

Orwell Highway Department Stormwater Management

Final Design Report

SUBMITTED TO:

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Addison County REGIONAL PLANNING COMMISSION

SUBMITTED BY:

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Disclaimer

The intent of this report is to present the data collected, evaluations, analysis, designs, and cost estimates under a contract between the Addison County Regional Planning Commission (ACRPC) and Watershed Consulting Associates, LLC (Watershed Consulting).

Project Overview

This planning study provides a 30% design for the collection, treatment, and disposal of stormwater runoff from the town's sand and salt storage areas. The Town of Orwell is interested in a long-term solution for managing the runoff and as of the initiation of this project was open to exploring an off-site parcel or investment in a larger salt/sand shed.



Figure 1: Aerial image of the town's sand and salt storage areas.



Background

Problem Definition

In the current state of conditions, stormwater runoff from the sand and salt storage is mixed and transported over an impervious vehicle yard and driving area before running onto adjoining properties (Figure 2). In addition to the negative impacts of sediment and phosphorus loading, excess chloride has notable adverse environmental implications to freshwater ecosystems and can contaminate groundwater, impacting vegetation and drinking water sources.



Figure 2: Direction of existing runoff flow path.

Existing Site Conditions

Orwell's Town Highway Garage and Fire and Rescue Garage are co-located east of the village at 604 Main St. (Vermont Route 73). The garages sit on a three-acre parcel with sand and salt storage uphill to the east. For the purposes of this project, a 1.06-acre secondary parcel was purchased by the town, located to the west of the town garage on the other side of the residential property driveway. These parcels are located within the East Creek Watershed, a direct tributary to Lake Champlain and recognized as part of the Southern Lake Champlain Planning Basin, more commonly referred to as South Lake A. Under the 2016 phosphorus total maximum daily load (TMDL) goals for Lake Champlain, phosphorus reduction goals for South Lake A are set at 55% for all land-uses exclusive of agriculture.

The 5.51-acre drainage area for this project is composed of 1.85 acres of impervious area which includes four existing buildings, exposed sand and gravel piles, and a large vehicle yard. Stormwater derived from the Orwell Town Garage parcel moves across the driveway to the west before entering a 12" culvert located in the state right of way (ROW) near the southwestern corner of the parcel. This culvert brings water into a swale on the edge of the secondary parcel that follows the length of Rte. 73 for approximately 85 meters before dispersing into a wooded area on residential property (Figure 3).





Figure 3: State of existing conditions including (1) swale in ROW, (2) culvert in ROW, and (3) salt shed.

Soil Conditions

An assessment of the soil conditions on site was completed by the evaluation of three soil pits using an excavator and one constant-head permeameter test (i.e. infiltration analysis) (Figure 4). The assessment of the soil pits included the documentation of horizon breaks, soil structure, type, moisture, color, presence, or absence of redoximorphic features, and size and quantity of roots and coarse fragments. All test pits revealed silt and sand loams soils with bedrock and evidence of seasonal high groundwater tables identified at varying depths within the site. The results of the infiltration analysis revealed the secondary parcel to have fair infiltration with a saturated hydraulic conductivity of 0.72 in/hr. A summary of the soil conditions observed in each pit is provided in Appendix A-1.



Figure 4: Excavator digging soil pit (Left) & sandy loam soils identified (Right).



Proposed Stormwater Treatment Practices

A final 30% level design plan is provided in Appendix A-2. A summary of the proposed project design elements is provided here:

- A conveyance system including swales, culverts and catch basins is proposed to intercept the existing drainage from the vehicle yard and neighboring hill.
- A Downstream Defender Swirl Separator is proposed to capture sediment and debris from surface runoff captured by the conveyance system. Details can be found in Appendix A-3.
- A single cell gravel wetland with a stone level spreader overflow is proposed to manage flows up to the 1-inch, 24-hour storm event (Water Quality storm event) from the 1.85 acres drainage area. An optional sediment forebay is included in this design. This design will provide maximum benefit for treating runoff to East Creek and meeting water quality treatment goals including the removal of phosphorus. HydroCAD modeling reports are provided in Appendix A-4.
- Structural improvements to the site are proposed including paving of vehicle yard, addition of a roof over the existing fuel tank, demolition of the existing salt shed and addition of a new pole barn for the storage of sand and salt.

Operations & Maintenance

Once implemented, the project should be maintained for a design life of 20 years. A draft Operations & Maintenance (O&M) guidelines agreement with a checklist for inspection is provided in Appendix A-5. This document will need to be completed & signed by the responsible party & landowner.

- An O&M site plan can be found in Appendix A-6. This plan summarizes the O&M needs of the stormwater-related practices on-site.
- An O&M manual specific to the Downstream Defender Swirl Separator can be found in Appendix A-7. This document has been developed by Hydro International plc and provides additional details relevant to O&M.

Opinion of Probable Cost

As shown in Appendix A-8 Opinion of Probable Costs, the estimated total cost for the completion of the proposed design is \$844,000. The bulk of the project cost is attributed to paving and construction of the enclosed sand/salt storage facility. Materials costs are determined by the Vermont Agency of Transportation 5 Year Averaged Price List (June 2015 – June 2020). Final design and construction engineering fees are applied to the subtotal construction cost in accordance with the State of Vermont Drinking Water State Revolving Fund (DWSRF) Guidance Document Number 9, Engineering Allowance for DWSRF Projects.

Subtotal Construction Cost:	\$704,680	Total Estimated Cost:	\$844,000		
Catch Basins & Pipes:	\$36,542	Construction Engineering (13% of Subtotal): \$89,14			
Paving & Storage Facility:	\$546,605	Final Design (7% of Subtotal):	\$49,328		
Swirl Separator:	\$15,850				
Gravel Wetland:	\$67,229				
Site Preparation:	\$38,453				



Phosphorus Removal

Collectively, these practices will manage all 1.85 acres of impervious surface to the full Water Quality Storm (1.0", 24-hour) standard. This level of treatment surpasses the standard included in the Vermont Stormwater Management Manual (2017 VSMM) for a redeveloped site such as this.

•	Total Estimated Phosphorus Load:	3.79 kg/year
•	Estimated Phosphorus Reduction Efficiency	64.75%
•	Total Estimated Phosphorus Load Reduction	2.46 kg/year
•	Assumed Lifespan of Gravel Wetland:	20 years

Permitting Summary

Erosion and Sediment Control Permitting

The addition of a gravel wetland, new salt and sand storage facility, and repaving will likely result in a total earth disturbance equal to or greater than one acre of land area. As a result, a Construction General Permit (CGP) 3-9020 will be required to manage erosion and sediment during construction. The Vermont Department of Environmental Conservation (DEC) Risk Evaluation and Soils Evaluation Tool was used to determine that this project qualifies as Low Risk. This document can be found in Appendix A-9 Risk Evaluation & Soils Evaluation Tool.

For this low-risk project to apply for coverage under the Construction General Permit, a stormwater Construction Discharge General Permit 3-9020 Notice of Intent must be completed via <u>Vermont ANR Online</u>.

Town of Orwell Zoning Permit

For the construction of the new salt and sand storage facility, a zoning permit provided through the Town of Orwell will need to be completed. A copy of this permit can be found in Appendix A-10.

State Highway Access and Work Permit

For the retrofit of the existing culvert and redirection of flow out of the State of Vermont's right of way (ROW), a State Highway Access and Work Permit will be required. Watershed Consulting spoke with a representative from the state and can confirm this project's capacity to receive this necessary permit which can be found in Appendix A-11.

Floodplain-Floodway

No floodplains or floodways are impacted by the gravel wetland system.

Operational Stormwater

Due to the fact that this parcel does not qualify as a "three-acre site", and the proposed activities are not determined to be jurisdictional redevelopment, no operational stormwater permit will be needed at this time. This was confirmed by a representative from the Vermont DEC as exhibited in Appendix A-12.

Stream Alteration

No streams and stream buffers are impacted by the Project. Proposed project designs will reduce flow and pollutant impact on East Creek.

Wetlands

No wetlands or wetland buffers are delineated on the parent parcel. Therefore, a Wetlands General Permit 3-9026 is not required.

Land Use and Development (Act 250)

No existing Act 250 stormwater permits were identified on either the town garage parcel or the one adjacent to it, both of which are therefore exempt from Act 250.



Project Timeline

Provided below is an outline of the project timeline for the proposed design. This includes a timeline for the development of a final design, construction & permitting, as well as grant application deadlines for potential funding sources. This timeline was developed under the assumption that construction would begin in the summer of 2022.

Funding Sources & Grant Application Deadlines

Grant Name: SFY 2022 Environmental Mitigation Grant Application

Description: The Municipal Highway and Stormwater Mitigation Program provides funding from the federal highway administration for any environmental mitigation activity, including pollution prevention and pollution abatement activities and mitigation to address stormwater management, control, and water pollution prevention or abatement related to highway construction or due to highway runoff. It is an 80% federal/state share with a required 20% local match.

Due Date: October 1st, 2021

Grant Name: Lake Champlain Basin Program Clean Water and Healthy Ecosystems Implementation Grant **Description:** The Lake Champlain Basin Program (LCBP), in coordination with NEIWPCC has made Clean Water – Small Implementation & Large Implementation grants available to projects that will improve water quality and directly result in the reduction of water pollution in the US-portion of the Lake Champlain Basin. **Due Date: October 11th**, **2021**

Grant Name: Building Resilient Infrastructure and Communities (BRIC) Grant Program

Description: The Building Resilient Infrastructure and Communities (BRIC) grant program is an annual FEMA funding program for hazard mitigation. BRIC will support states, local communities, and territories, as they undertake hazard mitigation projects to reduce the risk from natural hazards. Cost sharing for this grant includes 75% federal, 25% local non-federal (cash and/or in-kind) and up to 90% federal share for small, impoverished communities. **Due Date: December 17th, 2021**

Funding Source: American Rescue Plan Local Fiscal Recovery Funding

Description: The State of Vermont Department of Finance and Management has opened a web portal where Vermont municipalities may request their share of \$58,788,245 in American Rescue Plan Local Fiscal Recovery Funding. This funding source has been made available to the Town of Orwell for 2021 and 2022. **Due Date: N/A**

Funding Name: Clean Water State Revolving Fund (CWSRF)

Description: Vermont's CWSRF Program provides funding for Vermont's Clean Water projects in the form of low interest loans to municipalities and private entities for eligible projects. Several types of loans are available. Clean Water SRF recipients are required to follow the Qualifications-Based Selection Process and Request for Qualifications (QBS-RFQ), develop Fiscal Sustainability Plans (FSP), and Cost and Effectiveness Guidelines (C&E). **Due Date: N/A**



Table 1: Project Timeline

Droiget Tack	2021		2022												
Project Task	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Secure Funding															
Submit Permitting															
Applications															
Develop 100% Design															
Demolition of Salt															
Shed															
Paving of Vehicle Yard															
Catch Basins															
Installation															
Swirl Separator															
Installation															
Gravel Wetland															
Construction															
Sand & Salt Shed															
Construction															1