Brattleboro Stormwater Master Plan

Final Report

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SUBMITTED TO:

Vermont Department of Environmental Conservation

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Disclaimer

The intent of this report is to present the data collected, evaluations, analyses, designs, and cost estimates for the Brattleboro Stormwater Master Plan (SWMP) under a contract between the Vermont Department of Environmental Conservation (VT DEC) and Watershed Consulting Associates, LLC (Watershed Consulting). Funding for the project was provided by the Vermont Department of Environmental Conservation. The plan presented is intended to provide the stakeholders of the Brattleboro a means by which to identify and prioritize future stormwater management efforts. This planning study presents a recommended suite of Best Management Practices (BMPs) to address specific concerns that have been raised for this area. There is great need to reduce stormwater impacts including phosphorus, nitrogen, and sediment loading from stormwater runoff to receiving waters, especially within Vermont's municipalities in the Connecticut River Valley considering current and future regulation under Total Maximum Daily Loads (TMDLs) described in the Deerfield River and Lower Connecticut River Tactical Basin Plan. Although there are other BMP strategies that could be implemented in the study area, those presented in this document are the sites and practices that project stakeholders believe will have the greatest impact and probability of implementation. These practices do not represent a regulatory obligation at this time, nor is any property owner within the SWMP obligated to implement them. However, it should be noted that for properties with three or more acres of impervious cover without a current State stormwater permit, regulations require stormwater management for existing impervious areas under the Vermont General Permit 3-9050, also known as the "three-acre rule". This SWMP, and therefore its resultant strategies, is one of the actions in the Deerfield River and Lower Connecticut River Tactical Basin Plan. The BMP strategies identified in this SWMP will be put in queue for funding for additional design and implementation.

Glossary of Terms

Best Management Practice (BMP)- BMPs are practices that manage stormwater runoff to improve water quality and reduce stormwater volume and velocity. Examples of BMPs include gravel wetlands, infiltration basins, and bioretention practices.

Buffers- Protective vegetated areas (variable width) along stream banks that stabilize stream banks, filter sediment, slow stormwater runoff velocity, and shade streams to keep waters cool in the summer months.

Channel Protection Volume (CPv)- The stormwater volume generated from the one-year, 24-hour rainfall event. Management of this event targets preventing stream channel erosion.

Check Dam- A small dam, often constructed in a swale, that decreases the velocity of stormwater and encourages the settling and deposition of sediment. They are often constructed from wood or stone.

Detention BMP- A BMP that stores stormwater for a defined length of time before it eventually drains to the receiving water body. Stormwater is not retained in the practice. The objective of a detention BMP is to reduce the peak discharge from the BMP to reduce channel erosion and settle out pollutants from the stormwater. Some of these practices also include additional water quality benefits. Examples include gravel wetlands, detention ponds, and non-infiltration-dependent bioretention practices.

Drainage Area- The area contributing runoff to a specific point. Generally, this term is used for the area that drains to a BMP or other feature like a stormwater pipe.

Hydrologic Soil Group- A Natural Resource Conservation Service classification system for the permeability of soils. They are categorized into four groups (A, B, C, and D) with "A" having the highest permeability and "D" having the lowest.

Infiltration/Infiltration Rate- Water percolating into the ground surface. The rate at which this occurs (infiltration rate) is generally presented as inches per hour.

Infiltration BMP- A BMP that allows for the infiltration of stormwater into the subsurface soil as groundwater, which returns to the stream as baseflow. Mapped soils of Hydrologic Group A or B (sandy, well-drained soils) are an indicator of infiltration potential. Infiltration reduces the amount of surface storage required. Typical infiltration BMP practices include infiltration trenches, bioretention practices, subsurface infiltration chambers, infiltration basins, and others.

Outfall- The point where stormwater discharges from a system like a pipe.

Sheet Flow- Stormwater runoff flowing over the ground surface in a thin layer.

Stabilization- Vegetated or structural practices that prevent erosion from occurring.

Stormwater/Stormwater Runoff- Precipitation and snowmelt that runs off the ground surface.

Stormwater Master Plan (SWMP)- A comprehensive plan to identify and prioritize stormwater management opportunities to address current and prevent future stormwater related problems.

Stormwater Permit- A permit issued by the State for the regulated discharge of stormwater.

Swale- An open vegetated channel used to convey runoff and to provide pre-treatment by filtering out pollutants and sediments.

Total Maximum Daily Load (TMDL) – A TMDL is a calculation of the maximum pollutant loading that a water body can accommodate and still meet Vermont Water Quality Standards. The term TMDL also refers to the regulated management plan, which defines how the water body will be regulated and returned to its acceptable condition. This includes the maximum loading, sources of pollution, and criteria for determining if the TMDL is met.

Total Nitrogen (TN)- The total nitrogen present in stormwater. This value is the sum of nitrate-nitrogen (NO3-N), nitrite-nitrogen (NO2-N), ammonia-nitrogen (NH3-N), and organically bonded nitrogen.

Total Phosphorus (TP)- The total phosphorus present in stormwater. This value is the sum of particulate and dissolved phosphorus. It includes both organic and inorganic forms.

Total Suspended Solids (TSS)- The total particulate matter suspended in the water column.

Watershed- The area contributing runoff to a specific point. This includes the entire area draining to the point where the river discharges to the receiving waters (i.e., a lake or the ocean).

Water Quality Volume (WQv)- The stormwater volume generated from the first inch of runoff. This runoff is known as the 90th percentile rainfall event and contains the majority of pollutants associated with a runoff event.

1 Introduction

1.1 The Problem with Stormwater

Stormwater runoff is any precipitation including melting snow and ice that runs off the land. In undeveloped areas, much of the precipitation is infiltrated into the ground, taken up by plants, or evaporated back into the atmosphere. However, when human development limits or completely prevents this natural sponge-like effect of the land, generally through the introduction of impervious areas such as roads, parking lots, or buildings, the volume of stormwater runoff increases, sometimes dramatically. In addition to the increased volume of stormwater runoff, the runoff is also frequently laden with pollutants such as sediment, nutrients, oils, and pathogens. These stormwater runoff related issues decrease aquatic habitat health, increase flooding and erosion, threaten infrastructure, and prevent use and enjoyment of our water resources. Traditionally, stormwater management techniques have relied heavily upon gray infrastructure, where stormwater is collected and conveyed in a network of catchbasins and pipes, prior to discharging to surface waters (i.e., streams, rivers, ponds, lakes, and coastal waters). Although this approach is effective in removing stormwater from developed areas, it does not eliminate the problem and has proved to worsen negative stormwater effects such as erosion, flooding, and nutrient pollution. It is clear that something must change. This is where stormwater master planning comes into play. Funding is limited to implement projects that will improve water quality and reduce the negative impacts of uncontrolled stormwater runoff. As such, creating a plan of where and how to best use these funds to provide the greatest benefit to our water resources is key.

1.2 What is Stormwater Master Planning?

In the wake of rapid urban development and increasing rainfall intensity, stormwater management that seeks to mimic the undeveloped environment and treat stormwater runoff as close to the source as possible has become the focus of efforts to mitigate flooding and maintain the health of our waterways. Given the complexity of current stormwater issues, the development of the Stormwater Master Planning process provides communities with a range of possibilities for stormwater mitigation from small-scale (i.e., individual parcels) to large-scale (i.e., community-wide). Stormwater rarely follows political or parcel boundaries and tackling this problem from a strategic perspective is key to preventing future problems and addressing current sources of water quality degradation. This process was developed because many of the developed areas within the State of Vermont predate regulatory requirements for stormwater management, but these distributed and unmanaged areas are contributing to the impairments of our surface waters, including the Connecticut River and Whetstone Brook. These unmanaged stormwater discharges can be identified and addressed through this Stormwater Master Planning process. The process allows for assessment and prioritization of areas most in need of mitigation while acknowledging that, for many areas, these types of stormwater retrofits are voluntary. Public awareness of both stormwater problems and stormwater management practices are critical to the Stormwater Master Planning process. As such, working with municipal officials, project stakeholders, and community members is key to implementation of and support for these plans. Stormwater Master Planning involves analysis of current and anticipated future conditions, and seeks to prioritize stormwater solutions, maximizing the potential for water quality improvement, flood mitigation, erosion reduction, and pollution prevention using a variety of best management practices (BMPs) and allocating limited funds in a planned and methodical way.

2 Guidelines

In May 2013, the State of Vermont Department of Environmental Conservation (VT DEC) issued a document titled *Vermont Stormwater Master Planning Guidelines*, designed to provide VT communities with a standardized guideline and series of templates. The document assists communities in planning for future stormwater management practices and programs. This Plan is a combination of Templates 2A: Hybrid site & community retrofit approach with green stormwater infrastructure (GSI) stormwater management, and 3A: Large watershed or regional approach with planned build out analysis and traditional (end of pipe or centralized) stormwater management.

Vermont has had stormwater regulations in place since 1978, with updates concerning unified sizing criteria made in 2002 and again in 2017. Recognizing that stormwater management can be a costly endeavor, the new guidelines are written to help identify the appropriate practices for each watershed, community, and site, in order to maximize the use of limited funds.

The guidelines encourage each stormwater master plan (SWMP) to follow the same procedures, and include:

- Problem Definition
- Collection of Existing Data
- Summary and Recommendations
- Existing and Proposed Program, Procedure, or Practice Evaluation
- Development of New Data

In keeping with these guidelines, we have prepared the following report.

3 Background

3.1 Existing Conditions

The study area for this Stormwater Master Plan (SWMP) includes Brattleboro, Vermont (Figure 1). Focus areas within the Town of Brattleboro generally include the more developed areas. The study area is located in Windham County on the banks of the Connecticut River and Whetstone Brook. The Town of Brattleboro spans 32.63 sq mi (20,885 acres), approximately 75% of which is classified as forested while 6.1% of the Town is classified as impervious cover.

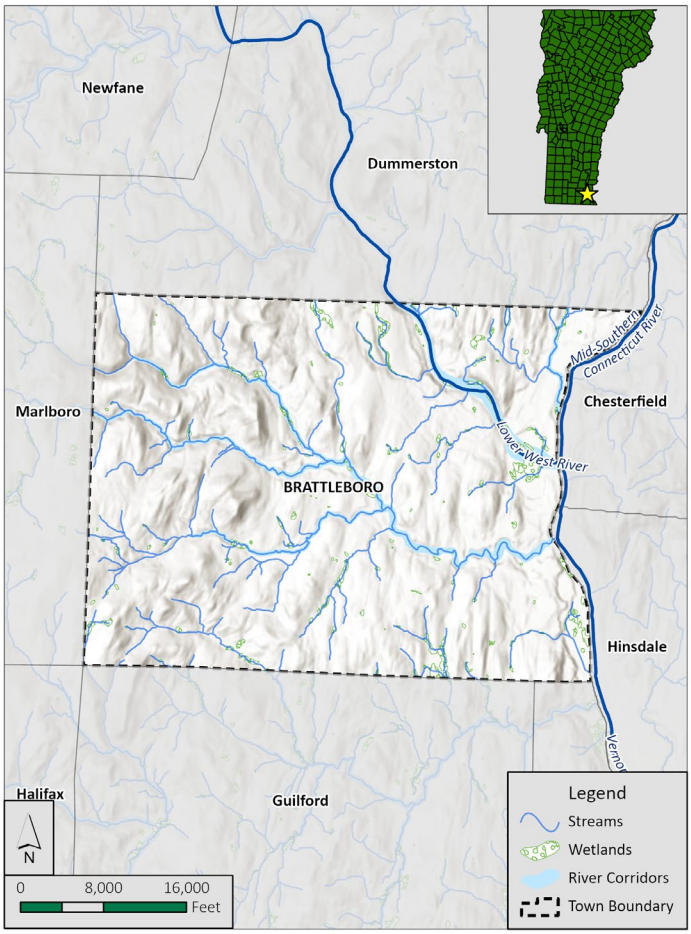

Figure 1. The study area is located in Windham County, VT.

While much of the area is considered rural, there are also areas of urban, commercial, and industrial development. In Brattleboro, approximately 1,747 acres were classified as agricultural, primarily in hay production, as of 2016 land cover data. Additionally, soils in the study area and their associated infiltration potential were assessed using the Natural Resources Conservation Service (NRCS) Hydrologic Soil Group (HSG) classifications. HSGs are classified from group A (highest infiltration potential) to group D (lowest infiltration potential). In the study area, most soils belong to Hydrologic Soil Group C (43%) while only 19% are in group A. 22% are in group B and 10% are in group D. The remainder are classified as a combination of HSGs, water, or unclassified. This combination of steep slopes with limited infiltration capacity and a highly erodible surface makes the area particularly susceptible to erosion.

Virtual overview maps of the study area and maps depicting existing watershed conditions can be found in the accompanying Story Map[1].

[1] https://arcg.is/brDbv

3.2 Problem Definition

The study area is located primarily within the Catsbane Brook-Connecticut River, Upper Green River, Vernon Dam-Connecticut River, West River, and Whetstone Brook watersheds (Figure 2).

In April 2021, the VT DEC confirmed that Crosby Brook is impaired by sedimentation and siltation due to channelization and buffer loss. This has also caused wildlife and fish habitat alterations. This segment is on the 2020 303(d) List of Impaired Waters and discharges into the Connecticut River from the northeast corner of Brattleboro. The majority of the contributing drainage area includes northeast Brattleboro and southeast Dummerston.

Kettle Pond has observations of sedimentation sourced from runoff from developed lands. The sources are largely from the town's Department of Public Works sand pile and the Brattleboro Union High School that is south of Kettle Pond.

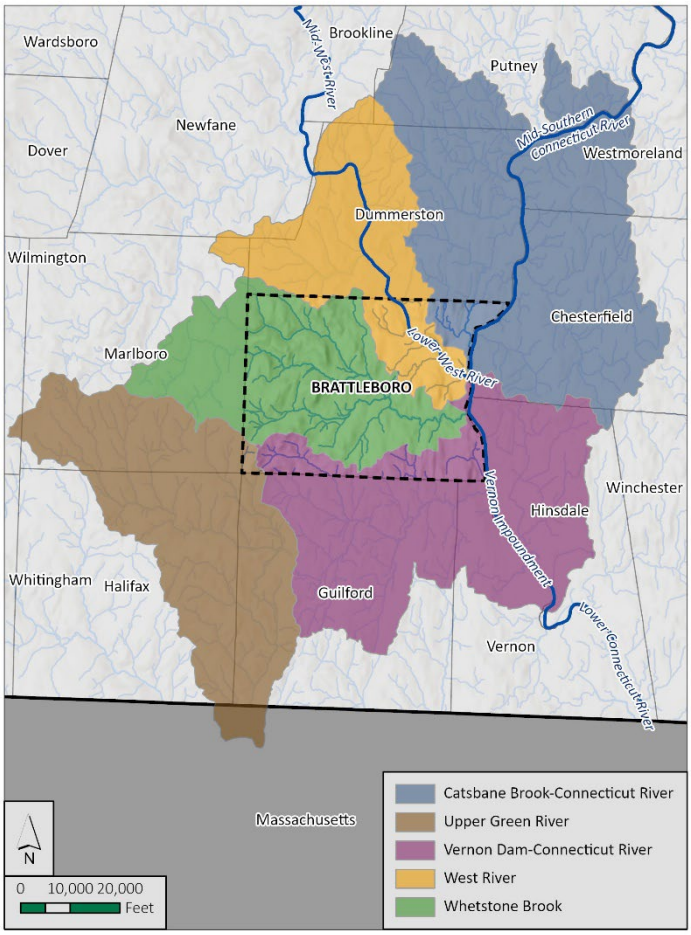

Figure 2. The study area is located primarily within the Catsbane Brook-Connecticut River, Upper Green River, Vernon Dam-Connecticut River, West River, and Whetstone Brook watersheds, tributaries of the Connecticut River and Whetstone Brook.

Whetstone Brook flows west to east before discharging into the Connecticut River in downtown Brattleboro. Whetstone Brook has a 2.5-mile segment that is impaired by bacteria. The contributing watershed consists of industrial and commercial development with sources of malfunctioning onsite septic systems, leaking sanitary sewer pipes, and stormwater runoff and illicit discharges from developed surfaces. Additionally, areas downstream of the study area have been negatively affected by human activities.

In Brattleboro, there is a constrained downtown area that is constructed along the banks of the Whetstone River. There has been significant and damaging flooding in this area due to unmanaged stormwater runoff, increasing development within the watershed, and removal of many natural floodplain areas. Contamination and bedrock are both present in the downtown area, which can make management of stormwater more difficult. Additionally, much of the existing stormwater infrastructure is aged and is challenging to maintain and repair. This area requires strategic retrofit solutions that reduce the occurrence of flooding and improve water quality.

The area faces many challenges as it includes developed areas that drain to the the Connecticut River and Whetstone Brook. Areas of concentrated impervious cover include historic, industrial, commercial, and residential development. Many of the older developments within this area were constructed before current

stormwater standards were developed, and they were constructed without any or with only minimal stormwater management. This has resulted in untreated stormwater draining developed lands, transporting pollutants, and discharging to surface waters.

The human-influenced stressors in the Town include commercial development and associated parking areas, construction of roads, residential development, and clearing of previously forested areas. Unmanaged stormwater runoff, particularly from impervious surfaces and landscaped pervious surfaces exacerbate the occurrence of nuisance flooding as well as more extreme flood events. These flood events are expected to occur more frequently due to the predicted increased frequency and intensity of extreme weather events associated with climate change.

4 Methodology

4.1 Identification of All Opportunities

4.1.1. Initial Data Review and Kickoff Meeting

Relevant prior watershed studies and work previously completed in the study area were reviewed in the context of this SWMP study. This includes Deerfield River and Lower Connecticut River Tactical Basin Plan, the VT DEC's Stormwater Infrastructure Mapping Reports, Design for Resilience in Brattleboro's Lower Whetstone Brook Corridor report, Whetstone Brook Watershed Stream Geomorphic Assessment and River Corridor Plan report, the Putney Road -Crosby Brook Restoration Study Project for proposed STPs in the watershed, and other related documents.

The VT DEC completed the stormwater infrastructure mapping project in the Town of Brattleboro in Fall 2015. The Brattleboro DPW conducted a Road Erosion Inventory (REI) assessment as part of their MRGP permit in Summer 2019. There are 1,675 MRGP segments in the town's current REI database. There are 0 non-compliant road segments that need to be improved to meet the 15% improvement target under the MRGP permit.

Relevant Geographic Information System (GIS) data was drawn from a variety of public resources including the Agency of Natural Resources' Atlas, Vermont Center for Geographic Information Open Geodata Portal, and data created by the University of Vermont's Spatial Analysis Lab. A file geodatabase was created to ensure organization and for ease of use. These data represent the "best available" data at the time of data collection (2021). See Appendix A - Data Review.

A preliminary GIS analysis was conducted to identify parcels with 3 acres or greater of impervious surfaces in Brattleboro. The preliminary GIS analysis using the 2016 impervious dataset provided by the VCGI Open Data Portal demonstrated that there are 35 properties that are equal to or greater than 3 acres of impervious surfaces. 7 of these sites already have an existing stormwater permit and will have to apply for an Operational Stormwater Permit (3-9050) 60 days prior to the expiration of the existing permit. The remaining 28 sites have no existing stormwater permit and are not located within the Lake Champlain Basin, Lake Memphremagog Basin, or a stormwater-impaired watershed, therefore these properties will need to apply for a 3-9050 Operational Stormwater Permit to comply with 3-acre requirements no later than October 1, 2033.

The project team met with representatives from the Town of Brattleboro, the VT DEC, and the Windham Regional Planning Commission on July 13, 2021 to discuss the SWMP and solicit information on known problem areas. See Appendix B - Project Kickoff for meeting minutes. During this meeting, a list of potentially important sites was discussed with the project team. This list included particular parcels as well

as general areas of importance. These areas were noted and added to the list of sites identified during the desktop assessment.

4.1.2. Desktop Assessment and Digital Map Preparation

4.1.2.1 Desktop Assessment

A desktop assessment was completed to identify additional potential sites for stormwater BMP implementation. This process involved a thorough review of existing GIS resources and associated attribute data, considered input from stakeholders, and utilized information collected during the development of the data library. One key resource was the VT DEC Stormwater Infrastructure Mapping Report for the area. This report and mapped data provided current drainage maps and potential locations of stormwater retrofit sites for the study area.

GIS data was reviewed. Data included, but was not limited to, storm sewer infrastructure, soils classifications, parcel data, contamination, wetlands, and river corridors. This data was used to identify and map stormwater subwatersheds with high impervious cover, stormwater subwatersheds that are more directly connected to water bodies (direct pipes to streams or via overland flow), and areas that may have worsening stormwater impacts in the future. A point location was created for each identified site or area for assessment in the field.

During this initial BMP identification, and after incorporating problem areas noted by stakeholders, a total of 40 locations were identified for field investigation. See Figure 3 for an overview map of these sites. See Appendix C - Desktop Assessment for more information and a larger overview map of these areas.

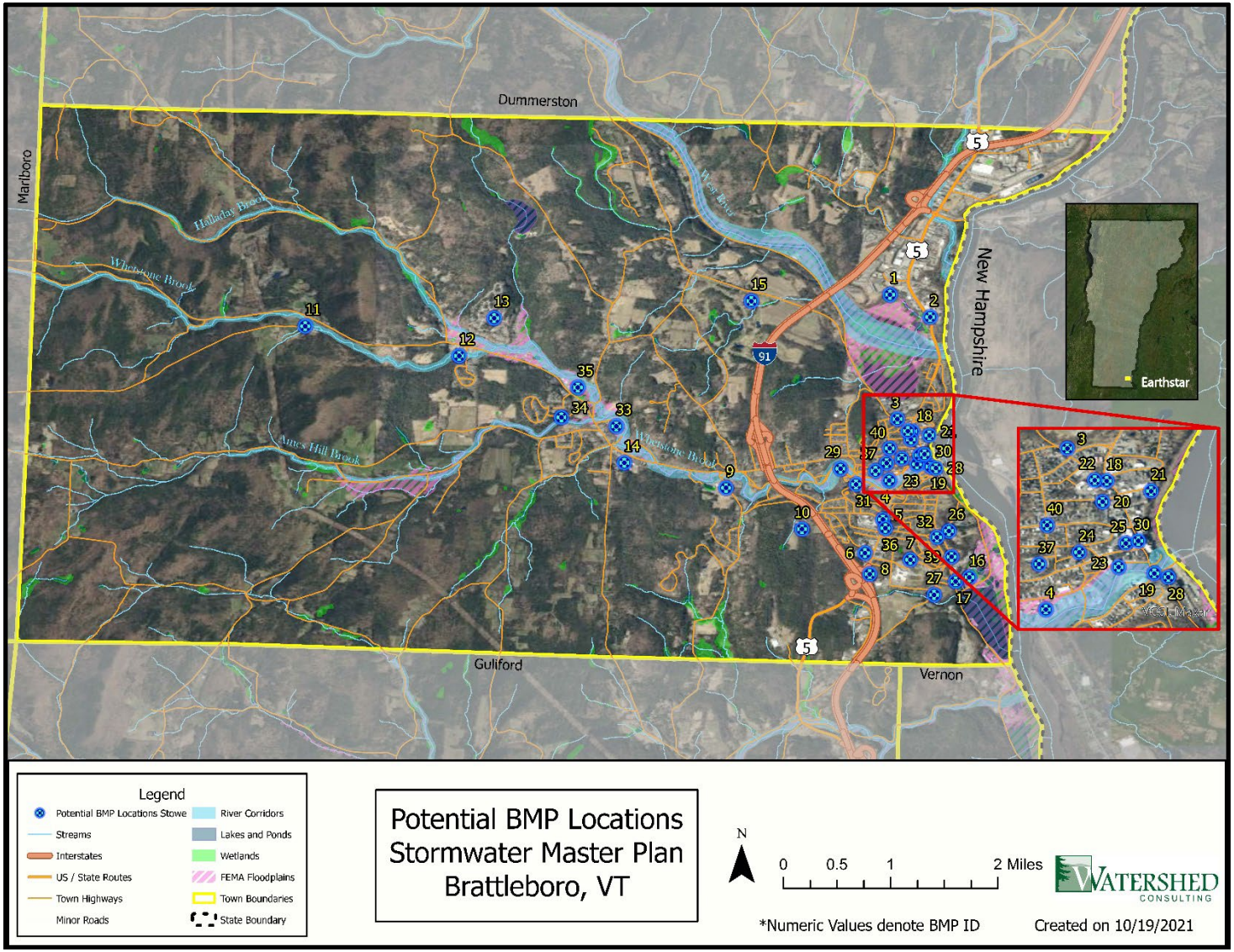

Figure 3. Desktop identified potential BMP locations in Brattleboro.

4.1.2.2. Digital Map and App Preparation

In order to maximize efficiency in the field and better understand site-specific conditions, digital base maps were created for the Town. The maps show parcel boundaries, public parcels, stormwater infrastructure, hydrologic soils groups, river corridors, hydric soils, and wetlands. This information was used in the field to assess potential feasibility issues for proposed practices and to better identify preliminary BMP locations.

The base layers were pre-loaded into a project-specific mobile app that was customized for this project using the Fulcrum platform[2]. The app was also pre-loaded with the 40 locations for the potential BMP sites. These points allowed for easy site location and data collection in the field (Figure 4).

The app was used to collect information including site suitability, photographic documentation, follow-up notes, and other pertinent data. All collected data was securely uploaded to the Cloud for later use.

4.1.2.3. Field Data Collection

Sites were field assessed on November 11, 2021 in Brattleboro. The project team was joined by Brian Bannon (Town Zoning Administrator) and Hank Ainley (VT DEC) for portions of the site visits. Data was collected about each site in the mobile app. The desktop identified sites (40 locations) as well as sites identified during the course of field work were assessed as part of this field survey. The potential list of sites was updated to include these additional sites and occasionally to remove sites that seemed like a potential opportunity for BMP implementation from the desktop but were determined to not be a good site for further BMP design and implementation in the field based on site-specific observations. Following this process, a total of 52 locations sites remained as potential BMP opportunities. A large map of these sites with associated site names, summary sheets, and a memo reviewing the field survey process can be found in Appendix D – Field Assessments.

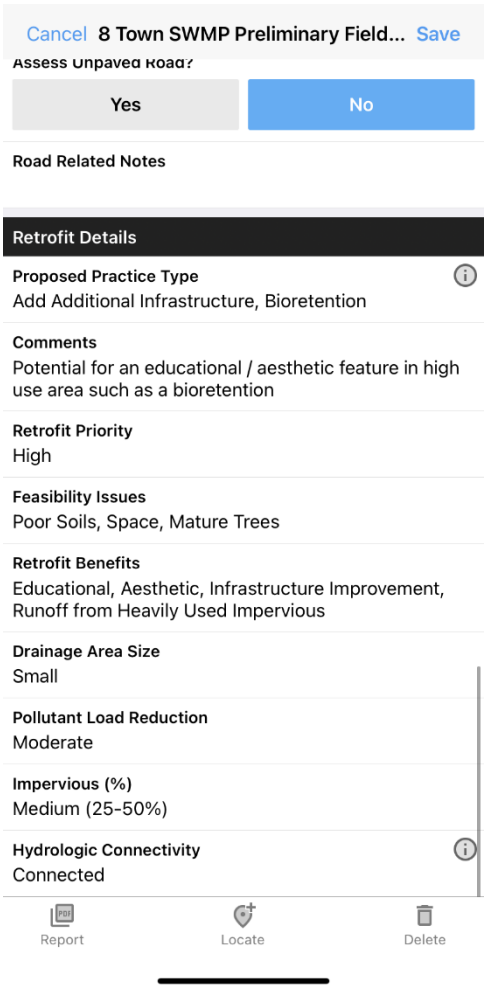

Figure 4. Example screen from data collection app.

4.2 Preliminary BMP Ranking

After the initial field visits were completed, a preliminary ranking and prioritization were carried out on the identified opportunities. The goal of this ranking was to refine the list of field assessed potential BMPs (52 sites) to a priority list of 18 sites. Each project was scored using a Tier I ranking system developed by Watershed Consulting (see Appendix E – Preliminary Ranking for ranking criteria). In addition to objective ranking criteria such as drainage area size, impervious area percentage, proximity to surface waters, etc., an additional criterion that takes local expertise into account was added to the Tier I ranking system. If

[2] www.fulcrumapp.com

municipal or state project stakeholders provided information regarding a particular project and known water quality or flooding concerns, an additional score was added. Likewise, if town and/or state officials provided feedback that certain projects were not feasible, these sites were removed from consideration. This information was added to the Tier I ranking criteria in order to account for stakeholder feedback in this early stage of the project.

Following scoring, a rank was assigned to each project. In the event of an identical score for more than one project, the projects were assigned the same rank number. Those sites with higher scores were ranked as more important. An overview map of the ranked sites can be found in Figure 5. See Appendix E – Preliminary Ranking for the complete list of factors utilized in the preliminary ranking. Also included in Appendix E is the completed ranking for each potential site, and one-page field data summary sheets with initial ranking information. The sites were reviewed by project stakeholders to ensure that the selected projects were supported.

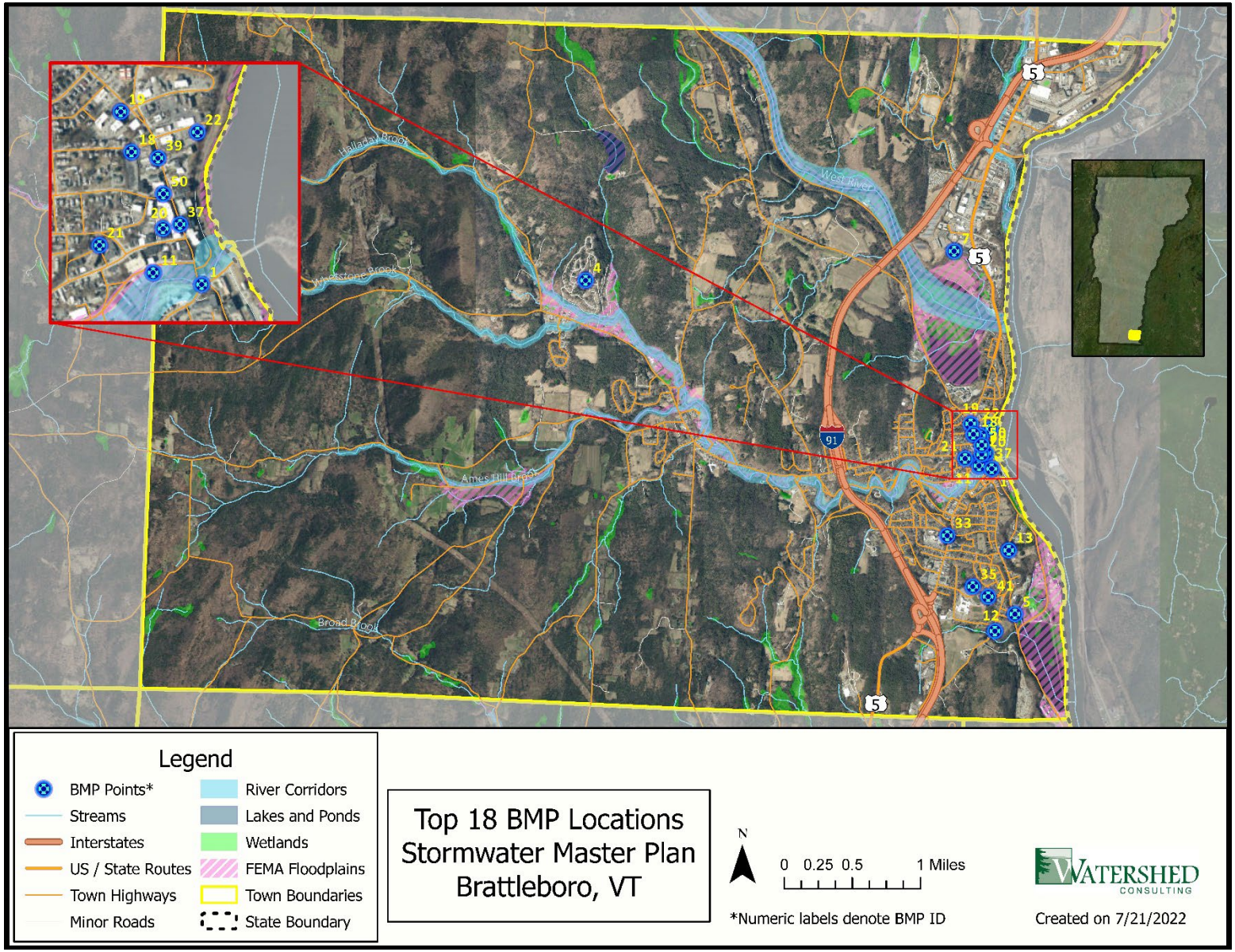

Figure 5. The selected Top 18 projects are shown for Brattleboro.

4.3 Final BMP Ranking

Modeling was completed for each of the Top 18 sites. This modeling allowed for preliminary sizing of the proposed practices as well as an understanding of the water quality and quantity benefits. The contributing drainage area of each of the BMPs was defined using the best available topographic data and land use/land cover was digitized using the best available aerial imagery. Drainage areas were then refined as needed based on field observations.

A Tier II ranking and prioritization process was carried out on the Top 18 sites to determine the estimated pollutant load reductions, estimated implementation costs, anticipated permitting complexity, Operations and Maintenance (O&M) difficulty, community and stakeholder preferences, and co-benefits for each site. Watershed Consulting adopted the ranking criteria from the Vermont DEC's Unified Scoring Prioritization Matrix for Stormwater Master Plans to rank the Top 18 project sites in each town (Figure 6). Minor modifications to the ranking criteria were made including adjusting scoring to account for feedback received during the community outreach portion of the project. A full explanation of the changes can be found in Appendix F – Final BMP Ranking.

A variety of modeling tools were used to acquire data to complete the ranking. EPA Region 1's Stormwater Management Optimization Tool (Opti-Tool) was utilized to model structural best management practices as it provides pollutant loading and reduction estimates for total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS). Some limitations to the Opti-Tool and solutions for these limitations are described in Appendix F.

To acquire the BMP storage capacity values, the BMPs were sized for one of the following treatment standards depending on the space available and engineering feasibility of each site:

- The 1-inch, 24-hour storm, otherwise known as the Water Quality Volume (WQv) Standard. This standard was used if site conditions allowed.
- 50% treatment of the WQv Standard (0.5-inch storm), otherwise known as the Redevelopment Standard.

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)		

Figure 6. The Unified Scoring Prioritization Matrix for Stormwater Master Plans developed by the Vermont DEC.

4.3.1. Community Outreach

An ESRI StoryMap was developed to provide an overview of the project, the goals, water quality and flooding issues related to unmanaged or improperly managed stormwater. This StoryMap was shared with project stakeholders and distributed to the community. Embedded within the StoryMap was a survey developed by the project team and made available to the public for approximately one month to gather feedback from the community.

This StoryMap was developed to be an accessible, user-friendly communication tool for both public and private entities to learn about the project background and goals as well as stormwater issues in general. This StoryMap was used during a Community Visioning meeting, which was held with representatives from the Town of Brattleboro, the VT DEC, and several interested community members on May 4, 2022. An overview of the project, the background, the goals, and the potential BMP opportunities was provided.

Then, questions were answered and feedback was requested from the community via the embedded survey. Meeting minutes can be found in Appendix F.

The online survey was publicly advertised on the Town's website, Front Porch Forum (if applicable), and mailed letters to relevant landowners. The survey was open for one month. There were 22 participants who provided feedback via survey. The participants largely included residents and then town representatives.

According to survey results, the biggest stormwater concerns in Brattleboro include flooding from rivers and streams, and nutrient pollution and contaminated soils entering waterways. 50% of participants would like to see above-ground stormwater practices that incorporate aesthetics, educational benefits, and habitat benefits, incorporated into Brattleboro's Main Street and downtown area. The remaining 50% of participants would like to see belowground stormwater practices that do not noticeably change the existing uses or appearance of the site. In a ranking exercise, survey respondents prioritized establishing wildlife habitat and landscape beautification. They felt neutral about providing educational opportunities with proposed stormwater projects and were least concerned with preserving public parking. When choosing preferred strategies for stormwater project prioritization, survey respondents prioritized tackling high capital, impactful projects over small, low-cost projects, focusing on publicly owned projects, having public services provide maintenance and upkeep, and incorporating stormwater projects with other ongoing town improvements.

Feedback was integrated from the community-wide survey into the Tier II ranking matrix. The following questions were selected for inclusion as they elicit objective answers that can be assigned a point value to either response including:

1. Do (Town) residents prefer seeing above-ground or in-ground stormwater practices that can incorporate planning, aesthetic, education, or habitat benefits OR below-ground stormwater practices that do not noticeably change the existing land uses or appearance of the site?
2. Should we start with smaller, low-cost, and easy-to-implement projects OR tackle high-capital, impactful projects?
3. Should we focus on publicly owned and managed projects OR work with private landowners?

See Appendix F – Final BMP Ranking for more information about this process.

4.3.2. Tier II Ranking and Scoring

The total score of each project was calculated by adding up the points for each criterion in the Tier II Ranking Matrix. The total score of each project was divided by the maximum points it could achieve for all applicable criteria in the Tier II Ranking Matrix to provide a percent score. The projects were ranked in order from highest to lowest percent score. The Top 18 project list below provides each project's BMP ID, site name, address, and the proposed practice:

Brat_35: Brattleboro Union High School (131 Fairground Road) – Proposed Practice: Hydrodynamic Separator, Infiltration Chambers

Brat_6: Living Memorial Park (61 Guiford Street) – Proposed Practice: Infiltration Chambers

Brat_18: High Grove Parking Lot (30 Grove Street) – Proposed Practice: Sand Filter

Brat_7: Staples Plaza (768 Putney Road) – Proposed Practice: Underground Storage / Infiltration

Brat_37: Main Street – Proposed Practice: Bioretention Curb Bump Outs, Tree Boxes

Brat_13: Morningside Cemetery (246 S Main Street) – Proposed Practice: Underground Storage / Infiltration

Brat_12: Town-Owned Site (South of 630 S Main Street) – Proposed Practice: Underground Storage / Infiltration

Brat_39: Town Parks & Recreation (207 Main Street) – Proposed Practice: Distributed Green Stormwater Infrastructure

Brat_33: Brattleboro Memorial Hospital (22 Maple Street) – Proposed Practice: Underground Storage / Infiltration

Brat_41: Department of Public Works (211 Fairground Road) – Proposed Practice: Dry Wells

Brat_1: Main St/Vernon St Intersection – Proposed Practice: Dry Wells

Brat_21: Parking Lot (72 Green Street, Behind Fire Department) – Proposed Practice: Underground Storage / Infiltration

Brat_5: The Cotton Mill (72-76 Cotton Mill Hill) – Proposed Practice: Underground Storage / Infiltration

Brat_22: Harris Place Parking Lot (51 Harris Place) – Proposed Practice: Underground Storage / Infiltration

Brat_19: Municipal Center (230 Main Street) – Proposed Practice: Bioretention

Brat_50: Pliny Park (Corner of High Street and Main Street)- Proposed Practice: Bioretention

Brat_11: Preston Lot (East of 72 Flat Street) – Proposed Practice: Bioretention

Brat_4: Tri Park Co-op Housing (42 Village Drive) – Proposed Practice: Residential Green Stormwater Infrastructure

A map of the Top 18 project locations and field sheets for each potential practice locations can be seen in Appendix F – Final BMP Ranking. The project point locations can be viewed in Figure 5.

4.4 Top 3 Sites

Selection of the Top 3 sites considered the results from Watershed Consulting's initial site investigations, preliminary ranking, final ranking, and input from project stakeholders concerning project priorities. The three sites with the highest score that also had stakeholder support and public or private landowner willingness were selected for 30% design. For the Town of Brattleboro, the selected sites were:

Brat_18: High Grove Parking Lot (30 Grove Street) – Proposed Practice: Sand Filter

Brat_35: Brattleboro Union High School (131 Fairground Road) – Proposed Practice: Hydrodynamic Separator, Infiltration Chambers

Brat_6: Living Memorial Park (61 Guiford Street) – Proposed Practice: Infiltration Chambers

A map showing these three BMP locations is included as Figure 7.

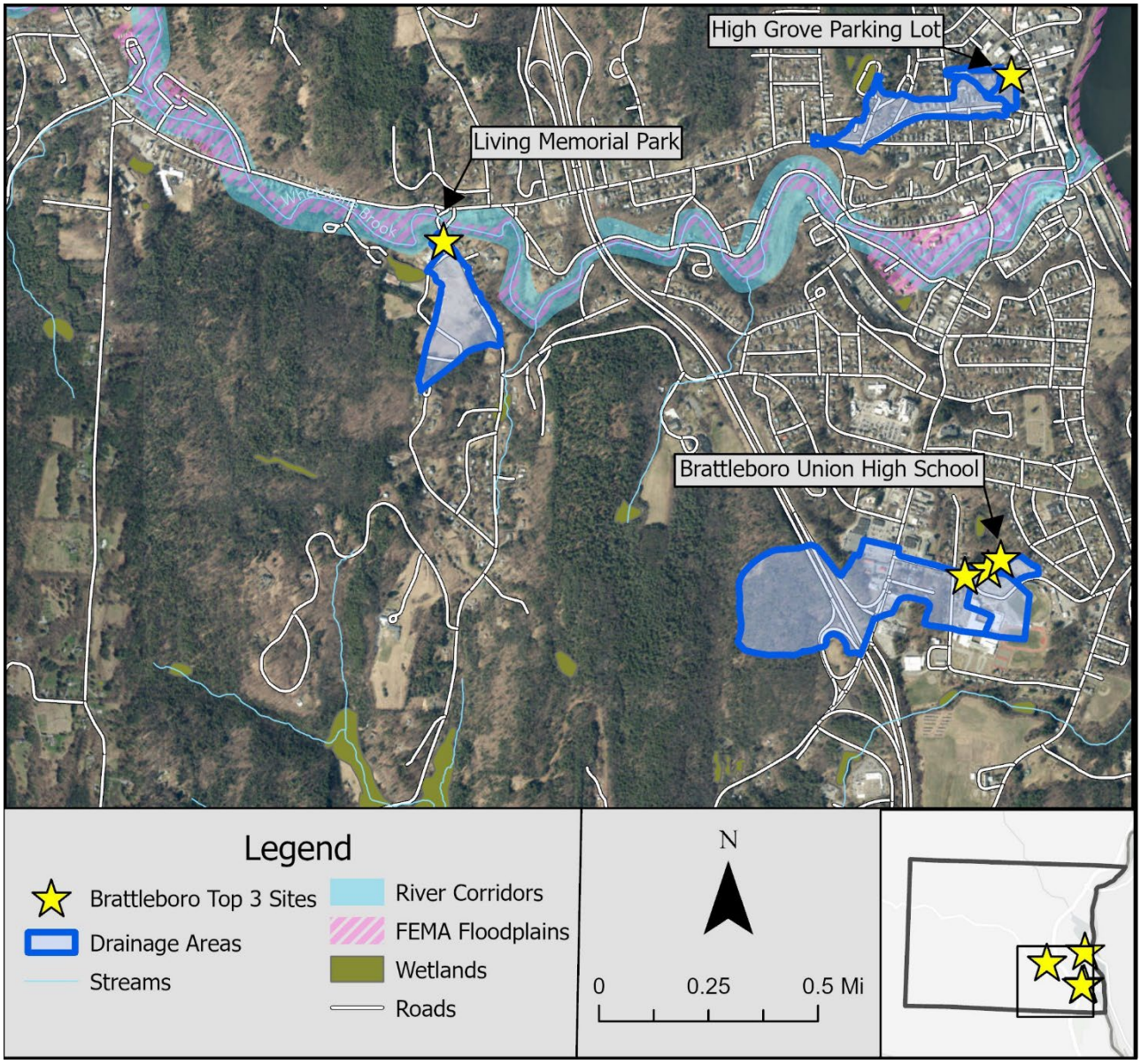

Figure 7. Top 3 site locations. Drainage areas are shown in blue and project locations are shown with a yellow star.

5 30% Designs

The selected Top 3 BMP sites are described below; their locations within the study area are shown in Figure 7. 30% designs were developed for each site. These plans can be found in Appendix H – 30% Designs.

5.1 Site 1: High Grove Parking Lot

5.1.1. 30% Concept Design Description

The proposed practice includes installing a sand filter chamber system underneath the existing public parking lot. The system will capture and treat runoff from the parking lot, Grove Street, and High Street. The system will help slow stormwater flows toward Main Street and treat runoff prior to discharge to the Connecticut River.

This would be a complicated but highly beneficial project to implement. To avoid any impacts to the structural integrity of the retaining wall on the eastern edge of the parking lot, as well as block infiltration of flows to prevent potential downslope flooding, the proposed system is atop an impermeable liner. To achieve treatment of the full water quality volume, the chamber system does not fit in a standard rectangular configuration in the angled parking lot. It is therefore proposed in connected sections. On the northern side of the parking lot, the depth of fill required to bring the lot back to the existing grade is within the specification of proposed SC-740 chamber. However, to bring the southern side of the lot back to its existing grade, the depth fill may exceed manufacture specifications. A reinforced chamber designed for deep cover, such as the ADS StormTech DC-780 chamber, could be considered in future design stages. Several crossings of stormwater lines over sewer lines are proposed, so additional utility survey would be required to confirm the feasibility of these crossings. To reduce the cost or complexity of the project, future design iterations could exclude flows from High Street or Grove Street if necessary.

Soils are mapped as being appropriate for infiltration (HSG A), but at this site, infiltration was not recommended due to its location on a steep slope with significant development downslope of the proposed practice location. As such, a non-infiltrating subsurface sand filter is recommended for this location and soils were not assessed in the field.

See Figure 8 for a map of the drainage area. The general area for the stormwater treatment practice is shown with a star on this map.

This practice will provide a significant water quality benefit and will reduce the velocity of stormwater volumes discharged (Table 1). A 30% design plan is provided in Appendix H – 30% Designs.

The total estimated cost for this project was calculated during development of the 30% design. The itemized cost estimate is available in Appendix H. In total, this project is estimated to cost $745,000.00.

- The cost per pound of phosphorus treated is $44,345.24.
- The annual cost per kg of phosphorus treated following the methodology utilized by the VT DEC in the Vermont Clean Water Initiative 2020 Performance Report is $4,889.06.
- The cost per pound of nitrogen treated is $14,466.02.

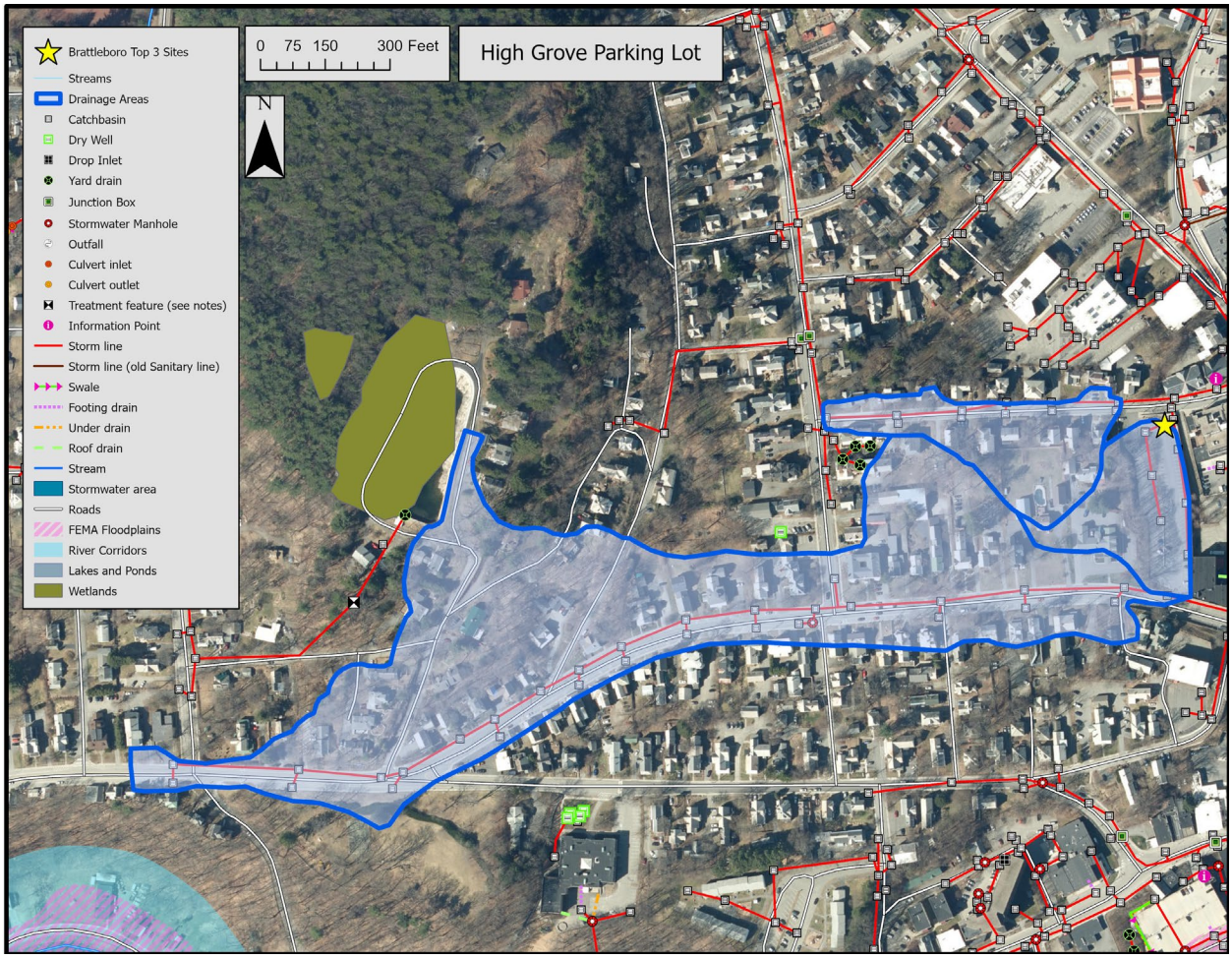

Figure 8. The drainage area for the proposed BMP is shown in blue. The proposed BMP location is shown with a star.

5.1.2. Pollutant Removal and Other Water Quality Benefits

This practice has the potential to prevent 16.8 lbs (74%) of total phosphorus (TP), 51.5 lbs (31%) of total nitrogen (TN), and 4,231 lbs (84%) of TSS from entering receiving waters annually. The design standard used for this retrofit was filtration of the water quality volume (WQv, or 1.0") of rain in a 24-hour period). See Table 1 for the benefit summary table.

Table 1. Site 1 benefit summary table.

TSS Removed	4,231 lbs
TP Removed	16.8 lbs
TN Removed	51.5 lbs
Impervious Treated	11.3 acres
Total Drainage Area	20.6 acres

5.1.3. Next Steps

As this site is owned and operated by the municipality of Brattleboro, it is recommended that the Town proceed with further design of this retrofit. Further design will involve refinement of the 30% retrofit concept with respect to size, outlet design, and routing to ensure that the target volume can be completely managed and that larger storms bypass the system safely.

5.1.4. Permit Needs

A preliminary natural resource screening was conducted to determine what permits will need to be obtained for project implementation. A local zoning permit and a state construction general permit (CGP) will be required for project implementation. Associated permit fees for each application will need to be determined in the subsequent design phases.

5.2 Site 2: Brattleboro Union High School

5.2.1. 30% Concept Design Description

This proposed project involves several components. First, water quality can be improved by installing a hydrodynamic separator on the stormline that crosses under Fairground Road. This line eventually discharges to Kettle Pond and would not be treated by either of the two proposed basins (described below), so a hydrodynamic separator would be an effective and compact way to provide water quality treatment for these flows in this constrained area.

The second component of this proposed project includes an infiltration basin for the main Brattleboro Union High School drainage. It is proposed that an infiltration basin is installed in the existing green space to the north of the school parking lot. Any overflow from the basin during large storm events will be directed toward a stone lined channel prior to discharging to Kettle Pond.

The final component of the proposed project addresses the sedimentation to Kettle Pond from the Town Sand Pit. The proposed practice includes installing an infiltrating sand filter along perimeter of the Town sand pit. The practice will capture runoff from the pit, reducing sediment and other pollutant loads into Kettle Pond. Soils are mapped as having very good infiltration potential and fall within Hydrologic Soil Group A, for the northern half of the site. For the southern half of the site, soils are mapped as having good infiltration potential (Hydrologic Soil Group B). Soils were assessed in the field on October 14, 2022 adjacent to where the proposed BMP is located using a hand auger. Assessments showed that soils were generally sandy loam and granular and were appropriate for an infiltration-based BMP. An infiltration test completed using a Johnson constant head permeameter. The infiltration rate was utilized for the design and sizing of the proposed Tier 1 practice for stormwater treatment. The soils report can be found in Appendix G.

See Figure 9 for a map of the drainage area. The general area for the stormwater treatment practice is shown with a star on this map.

This practice will provide a significant water quality benefit and will reduce the velocity of stormwater volumes discharged (Table 2). A 30% design plan is provided in Appendix H - 30% Designs.

A visually appealing rendering was also developed for this site. This rendering can serve as a communication tool to help stakeholders understand the aesthetic, location, and design of the proposed practice. It can also be utilized in grant applications to obtain additional funding. This rendering can be found in Appendix I.

The total estimated cost for this project was calculated during development of the 30% design. The itemized cost estimate is available in Appendix H. In total, this project is estimated to cost $95,000.00.

- The cost per pound of phosphorus treated is $6,418.92.
- The annual cost per kg of phosphorus treated following the methodology utilized by the VT DEC in the Vermont Clean Water Initiative 2020 Performance Report is $707.69.
- The cost per pound of nitrogen treated is $744.51.

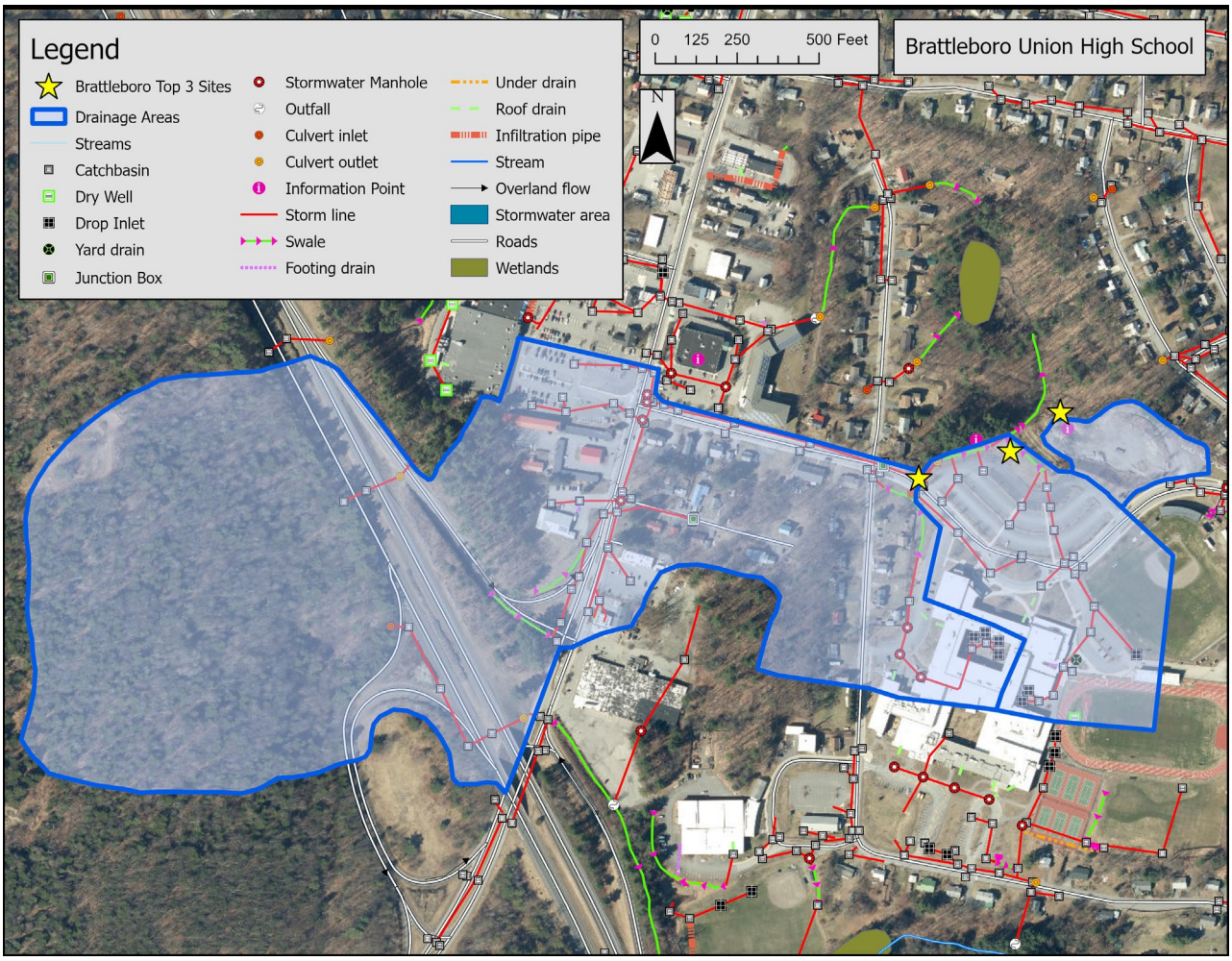

Figure 9. The drainage area for the proposed BMP is shown in blue. The proposed BMP location is shown with a star.

5.2.2. Pollutant Removal and Other Water Quality Benefits

This practice has the potential to prevent 14.8 lbs (97%) of total phosphorus (TP), 127.6 lbs (99%) of total nitrogen (TN), and 3,195 lbs (98%) of TSS from entering receiving waters annually. The design standard used for this retrofit was infiltration of the water quality volume (WQv, or 1.0") of rain in a 24-hour period). See Table 2 for the benefit summary table.

Table 2. Site 2 benefit summary table.

TSS Removed	3,195 lbs
TP Removed	14.8 lbs
TN Removed	127.6 lbs
Impervious Treated	8.5 acres
Total Drainage Area	12.8 acres

5.2.3. Next Steps

As this site is owned and operated by the municipality of Brattleboro, it is recommended that the Town proceed with further design of this retrofit. Further design will involve refinement of the 30% retrofit concept with respect to size, outlet design, and routing to ensure that the target volume can be completely managed and that larger storms bypass the system safely.

5.2.4. Permit Needs

A preliminary natural resource screening was conducted to determine what permits will need to be obtained for project implementation. A local zoning permit and a state construction general permit (CGP) will be required for project implementation.

There is an existing Act 250 permit series issued to the BUHS property (permit series #700017). A minor amendment permit application to the existing Act 250 permit will need to be completed for project implementation.

BUHS has an existing stormwater permit (#5954-9010.A) that expires on July 28th, 2024. A renewal application will need to be submitted to the DEC Stormwater Program no later than 60 days prior to the expiration of the permit. BUHS is a 3-acre site and will need to obtain a 3-9050 Operational Stormwater Permit when the proposed project is ready for implementation in order to comply with 3-acre requirements.

Associated permit fees for each application will need to be determined in the subsequent design phases.

5.3 Site 3: Living Memorial Park

5.3.1. 30% Concept Design Description

Install infiltration chamber system underneath existing parking lot. The system will capture runoff from the parking area, a section of Guilford Street, a section of Memorial Park Drive.

The proposed practice collects drainage from an existing stormline under Guilford Street using a weir. Flows greater than the water quality volume would top the weir, bypassing the chamber system, and continue down Guilford Street. It would be important to confirm that any backup of flow caused by the proposed weir would cause any flooding upstream in the existing stormwater system. Given that the infiltration rate is relatively low, verifying the ability of the practice to properly pass larger storms is crucial. The existing pipes receiving the overflow are 12" diameter pipes. Subsequent modeling may suggest that 12" pipes are inadequate, and may have to be upsized which would add additional cost the project.

Soils are mapped as having very good infiltration potential and fall within Hydrologic Soil Group A, for the northern half of the site where the parking areas are. For the southern half of the site, soils are mapped as having good infiltration potential (Hydrologic Soil Group B). Soils were assessed in the field on October 14, 2022 adjacent to where the proposed BMP is located using a hand auger. Assessments showed that soils were generally sandy loam and gravely and were appropriate for an infiltration-based BMP. An infiltration test completed using a Johnson constant head permeameter. The infiltration rate was utilized for the design and sizing of the proposed Tier 1 practice for stormwater treatment. The soils report can be found in Appendix G.

See Figure 10 for a map of the drainage area. The general area for the stormwater treatment practice is shown with a star on this map.

This practice will provide a significant water quality benefit and will reduce the velocity of stormwater volumes discharged (Table 3). A 30% design plan is provided in Appendix H - 30% Designs.

A visually appealing rendering was also developed for this site. This rendering can serve as a communication tool to help stakeholders understand the aesthetic, location, and design of the proposed practice. It can also be utilized in grant applications to obtain additional funding. This rendering can be found in Appendix I.

The total estimated cost for this project was calculated during development of the 30% design. The itemized cost estimate is available in Appendix H. In total, this project is estimated to cost $357,000.00.

- The cost per pound of phosphorus treated is $72,267.21.
- The annual cost per kg of phosphorus treated following the methodology utilized by the VT DEC in the Vermont Clean Water Initiative 2020 Performance Report is $7,967.46.
- The cost per pound of nitrogen treated is $8,333.33.

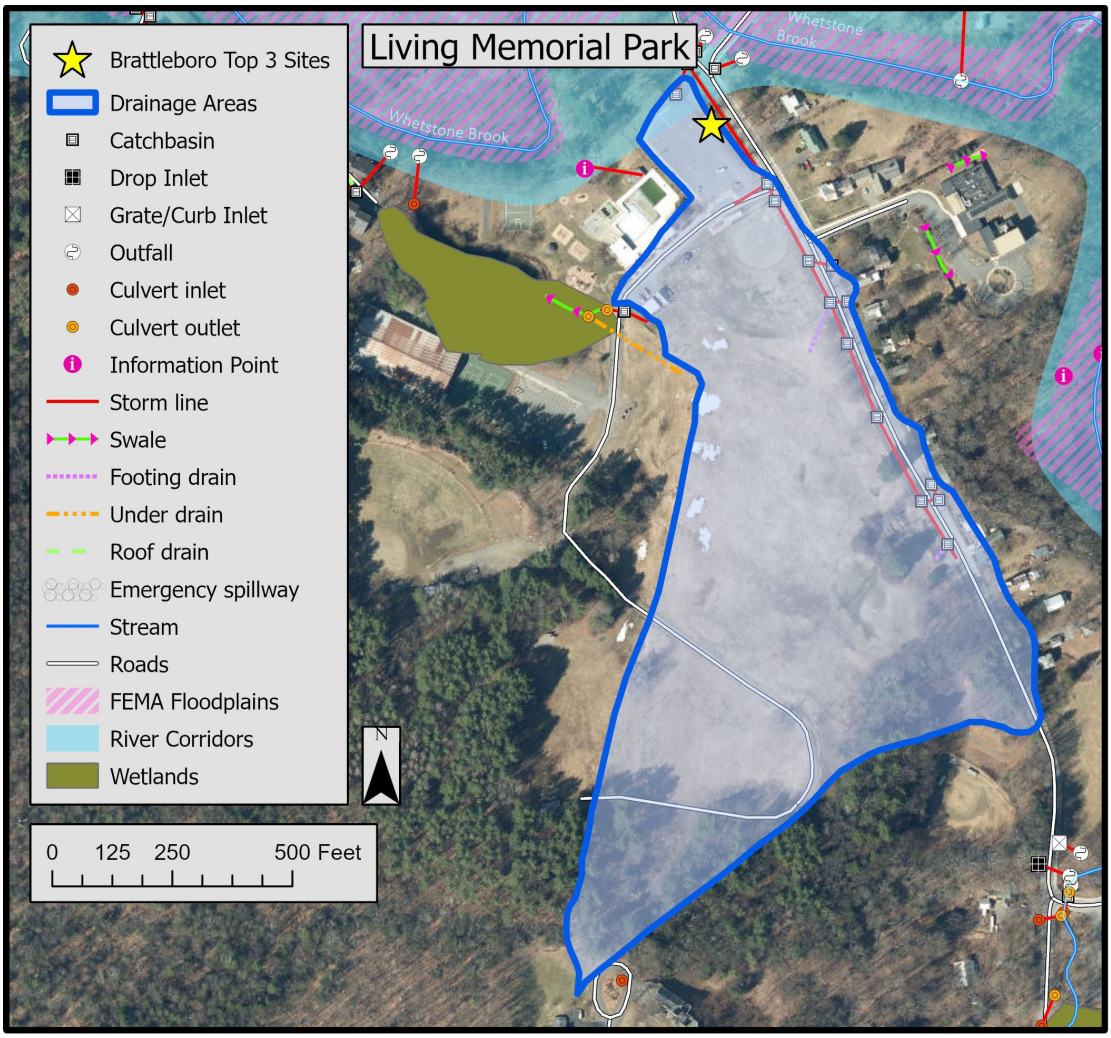

Figure 10. The drainage area for the proposed BMP is shown in blue. The proposed BMP location is shown with a star.

5.3.2. Pollutant Removal and Other Water Quality Benefits

This practice has the potential to prevent 4.94 lbs (70.5%) of total phosphorus (TP), 42.84 lbs (74.1%) of total nitrogen (TN), and 1,137.5 lbs (73.3%) of TSS from entering receiving waters annually. The design standard used for this retrofit was infiltration of the water quality volume (WQv, or 1.0") of rain in a 24-hour period). See Table 3 for the benefit summary table.

Table 3. Site 3 benefit summary table.

TSS Removed	1,138 lbs
TP Removed	4.94 lbs
TN Removed	42.84 lbs
Impervious Treated	2.9 acres
Total Drainage Area	19.3 acres

5.3.3. Next Steps

As this site is owned and operated by the municipality of Brattleboro, it is recommended that the Town proceed with further design of this retrofit. Further design will involve refinement of the 30% retrofit concept with respect to size, outlet design, and routing to ensure that the target volume can be completely managed and that larger storms bypass the system safely.

5.3.4. Permit Needs

A preliminary natural resource screening was conducted to determine what permits will need to be obtained for project implementation. A local zoning permit and a state construction general permit (CGP) will be required for project implementation.

There is an existing Act 250 permit series issued to the Living Memorial Park property (permit series #700023). A minor amendment permit application to the existing Act 250 permit will need to be completed for project implementation.

There is no existing stormwater permit issued to Living Memorial Park. This site is a 3-acre site and will need to obtain a 3-9050 Operational Stormwater Permit no later than October 1, 2033 when the proposed project is ready for implementation in order to comply with 3-acre requirements.

A small portion of the proposed project falls within the river corridor of Whetstone Brook. In subsequent design phases, the applicable River Scientist will need to be contacted to determine the allowed uses and potential permitting needs for impact to the River Corridor.

Associated permit fees for each application will need to be determined in the subsequent design phases.

6 Final Recommendations

The results of this SWMP have identified a number of potential BMP concepts and locations that would have a positive impact on water quality in the study area and receiving waters. Although designs were only advanced for the Top 3 projects, this plan also serves to highlight these other opportunities throughout the study area. The momentum developed during this study should be strengthened and continued.

The practices proposed in this study all stand to have a substantial impact on abating water pollution and setting a precedent for integrating stormwater management practices within the landscape. It is our recommendation that the Top 3 project stakeholders, potentially in partnership with the regional planning commission, private landowners, and other public stakeholders, move to seek out grant funding to complete a final design and ultimately implementation of these practices. The project renderings completed for selected projects (see Appendix I – Concept Renderings), the 30% designs (see Appendix H – 30% Designs), and the Story Map can be utilized as outreach tools and to support grant applications and public and private support as needed.

It is also recommended that the Town of Brattleboro move forward with additional design and implementation of other projects presented in this plan (see Appendix E and F for lists of projects). As these practices are the result of a stormwater master planning effort under a VT DEC Clean Water Fund grant, they are well-suited as candidates for an implementation grant from this same source. We recommend the following steps in proceeding with this:

- For priority projects being developed to the 30% concept level, consider grant applications for final design and implementation.
- Submit grant funding requests for higher scoring projects that may include both preliminary and final design.

A visually appealing rendering was also developed for an additional site, the Brattleboro Town Clerk and Municipal Center Parking project. This site was deemed a priority water quality project, though it was not selected for a 30% design. This rendering can serve as a communication tool to help stakeholders understand the aesthetic, location, and design of the proposed practice. It can also be utilized in grant applications to obtain additional funding. This rendering can be found in Appendix I.

The Vermont Agency of Transportation (VTrans), as part of their Transportation Separate Storm Sewer System (TS4) General Permit, will be completing retrofits of VTrans-owned impervious surfaces throughout the Town. Projects identified in this plan that involve VTrans drainage should be coordinated with the VTrans TS4 permitting efforts to allow for potential collaboration.

7 Funding Opportunities

There is a wide range of grant programs within Vermont that can help to forward voluntary or regulatory stormwater project opportunities identified in this SWMP to the preliminary (30%) design, final (100%) design, and implementation phases.

Grant funding opportunities listed below are organized into four categories based on the type of stormwater project it is applicable for:

1. All Stormwater Design/Implementation Projects (Applicable for Regulatory or Voluntary)
2. Voluntary Stormwater Design/Implementation Projects Only
3. Regulatory Stormwater Design/Implementation Projects Only: Required for GP 3-9050 Operational Stormwater Permit

4. Regulatory Stormwater Design/Implementation Projects Only: Required for Municipal Roads General Permit (MRGP).

Additional information regarding these opportunities follows.

7.1 All Stormwater Design/Implementation Projects (Applicable for Regulatory or Voluntary):

7.1.1. Clean Water Initiative Program:

The Vermont DEC's Clean Water Initiative Program (CWIP) funds projects that will maintain compliance with the Vermont Water Quality Standards[3] and meet the following goals from Vermont's Surface Water Management Strategy[4]:

1. Protect, Maintain, Enhance, and Restore the Biological, Chemical, and Physical Integrity of all Surface Waters
2. Support the Public Use and Enjoyment of Water Resources
3. Protect the Public Health and Safety

The VT DEC CWIP has developed a funding policy that serves as a communication tool to assist prospective grant recipients with understanding the required eligibility requirements, timelines, milestones, deliverables, and outcomes that are required when using CWIP-administered funds for water quality projects. The CWIP State Fiscal Year (SFY) 2023 Funding Policy was approved in December 2022. The Funding Policy applies to the following 4 CWIP-administered clean water funding programs (red text represents CWIP funding programs that are applicable to the stormwater projects in this SWMP):

- Water Quality Restoration Formula and Operation and Maintenance Grants.
- Water Quality Enhancement Grants (includes both state-administered contracts and grants as well as block grants issued under this funding program and excludes wetlands incentive payments). The following section provides more information on this specific funding program for voluntary stormwater projects.
- Municipal Stormwater Implementation Grants (includes Municipal Separate Storm Sewer System (MS4) Community Formula Grants and Municipal Roads Grants in Aid Equipment Grants; excludes the Green Schools Initiative).
- New funding rounds under existing or open CWIP block grant agreements from State Fiscal Year 2022 or earlier (includes the Woody Buffer Block Grant, Design and Implementation Block Grant, Dam Removal Design and Implementation Block Grant, Watershed Work Crew Block Grants, and the Project Development Block Grant). The next section provides more information on the Design and Implementation Block Grants.

Visit the CWIP Grants Notification Listserv link to stay informed on new CWIP grant opportunities that can fund these stormwater projects in your municipality. Enter your email and name to receive email updates on funding opportunities when they are released.

7.1.2. Design/Implementation Block Grant (DIBG):

The Design and Implementation block grant (DIBG) program is available to stormwater projects statewide and administered through the Watersheds United Vermont (WUV), Mount Ascutney Regional Planning

[3] 2022 Vermont Water Quality Standards: https://dec.vermont.gov/sites/dec/files/documents/2022-Vermont-Water-Quality-Standards.pdf
[4] Vermont Surface Water Management Strategy: https://dec.vermont.gov/watershed/map/strategy

Commission (MARC), and the Natural Resources Conservation Council (NRCC) with funding sourced from the Vermont DEC CWIP. MARC, NRCC, and WUV usually announce two to three funding rounds each year. Applicants are required to screen for possible natural resources conflicts and provide backup cost estimates and preliminary engineering plans. To stay updated on when new funding rounds are available, either click on the links above to MARC, NRCC, and WUV, or enter your name and email through this CWIP Grants Notification Listserv link. This program will fund final design and construction with 10% of the project delivery cost as payment to the entity that will manage the grant (watershed group or regional planning commission). Grants are competitive based on cost per pound of phosphorus removed. ***This block grant is projected to sunset by 2024.***

7.1.3. Vermont Clean Water State Revolving Fund (CWSRF):

The Vermont CWSRF program provides funding in the form of low interest loans to municipalities and private entities for eligible projects. Eligible project types applicable to the projects identified in this SWMP include stormwater treatment and green infrastructure projects. This program includes funding for the planning and final design phase and the construction phase. Repayment of planning and final design loans can be rolled into a subsequent construction loan or begins five years following completion of the relevant engineering documents or the last loan disbursement, whichever occurs first. Repayment of the construction loan begins one year following project construction completion. 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 follow Cost and Effectiveness Guidelines (C&E). These documents can be found in the blue link above.

7.2 Voluntary *Stormwater Design/Implementation Project:*

7.2.1. Water Quality Enhancement Development, Design, & Implementation Block Grant:

This block grant program will be coming soon and will prioritize projects ***outside of the Lake Champlain and Lake Memphremagog Basins***. To receive email updates on when this program becomes available, enter your name and email through this CWIP Grants Notification Listserv link. The block grant program will support the development, design, and implementation of priority water quality enhancement projects. All projects must be non-regulatory (voluntary) and must meet at least one of the following statutorily defined purposes for Water Quality Enhancement Grants:

a. Protect high quality waters,
b. Maintain or improve water quality,
c. Restore degraded or stressed waters,
d. Create resilient watersheds and communities, or
e. Support the public's use and enjoyment of the State's waters

View the Water Quality Enhancement Grants Summary to learn more.

7.3 Regulatory Stormwater Design/Implementation Project: Required for GP 3-9050 Operational Stormwater Permit.

7.3.1. American Rescue Plan Act of 2021 (ARPA) 3-Acre Stormwater:

This is a 3-Acre Stormwater Permit Obtainment Assistance Program. The Agency of Natural Resources has administered this program for eligible property owners whose properties have three or more acres of impervious surfaces to assist them with a portion of the costs associated with obtaining the Stormwater General Permit 3-9050. Construction expenses associated with General Permit 3-9050 are **not** eligible for

payment under this benefit program. This program goes into effect in February 2023 and will have a rolling application period and permit obtainment payments will be available for eligible Permittees that submit an assistance application through October 31, 2024. The Agency may reserve the right to discontinue this program at any time.

Eligible recipients of ARPA funds for 3-Acre Stormwater projects:

- Individual landowners
- Manufactured Home Communities (MHCs)
- Homeowners Associations
- Small businesses
    - To be considered a small business, the business entity (permittee) must attest that they are a Small Business Enterprise (SBE)
    - Municipalities, nonprofits, and co-ops, where they are a Permittee or co-Permittee
- Public elementary, secondary, and post-secondary educational institutions that are ineligible to participate in the Green Schools Initiative.

Ineligible recipients of ARPA funds for 3-Acre Stormwater projects:

- Business entities that do not attest that they are an SBE
- State- or federally owned 3-acre sites
- MHCs that have received 3-acre permit engineering services provided by the State
- Green Schools Initiative-eligible public elementary, secondary, and post-secondary educational institution

Eligible projects must first have received confirmation of submittal of an administratively complete Full Notice of Intent from the Stormwater Program or received permit coverage under General Permit 3-9050 based on a full Notice of Intent on or after March 3, 2021; or, for projects where a municipality or stormwater utility has assumed full legal responsibility for the discharge of stormwater runoff from an impervious surface, the project must have received permit coverage for such impervious surface pursuant to an authorization issued under a general permit, or an individual permit, issued pursuant to the Stormwater Permitting Rule (Environmental Protection Rules, Ch. 22) on or after March 3, 2021.

To receive an advance benefit payment for costs associated with obtaining coverage under Stormwater General Permit 3-9050 or individual permit, the Permittee must submit the information listed in the Assistance Application Requirements section electronically through ANR Online by October 31, 2024.

7.4 Regulatory Stormwater Design/Implementation Project: Required for Municipal Roads General Permit (MRGP).

7.4.1. DEC Municipal Roads Program:

The Municipal Roads General Permit requires a municipality to achieve significant reductions in stormwater-related erosion from unpaved and paved municipal roads. Project opportunities identified in this SWMP that include a component to improve a municipal MRGP road segment are eligible for funding (may only be for the road segment component) through four grant programs:

1. Municipal Roads Grant-In-Aid (VTrans)
2. Better Roads Grant Program (VTrans)
3. Municipal Highway and Stormwater Mitigation (VTrans)

4. Transportation Alternatives Program (VTrans)

The four VTrans grant programs available are described below in more detail:

7.4.2. Grants *in Aid Program (VTrans):*

The Grants in Aid Program provides technical support and grant funding to municipalities to promote the use of erosion control and maintenance techniques that save money while ensuring BMPs are completed in accordance with the VT DEC's MRGP program. The match requirement is 20% local match. This funding program is announced annually, with applications typically due in the Summer.

7.4.3. Better Roads Grant Program (VTrans):

The Better Roads Grant Program funds municipal roadway improvements that benefit water quality, including:

- Inventories of roadway erosion and/or stormwater management issues and capital budget planning (Grant Category A)
- Correction of road related erosion and/ or construction of stormwater management projects (Grant Category B)
- Correction of streambank and/or slope related problems (Grant Category C)
- Roadway structures and culvert upgrades (Grant Category D)

The match requirement is 20% local match. This funding program is announced annually, with applications typically due in the Winter.

7.4.4. Municipal Highway and Stormwater Mitigation (VTrans):

The Municipal Highway and Stormwater Mitigation Program funds environmental mitigation activities, including stormwater and water pollution prevention, management, and control related to highway construction or highway runoff. The match requirement is 20% local match. This funding program is announced annually, with applications typically due in late Summer or early Fall.

7.4.5. Transportation Alternatives Program (VTrans):

The Transportation Alternatives Program funds environmental mitigation activities, including stormwater and water pollution prevention, management, and control related to highway construction or highway runoff. The match requirement is 20% for design and construction and 50% for scoping. This funding program is announced annually, with applications typically due in the Winter.