

Stormwater Master Plan for the Town of Pittsford, Vermont

FINAL REPORT

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Appendix A: Stormwater Project Location Map (24"x36")

Appendix B: Problem Area Summary Table and Prioritization Matrix (11"x17" and 8.5"x11")

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1.0 Introduction

In 2022, Fitzgerald Environmental Associates (FEA) was contracted by the Vermont Department of Environmental Conservation (VTDEC) to develop a Stormwater Master Plan (SWMP) for the Town of Pittsford. This final SWMP report for the Town of Pittsford represents significant efforts and collaborations over the last several years between the Town, FEA, VTDEC, and other partners, including private landowners and business owners, interested in mitigating stormwater and improving water quality.

1.1 Stormwater Master Planning

Stormwater runoff is caused by precipitation, both in the form of rain or melting snow/ice, that is not infiltrated into the ground, absorbed by wetlands, or otherwise intercepted by plants. Human alteration of our landscapes in the form of impervious surfaces (i.e., pavement, rooftops, etc.) and compaction of soils disrupts natural hydrology and causes increased stormwater runoff. Increased stormwater runoff leads to higher magnitude flood flows, greater erosive power in stream channels, and increased delivery of sediment, nutrients, and other pollutants to waterways. Increased stormwater runoff is directly linked to the quality of water in our streams, rivers, ponds, and lakes that we depend on for drinking water, healthy fisheries, and recreation.

Stormwater Master Plans (SWMPs) can address stormwater problem areas either by mitigating impacts before they create problems or by avoiding the creation of issues at vulnerable sites. Prevention is cheaper than restoration, and SWMPs aim to address stormwater problem areas primarily through prevention. If we are to avoid the high cost of restoring degraded surface waters, we must better manage stormwater runoff before those waters become impaired. SWMPs are developed with public involvement and comment and should be as comprehensive as possible in listing all known problem areas within the Town. SWMPs are based on a prioritized list of stormwater projects. This strategic approach is more likely to produce long term water quality resiliency than a reactionary approach that addresses problems as they arise. Historically, almost all Vermont municipalities have responded to stormwater runoff or drainage problems the latter way, often during an emergency or after a structural failure has occurred. SWMPs contain important information and recommendations about preserving natural features and functions of watersheds and provide lists of evaluated alternatives such as using traditional pipe (gray) infrastructure versus green stormwater infrastructure.



1.2 Project Goals and Objectives

The purpose of this planning effort is to better manage stormwater runoff to reduce sediment and nutrient pollution to the Otter Creek and Poultney River Watersheds, improve flood resiliency, and reduce the Town's maintenance burden at chronic problem areas.. The primary objectives of this SWMP are to:

- Identify opportunities to incorporate stormwater treatment and/or outfall stabilization at the outfalls of existing closed stormwater conveyance systems.
- Identify opportunities to incorporate green stormwater infrastructure within the Villages of Pittsford and Florence.
- Identify opportunities to improve stormwater management in areas with active erosion and/or poor conveyances.

Project prioritization followed the Unified Scoring Metrics developed by VTDEC (2023) and Non-Unified Scoring Metrics (**Section 4.4**). Conceptual design plans (30% and 10% designs) were prepared for 5 high-priority projects. Phosphorus loading and removal estimates were provided for each project to assist the Town with project implementation prioritization for meeting water quality goals.

2.0 Study Area Description

Pittsford is a 43.6 square mile town located in Rutland County (**Figure 1**). The 90-acre village center spans Sugar Hollow Brook. As of the 2020 census, Pittsford has a total population of 2,862 people (U.S. Census Bureau, 2020). The Town's area is primarily forested and is 6.8% developed (**Table 1**). Pittsford is bordered by 8 Vermont towns (Chittenden, Brandon, Sudbury, Hubbardton, Castleton, West Rutland, Rutland, and Proctor). Most of the roads in Pittsford are municipal and private, with 8.9% of the Town's road length on US Highways (**Table 2**). The Town lies within the Otter Creek and Poultney River watersheds.

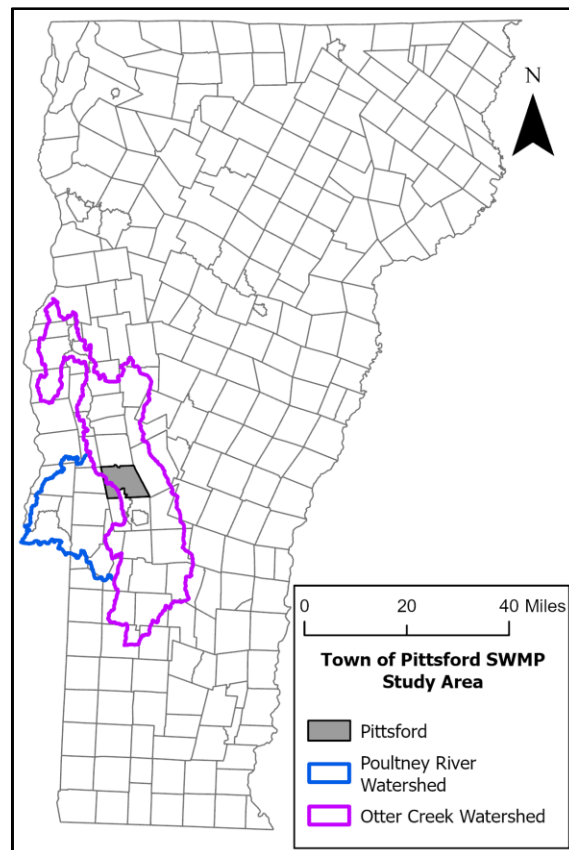


Figure 1: Town of Pittsford and Associated Watershed Location Map



Table 1: Land cover in Pittsford (Dewitz and U.S Geological Survey 2021)

Landcover/Landuse Type	Percent of Town Area
Agriculture	15.0%
Barren	0.5%
Developed	6.8%
Forest	65.5%
Grassland/Herbaceous	0.5%
Open Water	0.6%
Shrub/Scrub	0.6%
Wetland	10.6%

Table 2: Road length by AOT Class in Pittsford (Enhanced 911 Board, 2022)

AOT Class	Description	Length (miles)	Percent of Town Road Length (excluding discontinued)
1	Class 1 Town Highway	-	-
2	Class 2 Town Highway	17.0	20.0%
3	Class 3 Town Highway	36.8	43.3%
4	Class 4 Town Highway	2.55	3.0%
5	State Forest Highway	-	-
6	National Forest Highway	-	-
7	Legal Trail	2.68	3.1%
8 & 9	Private Road	15.5	18.2%
30	Vermont State Highway	2.82	3.3%
40	US Highway	7.58	8.9%
Other	-	0.17	0.2%
96	Discontinued Road	1.42	-



Soil mapping for the Town shows that soils are primarily mapped as C-type (somewhat poorly drained) and D-type (poorly drained). The highest concentration of A-type (well-drained) and B-type soils (somewhat well-drained) is in the southwest portion of the Town (**Table 3**).

Table 3: Summary of town-wide soil drainage (VCGI, 2022).

Soil Hydrogroup	Area (acres)	Percent of Town Area
A	4,066	17.5%
B	1,628	7.0%
C	10,127	43.6%
D	7,131	30.7%
Not Rated	100	0.4%
Water	202	0.9%

3.0 Stormwater Management Planning Library

3.1 Mapping Data

VTDEC Municipal Roads Program

A Road Erosion Inventory (REI) for the Town of Pittsford was conducted by the Rutland Regional Planning Commission (RRPC) in 2017. The REI was developed for municipalities to fulfill requirements of the VTDEC Municipal Roads General Permit (MRGP). In this inventory, roads are divided into 100-meter (328 ft) segments with unique identification numbers. The segments deemed hydrologically connected to surface waters (rivers, lakes, wetlands, etc.) are assessed in the field and given a road erosion score. This score is determined from characteristics of the roadway and of the stormwater drainage features associated with it (crown, berm, ditch, conveyance stability, culverts, etc). Each segment is classified as “Fully Meets”, “Partially Meets”, or “Does Not Meet”, to reflect the current level of conformance with the MRGP standards. Of the 894 hydrologically connected segments inventoried in Pittsford, 16 (1.8%) did not meet MRGP standards and 88 (9.8%) partially met MRGP standards ([link](#)). Roads in the Town with segments that did not meet or partially met MRGP standards included Sugar Hollow Road, Furnace Road, and Hitchcock Road, among others. The MRGP specifies a timeline for bringing all road segments up to standards. High priority segments identified in the REI are potentially important opportunities to reduce erosion and sediment loading to receiving waters.

Light Detection and Ranging (LiDAR)

LiDAR returns for Pittsford were collected in a series of flights conducted during 2013 as part of the VT LiDAR Initiative. These data meet the National Digital Elevation Program Quality Level 2 specifications for accuracy satisfactory for generation of a 0.7-meter Digital Elevation Model (DEM) and 1-foot contours. Derivations of LiDAR data, such as Digital Elevation Models (DEMs), terrain models, and contours are useful tools for stormwater feature identification and site design. The 0.7-meter DEM can assist in culvert watershed delineation and the design of stormwater management projects. Terrain models can assist in remote identification of erosion features, such as stormwater gullies.



Municipal Bridge and Culvert Data

Culvert and bridge data collected by the Rutland Regional Planning Commission for Town roads in Pittsford are available online (<https://vtculverts.org/>). The dataset includes the structure dimensions and overall conditions but does not include the presence/absence of erosion. While most culverts were rated as good or excellent (74%), a few were rated as poor or fair (23%). Six (6) were rated as critical. The culvert data were reviewed to refine the selection of non-stream culverts focused on during field surveys.

Town of Pittsford Stormwater Infrastructure Mapping Project

This dataset was produced by the Vermont Agency of Natural Resources (VTANR) in 2012. The Stormwater Mapping Project documents the connectivity of stormwater infrastructure on private and public land within the Town of Pittsford. These data show the paths of stormwater from different areas of impervious surface (**Figure 2**). The associated report identifies one high priority site for improvement (adjacent to the Fire Department). One potential retrofit project was identified in this study.



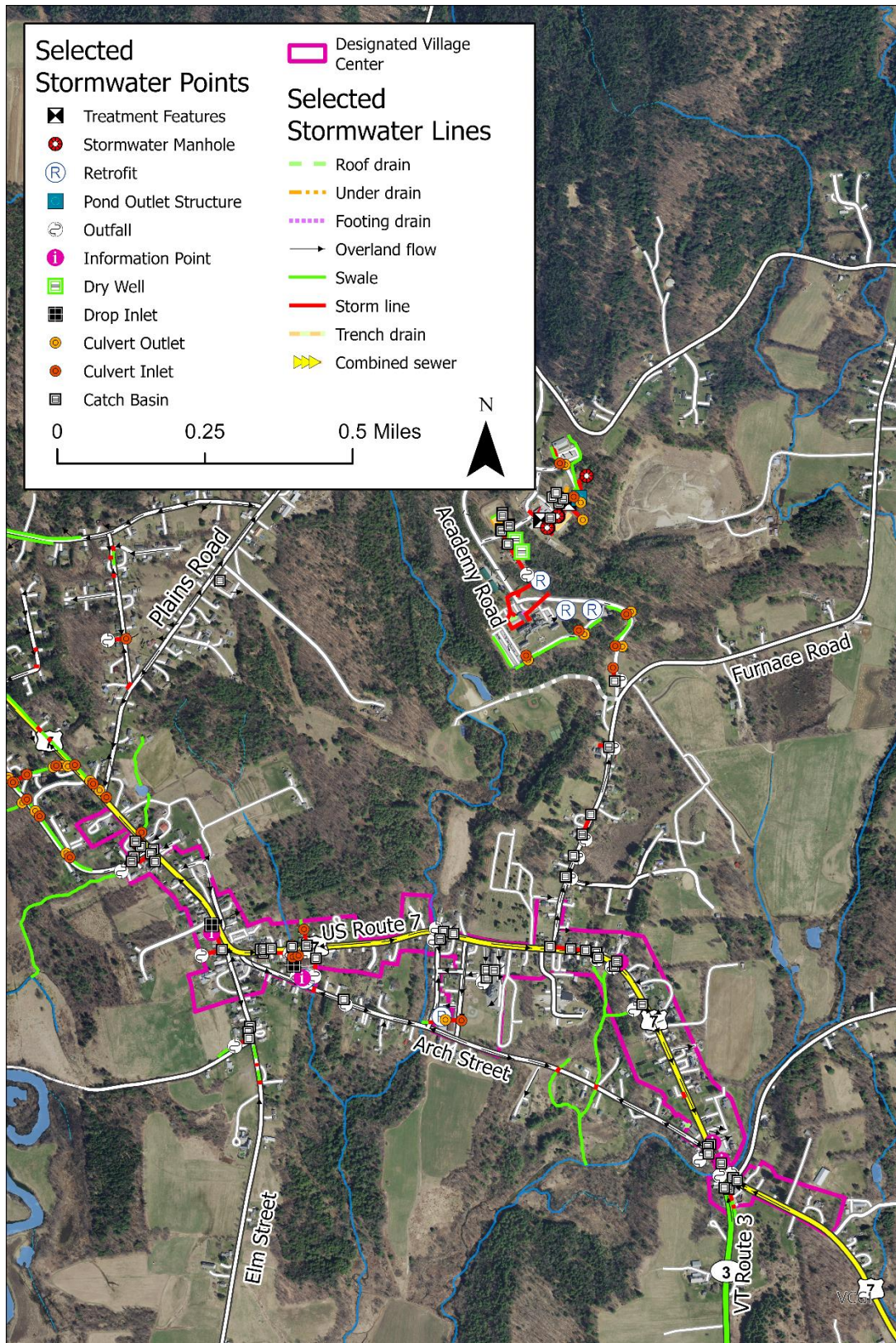


Figure 2: Pittsford Stormwater Infrastructure Map



Natural Resources Conservation Service (NRCS) Soils Survey

The NRCS soils survey dataset is valuable for stormwater master planning (websoilsurvey.sc.egov.usda.gov). As part of our initial scoping, we screened problem areas based on the NRCS hydrologic soil groupings (HSG). The HSGs indicate the infiltration potential of the native soil type, which is useful for identifying areas of excessive runoff potential (e.g., HSG D-type) or good infiltration (e.g., HSG A-type) where stormwater infiltration practices should be explored.

Flood Hazard Mapping

The FEMA DFIRM flood hazard dataset categorizes areas based on flooding potential. This dataset can inform planning based on areas where high flow volumes will occur during major storm events. This dataset can also be used to inform BMP designs and locations. BMPs proposed for locations upgradient of areas that are at high risk of flooding may have the potential to reduce downstream flooding and erosion issues. Prioritization of sites was informed by flood hazard potentials to mitigate flood damage within the Village center.

River Corridor Mapping

River corridor maps were produced by the Vermont Agency of Natural Resources. These data display both the river channel and the active corridor through which a river can be expected to meander over time. This mapping can inform stormwater mitigation efforts by indicating where rivers and streams might flow during flood events. This dataset also identifies areas where the river channel has been altered or confined. These problem areas are often prone to erosion and flooding.

3.2 Watershed Planning

Basin 3 Tactical Plan

The Tactical Basin Plan for Basin 3 was prepared by the Vermont Agency of Natural Resources in 2019. Basin 3 includes the Otter Creek, Little Otter Creek, and Lewis Creek watersheds. All three of these watersheds drain directly to Lake Champlain. Roughly 60% of the basin is forested with 21% agriculture, 21% wetlands, and 2% development. Within this Tactical Basin, Pittsford is located within the East Creek and Furnace Brook watersheds, both of which are tributaries of Otter Creek. Near Pittsford, the East Creek watershed is most heavily impacted by flow modification caused by dams. There is no data available about stressed and impaired waters in the Furnace Brook watershed. Potential projects mentioned in the Tactical Basin Plan of relevance to Pittsford include developing stormwater master reports or plans, reissuing permits to wastewater treatment facilities that meet phosphorus limits, and identifying high priority sites for wetland restoration.



South Lake Champlain Tactical Basin Plan

The Tactical Basin Plan for South Lake Champlain was prepared by the Vermont Agency of Natural Resources in 2017. The South Lake Champlain Basin includes Lower Champlain Direct, East Creek, the Poultney River, the Mettawee River, and the Castleton River. Within this Tactical Basin, Pittsford is in the Castleton River watershed. The Castleton River is most heavily impacted by pathogens from combined sewer overflows and high pH. Potential projects mentioned in the Tactical Basin Plan of relevance to the Castleton River include identifying potential dam removal sites, completing priority river corridor easement projects, and continuing buffer plantings in priority locations.

Basin 3 IDDE Report

The Illicit Discharge Detection and Elimination (IDDE) report for Basin 3 was produced by Stone Environmental for VTDEC in 2014. The study investigated discharges in 6 towns. Researchers collected water samples at outfalls and junctions in stormwater systems and tested them for chemical and biological pollutants. During surveys in 2012, no confirmed or suspected illicit discharges were identified in Pittsford. Any sites where stormwater and wastewater may be comingling are high priorities for the SWMP.

Basin 2 Water Quality and Aquatic Habitat Assessment Report

This report on water quality in Basin 2 (Poultney-Mettowee watershed) was produced in January 2013 by the Vermont Agency of Natural Resources Water Quality Division. The study included monitoring for biological contaminants and E. coli as well as physical condition monitoring and identification of hazardous waste sites and old landfills. None of these stressors were identified in Pittsford. No sampling was conducted in Pittsford. Within the Castleton River, the biological health for macroinvertebrates was generally very good to excellent. Most sites on the Castleton River included in the report were above the standards for E. coli levels.

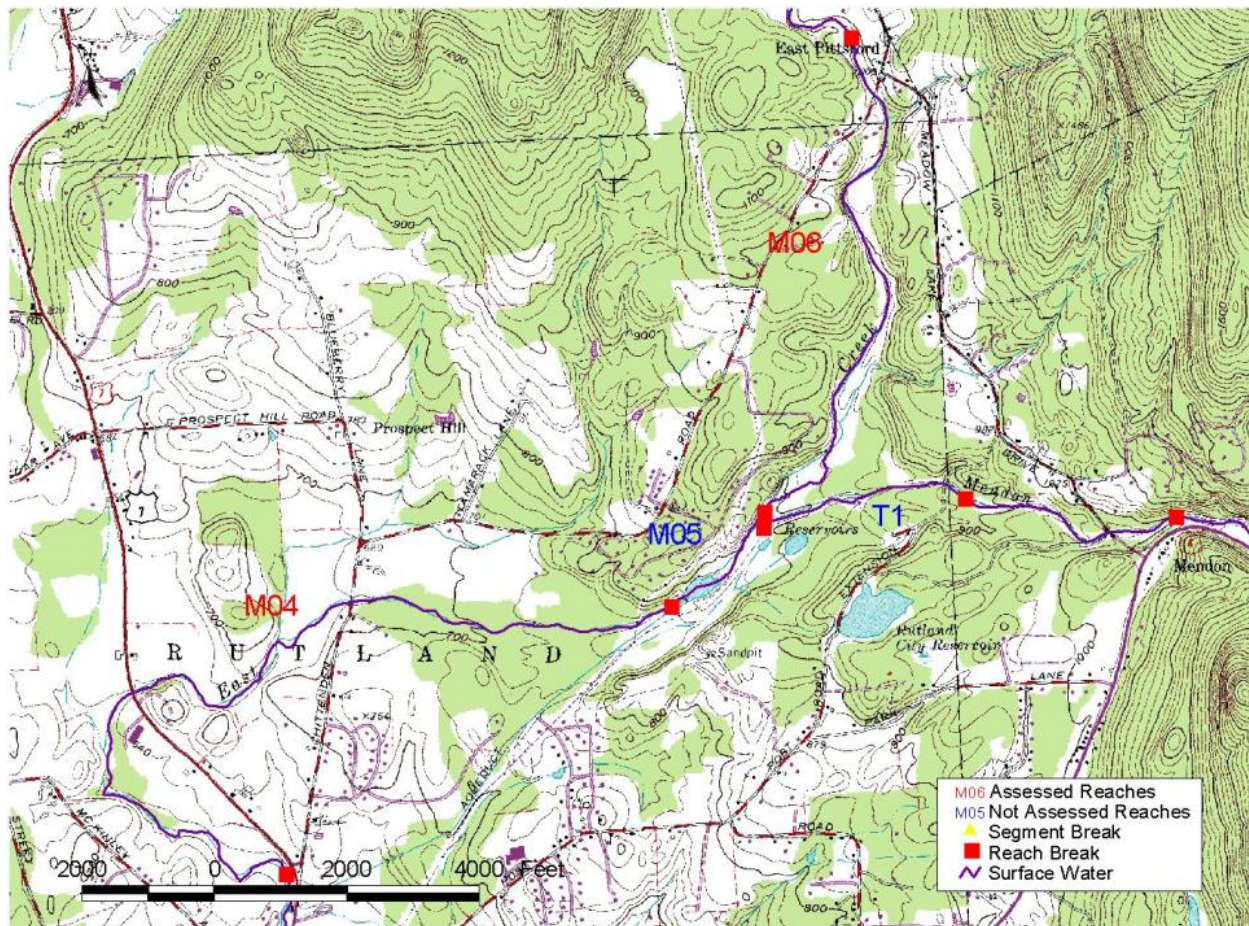
Phase 2 Stream Geomorphic Assessment of the East Creek Watershed

The RRPC conducted a Phase 2 Stream Geomorphic Assessment of selected reaches on the East Creek mainstem in 2006. Major problems in these reaches included human-caused channel constriction and localized instances of encroachment and erosion. Channel straightening, berming, and stream bank armoring have all brought the East Creek channel away from its natural geomorphology and caused increased risk of damage and erosion during high flow events. Some general information about each reach is summarized in **Table 4**. The locations of these reaches are shown in **Figures 3a and 3b**.



Table 4: Summary of Phase 2 Reaches in Pittsford

Stream	Reach	Existing Stream Type	Confinement Type	Habitat Condition	Geomorphic Condition
East Creek	M08	-	Very Broad	-	-
	M06	C	Very Broad	Good	Fair

**Figure 3a:** Map of Reach M06 (The Johnson Company 2007)

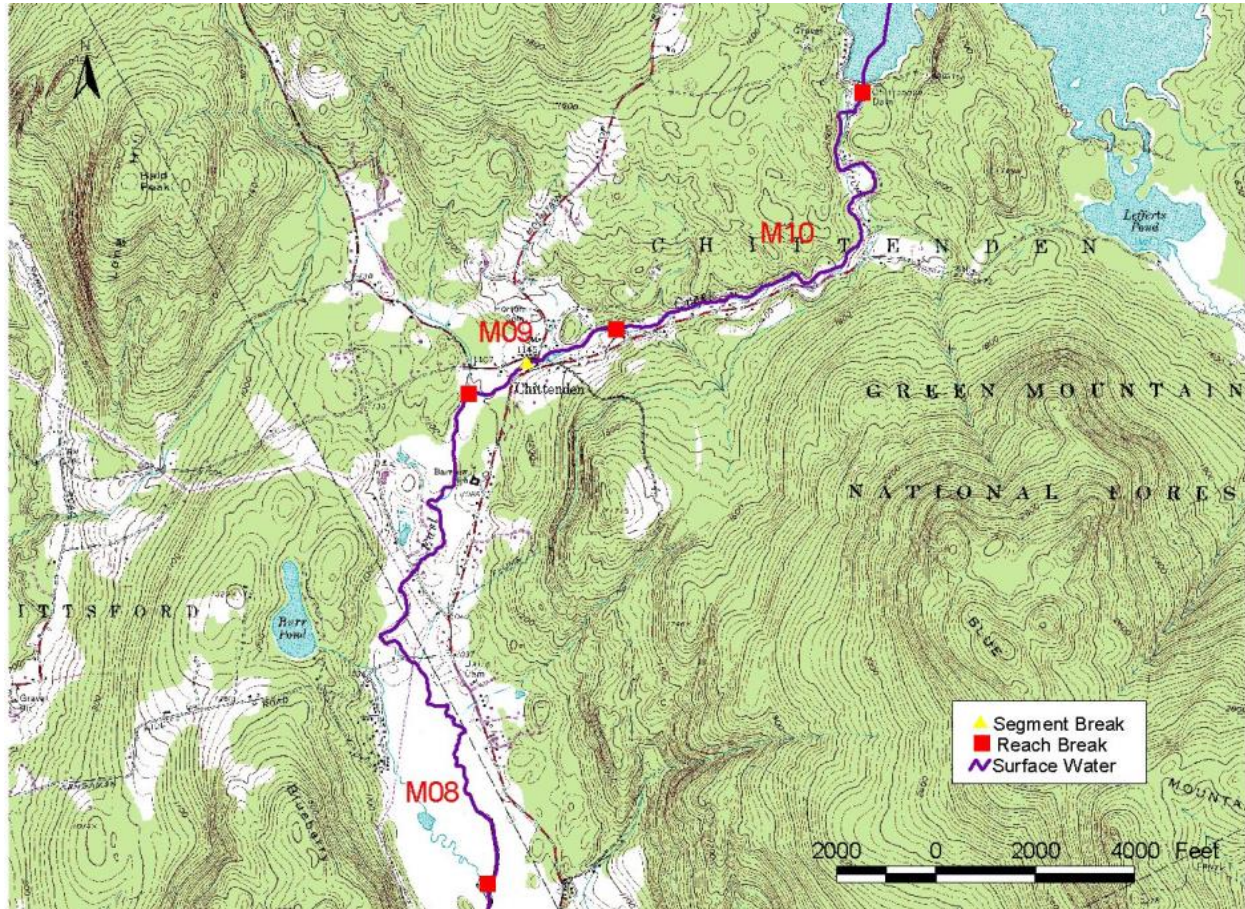


Figure 3b: Map of Reach M08 (The Johnson Company 2007)

Upper Otter Creek Phase 2 Geomorphic Assessment

The RRPC conducted a Phase 2 Stream Geomorphic Assessment of selected reaches on the Upper Otter Creek mainstem and in 2006 and 2008. Major problems in these reaches included human-caused channel and valley constriction and insufficiently large riparian buffers. Channel straightening, berming, and stream bank armoring have all brought the Otter Creek channel away from its natural geomorphology and caused increased risk of damage and erosion during high flow events. Some general information about each reach is summarized in **Table 5**. The locations of these reaches are shown in **Figure 4**.

Table 5: Summary of Phase 2 Reaches in Pittsford

Stream	Reach	Existing Stream Type	Confinement Type	Stream Sensitivity	Geomorphic Condition
Upper Otter Creek	M18	F	Unconfined	High	Good
	M19A	E	-	Very Low	Reference



Upper Otter Creek Study Area: Phase 2 Study Reaches (Downstream)

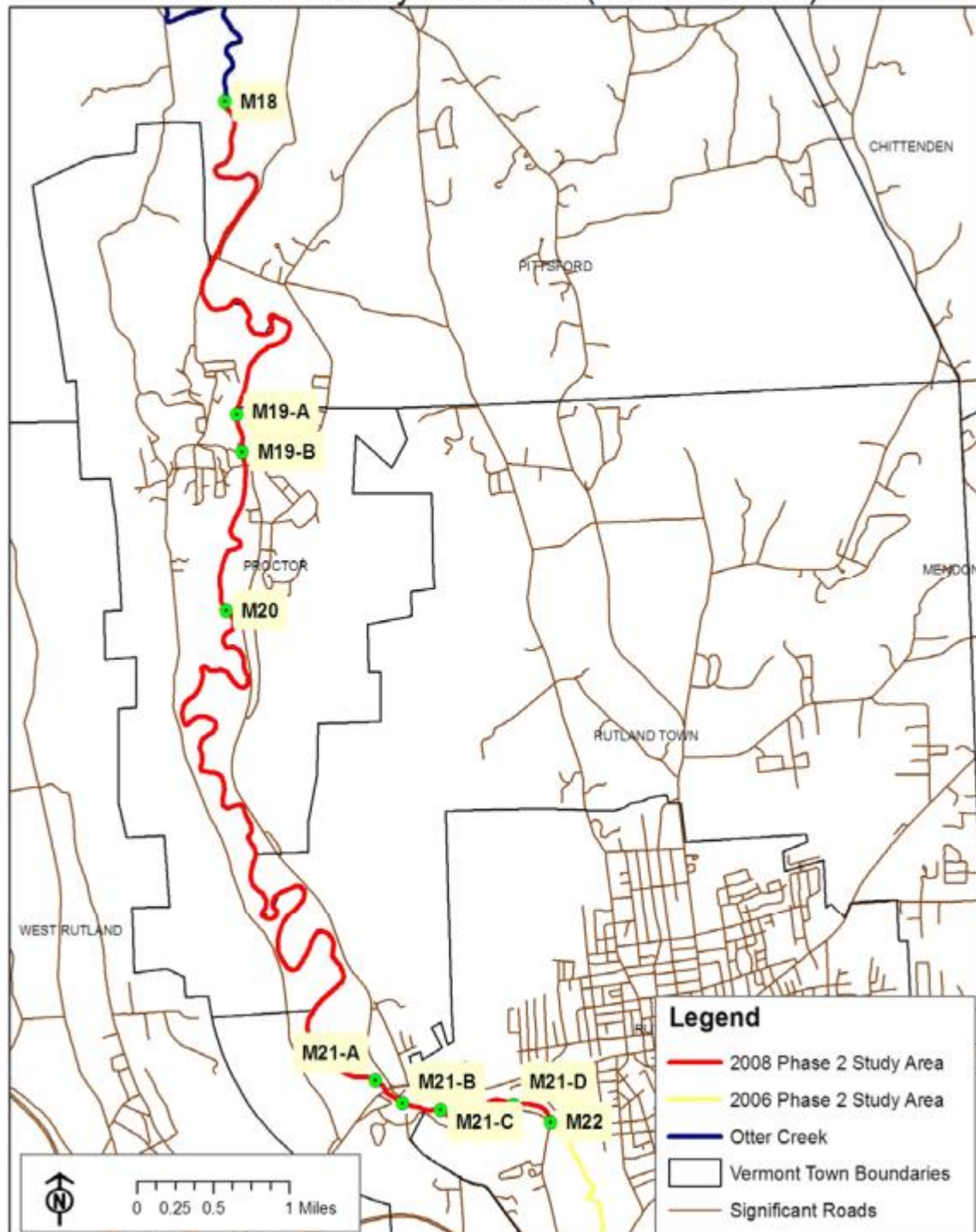


Figure 4: Map of Phase 2 Reaches in Pittsford (Round River Design 2009)



3.3 Town Planning and Permitting

Pittsford Town Plan

The Pittsford Town Plan was adopted by the Town in February 2018 and was developed by the Pittsford Planning Commission. This plan aims to “balance the wide range of competing interests and demands found in the town, to coordinate the pattern of development, the use of important natural resources, and to address both current and long-term needs.” The plan emphasizes protecting high-elevation land while developing more commercial opportunities. There are a total of 48 structures present in floodplains in Pittsford. The town is susceptible to flooding and FEMA flood hazard mapping helped to inform SWMP project selection to address flood risk and minimize damage.

Pittsford Local Hazard Mitigation Plan

This document was prepared by the Pittsford Hazard Mitigation Planning Team with technical assistance from the RRPC and adopted in 2021. The purpose of this plan is to identify natural hazards that are more likely to occur, assess their impacts on the community, and generate a list of strategies and actions to reduce the impacts. Of the hazards assessed, flash flooding/fluviat erosion was found to be one of the hazards to which Pittsford is most susceptible. High priority actions and mitigation strategies associated with flash flooding/fluviat erosion include removing berms, stabilizing stream banks, and establishing vegetative buffers in riparian areas.

Pittsford Zoning Regulations

This document was created by the Town of Pittsford and adopted in 2019. It contains provisions to promote the development of the Town in a way that minimizes potential damages from future flood events and water quality impacts. It limits development in mapped floodway areas. These guidelines helped to inform site selection for the SWMP. Development of BMPs in safer areas should be prioritized over those in flood-prone areas.

3.4 Data Gaps

The data sources and information describing stormwater and watershed management in the Town of Pittsford are thorough and primarily up to date. The stormwater infrastructure mapping was completed in 2012 and no discrepancies in the drainage mapping were found over the course of our field work.

4.0 Stormwater Problem Areas

One of the primary objectives of this SWMP is to "develop a comprehensive list of stormwater problems" within the Town of Pittsford. FEA staff made several field visits to the project area and hosted meetings with the Town to identify existing problem areas, evaluate and prioritize sites, and recommend potential solutions.

4.1 Identification of Problem Areas

The initial round of problem area identification began with the identification of stormwater related projects using a desktop exercise scanning the watershed with aerial imagery, NRCS soils data, Town stormwater infrastructure mapping, contour data, and road erosion inventory results in GIS. Potential



project areas were identified and mapped for review during site visits. A total of 22 stormwater problem areas were identified and assessed in the field (see map in Appendix A and table in Appendix B). We grouped the problem areas into four project categories described below.

- **Green Stormwater Infrastructure (GSI) Installation/Retrofit (9)** – Opportunity to reduce sediment and nutrient loads through the installation of a new stormwater best management practice (BMP). Also includes sites where nutrient and sediment reductions could be improved through the retrofit of existing stormwater BMPs .
- **Gully Stabilization (8)** – Areas of severe erosion from concentrated stormwater runoff.
- **Road Erosion Mitigation (3)** – Areas of high sediment and nutrient loading due to road, embankment, and ditch erosion.
- **Stream Restoration (2)** – Problem areas where stream bank or bed erosion is a significant nutrient and sediment source.

4.2 Evaluation and Prioritization of Problem Areas

The 9 GSI projects described in the Unified Prioritization Project Table (Appendix B) were prioritized based on the potential for each project to improve water quality and reduce environmental impact, project feasibility, and co-benefits. Estimated project cost and the phosphorus removal efficiency (\$/lb of P) were included. We followed the methods described in the “Unified Scoring Prioritization for Stormwater Master Plans” document developed by VTDEC (2023). These methods include a total of 19 criteria divided into 3 categories. The final score is expressed as a percentage of the maximum score (50 points). The final project scores ranged from 28% to 64%. Additional information about the unified prioritization methods can be found in **Section 4.3** and **Table 6**.

The 13 non-GSI projects described in the Non-Unified Prioritization Project Table (Appendix B) were assigned several numerical scoring metrics that were weighted to assist in prioritizing each project based on water quality benefits, project feasibility, maintenance requirements, costs, and any additional benefits. The maximum possible score is 30 and the individual site scores ranged from 13 to 22. Additional information about the non-unified prioritization methods can be found in **Section 4.4**.



Table 6: Unified scoring prioritization for Stormwater Master Plans, developed by VTDEC (2023).

Criteria	Proposed Weight	Max points
Water Quality/Environmental impact		
Sediment reduction (using STP calculator for sediment) (not yet developed)	0-4 (natural groupings within the range of sediment reductions for proposed projects for a specific plan. 0=very low reduction, 4= very high sediment reduction)	4
Phosphorus/nutrient reduction (using STP Calculator)	0-4 (natural groupings within the range of phosphorus reductions for proposed projects for a specific plan. 0=very low p reduction, 4= very high P reduction)	4
Impervious area managed	1-4 (natural groupings within the range of impervious surface managed for proposed projects for a specific plan. More impervious treated gets more points)	4
Percent of Water Quality & Channel Protection Volume treated*	0-3 (0= no WQ treated, 1= ½ WQV treated, 2=meeting WQV, 3=meets WQV and CPV). Do not apply to road projects.	3
Percent of Recharge criteria met *	0-3 (0 = no infiltration, 1 =infiltrates less than recharge volume, 2= meets full recharge, 3= exceeds recharge 1.5 times or more) Do not apply to road projects.	3
Streambank or other gully erosion mitigation	0-2 (calculate volume= Length x avg. width x avg. depth, use natural groupings to divide volume into 3 categories)	2
Green infrastructure opportunity	0-1 (0=no, 1=yes)	1
* WQV, CPV and Recharge criteria as outlined in 2017 Vermont Stormwater Management Manual		
Total Water Quality Score (out of 21, or 15 if road project)		
Feasibility Criteria		
Public land or Private Landowner support	0-3 (3=public land, 2=willing private land owner, 0=unwilling or unknown willingness of private landowner)	3
Project and Permitting complexity (number of permits required)	0-2 (2= simple permitting, 0= complex permitting-potential denial)	2
Infrastructure conflicts	1 (Y= 0, N=1)	1
Total Estimated Project Cost)	Enter engineering estimate+ construction estimate (no points)	
Project efficiency (\$/lbs. of P removed)	1-12 (Use natural grouping of \$/lbs. removed)	12
Ease of O&M and ease of access for O&M	0-2 (based on municipal input on what is easiest to maintain, 0=high maintenance, 2=easy maintenance)	2
Total Feasibility Score (out of 20)		
Other considerations/Co-benefits (0=doesn't address concern, 1=addresses concern)		
Educational benefits and or Recreational benefits	1	1
Natural habitat creation/protection	1	1
Infrastructure improvement (culvert replacement)	1	1
Outfall erosion control	1	1
Connected to receiving water	3=all runoff infiltrates on site, 2= runoff receives some treatment before reaching receiving water. 1=runoff drains via infrastructure directly to receiving water with no erosion or additional pollutant loading, 0 =runoff drains directly to receiving water	3
Flood mitigation (known problem)	1	1
Existing local concerns	1	1
Total Co-benefits Score (out of 9)		
Overall Score (out of 50 or 44)		



GIS-Based Site Screening

Using the field data points collected with sub-meter GPS during our watershed tours, we evaluated key characteristics for each site indicating the potential for increased stormwater runoff and pollutant loading, among several other factors described below. These GIS-based observations, along with field-based observations of site characteristics, are summarized in the project prioritization table (Appendix B).

The following geospatial data were reviewed and evaluated as part of the GIS-based screening:

- **Subwatershed Mapping** – The contributing drainage area to each problem area was mapped based on field observations and 1-foot contours derived from the 0.7-meter 2013 LiDAR elevation surface.
- **Aerial Photography** – We used the 0.6 m imagery collected in 2021 to review the site land cover characteristics (i.e., forest, grass, impervious).
- **Impervious Surfaces Data** – We used the 2016 statewide high-resolution impervious surfaces data layer developed by the UVM Spatial Analysis Lab.
- **Stormwater Infrastructure** – We used the Stormwater Infrastructure Mapping Project data collected in 2012 with detailed mapping of stormwater infrastructure throughout the Town.
- **NRCS Soils** – We used the VT Soils data to evaluate the inherent runoff and erosion potential of native soil types (i.e., hydrologic soil group, erodible land class). For project sites with potential for green stormwater infrastructure (GSI), we assessed the general runoff characteristics of the drainage area based on hydrologic soil group (HSG).
- **Parcel Data** – We used the parcel data available through VCGI to scope the limits of potential projects based on approximate parcel boundaries and road right-of-way.
- **VTDEC Hydrologically Collected Road Segment Data** – We used a statewide inventory of road erosion risk and hydrologic connectivity of road segments to prioritize areas of potential sediment loading to visit for field surveys.

4.3 Unified Matrix Evaluation and Prioritization of Problem Areas

The 9 projects described in the Unified Prioritization Project Table (Appendix B) were prioritized using the methods described in **Table 6**. Methods for determining project costs are described below. Estimated project cost and the phosphorus removal efficiency (\$/lb of P) were included. We followed the Unified Scoring Prioritization for Stormwater Master Plans document developed by VTDEC, with an adjustment to the phosphorus loading and phosphorus reduction criteria (VTDEC, 2018). This method includes a total of 19 criteria divided into 3 categories.

Phosphorus Loads from Sediment

Land cover-based phosphorus loading estimates account for generalized assumptions of sediment mobilization; however, we believe that phosphorus loading from active erosion areas may be underestimated for some of the stormwater problem areas. Other project types such as stream bank restoration or gully stabilization do not fit into the VTDEC Unified Scoring framework. We followed the VTDEC Standard Operating Procedure (SOP) for tracking and accounting of phosphorus associated with the Municipal Roads General Permit (MRGP) to estimate phosphorus loading and reduction associated with road improvements and erosion stabilization (VTDEC 2020).



For estimating the overall phosphorus loading and phosphorus reduction associated with excess sediment mobilization and stabilization, we used methods and loading rates established for the stabilization of roadside gully erosion in the VTDEC SOP. We estimate annual soil loss (in cubic feet) based on our best professional estimate of the age and volume of erosion features. We apply a 43.38 kg/ft³ sediment bulk density to volume of erosion and 0.000396 kg (P)/ kg sediment (TSS), the equivalent of an annual loading rate of 0.017 kg (P)/ft³ and 0.037 kg (P)/ft³ (VTDEC 2020).

BMP Unit Costs and Adjustment Factors

BMP unit costs (**Table 7**) and adjustment factors (**Table 8**) were derived from research completed by the Charles River Watershed Association and the Center for Watershed Protection (EPA, 2016), as well as updates based on actual construction costs in Vermont compiled by FEA and other consultants. The unit cost estimates include a 28% total inflation adjustment for 2017-2023 based on the Consumer Price Indicator Inflation Calculator. Unit construction costs for road drainage projects were based on the estimates provided in the Road Erosion Site Prioritization and Remediation Project Summary (Fitzgerald Environmental Associates and Milone and MacBroom, Inc., 2017). Additional multipliers for site type (**Table 8**) and level of permitting and engineering required (**Table 9**) are also shown below.



Table 7: BMP Unit Costs (\$)

BMP Type	Cost/ft³ Treatment Volume
Constructed Wetland	\$11.26
Dry Pond	\$5.77
Grass Conveyance Swale	\$5.13
Rain Garden (no underdrain)	\$19.83
Rain Garden (with underdrain)	\$19.83
Subsurface Infiltration	\$8.02
Surface Infiltration	\$8.00
Wet Pond	\$8.72
Swirl Separator (small)	Lump Sum: \$20,000
Swirl Separator (medium)	Lump Sum: \$40,000
Swirl Separator (large)	Lump Sum: \$60,000

Table 8: Site Type Cost Adjustment

Site Type	Cost Multiplier
Existing BMP retrofit	0.25
Complicated retrofit	0.75
New BMP in undeveloped area	1.00
New BMP in partially developed area	1.50
New BMP in developed area	2.00

Table 9: Permitting and Engineer (P&E) Cost Adjustment

Level of P&E Required	Cost Multiplier
None	1.00
Low	1.20
Moderate	1.25
High	1.35



4.4 Non-Unified Evaluation and Prioritization of Problem Areas

FEA hosted a meeting with the Town in April 2024 to discuss project prioritization and selection of 5 projects for conceptual design development. Five (5) projects were selected at this meeting for concept designs. FEA developed five 30% conceptual designs along with preliminary cost estimates. Concept designs include:

- A site plan with contours, existing stormwater infrastructure, and proposed design elements
- Where relevant, hydrologic and hydraulic modeling data of the contributing drainage area and proposed BMP sizing and design specifications
- Typical details for proposed practices
- A preliminary cost opinion (not included in 10% designs)
- **Water Quality Benefits (15 points total)**
 - **Nutrient Reduction Effectiveness (4 points)** – Degree of nutrient removal potential with project implementation, this accounts for both the existing nutrient loads and the removal efficiency and capacity of the proposed treatment. Nutrient loading was quantified based on the watershed size, the land cover types, and percent impervious surfaces. The effectiveness was based on the treatment efficacy of the potential mitigation options appropriate for the space and location of the treatment area.
 - 0 points – No nutrient source and/or no increased treatment
 - 1 point – Minor nutrient source and/or minor increase in treatment
 - 2 points – Moderate nutrient source with some increase in treatment
 - 3 points – Moderate nutrient source with significant increase in treatment
 - 4 points – Major nutrient source with significant increase in treatment
 - **Sediment Reduction Effectiveness (4 points)** – Degree of sediment removal potential with project implementation, this accounts for both the existing sediment loads and the removal efficiency and capacity of the proposed treatment. Sediment loading was quantified based on the watershed size, the land cover types, and percent impervious surfaces, and the effectiveness was based on the treatment efficacy of the potential mitigation options appropriate for the space and location of the treatment area.
 - 0 points – No sediment source and/or no increased treatment
 - 1 point – Minor sediment source and/or minor increase in treatment
 - 2 points – Moderate sediment source with some increase in treatment
 - 3 points – Moderate sediment source with significant increase in treatment
 - 4 points – Major sediment source with significant increase in treatment
 - **Drainage Area (1 point)** – Approximate drainage area to site is greater than 2 acres
 - **Impervious Drainage (3 points)** – Approximate area of impervious surfaces draining to the site.
 - 0 points – Area of impervious surfaces is less than 0.25 acres
 - 1 point – Area of impervious surfaces is 0.25-0.5 acres
 - 2 points – Area of impervious surfaces is 0.5-1.0 acres
 - 3 points – Area of impervious surfaces is >1.0 acres



- **Connectivity to Surface Waters (3 points)**
 - 0 points – All stormwater infiltrates on site
 - 1 point – Stormwater receives some treatment before reaching receiving waters
 - 2 points – Stormwater drains into drainage infrastructure that directly outlets to receiving waters (assumes no erosion or additional pollutant loading to discharge point)
 - 3 points – Stormwater drains directly into receiving waters (typically stormwater draining directly into a large wetland is assigned 2 points)
- **Landowner Support (2 points)**
 - 0 points – Project is located on private property, no contact with landowner
 - 1 point – Project is on Town or State property with no contact
 - 2 points – Project has been discussed and is supported by landowner
- **Operation and Maintenance Requirements (2 points)**
 - 0 points – Project will require significant increased maintenance effort
 - 1 point – Project will require some increased maintenance effort
 - 2 points – Project will require no additional maintenance effort
- **Cost and Constructability (6 points)** – This score is based on the overall project cost (low score for high cost) and accounts for additional design, permitting requirements, and implementation considerations, such as site constraints and utilities, prior to project implementation.
- **Additional Benefits (5 points total)** – Description of other project benefits, total score is roughly a count of the number of additional benefits. Additional benefits considered in the prioritization are as follows:
 - **(1) Chronic Problem Area** – The site requires frequent maintenance and/or is an ongoing problem affecting water quality
 - **(2) Seasonal Flooding** – The site is affected by or contributes to seasonal flooding
 - **(3) Educational** – The site provides an opportunity to educate the public about stormwater treatment practices
 - **(4) High Visibility** – The site is highly visible and will benefit from aesthetically designed treatment practices
 - **(5) Infrastructure Conflicts** – The stormwater problem area is increasing erosion or inundation vulnerability of adjacent infrastructure (i.e. roads, buildings, etc.)
 - **(6) Drains to Connected Stormwater Infrastructure** – The site drains into a larger stormwater conveyance system that is less likely to receive downstream treatment
 - **(7) Reduces Thermal Pollution** – Project implementation will reduce the risk of thermal loading from runoff to receiving surface waters
 - **(8) Improves BMP Performance** – Project implementation will improve the performance of existing stormwater treatment practices that receive runoff from the site
 - **(9) Peak Flow Reduction** – Project implementation will significantly reduce stormwater peak flows leaving the site
 - **(10) Enhances Lakeshore Natural Communities** – Project implementation will promote a native vegetated lakeshore buffer and/or provide wildlife habitat along the lakeshore



4.5 Conceptual Designs

FEA hosted a meeting with the Town and VTDEC in April 2024 to discuss project prioritization and selection of 5 projects for conceptual design development. Five (5) projects were selected at this meeting for concept designs. FEA developed four 30% conceptual designs and one 10% conceptual design along with preliminary cost estimates. Concept designs include:

- A site plan with contours, existing stormwater infrastructure, and proposed design elements
- Where relevant, hydrologic and hydraulic modeling data of the contributing drainage area and proposed BMP sizing and design specifications
- Typical details for proposed practices
- A preliminary cost opinion (not included in 10% designs)

The projects selected for conceptual design were:

1. **Project PIT-05 – US Route 7 Fish and Wildlife Parking Area (30%)**

Problems Identified: The gravel drive and parking area are eroding and draining into the wetland. The outfall is in good condition.

Proposed Best Management Practices: Vegetated Swale and Bioretention Basin with Pretreatment Sediment Forebay

Estimated Cost Effectiveness: \$40,000-\$50,000/kg P/year

2. **Project PIT-07/PIT-08 – Arch Street Apartment Building (30%)**

Problems Identified: A stormwater pipe daylights through a culvert into an incised channel with active erosion and down cutting in the front lawn of the apartment building. Just east of this incised channel, there is a short area of gully erosion from the pipe outlet to the inlet of the road culvert.

Proposed Best Management Practices: Flood Bench Cuts and Roughness Elements in the Stream, Gully Stabilization with Stone

Estimated Cost Effectiveness: \$40,000-\$50,000/kg P/year

3. **Project PIT-9 – Arch Street (30%)**

Problems Identified: A storm pipe continues to the west to a large gully at the stream crossing on the downstream side of the road.

Proposed Best Management Practices: Storm pipe diversion to a new splash bowl and level spreader.

Estimated Cost Effectiveness: \$125,000-\$150,000/kg P/year



4. Project PIT-14 – US Route 7 Paved Parking Lot (30%)

Problems Identified: Sediment runoff from the parking areas travels down the slope and into the river. Some minor sheet erosion is present.

Proposed Best Management Practices: Pretreatment Vegetated Swales and Infiltration Basin with Stabilized Outlet.

Estimated Cost Effectiveness: \$25,000-\$35,000/kg P/year

5. Project PIT-17/PIT-18 (10%) – Depot Hill Road Transfer Station

Problems Identified: A large gravel parking area is sending a heavy sediment load toward the downslope wetlands and stream.

Proposed Best Management Practices: Vegetated Swales and two (2) Sediment Traps

Estimated Cost Effectiveness: \$100,000-\$125,000/kg P/year

5.0 Next Steps

This Stormwater Master Plan represents an extensive effort to identify, describe, and evaluate stormwater issues affecting water quality and localized flooding in the Town of Pittsford. For each project recommendation, we provided a preliminary cost estimate and nutrient/sediment treatment estimates to town representatives to assist with planning and prioritizing project implementation. The problem area descriptions for town roads (e.g., roadside ditches) will aid the Town Highway Department in proactively stabilizing and maintaining these features to avoid future stormwater problems, and to come into compliance with the VTANR Municipal Roads General Permit.

We recommend that the Town work with VTDEC and other partners to secure funding for the high priority projects described in Appendices B and C. Landowner outreach should be completed for all projects that are not on Town land or right-of-way. The BMP installation/retrofit opportunities identified in the Unified Prioritization Matrix represent a potential phosphorus load reduction of approximately 39 lb/year. Based on our review and preliminary designs and our experience with previous SWMP efforts, we feel that the projects listed in Appendix C should be considered for further development and implementation.



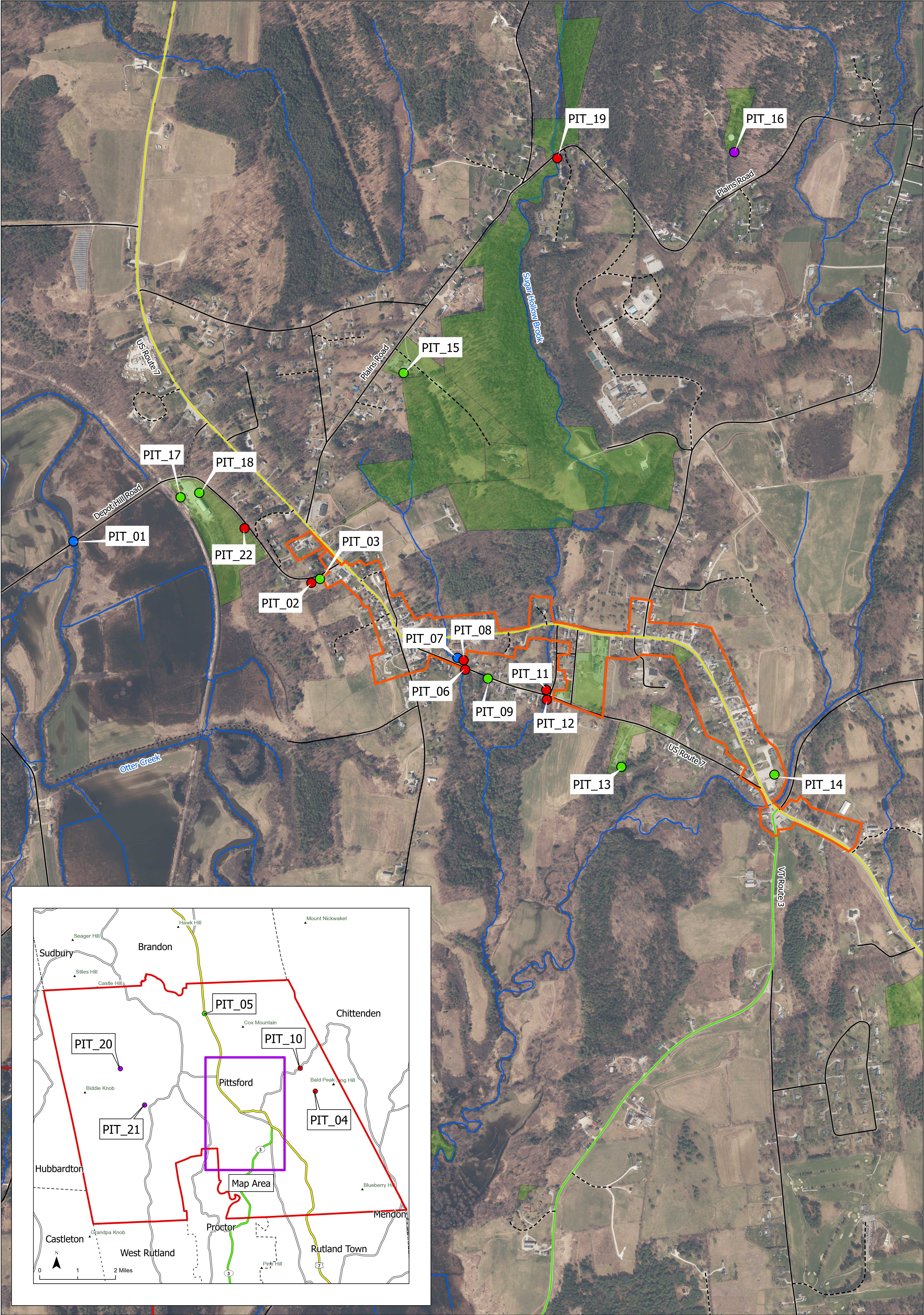
6.0 References

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- Fitzgerald Environmental Associates (FEA) and Milone and MacBroom (MMI). 2017. Road Erosion Site Prioritization and Remediation Project Summary. Memo prepared for the Chittenden County Regional Planning Commission. Dated December 27, 2017.
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APPENDIX A

Project Location Map (24"x36")



Appendix B

Project Prioritization Summary Tables Unified and Non-Unified (11" x 17" & 8.5" x 11")



Stormwater Master Plan - Town of Pittsford
Unified Prioritization Project Table
March 28, 2024

Project ID	Project Type	Location	Description	Preliminary Recommendations	Total Acreage	Impervious Acreage	% Impervious	P Load (lb/yr)	WQv (cf)	BMP Type	BMP Volume (cf)	BMP P Reduction (lb/yr)	Erosion P Reduction (lb/yr)	Total P Reduction (lb/yr)	Gully Mitigation	Landowner	Project/ Permitting Complexity	Infrastructure Conflicts	Total Cost	Project Efficiency \$/lb	Ease of O&M	Co-Benefits Sum	Total Score	Possible	Final Score %
PIT_18	GSI	Depot Hill Road - Transfer Station	A large gravel parking area is sending heavy sediment load toward the stream.	Install a sediment trap or infiltration basin.	0.29	0.22	75%	3.12	756	Infiltration Basin	760	1.91	3.52	5.43	2	3	0	1	\$ 15,300	\$ 2,818	2	0	32	50	64%
PIT_10	GSI	Furnace Road	There is a new drop inlet in the grass triangle at the intersection of Furnace Road and Adams Road. The outlet drops onto a steep bank with a gully to a large mass failure.	Install a sediment trap in the grass triangle and stabilize the outlet fully with stone. The slope is too steep and inaccessible for a mass failure stabilization.	15.50	0.23	1%	10.41	3,554	Extended Dry Detention Pond	190	0.24	5.55	5.79	2	3	2	1	\$ 41,300	\$ 7,131	2	1	30	50	60%
PIT_05	GSI	US Route 7 - Fish and Wildlife Parking Area	The gravel drive and parking area are eroding and draining into the wetland. The outfall is in good condition.	Install a culvert under the upper stretch of the road to divert water into the center green area. Lower the grade in the center green area to pool and infiltrate water. Fix the road grading. Add a feature downhill of the parking area to catch water that does not drain into the center green area.	0.51	0.22	44%	0.75	828	Infiltration Basin	830	0.66	0.52	1.18	1	3	0	1	\$ 10,000	\$ 8,489	2	2	26	50	52%
PIT_13	GSI	Arch Street - Wastewater Treatment Facility	The stormwater system drains through an open green space behind the facility into a small gully down to the stream.	Install a swale to conduct the surface water over to the green space and install a surface infiltration feature around the stone manhole.	1.10	0.26	23%	1.19	1,033	Infiltration Basin	1,040	1.01	1.00	2.01	1	3	0	1	\$ 20,000	\$ 9,945	2	0	25	50	50%
PIT_03	GSI	Depot Hill Road	Town-controlled stormwater pipes drain into a grassed swale that runs through a private lawn	Get landowner approval and install a large infiltration basin in the lawn.	20.39	4.46	22%	21.52	18,285	Infiltration Basin	8,800	15.66	0.00	15.66	0	0	1	1	\$ 141,800	\$ 9,053	2	0	22	50	44%
PIT_09	GSI	Arch Street	The closed system continues to the west to a large gully at the stream crossing on the downstream side.	Add a new outlet to the system on the south side to direct water to the empty wetland lot. The grades should work for this. Install a level spreader or splash pad at the new outlet to disperse flow.	0.86	0.13	16%	0.79	594	Infiltration Basin	600	0.75	0.00	0.75	0	3	2	1	\$ 11,600	\$ 15,508	2	1	20	50	40%
PIT_15	GSI	Caverly Road - Town Offices	A large paved area and the rooftops drain south to a grassed area.	Install a surface infiltration feature in the space behind the parking lot.	1.09	0.58	54%	1.80	2,108	Infiltration Basin	2,110	1.74	0.00	1.74	0	3	2	1	\$ 32,400	\$ 18,642	2	1	20	50	40%
PIT_17	GSI	Depot Hill Road - Transfer Station	A large gravel parking area is sending heavy sediment load toward the downslope wetland.	Install a shallow surface wetland ditch.	1.28	1.23	97%	3.15	4,266	Gravel Wetland	4,300	1.03	3.52	4.55	2	3	0	1	\$ 98,000	\$ 21,543	0	0	19	50	38%
PIT_14	GSI	US Route 7 - Paved Parking Lot	Sediment runoff from the parking areas travels down the slope and into the river. Some minor sheet erosion is present.	Add swales around the parking lot to the north and divert runoff into an infiltration feature in the green space.	1.29	0.90	70%	2.53	3,190	Infiltration Basin	3,190	2.40	0.00	2.40	0	0	0	1	\$ 51,000	\$ 21,268	2	0	14	50	28%

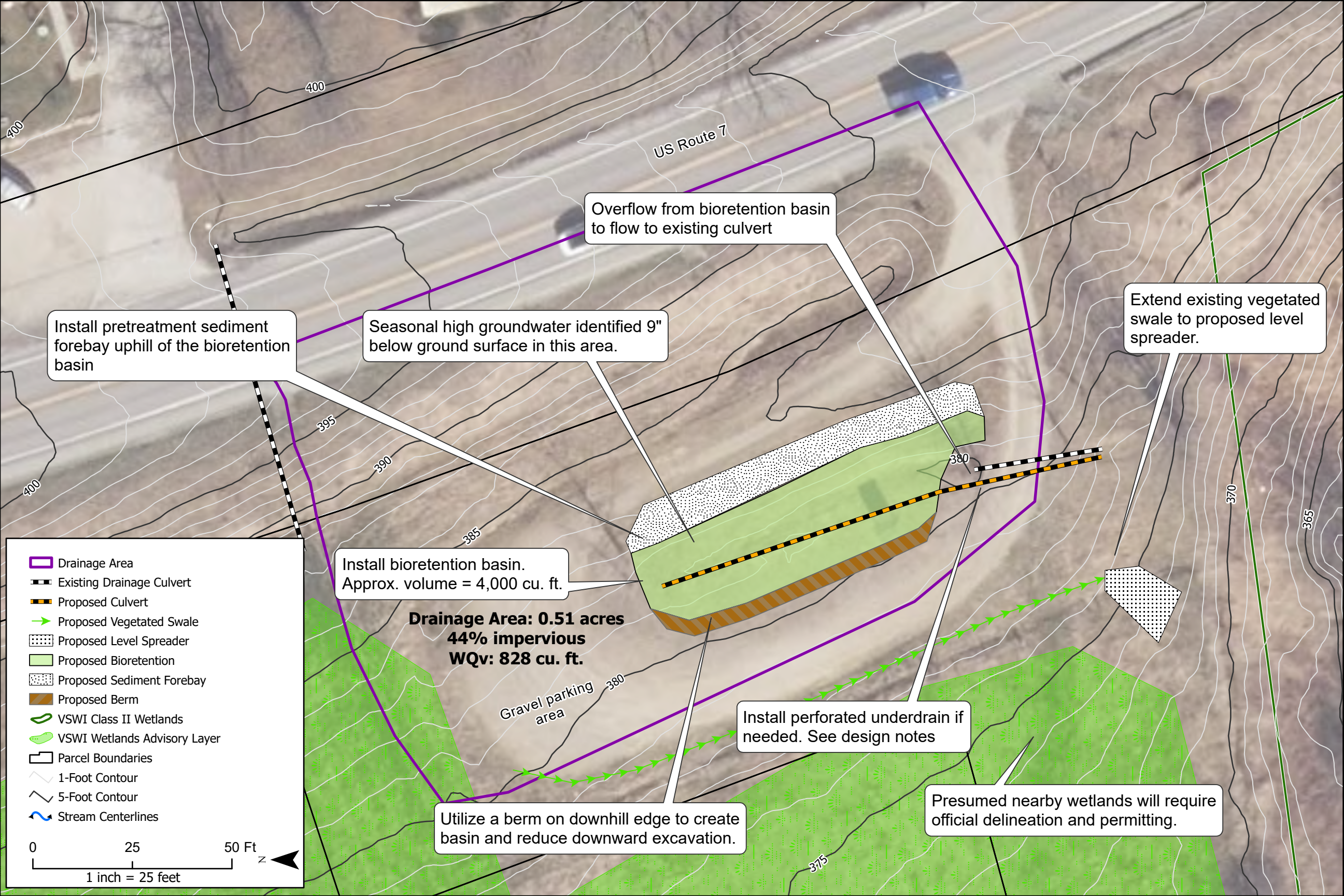
Stormwater Master Plan - Town of Pittsford
Non-Unified Prioritization Project Table
March 28, 2024

Additional Benefits Codes	CPA	SF	E	IC	SW	BMP	HV	TH	PF	L
	Chronic Problem Area	Seasonal Flooding	Educational	Infrastructure Conflicts	Drains to Connected Stormwater Infrastructure	Improves Existing BMP Performance	High Visibility	Reduces Thermal Pollution	Peak Flow Reduction	Enhance Lakeshore Natural Communities

					Water Quality Benefits										
Project ID	Project Type	Location	Description	Preliminary Recommendations	Nutrient Reduction	Sediment Reduction	Drainage Area	Impervious Drainage	Connectivity to Surface Waters	Landowner Support	O&M Requirements	Cost and Constructability	Additional Benefits	Additional Benefits Score	Total Score
					4	4	1	3	3	2	2	6		5	30
PIT_22	Gully	Depot Hill Road	A very large gully is forming at the cross culvert outlet and draining into the stream.	Stabilize the gully with stone.	4	4	1	3	2	2	2	2	CPA, IC	2	22
PIT_16	Road Erosion	Plains Road - Access to Town Water Tank	The road and the ditches on both sides are badly eroding.	Stabilize the ditches with stone and resurface the road.	3	3	1	0	2	2	1	6	CPA, IC	2	20
PIT_20	Road Erosion	Fire Hill Road	Erosion from the ditch is coming into the cross culvert.	Stabilize the ditch with stone and clean out the culvert.	2	2	1	2	3	1	1	6	CPA, IC	2	20
PIT_02	Gully	Depot Hill Road	A large gully is forming at the outfall from town-controlled stormwater infrastructure.	Stabilize the gully with stone.	4	4	1	3	2	0	2	2	SW	1	19
PIT_06	Gully	Arch Street	A gully has formed from a storm outlet on the steep slope to the stream channel. The stream channel is also a gully with evidence of large stone stabilization attempts that are somewhat effective.	Stabilize the outfall gully with stone and add additional stabilization to the eroding stream channel.	3	3	1	3	3	0	1	3	CPA, IC	2	19
PIT_21	Road Erosion	Old Hubbardton Road	Road erosion is forming in a section that was marked as "Fully Meets" by the MRGP.	Stabilize the erosion with stone and re-grade the road.	1	1	1	3	3	1	1	6	CPA	1	18
PIT_04	Gully	Goat Farm Road	A large gully has formed from the cross culvert under Goat Farm Road.	Stabilize the gully with stone and woody debris. Add grade controls to the drainage path as necessary.	4	4	1	0	3	0	2	2	SW	1	17
PIT_11	Gully	Mechanic Street	The outfall from an infiltration basin is forming a small gully down a steep slope to the river.	Stabilize the gully with stone.	1	1	1	3	3	0	2	5	IC	1	17
PIT_12	Gully	Arch Street	A long narrow gully is forming down a very steep slope.	Stabilize the active gully with stone and install a new splash pool.	3	3	0	1	3	0	1	5	SW	1	17
PIT_07	Stream	Arch Street - Apartment Building	A stormwater pipe daylights through a 48" squash culvert into a 12" wide incised channel with active erosion and down cutting in the front lawn of the apartment building.	Excavate benches for the channel and widen it to add capacity. Install grade controls where the steep slope makes them necessary. Good opportunity for aesthetic plantings.	1	1	1	3	3	0	2	3	E, HV	2	16
PIT_19	Gully	Plains Road - Near the Intersection with Blanchard Avenue	A gully is forming where water from the culvert under Blanchard Road enters the stream.	Stabilize the gully with stone.	1	1	0	1	3	1	2	5	IC	1	15
PIT_08	Gully	Arch Street - Apartment Building	There is a short area of gully erosion from the pipe outlet to the inlet of the road culvert.	Stabilize the gully with stone.	1	1	0	0	3	0	2	6	HV	1	14
PIT_01	Stream	Depot Hill Road - Covered Bridge	The banks on both sides of the river are eroding surrounding the covered bridge.	Stabilize the banks with stone or bioengineering.	3	3	0	0	2	0	2	1	SF, IC	2	13

APPENDIX C

Conceptual Designs
(11"x17")



Fitzgerald
Environmental
Associates, LLC
164 Main Street, Suite 2
Colchester, VT 05446
Telephone: 802.876.7778
www.fitzgeraldenvironmental.com

Notes:
- Conceptual design based
on FEA field visit in 2024

Project PIT-05 Conceptual Design
Stormwater Master Plan

Pomainville WMA
Pittsford, VT

JWC
MAP BY

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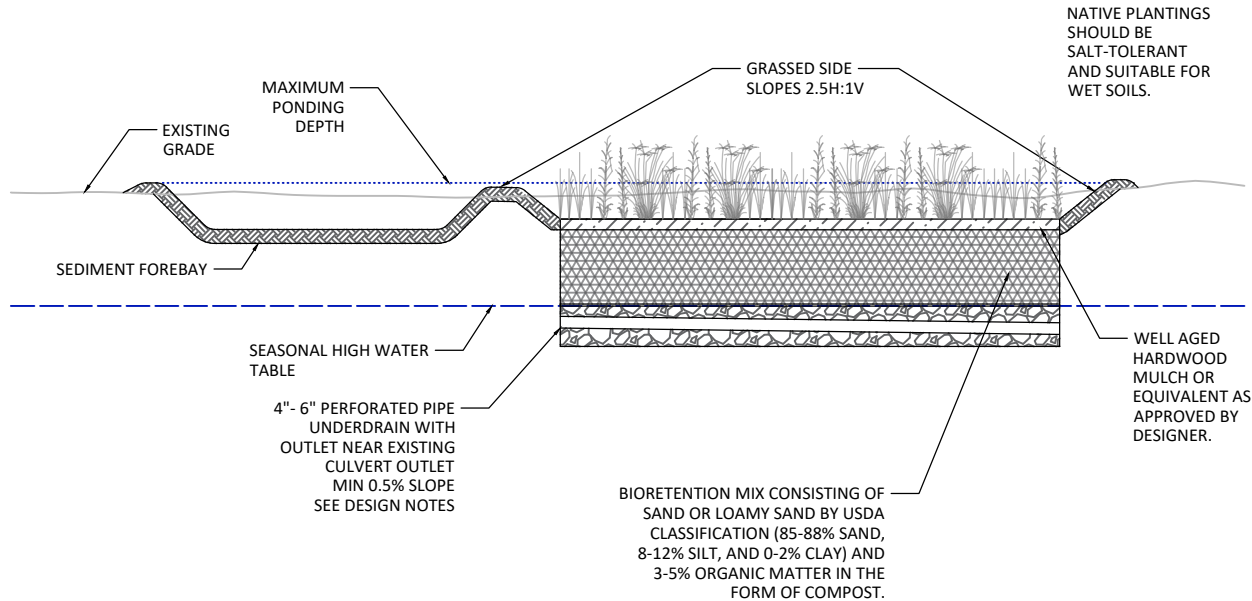
1 inch = 25 feet

March 3, 2025

SHEET 1

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BIORETENTION BASIN

N.T.S.

INSTALLATION NOTES

- THE VERMONT STORMWATER MANAGEMENT MANUAL IS A GOOD EDUCATIONAL RESOURCE TO ACCOMPANY THIS PROJECT. ALTERNATIVES TO THE DETAILS PRESCRIBED IN THIS PLAN ARE AVAILABLE IN THAT MANUAL.
- MINIMIZE DISTURBANCE TO EXISTING VEGETATION DURING INSTALLATION.

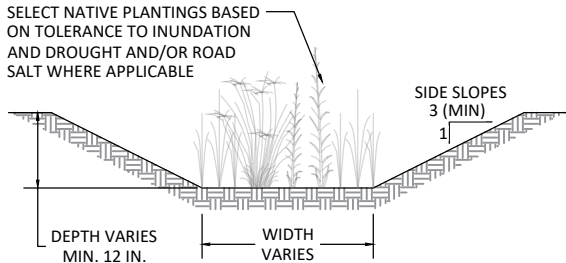
OPERATION OF MAINTENANCE NOTES

- MAINTENANCE OF THE BIORETENTION FEATURE INCLUDES OCCASIONAL WEEDING TO MAINTAIN THE SELECTED PLANTS.
- DURING THE FIRST YEAR OF OPERATION, WATERING, WEEDING, AND REPLACEMENT OF DEAD PLANTS IS IMPORTANT FOR PROPER ESTABLISHMENT.
- ACCUMULATION OF SEDIMENT WITHIN THE PRETREATMENT SEDIMENT FOREBAY SHOULD BE MONITORED. REMOVE SEDIMENT WHEN FOREBAY IS 1/2 FULL.
- THE LEVEL SPREADER SHOULD BE INSPECTED REGULARLY AFTER RAIN EVENTS TO VERIFY THAT THERE IS NOT CONCENTRATED FLOW FROM THE FEATURE.
- ANNUALLY INSPECT FOR INVASIVE SPECIES AND REMOVE IF PRESENT.
- INSPECT FOR EROSION PATHS OR CONCENTRATED FLOW, AS NEEDED REDISTRIBUTE STONE TO REMOVE CONCENTRATED FLOW PATHS.

DESIGN NOTES FOR FINAL DESIGN

ADDITIONAL MODELING IS REQUIRED TO DETERMINE PRECISE SIZING OF THE BASIN. TEST INFILTRATION RATE, SHOULD BE AT LEAST 0.2 INCHES PER HOUR DEPTH TO SEASONAL HIGH WATER TABLE (SHWT) SHOULD BE DETERMINED. IF DEPTH TO SHWT OR INFILTRATION RATE ARE INSUFFICIENT TO SUPPORT AN INFILTRATION BASIN, AN UNDER DRAIN MUST BE INCORPORATED INTO THE DESIGN.

*NOTES ADAPTED FROM SLR CONCEPT DESIGNS



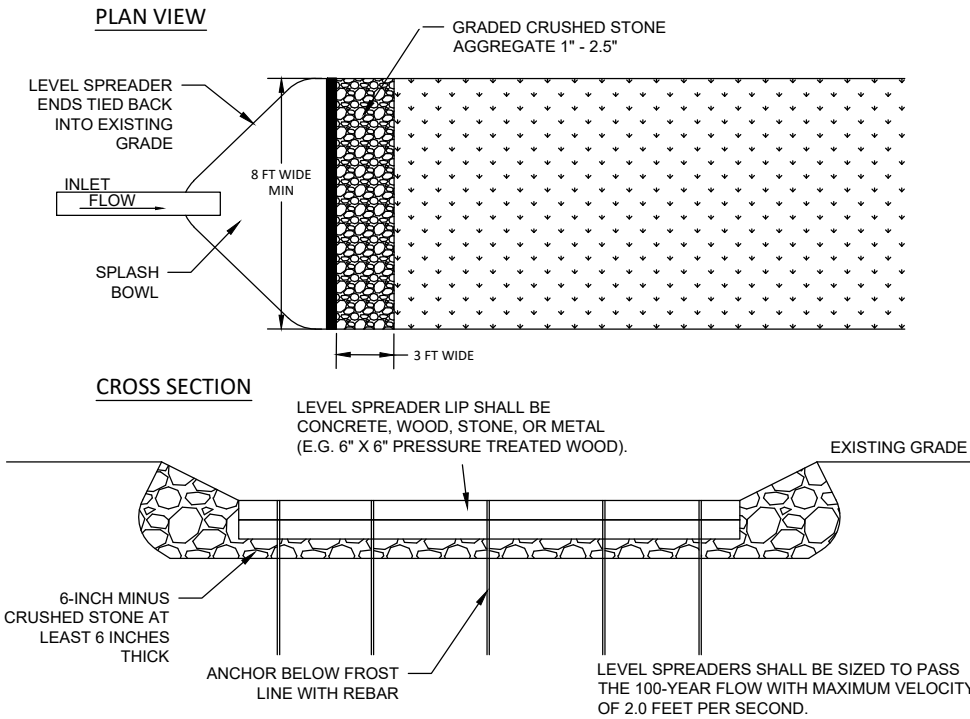
VEGETATED SWALE

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Preliminary Cost Opinion

Project PIT-05

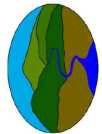
Item	Quantity	Unit	Unit Price	Cost
Mobilization/Demobilization	1	LS	\$ 1,600	\$ 1,600
Common Excavation	200	CY	\$ 25	\$ 5,000
Hauling	200	CY	\$ 20	\$ 4,000
Bioretention Soil	150	CY	\$ 80	\$ 12,000
Underdrain Pipe, 6"	125	LF	\$ 25	\$ 3,125
Extend Vegetated Swale	1	LS	\$ 700	\$ 700
Level Spreader	1	LS	\$ 2,500	\$ 2,500
Plantings	1	LS	\$ 500	\$ 500
Misc. Erosion Control and Site Restoration	1	LS	\$ 1,500	\$ 1,500
Laborer	48	HR	\$ 50	\$ 2,400
Final Design & Permitting	1	LS	\$ 10,000	\$ 10,000
Construction Oversight	1	LS	\$ 5,000	\$ 5,000
			Subtotal	\$ 48,325
			Contingency (20%)	\$ 9,670
			Total	\$ 57,995



LEVEL SPREADER

N.T.S.

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Environmental
Associates, LLC



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Notes:

Project PIT-05 Conceptual Design

Stormwater Master Plan

Pomaineville WMA

Pittsford, VT

NOT FOR CONSTRUCTION

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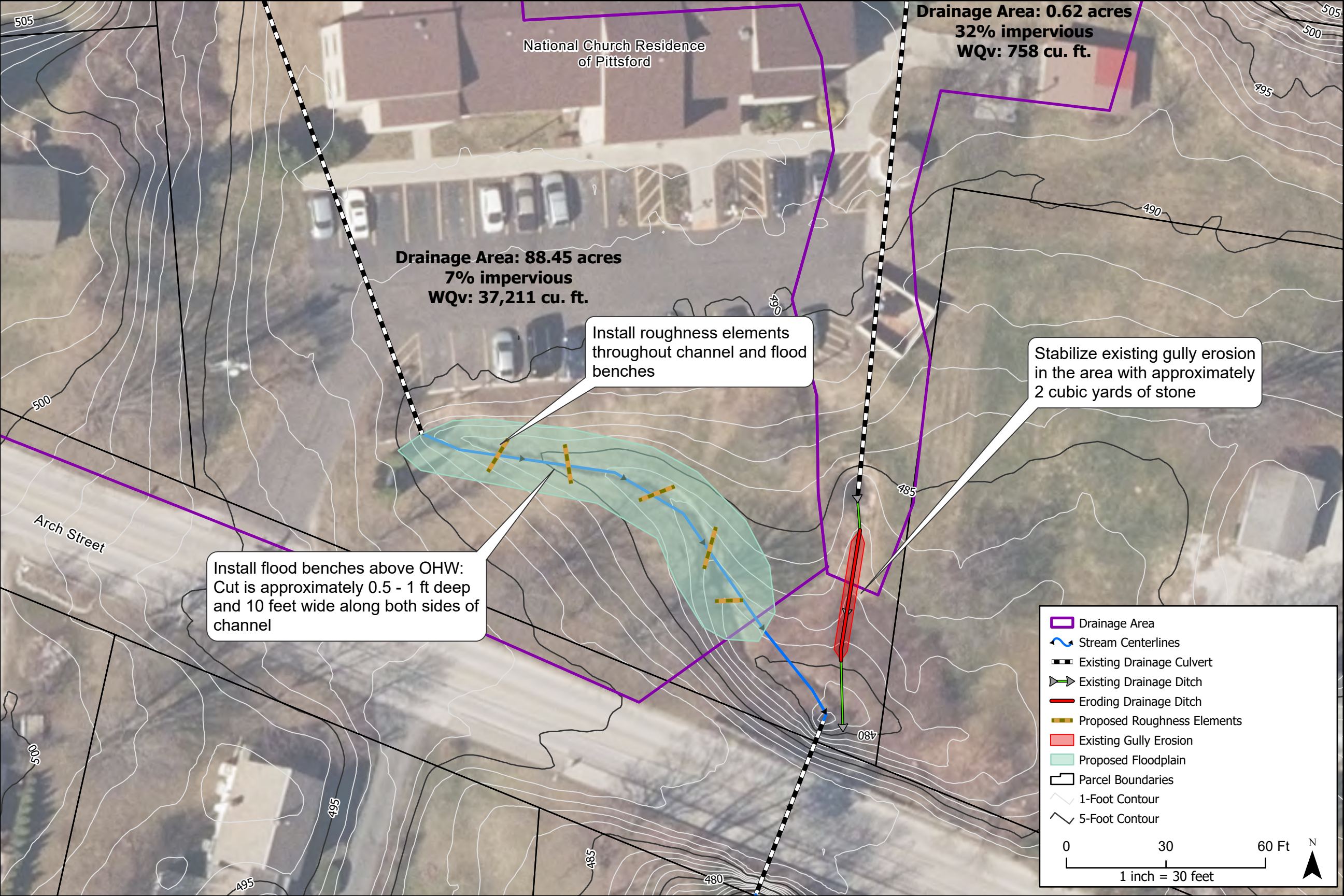
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Sheet 2

SHEET NO.





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Notes:

- Conceptual design based on FEA field visit in 2024

Project PIT-07 / PIT-08 Conceptual Design

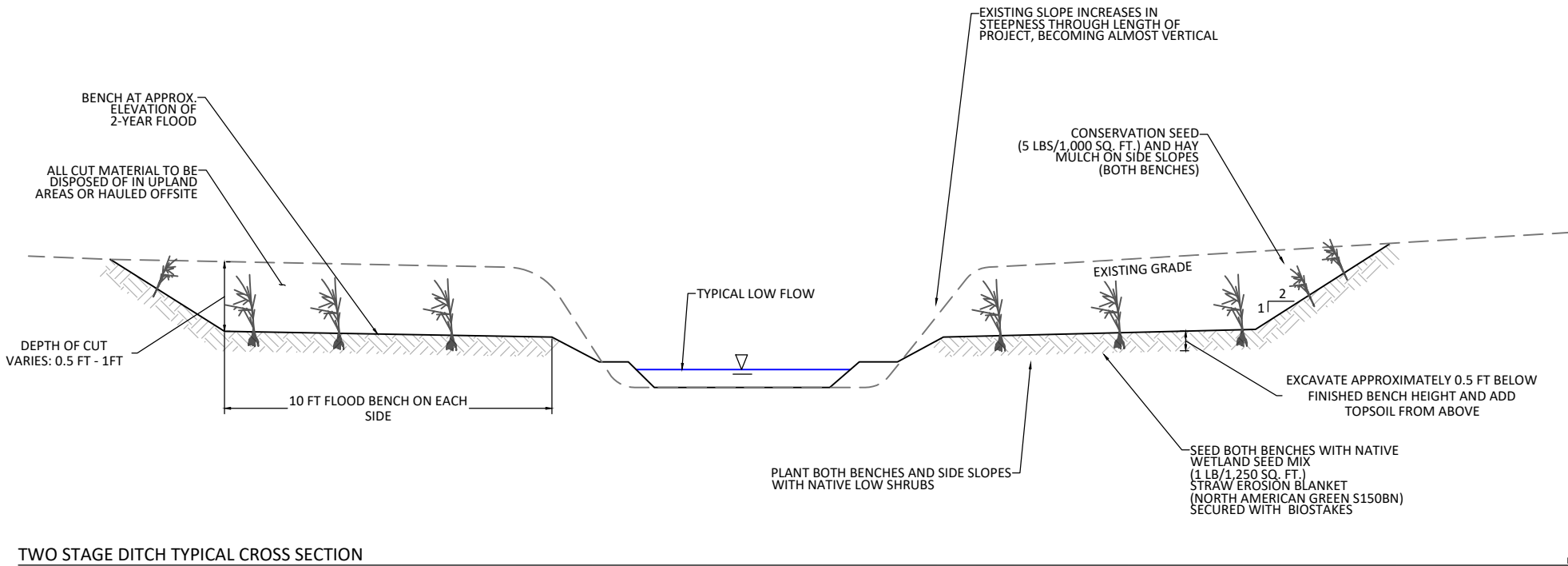
Stormwater Master Plan

Arch Street

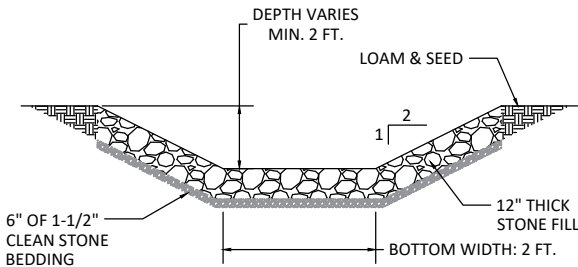
Pittsford, VT

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DATE	March 3, 2025		
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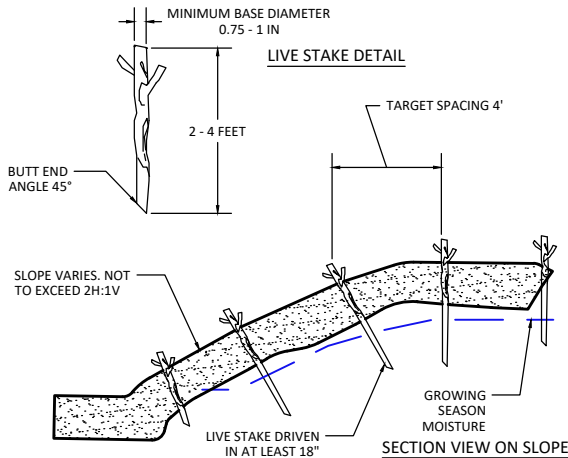


TWO STAGE DITCH TYPICAL CROSS SECTION



- SLOPES 5% TO 10% USE 6-8 INCH MINUS STONE FILL
- SLOPES MORE THAN 10% USE 12 INCH MINUS STONE FILL

STONE LINED DITCH



WILLOW SPECIFICATIONS:

RECOMMENDED NATIVE WILLOW SPECIES:
SALIX DISCOLOR - PUSSY WILLOW
SALIX ERIOCEPHALA - MISSOURI RIVER WILLOW
SALIX LUCIDA - SHINING WILLOW

WILLOW STAKES SHALL BE HARVESTED DURING THE DORMANT PERIOD FOLLOWING FALL LEAF DROP AND BEFORE PLANT LEAF BUDDING IN SPRING. ALTERNATIVELY, WILLOW TUBELINGS WITH WELL-ESTABLISHED ROOT SYSTEMS (MINIMUM 1-YEAR GROWTH IN TUBE) MAY BE SUBSTITUTED TO PROVIDE FLEXIBILITY IN THE PLANTING SCHEDULE.

SEQUENCE:

1. ACHIEVE FINAL GRADING. SEED WITH APPROPRIATE SEED MIX AND INSTALL ROLLED EROSION CONTROL PRODUCT.
2. INSTALL WILLOW STAKES THROUGH RECP. IF NECESSARY, USE METAL BAR TO CREATE "PILOT HOLE" FOR STAKE.
3. FILL REMAINING VOIDS AROUND STAKES ON FACE OF SLOPE WITH TOPSOIL AND LIGHTLY TAMP AROUND EACH STAKE.

LIVE STAKE PLANTING

INSTALLATION NOTES

- THE VERMONT STORMWATER MANAGEMENT MANUAL IS A GOOD EDUCATIONAL RESOURCE TO ACCOMPANY THIS PROJECT. ALTERNATIVES TO THE DETAILS PRESCRIBED IN THIS PLAN ARE AVAILABLE IN THAT MANUAL.
- MINIMIZE DISTURBANCE TO EXISTING VEGETATION DURING INSTALLATION.
- PLANTING DENSITIES ARE RECOMMENDED TO BE ONE PERENNIAL EVERY 2.5 FEET ON CENTER OR ONE SHRUB EVERY 5 FEET ON CENTER.

OPERATION OF MAINTENANCE NOTES

- DURING THE FIRST YEAR OF OPERATION, WATERING, WEEDING, AND REPLACEMENT OF DEAD PLANTS IS IMPORTANT FOR PROPER ESTABLISHMENT.
- ANNUALLY INSPECT TO MAKE SURE NO INVASIVE SPECIES ARE PRESENT.
- INSPECT FOR EROSION PATHS OR CONCENTRATED FLOW NEAR STABILIZED GULLY, AS NEEDED REDISTRIBUTE STONE TO REMOVE CONCENTRATED FLOW PATHS.

DESIGN NOTES FOR FINAL DESIGN

- ELEVATION OF FLOOD BENCHES SHOULD ALLOW A 2-YEAR 24-HOUR STORM TO ACCESS THE FLOOD BENCHES.

*NOTES ADAPTED FROM SLR CONCEPT DESIGNS

Preliminary Cost Opinion

Projects PIT-07 and PIT-08

Item	Quantity	Unit	Unit Price	Cost
Mobilization/Demobilization	1	LS	\$ 1,500	\$ 1,500
Common Excavation	70	CY	\$ 25	\$ 1,750
Hauling	70	CY	\$ 20	\$ 1,400
Plantings	1	LS	\$ 500	\$ 500
Stone Lined Ditch	1	LS	\$ 750	\$ 750
Misc. Erosion Control and Site Restoration	1	LS	\$ 1,500	\$ 1,500
Laborer	24	HR	\$ 50	\$ 1,200
Final Design & Permitting	1	LS	\$ 8,000	\$ 8,000
Construction Oversight	1	LS	\$ 4,000	\$ 4,000
Subtotal			\$ 20,600	
Contingency (20%)			\$ 4,120	
Total			\$ 24,720	



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Notes:

Project PIT-07 / PIT-08 Conceptual

Design

Stormwater Master Plan

Arch Street

Pittsford, VT

NOT FOR CONSTRUCTION

AEM

DRAWN

JHB

CHECKED

N.T.S.

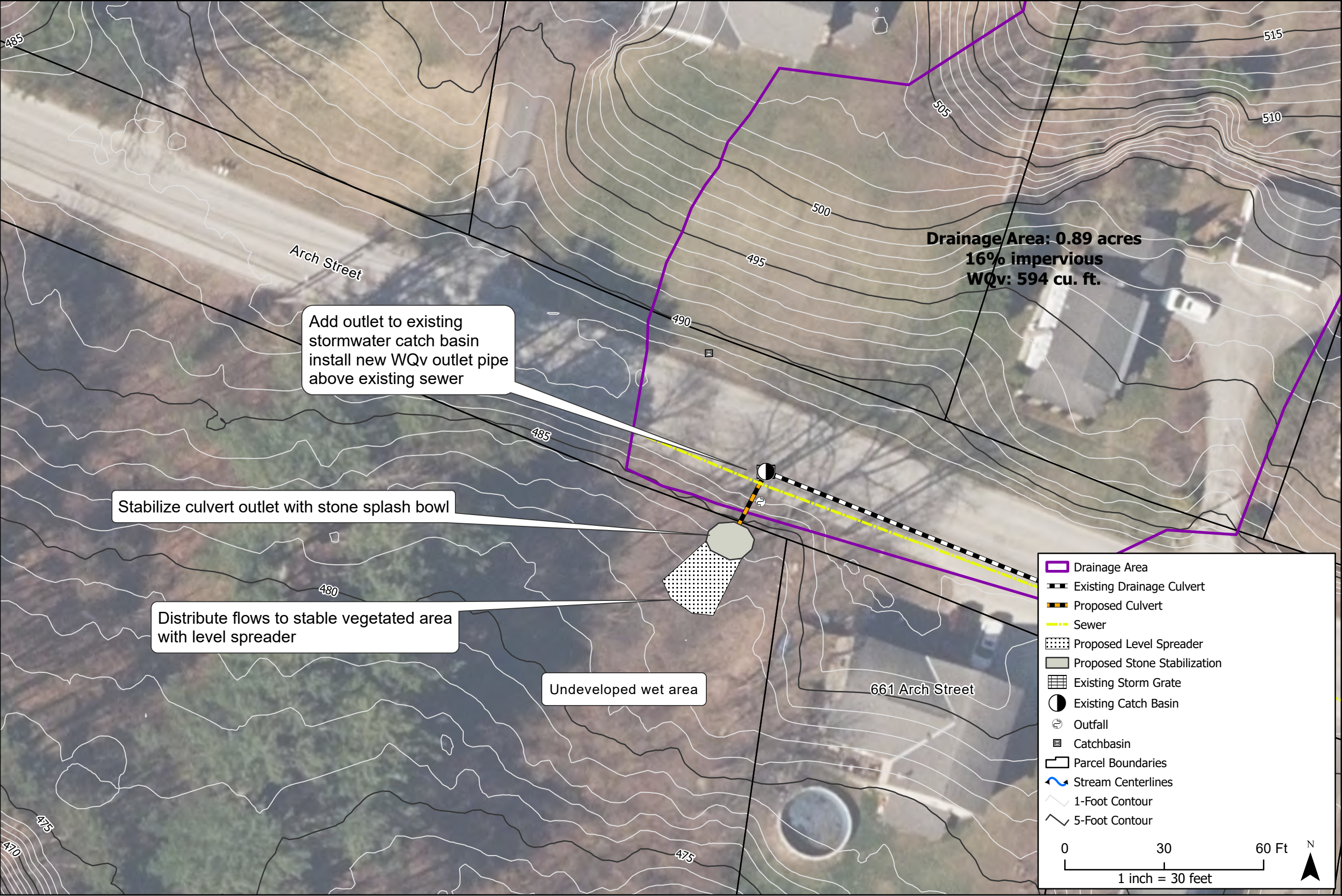
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Sheet 2

SHEET NO.



Drainage Area
 0.89 acres
 16% impervious
 WQv: 594 cu. ft.

Arch Street
 661 Arch Street

Undeveloped wet area

Stabilize culvert outlet with stone splash bowl

Distribute flows to stable vegetated area with level spreader

Add outlet to existing stormwater catch basin install new WQv outlet pipe above existing sewer

Legend:

- Drainage Area
- Existing Drainage Culvert
- Proposed Culvert
- Sewer
- Proposed Level Spreader
- Proposed Stone Stabilization
- Existing Storm Grate
- Existing Catch Basin
- Outfall
- Catchbasin
- Parcel Boundaries
- Stream Centerlines
- 1-Foot Contour
- 5-Foot Contour

Scale: 1 inch = 30 feet

North Arrow: N

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Notes:
 - Conceptual design based on FEA field visit in 2024

Project PIT-09 Conceptual Design Stormwater Master Plan

**Arch Street
 Pittsford, VT**

AEM
 MAP BY

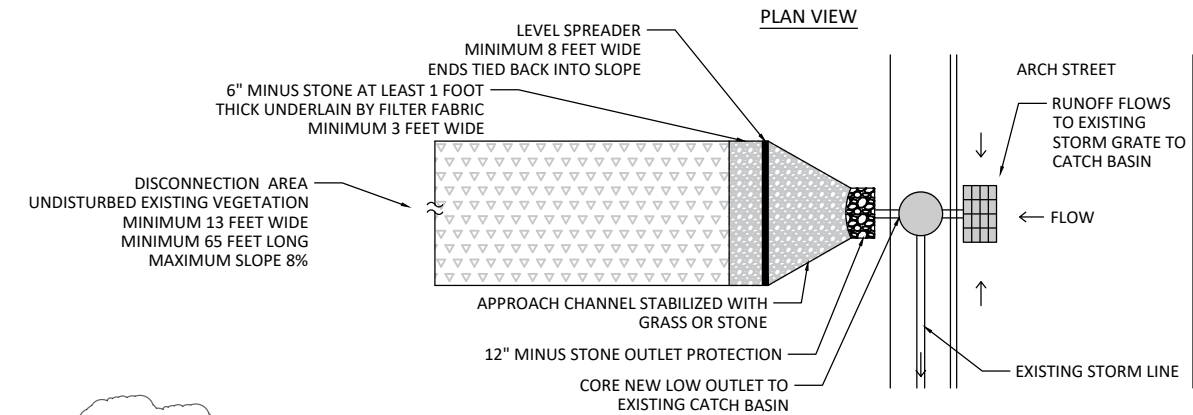
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1 inch = 30 feet
 SCALE

April 4, 2025
 DATE

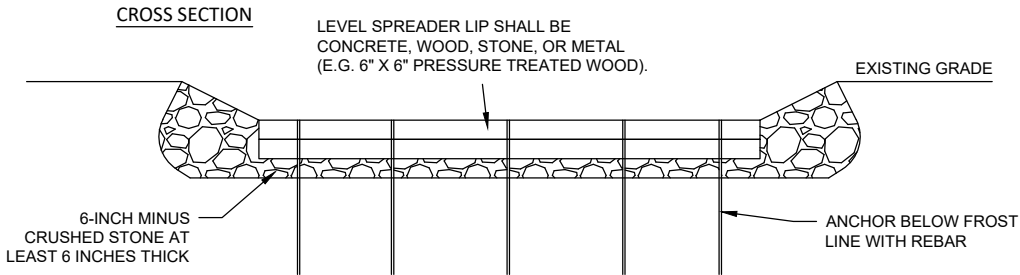
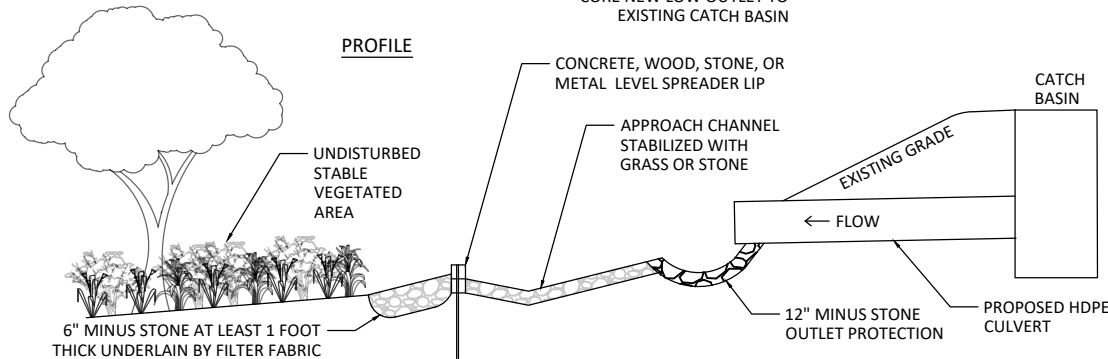
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NOTES

- LEVEL SPREADERS SHALL BE SIZED TO PASS THE MAXIMUM DESIGN FLOW WITH MAXIMUM VELOCITY OF 2.0 FEET PER SECOND.



N.T.S.

INSTALLATION NOTES

- THE VERMONT STORMWATER MANAGEMENT MANUAL IS A GOOD EDUCATIONAL RESOURCE TO ACCOMPANY THIS PROJECT. ALTERNATIVES TO THE DETAILS PRESCRIBED IN THIS PLAN ARE AVAILABLE IN THAT MANUAL.
- MINIMIZE DISTURBANCE TO EXISTING VEGETATION DURING INSTALLATION.

OPERATION OF MAINTENANCE NOTES

- THE LEVEL SPREADER SHOULD BE INSPECTED REGULARLY AFTER RAIN EVENTS TO VERIFY THAT THERE IS NOT CONCENTRATED FLOW FROM THE FEATURE.
- THE STONE BOWL CULVERT OUTLET PROTECTION SHOULD BE INSPECTED REGULARLY AFTER RAIN EVENTS TO VERIFY THE STONE IS EFFECTIVELY STABILIZING THE OUTLET. STONE SHOULD BE REDISTRIBUTED AND ADDED AS NEEDED.
- THE PROJECT SITE SHOULD BE INSPECTED FOLLOWING ANY MAJOR STORM EVENT WITHIN THE FIRST YEAR AFTER INSTALLATION.
- AFTER THE FIRST YEAR, THE PROJECT SITE SHOULD BE INSPECTED SEMI-ANNUALLY.
- INSPECT FOR EROSION PATHS OR CONCENTRATED FLOW, AS NEEDED REDISTRIBUTE STONE TO REMOVE CONCENTRATED FLOW PATHS.

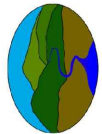
*NOTES ADAPTED FROM SLR CONCEPT DESIGNS

Preliminary Cost Opinion

Project PIT-09

Item	Quantity	Unit	Unit Price		Cost
Mobilization/Demobilization	1	LS	\$	1,500	\$ 1,500
Common Excavation	15	CY	\$	25	\$ 375
Hauling	15	CY	\$	20	\$ 300
Catch Basin Retrofit	1	LS	\$	5,000	\$ 5,000
Install Level Spreader	1	LS	\$	1,500	\$ 1,500
12 inch-minus stone	10	CY	\$	50	\$ 500
Misc. Erosion Control and Site Restoration	1	LS	\$	1,000	\$ 1,000
Laborer	24	HR	\$	50	\$ 1,200
Final Design & Permitting	1	LS	\$	8,000	\$ 8,000
Construction Oversight	1	LS	\$	4,000	\$ 4,000
Subtotal			\$	23,375	
Contingency (20%)			\$	4,680	
Total			\$	28,055	

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Notes:

Project PIT-09 Conceptual Design

Stormwater Master Plan

Arch Street

Pittsford, VT

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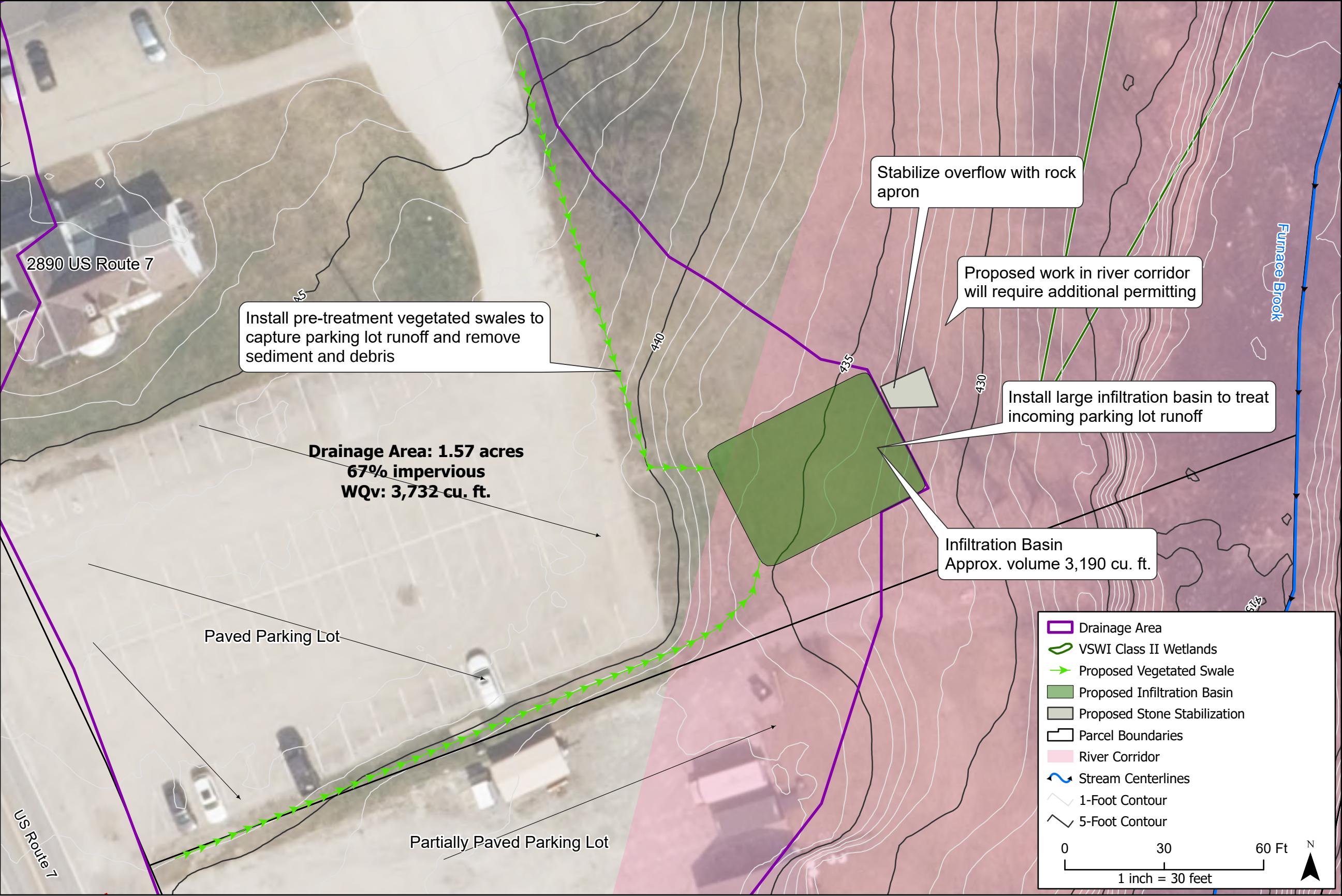
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Notes:

- Conceptual design based on FEA field visit in 2024

Project PIT-14 Conceptual Design
Stormwater Master Plan

US Route 7
Pittsford, VT

AEM	JHB
MAP BY	CHECKED

1 inch = 30 feet

SCALE

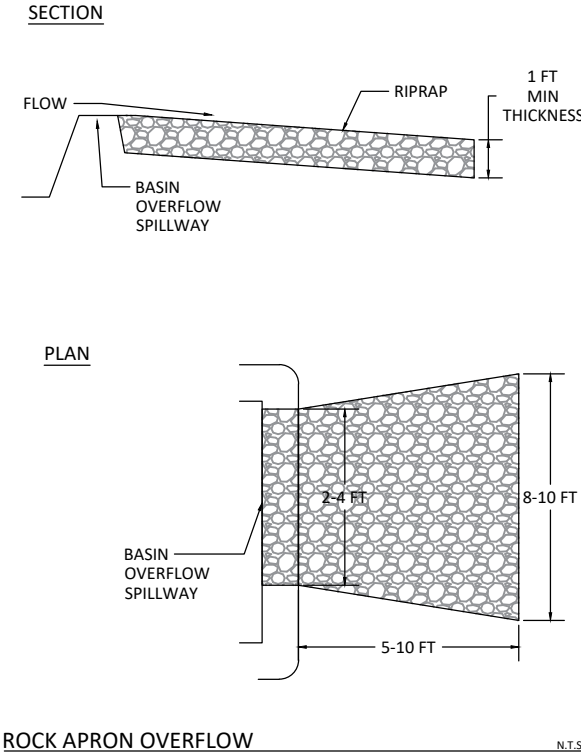
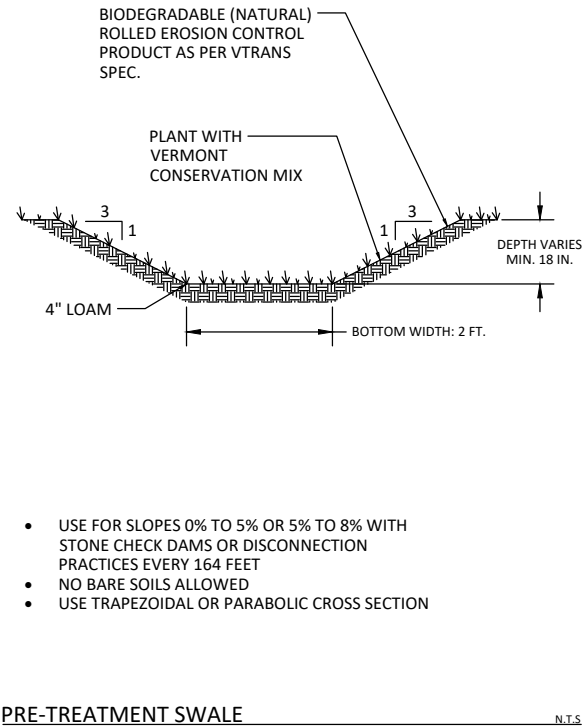
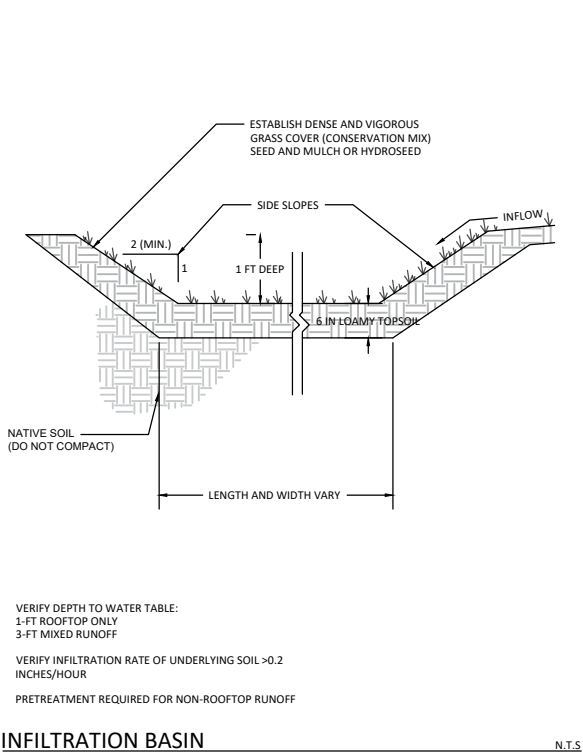
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- INSTALLATION NOTES**
- THE VERMONT STORMWATER MANAGEMENT MANUAL IS A GOOD EDUCATIONAL RESOURCE TO ACCOMPANY THIS PROJECT. ALTERNATIVES TO THE DETAILS PRESCRIBED IN THIS PLAN ARE AVAILABLE IN THAT MANUAL.
 - MINIMIZE DISTURBANCE TO EXISTING VEGETATION DURING INSTALLATION.
- OPERATION OF MAINTENANCE NOTES**
- SEDIMENT ACCUMULATIONS IN THE PRE-TREATMENT SWALES SHOULD BE CLEARED WHEN SEDIMENT DEPTH REACHES 0.5 FT.
 - THE INFILTRATION BASIN SHOULD BE CLEARED OF SEDIMENT WHEN SEDIMENT DEPTH REACHES ½ OF THE TOTAL DEPTH OF THE FEATURE.
 - DENSE VEGETATION COVER SHALL BE MAINTAINED IN THE SWALES AND BASIN
 - THE PROJECT SITE SHOULD BE INSPECTED FOLLOWING ANY MAJOR STORM EVENT WITHIN THE FIRST YEAR AFTER INSTALLATION.
 - AFTER THE FIRST YEAR, THE PROJECT SITE SHOULD BE INSPECTED SEMI-ANNUALLY.
 - INSPECT FOR EROSION PATHS OR CONCENTRATED FLOW, AS NEEDED REDISTRIBUTE STONE TO REMOVE CONCENTRATED FLOW PATHS.
- DESIGN NOTES FOR FINAL DESIGN**
- ADDITIONAL MODELING IS REQUIRED TO DETERMINE PRECISE SIZING OF THE SEDIMENT TRAP.
- *NOTES ADAPTED FROM SLR CONCEPT DESIGNS

Preliminary Cost Opinion

Project PIT-14

Item	Quantity	Unit	Unit Price		Cost
Mobilization/Demobilization	1	LS	\$	2,000	\$ 2,000
Common Excavation	125	CY	\$	25	\$ 3,125
Hauling	125	CY	\$	20	\$ 2,500
Topsoil	25	CY	\$	65	\$ 1,625
Install Vegetated Swale	2	LS	\$	1,500	\$ 3,000
Install Rock Apron outlet	1	LS	\$	1,000	\$ 1,000
Misc. Erosion Control and Site Restoration	1	LS	\$	1,500	\$ 1,500
Laborer	24	HR	\$	50	\$ 1,200
Final Design & Permitting	1	LS	\$	10,000	\$ 10,000
Construction Oversight	1	LS	\$	5,000	\$ 5,000
Subtotal			\$	30,950	
Contingency (20%)			\$	6,190	
Total			\$	37,140	



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Notes:

Project PIT-14 Conceptual Design

Stormwater Master Plan

US Route 7
Pittsford, VT

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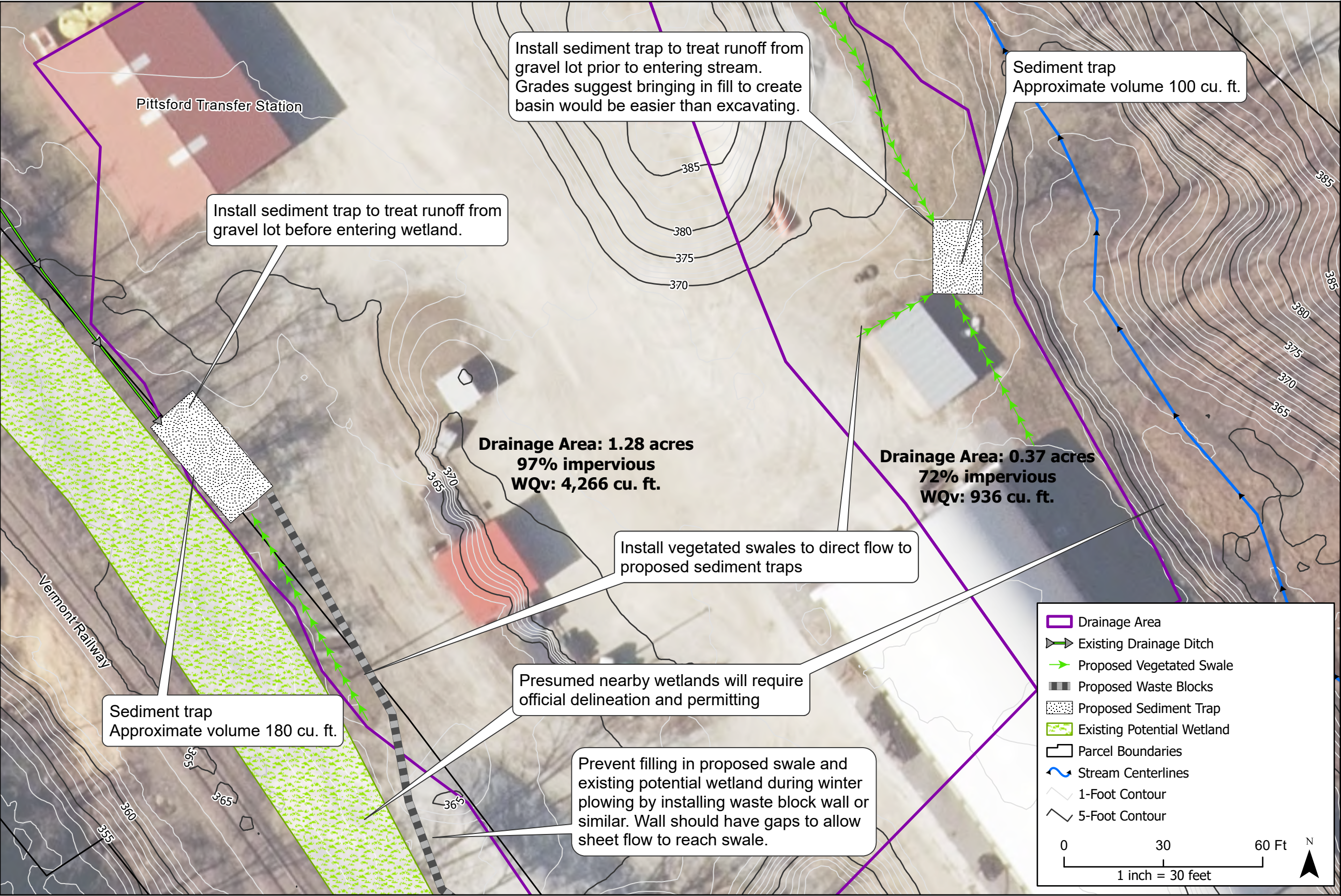
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Notes:

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Project PIT-17 / PIT-18 Conceptual Design

Stormwater Master Plan

Depot Hill Road

Pittsford, VT

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SCALE

1 inch = 30 feet

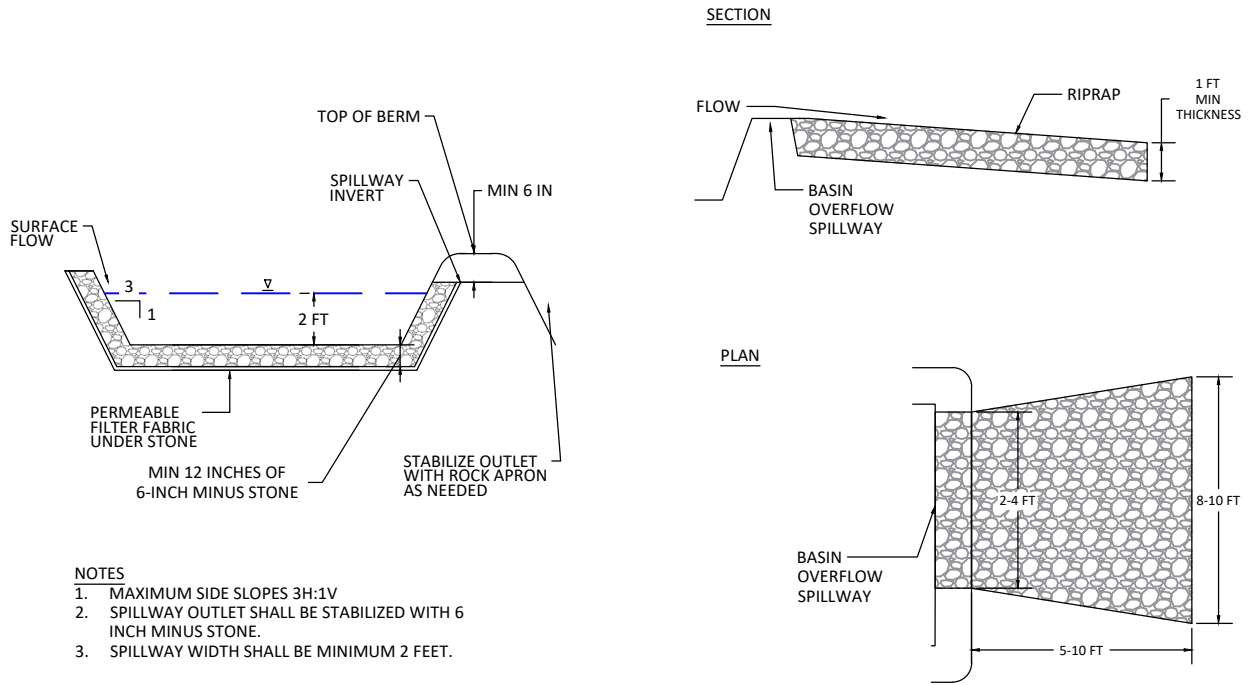
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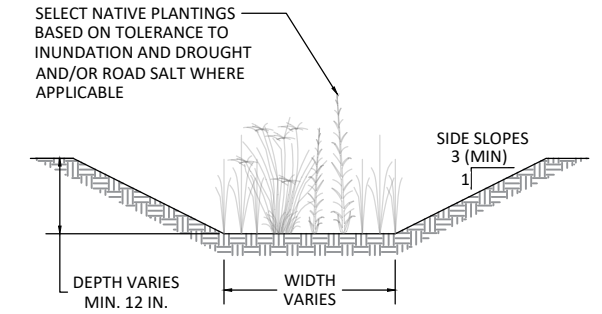
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SEDIMENT TRAP N.T.S

ROCK APRON OUTLET N.T.S



VEGETATED SWALE N.T.S

- INSTALLATION NOTES**
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 - MINIMIZE DISTURBANCE TO EXISTING VEGETATION DURING INSTALLATION.
- OPERATION OF MAINTENANCE NOTES**
- THE SEDIMENT TRAP SHOULD BE CLEARED OF SEDIMENT WHEN SEDIMENT DEPTH REACHES ½ OF THE TOTAL DEPTH OF THE FEATURE.
 - THE PROJECT SITE SHOULD BE INSPECTED FOLLOWING ANY MAJOR STORM EVENT WITHIN THE FIRST YEAR AFTER INSTALLATION.
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- DESIGN NOTES FOR FINAL DESIGN**
- ADDITIONAL MODELING IS REQUIRED TO DETERMINE PRECISE SIZING OF THE SEDIMENT TRAP.
- *NOTES ADAPTED FROM SLR CONCEPT DESIGNS

Preliminary Cost Opinion

Projects PIT-17 and PIT-18

Item	Quantity	Unit	Unit Price		Cost
Mobilization/Demobilization	1	LS	\$ 1,500	\$	1,500
Common Excavation	20	CY	\$ 25	\$	500
Hauling	20	CY	\$ 20	\$	400
6" Minus Stone	10	CY	\$ 80	\$	800
Install Vegetated Swale	2	LS	\$ 1,000	\$	2,000
Misc. Erosion Control and Site Restoration	1	LS	\$ 1,500	\$	1,500
Laborer	24	HR	\$ 50	\$	1,200
Final Design & Permitting	1	LS	\$ 7,500	\$	7,500
Construction Oversight	1	LS	\$ 3,000	\$	3,000
			Subtotal	\$	18,400
			Contingency (20%)	\$	3,680
			Total	\$	22,080



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Notes:

Project PIT-17 / PIT-18 Conceptual Design

Stormwater Master Plan
Depot Hill Road
Pittsford, VT
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