Morristown Stormwater Master Plan

Final Report

SUBMITTED TO:

Lamoille County
Conservation District
109 Professional Drive, Suite 2
Morrisville, VT 05661
(802) 888-9218

SUBMITTED BY:

Andres Torizzo & Kateri Gomez
Watershed Consulting Associates, LLC
208 Flynn Ave Suite 2H | PO Box 4413
Burlington, VT 05406
(802) 497-2367 |
www.watershedca.com

WATERSHED CONSULTING

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I. Disclaimer

The intent of this report is to present the data collected, evaluations, analyses, designs, and cost estimates for the Morristown Stormwater Master Plan under a contract between the Lamoille County Conservation District and Watershed Consulting Associates, LLC. Funding for the project was provided by the Vermont Department of Environmental Conservation's Clean Water Fund Grant. The plan presented is intended to provide the Town's stakeholders a means by which to identify and prioritize future stormwater management efforts. This planning study presents a recommended collection of Best Management Practices (BMPs) that would address specific concerns that have been raised for this area. There is great need to reduce stormwater impacts including phosphorus and sediment loading from stormwater runoff to receiving waters within municipalities and the greater Lake Champlain Basin considering current and future regulation under the Lake Champlain Total Maximum Daily Load requirements. 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 Town 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 will require management of existing impervious areas. This stormwater master plan, and therefore its resultant strategies, is one of the actions in the Lamoille Tactical Basin Plan. The BMP strategies identified in this stormwater master plan will be put in queue for state funding for implementation.

II. 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 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. For watersheds like Boardman Brook, this includes the entire area draining to the point where the river discharges to the Lamoille River.

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 Lake Champlain. 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

Morristown spans approximately 32,842 acres in Lamoille County, VT and is primarily forested (67%) and agricultural (18%), though 8% of the Town is classified as urban. Of that area, there are 930 acres (3%) of impervious cover. Morristown is located between the more rural towns of Cambridge, Johnson, Hyde Park, Wolcott, Elmore, and Worcester, and the relatively urbanized Stowe (Figure 1). Morristown's development is concentrated in the northcentral region adjacent to Hyde Park, as well as along the Route 100 corridor between Morrisville and Stowe (Figure 2).

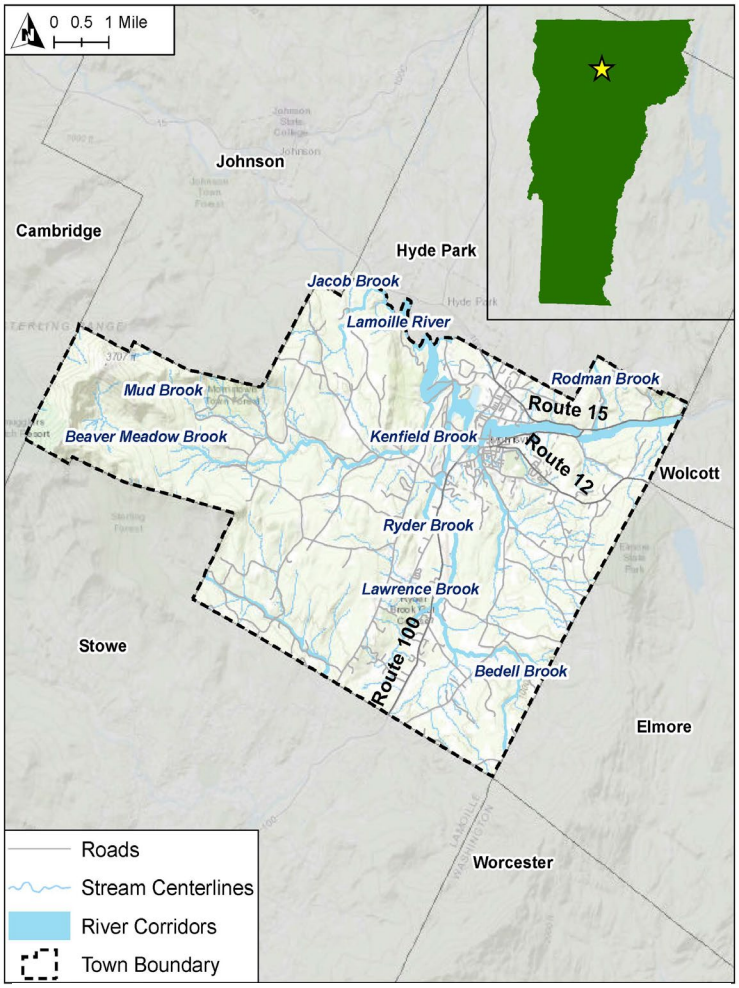

Figure 1. Morristown is located in Lamoille County, VT.

Soils analyses indicate that of the 32,842 total acres in the Town, 76% are classified as either potentially highly-erodible, or highly-erodible by the latest Natural Resources Conservation Service (NRCS) soil mapping data. Additionally, over half of the mapped soils in the watershed have very low infiltration potential as indicated by NRCS Hydrologic Soil Group classifications where soils are classified from group A (highest infiltration potential) to group D (lowest infiltration potential). In the Town, the majority of areas belong to Hydrologic Soil Group C (36%), while 19% are in group A, 19% are in group B, and 17% are in group D. The remainder is not classified or comprised of water. This combination of steep slopes with limited infiltration capacity and a highly erodible surface make the area susceptible to erosion.

The majority of developments within these areas were constructed with minimal stormwater management features, which has resulted in significant amounts of untreated stormwater draining large portions of developed lands discharging directly to surface waters, particularly to the Lamoille River in Morrisville. One effected area is Wilkins Ravine located between Lost Nation Brewing and Vermont Precision Woodworks (see Appendix A - Data Review).

Surrounding the developed lands, rural roads are generally unpaved, with open roadside ditches, and cross culverts. Many of these roads have steep slopes, and traverse large areas. Furthermore, the rural roads

access residential driveways which often convey drainage into, and through the Town road drainage system. This is a problem because runoff from private lands is negatively impacting the Town's overall drainage system.

3.2 Problem Definition

The Town of Morristown is located in Lamoille County primarily within the Ryder Brook-Lamoille River (whose tributaries within the Town include Rodman Brook, Lawrence Brook, and Bedell Brook) and the Kenfield Brook-Lamoille River (tributaries include Mud Brook, Jacob Brook, Centerville Brook, Beaver Meadow Brook) watersheds. These watersheds are tributaries of the Lamoille River which flows through the northwest corner of the Town. The area that borders the Town of Stowe falls within the Headwaters Little River watershed, a tributary of the Winooski River (Figure 2).

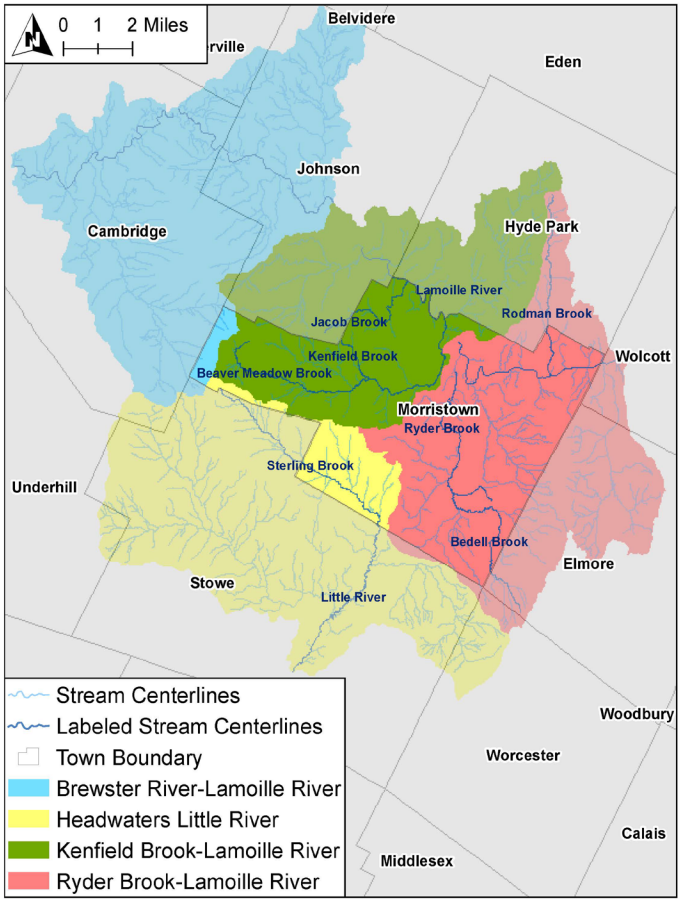

Figure 2. Morristown is located primarily within the Kenfield Brook-Lamoille River (green) and Ryder Brook-Lamoille River (pink) watersheds, tributaries of the Lamoille river.

Many of Morristown's surface waters have been negatively affected by human activities. Ryder Brook has reaches that are adversely impacted by stormwater runoff and development, and a section of the brook is on the 2016 stressed waters list due to physical alterations, sediment, and loss of riparian vegetation. This stressed waterbody is a tributary of the Lamoille River, which has reaches that are adversely impacted by stormwater runoff and development. A section of the Lamoille River is on the 2016 stressed waters list due to elevated mercury levels.

The Little River also has reaches that are adversely impacted by stormwater runoff and development. Sections of the river are on the 2016 stressed waters list for morphological instability, runoff from urban development, sediment from channel instability and manipulation, and nutrients and *E. coli* from agricultural runoff. The Little River is a tributary of the Winooski River which has many reaches that are adversely impacted by stormwater runoff and development. Although the focus areas for this plan are located outside of the Winooski watershed, it is worth noting that not only are multiple sections of the Winooski River on the 2016 stressed waters list, several reaches are also on the 2016 303(d) list of impaired waters.

The highest concentration of urban development is found in Morrisville Village and the adjacent North End of Morristown, located in the Town's northcentral region. The remainder of the Town is more sparsely developed with scattered rural residential and agricultural development throughout. Morrisville is located between the intersections of Route 12 and Route 15A, and the Historic VT-100 and Route 100. Morristown's North End is located between Morrisville Village and the intersection of Route 100 with Route 15 (Figure 3). Both areas have experienced increased development with expanding areas of impervious surfaces in or close to the Lamoille River corridor. In addition to expanding development along this corridor, steep gravel roads (e.g. Cole Hill Rd) can further contribute sediment and nutrients to surface waters. These roads and associated infrastructure can also constrain smaller tributaries, especially during storm events.

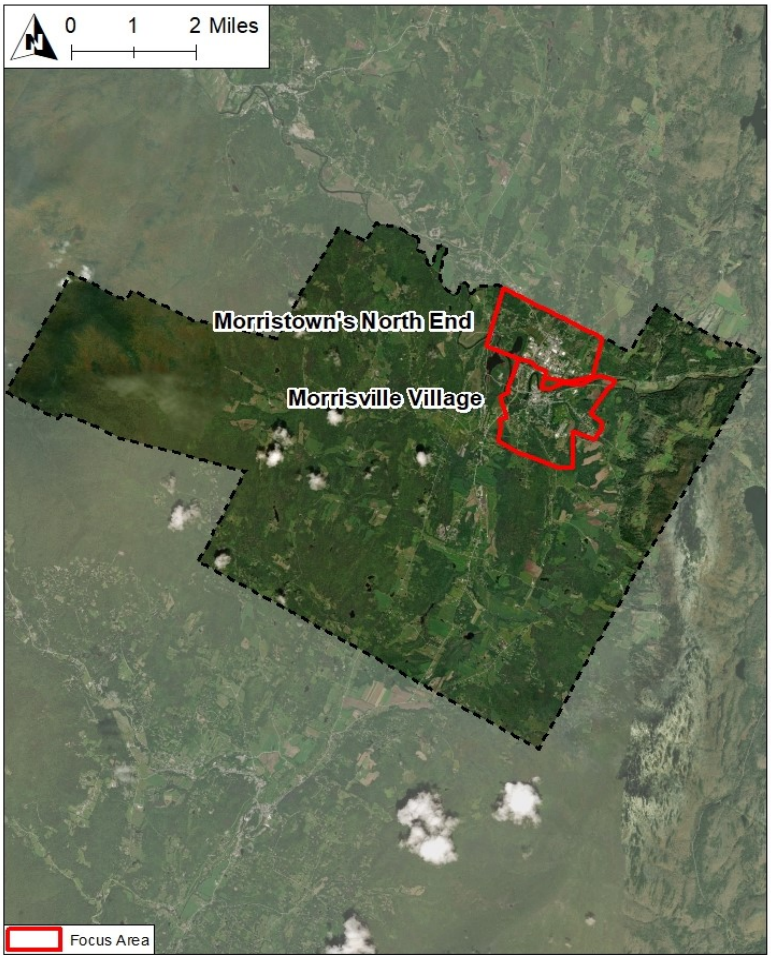

Figure 3. The focus areas for this SWMP encompass the Village of Morrisville as well as the adjacent North End of Morristown.

The human-influenced stressors in the watershed 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 throughout the Town. Additionally, the greater Lamoille River watershed and its tributaries have experienced historic extreme flooding, and these flood events are only expected to occur more frequently due to the predicted increased frequency and intensity of extreme weather events associated with climate change. The stormwater management practices investigated seek to protect local river resources as well as the larger Lake Champlain Basin, which currently has a Total Maximum Daily Load (TMDL) in place that requires reductions in phosphorus loading to Lake Champlain via its tributaries though reductions in stormwater and agricultural runoff pollution.

4 Methodology

4.1 Identification of All Opportunities

4.1.1 Kickoff Meeting and Initial Data Review

Relevant prior watershed studies and work previously completed in the Town was reviewed in the context of this SWMP study. This includes the 2016 Lamoille River Tactical Basin Plan, the VT DEC's 2012 Stormwater Mapping Project for the Town of Morristown, the 2010 Centerville Brook Corridor Plan, and the 2010 Lamoille River Corridor Plan.

Relevant Geographic Information System (GIS) data were 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 ease of use. These data represent the "best available" data at the time of data collection (2018). See Appendix A - Data Review.

The project team met with Town of Morristown stakeholders and the Lamoille County Conservation District (LCCD) on December 11th, 2017 to discuss the SWMP and solicit information on problem areas from the Town. 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 (see section 4.1.2.1).

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, as well as other resources.

Two such resources include the Town of Morristown Stormwater Mapping Project completed by the VT DEC in 2012. These stormwater infrastructure mapping projects provided current drainage maps and potential locations of BMP stormwater retrofit sites for the municipality. Designated priority areas were located in the Price Chopper Plaza, on either side of a stream crossing under Harrel St, at the Morristown Centennial Library, at the outfall adjacent to Fred's Energy on Bridge St, in the Northgate Plaza, at the outfall below Lepper Rd, on Munson Ave, and at the outfall located off of the intersection of Union St and Court St. These sites were assessed as part of this SWMP.

GIS data was then reviewed, which included but was not limited to, storm sewer infrastructure, soils classifications, parcel data, wetlands, and river corridors. These data were 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 the Town, a total of 26 locations were identified for field investigation.

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 study area. 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[1]. The app was also pre-loaded with the 26 point locations for the potential BMP sites, which included locations of problem areas and potential opportunities. 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.

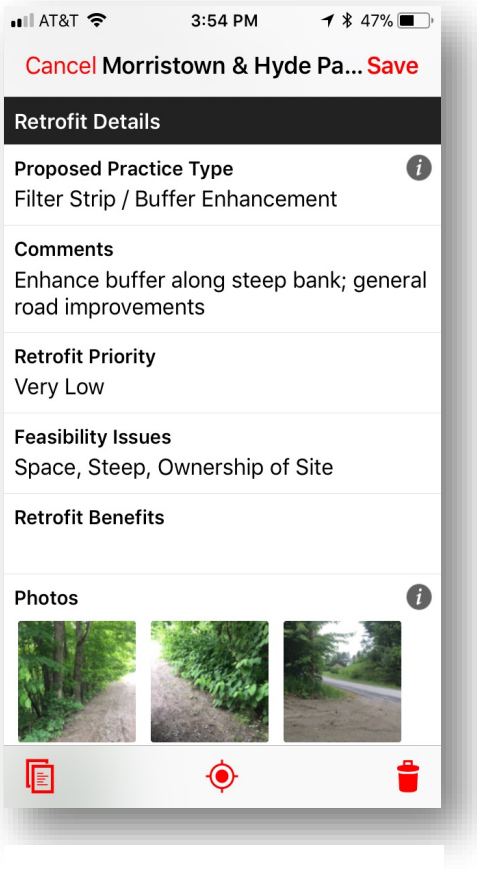

Figure 4. Example screen from data collection app.

4.1.2.3 Field Data collection

Each of the 26 previously identified potential BMP locations were evaluated in the field during the Summer of 2018. Data was collected about each site in the mobile app. A large map of these sites with associated site names and a list of these sites including potential BMP options and site notes can be found in Appendix B - Initial Site Identification.

4.2 *Preliminary BMP Ranking*

After the initial field visits were completed, a preliminary ranking system was utilized to prioritize these 26 projects. The goal of this ranking was to identify the 10 sites that would provide the greatest water quality benefit and have a high likelihood of implementation. This prioritization was accomplished by completing an assessment of project feasibility and benefits including drainage area size, pollutant load reduction potential, proximity to water, ownership, and feasibility issues. See Appendix C - Preliminary Site Ranking for the complete list of factors utilized in the preliminary ranking. Also included in Appendix C is the completed ranking for each potential site, and one-page field data summary sheets with initial ranking information.

[1] www.fulcrumapp.com

The list of sites was distributed to the Town of Morristown and the LCCD. As part of this process, the project team met with stakeholders on June 19th, 2018 to discuss the proposed project sites. During this meeting, the stakeholders nominated the Top 10 projects to be included in the plan, and the Top 3 priority projects for which 30% concept designs and cost estimates would be created. Following feedback from the Town, the list was revised to reflect the Town's priorities. Those revisions included the addition of the Munson Ave site as well as the Copley Parking Lot site. The updated Top 10 list, shown in Table 1, reflects the results of the preliminary ranking as well as stakeholder priorities and any feasibility issues previously unknown to the project team. The updated Top 10 point locations are shown in green in Figure 5; the lower ranked projects are shown in red.

Figure 5. 28 potential sites for BMP implementation were investigated in the field. The updated Top 10 are shown in green.

Table 1. The Top 10 projects are listed in preliminary ranked order.

Project Name	Proposed BMP Practice Type	BMP ID #	BMP Rank
Munson Ave	Underground Storage / Infiltration	27	1
Copley Park	Underground Storage / Infiltration	16	2
Copley Parking Lot	Underground Storage / Infiltration	28	3
Main and A Streets	Dry Well, Underground Storage / Infiltration	2	4
Samoset Rd Ag Retrofit	Check Dams, Ditch Improvements, Step Pools, Turnouts	5	5
Congress St Dry Wells	Dry Well, Underground Storage / Infiltration	12	6
Cole Hill Road and Driveway Retrofits	Check Dams, Ditch Improvements, Turnouts	15	7
Olive and Maple Infiltration	Dry Well, Underground Storage / Infiltration, Distributed Residential GSI	17	8
Bridge St and S River St Retrofit	Gravel Wetland	20	9
Morrisville Water and Light Infiltration	Underground Storage / Infiltration	26	10

4.3 Top 10 Sites - Concept Refinement

The contributing drainage area of each of the Top 10 BMPs was defined and land use/land cover was digitized using the best available topographic data and aerial imagery. Drainage areas were refined based on field observations (see Appendix D – Top 10 Sites for drainage area delineations).

A matrix was utilized in order to quantitatively and qualitatively describe each of the Top 10 projects. Considerations that factored into the descriptions of BMP projects included:

- Impervious area managed
- Ease of operation and maintenance
- Permitting restrictions
- Land availability
- Flood mitigation
- Other project benefits

Each of these criteria are listed and explained in Appendix D - Top 10 Sites.

4.4 Top 3 Sites - Potential BMPs

Selection of the Town's Top 3 sites considered the results from Watershed's initial site investigations, preliminary ranking, and input from municipal officials concerning project priorities. The sites selected within the Town of Morristown are listed in Table 2.

Table 2. The Top 3 BMP sites for Morristown.

Project Name	Address	Proposed Practice Type	BMP ID #	BMP Rank
Copley Park	Park St and Copley Ave	Underground Storage / Infiltration	16	1
Munson Ave	Munson Ave and Harrel St	Underground Storage / Infiltration	27	2
Copley Parking Lot	13-43 Pleasant St	Underground Storage / Infiltration	28	3

A map of each project showing the drainage areas and BMP locations can be found in Appendix E - Top 3 Sites.

4.5 Top 3 Sites - Modeling

Modeling was completed for each of the Top 3 sites. This modeling allowed for accurate 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. Each of the sites was modeled in HydroCAD to determine the appropriate BMP size and resultant stormwater volume benefits.

The Top 3 sites were also modeled to understand the existing condition pollutant loading and pollutant loading reductions associated with the proposed BMPs. This was completed using two methods. The first method utilized the VT Department of Environmental Conservation's Stormwater Treatment Practice (STP)

Calculator[2]. This model is used within the Lake Champlain Basin for estimation and tracking of BMP pollutant load reductions. The STP Calculator is currently only programmed to provide total phosphorus (TP) loading and reductions and cannot at this time be used to estimate total suspended solids (TSS). Pollutant loading estimates were also calculated using the Source Loading and Management Model for Windows (WinSLAMM) to determine the annual TSS and TP loading from the drainage area of each site. The modeling yielded expected pollutant removal loads (lbs) and rates (%).

The modeled volume and pollutant loading reductions are shown in Table 3. Complete modeling results are provided in Appendix E - Top 3 Sites.

Table 3. Modeling results for the Top 3 projects are shown below.

Project Name	Volume Managed (ac-ft)	Volume Infiltrated (ac-ft)	TSS Removal (lbs)	TSS Removal (%)	STP Calculator TP Removal (lbs)	STP Calculator TP Removal (%)
Copley Park	0.45	0.45	2,710.00	99.74%	15.92	96.05%
Munson Ave	0.68	0.68	26,446.40 (total) 16,080.60 (pond) 10,365.80 (chambers)*	92.99%	41.23 (total) 10.91 (pond) 30.31 (chambers)*	83.48%
Copley Parking Lot	0.23	0.23	3,607.10	100.00%	3.55	100.00%

* Part of this area drains to the Price Chopper Plaza pond before draining to the proposed subsurface infiltration chambers. Total TSS/TP removal values includes reductions from the existing pond and the proposed chamber system. Reductions associated with each individual practice are broken out in the table above. TSS/TP removal values referenced throughout the remainder of this document will be associated with the subsurface infiltration chambers.

4.6 Top 3 Sites - Concept Advancement

A prioritization matrix was utilized to quantitatively describe each of the Top 3 projects. Considerations that factored into the description of the BMP projects included factors such as:

- Impervious area managed
- Ease of operation and maintenance
- Volume managed
- Volume infiltrated
- Permitting restrictions
- Land availability
- Flood mitigation
- TSS removed
- TP removed
- Other project benefits
- Project cost

[2] https://anrweb.vt.gov/DEC/CleanWaterDashboard/STPCalculator.aspx

Each of these factors are listed and explained in Appendix E - Top 3 Sites.

4.6.1 Project Cost Estimation

Project cost, listed as one of the criteria considered, was calculated for the Top 3 sites using a spreadsheet-based method. The methodology for determining these planning level costs involved using the 2018, 5-year average price list. Pricing was also developed directly from ADS-Stormtech.

5 Priority BMPs

The selected Top 3 BMP implementation sites are briefly described below and shown in Figure 6. These opportunities are located on Town and private property. Individual drainage area maps and an overview map of these Top 3 sites are provided in Appendix E - Top 3 Sites.

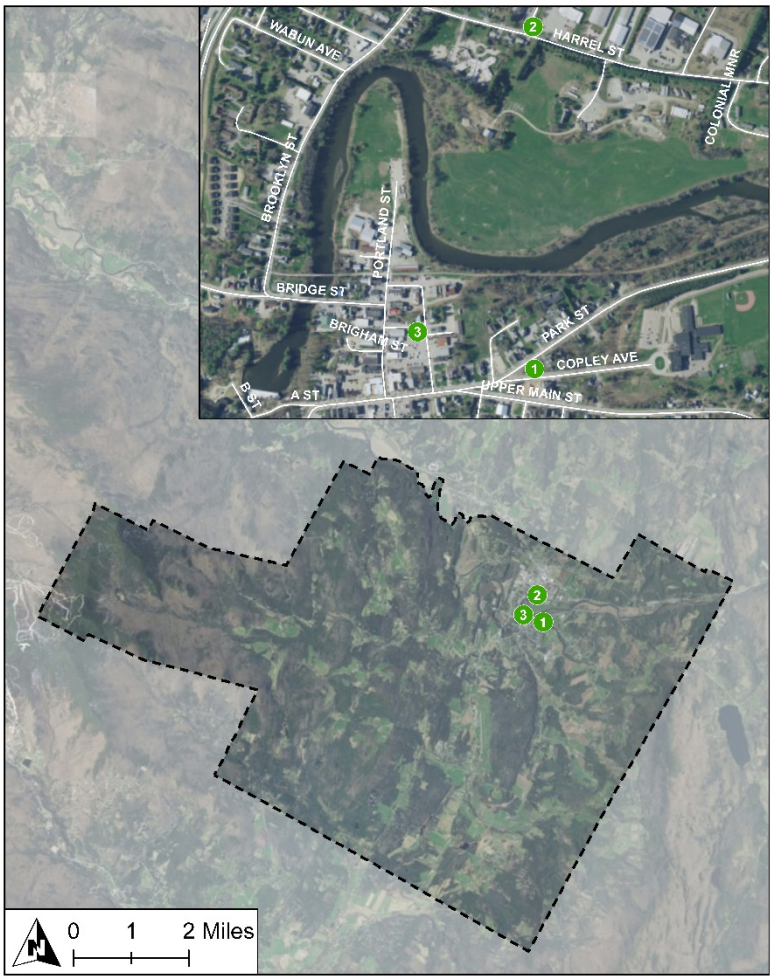

Figure 6. Top 3 BMP sites.

Site: 1

Project Name: Copley Park

Description: This site includes a stormline draining Peoples Academy and Copley Ave. Stormwater is currently collected in catchbasins via surface flow. The stormline discharges to a tributary of the Lamoille River. The concept for this site includes rerouting the stormline to a subsurface infiltration chamber system under the park at the corner of Copley Ave and Park St (Figure 7). Soils are mapped as being very good at this site for infiltration (Hydrologic Soil Group A).

Figure 7. Subsurface infiltration chambers are proposed in the park.

Outreach: This site is owned by the Town and, as such, no additional outreach was carried out.

Site: 2

Project Name: Munson Ave

Description: This site includes the commercial area between VT-15 E and Harrel St along Munson Ave (Figure 8). Stormwater is currently collected in a series of stormlines and overland flow, drains to a location south of Lepper Rd, and eventually discharges to the Lamoille River. The concept for this site includes directing overland flow to a subsurface infiltration chamber system under the road right-of-way at the corner of Munson Ave and Harrel St. Soils are mapped as being very good at this site for infiltration (Hydrologic Soil Group A).

Figure 8. Subsurface infiltration chambers are proposed in the Town's right-of-way along Munson Ave by CCV.

Outreach: This site is located between the Town's road right-of-way and a property owned by Sonny Demars. LCCD received confirmation from Sonny Demars via email communications.

Site: 3

Project Name: Copley Parking Lot

Description: This site includes the stormline draining Copley Parking Lot by Pleasant St. Stormwater is currently collected in catchbasins via surface flow. The stormline discharges to the Lamoille River north of Railroad St. The concept for this site includes rerouting the stormline to a subsurface infiltration chamber system in the northeastern corner of the parking lot (Figure 9). Soils are mapped as being very good at this site for infiltration (Hydrologic Soil Group A).

Outreach: This site is owned by the Town and, as such, no additional outreach was carried out.

Figure 9. Subsurface infiltration chambers are proposed in the parking lot by the corner of Pleasant St and Hutchins St.

When implemented, these three BMPs would treat approximately 50 acres, 22 acres (46%) of which is impervious. Modeled pollutant reductions for each of the projects, shown in Table 3, indicate that these BMPs will prevent approximately 16,683 lbs of TSS and 50 lbs of TP from reaching receiving waters annually.

Site surveys were completed for each of the Top 3 sites, from which existing conditions plans were developed. These plans served as the basis for the 30% proposed condition plans that were developed for each site. These plans are located in Appendix F - Existing Conditions Plans.

6 30% Designs

30% concept designs were developed for each of the Top 3 sites. Site-specific concepts are discussed in the following sections. 30% designs can be found in Appendix G - 30% Designs.

6.1 Site 1 - Copley Park

6.1.1 30% Concept Design Description

The Copley Park site is located at the intersection of Copley Ave and Park St. Currently, drainage is collected via surface flow in a series of catchbasins and discharged to a tributary of the Lamoille River without any water quality management. This drainage includes urban runoff from Peoples Academy and Copley Ave.

With greater than 3 acres of impervious surfaces and no stormwater permit, Peoples Academy and the Morrisville Elementary School will be subject to the 3-Acre General Permit which will require management of the site's stormwater runoff via stormwater retrofits. The proposed retrofit will help the schools reach this target.

Soils are mapped as having very good infiltration potential, Hydrologic Soil Group A. As such, the proposed practice for this site is infiltration based. A soils assessment was attempted for this location but was not completed due to scheduling conflicts with municipal stakeholders. See Appendix E - Top 3 Sites for the corresponding NRCS Soil Fact Sheet for soils in this location.

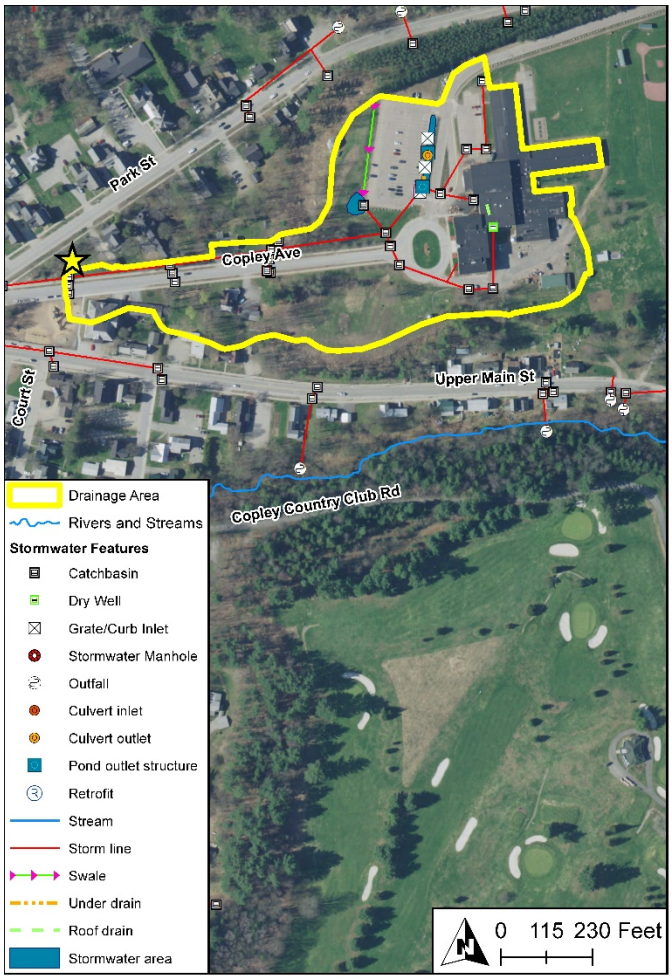

Figure 10. The BMP drainage area is shown in yellow for the Copley Park site. The proposed BMP location is shown with a star.

The proposed retrofit for this site involves redirecting the stormline on Copley Ave to a subsurface storage and infiltration chamber system under the park (see starred location in Figure 10). A chamber system was determined to be the most appropriate BMP for this location given the usage of greenspace in the park and the volume of runoff to be treated. The feature would overflow back to the existing stormline.

A 30% design plan is provided in Appendix G - 30% Designs.

6.1.2 Pollutant Removal and Other Water Quality Benefits

This practice has the potential to prevent more than 2,710 lbs of total suspended solids (TSS) and 15.92 lbs of total phosphorus (TP) from entering receiving waters annually. The design standard used for this retrofit was full infiltration of the water quality volume (WQ, or 1" of rain in a 24-hour period), equal to 19,732 ft^3 of runoff. See Table 4 for the benefit summary table.

Table 4. Copley Park benefit summary table.

TSS Removed	2,710 lbs
TP Removed	15.92 lbs
Impervious Treated	5.6 acres
Total Drainage Area	10.8 acres

6.1.3 Cost Estimates

The total estimate cost for this project is $83,599.41. Note that these costs are preliminary. Cost projections can be found in Table 5.

- The cost per pound of phosphorus treated is $5,251.22.
- The cost per impervious acre treated is $14,928.47.
- The cost per cubic foot of runoff treated is $4.24.

Table 5. The initial construction cost projection for Copley Park is included below.

VTrans Code	Description	Unit	Quantity	Unit Price	Amount
Site Preparation					
N/A	MOBILIZATION	LS	1	$1,000.00	$1,000.00
653.55	PROJECT DEMARCATION FENCE	LF	250	$1.17	$292.50
649.51	GEOTEXTILE FOR SILT FENCE	SY	70	$4.13	$289.10
N/A	CONSTRUCTION STAKING	HR	4	$125.00	$500.00
				Subtotal:	$2,081.60
Chambers - Excavation and Materials					
		EXCAVATION			
203.15	COMMON EXCAVATION	CY	362	$9.86	$3,569.32
		MATERIALS			
N/A	SC740		72	$241.50	$17,388.00
N/A	SC740 PLAIN END CAP		6	$51.18	$307.05
N/A	SC740 12T END CAP		5	$218.50	$1,092.50
N/A	SC740 24B END CAP		1	$337.58	$337.58
N/A	12" TRIPLE MANIFOLD		1	$337.11	$337.11
N/A	12" 90 BEND		1	$78.29	$78.29
N/A	12" TEE		1	$117.06	$117.06
N/A	12" COUPLERS		8	$8.30	$66.42
N/A	12" N12 AASHTO FOR MANIFOLD		20	$7.25	$144.90
N/A	24" COUPLERS		1	$33.20	$33.20
N/A	24" N12 AASHTO FOR ISOLATOR ROW		20	$21.08	$421.59
N/A	601TG TO WRAP SYSTEM (SY)		1500	$0.82	$1,224.75
N/A	315WTK FOR SCOUR PROTECTION (SY)		500	$0.72	$362.25
N/A	6" INSERTA TEE		1	$100.45	$100.45
N/A	6" RED HOLE SAW		1	$172.17	$172.17
N/A	12" INLINE DRAIN		1	$351.90	$351.90
N/A	6" N12 AASHTO FOR IP PORTS		20	$2.63	$52.67
629.54	CRUSHED STONE BEDDING (3/4" - 1 1/2" STONE)	TON	407	$34.04	$13,854.28
		PLANTING (ABOVE CHAMBERS IN GREENSPACE)			
651.15	SEED	LB	5	$7.66	$38.30
653.20	TEMPORARY EROSION MATTING	SY	333	$2.20	$732.60
651.25	HAY MULCH	TON	0.25	$597.15	$149.29
				Subtotal:	$40,931.69
New Infrastructure For Conveyance of Runoff to Practice					
		STRUCTURES AND PIPES			

VTrans Code	Description	Unit	Quantity	Unit Price	Amount
604.18	PRECAST REINFORCED CONCRETE DROP INLET WITH CAST IRON GRATE (SPLITTER/MANIFOLD OR OTHER)	EACH	3	$4,009.29	$12,027.87
601.0915	18" CPEP	LF	8	$64.04	$512.32
204.30	GRANULAR BACKFILL FOR STRUCTURES	CY	9	$40.30	$362.70
				Subtotal:	$12,902.89
	Construction Contingency - 20%				$13,419.88
Construction Subtotal:					$67,099.41
	Refine Survey	HR	16	$125.00	$2,000.00
	Refine H&H Modeling	HR	16	$125.00	$2,000.00
	60% Design	HR	24	$125.00	$3,000.00
	100% Design	HR	40	$125.00	$5,000.00
	Permitting & Cost Estimation	HR	36	$125.00	$4,500.00
Design Subtotal:					$16,500.00
Total					**$83,599.41**

6.1.4 Next Steps

As this site is owned and operated by the Town of Morristown, 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 infiltrated and that larger storms bypass the system safely.

6.1.5 Permit Needs

A project readiness screening worksheet has been completed for this project and is included in Appendix H - Permit Review Sheets. In summary:

Stormwater Permit

It is not expected that a stormwater permit at the location of the BMP will be required at this time.

The site should qualify for an Erosion Prevention and Sediment Control permit (3-9020) under the Low Risk categorization if the following guidelines are followed:

- Less than 2 acres of disturbance at any one time.
- All soils must be stabilized (temporary or final) within 7 days.
- Runoff from the site must pass through a 50' vegetated buffer prior to entering any Water of the State.

Local Permitting

No local permits are anticipated.

Other Permits

This project should be reviewed by a river scientist prior to final design due to its contribution of point source runoff to the stream. Permits are not anticipated to meet Act 250, wetlands, river corridor, or lakeshore requirements for this project.

6.2 Site 2 - Munson Ave

6.2.1 30% Concept Design Description

The Munson Ave site is located in the road right-of-way at the intersection of Munson Ave and Harrel St along the CCV parking lot. Currently, drainage is collected in a series of catchbasins and via overland flow and eventually drains to the Lamoille River. Stormwater discharging to the Lamoille River from this area includes urban runoff from VT-15 E, the Price Chopper Plaza, Mountain View Plaza, Industrial Park Dr, and Munson Ave. Existing stormwater BMPs in the drainage area include those associated with North Country Federal Credit Union (dry swale, storm pond), Price Chopper Supermarket (sedimentation basin and two recharge systems), and Capstone- Headstart (infiltration basins).

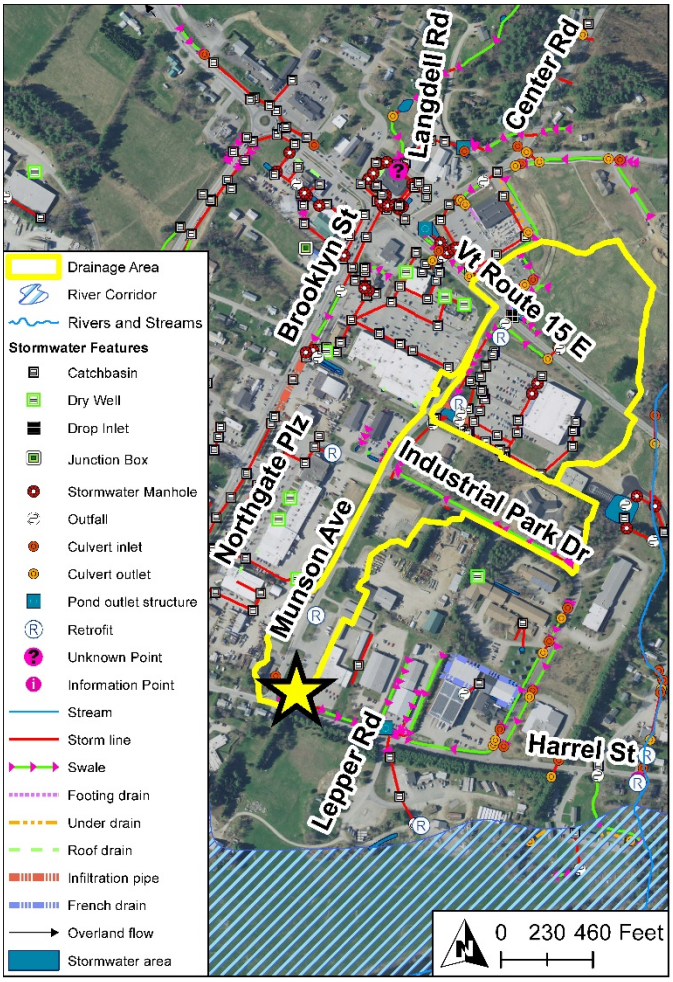

Figure 11. The BMP drainage area is shown in yellow for the Munson Ave site. The proposed BMP location is shown with a star.

With greater than 3 acres of impervious surfaces and no stormwater permit, the property at the corner of Munson Ave and Harrel St will be subject to the 3-Acre General Permit which will require management of the site's stormwater runoff via stormwater retrofits. The proposed retrofit will help reach this target.

Soils are mapped as having very good infiltration potential (Hydrologic Soil Group A). As such, the proposed practice for this site is infiltration based. A soils assessment was attempted for this location but was not completed due to scheduling conflicts with municipal stakeholders. See Appendix E - Top 3 Sites for the corresponding NRCS Soil Fact Sheet for soils in this location.

The proposed retrofit for this site involves directing surface flow at the corner of Munson Ave and Harrel St to a subsurface storage and infiltration chamber system in the road right-of-way between Munson Ave and the CCV parking lot (see starred location in Figure 11). A chamber system was determined to be the most appropriate BMP for this location given the usage of the road and the volume of runoff to be treated. The feature would overflow to the swale along Harrel St.

A 30% design plan is provided in Appendix G - 30% Designs.

6.2.2 Pollutant Removal and Other Water Quality Benefits

This practice has the potential to prevent more than 10,365.80 lbs of total suspended solids (TSS) and 30.31 lbs of total phosphorus (TP) from entering receiving waters annually. The design standard used for this retrofit was full infiltration of the water quality volume (WQ, or 1" of rain in a 24-hour period), equal to 29,664 ft^3 of runoff. See Table 6 for the benefit summary table.

Table 6. Munson Ave benefit summary table.

TSS Removed	10,365.80 lbs*
TP Removed	30.31 lbs*
Impervious Treated	15.4 acres
Total Drainage Area	36.8 acres

* Part of this area drains to the Price Chopper Plaza pond before draining to the proposed subsurface infiltration chambers. The TSS/TP removals referenced above are associated with the chamber system.

6.2.3 Cost Estimates

The total estimate cost for this project is $101,381.25. Note that these costs are preliminary. Cost projections can be found in Table 5.

- The cost per pound of phosphorus treated is $3,344.81.
- The cost per impervious acre treated is $6,583.20.
- The cost per cubic foot of runoff treated is $3.42.

Table 7. The initial construction cost projection for Munson Ave is included below.

VTrans Code	Description	Unit	Quantity	Unit Price	Amount
Site Preparation					
N/A	MOBILIZATION	LS	1	$1,000.00	$1,000.00
653.55	PROJECT DEMARCATION FENCE	LF	360	$1.17	$421.20
649.51	GEOTEXTILE FOR SILT FENCE	SY	75	$4.13	$309.75
N/A	CONSTRUCTION STAKING	HR	4	$125.00	$500.00
				Subtotal:	$2,230.95
Chambers - Excavation and Materials					
		EXCAVATION			
203.15	COMMON EXCAVATION	CY	466	$9.86	$4,594.76
		MATERIALS			
N/A	SC740		92	$241.50	$22,218.00
N/A	SC740 12T END CAP		14	$218.50	$3,059.00
N/A	SC740 24B END CAP		2	$337.58	$675.17
N/A	12" DOUBLE MANIFOLD		2	$229.43	$458.86
N/A	12" 90 BEND		2	$78.29	$156.58
N/A	12" COUPLERS		10	$8.30	$83.03
N/A	12" N12 AASHTO FOR MANIFOLD		20	$7.25	$144.90
N/A	24" COUPLERS		2	$33.20	$66.40
N/A	24" N12 AASHTO FOR ISOLATOR ROW		20	$21.08	$421.59
N/A	601TG TO WRAP SYSTEM (SY)		2000	$0.82	$1,633.00
N/A	315WTK FOR SCOUR PROTECTION (SY)		1000	$0.72	$724.50
N/A	6" INSERTA TEE		1	$100.45	$100.45
N/A	6" RED HOLE SAW		1	$172.17	$172.17
N/A	12" INLINE DRAIN		1	$351.90	$351.90
N/A	6" N12 AASHTO FOR IP PORTS		20	$2.63	$52.67
629.54	CRUSHED STONE BEDDING (3/4" - 1 1/2" STONE)	TON	527	$34.04	$17,939.08
		PLANTING (ABOVE CHAMBERS IN GREENSPACE)			
651.15	SEED	LB	5	$7.66	$38.30
653.20	TEMPORARY EROSION MATTING	SY	400	$2.20	$880.00
651.25	HAY MULCH	TON	0.25	$597.15	$149.29
				Subtotal:	$53,919.65
New Infrastructure for Conveyance of Runoff to Practice					
		STRUCTURES AND PIPES			
604.18	PRECAST REINFORCED CONCRETE DROP INLET WITH CAST IRON GRATE (SPLITTER/MANIFOLD OR OTHER)	EACH	2	$4,009.29	$8,018.58

VTrans Code	Description	Unit	Quantity	Unit Price	Amount
601.0915	18" CPEP	LF	100	$64.04	$6,404.00
204.30	GRANULAR BACKFILL FOR STRUCTURES	CY	4	$40.30	$161.20
				Subtotal:	$14,583.78
	Construction Contingency - 20%				$16,976.25
Construction Subtotal:					$84,881.25
	Refine Survey	HR	16	$125.00	$2,000.00
	Refine H&H Modeling	HR	16	$125.00	$2,000.00
	60% Design	HR	24	$125.00	$3,000.00
	100% Design	HR	40	$125.00	$5,000.00
	Permitting & Cost Estimation	HR	36	$125.00	$4,500.00
Design Subtotal:					$16,500.00
Total					**$101,381.25**

6.2.4 Next Steps

Preliminary outreach has been conducted with the landowner, Mr. Demars. He has indicated his willingness to 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 infiltrated and that larger storms bypass the system safely.

6.2.5 Permit Needs

A project readiness screening worksheet has been completed for this project and is included in Appendix H - Permit Review Sheets. In summary:

Stormwater Permit

The parcel contains more than 3 acres of impervious cover, so this site would necessitate a permit under the proposed 3-acre impervious cover rule.

The site should qualify for an Erosion Prevention and Sediment Control permit (3-9020) under the Low Risk categorization if the following guidelines are followed:

- Less than 2 acres of disturbance at any one time.
- All soils must be stabilized (temporary or final) within 7 days.
- Runoff from the site must pass through a 50' vegetated buffer prior to entering any Water of the State.

Local Permitting

No local permits are anticipated.

Other Permits

Act 250 permits for the development of the Demars property (5L0193, 100042, 5L0211, 5L0030) exist, and as such this project should be reviewed to determine if amendments to these permits would be required. Permits are not anticipated to meet wetlands, river corridor, or lakeshore requirements for this project.

6.3 Site 3 - Copley Parking Lot

6.3.1 30% Concept Design Description

The Copley Parking Lot site is located between Hutchins St to the north and Pleasant St to the east. Currently, drainage is collected via surface flow in a series of catchbasins and discharged to the Lamoille River without any water quality management. This drainage includes urban runoff from the parking lot and surrounding commercial properties.

Soils are mapped as having very good infiltration potential, Hydrologic Soil Group A. As such, the proposed practice for this site is infiltration based. A soils assessment was attempted for this location but was not completed due to scheduling conflicts with municipal stakeholders. See Appendix E - Top 3 Sites for the corresponding NRCS Soil Fact Sheet for soils in this location.

The proposed retrofit for this site involves rerouting the existing stormline to a subsurface storage and infiltration system in the northeastern corner of the parking lot by the intersection of Hutchins St and Pleasant St (see starred location in Figure 12). A chamber system was determined to be the most appropriate BMP for this location due to the site's usage as a parking lot and given the volume of runoff to be treated. The feature would overflow back to the existing stormline on Pleasant St. Installation of this BMP should be coordinated with the Town's plan to redo the parking lot.

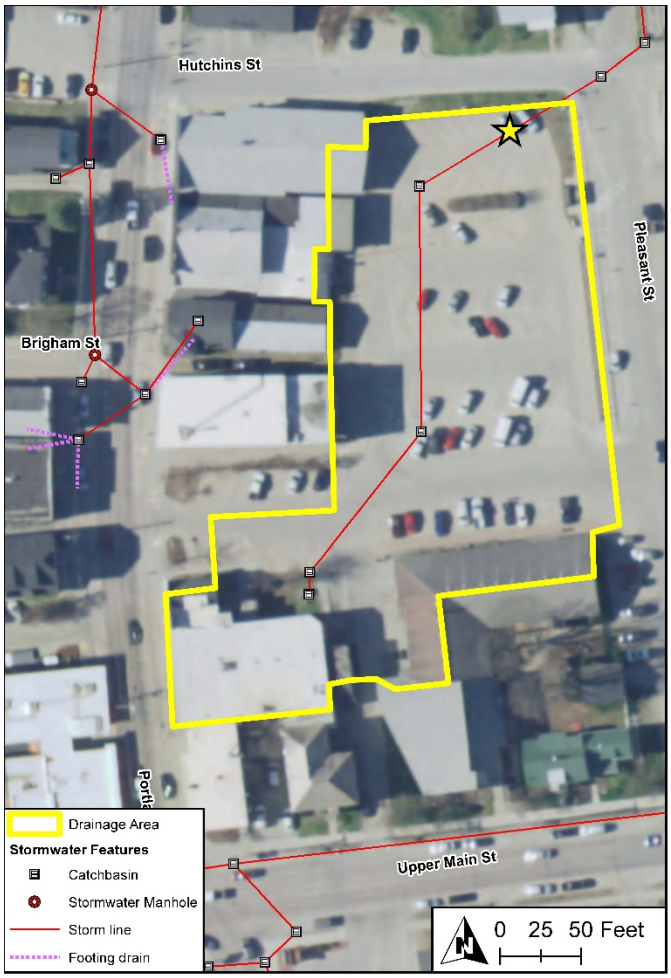

Figure 12. The BMP drainage area is shown in yellow for the Copley Parking Lot site. The proposed BMP location is shown with a star.

A 30% design plan is provided in Appendix G - 30% Designs.

6.3.2 Pollutant Removal and Other Water Quality Benefits

This practice has the potential to prevent more than 3,607.10 lbs of total suspended solids (TSS) and 3.55 lbs of total phosphorus (TP) from entering receiving waters annually. The design standard used for this retrofit was full infiltration of the channel protection volume (CPv, or 2.02" of rain in a 24-hour period), equal to 9,931 ft^3 of runoff. See Table 8 for the benefit summary table.

Table 8. Copley Parking Lot benefit summary table.

TSS Removed	3,607.10 lbs
TP Removed	3.55 lbs
Impervious Treated	1.4 acres
Total Drainage Area	1.5 acres

6.3.3 Cost Estimates

The total estimate cost for this project is $84,636.54. Note that these costs are preliminary. Cost projections can be found in Table 9.

- The cost per pound of phosphorus treated is $23,841.28.
- The cost per impervious acre treated is $60,454.67.
- The cost per cubic foot of runoff treated is $8.52.

Table 9. The initial construction cost projection for Copley Parking Lot is included below.

VTrans Code	Description	Unit	Quantity	Unit Price	Amount
Site Preparation					
N/A	MOBILIZATION	LS	1	$1,000.00	$1,000.00
653.55	PROJECT DEMARCATION FENCE	LF	186	$1.17	$217.62
649.51	GEOTEXTILE FOR SILT FENCE	SY	44	$4.13	$181.72
N/A	CONSTRUCTION STAKING	HR	4	$125.00	$500.00
				Subtotal:	$1,899.34
Chambers - Excavation and Materials					
EXCAVATION					
203.15	COMMON EXCAVATION	CY	243	$9.86	$2,395.98
MATERIALS					
N/A	SC740	EACH	40	$241.50	$9,660.00
N/A	SC740 PLAIN END CAP	EACH	1	$51.18	$51.18
N/A	SC740 12T END CAP	EACH	14	$218.50	$3,059.00
N/A	SC740 24B END CAP	EACH	1	$337.58	$337.58
N/A	12" TRIPLE MANIFOLD	EACH	2	$337.11	$674.22
N/A	12" DOUBLE MANIFOLD	LF	1	$229.43	$229.43
N/A	12" 90 BEND	LF	4	$78.29	$313.17
N/A	12" TEE	SY	1	$117.06	$117.06
N/A	12" COUPLERS	SY	22	$8.30	$182.67
N/A	12" N12 AASHTO FOR MANIFOLD	EACH	40	$7.25	$289.80
	24" COUPLERS		2	$33.20	$66.40
	24" N12 AASHTO FOR ISOLATOR ROW		20	$21.08	$421.59
	601TG TO WRAP SYSTEM (SY)		1500	$0.82	$1,224.75
N/A	315WTK FOR SCOUR PROTECTION (SY)	EACH	500	$0.72	$362.25
N/A	6" INSERTA TEE	EACH	1	$100.45	$100.45
629.54	6" RED HOLE SAW	TON	1	$172.17	$172.17
	12" INLINE DRAIN		1	$351.90	$351.90
N/A	6" N12 AASHTO FOR IP PORTS	EACH	20	$2.63	$52.67
629.54	CRUSHED STONE BEDDING (3/4" - 1 1/2" STONE)	TON	297	$34.04	$10,109.88
PLANTING (ABOVE CHAMBERS IN GREENSPACE)					
651.15	SEED	LB	5	$7.66	$38.30
653.20	TEMPORARY EROSION MATTING	SY	208	$2.20	$457.60
651.25	HAY MULCH	TON	0.25	$597.15	$149.29
PAVING					

VTrans Code	Description	Unit	Quantity	Unit Price	Amount
	ASHPALT	SF	2370	$4.00	$9,480.00
				Subtotal:	$40,297.33
New Infrastructure for Conveyance of Runoff to Practice					
	STRUCTURES AND PIPES				
604.18	PRECAST REINFORCED CONCRETE DROP INLET WITH CAST IRON GRATE (SPLITTER/MANIFOLD OR OTHER)	EACH	2	$4,009.29	$8,018.58
601.0915	18" CPEP	LF	100	$64.04	$6,404.00
204.30	GRANULAR BACKFILL FOR STRUCTURES	CY	4	$40.30	$161.20
				Subtotal:	$14,583.78
	Construction Contingency - 20%				$13,627.31
Construction Subtotal:					$68,136.54
	Refine Survey	HR	16	$125.00	$2,000.00
	Refine H&H Modeling	HR	16	$125.00	$2,000.00
	60% Design	HR	24	$125.00	$3,000.00
	100% Design	HR	40	$125.00	$5,000.00
	Permitting & Cost Estimation	HR	36	$125.00	$4,500.00
Design Subtotal:					$16,500.00
Total					**$84,636.54**

6.3.4 Next Steps

As this site is owned and operated by the Town of Morristown, 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 infiltrated and that larger storms bypass the system safely.

6.3.5 Permit Needs

A project readiness screening worksheet has been completed for this project and is included in Appendix H - Permit Review Sheets. In summary:

Stormwater Permit

It is not expected that a stormwater permit will be required at this time.

The site should qualify for an Erosion Prevention and Sediment Control permit (3-9020) under the Low Risk categorization if the following guidelines are followed:

- Less than 2 acres of disturbance at any one time.
- All soils must be stabilized (temporary or final) within 7 days.
- Runoff from the site must pass through a 50' vegetated buffer prior to entering any Water of the State.

Local Permitting

No local permits are anticipated.

Other Permits

This project should be reviewed by a river scientist prior to final design due to its contribution of point source runoff to the river. Permits are not anticipated to meet Act 250, wetlands, river corridor, or lakeshore requirements for this project.

7 Final Recommendations

The results of this SWMP have identified suite of potential BMP concepts and locations that would have a positive impact on water quality in the Town of Morristown and receiving waters. Although designs will only be advanced for the Top 3 projects, this plan also serves to highlight these other opportunities throughout the Town. 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 GSI in Morristown's landscape. It is our recommendation that the Town, in partnership with the LCCD move to implement the Top 3 practices, but also to move forward with additional design and implementation of other projects presented in this plan (see Appendix I - Projects for Watershed Projects Database for projects identified to the DEC to be inputted into the Watershed Projects Database). 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 request for final design and implementation.

- Following implementation of the priority projects, submit grant funding requests for higher scoring projects that may include both preliminary and final design.

It is also recommended that a stormwater-specific ordinance be developed for Morristown. A freestanding policy would clearly define best practices for stormwater management throughout the Town. Additionally, it would make the standards more accessible to Town residents and would be easier to update in response to new research and legislation.

Further, a Road Erosion Inventory assessment should be completed for Morristown. This assessment would help the Town prepare for compliance with the Municipal Roads General Permit (MRGP), issued in early 2018. See Appendix A. The assessment analyzes how well hydrologically-connected, 100-meter road segments comply with MRGP standards (e.g. road crown, berm issues, ditches, cross culverts, driveway culverts, outfalls, and presence of rill or gully erosion).

The Vermont Agency of Transportation (VTrans), as part of their Transportation Separate Storm Sewer System (TS4) General Permit, will be completing their own retrofit assessment 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.

To map and interact with watershed modeling results related to non-point total phosphorus loading sources within the Vermont portion of the Lake Champlain Basin, we recommend using the Clean Water Roadmap (CRW). This web-based tool supports the VT DEC's tactical basin planning and outreach efforts related to Lake Champlain Phosphorus TMDL. For more information, or to use the CWR, see Appendix A for the web document link.

Regulatory requirements under Act 64 will require management of sites with ≥3 acres of unmanaged and unpermitted (current State stormwater permit) impervious cover. Sites listed on the VT DEC's draft list of 3-acre sites, produced on June 25th, 2019, is provided below in Table 10. The majority of these sites were

not assessed as part of this plan and have large concentrations of impervious surfaces. It is recommended that these parcels be assessed for water quality improvements in the future.

Table 10. Unpermitted 3-acre sites

Owner/Permit Name	Location	Permits	Mapped Impervious (acres)
Copley Hospital Operating Room Expansion	528 Washington Highway	3194-9015, 3194-9010.R	3.33
Demars Professional Building	63-109 Professional Drive	3472-9010.R	3.70
Demars Properties LLC	197 Harrel Street		3.09
Elmore-Morristown Unified School District	46 Copley Avenue		9.70
Hannaford's Supermarket	80 Fairground Plaza, Rte 100	3437-9010	5.34
Harvey Kenneth & Martha	94 Lepper Road		4.82
Jersey Heights Subdivision	Jersey Wy, Jersey Ct, Foss St Ext, Sterling Ct	3015-9010.R	10.46
Manosh H A	133 Gallery Lane		6.76
Manosh Industrial Park Incubator Building	93 Northgate Avenue	4120-9015, 4476-9015	8.25
Morrisville Plaza	Vermont Route 100	3145-9010.T	8.83
N A Manosh Inc	120 Northgate Plaza		6.04
N H C Inc	317 Stafford Ave		3.20
Price Chopper Supermarket	370 Munson Ave	3211-9010.R	5.47
Ship Sevin II LLC	1st, 2nd, 3rd, 4th Streets		3.55
The Manor LLC	577 Washington Hwy		3.42