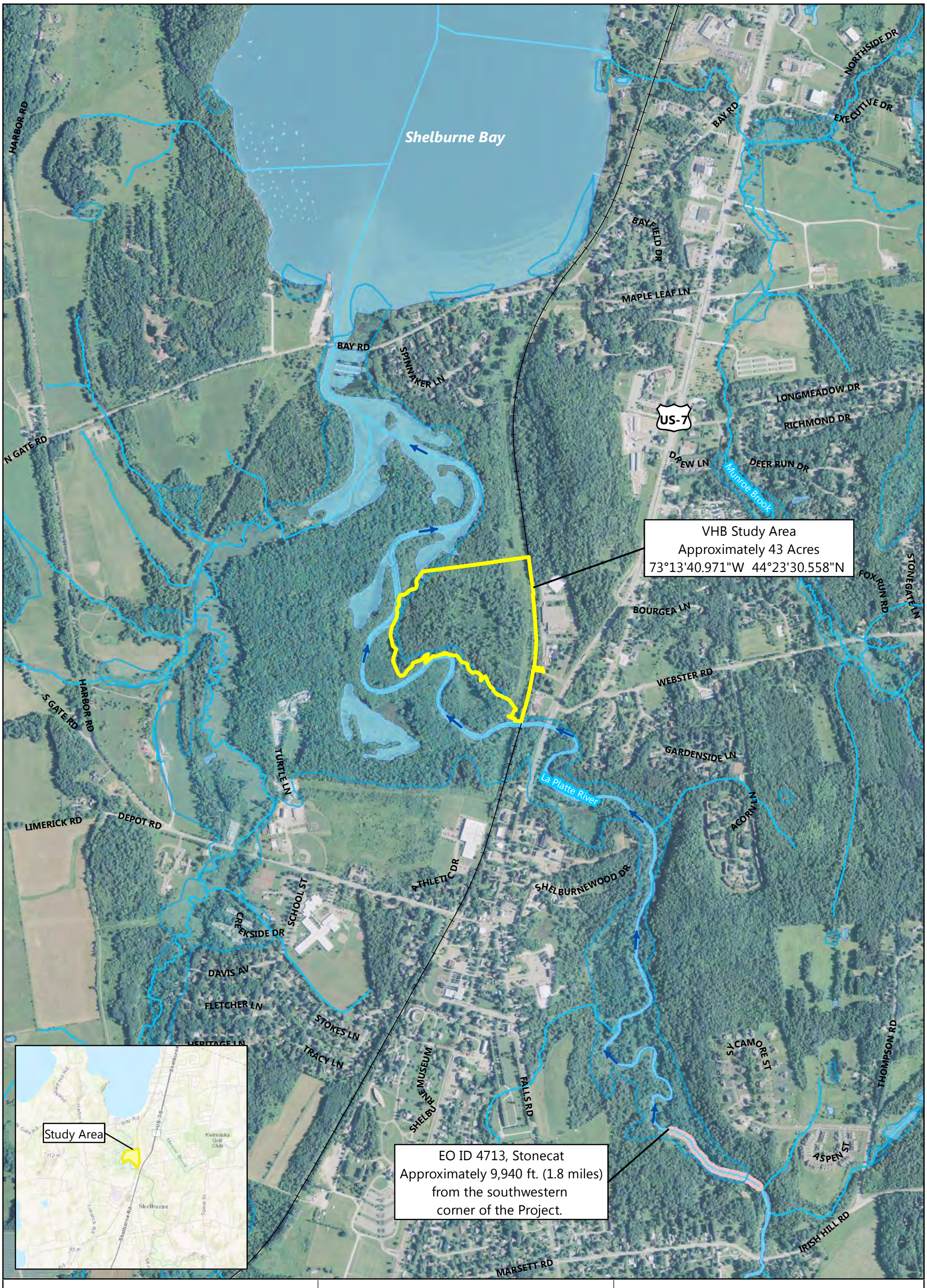
Scott E. Burbank, P.E.
Project Manager

Carla A. Fenner
Environmental Scientist

SEB/CAF/jkw
Enclosure

cc: David Wulfson, President, Vermont Railway

\\vtnfdata\projects\57762.00\docs\Permits\9020\Response to Comments\2016-02-04_Appendix_E_Supplementary_Response_rev.doc



Study Area (VHB)
EO ID 4713 (Stonecat)
Wetland (VSWI)
Stream (VHD)
Flow Direction Arrows (VHB)
Waterbody (VHD)

Vermont Railway
Shelburne Transload Facility
Shelburne, VT
Location of Stonecat Elemental Occurrence Relative to Project Location

February 3, 2016

1,000 500 0 1,000
Feet

Sources: NAIP Background Imagery by USDA (2014); The following datasets are from VCGI - VHD Streams (2008), VSWI Wetlands (ANR, 2013): NHI EO (2015); Study Area by VHB (2015).

\\vtnfdata\projects\57762.00\GIS\Project\Shelburne Transload_EO_Review.mxd exported by: jtherrien On 2/3/2016

June 30, 2016

Ref: 57762.00

Mr. Jon Kart
Vermont Fish and Wildlife Department
1 National Life Drive, Davis 2
Montpelier, VT 05620

Re: Vermont Railway, Inc.
Shelburne Transload Facility
Application for Endangered & Threatened Species Taking Permit

Dear Jon:

On behalf of Vermont Railway, Inc. ("VTR" or "Applicant"), VHB is submitting an application to the Vermont Fish and Wildlife Department ("FWD") requesting an Endangered & Threatened Species Takings Permit ("Permit") per the Vermont Endangered Species Act, pursuant to 10 VSA §5408, for the purpose of conducting a survey for protected mussel species in the Lower LaPlatte River. The survey is being proposed in order to determine the presence/absence, and distribution for state designated mussels in the Laplatte River downstream from a planned railroad transload facility and salt storage shed, referred to as the Shelburne Transload Facility ("STL").

Thank you for your review, and do not hesitate to contact us if you or the permit reviewers have any questions.

Sincerely,

Carla A. Fenner
Environmental Scientist

CAF/jkw

cc: Selden Houghton, VTR (electronic copy only)
David Wulfson, VTR (electronic copy only)
Ethan Nedeau, Biodrawversity (electronic copy only)

\\vhb\proj\Vermont\57762.00\docs\Permits\VT Takings\T&E Takings_Cover_Letter.docx

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VERMONT

Agency of Natural Resources
1 National Life Drive, Davis 2
Montpelier, VT 05620-3702
802-828-1294

Application for Endangered & Threatened Species Taking Permit

Statutory Authority: 10 VSA §5408

Application Fee

$50 for permits issued for scientific and education purposes, for enhancing the propagation of a species and for special purposes consistent with the federal Endangered Species Act.

$250 for each listed animal/plant taken up to $25,000. If the ANR Secretary determines that it is in the best interest of the species, ANR and the applicant may agree to mitigation in lieu of a monetary fee.

1. **Permittee/Applicant Name:** Selden Houghton
   Institution (if applicable): Vermont Railway, Inc.
   Principal Officer (CEO) of Institution: David Wulfson
   Physical Address/Town/St/Zip: One Railway Lane, Burlington, VT 05401
   Mailing Address (if different): _____
   Telephone: (802) 658-2550
   E-Mail: shoughton@vrs.us.com

2. **Name(s) & affiliation of subpermittee(s)**

Ethan Nedeau, Biodrawversity LLC Carla Fenner, VHB

3. **Which species, and how many of each, will be collected or impacted**?

Common Name	Scientific Name	# of individuals to be collected/ impacted	% of population to be collected/ impacted
Giant floater	*Pyganodon grandis*	**TBD**	**TBD**
Pocketbook	*Lampsilis ovata*	**TBD**	**TBD**
Pink heelsplitter	*Potamilus alatus*	**TBD**	**TBD**
Fragile papershell	*Leptodea fragilis*	**TBD**	**TBD**
Black sandshell	*Ligumia recta*	**TBD**	**TBD**
Fluted shell	*Lasmigona costat*	**TBD**	**TBD**

4 **Purposes for which you are applying for a takings permit** *(must meet one of the following)*:

_X__ Scientific Purposes
___ Educational Purposes
___ Enhance the Propagation of a Species
___ Special purposes consistent with the federal Endangered Species Act
___ Economic Hardship
___ Zoological Exhibition

Conduct survey to determine presence/abundance, and distribution of state-listed mussel species in the Lower LaPlatte River approximately between the river mouth and River Mile ("RM") 1 as shown the attached map (Attachment 1).

5. Detailed Explanation of Proposed Activities

A transload facility and salt storage shed are planned within an upland area in Shelburne, Vermont referred to as the Shelburne Transload Facility ("Project"), which would require the design and implementation of a stormwater management system. The stormwater system would ultimately discharge to the LaPlatte River at approximately RM 1. Therefore the mussel survey would determine if there are state-listed species at or downstream of the Project.

6. Is survey data available to indicate the size and/or extent of the impacted population for each species listed in section 3? No _X__, Yes ___.

Prior to the commencement of your proposed activities a survey may be required to determine the extent and number of individuals of T&E species populations at your proposed location. Said survey requires authorization from the Agency of Natural Resources (ANR) and shall be completed by an expert with experience/ qualifications acceptable to ANR.

The survey will determine this.

7. Provide a detailed explanation for the basis of the taking/impact.

For instance, if the basis is Economic Hardship explain the nature of hardship and the benefit that will result if the permit is issued. If the basis is Scientific Purposes, demonstrate how the benefits of the proposed activities outweigh the impact(s) to the individuals and the populations. Provide supporting documentation if applicable.

This initial survey is being conducted to assist with environmental review and stormwater permitting. The take/impact included in this permit application includes only the survey itself. Any further take/impact would be discussed pending the outcome of the survey.

8. What is the time frame of proposed activities: _July, 2016_____ to August, 2016_

9. What are the qualifications & experience of person(s) conducting the proposed activities?

Ethan Nedeau (Biodrawversity) has conducted these types of surveys throughout Lake Champlain and statewide in Vermont for all of Vermont's state-listed mussel species.

Carla Fenner (VHB) is coordinating the permit submittal, review, and Agency/Applicant communications.

10. Which methods and equipment will you use?
If you seek authorization to translocate/transplant specimens of Threatened & Endangered Species, attach a translocation/transplanting plan identifying how specimens will be found and moved, where to and how you propose to monitor the effectiveness of the translocation/transplanting.

Snorkeling in shallow water and SCUBA in deeper water. As this is a Phase I survey, no mussels will be moved. See attached Biodrawversity Study Plan (Attachment 2).

11. Where do you plan to collect, work and/or implement proposed activities?
Be as specific as possible and identify the town(s) and county. If field-based activities are proposed, attach a detailed map of project site(s).

LaPlatte River (Shelburne, VT). Work will be conducted from the mouth of the river at Shelburne Bay upstream to approximately RM 1, as shown in the attached map (Attachment 1).

12. **What are the possible impacts of the proposed activities on species?**
Include details about the numbers of plants and/or animals that will be taken/impacted.

Potential impacts that may result from activities contained in this permit application include only the survey activities.
Any concern regarding future potential impacts from the Project to state-listed mussel species would be addressed through a subsequent Takings permit application, if necessary.

13. **What is your plan for conservation or mitigation of species impacted?**

No specific plan for conservation or mitigation measures specific to the activities contained in this permit application.
If necessary and pending further evaluation following the survey, conservation and mitigation measures would be developed if the Project would result in impacts to state-listed mussel species.

14. **Final disposition of the specimens you collect (if any)?**

No mussels will be collected.

15. **Impacts to Migratory Birds:** Federal authorization is required for activities which might take birds (alive or dead, feathers, eggs and even nests). Federal migratory bird permits are issued by the US Fish & Wildlife Service Migratory Bird Office: 413-253-8643, http://www.fws.gov/migratorybirds/mbpermits.htm

My proposed project will impact migratory birds, feathers, eggs or nests: _X__No, ____ Yes?

If yes: My migratory bird permit # is_____, it is valid until _____
(please include a copy with your application)

I don't have a migratory bird permit but will apply for one ____ Yes.

16. **Required attachments**

_X__ **Permit fee:** Make checks payable to: **"VFWD T&E Permit Fund 20345"**
$50 for permits for scientific and education purposes, for enhancing the propagation of a species and for special purposes consistent with the federal Endangered Species Act.
$250 for each listed animal/plant taken up to $25,000. If the ANR Secretary determines that it is in the best interest of the species, ANR and the applicant may agree to mitigation in lieu of a monetary fee.

_X__ **Map/Site Plan:** For field-based activities attach a map, of appropriate scale, identifying the location where field based activities will occur.

_X__ **Scientific Research**: Include a research proposal/description with any T&E permit application for the purpose of scientific research.

___ **Translocation/Transplanting Plan**: If you seek authorization to translocate/transplant listed species, attach a plan identifying how specimens will be found and moved, where to and how you propose to monitor the effectiveness of the translocation/transplantation.

___ **Importation**: For permits authorizing the importation of live specimens of threatened or endangered species a Veterinary Health Inspection report is required certifying the disease free-status of the specimens to be imported.

3. **Certification by signature:** I hereby affirm, under penalty of perjury, that the information, as well as any exhibits, documentations, and maps, are truthful to the best of my knowledge, that I am not delinquent in any obligation to pay child support or that I am in good standing with respect to any unpaid judgment issued by the judicial bureau or district court for fines and penalties for a civil violation or criminal offense. I also understand that false statements made on this application are punishable pursuant to 10 V.S.A. 4267 of Vermont state law.

Signature: _____ **Date:** 6/30/16

Mail signed application to: "Permit Specialist" Vermont Fish & Wildlife Department, 1 National Life Drive, Davis 2, Montpelier, VT 05620-3702, or email the signed document to jon.kart@state.vt.us. While a signed application is needed for final approval of a permit, please send an electronic version of the completed application as well.

Endangered and threatened species taking permits are issued under the authority of 10 VSA §5408. Permits are issued for the purposes of taking (including collecting, disturbing or possessing) individuals (or parts of) of species listed as Endangered or Threatened by the state of Vermont. Collection on lands posted according to 10 VSA §5201 or 13 VSA §3705 is unlawful without landowner permission.

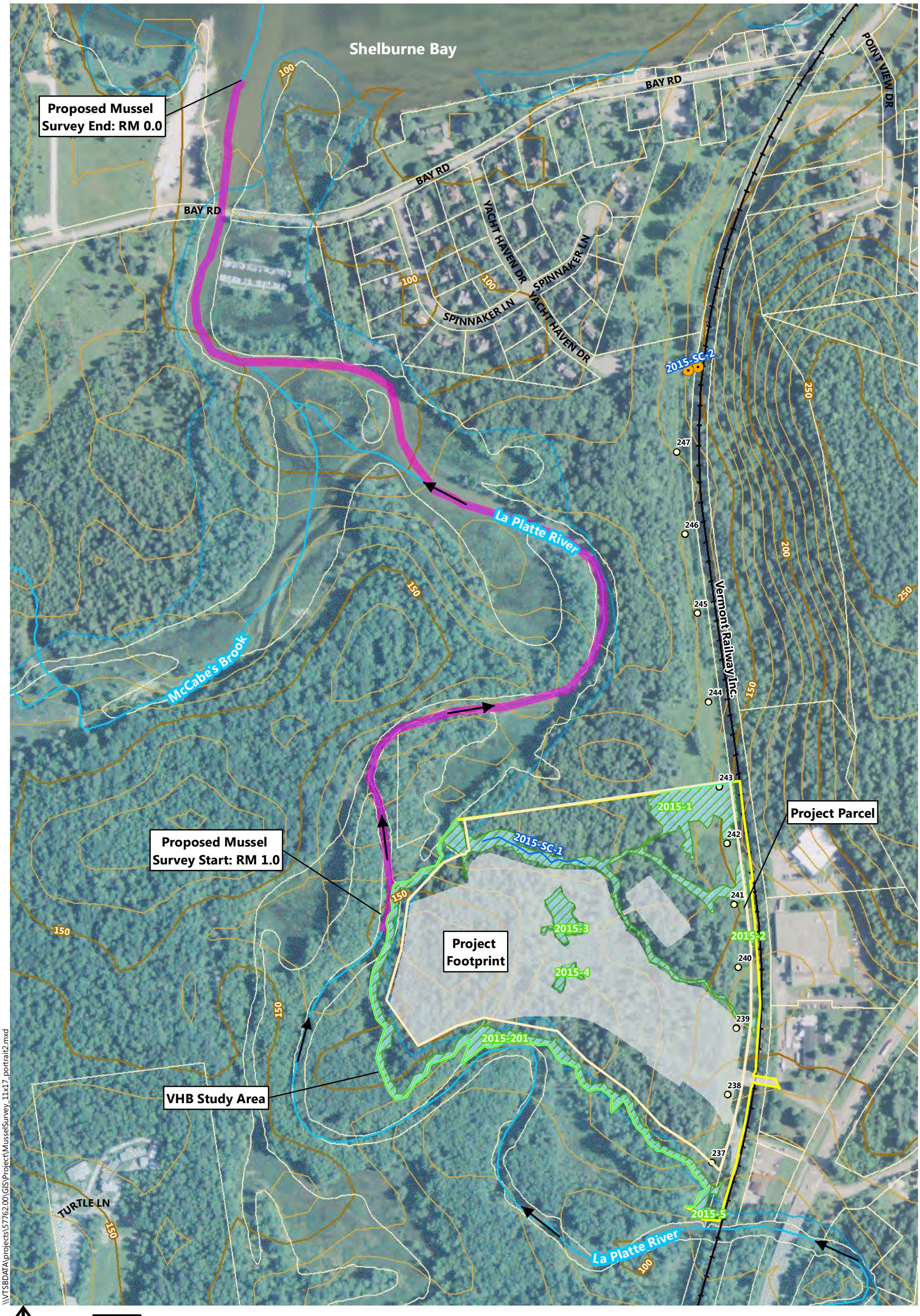
last updated 4/25/2013

ATTACHMENT 1

VERMONT RAILWAY

vhb

June 30, 2016



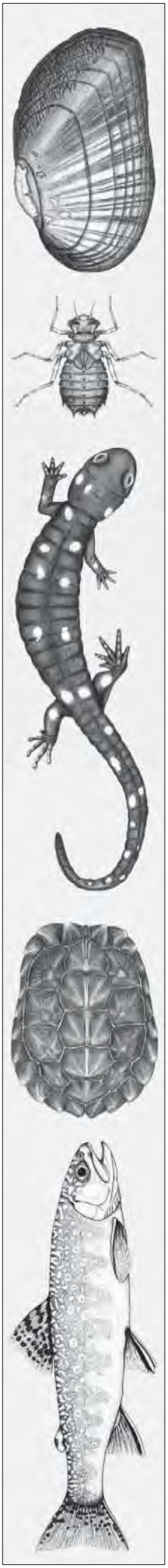
Shelburne Transload Facility | Shelburne, Vermont

Proposed Mussel Survey Map

- Proposed Mussel Survey (VHB)
- Study Area (VHB)
- Delineated Wetland (VHB)
- Wetland Continues (VHB)
- Delineated Stream (VHB)
- Flow Direction Arrows (VHB)
- Culvert (VHB)
- Utility Pole (VHB)
- Proposed Limit of Disturbance (VHB)
- VSWI Wetland (ANR)
- VHD Stream (VCGI)
- Parcel Boundary (VCGI)
- Railroad (VTrans)
- 10' Contour
- 50' Contour

Sources:
NAIP Background Imagery by USDA (Collected in 2014)
VCGI (Vermont Center for Geographic Information - Various Dates)
ANR (Vermont Agency of Natural Resources - 2015)
VTrans (Vermont Agency of Transportation - 2014)
VHB - 2015-2016

ATTACHMENT 2



VHB
40 IDX Drive
Building 100, Suite 200
South Burlington, VT 05403-7771

biodrawversity
ecological consulting and communications

June 21, 2016

PROPOSAL

Freshwater Mussel Survey in the LaPlatte River for the Shelburne Transload Facility (Shelburne, Vermont)

Project Location: LaPlatte River in Shelburne, Vermont. Approximately 400 meters of the river will be assessed/surveyed, from near the Route 7 crossing downstream to Lake Champlain, but focusing on areas near a proposed stormwater discharge point.

Target Species: Potential state-listed mussel species in this reach include Giant Floater (*Pyganodon grandis*), Pocketbook (*Lampsilis ovata*), Pink Heelsplitter (*Potamilus alatus*), Fragile Papershell (*Leptodea fragilis*), Black Sandshell (*Ligumia recta*), Cylindrical Papershell (*Anodontoides ferussacianus*), and Fluted Shell (*Lasmigona costata*).

Objectives: The primary objectives of the proposed study are:

- Determine if state-listed mussels occur in the area of the LaPlatte River along the parcel that is being developed for the Shelburne Transload Facility, especially near the proposed stormwater discharge;
- If state-listed mussels are found, collect information on population size and habitat quality/availability;
- As part of the final report, review and summarize existing information on the potential effects of chloride or other constituents of the proposed stormwater on freshwater mussels.

Scope of Work

1. Fieldwork

- A collection permit will be obtained from Vermont Fish and Wildlife.
- The survey will be conducted in July of 2016.
- Qualitative and semi-quantitative mussel surveys will be conducted, using a combination of snorkeling, SCUBA diving, visual and tactile searches, and walking/wading along the shoreline to look for shell middens. Due to the highly turbid nature of the LaPlatte River, we will attempt several methods to adequately characterize the mussel community, detect rare species, and describe habitat. It is lkely that the survey will rely on tactile searches, rather than visual searches.
- At each survey location, biologists will record species present, numbers of state-listed mussels, shell lengths and shell conditions for state-listed mussels, habitat descriptions, photographs of mussels and habitat, and survey method/duration.
- Mussel survey results will be reported as raw counts and catch-per-unit-effort (CPUE). The presence and approximate density of co-occurring native mussel species and non-native molluscs (i.e., zebra mussels and Asian clams) will also be recorded.

2. Reporting

- Results of the survey will be summarized in a written report. This will include (1) map(s) showing survey sites and locations of state-listed species and high-quality mussel habitat; (2) raw data and summary statistics for the survey effort, mussel counts, CPUE, shell lengths, shell conditions, and habitat parameters; and (3) photographs of state-listed mussels and their habitat.
- The report will include a summary of available peer-reviewed literature and case studies on the effects of chloride or other constituents of concern in the proposed stormwater discharge.

Memorandum

To: Shelburne Transload Facility Project File

Date: July 8, 2016

Project #: 57762.00

From: Carla A. Fenner, Environmental Scientist

Re: Supplement - Stormwater Permit 7514-9020 - Rare, Threatened, and Endangered Species Assessment

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This memorandum supplements VHB's January 18, 2016 memorandum titled *Stormwater Permit 7514-9020 – Rare Threatened, and Endangered Species Assessment* ("Memo") for the purpose of documenting a revision to Attachment 4 Species Checklist – Partial Floristic Inventory. In Attachment 4 to the Memo, also dated January 18, 2016, VHB incorrectly included the species *Valeriana uliginosa*. However the species that a VHB Environmental Scientist observed during the July, 2015 field surveys was *Valeriana officinalis*. This correction has been coordinated with the Vermont Department of Fish and Wildlife ("FWD")[1], and is included in an updated Species Checklist included as an attachment to this supplemental memo.

ATTACHMENT

Attachment 1 – Updated Species Checklist – Partial Floristic Inventory

\\vhb\proj\Vermont\57762.00\docs\memos\RTE\Supplemental Memo 070716\RTE Memo_Supplemental Correction_070816.docx

[1] Electronic mail between VHB (C. Fenner) and FWD (A. Marcus) on February 9, 2016.

40 IDX Drive
Building 100, Suite 200
South Burlington, VT 05403

Species Checklist[1] - Partial Floristic Inventory
Client: Vermont Railway
Project: Shelburne Transload Facility
Date: July 7, 2016
Survey Date(s) July 16 and 17, 2015
Surveyor(s): VHB (C. Fenner, O. McEnroe)
Prepared by: VHB (C. Fenner)

Scientific Name [1]	Common Name	Family	VT Rarity Rank[2]	Non-Native Invasive Species [3]
Acer negundo L.	boxelder	Aceraceae		
Acer rubrum L.	red maple	Aceraceae		
Agrostis gigantea Roth	redtop	Poaceae		
Alnus incana (L.) Moench	gray alder	Betulaceae		
Amphicarpaea bracteata (L.) Fernald	American hogpeanut	Fabaceae		
Anemone quinquefolia L.	wood anemone	Ranunculaceae		
Apios americana Medik.	groundnut	Fabaceae		
Apocynum cannabinum L.	Indianhemp	Apocynaceae		
Aralia nudicaulis L.	wild sarsaparilla	Araliaceae		
Arisaema triphyllum (L.) Schott	Jack in the pulpit	Araceae		
Asclepias incarnata L.	swamp milkweed	Asclepiadaceae		
Asclepias syriaca L.	common milkweed	Asclepiadaceae		
Athyrium filix-femina (L.) Roth ssp. angustum (Willd.) R.T.	subarctic ladyfern	Scrophulariaceae		
Berberis vulgaris L.	common barberry	Berberidaceae		
Betula alleghaniensis Britton	yellow birch	Betulaceae		
Betula papyrifera Marshall	paper birch	Betulaceae		
Betula populifolia Marshall	gray birch	Betulaceae		
Bidens cernua L.	nodding beggartick	Asteraceae		
Boehmeria cylindrica (L.) Sw.	smallspike false nettle	Urticaceae		
Carex annectens (E.P. Bicknell) E.P. Bicknell	yellowfruit sedge	Cyperaceae		
Carex baileyi Britton	Bailey's sedge	Cyperaceae		
Carex blanda Dewey	eastern woodland sedge	Cyperaceae		
Carex conoidea Schkuhr ex Willd.	openfield sedge	Cyperaceae		
Carex crinita Lam.	fringed sedge	Cyperaceae		
Carex gracillima Schwein.	graceful sedge	Cyperaceae		
Carex gynandra Schwein.	nodding sedge	Cyperaceae		
Carex intumescens Rudge	greater bladder sedge	Cyperaceae		
Carex lupulina Muhl. ex Willd.	hop sedge	Cyperaceae		
Carex lurida Wahlenb.	shallow sedge	Cyperaceae		
Carex scoparia Schkuhr ex Willd. var. scoparia	broom sedge	Cyperaceae		
Carex vulpinoidea Michx.	fox sedge	Cyperaceae		
Carpinus caroliniana Walter	American hornbeam	Betulaceae		
Carya ovata (Mill.) K. Koch	shagbark hickory	Juglandaceae		
Cephalanthus occidentalis L.	common buttonbush	Rubiaceae		
Cerastium arvense L.	field chickweed	Caryophyllaceae		
Cinna arundinacea L.	sweet woodreed	Poaceae		
Circaea lutetiana L. ssp. canadensis (L.) Asch. & Magnus	broadleaf enchanter's	Onagraceae		
Cirsium vulgare (Savi) Ten.	bull thistle	Asteraceae		
Clematis virginiana L.	devil's darning needles	Ranunculaceae		
Cornus amomum Mill.	silky dogwood	Cornaceae		
Cornus racemosa Lam.	gray dogwood	Cornaceae		
Dennstaedtia punctilobula (Michx.) T. Moore	eastern hayscented fern	Dennstaedtiaceae		
Equisetum fluviatile L.	water horsetail	Equisetaceae		
Equisetum variegatum Schleich. ex F. Weber & D. Mohr	variegated scouringrush	Equisetaceae		
Eupatorium perfoliatum L.	common boneset	Asteraceae		
Festuca rubra L.	red fescue	Poaceae		
Fragaria virginiana Duchesne	Virginia strawberry	Rosaceae		
Fraxinus pennsylvanica Marshall	green ash	Oleaceae		

Scientific Name [1]	Common Name	Family	VT Rarity Rank[2]	Invasive Species [3]
Galium asprellum Michx.	rough bedstraw	Rubiaceae		
Galium palustre L.	common marsh bedstraw	Rubiaceae		
Geum canadense Jacq.	white avens	Rosaceae		
Glyceria canadensis (Michx.) Trin.	rattlesnake mannagrass	Poaceae		
Glyceria grandis S. Watson	American mannagrass	Poaceae		
Hackelia virginiana (L.) I.M. Johnst.	beggarslice	Boraginaceae		
Hamamelis virginiana L.	American witchhazel	Hamamelidaceae		
Hieracium pratense Tausch	yellow hawkweed	Asteraceae		
Hypericum perforatum L.	common St. Johnswort	Clusiaceae		
Hypericum punctatum Lam.	spotted St. Johnswort	Clusiaceae		
Impatiens capensis Meerb.	jewelweed	Balsaminaceae		
Juncus canadensis J. Gay ex Laharpe	Canadian rush	Juncaceae		
Juncus effusus L.	common rush	Juncaceae		
Juniperus virginiana L.	eastern redcedar	Cupressaceae		
Laportea canadensis (L.) Weddell	Canadian woodnettle	Urticaceae		
Leersia oryzoides (L.) Sw.	rice cutgrass	Poaceae		
Lobelia spicata Lam.	palespike lobelia	Campanulaceae		
Lonicera canadensis W. Bartram ex Marshall	American fly honeysuckle	Caprifoliaceae		
Lonicera morrowii A. Gray	Morrow's honeysuckle	Caprifoliaceae		B
Lycopus americanus Muhl. ex W.P.C. Barton	American water horehound	Lamiaceae		
Lysimachia nummularia L.	creeping jenny	Primulaceae		
Lysimachia quadrifolia L.	whorled yellow loosestrife	Primulaceae		
Lysimachia terrestris (L.) Britton, Sterns & Poggenb.	earth loosestrife	Primulaceae		
Lythrum salicaria L.	purple loosestrife	Lythraceae		B
Maianthemum canadense Desf.	Canada mayflower	Liliaceae		
Matteuccia struthiopteris (L.) Todaro	ostrich fern	Dryopteridaceae		
Medeola virginiana L.	Indian cucumber	Liliaceae		
Melilotus officinalis (L.) Lam.	sweetclover	Fabaceae		
Mentha arvensis L.	wild mint	Lamiaceae		
Mitchella repens L.	partridgeberry	Rubiaceae		
Moneses uniflora (L.) A. Gray	single delight	Pyrolaceae		
Onoclea sensibilis L.	sensitive fern	Dryopteridaceae		
Osmunda cinnamomea L.	cinnamon fern	Osmundaceae		
Osmunda claytoniana L.	interrupted fern	Osmundaceae		
Osmunda regalis L.	royal fern	Osmundaceae		
Oxalis corniculata L.	creeping woodsorrel	Oxalidaceae		
Parthenocissus quinquefolia (L.) Planch.	Virginia creeper	Vitaceae		
Peltandra virginica (L.) Schott	green arrow arum	Araceae	S2S3	
Phalaris arundinacea L.	reed canarygrass	Poaceae		WL
Phragmites australis (Cav.) Trin. ex Steud.	common reed	Poaceae		B
Phryma leptostachya L.	American lopseed	Verbenaceae		
Pilea pumila (L.) A. Gray	Canadian clearweed	Urticaceae		
Pinus strobus L.	eastern white pine	Pinaceae		
Polygonum sagittatum L.	arrowleaf tearthumb	Polygonaceae		
Polystichum acrostichoides (Michx.) Schott	Christmas fern	Dryopteridaceae		
Populus tremuloides Michx.	quaking aspen	Salicaceae		
Potentilla norvegica L.	Norwegian cinquefoil	Rosaceae		
Prenanthes altissima L.	tall rattlesnakeroot	Asteraceae		
Prunus pensylvanica L. f.	pin cherry	Rosaceae		
Prunus serotina Ehrh.	black cherry	Rosaceae		
Pteridium aquilinum (L.) Kuhn	western brackenfern	Dennstaedtiaceae		
Pyrola rotundifolia auct. non L. p.p.	American shinleaf	Pyrolaceae		
Quercus alba L.	white oak	Fagaceae		
Quercus bicolor Willd.	swamp white oak	Fagaceae		
Quercus rubra L.	northern red oak	Fagaceae		
Rhus typhina L.	staghorn sumac	Anacardiaceae		
Rubus allegheniensis Porter	Allegheny blackberry	Rosaceae		
Rubus canadensis L.	smooth blackberry	Rosaceae		

Scientific Name [1]	Common Name	Family	VT Rarity Rank[2]	Invasive Species [3]
Rubus occidentalis L.	black raspberry	Rosaceae		
Salix bebbiana Sarg.	Bebb willow	Salicaceae		
Salix petiolaris Sm.	meadow willow	Salicaceae		
Salix sericea Marshall	silky willow	Salicaceae		
Sambucus racemosa L.	red elderberry	Caprifoliaceae		
Sanguinaria canadensis L.	bloodroot	Papaveraceae		
Scirpus atrocinctus Fernald	blackgirdle bulrush	Cyperaceae		
Scirpus atrovirens Willd.	green bulrush	Cyperaceae		
Scirpus cyperinus (L.) Kunth	woolgrass	Cyperaceae		
Solanum dulcamara L.	climbing nightshade	Solanaceae		
Solidago canadensis L.	Canada goldenrod	Asteraceae		
Solidago rugosa Mill.	wrinkleleaf goldenrod	Asteraceae		
Sparganium americanum Nutt.	American bur-reed	Sparganiaceae		
Spiraea alba Du Roi var. latifolia (Aiton) Dippel	white meadowsweet	Rosaceae		
Stachys pilosa	hairy hedge-nettle	Lamiaceae	S2?	
Symphyotrichum cordifolium (L.) G.L. Nesom	common blue wood aster	Asteraceae		
Symphyotrichum lateriflorum (L.) Á. Löve & D. Löve	calico aster	Asteraceae		
Symplocarpus foetidus (L.) Salisb. ex W.P.C. Barton	skunk cabbage	Araceae		
Taraxacum officinale F.H. Wigg.	common dandelion	Asteraceae		
Thalictrum pubescens Pursh	king of the meadow	Ranunculaceae		
Thelypteris noveboracensis (L.) Nieuwl.	New York fern	Thelypteridaceae		
Thelypteris palustris Schott	eastern marsh fern	Thelypteridaceae		
Trifolium pratense L.	red clover	Fabaceae		
Trillium L.	trillium	Liliaceae		
Tsuga canadensis (L.) Carrière	eastern hemlock	Pinaceae		
Typha latifolia L.	broadleaf cattail	Typhaceae		
Ulmus americana L.	American elm	Ulmaceae		
Urtica dioica L.	stinging nettle	Urticaceae		
Vaccinium angustifolium Aiton	lowbush blueberry	Ericaceae		
Valeriana officinalis L.	garden valerian	Valerianaceae		
Verbena urticifolia L.	white vervain	Verbenaceae		
Veronica americana Schwein. ex Benth.	American speedwell	Scrophulariaceae		
Viburnum acerifolium L.	mapleleaf viburnum	Caprifoliaceae		
Vicia cracca L.	bird vetch	Fabaceae		
Viola blanda Willd.	sweet white violet	Violaceae		
Viola renifolia A. Gray	white violet	Violaceae		
Viola sororia Willd.	common blue violet	Violaceae		
Vitis aestivalis Michx.	summer grape	Vitaceae		
Zanthoxylum americanum Mill.	common pricklyash	Rutaceae		

[1] Nomenclature follows USDA-NRCS PLANTS database (plants.usda.gov/) and/or Haines (2011).

[2] The Vermont State Rank from the "Rare and Uncommon Native Vascular Plants of Vermont - Vermont Natural Heritage Inventory - Vermont Fish & Wildlife Department", version dated June 15, 2015.

[3] Quarantine #3- Noxious Weeds (2012);
Vermont Wildlife Action Plan- Appendix K Exotic Invasive and Pest Species (2005). Vermont Fish & Wildlife Department

Appendix I: **LaPlatte River Chloride Loading Analysis**

This appendix contains the following information:

- Chloride Loading Analysis dated July 8, 2016 (VHB)

Memorandum

To: Vermont Railway, Inc.
Project File

Date: July 8, 2016

Project #: 57762.00

From: Robert Wildey, CPESC

Re: Shelburne Transload Facility
LaPlatte River Chloride Loading Analysis

INTRODUCTION

In support of the Vermont Railway, Inc. ("VTR", or "Applicant") proposal to develop the Shelburne Transload Facility ("Project" or "Facility"), located to the north of the Village of Shelburne and west of U.S. Route 7 and a VTR track and approximately 0.5 southeast from the mouth of the LaPlatte River, VHB has prepared the chloride loading analysis which is summarized in this memorandum. The memorandum outlines the data and assumptions used to evaluate whether chloride concentrations in the LaPlatte River are likely to exceed the Vermont Water Quality Standards for chloride under certain worst case conditions due to wash-off of residual material that may temporarily accumulate on paved surfaces during transfer activities at the Facility. Representatives of the Vermont DEC Stormwater Program were consulted during the development of the procedures and assumptions used in this analysis.

The proposed operations and facilities are designed to minimize any potential exposure of road salt to stormwater runoff as outlined in detail in the Stormwater Pollution Prevention Plan ("SWPPP") that was developed in support of the Facility's application for coverage under the Multi-Sector General Permit ("MSGP"). Various Best Management Practices ("BMPs") will be utilized at the site including covered storage of bulk salt and other potential stormwater contaminants, regular pavement sweeping and other material containment practices that are identified in the SWPPP. Post-construction water quality monitoring will also be conducted as described in the sampling plan memorandum included in Appendix F of the SWPPP.

In conducting this analysis, VHB reviewed existing chloride concentrations in the LaPlatte River and evaluated potential increases that could result from chloride wash-off following the construction of the Project.

The chloride loading analysis consisted of the following steps:

- Review and analyze historic streamflow and conductivity data from the USGS LaPlatte River stream gage to determine the stream flow under a range of existing conditions and the baseline chloride concentration found in the LaPlatte River
- Review historic chloride data from the VT DEC at water quality monitoring stations located near the Project site to evaluate the baseline chloride concentration that is found in the LaPlatte River during low flow periods
- Evaluate the stormwater runoff that would be generated by the impervious areas of the Project to determine the peak flow rate during the 0.9-inch Water Quality Volume rainfall event
- Conduct a literature review to identify the potential range of chloride concentrations that have be observed in runoff in other similar types of salt transfer/storage facility. However, it was not possible to determine if the facilities represented in the literature were subject to the requirements of the MSGP or the extent to which BMPs were implemented as part of their facility management.

- Conduct a sensitivity analysis to compare the resultant chloride concentration in the LaPlatte with the Vermont Water Quality Standard ("VWQS") chronic concentration criterion (four hour average concentration greater than 230 mg/L once every 3 years) or the acute chloride concentration criterion (one hour average concentration greater than 860 mg/L once every 3 years).

REVIEW OF EXISTING CHLORIDE CONCENTRATION DATA

To evaluate the existing chloride concentrations in the LaPlatte River, VHB reviewed water quality data from two Vermont Department of Conservation ("DEC") water quality monitoring stations located near the site (DEC Location ID 500789 and DEC 500785) and streamflow data from the United States Geological Survey ("USGS") stream gaging station located on the LaPlatte River upstream from the site at Shelburne Falls (USGS Gage 04272895). The location of this gaging station is shown on the Site Location Map, page 1 of the Attachment). A summary table of the average monthly median daily flows reported by the gage is included on page 2 of the Attachment, along with the daily median flow data for the months of July, August, September, October, and November.

The DEC reported total chloride in mg/L from a total of 50 samples that were collected between 2004 and 2007. These samples were collected between May and November of each year. The median concentration of all samples reported for these two stations was 46 mg/L. No samples exhibited concentrations above the VWQS chronic concentration standard of 230 mg/L. The sample with the maximum concentration of 117 mg/L was reported in November 2004. A summary table of the DEC chloride data and the corresponding flow data at the USGS stream gage for those sampling events is presented on page 3 of the Attachment.

Given the historic water quality and streamflow information available from these two sources, the background chloride concentration in the LaPlatte is relatively well-documented. The critical period when the River exhibits the highest chloride concentration typically occurs during the late-summer and fall (September, October and November) when stream flows are at their lowest. Based on this information, the background chloride concentration in the River rarely exceeds the chronic criterion and does not appear to ever exceed the acute criterion. The two data sources (USGS conductivity measurements converted to chloride using the state-wide regression equation and direct measurements of chloride by DEC) are generally in agreement that the median chloride concentration is approximately 50 mg/L. This value was therefore selected for use as an estimate of the background concentration in the River for subsequent calculations that are presented in this analysis.

REVIEW OF EXISTING FLOW DATA

Existing flow data from the USGS stream gage at Shelburne Falls (Gage # 04282795) is available from 1991 to the present. Flow statistics (recurrence intervals or probabilities) have been calculated based on this period of record and were downloaded from the USGS website (http://waterdata.usgs.gov/nwis/uv?site_no=04282795).

To be conservative, it was assumed that the flows leaving the Project site as a result of stormwater runoff during the water quality volume design storm would enter the LaPlatte River prior to any significant increase in stream flow that would accompany the response of the overall LaPlatte River watershed to the storm. This assumption is warranted due to the location of the Project at the lower end of the watershed.

LITERATURE REVIEW OF CHLORIDE RUNOFF FROM SALT STORAGE AND HANLDING FACILITIES

The values reported in the literature for chloride concentrations in runoff associated with salt storage and handling facilities are widely variable and at times over several orders of magnitude, with values reported from 140 mg/L to 13,500 mg/L. This variability is attributable to many site related factors including the land cover conditions, drainage area size, rainfall/runoff volumes, sample timing during runoff event, to name a few. For this analysis, VHB focused on using observed data at salt storage facilities, which in themselves are highly variable with some covered and others not. It was difficult to find data that directly relates to the proposed facility being completely covered and with several BMPs being employed to reduce exposure of the material to stormwater runoff. A study evaluating runoff from a variety of transportation facilities entitled, "Characterization and Environmental Management of Runoff from Road-Salt Storage Facilities – Final Report (Fitch et al., (2004)," and published by the Virginia Transportation Research Council was determined to provide the most relevant observed data. This study examined runoff from 292 facilities throughout Virginia that are managed by the Virginia Department of Transportation ("VDOT"). In this study, chloride concentrations were measured in the stormwater ponds that were used at the various facilities to collect runoff from salt handling and storage areas. The loading areas at the sites in the study were not covered and no discussion is given of the BMPs that are employed to reduce exposure to stormwater runoff. The observed chloride concentrations reported in this study ranged from 140 mg/L to 3,100 mg/L, with an average concentration of 1,600 mg/L. Based on a standard deviation analysis of the 292 sites that were evaluated, the study's authors determined that 95% of VDOTs ponds would have chloride concentrations less than 3,200 mg/L. The results of this study were used to help characterize the potential chloride concentrations that may occur in runoff from the Project.

WATER QUALITY VOLUME RUNOFF EVENT

For this analysis, the water quality event as defined in the Vermont Stormwater Management Manual (Vermont Agency of Natural Resources, April 2001, "VSMM") was selected as the representative rainfall event for analysis, as it is represents the storm event for which 90 percent of annual storm events are smaller. The precipitation depth for the water quality storm as defined in the VSMM is 0.9 inches. The flow rate from the portion of the Site involved in in salt handling operations was calculated using the TR-55 modified curve number method as defined in the VSMM. The modified curve number method was selected as conventional methods have been found to underestimate the volume and rate of runoff for rainfall events less than two inches.

The portion of the Site involved in salt handling operations is 5.6 acres, 2.0 acres of which consist of paved impervious surfaces that would be used for salt handling and 1.2 acres of the salt shed roof. This 5.6 acre area drains via stormwater conveyance channels and a pretreatment grass channel to a wet pond, which will provide settling of suspended solids prior to discharge via an overflow weir. Flow overtopping the weir discharges from the Project

towards the LaPlatte River to the north. The flow rate during the water quality storm that will outlet from the overflow weir was used as the site runoff rate in this chloride loading analysis. The Potential Pollutant Source Map included on page 3 of the Attachment shows these areas and the location of the wet pond. Complete site plans are included as an attachment to the SWPPP. Flow rate computations, calculated using TR-55 modified curve number methodology as applied by HydroCAD, are included on pages 4 through 10 of the Attachment.

The peak flow rate from the Site during the water quality storm event was estimated to be 2.4 cfs. This flow rate assumes that the wet pond is full at the start of the storm event, which is a conservative assumption considering the typically dry conditions that are prevalent during the month of September. In order to compare the potential chloride flux with the chronic and acute criteria of the VWQS, the average flow rate over the peak hour of the WQV event was evaluated and estimated to be 1.4 cfs and the average flow rate over the peak four hours of the WQV event was evaluated and estimated to be 0.5 cfs.

Mass balance equations were then performed using the peak 1-hour and peak 4-hour stream flow rates using historical September flow data for the LaPlatte River together with the background chloride concentration that were previously discussed. These calculations assume that the available chloride concentrations in both the stormwater runoff and the River are static throughout the storm event. This assumption is conservative given that dilution would occur as the storm continues and that the chloride wash-off load is not unlimited.

Table 1 presents the results of the sensitivity analysis performed to estimate the resulting chloride concentration in the LaPlatte River under different chloride concentrations in the stormwater discharged from the site. Supporting calculations are included on pages 11 through 15 of the Attachment.

Table 1. LaPlatte River Chloride Concentration Sensitivity Analysis

Chloride Concentration in Runoff	Peak 1-hour Average Chloride Concentration (Acute Criteria)	Peak 4-hour Average Chloride (Chronic Criteria)
100 mg/L	61 mg/L	55 mg/L
500 mg/L	148 mg/L	91 mg/L
1,000 mg/L	258 mg/L	136 mg/L
2,030 mg/L (chronic)	483 mg/L	230 mg/L
3,753 mg/L (acute)	860 mg/L	387 mg/L

The results of this analysis indicate that an exceedance of the acute chloride criterion would only likely occur if the chloride concentration in the stormwater discharge from the pond was higher than 3,750 mg/L and that an exceedance of the chronic chloride criterion would only likely occur if the chloride concentration in the stormwater discharge from the pond was higher than 2,030 mg/L. These values are higher than the average value of 1,600 mg/L and, in the case of the acute criterion, higher than the 95 percent probability concentration of 3,200 mg/L reported in the VDOT study (Fitch, 2004).

Assuming that the sodium chloride was completely dissolved in solution, the amount of bulk salt required to generate these chloride concentrations would be equivalent to 0.5 to 0.6 cubic yards (or roughly 1,000 to 1,200 pounds) of bulk salt being washed off during each event. Because BMPs (such as having a covered storage and handling area and regularly sweeping paved areas as part of good house-keeping practices) are required to be employed at the Project pursuant to the MSGP, it is anticipated that this volume of salt would not be exposed and available for wash-off prior to storm events, and therefore the chloride concentration in stormwater discharges from the Project would be considerably below the threshold values identified in this analysis. Based on this analysis, it appears likely that the chloride concentration in the LaPlatte River as a result of runoff from the Project might range between 61 and 258 mg/L when calculated over the peak one hour of the 0.9-inch WQV storm event and between 55 and 136 mg/L over the peak four hours of the 0.9-inch WQV storm event.

CONCLUSION

Based on the assumptions and data used in this analysis, the results strongly suggest indicate that the Project would not likely cause exceedances of the VWQS acute or chronic chloride criteria within the LaPlatte River. The use of BMPs at the Project site will further minimize the amount of chloride potentially discharged from the site by limiting the exposure to stormwater runoff. Sampling of the stormwater discharges from the facility are proposed as part of the SWPPP that has been prepared as part of compliance with the MSGP. Post-construction water quality monitoring is also proposed as a means to further protect against potential water quality criteria exceedances. Such samples can also be used to validate the assumptions and results that were derived from this analysis.

REFERENCES

Fitch, G. Michael et al., 2008. *Recycling of Salt-Contaminated Stormwater Runoff for Brine Production at Virginia Department of Transportation Road-Salt Storage Facilities*. Charlottesville, VA: Virginia Transportation Research Council, 2008.

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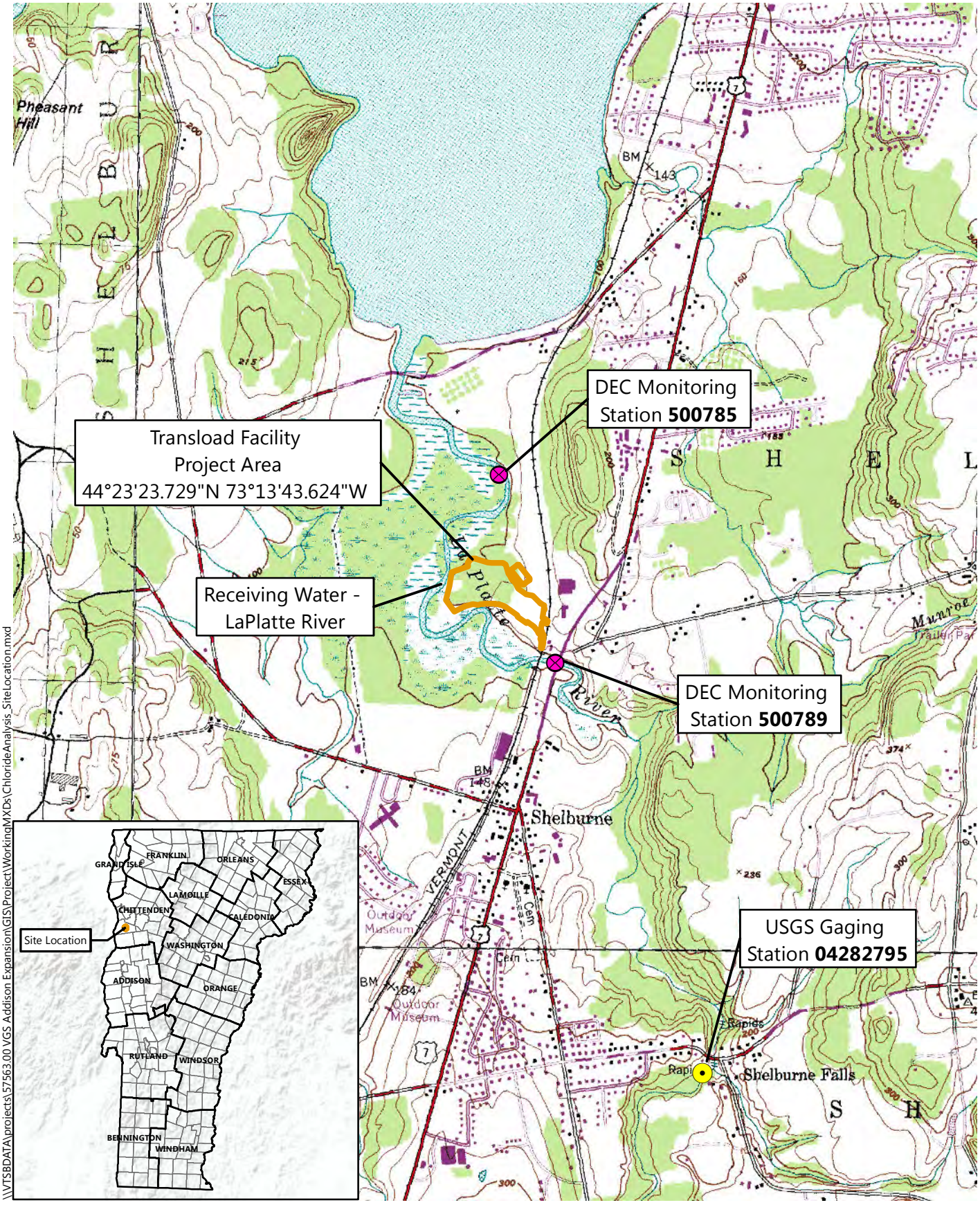
ATTACHMENT

July 08, 2016



\\VTSBDATA\projects\57563.00 VGS Addison Expansion\GIS\Project\WorkingMXDs\ChlorideAnalysis_SiteLocation.mxd

Shelburne Transload Facility | Shelburne, Vermont

Site Location Map

USGS Topo Background (1996)
DEC Monitoring Sites from IWIS Report (2016)

Computations

Project:	**Shelburne Transload**	**Project #:**	**57762.00**
Location:	**Shelburne, Vermont**	**Sheet:**	**1 of 1**
Calculated by:	**Robert Wildey**	**Date:**	**July 6, 2016**
Checked by:		**Date:**	
Title:	**LaPlatte River Median Daily Flows**		

Average Median Flow, By Month (cfs) [2]	
Month	**Flow**
January	24
February	19
March	52
April	83
May	34
June	16
July	8
August	6
September	5
October	14
November	30
December	36

LaPlatte River Median Daily Flow (cfs) [1]					
Day	**July**	**August**	**September**	**October**	**November**
1	8.9	6.4	5.4	8.6	21.0
2	9.3	6.7	5.7	7.2	23.0
3	7.2	7.0	4.5	6.7	23.0
4	6.6	7.1	4.5	6.0	22.0
5	10.0	8.7	4.7	9.2	20.0
6	10.0	7.4	4.7	8.9	22.0
7	7.8	6.7	4.7	8.8	20.0
8	8.7	5.1	4.5	8.2	20.0
9	15.0	4.9	5.0	7.0	22.0
10	12.0	5.9	4.4	7.7	18.0
11	9.3	9.1	4.4	7.0	21.0
12	6.9	9.5	4.2	7.4	27.0
13	6.1	6.7	4.3	6.8	32.0
14	5.9	7.9	4.2	7.2	26.0
15	8.2	6.9	5.0	8.2	36.0
16	8.3	5.9	4.8	9.5	42.0
17	6.7	4.9	5.4	12.0	35.0
18	7.3	4.5	4.9	12.0	33.0
19	7.8	4.2	4.9	14.0	30.0
20	6.4	4.4	4.4	13.0	30.0
21	5.8	5.1	4.7	16.0	30.0
22	6.1	7.1	5.2	22.0	34.0
23	6.8	5.3	5.5	23.0	30.0
24	9.4	5.8	7.1	24.0	29.0
25	7.6	4.9	7.2	22.0	35.0
26	6.8	4.3	5.2	25.0	34.0
27	6.4	4.2	5.4	24.0	46.0
28	7.6	4.0	5.8	28.0	43.0
29	8.0	3.5	7.2	25.0	42.0
30	8.1	3.4	9.1	23.0	41.0
31	7.3	3.7	-	21.0	-
Maximum	15	10	9	28	46
Minimum	6	3	4	6	18
Average	8	6	5	14	30

1. Median daily flow as measured at USGS Gage 04282795 (LaPlatte River at Shelburne Falls)
2. Average median daily flows for entire year, as measured at USGS Gage 04282795 (LaPlatte River at Shelburne Falls)

Computations

Project:	**Shelburne Transload**	**Project #:**	**57762.00**
Location:	**Shelburne, Vermont**	**Sheet:**	**1 of 1**
Calculated by:	**Robert Wildey**	**Date:**	**July 6, 2016**
Checked by:		**Date:**	
Title:	**LaPlatte River Background Chloride Concentration**		
	DEC Chloride Sampling Data		

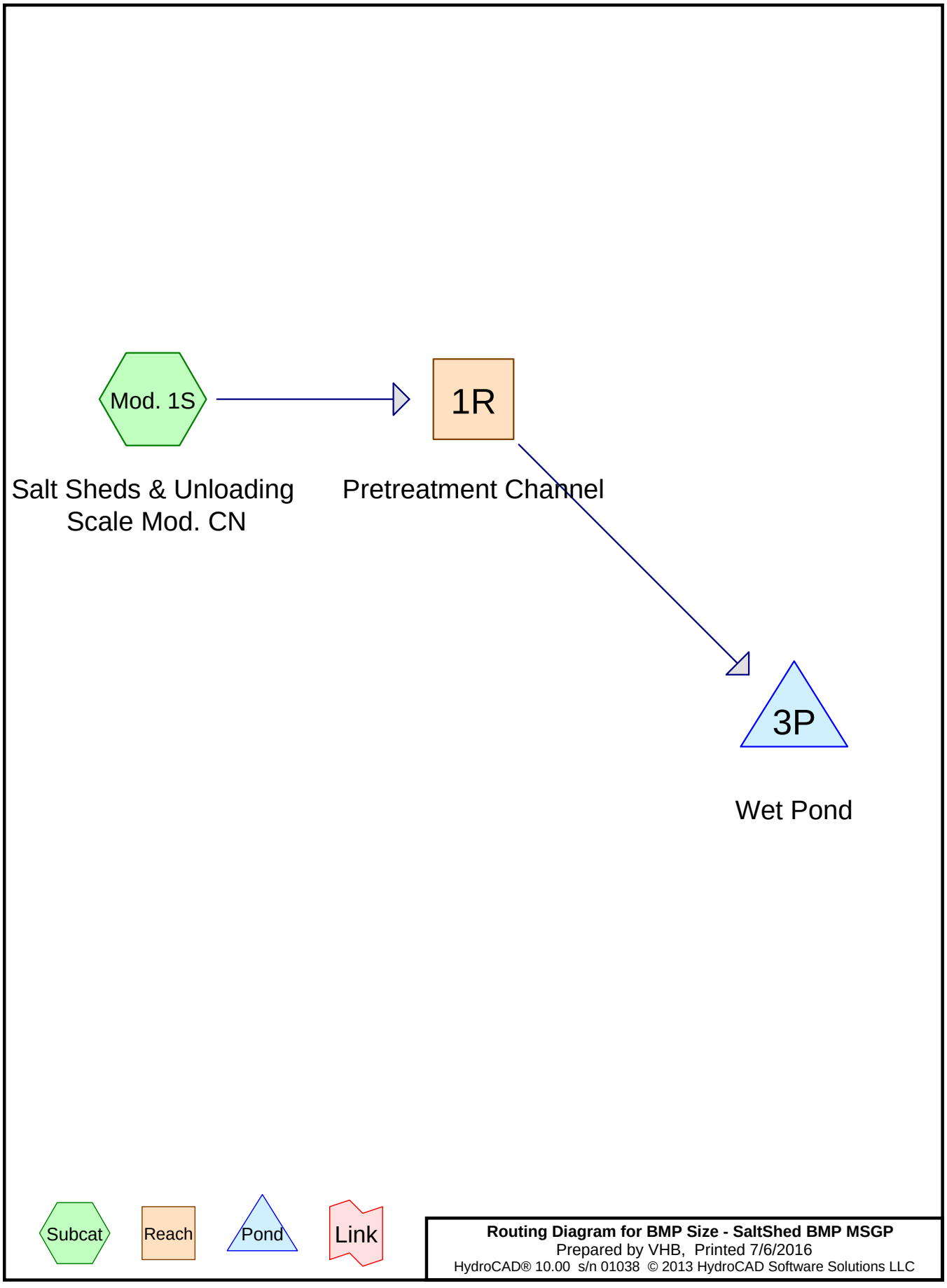
LaPlatte River @ Route 7 (DEC 500789)		
Sample Date	**Chloride Conc. (mg/L)[1]**	**Flow (cfs)[2]**
6/22/2004	53	9
7/20/2004	45	35
8/31/2004	14	406
9/21/2004	47	11
9/21/2004	47	11
10/12/2004	31	4
10/12/2004	31	4
11/16/2004	117	5
11/16/2004	116	5
5/3/2005	26	70
6/7/2005	53	8
7/5/2005	56	17
8/2/2005	47	23
9/6/2005	49	7
10/4/2005	30	9
11/8/2005	44	44
7/5/2006	16	86
8/1/2006	35	13
9/5/2006	55	6
10/3/2006	55	16
11/7/2006	27	27
6/12/2007	49	7
7/10/2007	23	98
8/14/2007	109	2
9/11/2007	71	4
11/13/2007	48	9

LaPlatte @ Yacht Haven Dr. (DEC 500785)		
Sample Date	**Chloride Conc. (mg/L)[1]**	**Flow (cfs)[2]**
6/22/2004	78	9
7/20/2004	32	35
8/31/2004	15	406
9/21/2004	48	11
10/12/2004	30	4
11/16/2004	117	5
5/3/2005	23	70
6/7/2005	46	8
7/5/2005	52	17
8/2/2005	43	23
9/6/2005	48	7
10/4/2005	30	9
11/8/2005	38	44
6/6/2006	17	81
7/5/2006	17	86
8/1/2006	32	13
9/5/2006	54	6
10/3/2006	46	16
11/7/2006	25	27
6/12/2007	38	7
7/10/2007	28	98
8/14/2007	78	2
9/11/2007	71	4
11/13/2007	46	9

Monthly Median Chloride and Flow Analysis (All DEC Data)		
Month	**Flow (cfs)[1]**	**Chloride (mg/L)[3]**
May	70	24
Jun	8	49
July	61	30
Aug	18	39
Sep	7	49
Oct	9	31
Nov	9	46

Maximum	406	117
Minimum	2	14
Median	11	46

1. Chloride measured at DEC Location ID 500789 - LaPlatte River at Route 7
2. Average daily flow on date of DEC sample, as measured at USGS Gage 04282795 (LaPlatte River at Shelburne Falls)
3. Median chloride concentration of DEC samples, by month
4. Median stream flow on dates when DEC samples were collected, by month
5. Median average daily flow , as measured at USGS Gage 04282795 (LaPlatte River at Shelburne Falls)



Routing Diagram for BMP Size - SaltShed BMP MSGP
Prepared by VHB, Printed 7/6/2016

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Mod. 1S: Salt Sheds & Runoff Area=5.640 ac 0.00% Impervious Runoff Depth>0.48"
Flow Length=914' Tc=9.2 min CN=95 Runoff=4.28 cfs 0.224 af

Reach 1R: Pretreatment Channel Avg. Flow Depth=0.57' Max Vel=0.69 fps Inflow=4.28 cfs 0.224 af
n=0.099 L=433.0' S=0.0060 '/' Capacity=18.53 cfs Outflow=3.05 cfs 0.221 af

Pond 3P: Wet Pond Peak Elev=109.38' Storage=16,393 cf Inflow=3.05 cfs 0.221 af
Outflow=2.38 cfs 0.219 af

Total Runoff Area = 5.640 ac Runoff Volume = 0.224 af Average Runoff Depth = 0.48"
100.00% Pervious = 5.640 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment Mod. 1S: Salt Sheds & Unloading Scale Mod. CN

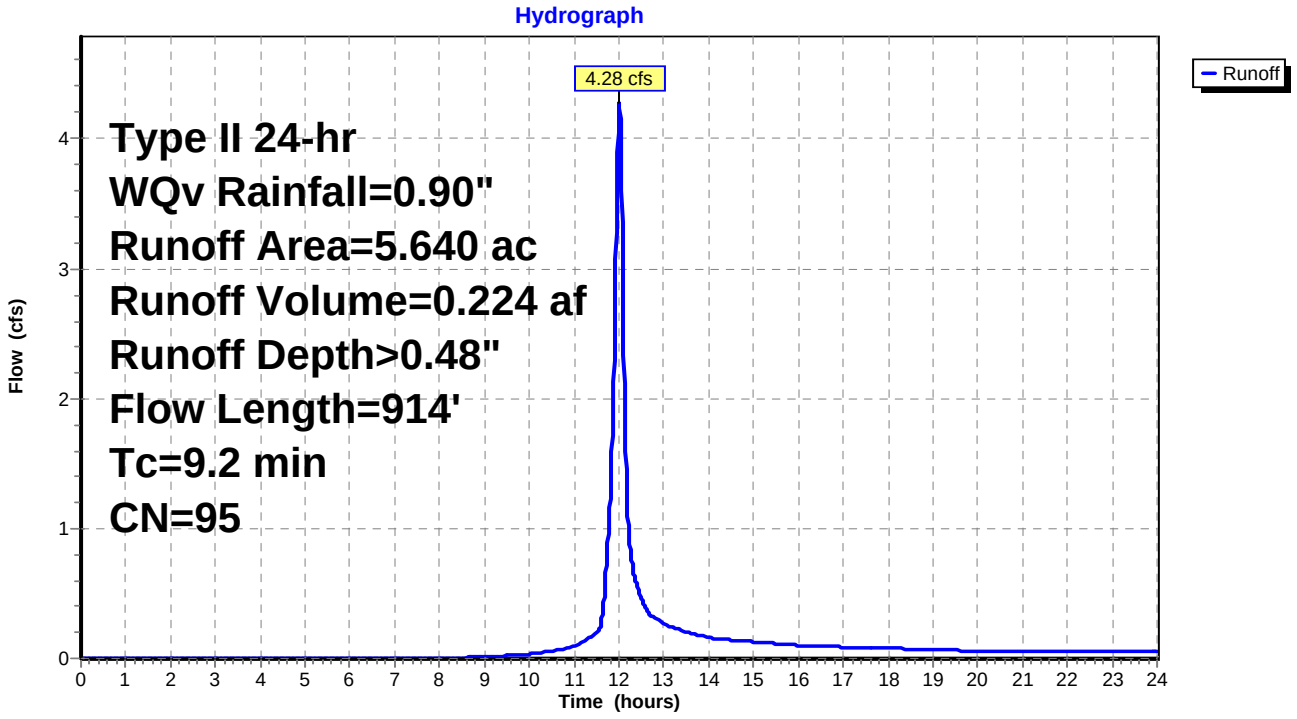
Runoff = 4.28 cfs @ 12.01 hrs, Volume= 0.224 af, Depth> 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Rainfall=0.90"

	Area (ac)	CN	Description
*	5.640	95	Mod. Curve Number
	5.640		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0200	1.17		**Sheet Flow, paved** Smooth surfaces n= 0.011 P2= 2.30"
2.9	500	0.0200	2.87		**Shallow Concentrated Flow, paved** Paved Kv= 20.3 fps
4.9	314	0.0050	1.06		**Shallow Concentrated Flow, conveyance channel** Grassed Waterway Kv= 15.0 fps
9.2	914	Total			

Subcatchment Mod. 1S: Salt Sheds & Unloading Scale Mod. CN



Summary for Reach 1R: Pretreatment Channel

Inflow Area = 5.640 ac, 0.00% Impervious, Inflow Depth > 0.48" for WQv event
Inflow = 4.28 cfs @ 12.01 hrs, Volume= 0.224 af
Outflow = 3.05 cfs @ 12.08 hrs, Volume= 0.221 af, Atten= 29%, Lag= 4.4 min

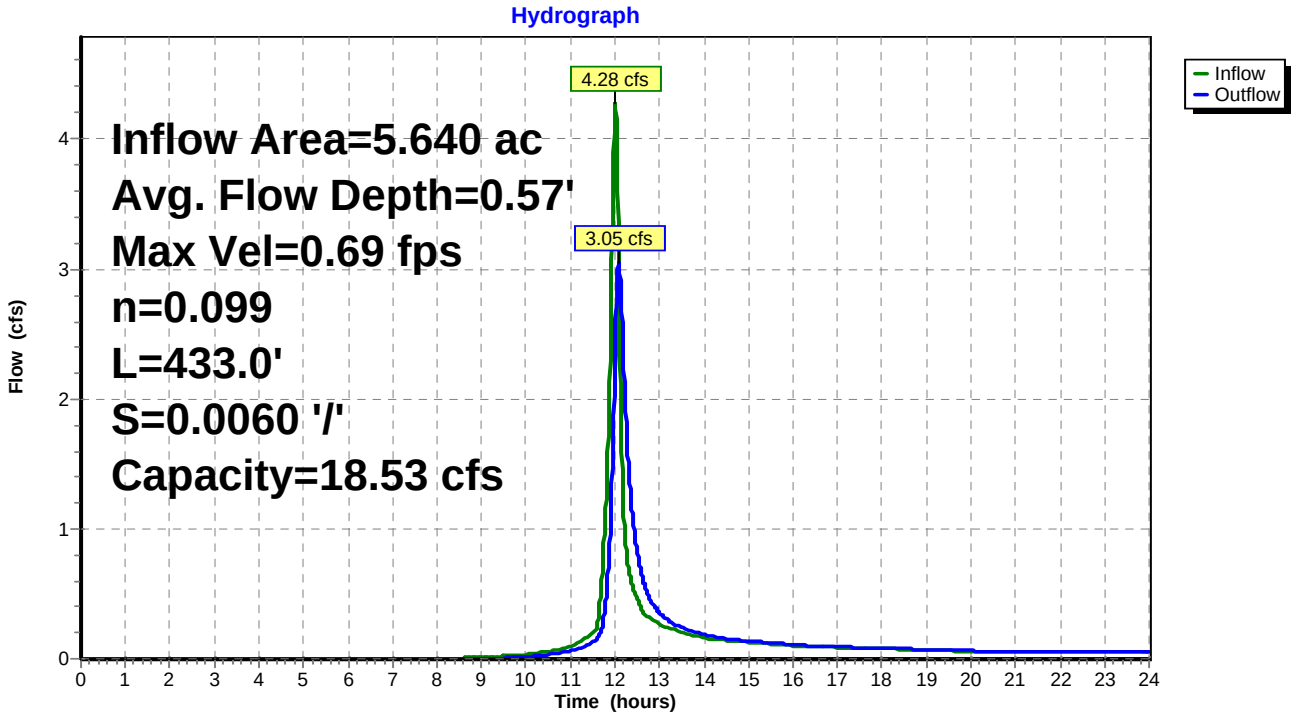
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.69 fps, Min. Travel Time= 10.4 min
Avg. Velocity = 0.20 fps, Avg. Travel Time= 35.9 min

Peak Storage= 1,908 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.57'
Bank-Full Depth= 1.50' Flow Area= 15.8 sf, Capacity= 18.53 cfs

6.00' x 1.50' deep channel, n= 0.099
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 433.0' Slope= 0.0060 '/'
Inlet Invert= 112.35', Outlet Invert= 109.75'

‡

Reach 1R: Pretreatment Channel



Summary for Pond 3P: Wet Pond

Inflow Area = 5.640 ac, 0.00% Impervious, Inflow Depth > 0.47" for WQv event
Inflow = 3.05 cfs @ 12.08 hrs, Volume= 0.221 af
Outflow = 2.38 cfs @ 12.18 hrs, Volume= 0.219 af, Atten= 22%, Lag= 6.1 min
Primary = 2.38 cfs @ 12.18 hrs, Volume= 0.219 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Starting Elev= 109.25' Surf.Area= 10,970 sf Storage= 15,006 cf
Peak Elev= 109.38' @ 12.18 hrs Surf.Area= 11,166 sf Storage= 16,393 cf (1,387 cf above start)
Flood Elev= 110.75' Surf.Area= 13,004 sf Storage= 29,972 cf (14,966 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 12.3 min (854.1 - 841.7)

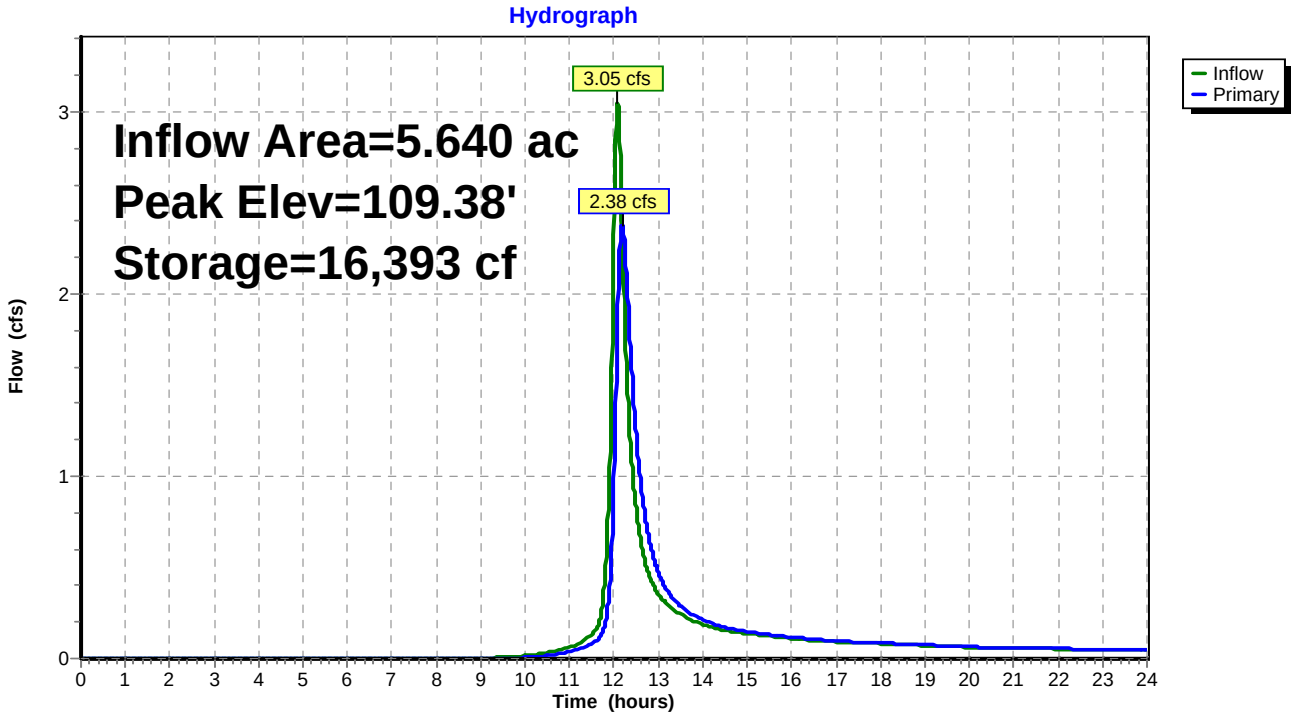
Volume	Invert	Avail.Storage	Storage Description
#1	107.75'	29,972 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
107.75	9,062	409.8	0	0	9,062
108.00	9,371	419.6	2,304	2,304	9,717
109.00	10,643	433.3	10,000	12,304	10,740
109.25	10,970	438.0	2,702	15,006	11,084
110.50	13,004	466.3	14,966	29,972	13,197

Device	Routing	Invert	Outlet Devices
#1	Primary	109.25'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=2.38 cfs @ 12.18 hrs HW=109.38' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 2.38 cfs @ 0.95 fps)

Pond 3P: Wet Pond



Computations

Project:	**Shelburne Transload**	**Project #:**	**57762.00**
Location:	**Shelburne, Vermont**	**Sheet:**	**1 of 1**
Calculated by:	**Robert Wildey**	**Date:**	**July 6, 2016**
Checked by:		**Date:**	
Title:	**West Pond Average Peak Discharge Rates for WQV Storm Event**		

Hour During WQV Event	1-Hr Average Peak Flow (cfs)[1]
0	
1	0.0
2	0.0
3	0.0
4	0.0
5	0.0
6	0.0
7	0.0
8	0.0
9	0.0
10	0.0
11	0.0
12	1.1
13	1.4
14	0.5
15	0.2
16	0.1
17	0.1
18	0.1
19	0.1
20	0.1
21	0.1
22	0.1
23	0.1
24	0.1

Hour During WQV Event	4-Hr Average Peak Flow (cfs)[2]
0	
1	
2	
3	
4	0.0
5	0.0
6	0.0
7	0.0
8	0.0
9	0.0
10	0.0
11	0.0
12	0.3
13	0.4
14	0.5
15	0.5
16	0.5
17	0.3
18	0.1
19	0.1
20	0.1
21	0.1
22	0.1
23	0.1
24	0.1

1. 1-hr Peak Average flow during hour of 24-hr WQV storm event, per HydroCAD model
2. 4-hr Peak Average flow during hour of 24-hr WQV storm event, per HydroCAD model

Computations

Project:	**Shelburne Transload**	**Project #:**	**57762.00**
Location:	**Shelburne, Vermont**	**Sheet:**	**1 of 1**
Calculated by:	**Robert Wildey**	**Date:**	**July 6, 2016**
Checked by:		**Date:**	
Title:	**Chloride Sensitivity Analysis During WQV Storm Event**		
	Chloride Concentration of 100 mg/L in Stormwater Runoff		

Acute (1-Hr) Peak Chloride Analysis	
Potential Discharge During WQV Event	
100	mg/liter chloride [1]
1.4	cubic feet / sec [2]
40	liter/sec
3,965	mg/second
0.00	kg/second
14	kg chloride during 1 hr event
0.65	chloride fraction of NaCl
22	kg NaCl required
34	density of bulk salt (kg/cf)
0	cf of NaCl required
0.0	cy of NaCl required
LaPlatte River - September Low Flow	
50	mg/liter chloride [3]
5	cubic feet / sec
142	liter/sec
7,080	mg/second
0.01	kg/second
Resulting Combined Flows	
0.01	kg/second
11,045	mg/second
6.4	cubic feet / sec
181	liter/sec
61	mg/liter chloride [4]

Chronic (4-Hr) Peak Chloride Analysis	
Potential Discharge During WQV Event	
100	mg/liter chloride [1]
0.5	cubic feet / sec [5]
14	liter/sec
1,416	mg/second
0.00	kg/second
20	kg total during 4 hr event
0.65	chloride fraction of NaCl
31	kg NaCl required
34	density of bulk salt (kg/cf)
1	cf of NaCl required
0.0	cy of NaCl required
LaPlatte River - September Low Flow	
50	mg/liter chloride [3]
5	cubic feet / sec
142	liter/sec
7,080	mg/second
0.01	kg/second
Resulting Combined Flows	
0.01	kg/second
8,496	mg/second
5.5	cubic feet / sec
156	liter/sec
55	mg/liter chloride [6]

1. Sensitivity analysis assumption of the chloride concentration in stormwater discharged from the West Pond
2. Average one-hour peak discharge from West Pond during 24-hr 0.9-inch rainfall event, as calcuated by HydroCAD
3. Estimated background concentration of chloride in LaPlatte River
4. Resulting one-hour peak chloride concentration in LaPlatte River for sensitivity analysis using 1,000 mg/L discharge from site.
5. Average four-hour peak discharge from West Pond during 24-hr 0.9-inch rainfall event, as calcuated by HydroCAD
6. Resulting four-hour peak chloride concentration in LaPlatte River for sensitivity analysis using 1,000 mg/L discharge from site.

Computations

Project:	**Shelburne Transload**	**Project #:**	**57762.00**
Location:	**Shelburne, Vermont**	**Sheet:**	**1 of 1**
Calculated by:	**Robert Wildey**	**Date:**	**July 6, 2016**
Checked by:		**Date:**	
Title:	**Chloride Sensitivity Analysis During WQV Storm Event**		
	Chloride Concentration of 500 mg/L in Stormwater Runoff		

Acute (1-Hr) Peak Chloride Analysis	
Potential Discharge During WQV Event	
500	mg/liter chloride [1]
1.4	cubic feet / sec [2]
40	liter/sec
19,824	mg/second
0.02	kg/second
71	kg chloride during 1 hr event
0.65	chloride fraction of NaCl
110	kg NaCl required
34	density of bulk salt (kg/cf)
2	cf of NaCl required
0.1	cy of NaCl required
LaPlatte River - September Low Flow	
50	mg/liter chloride [3]
5	cubic feet / sec
142	liter/sec
7,080	mg/second
0.01	kg/second
Resulting Combined Flows	
0.03	kg/second
26,904	mg/second
6.4	cubic feet / sec
181	liter/sec
148	mg/liter chloride [4]

Chronic (4-Hr) Peak Chloride Analysis	
Potential Discharge During WQV Event	
500	mg/liter chloride [1]
0.5	cubic feet / sec [5]
14	liter/sec
7,080	mg/second
0.01	kg/second
102	kg total during 4 hr event
0.65	chloride fraction of NaCl
157	kg NaCl required
34	density of bulk salt (kg/cf)
3	cf of NaCl required
0.1	cy of NaCl required
LaPlatte River - September Low Flow	
50	mg/liter chloride [3]
5	cubic feet / sec
142	liter/sec
7,080	mg/second
0.01	kg/second
Resulting Combined Flows	
0.01	kg/second
14,160	mg/second
5.5	cubic feet / sec
156	liter/sec
91	mg/liter chloride [6]

1. Sensitivity analysis assumption of the chloride concentration in stormwater discharged from the West Pond
2. Average one-hour peak discharge from West Pond during 24-hr 0.9-inch rainfall event, as calcuated by HydroCAD
3. Estimated background concentration of chloride in LaPlatte River
4. Resulting one-hour peak chloride concentration in LaPlatte River for sensitivity analysis using 1,000 mg/L discharge from site.
5. Average four-hour peak discharge from West Pond during 24-hr 0.9-inch rainfall event, as calcuated by HydroCAD
6. Resulting four-hour peak chloride concentration in LaPlatte River for sensitivity analysis using 1,000 mg/L discharge from site.

Computations

Project:	**Shelburne Transload**	**Project #:**	**57762.00**
Location:	**Shelburne, Vermont**	**Sheet:**	**1 of 1**
Calculated by:	**Robert Wildey**	**Date:**	**July 6, 2016**
Checked by:		**Date:**	
Title:	**Chloride Sensitivity Analysis During WQV Storm Event**		
	Chloride Concentration of 1,000 mg/L in Stormwater Runoff		

Acute (1-Hr) Peak Chloride Analysis	
Potential Discharge During WQV Event	
1,000	mg/liter chloride [1]
1.4	cubic feet / sec [2]
40	liter/sec
39,648	mg/second
0.04	kg/second
143	kg chloride during 1 hr event
0.65	chloride fraction of NaCl
220	kg NaCl required
34	density of bulk salt (kg/cf)
4	cf of NaCl required
0.2	cy of NaCl required
LaPlatte River - September Low Flow	
50	mg/liter chloride [3]
5	cubic feet / sec
142	liter/sec
7,080	mg/second
0.01	kg/second
Resulting Combined Flows	
0.05	kg/second
46,728	mg/second
6.4	cubic feet / sec
181	liter/sec
258	mg/liter chloride [4]

Chronic (4-Hr) Peak Chloride Analysis	
Potential Discharge During WQV Event	
1,000	mg/liter chloride [1]
0.5	cubic feet / sec [5]
14	liter/sec
14,160	mg/second
0.01	kg/second
204	kg total during 4 hr event
0.65	chloride fraction of NaCl
314	kg NaCl required
34	density of bulk salt (kg/cf)
6	cf of NaCl required
0.2	cy of NaCl required
LaPlatte River - September Low Flow	
50	mg/liter chloride [3]
5	cubic feet / sec
142	liter/sec
7,080	mg/second
0.01	kg/second
Resulting Combined Flows	
0.02	kg/second
21,240	mg/second
5.5	cubic feet / sec
156	liter/sec
136	mg/liter chloride [6]

1. Sensitivity analysis assumption of the chloride concentration in stormwater discharged from the West Pond
2. Average one-hour peak discharge from West Pond during 24-hr 0.9-inch rainfall event, as calcuated by HydroCAD
3. Estimated background concentration of chloride in LaPlatte River
4. Resulting one-hour peak chloride concentration in LaPlatte River for sensitivity analysis using 1,000 mg/L discharge from site.
5. Average four-hour peak discharge from West Pond during 24-hr 0.9-inch rainfall event, as calcuated by HydroCAD
6. Resulting four-hour peak chloride concentration in LaPlatte River for sensitivity analysis using 1,000 mg/L discharge from site.

Computations

Project:	**Shelburne Transload**	**Project #:**	**57762.00**
Location:	**Shelburne, Vermont**	**Sheet:**	**1 of 1**
Calculated by:	**Robert Wildey**	**Date:**	**July 6, 2016**
Checked by:		**Date:**	
Title:	**Chloride Analysis During WQV Storm Event**		
	Chronic Chloride Concentration In Stormwater Runoff		

Acute (1-Hr) Peak Chloride Analysis	
Potential Discharge During WQV Event	
2,030	mg/liter chloride [1]
1.4	cubic feet / sec [2]
40	liter/sec
80,486	mg/second
0.08	kg/second
290	kg chloride during 1 hr event
0.65	chloride fraction of NaCl
446	kg NaCl required
34	density of bulk salt (kg/cf)
9	cf of NaCl required
0.3	cy of NaCl required
LaPlatte River - September Low Flow	
50	mg/liter chloride [3]
5	cubic feet / sec
142	liter/sec
7,080	mg/second
0.01	kg/second
Resulting Combined Flows	
0.09	kg/second
87,566	mg/second
6.4	cubic feet / sec
181	liter/sec
483	mg/liter chloride [4]

Chronic (4-Hr) Peak Chloride Analysis	
Potential Discharge During WQV Event	
2,030	mg/liter chloride [5]
0.5	cubic feet / sec [6]
14	liter/sec
28,745	mg/second
0.03	kg/second
414	kg total during 4 hr event
0.65	chloride fraction of NaCl
637	kg NaCl required
34	density of bulk salt (kg/cf)
12	cf of NaCl required
0.5	cy of NaCl required
LaPlatte River - September Low Flow	
50	mg/liter chloride [3]
5	cubic feet / sec
142	liter/sec
7,080	mg/second
0.01	kg/second
Resulting Combined Flows	
0.04	kg/second
35,825	mg/second
5.5	cubic feet / sec
156	liter/sec
230	mg/liter chloride [7]

1. Calculated chloride concentration which represents the maximum permissible concentration before the VWQS acute criterion is exceeded.
2. Average one-hour peak discharge from West Pond during 24-hr 0.9-inch rainfall event, as calcuated by HydroCAD
3. Estimated background concentration of chloride in LaPlatte River
4. VWQS acute criterion for chloride, 1 hour average concentration not be exceeded more than once every 3 years
5. Calculated chloride concentration which represents the maximum permissible concentration before the VWQS chronic criterion is exceeded.
6. Average four-hour peak discharge from West Pond during 24-hr 0.9-inch rainfall event, as calcuated by HydroCAD
7. VWQS chronic criterion for chloride, 4 hour average concentration not be exceeded more than once every 3 years

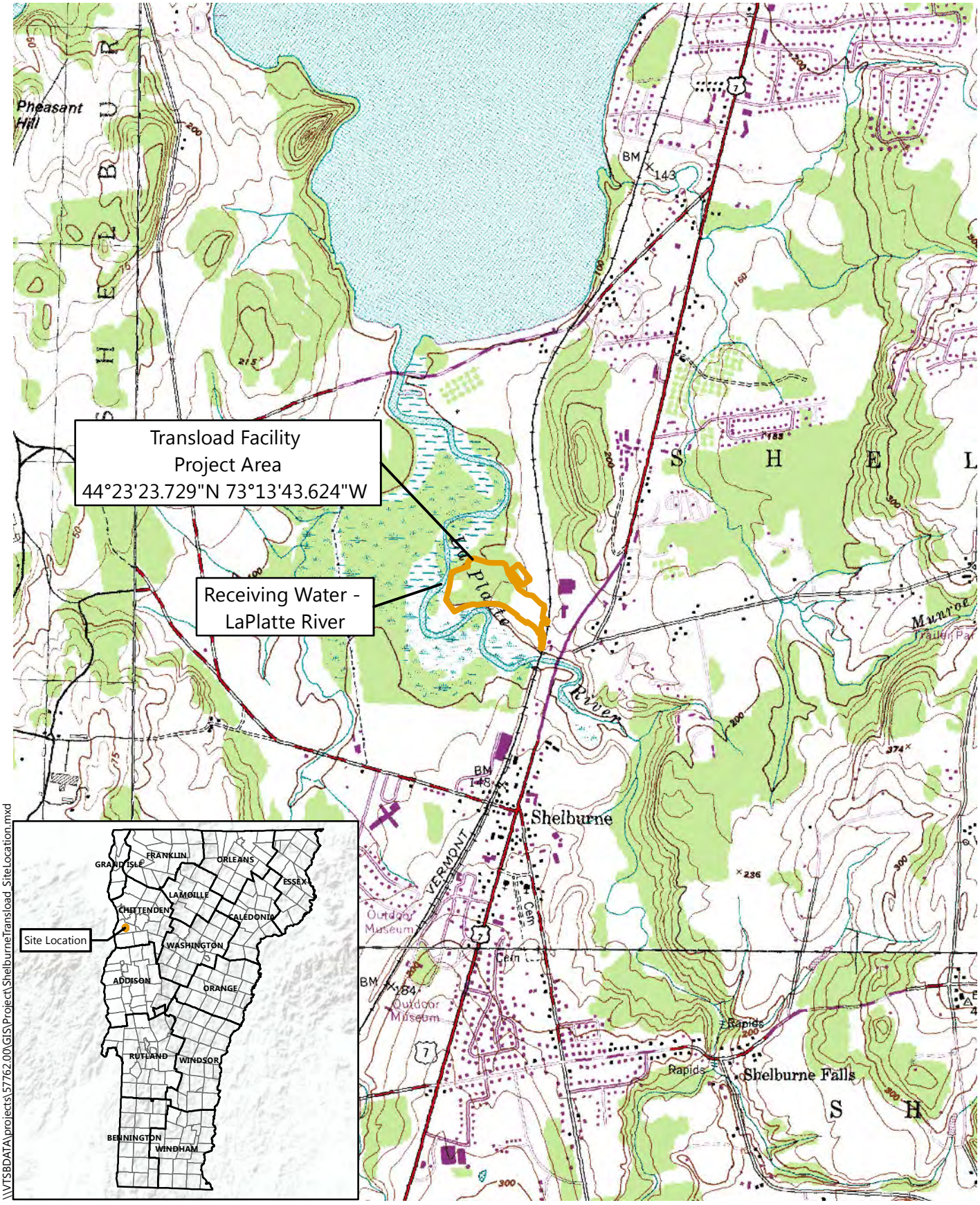
Computations

Project:	**Shelburne Transload**	**Project #:**	**57762.00**
Location:	**Shelburne, Vermont**	**Sheet:**	**1 of 1**
Calculated by:	**Robert Wildey**	**Date:**	**July 6, 2016**
Checked by:		**Date:**	
Title:	**Chloride Analysis During WQV Storm Event**		
	Acute Chloride Concentration In Stormwater Runoff		

Acute (1-Hr) Peak Chloride Analysis	
Potential Discharge During WQV Event	
3,753	mg/liter chloride [1]
1.4	cubic feet / sec [2]
40	liter/sec
148,793	mg/second
0.15	kg/second
536	kg chloride during 1 hr event
0.65	chloride fraction of NaCl
824	kg NaCl required
34	density of bulk salt (kg/cf)
16	cf of NaCl required
0.6	cy of NaCl required
LaPlatte River - September Low Flow	
50	mg/liter chloride [3]
5	cubic feet / sec
142	liter/sec
7,080	mg/second
0.01	kg/second
Resulting Combined Flows	
0.16	kg/second
155,873	mg/second
6.4	cubic feet / sec
181	liter/sec
860	mg/liter chloride [4]

Chronic (4-Hr) Peak Chloride Analysis	
Potential Discharge During WQV Event	
3,753	mg/liter chloride [5]
0.5	cubic feet / sec [6]
14	liter/sec
53,141	mg/second
0.05	kg/second
765	kg total during 4 hr event
0.65	chloride fraction of NaCl
1177	kg NaCl required
34	density of bulk salt (kg/cf)
23	cf of NaCl required
0.8	cy of NaCl required
LaPlatte River - September Low Flow	
50	mg/liter chloride [3]
5	cubic feet / sec
142	liter/sec
7,080	mg/second
0.01	kg/second
Resulting Combined Flows	
0.06	kg/second
60,221	mg/second
5.5	cubic feet / sec
156	liter/sec
387	mg/liter chloride [7]

1. Calculated chloride concentration which represents the maximum permissible concentration before the VWQS acute criterion is exceeded.
2. Average one-hour peak discharge from West Pond during 24-hr 0.9-inch rainfall event, as calcuated by HydroCAD
3. Estimated background concentration of chloride in LaPlatte River
4. VWQS acute criterion for chloride, 1 hour average concentration not be exceeded more than once every 3 years
5. Calculated chloride concentration which represents the maximum permissible concentration before the VWQS chronic criterion is exceeded.
6. Average four-hour peak discharge from West Pond during 24-hr 0.9-inch rainfall event, as calcuated by HydroCAD
7. VWQS chronic criterion for chloride, 4 hour average concentration not be exceeded more than once every 3 years



Shelburne Transload Facility | Shelburne, Vermont

Site Location Map

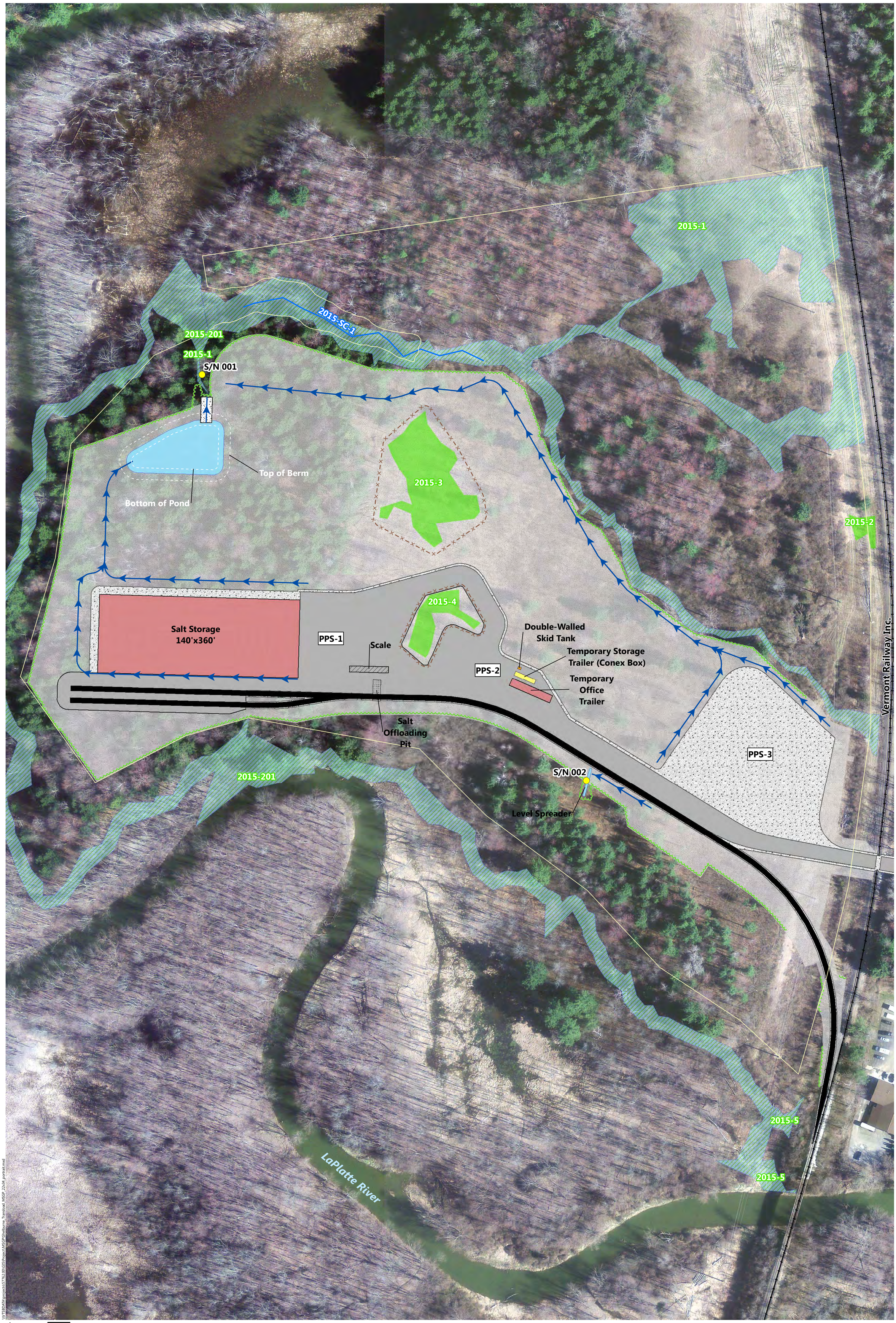
Project Area

USGS Topo Background (1996)

VERMONT RAILWAY

vhb

August 8, 2016



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0 40 80 160 Feet

Project Parcel (VHB)
Stormwater Discharge Point (VHB)
Delineated Stream (VHB)

Delineated Wetland (VHB)
Class II
Class III

Proposed Facility Feature (VHB)
Bottom of Pond; Top of Berm
Fence
Parking
Stormwater Swale
Tree Line
Building

Gravel
Pavement
Stormwater Treatment Pond
Rail Siding
RipRap
Scale
Unloading Pit
Pervious Area

Railroad (VTrans)

Shelburne Transload Facility

Shelburne, Vermont

Potential Pollutant Source Map

Sources:
Background Imagery by VCGI (2013)
VTrans (Vermont Department of Transportation - 2014)
VHB: 2015 - 2016

Site Plans

Issued for	**Multi Sector General Permit**
Date Issued	**Jul. 08, 2016**
Latest Issue	**Jul. 08, 2016**

Shelburne Transload Facility

Parcel 06-01-13
West of VT Route 7
Town of Shelburne, VT

vhb.com

vhb

40 IDX Dr
Building 100 Suite 200
South Burlington, VT 05403
802.497.6100

Owner

Vermont Railways
One Railway Lane
Burlington, VT 05401

Sheet Index

VHB Project : 57762.00 Shelburne Transload Facility
Issued for : Multi Sector General Permit Jul 08, 2016

Legend

Exist.	Prop.	
		PROPERTY LINE
		PROJECT LIMIT LINE
		RIGHT-OF-WAY/PROPERTY LINE
		EASEMENT
		BUILDING SETBACK
		PARKING SETBACK
10+00	10+00	BASELINE
		CONSTRUCTION LAYOUT
		ZONING LINE
		TOWN LINE
		LIMIT OF DISTURBANCE
		WETLAND LINE WITH FLAG
		FLOODPLAIN
BLSF	BLSF	BORDERING LAND SUBJECT TO FLOODING
BZ	BZ	WETLAND BUFFER ZONE
NDZ	NDZ	NO DISTURB ZONE
200'RA	200'RA	200' RIVERFRONT AREA
		GRAVEL ROAD
EOP		EDGE OF PAVEMENT
BB	BB	BITUMINOUS BERM
BC	BC	BITUMINOUS CURB
CC	CC	CONCRETE CURB
	CG	CURB AND GUTTER
CC	ECC	EXTRUDED CONCRETE CURB
CC	MCC	MONOLITHIC CONCRETE CURB
CC	PCC	PRECAST CONC. CURB
SGE	SGE	SLOPED GRAN. EDGING
VGC	VGC	VERT. GRAN. CURB
		LIMIT OF CURB TYPE
		SAWCUT
		BUILDING
	EN	BUILDING ENTRANCE
	LD	LOADING DOCK
		BOLLARD
D	D	DUMPSTER PAD
		SIGN
		DOUBLE SIGN
		STEEL GUARDRAIL
		WOOD GUARDRAIL
		PATH
		TREE LINE
		WIRE FENCE
		FENCE
		STOCKADE FENCE
		STONE WALL
		RETAINING WALL
		STREAM / POND / WATER COURSE
		DETENTION BASIN
		HAY BALES
		SILT FENCE
		SILT SOCK / STRAW WATTLE
4	4	MINOR CONTOUR
20	20	MAJOR CONTOUR
10	10	PARKING COUNT
	C10	COMPACT PARKING STALLS
DYL	DYL	DOUBLE YELLOW LINE
SL	SL	STOP LINE
		CROSSWALK
		ACCESSIBLE CURB RAMP
		ACCESSIBLE PARKING
VAN	VAN	VAN-ACCESSIBLE PARKING

Exist.	Prop.	
		CONCRETE
		HEAVY DUTY PAVEMENT
		RIPRAP
		CONSTRUCTION ENTRANCE
27.35 TC×	27.35 TC×	TOP OF CURB ELEVATION
26.85 BC×	26.85 BC×	BOTTOM OF CURB ELEVATION
132.75 ×	132.75 ×	SPOT ELEVATION
45.0 TW× 38.5 BW×	45.0 TW× 38.5 BW×	TOP & BOTTOM OF WALL ELEVATION
		BORING LOCATION
		TEST PIT LOCATION
MW	MW	MONITORING WELL
UD	UD	UNDERDRAIN
12"D	12"D	DRAIN
6"RD	6"RD	ROOF DRAIN
12"S	12"S	SEWER
FM	FM	FORCE MAIN
OHW	OHW	OVERHEAD WIRE
6"W	6"W	WATER
4"FP	4"FP	FIRE PROTECTION
	2"DW	DOMESTIC WATER
3"G	G	GAS
E	E	ELECTRIC
STM	STM	STEAM
T	T	TELEPHONE
FA	FA	FIRE ALARM
CATV	CATV	CABLE TV
		CATCH BASIN
		DOUBLE CATCH BASIN
		GUTTER INLET
		DRAIN MANHOLE
TD		TRENCH DRAIN
		PLUG OR CAP
CO	CO	CLEANOUT
		FLARED END SECTION
		HEADWALL
S		SEWER MANHOLE
CS	CS	CURB STOP & BOX
WV	WV	WATER VALVE & BOX
TSV	TSV	TAPPING SLEEVE, VALVE & BOX
		SIAMESE CONNECTION
HYD	HYD	FIRE HYDRANT
WM	WM	WATER METER
PIV	PIV	POST INDICATOR VALVE
W	W	WATER WELL
GG	GG	GAS GATE
GM	GM	GAS METER
E	EMH	ELECTRIC MANHOLE
EM	EM	ELECTRIC METER
		LIGHT POLE
T	TMH	TELEPHONE MANHOLE
T	T	TRANSFORMER PAD
		UTILITY POLE
		GUY POLE
		GUY WIRE & ANCHOR
HH	HH	HAND HOLE
PB	PB	PULL BOX
Matchline	Matchline	MATCHLINE

Abbreviations

General

ABAN	ABANDON
ACR	ACCESSIBLE CURB RAMP
ADJ	ADJUST
APPROX	APPROXIMATE
BIT	BITUMINOUS
BS	BOTTOM OF SLOPE
BWLL	BROKEN WHITE LANE LINE
CONC	CONCRETE
DYCL	DOUBLE YELLOW CENTER LINE
EL	ELEVATION
ELEV	ELEVATION
EXIST	EXISTING
FDN	FOUNDATION
FFE	FIRST FLOOR ELEVATION
GRAN	GRANITE
GTD	GRADE TO DRAIN
LA	LANDSCAPE AREA
LOD	LIMIT OF DISTURBANCE
MAX	MAXIMUM
MIN	MINIMUM
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
PERF	PERFORATED
PROP	PROPOSED
REM	REMOVE
RET	RETAIN
R&D	REMOVE AND DISPOSE
R&R	REMOVE AND RESET
SWEL	SOLID WHITE EDGE LINE
SWLL	SOLID WHITE LANE LINE
TS	TOP OF SLOPE
TYP	TYPICAL

Utility

CB	CATCH BASIN
CMP	CORRUGATED METAL PIPE
CO	CLEANOUT
DCB	DOUBLE CATCH BASIN
DMH	DRAIN MANHOLE
CIP	CAST IRON PIPE
COND	CONDUIT
DIP	DUCTILE IRON PIPE
FES	FLARED END SECTION
FM	FORCE MAIN
F&G	FRAME AND GRATE
F&C	FRAME AND COVER
GI	GUTTER INLET
GT	GREASE TRAP
HDPE	HIGH DENSITY POLYETHYLENE PIPE
HH	HANDHOLE
HW	HEADWALL
HYD	HYDRANT
INV	INVERT ELEVATION
I=	INVERT ELEVATION
LP	LIGHT POLE
MES	METAL END SECTION
PWW	PAVED WATER WAY
PVC	POLYVINYLCHLORIDE PIPE
PIV	POST INDICATOR VALVE
RCP	REINFORCED CONCRETE PIPE
R=	RIM ELEVATION
SMH	SEWER MANHOLE
TSV	TAPPING SLEEVE, VALVE AND BOX
UG	UNDERGROUND
UP	UTILITY POLE

Notes:

General

1. CONTRACTOR SHALL NOTIFY "DIG-SAFE" (1-888-344-7233) AT LEAST 72 HOURS BEFORE EXCAVATING.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR SITE SECURITY AND JOB SAFETY. CONSTRUCTION ACTIVITIES SHALL BE IN ACCORDANCE WITH OSHA STANDARDS AND LOCAL REQUIREMENTS.
3. THESE PLANS SHALL BE USED FOR THE PURPOSES OF SITE GRADING, STORMWATER MANAGEMENT SYSTEM CONSTRUCTION AND RAILWAY HORIZONTAL AND VERTICAL LAYOUT.
4. PAVING AND GRAVEL LAYOUT IS BASED ON THE PLAN PROVIDED BY OWNER. VHB HAS REPLICATED THIS LAYOUT FOR REFERENCE PURPOSES ONLY IN THIS PLAN SET.
5. GENERAL SPECIFICATIONS, MATERIALS AND EXECUTION SHALL BE GOVERNED BY VHB SPECIFICATIONS WHERE AVAILABLE. WHERE VHB SPECIFICATIONS ARE NOT PROVIDED, VERMONT AGENCY OF TRANSPORTATION 2011 STANDARD SPECIFICATIONS FOR CONSTRUCTION SHALL APPLY. IN CASES WHERE CONFLICTS EXIST, THE CONTRACTOR SHALL COORDINATE WITH THE OWNER'S REPRESENTATIVE FOR RESOLUTION OF THE CONFLICT PRIOR TO BEGINNING WORK ON THE ITEM IN QUESTION.
6. WHERE AN EXISTING CONDITION IS FOUND TO CONFLICT WITH THE PROPOSED WORK, OR EXISTING CONDITIONS DIFFER FROM THOSE SHOWN SUCH THAT THE WORK CANNOT BE COMPLETED AS INTENDED, THE LOCATION, ELEVATION AND DIMENSIONS OF THE CONFLICTING CONDITION SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED IN WRITING TO THE OWNER'S REPRESENTATIVE FOR THE RESOLUTION OF THE CONFLICT. CONTRACTOR'S FAILURE TO NOTIFY PRIOR TO PERFORMING ADDITIONAL WORK RELEASES OWNER FROM OBLIGATIONS FOR ADDITIONAL PAYMENTS WHICH OTHERWISE MAY BE WARRANTED TO RESOLVE THE CONFLICT.
7. THE CONTRACTOR SHALL FIELD VERIFY ALL UTILITY LOCATIONS, SIZES, AND MATERIALS WITHIN THE PROJECT AREA AND REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO BEGINNING WORK ON THE ITEM IN QUESTION.
8. ACCESSIBLE ROUTES, PARKING SPACES, RAMPS, SIDEWALKS AND WALKWAYS SHALL BE CONSTRUCTED IN CONFORMANCE WITH THE FEDERAL AMERICANS WITH DISABILITIES ACT AND WITH STATE AND LOCAL LAWS AND REGULATIONS (WHICHEVER ARE MORE STRINGENT).
9. AREAS DISTURBED DURING CONSTRUCTION AND NOT RESTORED WITH IMPERVIOUS SURFACES (BUILDINGS, PAVEMENTS, WALKS, ETC.) SHALL RECEIVE 6 INCHES LOAM AND SEED.
10. WITHIN THE LIMITS OF THE BUILDING FOOTPRINT, THE SITE CONTRACTOR SHALL PERFORM EARTHWORK OPERATIONS REQUIRED UP TO SUBGRADE ELEVATIONS.
11. WORK WITHIN THE LOCAL RIGHTS-OF-WAY SHALL CONFORM TO LOCAL MUNICIPAL STANDARDS. WORK WITHIN STATE RIGHTS-OF-WAY SHALL CONFORM TO THE LATEST EDITION OF THE STATE HIGHWAY DEPARTMENTS STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.
12. UPON AWARD OF CONTRACT, CONTRACTOR SHALL MAKE NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN NECESSARY PERMITS, PAY FEES, AND POST BONDS ASSOCIATED WITH THE WORK INDICATED ON THE DRAWINGS, IN THE SPECIFICATIONS, AND IN THE CONTRACT DOCUMENTS. DO NOT CLOSE OR OBSTRUCT ROADWAYS, SIDEWALKS, AND FIRE HYDRANTS, WITHOUT APPROPRIATE PERMITS.
13. TRAFFIC SIGNAGE AND PAVEMENT MARKINGS SHALL CONFORM TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.
14. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.
15. IN THE EVENT THAT SUSPECTED CONTAMINATED SOIL, GROUNDWATER, AND OTHER MEDIA ARE ENCOUNTERED DURING EXCAVATION AND CONSTRUCTION ACTIVITIES BASED ON VISUAL, OLFACTORY, OR OTHER EVIDENCE, THE CONTRACTOR SHALL STOP WORK IN THE VICINITY OF THE SUSPECT MATERIAL TO AVOID FURTHER SPREADING OF THE MATERIAL, AND SHALL NOTIFY THE OWNER IMMEDIATELY SO THAT THE APPROPRIATE TESTING AND SUBSEQUENT ACTION CAN BE TAKEN.
16. CONTRACTOR SHALL PREVENT DUST, SEDIMENT, AND DEBRIS FROM EXITING THE SITE AND SHALL BE RESPONSIBLE FOR CLEANUP, REPAIRS AND CORRECTIVE ACTION IF SUCH OCCURS.
17. DAMAGE RESULTING FROM CONSTRUCTION LOADS SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO OWNER.
18. CONTRACTOR SHALL CONTROL STORMWATER RUNOFF DURING CONSTRUCTION TO PREVENT ADVERSE IMPACTS TO OFF SITE AREAS, AND SHALL BE RESPONSIBLE TO REPAIR RESULTING DAMAGES, IF ANY, AT NO COST TO OWNER.
19. THIS PROJECT DISTURBS MORE THAN ONE ACRE OF LAND AND FALLS WITHIN THE NPDES CONSTRUCTION GENERAL PERMIT (CGP) PROGRAM AND EPA JURISDICTION. PRIOR TO THE START OF CONSTRUCTION CONTRACTOR IS TO FILE A CGP NOTICE OF INTENT WITH THE EPA AND PREPARE A STORMWATER POLLUTION PREVENTION PLAN IN ACCORDANCE WITH THE NPDES REGULATIONS. CONTRACTOR SHALL CONFIRM THE OWNER HAS ALSO FILED A NOTICE OF INTENT WITH THE EPA.

Layout and Materials

1. CONTRACTOR SHALL PROVIDE THE MANUFACTURER'S PRODUCT DATA AND/OR SHOP DRAWINGS FOR ALL SPECIFIED MATERIALS TO ENGINEER FOR APPROVAL PRIOR TO INSTALLATION.
2. DIMENSIONS ARE FROM THE FACE OF CURB, FACE OF BUILDING, FACE OF WALL, AND CENTER LINE OF PAVEMENT MARKINGS, UNLESS OTHERWISE NOTED.
3. SEE ARCHITECTURAL DRAWINGS FOR EXACT BUILDING DIMENSIONS AND DETAILS CONTIGUOUS TO THE BUILDING, INCLUDING SIDEWALKS, RAMPS, BUILDING ENTRANCES, STAIRWAYS, UTILITY PENETRATIONS, CONCRETE DOOR PADS, COMPACTOR PAD, LOADING DOCKS, BOLLARDS, ETC.
4. PROPOSED BOUNDS AND ANY EXISTING PROPERTY LINE MONUMENTATION DISTURBED DURING CONSTRUCTION SHALL BE SET OR RESET BY A PROFESSIONAL LICENSED SURVEYOR.
5. PRIOR TO START OF CONSTRUCTION, CONTRACTOR SHALL VERIFY EXISTING PAVEMENT ELEVATIONS AT INTERFACE WITH PROPOSED PAVEMENTS, AND EXISTING GROUND ELEVATIONS ADJACENT TO DRAINAGE OUTLETS TO ASSURE PROPER TRANSITIONS BETWEEN EXISTING AND PROPOSED FACILITIES.

Existing Conditions Information

1. BASE PLAN: THE PROPERTY LINES SHOWN WERE DETERMINED BY AN ACTUAL FIELD SURVEY CONDUCTED BY VHB, AND FROM PLANS OF RECORD. THE TOPOGRAPHY AND PHYSICAL FEATURES ARE BASED ON AN ACTUAL FIELD SURVEY PERFORMED ON THE GROUND BY VHB, DURING FALL 2015

   A. DELINEATION OF THE WETLANDS AND PLACEMENT OF THE FLAGS WAS PERFORMED BY: VHB, 2015

   B. FLAGS MARKING THE WETLANDS WERE LOCATED BY: VHB
2. TOPOGRAPHY: ELEVATIONS ARE BASED ON [NGVD 1988 VERTICAL DATUM].
3. GEOTECHNICAL DATA INCLUDING TEST PIT AND BORING LOCATIONS AND ELEVATIONS WERE OBTAINED FROM GEODESIGN.

Document Use

1. THESE PLANS AND CORRESPONDING CADD DOCUMENTS ARE INSTRUMENTS OF PROFESSIONAL SERVICE, AND SHALL NOT BE USED, IN WHOLE OR IN PART, FOR ANY PURPOSE OTHER THAN FOR WHICH IT WAS CREATED WITHOUT THE EXPRESSED, WRITTEN CONSENT OF VHB. ANY UNAUTHORIZED USE, REUSE, MODIFICATION OR ALTERATION, INCLUDING AUTOMATED CONVERSION OF THIS DOCUMENT SHALL BE AT THE USER'S SOLE RISK WITHOUT LIABILITY OR LEGAL EXPOSURE TO VHB.
2. CONTRACTOR SHALL NOT RELY SOLELY ON ELECTRONIC VERSIONS OF PLANS, SPECIFICATIONS, AND DATA FILES THAT ARE OBTAINED FROM THE DESIGNERS, BUT SHALL VERIFY LOCATION OF PROJECT FEATURES IN ACCORDANCE WITH THE PAPER COPIES OF THE PLANS AND SPECIFICATIONS THAT ARE SUPPLIED AS PART OF THE CONTRACT DOCUMENTS.
3. SYMBOLS AND LEGENDS OF PROJECT FEATURES ARE GRAPHIC REPRESENTATIONS AND ARE NOT NECESSARILY SCALED TO THEIR ACTUAL DIMENSIONS OR LOCATIONS ON THE DRAWINGS. THE CONTRACTOR SHALL REFER TO THE DETAIL SHEET DIMENSIONS, MANUFACTURERS' LITERATURE, SHOP DRAWINGS AND FIELD MEASUREMENTS OF SUPPLIED PRODUCTS FOR LAYOUT OF THE PROJECT FEATURES.

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Shelburne Transload Facility

Shelburne, Vermont

No.	Revision	Date	Appvd.

Designed by CJH/MHK — Checked by SEB

Issued for — Date

Multi Sector General Permit — Jul. 08, 2016

Not Approved For Construction

Drawing Title

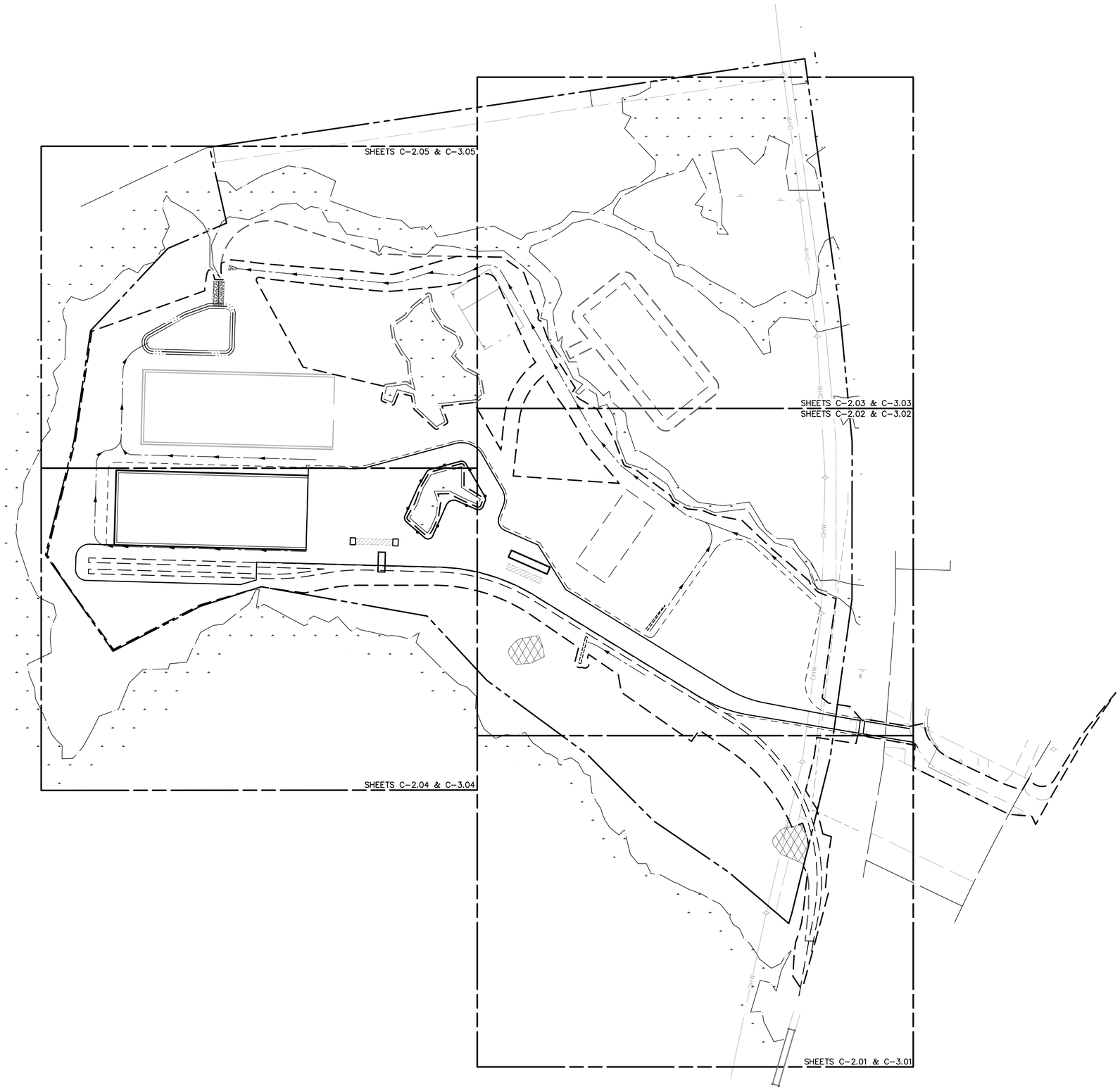
Legend and General Notes

Drawing Number

C-1.00

Sheet 1 of 14

Project Number 57762.00



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0 50 100 200 Feet

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Issued for: Multi Sector General Permit
Date: Jul. 08, 2016

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Drawing Title
Overall Site Plan

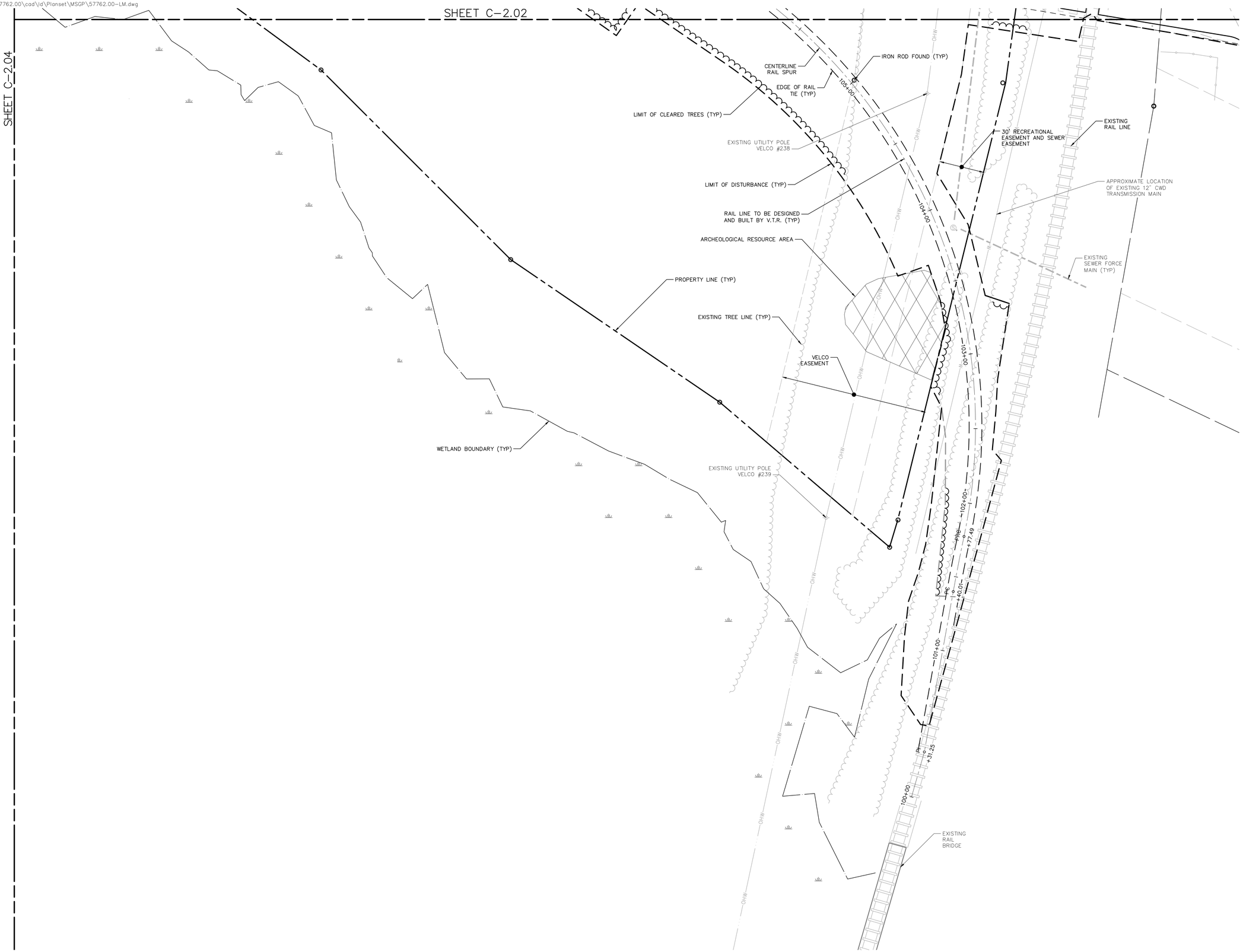
Drawing Number
C-2.00

Sheet 2 of 14

Project Number
57762.00

SHEET C-2.02

SHEET C-2.04



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0 15 30 60 Feet

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Date
Jul. 08, 2016

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Drawing Title
Layout and Materials Plan (1 of 5)

Drawing Number
C-2.01

Sheet 3 of 14

Project Number
57762.00

SHEET C-2.03

SHEET C-2.05

TEMPORARY GRAVEL ACCESS ROAD

CONCRETE WASTE BLOCK RETAINING WALL TO BE DESIGNED AND BUILT BY CONTRACTOR WITH APPROVAL BY ENGINEER

6' TALL CHAIN LINK FENCE

EOP

35'

EDGE OF PAVEMENT

SCALE TO BE DESIGNED AND BUILT BY CONTRACTOR WITH APPROVAL BY ENGINEER

TEMPORARY OFFICE TRAILER

OFFICE

EOP

SOIL STOCKPILE AREA

WETLAND BOUNDARY (TYP)

EDGE OF GRAVEL (TYP)

IRON ROD FOUND (TYP)

VELCO EASEMENT

EXISTING UTILITY POLE

30' RECREATIONAL EASEMENT AND SEWER EASEMENT

APPROXIMATE LOCATION OF EXISTING 12" CWD TRANSMISSION MAIN

EXISTING SEWER FORCE MAIN (TYP)

PROPERTY LINE (TYP)

EXISTING TREE LINE (TYP)

EXISTING UTILITY POLE VELCO #237

VEHICLE PARKING

EXISTING RAIL LINE

111+00

+45.85
PC

110+00

RAIL LINE TO BE DESIGNED AND BUILT BY V.T.R. (TYP)

ARCHEOLOGICAL RESOURCE AREA

109+00

18'

108+00

EOP

STORMWATER SWALE

CENTERLINE ACCESS DRIVE

EDGE OF RAIL TIE (TYP)

CENTERLINE RAIL SPUR

107+00

LIMIT OF CLEARED TREES (TYP)

LIMIT OF DISTURBANCE (TYP)

+16.96
PT

106+00

EOP

EOP

24'

SHEET C-2.04

SHEET C-2.01

0 15 30 60 Feet

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Shelburne Transload Facility

Shelburne, Vermont

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Drawing Title
Layout and Materials Plan (2 of 5)

Drawing Number
C-2.02

Sheet 4 of 14

Project Number
57762.00

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0 15 30 60 Feet

Shelburne Transload Facility

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Drawing Title
Layout and Materials Plan (3 of 5)

Drawing Number
C-2.03

Sheet 5 of 14

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57762.00

SHEET C-2.05

EDGE OF BUILDING (TYP)

360' (TYP)

EDGE OF GRAVEL

PREFABRICATED SALT SHED
140' X 360'
50,400 SF

140' (TYP)

130' (TYP)

STORMWATER CHANNEL

EOP

30'

21'

17'

118+89.73

-118+00-

68'

-117+00-

116+00

117+00

115+00

114+00

113+00

112+00

+33.20 PT

IRON ROD FOUND (TYP)

SEE "UNLOADING PIT PLAN AND DETAILS" DATED 4/28/2016 FOR ADDITIONAL INFORMATION

CENTERLINE OF RAIL SPUR

EDGE OF RAIL TIE (TYP)

RAIL LINE TO BE DESIGNED AND BUILT BY V.T.R. (TYP)

PROPERTY LINE (TYP)

LIMIT OF DISTURBANCE (TYP)

LIMIT OF CLEARED TREES (TYP)

EDGE OF PAVEMENT

CONCRETE WASTE BLOCK RETAINING WALL TO BE DESIGNED AND BUILT BY CONTRACTOR WITH APPROVAL BY ENGINEER

6' TALL CHAIN LINK FENCE

WETLAND BOUNDARY (TYP)

90'

10'

70'

10'

50'

20'

49'

SCALE TO BE DESIGNED AND BUILT BY CONTRACTOR WITH APPROVAL BY ENGINEER

SHEET C-2.02

SHEET C-2.01

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0 15 30 60 Feet

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Date: Jul. 08, 2016

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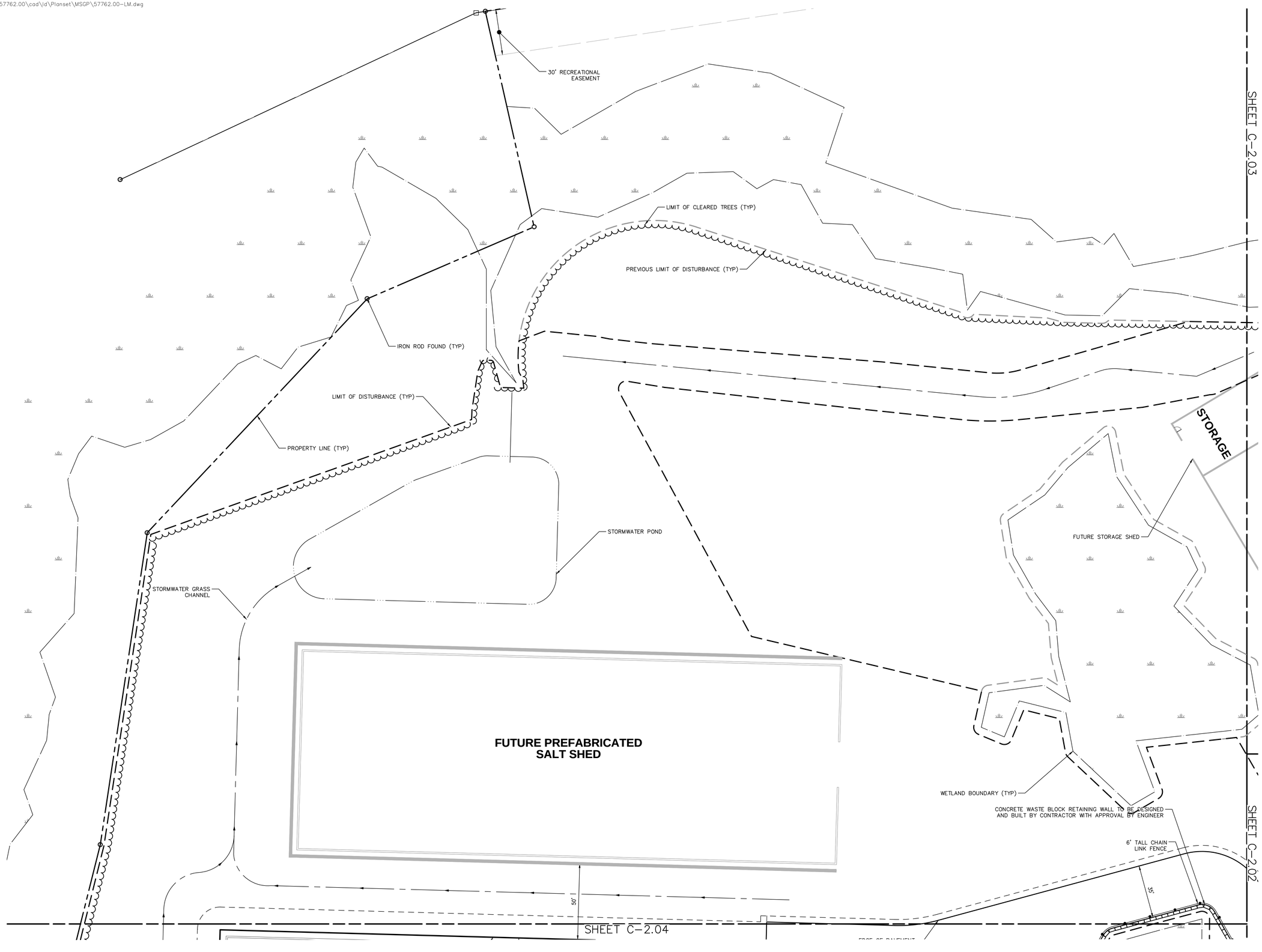
Drawing Title
Layout and Materials Plan (4 of 5)

Drawing Number
C-2.04

Sheet 6 of 14

Project Number
57762.00



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0 15 30 60 Feet

Shelburne Transload Facility

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Drawing Title
Layout and Materials Plan (5 of 5)

Drawing Number
C-2.05

Sheet 7 of 14

Project Number
57762.00

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0 15 30 60 Feet

Shelburne Transload Facility

Shelburne, Vermont

No.	Revision	Date	Appvd.

Designed by: CJH/MHK
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Date: Jul. 08, 2016

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Drawing Title
Grading and Drainage Plan (1 of 5)

Drawing Number
C-3.01

Sheet 8 of 14

Project Number
57762.00

Saved Thursday, July 07, 2016 5:03:56 PM CHAKEY Plotted Friday, July 08, 2016 12:51:27 PM Hakey, Christopher

SHEET C-3.03

SHEET C-3.05

SHEET C-3.04

SHEET C-3.01

TEMPORARY GRAVEL ACCESS ROAD

OFFICE

SOIL STOCKPILE AREA

VEHICLE PARKING

NORTHEAST GRASSED TREATMENT CHANNEL, SLOPE VARIES (SEE DETAIL)

GRAVEL PARKING LOT GRASSED CONVEYANCE CHANNEL, SLOPE = 1.0% (SEE DETAIL)

EXTENT OF BERM FOR GRAVEL PARKING LOT CONVEYANCE CHANNEL (SEE DETAIL)

LEVEL SPREADER (SEE DETAIL)

RAIL SPUR GRASSED CHANNEL (SEE DETAIL)

VT DEC RIVER CORRIDOR

IRON ROD FOUND (TYP)

VELCO EASEMENT

EXISTING UTILITY POLE

30' RECREATIONAL EASEMENT AND SEWER EASEMENT

EXISTING SEWER FORCE MAIN (TYP)

EXISTING UTILITY POLE VELCO #237

0.67%

2.00%

2.50%

2.80%

0 15 30 60 Feet

Shelburne Transload Facility

Shelburne, Vermont

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Drawing Title: Grading and Drainage Plan (2 of 5)

Drawing Number: C-3.02

Sheet 9 of 14

Project Number: 57762.00

0 15 30 60 Feet

Shelburne Transload Facility

Shelburne, Vermont

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Drawing Title

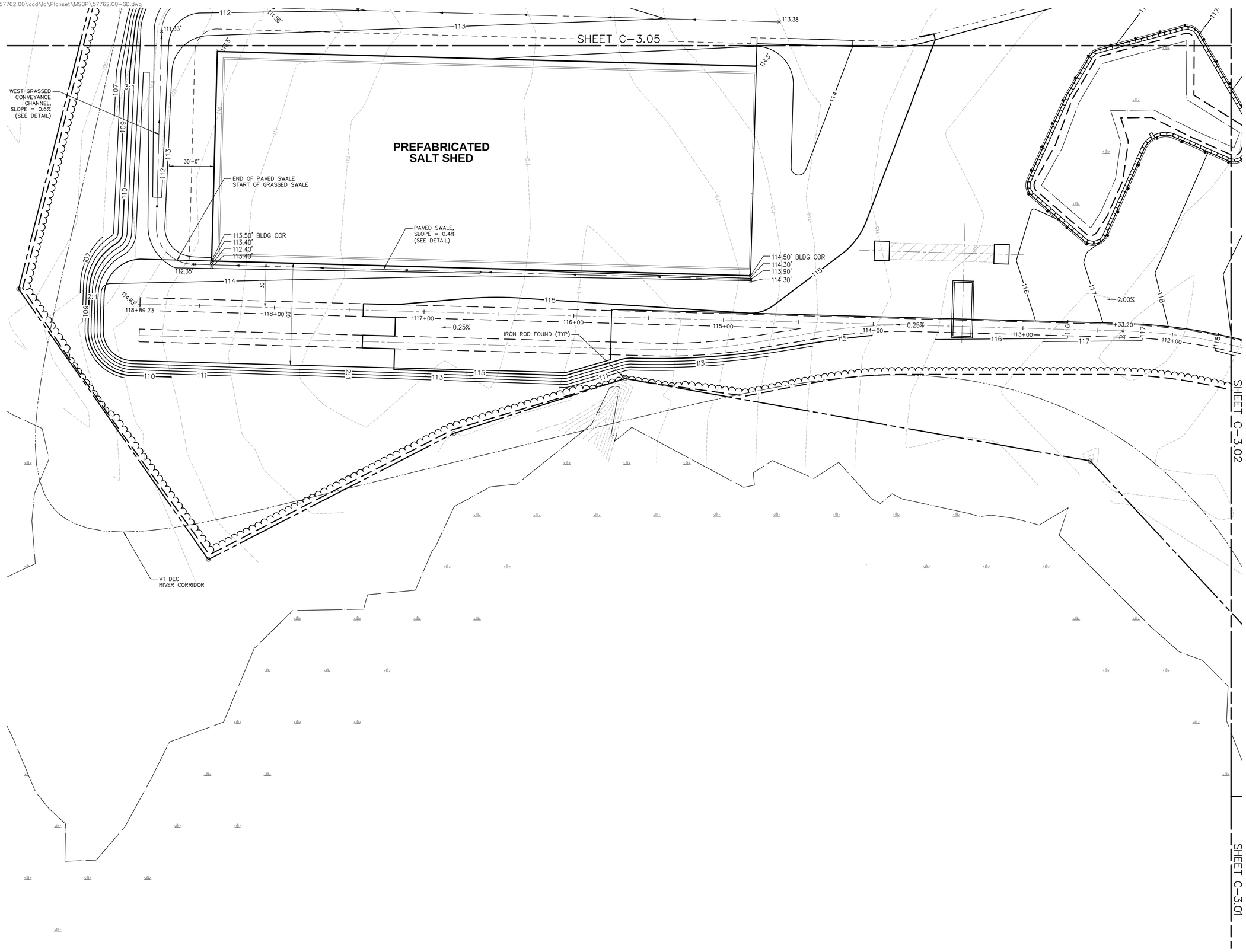
Grading and Drainage Plan (3 of 5)

Drawing Number

C-3.03

Sheet 10 of 14

Project Number 57762.00



0 15 30 60 Feet

Shelburne Transload Facility

Shelburne, Vermont

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Drawing Title
Grading and Drainage Plan (4 of 5)

Drawing Number
C-3.04

Sheet 11 of 14

Project Number
57762.00

30' RECREATIONAL EASEMENT

IRON ROD FOUND (TYP)

WEST POND DISCHARGE CONVEYANCE CHANNEL (SEE DETAIL)

WEST POND SPILLWAY (SEE DETAIL)

WEST POND DETENTION BASIN BERM SECTION (SEE DETAIL)

TOP OF BERM ELEV = 110.75'

TOP OF POND ELEV = 110.25'

NORTHEAST GRASSED TREATMENT CHANNEL, SLOPE VARIES (SEE DETAIL)

STORAGE

FUTURE STORAGE SHED

FUTURE PREFABRICATED SALT SHED

WEST GRASSED CONVEYANCE CHANNEL, SLOPE = 0.6% (SEE DETAIL)

VT DEC RIVER CORRIDOR

SHEET C-3.04

SHEET C-3.02

0 15 30 60 Feet

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Drawing Title

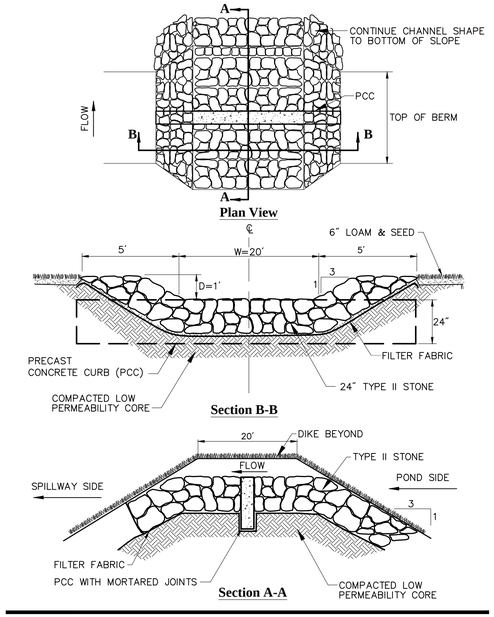
Grading and Drainage Plan (5 of 5)

Drawing Number

C-3.05

Sheet 12 of 14

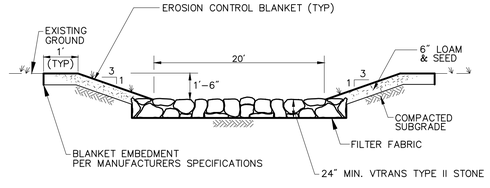
Project Number 57762.00



West Pond Spillway

04/16

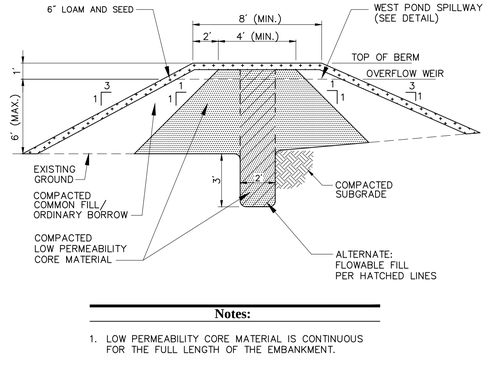
N.T.S. Source: VHB Rev



West Pond Discharge Conveyance Channel

04/16

N.T.S. Source: VHB



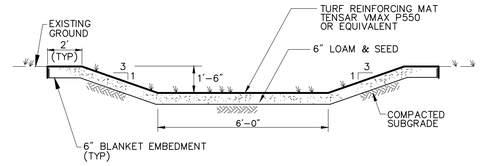
Notes:

1. LOW PERMEABILITY CORE MATERIAL IS CONTINUOUS FOR THE FULL LENGTH OF THE EMBANKMENT.

West Pond Detention Basin Berm Section

10/08

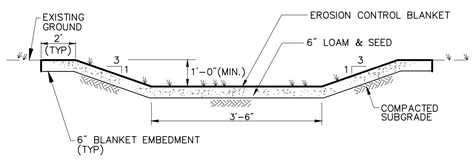
N.T.S. Source: VHB REV LD_160



West Grassed Conveyance Channel

04/16

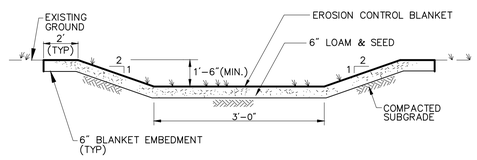
N.T.S. Source: VHB



Gravel Parking Lot Grassed Conveyance Channel

6/08

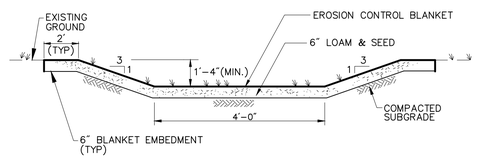
N.T.S. Source: VHB REV LD_171



Northeast Grassed Treatment Channel

6/08

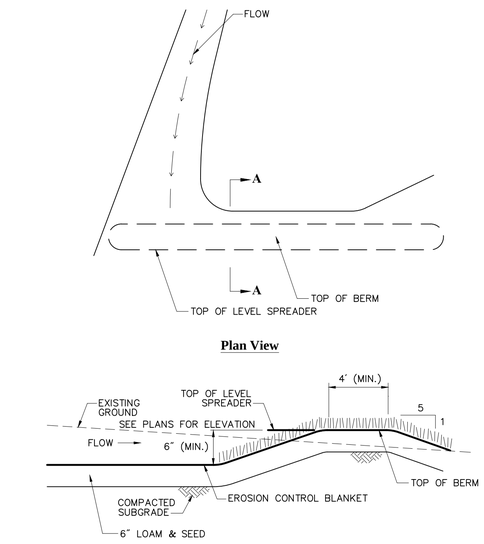
N.T.S. Source: VHB REV LD_171



Rail Spur Grassed Channel

6/08

N.T.S. Source: VHB REV LD_171



Level Spreader Detail

6/08

N.T.S. Source: VHB LD_172

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Drawing Title

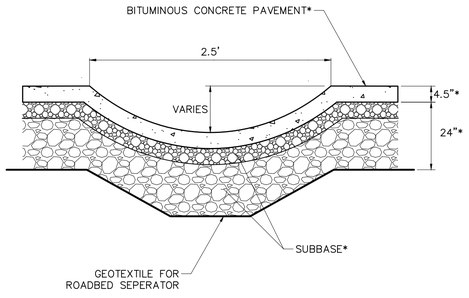
Site Details (1 of 2)

Drawing Number

C-4.01

Sheet 13 of 14

Project Number 57762.00

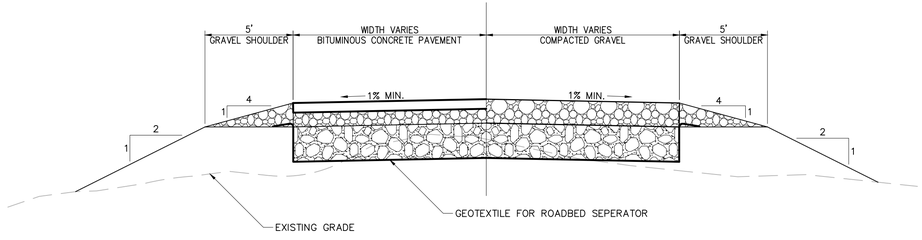


* SEE BITUMINOUS CONCRETE PAVEMENT SECTION FOR ADDITIONAL DETAILS

Paved Swale

04/16

N.T.S. Source: VHB LD

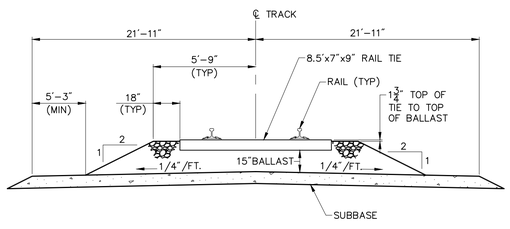


* SEE BITUMINOUS CONCRETE PAVEMENT SECTION FOR ADDITIONAL DETAILS

Drivable Surfaces Typical Sections

04/16

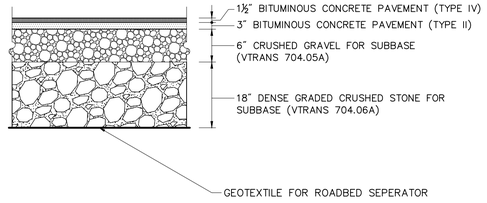
N.T.S. Source: VHB LD



Typical Rail Section

1/16

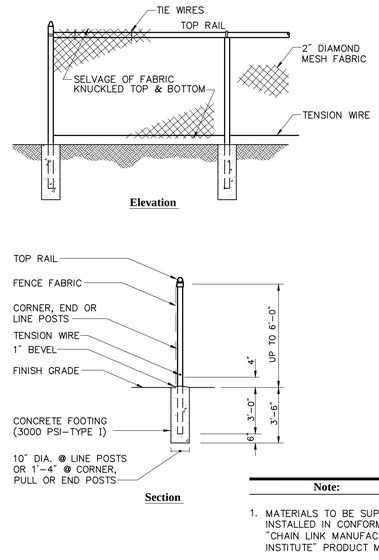
N.T.S. Source: VHB LD



Bituminous Concrete Pavement Section

1/27

N.T.S. Source: VHB LD



Note:

1. MATERIALS TO BE SUPPLIED AND INSTALLED IN CONFORMANCE WITH "CHAIN LINK MANUFACTURER'S INSTITUTE" PRODUCT MANUAL.

Chain Link Fence up to 6'

6/08

N.T.S. Source: VHB LD_481

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Drawing Title

Site Details (2 of 2)

Drawing Number

C-4.02

Sheet 14 of 14

Project Number

57762.00

August 1, 2016

Ref: 57762.00

Ms. Helen Carr
Southern Chittenden County District Reviewer
Vermont Department of Environmental Conservation
Watershed Management Division
Main Building - 2nd Floor
One National Life Drive
Montpelier, VT 05620-3522

Mr. Kevin Burke
Environmental Analyst
Vermont Department of Environmental Conservation
Watershed Management Division
Main Building - 2nd Floor
One National Life Drive
Montpelier, VT 05620-3522

RE: Vermont Railway, Inc. Shelburne Transload Facility
Shelburne, Vermont
Chloride Sensitivity Analysis

Dear Helen and Kevin:

On behalf of Vermont Railway, Inc. ("VTR"), VHB is submitting this letter and attached memo regarding an analysis that has been conducted as part of coordination with the Vermont Fish and Wildlife Department ("FWD") in the context of the above-noted project, regarding the Vermont-listed endangered fish species *Noturus flavus* ("stonecat") and mussel species *Lampsilis ovata* ("pocketbook") in the lower LaPlatte River. This material should be considered as providing sufficient information such that the application materials for coverage under the Multi-Sector General Permit can be determined to be complete.

Previously, based on information available from FWD, VHB understood that stonecat was not thought to be present in the project area. Therefore, in the original NOI and SWPPP filing for the Project dated July 8, 2016, our evaluation only included the pocketbook, which was previously understood to be the only State-listed aquatic species of concern in the project area.

As demonstrated by the analysis presented in the attached memo, given the nature of the facility and the Best Management Practices ("BMPs") to be implemented through the SWPPP, chloride concentrations are not anticipated exceed the VWQS chloride criteria, or to be elevated to such levels as to cause an adverse impact on the stonecat or pocketbook, if present in the project area.

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Given the above, VHB concludes that operational phase stormwater discharges from the project regulated under the MSGP will not adversely impact Federal- or State-listed threatened or endangered species. On this basis, we believe that the application is complete, and request that DEC proceed with notice of the application and public meeting expeditiously.

Notwithstanding the above, we note that VHB and our subconsultants are continuing to proceed with the completion of field surveys to establish the presence or absence of the listed species in the project area. Since we have completed the evaluation of potential impact based on the assumption that the species of concern are present in the project area, we view the completion of these surveys and presentation of the results to ANR as supplemental the SWPPP, but not necessary for the determination of completeness of the application package.

Finally, while we are filing these materials solely with the DEC stormwater program; we understand that your program will forward the materials to other involved programs within DEC and FWD.

Please do not hesitate to contact me if you have any questions related to these materials.

Sincerely,

Jeffrey A. Nelson
Director, Energy & Environmental Services

JAN/jkw

Enclosures

cc: David Wulfson, VTR
Peter Young, VTR

\\VTSBDATA\projects\57762.00\docs\memos\Water Quality\Chloride Sensitivity_Cover Letter.docx

Memorandum

To: VTR Shelburne Transload Project File

Date: August 1, 2016

Project #: 57762.00

From: Robert Wildey

Re: Pocketbook and Stonecat Chloride Sensitivity Analysis

This analysis has been conducted as part of coordination with the Vermont Fish and Wildlife Department ("FWD") regarding the potential presence of the Vermont-listed endangered mussel species *Lampsilis ovata* ("pocketbook") and fish species *Noturus flavus* ("stonecat") in the lower LaPlatte River. The context for this coordination is the pending application for coverage under the NPDES Multi-Sector General Permit ("MSGP") by Vermont Railway Inc. ("VTR") for the Shelburne Transload Project ("Project"). The specific reach of concern, or project area, for the Project consists of the reach between the U.S. Route 7 (Route 7) bridge and the outlet of the River into Lake Champlain.

Chloride Concentration Analysis

As previously presented in the Stormwater Pollution Prevention Plan ("SWPPP") for the Project, potential impacts to the aquatic species of the LaPlatte River from stormwater runoff from the Shelburne Transload facility were evaluated using a mass-balance model of flows in the river. This model looks at the pollutant of concern (chloride) that would be associated with bulk salt handling operations and the concentrations that could occur in the river as the result of stormwater runoff from the facility during the September low flow. Based on existing water quality data from DEC studies, a background concentration of 50 mg/L was assumed to be present in the LaPlatte River. Several scenarios were evaluated with concentrations of chloride in the discharge from the site's stormwater pond: 100 mg/L, 500 mg/L, and 1,000 mg/L. In addition, the model calculated the concentrations of chloride that would need to be present in the stormwater discharge in order to meet the threshold values listed in the Vermont Water Quality Standards ("VWQS") of 230 mg/L under chronic conditions (four hour average, no more than once every 3 years) or the 860 mg/L under acute conditions (one hour average, no more than once every 3 years) (DEC, 2014). The concentrations of chloride within the stormwater runoff required to exceed these values during a 0.9-inch water quality volume storm event was found to be 3,753 mg/L under acute conditions and 2,030 mg/L under chronic conditions, which are beyond those expected to occur from the facility. The good housekeeping and other best management practices that would be employed at the facility are anticipated to be sufficient to prevent the chloride concentration in stormwater runoff from causing an exceedance of the VWQS in the LaPlatte.

Vermont Water Quality Standards

As noted above, the VWQS provides threshold values for chloride under chronic and acute conditions. These values were derived from an assessment conducted by the U.S. Environmental Protection Agency (EPA, 1988). This assessment incorporated data from a number of studies that had investigated the impact of chloride on aquatic life, including vertebrate animal species (*Anquilla rostrata, Salmo gairdneri (Oncorhynchus mykiss), Carassius auratus, Pimephales promelas, Lepomis macrochirus, Ictalurus punctatus, Gamusia affinis, Micropterus salmoides*), invertebrate animal species (*Physa gyrina, Physa heterostropha, Musculium transversum, Daphnia magna, Daphnia pulex, Lirceus fontinalis, Hydroptila angusta, Culex spp., Chironomus attenuates, Cricotopus trifascia*), as well as other species of algae, diatoms, and plants. Studies that were incorporated into the analysis looked at growth inhibition at various life

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stages, reproductive success, and mortality under chronic and acute conditions. In general, the study found that invertebrates were more sensitive than vertebrates to chloride. For this reason, the chloride tolerance of Vermont-listed endangered mussels that may be present in this reach may provide a more relevant threshold for consideration than the stonecat. A literature review of the chloride sensitivity of *Lampsilis ovata* and *Noturus flavus* are discussed in the following sections.

Chloride Sensitivity of Pocketbook

A summary table published within the Canadian Water Quality Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers, 2011) identified the 24-hour effective median concentrations ("EC50s") for glochidia of *Lampsilis siliquoidea, Lampsilis fasciola, Lampsilis cardium* as reported in three studies as 709, 746, and 817 mg/L chloride, respectively. One of the studies cited (Gillis, 2011) reported on the acute toxicity of sodium chloride in natural and reconstituted waters for the glochidia of *Lampsilis fasciola, Lampsilis siliquoidea, Lampsilis cardium,* and *Epioblasma torulosa rangiana*. The specific EC50s in this study ranged from 113 to 1,430 mg/L chloride, with a considerable degree of interspecific variation, even between organisms collected from the same river in two consecutive years. Increased hardness within the natural waters were found to confer a degree of protection to the glochidia.

Glochidia of another member of the Unionidae family, *Elliptio complanata* exposed to 3,000 mg/L sodium chloride (approximately 1,800 mg/L chloride) were found to have a reduction in attachment success and metamorphosis (Blakeslee, 2013). In this same study, adult mussels exposed to sub-lethal concentrations of sodium chloride were found to experience a temporary reduction in metabolic rates when first exposed to 1,000 mg/L (approximately 600 mg/L chloride) but recovered within 7 days of exposure.

With the exception of the one EC50 reported in Gillis (2011) for *Lampsilis fasciola*, the VWQS chronic criteria of 230 mg/L chronic and 860 mg/L acute appears to be protective of members of the genus *Lampsilis* during the most sensitive phase of their life cycle. As shown in the modeling presented in the SWPPP, chloride concentrations in stormwater discharges from the Transload facility are not anticipated to result in exceedances of the VWQS in the LaPlatte.

Chloride Sensitivity of Stonecat

References for species of the genus *Noturus* do not appear to be as commonly cited in the literature as references for species of the genus *Lampsilis.* Furthermore, different studies have indicated varying conclusions with respect to the pollution tolerance of the members of the genus *Noturus*. Grabarkiewicz and Davis (2008) cites a study (Cross, 1967) that indicates that "the stonecat madtom may be among the more adaptable species" and another (Becker, 1983) that indicates that "stonecat tolerates pollution and oxygen depletion which few other fish can survive." In other literature sources, tolerance classifications for *Noturus flavus* range from "intermediate" (Halliwell et al., 1999) to "intolerant" (Ohio EPA 1987; Jester et al, 1992).

Other members of the catfish families *Ictaluridae* and *Clariidae* are commonly raised in the aquaculture industry to produce food or feedstocks. Extensive literature has been published due to the commercial value of these fish, although much of it is focused on the members of genus *Ictalurus* (including the channel catfish, *Ictalurus punctatus*).

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In the aquaculture literature, sodium chloride concentrations of 5,000 to 8,000 mg/L (3,000 to 4,800 mg/L chloride) were reported to reduce stress during transport and handling. A range of chloride concentrations from 5,175 to 13,592 mg/L was examined in a bioassay study which used *Ictalurus punctatus* fingerlings (Morgan and Evans, 1981). This study found that concentrations below 5,000 mg/L did not have significant impacts on their behavior or mortality. Another study looked at a variety of treatments, including a sodium chloride static bath dip, that were used to improve hatchability in eggs from African catfish *Clarias gariepinus* (Rasowo, 2007). In this study, eggs treated with sodium chloride concentrations between 100 and 1,000 mg/L (approximately 60 to 600 mg/L chloride) were found to improve hatch rates, while concentrations above 4,000 mg/L (approximately 2,400 mg/L chloride) were found to reduce the hatch rate. While this information is not directly applicable to *Noturus*, it may be used to provide an upper boundary to the potential effects that would be experienced if the chloride concentration in the LaPlatte were elevated above the VWQS thresholds.

One study was identified which specifically identified the chloride concentrations in streams where the more closely-related *Noturus gyrinus* (tadpole madtom) was found. In this study, two streams reported *Noturus gyrinus*, in streams in Minnesota. Both streams were found to have Index of Biotic Integrity ("IBI") values around 40 (the threshold between poor and fair). Chloride concentration in Shingle Creek (a watershed with approximately 23 percent impervious cover) was reported at approximately 120 mg/L and chloride concentrations in Nine Mile Creek (a watershed with approximately 28 percent impervious cover) was reported at approximately 65 mg/L. By comparison, the watershed contributing to the lower LaPlatte drainage area is approximately 3 percent impervious cover and has a mean chloride concentration of approximately 50 mg/L, based on data collected by DEC. Based on the existing land-uses and land planning within the watershed, it is likely that these values will remain somewhat consistent in the foreseeable future and that conditions would continue to be suitable for the stonecat in the LaPlatte.

Summary

Based on the information available in the literature and the evaluation of the potential concentrations of chloride in the LaPlatte River downstream from the operational phase stormwater discharges from the Shelburne Transload facility, VHB concludes that the VWQS thresholds for chloride would not be exceeded in the River and that these concentrations would be sufficiently protective of pocketbook mussels and stonecats that may be present in the LaPlatte River downstream from the Project site.

Memorandum

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Memorandum

To: Vermont Railway, Inc.
Project File

Date: August 31, 2016

Project #: 57762.00

From: Robert Wildey, CPESC

Re: Shelburne Transload Facility
LaPlatte River Chloride Loading Analysis

INTRODUCTION

In support of the Vermont Railway, Inc. ("VTR", or "Applicant") proposal to develop the Shelburne Transload Facility ("Project" or "Facility"), located to the north of the Village of Shelburne and west of U.S. Route 7 and a VTR track and approximately 0.5 southeast from the mouth of the LaPlatte River, VHB has prepared the chloride loading analysis which is summarized in this memorandum. The memorandum outlines the data and assumptions used to evaluate whether chloride concentrations in the LaPlatte River are likely to exceed the Vermont Water Quality Standards for chloride under certain worst case conditions due to wash-off of residual material that may temporarily accumulate on paved surfaces during transfer activities at the Facility. Representatives of the Vermont Department of Environmental Conservation ("DEC") Stormwater Program were consulted during the development of the procedures and assumptions used in this analysis.

The proposed operations and facilities are designed to minimize any potential exposure of road salt to stormwater runoff as outlined in detail in the Stormwater Pollution Prevention Plan ("SWPPP") that was developed in support of the Facility's application for coverage under the Multi-Sector General Permit ("MSGP"). Various Best Management Practices ("BMPs") will be utilized at the site including covered storage of bulk salt and other potential stormwater contaminants, regular pavement sweeping and other material containment practices that are identified in the SWPPP. Post-construction water quality monitoring will also be conducted as described in the sampling plan memorandum included in Appendix F of the SWPPP.

In conducting this analysis, VHB reviewed existing chloride concentrations in the LaPlatte River and evaluated potential increases that could result from chloride wash-off following the construction of the Project.

The chloride loading analysis consisted of the following steps:

- Review and analyze historic streamflow and conductivity data from the United States Geological Survey ("USGS") LaPlatte River stream gage to determine the streamflow under a range of existing conditions, and the baseline chloride concentration found in the LaPlatte River. This gage is located near the Project site, approximately one mile upstream.
- Review historic chloride data from the DEC at water quality monitoring stations located near the Project site to evaluate the baseline chloride concentration that is found in the LaPlatte River during low flow periods.
- Evaluate the stormwater runoff that would be generated by the impervious areas of the Project to determine the peak flow rate during the 0.9-inch Water Quality Volume rainfall event.
- Conduct a literature review to identify the potential range of chloride concentrations that have been observed in runoff at other similar types of salt transfer/storage facilities. However, it was not possible to determine if

the facilities represented in the literature were subject to the requirements of the MSGP or the extent to which BMPs were implemented as part of their facility management.

- Conduct a sensitivity analysis to compare the resultant chloride concentration in the LaPlatte River with the Vermont Water Quality Standard ("VWQS") chronic concentration criterion (four day average concentration no greater than 230 mg/L once every 3 years) and the VWQS acute chloride concentration criterion (one hour average concentration no greater than 860 mg/L once every 3 years).

REVIEW OF EXISTING CHLORIDE CONCENTRATION DATA

To evaluate the existing chloride concentrations in the LaPlatte River, VHB reviewed water quality data from two DEC water quality monitoring stations located near the site (DEC Location ID 500789 and DEC 500785), along with streamflow data from the USGS stream gaging station located on the LaPlatte River upstream from the site at Shelburne Falls (USGS Gage 04272895). The location of this gaging station is shown on the Site Location Map, page 1 of the Attachment. A summary table of the median monthly flows reported by the gage is included on page 2 of the Attachment, along with the daily median flows during the months of July, August, September, October, and November.

The DEC reported total chloride in mg/L from a total of 50 samples that were collected between 2004 and 2007. These samples were collected between May and November of each year. The median concentration of all samples reported for these two stations was 46 mg/L. No samples exhibited concentrations above the VWQS chronic criterion of 230 mg/L. The sample with the maximum concentration of 117 mg/L was reported in November 2004. A summary table of the DEC chloride data and the corresponding flow data at the USGS stream gage for those sampling events is presented on page 3 of the Attachment.

Additional chloride background information is available from USGS conductivity measurements, which VHB converted to approximate chloride concentrations using the state-wide regression equation, which indicated an approximate background concentration of 50 mg/L.

Given the historic water quality and streamflow information available from these two sources, the background chloride concentration in the LaPlatte is relatively well-documented. The critical period when the highest chloride concentrations typically were measured is the late-summer and fall (September, October and November) when stream flows are at their lowest. Based on this information, the background chloride concentration in the River rarely has been measured above the chronic criterion and does not appear ever to have been measured in excess of the acute criterion. The two data sources are generally in agreement that the median chloride concentration is approximately 50 mg/L. This value was therefore selected for use as an estimate of the background concentration in the River for subsequent calculations that are presented in this analysis.

REVIEW OF EXISTING FLOW DATA

Existing flow data from the USGS stream gage at Shelburne Falls (Gage # 04282795) are available from 1991 to the present and were downloaded from the USGS website (http://waterdata.usgs.gov/nwis/uv?site_no=04282795). VHB computed flow statistics (low-flow recurrence intervals) based on this data, which comprised a period of record of 25 complete water years. VHB calculated the 7Q10 drought flow, representing a seven-day duration drought with a probability of occurring once every ten years (e.g., with a ten-year recurrence interval), to be used as the design streamflow for modeling in-stream chloride concentrations, in accordance with the VWQS.

Based on the 25 complete water years of USGS data, VHB determined a 7Q10 flow of 0.83 cubic feet per second ("cfs") at the USGS gage. Although the watershed at the Project site is approximately 2 square miles larger than at the USGS gage, VHB did not adjust the 7Q10 rate upwards to account for this additional drainage area. For the instream chloride analysis, VHB rounded the USGS gage site 7Q10 rate to 0.8 cfs for use in the chloride concentration analysis. Calculations of the 7Q10 flow rate are provided on pages 4 to 5 of the Attachment.

To be conservative, VHB modeled chloride concentrations in the LaPlatte River in a worst-case scenario in which streamflows are at 7Q10 drought flow conditions while at the same time a storm event is washing runoff from the Project site. This worst-case scenario envisions that the flows leaving the Project site as a result of stormwater runoff during the water quality volume design storm would enter the LaPlatte River before streamflow would increase as a result of the same storm event.

LITERATURE REVIEW OF CHLORIDE RUNOFF FROM SALT STORAGE AND HANLDING FACILITIES

The values reported in the literature for chloride concentrations in runoff associated with salt storage and handling facilities are widely variable and at times over several orders of magnitude, with values reported from 140 mg/L to 13,500 mg/L. This variability is attributable to many site related factors including the land cover conditions, drainage area size, rainfall/runoff volumes, sample timing during runoff event, to name a few. For this analysis, VHB focused on using observed data at salt storage facilities, which in themselves are highly variable with some covered and others not. It was difficult to find data that directly relates to the proposed facility being completely covered and with several BMPs being employed to reduce exposure of the material to stormwater runoff. A study evaluating runoff from a variety of transportation facilities entitled, "Characterization and Environmental Management of Runoff from Road-Salt Storage Facilities – Final Report (Fitch et al., (2004)," and published by the Virginia Transportation Research Council was determined to provide the most relevant observed data. This study examined runoff from 292 facilities throughout Virginia that are managed by the Virginia Department of Transportation ("VDOT"). In this study, chloride concentrations were measured in the stormwater ponds that were used at the various facilities to collect runoff from salt handling and storage areas. The loading areas at the sites in the study were not covered and no discussion is given of the BMPs that are employed to reduce exposure to stormwater runoff. The observed chloride concentrations reported in this study ranged from 140 mg/L to 3,100 mg/L, with an average concentration of 1,600 mg/L. Based on a standard deviation analysis of the 292 sites that were evaluated, the study's authors determined that 95 percent of

VDOTs ponds would have chloride concentrations less than 3,200 mg/L. The results of this study were used to help characterize the potential chloride concentrations that may occur in runoff from the Project.

WATER QUALITY VOLUME RUNOFF EVENT

For this analysis, the water quality event as defined in the Vermont Stormwater Management Manual (Vermont Agency of Natural Resources, April 2001, "VSMM") was selected as the representative rainfall event for analysis, as it is represents the storm event for which 90 percent of annual storm events are smaller. The precipitation depth for the water quality storm as defined in the VSMM is 0.9 inches. The flow rate from the portion of the Site involved in salt handling operations was calculated using the TR-55 modified curve number method as defined in the VSMM. The modified curve number method was selected as conventional methods have been found to underestimate the volume and rate of runoff for rainfall events less than two inches.

The portion of the Site involved in salt handling operations is 5.6 acres, 2.0 acres of which consist of paved impervious surfaces that would be used for salt handling and 1.2 acres of the salt shed roof. This 5.6-acre area drains via stormwater conveyance channels and a pretreatment grass channel to a wet pond, which will provide settling of suspended solids prior to discharge via an overflow weir. Flow overtopping the weir discharges from the Project towards the LaPlatte River to the north. The flow rate during the water quality storm that will outlet from the overflow weir was used as the site runoff rate in this chloride loading analysis. Complete site plans are included as an attachment to the SWPPP. Flow rate computations, calculated using TR-55 modified curve number methodology as applied by HydroCAD, are included on pages 6 through 11 of the Attachment.

The peak flow rate from the Site during the water quality storm event was estimated to be 2.4 cfs. This flow rate assumes that the wet pond is full at the start of the storm event, which is a conservative assumption considering the dry conditions that would be in effect during the design 7Q10 streamflow event. In order to compare the potential chloride flux with the chronic and acute criteria of the VWQS, VHB estimated the average stormwater discharge rate during the peak hour of the WQV event to be 1.4 cfs, and the average flow rate during a four-day period that includes the WQV event to be 0.03 cfs.

VHB then performed mass balance equations to estimate the instream chloride concentrations, based on the peak 1-hour and average 4-day stormwater discharge rates mixing with the calculated 7Q10 flow rate for the LaPlatte River together with the background instream chloride concentrations that were previously discussed. These calculations assume that the available chloride concentrations in both the stormwater runoff and the River are static throughout the storm event. This assumption is conservative given that dilution would occur as the storm continues and that the chloride wash-off load is not unlimited.

Table 1 presents the results of the sensitivity analysis performed to estimate the resulting chloride concentration in the LaPlatte River under different chloride concentrations in the stormwater discharged from the site. Supporting calculations are included on pages 12 through 17 of the Attachment.

Table 1. LaPlatte River Chloride Concentration Sensitivity Analysis

Chloride Concentration in Runoff	Peak 1-hour Instream Chloride Concentration (Acute Criteria)	4-day Average Instream Chloride (Chronic Criteria)
VWQS Criteria	**860**	**230**
100 mg/L	82 mg/L	52 mg/L
500 mg/L	336 mg/L	65 mg/L
1,000 mg/L	655 mg/L	82 mg/L
5,450 mg/L (chronic)	3,486mg/L	230 mg/L
1,323 mg/L (acute)	860 mg/L	92 mg/L

The results of this analysis indicate that an exceedance of the acute chloride criterion would only likely occur if the chloride concentration in the stormwater discharge from the pond was higher than 1,323 mg/L during 7Q10 drought streamflow conditions. The analysis also indicates that an exceedance of the chronic chloride criterion would only likely occur if the chloride concentration in the stormwater discharge from the pond was higher than 5,450 mg/L during 7Q10 drought streamflows. In the case of the chronic criterion, such a runoff concentration would be higher than the 95 percent probability concentration of 3,200 mg/L reported in the VDOT study (Fitch, 2004).

Assuming that the sodium chloride was completely dissolved in solution, the amount of bulk salt required to generate an acute instream chloride concentration above the VWQS criterion would be equivalent to 0.2 cubic yards (or roughly 640 pounds of salt being washed-off in the peak 1 hour of a storm). For the chronic criterion, the equivalent of 1.6 cubic yards, or 5,000 pounds, of salt would need to be washed-off during a 4-day period. Because BMPs, such as having a covered storage and handling area and regularly sweeping paved areas as part of good house-keeping practices, are required to be employed at the Project pursuant to the MSGP, VHB anticipates that this volume of salt would not be exposed and available for wash-off prior to storm events, and therefore the chloride concentration in stormwater discharges from the Project would be considerably below the threshold values identified in this analysis.

Assuming that the stormwater discharged from the facility would contain chloride concentrations between 100 and 1,000 mg/L, it appears likely that the chloride concentrations in the LaPlatte River as a result of runoff from the Project might range between 82 and 655 mg/L when calculated over the peak one hour of the 0.9-inch WQV storm event and

between 52 and 82 mg/L during the 4-day average as the result of the 0.9-inch WQV storm event, in a worst-case scenario in which LaPlatte River streamflows are at 7Q10 drought rates.

CONCLUSION

Based on the assumptions and data used in this analysis, the results indicate that the Project would not likely cause exceedances of the VWQS acute or chronic chloride criteria within the LaPlatte River. The analysis is very conservative, because it estimates instream chloride concentrations in a worst-case scenario wherein runoff is being generated at the site from a storm that exceeds the runoff of 90 percent of all annual storms, at the same time that streamflows in the LaPlatte River are at 7Q10 drought conditions.

The use of BMPs at the Project site will minimize the amount of chloride potentially discharged from the site by limiting the exposure to stormwater runoff. Sampling of the stormwater discharges from the facility is proposed as part of the SWPPP that has been prepared as part of compliance with the MSGP. Post-construction water quality monitoring is also proposed as a means to further protect against potential water quality criteria exceedances. Such samples can also be used to validate the assumptions and results that were derived from this analysis.

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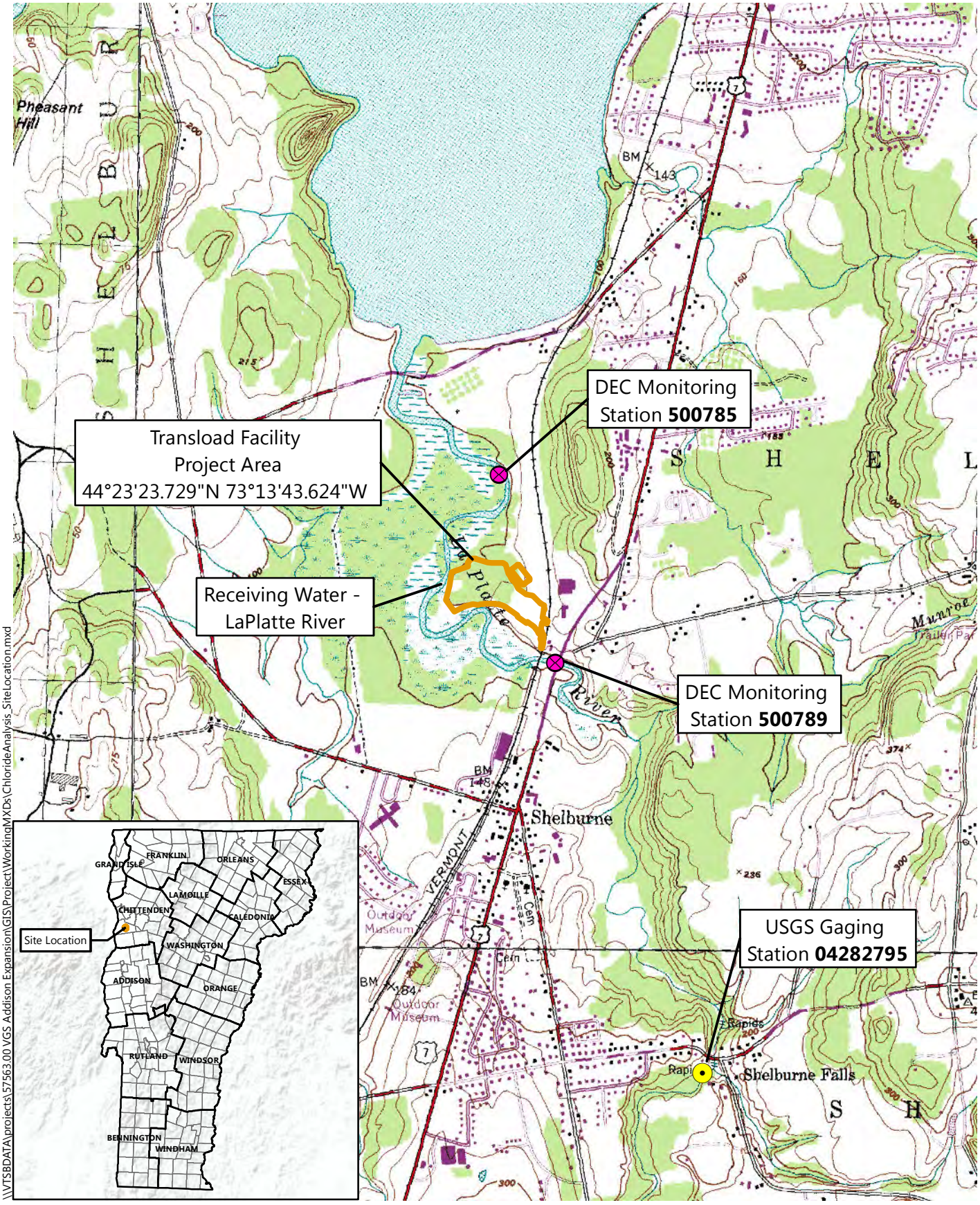
ATTACHMENT

July 08, 2016



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Shelburne Transload Facility | Shelburne, Vermont

Site Location Map

USGS Topo Background (1996)
DEC Monitoring Sites from IWIS Report (2016)

Computations

Project:	**Shelburne Transload**	**Project #:**	**57762.00**
Location:	**Shelburne, Vermont**	**Sheet:**	**1 of 1**
Calculated by:	**Robert Wildey**	**Date:**	**July 6, 2016**
Checked by:		**Date:**	
Title:	**LaPlatte River Median Daily Flows**		

Average Median Flow, By Month (cfs) [2]	
Month	**Flow**
January	24
February	19
March	52
April	83
May	34
June	16
July	8
August	6
September	5
October	14
November	30
December	36

LaPlatte River Median Daily Flow (cfs) [1]					
Day	**July**	**August**	**September**	**October**	**November**
1	8.9	6.4	5.4	8.6	21.0
2	9.3	6.7	5.7	7.2	23.0
3	7.2	7.0	4.5	6.7	23.0
4	6.6	7.1	4.5	6.0	22.0
5	10.0	8.7	4.7	9.2	20.0
6	10.0	7.4	4.7	8.9	22.0
7	7.8	6.7	4.7	8.8	20.0
8	8.7	5.1	4.5	8.2	20.0
9	15.0	4.9	5.0	7.0	22.0
10	12.0	5.9	4.4	7.7	18.0
11	9.3	9.1	4.4	7.0	21.0
12	6.9	9.5	4.2	7.4	27.0
13	6.1	6.7	4.3	6.8	32.0
14	5.9	7.9	4.2	7.2	26.0
15	8.2	6.9	5.0	8.2	36.0
16	8.3	5.9	4.8	9.5	42.0
17	6.7	4.9	5.4	12.0	35.0
18	7.3	4.5	4.9	12.0	33.0
19	7.8	4.2	4.9	14.0	30.0
20	6.4	4.4	4.4	13.0	30.0
21	5.8	5.1	4.7	16.0	30.0
22	6.1	7.1	5.2	22.0	34.0
23	6.8	5.3	5.5	23.0	30.0
24	9.4	5.8	7.1	24.0	29.0
25	7.6	4.9	7.2	22.0	35.0
26	6.8	4.3	5.2	25.0	34.0
27	6.4	4.2	5.4	24.0	46.0
28	7.6	4.0	5.8	28.0	43.0
29	8.0	3.5	7.2	25.0	42.0
30	8.1	3.4	9.1	23.0	41.0
31	7.3	3.7	-	21.0	-
Maximum	15	10	9	28	46
Minimum	6	3	4	6	18
Average	8	6	5	14	30

1. Median daily flow as measured at USGS Gage 04282795 (LaPlatte River at Shelburne Falls)
2. Average median daily flows for entire year, as measured at USGS Gage 04282795 (LaPlatte River at Shelburne Falls)

Computations

Project: Shelburne Transload | **Project #:** 57762.00
Location: Shelburne, Vermont | **Sheet:** 1 of 1
Calculated by: Robert Wildey | **Date:** August 31, 2016
Checked by: | **Date:**
Title: LaPlatte River Background Chloride Concentration
DEC Chloride Sampling Data

LaPlatte River @ Route 7 (DEC 500789)		
Sample Date	Chloride Conc. (mg/L)[1]	Flow (cfs)[2]
6/22/2004	53	9
7/20/2004	45	35
8/31/2004	14	406
9/21/2004	47	11
9/21/2004	47	11
10/12/2004	31	4
10/12/2004	31	4
11/16/2004	117	5
11/16/2004	116	5
5/3/2005	26	70
6/7/2005	53	8
7/5/2005	56	17
8/2/2005	47	23
9/6/2005	49	7
10/4/2005	30	9
11/8/2005	44	44
7/5/2006	16	86
8/1/2006	35	13
9/5/2006	55	6
10/3/2006	55	16
11/7/2006	27	27
6/12/2007	49	7
7/10/2007	23	98
8/14/2007	109	2
9/11/2007	71	4
11/13/2007	48	9

LaPlatte @ Yacht Haven Dr. (DEC 500785)		
Sample Date	Chloride Conc. (mg/L)[1]	Flow (cfs)[2]
6/22/2004	78	9
7/20/2004	32	35
8/31/2004	15	406
9/21/2004	48	11
10/12/2004	30	4
11/16/2004	117	5
5/3/2005	23	70
6/7/2005	46	8
7/5/2005	52	17
8/2/2005	43	23
9/6/2005	48	7
10/4/2005	30	9
11/8/2005	38	44
6/6/2006	17	81
7/5/2006	17	86
8/1/2006	32	13
9/5/2006	54	6
10/3/2006	46	16
11/7/2006	25	27
6/12/2007	38	7
7/10/2007	28	98
8/14/2007	78	2
9/11/2007	71	4
11/13/2007	46	9

Monthly Median Chloride and Flow Analysis (All DEC Data)		
Month	Flow (cfs)[1]	Chloride (mg/L)[3]
May	70	24
Jun	8	49
July	61	30
Aug	18	39
Sep	7	49
Oct	9	31
Nov	9	46

Maximum	406	117
Minimum	2	14
Median	11	46

1. Chloride measured at DEC Location ID 500789 - LaPlatte River at Route 7
2. Average daily flow on date of DEC sample, as measured at USGS Gage 04282795 (LaPlatte River at Shelburne Falls)
3. Median chloride concentration of DEC samples, by month
4. Median stream flow on dates when DEC samples were collected, by month
5. Median average daily flow , as measured at USGS Gage 04282795 (LaPlatte River at Shelburne Falls)

Shelburne Transload Facility

LaPlatte River 7Q10 Analysis

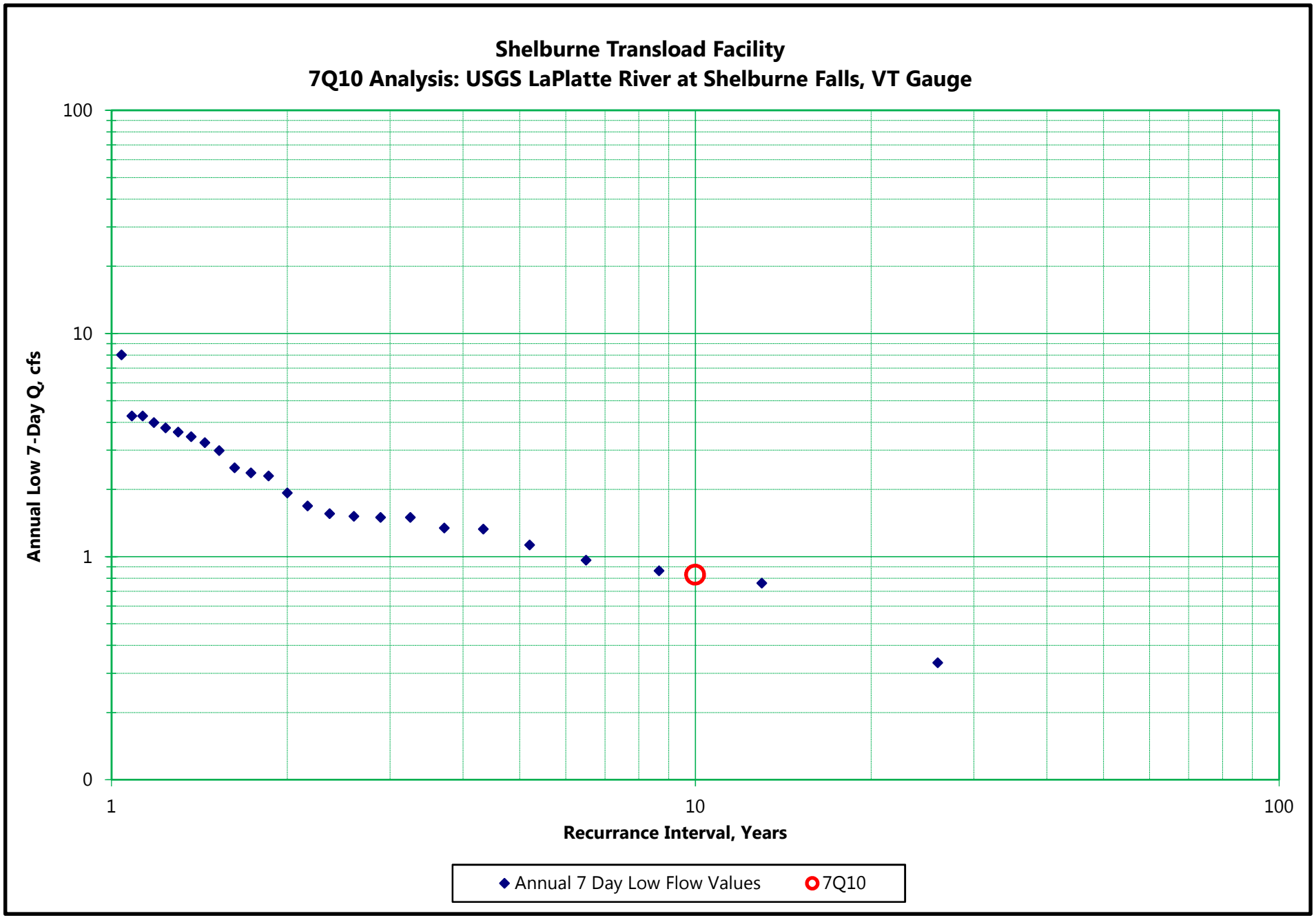
Based on USGS Station #04282795 (LaPlatte River at Shelburne Falls, VT)

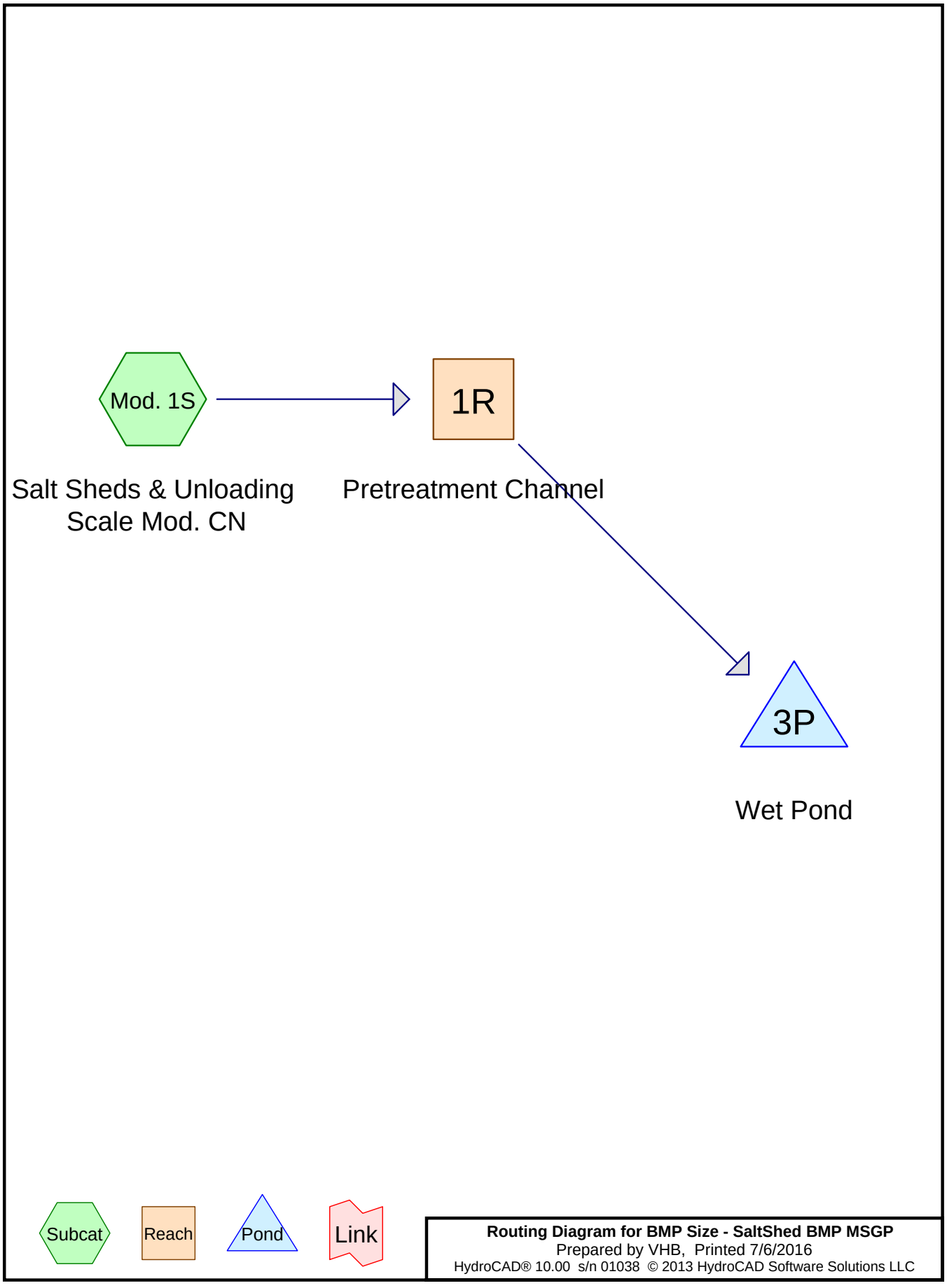
USGS Flow Data from LaPlatte River at Shelburne Falls, VT Gauge			
Water Year (ending in Sept)	**Annual Low 7-Day Q (cfs)**	**Rank**	**Recurrance Interval (years)**
1995	0.33	1	26
2001	0.76	2	13
1999	0.86	3	8.7
2007	1.0	4	6.5
2002	1.1	5	5.2
2010	1.3	6	4.3
1992	1.3	7	3.7
1991	1.5	8	3.3
2009	1.5	9	2.9
2015	1.5	10	2.6
2003	1.6	11	2.4
2012	1.7	12	2.2
2008	1.9	13	2.0
2011	2.3	14	1.9
1996	2.4	15	1.7
1993	2.5	16	1.6
2014	3.0	17	1.5
1997	3.2	18	1.4
2005	3.4	19	1.4
2004	3.6	20	1.3
2006	3.8	21	1.2
1994	4.0	22	1.2
1998	4.3	23	1.1
2000	4.3	24	1.1
1905	8.0	25	1.0

7Q10	**0.83**	cfs, at USGS LaPlatte River at Shelburne Falls, VT (watershed area =	44.6	square miles)

NOTE: "7Q10" is the drought flow equal to the **lowest average flow for 7 consecutive days with a 10% chance of occurring in any year** (that is, with a ten-year return period).

Pro-Rate the 7Q10 at the USGS gauge, to the watershed area at the project site:		
Watershed area at USGS gauge:	44.6	square miles (source: USGS)
Unitized 7Q10 :	0.02	csm (cfs per square mile of watershed)
Watershed area at project site:	46.4	square miles (source: USGS Streamstats)
Ratio of watershed areas:	1.04	
Pro-rated 7Q10 at project site:	0.86	cfs (= 7Q10 at USGS gauge x Ratio)


Shelburne Transload Facility
7Q10 Analysis: USGS LaPlatte River at Shelburne Falls, VT Gauge
Annual Low 7-Day Q, cfs
100
10
1
0
1
10
100
Recurrance Interval, Years
Annual 7 Day Low Flow Values
7Q10



Routing Diagram for BMP Size - SaltShed BMP MSGP
Prepared by VHB, Printed 7/6/2016

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Mod. 1S: Salt Sheds & Runoff Area=5.640 ac 0.00% Impervious Runoff Depth>0.48"
Flow Length=914' Tc=9.2 min CN=95 Runoff=4.28 cfs 0.224 af

Reach 1R: Pretreatment Channel Avg. Flow Depth=0.57' Max Vel=0.69 fps Inflow=4.28 cfs 0.224 af
n=0.099 L=433.0' S=0.0060 '/' Capacity=18.53 cfs Outflow=3.05 cfs 0.221 af

Pond 3P: Wet Pond Peak Elev=109.38' Storage=16,393 cf Inflow=3.05 cfs 0.221 af
Outflow=2.38 cfs 0.219 af

Total Runoff Area = 5.640 ac Runoff Volume = 0.224 af Average Runoff Depth = 0.48"
100.00% Pervious = 5.640 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment Mod. 1S: Salt Sheds & Unloading Scale Mod. CN

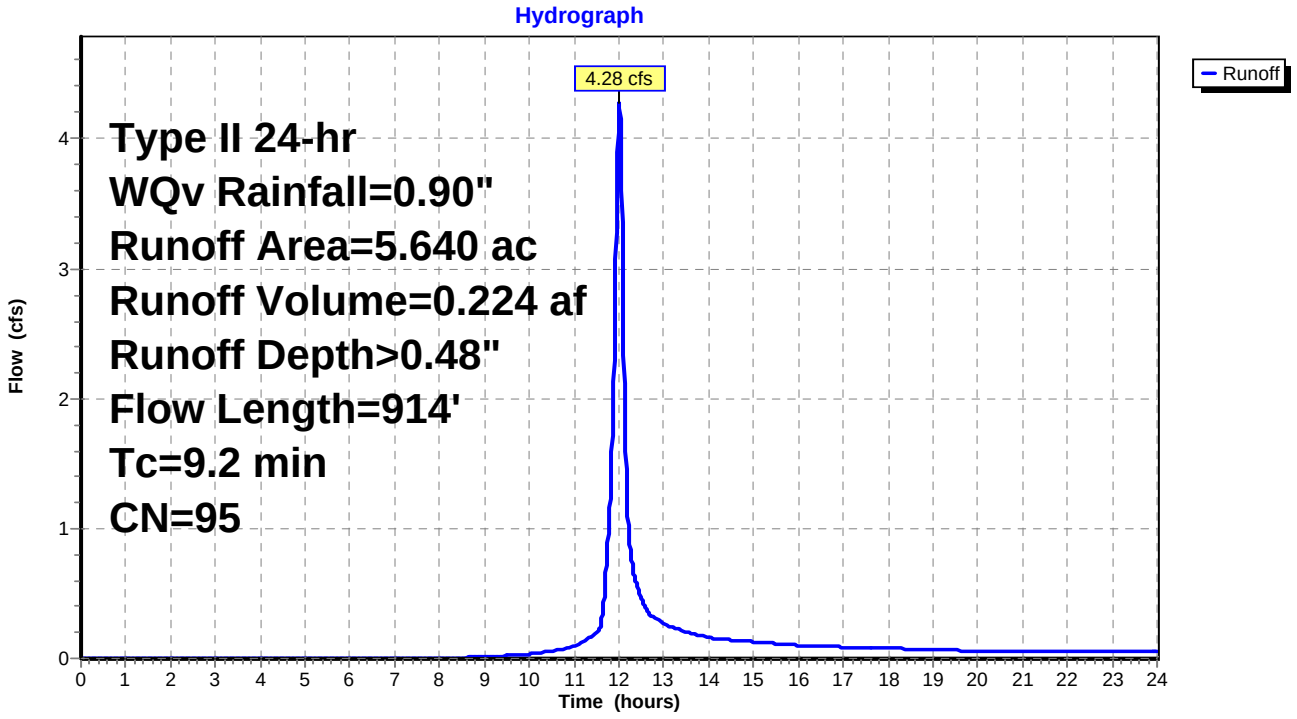
Runoff = 4.28 cfs @ 12.01 hrs, Volume= 0.224 af, Depth> 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Rainfall=0.90"

	Area (ac)	CN	Description
*	5.640	95	Mod. Curve Number
	5.640		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0200	1.17		**Sheet Flow, paved** Smooth surfaces n= 0.011 P2= 2.30"
2.9	500	0.0200	2.87		**Shallow Concentrated Flow, paved** Paved Kv= 20.3 fps
4.9	314	0.0050	1.06		**Shallow Concentrated Flow, conveyance channel** Grassed Waterway Kv= 15.0 fps
9.2	914	Total			

Subcatchment Mod. 1S: Salt Sheds & Unloading Scale Mod. CN



Summary for Reach 1R: Pretreatment Channel

Inflow Area = 5.640 ac, 0.00% Impervious, Inflow Depth > 0.48" for WQv event
Inflow = 4.28 cfs @ 12.01 hrs, Volume= 0.224 af
Outflow = 3.05 cfs @ 12.08 hrs, Volume= 0.221 af, Atten= 29%, Lag= 4.4 min

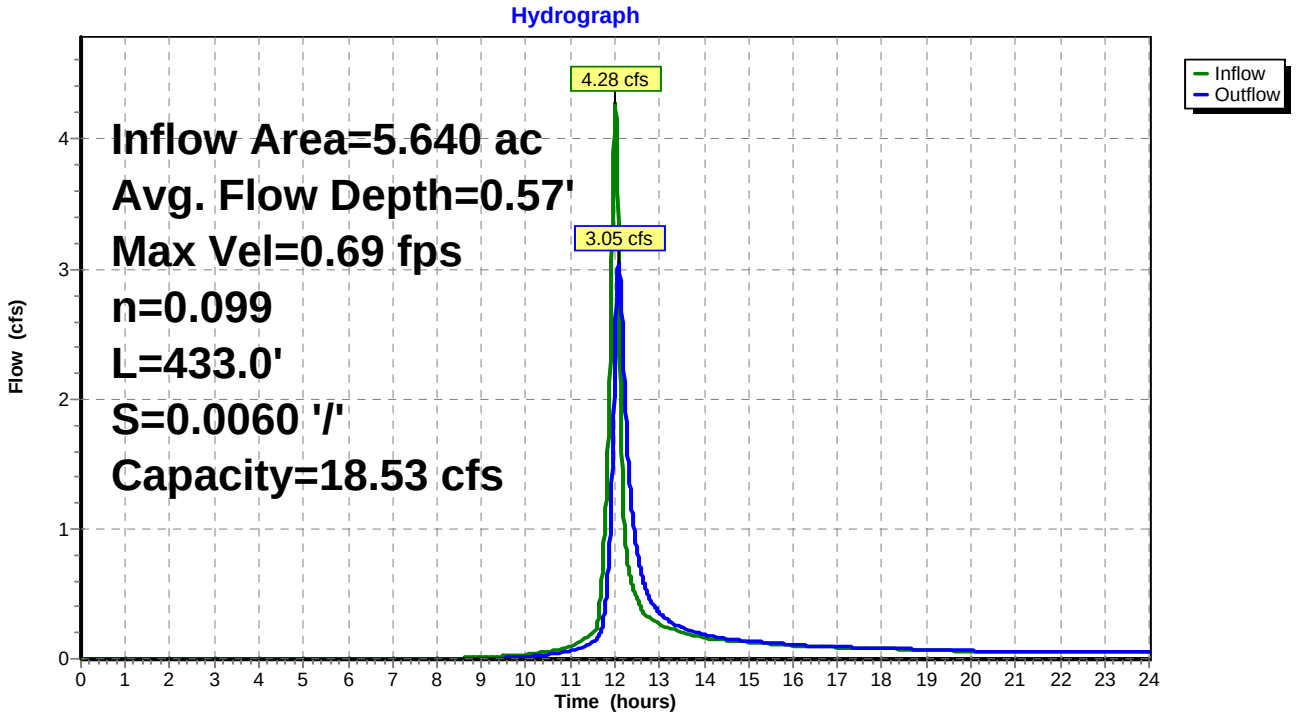
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.69 fps, Min. Travel Time= 10.4 min
Avg. Velocity = 0.20 fps, Avg. Travel Time= 35.9 min

Peak Storage= 1,908 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.57'
Bank-Full Depth= 1.50' Flow Area= 15.8 sf, Capacity= 18.53 cfs

6.00' x 1.50' deep channel, n= 0.099
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 433.0' Slope= 0.0060 '/'
Inlet Invert= 112.35', Outlet Invert= 109.75'

‡

Reach 1R: Pretreatment Channel



Summary for Pond 3P: Wet Pond

Inflow Area = 5.640 ac, 0.00% Impervious, Inflow Depth > 0.47" for WQv event
Inflow = 3.05 cfs @ 12.08 hrs, Volume= 0.221 af
Outflow = 2.38 cfs @ 12.18 hrs, Volume= 0.219 af, Atten= 22%, Lag= 6.1 min
Primary = 2.38 cfs @ 12.18 hrs, Volume= 0.219 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Starting Elev= 109.25' Surf.Area= 10,970 sf Storage= 15,006 cf
Peak Elev= 109.38' @ 12.18 hrs Surf.Area= 11,166 sf Storage= 16,393 cf (1,387 cf above start)
Flood Elev= 110.75' Surf.Area= 13,004 sf Storage= 29,972 cf (14,966 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 12.3 min (854.1 - 841.7)

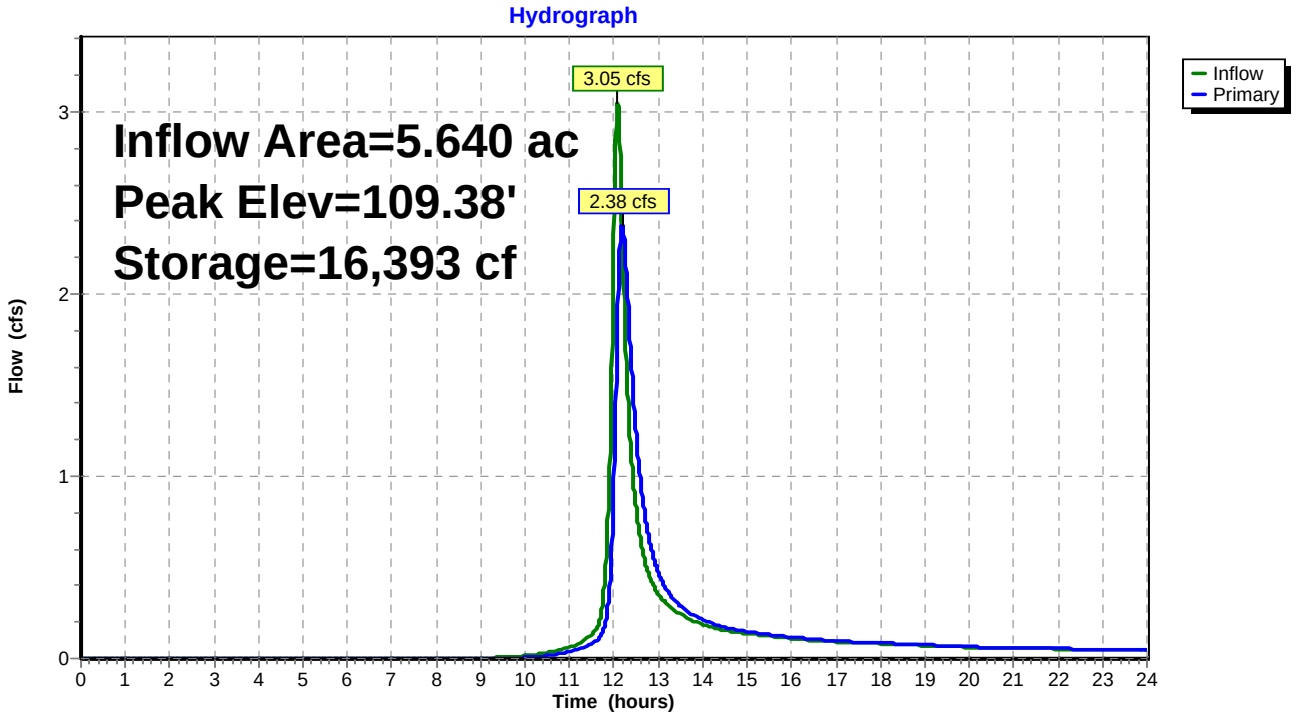
Volume	Invert	Avail.Storage	Storage Description
#1	107.75'	29,972 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
107.75	9,062	409.8	0	0	9,062
108.00	9,371	419.6	2,304	2,304	9,717
109.00	10,643	433.3	10,000	12,304	10,740
109.25	10,970	438.0	2,702	15,006	11,084
110.50	13,004	466.3	14,966	29,972	13,197

Device	Routing	Invert	Outlet Devices
#1	Primary	109.25'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=2.38 cfs @ 12.18 hrs HW=109.38' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 2.38 cfs @ 0.95 fps)

Pond 3P: Wet Pond



Computations

Project:	**Shelburne Transload**	**Project #:**	**57762.00**
Location:	**Shelburne, Vermont**	**Sheet:**	**1 of 1**
Calculated by:	**Robert Wildey**	**Date:**	**August 31, 2016**
Checked by:		**Date:**	
Title:	**West Pond Average Peak Discharge Rates for WQV Storm Event**		

Hour During WQV Event	1-Hr Average Peak Flow (cfs)[1]
0	
1	0.0
2	0.0
3	0.0
4	0.0
5	0.0
6	0.0
7	0.0
8	0.0
9	0.0
10	0.0
11	0.0
12	1.1
13	1.4
14	0.5
15	0.2
16	0.1
17	0.1
18	0.1
19	0.1
20	0.1
21	0.1
22	0.1
23	0.1
24	0.1

Calculation of Average Flow Resulting from 0.9-inch WQv Event over 4-Day period	
0.219	acre-feet [2]
43,560	acre-feet per cubic feet
9,540	cubic feet
86,400	seconds per day
4	number of days
0.03	cubic feet per second

1. 1-hr Peak Average flow during hour of 24-hr WQV storm event, per HydroCAD model
2. Runoff Volume resulting from 24-hr WQV storm event, per HydroCAD model

Computations

Project:	**Shelburne Transload**	**Project #:**	**57762.00**
Location:	**Shelburne, Vermont**	**Sheet:**	**1 of 1**
Calculated by:	**Robert Wildey**	**Date:**	**August 31, 2016**
Checked by:		**Date:**	
Title:	**Chloride Sensitivity Analysis During WQV Storm Event**		
	Chloride Concentration of 100 mg/L in Stormwater Runoff		

Acute (1-Hr) Chloride Analysis	
Potential Discharge During WQV Event	
100	mg / liter chloride [1]
1.4	cubic feet / sec [2]
40	liter / second
3,965	mg / second
0.00	kg / second
14	kg chloride during 1 hr event
0.65	chloride fraction of NaCl
22	kg NaCl required
34	density of bulk salt (kg/cf)
0.4	cf of NaCl required
0.02	cy of NaCl required
LaPlatte River - 7Q10 Low Flow	
50	mg / liter chloride [3]
0.8	cubic feet / sec
23	liter / second
1,133	mg / second
0.001	kg / second
Resulting Combined Flows	
0.01	kg / second
5,098	mg / second
2.2	cubic feet / sec
62	liter / second
82	mg / liter chloride [4]

Chronic (4-Day) Chloride Analysis	
Potential Discharge During WQV Event	
100	mg / liter chloride 1
0.03	cubic feet / sec [5]
1	liter / second
78	mg / second
0.0001	kg / second
27	kg total during 4 day event
0.65	chloride fraction of NaCl
42	kg NaCl required
34	density of bulk salt (kg/cf)
0.8	cf of NaCl required
0.03	cy of NaCl required
LaPlatte River - 7Q10 Low Flow	
50	mg / liter chloride [3]
0.8	cubic feet / sec
23	liter / second
1,133	mg / second
0.001	kg / second
Resulting Combined Flows	
0.00	kg / second
1,211	mg / second
0.83	cubic feet / sec
23	liter / second
52	mg / liter chloride [6]

1. Sensitivity analysis assumption of the chloride concentration in stormwater discharged from the West Pond
2. Average one-hour peak discharge from West Pond during 24-hr 0.9-inch rainfall event, as calculated by HydroCAD
3. Estimated background concentration of chloride in LaPlatte River
4. Resulting one-hour peak chloride concentration in LaPlatte River for sensitivity analysis using 100 mg/L discharge from site.
5. Four day average discharge from West Pond resulting from 24-hr 0.9-inch rainfall event, as calculated by HydroCAD
6. Resulting four-day peak chloride concentration in LaPlatte River for sensitivity analysis using 100 mg/L discharge from site.

Computations

Project:	**Shelburne Transload**	**Project #:**	**57762.00**
Location:	**Shelburne, Vermont**	**Sheet:**	**1 of 1**
Calculated by:	**Robert Wildey**	**Date:**	**August 31, 2016**
Checked by:		**Date:**	
Title:	**Chloride Sensitivity Analysis During WQV Storm Event**		
	Chloride Concentration of 500 mg/L in Stormwater Runoff		

Acute (1-Hr) Chloride Analysis	
Potential Discharge During WQV Event	
500	mg / liter chloride [1]
1.4	cubic feet / sec [2]
40	liter / second
19,824	mg / second
0.02	kg / second
71	kg chloride during 1 hr event
0.65	chloride fraction of NaCl
110	kg NaCl required
34	density of bulk salt (kg/cf)
2	cf of NaCl required
0.1	cy of NaCl required
LaPlatte River - 7Q10 Low Flow	
50	mg / liter chloride 3
0.8	cubic feet / sec
23	liter / second
1,133	mg / second
0.001	kg / second
Resulting Combined Flows	
0.02	kg / second
20,957	mg / second
2.2	cubic feet / sec
62	liter / second
336	mg / liter chloride [4]

Chronic (4-Day) Chloride Analysis	
Potential Discharge During WQV Event	
500	mg / liter chloride [1]
0.03	cubic feet / sec [5]
1	liter / second
391	mg / second
0.000	kg / second
135	kg total during 4 day event
0.65	chloride fraction of NaCl
208	kg NaCl required
34	density of bulk salt (kg/cf)
4	cf of NaCl required
0.1	cy of NaCl required
LaPlatte River - 7Q10 Low Flow	
50	mg / liter chloride [3]
0.8	cubic feet / sec
23	liter / second
1,133	mg / second
0.001	kg / second
Resulting Combined Flows	
0.002	kg / second
1,524	mg / second
0.83	cubic feet / sec
23	liter / second
65	mg / liter chloride [6]

1. Sensitivity analysis assumption of the chloride concentration in stormwater discharged from the West Pond
2. Average one-hour peak discharge from West Pond during 24-hr 0.9-inch rainfall event, as calculated by HydroCAD
3. Estimated background concentration of chloride in LaPlatte River
4. Resulting one-hour peak chloride concentration in LaPlatte River for sensitivity analysis using 500 mg/L discharge from site.
5. Four day average discharge from West Pond resulting from 24-hr 0.9-inch rainfall event, as calculated by HydroCAD
6. Resulting four-day chloride concentration in LaPlatte River for sensitivity analysis using 500 mg/L discharge from site.

Computations

Project:	**Shelburne Transload**	**Project #:**	**57762.00**
Location:	**Shelburne, Vermont**	**Sheet:**	**1 of 1**
Calculated by:	**Robert Wildey**	**Date:**	**August 31, 2016**
Checked by:		**Date:**	
Title:	**Chloride Sensitivity Analysis During WQV Storm Event**		
	Chloride Concentration of 1,000 mg/L in Stormwater Runoff		

Acute (1-Hr) Chloride Analysis

Potential Discharge During WQV Event	
1,000	mg / liter chloride [1]
1.4	cubic feet / sec [2]
40	liter / second
39,648	mg / second
0.04	kg / second
143	kg chloride during 1 hr event
0.65	chloride fraction of NaCl
220	kg NaCl required
34	density of bulk salt (kg/cf)
4	cf of NaCl required
0.2	cy of NaCl required
LaPlatte River - 7Q10 Low Flow	
50	mg / liter chloride 3
0.8	cubic feet / sec
23	liter / second
1,133	mg / second
0.001	kg / second
Resulting Combined Flows	
0.04	kg / second
40,781	mg / second
2.2	cubic feet / sec
62	liter / second
655	mg / liter chloride [4]

Chronic (4-Day) Chloride Analysis

Potential Discharge During WQV Event	
1,000	mg / liter chloride [1]
0.03	cubic feet / sec [5]
1	liter / second
782	mg / second
0.001	kg / second
270	kg total during 4 day event
0.65	chloride fraction of NaCl
416	kg NaCl required
34	density of bulk salt (kg/cf)
8	cf of NaCl required
0.3	cy of NaCl required
LaPlatte River - 7Q10 Low Flow	
50	mg / liter chloride [3]
0.8	cubic feet / sec
23	liter / second
1,133	mg / second
0.001	kg / second
Resulting Combined Flows	
0.002	kg / second
1,915	mg / second
0.83	cubic feet / sec
23	liter / second
82	mg / liter chloride [6]

1. Sensitivity analysis assumption of the chloride concentration in stormwater discharged from the West Pond
2. Average one-hour peak discharge from West Pond during 24-hr 0.9-inch rainfall event, as calculated by HydroCAD
3. Estimated background concentration of chloride in LaPlatte River
4. Resulting one-hour peak chloride concentration in LaPlatte River for sensitivity analysis using 1,000 mg/L discharge from site.
5. Four day average discharge from West Pond resulting from 24-hr 0.9-inch rainfall event, as calculated by HydroCAD
6. Resulting four-day peak chloride concentration in LaPlatte River for sensitivity analysis using 1,000 mg/L discharge from site.

Computations

Project:	**Shelburne Transload**	**Project #:**	**57762.00**
Location:	**Shelburne, Vermont**	**Sheet:**	**1 of 1**
Calculated by:	**Robert Wildey**	**Date:**	**August 31, 2016**
Checked by:		**Date:**	
Title:	**Chloride Analysis During WQV Storm Event**		
	Runoff Concentration That Results In Chronic Criterion		

Acute (1-Hr) Chloride Analysis	
Potential Discharge During WQV Event	
5,450	mg / liter chloride [1]
1.4	cubic feet / sec [2]
40	liter / second
216,082	mg / second
0.22	kg / second
778	kg chloride during 1 hr event
0.65	chloride fraction of NaCl
1197	kg NaCl required
34	density of bulk salt (kg/cf)
23	cf of NaCl required
0.8	cy of NaCl required
LaPlatte River - 7Q10 Low Flow	
50	mg / liter chloride 3
0.8	cubic feet / sec
23	liter / second
1,133	mg / second
0.001	kg / second
Resulting Combined Flows	
0.22	kg / second
217,214	mg / second
2.2	cubic feet / sec
62	liter / second
3,486	mg / liter chloride [4]

Chronic (4-Day) Chloride Analysis	
Potential Discharge During WQV Event	
5,450	mg / liter chloride [5]
0.03	cubic feet / sec [6]
1	liter / second
4,260	mg / second
0.004	kg / second
1,472	kg total during 4 day event
0.65	chloride fraction of NaCl
2265	kg NaCl required
34	density of bulk salt (kg/cf)
43	cf of NaCl required
1.6	cy of NaCl required
LaPlatte River - 7Q10 Low Flow	
50	mg / liter chloride [3]
0.8	cubic feet / sec
23	liter / second
1,133	mg / second
0.001	kg / second
Resulting Combined Flows	
0.005	kg / second
5,393	mg / second
0.83	cubic feet / sec
23	liter / second
230	mg / liter chloride [7]

1. Chloride concentration that results in an exceedance of the VWQS chronic criterion is used here to evaluate the effect of that concentration during the VWQS acute criterion timespan.
2. Average one-hour peak discharge from West Pond during 24-hr 0.9-inch rainfall event, as calculated by HydroCAD
3. Estimated background concentration of chloride in LaPlatte River
4. VWQS acute criterion for chloride, 1 hour average concentration not be exceeded more than once every 3 years

5. Calculated chloride concentration representing the concentration that would result in the VWQS chronic criterion being met.
6. Four day average discharge from West Pond resulting from 24-hr 0.9-inch rainfall event, as calculated by HydroCAD
7. VWQS chronic criterion for chloride, 4 day average concentration not be exceeded more than once every 3 years

Computations

Project:	**Shelburne Transload**	**Project #:**	**57762.00**
Location:	**Shelburne, Vermont**	**Sheet:**	**1 of 1**
Calculated by:	**Robert Wildey**	**Date:**	**August 31, 2016**
Checked by:		**Date:**	
Title:	**Chloride Analysis During WQV Storm Event**		
	Runoff Concentration That Results In Acute Criterion		

Acute (1-Hr) Chloride Analysis	
Potential Discharge During WQV Event	
1,323	mg / liter chloride [1]
1.4	cubic feet / sec [2]
40	liter / second
52,454	mg / second
0.05	kg / second
189	kg chloride during 1 hr event
0.65	chloride fraction of NaCl
291	kg NaCl required
34	density of bulk salt (kg/cf)
6	cf of NaCl required
0.2	cy of NaCl required
LaPlatte River - 7Q10 Low Flow	
50	mg / liter chloride 3
0.8	cubic feet / sec
23	liter / second
1,133	mg / second
0.001	kg / second
Resulting Combined Flows	
0.05	kg / second
53,587	mg / second
2.2	cubic feet / sec
62	liter / second
860	mg / liter chloride [4]

Chronic (4-Day) Chloride Analysis	
Potential Discharge During WQV Event	
1,323	mg / liter chloride [5]
0.03	cubic feet / sec [6]
1	liter / second
1,034	mg / second
0.001	kg / second
357	kg total during 4 day event
0.65	chloride fraction of NaCl
550	kg NaCl required
34	density of bulk salt (kg/cf)
11	cf of NaCl required
0.4	cy of NaCl required
LaPlatte River - 7Q10 Low Flow	
50	mg / liter chloride [3]
0.8	cubic feet / sec
23	liter / second
1,133	mg / second
0.001	kg / second
Resulting Combined Flows	
0.002	kg / second
2,167	mg / second
0.83	cubic feet / sec
23	liter / second
92	mg / liter chloride [7]

1. Calculated chloride concentration representing the concentration that would result in the VWQS acute criterion being met
2. Average one-hour peak discharge from West Pond during 24-hr 0.9-inch rainfall event, as calculated by HydroCAD
3. Estimated background concentration of chloride in LaPlatte River
4. VWQS acute criterion for chloride, 1 hour average concentration not be exceeded more than once every 3 years
5. Chloride concentration that results in an exceedance of the VWQS acute criterion is used here to evaluate the effect of that concentration during the VWQS chronic criterion timespan.
6. Four day average discharge from West Pond resulting from 24-hr 0.9-inch rainfall event, as calculated by HydroCAD
7. VWQS chronic criterion for chloride, 4 day average concentration not be exceeded more than once every 3 years

September 15, 2016 **Via Electronic Copy Only**

Ref: 57762.00

Mr. Jon Kart
Vermont Fish and Wildlife Department
1 National Life Drive, Davis 2
Montpelier, VT 05620

Ms. Helen Carr
Vermont Department of Environmental Conservation
Watershed Management Division
Main Building - 2nd Floor
1 National Life Drive
Montpelier, VT 05620

Re: Vermont Railway, Inc.
Shelburne Transload Facility
Endangered & Threatened Species Taking Permit ER-2016-23
Report Submittal / Freshwater Mussel Survey in the LaPlatte River

Dear Jon and Helen:

On behalf of Vermont Railway, Inc. ("VTR"), and as required by Condition 12(A) of Endangered & Threatened Species Taking Permit ER-2016-23 ("Permit") dated July 12, 2016, VHB is submitting a copy of the report *Freshwater Mussel Survey in the LaPlatte River for the Shelburne Transload Facility (Shelburne, Vermont)*, prepared by Biodrawversity LLC and dated August 2016. The survey work included in the report was performed by and under the direction of Ethan Nedeau of Biodrawversity, as a subconsultant to VHB, pursuant to and in accordance with the terms and conditions of the Permit.

This report is also intended to supplement and validate the information previously provided to the Vermont Department of Environmental Conservation in Appendix H of the Stormwater Pollution Prevention Plan ("SWPPP") prepared in accordance with the requirements for coverage under the Multi-Sector General Permit for the Shelburne Transload Facility (NOI #7514-9003). A copy of this report that has been redacted to remove the map and other information regarding the specific locations where the state-listed mussels

Engineers | Scientists | Planners | Designers

40 IDX Drive, Building 100
Suite 200
South Burlington, Vermont 05403
P 802.497.6100
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were found will be included in the SWPPP binder to be maintained at the facility.

Thank you, and do not hesitate to contact me if you have any questions.

Sincerely,

Robert Wildey
Water Resources Consultant

RAW/jkw

cc: Selden Houghton, VTR (electronic copy only)
David Wulfson, VTR (electronic copy only)
Ethan Nedeau, Biodrawversity (electronic copy only)

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REPORT

Freshwater Mussel Survey in the LaPlatte River for the Shelburne Transload Facility (Shelburne, Vermont)

prepared for

VHB, Inc.
40 IDX Drive
Building 100, Suite 200
South Burlington, VT 05403-7771

prepared by

Biodrawversity LLC
206 Pratt Corner Road
Leverett, MA 01054

August 2016

LaPlatte River, about 300 meters downstream from the proposed stormwater discharge of the Shelburne Transload Facility (Shelburne, Vermont).

INTRODUCTION

Biodrawversity LLC conducted a freshwater mussel survey in the LaPlatte River in Shelburne, Vermont. The survey was conducted as part of the review and permitting for a proposed salt storage facility in nearby uplands and its stormwater discharge to the river. There were limited data on the freshwater mussels of the LaPlatte River, but there was potential for state-listed species including Giant Floater (*Pyganodon grandis*; Threatened), Pocketbook (*Lampsilis ovata*; Endangered), Pink Heelsplitter (*Potamilus alatus*; Endangered), Fragile Papershell (*Leptodea fragilis*; Endangered), Black Sandshell (*Ligumia recta*; Endangered), Cylindrical Papershell (*Anodontoides ferussacianus*; Endangered), and Fluted Shell (*Lasmigona costata*; Endangered). Vermont Railway, Inc. applied for, and received, an *Endangered and Threatened Species Taking Permit* from Vermont Fish and Wildlife; Ethan Nedeau of Biodrawversity LLC was the qualified mussel consultant named as subpermittee. The primary objectives of the proposed study were:

1. Determine if state-listed mussels occur in the area of the LaPlatte River along the parcel that is being developed for the Shelburne Transload Facility, especially near the stormwater discharge.
2. Collect information on population size and habitat quality/availability of state-listed species.

STUDY AREA AND METHODS

Study Area: Approximately 900 meters of the river was assessed/surveyed, from 400 meters downstream to 500 meters upstream of the proposed stormwater discharge (Figure 1). This is a very low-gradient, meandering reach at lake level, and has extensive riparian wetlands that flood or dry with the lake's water level fluctuations. The study reach began approximately ½ mile downstream from the Route 7 bridge, and 600 meters upstream from the Bay Road bridge. The reach was accessed with kayaks, launched from the public access site in Shelburne Bay.

Biologists conducted the survey on July 20 and July 26, 2016. Weather was sunny and warm on both days, with slight wind. The survey was not conducted on two consecutive days because the Town of Shelburne posted a warning about *E. coli* contamination on the morning of the second day, and biologists returned only after this advisory had expired.

The proposed stormwater discharge is through the small channel shown here.

Methods: Qualitative mussel surveys were conducted using a combination of snorkeling, SCUBA diving, visual and tactile searches, and walking/wading along the shoreline. The LaPlatte River was highly turbid, and shallow areas were often densely vegetated and covered with a skim of duckweed, making it difficult to conduct visual surveys. Thus, these multiple survey techniques were necessary to detect mussels. Biologists recorded species present; numbers, shell lengths and shell conditions for state-listed mussels; habitat descriptions; photographs of mussels and habitat, and survey method/duration. The presence of co-occurring native mussel species and non-native molluscs (i.e., zebra mussels) were recorded.

RESULTS

Species Found: Seven native mussel species were found, including three state-endangered species: *Lampsilis ovata*, *Potamilus alatus*, and *Leptodea fragilis* (Figure 1). The four other species included *Elliptio complanata*, *Lampsilis radiata*, *Pyganodon cataracta*, and *Strophitus undulatus*. *E. complanata*, *L. radiata*, and *P. cataracta* were the three most common species; they were found throughout the entire study area. Only one *S. undulatus* was found at the upstream end of the survey area. Zebra mussels were present at low to moderate densities on hard substrates in the lower half of the survey area. Native mussels were fouled with zebra mussels, but at non-lethal, low levels.

Four *L. ovata* were found, including two downstream and two upstream from the proposed discharge. These ranged in length from 65 to 92 mm, exhibited light shell erosion, and were found in depths from 0.13 to 0.45 meters in silt/mud substrate (Table 1).

Ten *P. alatus* were found, including six downstream and four upstream from the proposed discharge. These ranged in length from 103 to 147 mm, exhibited light to moderate shell erosion, and were found in depths from 0.1 to 0.8 meters in silt/mud substrate (Table 1).

Three live and one shell of *L. fragilis* were found, including three downstream and one just upstream from the proposed discharge. These ranged in length from 40 to 105 mm, exhibited light shell erosion, and were found in depths from 0.3 to 1.1 meters in clay and silt substrate (Table 1).

Habitat Assessment: Overall, habitat is characterized as lentic depositional, with clay-mud substrates,

Figure 1. Survey area in the LaPlatte River upstream and downstream from the proposed stormwater discharge of the Shelburne Transload Facility (Shelburne, Vermont), showing locations of the three state-listed mussel species that were found.

dense vegetation and woody debris, and almost no perceptible flow. Very light flow was more evident at the upstream end of the survey area. Water depth exceeded 2.5 meters (~8 ft) in some areas, although some of the deeper areas were poorly surveyed due to zero visibility and accumulations of large woody debris. Few mussels were found in the deeper areas mid-channel, rather, all species were more concentrated near the shoreline in depths less than one meter. Highest mussel densities (all species) were found within or near beds of emergent and submerged vegetation in water depths less than 0.5 meters on gently sloping banks, usually in mud/silt substrates. Steep clay banks were present, but mussels were compara-

Table 1. Summary of locations, shell length and condition, and habitat of each of the 18 live and 1 dead individuals of three state-endangered mussel species found during the survey. See Figure 1 for locations.

Species	From Discharge	Latitude	Longitude	Shell Length (mm)	Shell Condition	Water Depth (m)	Substrate
L. ovata	Upstream	44.390559	-73.231683	92	0.0	0.13	Silt/Mud
L. ovata	Upstream	44.391210	-73.231596	80	0.0	0.13	Silt/Mud
L. ovata	Downstream	44.393995	-73.228306	65	0.0	0.45	Silt/Vegetation
L. ovata	Downstream	44.393334	-73.228554	68	0.0	0.25	Silt/Mud
L. fragilis	Upstream	44.392943	-73.229239	66	0.0	1.10	Silt/Mud
L. fragilis (Shell)	Downstream	44.393478	-73.228357	95	0.0	0.30	Silt/Clay
L. fragilis	Downstream	44.394618	-73.228410	105	0.0	0.30	Clay
L. fragilis	Downstream	44.395068	-73.229472	40	0.0	0.60	Silt/Mud
P. alatus	Downstream	44.393852	-73.228177	103	0.0	0.70	Silt/Clay
P. alatus	Upstream	44.390669	-73.231694	106	0.0	0.20	Silt/Mud
P. alatus	Downstream	44.394099	-73.228248	119	0.5	0.40	Silt/Clay
P. alatus	Upstream	44.392789	-73.230943	121	0.0	0.10	Silt/Mud
P. alatus	Upstream	44.390168	-73.231781	123	0.0	0.15	Silt/Mud
P. alatus	Downstream	44.393889	-73.228176	126	0.0	0.50	Silt/Clay
P. alatus	Upstream	44.391809	-73.231923	138	0.0	0.20	Silt/Mud
P. alatus	Downstream	44.393354	-73.228430	139	0.0	0.80	Silt/Clay
P. alatus	Downstream	44.393850	-73.228180	143	0.0	0.80	Silt/Clay
P. alatus	Downstream	44.393158	-73.228495	147	0.0	0.60	Silt/Mud
P. alatus	Downstream	44.395068	-73.229472	115	0.0	0.50	Silt/Mud

tively less common in clay than they were in mud/silt. Downstream from the discharge point, along the outside bend, there was a very large amount of broken glass and scrap metal in the river and along the bank – evidence of a former upland dump. This bank was not surveyed as well as other areas, due to the combined effects of zero visibility that prevented visual surveys, and large amounts of sharp debris that made tactile searches unsafe.

DISCUSSION

Mussels: The survey documented three state-endangered mussel species both upstream and downstream of the proposed stormwater discharge, and four other mussel species that are not protected in Vermont. Prior to this survey, only *L. ovata* was known to occur in the lower LaPlatte River. All three of the state-endangered species found in the LaPlatte River once occurred more broadly in the Lake Champlain basin but were nearly decimated by zebra mussels, and are primarily now confined to larger tributaries that lack large zebra mussel populations. These species prefer fine-grained sediment (clay, silt, sand) and slow water velocities. They have been found in a broad range of water depths, including very shallow areas (<0.5 meters) within or near submerged aquatic vegetation such as *Elodea* sp. and *Vallisneria* sp. Based on our understanding of the habitat for these three mussel species, nearly all of the lower LaPlatte River within the area we assessed is suitable habitat. Although we found relatively few individuals of these three species, we did document evidence of recruitment by finding juvenile *L. fragilis*, and we found endangered mussels throughout the entire area despite near-zero water clarity, dense vegetation, extensive woody debris, and large amount of broken glass.

Three state-endangered mussel species found in the LaPlatte River: *Lampsilis ovata* (top left), *Potamilus alatus* (top left), adult *Leptodea fragilis* (bottom left), and juvenile *Leptodea fragilis* (bottom right).

From: Ferguson, Mark
Sent: Friday, September 02, 2016 4:21 PM
To: Burke, Kevin
Cc: Carr, Helen; Gjessing, Catherine
Subject: RE: VTR Shelburne Transload

Follow Up Flag: Follow up
Flag Status: Flagged

Helen and Kevin,
Helen and I met August 19 to discuss the proposed VTR Shelburne Transload Facility and information provided by VHB (chloride sensitivity analysis memo, chloride loading analysis, and stormwater pollution prevention plan (SWPPP)). I've since then received the revised chloride analysis.

The chloride loading analysis report cites a study that examined runoff from 292 salt storage facilities in Virginia, which concluded that the observed average chloride concentrations in associated stormwater ponds was 1,600 mg/L. It also notes that these were not covered loading facilities. Results of the current VHB chloride analysis indicate that the Vermont acute chloride criterion would only be exceeded if stormwater discharge were higher than 1,323 mg/L during 7Q10 drought streamflow conditions. Although the VT Railways facility is planned to be covered, this maximum calculated concentration which still meet the acute criterion is lower than the average concentration found in the Virginia stormwater ponds. The VHB analysis reports that, "assuming that the stormwater discharged from the facility would contain chloride concentrations between 100 and 1,000 mg/L, it appears likely that the chloride concentrations in the LaPlatte River as a result of runoff from the Project might range between 82 and 655 mg/L when calculated over the peak one hour of the 0.9-inch WQV storm event and between 52 and 82 mg/L during the 4-day average as the result of the 0.9-inch WQV storm event, in a worst-case scenario in which LaPlatte River streamflows are at 7Q10 drought rates."

I expect that having the Vermont facility storage and handling area covered, and employing Best Management Practices (BMPs) should reduce the level of chloride runoff from what was observed in the Virginia study. Based on the information provided in the VHB chloride loading analysis and SWPPP, and the analysis' expected chloride concentrations in runoff and receiving waters (LaPlatte River), I expect that the operation is not likely to impact stonecats or the three state-endangered mussels (pink heelsplitter, pocketbook, fragile papershell) in the river. This is dependent, however, on concentrations staying within or below the anticipated levels noted above. With limited sensitivity or toxicity information available, however, it should be noted that stonecat, pink heelsplitter, pocketbook, and fragile papershell could be more sensitive to chloride than the chronic and acute concentration criteria allowed by the Vermont Water Quality Standards.

Given the unknown level of salt that may be exposed to runoff, BMPs and their implementation and chloride monitoring of effluent and receiving waters will be necessary to ensure that chloride concentrations stay within or below those provided in the chloride loading analysis. Although chloride monitoring is mentioned in "7.5 Supplemental Monitoring" in the SWPPP, I haven't seen details of this monitoring program. Post-construction water quality monitoring is also mentioned in the Conclusion of the chloride loading analysis report.

To determine whether stonecat could be exposed to potential concentrations of chloride or other pollutants originating from the salt storage/loading facility, it is still necessary for the applicant to conduct a survey for this species in the lower LaPlatte River.

Mark Ferguson
Natural Heritage Zoologist
Vermont Department of Fish & Wildlife
802-279-3422
New email address: mark.ferguson@vermont.gov

From: Burke, Kevin
Sent: Thursday, September 01, 2016 8:11 AM
To: Ferguson, Mark <Mark.Ferguson@vermont.gov>

Cc: Carr, Helen <Helen.Carr@vermont.gov>
Subject: FW: VTR Shelburne Transload

Hi Mark,

See the attached revision to chloride loading analysis.

Thanks,

Kevin

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
STORMWATER PROGRAM

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