Potash Brook Flow Restoration Plan

October 1, 2016

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1. Executive Summary

This Flow Restoration Plan (FRP) for the Potash Brook watershed was developed in accordance with requirements in the Municipal Separate Storm Sewer System (MS4) General Permit #3-9014 (2012). Once approved by the Vermont Department of Environmental Conservation (VTDEC) this FRP will become part of the Stormwater Management Plans (SWMP) prepared by the MS4 permittees in the Potash Brook watershed. This includes the City of South Burlington, the Vermont Agency of Transportation (VTrans), the City of Burlington, Burlington International Airport (BTV) and the University of Vermont (UVM). The Potash Brook FRP will act as a guidance document for the MS4 entities as they implement the stormwater Best Management Practices (BMPs) necessary to attain the flow restoration targets established by the Potash Brook Total Maximum Daily Load (TMDL). The Potash Brook TMDL was approved by the U.S. Environmental Protection Agency (EPA) on December 19, 2006. The TMDL suggests an 11.2% increase in stream flow during low flow conditions, and requires a 16.5% reduction in stream flow during high flow conditions (established as the 1-year storm event).

Development of the Potash Brook FRP was an iterative process that utilized the Vermont Best Management Practice Decision Support System (BMPDSS) model maintained by VTDEC. This model was created by VTDEC and its partners as part of the initial TMDL development. The BMPDSS model allows the user to add, remove, or modify information related to the existing and proposed stormwater BMPs in the watershed. The BMPDSS then predicts the impacts that these changes will have on stream flow. In 2002, VTDEC provided a “base” condition BMPDSS model for Potash Brook. This version of the BMPDSS model included all stormwater BMPs that existed in the watershed prior to 2002 and provided an estimated stream flow during the 1-year storm event. The goal of the FRP is to reduce stream flow by 16.5% during this target storm event.

The first step in FRP development was to inspect all existing BMPs included in the “base” condition model (Pre-2002). Based on the results of these field inspections, revisions were made to the BMPDSS model. Once this work was complete, the BMPDSS model was updated to include all BMPs that were constructed in the watershed after 2002. This version of the model became known as the “existing” condition, or Post-2002, model run.

Following updates to the BMPDSS for the Pre-2002 and Post-2002 model scenarios, existing Pre-2002 BMPs were evaluated to determine if they could be retrofit to provide improved treatment and detention of stormwater runoff. After an initial list of retrofit sites were identified, a preliminary field assessment was completed at each site to document any potential constructability issues and review the drainage areas for each proposed BMP. These new BMPs were then incorporated into the BMPDSS model. This model iteration, which also included new treatment opportunities and was identified as the “Credit 1” scenario, was followed by subsequent iterations of the BMPDSS model in which additional new BMPs were added. This process continued and new BMPs were added to the BMPDSS model until the required stream flow reduction target of 16.5% established in the TMDL was achieved.

The BMPDSS model run that ultimately achieved a 16.5% reduction in stream flow during the 1-year storm event includes a total of 107 sites; forty (40) retrofits to existing BMPs, forty-one (41) new detention systems, eighteen (18) new infiltration systems, five (5) new gravel wetlands, two (2) new bioretention systems, and one (1) new median filter system. The total cost for implementation of these BMPs is estimated at approximately $16,500,000 (final cost utilizes 2014 construction cost estimates).

Once the final list of required BMPs was determined, these projects were then ranked using a comprehensive ranking matrix and scheduled for construction over a 17-year period. The MS4 permit

requires that the BMPs identified in the FRP be constructed within 20 years of the effective date of the MS4 permit, which resulted in a December 5, 2032 deadline. Therefore, 17 years remain for project implementation prior to the construction deadline. Many factors were considered when developing the BMP implementation schedule. A number of the BMPs are currently covered by expired State of Vermont stormwater permits. These BMPs were included at the front of the schedule so that the associated properties could complete the required stormwater improvements and achieve permit compliance. Other BMPs involve properties containing more than 3 acres of impervious area. VTDEC is currently drafting a "3 Acre Permit" that would require stormwater retrofit of these sites. Therefore, BMPs in this situation were also placed towards the front of the implementation schedule. Other BMPs are located on land owned or controlled by the MS4 entities. These BMPs were given priority over those that were located on private property. The remaining projects were scheduled based on their ability to contribute to stream flow reductions, cost effectiveness, and constructability.

The final step in FRP development was to develop a financial plan that would allow for the construction of the BMPs included in the BMPDSS model. The MS4s involved in the Potash Brook FRP worked together to develop an implementation schedule for Potash Brook. Some MS4s have responsibility for BMP implementation as part of FRPs in multiple watersheds. For example, the City of South Burlington has the responsibility to implement BMPs as part of FRPs in five stormwater impaired watersheds: Bartlett, Englesby, Centennial, Munroe, and Potash Brook. All five FRPs were considered when developing a comprehensive and realistic D&C schedule for the City.

Initial project cost estimates were arrived at using 2014 cost estimates. The City of South Burlington intends to finance the required stormwater BMPs by utilizing funds raised by stormwater utility fees, State and Federal grants, as well as low interest loan programs. Once projects were scheduled over the 17-year implementation schedule an annual 3% inflation rate was applied based on historic trends in the construction cost index. The City of South Burlington was then able to take these annual costs and insert them into their existing stormwater utility rate model. Three different scenarios were evaluated in the rate model. The first scenario assumed that grant funding would not be available and that the City would not utilize low interest loans to assist with project implementation. This scenario resulted in a stormwater billing rate of $11.25 per Equivalent Residential Unit (ERU) in FY2032. The second scenario also assumed that grant funding would not be available, but that the City would utilize low interest loans to help pay for implementation of the projects. This scenario resulted in a stormwater billing rate of $10.44 per ERU in FY2032. The third funding scenario assumed that grant funding of approximately $250,000 per year would be available starting in 2018 and that this amount would increase to $500,000 in 2030. This resulted in a stormwater billing rate of $8.79 per ERU in FY2032.

2. Background

2.1. General

Potash Brook and its watershed are located in Chittenden County, principally in the City of South Burlington, and encompass an area of approximately 7.13 square miles. The main stem of Potash Brook originates in the southeast portion of South Burlington, south of Interstate 89 and east of Route 116, and flows to its mouth at Shelburne Bay in Lake Champlain. Several major tributaries flow to the main stem and drain significant portions of the watershed north and south. The entire stream and its tributaries are Class B waters designated as cold water fish habitat pursuant to the Vermont Water Quality Standards.

Potash Brook has been identified as not attaining water quality standards in accordance with Section 303(d) of the Federal Clean Water Act. In 2006, the EPA approved the Potash Brook Stormwater TMDL[1]. The Potash Brook TDML study established targets for flow modification in the stream. The flow targets are the basis for this FRP, which was developed in accordance with the MS4 General Permit Subpart IV.C.1 as a required part of the MS4s SWMPs.

The City of South Burlington, as well as the City of Burlington, BTV, VTrans, and UVM, are regulated MS4 Operators who own and control impervious surface in the Potash Brook Watershed. The final MS4 general permit dated December 2012 requires that the impacted MS4s develop and submit a comprehensive FRP for the Potash Brook Watershed. The purpose of this Potash Brook FRP is to identify the necessary stormwater Best Management Practices (BMPs) that will be used to achieve the flow restoration targets prescribed in the Potash Brook TMDL.

2.2. Permitting History

All State issued stormwater permits within the Potash Brook watershed were reviewed as part of the FRP development effort. A full list of VTDEC permits discharging to the Potash Brook and the type of system covered under the permit is included in Table 1. Several of the expired permits obtained new permit coverage under a Residual Designation Authority (RDA) permit from VTDEC. Many of the properties that were issued RDA permits have applied for a renewal of their permit, but VTDEC has yet to act on these renewal requests.

Table 1: Existing VTDEC Permits

Permit Number	RDA/Other[1]	Project Name Where Permit is Located	Permittee	Permit Expiration Date	Existing Manner of Discharge[2]
1-0239	6285-9030	Ridgewood Estates	Ridgewood Estates Homeowners Association	11/19/2014; 8/26/2013	CB, 2 DP (new), 1 DP upgrade
1-0464		Oak Creek Village	Butler Farms Inc.	12/31/1991	OF, GS, CB, (2) DP
1-0526	6279-9030	Woodlands Industrial Park	Woodland Commons Condominium Association	11/19/2014	DP
1-0538	7294-INDS; 7294-INDO	Price Chopper Pond	Pomerleau Real Estate Corp	3/31/1992	DP, GS
1-0647		Village at Dorset Park	Village at Dorset Park Community Assoc.	6/30/1993	(3) DP, CB
1-1020		Park Place	David Dubrul	3/31/1996	GS, OF
1-1033		Dorset Park Pond	City of South Burlington	3/31/1998	DP, GS
1-1155		Pinnacle at Spear	John Larkin; L&M Partnership	12/31/2003	CB, OF
1-1337	4442-9003	The Lane Press	The Lane Press	6/30/2003; 8/18/2011	IB
1-1380		South Burlington Community Housing	South Burlington Community Housing	9/30/2004	PP, IG

[1] The EPA approval of the Potash Brook TMDL can be viewed at the following links:
http://dec.vermont.gov/sites/dec/files/wsm/stormwater/docs/SWImpaired/sw_pot_tmdl_finalapproved.pdf
http://dec.vermont.gov/sites/dec/files/wsm/stormwater/docs/SWImpaired/sw_potashTMDLappovaldoc.pdf

Permit Number	RDA/Other[1]	Project Name Where Permit is Located	Permittee	Permit Expiration Date	Existing Manner of Discharge[2]
1-1391/ 1-1270/ 1-0839		Burlington International Airport	Heather Kendrew; Burlington International Airport	9/30/2004	IG, CB
1-1520		O'Brien Home Farm	Daniel and Leo O'Brien Jr.; dba Forest Park Realty Corp	10/9/2007	(3) DP, CB, GS
2-0100	7220-9020	Stonehedge	BAM Property Management	7/1/1985; 7/7/2016	DP, BR
2-0140		1 Kennedy Drive	Merv Brown	7/1/1987	PP, SF for 1st 1/2" only
2-0195		Healthy Living Wetland Pond	Mings Inc.	11/17/1983	OF, GS
2-0825		Twin Oaks Pond	Property Management Associates	6/30/1980	SF and RP for 1st 1/2" runoff
2-0909		South Burlington City Hall	City of South Burlington	7/1/1985	SF for 1st 1/2" runoff - NOT BUILT
2-0988	6391-INDS	Winding Brook	Winding Brook Homeowner's Association	7/1/1985; 12/7/2015	DP
6170-9020		Summerfield	John O'Brien; Buckthorm Group	8/12/2013	DP
6174-INDS.A		South Burlington High School	South Burlington School District	10/18/2015	(2) IB
1-1214		Shopping Center - Hannaford - Lowe's	Southland Plaza	9/30/2005	(2) DP, RS, GS
6204-9020		Fay Dr Pond	Allen Road Land Company, Inc	4/23/2014	DP
1-1254	4113-INDS	Technology Park Lot 8A	Technology Park Associates	9/30/2001	DP
1-0233		Key Bank	ICV Construction Inc.	5/1/1982	CB
1-0234	6322-9030	Quarry Hill South	Horizon Heights Condominiums Association	11/19/2014	CB
1-0237; 1-1013; 1-1290		Kennedy Dr. P4 Expansion	CPA Partnership	7/1/1982; 3/31/1996; 3/30/2002	CB, OF, OGS, GS
1-0242		Dorset Commons	Veve Associates	8/1/1982	CB
1-0503	6282-9030	UMall	University Mall Realty Trust	9/30/2003; 11/19/2014	(2) DP, (2) IG
1-0618	6853-9003; 6853-INDS	Dynapower	Burlington Properties LTD	12/31/1992	OF, GS, CB, (2) DP
1-0661		South Meadows Pond	c/o Richard Feeley; South Meadow Housing Associates	6/30/1993	CB, DP
1-0969	6295-9030	INS Building	INS	9/30/1995	(2) DP
1-0998		Retina Center	Daniel and Eugene Morrissey	12/31/1995	OF, GS, CB
1-1000	6291-9030	Adelphia Cable Communications	Comcast Cable	12/31/1995; 11/19/2014	DP, CB, GS

Permit Number	RDA/Other[1]	Project Name Where Permit is Located	Permittee	Permit Expiration Date	Existing Manner of Discharge[2]
1-1015		Pillsbury Manor	John P Larkin	3/31/1996	DP
1-1117		The Pines	Pines Housing LP	12/31/1997	DP, CB
1-1269	4290-INDS	Meadowland	Attn: Mark R. Neagley; Summer Ice Joint Ventures	9/30/2001; 1/16/2013; 9/30/2015	(8) DP
1-1438		Farrell/ Eastwood Commons	D Farrell; S McConaughy & New Enterprises Inc.	9/30/2005	DP, CB
1-1452		Olympiad Apartments	Dan Morrissey; Sixty Farrell Street Associates	12/31/2005	DP
1-1458		Technology Park	Technology Park Partners	3/31/2006	DP, PW
1-1504		110 Kimball Ave	James Foster; 110-120 Kimball LLC	9/18/2006	(2) IB
1-1526	6269-9030	30 Kimball Ave	Kimball Partners, LLC	11/19/2014	DP
1-1582		Kennedy Dr	City of South Burlington	5/29/2008	(7) DP
2-0101		Ashbrook Dr	Ashbrook Park H.O. Assoc	7/1/1985	CB, GS
2-0144		Outback	Merv Brown	7/1/1985	IT for 1st 1/2", ST, GS
2-0167		Easy Self Storage	Easy Self Storage	7/1/1985	CB
2-0212		Fairpoint Communications	Gregory Myka; Verizon	7/1/1985	CB, OF, GS
2-0220		Dubois Dr	City of South Burlington	7/1/1985	CB, GS
2-0238; 2-0737		Grandview Dr	Carol Gamsby; CGPM Inc.	7/1/1985; 9/1/1983	CB, SF for 1st 1/2"
2-0312		Adirondack St	Butler Farms Inc	7/1/1986; 6/232013	CB
2-0619		Dorset Street Expansion	City of South Burlington	12/31/1992	CB, OF
2-0767	6553-INDO	Chelsea Cir	Art Dudek, President; Foxcroft Condominium Assoc.	6/30/1980; 4/22/2015	CB
2-0794		Brookwood Dr	Brookwood LTD	7/1/1980	CB
2-0811		Ace Hardware	LNP, Inc.	7/1/1980	ST
2-0824		Windridge Ct	Dan and Leo O'Brien; O'Brien Family Partnership	7/1/1980	CB
2-0878		Sugartree Ln	Dan Zang; SugarTree Condominium Association	6/30/1985	SF for 1st 1/2" runoff
2-0939	6275-9030; 6269-9030	Business Park North	Alan Palmer	7/1/1986; 11/19/2014	CB, OF, GS
2-1023; 2-0219		Wellesley Grove	Wellesley Grove Condominium Assoc.	7/1/1986; 7/1/1985	PP
2-1069		One Twin Oaks Assoc.	c/o Stephen Pitman; One Twin Oaks Assoc.	7/1/1987	IT for 1st 1/2" of runoff.
2-1171		Merchants Bank	Merchants Bank	7/1/1988	CB
2-0228	6293-9030	Vermont Gas Systems	James Mullowney; Vermont Gas Systems, Inc	7/1/1988; 11/19/2014	CB, OF, GS
2-0179	6318-9030	Church of Jesus Christ of Latter-Day Saints	The Church of Jesus Christ of Latter-Day Saints	7/1/1985; 11/19/2014	GS

Permit Number	RDA/Other[1]	Project Name Where Permit is Located	Permittee	Permit Expiration Date	Existing Manner of Discharge[2]
1-1241	4049-9030; 4049-9030.1	Vt National Country Club	Vermont National Country Club	3/31/2001	(3) DP, CB, GS
1 -	RDA: Residual Designation Authority- Private Permittees requests to have their expired stormwater system covered under an RDA permit, which overwrites their expired permit.				
2 -	Manner of Discharge: CB: Catch Basin, GS: Grass Swale, RS: Retention Swale, ST: Settling Tank, OF: Control orifice, IB: Infiltration Basin, DP: Detention Pond, DW: Dry Well, IG: Infiltration Gallery, SF: Sand Filter, BR: Bioretention.				
3 -	Expired permit retrofits were determined based on direct benefit to the Flow Restoration Targets. Expired permits with a CPv (extended detention of the 1-year design storm) BMP were assessed for retrofit opportunity, and if the flow reduction benefit was determined negligible, a retrofit was not proposed.				

2.3. Potash Brook Total Maximum Daily Load (TMDL)

2.3.1. Stormwater TMDL History

In response to Potash Brook not meeting the water quality standards set forth in Section 303(d) of the Federal Clean Water Act, the VTDEC developed TMDLs for impaired watersheds using flow as a surrogate for pollutant loading. The basis for the TMDL development was the comparison of modeled Flow Duration Curves (FDCs) between impaired and attainment watersheds. The Program for Predicting Polluting Particles Passage through Pits, Puddles, and Ponds, Urban Catchment Model (P8) was used to model gauged and ungauged watersheds in Vermont and develop Flow Duration Curves (FDCs) from which a normalized high flow and low flow per drainage area in square miles (cfs/sq.mi.) were extracted.

An FDC is a graph that displays the percentage of time during a given period where flow exceeds a certain value. For the purposes of the Potash Brook Stormwater TMDL, VTDEC determined that the “low” flow target would be represented by the 95th percentile (Q95%) of the curve and the “high” flow target would be represented by the 5th percentile (Q0.3%). The high and low flow values from the FDCs were then compared between “impaired” watersheds and comparable “attainment” watersheds to determine a percent change (i.e. reduction of high flow, increase of low flow). The percent change was reported in the EPA approved TMDL for each impaired watershed. The high-flow (Q0.3%) was determined to be relatively equivalent to the 1-year design storm flow (2.1 inches of rain over a 24-hour period in Chittenden County). Therefore, stormwater BMPs designed to meet the VTDEC Stormwater Management Manual’s Channel Protection volume (CPv) storage standard were used to address the required high-flow reduction target[1].

2.3.2. TMDL Flow Targets

The Potash Brook was designated as impaired on the 2004 Vermont 303(d) List from its mouth at Lake Champlain to a point upstream 5.2 miles due to non-support of aquatic life designated uses. The TMDL concluded that since all tributaries and the main stem drain to the impaired lower portion of the stream, the entire Potash Brook watershed was considered to contribute to

[1] The approved Potash Brook TMDL can be viewed at the following link:
http://dec.vermont.gov/sites/dec/files/wsm/stormwater/docs/SWImpaired/sw_pot_tmdl_finalapproved.pdf

its impairment. The source of the impairment was considered to be multiple impacts associated with unmanaged stormwater runoff including runoff from both urban and developed areas, as well as from agricultural and open areas. The low flow target suggested a total 12.2% increase in watershed base stream flows during low flow conditions (11.2% wasteload allocation for urban/developed areas), and the high flow target required a total 17.9% reduction in watershed flow allocation during the 1-year storm event (16.5% wasteload allocation for urban/developed areas).

2.3.3. Future Growth in Potash TMDL

The TMDL flow targets and future growth assumption used by VTDEC in development of TMDL targets were reviewed as part of the FRP development. In May 2015, at the request of the City of South Burlington, the Chittenden County Regional Planning Commission (CCRPC) completed a study to estimate the expected non-jurisdictional impervious area growth in the Potash Brook watershed over the next 20 years. Non-jurisdictional growth by definition the impervious area that does not require a stormwater permit, and is therefore important to account for within the 20 year management plan. The original TMDL assigned a non-jurisdictional impervious growth of 30 acres, whereas the CCRPC study estimated 22 acres based on the actual non-jurisdictional growth rate from 2003 to 2010. With the revised future growth, the high-flow target (Q0.3%) would be reduced from 16.5% to 16.0%[1] as summarized in Table 2 below. The modified flow targets were considered, but ultimately the original (unmodified) flow target of 16.5%, was incorporated into the FRP planning process and proposed BMP implementation scenario.

Table 2: Modified TMDL Flow Targets with revised non-jurisdictional future impervious growth estimate

Flow Target	Target High Flow Q 0.3(± %) **Reduction**	Target Low Flow[2] Q 95 (± %) **Increase**
TMDL Target from current Urban/Developed areas	-14.6%	10.5%
TMDL Targets with **30 acres** of Non-Jurisdictional Future Growth	-16.5%	11.2%
TMDL *Modified* Targets with **22 acres** of Non-Jurisdictional Future Growth[1]	-16.0%	11.0%

1 Modified target was calculated as: -[(14.6%) + (16.5% - 14.6%)*(22 ac/30 ac)] = -16.0%

2. The low flow target is not actionable under the TMDL, but is included because improving base flow in the watershed is still a water quality goal.

2.4 MS4 Permit Background and Requirements

A MS4 is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, or man-made channels) that are designed or used for the collection or conveyance of stormwater discharged to waters of the State or waters of the United States. MS4 systems do not include combined sewer systems that are part of publicly owned wastewater treatment facilities.

On December 5, 2012, Vermont's revised MS4 Permit was issued. This MS4 permit was the second MS4 General Permit issued by the VTDEC. The first MS4 permit was issued in 2003 and amended in 2004. Both the 2004 and 2012 permits authorize stormwater discharges within the urbanized areas of small MS4s. Small MS4s included cities, towns, counties, airports, highway departments, and

universities. The City of South Burlington, City of Burlington, University of Vermont, Burlington International Airport, and Vermont Agency of Transportation were designated as a regulated small MS4, as were, Colchester, Essex, Essex Junction, Milton, Shelburne, Williston, and Winooski.

Included in the 2012 MS4 permit issuance were new requirements for municipalities to develop FRPs to implement the stormwater TMDLs. The FRPs must be developed for each impaired watershed within three (3) years of the date of issuance of the authorization to discharge to the permittee under the general permit, by October 1, 2016, and must include the following elements:

1) An identification of the required controls
2) A design and construction schedule
3) A financial plan
4) A regulatory analysis
5) The identification of regulatory assistance, and
6) Identification of any third party implementation.

The schedule shall provide for implementation of the required BMPs as soon as possible, but no later than 20 years from the effective date of the permit, before December 5, 2032.

3. Best Management Practice Decision Support System Model Assessment

3.1 Background

In an effort to implement the Vermont Stormwater TMDLs, the VTDEC worked with an external consultant (TetraTech) to develop the computer-based VT BMPDSS, a VT-specific hydrologic BMP assessment model. This modeling tool was developed by TetraTech, Inc., with considerable investment from EPA Region 3 and Prince George's County, Maryland, and was adapted for use in Vermont using funding from the Vermont Agency of Natural Resources (ANR). The purpose of the modeling tool was to predict progress toward the TMDL flow targets based on proposed BMP implementation scenarios to help MS4 communities identify different BMP options and associated costs.

3.1.1 Model Calibration for Potash Brook

During development of the Potash Brook FRP, the VT BMPDSS was also reviewed for any values or factors utilized in the stream flow model that could impact results. One value used by the BMPDSS is the Hydraulic Weighting Factor (HWF). The HWF is a measure of lag time within a watershed. VTDEC collected rainfall and stream flow data from 2006 to 2008 and calibrated the original model to this data using the HWF. After working closely with VTDEC, it was determined that adjustment of the HWF used in the original BMPDSS model would provide model results that more closely replicated the observed rainfall and streamflow data. Therefore, with VTDEC concurrence, the original and subsequent BMPDSS model runs utilized a modified HWF.

In order to complete a flow target assessment, VTDEC developed three model scenarios for each impaired watershed, including a base condition (Pre-2002), existing condition (Post-2002), and an optimized credit scenario (meeting the flow restoration target). The base scenario (Pre-2002 model) included all stormwater BMPs installed prior to issuance of the VT Stormwater Design Standards in 2002. The land use data used in this scenario was derived from 2002 Quickbird satellite imagery. An

existing scenario (Post-2002 model) was then developed with all existing BMPs designed to the 2002 VT Stormwater Design Standards, providing credit toward the flow target on a percent change basis compared to the base scenario. The optimized run was used by VTDEC to gage the estimated cost and level of effort to reach the flow targets in each impaired watershed. During the optimized credit run, a theoretical full build-out of BMPs were placed in each subwatershed by the model with a goal of minimizing cost and maximizing flow benefit. Results from the BMPDSS model output were provided as unadjusted cubic feet per second (cfs) and normalized flow (flow per drainage area, cfs/sq. mi). The unadjusted flow was used in the determination of progress towards the TMDL targets to eliminate the effect of watershed area in the percent change comparison.

3.2 Objective

The objective of the BMPDSS Model Assessment was to review the baseline (Pre-2002) and existing conditions (Post-2002) BMPDSS models for accuracy and to develop revised inputs for submittal to VTDEC, in order to establish a revised existing conditions model prior to the assessment of Credit Scenarios. Creation of Credit Scenarios involved developing a list of potential retrofit sites for review by the MS4s in the watershed. Once a preliminary list was created, concepts were refined, and sizing and drainage area delineations were developed for input into the BMPDSS model.

3.3 Existing Condition Review

The first step in the process was to complete a desktop assessment to compare the City's latest BMP data to the data used by VTDEC, which was last revised in 2014. The City had been making independent corrections and additions to the VTDEC's BMP drainage area data since 2014 and this information was used for an initial review. The VTDEC's list of permitted discharges for Potash Brook was also compared to the BMPDSS data to ensure no permitted BMPs were omitted. There were several permitted sites that did not have volume-based or infiltration BMPs. While these BMPs provide water quality treatment, they did not have a significant impact on flow rates in Potash Brook and were therefore omitted from the models. Significant changes have occurred in the Potash Brook watershed since the last BMPDSS model update (2014), as well as a number of retrofits to existing BMPs. As a result, 22 additional permitted BMPs and 12 retrofits to existing BMPs were added to the Post-2002 model as a part of the existing conditions review. A map showing existing stormwater BMPs in the Potash Brook watershed is presented in Appendix A, and a list of existing stormwater BMPs in the Potash Brook watershed is presented in Table A-2 in Appendix A.

Prior to conducting site inspections, expired VTDEC stormwater permit files for existing BMPs were reviewed so that the information could be compared to what was included in the Pre-2002 BMPDSS model. Site visits of all BMPs included in the Pre-2002 model were conducted between April 29th and May 5th of 2015. Several of the BMPs included in the Pre-2002 model have since been retrofit to meet 2002 VT Stormwater Design Standards, which has been indicated on the field forms located in Appendix A.

Verification of BMP drainage areas and the design of the existing BMPs was also completed during these site visits. Documentation of these observations has been included on field sheets (see Existing Stormwater BMP Site Inspection Field Sheets provided in Appendix A). BMP outlet structures were noted on the field sheet to confirm the general configuration. The HydroCAD models used by VTDEC to enter the BMPs into the BMPDSS were also reviewed against existing site conditions. Comparison of measured field observations versus what VTDEC used for model inputs yielded a number of

discrepancies. A list of the changes realized by field inspections are provided in the following two sections; 3.4 Pre-2002 Model Revisions and 3.5 Post-2002 Model Revisions.

Revised input files for the Pre-2002 and Post-2002 models were submitted to the VTDEC. This included revised subwatersheds, BMP point locations, BMP drainage areas, and HydroCAD model files. For more recent BMPs, the original HydroCAD files were acquired either through the City of South Burlington Planning and Zoning Department, BTV, VTDEC, or directly from the original design Engineer. Models were either used directly as provided or simplified for purposes of transferring to the BMPDSS. Simplifications included removing additional routing features like catch basins and/or reaches or other storages not pertinent to the specific BMP design configuration included in the BMPDSS.

3.4 Pre-2002 Model Revisions

The following revisions were made to the Pre-2002 model, which is representative of the watershed prior to 2002, before the current (2002) VT Stormwater Design Standards were established.

3.4.1 Watershed Boundary Revisions:

Englesby/Potash Boundary - The Englesby Brook and Potash Brook watershed boundary was revised by Stone Environmental as a part of the Englesby FRP project in March 2015. Further refinement of this boundary was completed based on review of the City of Burlington's storm sewer infrastructure, subwatershed mapping ("BTV_Subwatershed_032615"), Light Imaging, Detection, And Ranging (or LIDAR) imaging, and supplemental field verification. The boundary reflects what the VTDEC considers the most up-to-date boundary, consistent between the VTDEC's Englesby and Potash Brook BMPDSS models. A net difference of 3.38 acres was removed from the Potash Brook watershed and added to the Englesby watershed within the South Burlington jurisdiction, and a net difference of 0.45 acres was removed from the Potash Brook watershed and added to the Englesby watershed within the Burlington jurisdiction as a result of the watershed revisions (Figure 1 and Figure 2).

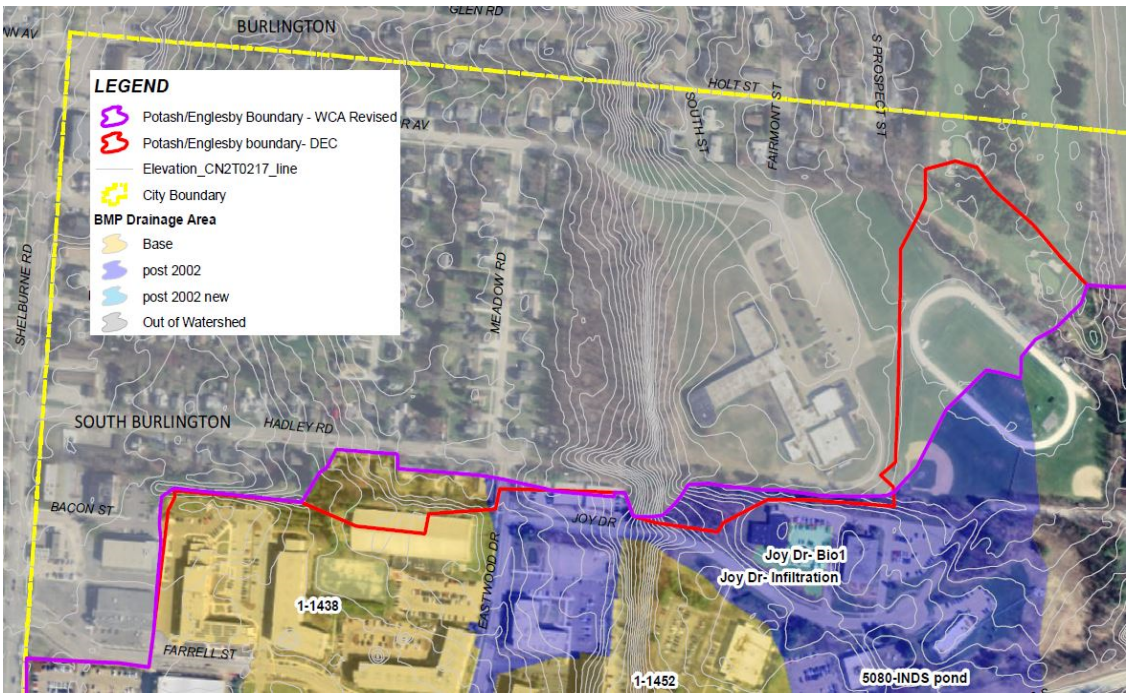


Figure 1: Potash/Englesby watershed boundary changes within the City of South Burlington from VTDEC's latest version in May 2015 to WCA's most revised version as of July 2015 (net change of 3.38 acres).

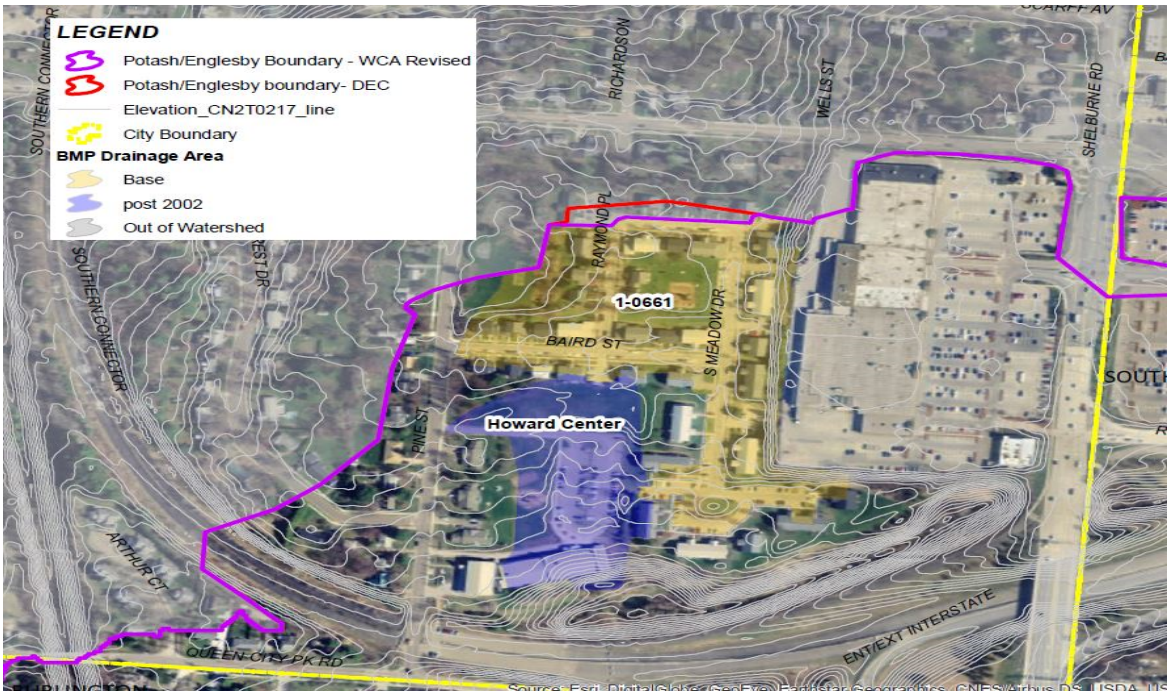


Figure 2: Potash/Englesby watershed boundary changes within the City of Burlington from VTDEC's latest version in May 2015 to HTA-WCA's most revised version as of July 2015 (net change of 0.45 acres).

<u>Highland Terrace/Hinesburg Rd.</u> - A 6-acre area was determined to be outside of the Potash Brook watershed near Highland Terrace based on the mapped infrastructure and field confirmation, all of which is within the South Burlington jurisdiction.

Burlington International Airport - Several sections of the Potash Brook watershed outer boundary at the Burlington International Airport were adjusted based on drainage mapping completed by Stantec Consulting in 2013, as part of a Stormwater Utility Credit Analysis. The adjustments resulted in a net change of 6.42 acres being removed from the watershed.

3.4.2 Subwatershed Boundary Revisions:

Thirty-three (33) of the subwatershed boundaries were revised based on field verification, and/or required due to changes in the BMP drainage areas. The majority of these modifications were minor. However, significant changes were made to boundaries near the Dorset Street Park, the Meadowland Business Park, and Burlington International Airport. The individual impact of each adjustment on the flow at the watershed outlet is unknown, as the model was not revised for each adjustment, and the impact resulted in no net change. A map showing subwatershed boundaries is presented in Appendix A - Map A-2: Subwatershed Boundaries.

3.4.3 BMP Drainage Areas:

The most recent BMP drainage area file provided by the VTDEC was compared to South Burlington's most up-to-date BMP drainage area data. The City's delineations were considered the most accurate as the South Burlington Stormwater Service Department has been updating delineations based on field conditions, and therefore replaced the VTDEC's version. Additional revisions to the City's delineations were needed for some BMPs based on field verification. Overall, thirty (30) of the VTDEC's BMP drainage areas were revised.

3.4.4 Pre-2002 Model BMPs:

Six (6) Pre-2002 BMPs were added to the model, including: an existing pond at the Ridgewood Estates which was not previously considered a permitted stormwater feature, two infiltration fields at the Burlington International Airport between Taxiway Alpha and Runway 1-19, a dry well at the UVM Forestry Research Center, an infiltration basin near Shunpike Rd, and an infiltration basin at Vermont Panurgy, Inc. Several revisions were made to the model input data for existing BMPs included in the model based on permit review and field verification, as summarized in Table 3 below.

Table 3: Input Data Revisions for Pre-2002 Model BMPs

Permit #	Pond Name	Model Input data revision
1-0464a	Oak Creek Village Pond #2 (Fox Run Lane)	Revised pond grading and culvert invert based on Stantec Survey of site prior to upgrades.
1-0464b	Oak Creek Village Pond#3 (Moss Glen Lane)	Revised pond grading and culvert invert based on Stantec Survey of site prior to upgrades.
1-1391	"I4_1-1319" (Burlington International Airport)	Replaced existing inputs with revised model file prepared by Stantec as a part of their Stormwater Credit Analysis with updated infiltration rate based on field testing.
1-0839	“I3_North" (Burlington International Airport Runway 1-19)	Replaced existing inputs with revised model file prepared by Stantec for the Northern section of the exfiltration system East of Runway 1-19, permitted under 1-0839.
1-0839	“I3_South" (Burlington International Airport Runway 1-19)	Replaced existing inputs with revised model file prepared by Stantec for the southern section of the exfiltration system East of Runway 1-19, permitted under 1-0839.
1-1458	Technology Park Field Detention Pond 3 (Community Drive)	Pond 3 outlet structure was changed from a 12" orifice to a 4" @ 2.25' below the existing sharp-crested weir, based on field inspection.
1-0503d	UMall SN005- Sears Automotive Pond	Revised Pond culvert outlet from 36" to 12".
1-1504b	110 Kimball Ave- South Infiltration Basin	Removed 18" riser structure. Only found 12" culvert out in field.
1-0503c	UMall Detention Pond	Revised pond outlet orifice from 6” to 7” and added high flow orifice based on field inspection.

3.5 Post-2002 Model Revisions

The Post-2002 model**,** including all BMPs in compliance with the 2002 VT Stormwater Design Standards, was revised as follows:

3.5.1 Watershed Boundary Revisions:

Englesby/Potash Watershed Boundary - The boundary is consistent with the revised Base model boundary with the exception of the most northern section where the new UVM athletic field is located. A 10-acre site on University of Vermont property now drains out of the Potash Brook watershed as a result of the new grading.

3.5.2 Subwatershed Boundary Revisions:

Thirty-seven (37) of the subwatershed boundary segments were revised due to the changes in the BMP drainage areas provided by South Burlington and confirmed via field verification. The subwatersheds are utilized by the BMPDSS to model flow, and more accurate subwatershed boundaries results in better flow modelling. Map A-2 showing subwatershed boundaries is presented in Appendix A.

3.5.3 BMP Drainage Areas:

BMP drainage areas from Geographical Information System (GIS) data provided by South Burlington were included in the BMPDSS model with the exception of the Hayes Stormwater Improvements to Swales 1, 2 and 3 and a swirl separator located on Farrell Street. These improvements were determined not to have a detention benefit in the model. Several minor revisions were required based on field verification and/or conflict with new BMPs, previously not included in the South Burlington data.

3.5.4 Post-2002 Existing BMP Revisions:

Revisions to five (5) existing BMPs were needed based on discrepancies between the existing model configuration and field observations. Thirteen (13) previously omitted retrofits to existing BMPs were added to the model, summarized in Table A-2 in Appendix A, under group ID "Existing BMP Retrofit-new". In addition, 26 new BMPs were added to the Post2002 model, included in Table A-2 under group ID "Post2002-new". As a result of the new permitted projects, 124.5 acres of impervious was added to the existing condition model. Thirteen (13) of the new BMPs or proposed retrofits have an existing VTDEC Stormwater Permit or Construction Permit, but have not been constructed as of May 2015, including;

- #1-0538: Pond upgrade under USACE Potash Tributary 3 Project at Midas Drive
- #1-0647: Proposed upgrades to three (3) ponds at the Village at Dorset Park
- #6174-INDS.A: Two proposed Infiltration Basins for new Concession Stand Project at South Burlington High School
- #6970-INDS: Wet Pond and Detention Swale for Dorset Street Hotel Project
- #7017-INDS: Two Detention Ponds and 1 Dry Pond for Rye Associates Planned Unit Development off Hinesburg Road.
- #2-0100: Detention Pond within Stonehedge Development
- #6553-INDO: Detention Pond for Hayes Apartments located off Hayes Ave.

Several existing BMPs in the City's GIS based stormwater pond inventory were previously omitted from both the Pre-2002 and Post-2002 model runs, and were added to the subsequent Post-2002 model iteration. These omitted BMPs include the following:

- Three proposed bioretention areas in the Stonehedge Neighborhood, under expired permit 2-0100.
- BMP retrofits associated with Permit #6269-9030 which covers the permitted system at 30 Kimball Avenue.
- Proposed modifications identified in the original Engineering Feasibility Assessment (EFA) for Permit #6282-9030 (expired permit #1-0503), which covers the stormwater BMPs at the University Mall. The original EFA was reviewed as a part of this process, but was not incorporated into the model because the proposed modifications were not approved by VTDEC. No proposed BMP upgrades have been implemented at this time.

3.6 Revised Model Results:

Overall the unadjusted flow for the Pre-2002 model and Post-2002 model decreased between the VTDEC model (model runs dated 11/18/14) and the revised Pre-2002 and Post-2002 models (model runs dated 7/8/15). A summary showing the difference between the original VTDEC model and the

revised model is presented in Table 4 below. The unadjusted flow was used to compare the model scenarios versus the normalized flow by area due to slight differences in watershed area between the model runs (as a result of the watershed boundary changes described in sections 3.4 and 3.5). The change between the watershed unadjusted high flow (cfs) in the Pre-2002 and Post-2002 scenarios was estimated to be -2.9% for the revised model run, compared to -1.4% for the previous VTDEC model run. There was no change in the low-flow percent difference between the model runs, however the overall base flow *increased* by 0.01 cfs across the watershed (Table 4). While the low-flow target is not actionable under the approved TMDL, the FRP continued to evaluate stream flows under this condition with the intent of achieving the recommended increase in flow.

Table 4: Potash Brook Base Model Runs Summary

Model Run Scenario	High-flow Q0.3% **Unadjusted flow (cfs)**	Low-flow Q95% **Unadjusted flow (cfs)**	BMPDSS Model Run Date
TMDL Targets with 30 acres of Non-Jurisdictional Future Growth	-16.50%	11.20%	----
Pre-2002 Scenario VTDEC	103.15	1.37	11/18/2014
Post-2002 Scenario VTDEC	101.74	1.36	11/18/2014
Percent Change from Pre-2002 to Post-2002 Scenarios VTDEC	-1.40%	-0.70%	
Revised Pre-2002 Scenario	101.90	1.38	7/8/2015
Revised Post-2002 Scenario	98.95	1.37	7/8/2015
Percent Change from Revised Pre-2002 to Revised Post-2002 Scenarios	**-2.90%**	-0.70%	----

3.7 Summary of BMPDSS Model Assessment Effort:

As a part of the BMPDSS model review, over 67 acres of additional impervious surface were added to the watershed model. Past experience with the BMPDSS model has exhibited sensitivity to changes in land cover, particularly impervious surface. One might expect the overall watershed high flow to increase with the change in land cover to a more impervious condition watershed-wide. However, new BMPs were also added to the model to manage stormwater runoff from the new developed areas, which reduced the impact observed in the model. Additionally, 12 retrofits to existing BMPs were added to the Post-2002 model, all of which were upgrades to the existing structures designed to detain the 1-year storm. As a result, the existing model scenario would be expected to estimate a net reduction in flow from the baseline condition, as was observed in the revised model scenario (Table 4).

4. Identification of Stormwater Best Management Practices

The process of BMP identification involved an initial assessment of the existing BMPs with expired permits that did not already meet the CPv standards in the 2002 Vermont Stormwater Management Manual (VSMM) to determine if they could be retrofit to meet the VSMM design standards. Upon review of the existing BMPs, it was determined that additional new BMPs would be required to meet the high-flow and low-flow targets. An initial desktop assessment of the watershed was completed to identify open spaces ideal for BMP implementation. A focus of this effort was to first evaluate property owned by the MS4s where projects could be implemented more readily than on private property. In addition, the location of

proposed BMPs across the watershed was taken into consideration to provide storage throughout the watershed. The effort also focused on areas with a high-percentage of impervious coverage where flows were expected to be highest and where infiltration may be possible, as indicated by mapped Natural Resource Conservation Service Hydrologic Soil Group A[1] or B[2] soils.

After an initial list of retrofit sites were identified, a preliminary field assessment was completed at each location to document potential constructability issues and review mapped drainage areas for the proposed BMPs. The BMPs were then modeled using HydroCAD to meet the CPv storage criteria for cold water fish habitat (12-hour detention standard), and incorporated into the BMPDSS model. The initial model iteration, "Credit 1" scenario, included the addition of 54 BMPs. The Credit 1 scenario did not achieve the flow reductions required by the TMDL. Additional BMPs were then identified and added in subsequent iterations of the proposed model until flow targets were met. This resulted in credit scenarios 2 through 4, as well as a final "CMAC Valve Run" scenario.

4.1 BMPDSS Model Assessment Results

The Post-2002 BMPDSS model runs included 90 BMPs and accounted for a 4.5% decrease towards the high flow (Q0.3) reduction target of 16.5%.

After completing the initial credit model run (Credit 1 scenario), the MS4 partners discussed the Hydraulic Weighting Factor (HWF) with VTDEC. As previously discussed (see section 3.1.1), it was determined that adjustment of the HWF used in the original BMPDSS model would provide results that more closely replicated the observed rainfall and streamflow data. Therefore, with VTDEC concurrence, the original and subsequent BMPDSS model runs utilized a modified HWF. These modifications resulted in a revised flow reduction of the unadjusted high flow (Q0.3) from 131.02 cfs to 125.08 cfs between the Pre-2002 and Post-2002 model runs, or 4.5% decrease. This reduction of 4.5% towards the high flow (Q0.3) reduction target of 16.5% differs from the earlier identified reduction of 2.9% towards the high flow target from the Pre-2002 Scenario to the Post-2002 Scenario identified in Table 4.

The final BMP scenario was developed based on an iterative assessment using the BMPDSS modeling tool. The initial model run (Credit 1 scenario) included fifty-four (54) additional BMPs, bringing the modeled stream flow reduction at the high-flow target to 11.8%. Fifteen (15) additional BMPs were identified and added to a subsequent model run "Credit 2". The Credit 2 run modeled stream flow reductions at the high-flow to 14.6% towards the targeted reduction of 16.5%. Thirteen (13) additional BMPs were identified and added to model run "Credit 3". The Credit 3 run reduced the estimated stream flows during the high-flow target by an additional 0.6%, increasing the total stream flow reductions to 15.2% towards the targeted reduction of 16.5%. A fourth model run was completed with "Credit 4", and included an additional sixteen (16) BMPs. The Credit 4 model run predicted a 16.4% reduction in stream flows during the high-flow target event.

A final model run "CMAC Valve Run" was then conducted implementing Continuous Monitoring and Adaptive Control (CMAC) valves on 18 ponds that were already included in previous model runs. These

[1] Group A is sand, loamy sand or sandy loam types of soils. It has low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands or gravels and have a high rate of water transmission.

[2] Group B is silt loam or loam. It has a moderate infiltration rate when thoroughly wetted and consists chiefly or moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures.

actuated valves maximize the use of the ponds' storage capacity by predictively drawing down the permanent pool in advance of a storm event using data from connected on-site sensors, weather forecasts, and site specific parameters. This final model run predicted that stream flow during the high flow event would be reduced by 16.5%, meeting the targeted flow reductions of the TMDL**.** A summary of the results of each BMPDSS model iteration are presented in Table 5.

Table 5: Summary of BMPDSS Model Results

Description	Area (sq. mi)	Q0.3		Q95		# of BMPs Added for Model Runs	Impervious Area Managed (acres)*	% of Total Watershed Impervious Managed
		Area adjusted (cfs/sq.mi.)	Unadjusted flow (cfs)	Area adjusted (cfs/sq.mi.)	Unadjusted flow (cfs)			
Pre-2002 BMPs	7.055	18.570	131.020	0.1885	1.330			
Post-2002 BMPs	7.045	17.755	125.090	0.1874	1.320	90	248.1	26.5%
% Change vs Base			-4.5%		-0.8%			
Credit 1	7.046	16.403	115.580	0.1887	1.330	54	466.8	49.9%
% Change vs Base			-11.8%		0.0%			
Credit 2	7.024	15.932	111.900	0.1894	1.330	15	527.6	56.4%
% Change vs Base			-14.6%		0.0%			
Credit 3	7.024	15.811	111.050	0.1894	1.330	13	555.2	59.4%
% Change vs Base			-15.2%		0.0%			
Credit 4	7.024	15.592	109.520	0.1894	1.330	16	595.4	63.7%
% Change vs Base			-16.4%		0.0%			
CMAC Valve Run	7.024	15.568	109.350	0.1922	1.350	18 Ponds w/CMAC Valves	595.4	63.7%
% Change vs Base			**-16.5%**		1.5%			
* Includes all Post-2002 and Credit run BMPs to this point.								

A summary table listing all of the proposed BMPs added to each credit model scenarios is included in Appendix B (Table B-1). The table shows the model run to which the BMP was first added. The BMPs were maintained in the model for subsequent "Credit" runs.

The BMPDSS model did not predict a significant increase in the stream base flow (1.5% of the target of 11.2%) despite the preferential selection of infiltration-based BMPs when possible given site constraints such as soil type. The majority of soils within the Potash Brook watershed (64%) are not conducive to infiltration-based BMPs due to their negligible infiltration rates. Additionally, it has been noted by the VTDEC and other BMPDSS model users that the model tends to under represent infiltration-based BMPs and is not sensitive enough to accurately predict base flow increases as a result of smaller infiltration-based BMPs. It is expected that actual base flow increases will be higher than predicted by the BMPDSS.

5. Proposed BMP Implementation Plan

The final proposed BMP implementation plan includes a total of 107 sites; forty (40) retrofits to existing BMPs, forty-one (41) new detention systems, eighteen (18) new infiltration systems, five (5) new gravel wetlands, two (2) new bioretention systems, and one (1) new median filter system. The final number of proposed BMPs differs from the number of BMPS added to the model runs shown on Table 5 for several

reasons including; some BMPs were initially included in the model as two separate sites and then later combined into one project, and some projects were rerun in the CMAC Valve Run. The final proposed BMPs are summarized in Appendix C, Table C-1, including the impervious cover treated, drainage area, WQv managed, CPv storage, or infiltration volume manage as estimated by the HydroCAD design model. A map of the proposed BMP locations is included in Appendix C.

5.1 Proposed BMPs

One hundred seven (107) BMP sites are proposed for implementation in the Potash Brook watershed. Proposed BMPs include a mixture of existing BMPS, retrofits to existing BMPs, and new BMPs The proposed BMPS for implementation are summarized in Table C-1 in Appendix C. Summary sheets describing each proposed BMP in detail for the Potash Brook FRP were prepared and are included in Appendix C.

5.2 Considerations During BMP Design

Proposed BMPs are currently conceptual in nature. These BMPs will need to be advanced to final design prior to construction. A variety of site specific factors will need to be further considered during the design phase. These considerations include, but are not limited to, the following:

- Relocation of utilities
- Wetland impacts
- Archeological resource impacts
- Soil characterization
- Depth to groundwater
- Depth to bedrock
- ”Hotspot” land use
- Access considerations
- Land purchase/easements
- Future land use plans
- Potential need for site improvements such as; underground storage, retaining walls, etc.

6. Implementation Schedule

A Design and Construction (D&C) schedule is a required element of the final FRP. The MS4 permit indicates that the implementation schedule for the BMPs included in the FRP must be over a timeframe that is less than 20 years from the effective date of permit. The MS4s involved in the Potash Brook FRP worked together to develop an implementation schedule for Potash Brook. Some MS4s have responsibility for BMP implementation as part of FRPs in multiple watersheds. For example, the City of South Burlington has the responsibility to implement BMPs as part of FRPs in five stormwater impaired watersheds: Bartlett, Englesby, Centennial, Munroe, and Potash Brook. All five FRPs need to be considered when developing a comprehensive and realistic D&C schedule for the City. The time schedule also accounts for acquisition of necessary permits and/or regulatory approvals, as well as limitations of MS4 resources on an annual basis.

6.1 Project Ranking

All proposed BMPs identified as part of FRP development in the five stormwater impaired watersheds of Potash, Bartlett, Englesby, Centennial, and Munroe Brook were ranked and a

project prioritization was created. Considerations that factored into the ranking of BMP projects include the estimated benefit of a BMP towards the FRP's flow restoration targets, and the amount of impervious area treated. The comprehensive ranking matrix ranked the proposed BMP projects based on the following criteria, which were grouped into four general categories as shown in Table 6.

Table 6: Project Ranking Matrix

Category	ID	Criteria
Cost/Operations	A	Project Cost per Impervious Acre
Project Design Metrics	B	Impervious Acres Managed (ac)
	C	Channel Protection Volume (CPv) Mitigated, (ie. 1-year Storm)
	D	Volume Infiltrated (ac-ft)
Project Implementation	E	Permits
	F	Land Availability
Other Project Benefits/Constraints	G	Flood Mitigation (Is existing flooding issue mitigated by project?)
	H	TMDL Flow Target Addressed (Q03, Q95)
	I	Lake Champlain Phosphorus TMDL
	J	Other Project Benefits/Constraints

Values for each criteria were identified and assigned a relative score, so that proposed BMP projects could be ranked based on a total score. A full description of the ranking criteria is presented in Table D-1 in Appendix D, and a scoring key is presented in Table D-2 in Appendix D. The development of cost estimates is further defined in the Subsection 6.1.1. The final scoring of proposed BMP projects in the Potash Brook Watershed is presented Table E-2 in Appendix E.

6.2 Proposed BMP Cost Estimates

A spreadsheet-based method was used to develop planning level costs for all proposed BMPs. This methodology was first developed for the City of South Burlington by the Horsley-Witten Group (HW) and was utilized as part of Centennial Brook FRP development (the HW Memorandum dated 1/9/14 that describes this methodology is provided in Appendix D). This methodology provided consistent budgetary cost estimates across all FRPs.

BMP cost estimates are based on average costs for conceptual level projects and deviation from these estimates is expected as projects move forward with engineering design. It is anticipated that there will be differences between project cost estimates presented in the FRP and actual project bid costs. The BMP cost estimates presented in the FRP are based on limited site investigation and the application of a BMP estimating methodology previously developed by HW. This methodology, while providing consistency in budget cost estimating, may fail to accurately reflect project cost impacts due to actual site conditions and constraints. Therefore, the BMP cost estimates presented are suitable for planning purposes only and not detailed project budgeting. For consistency purposes, all project cost estimates presented are calculated using costs in 2014, when the methodology was developed.

The BMP cost estimates were developed based on the following assumptions:

Design Control Volumes: Design control volumes were based on the estimated runoff volume associated with the 1-year storm event for off-line, underground or green infrastructure-type practices. Control volumes for large, in-line infiltration or detention basins were based on the estimated runoff associated with the 100-year storm event plus approximately 2 feet of freeboard volume. Underground systems and green infrastructure-type practices were conceptually designed as offline practices that only accept runoff from the one-year event. Runoff volumes for all storm events were determined based on HydroCAD model results that rely on the Soil Conservation Service (SCS) TR-55 and TR-20 hydrologic methods.

Unit Costs and Site Adjustment Factors: Unit cost for each BMP and site adjustment factors were derived from research by the Charles River Watershed Association and Center for Watershed Protection, as well as from experience with actual construction.[1] Underground detention chambers (UDC) and underground recharge chamber (URC) systems were typically designed using Stormtech SC-740™ chamber systems. Cost estimates for the retrofit sites described as "GI/URC" were calculated as bioretention treatment systems followed by Stormtech SC-740™ chambers for recharge benefits. Cost adjustment factors were used to account for site specific differences typically related to project size, location, and complexity. Retrofits of existing BMPs, for example, generally cost less than new installations. The values used to estimate BMP costs are summarized in Table 7 below:

Table 7: Proposed BMP Unit Costs and Adjustment Factors

BMP	Base Cost ($/ft3)
Detention Basin	$2
Infiltration Basin	$4
Underground Chamber (infiltration or detention)	$12
Bioretention	$10
Green Infrastructure/ Underground Chamber Combo	$22
Site Type	Cost Multiplier
Existing BMP retrofit	0.25
New BMP in undeveloped area	1
New BMP in partially developed area	1.5
New BMP in developed area	2
Adjustment factor for large aboveground basin projects	0.5

*Excerpt from Horsley Witten Memorandum Dated January 9th 2014 (Page 11)

Site Specific Costs: Cost of significant utility or other work related to the construction of the BMP itself. Site specific costs are variable based on past experience.

Base Construction Cost: Calculated as the product of the design control volume, the unit cost, and the site adjustment factor.

Permits and Engineering Costs: Used either 20% (for largest storage volume projects), and 35% for smaller or complex projects.

[1] Horsley Witten Group, Inc. 2014. Centennial Brook Watershed: Flow Restoration VTBMPDSS Modeling Analysis and BMP Supporting Information. Memorandum Dated January 9th, 2014.

Land Acquisition Costs *(Modified*): A variation from the HW method was applied. Based on an estimate from the South Burlington City Assessor, a land acquisition cost of $120,000 per acre required for the BMP was applied to projects on private property. It should be noted that this value is based on a limited estimate and not necessary an expected cost per acre.

Total Project Cost: Calculated as the sum of the base construction cost, permitting and engineering costs, and land acquisition costs.

Cost per Impervious Acre: Calculated as the construction costs plus the permitting and engineering costs divided by the impervious acres managed by the BMP.

Operation and Maintenance: The annual O&M was calculated as 3% of the base construction costs, with a maximum of $10,000.

Minimum Cost Adjustment: After total project costs were determined for each proposed BMP based on the HW methodology, costs were reviewed and adjusted so that projects involving an outlet retrofit, such as a new outlet structure, were assigned a minimum cost of $10,000, and a project involving an expansion retrofit were assigned a minimum cost of $25,000.

A summary of all project costs for each proposed BMP in the Potash Brook Watershed are included in Table E-1 in Appendix E.

6.3 Implementation Schedule

The BMPDSS model run that ultimately achieved the required 16.5% reduction in stream flow during the 1-year storm event included 93 BMPs costing approximately $16,500,000 (this value utilizes 2014 construction cost estimates). The MS4 general permit requires that the BMPs identified in the FRP be constructed within 20 years of the effective date of the MS4 general permit. Therefore, the MS4 entities developed a schedule for design and construction of all BMPs that concludes before December 5, 2032. The implementation schedule for the proposed BMP projects in the Potash Brook watershed are included in Table E-3 in Appendix E.

In addition to a project's score within the BMP ranking matrix, development of a BMP implementation schedule required the consideration of additional factors. A number of the proposed BMPs are currently covered by expired State of Vermont stormwater permits. These BMPs were included in the beginning of the schedule so that the associated properties could complete the required stormwater improvements and achieve permit compliance. Other BMPs involve property containing more than 3 acres of impervious area. VTDEC is currently drafting a "3 Acre Stormwater Permit" that would require stormwater retrofits at these sites. BMPs in this situation were also placed towards the front of the implementation schedule. In addition, some of the proposed BMPs are located on land owned or controlled by the MS4 entities. These BMPs were given priority over those that were located on private property.

The BMP schedule presented in this FRP is expected to receive updates on an annual basis. Projects will be added, modified, or removed as necessary to meet FRP flow targets and respond to actual conditions. The primary reason being that the BMPs presented in the implementation schedule have only been developed in concept. It is reasonable to anticipate that changes will occur when these concepts are further developed. Depending on actual circumstances, the level of treatment achieved may be more or less than the level of treatment anticipated (e.g. variations

in soil conditions allow for either more or less infiltration of stormwater runoff than originally anticipated). These type of modifications are common when advancing BMP plans from concept to final design. Therefore, flexibility in the schedule is necessary to accommodate these changes.

Additionally, in order for project implementation to move forward in a cost effective manner, the MS4s will need to take advantage of opportunities for stormwater improvements as they present themselves. For example, a private property owner may decide to redevelop their property on a schedule that was not anticipated in the current BMP implementation schedule. If this occurs, the MS4s may need to shift available resources from a scheduled project in order to take advantage of a cost savings opportunity.

Finally, projects may need to be shifted in the BMP schedule based on Vermont's changing regulatory system. VTDEC is currently developing an implementation plan for the Lake Champlain Phosphorous TMDL. When this document is finalized, the MS4 permit will require regulated entities to develop Phosphorus Control Plans (PCPs), similar in size and scope to the FRPs being developed as part of stormwater TMDLs. When this occurs, the FRPs will likely need to be revised based on PCP requirements, which are yet to be defined by VTDEC.

7. Financial Plan

Subject to the requirements of the MS4 permit, a financial plan is required as a part of the FRP. This plan must provide initial BMP cost estimates and demonstrate the means by which BMP implementation will be financed. The financial plan must also include the steps that each MS4 will take to implement the finance plan.

Initial BMP cost estimates were arrived at using 2014 cost estimates. Once projects were scheduled over the remaining 17-year implementation schedule, an annual 3% inflation rate based on the construction cost index was applied. Table E-3 in Appendix E presents inflation adjusted project costs for each BMP project. Applying this inflation rate provides a more accurate annual cost for BMP construction in the later years of the schedule.

7.1 City of South Burlington Financial Plan

In 2005, the City of South Burlington created Vermont's first stormwater utility. Under the stormwater utility system, all developed properties in the City pay an impervious area-based stormwater fee using an Equivalent Residential Unit (ERU) system[1]. These stormwater fees provide the City with a stable funding source that is used to comply with State and Federal stormwater regulations and maintain stormwater infrastructure throughout the City. The stormwater utility was created with the understanding that there would be future stormwater costs related to the five stormwater impaired watersheds located in South Burlington, as well as costs related to future implementation of projects required by the Lake Champlain Phosphorous TMDL. The City anticipates using funds generated from stormwater utility fees to fund a portion of FRP related costs.

[1] South Burlington's *Ordinance Regulating the Use of Public and Private Sanitary Sewerage and Stormwater Systems*, dated 10/5/15, can be viewed at the following link: http://www.sburl.com/vertical/sites/%7BD1A8A14E-F9A2-40BE-A701-417111F9426B%7D/uploads/Sewer_and_Stormwater_Ordinance_Final_Clean_10.5.15.pdf

Once the BMP cost and implementation schedule was developed, the City of South Burlington Stormwater Utility was able to incorporate this information into its existing stormwater rate model. The City evaluated three different scenarios for funding the BMPs included in the FRP. The first scenario assumed that there would be no grant funding or low interest loans available to assist with implementation. The second scenario assumed that there would be no grant funding available, but low interest loans would be available to help the City pay for implementation. This scenario included $5M in low interest loans to help pay for BMP implementation. The third funding scenario assumed that grant funding of approximately $250,000 per year would be available in 2018 through 2029, and that this amount would increase to $500,000 in 2030, 2031, and 2032. The third funding scenario does not include low interest loans. The impact that these scenarios would have on stormwater utility rates is summarized in Table 8. The resulting annual cost to a single family residential property and commercial property owner containing 1 acre of impervious area is summarized in Table 9. Calculations for "Commercial Property Containing 1 Acre Impervious Area" in Table 9 assume an Equivalent Residential Unit (ERU) rate of 17 and do not take into account the City's relative tier factors, based percent impervious cover, which would yield an ERU range of 13 to 22 ERUs.

Table 8: Stormwater Billing Rate (Cost per Equivalent Residential Unit) Under Different Flow Restoration Plan Funding Scenarios

Fiscal Year	Funding Scenario 1 Receive No Grants and No Loans	Funding Scenario 2 Receive Low Interest Loans, No Grants	Funding Scenario 3 Receive $250,000 in Grants Annually*
2018	$6.69	$6.69	$6.69
2019	$6.87	$6.84	$6.84
2020	$7.05	$6.99	$6.99
2021	$7.26	$7.14	$7.14
2022	$7.50	$7.29	$7.29
2023	$7.77	$7.47	$7.44
2024	$8.07	$7.68	$7.59
2025	$8.40	$7.92	$7.74
2026	$8.76	$8.19	$7.89
2027	$9.15	$8.49	$8.04
2028	$9.57	$8.82	$8.19
2029	$9.99	$9.18	$8.34
2030	$10.41	$9.57	$8.49
2031	$10.83	$9.99	$8.64
2032	$11.25	$10.44	$8.79

*Funding Scenario 3 does not include low interest loans.

Table 9: Annual Stormwater Fee Paid by Property Owners Under Different Flow Restoration Plan Funding Scenarios

Fiscal Year	Funding Scenario 1 - Receive No Grants and No Loans		Funding Scenario 2 - Receive Low Interest Loans, No Grants		Funding Scenario 3 - Receive $250,000 in Grants Annually*	
	Single Family Residential Property	Commercial Property Containing 1 Acre Impervious Area	Single Family Residential Property	Commercial Property Containing 1 Acre Impervious Area	Single Family Residential Property	Commercial Property Containing 1 Acre Impervious Area
2018	$80.28	$1,364.76	$80.28	$1,364.76	$80.28	$1,364.76
2019	$82.44	$1,401.48	$82.08	$1,395.36	$82.08	$1,395.36
2020	$84.60	$1,438.20	$83.88	$1,425.96	$83.88	$1,425.96
2021	$87.12	$1,481.04	$85.68	$1,456.56	$85.68	$1,456.56
2022	$90.00	$1,530.00	$87.48	$1,487.16	$87.48	$1,487.16
2023	$93.24	$1,585.08	$89.64	$1,523.88	$89.28	$1,517.76
2024	$96.84	$1,646.28	$92.16	$1,566.72	$91.08	$1,548.36
2025	$100.80	$1,713.60	$95.04	$1,615.68	$92.88	$1,578.96
2026	$105.12	$1,787.04	$98.28	$1,670.76	$94.68	$1,609.56
2027	$109.80	$1,866.60	$101.88	$1,731.96	$96.48	$1,640.16
2028	$114.84	$1,952.28	$105.84	$1,799.28	$98.28	$1,670.76
2029	$119.88	$2,037.96	$110.16	$1,872.72	$100.08	$1,701.36
2030	$124.92	$2,123.64	$114.84	$1,952.28	$101.88	$1,731.96
2031	$129.96	$2,209.32	$119.88	$2,037.96	$103.68	$1,762.56
2032	$135.00	$2,295.00	$125.28	$2,129.76	$105.48	$1,793.16

It is the City's expectation that significant funding from the State of Vermont and other Federal sources will be available to help with the cost of stormwater TMDL implementation. The State of Vermont has already taken initial steps towards providing this funding. In 2015, the Vermont legislature created the Clean Water Fund (CWF). The CWF was provided with $2,005,000 in 2016 and $7,688,000 in 2016. While these initial investments are not at the level necessary to provide significant funding to the MS4 communities subject to stormwater TMDLs, it is our understanding that the State is working to provide additional funding to the CWF in the future. In December 2016, the State Treasurer and State agencies will be delivering a report to the Vermont legislature that provides options for raising significant money to fund the CWF. The City of South Burlington intends to work closely with our legislative representatives to ensure that this funding is made available for the stormwater improvements included in the FRPs. The City of South Burlington will also pursue funding from existing and new grant sources from other organizations including, but not limited to, VTDEC, the Vermont Agency of Transportation, and the Lake Champlain Basin Program.

7.2 City of Burlington Financial Plan

In 2009, the City of Burlington followed the example of the City of South Burlington in implementing an impervious area based stormwater fee to provide the City of Burlington with a stable funding source to maintain stormwater infrastructure throughout the City and to comply with numerous State and Federal stormwater regulations including the Stormwater TMDLs, Lake Champlain TMDL and Combined Sewer requirements. Implementation of retrofits for which the City is responsible will ultimately be the responsibility of the stormwater ratepayers. In order to limit the impact to the ratepayers, the City intends to leverage existing and new grant and loan sources, as they are available. In the case of Potash Brook, the two retrofits identified within Burlington City limits are on private property. Later analyses will determine whether additional retrofit financial obligations (i.e. paying into project completed elsewhere in the watershed) will be necessary for the City to meet its obligations in Potash Brook. As part of its Integrated Planning effort, the City of Burlington will also be evaluating possible mechanisms for incentivizing the construction of retrofits identified on private property, particularly if the City can get improvements that go above the Flow Restoration Plan requirements and make gains in phosphorus control. Additionally, as part of the Integrated Planning effort, the City will be completing a financial capability assessment (FCA) to evaluate the long-term ability of ratepayers to fund these and other Clean Water Act obligations. An FCA won't mean that Clean Water Act obligations won't be met – but may point to an adjustment of the overall schedule of implementation of all of the City of Burlington's obligations, including implementation of this and other Flow Restoration Plan projects, in order to mitigate the impact of stormwater and wastewater rates increasing at an unsustainable rate for the Burlington community. This FRP and SWMP will be amended with an updated financial plan, including stormwater rate projections for this and other Clean Water Act obligations once the FCA under the Integrated Plan is completed (end of 2018).

7.3 University of Vermont Financial Plan

Under the current budgeting process, the University would establish project funds to fulfill the University of Vermont's obligation. We would endeavor to pursue federal and state stormwater grant opportunities.

7.4 Vermont Agency of Transportation Financial Plan

Planning level costs were independently estimated for each VTrans project using a consistent spreadsheet-based method for all projects. As such, some cost estimates may differ slightly from those presented in other FRP documents. VTrans will request state and federal funding for the appropriate amount to implement the BMPs as outlined in their design and construction schedule. For those projects that will require a joint effort with another municipality, VTrans will request funding for their portion of the cost share. In watersheds where VTrans is either not meeting or exceeding their allocated target there may be cost sharing between MS4s.

7.5 Burlington International Airport Financial Plan

A financial plan that estimates the costs for implementing the BMPs and describes a strategy for financing is a required element of the FRP. The financing plan includes the steps each permittee will take to implement the financing plan. The City of South Burlington Potash Brook and Centennial Brook FRPs include cost estimates for each of the BMPs, using 2014 cost estimates with an annual 3% inflation rate as noted above. The VTDEC and the contributing MS4 permittees within these watersheds have signed a Memorandum of Agreement (MOA) to perform monitoring and other data collection required under the MS4 permitting program. Each MS4 permittee, including BTV, has been assigned a percentage of the total cost of the contracted work over a five-year timeframe. This type of collaborative arrangement will also apply to implementation and financing of the BMPs.

As described in the FRPs, it is BTV's expectation that significant funding from the State of Vermont and other Federal sources will be available to help with the cost of stormwater TMDL implementation. In 2015, the Vermont legislature created the Clean Water Fund (CWF). This fund was provided with $2,005,000 in 2015 and $7,688,000 in 2016, and will likely receive additional funding in the years to come. The City of South Burlington and Burlington Airport intend to work closely with legislative representatives to ensure that this funding is made available for the stormwater improvements included in the FRPs.

The Burlington Airport also intends to seek funding for implementing its commensurate share of the BMPs within the watersheds, including requests from the CWF and other sources. BTV is committed to participating in a cost share with the City of South Burlington to implement its FRP in a manner that is fair and reasonable for the airport. It is also noted that BTV reserves the right to achieve its FRP commitments through implementing projects of its own choosing that may not be identified on South Burlington's present list of proposed watershed improvement projects.

8. Regulatory Analysis

In accordance with the MS4 permit, an FRP requires a regulatory analysis that identifies and describes any additional regulatory authorities, including authority to require low impact development BMPs, that the permittees will need in order to effectively implement the FRP.

Currently, stormwater runoff within the Potash Brook watershed is regulated primarily by the VTDEC, City of South Burlington, City of Burlington, and VTrans. VTDEC regulates new developments through issuance of Stormwater Discharge Permits with technical requirements as outlined in the 2002 Vermont Stormwater Manual. The cities of South Burlington and Burlington require improved stormwater practices and low impact development for new developments through their stormwater ordinances and Land Development Regulations (LDRs). VTrans regulates stormwater discharges to the state Right of Way through 19 V.S.A.§1111 "Permitted use of the right-of-way".

The City of South Burlington updated stormwater requirements in its LDRs in June 2016.[1] The revised LDRs require that any project resulting in ½ acre or more of impervious area implement stormwater controls that prioritize infiltration. The revised LDRs also contain new requirements for properties that are being redeveloped. It is the City's expectation that these changes will result in gradual improvements in stormwater management over the course of the BMP implementation schedule.

The City of South Burlington also revised its "Ordinance Regulating the Use of Public and Private Sanitary Sewerage and Stormwater Systems" in October 2015.[2] The ordinance provides a policy regarding the handling of expired VTDEC stormwater permits located in South Burlington. The City will continue to take over responsibility for exclusively residential stormwater systems that complete upgrades. In addition, the revised ordinance allows commercial properties with expired permits to obtain coverage under the City's MS4 permit if upgrades to the stormwater system are completed. These properties will still be responsible for maintaining their systems, but the permit coverage required by the State of Vermont can now be provided through the City's MS4 permit, instead of obtaining coverage under one of VTDEC's other permit programs.

While the City of South Burlington has taken significant steps to alleviate the problems caused by expired State of Vermont stormwater permits within its boundaries, there is still a significant role that the VTDEC needs to play in order to support these efforts. The City's revised ordinance provides the opportunity for properties to obtain their required State of Vermont stormwater permit coverage through the City's MS4 permit, but it does not require it. It is anticipated that some property owners will want to work directly with VTDEC to obtain this permit coverage. In order for South Burlington to effectively implement its FRP, VTDEC needs to update its State permit programs so that properties with expired stormwater permits in stormwater impaired watersheds can obtain permit coverage directly from VTDEC. This updated permit program should require stormwater treatment on the properties that are, at minimum, equal to the stormwater treatment requirements included in the City's LDRs and referenced in the City's Stormwater Ordinance. If VTDEC fails to take this step and creates a permit program that allows properties to obtain permits with minimal stormwater improvements, it has the strong potential to undermine the City's efforts to meet the FRP targets.

The expired permit within Burlington's municipal boundary (South Meadow, 1-0661) does not contain any public Right of Way or other impervious. As such, the City is not committing to incorporating this permit at this time. However, the City of Burlington is reluctant to formally

[1] Section 12.03 – Stormwater Management Standards, "South Burlington Land Development Regulations," dated 6/27/16, can be viewed at the following link: http://www.sburl.com/vertical/Sites/%7BD1A8A14E-F9A2-40BE-A701-417111F9426B%7D/uploads/LDRs_Effective_6-27-2016__Complete_reduced_size.pdf

[2] South Burlington's "Ordinance Regulating the Use of Public and Private Sanitary Sewerage and Stormwater Systems," dated 10/5/15, can be viewed at the following link: http://www.sburl.com/vertical/sites/%7BD1A8A14E-F9A2-40BE-A701-417111F9426B%7D/uploads/Sewer_and_Stormwater_Ordinance_Final_Clean_10.5.15.pdf

request residual designation of this permit until the State has developed and made public the engineering feasibility assessment (EFA) it will use for these residually designated permits, since it is important that such an EFA reference the Flow Restoration Plan and ensure that retrofits under the RDA permit meet the goals of the flow restoration plan.

A full list of the expired State of Vermont permits with discharges to Potash Brook is presented in Table 1 in Section 2.2. BMPs with expired State of Vermont permits proposed for retrofit under this FRP are included in Table C-1: Final Proposed BMPs for Potash Brook FRP in Appendix C.

9. Third Party Implementation

In accordance with the MS4 permit, a FRP requires identification of the name of any party, other than the permittee, that is responsible for implementing any portion of the FRP. A full list of expired permits, identifying the third party permittee, within the Potash Brook watershed is presented in Table 1 in Section 2.2.

10. Conclusion

This Potash Brook FRP was completed to meet the requirements under Part III of the MS4 general permit for the contributing MS4s; City of South Burlington, City of Burlington, UVM, BTV, and VTrans. In accordance with Subpart IV.C.1. of the General Permit, the MS4s were required to submit a final FRP within 3 years of the permit issuance. This Potash Brook FRP fulfills those requirements. The Potash Brook FRP will become a part of the permittees' SWMP upon approval by VTDEC. Once the final Potash Brook FRP is approved by VTDEC, implementation of this FRP by the contributing MS4s is required. Additionally, updates on FRP progress toward the flow target reductions are required as a part of the MS4 annual reports.

11. Appendices

Appendix A - Existing Potash Brook Watershed BMPs

Map A-1: Existing Stormwater BMP

Table A-2: Post BMPDSS Model Existing Stormwater BMP List

Map A-2: Subwatershed Boundaries

Existing Stormwater BMP Site Inspection Field Sheets

Appendix B - BMPs included in BMPDSS Credit Runs

Table B-1: Summary List of All BMPs included in BMPDSS Credit Runs

Appendix C – Potash Brook FRP Proposed BMPs

Table C-1: Final Proposed BMPs for Potash Brook FRP

Map C-1: Existing and Proposed Potash Brook FRP BMPs

Potash Brook FRP BMP Summary Sheets

Appendix D – Project Ranking

Horsley-Whitten Memorandum 1/9/14

Table D-1: BMP Ranking Criteria Key

Table D-2: BMP Ranking Scoring Key

Appendix E – Proposed BMP Cost Estimates, Prioritization Ranking, and Implementation Schedule

Table E-1: Potash Brook Watershed BMP Project Cost Estimates

Table E-2: Potash Brook Watershed BMP Project Scoring

Table E-3: Potash Brook Watershed BMP Project Implementation Schedule

APPENDIX A

EXISTING POTASH BROOK
WATERSHED BMPs

Legend

- Stream Centerlines
- Stormwater BMPs
- Subwatershed Boundaries
- Watershed Boundary
- MS4 boundaries
- Town Boundaries

BMP Drainage Areas

- Base
- Base - new
- Existing BMP Retrofit
- Existing BMP Retrofit - new
- Post 2002
- Post 2002 - new

Stormwater Permits

- Construction
- Expired
- INDO
- INDS
- MSGP-9003
- RDA

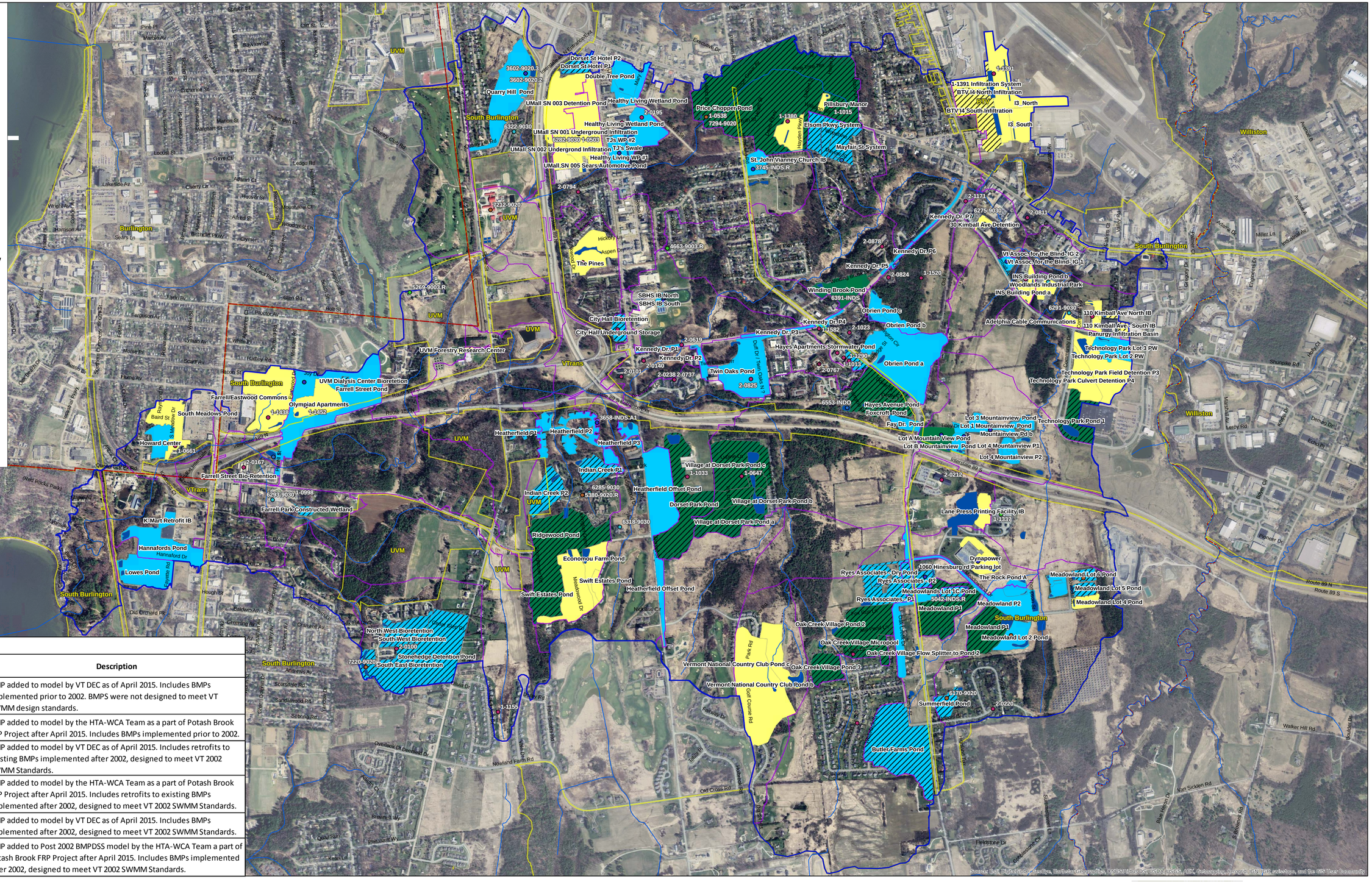


Table 1: Drainage Area Scenario Groupings

Grouping ID	BMPDSS Model Scenario	Description
Base	Pre-2002	BMP added to model by VT DEC as of April 2015. Includes BMPs implemented prior to 2002. BMPS were not designed to meet VT SWMM design standards.
Base - new	Pre-2002	BMP added to model by the HTA-WCA Team as a part of Potash Brook FRP Project after April 2015. Includes BMPs implemented prior to 2002.
Existing BMP Retrofit	Post-2002	BMP added to model by VT DEC as of April 2015. Includes retrofits to existing BMPs implemented after 2002, designed to meet VT 2002 SWMM Standards.
Existing BMP Retrofit - new	Post-2002	BMP added to model by the HTA-WCA Team as a part of Potash Brook FRP Project after April 2015. Includes retrofits to existing BMPs implemented after 2002, designed to meet VT 2002 SWMM Standards.
Post 2002	Post-2002	BMP added to model by VT DEC as of April 2015. Includes BMPs implemented after 2002, designed to meet VT 2002 SWMM Standards.
Post 2002 - new	Post-2002	BMP added to Post 2002 BMPDSS model by the HTA-WCA Team a part of Potash Brook FRP Project after April 2015. Includes BMPs implemented after 2002, designed to meet VT 2002 SWMM Standards.

N

0 1,750 3,500 ft

Map A-1 - Existing Stormwater BMPs

Potash Brook Watershed
South Burlington, VT

Hoyle, Tanner & Associates, Inc.

WATERSHED CONSULTING ASSOCIATES, LLC

Map Produced: 07-11-2016

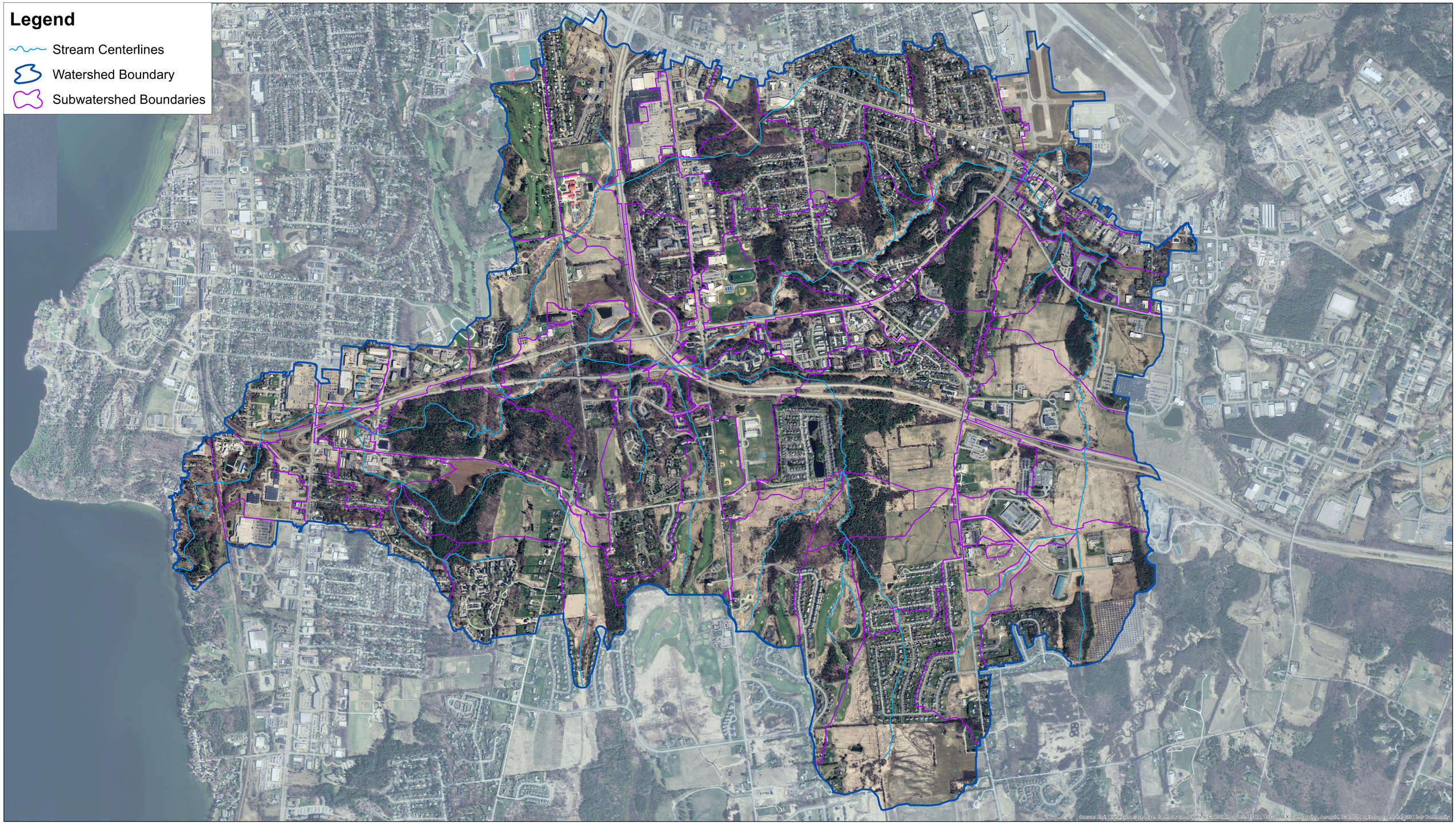
Potash Brook FRP Phase I
Table A-2: Post2002 BMPDSS Model Existing SW BMP List
as of 7-11-16

Table A-2: Post2002 BMPDSS Model Existing Stormwater BMP List

#	Model	MS4	Pond Name	BMP Type	Current Permit Number	RDA/ Renewed/ Related Permit	Location (Cross Streets)	BMP Drainage Area (acres)
Burlington Airport								
1	Base	BTV	I3_South	Infiltration Gallery	1-0839	n/a	1200 Airport Dr.	6.02
2	Base	BTV	1-1391 Infiltration System	Infiltration Gallery	1-1391	n/a	1200 Airport Dr.	3.11
3	Base	BTV	I3_North	Infiltration Gallery	No Permit	n/a	1200 Airport Dr.	19.88
4	Base-new	BTV	BTV I4 North Infiltration	Infiltration Field	3028-INDS.A	n/a	1200 Airport Dr.	2.08
5	Base-new	BTV	BTV I4 South Infiltration	Infiltration Field	3028-INDS.A	n/a	1200 Airport Dr.	13.42
City of Burlington								
6	Base	Burlington	South Meadows Pond	Detention Pond	1-0661	n/a	Baird St/ S. Meadow Dr.	10.10
7	Post 2002	Burlington	Howard Center	Wet Pond	7372-9020	n/a	Bard St. / Pine St.	5.29
City of South Burlington								
8	Base	South Burlington	110 Kimball Ave - South IB	Infiltration Basin	1-1504	n/a	Kimball Ave/Comcast Wy	1.42
9	Base	South Burlington	110 Kimball Ave - North IB	Infiltration Basin	1-1504	n/a	Kimball Ave/Comcast Wy	1.43
10	Base	South Burlington	30 Kimball Ave Detention	Detention Swale	6269-9030	1-1526	30 Kimball Avenue	1.27
11	Base	South Burlington	Adelphia Cable Communications	Detention Pond	6291-9030	1-1000	Comcast Wy/Kimball Ave.	1.91
12	Base	South Burlington	Dynapower	Detention Pond	6853-INDS	1-0618	85 Meadowland Dr.	5.81
13	Base	South Burlington	Economou Farm Pond	Detention Pond	4049-9030	1-1241	Swift St. / Economou Farm Rd.	6.37
14	Base	South Burlington	Farrell/Eastwood Commons	Detention Pond	1-1438	n/a	Farrell St.	20.95
15	Base	South Burlington	INS Building Pond a	Detention Pond	1-0969	6295-9030 (abandoned)	70 Kimball Ave	2.11
16	Base	South Burlington	INS Building Pond b	Detention Pond	1-0969	6295-9030 (abandoned)	70 Kimball Ave	1.44
17	Base	South Burlington	Lane Press Printing Facility IB	Infiltration Basin	1-1337	n/a	Meadowland Dr.	4.17
18	Base	South Burlington	Meadowland Lot 4 Pond	Detention Pond	1-1269	1-1269	Meadowland Dr. /Bowdoin St.	2.76
19	Base	South Burlington	Olympiad Apartments	Detention Pond	1-1452	n/a	Farrell St./ Eastwood Dr.	9.65
20	Base	South Burlington	Pillsbury Manor	Detention Pond	1-1015	n/a	Williston Rd/ Pillsbury Manor N.	1.06
21	Base	South Burlington	S. Burlington Community Housing	Infiltration Gallery	1-1380	n/a	Anderson Pwky/ Williston Rd.	6.92
22	Base	South Burlington	Swift Estates Pond	Pond	Swift Estates	n/a	Meadowood Dr.	18.52
23	Base	South Burlington	Technology Park Culvert Detention P4	Detention Area	1-1458 P4	n/a	Kimball Ave/Community Drive	8.05
24	Base	South Burlington	Technology Park Field Detention P3	Detention Area	1-1458 P3	n/a	Kimball Ave/Community Drive	15.12
25	Base	South Burlington	The Pines	Detention Pond	1-1117	n/a	Aspen Dr./Dorset Dr.	12.67
26	Base	South Burlington	UMall SN 001 Underground Infiltration	Infiltration Gallery	1-0503	6282-9030	Dorset St	17.15
27	Base	South Burlington	UMall SN 002 Undergrond Infiltration	Infiltration Gallery	1-0503	6282-9030	Dorset St	5.61
28	Base	South Burlington	UMall SN 003 Detention Pond	Detention Pond	1-0503	6282-9030	Dorset St	16.90
29	Base	South Burlington	UMall SN 005 Sears Automotive Pond	Detention Pond	1-0503	6282-9030	Dorset St	1.15
30	Base	South Burlington	Vermont National Country Club Pond b	Detention Pond	4049-9030	1-1241	Golf Course Rd. (Near 13th Tee)	36.03
31	Base	South Burlington	Vermont National Country Club Pond c	Detention Pond	4049-9030	1-1241	Swift St. / Economou Farm Rd.	9.94
32	Base	South Burlington	Woodlands Industrial Park	Detention Pond	6279-9030	6279-9030	102 Kimball Ave. (Woodland Commons)	2.39
33	Base-new	South Burlington	Shunpike Infiltration Basin	Infiltration Basin	No Permit	n/a	Shunpike Rd/ Kimball Ave	0.78
34	Base-new	South Burlington	UVM Forestry Research Center	Dry Well	No Permit	n/a	Spear St	1.02
35	Base-new	South Burlington	Panurgy Infiltration Basin	Infiltration Basin	No Permit	n/a	Shunpike Rd/ Kimball Ave	1.33
36	Existing BMP Retrofit	South Burlington	Mountain View Business Park - Lot A	Detention Pond	5395-INDS	1-1536	62 Tilley Drive	6.05
37	Existing BMP Retrofit	South Burlington	Winding Brook Pond	Detention Pond	6391-INDS	2-0988	Winding Brook Drive	9.11
38	Existing BMP Retrofit-new	South Burlington	Dorset Park Pond	Detention Pond	1-1033	n/a	Swift St./Dorset St.	26.07
39	Existing BMP Retrofit-new	South Burlington	Foxcroft Pond	Detention Pond	6553-INDO upgrades	2-0848	Kinsington St./ Hayes Ave.	5.38
40	Existing BMP Retrofit-new	South Burlington	Hayes Avenue Pond	Detention Pond	6553-INDO upgrades	2-0848	Kinsington St./ Hayes Ave.	12.66
41	Existing BMP Retrofit-new	South Burlington	Meadowland P1	Detention Pond	4290-9020.1 Lot 1b	1-1269 lot 1b	Meadowland Dr.	30.58
42	Existing BMP Retrofit-new	South Burlington	Oak Creek Village Flow Splitter to Pond 2	Flow Splitter	1-0464	n/a	Moss Glen Lane/Hinesburg Rd.	5.28
43	Existing BMP Retrofit-new	South Burlington	Oak Creek Village Pond 2	Detention Pond	1-0464	n/a	Moss Glen Lane/Hinesburg Rd.	16.75
44	Existing BMP Retrofit-new	South Burlington	Oak Creek Village Pond 3	Detention Pond	1-0464	n/a	Moss Glen Lane/Hinesburg Rd.	7.78

#	Model	MS4	Pond Name	BMP Type	Current Permit Number	RDA/ Renewed/ Related Permit	Location (Cross Streets)	BMP Drainage Area (acres)
45	Existing BMP Retrofit-new	South Burlington	Price Chopper Pond	Detention Pond	7294-9020	1-0538	End of Midas Dr./Williston Rd.	99.49
46	Existing BMP Retrofit-new	South Burlington	Ridgewood Pond	In stream pond.	1-0239/6285-9030	n/a	Corner of Dorset St & Swift Street	38.40
47	Existing BMP Retrofit-new	South Burlington	Technology Park Pond 1	Detention Pond	4113-INDS	1-1254	Community Dr.	8.96
48	Existing BMP Retrofit-new	South Burlington	Village at Dorset Park Pond a	Detention Pond	1-0647	n/a	Swift St/Brand Farm Dr.	16.31
49	Existing BMP Retrofit-new	South Burlington	Village at Dorset Park Pond b	Detention Pond	1-0647	n/a	Swift St/Brand Farm Dr.	8.27
50	Existing BMP Retrofit-new	South Burlington	Village at Dorset Park Pond c	Detention Pond	1-0647	n/a	Swift St/Brand Farm Dr.	20.48
51	post 2002	South Burlington	Double Tree Pond	Detention Pond	No Permit	n/a	Williston Rd.	5.78
52	post 2002	South Burlington	East Mountain View Pond	Detention Pond	5042-INDS	n/a	1100 Hinesburg Road	2.44
53	post 2002	South Burlington	Farrell Street Bioretention	Bioretention	5080-INDS	n/a	19 Farrell Street	0.35
54	post 2002	South Burlington	Farrell Street Pond	Detention Pond	5080-INDS	n/a	19 Farrell Street	32.96
55	post 2002	South Burlington	Fay Dr. Pond	Detention Pond	6204-9020	n/a	725 Hinesburg Road	2.81
56	post 2002	South Burlington	Hannafords Pond	Detention Pond	1-1214	n/a	Hannaford Dr	14.71
57	post 2002	South Burlington	Healthy Living Wet Pond #1	Detention Pond	4461-INDS.A	n/a	222, 200, 196 & 192 Dorset Street	3.36
58	post 2002	South Burlington	Healthy Living Wetland Pond	Wetland Pond Area	4461-INDS.A	n/a	222, 200, 196, &192 Dorset St.	15.35
59	post 2002	South Burlington	Heatherfield P1	Detention Pond	3658-INDS	n/a	885 Dorset St.	1.40
60	post 2002	South Burlington	Heatherfield P2	Detention Pond	3658-INDS	n/a	885 Dorset St.	10.76
61	post 2002	South Burlington	Heatherfield P3	Detention Pond	3658-INDS	n/a	885 Dorset St.	4.30
62	post 2002	South Burlington	Heatherfield Offset Pond	Detention Pond	3864-NDO	n/a	Dorset and Spear St.	23.93
63	post 2002	South Burlington	Kennedy Dr. P1	Detention Pond	1-1582	n/a	Kennedy Drive	1.47
64	post 2002	South Burlington	Kennedy Dr. P2	Detention Pond	1-1582	n/a	Kennedy Drive	2.16
65	post 2002	South Burlington	Kennedy Dr. P3	Detention Pond	1-1582	n/a	Kennedy Drive	2.11
66	post 2002	South Burlington	Kennedy Dr. P4	Detention Pond	1-1582	n/a	Kennedy Drive	1.41
67	post 2002	South Burlington	Kennedy Dr. P5	Detention Pond	1-1582	n/a	Kennedy Drive	0.70
68	post 2002	South Burlington	Kennedy Dr. P6	Detention Pond	1-1582	n/a	Kennedy Drive	0.66
69	post 2002	South Burlington	Kennedy Dr. P7	Detention Pond	1-1582	n/a	Kennedy Drive	1.82
70	post 2002	South Burlington	K-Mart Retrofit IB	Infiltration Gallery	5406-9020	n/a	Hannaford Drive	1.70
71	post 2002	South Burlington	Lot 1 Mountainview Pond	Detention Pond	3805-INDS.2	n/a	Tilley Drive, off of Rt. 116 (Hinesburg Rd)	3.92
72	post 2002	South Burlington	Lot 3 Mountainview Pond	Detention Pond	3805-INDS.3	n/a	Tilley Drive, off of Rt. 116 (Hinesburg Rd)	2.11
73	post 2002	South Burlington	Lot 4 Mountainview P1	Detention Pond	3805-INDS.1	n/a	Tilley Drive, off of Rt. 116 (Hinesburg Rd)	2.27
74	post 2002	South Burlington	Lot 4 Mountainview P2	Detention Pond	3805-INDS.1	n/a	Tilley Drive, off of Rt. 116 (Hinesburg Rd)	1.81
75	post 2002	South Burlington	Lowes Pond	Detention Pond	1-1214	n/a	Hannaford Dr.	12.73
76	post 2002	South Burlington	Meadowland Lot 2 Pond	Detention Pond	4290-INDC lot 2	1-1269	472 Meadowland Drive, 66 Bowdoin St.	5.85
77	post 2002	South Burlington	Meadowland Lot 8&9 Filter	Filter	5913-9020.1	1-1269	65 and 103 Bowdoin Street	0.22
78	post 2002	South Burlington	Meadowland Lot 8&9 North Pond	Detention Pond	5913-9020.1	1-1269	65 and 103 Bowdoin Street	1.29
79	post 2002	South Burlington	Meadowland Lot 8&9 South Pond	Detention Pond	5913-9020.1	1-1269	65 and 103 Bowdoin Street	1.73
80	post 2002	South Burlington	Meadowland Bus. Park Pond #2	Detention Pond	4290-9020.3 Lot 10	1-1269	472 Meadowland Dr	13.46
81	post 2002	South Burlington	Mountain View Business Park, Lot B	Detention Pond	3622-INDS	n/a	116 Hinesburg Rd.	2.33
82	post 2002	South Burlington	Mountain View Office Park Pond b	Detention Pond	3805-INDS	n/a	Tilley Drive, off of Rt. 116 (Hinesburg Rd)	0.90
83	post 2002	South Burlington	Oak Creek Village Micropool	Detention Pond	6009-9020	n/a	Hinesburg Road, Butler Drive, Fox Run Lane	5.80
84	post 2002	South Burlington	Obrien Pond a	Detention Pond	1-1520	n/a	Stonington Circle & Eldredge Street	31.76
85	post 2002	South Burlington	Obrien Pond b	Detention Pond	1-1520	n/a	Stonington Circle & Eldredge Street	3.08
86	post 2002	South Burlington	Obrien Pond c	Detention Pond	1-1520	n/a	Stonington Circle & Eldredge Street	4.06
87	post 2002	South Burlington	Quarry Hill Pond	Detention Pond	3602-INDS	n/a	Quarry Hill Road	21.75
88	post 2002	South Burlington	SBHS IB North	Infiltration Basin	6174-INDS.A	n/a	Dorset St.	0.21
89	post 2002	South Burlington	SBHS IB South	Infiltration Basin	6174-INDS.A	n/a	Dorset St.	0.46
90	post 2002	South Burlington	St. John Vianney Church IB	Infiltration Basin	3745-INDS	n/a	160 Hinesburg Road	4.17
91	post 2002	South Burlington	Technology Park Lot 2 PW	Pocket Wetland	1-1458	n/a	Kimball Ave/Community Drive	2.66
92	post 2002	South Burlington	Technology Park Lot 3 PW	Pocket Wetland	1-1458	n/a	Kimball Ave/Community Drive	3.85
93	post 2002	South Burlington	The Rock Pond A	detention pond	4207-INDC	1-1269	Meadowland Business Park	1.12
94	post 2002	South Burlington	The Rock Pond B	Detention Pond	4207-INDC	1-1269	Meadowland Business Park	1.85
95	post 2002	South Burlington	Trader Joes Median Swale	Infiltration Swale	4461-INDS.A	n/a	222, 200, 196, &192 Dorset St.	0.56
96	post 2002	South Burlington	Trader Joes Wet Pond #2	Wet Pond	4461-INDS.A	n/a	222, 200, 196, &192 Dorset St.	1.72
97	post 2002	South Burlington	Twin Oaks Pond	Detention Pond	5358-9020	2-0825	Twin Oaks Terrace, Kennedy Drive	19.81
98	post 2002	South Burlington	Vt Assoc. for the Blind- IG 1	Infitration Gallery	5717-INDS	n/a	Kimball Avenue	1.19
99	post 2002	South Burlington	Vt Assoc. for the Blind- IG 2	Infitration Gallery	5717-INDS	n/a	Kimball Avenue	0.56
100	post 2002 new	South Burlington	1060 Hinesburg Rd Parking lot	Detention Pond	6499-9020	n/a	1060, 1070 and 1080 Route 116	2.87

#	Model	MS4	Pond Name	BMP Type	Current Permit Number	RDA/ Renewed/ Related Permit	Location (Cross Streets)	BMP Drainage Area (acres)
101	post 2002 new	South Burlington	Butler Farms Pond	Detention Pond	6660-9020	n/a	Route 116, Butler Drive, Marcy Street	33.56
102	post 2002 new	South Burlington	City Hall Bioretention	Bioretention Basin	2-0909	n/a	575 Dorset St.	0.82
103	post 2002 new	South Burlington	City Hall Underground Storage	Underground Storage	2-0909	n/a	575 Dorset St.	2.43
104	post 2002 new	South Burlington	Dorset St Hotel Pond #1	Wet Pond	6970-9020	n/a	5 Dorset St.	2.97
105	post 2002 new	South Burlington	Dorset St Hotel Pond #2	Wet Pond	6970-9020	n/a	5 Dorset St.	1.01
106	post 2002 new	South Burlington	Elsom Pkwy System	Perforated Pipe	Mayfair Park Improvement	n/a	Elsom Pkwy	6.98
107	post 2002 new	South Burlington	Farrell Park Constructed Wetland	Constructed Wetland	No Permit	n/a	Swift St. / Farrell St.	1.37
108	post 2002 new	South Burlington	Hayes Apartments Stormwater Pond	Detention Pond	1-0839	n/a	635 Hinesburg Rd	1.98
109	post 2002 new	South Burlington	Indian Creek Dry Detention Basin 1	Detention Pond	1-0239/6285-9030	n/a	Corner of Dorset St & Swift Street	6.13
110	post 2002 new	South Burlington	Indian Creek Dry Detention Basin 2	cul-de-sac pond	1-0239/6285-9030	n/a	Corner of Dorset St & Swift Street	8.98
111	post 2002 new	South Burlington	Mayfair St System	Perforated Pipe	Mayfair Park Improvement	n/a	Elsom Pkwy	8.42
112	post 2002 new	South Burlington	Meadowland Bus. Park Lot 5 Pond	Detention Pond	4290-9020.2 Lot 5	1-1269	472 Meadowland Dr	2.71
113	post 2002 new	South Burlington	Meadowland Bus. Park Lot 6 Pond	Detention Pond	4319-INDC lot 6	1-1269	104 Bowdoin St	2.40
114	post 2002 new	South Burlington	Meadowlands Business Complex Lot 1C	Future Detention Pond	4290-9020.4 Lot 1C	n/a	472 Meadowland Drive, 66 Bowdoin St	2.70
115	post 2002 new	South Burlington	North West Bioretention	Bioretention Basin	7220-9020	n/a	Stonehedge Drive	5.74
116	post 2002 new	South Burlington	Ryes Associates - Dry Pond	Dry Pond	7017-INDS	n/a	Hinesburg Rd/Fox Run Lane	3.12
117	post 2002 new	South Burlington	Ryes Associates - Pond #1	Wet Pond	7017-INDS	n/a	Hinesburg Rd/Fox Run Lane	9.99
118	post 2002 new	South Burlington	Ryes Associates - Pond #2	Wet Pond	7017-INDS	n/a	Hinesburg Rd/Fox Run Lane	2.67
119	post 2002 new	South Burlington	South East Bioretention	Bioretention Basin	7220-9020	n/a	Stonehedge Drive	0.82
120	post 2002 new	South Burlington	South West Bioretention	Bioretention Basin	7220-9020	n/a	Stonehedge Drive	3.92
121	post 2002 new	South Burlington	Stonehedge Detention Pond	Detention Pond-Future	7220-9020	n/a	Stonehedge Drive	40.18
122	post 2002 new	South Burlington	Summerfield Pond	Detention Pond	6170-9020	n/a	1404 Hinesburg Rd.	4.26
123	post 2002 new	South Burlington	Dialysis Center Bioretetion	Bioretention	7317-INDS	n/a	35 Joy Dr.	0.45
124	post 2002 new	South Burlington	Dialysis Center Infiltration	Infiltration Basin	7317-INDS	n/a	35 Joy Dr.	0.19



N

0 1,750 3,500 ft

Map A-2 – Subwatershed Boundaries

Potash Brook Watershed
South Burlington, VT

Hoyle, Tanner & Associates, Inc.

WATERSHED CONSULTING ASSOCIATES, LLC

Map Produced: 08-05-2016

Existing Stormwater BMP Site Inspection **Assessed by:** KG,JS

Assessment Information	Site Information
City BMP ID: Pd0054	**Site/Practice Description:** Wet extended detention pond with forebay (Oak Creek Village Pond #2) , located at the end of Fox Run Lane.
Current Permit #: 1-0464 **Related Permit #(s):** 6658-9020, US EPA Stormwater Demonstration Grant EM-83234901-1	
BMP Name: Oak Creek Village Pond 2	
BMP Type: Detention Pond	
BMP Ownership: City	
Post 2002 Upgrades (Y/N): Yes. Upgraded Post 2002.	
Date/Time Assessed: 2015-09-09 / 12:20	
Address/Cross Streets: Mill Pond Ln	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: None	
Operation/Maintenance Issues: No	
O/M Comments: No visible issues.	Detention pond with micropool.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Concrete riser structure.		
Orifice 1: Low-flow	**Orifice 2:** Low-flow	**Orifice 3:** Low-flow
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 2	**Diameter (in):** 72x12	**Diameter (in):** 4
Orientation (V/H): Vertical	**Orientation (V/H):** Vertical	**Orientation (V/H):** Vertical
Material: PVC- smooth	**Material:** Concrete	**Material:** PVC- smooth
Invert from Rim: 78	**Invert from Rim:** 42	**Invert from Rim:** 60
Emergency Spillway Dimensions (if applicable): yes	**Breadth (ft):** 6	**Length (ft):** 150
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-0464a	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Post 2002 (retrofit)	**Justification:** System currently meeting CPv standard. No FRP Benefit.
Revision to GIS DA: Revise DA.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0055	**Site/Practice Description:** Wet pond with forebay (Oak Creek Village Pond #3), located off Moss Glen Lane.
Current Permit #: 1-0464 **Related Permit #(s):** 6658-9020, US EPA Stormwater Demonstration Grant EM-83234901-0	
BMP Name: Oak Creek Village Pond 3	
BMP Type: Detention Pond	
BMP Ownership: City	
Post 2002 Upgrades (Y/N): Yes. Upgraded Post 2002.	
Date/Time Assessed: 2015-09-09 / 12:06	
Address/Cross Streets: Moss Glen Lane/Hinesburg Rd.	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: None	
Operation/Maintenance Issues: No	
O/M Comments: No visible issues.	Pond with outlet structure.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Detention pond		
Orifice 1: Low-flow	**Orifice 2:** Low-flow	**Orifice 3:** Culvert
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 2	**Diameter (in):** 24x6	**Diameter (in):** 30
Orientation (V/H): Vertical	**Orientation (V/H):** Vertical	**Orientation (V/H):** Vertical
Material: PVC- smooth	**Material:** Concrete	**Material:** Concrete
Invert from Rim: 53	**Invert from Rim:** 30	**Invert from Rim:** 56
Emergency Spillway Dimensions (if applicable): Yes	**Breadth (ft):** 10	**Length (ft):** 50
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-0464b	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Post 2002 (retrofit)	**Justification:** System currently meeting CPv standard. No FRP Benefit.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: IA0010	**Site/Practice Description:** Infiltration Basin underground in Hannaford's Parking lot. Not visible from street.
Current Permit #: 6282-9030 **Related Permit #(s):** 1-0503	
BMP Name: UMall SN 002 Underground Infiltration	
BMP Type: Infiltration Gallery	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): RDA under review	
Date/Time Assessed: 2015-05-04 / 12:38	
Address/Cross Streets: Dorset St	
Reviewed Existing Site Plans Prior to Field Visit: Plans not available.	
Active Pollution Visible: None	
Operation/Maintenance Issues: Pending	
O/M Comments: Not able to check underground basin. Contact Property owner for maintenance history.	Parking lot containing catchbasins.

Existing BMP Sizing Information

BMP Outlet Structure Overview: No outlet. Pipes connecting mapped catch basins were confirmed in field.

Orifice 1:	**Orifice 2:**	**Orifice 3:**
Multiplier:	**Multiplier:**	**Multiplier:**
Diameter (in):	**Diameter (in):**	**Diameter (in):**
Orientation (V/H):	**Orientation (V/H):**	**Orientation (V/H):**
Material:	**Material:**	**Material:**
Invert from Rim:	**Invert from Rim:**	**Invert from Rim:**

Emergency Spillway Dimensions (if applicable): No visible spillway **Breadth (ft):** --- **Length (ft):** ---

Structure Notes/Follow-up: Catch basins and pipes consistent with mapping. Iron deposits in several catch basin sumps.

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-0503a	**Is Retrofit Possible/Needed:** Proposed Upgrade
Model (Which Model Scenario is the existing system included?): Base	**Justification:** BMP does not meet Rev, or WQv standards. See proposed modifications in EFA submittal (not accepted by DEC as of 2015).
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** See proposed EFA modifications.
	Feasibility Issues/Comments: Unknown at time of inspection.

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: IA0009	**Site/Practice Description:** Infiltration Basin underground in Parking lot between the Hannaford's Building and Sears Automotive Shop. Not visible from street.
Current Permit #: 6282-9030 **Related Permit #(s):** 1-0503	
BMP Name: UMall SN 001 Underground Infiltration	
BMP Type: Infiltration Gallery	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): RDA under review	
Date/Time Assessed: 2015-05-04 / 12:44	
Address/Cross Streets: Dorset St	
Reviewed Existing Site Plans Prior to Field Visit: Plans not available.	
Active Pollution Visible: Trash, Litter	
Operation/Maintenance Issues: Pending	
O/M Comments: Water is bypassing cbs, erosion in parking lots where ponding occurs. Need sweeping of sediment/trash left over from snow storage. Not able to check underground basin. Contact Property owner for maintenance history.	Back parking lot near fence shows evidence of flow bypassing inlets and excessive sediment from snow storage.

Existing BMP Sizing Information

BMP Outlet Structure Overview: Parking lots have quite a bit of sediment. Suspect part of parking lot sheet flows.

Orifice 1:	**Orifice 2:**	**Orifice 3:**
Multiplier:	**Multiplier:**	**Multiplier:**
Diameter (in):	**Diameter (in):**	**Diameter (in):**
Orientation (V/H):	**Orientation (V/H):**	**Orientation (V/H):**
Material:	**Material:**	**Material:**
Invert from Rim:	**Invert from Rim:**	**Invert from Rim:**

Emergency Spillway Dimensions (if applicable): No visible spillway **Breadth (ft):** --- **Length (ft):** ---

Structure Notes/Follow-up: South part of parking lot has quite a bit of sediment covering it. Suspect part of parking lot bypasses catch basins.

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-0503b	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Increase capture with an infiltration trench at southern edge of parking lot.
Revision to GIS DA: Revise DA.	**Proposed Practice Type:** Infiltration Trench
	Feasibility Issues/Comments: Unknown at time of inspection.

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0077	**Site/Practice Description:** Detention pond with outlet control device. Drainage area includes area around Sears and parking garage at University Mall.
Current Permit #: 6282-9030 **Related Permit #(s):** 1-0503	
BMP Name: UMall SN 003 Detention Pond	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): RDA under review	
Date/Time Assessed: 2015-09-09 / 08:49	
Address/Cross Streets: Dorset St	
Reviewed Existing Site Plans Prior to Field Visit: Plans not available.	
Active Pollution Visible: None	
Operation/Maintenance Issues: Yes	
O/M Comments: Water seems to enter riser through crack in base of structure.	Flow drains to outlet structure with little to no detention.

Existing BMP Sizing Information

BMP Outlet Structure Overview: Concrete riser with low-flow orifice (not visible) and three orifices on side of riser, with culvert out.

Orifice 1: Culvert	**Orifice 2:** Low-flow	**Orifice 3:** Low-flow
Multiplier:1	**Multiplier:** 1	**Multiplier:** 3
Diameter (in): 36	**Diameter (in):** 7	**Diameter (in):** 7
Orientation (V/H): Vertical	**Orientation (V/H):** Vertical	**Orientation (V/H):** Vertical
Material: PVC- smooth	**Material:** Concrete	**Material:** Concrete
Invert from Rim: 57	**Invert from Rim:** 47	**Invert from Rim:** 26

Emergency Spillway Dimensions (if applicable): No visible spillway **Breadth (ft):** --- **Length (ft):** ---

Structure Notes/Follow-up: Check plans for culvert out size and if there is a low-flow orifice below visible surface.

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-0503c	**Is Retrofit Possible/Needed:** Proposed Upgrade
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Pond does not meet Rev, CPv, or WQv standards. See proposed modifications in EFA submittal (not accepted by DEC as of 2015).
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** See proposed EFA modifications.
	Feasibility Issues/Comments: Need to assess capacity for more detention if orifice size is reduced.

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0078	**Site/Practice Description:** Detention pond behind Sears Automotive Shop.
Current Permit #: 6282-9030 **Related Permit #(s):** 1-0503	
BMP Name: UMall SN 005 Sears Automotive Pond	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): RDA under review	
Date/Time Assessed: 2015-05-04 / 12:57	
Address/Cross Streets: Dorset St	
Reviewed Existing Site Plans Prior to Field Visit: Plans not available.	
Active Pollution Visible: Trash, Litter	
Operation/Maintenance Issues: Yes	
O/M Comments: Clean up trash and litter.	Detention pond overview.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Concrete riser with 2 low flow orifices- one above the other and culvert out.		
Orifice 1: Low-flow	**Orifice 2:** Riser	**Orifice 3:** Culvert
Multiplier:2	**Multiplier:** 2	**Multiplier:** 1
Diameter (in): 5	**Diameter (in):** 41	**Diameter (in):** 12
Orientation (V/H): Vertical	**Orientation (V/H):** Horizontal	**Orientation (V/H):** Vertical
Material: Concrete	**Material:** Concrete	**Material:** HPDE
Invert from Rim: 25	**Invert from Rim:** 0	**Invert from Rim:** 30
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-0503d	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Pond does not meet Rev, CPv, or WQv standards. See proposed modifications in EFA submittal (not accepted by DEC as of 2015).
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** Outlet Structure retrofit
	Feasibility Issues/Comments: Need to assess capacity for more detention if orifice size is reduced.

Existing Stormwater BMP Site Inspection **Assessed by:** KG,JS

Assessment Information	Site Information
City BMP ID: Pd0169	**Site/Practice Description:** Micropool practice and forebay with low-flow outlet control, located behind facility on east side of property.
Current Permit #: 6279-9030 **Related Permit #(s):** 1-0526	
BMP Name: Woodlands Industrial Park	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): Yes. Upgraded Post 2002.	
Date/Time Assessed: 2015-04-28 / 16:32	
Address/Cross Streets: 102 Kimball Ave	
Reviewed Existing Site Plans Prior to Field Visit: Yes. No outlet structure detail.	
Active Pollution Visible: None	
Operation/Maintenance Issues: No	
O/M Comments: No visible issues.	Detention pond overview.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Concrete riser with low-flow orifice, trash rack, and emergency spillway.		
Orifice 1: Low-flow	**Orifice 2:** Riser	**Orifice 3:** Culvert
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 4	**Diameter (in):** 24	**Diameter (in):** Couldn't see
Orientation (V/H): Vertical	**Orientation (V/H):** Horizontal	**Orientation (V/H):** Vertical
Material: PVC- smooth	**Material:** Concrete	**Material:** Couldn't see
Invert from Rim: 31	**Invert from Rim:** 0	**Invert from Rim:** Unknown
Emergency Spillway Dimensions (if applicable): Yes	**Breadth (ft):** 10	**Length (ft):** 20
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-0526	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Post 2002 (retrofit)	**Justification:** System currently meeting CPv standard. No FRP Benefit.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0006	**Site/Practice Description:** Detention pond with stand pipe, located at the end of Midas Dr providing detention for runoff from Commerce Square.
Current Permit #: 7294-9020 **Related Permit #(s):** 1-0538	
BMP Name: Price Chopper Pond	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): Proposed Upgrade	
Date/Time Assessed: 2015-05-04 / 14:54	
Address/Cross Streets: Midas Dr	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: Trash, Litter	
Operation/Maintenance Issues: Yes	
O/M Comments: Trash, litter likely left over from snow storage. Standpipe outlet tilted, in need of repair.	Detention pond overview.

Existing BMP Sizing Information

BMP Outlet Structure Overview: Concrete riser structure. Could not see culvert out. Standpipe in center of pond, but couldn't see connection to riser.

Orifice 1: Riser	**Orifice 2:**	**Orifice 3:**
Multiplier:1	**Multiplier:** 1	**Multiplier:**
Diameter (in): 21	**Diameter (in):**	**Diameter (in):**
Orientation (V/H): Horizontal	**Orientation (V/H):**	**Orientation (V/H):**
Material: Concrete	**Material:**	**Material:**
Invert from Rim: 0	**Invert from Rim:**	**Invert from Rim:**

Emergency Spillway Dimensions (if applicable): No visible spillway **Breadth (ft):** --- **Length (ft):** ---

Structure Notes/Follow-up: Retrofit already proposed under 7294-9020 permit.

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-0538	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Post 2002 (retrofit)	**Justification:** Proposed retrofit- Permit #7294-INDO
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** Detention Pond-Regrade/Expand
	Feasibility Issues/Comments: See USACE Tributary 3 to Potash Brook Stormwater Treatment Section 545 Project

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0076	**Site/Practice Description:** Highly vegetated detention pond on Southern edge of parking lot. Grass swale permitted under 6853-INDS drains to pond.
Current Permit #: 6853-INDS **Related Permit #(s):** 1-0618	
BMP Name: Dynapower	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No change to permitted pond. INDS covered new swale which doesn't provide more detention.	
Date/Time Assessed: 2015-05-06 / 13:04	
Address/Cross Streets: Meadowland Dr	
Reviewed Existing Site Plans Prior to Field Visit: Yes. No detail for pond.	
Active Pollution Visible: Excessive sediment in catch basins.	
Operation/Maintenance Issues: Yes	
O/M Comments: Catch basin sumps still have erosion covers from past construction. Sumps are full of sediment. Catch basins in parking lot need to be cleaned out.	Detention pond overview.

Existing BMP Sizing Information

BMP Outlet Structure Overview: Culvert out. No low flow control visible.

Orifice 1: Culvert	**Orifice 2:**	**Orifice 3:**
Multiplier:1	**Multiplier:** 1	**Multiplier:**
Diameter (in): 12	**Diameter (in):**	**Diameter (in):**
Orientation (V/H): Vertical	**Orientation (V/H):**	**Orientation (V/H):**
Material: Concrete	**Material:**	**Material:**
Invert from Rim: Unknown	**Invert from Rim:**	**Invert from Rim:**

Emergency Spillway Dimensions (if applicable): No visible spillway **Breadth (ft):** --- **Length (ft):** ---

Structure Notes/Follow-up: ---

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-0618	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Does not meet CPv standard.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** Outlet Structure retrofit
	Feasibility Issues/Comments: Need to assess capacity for more detention if orifice size is reduced.

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0033	**Site/Practice Description:** Large detention connected to two downstream ponds, located within the Village at Dorset Park neighborhood.
Current Permit #: 1-0647 **Related Permit #(s):** In Progress	
BMP Name: Village at Dorset Park Pond a	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): Proposed Upgrade	
Date/Time Assessed: 2015-05-01 / 13:47	
Address/Cross Streets: Lupine Drive	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: Trash, Litter	
Operation/Maintenance Issues: Yes	
O/M Comments: Clean up trash and litter.	Pond with outlet structure.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Standpipe with internal weir. Couldn't see into riser.		
Orifice 1: ---	**Orifice 2:** ---	**Orifice 3:** ---
Multiplier:0	**Multiplier:** 0	**Multiplier:** 0
Diameter (in): ---	**Diameter (in):** ---	**Diameter (in):** ---
Orientation (V/H): ---	**Orientation (V/H):** ---	**Orientation (V/H):** ---
Material: ---	**Material:** ---	**Material:** ---
Invert from Rim: ---	**Invert from Rim:** ---	**Invert from Rim:** ---
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: Check plans for BMP configuration.		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-0647a	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Post 2002 (retrofit)	**Justification:** Does not meet CPv standard.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** Detention Pond-Regrade/Expand
	Feasibility Issues/Comments: Retrofit already proposed. Project "Village at Dorset Park".

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0033	**Site/Practice Description:** Large detention connected between two other large ponds, located within the Village at Dorset Park neighborhood.
Current Permit #: 1-0647 **Related Permit #(s):** In Progress	
BMP Name: Village at Dorset Park Pond b	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): Proposed Upgrade	
Date/Time Assessed: 2015-05-01 / 13:42	
Address/Cross Streets: Lupine Drive	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: None	
Operation/Maintenance Issues: No	
O/M Comments: No visible issues.	Detention pond with outlet structure.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Standpipe with internal weir. Couldn't see into riser.		
Orifice 1: ---	**Orifice 2:** ---	**Orifice 3:** ---
Multiplier:0	**Multiplier:** 0	**Multiplier:** 0
Diameter (in): ---	**Diameter (in):** ---	**Diameter (in):** ---
Orientation (V/H): ---	**Orientation (V/H):** ---	**Orientation (V/H):** ---
Material: ---	**Material:** ---	**Material:** ---
Invert from Rim: ---	**Invert from Rim:** ---	**Invert from Rim:** ---
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-0647b	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Post 2002 (retrofit)	**Justification:** Does not meet CPv standard.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** Detention Pond-Regrade/Expand
	Feasibility Issues/Comments: Retrofit already proposed. Project "Village at Dorset Park".

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0033	**Site/Practice Description:** Large detention connected to two upstream ponds, located within the Village at Dorset Park neighborhood.
Current Permit #: 1-0647 **Related Permit #(s):** In Progress	
BMP Name: Village at Dorset Park Pond c	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): Proposed Upgrade	
Date/Time Assessed: 2015-05-01 / 13:30	
Address/Cross Streets: Brand Farm Drive	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: Trash, Litter	
Operation/Maintenance Issues: Yes	
O/M Comments: Clean up trash and litter.	View of detention pond from outlet structure.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Concrete riser with weir on side and two overflow grates.		
Orifice 1: Low-flow	**Orifice 2:** Riser	**Orifice 3:** Culvert
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 48 x 12	**Diameter (in):** 20 x 13	**Diameter (in):** Couldn't see
Orientation (V/H): Vertical	**Orientation (V/H):** Vertical	**Orientation (V/H):** Vertical
Material: Concrete	**Material:** Concrete	**Material:** Couldn't see
Invert from Rim: 48	**Invert from Rim:** 18"	**Invert from Rim:** Couldn't see
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-0647c	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Post 2002 (retrofit)	**Justification:** Expired permit- need to retrofit pond to meet VSMM standards.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** Detention Pond-Regrade/Expand
	Feasibility Issues/Comments: Retrofit already proposed. Project "Village at Dorset Park".

Existing Stormwater BMP Site Inspection **Assessed by:** KG

Assessment Information	Site Information
City BMP ID: PD0164	**Site/Practice Description:** Two fenced detention ponds
Current Permit #: 1-0661 **Related Permit #(s):**	
BMP Name: South Meadows Pond	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No	
Date/Time Assessed: 2015-09-09 / 10:04	
Address/Cross Streets: S Meadow Dr and Baird St	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: Trash, Litter	
Operation/Maintenance Issues: Yes	
O/M Comments: Clean up trash and litter.	Detention pond overview.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: CMP culvert out. No low-flow orifice.		
Orifice 1: Culvert	**Orifice 2:** Riser	**Orifice 3:**
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 18	**Diameter (in):** 24	**Diameter (in):**
Orientation (V/H): Vertical	**Orientation (V/H):** Horizontal	**Orientation (V/H):**
Material: CMP	**Material:** CMP	**Material:**
Invert from Rim: 31	**Invert from Rim:**	**Invert from Rim:**
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-0661	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Does not meet CPv standard.
Revision to GIS DA: Revise DA.	**Proposed Practice Type:** Outlet Structure retrofit and pond expansion
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0071	**Site/Practice Description:** Detention pond with excess vegetation growth, located on west side of parking lot.
Current Permit #: 6291-9030 **Related Permit #(s):** 1-1000	
BMP Name: Adelphia Cable Communications	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No. No change to permitted pond associated with RDA permit.	
Date/Time Assessed: 2015-04-29 / 13:32	
Address/Cross Streets: Comcast Way	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: Trash, Litter	
Operation/Maintenance Issues: Yes	
O/M Comments: Excessive phragmites growth. Inlet pipe damaged on western edge.	Detention pond with significant vegetation.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: No outlet structure visible. Did not find culvert out.		
Orifice 1:	**Orifice 2:**	**Orifice 3:**
Multiplier:	**Multiplier:**	**Multiplier:**
Diameter (in):	**Diameter (in):**	**Diameter (in):**
Orientation (V/H):	**Orientation (V/H):**	**Orientation (V/H):**
Material:	**Material:**	**Material:**
Invert from Rim:	**Invert from Rim:**	**Invert from Rim:**
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1000	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Does not meet CPv standard.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** Detention Pond-Regrade/Expand
	Feasibility Issues/Comments: Unknown at time of inspection.

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0080	**Site/Practice Description:** Dry pond in back of Pillsbury Manor building, which appears to be connected to a high-flow bypass from upper drainage area. Drains to City system on Willison Rd.
Current Permit #: 1-1015 **Related Permit #(s):**	
BMP Name: Pillsbury Manor	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No, but check proposed redevelopment plans with P&Z.	
Date/Time Assessed: 2015-04-28 / 15:41	
Address/Cross Streets: Williston Rd/ Pillsbury Manor Rd	
Reviewed Existing Site Plans Prior to Field Visit: Yes. No detail for pond outlet.	
Active Pollution Visible: None	
Operation/Maintenance Issues: Yes	
O/M Comments: Outlet Pipe clogged with leaves and debris.	Staff inspecting location of outlet pipe.

Existing BMP Sizing Information

BMP Outlet Structure Overview: Appears outlet of pond is periodically an inlet from the collection system to north during larger storm events.

Orifice 1: Culvert	**Orifice 2:**	**Orifice 3:**
Multiplier:1	**Multiplier:** 1	**Multiplier:**
Diameter (in): 12	**Diameter (in):**	**Diameter (in):**
Orientation (V/H): Vertical	**Orientation (V/H):**	**Orientation (V/H):**
Material: PVC- smooth	**Material:**	**Material:**
Invert from Rim: 66	**Invert from Rim:**	**Invert from Rim:**

Emergency Spillway Dimensions (if applicable): No visible spillway **Breadth (ft):** --- **Length (ft):** ---

Structure Notes/Follow-up: ---

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1015	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Does not meet CPv standard, but appears to have more storage capacity.
Revision to GIS DA: Need to verify Eastern Roof drainage.	**Proposed Practice Type:** Outlet Structure retrofit, Expand Pond.
	Feasibility Issues/Comments: Proposed redevelopment project needs to be considered.

Existing Stormwater BMP Site Inspection **Assessed by:** KG

Assessment Information	Site Information
City BMP ID: Pd0032	**Site/Practice Description:** Large detention pond at north end of Dorset St. Park.
Current Permit #: 1-1033 **Related Permit #(s):**	
BMP Name: Dorset Park Pond	
BMP Type: Detention Pond	
BMP Ownership: South Burlington	
Post 2002 Upgrades (Y/N): No. Upgrade completed prior to 2002.	
Date/Time Assessed: 2015-09-09 / 10:42	
Address/Cross Streets: Dorset St. and Swift St.	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: Trash, Litter	
Operation/Maintenance Issues: Yes	
O/M Comments: Clean up trash and litter.	Detention pond overview.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Detention pond with outlet riser		
Orifice 1: Low-flow	**Orifice 2:** Low-flow	**Orifice 3:** Culvert
Multiplier:2	**Multiplier:** 2	**Multiplier:** 1
Diameter (in): 4	**Diameter (in):** 16x12	**Diameter (in):** 24
Orientation (V/H): Vertical	**Orientation (V/H):** Vertical	**Orientation (V/H):** Vertical
Material: Concrete	**Material:** Concrete	**Material:** PVC- smooth
Invert from Rim: 70	**Invert from Rim:** 18	**Invert from Rim:** 90
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1033	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Base	**Justification:** System currently meeting CPv standard. No FRP Benefit.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0004	**Site/Practice Description:** Large detention area between The Pines development and Oakwood Dr. Heavily vegetated on banks of ponded area.
Current Permit #: 1-1117 **Related Permit #(s):**	
BMP Name: The Pines	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No	
Date/Time Assessed: 2015-05-04 / 15:09	
Address/Cross Streets: Brookwood Dr	
Reviewed Existing Site Plans Prior to Field Visit: Plans not available.	
Active Pollution Visible: Trash, Litter	
Operation/Maintenance Issues: Yes	
O/M Comments: Side banks eroded.	View of detention pond from the outlet structure.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Single culvert out. Inlet not visible from pond.		
Orifice 1: ---	**Orifice 2:** ---	**Orifice 3:** ---
Multiplier:0	**Multiplier:** 0	**Multiplier:** 0
Diameter (in): ---	**Diameter (in):** ---	**Diameter (in):** ---
Orientation (V/H): ---	**Orientation (V/H):** ---	**Orientation (V/H):** ---
Material: ---	**Material:** ---	**Material:** ---
Invert from Rim: ---	**Invert from Rim:** ---	**Invert from Rim:** ---
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: Could not see culvert out. Check plans for culvert information. Check for San Remo Retrofit in this area.		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1117	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Does not meet CPv standard.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** Outlet Structure retrofit
	Feasibility Issues/Comments: High water table. Local resident mentioned past wet basement issues on the adjacent street.

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0003	**Site/Practice Description:** Large detention pond with forebay located to west of Hannaford's Store off Shelburne Rd.
Current Permit #: 1-1214 **Related Permit #(s):**	
BMP Name: Hannafords Pond	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): Yes. No new permit associated with upgrade.	
Date/Time Assessed: 2015-05-04 / 15:41	
Address/Cross Streets: Hannafords Dr	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: Excessive Erosion	
Operation/Maintenance Issues: Yes	
O/M Comments: Excessive Erosion. Need to revisit to provide more details concerning location and extent of erosion.	View of detention pond forebay.

Existing BMP Sizing Information

BMP Outlet Structure Overview: Detention pond with low flow orifice. Pond has been upgraded to post-2002 standards.

Orifice 1: ---	**Orifice 2:** ---	**Orifice 3:** ---
Multiplier:0	**Multiplier:** 0	**Multiplier:** 0
Diameter (in): ---	**Diameter (in):** ---	**Diameter (in):** ---
Orientation (V/H): ---	**Orientation (V/H):** ---	**Orientation (V/H):** ---
Material: ---	**Material:** ---	**Material:** ---
Invert from Rim: ---	**Invert from Rim:** ---	**Invert from Rim:** ---

Emergency Spillway Dimensions (if applicable): Yes **Breadth (ft):** 10 **Length (ft):** 30

Structure Notes/Follow-up: ---

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1214	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Post 2002 (retrofit)	**Justification:** System currently meeting CPv standard. No FRP Benefit.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0075	**Site/Practice Description:** Pocket pond within golf course grounds, draining to larger detention pond to East.
Current Permit #: 4049-9030 & 4049-9030.1. **Related Permit #(s):** 1-1241	
BMP Name: Vermont National Country Club Pond b	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No change to permitted pond under RDA.	
Date/Time Assessed: 2015-05-01 / 15:03	
Address/Cross Streets: Golf Course Rd	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: None	
Operation/Maintenance Issues: No	
O/M Comments: No visible issues.	Detention pond overview.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Metal riser structure with low-flow orifice and culvert out.		
Orifice 1: Low-flow	**Orifice 2:** Riser	**Orifice 3:** Culvert
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 6	**Diameter (in):** 27	**Diameter (in):** Couldn't see
Orientation (V/H): Horizontal	**Orientation (V/H):** Horizontal	**Orientation (V/H):** Vertical
Material: CMP	**Material:** CMP	**Material:** Couldn't see
Invert from Rim: 14	**Invert from Rim:** 0	**Invert from Rim:** Couldn't see
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: Check plans for culvert dimensions.		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1241b	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** May not meet CPv standard. Retrofit outlet to increase detention.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** Outlet Structure retrofit
	Feasibility Issues/Comments: Need to assess capacity for more detention if orifice size is reduced.

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0074	**Site/Practice Description:** Detention pond on east side of golf course collecting runoff from Golf Course Rd, Park Rd, and golf course grounds.
Current Permit #: 4049-9030 & 4049-9030.1. **Related Permit #(s):** 1-1241	
BMP Name: Vermont National Country Club Pond c	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No change to permitted pond under RDA.	
Date/Time Assessed: 2015-05-01 / 15:12	
Address/Cross Streets: Golf Course Rd	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: None	
Operation/Maintenance Issues: Yes	
O/M Comments: Woody debris in outlet structure	Detention pond outlet structure.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: CMP riser with trash rack. Culvert out not visible.		
Orifice 1: Riser	**Orifice 2:**	**Orifice 3:**
Multiplier:1	**Multiplier:** 1	**Multiplier:**
Diameter (in): 12	**Diameter (in):**	**Diameter (in):**
Orientation (V/H): Horizontal	**Orientation (V/H):**	**Orientation (V/H):**
Material: CMP	**Material:**	**Material:**
Invert from Rim: 0	**Invert from Rim:**	**Invert from Rim:**
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1241c	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Retrofit outlet to increase detention.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** Outlet Structure retrofit
	Feasibility Issues/Comments: Need to assess capacity for more detention if orifice size is reduced. Potential concern of overflow to neighborhood. Consider diversion swale.

Existing Stormwater BMP Site Inspection **Assessed by:** KG

Assessment Information	Site Information
City BMP ID: Pd0098	**Site/Practice Description:** Dry Pond at the corner of Swift St. and Economou Farm Rd. connected to a small area of the golf course, and part of the Economou Rd. neighborhood.
Current Permit #: 4049-9030 & 4049-9030.1. **Related Permit #(s):** 1-1241	
BMP Name: Economou Farm Pond	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No change to permitted pond under RDA.	
Date/Time Assessed: 2015-04-24 / 10:02	
Address/Cross Streets: Swift Street/Economou Farm Rd	
Reviewed Existing Site Plans Prior to Field Visit: yes. Plans are poor quality.	
Active Pollution Visible: None	
Operation/Maintenance Issues: Yes	
O/M Comments: Outlet clogged by vegetation	Detention pond overview.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: HDPE riser with culvert out. Low-flow orifice not found.		
Orifice 1: Culvert	**Orifice 2:** Riser	**Orifice 3:**
Multiplier:1	**Multiplier:** 1	**Multiplier:**
Diameter (in): 12	**Diameter (in):** 12	**Diameter (in):**
Orientation (V/H): Vertical	**Orientation (V/H):** Horizontal	**Orientation (V/H):**
Material: HDPE	**Material:** HDPE	**Material:**
Invert from Rim: 41.5	**Invert from Rim:** 0	**Invert from Rim:**
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: Piped infrastructure indicates more flow goes to the unpermitted pond at Swift Estates rather than the 1-1241d pond.		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1241d	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Retrofit outlet to increase detention.
Revision to GIS DA: Revision needed to south side of Economou Farm Rd	**Proposed Practice Type:** Outlet Structure retrofit
	Feasibility Issues/Comments: Need to assess capacity for more detention if orifice size is reduced.

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0036	**Site/Practice Description:** Detention pond with upgraded outlet structure, located at south end of parking lot. Wetland vegetation present.
Current Permit #: 4113-INDS **Related Permit #(s):** 1-1254	
BMP Name: Technology Park Pond 1	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): Yes. Upgraded outlet weir.	
Date/Time Assessed: 2015-04-29 / 14:40	
Address/Cross Streets: Community Dr	
Reviewed Existing Site Plans Prior to Field Visit: yes. No pond detail.	
Active Pollution Visible: None	
Operation/Maintenance Issues: No	
O/M Comments: No visible issues.	View of detention pond from outlet structure.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Concrete riser with trash rack.		
Orifice 1: Low-flow	**Orifice 2:** Riser	**Orifice 3:** Culvert
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 11 x 8	**Diameter (in):** 75	**Diameter (in):** 48
Orientation (V/H): Vertical	**Orientation (V/H):** Vertical	**Orientation (V/H):** Vertical
Material: Concrete	**Material:** Concrete	**Material:** HPDE
Invert from Rim: 8	**Invert from Rim:** 0	**Invert from Rim:** 65
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1254	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Post 2002 (retrofit)	**Justification:** System currently meeting CPv standard. No FRP Benefit.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0172	**Site/Practice Description:** Large natural detention area in undeveloped field to the south of Meadowland Dr., controlled by a roadway culvert.
Current Permit #: 1-1269 **Related Permit #(s):**	
BMP Name: Meadowland Bus. Park Pond #1	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No	
Date/Time Assessed: 2015-04-29 / 15:27	
Address/Cross Streets: Meadowland Dr	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: Trash, Litter	
Operation/Maintenance Issues: Yes	
O/M Comments: Outlet pipe broken.	View of detention pond.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Culvert out under roadway. No low-flow orifice.		
Orifice 1: Culvert	**Orifice 2:**	**Orifice 3:**
Multiplier:1	**Multiplier:** 1	**Multiplier:**
Diameter (in): 24	**Diameter (in):**	**Diameter (in):**
Orientation (V/H): Vertical	**Orientation (V/H):**	**Orientation (V/H):**
Material: HDPE	**Material:**	**Material:**
Invert from Rim: 60	**Invert from Rim:**	**Invert from Rim:**
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1269	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Secondary BMP, upstream of Pond 2. Retrofit may have limited benefit.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** Outlet Structure retrofit
	Feasibility Issues/Comments: Need to assess capacity for more detention if orifice size is reduced.

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0053	**Site/Practice Description:** Large shallow detention pond east of Thompson St. connected to Meadowland Dr. and Lot 10 Building runoff.
Current Permit #: 4290-9020.3 **Related Permit #(s):** 1-1269	
BMP Name: Meadowland Bus. Park Pond #2	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No	
Date/Time Assessed: 2015-04-29 / 15:21	
Address/Cross Streets: Meadowland Dr	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: Trash, Litter	
Operation/Maintenance Issues: Yes	
O/M Comments: Clean up trash and litter located on	Overview of detention pond.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Culvert out. No low-flow control visible.		
Orifice 1: Culvert	**Orifice 2:**	**Orifice 3:**
Multiplier:1	**Multiplier:** 1	**Multiplier:**
Diameter (in): 21	**Diameter (in):**	**Diameter (in):**
Orientation (V/H): Vertical	**Orientation (V/H):**	**Orientation (V/H):**
Material: CMP	**Material:**	**Material:**
Invert from Rim: 72	**Invert from Rim:**	**Invert from Rim:**
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1269a	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Not meeting CPv standard. Retrofit outlet structure.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** Outlet Structure retrofit
	Feasibility Issues/Comments: Need to assess capacity for more detention if orifice size is reduced.

Existing Stormwater BMP Site Inspection **Assessed by:** KG,JS

Assessment Information	Site Information
City BMP ID: Pd0040	**Site/Practice Description:** Detention Pond with low-flow control outlet riser. Appears to be designed to VSMM 2002 standards.
Current Permit #: 4290-9020.1 **Related Permit #(s):** 1-1269	
BMP Name: Meadowland Bus. Park Lot 4 Pond	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No	
Date/Time Assessed: 2015-04-29 / 16:17	
Address/Cross Streets: Meadowland Dr	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: None	
Operation/Maintenance Issues: No	
O/M Comments: No visible issues.	Detention pond with outlet structure.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Riser with elbow joint, low flow hole at bottom of elbow		
Orifice 1: Low-flow	**Orifice 2:** Culvert	**Orifice 3:** Riser
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 2	**Diameter (in):** 12	**Diameter (in):** 24
Orientation (V/H): Vertical	**Orientation (V/H):** Vertical	**Orientation (V/H):** Horizontal
Material: PVC- smooth	**Material:** PVC- smooth	**Material:** Concrete
Invert from Rim: 30	**Invert from Rim:** 10'	**Invert from Rim:** 0
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1269b	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Base	**Justification:** System currently meeting CPv standard. No FRP Benefit.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: IA0016	**Site/Practice Description:** Vegetated retention basin with sand filter underdrain system.
Current Permit #: 1-1337 **Related Permit #(s):**	
BMP Name: Lane Press Printing Facility Complex Infiltration Area	
BMP Type: Infiltration Basin	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No	
Date/Time Assessed: 2015-04-29 / 15:37	
Address/Cross Streets: Meadowland Dr	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: None	
Operation/Maintenance Issues: No	
O/M Comments: No visible issues.	Overview of infiltration basin.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Culvert out not found.		
Orifice 1:	**Orifice 2:**	**Orifice 3:**
Multiplier:	**Multiplier:**	**Multiplier:**
Diameter (in):	**Diameter (in):**	**Diameter (in):**
Orientation (V/H):	**Orientation (V/H):**	**Orientation (V/H):**
Material:	**Material:**	**Material:**
Invert from Rim:	**Invert from Rim:**	**Invert from Rim:**
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1337	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Base	**Justification:** System currently infiltrating 1-year storm. No FRP Benefit.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: IA0016	**Site/Practice Description:** Grassed island in parking lot with buried pre-fabricated "Hancor EnviroChambers". Includes 3 rows each 231.35' long with 6" between rows.
Current Permit #: 1-1380 **Related Permit #(s):**	
BMP Name: S. Burlington Community Housing	
BMP Type: Infiltration Gallery	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No	
Date/Time Assessed: 2015-04-28 / 15:16	
Address/Cross Streets: Hayden Dr/ Williston Rd.	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: None	
Operation/Maintenance Issues: No	
O/M Comments: No visible issues.	Overview of infiltration trench.

Existing BMP Sizing Information

BMP Outlet Structure Overview: Open grassed field with catch basins on North and South End. South catch basin has 6" reverse grade PVC pipe routed into the underground infiltration chambers. No pipes visible in north catchbasin.

Orifice 1:	**Orifice 2:**	**Orifice 3:**
Multiplier:	**Multiplier:**	**Multiplier:**
Diameter (in):	**Diameter (in):**	**Diameter (in):**
Orientation (V/H):	**Orientation (V/H):**	**Orientation (V/H):**
Material:	**Material:**	**Material:**
Invert from Rim:	**Invert from Rim:**	**Invert from Rim:**

Emergency Spillway Dimensions (if applicable): No visible spillway **Breadth (ft):** --- **Length (ft):** ---

Structure Notes/Follow-up: Review plan to verify infiltration basin outlet.

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1380	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Infiltrates up to 1-year storm. Meets CPv standard according to DEC review.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** KG

Assessment Information	Site Information
City BMP ID: Pd0002	**Site/Practice Description:** Detention pond with forebay and controlled outlet structure at South end of property.
Current Permit #: 1-1438 **Related Permit #(s):**	
BMP Name: Farrell Property Development/ Eastwood Commons	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No	
Date/Time Assessed: 2015-04-23 / 15:15	
Address/Cross Streets: Farrell St	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: Trash, Litter	
Operation/Maintenance Issues: Yes	
O/M Comments: Clean up trash and litter.	Overview of detention pond.

Existing BMP Sizing Information

BMP Outlet Structure Overview: Riser with 6.5" hole located 2'8" below riser rim and 4.25" hole located 5'5" below rim.

Orifice 1: Culvert	**Orifice 2:** Riser	**Orifice 3:**
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 18	**Diameter (in):** 30	**Diameter (in):**
Orientation (V/H): Vertical	**Orientation (V/H):** Horizontal	**Orientation (V/H):**
Material: HDPE	**Material:** Concrete	**Material:**
Invert from Rim: 84	**Invert from Rim:** 0	**Invert from Rim:**

Emergency Spillway Dimensions (if applicable): No visible spillway **Breadth (ft):** --- **Length (ft):** ---

Structure Notes/Follow-up: ---

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1438	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Does not meet CPv standard.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** Outlet Structure retrofit and pond expansion
	Feasibility Issues/Comments: Need to assess capacity for more detention if orifice size is reduced.

Existing Stormwater BMP Site Inspection **Assessed by:** KG

Assessment Information	Site Information
City BMP ID: Pd0001	**Site/Practice Description:** Detention pond with controlled outlet structure.
Current Permit #: 1-1452 **Related Permit #(s):**	
BMP Name: Olympiad Apartments & Office Bldg	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No	
Date/Time Assessed: 2015-04-23 / 16:00	
Address/Cross Streets: Farrell St and Eastwood Dr	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: Trash, Litter	
Operation/Maintenance Issues: Yes	
O/M Comments: Clean up trash and litter.	Overview of detention pond.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Riser with 3 low-flow orifices and culvert outlet.		
Orifice 1: Culvert	**Orifice 2:** Riser	**Orifice 3:** Low-flow
Multiplier:1	**Multiplier:** 1	**Multiplier:** 3
Diameter (in): 18	**Diameter (in):**	**Diameter (in):** 4
Orientation (V/H): Vertical	**Orientation (V/H):** Horizontal	**Orientation (V/H):** Vertical
Material: HDPE	**Material:** Concrete	**Material:** Concrete
Invert from Rim: 70	**Invert from Rim:** 0	**Invert from Rim:** 60
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1452	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Does not fully meet CPv or WQv standards.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** Add forebay and clear out vegetation.
	Feasibility Issues/Comments: Unknown at time of inspection.

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0153	**Site/Practice Description:** Detention pond with controlled outlet structure. Ponded area is classified as a Class II Wetland.
Current Permit #: 1-1458 **Related Permit #(s):**	
BMP Name: Technology Park Field Detention P3	
BMP Type: Detention Area	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No	
Date/Time Assessed: 2015-04-29 / 14:25	
Address/Cross Streets: Community Dr	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: None	
Operation/Maintenance Issues: No	
O/M Comments: No visible issues.	Detention pond outlet structure.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Concrete box with weir outlet and routed to primary culvert outlet.		
Orifice 1: Low-flow	**Orifice 2:** Riser	**Orifice 3:** Culvert
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 4	**Diameter (in):** 48 x 8 x 6	**Diameter (in):** 18
Orientation (V/H): Vertical	**Orientation (V/H):** Horizontal	**Orientation (V/H):** Vertical
Material: Concrete	**Material:** Concrete	**Material:** Concrete
Invert from Rim: 36	**Invert from Rim:** 0	**Invert from Rim:** 57
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1458 P3	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Base	**Justification:** System currently meeting CPv standard. No FRP Benefit.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0154	**Site/Practice Description:** Detention area at culvert under Community Dr.
Current Permit #: 1-1458 **Related Permit #(s):**	
BMP Name: Technology Park Culvert Detention P4	
BMP Type: Detention Area	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No	
Date/Time Assessed: 2015-04-29 / 14:20	
Address/Cross Streets: Community Dr	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: None	
Operation/Maintenance Issues: Yes	
O/M Comments: Excessive vegetation and leaves clogging culvert outlet.	Culvert outlet.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Culvert with concrete head wall.		
Orifice 1: Culvert	**Orifice 2:**	**Orifice 3:**
Multiplier:1	**Multiplier:** 1	**Multiplier:**
Diameter (in): 18	**Diameter (in):**	**Diameter (in):**
Orientation (V/H): Vertical	**Orientation (V/H):**	**Orientation (V/H):**
Material: Concrete	**Material:**	**Material:**
Invert from Rim: 120	**Invert from Rim:**	**Invert from Rim:**
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1458 P4	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Does not meet CPv standard.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** Outlet Structure retrofit
	Feasibility Issues/Comments: Need to assess capacity for more detention if orifice size is reduced.

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: IA0017	**Site/Practice Description:** Infiltration basin on north edge of parking lot.
Current Permit #: 1-1504 **Related Permit #(s):**	
BMP Name: 110 Kimball Ave North Infiltration Basin	
BMP Type: Infiltration Basin	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No	
Date/Time Assessed: 2015-04-29 / 13:46	
Address/Cross Streets: 110 Kimball Ave	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: None	
Operation/Maintenance Issues: Yes	
O/M Comments: Culvert pipe broken at entry and exit. Inlet clogged with leaves. Surface is muddy. Could be retrofit with more appropriate cover material.	Infiltration basin on the northern side of parking lot.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: 12" HPDE culvert outlet for surface runoff		
Orifice 1: Culvert	**Orifice 2:**	**Orifice 3:**
Multiplier:1	**Multiplier:** 1	**Multiplier:**
Diameter (in): 12	**Diameter (in):**	**Diameter (in):**
Orientation (V/H): Vertical	**Orientation (V/H):**	**Orientation (V/H):**
Material: HDPE	**Material:**	**Material:**
Invert from Rim: At level of pond surface	**Invert from Rim:**	**Invert from Rim:**
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: Check BMP entry in model.		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1504a	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Runoff is bypassing infiltration basin and sheet flowing to a swale with a direct discharge to the Brook. Add trench along west edge of parking lot to direct runoff to infiltration basin.
Revision to GIS DA: Need to revise drainage area.	**Proposed Practice Type:** Add trench drain on west side of parking lot to daylight to infiltration basin.
	Feasibility Issues/Comments: Need to assess capacity for more detention if more surface flow is directed to infiltration basin.

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: IA0004	**Site/Practice Description:** Permitted as Infiltration basin in south grassed island but really just depression at culvert under office entrance road, providing minimal flow detention.
Current Permit #: 1-1504 **Related Permit #(s):**	
BMP Name: 110 Kimball Ave - South Infiltration Basin	
BMP Type: Infiltration Basin	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No	
Date/Time Assessed: 2015-04-29 / 14:06	
Address/Cross Streets: 110 Kimball Ave	
Reviewed Existing Site Plans Prior to Field Visit: Yes. No detail for IB.	
Active Pollution Visible: None	
Operation/Maintenance Issues: Yes	
O/M Comments: Erosion at basin outlet is indicator of ponding and higher velocity flows.	Overview of infiltration basin.

Existing BMP Sizing Information

BMP Outlet Structure Overview: 12" HPDE culvert out, with no low-flow control.

Orifice 1: Culvert	**Orifice 2:**	**Orifice 3:**
Multiplier:1	**Multiplier:** 1	**Multiplier:**
Diameter (in): 12	**Diameter (in):**	**Diameter (in):**
Orientation (V/H): Vertical	**Orientation (V/H):**	**Orientation (V/H):**
Material: HDPE	**Material:**	**Material:**
Invert from Rim: 60	**Invert from Rim:**	**Invert from Rim:**

Emergency Spillway Dimensions (if applicable): No visible spillway **Breadth (ft):** --- **Length (ft):** ---

Structure Notes/Follow-up: Verify that the culvert out doesn't flow back to other south side of roadway.

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1504b	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Permitted outlet riser not installed. Flow discharges to class II wetland via 12" culvert.
Revision to GIS DA: Need to revise drainage area for infiltration basin. Some area bypasses system.	**Proposed Practice Type:** Outlet Structure retrofit- Add proposed outlet control riser that was never constructed.
	Feasibility Issues/Comments: Need to assess capacity for more detention in south median area if orifice size is reduced.

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0020	**Site/Practice Description:** Micropool extended detention pond with forebay and outlet control at entrance to Stonington Circle.
Current Permit #: 1-1520 **Related Permit #(s):**	
BMP Name: O'Brien Home Farm Pond a	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): Post 2002 Design	
Date/Time Assessed: 2015-09-09 / 13:57	
Address/Cross Streets: Eldrige Street/Hinesburg Rd.	
Reviewed Existing Site Plans Prior to Field Visit: Plans not available.	
Active Pollution Visible: None	
Operation/Maintenance Issues: No	
O/M Comments: No visible issues.	Overview of detention pond.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Concrete riser structure with low-flow orifice.		
Orifice 1: Low-flow	**Orifice 2:** Low-flow	**Orifice 3:** Low-flow
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 6	**Diameter (in):** 2.5	**Diameter (in):** 12.5
Orientation (V/H): Vertical	**Orientation (V/H):** Vertical	**Orientation (V/H):** Vertical
Material: PVC- smooth	**Material:**	**Material:** PVC- smooth
Invert from Rim: 72	**Invert from Rim:** 40	**Invert from Rim:** 19
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1520a	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Post 2002	**Justification:** System currently meeting CPv standard. No FRP Benefit.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0021	**Site/Practice Description:** Micropool extended detention pond with forebay, located across from entrance to O'Brien Home Farm development.
Current Permit #: 1-1520 **Related Permit #(s):**	
BMP Name: O'Brien Home Farm Pond b	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): Post 2002 Design	
Date/Time Assessed: 2015-09-09 / 13:32	
Address/Cross Streets: Stonington Dr	
Reviewed Existing Site Plans Prior to Field Visit: Plans not available.	
Active Pollution Visible: None	
Operation/Maintenance Issues: No	
O/M Comments: No visible issues.	Overview of detention pond.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Concrete riser structure with low-flow orifice.		
Orifice 1: Low-flow	**Orifice 2:** Low-flow	**Orifice 3:** Riser
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 1	**Diameter (in):** 6	**Diameter (in):** 27
Orientation (V/H): Vertical	**Orientation (V/H):** Vertical	**Orientation (V/H):** Horizontal
Material: PVC- smooth	**Material:** PVC- smooth	**Material:**
Invert from Rim: 36	**Invert from Rim:** 21	**Invert from Rim:** 0
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1520b	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Post 2002	**Justification:** System currently meeting CPv standard. No FRP Benefit.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0022	**Site/Practice Description:** Micropool extended detention pond with forebay, located at corner of Eldridge St., within O'Brien Home Farm development.
Current Permit #: 1-1520 **Related Permit #(s):**	
BMP Name: O'Brien Home Farm Pond c	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): Post 2002 Design	
Date/Time Assessed: 2015-09-09 / 13:42	
Address/Cross Streets: Kennedy Dr	
Reviewed Existing Site Plans Prior to Field Visit: Plans not available.	
Active Pollution Visible: Trash, Litter	
Operation/Maintenance Issues: Yes	
O/M Comments: Clean up trash and litter.	Overview of detention pond.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Concrete riser structure with low-flow orifice.		
Orifice 1: Low-flow	**Orifice 2:** Low-flow	**Orifice 3:** Riser
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 2	**Diameter (in):** 6	**Diameter (in):** 21
Orientation (V/H): Vertical	**Orientation (V/H):** Vertical	**Orientation (V/H):** Horizontal
Material: Other	**Material:**	**Material:**
Invert from Rim: 29	**Invert from Rim:** 12	**Invert from Rim:** 0
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up:		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1520c	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Post 2002	**Justification:** System currently meeting CPv standard. No FRP Benefit.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0166	**Site/Practice Description:** Detention swale with flow control riser structure. Discharges to natural pond.
Current Permit #: 6269-9030 **Related Permit #(s):** 1-1526	
BMP Name: 30 Kimball Ave	
BMP Type: Detention Swale	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): Unknown. Waiting for EFA plans from DEC.	
Date/Time Assessed: 2015-04-29 / 13:02	
Address/Cross Streets: 30 Kimball Ave	
Reviewed Existing Site Plans Prior to Field Visit: Plans not available.	
Active Pollution Visible: None	
Operation/Maintenance Issues: No	
O/M Comments: No visible issues.	View of detention basin from outlet structure.

Existing BMP Sizing Information

BMP Outlet Structure Overview: Riser with 24" grate. 4" outlet into riser at surface of detention swale. In riser, 6" PVC outlet from underdrain of detention swale. Riser outlet has 90 elbow connected to 18" culvert out.

Orifice 1: Low-flow	**Orifice 2:** Low-flow	**Orifice 3:** Culvert
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 4	**Diameter (in):** 6	**Diameter (in):** 18
Orientation (V/H): Vertical	**Orientation (V/H):** Vertical	**Orientation (V/H):** Vertical
Material: PVC- smooth	**Material:** PVC- smooth	**Material:** PVC-corrugated
Invert from Rim: 15	**Invert from Rim:** 60	**Invert from Rim:** 54

Emergency Spillway Dimensions (if applicable): Yes **Breadth (ft):** 10 **Length (ft):** 10

Structure Notes/Follow-up: ---

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1526	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Does not meet CPv standard.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** Outlet Structure retrofit.
	Feasibility Issues/Comments: Need to assess capacity for more detention in south median area if orifice size is reduced.

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0051	**Site/Practice Description:** Retention pond with two sedimentation areas.
Current Permit #: 5395-INDS **Related Permit #(s):** 1-1536	
BMP Name: Mountain View Business Park - Lot A	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): Yes. Upgraded Post 2002.	
Date/Time Assessed: 2015-05-01 / 16:28	
Address/Cross Streets: Tilley Drive	
Reviewed Existing Site Plans Prior to Field Visit: Plans not available.	
Active Pollution Visible: Trash, Litter	
Operation/Maintenance Issues: Yes	
O/M Comments: Clean up trash and litter.	Overview of detention pond.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Riser with low flow hole and culvert out.		
Orifice 1: Low-flow	**Orifice 2:** Riser	**Orifice 3:** Culvert
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 4	**Diameter (in):** 18	**Diameter (in):** 12
Orientation (V/H): Vertical	**Orientation (V/H):** Horizontal	**Orientation (V/H):** Vertical
Material: PVC- smooth	**Material:** CMP	**Material:** HPDE
Invert from Rim: 12	**Invert from Rim:** 0	**Invert from Rim:** 72
Emergency Spillway Dimensions (if applicable): Yes	**Breadth (ft):** 10	**Length (ft):** 50
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 1-1536	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Post 2002 (retrofit)	**Justification:** System currently meeting CPv standard. No FRP Benefit.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0073	**Site/Practice Description:** Detention pond with forebay
Current Permit #: 6553-INDO upgrades **Related Permit #(s):** 2-0848	
BMP Name: Foxcroft Pond	
BMP Type: Detention Pond	
BMP Ownership: City	
Post 2002 Upgrades (Y/N): Yes. Upgraded Post 2002.	
Date/Time Assessed: 2015-09-09 / 11:07	
Address/Cross Streets: Kinsington St	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: None	
Operation/Maintenance Issues: Yes	
O/M Comments: Excessive vegetation, algal growth at outlet.	Overview of detention pond.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Concrete riser with low flow orifice, weir inside, 24" grate top and culvert out.		
Orifice 1: Low-flow	**Orifice 2:** Low-flow	**Orifice 3:** Culvert
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 8	**Diameter (in):** 18 x 12	**Diameter (in):** 24
Orientation (V/H): Vertical	**Orientation (V/H):** Vertical	**Orientation (V/H):** Vertical
Material: PVC- smooth	**Material:** Concrete	**Material:** PVC-corrugated
Invert from Rim: 72	**Invert from Rim:** 24	**Invert from Rim:** 72
Emergency Spillway Dimensions (if applicable): Yes	**Breadth (ft):** 15	**Length (ft):** 40
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 2-0848_N	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Post 2002 (retrofit)	**Justification:** Part of Hayes Stormwater Improvements Project. Upgrade completed.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0072	**Site/Practice Description:** Detention pond with forebay, located at end of Kinsington St.
Current Permit #: 6553-INDO upgrades **Related Permit #(s):** 2-0848	
BMP Name: Hayes Avenue Pond	
BMP Type: Detention Pond	
BMP Ownership: City	
Post 2002 Upgrades (Y/N): Yes. Upgraded Post 2002.	
Date/Time Assessed: 2015-05-04 / 14:39	
Address/Cross Streets: Kinsington St	
Reviewed Existing Site Plans Prior to Field Visit: Yes	
Active Pollution Visible: None	
Operation/Maintenance Issues: Yes	
O/M Comments: Algal growth, which could be issue in future. Not major issue as observed.	Overview of detention pond.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Square riser with weir inside.		
Orifice 1: Low-flow	**Orifice 2:** Riser	**Orifice 3:** Culvert
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 18 x 6	**Diameter (in):** 24	**Diameter (in):** Unknown
Orientation (V/H): Vertical	**Orientation (V/H):** Horizontal	**Orientation (V/H):** Vertical
Material: Concrete	**Material:** Concrete	**Material:**
Invert from Rim: 12	**Invert from Rim:** 0	**Invert from Rim:**
Emergency Spillway Dimensions (if applicable): Yes	**Breadth (ft):** 12	**Length (ft):** 30
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 2-0848_S	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Post 2002 (retrofit)	**Justification:** Part of Hayes Stormwater Improvements Project. Upgrade completed.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** JS,KG

Assessment Information	Site Information
City BMP ID: Pd0041	**Site/Practice Description:** Detention pond with forebay, and low-flow outlet control, located within Winding Brook development.
Current Permit #: 6391-INDS **Related Permit #(s):** 2-0988	
BMP Name: Winding Brook Pond	
BMP Type: Detention Pond	
BMP Ownership: City	
Post 2002 Upgrades (Y/N): Yes. Upgraded Post 2002.	
Date/Time Assessed: 2015-09-09 / 11:25	
Address/Cross Streets: Winding Brook	
Reviewed Existing Site Plans Prior to Field Visit: Plans not available.	
Active Pollution Visible: None	
Operation/Maintenance Issues: No	
O/M Comments: No visible issues.	Overview of detention pond.

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Riser structure with low-flow orifice.		
Orifice 1: Low-flow	**Orifice 2:** Low-flow	**Orifice 3:** Low-flow
Multiplier:1	**Multiplier:** 1	**Multiplier:** 1
Diameter (in): 2	**Diameter (in):** 6	**Diameter (in):** 16 x 4
Orientation (V/H): Vertical	**Orientation (V/H):** Vertical	**Orientation (V/H):** Vertical
Material: Concrete	**Material:** PVC- smooth	**Material:** Concrete
Invert from Rim: 60	**Invert from Rim:** 32	**Invert from Rim:** 13
Emergency Spillway Dimensions (if applicable): Yes	**Breadth (ft):** 5	**Length (ft):** 10
Structure Notes/Follow-up: ---		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: 2-0988	**Is Retrofit Possible/Needed:** No
Model (Which Model Scenario is the existing system included?): Post 2002 (retrofit)	**Justification:** System currently meeting CPv standard. No FRP Benefit.
Revision to GIS DA: No revision needed based on field inspection.	**Proposed Practice Type:** No retrofit needed.
	Feasibility Issues/Comments: No Comment

Existing Stormwater BMP Site Inspection **Assessed by:** KG

Assessment Information	Site Information
City BMP ID: Pd0167	**Site/Practice Description:** Multistage Detention Pond
Current Permit #: No Permit **Related Permit #(s):**	
BMP Name: Swift Estates Pond	
BMP Type: Detention Pond	
BMP Ownership: Private	
Post 2002 Upgrades (Y/N): No	
Date/Time Assessed: 2015-04-24 / 10:30	
Address/Cross Streets: Swift Street	
Reviewed Existing Site Plans Prior to Field Visit: Plans not available.	
Active Pollution Visible: None	
Operation/Maintenance Issues: No	
O/M Comments: No visible issues.	Detention pond overview. Photo taken from Meadowood Drive

Existing BMP Sizing Information		
BMP Outlet Structure Overview: Culvert under Swift St is only outlet control.		
Orifice 1: Culvert	**Orifice 2:** ---	**Orifice 3:** ---
Multiplier:1	**Multiplier:** 1	**Multiplier:** 0
Diameter (in): 18	**Diameter (in):** ---	**Diameter (in):** ---
Orientation (V/H): Vertical	**Orientation (V/H):** ---	**Orientation (V/H):** ---
Material: CMP	**Material:** ---	**Material:** ---
Invert from Rim: ---	**Invert from Rim:** ---	**Invert from Rim:** ---
Emergency Spillway Dimensions (if applicable): No visible spillway	**Breadth (ft):** ---	**Length (ft):** ---
Structure Notes/Follow-up: Revise drainage area to include stormwater from cul-de-sac and rear of rooftops of five homes on Economou Farm Rd via catch basins in roadway and collection pipe.		

BMPDSS Model Update Information	Retrofit Feasibility
BMPDSS ID: Swift Estates	**Is Retrofit Possible/Needed:** Potential
Model (Which Model Scenario is the existing system included?): Base	**Justification:** Does not meet CPv standard.
Revision to GIS DA: Yes. Revise DA from Economou Farm Rd.	**Proposed Practice Type:** Outlet Structure retrofit.
	Feasibility Issues/Comments: Site access could be an issue if pond needs to be expanded for more detention.

Potash Brook FRP
Table B-1: Proposed BMPs for BMPDSS Model Credit Runs

Model Run	Proposed BMP ID #	Project Name	BMP Address	New or Existing	BMP Type	MS4s with Impervious Area	Expired Permit #	BMP Drainage Area (acres)	Impervious Area Managed (acres)	Impervious %
Credit1	PB0002	110 Kimball Ave - North Infiltration Basin	110 Kimball Ave, South Burlington	Existing	IB	South Burlington	1-1504a	1.51	0.58	38%
Credit1	PB0003	110 Kimball Ave - South Infiltration Basin	110 Kimball Ave, South Burlington	Existing	IB	South Burlington	1-1504b	1.42	0.94	66%
Credit1	PB0004	189 Cloverleaf Detention Pond	Shelburne Rd and Queen City Pkwy, South Burlington	New	DP	South Burlington, VTrans, Burlington	No Permit	21.25	12.14	57%
Credit1	PB0006	30 Kimball Ave Swale Retrofit	30 Kimball Ave, South Burlington	Existing	DS	South Burlington	1-1526; 6269-9030	1.27	1.05	82%
Credit1	PB0009	Airport Drive	Airport Dr and Airport Rd, South Burlington	New	IG	South Burlington, BTV	No Permit	9.65	2.70	28%
Credit1	PB0011	Blue Mall Infiltration	Dorset St south of Market St, South Burlington	New	IG	South Burlington	2-0144	2.49	2.40	97%
Credit1	PB0012	Brookwood Drive Pond	Brookwood Dr off of Dorset St, South Burlington	New	DP	South Burlington	2-0794; 2-0619	41.24	24.49	59%
Credit1	PB0013	Burlington Price Chopper	Shelburne Rd, Burlington	New	GW	Burlington	No Permit	12.69	11.48	90%
Credit1	PB0014	Chelsea Circle	Chelsea Cir and Hayes Ave, South Burlington	New	IB	South Burlington	2-0767	3.28	1.82	56%
Credit1	PB0016	Community Bible Church Infiltration	Williston Rd and Millham Ct, South Burlington	New	IT	South Burlington	No Permit	10.34	6.17	60%
Credit1	PB0017	Domino's	Swift St and Farrell St, South Burlington	New	DP	South Burlington	No Permit	2.30	1.34	58%
Credit1	PB0019	Dumont Park Stormwater Project	Barrett St and Obrien Dr, South Burlington	New	DP	South Burlington, VTrans	No Permit	9.56	4.16	43%
Credit1	PB0021	East Terrace Detention Pond	East Terrace, South Burlington	New	DP	South Burlington	No Permit	6.36	2.28	36%
Credit1	PB0024	Economou Farm Pond	Economou Farm Rd, South Burlington	Existing	DP	South Burlington	1-1241d	6.37	1.46	23%
Credit1	PB0027	Fairpoint Communications	Hinesburg Rd south of I-89, South Burlington	New	DP	South Burlington	2-0212	8.75	4.76	54%
Credit1	PB0028	Faith United Methodist Church	Dorset St south of Songbird Ln, South Burlington	New	DP	South Burlington	No Permit	1.68	1.03	61%
Credit1	PB0029	Golf Course Road South	Golf Course Rd and Old Cross Rd, South Burlington	New	DP	South Burlington	1-1241	5.19	1.67	32%
Credit1	PB0031	Grandview Drive North Detention Pond	Grandview Dr and W Twin Oaks Terr, South Burlington	New	DP	South Burlington	2-0238; 2-0737	3.02	1.38	46%
Credit1	PB0032	Grandview Drive West Detention Pond	Grandview Dr and Dorset St, South Burlington	New	DP	South Burlington	2-0238; 2-0737	3.14	1.89	60%
Credit1	PB0033	Hawthorne Circle Detention Pond	Hawthorne Cir and Kennedy Dr, South Burlington	New	DP	South Burlington	No Permit	4.95	2.55	51%
Credit1	PB0034	Helen Ave Cul De Sac	Helen Ave, South Burlington	New	IB	South Burlington	No Permit	5.70	2.15	38%
Credit1	PB0037	Iby Gravel Wetland	Iby St off of Hinesburg Rd, South Burlington	New	GW	South Burlington	No Permit	2.82	1.14	40%
Credit1	PB0038	INS Building Pond A Retrofit	Kimball Ave west of Community Dr, South Burlington	Existing	RP	South Burlington	1-0969	2.11	0.98	47%

Potash Brook FRP
Table B-1: Proposed BMPs for BMPDSS Model Credit Runs

Model Run	Proposed BMP ID #	Project Name	BMP Address	New or Existing	BMP Type	MS4s with Impervious Area	Expired Permit #	BMP Drainage Area (acres)	Impervious Area Managed (acres)	Impervious %
Credit1	PB0039	INS Building Pond B Retrofit	Kimball Ave west of Community Dr, South Burlington	Existing	DP	South Burlington	1-0969b	1.44	0.61	42%
Credit1	PB0045	K-Mart Plaza Infiltration	Shelburne Rd north of Hannaford Dr, South Burlington	New	IG	South Burlington	No Permit	8.86	7.68	87%
Credit1	PB0049	Lilac Ln Infiltration Basin	Lilac Ln off of Hinesburg Rd, South Burlington	New	IB	South Burlington	No Permit	1.46	0.85	58%
Credit1	PB0051	Logwood Neighborhood Detention Pond	Williston Rd south of intersection with Airport Rd, South Burlington	New	DP	South Burlington	No Permit	44.81	18.44	41%
Credit1 / CMAC Valve	PB0054	Meadowland Business Park Pond 2	Meadowland Dr, South Burlington	Existing	DP	South Burlington, VTrans	1-1269_4290-9020.3 Lot 10	13.46	5.13	38%
Credit1	PB0055	Merchant's Bank Detention Pond	Kimball Ave and Kennedy Dr, South Burlington	New	DP	South Burlington	2-1171; 6275-9030; 6269-9030; 2-0939	4.36	3.17	73%
Credit1	PB0058	North Country Credit North West Infiltration	Swift St west of Shelburne Rd, South Burlington	New	IT	South Burlington	No Permit	0.25	0.21	84%
Credit1	PB0059	North Country Credit South Infiltration	Swift St west of Shelburne Rd, South Burlington	New	IG	South Burlington	No Permit	0.76	0.62	81%
Credit1	PB0060	O'Brien Drive Underground Detention	Obrien Dr, South Burlington	New	UD	South Burlington	No Permit	8.47	2.87	34%
Credit1	PB0061	Olympiad Apartments & Office Building Pond Retrofit	Farrell St south of Eastwood Dr, South Burlington	Existing	DP	South Burlington	1-1452	9.65	3.68	38%
Credit1	PB0064	Pillsbury Manor Infiltration Basin Retrofit	Pillsbury Manor N and Williston Rd, South Burlington	Existing	IB	South Burlington	1-1015	1.06	0.40	38%
Credit1	PB0065	Quarry Hill South	Quarry Hill Rd off of Spear St, South Burlington	New	DS	South Burlington	6322-9030	5.62	2.52	45%
Credit1	PB0066	Queen City Park Road Detention Pond	Queen City Park Rd off of Shelburne Rd, South Burlington	New	DP	South Burlington, VTrans	No Permit	6.51	2.98	46%
Credit1	PB0070	South Meadows Pond	Farrell St, South Burlington	Existing	DP	Burlington	1-0661	10.10	4.73	47%
Credit1	PB0071	Southview Drive	Southview Dr off of Prouty Pkwy, South Burlington	New	UD	South Burlington	No Permit	12.26	4.81	39%
Credit1	PB0072	Staples Plaza Underground Detention	Williston Rd west of I-89, South Burlington	New	UD	South Burlington, VTrans	No Permit	1.70	1.64	97%
Credit1	PB0074	Sugartree Lane	Sugartree Ln off of Kennedy Dr, South Burlington	New	DP	South Burlington	2-0878	1.54	1.05	69%
Credit1	PB0075	Swift Estates Pond	Meadowood Dr and Swift St, South Burlington	Existing	DP	South Burlington	No Permit	18.52	3.57	19%
Credit1	PB0076	Technology Park Pond Retrofit	Community Dr off of Kimball Ave, South Burlington	Existing	DP	South Burlington	1-1458 P4	8.05	0.03	0%
Credit1 / CMAC Valve	PB0078	The Pines	Aspen Dr off of Dorset St, South Burlington	Existing	DP	South Burlington	1-1117	12.67	5.85	46%

Potash Brook FRP
Table B-1: Proposed BMPs for BMPDSS Model Credit Runs

Model Run	Proposed BMP ID #	Project Name	BMP Address	New or Existing	BMP Type	MS4s with Impervious Area	Expired Permit #	BMP Drainage Area (acres)	Impervious Area Managed (acres)	Impervious %
Credit1	PB0079	UMall Detention Pond	Dorset St (University Mall), South Burlington	Existing	DP	South Burlington	1-0503c; 6282-9030	16.90	14.96	89%
Credit1	PB0080	UMall Infiltration 1	Dorset St (University Mall), South Burlington	Existing	IG	South Burlington	1-0503b; 6282-9030	17.15	15.30	89%
Credit1	PB0081	UMall Infiltration 2	Dorset St (University Mall), South Burlington	Existing	IG	South Burlington	1-0503a; 6282-9030	5.61	5.55	99%
Credit1	PB0084	UVM Forestry Research Center - East Roof	Spear St north of I-89, South Burlington	New	IG	UVM	No Permit	0.42	0.41	98%
Credit1	PB0085	UVM Forestry Research Center - West Roof	Spear St north of I-89, South Burlington	New	IG	UVM	No Permit	0.12	0.12	100%
Credit1	PB0086	Vermont National Country Club Pond B	Golf Course Rd and Park Rd, South Burlington	Existing	DP	South Burlington	1-1241b	35.72	8.63	24%
Credit1	PB0087	Vermont National Country Club Pond C	Golf Course Rd and Park Rd, South Burlington	Existing	DP	South Burlington	1-1241c	9.94	0.47	5%
Credit2	PB0001	1050 Hinesburg Road	1050 Hinesburg Rd, South Burlington	New	DP	South Burlington, VTrans	No Permit	1.43	0.74	52%
Credit2	PB0005	189 Ramp Detention Pond	Dorset St and 189 Ramps, South Burlington	New	DP	South Burlington, VTrans	2-0619	9.36	5.78	62%
Credit2	PB0018	Dorset Commons Pond	Dorset St and Town Square Dr, South Burlington	New	DP	South Burlington	1-0242	17.54	5.01	29%
Credit2	PB0022	Eastwood Commons Pond Expansion	Farrell St, South Burlington	Existing	DP	South Burlington	1-1438	28.39	20.78	73%
Credit2	PB0040	Joy Dr Detention Pond	Joy Dr, South Burlington	New	DP	South Burlington	No Permit	3.07	1.34	44%
Credit2 / CMAC Valve	PB0042	Kennedy Dr Pond 3 Expansion	Kennedy Dr west of Timber Ln, South Burlington	Existing	DP	South Burlington	1-1582c	6.39	4.82	75%
Credit2	PB0043	Kennedy Dr Pond 4 Expansion	Kennedy Dr and Hinesburg Rd, South Burlington	Existing	DP	South Burlington, VTrans	1-1582d; 1-0237; 1-1023; 1-1290	10.07	4.78	47%
Credit2 / CMAC Valve	PB0044	Kennedy Dr Pond 7 Expansion	Kennedy Dr north of Kimball Ave, South Burlington	Existing	DP	South Burlington	1-1582g; 1-0233	11.24	8.67	77%
Credit2	PB0052	Marcotte Central School	Market St near Dorset St intersection, South Burlington	New	DP	South Burlington	No Permit	2.11	1.83	87%
Credit2	PB0053	Marine Connection	Williston Rd and Shunpike Rd, South Burlington	New	DS	South Burlington	No Permit	10.79	4.73	44%
Credit2	PB0056	Miller Research Farm	Spear St north of I-89, South Burlington	New	DP	South Burlington, Burlington, VTrans	No Permit	79.01	5.03	6%
Credit2	PB0068	South Burlington High School Infiltration	Dorset St north of Kennedy Dr, South Burlington	New	IB	South Burlington	No Permit	3.57	3.10	87%
Credit2	PB0082	UMall Sears Auto Pond	Dorset St (University Mall), South Burlington	Existing	GW	South Burlington	1-0503d; 6282-9030; 2-0619	11.62	9.29	80%
Credit2	PB0091	Woodcrest Drive	Woodcrest Dr and Deane St, South Burlington	New	IB	South Burlington, VTrans	No Permit	7.46	2.38	32%
Credit3	PB0008	Adirondack Street	Adirondack St and Butler Dr, South Burlington	New	UD	South Burlington	2-0312	11.95	3.52	29%
Credit3	PB0010	Ashbrook Drive	Ashbrook Dr and Dorset St, South Burlington	New	DP	South Burlington	2-0101	2.49	0.88	35%

Potash Brook FRP
Table B-1: Proposed BMPs for BMPDSS Model Credit Runs

Model Run	Proposed BMP ID #	Project Name	BMP Address	New or Existing	BMP Type	MS4s with Impervious Area	Expired Permit #	BMP Drainage Area (acres)	Impervious Area Managed (acres)	Impervious %
Credit3	PB0015	Church of Jesus Christ of Latterday Saints	Swift St and Dorset St, South Burlington	New	DS	South Burlington	2-0179; 6318-9030	3.12	1.58	51%
Credit3	PB0023	Easy Self Storage	Swift St and Shelburne Rd, South Burlington	New	DP	South Burlington	2-0167	1.87	1.21	65%
Credit3	PB0030	Gonzo's Underground	Williston Rd east of Kennedy Dr, South Burlington	New	UD	South Burlington, VTrans	2-0811	13.62	8.72	64%
Credit3	PB0035	Hinesburg Road	Hinesburg Rd and Deane St, South Burlington	New	DP	South Burlington, VTrans	No Permit	3.53	1.27	36%
Credit3	PB0041	Kennedy Dr Pond 2 Expansion	Kennedy Dr and W Twin Oaks Terr, South Burlington	Existing	DP	South Burlington	1-1582b; 2-1069	3.89	2.36	61%
Credit3	PB0050	Lindenwood Drive Detention Pond	Lindenwood Dr off of Shelburne Rd, South Burlington	New	DP	South Burlington	No Permit	10.57	2.19	21%
Credit3	PB0067	Shaws West	Shelburne Rd north of 189, South Burlington	New	UD	South Burlington	No Permit	1.85	1.71	93%
Credit3	PB0083	UVM Bio Research Complex	Spear St north of I-89, South Burlington	New	DP	UVM	5269-9003.R	1.85	0.92	50%
Credit3	PB0088	VT Gas Detention Pond	Swift St and Farrell St, South Burlington	New	DP	South Burlington	2-0228; 6293-9030	7.57	3.09	41%
Credit3	PB0089	Wellesley Grove	Georgetown off of Kennedy Dr, South Burlington	New	DP	South Burlington	2-1023	8.85	2.15	24%
Credit3	PB0090	Windridge Court	Windridge Ct and Kennedy Dr, South Burlington	New	IB	South Burlington	2-0824	1.04	0.58	55%
Credit4	PB0007	Adelphia Cable Pond Retrofit	Kimball Ave and Adelphia Dr, South Burlington	Existing	DP	South Burlington	1-1000; 6291-9030	4.15	2.66	64%
Credit4	PB0020	Dynapower	Hinesburg Rd and Meadowland Dr, South Burlington	Existing	DP	South Burlington	1-0618	12.20	6.50	53%
Credit4	PB0025	Exit 13 Gravel Wetland	I-89 Exit 13, South Burlington	New	GW	VTrans	No Permit	16.72	5.57	33%
Credit4	PB0026	Exit 14 Gravel Wetland	I-89 Exit 14, South Burlington	New	GW	VTrans	No Permit	4.91	1.93	39%
Credit4	PB0036	I-89 Swale	Between I-89 N and S lanes west of Hinesburg Rd, South Burlington	New	MF	VTrans	No Permit	6.28	1.91	30%
Credit4	PB0046	Knoll Circle	Knoll Cir north of Dubois Dr, South Burlington	New	DP	South Burlington	2-0220	12.16	2.16	18%
Credit4	PB0047	Lane Press Roof	Meadowland Dr, South Burlington	New	IB	South Burlington	1-1337	5.57	4.17	75%
Credit4	PB0048	Laurel Hill Drive	Laurel Hill Dr off of Shelburne Rd, South Burlington	New	IB	South Burlington	No Permit	6.50	1.84	28%
Credit4	PB0057	Nicklaus Circle	Nicklaus Cir off of Dorset St, South Burlington	New	DP	South Burlington	1-1241, 4049-9030	9.25	2.23	24%
Credit4	PB0062	Panurgy Infiltration Basin	Kimball Ave and Shunpike Rd, South Burlington	Existing	IB	South Burlington	3409-9010	1.33	0.8	60%
Credit4	PB0063	Park Road Detention Pond	Park Rd off of Dorset St, South Burlington	New	DP	South Burlington	1-1241	6.96	1.27	18%

Potash Brook FRP
Table B-1: Proposed BMPs for BMPDSS Model Credit Runs

Model Run	Proposed BMP ID #	Project Name	BMP Address	New or Existing	BMP Type	MS4s with Impervious Area	Expired Permit #	BMP Drainage Area (acres)	Impervious Area Managed (acres)	Impervious %
Credit4	PB0069	South Burlington High School North	Dorset St north of Kennedy Dr, South Burlington	New	IG	South Burlington	6174-INDS.A	5.77	4.26	74%
Credit4	PB0073	Stonehedge Circle	Stonehedge Dr off of Spear St, South Burlington	New	DP	South Burlington	2-0100	2.48	1.26	51%
Credit4	PB0077	Temple Detention Pond	Swift St and Dorset St, South Burlington	New	DP	South Burlington	No Permit	1.81	0.92	51%
Credit4	PB0092	Woodlands Industrial Park	Kimball Ave west of Community Dr, South Burlington	Existing	DP	South Burlington	1-0526/ 6279-9030	4.40	3.89	88%
Credit4	PB0093	Worcester Street	Adirondack St and Butler Dr, South Burlington	New	UD	South Burlington	2-0312	10.84	3.82	35%
CMAC Valve	PB0096	Dorset Park Pond	Dorset St and Swift St, South Burlington	Existing	DP	South Burlington	1-1033	26.07	5.95	23%
CMAC Valve	PB0112	Lowes Pond	Hannaford Dr, South Burlington	Existing	DP	South Burlington	1-1214	12.73	10.05	79%
CMAC Valve	PB0099	Hannaford's Pond	Hannaford Dr, South Burlington	Existing	DP	South Burlington	1-1214	14.71	7.75	53%
CMAC Valve	PB0086	Vermont National Country Club Pond B	Golf Course Rd, South Burlington	Existing	DP	South Burlington	1-1241b	35.72	8.63	24%
CMAC Valve	PB0101	Technology Park Pond 1	Community Dr, South Burlington	Existing	DP	South Burlington	1-1254	8.96	3.78	42%
CMAC Valve	PB0103	Lot A Mountain View Pond	Tilley Dr, South Burlington	Existing	DP	South Burlington	1-1536	6.05	2.55	42%
CMAC Valve	PB0104	Kennedy Dr Pond 1	Kennedy Dr, South Burlington	Existing	DP	South Burlington	1-1582a	1.47	1.33	91%
CMAC Valve	PB0105	Quarry Hill Pond	Quarry Hill Rd off of Spear St, South Burlington	Existing	DP	South Burlington	3602-INDS	21.75	6.19	28%
CMAC Valve	PB0106	Heatherfield P1	Off of Spear St, South Burlington	Existing	DP	South Burlington	3658a	1.40	0.90	64%
CMAC Valve	PB0107	Heatherfield P2	Off of Spear St, South Burlington	Existing	DP	South Burlington	3658b	10.76	7.08	66%
CMAC Valve	PB0108	Heatherfield P3	Off of Spear St, South Burlington	Existing	DP	South Burlington	3658c	4.30	2.71	63%
CMAC Valve	PB0109	Winding Brook	Winding Brook Dr, South Burlington	Existing	DP	South Burlington	3691-INDS	9.11	3.32	36%
CMAC Valve	PB0110	Mountainview Pond b	Tilley Dr, South Burlington	Existing	DP	South Burlington	3805-INDS	0.90	0.61	68%
CMAC Valve	PB0111	Farrell St Pond	Farrell St, South Burlington	Existing	DP	South Burlington	5080-INDO	32.96	11.03	33%

1. BMP Type Abbreviations: GW: Gravel Wetland, GS: Grass Swale, RS: Retention Swale, ST: Settling Tank, OF: Control orifice, IB: Infiltration Basin, IT: Infiltration Trench, DP: Detention Pond, UD: Underground Detention, RP: Retention Pond, DS: Detention Swale, DW: Dry Well, IG: Infiltration Gallery, SF: Sand Filter, BR: Bioretention, MF: Median Filter.

APPENDIX C

POTASH BROOK FRP
PROPOSED BMPs

Potash Brook FRP
Table C-1: Final Proposed BMPs for the Potash Brook FRP

Proposed BMP ID #	Project Name	BMP Address	BMP Landowner	MS4s with Impervious Area	New or Existing	BMP Type	BMP Description	Expired Permit #	Drainage Area (acres)	Impervious Area Managed (acres)	Impervious %	CPv Managed (ac-ft)	Volume Infiltrated (ac-ft)	WQ Volume controlled (%)
PB0001	1050 Hinesburg Rd	1050 Hinesburg Rd, South Burlington	Private	South Burlington, VTrans	New	DP	There is an existing wet depression here where stormwater is already routed. Propose to retrofit pond to meet CPv standards.	No Permit	1.43	0.74	52%	0.111	0	100%
PB0002	110 Kimball Ave - North Infiltration Basin	110 Kimball Ave, South Burlington	Private	South Burlington	Existing	IB	Runoff is bypassing infiltration basin and sheet flowing to a swale with direct discharge to the brook. Add trench along west edge of parking lot to direct runoff to infiltration basin. Expand basin to accommodate increased volume.	1-1504a	1.51	0.58	38%	0.024	0.04	100%
PB0003	110 Kimball Ave - South Infiltration Basin	110 Kimball Ave, South Burlington	Private	South Burlington	Existing	IB	Retrofit outlet structure and add proposed outlet control riser that was not constructed.	1-1504b	1.42	0.94	66%	0.053	0.06	100%
PB0004	189 Cloverleaf Detention Pond	Shelburne Rd and Queen City Pkwy, South Burlington	MS4 Owned	South Burlington, VTrans, Burlington	New	DP	Add outlet structure to area that is already depressed to detain stormwater. Reroute stormline from Shelburne Rd to this area.	No Permit	21.25	12.14	57%	1.129	0	100%
PB0005	189 Ramp Detention Pond	Dorset St and 189 Ramps, South Burlington	MS4 Owned	South Burlington, VTrans	New	DP	Detain stormwater from 189 Ramps and Dorset St. Intercept stormline near Kennedy Dr and reroute to the area between 189 ramps.	2-0619	9.36	5.78	62%	0.348	0	100%
PB0006	30 Kimball Ave Swale Retrofit	30 Kimball Ave, South Burlington	Private	South Burlington	Existing	DS	Retrofit existing swale detention to meet CPv. Expand swale to accommodate modified outlet structure.	1-1526; 6269-9030	1.27	1.05	82%	0.025	0	100%
PB0007	Adelphia Cable Pond Retrofit	Kimball Ave and Adelphia Dr, South Burlington	Private	South Burlington	Existing	DP	Reroute drainage from Kimball Ave to this detention pond behind Adelphia Cable. Retrofit and expand existing pond to detain CPv.	1-1000; 6291-9030	4.15	2.66	64%	0.086	0	100%
PB0008	Adirondack Street	Adirondack St and Butler Dr, South Burlington	Private	South Burlington	New	UD	Construct underground detention chambers under ROW and grassed shoulder.	2-0312	11.95	3.52	29%	0.580	0	100%
PB0009	Airport Dr	Airport Dr and Airport Rd, South Burlington	MS4 Owned	South Burlington, BTV	New	IG	Construct subsurface infiltration chambers in southernmost lot where houses will be removed. Intercept stormline running south down Airport Dr.	No Permit	9.65	2.70	28%	0.455	0.46	100%
PB0010	Ashbrook Drive	Ashbrook Dr and Dorset St, South Burlington	Private	South Burlington	New	DP	Reroute stormwater and detain southwest of Dorset St behind apartment buildings.	2-0101	2.49	0.88	35%	0.178	0	100%
PB0011	Blue Mall Infiltration	Dorset St south of Market St, South Burlington	Private	South Burlington	New	IG	Construct underground infiltration chambers in the southwest edge of parking lot. Overflow to existing stormline that flows to Dorset St.	2-0144	2.49	2.40	97%	0.367	0.37	100%
PB0012	Vermont National Country Club Pond B	Golf Course Rd and Park Rd, South Burlington	Private	South Burlington	Existing	DP	Retrofit existing detention pond. Add forebay and expand pond.	1-1241b	41.24	24.49	59%	1.998	0	100%
PB0013	Burlington Price Chopper	Shelburne Rd, Burlington	Private	Burlington	New	GW	Construct new gravel wetland in area between parking lot and stream to the south of parking lot.	No Permit	12.69	11.48	90%	1.229	0	100%
PB0014	South Burlington High School Infiltration	Dorset St north of Kennedy Dr, South Burlington	MS4 Owned	South Burlington	New	IB	Construct new infiltration basin to the southeast of sports field in currently wooded area.	No Permit	3.28	1.82	56%	0.292	0.29	100%
PB0015	Church of Jesus Christ of Latterday Saints	Swift St and Dorset St, South Burlington	Private	South Burlington	New	DS	Add detention to swale to the west of parking area with outlet control to detain CPv.	2-0179; 6318-9030	3.12	1.58	51%	0.099	0	100%
PB0016	Community Bible Church Infiltration	Williston Rd and Millham Ct, South Burlington	Private	South Burlington	New	IT	Construct linear infiltration trench (perforated pipe) along back of several businesses.	No Permit	10.34	6.17	60%	0.912	0.91	100%
PB0017	Domino's	Swift St and Farrell St, South Burlington	Private	South Burlington	New	DP	Construct a new detention pond behind parking area. Add catchbasin along Swift St to also capture half of the road drainage.	No Permit	2.30	1.34	58%	0.231	0	100%
PB0018	The Pines	Aspen Dr off of Dorset St, South Burlington	Private	South Burlington	Existing	DP	Retrofit existing pond to meet CPv standards. Add forebay and outlet structure with low flow orifice; expand pond.	1-1117	17.54	5.01	29%	0.602	0	100%
PB0019	Dumont Park Stormwater Project	Barrett St and Obrien Dr, South Burlington	Private	South Burlington, VTrans	New	DP	Construct new detention pond to the north of Barrett St where two stormlines converge.	No Permit	9.56	4.16	43%	0.269	0	100%
PB0020	Dynapower	Hinesburg Rd and Meadowland Dr, South Burlington	Private	South Burlington	Existing	DP	Reroute roof drainage to existing detention pond. Formalize pond and retrofit to detain CPv.	1-0618	12.20	6.50	53%	0.952	0	100%
PB0021	East Terrace Detention Pond	East Terrace, South Burlington	Private	South Burlington	New	DP	Construct new linear detention basin near the outfall to the east side of East Terrace.	No Permit	6.36	2.28	36%	0.344	0	100%

Potash Brook FRP
Table C-1: Final Proposed BMPs for the Potash Brook FRP

Proposed BMP ID #	Project Name	BMP Address	BMP Landowner	MS4s with Impervious Area	New or Existing	BMP Type	BMP Description	Expired Permit #	Drainage Area (acres)	Impervious Area Managed (acres)	Impervious %	CPv Managed (ac-ft)	Volume Infiltrated (ac-ft)	WQ Volume controlled (%)
PB0022	Eastwood Commons Pond Expansion	Farrell St, South Burlington	Private	South Burlington	Existing	DP	Reroute area to the west of existing pond (eastern side of Shaw's plaza) to this pond. Add a new connection between these stormwater systems to the east of the Shaw's property. Expand pond and modify outlet structure to accommodate additional drainage.	1-1438	28.39	20.78	73%	0.728	0	100%
PB0023	Easy Self Storage	Swift St and Shelburne Rd, South Burlington	Private	South Burlington	New	DP	Create new detention basin to the north of the storage area.	2-0167	1.87	1.21	65%	0.203	0	100%
PB0024	Economou Farm Pond	Economou Farm Rd, South Burlington	Private	South Burlington	Existing	DP	Retrofit existing dry pond to detain CPv. Expand pond and retrofit outlet structure. Add forebay.	1-1241d	6.37	1.46	23%	0.669	0	100%
PB0025	Exit 13 Gravel Wetland	I-89 Exit 13, South Burlington	MS4 Owned	VTrans	New	GW	Install new gravel wetland in depressed triangle greenspace between ramps. Reroute several culverts to this area.	No Permit	16.72	5.57	33%	0.567	0	100%
PB0026	Exit 14 Gravel Wetland	I-89 Exit 14, South Burlington	MS4 Owned	VTrans	New	GW	Propose new gravel wetland in depressed triangle greenspace between ramps. Reroute several culverts to this area.	No Permit	4.91	1.93	39%	0.294	0	100%
PB0027	Fairpoint Communications	Hinesburg Rd south of I-89, South Burlington	Private	South Burlington	New	DP	Construct new detention pond to the east of property in grassed area. Two outfalls on site drain to wetland swales that need to be rerouted to the east.	2-0212	8.75	4.76	54%	0.591	0	100%
PB0028	Faith United Methodist Church	Dorset St south of Songbird Ln, South Burlington	Private	South Burlington	New	DP	Construct new underground detention behind church (northwest) in grassy area. Current outfall is eroded.	No Permit	1.68	1.03	61%	0.149	0	100%
PB0029	Golf Course Rd South	Golf Course Rd and Old Cross Rd, South Burlington	Private	South Burlington	New	DP	Construct new detention basin at the end of pipe before it enters the golf course. Existing infrastructure already drains to swale.	1-1241	5.19	1.67	32%	0.232	0	100%
PB0030	Gonzo's Underground	Williston Rd east of Kennedy Dr, South Burlington	Private	South Burlington, VTrans	New	UD	Propose to intercept stormline that flows west along Williston Rd to underground detention chambers under grassed area in front of Budget Car Rental / Gonzo's plaza.	2-0811	13.62	8.72	64%	0.451	0	100%
PB0031	Grandview Drive North Detention Pond	Grandview Dr and W Twin Oaks Terr, South Burlington	Private	South Burlington	New	DP	Construct new surface detention BMP following outfall, which is currently broken and experiencing significant erosion.	2-0238; 2-0737	3.02	1.38	46%	0.142	0	100%
PB0032	Grandview Drive West Detention Pond	Grandview Dr and Dorset St, South Burlington	Private	South Burlington	New	DP	Construct new surface detention basin to the west of Dorset St. Reroute stormline away from brook to new BMP.	2-0238; 2-0737	3.14	1.89	60%	0.179	0	100%
PB0033	Hawthorne Circle Detention Pond	Hawthorne Cir and Kennedy Dr, South Burlington	Private	South Burlington	New	DP	Construct new detention basin in greenspace formed in the triangle between three garages.	No Permit	4.95	2.55	51%	0.150	0	100%
PB0034	Helen Ave Cul De Sac	Helen Ave, South Burlington	Private	South Burlington	New	IB	Construct new infiltration basin in the cul de sac at the end of Helen Ave, which would provide significant water quality benefit.	No Permit	5.70	2.15	38%	0.354	0.35	100%
PB0035	Hinesburg Rd	Hinesburg Rd and Deane St, South Burlington	Private	South Burlington, VTrans	New	DP	Reroute stormwater to existing catchbasin on Deane St and detain to the west of Hinesburg Rd to the south of existing houses.	No Permit	3.53	1.27	36%	0.138	0	100%
PB0036	I-89 Swale	Between I-89 N and S lanes west of Hinesburg Rd, South Burlington	MS4 Owned	VTrans	New	MF	Construct median filter in depressed area between north and south I-89 lanes. Reroute several culverts.	No Permit	6.28	1.91	30%	0.531	0	100%
PB0037	Iby Gravel Wetland	Iby St off of Hinesburg Rd, South Burlington	Private	South Burlington	New	GW	Construct new gravel wetland at the end of Iby St to capture stormwater for the street.	No Permit	2.82	1.14	40%	0.067	0	100%
PB0038	INS Building Pond A Retrofit	Kimball Ave west of Community Dr, South Burlington	Private	South Burlington	Existing	RP	Retrofit existing detention pond. Add forebay and construct outlet structure with low flow orifice to meet CPv standards.	1-0969	2.11	0.98	47%	0.040	0	100%
PB0039	INS Building Pond B Retrofit	Kimball Ave west of Community Dr, South Burlington	Private	South Burlington	Existing	DP	Retrofit existing detention pond. Add forebay and construct outlet structure with low flow orifice to meet CPv standards.	1-0969b	1.44	0.61	42%	0.040	0	100%
PB0040	Joy Dr Detention Pond	Joy Dr, South Burlington	Private	South Burlington	New	DP	Construct new detention practice in adjacent flat area near the Green Mountain Power transmission corridor.	No Permit	3.07	1.34	44%	0.210	0	100%
PB0041	Kennedy Dr Pond 2 Expansion	Kennedy Dr and W Twin Oaks Terr, South Burlington	MS4 Owned	South Burlington	Existing	DP	Retrofit existing detention pond to accommodate additional drainage from The Edge and 1 Twin Oaks.	1-1582b; 2-1069	3.89	2.36	61%	0.159	0	100%

Potash Brook FRP

Table C-1: Final Proposed BMPs for the Potash Brook FRP

Proposed BMP ID #	Project Name	BMP Address	BMP Landowner	MS4s with Impervious Area	New or Existing	BMP Type	BMP Description	Expired Permit #	Drainage Area (acres)	Impervious Area Managed (acres)	Impervious %	CPv Managed (ac-ft)	Volume Infiltrated (ac-ft)	WQ Volume controlled (%)
PB0042	Kennedy Dr Pond 3 Expansion	Kennedy Dr west of Timber Ln, South Burlington	MS4 Owned	South Burlington	Existing	DP	Drainage for offices to the east of Timber Ln currently discharges to a swale along Kennedy Dr heading west (direction of the existing pond). Reroute culvert that crosses under access ramp to pond. Expand pond and retrofit to detain CPv.	1-1582c	6.39	4.82	75%	0.175	0	100%
PB0043	Dorset Commons Pond	Dorset St and Town Square Dr, South Burlington	Private	South Burlington	New	DP	Construct new detention pond in wooded area behind Dorset Commons.	1-0242	10.07	4.78	47%	0.252	0	100%
PB0044	Kennedy Dr Pond 7 Expansion	Kennedy Dr north of Kimball Ave, South Burlington	MS4 Owned	South Burlington	Existing	DP	Reroute stormline that currently outfalls behind Key Bank to existing detention pond. Expand pond footprint to accommodate additional drainage area and detain CPv.	1-1582g; 1-0233	11.24	8.67	77%	0.583	0	100%
PB0045	Brookwood Drive Pond	Brookwood Dr off of Dorset St, South Burlington	Private	South Burlington	New	DP	Construct new detention pond to detain this large outfall. Forebay to be located in empty lot near Brookwood Dr.	2-0794; 2-0619	8.86	7.68	87%	0.863	0.10	100%
PB0046	Knoll Circle	Knoll Cir north of Dubois Dr, South Burlington	Private	South Burlington	New	DP	Construct new surface detention basin with swale inlet. Current stormline draining subdivision already enters swale, which also drains area to the west.	2-0220	12.16	2.16	18%	0.802	0	100%
PB0047	Lane Press Roof	Meadowland Dr, South Burlington	Private	South Burlington	New	IB	Capture roof drainage in a new infiltration basin. Roof drains already flows to grassed area where treatment is proposed.	1-1337	5.57	4.17	75%	0.691	0.69	100%
PB0048	Laurel Hill Dr	Laurel Hill Dr off of Shelburne Rd, South Burlington	Private	South Burlington	New	IB	Construct new infiltration basin to the north of houses before stormline pipe enters riparian buffer.	No Permit	6.50	1.84	28%	0.405	0.41	100%
PB0049	Lilac Ln Infiltration Basin	Lilac Ln off of Hinesburg Rd, South Burlington	Private	South Burlington	New	IB	Formalize infiltration basin in depressed area at the end of Lilac Ln.	No Permit	1.46	0.85	58%	0.131	0.13	100%
PB0050	Lindenwood Drive Detention Pond	Lindenwood Dr off of Shelburne Rd, South Burlington	Private	South Burlington	New	DP	Add catchbasins and infrastructure to reroute stormwater to the east of Lindenwood Dr. Part of Brewer Pkwy drains to this area as well. Propose to create one detention basin to detain drainage from both streets. Lindenwood Dr has existing puddling and icing issues. This BMP would also mitigate those issues.	No Permit	10.57	2.19	21%	0.205	0	100%
PB0051	Logwood Neighborhood Detention Pond	Williston Rd south of intersection with Airport Rd, South Burlington	Private	South Burlington	New	DP	Construct new end of pipe surface impoundment BMP behind Lean Dental Group. Outfall is currently eroded.	No Permit	44.81	18.44	41%	0.606	0	100%
PB0052	Marcotte Central School	Market St near Dorset St intersection, South Burlington	MS4 Owned	South Burlington	New	DP	Construct new detention basin in wooded area directly south of school parking lot. Route outfall to existing stormline. Potential educational benefit.	No Permit	2.11	1.83	87%	0.186	0	100%
PB0053	Marine Connection	Williston Rd and Shunpike Rd, South Burlington	Private	South Burlington	New	DS	Add detention to existing swale near the back of the large Marine Connection building. Expand swale to accommodate additional volume.	No Permit	10.79	4.73	44%	0.214	0	100%
PB0054	Kennedy Dr Pond 4 Expansion	Kennedy Dr and Hinesburg Rd, South Burlington	MS4 Owned	South Burlington, VTrans	Existing	DP	Reroute stormline from Chatham Green and swale along Hinesburg Rd to existing detention pond. Expand pond to accommodate additional drainage area and detain CPv.	1-1582d; 1-0237; 1-1023; 1-1290	13.46	5.13	38%	1.704	0	100%
PB0055	Merchant's Bank Detention Pond	Kimball Ave and Kennedy Dr, South Burlington	Private	South Burlington	New	DP	Route stormwater from Allstate Insurance west to Merchant's Bank and provide detention in grassed area.	2-1171; 6275-9030; 6269-9030; 2-0939	4.36	3.17	73%	0.228	0	100%
PB0056	Miller Research Complex	Spear St north of I-89, South Burlington	MS4 Owned	UVM	New	DP	Construct bioretention to treat stormwater in grassed area near the center of complex. Potential educational benefit.	5269-9003.R	79.01	5.03	6%	2.364	0	100%
PB0057	Nicklaus Circle	Nicklaus Cir off of Dorset St, South Burlington	Private	South Burlington	New	DP	Construct new linear detention feature to the north of Nicklaus Cir where the stormline and swale converge.	1-1241, 4049-9030	9.25	2.23	24%	0.537	0	100%
PB0058	North Country Credit North West Infiltration	Swift St west of Shelburne Rd, South Burlington	Private	South Burlington	New	IT	Install perforated pipe to the north of parking lot in grassed area to infiltrate stormwater.	No Permit	0.25	0.21	84%	0.026	0.03	100%
PB0059	North Country Credit South Infiltration	Swift St west of Shelburne Rd, South Burlington	Private	South Burlington	New	IG	Construct underground infiltration chambers in the southeast corner of parking lot. Overflow to existing stormline.	No Permit	0.76	0.62	81%	0.119	0.12	100%
PB0060	O'Brien Drive Underground Detention	Obrien Dr, South Burlington	Private	South Burlington	New	UD	Construct underground storage chambers in open lot between existing houses.	No Permit	8.47	2.87	34%	0.536	0.54	100%

Potash Brook FRP
Table C-1: Final Proposed BMPs for the Potash Brook FRP

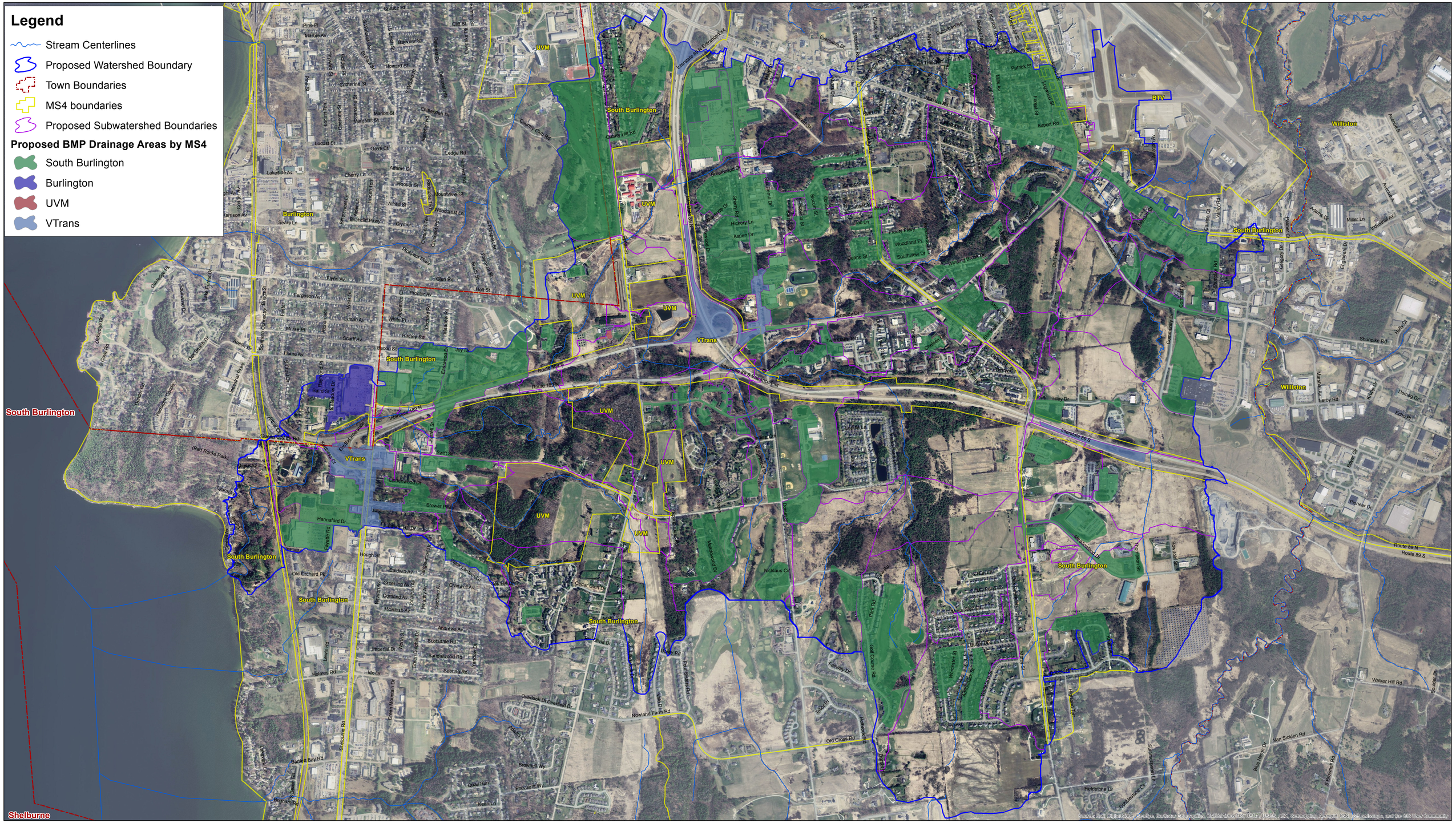
Proposed BMP ID #	Project Name	BMP Address	BMP Landowner	MS4s with Impervious Area	New or Existing	BMP Type	BMP Description	Expired Permit #	Drainage Area (acres)	Impervious Area Managed (acres)	Impervious %	CPv Managed (ac-ft)	Volume Infiltrated (ac-ft)	WQ Volume controlled (%)
PB0061	Olympiad Apartments & Office Building Pond Retrofit	Farrell St south of Eastwood Dr, South Burlington	Private	South Burlington	Existing	DP	Retrofit existing detention pond. Add forebay, clean out vegetation, and ensure pond detains CPv.	1-1452	9.65	3.68	38%	0.055	0	100%
PB0062	Panurgy Infiltration Basin	Kimball Ave and Shunpike Rd, South Burlington	Private	South Burlington	Existing	IB	Retrofit and expand existing infiltration basin to infiltrate the CPv.	3409-9010	1.33	0.8	60%	0.081	0.14	100%
PB0063	Park Road Detention Pond	Park Rd off of Dorset St, South Burlington	Private	South Burlington	New	DP	Propose to reroute swale on southern side of Park Rd to the north and detain in wooded area.	1-1241	6.96	1.27	18%	0.421	0	100%
PB0064	Pillsbury Manor Infiltration Basin Retrofit	Pillsbury Manor N and Williston Rd, South Burlington	Private	South Burlington	Existing	IB	Retrofit existing pond to infiltration basin. Overflow to existing culvert.	1-1015	1.06	0.40	38%	0.068	0.07	100%
PB0065	Quarry Hill South	Quarry Hill Rd off of Spear St, South Burlington	Private	South Burlington	New	DS	Add detention to existing swale running northeast behind garages.	6322-9030	5.62	2.52	45%	0.478	0	100%
PB0066	Queen City Park Road Detention Pond	Queen City Park Rd off of Shelburne Rd, South Burlington	MS4 Owned	South Burlington, VTrans	New	DP	Add detention to existing depressed area where stormlines already outfall. Drainage from Shelburne Rd is assumed to be already rerouted to larger depression to the north (see project entitled 189 Cloverleaf Detention Pond).	No Permit	6.51	2.98	46%	0.452	0	100%
PB0067	Shaws West	Shelburne Rd north of 189, South Burlington	Private	South Burlington	New	UD	Construct underground detention in vegetated island along west side of parking lot. Reroute last catchbasin in southwest corner of parking to this area.	No Permit	1.85	1.71	93%	0.157	0	100%
PB0068	Meadowland Business Park Pond 2	Meadowland Dr, South Burlington	Private	South Burlington, VTrans	Existing	DP	Retrofit existing detention pond. Add forebay and construct outlet structure with low flow orifice to meet CPv standards.	1-1269_4290-9020.3 Lot 10	3.57	3.10	87%	0.443	0.443	100%
PB0069	South Burlington High School North	Dorset St north of Kennedy Dr, South Burlington	MS4 Owned	South Burlington	New	IG	Construct dry wells to infiltrate stormwater from the high school parking lot and middle school roof. Potential educational benefit.	6174-INDS.A	5.77	4.26	74%	0.689	0.69	100%
PB0070	South Meadows Pond	Farrell St, South Burlington	Private	Burlington	Existing	DP	Retrofit existing detention pond to meet CPv standards. Add forebay and expand pond. Upgrade outlet structure.	1-0661	10.10	4.73	47%	0.370	0	100%
PB0071	Southview Drive	Southview Dr off of Prouty Pkwy, South Burlington	Private	South Burlington	New	UD	Construct underground detention chambers in ROW and grassed area. Road is 30ft wide and could be narrowed for storage.	No Permit	12.26	4.81	39%	0.711	0.04	100%
PB0072	Staples Plaza Underground Detention B	Williston Rd west of I-89, South Burlington	Private	South Burlington, VTrans	New	UD	Construct underground detention chambers in southeast corner of parking lot.	No Permit	1.70	1.64	97%	0.198	0.03	100%
PB0073	Stonehedge Circle	Stonehedge Dr off of Spear St, South Burlington	Private	South Burlington	New	DP	Construct bioretention along road in grassed area with discharge to existing catchbasin.	2-0100	2.48	1.26	51%	0.203	0	100%
PB0074	Sugartree Lane	Sugartree Ln off of Kennedy Dr, South Burlington	Private	South Burlington	New	DP	Expand existing depressed area at the end of Sugartree Ln , which appears to be an abandoned detention area. Reroute catchbasins to pond. Upgrade pond outlet.	2-0878	1.54	1.05	69%	0.115	0	100%
PB0075	Swift Estates Pond	Meadowood Dr and Swift St, South Burlington	Private	South Burlington	Existing	DP	Retrofit existing detention pond to meet CPv standards. Add forebay and upgrade outlet structure.	No Permit	18.52	3.57	19%	0.326	0	100%
PB0076	Technology Park Pond Retrofit	Community Dr off of Kimball Ave, South Burlington	Private	South Burlington	Existing	DP	Retrofit existing detention pond to meet CPv standards. Upgrade outlet structure and expand pond to accommodate additional storage.	1-1458 P4	8.05	0.03	0%	0.271	0	100%
PB0077	Temple Detention Pond	Swift St and Dorset St, South Burlington	Private	South Burlington	New	DP	Propose new detention pond in depressed area in front of Temple by intersection of Dorset St and Swift St. Stormwater already collects in this area.	No Permit	1.81	0.92	51%	0.192	0	100%
PB0078	K-Mart Plaza Infiltration	Shelburne Rd north of Hannaford Dr, South Burlington	Private	South Burlington	New	IG	Construct new underground infiltration chambers in K-Mart parking lot.	No Permit	12.67	5.85	46%	0.215	0	100%
PB0079	UMall Detention Pond	Dorset St (University Mall), South Burlington	Private	South Burlington	Existing	DP	Retrofit existing detention pond to detain CPv. Upgrade outlet structure and expand pond.	1-0503c; 6282-9030	16.90	14.96	89%	0.909	0	100%
PB0080	UMall Infiltration 1	Dorset St (University Mall), South Burlington	Private	South Burlington	Existing	IG	Retrofit existing infiltration gallery to infiltrate the CPv.	1-0503b; 6282-9030	17.15	15.30	89%	0.032	0.18	100%
PB0081	UMall Infiltration 2	Dorset St (University Mall), South Burlington	Private	South Burlington	Existing	IG	Retrofit existing infiltration gallery to infiltrate the CPv.	1-0503a; 6282-9030	5.61	5.55	99%	0.311	2.17	100%

Potash Brook FRP
Table C-1: Final Proposed BMPs for the Potash Brook FRP

Proposed BMP ID #	Project Name	BMP Address	BMP Landowner	MS4s with Impervious Area	New or Existing	BMP Type	BMP Description	Expired Permit #	Drainage Area (acres)	Impervious Area Managed (acres)	Impervious %	CPv Managed (ac-ft)	Volume Infiltrated (ac-ft)	WQ Volume controlled (%)
PB0082	Chelsea Circle	Chelsea Cir and Hayes Ave, South Burlington	Private	South Burlington	New	IB	Construct new infiltration basin constructed to south of existing swale, which receives flow from Chelsea Cir condos and Timberlane Dental parking lot. Neighborhood icing and flooding issues can be mitigated with this project.	2-0767	11.62	9.29	80%	0.612	0	100%
PB0083	UVM Forestry Research Center - West Roof	Spear St north of I-89, South Burlington	MS4 Owned	UVM	New	IG	Construct dry well to capture and infiltrate roof drain. Potential educational benefit.	No Permit	1.85	0.92	50%	0.199	0	100%
PB0084	UVM Forestry Research Center - East Roof	Spear St north of I-89, South Burlington	MS4 Owned	UVM	New	IG	Construct dry well to capture and infiltrate roof drain. Potential educational benefit.	No Permit	0.42	0.41	98%	0.055	0.01	100%
PB0085	Miller Research Farm	Spear St north of I-89, South Burlington	MS4 Owned	South Burlington, Burlington, VTrans	New	DP	Reroute culvert east across Spear St and detain water to the south of the UVM farm.	No Permit	0.12	0.12	100%	0.016	0.01	100%
PB0086	UMall Sears Auto Pond	Dorset St (University Mall), South Burlington	Private	South Burlington	Existing	GW	Construct large gravel wetland in unused section of parking lot in Umall (to the east of the party store). Reroute Dorset St stormline here.	1-0503d; 6282-9030; 2-0619	35.72	8.63	24%	0.427	0	100%
PB0087	Vermont National Country Club Pond C	Golf Course Rd and Park Rd, South Burlington	Private	South Burlington	Existing	DP	Retrofit existing detention pond. Add forebay and expand pond.	1-1241c	9.94	0.47	5%	0.848	0	100%
PB0088	VT Gas Detention Pond	Swift St and Farrell St, South Burlington	Private	South Burlington	New	DP	Reroute stormline from Swift St to grassed area to the north of VT Gas property and construct new detention pond.	2-0228; 6293-9030	7.57	3.09	41%	0.172	0	100%
PB0089	Wellesley Grove	Georgetown off of Kennedy Dr, South Burlington	Private	South Burlington	New	DP	Add outlet control to existing depression to detain stormwater. Outfall is currently eroded.	2-1023	8.85	2.15	24%	0.269	0	100%
PB0090	Windridge Court	Windridge Ct and Kennedy Dr, South Burlington	Private	South Burlington	New	IB	Construct new infiltration basin to infiltrate stormwater to the west of this small development.	2-0824	1.04	0.58	55%	0.099	0.10	100%
PB0091	Woodcrest Drive	Woodcrest Dr and Deane St, South Burlington	MS4 Owned	South Burlington, VTrans	New	IB	Infiltrate stormwater to the southwest of drainage area. Reroute stormline south to new BMP. Construct new swale to drain the end of Woodcrest Dr, which is currently eroding slope following road.	No Permit	7.46	2.38	32%	0.496	0.50	100%
PB0092	Woodlands Industrial Park	Kimball Ave west of Community Dr, South Burlington	Private	South Burlington	Existing	DP	Reroute roof drainage to existing detention pond. Retrofit pond to accommodate additional volume and detain CPv.	1-0526/ 6279-9030	4.40	3.89	88%	0.371	0	100%
PB0093	Worcester Street	Adirondack St and Butler Dr, South Burlington	Private	South Burlington	New	UD	Construct underground detention chambers under ROW and grassed shoulder.	2-0312	10.84	3.82	35%	0.560	0	100%
PB0094	Dorset Park Pond	Dorset St and Swift St, South Burlington	MS4 Owned	South Burlington	Existing	DP	Retrofit pond with CMAC valve.	1-1033	26.07	5.95	23%	0.30	0	100%
PB0095	Hannaford's Pond	Hannaford Dr, South Burlington	Private	South Burlington	Existing	DP	Retrofit pond with CMAC valve.	1-1214	14.71	7.75	53%	0.34	0	100%
PB0096	Lowes Pond	Hannaford Dr, South Burlington	Private	South Burlington	Existing	DP	Retrofit pond with CMAC valve.	1-1214	12.73	10.05	79%	0.196	0	100%
PB0097	Vermont National Country Club Pond B	Golf Course Rd, South Burlington	Private	South Burlington	Existing	DP	Retrofit pond with CMAC valve.	1-1241b	35.72	8.63	24%	0.92	0	100%
PB0098	Technology Park Pond 1	Community Dr, South Burlington	Private	South Burlington	Existing	DP	Retrofit pond with CMAC valve.	1-1254	8.96	3.78	42%	0.37	0	100%
PB0099	Lot A Mountain View Pond	Tilley Dr, South Burlington	Private	South Burlington	Existing	DP	Retrofit pond with CMAC valve.	1-1536	6.05	2.55	42%	0.02	0	100%
PB0100	Kennedy Dr Pond 1	Kennedy Dr, South Burlington	MS4 Owned	South Burlington	Existing	DP	Retrofit pond with CMAC valve.	1-1582a	1.47	1.33	91%	0.05	0	100%
PB0101	Quarry Hill Pond	Quarry Hill Rd off of Spear St, South Burlington	Private	South Burlington	Existing	DP	Retrofit pond with CMAC valve.	3602-INDS	21.75	6.19	28%	0.00	0	100%
PB0102	Heatherfield P1	Off of Spear St, South Burlington	Private	South Burlington	Existing	DP	Retrofit pond with CMAC valve.	3658a	1.40	0.90	64%	0.00	0	100%
PB0103	Heatherfield P2	Off of Spear St, South Burlington	Private	South Burlington	Existing	DP	Retrofit pond with CMAC valve.	3658b	10.76	7.08	66%	0.03	0	100%
PB0104	Heatherfield P3	Off of Spear St, South Burlington	Private	South Burlington	Existing	DP	Retrofit pond with CMAC valve.	3658c	4.30	2.71	63%	0.05	0	100%
PB0105	Winding Brook	Winding Brook Dr, South Burlington	Private	South Burlington	Existing	DP	Retrofit pond with CMAC valve.	3691-INDS	9.11	3.32	36%	0.11	0	100%
PB0106	Mountainview Pond b	Tilley Dr, South Burlington	Private	South Burlington	Existing	DP	Retrofit pond with CMAC valve.	3805-INDS	0.90	0.61	68%	0.08	0	100%
PB0107	Farrell St Pond	Farrell St, South Burlington	MS4 Owned	South Burlington	Existing	DP	Retrofit pond with CMAC valve.	5080-INDO	32.96	11.03	33%	0.05	0	100%

Notes:

1. **BMP Type Abbreviations**: GW: Gravel Wetland, GS: Grass Swale, RS: Retention Swale, ST: Settling Tank, OF: Control orifice, IB: Infiltration Basin, IT: Infiltration Trench, DP: Detention Pond, UD: Underground Detention, RP: Retention Pond, DS: Detention Swale, DW: Dry Well, IG: Infiltration Gallery, SF: Sand Filter, BR: Bioretention, MF: Median Filter.



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0 1,750 3,500 ft

Map C-1 – Proposed Stormwater BMPs

Potash Brook Watershed
South Burlington, VT

Hoyle, Tanner & Associates, Inc.

WATERSHED CONSULTING ASSOCIATES, LLC

Map Produced: 07-13-2016

Potash Brook FRP BMP Summary Sheet

Site name:	1050 Hinesburg Road	**South Burlington ID:**	PB0001		
Approximate address:	1050 Hinesburg Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

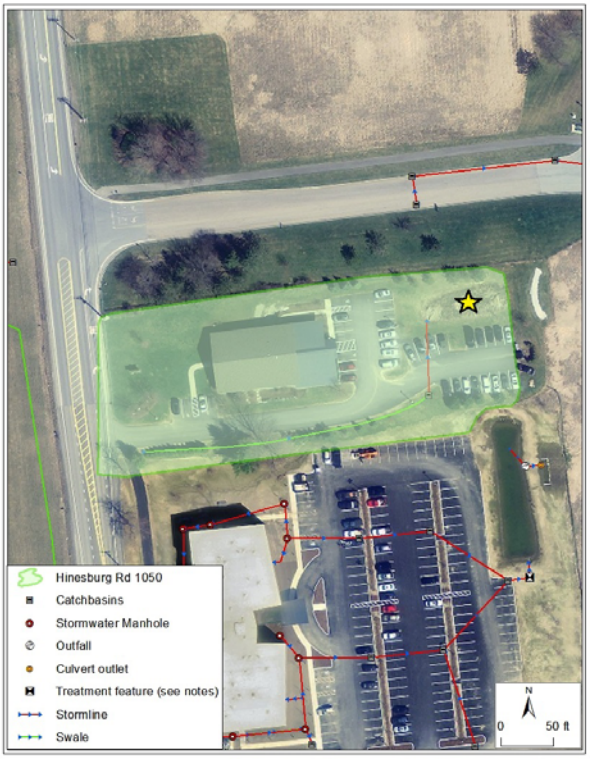
Proposed BMP description:

There is an existing wet depression here where stormwater is already routed. Propose to retrofit pond to meet CPv standards.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$27,000
Drainage area (acres)	1.43
Impervious area managed (acres)	0.74
% Impervious	52%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.07
BMP Depth (feet)	6.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington, VTrans
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.11
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	110 Kimball Ave - North Infiltration Basin	**South Burlington ID:**	PB0002

Approximate address:	110 Kimball Ave, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing

Proposed BMP type:	Retrofit Existing Infiltration Basin

Proposed BMP description:

Runoff is bypassing infiltration basin and sheet flowing to a swale with direct discharge to the brook. Add trench along west edge of parking lot to direct runoff to infiltration basin. Expand basin to accommodate increased volume.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	1.51
Impervious area managed (acres)	0.58
% Impervious	38%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.15
BMP Depth (feet)	1.50
Hydrologic soil group	B
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.02
Volume infiltrated (ac-ft)	0.04
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1504a

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	110 Kimball Ave - South Infiltration Basin	**South Burlington ID:**	PB0003

Approximate address:	110 Kimball Ave, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing

Proposed BMP type:	Retrofit Existing Infiltration Basin

Proposed BMP description:

Retrofit outlet structure and add proposed outlet control riser that was not constructed.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$10,000
Drainage area (acres)	1.42
Impervious area managed (acres)	0.94
% Impervious	66%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.14
BMP Depth (feet)	3.50
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.05
Volume infiltrated (ac-ft)	0.06
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1504b

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	189 Cloverleaf Detention Pond	**South Burlington ID:**	PB0004		
Approximate address:	Shelburne Rd and Queen City Pkwy, South Burlington	**MS4 where BMP is located:**	VTrans	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

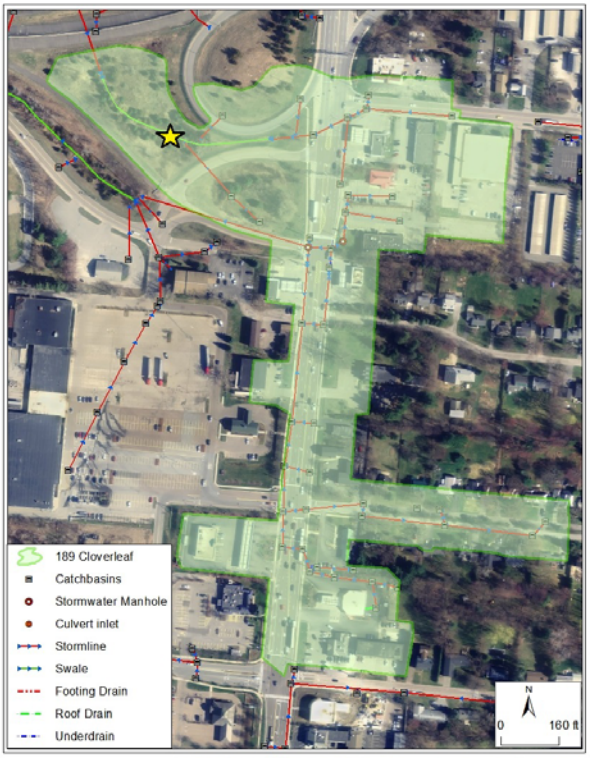
Add outlet structure to area that is already depressed to detain stormwater. Reroute stormline from Shelburne Rd to this area.

Feasibility concerns:

Wetlands concerns.

Proposed BMP details	
Estimated project cost	$59,000
Drainage area (acres)	21.25
Impervious area managed (acres)	12.14
% Impervious	57%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	1.19
BMP Depth (feet)	16.00
Hydrologic soil group	B
MS4s contributing drainage to BMP	South Burlington, VTrans, Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	1.13
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	189 Ramp Detention Pond	**South Burlington ID:**	PB0005		
Approximate address:	Dorset St and 189 Ramps, South Burlington	**MS4 where BMP is located:**	VTrans	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Detain stormwater from a large section of Dorset St. Intercept stormline near Kennedy Dr and reroute to the area between 189 ramps.

Feasibility concerns:

BMP location will need significant earthwork as area is elevated.

Proposed BMP details	
Estimated project cost	$101,000
Drainage area (acres)	9.36
Impervious area managed (acres)	5.78
% Impervious	62%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.33
BMP Depth (feet)	8.00
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington, VTrans
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.35
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0619

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	30 Kimball Ave Swale Retrofit	**South Burlington ID:**	PB0006

Approximate address:	30 Kimball Ave, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing

Proposed BMP type:	Retrofit Existing Swale

Proposed BMP description:

Retrofit existing swale detention to meet CPv. Expand swale to accommodate modified outlet structure.

Feasibility concerns:

Space is limited.

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	1.27
Impervious area managed (acres)	1.05
% Impervious	82%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.06
BMP Depth (feet)	3.50
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.02
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1526; 6269-9030

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Adelphia Cable Pond Retrofit	**South Burlington ID:**	PB0007

Approximate address:	Kimball Ave and Adelphia Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing

Proposed BMP type:	Retrofit Existing Detention Pond

Proposed BMP description:

Reroute drainage from Kimball Ave to this detention pond behind Adelphia Cable. Retrofit and expand existing pond to detain CPv.

Feasibility concerns:

Utilities limited pond expansion to the east.

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	4.15
Impervious area managed (acres)	2.66
% Impervious	64%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.21
BMP Depth (feet)	6.00
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.09
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1000; 6291-9030

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Adirondack Street	**South Burlington ID:**	PB0008		
Approximate address:	Adirondack St and Butler Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Underground detention				

Proposed BMP description:

Construct underground detention chambers under ROW and grassed shoulder.

Feasibility concerns:

Space is very limited. Utilities concerns. Unsure how high groundwater table is here.

Proposed BMP details	
Estimated project cost	$845,000
Drainage area (acres)	11.95
Impervious area managed (acres)	3.52
% Impervious	29%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.22
BMP Depth (feet)	5.67
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.58
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0312

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Airport Drive	**South Burlington ID:**	PB0009		
Approximate address:	Airport Dr and Airport Rd, South Burlington	**MS4 where BMP is located:**	BTV	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Gallery				

Proposed BMP description:

Construct subsurface infiltration chambers in southernmost lot where houses will be removed. Intercept stormline running south down Airport Dr.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$439,000
Drainage area (acres)	9.65
Impervious area managed (acres)	2.70
% Impervious	28%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.09
BMP Depth (feet)	3.50
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington, BTV
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.46
Volume infiltrated (ac-ft)	0.46
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Ashbrook Drive	**South Burlington ID:**	PB0010		
Approximate address:	Ashbrook Dr and Dorset St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention pond				

Proposed BMP description:

Reroute stormwater and detain southwest of Dorset St behind apartment buildings.

Feasibility concerns:

Space is limited. Potential wetlands concerns.

Proposed BMP details	
Estimated project cost	$42,000
Drainage area (acres)	2.49
Impervious area managed (acres)	0.88
% Impervious	35%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.09
BMP Depth (feet)	6.00
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.18
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0101

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Blue Mall Infiltration	**South Burlington ID:**	PB0011		
Approximate address:	Dorset St south of Market St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Gallery				

Proposed BMP description:

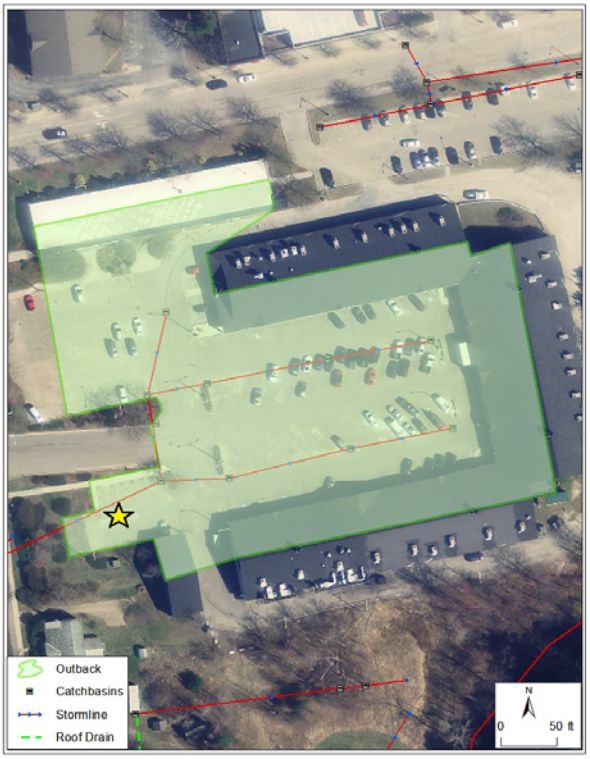
Construct underground infiltration chambers in the southwest edge of parking lot. Overflow to existing stormline that flows to Dorset St.

Feasibility concerns:

Potential underground utilities.

Proposed BMP details	
Estimated project cost	$531,000
Drainage area (acres)	2.49
Impervious area managed (acres)	2.40
% Impervious	97%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.11
BMP Depth (feet)	3.50
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.37
Volume infiltrated (ac-ft)	0.37
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0144

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Brookwood Drive Pond	**South Burlington ID:**	PB0012		
Approximate address:	Brookwood Dr off of Dorset St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

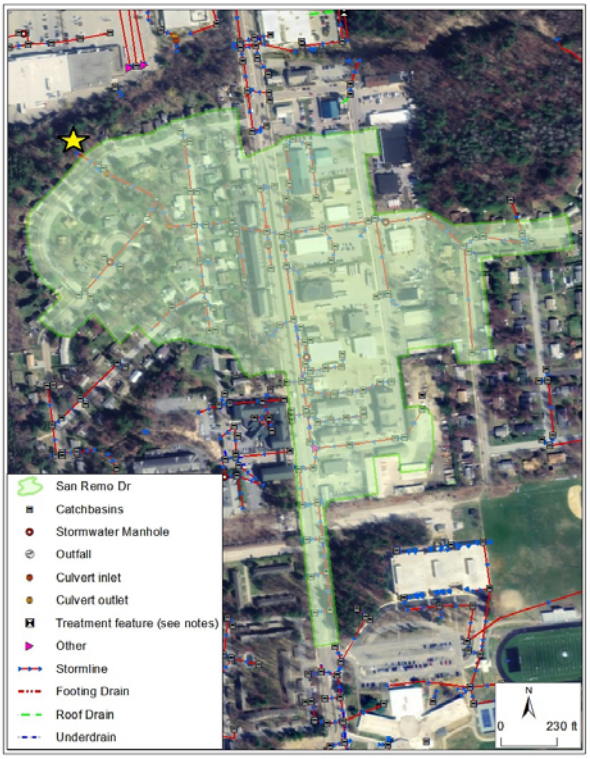
Construct new detention pond to detain this large outfall. Forebay to be located in empty lot near Brookwood Dr.

Feasibility concerns:

Space is limited. Potential wetlands concerns and utility issues.

Proposed BMP details	
Estimated project cost	$394,000
Drainage area (acres)	41.24
Impervious area managed (acres)	24.49
% Impervious	59%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.34
BMP Depth (feet)	14.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	2.00
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0794; 2-0619

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Burlington Price Chopper	**South Burlington ID:**	PB0013		
Approximate address:	Shelburne Rd, Burlington	**MS4 where BMP is located:**	Burlington	**New or existing BMP?**	New
Proposed BMP type:	Gravel wetland				

Proposed BMP description:

Construct new gravel wetland in area between parking lot and stream to the south of parking lot.

Feasibility concerns:

Space is limited.

Proposed BMP details	
Estimated project cost	$1,459,000
Drainage area (acres)	12.69
Impervious area managed (acres)	11.48
% Impervious	90%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.11
BMP Depth (feet)	8.00
Hydrologic soil group	Not Rated
MS4s contributing drainage to BMP	Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	1.23
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Chelsea Circle	**South Burlington ID:**	PB0014		
Approximate address:	Chelsea Cir and Hayes Ave, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Basin				

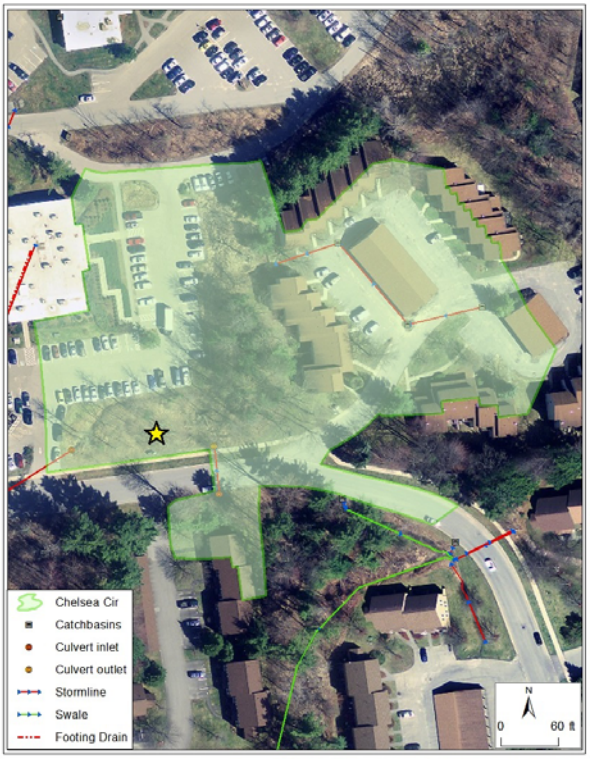
Proposed BMP description:

Construct new infiltration basin constructed to south of existing swale, which receives flow from Chelsea Cir condos and Timberlane Dental parking lot. Neighborhood icing and flooding issues can be mitigated with this project.

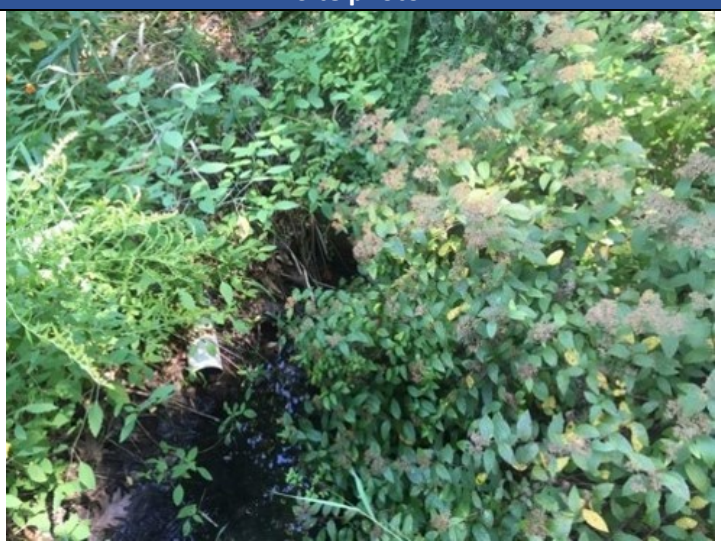
Feasibility concerns:

Proposed BMP details	
Estimated project cost	$115,000
Drainage area (acres)	3.28
Impervious area managed (acres)	1.82
% Impervious	56%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.20
BMP Depth (feet)	4.50
Hydrologic soil group	B
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.29
Volume infiltrated (ac-ft)	0.29
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0767

Site map



Site photo



Potash Brook FRP BMP Summary Sheet

Site name:	Church of Jesus Christ of Latterday Saints	**South Burlington ID:**	PB0015

Approximate address:	Swift St and Dorset St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New

Proposed BMP type:	Detention Swale

Proposed BMP description:

Add detention to swale to the west of parking area with outlet control to detain CPv

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$29,000
Drainage area (acres)	3.12
Impervious area managed (acres)	1.58
% Impervious	51%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.09
BMP Depth (feet)	4.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Institutional
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.10
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0179; 6318-9030

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Community Bible Church Infiltration	**South Burlington ID:**	PB0016

Approximate address:	Williston Rd and Millham Ct, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New

Proposed BMP type:	Infiltration Trench

Proposed BMP description:

Construct linear infiltration trench (perforated pipe) along back of several businesses.

Feasibility concerns:

Proposed BMP details

Estimated project cost	$975,000
Drainage area (acres)	10.34
Impervious area managed (acres)	6.17
% Impervious	60%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.08
BMP Depth (feet)	4.00
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Institutional
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.91
Volume infiltrated (ac-ft)	0.91
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Domino's	**South Burlington ID:**	PB0017		
Approximate address:	Swift St and Farrell St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Construct a new detention pond behind parking area. Add catchbasin along Swift St to also capture half of the road drainage.

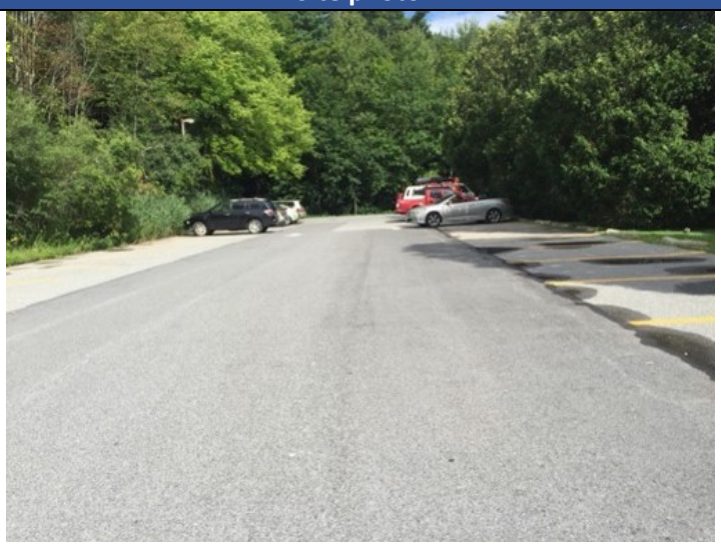
Feasibility concerns:

Space is limited. Site is in close proximity to Potash Brook.

Proposed BMP details	
Estimated project cost	$54,000
Drainage area (acres)	2.30
Impervious area managed (acres)	1.34
% Impervious	58%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.14
BMP Depth (feet)	5.60
Hydrologic soil group	C/D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.23
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo



Potash Brook FRP BMP Summary Sheet

Site name:	Dorset Commons Pond	**South Burlington ID:**	PB0018		
Approximate address:	Dorset St and Town Square Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Construct new detention pond in wooded area behind Dorset Commons.

Feasibility concerns:

Potential wetlands issues. There is a water transmission main that runs through this area.

Proposed BMP details	
Estimated project cost	$168,000
Drainage area (acres)	17.54
Impervious area managed (acres)	5.01
% Impervious	29%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.51
BMP Depth (feet)	6.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.60
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-0242

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Dumont Park Stormwater Project	**South Burlington ID:**	PB0019

Approximate address:	Barrett St and Obrien Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New

Proposed BMP type:	Detention Pond

Proposed BMP description:

Construct new detention pond to the north of Barrett St where two stormlines converge.

Feasibility concerns:

Wetlands concerns. This site is near the future Dumont Park development.

Proposed BMP details	
Estimated project cost	$69,000
Drainage area (acres)	9.56
Impervious area managed (acres)	4.16
% Impervious	43%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.22
BMP Depth (feet)	6.00
Hydrologic soil group	B
MS4s contributing drainage to BMP	South Burlington, VTrans
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.27
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Dynapower	**South Burlington ID:**	PB0020		
Approximate address:	Hinesburg Rd and Meadowland Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Existing Detention Pond				

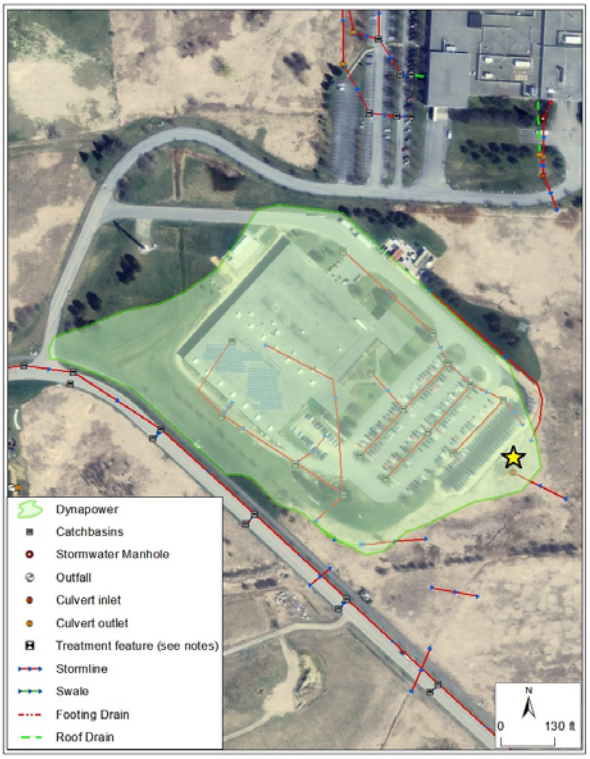
Proposed BMP description:

Reroute roof drainage to existing detention pond. Formalize pond and retrofit to detain CPv.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	12.20
Impervious area managed (acres)	6.50
% Impervious	53%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.27
BMP Depth (feet)	9.50
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Industrial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.95
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-0618

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	East Terrace Detention Pond	**South Burlington ID:**	PB0021

Approximate address:	East Terrace, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New

Proposed BMP type:	Detention Pond

Proposed BMP description:

Construct new linear detention basin near the outfall to the east side of East Terrace.

Feasibility concerns:

Must ensure that BMP is >50 ft from delineated wetlands that exist north of the treatment area.

Proposed BMP details	
Estimated project cost	$102,000
Drainage area (acres)	6.36
Impervious area managed (acres)	2.28
% Impervious	36%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.40
BMP Depth (feet)	4.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.34
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Eastwood Commons Pond Expansion	**South Burlington ID:**	PB0022

Approximate address:	Farrell St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing

Proposed BMP type:	Retrofit Existing Detention Pond

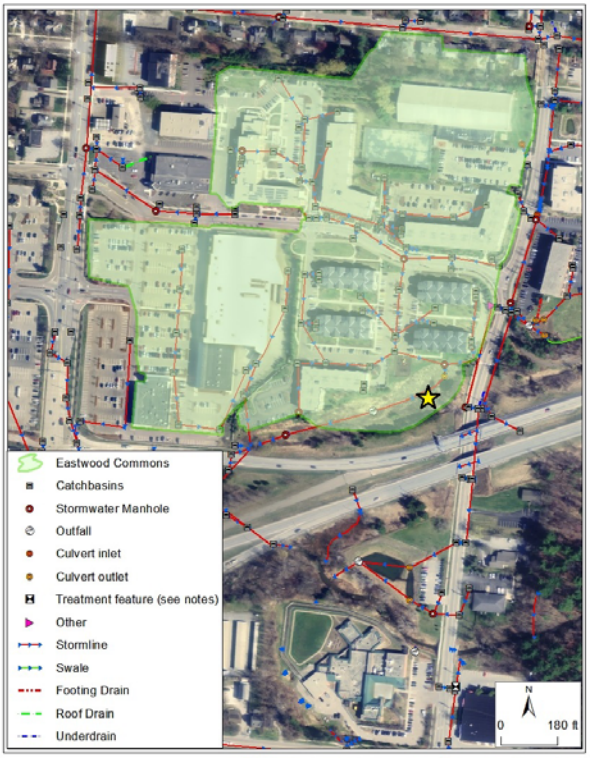
Proposed BMP description:

Reroute area to the west of existing pond (eastern side of Shaw's plaza) to this pond. Add a new connection between these stormwater systems to the east of the Shaw's property. Expand pond and modify outlet structure to accommodate additional drainage.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	28.39
Impervious area managed (acres)	20.78
% Impervious	73%
Land owner where BMP is	Private
BMP Footprint Size (acres)	1.05
BMP Depth (feet)	13.00
Hydrologic soil group	A/C/D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.73
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1438

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Easy Self Storage	**South Burlington ID:**	PB0023		
Approximate address:	Swift St and Shelburne Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Create new detention basin to the north of the storage area.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$53,000
Drainage area (acres)	1.87
Impervious area managed (acres)	1.21
% Impervious	65%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.14
BMP Depth (feet)	5.00
Hydrologic soil group	B
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.20
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0167

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Economou Farm Pond	**South Burlington ID:**	PB0024		
Approximate address:	Economou Farm Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Existing Detention Pond				

Proposed BMP description:

Retrofit existing dry pond to detain CPv. Expand pond and retrofit outlet structure. Add forebay.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	6.37
Impervious area managed (acres)	1.46
% Impervious	23%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.87
BMP Depth (feet)	7.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.67
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1241d

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Exit 13 Gravel Wetland	**South Burlington ID:**	PB0025		
Approximate address:	I-89 Exit 13, South Burlington	**MS4 where BMP is located:**	VTrans	**New or existing BMP?**	New
Proposed BMP type:	Gravel wetland				

Proposed BMP description:

Propose new gravel wetland in depressed triangle greenspace between ramps. Reroute several culverts to this area.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$219,000
Drainage area (acres)	16.72
Impervious area managed (acres)	5.57
% Impervious	33%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.43
BMP Depth (feet)	5.50
Hydrologic soil group	B
MS4s contributing drainage to BMP	VTrans
Primary land use in drainage area	Transportation
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.57
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Exit 14 Gravel Wetland	**South Burlington ID:**	PB0026		
Approximate address:	I-89 Exit 14, South Burlington	**MS4 where BMP is located:**	VTrans	**New or existing BMP?**	New
Proposed BMP type:	Gravel wetland				

Proposed BMP description:

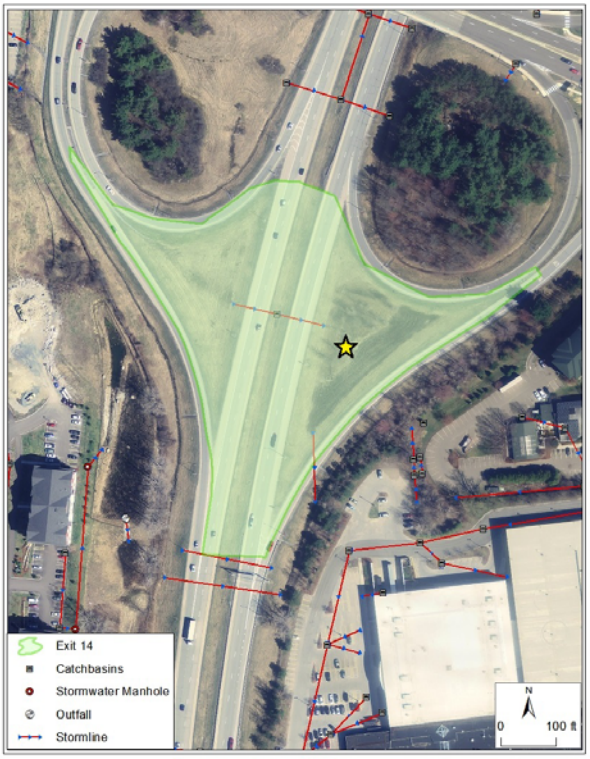
Propose new gravel wetland in depressed triangle greenspace between ramps. Reroute several culverts to this area.

Feasibility concerns:

Soils are unmapped.

Proposed BMP details	
Estimated project cost	$131,000
Drainage area (acres)	4.91
Impervious area managed (acres)	1.93
% Impervious	39%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.37
BMP Depth (feet)	5.00
Hydrologic soil group	Not Rated/B
MS4s contributing drainage to BMP	VTrans
Primary land use in drainage area	Transportation
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.29
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Fairpoint Communications	**South Burlington ID:**	PB0027		
Approximate address:	Hinesburg Rd south of I-89, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Construct new detention pond to the east of property in grassed area. Two outfalls on site drain to wetland swales that need to be rerouted to the east.

Feasibility concerns:

There is bedrock nearby. Ensure that BMP is outside of wetlands buffer.

Proposed BMP details	
Estimated project cost	$124,000
Drainage area (acres)	8.75
Impervious area managed (acres)	4.76
% Impervious	54%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.26
BMP Depth (feet)	7.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.59
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0212

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Faith United Methodist Church	**South Burlington ID:**	PB0028		
Approximate address:	Dorset St south of Songbird Ln, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Construct new underground detention behind church (northwest) in grassy area. Current outfall is eroded.

Feasibility concerns:

Space is limited.

Proposed BMP details	
Estimated project cost	$49,000
Drainage area (acres)	1.68
Impervious area managed (acres)	1.03
% Impervious	61%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.12
BMP Depth (feet)	6.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Institutional
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.15
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Golf Course Road South	**South Burlington ID:**	PB0029		
Approximate address:	Golf Course Rd and Old Cross Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Construct new detention basin at the end of pipe before it enters the golf course. Existing infrastructure already drains to swale.

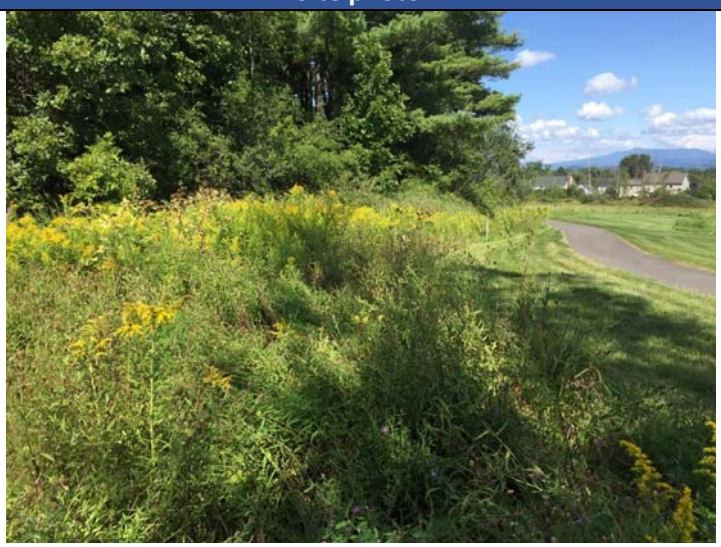
Feasibility concerns:

Space is somewhat limited.

Proposed BMP details	
Estimated project cost	$38,000
Drainage area (acres)	5.19
Impervious area managed (acres)	1.67
% Impervious	32%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.12
BMP Depth (feet)	5.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.23
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1241

Site map

Site photo



Potash Brook FRP BMP Summary Sheet

Site name:	Gonzo's Underground	**South Burlington ID:**	PB0030		
Approximate address:	Williston Rd east of Kennedy Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Underground detention				

Proposed BMP description:

Propose to intercept stormline that flows west along Williston Rd to underground detention chambers under grassed area in front of Budget Car Rental / Gonzo's plaza.

Feasibility concerns:

Space is limited. Buried utilities may be a concern.

Proposed BMP details	
Estimated project cost	$662,000
Drainage area (acres)	13.62
Impervious area managed (acres)	8.72
% Impervious	64%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.21
BMP Depth (feet)	5.33
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington, VTrans
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.45
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0811

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Grandview Drive North Detention Pond	**South Burlington ID:**	PB0031

Approximate address:	Grandview Dr and W Twin Oaks Terr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New

Proposed BMP type:	Detention Pond

Proposed BMP description:

Construct new surface detention BMP following outfall, which is currently broken and experiencing significant erosion.

Feasibility concerns:

Wetlands concerns. There are delineated Class II wetlands downstream of outlet.

Proposed BMP details	
Estimated project cost	$33,000
Drainage area (acres)	3.02
Impervious area managed (acres)	1.38
% Impervious	46%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.07
BMP Depth (feet)	6.50
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.14
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0238; 2-0737

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Grandview Drive West Detention Pond	**South Burlington ID:**	PB0032

Approximate address:	Grandview Dr and Dorset St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New

Proposed BMP type:	Detention Pond

Proposed BMP description:

Construct new surface detention basin to the west of Dorset St. Reroute stormline away from brook to new BMP.

Feasibility concerns:

Wetlands concerns.

Proposed BMP details	
Estimated project cost	$36,000
Drainage area (acres)	3.14
Impervious area managed (acres)	1.89
% Impervious	60%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.03
BMP Depth (feet)	5.20
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.18
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0238; 2-0737

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Hawthorne Circle Detention Pond	**South Burlington ID:**	PB0033

Approximate address:	Hawthorne Cir and Kennedy Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New

Proposed BMP type:	Detention Pond

Proposed BMP description:

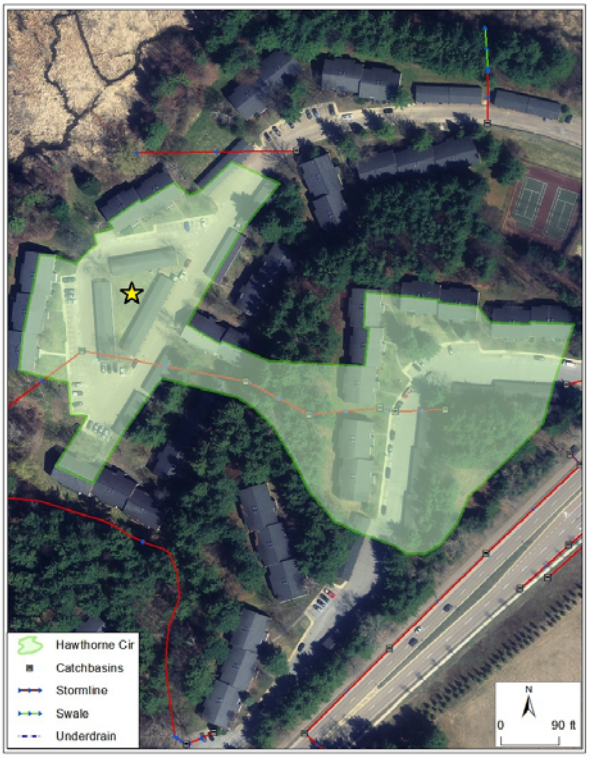
Construct new detention basin in greenspace formed in the triangle between three garages.

Feasibility concerns:

Potential underground utilities.

Proposed BMP details	
Estimated project cost	$38,000
Drainage area (acres)	4.95
Impervious area managed (acres)	2.55
% Impervious	51%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.09
BMP Depth (feet)	6.00
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.15
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Helen Ave Cul De Sac	**South Burlington ID:**	PB0034		
Approximate address:	Helen Ave, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Basin				

Proposed BMP description:

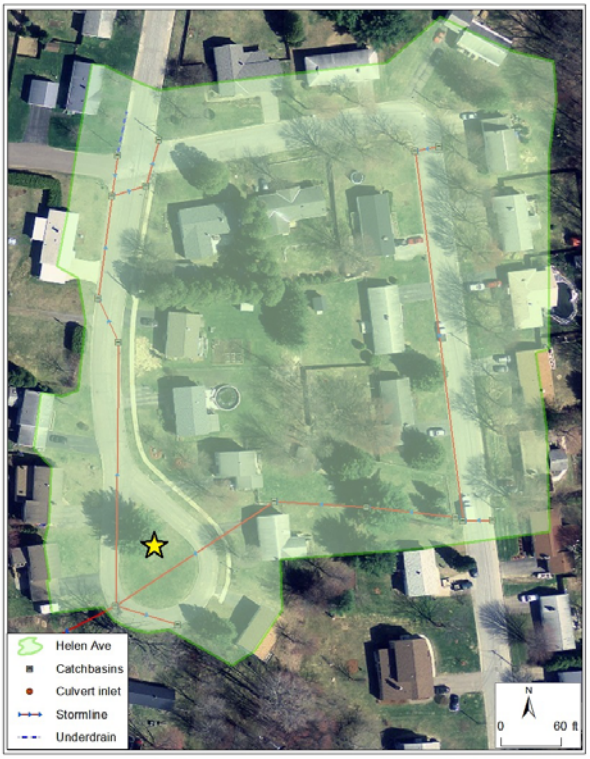
Construct new infiltration basin in the cul de sac at the end of Helen Ave, which would provide significant water quality benefit.

Feasibility concerns:

Water line and mature tree present in cul-de-sac.

Proposed BMP details	
Estimated project cost	$136,000
Drainage area (acres)	5.70
Impervious area managed (acres)	2.15
% Impervious	38%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.09
BMP Depth (feet)	6.00
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.35
Volume infiltrated (ac-ft)	0.35
Primary or secondary BMP?	Secondary
Expired permit(s)?	No Permit

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Hinesburg Road	**South Burlington ID:**	PB0035		
Approximate address:	Hinesburg Rd and Deane St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention pond				

Proposed BMP description:

Reroute stormwater to existing catchbasin on Deane St and detain to the west of Hinesburg Rd to the south of existing houses.

Feasibility concerns:

Must ensure BMP is located outside of river corridor.

Proposed BMP details	
Estimated project cost	$33,000
Drainage area (acres)	3.53
Impervious area managed (acres)	1.27
% Impervious	36%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.07
BMP Depth (feet)	6.00
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington, VTrans
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.14
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	I-89 Swale	**South Burlington ID:**	PB0036		
Approximate address:	Between I-89 N and S lanes west of Hinesburg Rd, South Burlington	**MS4 where BMP is located:**	VTrans	**New or existing BMP?**	New
Proposed BMP type:	Median Filter				

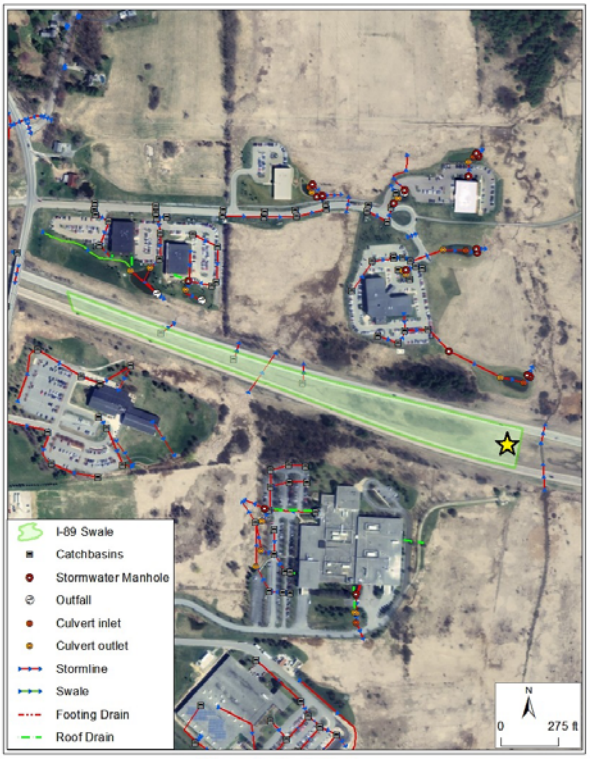
Proposed BMP description:

Construct median filter in depressed area between north and south I-89 lanes. Reroute several culverts.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$129,000
Drainage area (acres)	6.28
Impervious area managed (acres)	1.91
% Impervious	30%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.38
BMP Depth (feet)	5.50
Hydrologic soil group	D
MS4s contributing drainage to BMP	VTrans
Primary land use in drainage area	Transportation
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.53
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Iby Gravel Wetland	**South Burlington ID:**	PB0037		
Approximate address:	Iby St off of Hinesburg Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Gravel wetland				

Proposed BMP description:

Construct new gravel wetland at the end of Iby St to capture stormwater for the street.

Feasibility concerns:

Wetlands concerns. This site is near the future Dumont Park development.

Proposed BMP details	
Estimated project cost	$67,000
Drainage area (acres)	2.82
Impervious area managed (acres)	1.14
% Impervious	40%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.06
BMP Depth (feet)	3.00
Hydrologic soil group	B
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.07
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	INS Building Pond A Retrofit	**South Burlington ID:**	PB0038		
Approximate address:	Kimball Ave west of Community Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Existing Retention Pond				

Proposed BMP description:

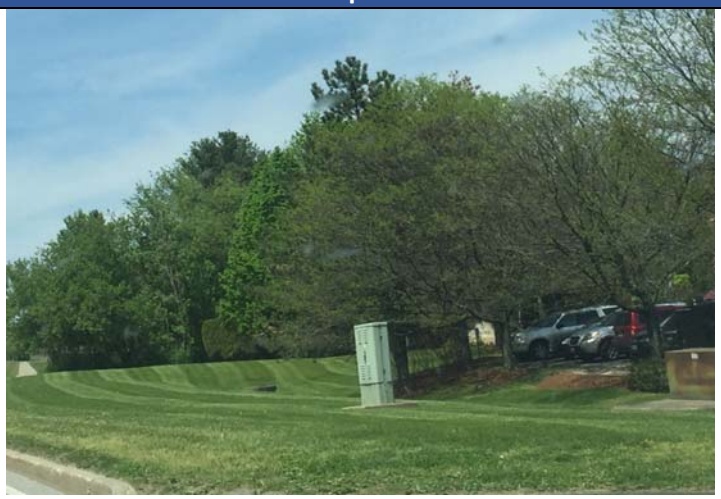
Retrofit existing detention pond. Add forebay and construct outlet structure with low flow orifice to meet CPv standards.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	2.11
Impervious area managed (acres)	0.98
% Impervious	47%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.33
BMP Depth (feet)	2.25
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Governmental
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.04
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-0969

Site map

Site photo



Potash Brook FRP BMP Summary Sheet

Site name:	INS Building Pond B Retrofit	**South Burlington ID:**	PB0039		
Approximate address:	Kimball Ave west of Community Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Existing Detention Pond				

Proposed BMP description:

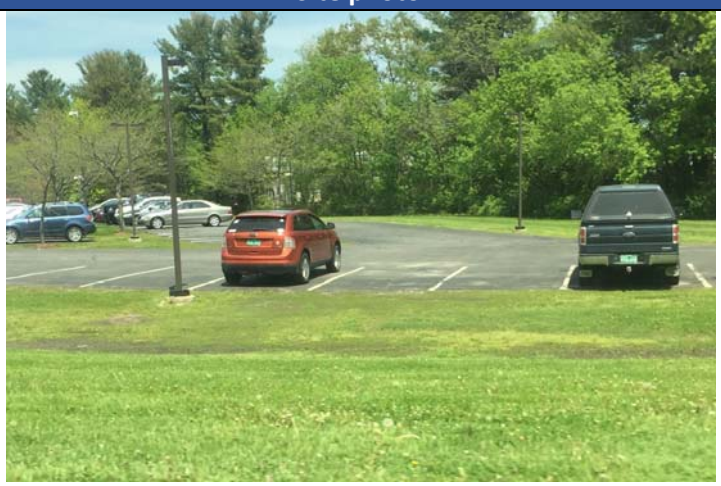
Retrofit existing detention pond. Add forebay and construct outlet structure with low flow orifice to meet CPv standards.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	1.44
Impervious area managed (acres)	0.61
% Impervious	42%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.15
BMP Depth (feet)	3.00
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Governmental
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.04
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-0969b

Site map

Site photo



Potash Brook FRP BMP Summary Sheet

Site name:	Joy Dr Detention Pond	**South Burlington ID:**	PB0040		
Approximate address:	Joy Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Construct new surface BMP in adjacent flat area near the Green Mountain Power transmission corridor.

Feasibility concerns:

Power line corridor is close to proposed BMP.

Proposed BMP details	
Estimated project cost	$47,000
Drainage area (acres)	3.07
Impervious area managed (acres)	1.34
% Impervious	44%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.12
BMP Depth (feet)	6.00
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.21
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Kennedy Dr Pond 2 Expansion	**South Burlington ID:**	PB0041

Approximate address:	Kennedy Dr and W Twin Oaks Terr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing

Proposed BMP type:	Retrofit Existing Detention Pond

Proposed BMP description:

Retrofit existing detention pond to accommodate additional drainage from The Edge and 1 Twin Oaks.

Feasibility concerns:

Space to expand pond is limited.

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	3.89
Impervious area managed (acres)	2.36
% Impervious	61%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.90
BMP Depth (feet)	4.57
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.16
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1582b; 2-1069

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Kennedy Dr Pond 3 Expansion	**South Burlington ID:**	PB0042

Approximate address:	Kennedy Dr west of Timber Ln, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing

Proposed BMP type:	Retrofit Existing Detention Pond and add CMAC Valve

Proposed BMP description:

Drainage for offices to the east of Timber Ln currently discharges to a swale along Kennedy Dr heading west (direction of the existing pond). Reroute culvert that crosses under access ramp to pond to pond. Add CMAC valve to detain CPv.

Feasibility concerns:

Limited area to expand pond.

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	6.39
Impervious area managed (acres)	4.82
% Impervious	75%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.11
BMP Depth (feet)	6.56
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.18
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1582c

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Kennedy Dr Pond 4 Expansion	**South Burlington ID:**	PB0043

Approximate address:	Kennedy Dr and Hinesburg Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing

Proposed BMP type:	Retrofit Existing Detention Pond

Proposed BMP description:

Reroute stormline from Chatham Green and swale along Hinesburg Rd to existing detention pond. Expand pond to accommodate additional drainage area and detain CPv.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	10.07
Impervious area managed (acres)	4.78
% Impervious	47%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.11
BMP Depth (feet)	5.62
Hydrologic soil group	A/C
MS4s contributing drainage to BMP	South Burlington, VTrans
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.25
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1582d; 1-0237; 1-1023; 1-1290

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Kennedy Dr Pond 7 Expansion	**South Burlington ID:**	PB0044

Approximate address:	Kennedy Dr north of Kimball Ave, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing

Proposed BMP type:	Retrofit Existing Detention Pond and add CMAC Valve

Proposed BMP description:

Reroute stormline that currently outfalls behind Key Bank to existing detention pond. Add CMAC valve to detain CPv.

Feasibility concerns:

Elevations of pipes near Key Bank are quite low.

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	11.24
Impervious area managed (acres)	8.67
% Impervious	77%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.30
BMP Depth (feet)	7.95
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.58
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1582g; 1-0233

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	K-Mart Plaza Infiltration	**South Burlington ID:**	PB0045		
Approximate address:	Shelburne Rd north of Hannaford Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Gallery				

Proposed BMP description:

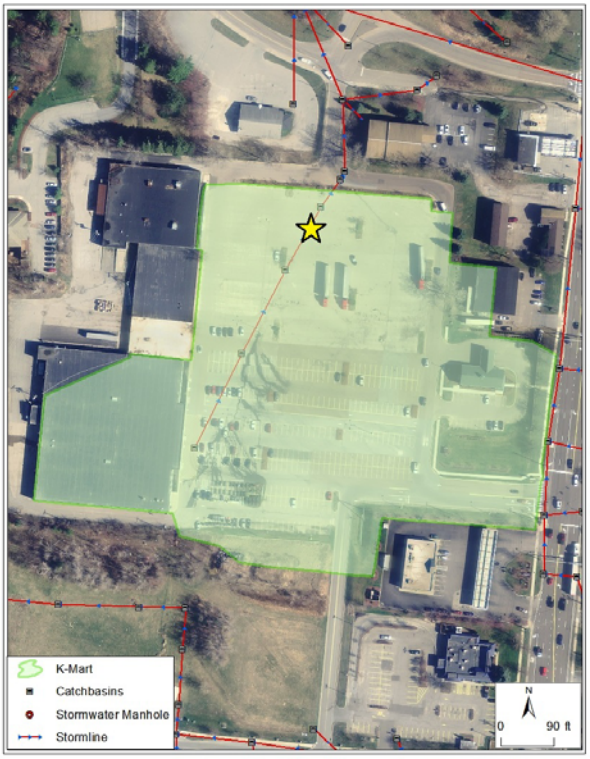
Construct new underground infiltration chambers in K-Mart parking lot.

Feasibility concerns:

Unsure what the plans are for this plaza in the future.

Proposed BMP details	
Estimated project cost	$1,121,000
Drainage area (acres)	8.86
Impervious area managed (acres)	7.68
% Impervious	87%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.32
BMP Depth (feet)	3.50
Hydrologic soil group	B
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.86
Volume infiltrated (ac-ft)	0.10
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Knoll Circle	**South Burlington ID:**	PB0046		
Approximate address:	Knoll Cir north of Dubois Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Construct new surface detention basin with swale inlet. Current stormline draining subdivision already enters swale, which also drains area to the west.

Feasibility concerns:

Proposed BMP is located outside of Knoll Cir residential property.

Proposed BMP details	
Estimated project cost	$184,000
Drainage area (acres)	12.16
Impervious area managed (acres)	2.16
% Impervious	18%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.35
BMP Depth (feet)	6.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.80
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0220

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Lane Press Roof	**South Burlington ID:**	PB0047		
Approximate address:	Meadowland Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Basin				

Proposed BMP description:

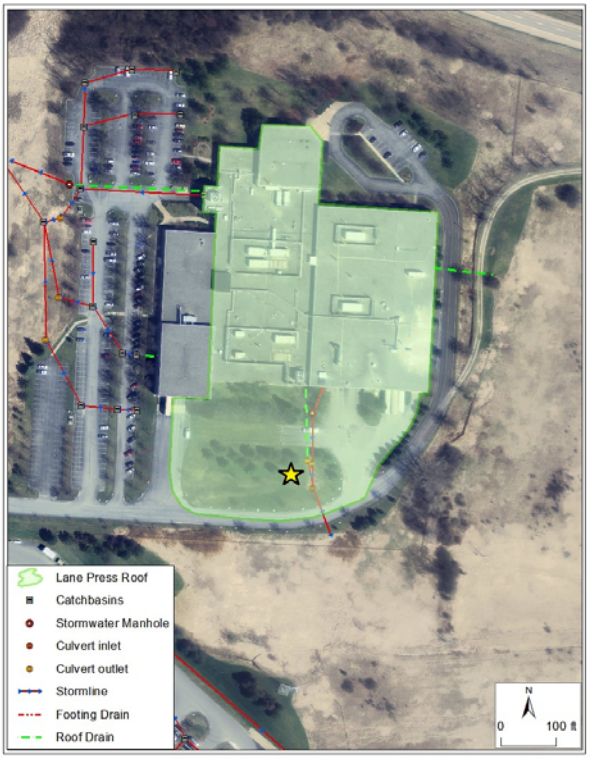
Capture roof drainage in a new infiltration basin. Roof drains already flows to grassed area where treatment is proposed.

Feasibility concerns:

Soils are mapped as D, but infiltration basin directly to the west seems to be performing well and soils in this area appear similar. Would need to test infiltration rates to confirm that infiltration is possible here. If not, gravel wetland STP could be used.

Proposed BMP details	
Estimated project cost	$310,000
Drainage area (acres)	5.57
Impervious area managed (acres)	4.17
% Impervious	75%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.55
BMP Depth (feet)	4.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Industrial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.69
Volume infiltrated (ac-ft)	0.69
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1337

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Laurel Hill Drive	**South Burlington ID:**	PB0048		
Approximate address:	Laurel Hill Dr off of Shelburne Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Basin				

Proposed BMP description:

Construct new infiltration basin to the north of houses before stormline pipe enters riparian buffer.

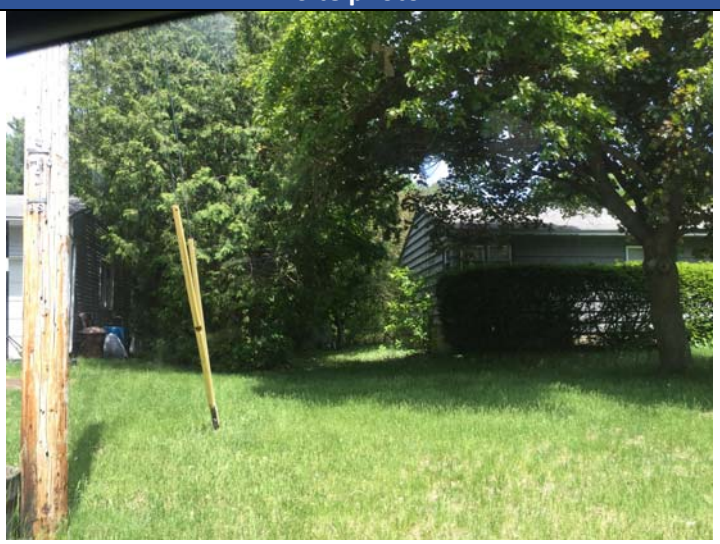
Feasibility concerns:

Proposed BMP is on private property.

Proposed BMP details	
Estimated project cost	$162,000
Drainage area (acres)	6.50
Impervious area managed (acres)	1.84
% Impervious	28%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.16
BMP Depth (feet)	4.50
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.41
Volume infiltrated (ac-ft)	0.41
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo



Potash Brook FRP BMP Summary Sheet

Site name:	Lilac Ln Infiltration Basin	**South Burlington ID:**	PB0049		
Approximate address:	Lilac Ln off of Hinesburg Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Basin				

Proposed BMP description:

Formalize infiltration basin in depressed area at the end of Lilac Ln.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$44,000
Drainage area (acres)	1.46
Impervious area managed (acres)	0.85
% Impervious	58%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.03
BMP Depth (feet)	6.00
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.13
Volume infiltrated (ac-ft)	0.13
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Lindenwood Drive Detention Pond	**South Burlington ID:**	PB0050

Approximate address:	Lindenwood Dr off of Shelburne Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New

Proposed BMP type:	Detention pond

Proposed BMP description:

Add catchbasins and infrastructure to reroute stormwater to the east of Lindenwood Dr. Part of Brewer Pkwy drains to this area as well. Propose to create one detention basin to detain drainage from both streets. Lindenwood Dr has existing puddling and icing issues. This BMP would also mitigate those issues.

Feasibility concerns:

BMP will require installing catchbasins and associated infrastructure on Lindenwood Dr. There is a water line running nearby.

Proposed BMP details	
Estimated project cost	$89,000
Drainage area (acres)	10.57
Impervious area managed (acres)	2.19
% Impervious	21%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.44
BMP Depth (feet)	5.00
Hydrologic soil group	A/B
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.20
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Logwood Neighborhood Detention Pond	**South Burlington ID:**	PB0051

Approximate address:	Williston Rd south of intersection with Airport Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New

Proposed BMP type:	Detention Pond

Proposed BMP description:

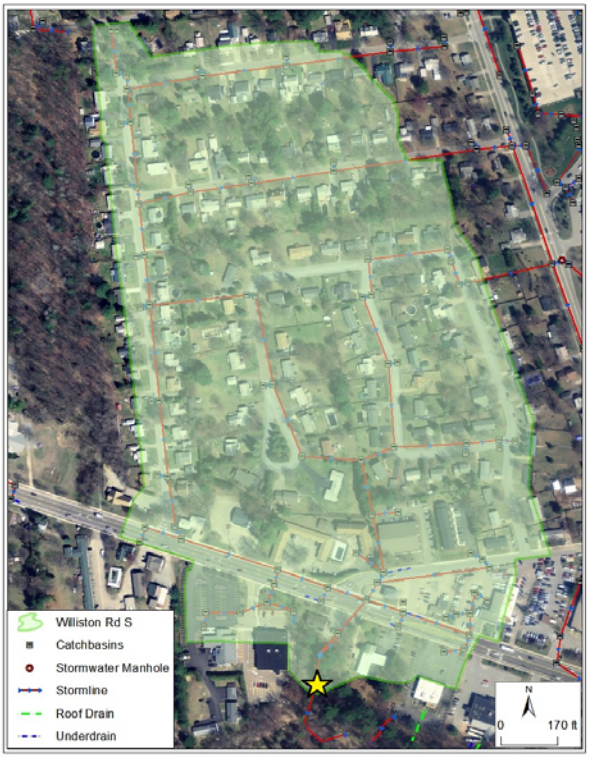
Construct new end of pipe surface impoundment BMP behind Lean Dental Group. Outfall is currently eroded.

Feasibility concerns:

Proposed BMP is on private property. Soils are unmapped. There are Class II wetlands south of proposed BMP, but BMP area should be well outside of wetlands buffer.

Proposed BMP details	
Estimated project cost	$151,000
Drainage area (acres)	44.81
Impervious area managed (acres)	18.44
% Impervious	41%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.47
BMP Depth (feet)	6.50
Hydrologic soil group	Not Rated
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.61
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Marcotte Central School	**South Burlington ID:**	PB0052		
Approximate address:	Market St near Dorset St intersection, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Construct new detention basin in wooded area directly south of school parking lot. Route outfall to existing stormline. Potential educational benefit.

Feasibility concerns:

Potential wetlands concerns. Future Market St development.

Proposed BMP details	
Estimated project cost	$57,000
Drainage area (acres)	2.11
Impervious area managed (acres)	1.83
% Impervious	87%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.20
BMP Depth (feet)	5.25
Hydrologic soil group	B
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Institutional
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.19
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Marine Connection	**South Burlington ID:**	PB0053		
Approximate address:	Williston Rd and Shunpike Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Swale				

Proposed BMP description:

Add detention to existing swale near the back of the large Marine Connection building. Expand swale to accommodate additional volume.

Feasibility concerns:

Potential for future development in greenspace.

Proposed BMP details	
Estimated project cost	$58,000
Drainage area (acres)	10.79
Impervious area managed (acres)	4.73
% Impervious	44%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.20
BMP Depth (feet)	6.00
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.21
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Meadowland Business Park Pond 2	**South Burlington ID:**	PB0054		
Approximate address:	Meadowland Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Existing Detention Pond and add CMAC Valve				

Proposed BMP description:

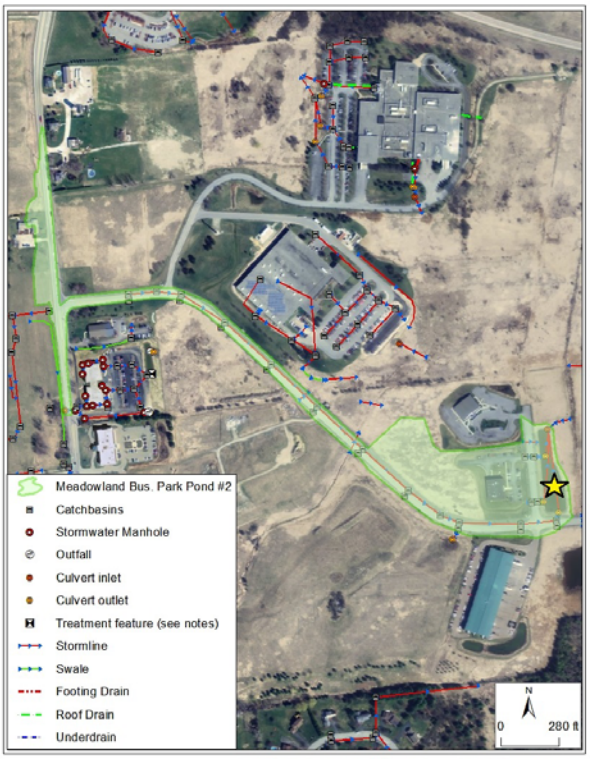
Retrofit existing detention pond. Add forebay and CMAC valve to detain CPv.

Feasibility concerns:

Space is somewhat limited.

Proposed BMP details	
Estimated project cost	$45,000
Drainage area (acres)	13.46
Impervious area managed (acres)	5.13
% Impervious	38%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.89
BMP Depth (feet)	4.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington, VTrans
Primary land use in drainage area	Industrial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	1.70
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1269_4290-9020.3 Lot 10

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Merchant's Bank Detention Pond	**South Burlington ID:**	PB0055

Approximate address:	Kimball Ave and Kennedy Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New

Proposed BMP type:	Detention Pond

Proposed BMP description:

Route stormwater from Allstate Insurance west to Merchant's Bank and provide detention in grassed area

Feasibility concerns:

Space is limited.

Proposed BMP details	
Estimated project cost	$66,000
Drainage area (acres)	4.36
Impervious area managed (acres)	3.17
% Impervious	73%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.10
BMP Depth (feet)	6.50
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.23
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-1171; 6275-9030; 6269-9030; 2-0939

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Miller Research Farm	**South Burlington ID:**	PB0056		
Approximate address:	Spear St north of I-89, South Burlington	**MS4 where BMP is located:**	UVM	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Reroute culvert east across Spear St and detain water to the south of the UVM farm.

Feasibility concerns:

BMP is located on UVM property. Buried utilities nearby.

Proposed BMP details	
Estimated project cost	$463,000
Drainage area (acres)	79.01
Impervious area managed (acres)	5.03
% Impervious	6%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.77
BMP Depth (feet)	9.00
Hydrologic soil group	B
MS4s contributing drainage to BMP	South Burlington, Burlington, VTrans
Primary land use in drainage area	Golf Course
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	2.36
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Nicklaus Circle	**South Burlington ID:**	PB0057		
Approximate address:	Nicklaus Cir off of Dorset St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Construct new linear detention feature to the north of Nicklaus Cir where the stormline and swale converge.

Feasibility concerns:

Golf course is adjacent to proposed practice area and may object to large BMP.

Proposed BMP details	
Estimated project cost	$161,000
Drainage area (acres)	9.25
Impervious area managed (acres)	2.23
% Impervious	24%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.29
BMP Depth (feet)	6.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.54
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1241, 4049-9030

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	North Country Credit North West Infiltration	**South Burlington ID:**	PB0058

Approximate address:	Swift St west of Shelburne Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New

Proposed BMP type:	Infiltration Trench

Proposed BMP description:

Install perforated pipe to the north of parking lot in grassed area to infiltrate stormwater.

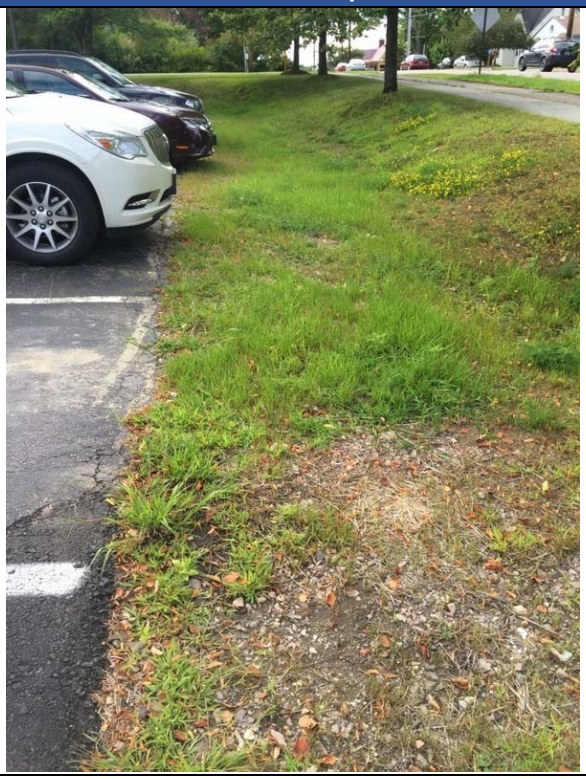
Feasibility concerns:

BMP only treats a small impervious area.

Proposed BMP details	
Estimated project cost	$37,000
Drainage area (acres)	0.25
Impervious area managed (acres)	0.21
% Impervious	84%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.01
BMP Depth (feet)	3.00
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.03
Volume infiltrated (ac-ft)	0.03
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo



Potash Brook FRP BMP Summary Sheet

Site name:	North Country Credit South Infiltration	**South Burlington ID:**	PB0059

Approximate address:	Swift St west of Shelburne Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New

Proposed BMP type:	Infiltration Gallery

Proposed BMP description:

Construct underground infiltration chambers in the southeast corner of parking lot. Overflow to existing stormline.

Feasibility concerns:

BMP only treats a small impervious area.

Proposed BMP details	
Estimated project cost	$129,000
Drainage area (acres)	0.76
Impervious area managed (acres)	0.62
% Impervious	81%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.03
BMP Depth (feet)	3.50
Hydrologic soil group	A/B
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.12
Volume infiltrated (ac-ft)	0.12
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	O'Brien Drive Underground Detention	**South Burlington ID:**	PB0060

Approximate address:	Obrien Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New

Proposed BMP type:	Underground Detention

Proposed BMP description:

Construct underground storage chambers in open lot between existing houses.

Feasibility concerns:

Space is limited.

Proposed BMP details	
Estimated project cost	$580,000
Drainage area (acres)	8.47
Impervious area managed (acres)	2.87
% Impervious	34%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.11
BMP Depth (feet)	3.50
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.54
Volume infiltrated (ac-ft)	0.54
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Olympiad Apartments & Office Building Pond Retrofit	**South Burlington ID:**	PB0061

Approximate address:	Farrell St south of Eastwood Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Existing Detention Pond				

Proposed BMP description:

Retrofit existing detention pond. Add forebay, clean out vegetation, and ensure pond detains CPv.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	9.65
Impervious area managed (acres)	3.68
% Impervious	38%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.21
BMP Depth (feet)	8.00
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.06
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1452

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Panurgy Infiltration Basin	**South Burlington ID:**	PB0062		
Approximate address:	Kimball Ave and Shunpike Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Existing Infiltration Basin				

Proposed BMP description:

Retrofit and expand existing infiltration basin to infiltrate the CPv.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	1.33
Impervious area managed (acres)	0.80
% Impervious	60%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.06
BMP Depth (feet)	5.00
Hydrologic soil group	A/C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.08
Volume infiltrated (ac-ft)	0.14
Primary or secondary BMP?	Primary
Expired permit(s)?	3409-9010

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Park Road Detention Pond	**South Burlington ID:**	PB0063		
Approximate address:	Park Rd off of Dorset St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Propose to reroute swale on southern side of Park Rd to the north and detain in wooded area.

Feasibility concerns:

Ledge outcroppings were noted nearby.

Proposed BMP details	
Estimated project cost	$94,000
Drainage area (acres)	6.96
Impervious area managed (acres)	1.27
% Impervious	18%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.23
BMP Depth (feet)	6.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.42
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1241

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Pillsbury Manor Infiltration Basin Retrofit	**South Burlington ID:**	PB0064

Approximate address:	Pillsbury Manor N and Williston Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing

Proposed BMP type:	Retrofit to Infiltration Basin

Proposed BMP description:

Retrofit existing pond to infiltration basin. Overflow to existing culvert.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	1.06
Impervious area managed (acres)	0.40
% Impervious	38%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.05
BMP Depth (feet)	5.00
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.07
Volume infiltrated (ac-ft)	0.07
Primary or secondary BMP?	Secondary
Expired permit(s)?	1-1015

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Quarry Hill South	**South Burlington ID:**	PB0065		
Approximate address:	Quarry Hill Rd off of Spear St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Swale				

Proposed BMP description:

Add detention to existing swale running northeast behind garages.

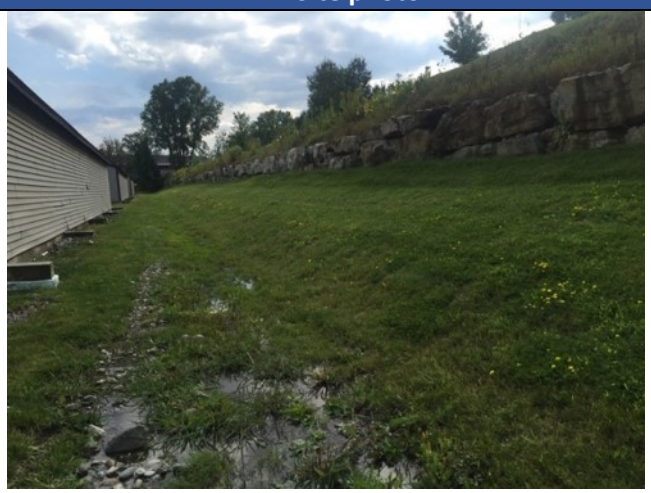
Feasibility concerns:

The wall slope to the west of the swale is quite steep.

Proposed BMP details	
Estimated project cost	$132,000
Drainage area (acres)	5.62
Impervious area managed (acres)	2.52
% Impervious	45%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.40
BMP Depth (feet)	5.00
Hydrologic soil group	B/D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.48
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	6322-9030

Site map

Site photo



Potash Brook FRP BMP Summary Sheet

Site name:	Queen City Park Road Detention Pond	**South Burlington ID:**	PB0066

Approximate address:	Queen City Park Rd off of Shelburne Rd, South Burlington	**MS4 where BMP is located:**	VTrans	**New or existing BMP?**	New

Proposed BMP type:	Detention Pond

Proposed BMP description:

Add detention to existing depressed area where stormlines already outfall. Drainage from Shelburne Rd is assumed to be already rerouted to larger depression to the north (see project entitled 189 Cloverleaf).

Feasibility concerns:

Space is somewhat limited.

Proposed BMP details	
Estimated project cost	$99,000
Drainage area (acres)	6.51
Impervious area managed (acres)	2.98
% Impervious	46%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.63
BMP Depth (feet)	4.00
Hydrologic soil group	B
MS4s contributing drainage to BMP	South Burlington, VTrans
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.45
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Shaws West	**South Burlington ID:**	PB0067		
Approximate address:	Shelburne Rd north of 189, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Underground Detention				

Proposed BMP description:

Construct underground detention in vegetated island along west side of parking lot. Reroute last catchbasin in southwest corner of parking to this area.

Feasibility concerns:

Space is limited.

Proposed BMP details	
Estimated project cost	$230,000
Drainage area (acres)	1.85
Impervious area managed (acres)	1.71
% Impervious	93%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.07
BMP Depth (feet)	4.83
Hydrologic soil group	B/D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.16
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	South Burlington High School Infiltration	**South Burlington ID:**	PB0068

Approximate address:	Dorset St north of Kennedy Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New

Proposed BMP type:	Infiltration Basin

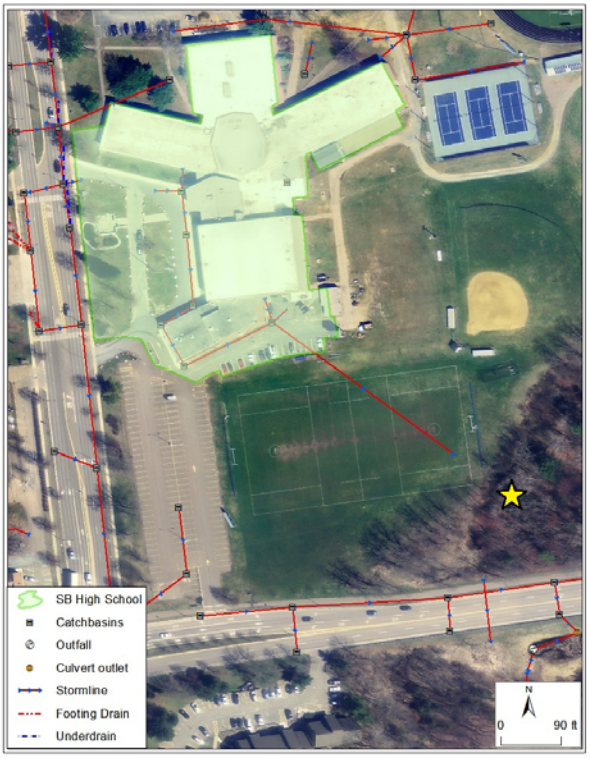
Proposed BMP description:

Construct new infiltration basin to the southeast of sports field in currently wooded area.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$165,000
Drainage area (acres)	3.57
Impervious area managed (acres)	3.10
% Impervious	87%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.22
BMP Depth (feet)	6.00
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Institutional
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.44
Volume infiltrated (ac-ft)	0.44
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	South Burlington High School North	**South Burlington ID:**	PB0069

Approximate address:	Dorset St north of Kennedy Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Underground Infiltration				

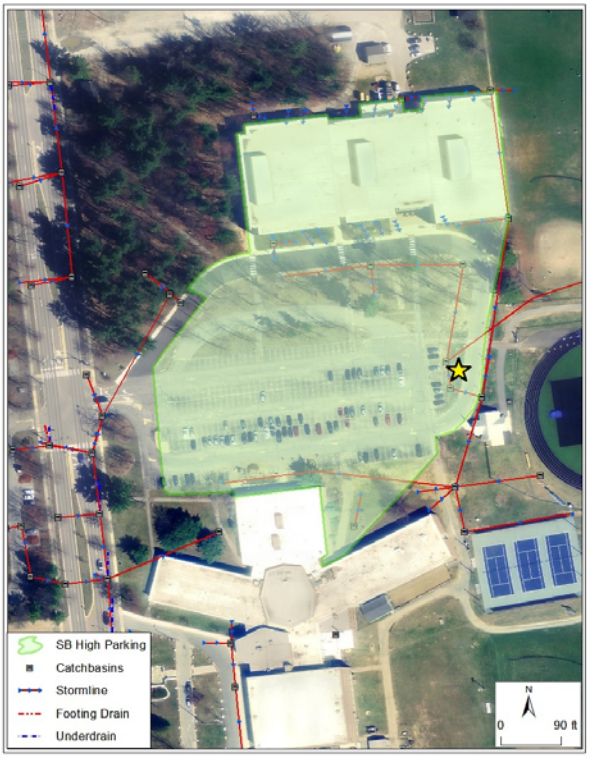
Proposed BMP description:

Construct dry wells to infiltrate stormwater from the high school parking lot and middle school roof. Potential educational benefit.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$992,000
Drainage area (acres)	5.77
Impervious area managed (acres)	4.26
% Impervious	74%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.16
BMP Depth (feet)	5.17
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Institutional
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.69
Volume infiltrated (ac-ft)	0.69
Primary or secondary BMP?	Primary
Expired permit(s)?	6174-INDS.A

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	South Meadows Pond	**South Burlington ID:**	PB0070		
Approximate address:	Farrell St, South Burlington	**MS4 where BMP is located:**	Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Existing Detention Pond				

Proposed BMP description:

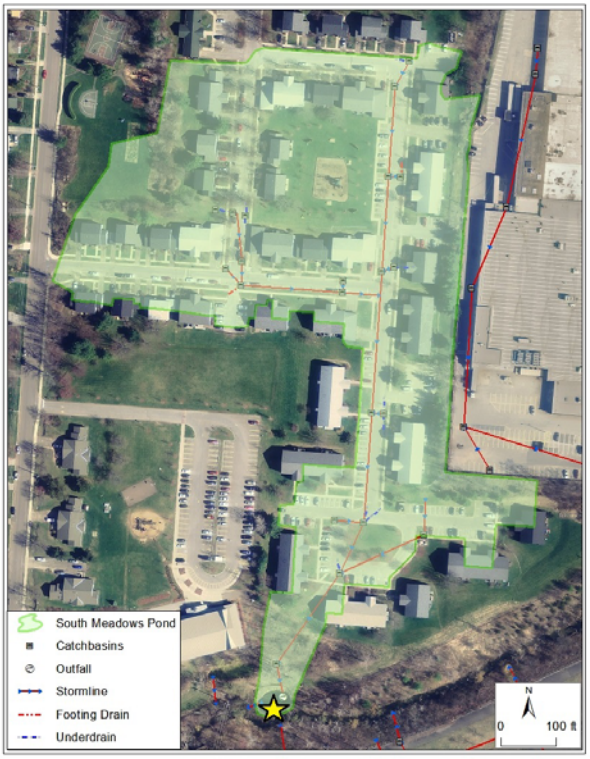
Retrofit existing detention pond to meet CPv standards. Add forebay and expand pond. Upgrade outlet structure.

Feasibility concerns:

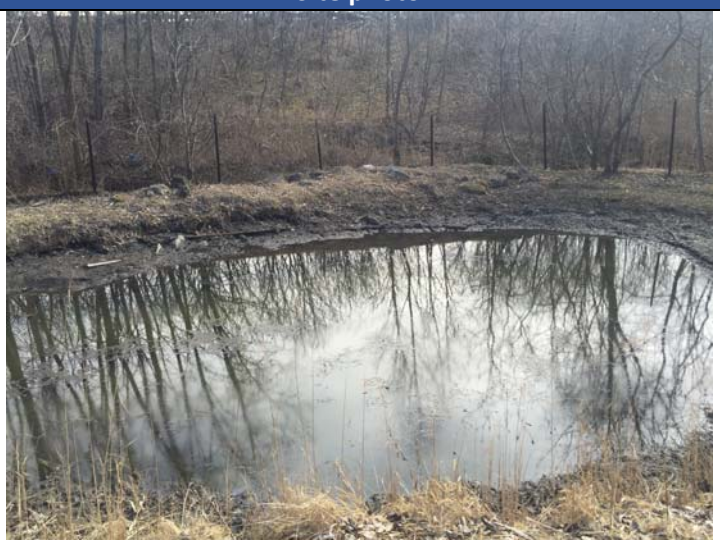
Space is limited. Water line runs nearby. Pond is very close to brook.

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	10.10
Impervious area managed (acres)	4.73
% Impervious	47%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.19
BMP Depth (feet)	10.00
Hydrologic soil group	B
MS4s contributing drainage to BMP	Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.37
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-0661

Site map



Site photo



Potash Brook FRP BMP Summary Sheet

Site name:	Southview Drive	**South Burlington ID:**	PB0071		
Approximate address:	Southview Dr off of Prouty Pkwy, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Underground Detention				

Proposed BMP description:

Construct underground detention chambers in ROW and grassed area. Road is 30ft wide and could be narrowed for storage.

Feasibility concerns:

Space is limited.

Proposed BMP details	
Estimated project cost	$1,048,000
Drainage area (acres)	12.26
Impervious area managed (acres)	4.81
% Impervious	39%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.37
BMP Depth (feet)	5.00
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.71
Volume infiltrated (ac-ft)	0.04
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Staples Plaza Underground Detention	**South Burlington ID:**	PB0072

Approximate address:	Williston Rd west of I-89, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New

Proposed BMP type:	Underground Detention

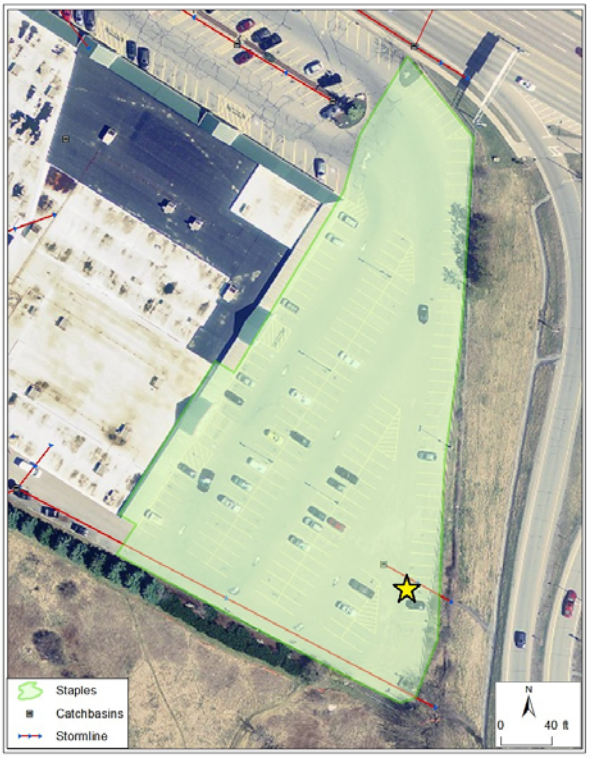
Proposed BMP description:

Construct underground detention chambers in southeast corner of parking lot.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$288,000
Drainage area (acres)	1.70
Impervious area managed (acres)	1.64
% Impervious	97%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.07
BMP Depth (feet)	5.17
Hydrologic soil group	Not Rated
MS4s contributing drainage to BMP	South Burlington, VTrans
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.20
Volume infiltrated (ac-ft)	0.03
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Stonehedge Circle	**South Burlington ID:**	PB0073		
Approximate address:	Stonehedge Dr off of Spear St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Bioretention				

Proposed BMP description:

Construct bioretention along road in grassed area with discharge to existing catchbasin.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$55,000
Drainage area (acres)	2.48
Impervious area managed (acres)	1.26
% Impervious	51%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.16
BMP Depth (feet)	4.00
Hydrologic soil group	B
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.20
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0100

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Sugartree Lane	**South Burlington ID:**	PB0074		
Approximate address:	Sugartree Ln off of Kennedy Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

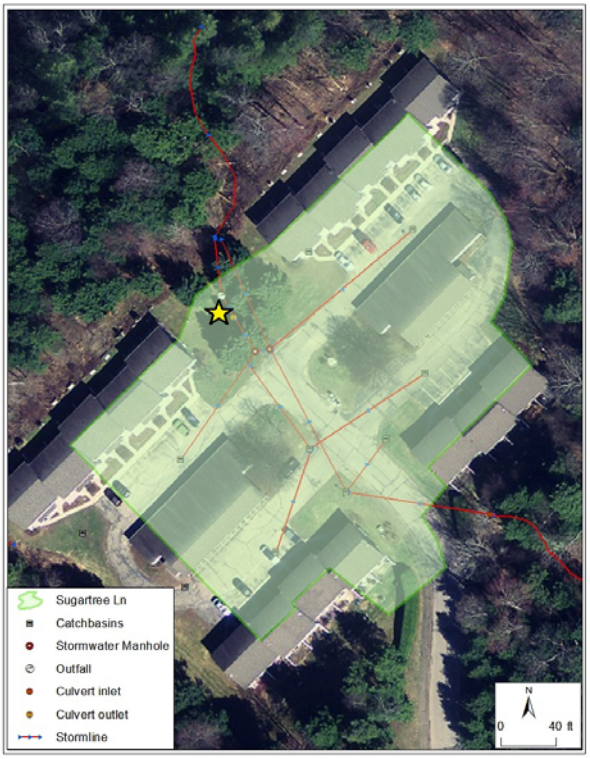
Expand existing depressed area at the end of Sugartree Ln , which appears to be an abandoned detention area. Reroute catchbasins to pond. Upgrade pond outlet.

Feasibility concerns:

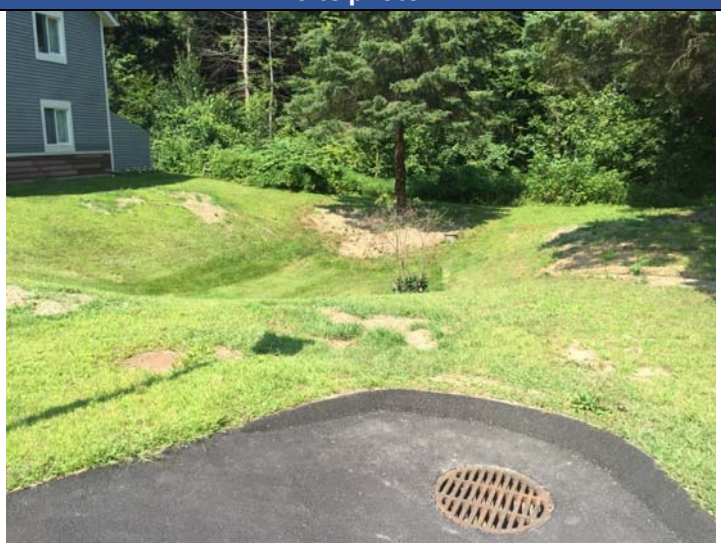
Space to expand depressed area is limited.

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	1.54
Impervious area managed (acres)	1.05
% Impervious	69%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.05
BMP Depth (feet)	8.00
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.12
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0878

Site map



Site photo



Potash Brook FRP BMP Summary Sheet

Site name:	Swift Estates Pond	**South Burlington ID:**	PB0075		
Approximate address:	Meadowood Dr and Swift St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Existing Detention Pond				

Proposed BMP description:

Retrofit existing detention pond to meet CPv standards. Add forebay and upgrade outlet structure.

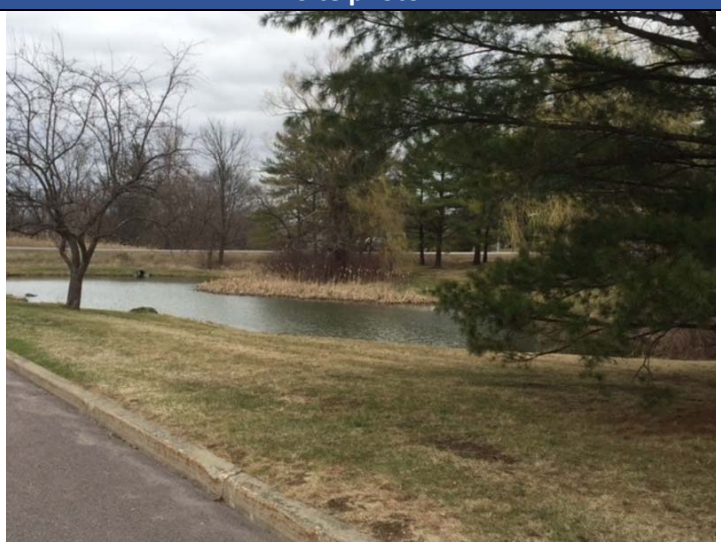
Feasibility concerns:

Space is limited to expand pond.

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	18.52
Impervious area managed (acres)	3.57
% Impervious	19%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.41
BMP Depth (feet)	7.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.33
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo



Potash Brook FRP BMP Summary Sheet

Site name:	Technology Park Pond Retrofit	**South Burlington ID:**	PB0076

Approximate address:	Community Dr off of Kimball Ave, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing

Proposed BMP type:	Retrofit Existing Detention Pond

Proposed BMP description:

Retrofit existing detention pond to meet CPv standards. Upgrade outlet structure and expand pond to accommodate additional storage.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	8.05
Impervious area managed (acres)	0.03
% Impervious	0%
Land owner where BMP is	Private
BMP Footprint Size (acres)	1.08
BMP Depth (feet)	5.50
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Industrial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.27
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1458 P4

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Temple Detention Pond	**South Burlington ID:**	PB0077		
Approximate address:	Swift St and Dorset St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Propose new detention pond in depressed area in front of Temple by intersection of Dorset St and Swift St. Stormwater already collects in this area.

Feasibility concerns:

Wetlands concerns.

Proposed BMP details	
Estimated project cost	$47,000
Drainage area (acres)	1.81
Impervious area managed (acres)	0.92
% Impervious	51%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.14
BMP Depth (feet)	5.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Institutional
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.19
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	The Pines	**South Burlington ID:**	PB0078		
Approximate address:	Oakwood Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Existing Detention Pond and add CMAC Valve				

Proposed BMP description:

Retrofit existing detention pond. Add forebay and CMAC valve to detain CPv.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	12.67
Impervious area managed (acres)	5.85
% Impervious	46%
Land owner where BMP is	Private
BMP Footprint Size (acres)	1.14
BMP Depth (feet)	5.00
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.21
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1117

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	UMall Detention Pond	**South Burlington ID:**	PB0079		
Approximate address:	Dorset St (University Mall), South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Existing Detention Pond				

Proposed BMP description:

Retrofit existing detention pond to detain CPv. Upgrade outlet structure and expand pond.

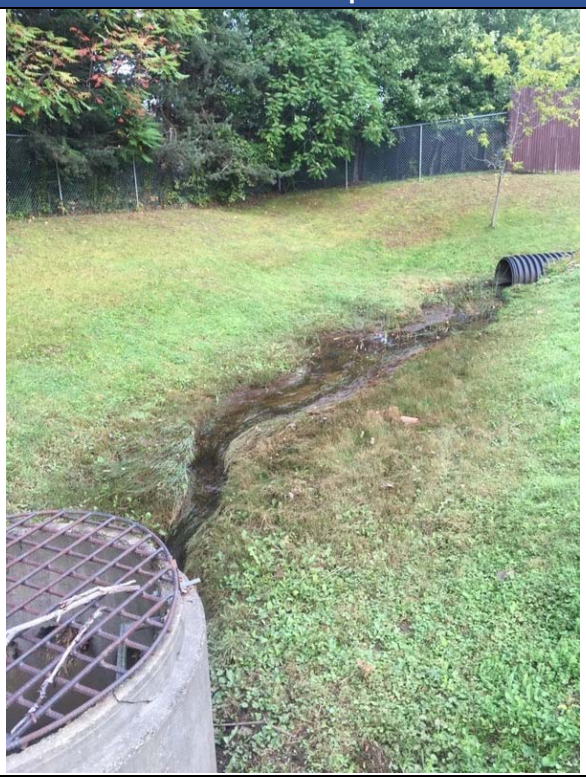
Feasibility concerns:

Space is limited.

Proposed BMP details	
Estimated project cost	$27,000
Drainage area (acres)	16.90
Impervious area managed (acres)	14.96
% Impervious	89%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.34
BMP Depth (feet)	9.00
Hydrologic soil group	B
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.91
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-0503c; 6282-9030

Site map

Site photo



Potash Brook FRP BMP Summary Sheet

Site name:	UMall Infiltration 1	**South Burlington ID:**	PB0080		
Approximate address:	Dorset St (University Mall), South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Infiltration Gallery				

Proposed BMP description:

Retrofit existing infiltration gallery to infiltrate the CPv.

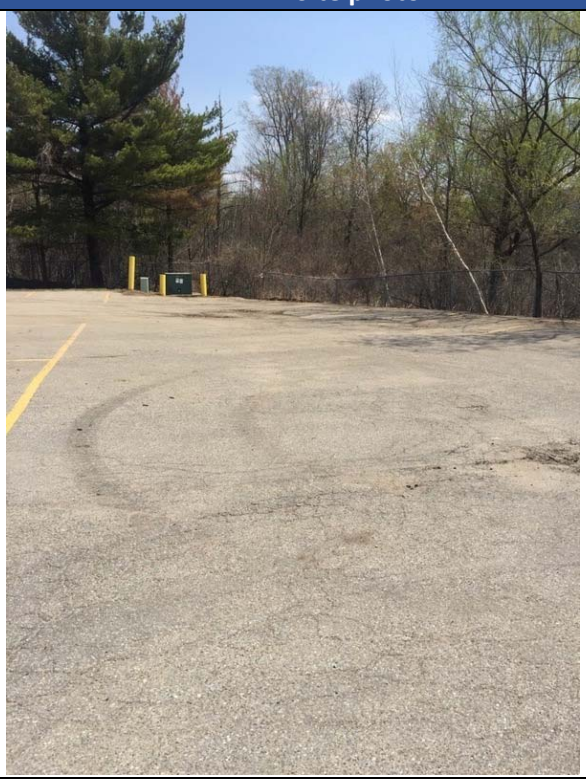
Feasibility concerns:

Need to assess capacity for expanding infiltration gallery.

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	17.15
Impervious area managed (acres)	15.30
% Impervious	89%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.09
BMP Depth (feet)	5.40
Hydrologic soil group	B
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.03
Volume infiltrated (ac-ft)	0.18
Primary or secondary BMP?	Primary
Expired permit(s)?	1-0503b; 6282-9030

Site map

Site photo



Potash Brook FRP BMP Summary Sheet

Site name:	UMall Infiltration 2	**South Burlington ID:**	PB0081		
Approximate address:	Dorset St (University Mall), South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Infiltration Gallery				

Proposed BMP description:

Retrofit existing infiltration gallery to infiltrate the CPv.

Feasibility concerns:

Need to assess capacity for expanding infiltration gallery.

Proposed BMP details	
Estimated project cost	$55,000
Drainage area (acres)	5.61
Impervious area managed (acres)	5.55
% Impervious	99%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.48
BMP Depth (feet)	4.72
Hydrologic soil group	B
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.31
Volume infiltrated (ac-ft)	2.17
Primary or secondary BMP?	Primary
Expired permit(s)?	1-0503a; 6282-9030

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	UMall Sears Auto Pond	**South Burlington ID:**	PB0082		
Approximate address:	Dorset St (University Mall), South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Pond to Gravel Wetland				

Proposed BMP description:

Construct large gravel wetland in unused section of parking lot in Umall (to the east of the party store). Reroute Dorset St stormline here.

Feasibility concerns:

Proposed BMP will require reducing parking. Potential buried utilities.

Proposed BMP details	
Estimated project cost	$90,000
Drainage area (acres)	11.62
Impervious area managed (acres)	9.29
% Impervious	80%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.86
BMP Depth (feet)	6.00
Hydrologic soil group	A/B/D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.61
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-0503d; 6282-9030; 2-0619

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	UVM Bio Research Complex	**South Burlington ID:**	PB0083		
Approximate address:	Spear St north of I-89, South Burlington	**MS4 where BMP is located:**	UVM	**New or existing BMP?**	New
Proposed BMP type:	Bioretention				

Proposed BMP description:

Construct bioretention to treat stormwater in grassed area near the center of complex. Potential educational benefit.

Feasibility concerns:

Potential buried utilities.

Proposed BMP details	
Estimated project cost	$176,000
Drainage area (acres)	1.85
Impervious area managed (acres)	0.92
% Impervious	50%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.10
BMP Depth (feet)	5.00
Hydrologic soil group	C
MS4s contributing drainage to BMP	UVM
Primary land use in drainage area	Institutional
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.20
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	5269-9003.R

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	UVM Forestry Research Center - East Roof	**South Burlington ID:**	PB0084

Approximate address:	Spear St north of I-89, South Burlington	**MS4 where BMP is located:**	UVM	**New or existing BMP?**	New

Proposed BMP type:	Infiltration Gallery

Proposed BMP description:

Construct dry well to capture and infiltrate roof drain. Potential educational benefit.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$39,000
Drainage area (acres)	0.42
Impervious area managed (acres)	0.41
% Impervious	98%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.01
BMP Depth (feet)	3.33
Hydrologic soil group	B
MS4s contributing drainage to BMP	UVM
Primary land use in drainage area	Institutional
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.06
Volume infiltrated (ac-ft)	0.01
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	UVM Forestry Research Center - West Roof	**South Burlington ID:**	PB0085

Approximate address:	Spear St north of I-89, South Burlington	**MS4 where BMP is located:**	UVM	**New or existing BMP?**	New

Proposed BMP type:	Infiltration Gallery

Proposed BMP description:

Construct dry well to capture and infiltrate roof drain. Potential educational benefit.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	0.12
Impervious area managed (acres)	0.12
% Impervious	100%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.03
BMP Depth (feet)	3.33
Hydrologic soil group	B
MS4s contributing drainage to BMP	UVM
Primary land use in drainage area	Institutional
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.02
Volume infiltrated (ac-ft)	0.01
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Vermont National Country Club Pond B	**South Burlington ID:**	PB0086		
Approximate address:	Golf Course Rd and Park Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Existing Detention Pond				

Proposed BMP description:

Retrofit existing detention pond. Add forebay and expand pond.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	35.72
Impervious area managed (acres)	8.63
% Impervious	24%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.47
BMP Depth (feet)	10.50
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.43
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1241b

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Vermont National Country Club Pond C	**South Burlington ID:**	PB0087		
Approximate address:	Golf Course Rd and Park Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Existing Detention Pond				

Proposed BMP description:

Retrofit existing detention pond. Add forebay and expand pond.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	9.94
Impervious area managed (acres)	0.47
% Impervious	5%
Land owner where BMP is	Private
BMP Footprint Size (acres)	1.78
BMP Depth (feet)	4.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Golf Course
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.85
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1241c

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	VT Gas Detention Pond	**South Burlington ID:**	PB0088		
Approximate address:	Swift St and Farrell St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention pond				

Proposed BMP description:

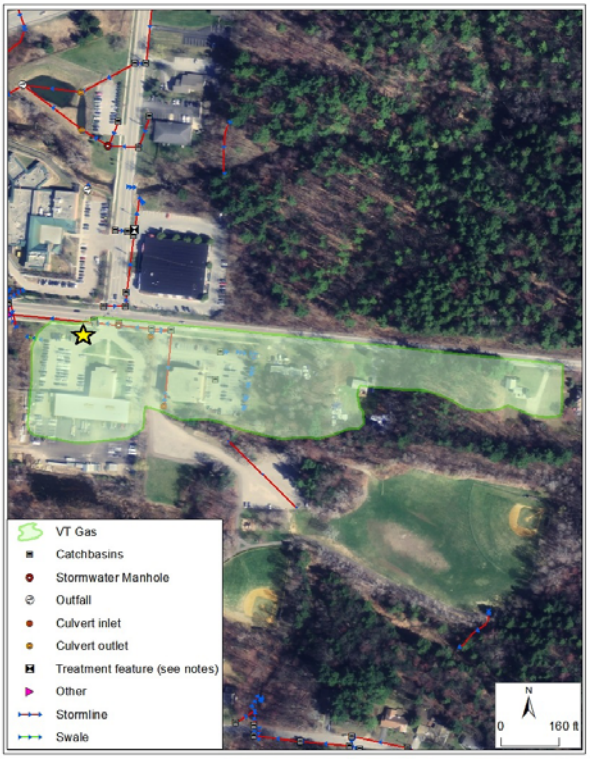
Reroute stormline from Swift St to grassed area to the north of VT Gas property and construct new detention pond.

Feasibility concerns:

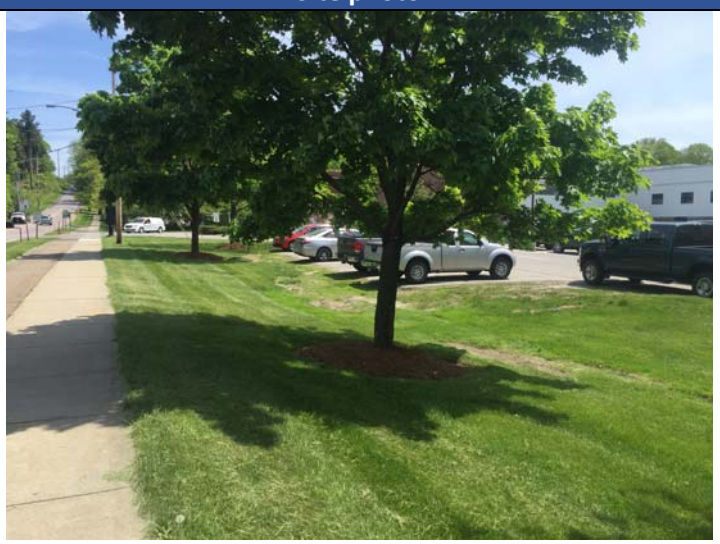
Space is limited. Proposed BMP is in close proximity to brook.

Proposed BMP details	
Estimated project cost	$52,000
Drainage area (acres)	7.57
Impervious area managed (acres)	3.09
% Impervious	41%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.10
BMP Depth (feet)	6.00
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.17
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0228; 6293-9030

Site map



Site photo



Potash Brook FRP BMP Summary Sheet

Site name:	Wellesley Grove	**South Burlington ID:**	PB0089		
Approximate address:	Georgetown off of Kennedy Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Detention pond				

Proposed BMP description:

Add outlet control to existing depression to detain stormwater. Outfall is currently eroded.

Feasibility concerns:

Wetlands concerns.

Proposed BMP details	
Estimated project cost	$77,000
Drainage area (acres)	8.85
Impervious area managed (acres)	2.15
% Impervious	24%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.29
BMP Depth (feet)	5.00
Hydrologic soil group	A/C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.27
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-1023

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Windridge Court	**South Burlington ID:**	PB0090		
Approximate address:	Windridge Ct and Kennedy Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Basin				

Proposed BMP description:

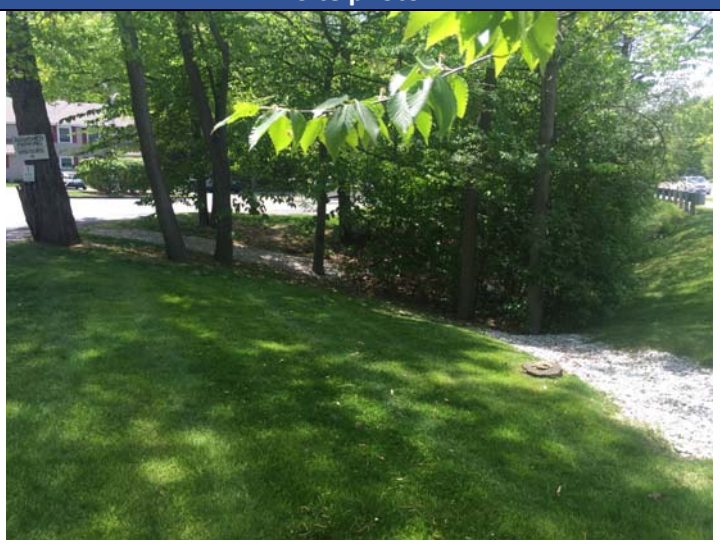
Construct new infiltration basin to infiltrate stormwater to the west of this small development.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$45,000
Drainage area (acres)	1.04
Impervious area managed (acres)	0.58
% Impervious	55%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.09
BMP Depth (feet)	4.50
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.10
Volume infiltrated (ac-ft)	0.10
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0824

Site map

Site photo



Potash Brook FRP BMP Summary Sheet

Site name:	Woodcrest Drive	**South Burlington ID:**	PB0091		
Approximate address:	Woodcrest Dr and Deane St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Basin				

Proposed BMP description:

Infiltrate stormwater to the southwest of drainage area. Reroute stormline south to new BMP. Construct new swale to drain the end of Woodcrest Dr, which is currently eroding slope following road.

Feasibility concerns:

Wetlands exist to the west and south of proposed BMP.

Proposed BMP details	
Estimated project cost	$182,000
Drainage area (acres)	7.46
Impervious area managed (acres)	2.38
% Impervious	32%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.22
BMP Depth (feet)	5.00
Hydrologic soil group	A/C
MS4s contributing drainage to BMP	South Burlington, VTrans
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.50
Volume infiltrated (ac-ft)	0.50
Primary or secondary BMP?	Primary
Expired permit(s)?	No Permit

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Woodlands Industrial Park	**South Burlington ID:**	PB0092		
Approximate address:	Kimball Ave west of Community Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Retrofit Existing Detention Pond				

Proposed BMP description:

Reroute roof drainage to existing detention pond. Retrofit pond to accommodate additional volume and detain CPv.

Feasibility concerns:

Space to expand pond is limited.

Proposed BMP details	
Estimated project cost	$25,000
Drainage area (acres)	4.40
Impervious area managed (acres)	3.89
% Impervious	88%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.20
BMP Depth (feet)	8.00
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Industrial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.37
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-0526/ 6279-9030

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Worcester Street	**South Burlington ID:**	PB0093		
Approximate address:	Adirondack St and Butler Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Underground Detention				

Proposed BMP description:

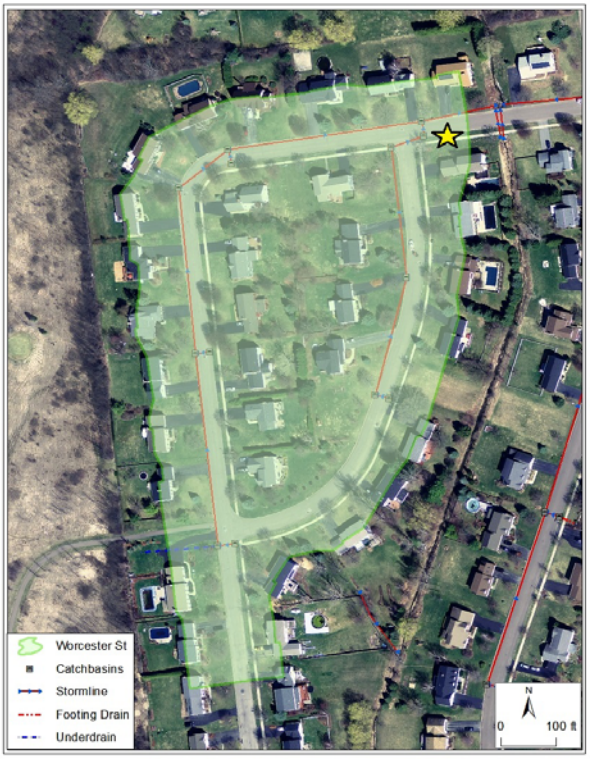
Construct underground detention chambers under ROW and grassed shoulder.

Feasibility concerns:

Space is very limited. Utilities concerns. Unsure how high groundwater table is here.

Proposed BMP details	
Estimated project cost	$821,000
Drainage area (acres)	10.84
Impervious area managed (acres)	3.82
% Impervious	35%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.26
BMP Depth (feet)	5.17
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.56
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	2-0312

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Dorset Park Pond	**South Burlington ID:**	PB0094		
Approximate address:	Dorset St and Swift St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Retrofit pond with CMAC valve.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$20,000
Drainage area (acres)	26.07
Impervious area managed (acres)	5.95
% Impervious	23%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	1.18
BMP Depth (feet)	6.60
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Recreational
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.30
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1033

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Hannaford's Pond	**South Burlington ID:**	PB0095		
Approximate address:	Hannaford Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Detention Pond				

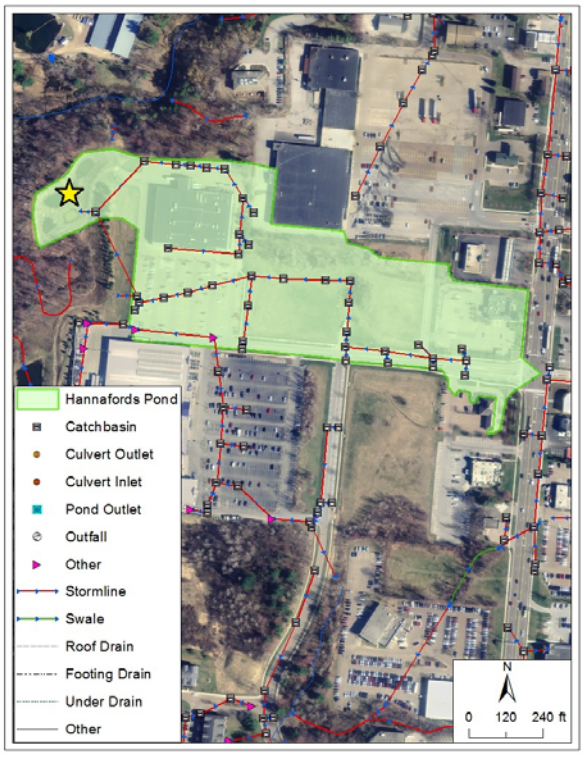
Proposed BMP description:

Retrofit pond with CMAC valve.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$21,000
Drainage area (acres)	14.71
Impervious area managed (acres)	7.75
% Impervious	53%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.59
BMP Depth (feet)	10.50
Hydrologic soil group	B
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.34
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1214

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Lowes Pond	**South Burlington ID:**	PB0096		
Approximate address:	Hannaford Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Detention Pond				

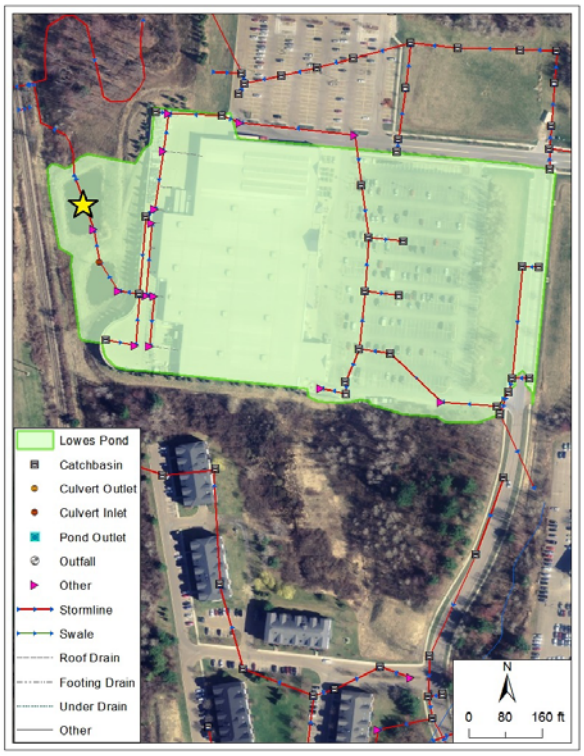
Proposed BMP description:

Retrofit pond with CMAC valve.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$17,000
Drainage area (acres)	12.73
Impervious area managed (acres)	10.05
% Impervious	79%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.34
BMP Depth (feet)	6.00
Hydrologic soil group	A/D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.20
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1214

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Vermont National Country Club Pond B	**South Burlington ID:**	PB0097

Approximate address:	Golf Course Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing

Proposed BMP type:	Detention Pond

Proposed BMP description:

Retrofit pond with CMAC valve.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$36,000
Drainage area (acres)	35.72
Impervious area managed (acres)	8.63
% Impervious	24%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.63
BMP Depth (feet)	12.00
Hydrologic soil group	C/D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.92
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1241b

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Technology Park Pond 1	**South Burlington ID:**	PB0098		
Approximate address:	Community Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Detention Pond				

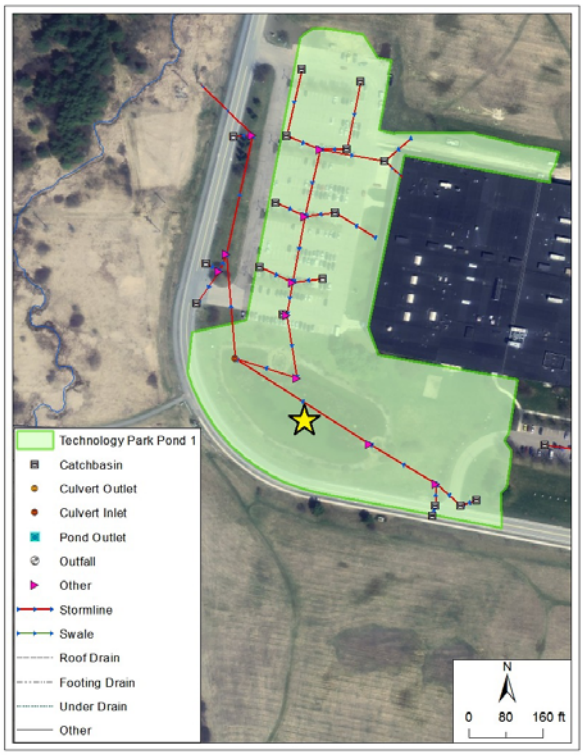
Proposed BMP description:

Retrofit pond with CMAC valve.

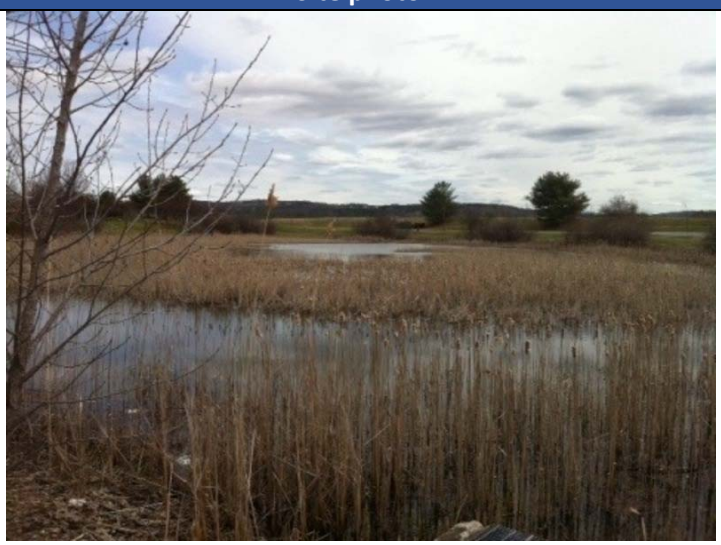
Feasibility concerns:

Proposed BMP details	
Estimated project cost	$22,000
Drainage area (acres)	8.96
Impervious area managed (acres)	3.78
% Impervious	42%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.74
BMP Depth (feet)	8.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Industrial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.37
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1254

Site map



Site photo



Potash Brook FRP BMP Summary Sheet

Site name:	Lot A Mountain View Pond	**South Burlington ID:**	PB0099		
Approximate address:	Tilley Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Detention Pond				

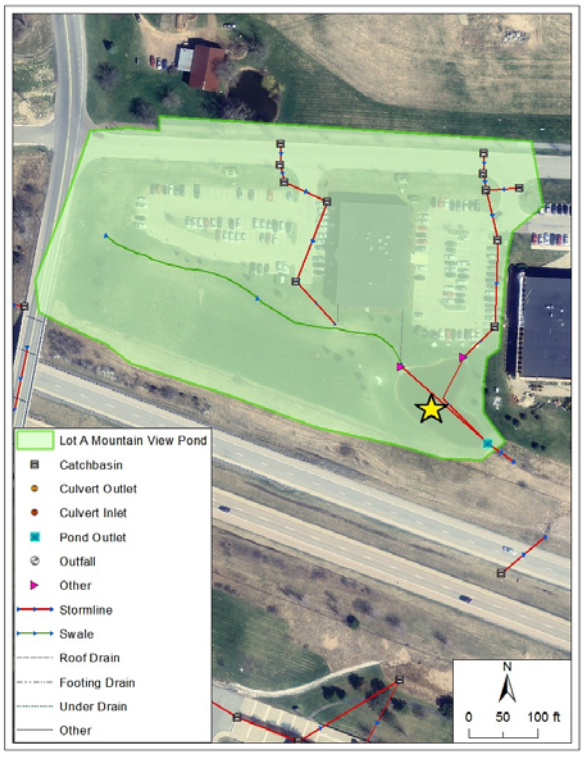
Proposed BMP description:

Retrofit pond with CMAC valve.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$12,000
Drainage area (acres)	6.05
Impervious area managed (acres)	2.55
% Impervious	42%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.16
BMP Depth (feet)	14.00
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.02
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1536

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Kennedy Dr Pond 1	**South Burlington ID:**	PB0100		
Approximate address:	Kennedy Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Detention Pond				

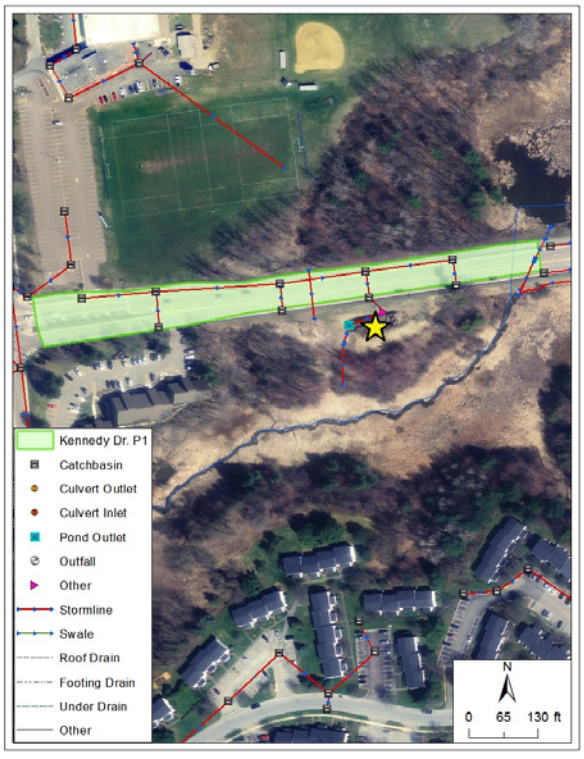
Proposed BMP description:

Retrofit pond with CMAC valve.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$13,000
Drainage area (acres)	1.47
Impervious area managed (acres)	1.33
% Impervious	91%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.08
BMP Depth (feet)	5.91
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Road
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.05
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	1-1582a

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Quarry Hill Pond	**South Burlington ID:**	PB0101		
Approximate address:	Quarry Hill Rd off of Spear St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Detention Pond				

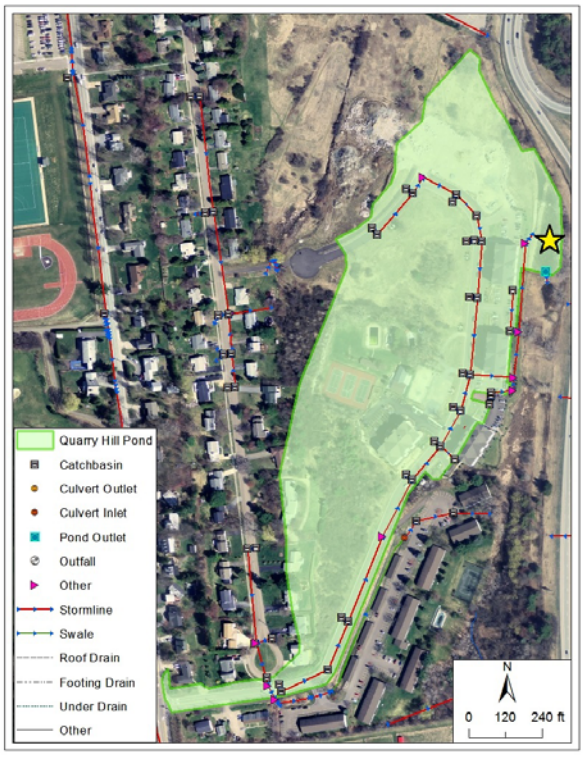
Proposed BMP description:

Retrofit pond with CMAC valve.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$12,000
Drainage area (acres)	21.75
Impervious area managed (acres)	6.19
% Impervious	28%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.41
BMP Depth (feet)	5.40
Hydrologic soil group	B/D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.00
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	3602-INDS

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Heatherfield P1	**South Burlington ID:**	PB0102		
Approximate address:	Off of Spear St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Detention Pond				

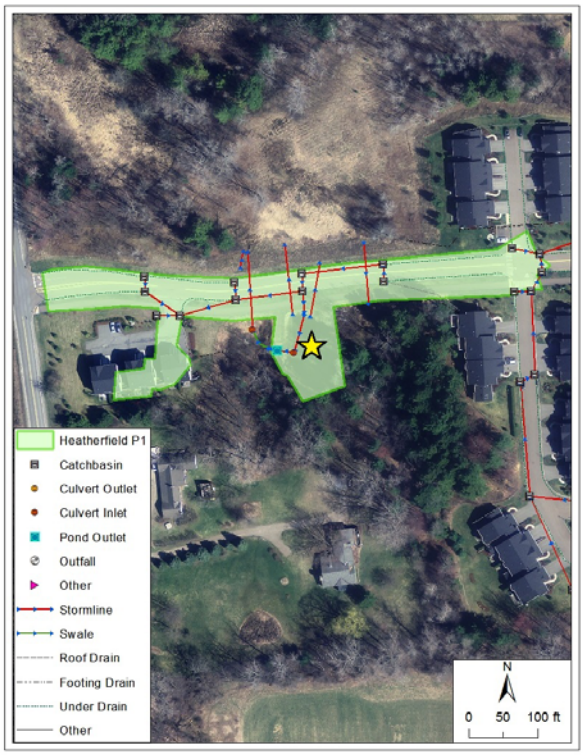
Proposed BMP description:

Retrofit pond with CMAC valve.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$12,000
Drainage area (acres)	1.40
Impervious area managed (acres)	0.90
% Impervious	64%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.05
BMP Depth (feet)	8.00
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.00
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	3658a

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Heatherfield P2	**South Burlington ID:**	PB0103		
Approximate address:	Off of Spear St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Retrofit pond with CMAC valve.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$13,000
Drainage area (acres)	10.76
Impervious area managed (acres)	7.08
% Impervious	66%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.26
BMP Depth (feet)	11.00
Hydrologic soil group	B/C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.03
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	3658b

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Heatherfield P3	**South Burlington ID:**	PB0104		
Approximate address:	Off of Spear St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Retrofit pond with CMAC valve.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$13,000
Drainage area (acres)	4.30
Impervious area managed (acres)	2.71
% Impervious	63%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.10
BMP Depth (feet)	11.50
Hydrologic soil group	A
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.05
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	3658c

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Winding Brook	**South Burlington ID:**	PB0105		
Approximate address:	Winding Brook Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Detention Pond				

Proposed BMP description:

Retrofit pond with CMAC valve.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$15,000
Drainage area (acres)	9.11
Impervious area managed (acres)	3.32
% Impervious	36%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.19
BMP Depth (feet)	9.50
Hydrologic soil group	C
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Residential
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.11
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	3691-INDS

Site map

Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Mountainview Pond b	**South Burlington ID:**	PB0106		
Approximate address:	Tilley Dr, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Detention Pond				

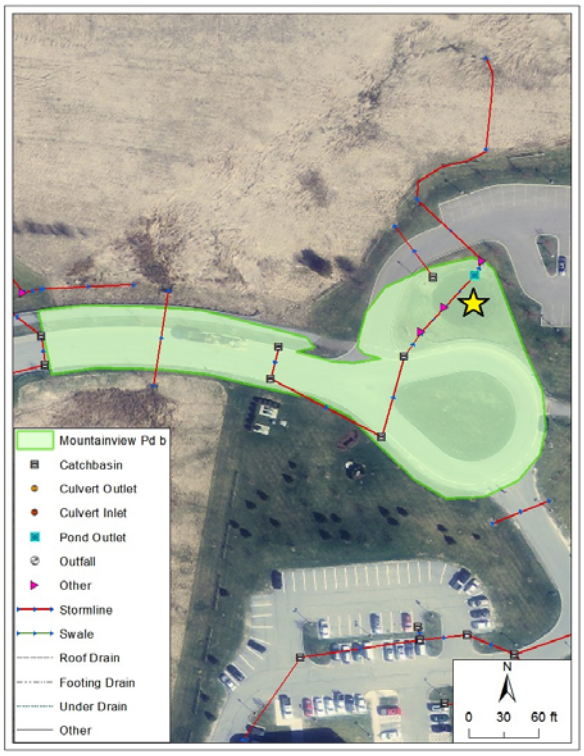
Proposed BMP description:

Retrofit pond with CMAC valve.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$14,000
Drainage area (acres)	0.90
Impervious area managed (acres)	0.61
% Impervious	68%
Land owner where BMP is	Private
BMP Footprint Size (acres)	0.13
BMP Depth (feet)	9.50
Hydrologic soil group	D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Road
Regional project? (2 or more landowners)	No
Channel protection volume managed (ac-ft)	0.08
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	3805-INDS

Site map



Site photo

Potash Brook FRP BMP Summary Sheet

Site name:	Farrell St Pond	**South Burlington ID:**	PB0107		
Approximate address:	Farrell St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Detention Pond				

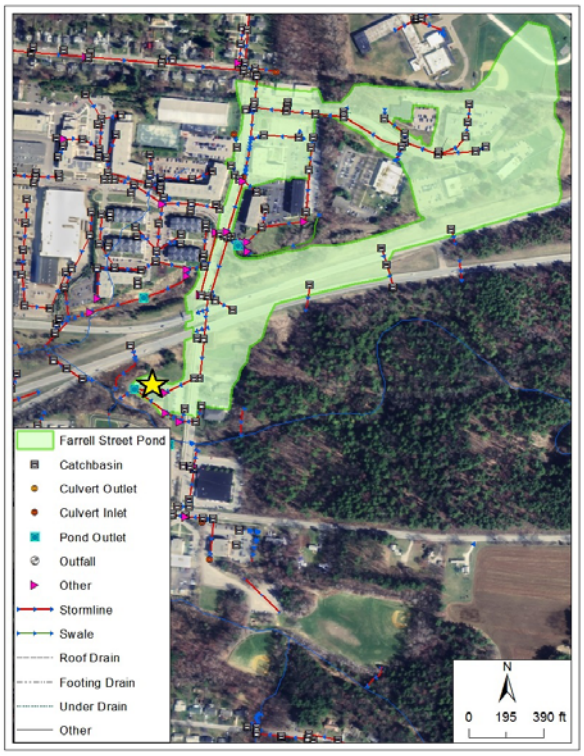
Proposed BMP description:

Retrofit pond with CMAC valve.

Feasibility concerns:

Proposed BMP details	
Estimated project cost	$13,000
Drainage area (acres)	32.96
Impervious area managed (acres)	11.03
% Impervious	33%
Land owner where BMP is	MS4 Owned
BMP Footprint Size (acres)	0.41
BMP Depth (feet)	9.00
Hydrologic soil group	A/C/D
MS4s contributing drainage to BMP	South Burlington
Primary land use in drainage area	Commercial
Regional project? (2 or more landowners)	Yes
Channel protection volume managed (ac-ft)	0.05
Volume infiltrated (ac-ft)	0.00
Primary or secondary BMP?	Primary
Expired permit(s)?	5080-INDO

Site map



Site photo

APPENDIX D

PROJECT RANKING

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Sandwich, MA • 02563
Tel: 508-833-6600 • Fax: 508-833-3150 • www.horsleywitten.com

MEMORANDUM

DATE: December 2, 2013

TO: Dan Albrecht; Megan Moir; Tom DiPietro; Jennifer Callahan; Bill Nedde, Linda Seavey, and Lani Ravin

FROM: Horsley Witten Group, Inc.

RE: Centennial Brook Watershed: Flow Restoration VTBMPDSS Modeling Analysis and BMP Supporting Information

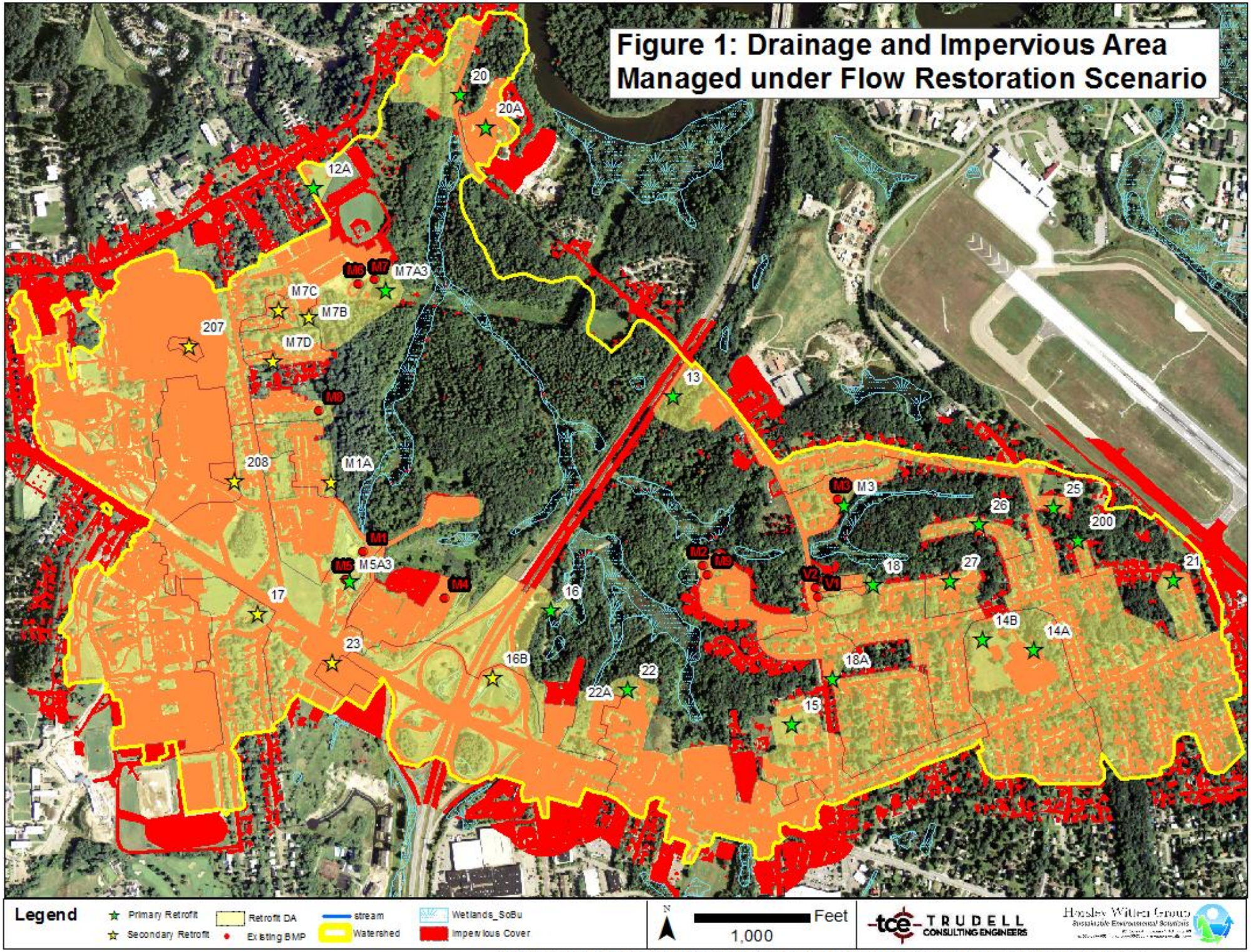
This memorandum describes the basic approach used to model potential stormwater retrofits for the Centennial Brook Flow Restoration Plan (FRP) using the VT BMPDSS model. Modeling efforts have proven that is it difficult to meet the **63.0%** high flow reduction target required by the Centennial Brook TMDL. In fact, the percent flow reduction achieved under the proposed restoration scenario is **45.7%**. This reduction reflects management of 90% of the watershed impervious cover using all retrofits identified in the field and vetted with the MS4s. Under this scenario, UVM's existing Main St. and North Campus ponds would be modified from their current configuration to improve performance while maintaining 12-hr detention times and storage capacity for future development activities (only the proposed Colchester Ave. watershed expansion is incorporated into the model at this time).

Table 1 summarizes high flow reduction targets established by the TMDL, a revised target based on an analysis of future impervious cover, and the percent reduction achieved under the currently modeled VTBMPDSS restoration scenario. Figures 1-3 show impervious cover and drainage area maps for the proposed restoration scenario, including a zoom in of the proposed Colchester Avenue expansion.

Table 1. Summary of Percent Flow Reductions Achieved

Description		% High Flow Reduction	Managed IA (acres)	Planning Level Cost[5]
TMDL Reduction Targets	TMDL baseline with no agriculture.	49.9	--	--
	TMDL with no agriculture and 40 acres future, unmanaged impervious cover.	63.0	--	--
	TMDL with no agriculture and revised 5 acres of future, unmanaged impervious cover.[1]	51.5[2]	--	--
Current Conditions	All existing BMPs (revised ANR VTBMPDSS Credit Model)	14.8	106.1[3]	--
Proposed Flow Restoration Scenario	All primary and secondary retrofits; existing UVM facilities meeting 12-hr detention criteria and maintaining future use allocations; Colchester Ave watershed expansion included.[4]	45.7	243.5	$9,740,000

[1] Based on 2013 analysis conducted by CCRPC for Burlington and South Burlington.
[2] 51.5% = 49.9% baseline target + 5/40 acres future IA * 13.1% reduction target associated with future IA
[3] IA managed by post-2002 BMPs, which does not include Main Street and Queensbury ponds (based on most recently available GIS)
[4] One surface detention facility proposed in the VTrans right-of-way is designed to exceed 24-hr detention time.
[5] See cost section for more detail on planning level assumptions and costing analysis.



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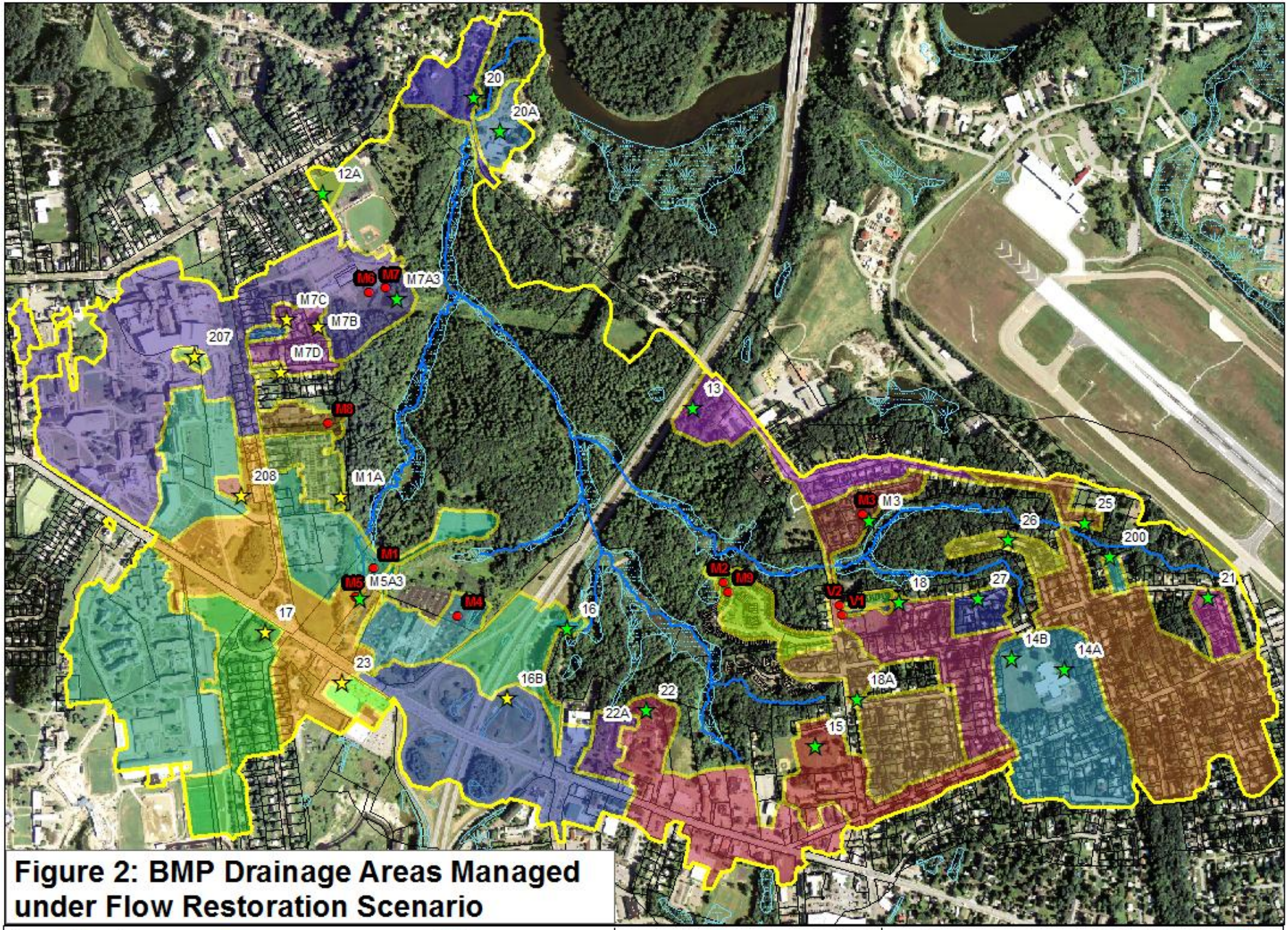

Figure 2: BMP Drainage Areas Managed under Flow Restoration Scenario

Legend

- Primary Retrofit
- Secondary Retrofit
- Retrofit DA
- Existing BMP
- stream
- Watershed
- Wetlands_SoBu
- Parcels

N

Feet

1,000

TRUDELL CONSULTING ENGINEERS

Hoisley Witten Group

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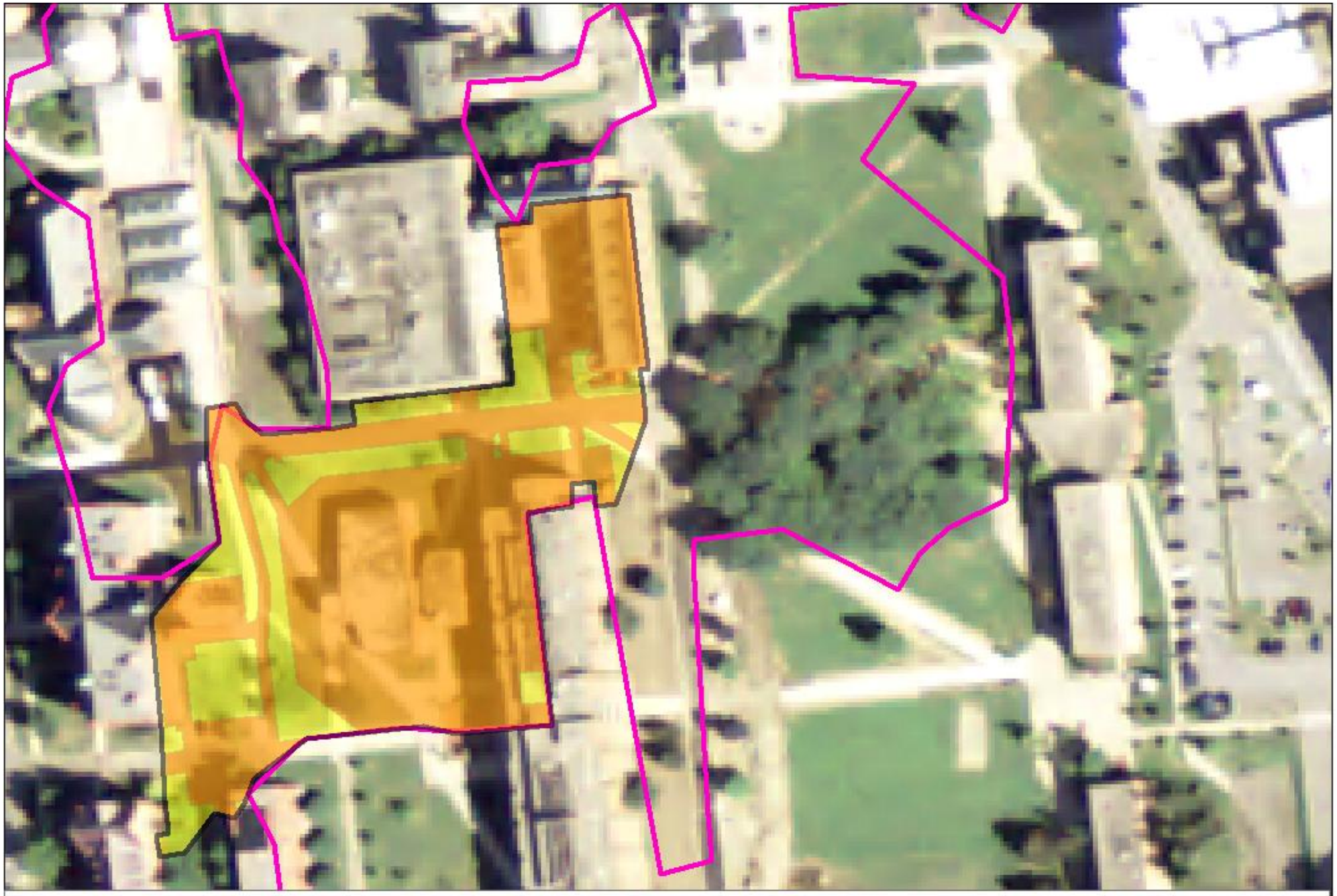

Figure 3. Colchester Ave. Proposed Watershed Expansion

Legend

- Colchester Ave Area
- Impervious Cover
- Existing Watershed Boundary

N

100 Feet

TRUDELL CONSULTING ENGINEERS

Hoisley Witten Group

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General Conclusions

The restoration scenario presented here is not intended to represent the optimal implementation scenario proposed by the MS4s, rather it represents the maximum reduction all MS4s agree is achievable, regardless of cost considerations. Prior to moving forward with finalizing the flow restoration plan for Centennial Brook, the MS4s and the VT Agency of Natural Resources (ANR) may want to consider the following:

1. A detailed analysis was conducted by Chittenden County Regional Planning Commission in July, 2013 that refined the estimate of future, unregulated impervious cover to a more realistic estimate of 5 acres, rather than the 40 acres assumed in the TMDL. This change, if approved by ANR, would lower the high flow TMDL target from 63.0% to 51.5%.
2. Restoration activities other than the implementation of structural stormwater retrofits, such as tree planting, buffer enhancement, impervious cover reduction, or more stringent development requirements could potentially bridge the remaining gap for meeting the reduction target if a crediting mechanism was established.
3. Higher flow reductions are possible if surface detention time (center of mass) are relaxed in Centennial Brook; although modeling suggests that detention times >24 hrs for retrofits of existing and new ponds still cannot meet the 63% reduction target. If increased detentions times were allowed, future permitting of proposed development projects draining to those retrofitted facilities would also need to be considered.
4. The proposed retrofits with the most influence on flow reduction modeled at the watershed outlet include: Best Western (#22 at 13.6% relative reduction); North Campus Pond (M7A3 at 7.7%); Chamberlain School (#14 at 5.9%); and Picard Circle (#25 at 4.3%). The East Campus Pond (M1) contributes to 13.4% of the achieved flow reduction, though no retrofit of this facility is proposed. The Main St. pond retrofit's (M5A3) relative reduction was 3.4%. These "regional" storage facilities manage more impervious cover than the smaller on-site BMPs, which have less of an individual influence on reductions measured at the watershed outlet. Based on the results of the VTBMPDSS, the revised 51.5% flow reduction target can be met by extending detention times of the UVM ponds beyond 24 hours; however, since over-detention in these existing facilities was reported by Krebs and Lansing to significantly reduce UVM's future development opportunities, this retrofit option is not considered practical. Regardless, the 63% target was not reached under any modeling scenarios.
5. A number of secondary BMPs (practices within the drainage areas of primary sites) were identified as backup options in case primary sites become infeasible or are down-sized. None of the secondary practices are able to completely replace the relevant primary practice, however. The I-89 clover-leaf (16B) comes the closest, but is about ½ as effective as the primary BMP proposed at I-89 outfall (16). Currently, these secondary practices are included in the proposed restoration scenario in addition to the primary facilities to show the maximum amount of flow reduction deemed achievable, regardless of cost. Removing the secondary facilities from the restoration scenario will likely result in a very modest change the flow reduction at significant cost savings.
6. The VTBMPDSS model runs for Centennial Brook do not fully depict expected increases in low flow despite a substantial increase in annual infiltration volumes from the proposed infiltration BMPs. Under the proposed restoration scenario, 94 acres of impervious cover are directed to infiltration practices designed to infiltrate the 1-year storm. Using the Burlington rainfall record, a rough analysis of recharge from the impervious area runoff should yield approximately 22 inches/year.

This recharge should augment streamflow by approximately 0.24 cfs across the entire flow duration curve; however, the model predictions of increase in low flow from infiltration practices are only 0.02 cfs (an 8% increase over baseline conditions).

7. The planning level estimate of overall capital costs for the proposed flow restoration scenario modeled is $9,740,000.

The remainder of this memorandum provides more detailed information on the modeling analyses, BMP input information, and estimated construction costs. Additional supporting information submitted separately from, but in conjunction with, this memo includes:

- VTBMPDSS model runs for the revised baseline, the revised credit, and the proposed restoration scenario.
- GIS shapefiles used in each scenario, including updated impervious cover layer, BMP footprints, and other shapefiles created during this effort.
- HydroCAD models—created for all of the revised Credit BMPs and potential retrofits using HydroCAD version 10.00 for calibrating VTBMPDSS input;
- Spreadsheets—summarizing reductions, input variables, and cost estimates.

VTBMPDSS Modeling Analysis

The VTBMPDSS model is a continuous hydrological simulation model that estimates the effect of land use changes and stormwater BMPs on streamflow. This model was applied to the Centennial Brook watershed, which has a drainage area of about 1.4 square miles. The most important inputs to the model for this study are the GIS layers of land use, impervious cover, and soil, as well as the locations, configuration, and connections of the BMPs themselves.

Establishing Baseline Conditions

The ANR Baseline Scenario represents the watershed condition prior to the Centennial TMDL (2002), which in this case reflects six existing BMPs. In coordination with ANR, a Revised Baseline Scenario was created to address an issue discovered during subsequent modeling runs involving the application of BMPs with small drainage areas. Each time one of these on-site BMPs is added, the model creates a new routing connection that increases downstream flow and reduces times of concentration in the drainage area. This phenomenon can cause the VTBMPDSS model to underestimate the reduction potential of smaller green infrastructure (GI) practices and negates some of the potential benefits of BMP treatment trains. To accurately account for this effect, the Baseline Scenario was revised to incorporate virtual outlets (VOs) and drainage areas with “dummy” connections in the same manner as in the subsequently modeled flow restoration scenario. This adjustment did not alter flow paths in the Baseline Scenario, but did slightly increase Q03 base flows. Thus, slight increases in percent reductions over baseline conditions were achieved in the restoration scenarios.

FDC Statistics and Flow Reductions

The VTBMPDSS model outputs both summary files and complete records of hourly flows for any specified control points. The outlet is the primary control point (number 16 for this model). The outlet summary file (Init_Eval.out) provides a quick way to see the control point flows for Q95 and Q03 flows (cfsm) from the current scenario. These numbers were used as a quick guide on performance.

For the final FDC flow numbers, ANR recommends that a separate FDC analysis be performed using only the last 10 years of the 12 year output record for the desired control point (Init_VirtualOutlet_16.out). The FDC spreadsheet was used to provide these numbers for all current scenarios. Only these FDC numbers are reported in this memo.

Additionally, ANR requires computation of the flow reductions percentages based on flow in cubic feet per second (cfs) not cubic feet per second per square mile (cfsm). The logic is that additional watershed area would increase flow (in cfs) and require instream morphological changes that could be detrimental, like augmenting sediment load. The flow per square mile (cfsm) might be unchanged and not reflect this impact. Only flows in cfs were reported in this memo.

Current Condition (Credit) Models

The ANR Credit Scenario reflects upgrades to four of the six ponds included in the baseline model to meet 2002 VT Stormwater Manual criteria. Updated ponds include: the East Campus Pond (M1), Sheraton Pond (M4); the North Campus Pond (M6) with sediment forebay (M7); and the Quarry Ridge Pond (M9) with sediment forebay (M2). The Queensbury Rd. Pond (M3) and the Main St. Pond (M5) remained unchanged from the baseline model. The ANR Credit Scenario was reviewed and revised to account for: 1) an error discovered in the HydroCAD and VTBMPDSS setup for the East Campus pond (M1), and 2) recent construction at Patchen Woods that added two vegetated swales (V1 and V2), increased impervious cover, and required slight changes to sub-watershed boundaries.

HydroCAD modeling of BMPs

HydroCAD models were set up for most of the proposed retrofits identified during field investigations in May, 2013. The Field Findings Memorandum (dated June 13, 2013) that documented procedures and feasible retrofit concepts has been revised to reflect subsequent changes to some of the retrofit concepts (see Revised Field Summaries Memorandum, dated October, 2013). The HydroCAD runs were saved as PDF files, marked up to show the relevant VTBMPDSS parameters used, and then the selected parameters were saved in a model input spreadsheet, thus providing full documentation of each VTBMPDSS model run. All HydroCAD models and the input spreadsheet are available for review. The following two modeling adjustments should be noted:

- HydroCAD models were based on the most updated impervious cover and soils data, which may differ slightly from what is being used in the VTBMPDSS model. ANR requested consistency in the GIS layers used for running model scenarios to ensure that results are comparable to baseline conditions; however, they agreed that the BMPs should be adequately designed using the latest data.
- Because of the differing methods that HydroCAD and the VTBMPDSS models aggregate runoff from soils and impervious areas and deal with flow lag times (time of concentration), the size of the HydroCAD designs for some infiltration practices (e.g., Jaycee Park (15) and Patchen Rd. (18A)) had to be increased to achieve maximum infiltration in the VTBMPDSS.

Flow Restoration Scenario

A number of restoration scenarios were modeled to compare various implementation options using 39 stormwater BMPs. In these scenarios, primary BMPs are defined as having an outlet directly to a stream while secondary BMPs drain to a downstream BMP. More details of the BMP concept summaries, based on GIS and field data, can be found in the revised “Centennial Brook Watershed: Retrofit Field Findings Summary Memorandum” (dated October, 2013). A few key model parameters used during the restoration scenarios include:

- The revised impervious cover used in the Revised Credit Scenario was updated slightly to account for new parking lots and buildings recently constructed/removed based on a visual inspection of the latest satellite images. Even though more recent impervious cover GIS layers were available, this approach was recommended by ANR since it allows direct comparison with the baseline scenarios without introducing differences between remote sensing technology used to develop the old and new impervious cover layers.
- The watershed boundary was changed in a few locations based on MS4 input and field verification. For example, the area north of University Avenue and west of the baseball diamond was removed because it is now connected to the combined sewer system. The UVM proposed expansion on the corner of Colchester Avenue and University Place was modeled as part of the restoration scenario presented here.
- All the stormwater practices, except for vegetated swales, were modeled as multistage ponds. The multistage pond allows the volume-stage relationship to be well represented, has more options for outlet control structures, and has all the controls represented in other model BMPs like infiltration or biofiltration. The multi-stage pond also has the added advantage in that it can be turned on/off or scaled with a multiplier (normally set to 1.0). The parameter allows the same network to be preserved for all flow restoration scenarios and is extremely useful for evaluating different scenarios and individual BMP performance.

Table 2 summarizes the base, credit, and restoration scenarios discussed above. Table 3 provides an accounting of some of the key input parameters of each proposed BMP used in the proposed restoration scenario.

Table 2. Summary of Modeling Scenarios

Model Scenario			Purpose	Q03 High Flow		Conclusion
				(cfs)	% Red.	
Pre-TMDL	ANR Base	Six pre-2002 BMPs, 2002 land use and IA GIS layers	What were the flows at the time the TMDL was established? These flows are the baseline from which restoration/treatment is measured.	27.2	--	We were able to successfully replicate ANR's model.
	Revised Base	ANR Base + virtual outlets, DAs, and network	Add "dummy" BMP connections to allow for more accurate comparison with restoration scenarios.	28.6	--	This is the new baseline to measure achieved flow reductions.
Current	ANR Credit	ANR Base + upgrades to some existing BMPs	What is the change in baseline flow with the retrofit of 4 of 6 existing BMPs to 2002 standards?	23.1	15.2%	We were able to replicate ANR's model.
	Revised Credit	ANR Credit + BMP revisions/addition	Revise current conditions by correcting model inputs on East Campus Pond (M1) and adding the Patchen Woods development.	23.2	14.8%	Corrections result in a slight decrease from ANR's prediction of the current reductions.
Proposed Restoration Scenario		All primary and secondary retrofits (see Table 3)	What is the max. flow reduction achievable if all feasible retrofits are implemented with UVM-designed retrofits of the Main St. (M5A3) and North Campus (M7A3) ponds and the Colchester Ave. expansion.	15.5	45.7%	Does not meet the revised 51.5%% TMDL reduction target, and benefit of secondary practices probably not worth the additional cost.

Table 3. BMPs used in Flow Restoration Scenarios

Site ID	Site Name	BMP Type[1]	Class[2]	DA (ac)	IA (ac)[3]	% Difference in Q03[4]		Design Notes
						BMP Outlet	Watershed Outlet	
12A	University soccer field	IB	E	1.41	0.33	-100.0	0.0	--
13	Patchen Rd. depression	URC	P	14.06	5.07	-100.0	-1.2	Max. ponding depth=7'; Exfiltration = 2.41 in/hr
14A/B	Chamberlin School	URC	P	31.49	10.12	-100.0	-5.9	Field size: 97'(w) x 167'(l) x 3.5'(h); Exf. = 0.52 in/hr
15	Jaycee Park	DB	P	15.73	6.28	-100.0	-2.7	Field size: 87'(w) x 60'(l) x 3.5'(h); Exf. = 2.41 in/hr
16	I-89 outfall	DB	P	52.25	18.88	-26.4[4]	-2.1	Max det. time= 46.6 hr; max. ponding depth=12'
16B	I-89 cloverleaf (NE)	UDC	S	39.17	16.14	-83.0	-0.9	Max det. time=48.8 hrs; max. ponding depth=8'
17	Jug handle @ Spear & Main St. (east)	UDC	S	22.01	7.28	-74.9	-0.3	Field size: 144'(w) x 231'(l) x 3.5'(h)
18	Fielding Lane Condos	URC	P	18.74	5.48	-100.0	-2.3	Max. ponding depth=4'; Exf. = 2.41 in/hr
18A	Patchen Rd & Pine St	URC	P	20.41	6.00	-100.0	-1.8	Field size: 49'(w) x 81'(l) x 3.5'(h); Exf. = 2.41 in/hr
20	Grove St Parking Lot	URC	P	8.82	2.54	-100.0	-0.3	Field size: 30'(w) x 74'(l) x 3.5'(h); Exf. = 2.41 in/hr
20A	SD Ireland Property	URC	P	4.66	3.82	-100.0	-0.2	--
21	Dumont Ave (south)	URC	P	3.93	1.20	-100.0	-0.1	Field size: 21'(w) x 24'(l) x 3.5'(h); Exf. = 2.41 in/hr
22	Best Western Windjammer (N)	IB	P	29.25	21.68	-100.0	-13.6	Max. ponding depth=12'; Exf. = 2.41 in/hr
22A	Best Western Windjammer (W)	IB	P	4.09	1.24	-100.0	-0.5	Max. ponding depth=3'; Exf. = 2.41 in/hr
23A/B	Staples Plaza	UDC	S	2.50	2.43	-67.7	-0.2	Field size: 35'(w) x 259'(l) x 2.33'(h)
25	Picard Circle	URC	P	51.85	17.11	-86.7	-4.3	Field size: 49'(w) x 138'(l) x 3.5'(h); Exf. = 2.41 in/hr
26	Duval St	URC	P	3.57	1.18	-100.0	-0.1	Field size: 21'(w) x 24'(l) x 3.5'(h); Exf. = 2.41 in/hr
27	Clover St	URC	P	3.82	1.43	-100.0	0.0	Field size: 26'(w) x 31'(l) x 3.5'(h); Exf. = 2.41 in/hr
200	N Henry Court	URC	P	1.03	0.45	-100.0	0.0	Field size: 11'(w) x 24'(l) x 3.5'(h); Exf. = 2.41 in/hr
207	Fletcher Allen green space	Bio	S	0.89	0.85	-100.0	0.0	Bio surface area: 3,200 sf
208	Fletcher Allen parking lot	Bio	S	0.83	0.53	-100.0	-0.1	Bio surface area: 2,300 sf
M1A	Centennial Crt Apartments	IB	S	6.54	3.03	-100.0	-0.6	Max. ponding depth=4'; Exfiltration=0.52 in/hr

Site ID	Site Name	BMP Type[1]	Class[2]	DA (ac)	IA (ac)[3]	% Difference in Q03[4]		Design Notes
						BMP Outlet	Watershed Outlet	
M1	East Campus Pond	DB	E	80.18	49.22	-58.1	-13.4	Existing UVM design. Max. det. time= < 12 hrs. Stor. Vol. = 11.3 ac-ft
M2/ M9	Quarry Ridge	DB	E	7.44	4.2	-59.7	-1.1	Max det. time= 12.5 hrs
M3A	Queensbury Pond (modified)	IB	P	8.99	4.17	-86.5	-0.8	Max. ponding depth=10'; Exfiltration=2.41 in/hr
M4	Sheraton	DB	E	9.81	6.70	-52.4	-0.2	Max det. time= 9.9 hrs
M5A3	Main St (UVM modified)	DB	P	64.15	26.59	-39.0	-3.4	UVM design. Max. det. time= < 12 hrs. Stor. Vol. =8.5 ac-ft; with smaller low flow orifice of 5.8" than existing
M6 / M7A3	North Campus (UVM modified)	DB	P	86.25	48.16	-46.3	-7.7	UVM design. Max. det. time= < 12 hrs. Stor. Vol. =21.5 ac-ft.; perm pool elevation 236.0, with smaller low flow orifice of 7.3" than existing and raised to 9-ft embankment
M7B	Open area east of Case Pkwy	URC	S	7.04	3.19	-100.0	-0.1	Field size: 40'(w) x 74'(l) x 3.5'(h); Exf. = 2.41 in/hr
M7C	Case Pkwy center island	Bio	S	0.86	0.50	-100.0	0.1	Bio surface area: 700 sf
M7D	140 East Ave residence	Bio	S	0.63	0.36	0.0	0.0	Bio surface area: 1,550 sf
M8	Burlington COOP	DB	E	3.73	1.62	-100.0	-0.4	Max det. time= 2hrs
V1	Patchen Woods	VS	E	0.48	0.32	-50.0	-0.3	
V2	Patchen Woods	VS	E	0.91	0.81	-100.0	-0.11	

[1] Bio=bioretention; DB=detention basin, IB= infiltration basin; UDC= underground detention chamber; URC=underground recharge chambers; and VS=vegetated swale

[2] P=Primary BMP; S= Secondary BMP that drains to a primary BMP; E=Existing practice

[3] Impervious area shown here is based on the most recent/ accurate information that was used to size potential retrofits and may not correspond exactly with GIS layers used in the VTBMPDSS model

[4] Percent difference in high flows is negative when showing a reduction. The model was run with all BMPs turned on and then with individual BMPs turned off, one at a time, to quantify differences in flow and relative performance at the outlet of individual BMPs. Differences at each BMP outlet were determined by comparing the inflows and outflows. 100% represents no surface discharge; BMPS with less than 50% at the BMP outlet could be opportunities to enhance performance. Differences in flow at the watershed outlet are intended as a relative comparison of BMP effectiveness, but are not absolute or additive. Individual BMP values do not add up to corresponding total watershed reductions due to other losses in the system.

[4] Relative performance for #16 appears low because #16B is already managing a large portion of the drainage area.

Estimated Project Costs

This section provides estimates of construction costs for the various stormwater retrofit facilities based on volume managed, the type of BMP, and the type of project site. The total cost for implementation of the restoration scenario presented here is $9,740,000.

The cost estimates were developed based on the following assumptions and design decisions:

1. **Design Control Volumes** are based on the estimated runoff volume associated with the one-year storm event for underground systems or green infrastructure-type practices. Control volumes for large, above-ground infiltration or detention basins are based on the estimated runoff associated with the one hundred year storm event plus approximately two feet of freeboard volume. Underground systems and green infrastructure-type practices were conceptually designed as off-line practices that only accept runoff from the one-year event. Runoff volumes for all storm events were determined based on HydroCAD® model results that rely on the Soil Conservation Service (SCS) TR-55 and TR-20 hydrologic methods.
2. Table 4 summarizes **Unit Costs** for each BMP and **Site Adjustment Factors** that were derived from research by the Charles River Watershed Association and Center for Watershed Protection, as well as from our experience with actual construction. Underground detention chambers (UDC) and underground recharge chamber (URC) systems were typically designed using Stormtech SC-740™ chamber systems. A Stormtech SC-310™ system was used at Site 23A/B due to a shallow existing drainage system. Cost estimates for the retrofit sites described as "GI/URC" were calculated as bioretention treatment systems followed by Stormtech SC-740™ chambers for recharge benefits. The cost adjustment factors were used to account for site-specific differences typically related to project size, location, and complexity. Retrofits of existing BMPs, for example, generally cost less than new installations.

Table 4. Retrofit unit costs and adjustment factors

BMP	Base Cost ($/ft^3)
Detention Basin	$2
Infiltration Basin	$4
Underground Chamber (infiltration or detention)	$12
Bioretention	$10
Green Infrastructure/ Underground Chamber Combo	$22
Site Type	**Cost Multiplier**
Existing BMP retrofit	0.25
New BMP in undeveloped area	1.00
New BMP in partially developed area	1.50
New BMP in developed area	2.00
Adjustment factor for large aboveground basin projects	0.50

3. For certain retrofit locations, additional **Site-Specific Costs** were added to the construction costs. For example, Sites #13, #22, and M3A will require significant drainage or utility reconstruction. Site M5A3 will require ledge removal if constructed. Site M7A3 will require elevating the existing electric transmission lines to provide adequate clearance for the basin berm construction. Site-specific construction items are described in detail in the Retrofit

Summary Sheets provided as part of the Revised Field Findings Memo (dated October 14), except for the most recent retrofit concepts by UVM for M5A3 and M7A3, which were updated after submittal of the Revised Field Findings Memo. Table 3 provides information on the key design elements of M5A3 and M7A3.

4. **Base Construction Cost** is the product of the design control volume, the unit cost, and the site adjustment factor. Site-specific costs were added to this result for the applicable retrofit sites.
5. **Permits & Engineering Costs** were estimated at either 20% or 35% of the construction cost depending on the scale of the project. The largest projects (in terms of control volume) were estimated at 20% and the smaller projects at 35%. Certain large-scale projects that are likely to include high levels of engineering or permitting effort were assigned a 35% fee, despite their overall size.
6. **Land Acquisition Cost** was added to the total costs for facilities located on private, non-UVM properties. Retrofits that may require partial land acquisition fees were marked up by $150,000; retrofits possibly requiring total land acquisition were marked up by $300,000. These land acquisition estimates are considered to be place-holders at this time and may require adjustments based on current land values and the willingness of land owners to grant easements for the proposed drainage improvements. It was assumed that no land acquisition fees would be necessary for privately owned Sites 22, 22B, and 23A/B due to possible Residual Designation Authority (RDA) applicability. Site M1A was also not assigned a land acquisition fee due to possible existing agreements between UVM and the Centennial Court Apartments property management; however additional refinement of costs for UVM property may require inclusion of a land acquisition cost.
7. **Total Project Cost** is the sum of the base construction cost, permitting & engineering costs, and land acquisitions costs; it does not include operation & maintenance costs.
8. **Relative Cost** is described in terms of total project costs and represented by dollar signs. A project costing less than $100,000 is given $; a project between $100,000 and $250,000 is given $$; a project between $250,000 and $500,000 is given $$$; and a project greater than $500,000 is given $$$$.
9. **Costs per Impervious Acre** treated was calculated by dividing the sum of the construction costs and the permitting & engineering costs by the total impervious area directed to each BMP. Impervious areas used in this calculation are displayed in Table 3. Land acquisition costs and operation & maintenance costs are not included as part of this calculation.
10. **Operation & Maintenance** costs were estimated separately for each BMP, but are <u>not</u> included in the total construction costs. We assume that annual O&M is approximately 3% of project construction costs, with a cap at $10,000.

Each of the numbered descriptions above provides clarification to the corresponding columns in Table 5. The spreadsheet used to develop Table 5 is provided separately as supporting information.

Table 5. BMP Cost Summary Table

Site ID	Site Name	BMP Type	Class	Design Control Volume[1] (ft3)	Base Unit Cost[2] ($/cu.ft.)	Site Adjust. Factor[2]	Site Specific Cost[3]	Base Constr. Cost[4]	Permits & Eng.[5]	Land Cost[6]	Total Project Cost[7]	Relative Cost[8]	Cost/ Imp. Acre[9]	O&M[10]
12A	University soccer field	IB	E	2,700	-	-	-	-	-	-	-	-	-	-
13	Patchen Rd depression	URC	P	66,800	$4	0.25	$25,000	$91,800	$33,000	$150,000	$280,000	$$$	$25,000	$2,800
14A/B	Chamberlin School	URC	P	35,200	$12	1.50	$0	$633,600	$127,000	$0	$770,000	$$$$	$76,000	$10,000
15	Jaycee Park	DB	P	11,300	$12	1.50	$0	$203,400	$72,000	$0	$280,000	$$$	$48,000	$6,200
16	I-89 outfall	DB	P	566,000	$2	1.00	$0	$1,132,000	$227,000	$150,000	$1,510,000	$$$$	$72,000	$10,000
16B	I-89 cloverleaf (NE)	UDC	S	320,000	$2	0.50	$0	$320,000	$112,000	$0	$440,000	$$$	$27,000	$9,600
17	Jug handle @ Spear & Main St.	UDC	S	73,000	$12	1.50	$0	$1,314,000	$263,000	$0	$1,580,000	$$$$	$217,000	$10,000
18	Fielding Lane Condos	URC	P	21,700	$4	1.00	$0	$86,800	$31,000	$300,000	$420,000	$$$	$23,000	$2,700
18A	Patchen Rd & Pine St	URC	P	8,600	$12	1.50	$0	$154,800	$55,000	$150,000	$360,000	$$$	$35,000	$4,700
20	Grove St Parking Lot	URC	P	4,800	$12	2.00	$0	$115,200	$41,000	$0	$160,000	$$	$62,000	$3,500
20A	SD Ireland Property	URC	P	28,700	-	-	-	-	-	-	-	-	-	-
21	Dumont Ave (south)	URC	P	1,100	$12	1.50	$0	$19,800	$7,000	$0	$30,000	$	$23,000	$600
22	Best West.(N)	IB	P	181,000	$4	0.50	$50,000	$412,000	$145,000	$0	$560,000	$$$$	$26,000	$10,000
22A	Best West. (W)	IB	P	30,000	$4	0.50	$0	$60,000	$21,000	$0	$90,000	$	$75,000	$1,800
23A/B	Staples Plaza	UDC	S	11,600	$12	2.00	$0	$278,400	$56,000	$0	$340,000	$$$	$139,000	$8,400
25	Picard Circle	URC	P	14,700	$12	1.50	$0	$264,600	$53,000	$0	$320,000	$$$	$20,000	$8,000
26	Duval St	URC	P	1,100	$22	1.50	$0	$36,300	$13,000	$150,000	$200,000	$$	$42,000	$1,100
27	Clover St	URC	P	1,700	$12	1.50	$0	$30,600	$11,000	$150,000	$200,000	$$	$30,000	$1,000

Site ID	Site Name	BMP Type	Class	Design Control Volume[1] (ft3)	Base Unit Cost[2] ($/cu.ft.)	Site Adjust. Factor[2]	Site Specific Cost[3]	Base Constr. Cost[4]	Permits & Eng.[5]	Land Cost[6]	Total Project Cost[7]	Relative Cost[8]	Cost/ Imp. Acre[9]	O&M[10]
200	N Henry Court	URC	P	600	$22	1.50	$0	$19,800	$7,000	$0	$30,000	$	$60,000	$600
207	Fletcher Allen green space	Bio	S	3,700	$10	1.00	$0	$37,000	$13,000	$0	$50,000	$	$59,000	$1,200
208	Fletcher Allen parking lot	Bio	S	2,700	$10	1.00	$0	$27,000	$10,000	$0	$40,000	$	$70,000	$900
M1A	Centennial Court Apts.	IB	S	30,800	$4	1.00	$0	$123,200	$44,000	$0	$170,000	$$	$59,000	$3,700
M3A	Queensbury (modified)	IB	P	26,700	$4	0.25	$25,000	$51,700	$19,000	$150,000	$230,000	$$	$24,000	$1,600
M5A3	Main St (UVM modified)	DB	P	370,900	$2	0.50	$100,000	$470,900	$95,000	$0	$570,000	$$$$	$22,000	$10,000
M7A3	North Campus (with extra DA)	DB	P	1,008,000	$2	0.25	$100,000	$604,000	$121,000	$0	$730,000	$$$$	$16,000	$10,000
M7B	Open area east of Case Pkwy	URC	S	6,300	$12	1.50	$0	$113,400	$40,000	$0	$160,000	$$	$38,000	$3,500
M7C	Case Pkwy center island	Bio	S	1,000	$10	1.50	$0	$15,000	$6,000	$0	$30,000	$	$42,000	$500
M7D	140 East Ave residence	Bio	S	1,800	$10	1.50	$0	$27,000	$10,000	$150,000	$190,000	$$	$103,000	$900

See preceding text for footnotes.

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Potash Brook Flow Restoration Plan

Table D-1: BMP Ranking Criteria Key

Category	ID	Criteria	Technical Description	Description
Cost/Operations	A	Project Cost per Impervious Acre	The project costs per impervious acre were grouped into categories from $2/acre to $500,000/acre based on the range of projects proposed. Cost estimates were developed using the latest unit costs from VTrans as well as local experience. More expensive projects are ranked lower.	Project Costs include additional engineering, permitting, and construction. Transportation and utility conflicts, as well as overall constructability is also reflected in the cost.
Project Design Metrics	B	Impervious Acres Managed (ac)	Natural groupings within the range of impervious managed for the proposed projects were identified. More impervious managed receives a higher score.	The more impervious managed by a project, the higher the potential pollutant reduction. Additionally, the goal of the FRP is to manage existing impervious surfaces.
	C	Channel Protection Volume (CPv) Mitigated, (i.e.. 1-year Storm)	Groupings within the range of CPv volume storage were identified. The largest grouping receives the highest score. The CPv was estimated in HydroCAD, using local rainfall data.	The Channel Protection Volume (CPv) is the volume of stormwater runoff generated from the 1-year design storm (1.98" in Burlington). A BMP which provides CPv storage was determined to reduce the High-flow (Q0.3%), which is the flow rate exceeded 0.3% of the time (output from the State's BMPDSS model). Mitigating the CPv reduces channel erosion and excessive pollutant loading from streams.
	D	Volume Infiltrated (ac-ft)	Natural groupings within the range of volumes infiltrated for the BMPs were identified to which relative points were be assigned. The largest volume infiltrated was assigned the highest score. Volumes were calculated in HydroCAD.	The Volume Infiltrated indicates the amount of stormwater runoff that is infiltrated into the groundwater, and provides baseflow for the stream. The TMDL flow targets include a low-flow target, which is addressed by an infiltration-based BMP.
Project Implementation	E	Permitabilty	Permitabilty is simplified into two categories to reflect the common scenarios in permitting, as 1) minimal permitting, versus 2) Complex permitting issues. An itemized list of permits was included to inform the ranking, but was not used in the scoring.	Permitabilty is a measure of the expected level of effort to permit the project, based on knowledge that each type of permit takes varying amounts of time. Some common permits include Stormwater Construction, Local Zoning, Act 250 amendments, VTRANS ROW, etc.
	F	Land Availability	Public land is preferred, followed by regulated private land, and private land where the owners are known to be open to participate. Private land, in which participation of the owner is unknown is lower priority.	Land availability is critical for BMPs requiring open space for detention and access for the City. Properties owned by the City are ranked the highest, followed by privately owned land that has an expired permit, which provides leverage for owner participation.
	G	Flood Mitigation	Flood mitigation is categorized by the scale of the impact.	Flood mitigation is categorized by the scale of the impact. A neighborhood flooding issue is weighed more heavily than a localized drainage issue.
	H	TMDL Flow Target Addressed (Q03, Q95)	More weight is on BMPs that address both TMDL targets- the high-flow (Q0.3%) and low-flow targets (Q95%). The high-flow target is addressed by detention BMPs which storage the CP volume.	The goal of the FRP is to implement projects which address the TMDL flow targets. The high-flow target is measured as a **reduction** in the stream flow rate exceeded 0.3% of the time, while the low-flow target is an **increase** in the stream flow rate exceeded 95% of the time (baseflow). Projects which address both targets through storage or infiltration of the 1-year design storm are weighted the highest, followed by projects which address just the high-flow. Projects which do not address the full 1-year storm volume are weighted the lowest.
	I	Lake Champlain Phosphorus TMDL	Yes or no whether the proposed practice will provide benefit toward the Lake Champlain Phosphorus TMDL. This will be determined once the TMDL compliance metrics are released.	The Lake Champlain Phosphorus TMDL has been developed in the effort to reduce nutrient loading and consequential toxic algal blooms in Lake Champlain. The TMDL will require stormwater BMPs to meet a certain level of Total Phosphorus reduction. Each BMP will be evaluated against the TMDL compliance metrics, and scored yes or no if the project meets the TMDL standards.
	J	Other Project Benefits/Constraints	This criteria is to account for indirect project benefits like infrastructure improvements (e.g. aging culvert replacement, wetlands enhancement, and if it addresses an expired permit), or potential constraints (e.g. utility issues encountered during construction).	This criteria is to account for indirect project benefits like infrastructure improvements, community benefits, habitat creation, etc, as well as things that might constrain the project such as the potential of encountering utilities during construction.

Potash Brook Flow Restoration Plan
Table D-2: BMP Ranking Scoring Key

Category	ID	Criteria	Quality	Score
Cost/Operations	A	Project Cost per Impervious Acre	$1.00 - $24,999	4
			$25,000 - $49,999	3
			$50,000 - $99,999	2
			$100,000 - $199,999	1
			$200,000 - $499,999	0
			$500,000 +	-1
Project Design Metrics	B	Impervious Acres Managed (ac)	>10 acres	6
			>5-10 acres	5
			>4-5 acres	4
			>2-4 acres	3
			>1-2 acres	2
			≤ 1 acre	1
			0 acres	0
	C	Channel Protection Volume (CPv) Mitigated, (ie. 1-year Storm)	>0.6 ac-ft	5
			>0.4-0.6 ac-ft	4
			>0.2-0.4 ac-ft	3
			>0.05-0.2 ac-ft	2
			>0-0.05 ac-ft	1
			0 ac-ft	0
	D	Volume Infiltrated (ac-ft)	>2 ac-ft	5
			1 - 2 ac-ft	4
			0.5 - 1 ac-ft	3
			0.1 - 0.5 sc-ft	2
			>0.01 - 0.1 ac-ft	1
			no infiltration	0
Project Implementation	E	Permitabilty	Minimal Issues/Concerns or no permits	2
			Complex issues/Potential permit denial	0
	F	Land Availability	City owned	4
			Non City owned regulated (expire permit)	3
			Non City owned/Participatory Owner	2
			Unknown	0
			Not City owned/Non participatory owner	-2
	G	Flood Mitigation (Is existing flooding issue mitigated by project?)	Neighborhood Wide Flooding Issue	3
			Infrastructure damage (e.g. Wet Basement)/Single Property	2
			Nuisance Issue (ie. ponding, puddles, etc).	1
			None	0
	H	TMDL Flow Target Addressed (Q03, Q95)	High and Low Flow Targets	3
			High Flow Target	2
			No target addressed in BMPDSS (just WQ treatment)	1
	I	Lake Champlain Phosphorus TMDL	Addressed TMDL	1
			Does not address TMDL	0
	J	Other Project Benefits/Constraints	Infrastructure Improvement (e.g. Culvert Replacement)	1
			Educational/Functional Benefit	1
			Recreational Benefit	1
			Natural Habitat Creation/Protection	1
			Outfall Erosion Control	1
			Utility Issues/Uncertainty	-1

APPENDIX E

PROPOSED BMP COST ESTIMATES,
PRIORITIZATION RANKING,
AND
IMPLEMENTATION SCHEDULE

Potash Brook Flow Restoration Plan
Table E-1: Project Cost Estimates

BMP ID	Project Name	Retrofit Description	Impervious Area Managed (acres)	Design Control Volume (ac-ft)	Design Control Volume (cf)	Base Unit Cost[1] ($/cf)	Site Adjustment Factor[1]	Base Construction Cost[2]	Permits & Engineering Contingency	BMP Footprint Area (acres)	Land Cost	Summed Project Cost	Minimum Project Cost[3]	Final Project Cost	Cost per Impervious Acre	O&M
PB0001	1050 Hinesburg Road	Detention Pond	0.7	0.11	4,835	$2	1.5	$14,505	$ 5,077	0.065	$7,800	$ 27,382	$ 25,000	$ 27,382	$ 26,478	$ 435
PB0002	110 Kimball Ave - North Infiltration Basin	Retrofit Existing Infiltration Basin	0.58	0.02	1,045	$4	0.25	$1,045	$ 366	NA	$0	$ 1,411	$ 25,000	$ 25,000	$ 2,449	$ 31
PB0003	110 Kimball Ave - South Infiltration Basin	Retrofit Existing Infiltration Basin	0.9	0.05	2,309	$4	0.25	$2,309	$ 808	NA	$0	$ 3,117	$ 10,000	$ 10,000	$ 3,308	$ 69
PB0004	189 Cloverleaf Detention Pond	Detention Pond	12.1	1.13	49,179	$2	0.5	$49,179	$ 9,836	1.19	$0	$ 59,015	$ 25,000	$ 59,015	$ 4,861	$ 1,475
PB0005	189 Ramp Detention Pond	Detention Pond	5.8	0.35	15,159	$2	1.5	$45,477	$ 15,917	0.33	$39,600	$ 100,993	$ 25,000	$ 100,993	$ 10,627	$ 1,364
PB0006	30 Kimball Ave Swale Retrofit	Retrofit Existing Detention Pond	1.0	0.03	1,089	$2	0.25	$545	$ 191	NA	$0	$ 735	$ 25,000	$ 25,000	$ 703	$ 16
PB0007	Adelphia Cable Pond Retrofit	Retrofit Existing Detention Pond	2.7	0.09	3,746	$2	0.25	$1,873	$ 656	NA	$0	$ 2,529	$ 25,000	$ 25,000	$ 951	$ 56
PB0008	Adirondack Street	Underground detention	3.5	0.58	25,265	$12	2	$606,355	$ 212,224	0.217	$26,040	$ 844,620	$ 25,000	$ 844,620	$ 232,439	$ 10,000
PB0009	Airport Drive	Infiltration Gallery	3.6	0.46	19,820	$12	1.5	$356,756	$ 71,351	0.091	$10,920	$ 439,028	$ 25,000	$ 439,028	$ 118,182	$ 10,000
PB0010	Ashbrook Drive	Detention pond	0.9	0.18	7,754	$2	1.5	$23,261	$ 8,141	0.089	$10,680	$ 42,082	$ 25,000	$ 42,082	$ 35,579	$ 698
PB0011	Blue Mall Infiltration	Infiltration Gallery	2.4	0.37	15,987	$12	2	$383,676	$ 134,287	0.11	$13,015	$ 530,978	$ 25,000	$ 530,978	$ 215,397	$ 10,000
PB0012	Brookwood Drive	Detention Pond	24.5	2.00	87,033	$2	1.5	$261,099	$ 91,385	0.344	$41,280	$ 393,763	$ 25,000	$ 393,763	$ 14,392	$ 7,833
PB0013	Burlington Price Chopper	Gravel wetland	11.5	1.23	53,550	$10	2	$1,071,002	$ 374,851	0.11	$13,223	$ 1,459,075	$ 25,000	$ 1,459,075	$ 125,945	$ 10,000
PB0014	Chelsea Circle	Infiltration Basin	1.8	0.29	12,720	$4	1.5	$76,317	$ 15,263	0.196	$23,520	$ 115,101	$ 25,000	$ 115,101	$ 50,350	$ 2,290
PB0015	Church of Jesus Christ of Latterday Saints	Detention Swale	1.6	0.10	4,312	$2	1.5	$12,937	$ 4,528	0.093	$11,160	$ 28,625	$ 25,000	$ 28,625	$ 11,032	$ 388
PB0016	Community Bible Church Infiltration	Infiltration Trench	6.2	0.91	39,727	$12	1.5	$715,081	$ 250,278	0.083	$9,960	$ 975,319	$ 25,000	$ 975,319	$ 156,497	$ 10,000
PB0017	Domino's	Detention Pond	1.3	0.23	10,062	$2	1.5	$30,187	$ 6,037	0.145	$17,400	$ 53,624	$ 25,000	$ 53,624	$ 26,954	$ 906
PB0018	Dorset Commons Ponds	Detention Pond	5.0	0.60	26,223	$2	1.5	$78,669	$ 27,534	0.513	$61,560	$ 167,764	$ 25,000	$ 167,764	$ 21,210	$ 2,360
PB0019	Dupont Park Stormwater Project	Detention Pond	4.2	0.27	11,718	$2	1.5	$35,153	$ 7,031	0.223	$26,760	$ 68,944	$ 25,000	$ 68,944	$ 10,143	$ 1,055
PB0020	Dynapower	Retrofit Existing Detention Pond	6.5	0.95	41,469	$2	0.25	$20,735	$ 4,147	NA	$0	$ 24,881	$ 25,000	$ 25,000	$ 3,828	$ 622
PB0021	East Terrace Detention Pond	Detention Pond	2.3	0.34	14,985	$2	1.5	$44,954	$ 8,991	0.401	$48,120	$ 102,065	$ 25,000	$ 102,065	$ 23,663	$ 1,349
PB0022	Eastwood Commons Ponds Expansion	Retrofit Existing Detention Pond	20.8	0.73	31,712	$2	0.25	$15,856	$ 3,171	NA	$0	$ 19,027	$ 25,000	$ 25,000	$ 916	$ 476
PB0023	Easy Self Storage	Detention Pond	1.2	0.20	8,843	$2	1.5	$26,528	$ 9,285	0.140	$16,800	$ 52,613	$ 25,000	$ 52,613	$ 29,597	$ 796
PB0024	Economou Farm Pond	Retrofit Existing Detention Pond	1.5	0.67	29,142	$2	0.25	$14,571	$ 2,914	NA	$0	$ 17,485	$ 25,000	$ 25,000	$ 11,952	$ 437
PB0025	Exit 13 Gravel Wetland	Gravel wetland	5.6	0.57	24,699	$10	0.5	$123,493	$ 43,222	0.434	$52,080	$ 218,795	$ 25,000	$ 218,795	$ 29,931	$ 3,705
PB0026	Exit 14 Gravel Wetland	Gravel wetland	1.9	0.29	12,807	$10	0.5	$64,033	$ 22,412	0.372	$44,640	$ 131,085	$ 25,000	$ 131,085	$ 44,790	$ 1,921
PB0027	Fairpoint Communications	Detention Pond	4.8	0.59	25,744	$2	1.5	$77,232	$ 15,446	0.260	$31,200	$ 123,878	$ 25,000	$ 123,878	$ 19,477	$ 2,317
PB0028	Faith United Methodist Church	Detention Pond	1.0	0.15	6,490	$2	2	$25,962	$ 9,087	0.116	$13,920	$ 48,968	$ 25,000	$ 48,968	$ 33,983	$ 779
PB0029	Golf Course Road South	Detention Pond	1.7	0.23	10,106	$2	1	$20,212	$ 4,042	0.117	$14,040	$ 38,294	$ 25,000	$ 38,294	$ 14,556	$ 606
PB0030	Gonzo's Underground	Underground Detention	8.7	0.45	19,646	$12	2	$471,493	$ 165,023	0.21	$25,026	$ 661,542	$ 25,000	$ 661,542	$ 72,986	$ 10,000
PB0031	Grandview Drive North Detention Pond	Detention Pond	1.4	0.14	6,186	$2	1.5	$18,557	$ 6,495	0.066	$7,920	$ 32,971	$ 25,000	$ 32,971	$ 18,141	$ 557
PB0032	Grandview Drive West Detention Pond	Detention Pond	1.9	0.18	7,786	$2	1.5	$23,358	$ 8,175	0.034	$4,132	$ 35,666	$ 25,000	$ 35,666	$ 16,704	$ 701
PB0033	Hawthorne Circle Detention Pond	Detention Pond	2.5	0.15	6,534	$2	1.5	$19,602	$ 6,861	0.093	$11,160	$ 37,623	$ 25,000	$ 37,623	$ 10,378	$ 588
PB0034	Helen Ave Cul De Sac	Infiltration Basin	2.2	0.35	15,420	$4	1.5	$92,521	$ 32,383	0.093	$11,160	$ 136,064	$ 25,000	$ 136,064	$ 58,071	$ 2,776
PB0035	Hinesburg Road	Detention Pond	1.3	0.14	6,011	$2	1.5	$18,034	$ 6,312	0.070	$8,400	$ 32,746	$ 25,000	$ 32,746	$ 19,147	$ 541
PB0036	I-89 Swale	Detention Pond	1.9	0.53	23,130	$2	1.5	$69,391	$ 13,878	0.384	$46,080	$ 129,349	$ 25,000	$ 129,349	$ 43,596	$ 2,082
PB0037	Iby Street Gravel Wetland	Gravel wetland	1.1	0.07	2,919	$10	1.5	$43,778	$ 15,322	0.062	$7,440	$ 66,540	$ 25,000	$ 66,540	$ 51,829	$ 1,313
PB0038	INS Building Pond A Retrofit	Retrofit Existing Retention Pond	1.0	0.04	1,742	$2	0.25	$871	$ 305	NA	$0	$ 1,176	$ 25,000	$ 25,000	$ 1,196	$ 26
PB0039	INS Building Pond B Retrofit	Retrofit Existing Detention Pond	0.6	0.04	1,742	$2	0.25	$871	$ 305	NA	$0	$ 1,176	$ 25,000	$ 25,000	$ 1,926	$ 26
PB0040	Joy Drive Detention Pond	Detention Pond	1.3	0.21	9,148	$2	1.5	$27,443	$ 5,489	0.119	$14,280	$ 47,211	$ 25,000	$ 47,211	$ 24,586	$ 823
PB0041	Kennedy Drive Pond 2 Expansion	Retrofit Existing Detention Pond	2.4	0.16	6,926	$2	0.25	$3,463	$ 1,212	NA	$0	$ 4,675	$ 25,000	$ 25,000	$ 1,981	$ 104
PB0042	Kennedy Drive Pond 3 Expansion	Retrofit Existing Detention Pond	4.8	0.18	7,623	$2	0.25	$3,812	$ 762	NA	$0	$ 4,574	$ 25,000	$ 25,000	$ 949	$ 114
PB0043	Kennedy Drive Pond 4 Expansion	Retrofit Existing Detention Pond	4.8	0.25	10,977	$2	0.25	$5,489	$ 1,921	NA	$0	$ 7,410	$ 25,000	$ 25,000	$ 1,550	$ 165
PB0044	Kennedy Drive Pond 7 Expansion	Retrofit Existing Detention Pond	8.7	0.58	25,395	$2	0.25	$12,698	$ 4,444	NA	$0	$ 17,142	$ 25,000	$ 25,000	$ 1,978	$ 381
PB0045	K-Mart Plaza Infiltration	Infiltration Gallery	7.7	0.86	37,592	$12	2	$902,215	$ 180,443	0.32	$38,400	$ 1,121,058	$ 25,000	$ 1,121,058	$ 140,894	$ 10,000
PB0046	Knoll Circle	Detention Pond	2.2	0.80	34,935	$2	1.5	$104,805	$ 36,682	0.352	$42,240	$ 183,727	$ 25,000	$ 183,727	$ 65,503	$ 3,144
PB0047	Lane Press Roof	Infiltration Basin	4.2	0.69	30,100	$4	1.5	$180,600	$ 63,210	0.55	$66,000	$ 309,810	$ 25,000	$ 309,810	$ 58,468	$ 5,418
PB0048	Laurel Hill Drive	Infiltration Basin	1.8	0.41	17,642	$4	1.5	$105,851	$ 37,048	0.16	$19,200	$ 162,099	$ 25,000	$ 162,099	$ 77,662	$ 3,176
PB0049	Lilac Lane Infiltration Basin	Infiltration Basin	0.8	0.13	5,706	$4	1.5	$34,238	$ 6,848	0.027	$3,240	$ 44,326	$ 25,000	$ 44,326	$ 48,344	$ 1,027
PB0050	Lindenwood Drive Detention Pond	Detention Pond	2.2	0.21	8,930	$2	1.5	$26,789	$ 9,376	0.440	$52,800	$ 88,966	$ 25,000	$ 88,966	$ 16,500	$ 804

Potash Brook Flow Restoration Plan
Table E-1: Project Cost Estimates

BMP ID	Project Name	Retrofit Description	Impervious Area Managed (acres)	Design Control Volume (ac-ft)	Design Control Volume (cf)	Base Unit Cost[1] ($/cf)	Site Adjustment Factor[1]	Base Construction Cost[2]	Permits & Engineering Contingency	BMP Footprint Area (acres)	Land Cost	Summed Project Cost	Minimum Project Cost[3]	Final Project Cost	Cost per Impervious Acre	O&M
PB0051	Logwood Neighborhood Detention Pond	Detention Pond	18.4	0.61	26,397	$2	1.5	$79,192	$ 15,838	0.47	$56,280	$ 151,310	$ 25,000	$ 151,310	$ 5,154	$ 2,376
PB0052	Marcotte Central School	Detention Pond	1.8	0.19	8,102	$2	1.5	$24,306	$ 8,507	0.204	$24,480	$ 57,294	$ 25,000	$ 57,294	$ 17,966	$ 729
PB0053	Marine Connection	Detention Swale	4.7	0.21	9,322	$2	1.5	$27,966	$ 5,593	0.2	$24,000	$ 57,559	$ 25,000	$ 57,559	$ 7,088	$ 839
PB0054	Meadowland Bus. Park Pond #2	Retrofit Existing Detention Pond	2.9	1.70	74,226	$2	0.25	$37,113	$ 7,423	NA	$0	$ 44,536	$ 25,000	$ 44,536	$ 15,142	$ 1,113
PB0055	Merchant's Bank Detention Pond	Detention Pond	3.2	0.23	9,932	$2	2	$39,727	$ 13,904	0.101	$12,120	$ 65,751	$ 25,000	$ 65,751	$ 16,916	$ 1,192
PB0056	Miller Research Farm	Detention Pond	5.0	2.36	102,976	$2	1.5	$308,928	$ 61,786	0.773	$92,760	$ 463,473	$ 25,000	$ 463,473	$ 66,139	$ 9,268
PB0057	Nicklaus Circle	Detention Pond	2.2	0.54	23,392	$2	2	$93,567	$ 32,748	0.292	$35,040	$ 161,355	$ 25,000	$ 161,355	$ 56,644	$ 2,807
PB0058	North Country Credit Northwest Infiltration	Infiltration Trench	0.2	0.03	1,133	$12	2	$27,181	$ 9,514	0.006	$720	$ 37,415	$ 25,000	$ 37,415	$ 174,094	$ 815
PB0059	North Country Credit South Infiltration	Infiltration Gallery	0.6	0.12	5,184	$12	1.5	$93,306	$ 32,657	0.03	$3,125	$ 129,087	$ 25,000	$ 129,087	$ 203,749	$ 2,799
PB0060	O'Brien Drive Underground Infiltration	Underground Detention	2.9	0.54	23,348	$12	1.5	$420,267	$ 147,093	0.11	$13,015	$ 580,375	$ 25,000	$ 580,375	$ 197,409	$ 10,000
PB0061	Olympiad Apartments & Office Bldg Pond Retrofits	Retrofit Existing Detention Pond	3.7	0.06	2,396	$2	0.25	$1,198	$ 240	NA	$0	$ 1,437	$ 25,000	$ 25,000	$ 390	$ 36
PB0062	Panurgy Infiltration Basin	Infiltration Basin	0.8	0.08	3,528	$4	0.25	$3,528	$ 706	NA	$0	$ 4,234	$ 25,000	$ 25,000	$ 5,293	$ 106
PB0063	Park Rd Detention Pond	Detention Pond	1.3	0.42	18,339	$2	1.5	$55,016	$ 11,003	0.23	$27,600	$ 93,620	$ 25,000	$ 93,620	$ 51,984	$ 1,650
PB0064	Pillsbury Manor Infiltration Basin Retrofit	Retrofit to Infiltration Basin	0.4	0.07	2,962	$4	0.25	$2,962	$ 1,037	NA	$0	$ 3,999	$ 25,000	$ 25,000	$ 10,019	$ 89
PB0065	Quarry Hill South	Detention Swale	2.5	0.48	20,822	$2	1.5	$62,465	$ 21,863	0.399	$47,880	$ 132,208	$ 25,000	$ 132,208	$ 33,505	$ 1,874
PB0066	Queen City Park Road Detention Pond	Detention Pond	3.0	0.45	19,689	$2	0.5	$19,689	$ 3,938	0.63	$75,600	$ 99,227	$ 25,000	$ 99,227	$ 7,929	$ 591
PB0067	Shaws West	Underground Detention	1.7	0.16	6,839	$12	2	$164,134	$ 57,447	0.07	$8,447	$ 230,028	$ 25,000	$ 230,028	$ 129,256	$ 4,924
PB0068	South Burlington High School Infiltration	Infiltration Basin	3.1	0.44	19,297	$4	1.5	$115,782	$ 23,156	0.22	$26,400	$ 165,339	$ 25,000	$ 165,339	$ 44,851	$ 3,473
PB0069	South Burlington High School North	Underground Infiltration	4.3	0.69	30,013	$12	2	$720,308	$ 252,108	0.16	$19,551	$ 991,967	$ 25,000	$ 991,967	$ 228,267	$ 10,000
PB0070	South Meadows Pond	Retrofit Existing Detention Pond	4.7	0.37	16,117	$2	0.25	$8,059	$ 1,612	NA	$0	$ 9,670	$ 25,000	$ 25,000	$ 2,044	$ 242
PB0071	Southview Drive	Underground Detention	4.8	0.71	30,971	$12	2	$743,308	$ 260,158	0.37	$44,334	$ 1,047,799	$ 25,000	$ 1,047,799	$ 208,801	$ 10,000
PB0072	Staples Plaza Underground Detention Basin	Underground Detention	1.6	0.20	8,625	$12	2	$206,997	$ 72,449	0.07	$8,977	$ 288,423	$ 25,000	$ 288,423	$ 170,069	$ 6,210
PB0073	Stonehedge Circle	Detention Pond	1.3	0.20	8,843	$2	1.5	$26,528	$ 9,285	0.16	$18,720	$ 54,533	$ 25,000	$ 54,533	$ 28,423	$ 796
PB0074	Sugartree Lane	Detention Pond	1.1	0.12	5,009	$2	1.5	$15,028	$ 3,006	0.05	$6,000	$ 24,034	$ 25,000	$ 25,000	$ 17,108	$ 451
PB0075	Swift Estates Pond	Retrofit Existing Detention Pond	3.6	0.33	14,201	$2	0.25	$7,100	$ 1,420	NA	$0	$ 8,520	$ 25,000	$ 25,000	$ 2,388	$ 213
PB0076	Technology Park Pond Retrofit	Retrofit Existing Detention Pond	0.03	0.27	11,805	$2	0.25	$5,902	$ 1,180	NA	$0	$ 7,083	$ 25,000	$ 25,000	$ 238,633	$ 177
PB0077	Temple Detention Pond	Detention Pond	0.9	0.19	8,364	$2	1.5	$25,091	$ 5,018	0.14	$16,800	$ 46,909	$ 25,000	$ 46,909	$ 32,727	$ 753
PB0078	The Pines	Retrofit Existing Detention Pond	5.8	0.22	9,365	$2	0.25	$4,683	$ 937	NA	$0	$ 5,619	$ 25,000	$ 25,000	$ 961	$ 140
PB0079	UMall Detention Pond	Retrofit Existing Detention Pond	15.0	0.91	39,596	$2	0.25	$19,798	$ 6,929	NA	$0	$ 26,727	$ 25,000	$ 26,727	$ 1,786	$ 594
PB0080	UMall Infiltration 1	Retrofit Infiltration Gallery	5.5	0.31	13,547	$12	0.25	$40,641	$ 14,225	NA	$0	$ 54,866	$ 25,000	$ 54,866	$ 9,890	$ 1,219
PB0081	UMall Infiltration 2	Retrofit Infiltration Gallery	15.3	0.03	1,394	$12	0.25	$4,182	$ 1,464	NA	$0	$ 5,645	$ 25,000	$ 25,000	$ 369	$ 125
PB0082	UMall Sears Auto Pond	Gravel Wetland	9.3	0.61	26,670	$10	0.25	$66,674	$ 23,336	NA	$0	$ 90,010	$ 25,000	$ 90,010	$ 9,684	$ 2,000
PB0083	UVM Bio Research Complex	Bioretention	0.9	0.20	8,668	$10	1.5	$130,027	$ 45,509	0.104	$0	$ 175,536	$ 25,000	$ 175,536	$ 191,667	$ 3,901
PB0084	UVM Forestry Research Center - East Roof	Infiltration Gallery	0.4	0.06	2,396	$12	1	$28,750	$ 10,062	0.011	$0	$ 38,812	$ 25,000	$ 38,812	$ 95,055	$ 862
PB0085	UVM Forestry Research Center - West Roof	Infiltration Gallery	0.1	0.02	697	$12	1	$8,364	$ 2,927	0.034	$0	$ 11,291	$ 25,000	$ 25,000	$ 104,974	$ 251
PB0086	Vermont National Country Club Pond B	Retrofit Existing Detention Pond	8.6	0.43	18,600	$2	0.25	$9,300	$ 1,860	NA	$0	$ 11,160	$ 25,000	$ 25,000	$ 1,293	$ 279
PB0087	Vermont National Country Club Pond C	Retrofit Existing Detention Pond	0.5	0.85	36,939	$2	0.25	$18,469	$ 3,694	NA	$0	$ 22,163	$ 25,000	$ 25,000	$ 46,732	$ 554
PB0088	VT Gas Detention Pond	Detention pond	3.1	0.17	7,492	$2	2	$29,969	$ 10,489	0.099	$11,880	$ 52,339	$ 25,000	$ 52,339	$ 13,093	$ 899
PB0089	Wellesley Grove	Detention pond	2.1	0.27	11,718	$2	1.5	$35,153	$ 7,031	0.294	$35,280	$ 77,464	$ 25,000	$ 77,464	$ 19,659	$ 1,055
PB0090	Windridge Court	Infiltration Basin	0.6	0.10	4,312	$4	1.5	$25,875	$ 9,056	0.085	$10,200	$ 45,131	$ 25,000	$ 45,131	$ 60,479	$ 776
PB0091	Woodcrest Drive	Infiltration Basin	2.4	0.50	21,606	$4	1.5	$129,635	$ 25,927	0.224	$26,880	$ 182,441	$ 25,000	$ 182,441	$ 65,362	$ 3,889
PB0092	Woodlands Industrial Park	Retrofit Existing Detention Pond	3.9	0.37	16,161	$2	0.25	$8,080	$ 2,828	NA	$0	$ 10,909	$ 25,000	$ 25,000	$ 2,804	$ 242
PB0093	Worcester Street	Underground Detention	3.8	0.56	24,394	$12	2	$585,446	$ 204,906	0.258	$30,905	$ 821,258	$ 25,000	$ 821,258	$ 206,899	$ 10,000
PB0094	Dorset Park Pond	Detention Pond	5.9	0.30	13,024	$2	0.25	$16,512	$ 3,302	NA	$0	$ 19,815	$ 10,000	$ 19,815	$ 3,331	$ 495
PB0095	Hannaford's Pond	Detention Pond	7.8	0.34	14,723	$2	0.25	$17,362	$ 3,472	NA	$0	$ 20,834	$ 10,000	$ 20,834	$ 2,687	$ 521
PB0096	Lowes Pond	Detention Pond	10.1	0.20	8,538	$2	0.25	$14,269	$ 2,854	NA	$0	$ 17,123	$ 10,000	$ 17,123	$ 1,703	$ 428
PB0097	Vermont National Country Club Pond B	Detention Pond	8.6	0.92	40,119	$2	0.25	$30,059	$ 6,012	NA	$0	$ 36,071	$ 10,000	$ 36,071	$ 4,181	$ 902
PB0098	Technology Park Pond 1	Detention Pond	3.8	0.37	15,987	$2	0.25	$17,993	$ 3,599	NA	$0	$ 21,592	$ 10,000	$ 21,592	$ 5,720	$ 540
PB0099	Lot A Mountain View Pond	Detention Pond	2.6	0.02	784	$2	0.25	$10,392	$ 2,078	NA	$0	$ 12,470	$ 10,000	$ 12,470	$ 4,888	$ 312
PB0100	Kennedy Dr Pond 1	Detention Pond	1.3	0.05	2,047	$2	0.25	$11,024	$ 2,205	NA	$0	$ 13,228	$ 10,000	$ 13,228	$ 9,912	$ 331

Potash Brook Flow Restoration Plan
Table E-1: Project Cost Estimates

BMP ID	Project Name	Retrofit Description	Impervious Area Managed (acres)	Design Control Volume (ac-ft)	Design Control Volume (cf)	Base Unit Cost[1] ($/cf)	Site Adjustment Factor[1]	Base Construction Cost[2]	Permits & Engineering Contingency	BMP Footprint Area (acres)	Land Cost	Summed Project Cost	Minimum Project Cost[3]	Final Project Cost	Cost per Impervious Acre	O&M
PB0101	Quarry Hill Pond	Detention Pond	6.2	0.00	0	$2	0.25	$10,000	$ 2,000	NA	$0	$ 12,000	$ 10,000	$ 12,000	$ 1,940	$ 300
PB0102	Heatherfield P1	Detention Pond	0.9	0.00	0	$2	0.25	$10,000	$ 2,000	NA	$0	$ 12,000	$ 10,000	$ 12,000	$ 13,356	$ 300
PB0103	Heatherfield P2	Detention Pond	7.1	0.03	1,220	$2	0.25	$10,610	$ 2,122	NA	$0	$ 12,732	$ 10,000	$ 12,732	$ 1,799	$ 318
PB0104	Heatherfield P3	Detention Pond	2.7	0.05	2,222	$2	0.25	$11,111	$ 2,222	NA	$0	$ 13,333	$ 10,000	$ 13,333	$ 4,924	$ 333
PB0105	Winding Brook	Detention Pond	3.3	0.11	4,661	$2	0.25	$12,330	$ 2,466	NA	$0	$ 14,797	$ 10,000	$ 14,797	$ 4,457	$ 370
PB0106	Mountainview Pond b	Detention Pond	0.6	0.08	3,398	$2	0.25	$11,699	$ 2,340	NA	$0	$ 14,039	$ 10,000	$ 14,039	$ 23,024	$ 351
PB0107	Farrell St Pond	Detention Pond	11.0	0.05	2,004	$2	0.25	$11,002	$ 2,200	NA	$0	$ 13,202	$ 10,000	$ 13,202	$ 1,197	$ 330

Notes:

1. Project costs are based on the Horsley-Witten Spreadsheet Method
2. $10,000 is added to the base construction cost for a CMAC valve installation.
3. Minimum project costs are $10,000 for simple retrofits and $25,000 otherwise. The "Final Project Cost" is the greater of the "Summed Project Costs" or the "Minimum Project Costs".

Potash Brook Flow Restoration Plan
Table E-2: Potash Brook Watershed BMP Project Scoring

ID #	Project Name	Expired Permit	MS4	BMP Type [1]	Project Cost Estimate [2]	Retrofit Description	Total Score [3]
PB0001	1050 Hinesburg Road	No Permit	South Burlington	DP	$27,000	There is an existing wet depression here where stormwater is already routed. Propose to retrofit pond to meet CPv standards.	11
PB0002	110 Kimball Ave - North Infiltration Basin	1-1504a	South Burlington	IB	$25,000	Runoff is bypassing infiltration basin and sheet flowing to a swale with direct discharge to the brook. Add trench along west edge of parking lot to direct runoff to infiltration basin. Expand basin to accommodate increased volume.	15
PB0003	110 Kimball Ave - South Infiltration Basin	1-1504b	South Burlington	IB	$10,000	Retrofit outlet structure and add proposed outlet control riser that was not constructed.	17
PB0004	189 Cloverleaf Detention Pond	No Permit	VTrans	DP	$59,000	Add outlet structure to area that is already depressed to detain stormwater. Reroute stormline from Shelburne Rd to this area.	21
PB0005	189 Ramp Detention Pond	2-0619	VTrans	DP	$101,000	Detain stormwater from a large section of Dorset St. Intercept stormline near Kennedy Dr and reroute to the area between 189 ramps.	21
PB0006	30 Kimball Ave Swale Retrofit	1-1526; 6269-9030	South Burlington	DS	$25,000	Retrofit existing swale detention to meet CPv. Expand swale to accommodate modified outlet structure.	15
PB0007	Adelphia Cable Pond Retrofit	1-1000; 6291-9030	South Burlington	DP	$25,000	Reroute drainage from Kimball Ave to this detention pond behind Adelphia Cable. Retrofit and expand existing pond to detain CPv.	17
PB0008	Adirondack Street	2-0312	South Burlington	UD	$845,000	Construct underground detention chambers under ROW and grassed shoulder.	15
PB0009	Airport Drive	No Permit	BTV	IG	$439,000	Construct subsurface infiltration chambers in southernmost lot where houses will be removed. Intercept stormline running south down Airport Dr.	20
PB0010	Ashbrook Drive	2-0101	South Burlington	DP	$42,000	Reroute stormwater and detain southwest of Dorset St behind apartment buildings.	14
PB0011	Blue Mall Infiltration	2-0144	South Burlington	IG	$531,000	Construct underground infiltration chambers in the southwest edge of parking lot. Overflow to existing stormline that flows to Dorset St.	16
PB0012	Brookwood Drive Pond	2-0794; 2-0619	South Burlington	DP	$394,000	Construct new detention pond to detain this large outfall. Forebay to be located in empty lot near Brookwood Dr.	22
PB0013	Burlington Price Chopper	No Permit	Burlington	GW	$1,459,000	Construct new gravel wetland in area between parking lot and stream to the south of parking lot.	14
PB0014	Chelsea Circle	2-0767	South Burlington	IB	$115,000	Construct new infiltration basin constructed to south of existing swale, which receives flow from Chelsea Cir condos and Timberlane Dental parking lot. Neighborhood icing and flooding issues can be mitigated with this project.	21
PB0015	Church of Jesus Christ of Latterday Saints	2-0179; 6318-9030	South Burlington	DS	$29,000	Add detention to swale to the west of parking area with outlet control to detain CPv	16
PB0016	Community Bible Church Infiltration	No Permit	South Burlington	IT	$975,000	Construct linear infiltration trench (perforated pipe) along back of several businesses.	20
PB0017	Domino's	No Permit	South Burlington	DP	$54,000	Construct a new detention pond behind parking area. Add catchbasin along Swift St to also capture half of the road drainage.	10
PB0018	Dorset Commons Pond	1-0242	South Burlington	DP	$168,000	Construct new detention pond in wooded area behind Dorset Commons.	21
PB0019	Dumont Park Stormwater Project	No Permit	South Burlington	DP	$69,000	Construct new detention pond to the north of Barrett St where two stormlines converge.	20
PB0020	Dynapower	1-0618	South Burlington	DP	$25,000	Reroute roof drainage to existing detention pond. Formalize pond and retrofit to detain CPv.	22

Potash Brook Flow Restoration Plan
Table E-2: Potash Brook Watershed BMP Project Scoring

ID #	Project Name	Expired Permit	MS4	BMP Type [1]	Project Cost Estimate [2]	Retrofit Description	Total Score [3]
PB0021	East Terrace Detention Pond	No Permit	South Burlington	DP	$102,000	Construct new linear detention basin near the outfall to the east side of East Terrace.	14
PB0022	Eastwood Commons Pond Expansion	1-1438	South Burlington	DP	$25,000	Reroute area to the west of existing pond (eastern side of Shaw's plaza) to this pond. Add a new connection between these stormwater systems to the east of the Shaw's property. Expand pond and modify outlet structure to accommodate additional drainage.	23
PB0023	Easy Self Storage	2-0167	South Burlington	DP	$53,000	Create new detention basin to the north of the storage area.	16
PB0024	Economou Farm Pond	1-1241d	South Burlington	DP	$25,000	Retrofit existing dry pond to detain CPv. Expand pond and retrofit outlet structure. Add forebay.	19
PB0025	Exit 13 Gravel Wetland	No Permit	VTrans	GW	$219,000	Propose new gravel wetland in depressed triangle greenspace between ramps. Reroute several culverts to this area.	25
PB0026	Exit 14 Gravel Wetland	No Permit	VTrans	GW	$131,000	Propose new gravel wetland in depressed triangle greenspace between ramps. Reroute several culverts to this area.	20
PB0027	Fairpoint Communications	2-0212	South Burlington	DP	$124,000	Construct new detention pond to the east of property in grassed area. Two outfalls on site drain to wetland swales that need to be rerouted to the east.	19
PB0028	Faith United Methodist Church	No Permit	South Burlington	DP	$49,000	Construct new underground detention behind church (northwest) in grassy area. Current outfall is eroded.	13
PB0029	Golf Course Road South	1-1241	South Burlington	DP	$38,000	Construct new detention basin at the end of pipe before it enters the golf course. Existing infrastructure already drains to swale.	17
PB0030	Gonzo's Underground	2-0811	South Burlington	UD	$662,000	Propose to intercept stormline that flows west along Williston Rd to underground detention chambers under grassed area in front of Budget Car Rental / Gonzo's plaza.	16
PB0031	Grandview Drive North Detention Pond	2-0238; 2-0737	South Burlington	DP	$33,000	Construct new surface detention BMP following outfall, which is currently broken and experiencing significant erosion.	14
PB0032	Grandview Drive West Detention Pond	2-0238; 2-0737	South Burlington	DP	$36,000	Construct new surface detention basin to the west of Dorset St. Reroute stormline away from brook to new BMP.	13
PB0033	Hawthorne Circle Detention Pond	No Permit	South Burlington	DP	$38,000	Construct new detention basin in greenspace formed in the triangle between three garages.	13
PB0034	Helen Ave Cul De Sac	No Permit	South Burlington	IB	$136,000	Construct new infiltration basin in the cul de sac at the end of Helen Ave, which would provide significant water quality benefit.	16
PB0035	Hinesburg Road	No Permit	South Burlington	DP	$33,000	Reroute stormwater to existing catchbasin on Deane St and detain to the west of Hinesburg Rd to the south of existing houses.	16
PB0036	I-89 Swale	No Permit	VTrans	MF	$129,000	Construct median filter in depressed area between north and south I-89 lanes. Reroute several culverts.	21
PB0037	Iby Gravel Wetland	No Permit	South Burlington	GW	$67,000	Construct new gravel wetland at the end of Iby St to capture stormwater for the street.	15
PB0038	INS Building Pond A Retrofit	1-0969	South Burlington	RP	$25,000	Retrofit existing detention pond. Add forebay and construct outlet structure with low flow orifice to meet CPv standards.	13
PB0039	INS Building Pond B Retrofit	1-0969b	South Burlington	DP	$25,000	Retrofit existing detention pond. Add forebay and construct outlet structure with low flow orifice to meet CPv standards.	13

Potash Brook Flow Restoration Plan
Table E-2: Potash Brook Watershed BMP Project Scoring

ID #	Project Name	Expired Permit	MS4	BMP Type [1]	Project Cost Estimate [2]	Retrofit Description	Total Score [3]
PB0040	Joy Dr Detention Pond	No Permit	South Burlington	DP	$47,000	Construct new surface BMP in adjacent flat area near the Green Mountain Power transmission corridor.	12
PB0041	Kennedy Dr Pond 2 Expansion	1-1582b; 2-1069	South Burlington	DP	$25,000	Retrofit existing detention pond to accommodate additional drainage from The Edge and 1 Twin Oaks.	18
PB0042	Kennedy Dr Pond 3 Expansion	1-1582c	South Burlington	DP	$25,000	Drainage for offices to the east of Timber Ln currently discharges to a swale along Kennedy Dr heading west (direction of the existing pond). Reroute culvert that crosses under access ramp to pond to pond. Expand pond and retrofit to detain CPv.	19
PB0043	Kennedy Dr Pond 4 Expansion	1-1582d; 1-0237; 1-1023; 1-1290	South Burlington	DP	$25,000	Reroute stormline from Chatham Green and swale along Hinesburg Rd to existing detention pond. Expand pond to accommodate additional drainage area and detain CPv.	20
PB0044	Kennedy Dr Pond 7 Expansion	1-1582g; 1-0233	South Burlington	DP	$25,000	Reroute stormline that currently outfalls behind Key Bank to existing detention pond. Expand pond footprint to accommodate additional drainage area and detain CPv.	22
PB0045	K-Mart Plaza Infiltration	No Permit	South Burlington	IG	$1,121,000	Construct new underground infiltration chambers in K-Mart parking lot.	17
PB0046	Knoll Circle	2-0220	South Burlington	DP	$184,000	Construct new surface detention basin with swale inlet. Current stormline draining subdivision already enters swale, which also drains area to the west.	18
PB0047	Lane Press Roof	1-1337	South Burlington	IB	$310,000	Capture roof drainage in a new infiltration basin. Roof drains already flows to grassed area where treatment is proposed.	23
PB0048	Laurel Hill Drive	No Permit	South Burlington	IB	$162,000	Construct new infiltration basin to the north of houses before stormline pipe enters riparian buffer.	16
PB0049	Lilac Ln Infiltration Basin	No Permit	South Burlington	IB	$44,000	Formalize infiltration basin in depressed area at the end of Lilac Ln.	13
PB0050	Lindenwood Drive Detention Pond	No Permit	South Burlington	DP	$89,000	Add catchbasins and infrastructure to reroute stormwater to the east of Lindenwood Dr. Part of Brewer Pkwy drains to this area as well. Propose to create one detention basin to detain drainage from both streets. Lindenwood Dr has existing puddling and icing issues. This BMP would also mitigate those issues.	17
PB0051	Logwood Neighborhood Detention Pond	No Permit	South Burlington	DP	$151,000	Construct new end of pipe surface impoundment BMP behind Lean Dental Group. Outfall is currently eroded.	21
PB0052	Marcotte Central School	No Permit	South Burlington	DP	$57,000	Construct new detention basin in wooded area directly south of school parking lot. Route outfall to existing stormline. Potential educational benefit.	16
PB0053	Marine Connection	No Permit	South Burlington	DS	$58,000	Add detention to existing swale near the back of the large Marine Connection building. Expand swale to accommodate additional volume.	16
PB0054	Meadowland Business Park Pond 2	1-1269_4290-9020.3 Lot 10	South Burlington	DP	$45,000	Retrofit existing detention pond. Add forebay and construct outlet structure with low flow orifice to meet CPv standards.	22
PB0055	Merchant's Bank Detention Pond	2-1171; 6275-9030; 6269-9030; 2-0939	South Burlington	DP	$66,000	Route stormwater from Allstate Insurance west to Merchant’s Bank and provide detention in grassed area	18

Potash Brook Flow Restoration Plan
Table E-2: Potash Brook Watershed BMP Project Scoring

ID #	Project Name	Expired Permit	MS4	BMP Type [1]	Project Cost Estimate [2]	Retrofit Description	Total Score [3]
PB0056	Miller Research Farm	No Permit	UVM	DP	$463,000	Reroute culvert east across Spear St and detain water to the south of the UVM farm.	24
PB0057	Nicklaus Circle	1-1241, 4049-9030	South Burlington	DP	$161,000	Construct new linear detention feature to the north of Nicklaus Cir where the stormline and swale converge.	17
PB0058	North Country Credit North West Infiltration	No Permit	South Burlington	IT	$37,000	Install perforated pipe to the north of parking lot in grassed area to infiltrate stormwater.	10
PB0059	North Country Credit South Infiltration	No Permit	South Burlington	IG	$129,000	Construct underground infiltration chambers in the southeast corner of parking lot. Overflow to existing stormline.	11
PB0060	O'Brien Drive Underground Detention	No Permit	South Burlington	UD	$580,000	Construct underground storage chambers in open lot between existing houses.	16
PB0061	Olympiad Apartments & Office Building Pond Retrofit	1-1452	South Burlington	DP	$25,000	Retrofit existing detention pond. Add forebay, clean out vegetation, and ensure pond detains CPv.	17
PB0062	Panurgy Infiltration Basin	3409-9010	South Burlington	IB	$25,000	Retrofit and expand existing infiltration basin to infiltrate the CPv.	14
PB0063	Park Road Detention Pond	1-1241	South Burlington	DP	$94,000	Propose to reroute swale on southern side of Park Rd to the north and detain in wooded area.	16
PB0064	Pillsbury Manor Infiltration Basin Retrofit	1-1015	South Burlington	IB	$25,000	Retrofit existing pond to infiltration basin. Overflow to existing culvert.	15
PB0065	Quarry Hill South	6322-9030	South Burlington	DS	$132,000	Add detention to existing swale running northeast behind garages.	17
PB0066	Queen City Park Road Detention Pond	No Permit	VTrans	DP	$99,000	Add detention to existing depressed area where stormlines already outfall. Drainage from Shelburne Rd is assumed to be already rerouted to larger depression to the north (see project entitled 189 Cloverleaf).	19
PB0067	Shaws West	No Permit	South Burlington	UD	$230,000	Construct underground detention in vegetated island along west side of parking lot. Reroute last catchbasin in southwest corner of parking to this area.	10
PB0068	South Burlington High School Infiltration	No Permit	South Burlington	IB	$165,000	Construct new infiltration basin to the southeast of sports field in currently wooded area.	21
PB0069	South Burlington High School North	6174-INDS.A	South Burlington	IG	$992,000	Construct dry wells to infiltrate stormwater from the high school parking lot and middle school roof. Potential educational benefit.	23
PB0070	South Meadows Pond	1-0661	Burlington	DP	$25,000	Retrofit existing detention pond to meet CPv standards. Add forebay and expand pond. Upgrade outlet structure.	19
PB0071	Southview Drive	No Permit	South Burlington	UD	$1,048,000	Construct underground detention chambers in ROW and grassed area. Road is 30ft wide and could be narrowed for storage.	19
PB0072	Staples Plaza Underground Detention B	No Permit	South Burlington	UD	$288,000	Construct underground detention chambers in southeast corner of parking lot.	11
PB0073	Stonehedge Circle	2-0100	South Burlington	DP	$55,000	Construct bioretention along road in grassed area with discharge to existing catchbasin.	13
PB0074	Sugartree Lane	2-0878	South Burlington	DP	$25,000	Expand existing depressed area at the end of Sugartree Ln , which appears to be an abandoned detention area. Reroute catchbasins to pond. Upgrade pond outlet.	16
PB0075	Swift Estates Pond	No Permit	South Burlington	DP	$25,000	Retrofit existing detention pond to meet CPv standards. Add forebay and upgrade outlet structure.	15
PB0076	Technology Park Pond Retrofit	1-1458 P4	South Burlington	DP	$25,000	Retrofit existing detention pond to meet CPv standards. Upgrade outlet structure and expand pond to accommodate additional storage.	11

Potash Brook Flow Restoration Plan
Table E-2: Potash Brook Watershed BMP Project Scoring

ID #	Project Name	Expired Permit	MS4	BMP Type [1]	Project Cost Estimate [2]	Retrofit Description	Total Score [3]
PB0077	Temple Detention Pond	No Permit	South Burlington	DP	$47,000	Propose new detention pond in depressed area in front of Temple by intersection of Dorset St and Swift St. Stormwater already collects in this area.	9
PB0078	The Pines	1-1117	South Burlington	DP	$25,000	Retrofit existing pond to meet CPv standards. Add forebay and outlet structure with low flow orifice; expand pond.	20
PB0079	UMall Detention Pond	1-0503c; 6282-9030	South Burlington	DP	$27,000	Retrofit existing detention pond to detain CPv. Upgrade outlet structure and expand pond.	23
PB0080	UMall Infiltration 1	1-0503b; 6282-9030	South Burlington	IG	$25,000	Retrofit existing infiltration gallery to infiltrate the CPv.	22
PB0081	UMall Infiltration 2	1-0503a; 6282-9030	South Burlington	IG	$55,000	Retrofit existing infiltration gallery to infiltrate the CPv.	25
PB0082	UMall Sears Auto Pond	1-0503d; 6282-9030; 2-0619	South Burlington	GW	$90,000	Construct large gravel wetland in unused section of parking lot in Umall (to the east of the party store). Reroute Dorset St stormline here.	22
PB0083	UVM Bio Research Complex	5269-9003.R	UVM	DP	$176,000	Construct bioretention to treat stormwater in grassed area near the center of complex. Potentially move BMP if site is built-out further.	13
PB0084	UVM Forestry Research Center - East Roof	No Permit	UVM	IG	$39,000	Construct dry well to capture and infiltrate roof drain. Potential educational benefit.	15
PB0085	UVM Forestry Research Center - West Roof	No Permit	UVM	IG	$25,000	Construct dry well to capture and infiltrate roof drain. Potential educational benefit.	12
PB0086	Vermont National Country Club Pond B	1-1241b	South Burlington	DP	$25,000	Retrofit existing detention pond. Add forebay and expand pond.	21
PB0087	Vermont National Country Club Pond C	1-1241c	South Burlington	DP	$25,000	Retrofit existing detention pond. Add forebay and expand pond.	17
PB0088	VT Gas Detention Pond	2-0228; 6293-9030	South Burlington	DP	$52,000	Reroute stormline from Swift St to grassed area to the north of VT Gas property and construct new	17
PB0089	Wellesley Grove	2-1023	South Burlington	DP	$77,000	Add outlet control to existing depression to detain stormwater. Outfall is currently eroded.	15
PB0090	Windridge Court	2-0824	South Burlington	IB	$45,000	Construct new infiltration basin to infiltrate stormwater to the west of this small development.	15
PB0091	Woodcrest Drive	No Permit	South Burlington	IB	$182,000	Infiltrate stormwater to the southwest of drainage area. Reroute stormline south to new BMP. Construct new swale to drain the end of Woodcrest Dr, which is currently eroding slope following road.	18
PB0092	Woodlands Industrial Park	1-0526/ 6279-9030	South Burlington	DP	$25,000	Reroute roof drainage to existing detention pond. Retrofit pond to accommodate additional volume and detain CPv.	18
PB0093	Worcester Street	2-0312	South Burlington	UD	$821,000	Construct underground detention chambers under ROW and grassed shoulder.	15
PB0094	Dorset Park Pond	1-1033	South Burlington	DP	$20,000	Retrofit pond with CMAC valve.	21
PB0095	Hannaford's Pond	1-1214	South Burlington	DP	$21,000	Retrofit pond with CMAC valve.	17
PB0096	Lowes Pond	1-1214	South Burlington	DP	$17,000	Retrofit pond with CMAC valve.	17
PB0097	Vermont National Country Club Pond B	1-1241b	South Burlington	DP	$36,000	Retrofit pond with CMAC valve.	19
PB0098	Technology Park Pond 1	1-1254	South Burlington	DP	$22,000	Retrofit pond with CMAC valve.	15
PB0099	Lot A Mountain View Pond	1-1536	South Burlington	DP	$12,000	Retrofit pond with CMAC valve.	13

Potash Brook Flow Restoration Plan
Table E-2: Potash Brook Watershed BMP Project Scoring

ID #	Project Name	Expired Permit	MS4	BMP Type [1]	Project Cost Estimate [2]	Retrofit Description	Total Score [3]
PB0100	Kennedy Dr Pond 1	1-1582a	South Burlington	DP	$13,000	Retrofit pond with CMAC valve.	17
PB0101	Quarry Hill Pond	3602-INDS	South Burlington	DP	$12,000	Retrofit pond with CMAC valve.	14
PB0102	Heatherfield P1	3658a	South Burlington	DP	$12,000	Retrofit pond with CMAC valve.	12
PB0103	Heatherfield P2	3658b	South Burlington	DP	$13,000	Retrofit pond with CMAC valve.	17
PB0104	Heatherfield P3	3658c	South Burlington	DP	$13,000	Retrofit pond with CMAC valve.	16
PB0105	Winding Brook	3691-INDS	South Burlington	DP	$15,000	Retrofit pond with CMAC valve.	18
PB0106	Mountainview Pond b	3805-INDS	South Burlington	DP	$14,000	Retrofit pond with CMAC valve.	12
PB0107	Farrell St Pond	5080-INDO	South Burlington	DP	$13,000	Retrofit pond with CMAC valve.	21

Notes:

1. **BMP Type Abbreviations**: GW: Gravel Wetland, GS: Grass Swale, RS: Retention Swale, ST: Settling Tank, OF: Control orifice, IB: Infiltration Basin, IT: Infiltration Trench, DP: Detention Pond, UD: Underground Detention, RP: Retention Pond, DS: Detention Swale, DW: Dry Well, IG: Infiltration Gallery, SF: Sand Filter, BR: Bioretention, MF: Median Filter.

2. Project costs estimates are rounded.

3. Total score is based on scoring criteria and scoring key presented in Tables D-1 and D-2 in Appendix D.

Potash Brook Flow Restoration Plan
Table E-3: Potash Brook Watershed BMP Project Implementation Schedule

ID #	Project Name	Expired Permit	MS4	BMP Type [1]	Retrofit Description	Implementation Year	Project Cost Estimate [2]	Project Cost Estimate w/ Inflation [3]
PB0012	Brookwood Drive Pond	2-0794; 2-0619	South Burlington	DP	Construct new detention pond to detain this large outfall. Forebay to be located in empty lot near Brookwood Dr.	2018	$394,000	$443,000
PB0082	UMall Sears Auto Pond	1-0503d; 6282-9030; 2-0619	South Burlington	GW	Construct large gravel wetland in unused section of parking lot in Umall (to the east of the party store). Reroute Dorset St stormline here.	2019	$90,000	$104,000
PB0091	Woodcrest Drive	No Permit	South Burlington	IB	Infiltrate stormwater to the southwest of drainage area. Reroute stormline south to new BMP. Construct new swale to drain the end of Woodcrest Dr, which is currently eroding slope following road.	2019	$182,000	$211,000
PB0094	Dorset Park Pond	1-1033	South Burlington	DP	Investigate option to retrofit pond with under drain and include CMAC valve to detain CPv.	2019	$20,000	$23,000
PB0105	Winding Brook	3691-INDS	South Burlington	DP	Investigate option to retrofit pond with CMAC valve to detain CPv.	2019	$15,000	$17,000
PB0107	Farrell St Pond	5080-INDO	South Burlington	DP	Investigate option to retrofit pond with CMAC valve to detain CPv.	2019	$13,000	$15,000
PB0051	Logwood Neighborhood Detention Pond	No Permit	South Burlington	DP	Construct new end of pipe surface impoundment BMP behind Lean Dental Group. Outfall is currently eroded.	2020	$151,000	$180,000
PB0066	Queen City Park Road Detention Pond	No Permit	VTrans	DP	Add detention to existing depressed area where stormlines already outfall. Drainage from Shelburne Rd is assumed to be already rerouted to larger depression to the north (see project entitled 189 Cloverleaf).	2020	$99,000	$118,000
PB0022	Eastwood Commons Pond Expansion	1-1438	South Burlington	DP	Reroute area to the west of existing pond (eastern side of Shaw's plaza) to this pond. Add a new connection between these stormwater systems to the east of the Shaw's property. Expand pond and modify outlet structure to accommodate additional drainage.	2021	$25,000	$31,000
PB0024	Economou Farm Pond	1-1241d	South Burlington	DP	Retrofit existing dry pond to detain CPv. Expand pond and retrofit outlet structure. Add forebay.	2021	$25,000	$31,000
PB0029	Golf Course Road South	1-1241	South Burlington	DP	Construct new detention basin at the end of pipe before it enters the golf course. Existing infrastructure already drains to swale.	2021	$38,000	$47,000
PB0050	Lindenwood Drive Detention Pond	No Permit	South Burlington	DP	Add catchbasins and infrastructure to reroute stormwater to the east of Lindenwood Dr. Part of Brewer Pkwy drains to this area as well. Propose to create one detention basin to detain drainage from both streets. Lindenwood Dr has existing puddling and icing issues. This BMP would also mitigate those issues.	2021	$89,000	$109,000
PB0063	Park Road Detention Pond	1-1241	South Burlington	DP	Propose to reroute swale on southern side of Park Rd to the north and detain in wooded area.	2021	$94,000	$116,000
PB0067	Shaws West	No Permit	South Burlington	UD	Construct underground detention in vegetated island along west side of parking lot. Reroute last catchbasin in southwest corner of parking to this area.	2021	$230,000	$283,000
PB0072	Staples Plaza Underground Detention B	No Permit	South Burlington	UD	Construct underground detention chambers in southeast corner of parking lot.	2021	$288,000	$354,000
PB0086	Vermont National Country Club Pond B	1-1241b	South Burlington	DP	Retrofit existing detention pond. Add forebay and expand pond.	2021	$25,000	$31,000
PB0087	Vermont National Country Club Pond C	1-1241c	South Burlington	DP	Retrofit existing detention pond. Add forebay and expand pond.	2021	$25,000	$31,000
PB0102	Heatherfield P1	3658a	South Burlington	DP	Investigate option to retrofit pond with CMAC valve to detain CPv.	2021	$12,000	$15,000
PB0103	Heatherfield P2	3658b	South Burlington	DP	Investigate option to retrofit pond with CMAC valve to detain CPv.	2021	$13,000	$16,000
PB0104	Heatherfield P3	3658c	South Burlington	DP	Investigate option to retrofit pond with CMAC valve to detain CPv.	2021	$13,000	$16,000
PB0004	189 Cloverleaf Detention Pond	No Permit	VTrans	DP	Add outlet structure to area that is already depressed to detain stormwater. Reroute stormline from Shelburne Rd to this area.	2022	$59,000	$75,000
PB0007	Adelphia Cable Pond Retrofit	1-1000; 6291-9030	South Burlington	DP	Reroute drainage from Kimball Ave to this detention pond behind Adelphia Cable. Retrofit and expand existing pond to detain CPv.	2022	$25,000	$32,000
PB0013	Burlington Price Chopper	No Permit	Burlington	GW	Construct new gravel wetland in area between parking lot and stream to the south of parking lot.	2022	$1,459,000	$1,848,000
PB0019	Dumont Park Stormwater Project	No Permit	South Burlington	DP	Construct new detention pond to the north of Barrett St where two stormlines converge.	2022	$69,000	$87,000

Potash Brook Flow Restoration Plan
Table E-3: Potash Brook Watershed BMP Project Implementation Schedule

ID #	Project Name	Expired Permit	MS4	BMP Type [1]	Retrofit Description	Implementation Year	Project Cost Estimate [2]	Project Cost Estimate w/ Inflation [3]
PB0031	Grandview Drive North Detention Pond	2-0238; 2-0737	South Burlington	DP	Construct new surface detention BMP following outfall, which is currently broken and experiencing significant erosion.	2022	$33,000	$42,000
PB0032	Grandview Drive West Detention Pond	2-0238; 2-0737	South Burlington	DP	Construct new surface detention basin to the west of Dorset St. Reroute stormline away from brook to new BMP.	2022	$36,000	$46,000
PB0037	Iby Gravel Wetland	No Permit	South Burlington	GW	Construct new gravel wetland at the end of Iby St to capture stormwater for the street.	2022	$67,000	$85,000
PB0083	UVM Bio Research Complex	5269-9003.R	UVM	DP	Construct bioretention to treat stormwater in grassed area near the center of complex. Potentially move BMP if site is built-out further.	2022	$176,000	$223,000
PB0002	110 Kimball Ave - North Infiltration Basin	1-1504a	South Burlington	IB	Runoff is bypassing infiltration basin and sheet flowing to a swale with direct discharge to the brook. Add trench along west edge of parking lot to direct runoff to infiltration basin. Expand basin to accommodate increased volume.	2023	$25,000	$33,000
PB0003	110 Kimball Ave - South Infiltration Basin	1-1504b	South Burlington	IB	Retrofit outlet structure and add proposed outlet control riser that was not constructed.	2023	$10,000	$13,000
PB0006	30 Kimball Ave Swale Retrofit	1-1526; 6269-9030	South Burlington	DS	Retrofit existing swale detention to meet CPv. Expand swale to accommodate modified outlet structure.	2023	$25,000	$33,000
PB0011	Blue Mall Infiltration	2-0144	South Burlington	IG	Construct underground infiltration chambers in the southwest edge of parking lot. Overflow to existing stormline that flows to Dorset St.	2023	$531,000	$693,000
PB0015	Church of Jesus Christ of Latterday Saints	2-0179; 6318-9030	South Burlington	DS	Add detention to swale to the west of parking area with outlet control to detain CPv	2023	$29,000	$38,000
PB0018	Dorset Commons Pond	1-0242	South Burlington	DP	Construct new detention pond in wooded area behind Dorset Commons.	2023	$168,000	$219,000
PB0020	Dynapower	1-0618	South Burlington	DP	Reroute roof drainage to existing detention pond. Formalize pond and retrofit to detain CPv.	2023	$25,000	$33,000
PB0023	Easy Self Storage	2-0167	South Burlington	DP	Create new detention basin to the north of the storage area.	2023	$53,000	$69,000
PB0027	Fairpoint Communications	2-0212	South Burlington	DP	Construct new detention pond to the east of property in grassed area. Two outfalls on site drain to wetland swales that need to be rerouted to the east.	2023	$124,000	$162,000
PB0034	Helen Ave Cul De Sac	No Permit	South Burlington	IB	Construct new infiltration basin in the cul de sac at the end of Helen Ave, which would provide significant water quality benefit.	2023	$136,000	$177,000
PB0038	INS Building Pond A Retrofit	1-0969	South Burlington	RP	Retrofit existing detention pond. Add forebay and construct outlet structure with low flow orifice to meet CPv standards.	2023	$25,000	$33,000
PB0039	INS Building Pond B Retrofit	1-0969b	South Burlington	DP	Retrofit existing detention pond. Add forebay and construct outlet structure with low flow orifice to meet CPv standards.	2023	$25,000	$33,000
PB0045	K-Mart Plaza Infiltration	No Permit	South Burlington	IG	Construct new underground infiltration chambers in K-Mart parking lot.	2023	$1,121,000	$1,463,000
PB0047	Lane Press Roof	1-1337	South Burlington	IB	Capture roof drainage in a new infiltration basin. Roof drains already flows to grassed area where treatment is proposed.	2023	$310,000	$404,000
PB0055	Merchant's Bank Detention Pond	2-1171; 6275-9030; 6269-9030; 2-0939	South Burlington	DP	Route stormwater from Allstate Insurance west to Merchant's Bank and provide detention in grassed area	2023	$66,000	$86,000
PB0057	Nicklaus Circle	1-1241, 4049-9030	South Burlington	DP	Construct new linear detention feature to the north of Nicklaus Cir where the stormline and swale converge.	2023	$161,000	$210,000
PB0061	Olympiad Apartments & Office Building Pond Retrofit	1-1452	South Burlington	DP	Retrofit existing detention pond. Add forebay, clean out vegetation, and ensure pond detains CPv.	2023	$25,000	$33,000
PB0062	Panurgy Infiltration Basin	3409-9010	South Burlington	IB	Retrofit and expand existing infiltration basin to infiltrate the CPv.	2023	$25,000	$33,000
PB0064	Pillsbury Manor Infiltration Basin Retrofit	1-1015	South Burlington	IB	Retrofit existing pond to infiltration basin. Overflow to existing culvert.	2023	$25,000	$33,000
PB0070	South Meadows Pond	1-0661	Burlington	DP	Retrofit existing detention pond to meet CPv standards. Add forebay and expand pond. Upgrade outlet structure.	2023	$25,000	$33,000
PB0074	Sugartree Lane	2-0878	South Burlington	DP	Expand existing depressed area at the end of Sugartree Ln , which appears to be an abandoned detention area. Reroute catchbasins to pond. Upgrade pond outlet.	2023	$25,000	$33,000

Potash Brook Flow Restoration Plan
Table E-3: Potash Brook Watershed BMP Project Implementation Schedule

ID #	Project Name	Expired Permit	MS4	BMP Type [1]	Retrofit Description	Implementation Year	Project Cost Estimate [2]	Project Cost Estimate w/ Inflation [3]
PB0076	Technology Park Pond Retrofit	1-1458 P4	South Burlington	DP	Retrofit existing detention pond to meet CPv standards. Upgrade outlet structure and expand pond to accommodate additional storage.	2023	$25,000	$33,000
PB0078	The Pines	1-1117	South Burlington	DP	Retrofit existing pond to meet CPv standards. Add forebay and outlet structure with low flow orifice; expand pond.	2023	$25,000	$33,000
PB0079	UMall Detention Pond	1-0503c; 6282-9030	South Burlington	DP	Retrofit existing detention pond to detain CPv. Upgrade outlet structure and expand pond.	2023	$27,000	$35,000
PB0080	UMall Infiltration 1	1-0503b; 6282-9030	South Burlington	IG	Retrofit existing infiltration gallery to infiltrate the CPv.	2023	$25,000	$33,000
PB0081	UMall Infiltration 2	1-0503a; 6282-9030	South Burlington	IG	Retrofit existing infiltration gallery to infiltrate the CPv.	2023	$55,000	$72,000
PB0089	Wellesley Grove	2-1023	South Burlington	DP	Add outlet control to existing depression to detain stormwater. Outfall is currently eroded.	2023	$77,000	$100,000
PB0090	Windridge Court	2-0824	South Burlington	IB	Construct new infiltration basin to infiltrate stormwater to the west of this small development.	2023	$45,000	$59,000
PB0092	Woodlands Industrial Park	1-0526/ 6279-9030	South Burlington	DP	Reroute roof drainage to existing detention pond. Retrofit pond to accommodate additional volume and detain CPv.	2023	$25,000	$33,000
PB0010	Ashbrook Drive	2-0101	South Burlington	DP	Reroute stormwater and detain southwest of Dorset St behind apartment buildings.	2024	$42,000	$56,000
PB0026	Exit 14 Gravel Wetland	No Permit	VTrans	GW	Propose new gravel wetland in depressed triangle greenspace between ramps. Reroute several culverts to this area.	2024	$131,000	$176,000
PB0044	Kennedy Dr Pond 7 Expansion	1-1582g; 1-0233	South Burlington	DP	Reroute stormline that currently outfalls behind Key Bank to existing detention pond. Expand pond footprint to accommodate additional drainage area and detain CPv.	2024	$25,000	$34,000
PB0046	Knoll Circle	2-0220	South Burlington	DP	Construct new surface detention basin with swale inlet. Current stormline draining subdivision already enters swale, which also drains area to the west.	2024	$184,000	$247,000
PB0056	Miller Research Farm	No Permit	UVM	DP	Reroute culvert east across Spear St and detain water to the south of the UVM farm.	2024	$463,000	$622,000
PB0009	Airport Drive	No Permit	BTV	IG	Construct subsurface infiltration chambers in southernmost lot where houses will be removed. Intercept stormline running south down Airport Dr.	2025	$439,000	$608,000
PB0041	Kennedy Dr Pond 2 Expansion	1-1582b; 2-1069	South Burlington	DP	Retrofit existing detention pond to accommodate additional drainage from The Edge and 1 Twin Oaks.	2025	$25,000	$35,000
PB0042	Kennedy Dr Pond 3 Expansion	1-1582c	South Burlington	DP	Drainage for offices to the east of Timber Ln currently discharges to a swale along Kennedy Dr heading west (direction of the existing pond). Reroute culvert that crosses under access ramp to pond to pond. Expand pond and retrofit to detain CPv.	2025	$25,000	$35,000
PB0043	Kennedy Dr Pond 4 Expansion	1-1582d; 1-0237; 1-1023; 1-1290	South Burlington	DP	Reroute stormline from Chatham Green and swale along Hinesburg Rd to existing detention pond. Expand pond to accommodate additional drainage area and detain CPv.	2025	$25,000	$35,000
PB0100	Kennedy Dr Pond 1	1-1582a	South Burlington	DP	Investigate option to retrofit pond with CMAC valve to detain CPv.	2025	$13,000	$18,000
PB0005	189 Ramp Detention Pond	2-0619	VTrans	DP	Detain stormwater from a large section of Dorset St. Intercept stormline near Kennedy Dr and reroute to the area between 189 ramps.	2026	$101,000	$144,000
PB0014	Chelsea Circle	2-0767	South Burlington	IB	Construct new infiltration basin constructed to south of existing swale, which receives flow from Chelsea Cir condos and Timberlane Dental parking lot. Neighborhood icing and flooding issues can be mitigated with this project.	2026	$115,000	$164,000
PB0025	Exit 13 Gravel Wetland	No Permit	VTrans	GW	Propose new gravel wetland in depressed triangle greenspace between ramps. Reroute several culverts to this area.	2026	$219,000	$312,000
PB0049	Lilac Ln Infiltration Basin	No Permit	South Burlington	IB	Formalize infiltration basin in depressed area at the end of Lilac Ln.	2026	$44,000	$63,000
PB0054	Meadowland Business Park Pond 2	1-1269_4290-9020.3 Lot 10	South Burlington	DP	Retrofit existing detention pond. Add forebay and construct outlet structure with low flow orifice to meet CPv standards.	2026	$45,000	$64,000
PB0065	Quarry Hill South	6322-9030	South Burlington	DS	Add detention to existing swale running northeast behind garages.	2026	$132,000	$188,000

Potash Brook Flow Restoration Plan
Table E-3: Potash Brook Watershed BMP Project Implementation Schedule

ID #	Project Name	Expired Permit	MS4	BMP Type [1]	Retrofit Description	Implementation Year	Project Cost Estimate [2]	Project Cost Estimate w/ Inflation [3]
PB0001	1050 Hinesburg Road	No Permit	South Burlington	DP	There is an existing wet depression here where stormwater is already routed. Propose to retrofit pond to meet CPv standards.	2027	$27,000	$40,000
PB0017	Domino's	No Permit	South Burlington	DP	Construct a new detention pond behind parking area. Add catchbasin along Swift St to also capture half of the road drainage.	2027	$54,000	$79,000
PB0030	Gonzo's Underground	2-0811	South Burlington	UD	Propose to intercept stormline that flows west along Williston Rd to underground detention chambers under grassed area in front of Budget Car Rental / Gonzo's plaza.	2027	$662,000	$972,000
PB0068	South Burlington High School Infiltration	No Permit	South Burlington	IB	Construct new infiltration basin to the southeast of sports field in currently wooded area.	2027	$165,000	$242,000
PB0069	South Burlington High School North	6174-INDS.A	South Burlington	IG	Construct dry wells to infiltrate stormwater from the high school parking lot and middle school roof. Potential educational benefit.	2027	$992,000	$1,457,000
PB0084	UVM Forestry Research Center - East Roof	No Permit	UVM	IG	Construct dry well to capture and infiltrate roof drain. Potential educational benefit.	2027	$39,000	$57,000
PB0085	UVM Forestry Research Center - West Roof	No Permit	UVM	IG	Construct dry well to capture and infiltrate roof drain. Potential educational benefit.	2027	$25,000	$37,000
PB0033	Hawthorne Circle Detention Pond	No Permit	South Burlington	DP	Construct new detention basin in greenspace formed in the triangle between three garages.	2028	$38,000	$57,000
PB0035	Hinesburg Road	No Permit	South Burlington	DP	Reroute stormwater to existing catchbasin on Deane St and detain to the west of Hinesburg Rd to the south of existing houses.	2028	$33,000	$50,000
PB0036	I-89 Swale	No Permit	VTrans	MF	Construct median filter in depressed area between north and south I-89 lanes. Reroute several culverts.	2028	$129,000	$195,000
PB0095	Hannaford's Pond	1-1214	South Burlington	DP	Investigate option to retrofit pond with CMAC valve to detain CPv.	2028	$21,000	$32,000
PB0096	Lowes Pond	1-1214	South Burlington	DP	Investigate option to retrofit pond with CMAC valve to detain CPv.	2028	$17,000	$26,000
PB0097	Vermont National Country Club Pond B	1-1241b	South Burlington	DP	Investigate option to retrofit pond with CMAC valve to detain CPv.	2028	$36,000	$54,000
PB0098	Technology Park Pond 1	1-1254	South Burlington	DP	Investigate option to retrofit pond with CMAC valve to detain CPv.	2028	$22,000	$33,000
PB0099	Lot A Mountain View Pond	1-1536	South Burlington	DP	Investigate option to retrofit pond with CMAC valve to detain CPv.	2028	$12,000	$18,000
PB0101	Quarry Hill Pond	3602-INDS	South Burlington	DP	Investigate option to retrofit pond with CMAC valve to detain CPv.	2028	$12,000	$18,000
PB0106	Mountainview Pond b	3805-INDS	South Burlington	DP	Investigate option to retrofit pond with CMAC valve to detain CPv.	2028	$14,000	$21,000
PB0008	Adirondack Street	2-0312	South Burlington	UD	Construct underground detention chambers under ROW and grassed shoulder.	2029	$845,000	$1,316,000
PB0093	Worcester Street	2-0312	South Burlington	UD	Construct underground detention chambers under ROW and grassed shoulder.	2029	$821,000	$1,279,000
PB0021	East Terrace Detention Pond	No Permit	South Burlington	DP	Construct new linear detention basin near the outfall to the east side of East Terrace.	2030	$102,000	$164,000
PB0040	Joy Dr Detention Pond	No Permit	South Burlington	DP	Construct new surface BMP in adjacent flat area near the Green Mountain Power transmission corridor.	2030	$47,000	$75,000
PB0052	Marcotte Central School	No Permit	South Burlington	DP	Construct new detention basin in wooded area directly south of school parking lot. Route outfall to existing stormline. Potential educational benefit.	2030	$57,000	$91,000
PB0053	Marine Connection	No Permit	South Burlington	DS	Add detention to existing swale near the back of the large Marine Connection building. Expand swale to accommodate additional volume.	2030	$58,000	$93,000
PB0058	North Country Credit North West Infiltration	No Permit	South Burlington	IT	Install perforated pipe to the north of parking lot in grassed area to infiltrate stormwater.	2030	$37,000	$59,000
PB0059	North Country Credit South Infiltration	No Permit	South Burlington	IG	Construct underground infiltration chambers in the southeast corner of parking lot. Overflow to existing stormline.	2030	$129,000	$207,000
PB0060	O'Brien Drive Underground Detention	No Permit	South Burlington	UD	Construct underground storage chambers in open lot between existing houses.	2030	$580,000	$931,000
PB0075	Swift Estates Pond	No Permit	South Burlington	DP	Retrofit existing detention pond to meet CPv standards. Add forebay and upgrade outlet structure.	2030	$25,000	$40,000
PB0088	VT Gas Detention Pond	2-0228; 6293-9030	South Burlington	DP	Reroute stormline from Swift St to grassed area to the north of VT Gas property and construct new detention pond.	2030	$52,000	$83,000

Potash Brook Flow Restoration Plan
Table E-3: Potash Brook Watershed BMP Project Implementation Schedule

ID #	Project Name	Expired Permit	MS4	BMP Type [1]	Retrofit Description	Implementation Year	Project Cost Estimate [2]	Project Cost Estimate w/ Inflation [3]
PB0071	Southview Drive	No Permit	South Burlington	UD	Construct underground detention chambers in ROW and grassed area. Road is 30ft wide and could be narrowed for storage.	2031	$1,048,000	$1,732,000
PB0016	Community Bible Church Infiltration	No Permit	South Burlington	IT	Construct linear infiltration trench (perforated pipe) along back of several businesses.	2032	$975,000	$1,660,000
PB0028	Faith United Methodist Church	No Permit	South Burlington	DP	Construct new underground detention behind church (northwest) in grassy area. Current outfall is eroded.	2032	$49,000	$83,000
PB0048	Laurel Hill Drive	No Permit	South Burlington	IB	Construct new infiltration basin to the north of houses before stormline pipe enters riparian buffer.	2032	$162,000	$276,000
PB0073	Stonehedge Circle	2-0100	South Burlington	DP	Construct bioretention along road in grassed area with discharge to existing catchbasin.	2032	$55,000	$94,000
PB0077	Temple Detention Pond	No Permit	South Burlington	DP	Propose new detention pond in depressed area in front of Temple by intersection of Dorset St and Swift St. Stormwater already collects in this area.	2032	$47,000	$80,000

Notes:

1. BMP Type Abbreviations: GW: Gravel Wetland, GS: Grass Swale, RS: Retention Swale, ST: Settling Tank, OF: Control orifice, IB: Infiltration Basin, IT: Infiltration Trench, DP: Detention Pond, UD: Underground Detention, RP: Retention Pond, DS: Detention Swale, DW: Dry Well, IG: Infiltration Gallery, SF: Sand Filter, BR: Bioretention, MF: Median Filter.

2. Project costs estimates are based on 2014 dollars and are rounded.

3. Project costs have been inflated based on the year of implementation and an annual 3% inflation rate.

CENTENNIAL BROOK FLOW RESTORATION PLAN

October 1, 2016

Prepared by:

southburlington
PUBLIC WORKS

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tce TRUDELL CONSULTING ENGINEERS

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1. Executive Summary

This Flow Restoration Plan (FRP) for the Centennial Brook watershed was developed in accordance with requirements in the Municipal Separate Storm Sewer System (MS4) General Permit #3-9014 (2012). Once approved by the Vermont Department of Environmental Conservation (VTDEC) this FRP will become part of the Stormwater Management Plans (SWMP) prepared by the MS4 permittees in the Centennial Brook watershed. This includes the City of South Burlington, the Vermont Agency of Transportation (VTrans), the City of Burlington, Burlington International Airport (BTV), and the University of Vermont (UVM). The Centennial Brook FRP will act as a guidance document for the MS4 entities as they implement the stormwater Best Management Practices (BMPs) necessary to attain the flow restoration targets established by the Centennial Brook Total Maximum Daily Load (TMDL). The Centennial Brook TMDL was approved by the U.S. Environmental Protection Agency (EPA) on September 28, 2007. The TMDL suggests a 23.2% increase in stream flow during low flow conditions, and requires a 63.4% reduction in stream flow during high flow conditions (established as the 1-year storm event).

Development of the Centennial Brook FRP was an iterative process that utilized the Vermont Best Management Practice Decision Support System (BMPDSS) model maintained by VTDEC. This model was created by VTDEC and its partners as part of the initial TMDL development. The BMPDSS model allows the user to add, remove, or modify information related to the existing and proposed stormwater BMPs in the watershed. The BMPDSS then predicts the impacts that these changes will have on stream flow. In 2002, VTDEC provided a "base" condition BMPDSS model for Centennial Brook. This version of the BMPDSS model included all stormwater BMPs that existed in the watershed prior to 2002 and provided an estimated stream flow during the 1-year storm event. The goal of the FRP is to reduce stream flow by 63.4% during this target storm event.

The first step in FRP development was to inspect all existing BMPs included in the "base" condition model (Pre-2002). Based on the results of these field inspections, revisions were made to the BMPDSS model. Once this work was complete, the BMPDSS model was updated to include all BMPs that were constructed in the watershed after 2002. This version of the model became known as the "existing" conditions, or Post-2002, model run.

Following updates to the BMPDSS for the Pre-2002 and Post-2002 model scenarios, existing Pre-2002 BMPs were evaluated to determine if they could be retrofit to provide improved treatment and detention of stormwater runoff. After an initial list of retrofit sites were identified, a preliminary field assessment was completed at each site to document any potential constructability issues and review the drainage areas for each proposed BMP. These new BMPs were then incorporated into the BMPDSS model. New BMPs were added to the BMPDSS model until the required stream flow reduction target was achieved.

In addition to the identification of stormwater controls, the Total Maximum Daily Load (TMDL) flow targets and future growth assumption developed by VTDEC was reviewed in the context of the FRP development. In July 2013, at the request of the City of South Burlington, the Chittenden County Regional Planning Commission (CCRPC)[1] completed a study to estimate the expected non-jurisdictional impervious area growth in the Centennial Brook watershed over the next 20 years. The original TMDL arbitrarily assumed a non-jurisdictional impervious growth of 40 acres, whereas the CCPRC study estimated 5 acres

[1] Chittenden County Regional Planning Commission (CCRPC). 2013. Impervious Surface Analysis for the Centennial Brook Watershed.

based on the actual non-jurisdictional growth rate from 2003 to 2010. The revised future growth reduced the high-flow target (Q0.3%) from 63.4% to 51.6%[2].

The final proposed BMPDSS model run that ultimately achieved a 51.6% reduction in stream flow during the 1-year storm event includes a total of 27 sites; seven (7) retrofits to existing BMPs, three (3) new detention systems, nineteen (19) new infiltration systems, and one (1) new bioretention system. The total cost for implementation of these BMPs is estimated at approximately $10,000,000 (final cost utilizes 2014 construction cost estimates).

Once the final list of required BMPs was determined, these projects were then ranked using a comprehensive ranking matrix and scheduled for construction over a 17-year period. The MS4 permit requires that the BMPs identified in the FRP be constructed within 20 years of the effective date of the MS4 permit, which results in a December 5, 2032 deadline. Therefore, 17 years remain for project implementation prior to the construction deadline. Many factors were considered when developing the BMP implementation schedule. A number of the BMPs are currently covered by expired State of Vermont stormwater permits. These BMPs were included at the front of the schedule so that the associated properties could complete the required stormwater improvements and achieve permit compliance. Other BMPs involve properties containing more than 3 acres of impervious area. VTDEC is currently drafting a "3 Acre Permit" that would require stormwater retrofit of these sites. Therefore, BMPs in this situation were also placed towards the front of the implementation schedule. Other BMPs are located on land owned or controlled by the MS4 entities. These BMPs were given priority over those that were located on private property. The remaining projects were scheduled based on their ability to contribute to stream flow reductions, cost effectiveness, and constructability.

The final step in FRP development was to develop a financial plan that would allow for the construction of the BMPs included in the BMPDSS model. The MS4s involved in the Centennial Brook FRP worked together to develop an implementation schedule for Centennial Brook. Some MS4s have responsibility for BMP implementation as part of FRPs in multiple watersheds. For example, the City of South Burlington has the responsibility to implement BMPs as part of FRPs in five stormwater impaired watersheds: Bartlett, Englesby, Centennial, Munroe, and Potash Brook. All five FRPs were considered when developing a comprehensive and realistic D&C schedule for the City.

Initial project cost estimates were arrived at using 2014 cost estimates. The City of South Burlington intends to finance the required stormwater BMPs by utilizing funds raised by stormwater utility fees, State and Federal grants, as well as low interest loan programs. Once projects were scheduled over the 17-year implementation schedule an annual 3% inflation rate was applied based on historic trends in the construction cost index. The City of South Burlington was then able to take these annual costs and insert them into their existing stormwater utility rate model. Three different scenarios were evaluated in the rate model. The first scenario assumed that grant funding would not be available and that the City would not utilize low interest loans to assist with project implementation. This scenario resulted in a stormwater billing rate of $11.25 per Equivalent Residential Unit (ERU) in FY2032. The second scenario also assumed that grant funding would not be available, but that the City would utilize low interest loans to help pay for implementation of the projects. This scenario resulted in a stormwater billing rate of $10.44 per ERU in FY2032. The third funding scenario assumed that grant funding of approximately $250,000 per year would be available starting in 2018 and that this amount would increase to $500,000 in 2030. This resulted in a stormwater billing rate of $8.79 per ERU in FY2032.

[2] See Table 1: The Modified target was calculates as: -(49.9%) + (63.4-49.9%)*(5 ac/40 ac) = -51.6%

2. Background

2.1. General

Centennial Brook and its watershed are located in Chittenden County, principally in the City of South Burlington, and encompass an area of approximately 1.4 square miles. Centennial Brook is a small second order tributary to the Winooski River, with its confluence located about one half mile above the Winooski Dam at an elevation of approximately 225 ft. Centennial Brook is 0.8 miles in length. At river mile (RM) 0.8 it divides into two branches. The southern branch is 0.8 miles in length and includes within it drainage the I-89 interchange and Route 2 east of the interchange in South Burlington. The east branch is 1.3 miles in length and drains dense residential areas from the upper portion of the watershed. The entire stream and its tributaries are Class B waters designated as cold water fish habitat pursuant to the Vermont Water Quality Standards.

Centennial Brook has been identified as not attaining water quality standards in accordance with Section 303(d) of the Federal Clean Water Act. In 2007, the EPA approved the Centennial Brook Stormwater TMDL[3]. The Centennial Brook TDML study established targets for flow modification in the stream. The flow targets are the basis for this FRP, which was developed in accordance with the MS4 General Permit Subpart IV.C.1 as a required part of the MS4s SWMPs.

The City of South Burlington, as well as the City of Burlington, VTrans and UVM, are regulated MS4 Operators who own and control impervious surface in the Centennial Brook Watershed. The final MS4 general permit dated December 2012 requires that the impacted MS4s develop and submit a comprehensive FRP for the Centennial Brook Watershed. The purpose of this Centennial Brook FRP is to identify the necessary stormwater Best Management Practices (BMPs) that will be used to achieve the flow restoration targets prescribed in the Centennial Brook TMDL.

2.2. Permitting History

All State issued stormwater permits within the Centennial Brook watershed were reviewed as part of the FRP development effort. A full list of VTDEC permits discharging to the Centennial Brook is included in Table 1. Several of the expired permits obtained new permit coverage under a Residual Designation Authority (RDA) permit from VTDEC. Many of the properties that were issued RDA permits have applied for a renewal of their permit, but VTDEC has yet to act on these renewal requests.

Table 1. Expired Permits Within The Centennial Brook Watershed

PERMIT NUMBER	Project Name	PERMIT BUSINESS	EXPDATE
2-0126		Larkin Realty	7/1/1985
1-0871	Summer Woods	CGPM Inc.	6/30/1994

[3] The EPA approval of the Centennial Brook TMDL can be viewed at the following links: https://ofmpub.epa.gov/waters10/attains_impaired_waters.show_tmdl_document?p_tmdl_doc_blobs_id=72381

1-0946	Queensbury Rd and Bluff Court	O'Brien Brothers Agency, Inc.	6/30/1995
1-1257	Quarry Ridge (Centennial Heights)	Quarry Ridge Homeowners Assocaition (So Burlington Realty)	6/30/2001
4330-INDS		South Burlington School District	9/19/2011
4524-INDS	Benson Development	Benson Development LP	3/26/2012
5932-INDS	Precourt Properties	Precourt Investment Co., LLC	12/30/2013

2.3. Centennial Brook Total Maximum Daily Load (TMDL)

2.3.1. Stormwater TMDL History

In response to Centennial Brook not meeting the water quality standards set forth in Section 303(d) of the Federal Clean Water Act, the VTDEC developed TMDLs for impaired watersheds using flow as a surrogate for pollutant loading. The basis for the TMDL development was the comparison of modeled Flow Duration Curves (FDCs) between impaired and attainment watersheds. The Program for Predicting Polluting Particles Passage through Pits, Puddles, and Ponds, Urban Catchment Model (P8) was used to model gauged and ungauged watersheds in Vermont and develop Flow Duration Curves (FDCs) from which a normalized high flow and low flow per drainage area in square miles (cfs/sq.mi.) were extracted.

As described in the Horsley Witten memorandum "Centennial Brook Watershed Flow Restoration Plan Development: Phase I Findings" (February, 2013), the P8 model was initially calibrated to two nearby New York watersheds with long-term flow records where there were some issues with groundwater predictions, and later to six UVM-monitored watersheds with shorter flow records. The model prediction of storm flow was tested on the UVM watersheds and produced satisfactory results, but it should be noted that none of the UVM watersheds had more than 16% impervious cover. For application of the P8 model in ungaged watersheds, such as Centennial Brook, several input parameters had to be estimated or set as a constant, which can introduce potential error.

An FDC is a graph that displays the percentage of time during a given period where flow exceeds a certain value. For the purposes of the Centennial Brook Stormwater TMDL, VTDEC determined that the "low" flow target would be represented by the 95th percentile (Q95%) of the curve and the "high" flow target would be represented by the 5th percentile (Q0.3%). The high and low flow values from the FDCs were then compared between "impaired" watersheds and comparable "attainment" watersheds to determine a percent change (i.e. reduction of high flow, increase of low flow). The percent change was reported in the EPA approved TMDL for each impaired watershed. The high-flow (Q0.3%) was determined to be relatively equivalent to the 1-year design storm flow (2.1 inches of rain over a 24-hour period in Chittenden County). Therefore, stormwater BMPs designed to meet the VTDEC Stormwater Management Manual's Channel Protection volume (CPv) storage standard were used to address the required high-flow reduction target.

2.3.2. TMDL Flow Targets

Centennial Brook is an 887-acre highly-developed tributary to the Winooski River that flows northward from the intersection of Route 2 and I-89. The brook is designated as a Class B water supporting a cold water fishery. Prior assessments for fish were fair to good and the macro invertebrate assessments were poor. Most watershed reaches are rated as poor for sediment content. The TMDL uses high flow as a surrogate for "pollutant of concern" with the assumption that restoration of the high and low flow is assumed to restore the physical, biological, and chemical regime. The low flow target suggested a total 23.2% increase in watershed base stream flows during low flow conditions, and the high flow target required a total 63.4% reduction in watershed flow allocation during the 1-year storm event. UVM and DEC have discussed the exclusion of flows derived from agricultural/open space lands, which would reduce the 63.4% TMDL reduction target to 63.0%.

2.3.3. Future Growth Modified Target

The TMDL flow targets and future growth assumptions used by VTDEC in development of TMDL targets were reviewed as part of the FRP development. In July 2013, at the request of the City of South Burlington, the CCRPC completed a study to estimate the additional non-jurisdictional impervious growth expected in the Centennial Brook over the next 20 years (Appendix B) . Non-jurisdictional growth is by definition impervious area that does not require a stormwater permit, and is therefore important to account for within the 20 year management plan.

The study estimated a future growth of 5 acres, accounting for the maximum new impervious surfaces allowed by the zoning lot coverage for each available parcel of land within the City of Burlington and City of South Burlington. Modified TMDL flow targets were determined by multiplying the portion of the TMDL target associated with future growth (FG) by a correction factor as follows:

Modified Flow Target = $(Target\ \%\ with\ no\ FG) + (\ Target\ \%\ from\ FG) * (\frac{Revised\ FG\ acres}{Original\ FG\ acres})$

The approved original TMDL flow targets and modified flow targets with a revised future growth for Centennial Brook are as follows:

Table 2. Modified TMDL Flow Targets with revised non-jurisdictional future impervious growth estimate

Flow Target	Target High Flow Q 0.3(± %) **Reduction**	Target Low Flow[2] Q 95 (± %) **Increase**
TMDL Target from current Urban/Developed areas	-49.9%	23.2%
TMDL Targets with **40 acres** of Non-Jurisdictional Future Growth	-63.4%	23.2%
TMDL *Modified* Targets with **5 acres** of Non-Jurisdictional Future Growth[1]	-51.6%	23.2%

1 Modified target was calculated as: -[(49.9%) + (63.4% - 49.9%)*(5 ac/40 ac)] = -15.6%

2. The low flow target is not actionable under the TMDL, but is included because improving base flow in the watershed is still a water quality goal.

2.4 MS4 Permit Background and Requirements

A MS4 is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, or man-made channels) that are designed or used for the collection or conveyance of stormwater discharged to waters of the State or waters of the United States. MS4 systems do not include combined sewer systems` that are part of publicly owned wastewater treatment facilities.

On December 5, 2012, Vermont's revised MS4 Permit was issued. This MS4 permit was the second MS4 General Permit issued by the VTDEC. The first MS4 permit was issued in 2003 and amended in 2004. Both the 2004 and 2012 permits authorize stormwater discharges within the urbanized areas of small MS4s. Small MS4s included cities, towns, counties, airports, highway departments, and universities. The City of South Burlington, City of Burlington, University of Vermont, Burlington International Airport and Vermont Agency of Transportation were designated as regulated small MS4s, as were Colchester, Essex, Essex Junction, Milton, Shelburne, Williston, and Winooski.

Included in the 2012 MS4 permit issuance were new requirements for municipalities to develop FRPs to implement the stormwater TMDLs. The FRPs must be developed for each impaired watershed within three (3) years of the date of issuance of the authorization to discharge to the permittee under the general permit, by October 1, 2016, and must include the following elements:

1) An identification of the required controls
2) A design and construction schedule
3) A financial plan
4) A regulatory analysis
5) The identification of regulatory assistance, and
6) Identification of any third party implementation.

The schedule shall provide for implementation of the required BMPs as soon as possible, but no later than 20 years from the effective date of the permit; before December 5, 2032.

3. Best Management Practice Decision Support System Model Assessment

3.1 Background

In an effort to implement the Vermont Stormwater TMDLs, the VTDEC worked with an external consultant (TetraTech) to develop the computer-based VT BMPDSS, a VT-specific hydrologic BMP assessment model. This modeling tool was developed by TetraTech, Inc., with considerable investment from EPA Region 3 and Prince George’s County, Maryland, and was adapted for use in Vermont using funding from the Vermont Agency of Natural Resources (ANR). The purpose of the modeling tool was to predict progress toward the TMDL flow targets based on proposed BMP implementation scenarios to help MS4 communities identify different BMP options and associated costs.

3.1.1 Model Calibration for Centennial Brook

During development of the Centennial Brook FRP, the VT BMPDSS was also reviewed for any values or factors utilized in the stream flow model that could impact accuracy and results. One value used by the BMPDSS is the Hydraulic Weighting Factor (HWF). The HWF is a measure of lag time within a watershed. VTDEC collected rainfall and stream flow data from 2006 to 2008 and calibrated the original model to this data using the HWF. After working closely with VTDEC, it was determined that adjustment of the HWF used in the original BMPDSS model would provide model results that more closely replicated the observed rainfall and streamflow data. Therefore, with VTDEC concurrence, the final BMPDSS model runs utilized a modified HWF.

In order to complete a flow target assessment, VTDEC developed three model scenarios for each impaired watershed, including a "Base" (Pre-2002), "Existing" conditions (Post-2002), and an optimized credit scenario (meeting the flow restoration target). The base scenario (Pre-2002 model) included all stormwater BMPs installed prior to issuance of the VT Stormwater Design Standards in 2002. The land use data used in this scenario was derived from 2002 Quickbird satellite imagery. An existing scenario (Post-2002 model) was then developed with all existing BMPs designed to the 2002 VT Stormwater Design Standards, providing credit toward the flow target on a percent change basis compared to the base scenario. The optimized credit run was used by VTDEC to gage the estimated cost and level of effort to reach the flow targets in each impaired watershed. During the optimized credit run, a theoretical full build-out of BMPs were placed in each subwatershed by the model with a goal of minimizing cost and maximizing flow benefit. Results from the BMPDSS model output were provided as unadjusted cubic feet per second (cfs) and normalized flow (flow per drainage area, cfs/sq. mi). The unadjusted flow was used in the determination of progress towards the TMDL targets to eliminate the effect of watershed area in the percent change comparison.

3.2 Objective

Assessment of the VTBMPDSS model involved a thorough verification of model input variables, assumptions, and results of the baseline (Pre-2002) and existing conditions (Post-2002) BMPDSS models. Creation of the "Credit" scenarios involved developing a list of potential retrofit sites for review by the MS4s in the watershed. As part of this process, site inspections were conducted in order to help assess the feasibility of conceptual projects (see Stormwater BMP Site Inspection Field Sheets provided in Appendix A). Once a preliminary list was created, concepts were refined, and sizing and drainage area delineations were developed for input into the BMPDSS model. The most important inputs to the model for this study were the GIS layers of land use, impervious cover, and soil, as well as the locations, configuration, and hydraulic connections of the BMPs themselves.

3.3 Review of Base and Existing Conditions BMPDSS Model

Prior to conducting site inspections, expired VTDEC stormwater permit files for existing BMPs were reviewed so that the information could be compared to what was included in the Pre-2002 BMPDSS model. Input variables such as drainage areas, impervious cover, soils, and stormwater facility design information were reviewed against GIS data and evaluation of design calculations and site plans was carried out for each of the stormwater practices. This review determined the following:

- Soils, watershed boundary, and 2002 land use data were consistently applied to both the Pre-2002 and Post-2002 condition model runs. The Post-2002 condition model used slightly different impervious area and BMP drainage areas to reflect Post-2002 conditions.

- The Hydrologic Response Unit (HRU) parameters of soils, land use, slope, and impervious cover were in line with the GIS data. Many of the small discrepancies found between GIS area calculations and model inputs were attributed to the HRU grid system used by the model (where individual grids cannot be split and are assigned either inside or outside of a boundary).

- Impervious cover estimates differed slightly between the Pre-2002 and Post-2002 model, with the latter being more accurate. Recently updated impervious cover mapping provided by South Burlington shows a net increase in 1.3 acres over the Post-2002 version and a net decrease in 4.5 acres of VTrans impervious cover, which appears to reflect more accurate mapping rather than an actual change in land cover.

- Updated impervious cover from Burlington was received on 11/30/12, which included revised UVM coverage, and separate calculations from UVM were received on 12/17/12. Review of the data shows an increase in 0.75 acres for the City and a decrease of 11.8 UVM acres from the Post-2002 conditions. Minor changes in drainage boundaries are also reflected in the UVM numbers. Table 3 summarizes changes in total acres and impervious area for each MS4 for the Pre-2002 and Post-2002 models compared to the more recently updated data.

Table 3. Cross-check of MS4 Area and Impervious Acres by Model Runs*

MS4	Total Acres			Impervious Acres		
	Base Model (Pre-2002)	Existing Conditions Model (Post-2002)	Updated Data	Base Model (Pre-2002)	Existing Conditions Model (Post-2002)	Updated Data
UVM	301.3	301.3	300.0	90.0	89.1	77.3
VTrans	59.6	59.6	59.6	18.3	18.3	13.8
Burlington	101.8	101.8	101.9	43.8	45.1	45.9
South Burlington	423.3	423.3	423.4	126.5	126.5	127.8
Total Watershed	**886.0**	**886.0**	**884.9**	**278.6**	**279.1**	**264.8**

*Areas are derived from GIS data; updated impervious cover based on data provided by S. Burlington and Burlington

- MS4 boundaries were developed using a parcel-based delineation for VTrans, a property boundary provided by UVM, and a boundary for Burlington and South Burlington based on the Vermont Center for Geographic Information (VCGI) municipal boundary shapefile.

- BMP drainage area information was cross-checked between the HRU and BMP model input tables, GIS information, and BMP design information. Table 4 shows discrepancies between GIS and HRU inputs in the VTMPDSS and updated impervious estimates. The discrepancies found were a ≥6.5 acre difference between the model inputs and updated estimates for the North Campus pond and the VTDEC's HydroCAD run, as well as UVM's sizing calculations which utilized an impervious cover that was 10 acres less than the input used in the VTBMPDSS. The differences seen for the North Campus pond may have been due to outdated mapping and/or the exclusion of non-UVM impervious cover from the sizing calculations. Updated drainage boundaries were provided by UVM.

Table 4. Cross-check of Impervious Acres Draining to each BMP

BMP	IMPERVIOUS ACRES IN BMP DRAINAGE AREA				
	Base Model (Pre-2002)		Existing Conditions Model (Post-2002)		Updated Data
	HRU model input	*GIS*	*HRU model input*	*GIS*	
M1 East Campus Pond (and retrofit)	53.2	52.7	52.5	52.4	47.7
M2/9 Quarry Ridge Pond	5.1	4.6	5.1	4.6	4.2
M3 Queensbury Pond	1.8	1.7	1.8	1.7	1.5
M4 Sheraton (and retrofit)	5.8	6.2	6.7	7.1	6.8
M5 Main St. Pond	11.6	11.8	11.6	11.8	9.0
M6/7 North Campus Pond	50.9	48.1	50.0	47.6	43.5
M8 Burlington Co Housing Pond/Infil.	-	0.0	1.6	1.3	1.6
TOTAL	**128.3**	**125.0**	**129.2**	**126.4**	**114.3**

- DEC modeled stormwater facilities using HydroCAD to generate the BMP information needed to input into the VTBMPDSS. Both the HydroCAD and the VTBMPDSS inputs were reviewed for each BMP, as well as the design plans and any calculations obtained. Specifically checked were pond storage volumes, drainage areas, outlet elevations, and orifice sizes. Three discrepancies were found: storage volumes for M9 Quarry Ridge (Post-2002); drainage areas for M4 Sheraton (Pre-2002); and volume and outlet assumptions for M5 Main St Pond (Pre-2002). The BMP input for M9 Quarry Ridge was revised and the Post-2002 model was re-run to assess the magnitude of the change to the overall results—the high flow reduction at the watershed outlet changed by 0.1%. This resulted in an overall increase from 16.0% to 16.1% in the Q0.3% reduction for the watershed. Table 5 summarizes the findings from this BMP evaluation.

Table 5. Summary of BMP Information Review

BMP ID*	Name	Comments
M1 (Pre)	UVM - East Campus Pre-2002	**Acceptable**. Small discrepancy in volume between DSS and HydroCAD model, but it appears to correspond to permanent pool storage. HydroCAD matches existing conditions plan. Consider revising dual outlet pipe routing.
M1 (Post)	UVM - East Campus Post-2002	**Acceptable**. Volumes match between models, but no plan set was available to confirm. Inconsistencies in number of outlets; OK based on calculations provided by engineer.
M2 (Pre)	Quarry Ridge Pond Pre-2002	**Acceptable**. All volumes match with plans. As-built plans have an outlet adjustment from 240.0' to 240.3' which is not reflected in the model.
M9 (Post)	Quarry Ridge Pond Post-2002	**Model to be revised.** Impervious area in HydroCAD is slightly lower than in model input. Storage volumes and outflows incorrectly modeled in relation to M2.
M3 (Pre)	Queensbury Road Pre & Post-2002	**Acceptable**. Plans are difficult to read. Pond volumes all appear to check. Cannot verify hole size/count on perforated standpipe outlet structure. The modeled overflow diameter may be slightly understated according the plans. Plans appear to show a 15" dia. orifice, model says 12" diameter. This does not affect the 1-yr storm.
M4 (Pre)	Sheraton Hotel Pre-2002	**Additional review**. All volumes and outlets check, however, the total drainage area (DA) and impervious acres (IA) are twice as large in the HydroCAD model as in the model input (i.e., 11.3 IA /16 DA acres in HydroCAD compared to ~6 IA/8.2 DA acres in VTBMPDSS and GIS.
M4 (Post)	Sheraton Hotel Post-2002	**Acceptable**. All volumes and outlets check. Should model 24" PVC outlet culvert from outlet structure.
M5 (Pre)	Main Street Pond Pre & Post-2002	**Review**. Volumes cannot be verified because page scaling is not included on plan set. Primary outlet elevations inconsistent, may be assuming more flow being released.
M6 (Pre)	UVM - North Campus Pre-2002	**Acceptable**. Volumes checked, but inconsistency in model for upper orifices; these do not affect 1-yr storm release. Impervious cover in the DA is off ~10 acres.
M7 (Post)	UVM - North Campus Post-2002	**Acceptable**. Adjust the HydroCAD routing input parameters if this BMP is to be remodeled under retrofit scenario.
M8 (Post)	Burlington Co-Housing Post-2002	**Acceptable**. Make minor adjustments to outlets to more accurately reflect design.

* Pre- and Post-2002 stormwater design standards

Verification of BMP drainage areas and the design of the existing BMPs was also completed during site visits. Documentation of these observations has been included on field sheets (see Stormwater BMP Site Inspection Field Sheets provided in Appendix A). BMP outlet structures were noted on the field sheet to confirm the general configuration. The HydroCAD models used by VTDEC to enter the BMPs into the BMPDSS were also reviewed against existing site conditions. Comparison of measured field observations versus what VTDEC used for model inputs yielded a number of discrepancies. The watershed boundary was changed in a few locations based on MS4 input and field verification. For example, the area north of University Avenue and west of the baseball diamond was removed because it is now connected to the combined sewer system.

In coordination with VTDEC, a Revised Baseline Scenario was created to address an issue discovered during subsequent modeling runs involving the application of BMPs with small drainage areas. Each time one of these on-site BMPs was added, the model creates a new routing connection that increases downstream flow and reduces times of concentration in the drainage area. This phenomenon can cause the VTBMPDSS model to underestimate the reduction potential of smaller green infrastructure (GI) practices and negates some of the potential benefits of BMP treatment trains. To accurately account for this effect, the "Base" model was revised to incorporate virtual outlets (VOs) and drainage areas with "dummy" connections in the same manner as in the subsequently modeled credit scenario. This adjustment did not alter flow paths in the "Base" model, but did slightly increase Q03 base flows. Thus, slight increases in percent reductions over baseline conditions were achieved in the restoration scenarios.

3.4 Revised Base and Existing Conditions Model Results:

Results of the Centennial VTBMPDSS are summarized in Table 6, based on the results generated by VTDEC. From the flows modeled under the existing Post-2002 scenario at the watershed outlet, there has been a 16.1% reduction in high flows and a 0.03% increase in low flows over the base Pre-2002 "Base" conditions. This result leaves an additional 35.5% reduction and 23.2% increase to meet the overall high and low flow restoration targets, respectively.

Table 6. Summary of Centennial Brook Flows Modeled at the Watershed Outlet *

Model Run	High Flow (Q 0.3%)	Low Flow (Q 95%)
Revised TMDL Target	51.6% reduction	23.2% increase
Pre-2002 Model (cfs/mi2)	20.1	0.17
Post-2002 Model (cfs/mi2)	16.9	0.17
% Change	16.1%	-0.03%
% Remaining	35.5	23.2%

Based on DEC Credit Model run, with revisions to BMP M9 model input.

4. Identification of Stormwater Best Management Practices

The process of BMP identification involved an initial assessment of the existing BMPs with expired permits that did not already meet the CPv standards in the 2002 Vermont Stormwater Management Manual (VSMM) to determine if they could be retrofit to meet the VSMM design standards. Upon review of the existing BMPs, it was determined that additional new BMPs would be required to meet the high-flow and low-flow targets. An initial desktop assessment of the watershed was completed to identify open spaces ideal for BMP implementation. A focus of this effort was to first evaluate property owned by the MS4s where projects could be implemented more readily than on private property. In addition, the location of proposed BMPs across the watershed was taken into consideration to provide storage throughout the watershed. The effort also focused on areas with a high-percentage of impervious coverage where flows were expected to be highest and where infiltration may be possible, as indicated by mapped Natural Resource Conservation Service Hydrologic Soil Group A[4] or B[5] soils.

After an initial list of retrofit sites were identified, a preliminary field assessment was completed at each location to document potential constructability issues and review mapped drainage areas for the proposed BMPs. The BMPs were then modeled using HydroCAD to meet the CPv storage criteria for cold water fish habitat (12-hour detention standard), and incorporated into the BMPDSS model. A number of credit scenarios were modeled to compare various implementation options using 27 stormwater BMPs. In these scenarios, primary BMPs are defined as having an outlet directly to a stream while secondary BMPs drain to a downstream BMP. More details of the BMP concept summaries, based on GIS and field data, can be found in the revised "Centennial Brook Watershed: Retrofit Field Findings Summary Memorandum" (dated October, 2013).

4.1 BMPDSS Model Assessment Results

The credit model runs included 27 BMPs and accounted for an initial 44.2% decrease towards the revised high flow (Q0.3) reduction target of 51.6%.

After completing these initial credit model runs, the MS4 partners discussed the Hydraulic Weighting Factor (HWF) with VTDEC. It was determined that adjustment of the HWF used in the original BMPDSS model would provide results that more closely replicated the observed rainfall and streamflow data. Therefore, with VTDEC concurrence, the final BMPDSS model run utilized a modified HWF, as described previously in section 3.1.1.

These modifications resulted in a revised 51.8% flow reduction of the unadjusted high flow (Q0.3) between the base scenario and proposed credit model runs, meeting the revised high target flow reduction of the TMDL**.** A summary of the base (Pre-2002), existing conditions (Post-2002), and final credit scenarios discussed above are presented in Table 7. Table C-1 in, Appendix C, provides an accounting of some of the key input parameters of each proposed BMP used in the proposed credit scenario.

[4] Group A is sand, loamy sand or sandy loam types of soils. It has low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands or gravels and have a high rate of water transmission.

[5] Group B is silt loam or loam. It has a moderate infiltration rate when thoroughly wetted and consists chiefly or moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures.

Table 7. Summary of Modeling Scenarios

Model Scenario			Purpose	Q03 High Flow		Conclusion
				(cfs)	% Red.	
Pre-TMDL	ANR Base (Pre-2002)	Six Pre-2002 BMPs, 2002 land use and IA GIS layers.	What were the flows at the time the TMDL was established? These flows are the baseline from which restoration/treatment is measured.	27.2	--	We were able to successfully replicate ANR's model.
Pre-TMDL	Revised Base (Pre-2002)	ANR Base + virtual outlets, DAs, and network.	Add "dummy" BMP connections to allow for more accurate comparison with credit scenarios.	27.9	--	This is the new baseline to measure achieved flow reductions.
Current	ANR Existing (Post-2002)	ANR Base + upgrades to some existing BMPs.	What is the change in baseline flow with the retrofit of 4 of 6 existing BMPs to 2002 standards?	23.1	15.2%	We were able to replicate ANR's model.
Current	Revised Existing (Post-2002)	ANR Post-2002 + BMP revisions & additions.	Revise current conditions by correcting model inputs on East Campus Pond (M1) and adding the Patchen Woods development.	23.2	14.8%	Corrections result in a slight decrease from ANR's prediction of the current reductions.
Final Credit Scenario w/Initial TMDL Reduction Target		All primary and secondary retrofits (see Table 3)	What is the max. flow reduction achievable if all feasible retrofits are implemented with UVM-designed retrofits of the Main St. (M5A3) and North Campus (M7A3) ponds and the Colchester Ave. expansion.	15.6	44.2%	Does not meet the revised 51.6% TMDL reduction target, and benefit of secondary practices probably not worth the additional cost.
Final Credit Scenario w/ Revised TMDL Reduction Target		All primary and secondary retrofits (see Table 3)	What is the max. flow reduction achievable if all feasible retrofits are implemented with UVM-designed retrofits of the Main St. (M5A3) and North Campus (M7A3) ponds and the Colchester Ave. expansion.	15.6	51.8%	Meets the revised 51.6% TMDL reduction target.

The BMPDSS model did not predict a significant increase in the stream base flow despite the preferential selection of infiltration-based BMPs when possible given site constraints such as soil type. It has been noted by the VTDEC and other BMPDSS model users that the model tends to under represent infiltration-based BMPs and is not sensitive enough to accurately predict base flow increases as a result of smaller infiltration-based BMPs. It is expected that actual base flow increases will be higher than predicted by the BMPDSS.

5. Proposed BMP Implementation Plan

The final proposed BMP implementation plan includes a total of 27 sites; seven (7) retrofits to existing BMPs, three (3) new detention systems, nineteen (19) new infiltration systems, and one (1) new bioretention system. The proposed BMPs are summarized in Appendix C, Table C-1, including the impervious cover treated, drainage area, WQv managed, CPv storage, or infiltration volume manage as estimated by the HydroCAD design model. A map of the proposed BMP locations is included in Appendix C.

5.1 Proposed BMPs

Twenty seven (27) BMP sites are proposed for implementation in the Centennial Brook watershed. Proposed BMPs include a mixture of retrofits to existing BMPs and new BMPs. The proposed BMPS for implementation are summarized in Table C-1 in Appendix C. Summary sheets describing each proposed BMP in detail for the Centennial Brook FRP were prepared and are included in Appendix C.

5.2 Considerations During BMP Design

Proposed BMPs are currently conceptual in nature. These BMPs will need to be advanced to final design prior to construction. A variety of site specific factors will need to be further considered during the design phase. These considerations include, but are not limited to, the following:

- Relocation of utilities
- Wetland impacts
- Archeological resource impacts
- Soil characterization
- Depth to groundwater
- Depth to bedrock
- ”Hotspot” land use
- Access considerations
- Land purchase/easements
- Future land use plans
- Potential need for site improvements such as; underground storage, retaining walls, etc.

6. Implementation Schedule

A Design and Construction (D&C) schedule is a required element of the final FRP. The MS4 permit indicates that the implementation schedule for the BMPs included in the FRP must be over a timeframe that is less than 20 years from the effective date of the permit. The MS4s involved in the Centennial Brook FRP worked together to develop an implementation schedule for Centennial Brook. Some MS4s have responsibility for BMP implementation as part of FRPs in multiple watersheds. For example, the City of

South Burlington has the responsibility to implement BMPs as part of FRPs in five stormwater impaired watersheds: Bartlett, Englesby, Centennial, Munroe, and Potash Brook. All five FRPs were considered when developing a comprehensive and realistic D&C schedule for the City. The time schedule also accounts for acquisition of necessary permits and/or regulatory approvals, as well as limitations of MS4 resources on an annual basis.

6.1 Project Ranking

All proposed BMPs identified as part of FRP development in the five stormwater impaired watersheds of Potash, Bartlett, Englesby, Centennial, and Munroe Brook were ranked and a project prioritization was created. Considerations that factored into the ranking of BMP projects include the estimated benefit of a BMP towards the FRP's flow restoration targets, and the amount of impervious area treated. The comprehensive ranking matrix ranked the proposed BMP projects based on the following criteria, which were grouped into four general categories as shown in Table 8.

Table 8: Project Ranking Matrix

Category	ID	Criteria
Cost/Operations	A	Project Cost per Impervious Acre
Project Design Metrics	B	Impervious Acres Managed (ac)
	C	Channel Protection Volume (CPv) Mitigated, (ie. 1-year Storm)
	D	Volume Infiltrated (ac-ft)
Project Implementation	E	Permits
	F	Land Availability
Other Project Benefits/Constraints	G	Flood Mitigation (Is existing flooding issue mitigated by project?)
	H	TMDL Flow Target Addressed (Q03, Q95)
	I	Lake Champlain Phosphorus TMDL
	J	Other Project Benefits/Constraints

Values for each criteria were identified and assigned a relative score, so that proposed BMP projects could be ranked based on a total score. A full description of the ranking criteria is presented in Table D-1 in Appendix D, and a scoring key is presented in Table D-2 in Appendix D. The development of cost estimates is further defined in the Subsection 6.1.1. The final scoring of proposed BMP projects in the Centennial Brook Watershed is presented Table E-2 in Appendix E.

6.2 Proposed BMP Cost Estimates

BMP cost estimates are based on average costs for conceptual level projects and deviation from these estimates is expected as projects move forward with engineering design. It is anticipated that there will be differences between project cost estimates presented in the FRP and actual project bid costs. The BMP cost estimates presented in the FRP are based on limited site investigation and the application of this methodology may fail to accurately reflect project cost impacts due to actual site conditions and constraints. Therefore, the BMP cost estimates presented are suitable for planning purposes only and not detailed project budgeting. For consistency purposes, all project cost estimates presented are calculated using costs in 2014, when the methodology was developed.

The BMP cost estimates were developed based on the following assumptions:

Design Control Volumes: Design control volumes were based on the estimated runoff volume associated with the 1-year storm event for off-line, underground or green infrastructure-type practices. Control volumes for large, in-line infiltration or detention basins were based on the estimated runoff associated with the 100-year storm event plus approximately 2 feet of freeboard volume. Underground systems and green infrastructure-type practices were conceptually designed as offline practices that only accept runoff from the one-year event. Runoff volumes for all storm events were determined based on HydroCAD model results that rely on the Soil Conservation Service (SCS) TR-55 and TR-20 hydrologic methods.

Unit Costs and Site Adjustment Factors: Unit cost for each BMP and site adjustment factors were derived from research by the Charles River Watershed Association and Center for Watershed Protection, as well as from experience with actual construction. Underground detention chambers (UDC) and underground recharge chamber (URC) systems were typically designed using Stormtech SC-740™ chamber systems. Cost estimates for the retrofit sites described as "GI/URC" were calculated as bioretention treatment systems followed by Stormtech SC-740™ chambers for recharge benefits. Cost adjustment factors were used to account for site specific differences typically related to project size, location, and complexity. Retrofits of existing BMPs, for example, generally cost less than new installations. The values used to estimate BMP costs are summarized in Table 9 below:

Table 9: Proposed BMP Unit Costs and Adjustment Factors

BMP	Base Cost ($/ft3)
Detention Basin	$2
Infiltration Basin	$4
Underground Chamber (infiltration or detention)	$12
Bioretention	$10
Green Infrastructure/ Underground Chamber Combo	$22
Site Type	Cost Multiplier
Existing BMP retrofit	0.25
New BMP in undeveloped area	1
New BMP in partially developed area	1.5
New BMP in developed area	2
Adjustment factor for large aboveground basin projects	0.5

Site Specific Costs: Cost of significant utility or other work related to the construction of the BMP itself. Site specific costs were added to construction costs for certain project locations based on past experience. For example, sites may require significant drainage reconstruction, utility relocation, or ledge removal. Site-specific construction items are described in detail in the Retrofit Summary Sheets provided as part of the Revised Field Findings Memo (dated October 14), except for the retrofit concepts updated after submittal of the Revised Field Findings Memo.

Base Construction Cost: Calculated as the product of the design control volume, the unit cost, and the site adjustment factor.

Permits and Engineering Costs: Used either 20% (for largest storage volume projects), and 35% for smaller or complex projects.

Land Acquisition Costs: Added to the total costs for facilities located on non-MS4 properties. Retrofits that may require partial land acquisition fees were marked up by $150,000; retrofits possibly requiring total land acquisition were marked up by $300,000. These land acquisition estimates are considered to be place-holders at this time and may require adjustments based on current land values and the willingness of land owners to grant easements for the proposed drainage improvements.

Total Project Cost: Calculated as the sum of the base construction cost, permitting and engineering costs, and land acquisition costs.

Cost per Impervious Acre: Calculated as the construction costs plus the permitting and engineering costs divided by the impervious acres managed by the BMP.

Operation and Maintenance: The annual O&M was calculated as 3% of the base construction costs, with a maximum of $10,000.

Minimum Cost Adjustment: After total project costs were determined for each proposed BMP, costs were reviewed and adjusted so that projects were assigned a minimum cost of $25,000.

A summary of all project costs for each proposed BMP in the Centennial Brook Watershed are included in Table E-1 in Appendix E.

6.3 Implementation Schedule

The BMPDSS model run that ultimately achieved the required 51.8% reduction in stream flow during the 1-year storm event included 27 BMPs costing approximately $10,000,000 (this value utilizes 2014 construction cost estimates). The MS4 general permit requires that the BMPs identified in the FRP be constructed within 20 years of the effective date of the MS4 general permit. Therefore, the MS4 entities developed a schedule for design and construction of all BMPs that concludes before December 5, 2032. The implementation schedule for the proposed BMP projects in the Centennial Brook watershed are included in Table E-3 in Appendix E.

In addition to a project's score within the BMP ranking matrix, development of a BMP implementation schedule required the consideration of additional factors. A number of the proposed BMPs are currently covered by expired State of Vermont stormwater permits. These BMPs were included in the beginning of the schedule so that the associated properties could complete the required stormwater improvements and achieve permit compliance. Other BMPs involve property containing more than 3 acres of impervious area. VTDEC is currently drafting a "3 Acre Stormwater Permit" that would require stormwater retrofits at these sites. BMPs in this situation were also placed towards the front of the implementation schedule. In addition, some of the proposed BMPs are located on land owned or controlled by the MS4 entities. These BMPs were given priority over those that were located on private property.

The BMP schedule presented in this FRP is expected to receive updates on an annual basis. Projects will be added, modified, or removed as necessary to meet FRP flow targets and respond to actual conditions. The primary reason being that the BMPs presented in the implementation schedule have only been developed to in concept. It is reasonable to anticipate that changes will occur when these concepts are further developed. Depending on actual circumstances, the level of treatment achieved may be more or less than the level of treatment anticipated (e.g. variations in soil conditions allow for either more or less infiltration of stormwater runoff than originally anticipated). These type of modifications are common when advancing BMP plans from concept to final design. Therefore, flexibility in the schedule is necessary to accommodate these changes.

Additionally, in order for project implementation to move forward in a cost effective manner, the MS4s will need to take advantage of opportunities for stormwater improvements as they present themselves. For example, a private property owner may decide to redevelop their property on a schedule that was not anticipated in the current BMP implementation schedule. If this occurs, the MS4s may need to shift available resources from a scheduled project in order to take advantage of a cost savings opportunity.

Finally, projects may need to be shifted in the BMP schedule based on Vermont's changing regulatory system. VTDEC is currently developing an implementation plan for the Lake Champlain Phosphorous TMDL. When this document is finalized, the MS4 permit will require regulated entities to develop Phosphorus Control Plans (PCPs), similar in size and scope to the FRPs being developed as part of stormwater TMDLs. When this occurs, the FRPs will likely need to be revised based on PCP requirements, which are yet to be defined by VTDEC.

7. Financial Plan

Subject to the requirements of the MS4 permit, a financial plan is required as a part of the FRP. This plan must provide initial BMP cost estimates and demonstrate the means by which BMP implementation will be financed. The financial plan must also include the steps that each MS4 will take to implement the finance plan.

Initial BMP cost estimates were arrived at using 2014 cost estimates. Once projects were scheduled over the remaining 17-year implementation schedule, an annual 3% inflation rate based on the construction cost index was applied. Table E-3 in Appendix E presents inflation adjusted project costs for each BMP project. Applying this inflation rate provides a more accurate annual cost for BMP construction in the later years of the schedule.

7.1 City of South Burlington Financial Plan

In 2005, the City of South Burlington created Vermont's first stormwater utility. Under the stormwater utility system, all developed properties in the City pay an impervious area-based stormwater fee using an Equivalent Residential Unit (ERU) system[1]. These stormwater fees provide the City with a stable funding source that is used to comply with State and Federal stormwater regulations and maintain stormwater infrastructure throughout the City. The stormwater utility was created with the understanding that there would be future stormwater

[1] South Burlington's *Ordinance Regulating the Use of Public and Private Sanitary Sewerage and Stormwater Systems*, dated 10/5/15, can be viewed at the following link: http://www.sburl.com/vertical/sites/%7BD1A8A14E-F9A2-40BE-A701-417111F9426B%7D/uploads/Sewer_and_Stormwater_Ordinance_Final_Clean_10.5.15.pdf

costs related to the five stormwater impaired watersheds located in South Burlington, as well as costs related to future implementation of projects required by the Lake Champlain Phosphorous TMDL. The City anticipates using funds generated from stormwater utility fees to fund a portion of FRP related costs.

Once the BMP cost and implementation schedule was developed, the City of South Burlington Stormwater Utility was able to incorporate this information into its existing stormwater rate model. The City evaluated three different scenarios for funding the BMPs included in the FRP. The first scenario assumed that there would be no grant funding or low interest loans available to assist with implementation. The second scenario assumed that there would be no grant funding available, but low interest loans would be available to help the City pay for implementation. This scenario included $5M in low interest loans to help pay for BMP implementation. The third funding scenario assumed that grant funding of approximately $250,000 per year would be available in 2018 through 2029, and that this amount would increase to $500,000 in 2030, 2031, and 2032. The third funding scenario does not include low interest loans. The impact that these scenarios would have on stormwater utility rates is summarized in Table 9. The resulting annual cost to a single family residential property and a commercial property owner containing 1 acre of impervious area is summarized in Table 11. Calculations for "Commercial Property Containing 1 Acre Impervious Area" in Table 11 assume an Equivalent Residential Unit (ERU) rate of 17 and do not take into account the City's relative tier factors, based percent impervious cover, which would yield an ERU range of 13 to 22 ERUs.

Table 10: Stormwater Billing Rate (Cost per Equivalent Residential Unit) Under Different Flow Restoration Plan Funding Scenarios

Fiscal Year	Funding Scenario 1 Receive No Grants and No Loans	Funding Scenario 2 Receive Low Interest Loans, No Grants	Funding Scenario 3 Receive $250,000 in Grants Annually*
2018	$6.69	$6.69	$6.69
2019	$6.87	$6.84	$6.84
2020	$7.05	$6.99	$6.99
2021	$7.26	$7.14	$7.14
2022	$7.50	$7.29	$7.29
2023	$7.77	$7.47	$7.44
2024	$8.07	$7.68	$7.59
2025	$8.40	$7.92	$7.74
2026	$8.76	$8.19	$7.89
2027	$9.15	$8.49	$8.04
2028	$9.57	$8.82	$8.19
2029	$9.99	$9.18	$8.34
2030	$10.41	$9.57	$8.49
2031	$10.83	$9.99	$8.64
2032	$11.25	$10.44	$8.79

*Funding Scenario 3 does not include low interest loans.

Table 11: Annual Stormwater Fee Paid by Property Owners Under Different Flow Restoration Plan Funding Scenarios

Fiscal Year	Funding Scenario 1 - Receive No Grants and No Loans		Funding Scenario 2 - Receive Low Interest Loans, No Grants		Funding Scenario 3 - Receive $250,000 in Grants Annually*	
	Single Family Residential Property	Commercial Property Containing 1 Acre Impervious Area	Single Family Residential Property	Commercial Property Containing 1 Acre Impervious Area	Single Family Residential Property	Commercial Property Containing 1 Acre Impervious Area
2018	$80.28	$1,364.76	$80.28	$1,364.76	$80.28	$1,364.76
2019	$82.44	$1,401.48	$82.08	$1,395.36	$82.08	$1,395.36
2020	$84.60	$1,438.20	$83.88	$1,425.96	$83.88	$1,425.96
2021	$87.12	$1,481.04	$85.68	$1,456.56	$85.68	$1,456.56
2022	$90.00	$1,530.00	$87.48	$1,487.16	$87.48	$1,487.16
2023	$93.24	$1,585.08	$89.64	$1,523.88	$89.28	$1,517.76
2024	$96.84	$1,646.28	$92.16	$1,566.72	$91.08	$1,548.36
2025	$100.80	$1,713.60	$95.04	$1,615.68	$92.88	$1,578.96
2026	$105.12	$1,787.04	$98.28	$1,670.76	$94.68	$1,609.56
2027	$109.80	$1,866.60	$101.88	$1,731.96	$96.48	$1,640.16
2028	$114.84	$1,952.28	$105.84	$1,799.28	$98.28	$1,670.76
2029	$119.88	$2,037.96	$110.16	$1,872.72	$100.08	$1,701.36
2030	$124.92	$2,123.64	$114.84	$1,952.28	$101.88	$1,731.96
2031	$129.96	$2,209.32	$119.88	$2,037.96	$103.68	$1,762.56
2032	$135.00	$2,295.00	$125.28	$2,129.76	$105.48	$1,793.16

*Funding Scenario 3 does not include low interest loans.

It is the City's expectation that significant funding from the State of Vermont and other Federal sources will be available to help with the cost of stormwater TMDL implementation. The State of Vermont has already taken initial steps towards providing this funding. In 2015 the Vermont legislature created the Clean Water Fund (CWF). The CWF was provided with $2,005,000 in 2016, and $7,688,000 in 2016. While these initial investments are not at the level necessary to provide significant funding to the MS4 communities subject to stormwater TMDLs, it is our understanding that the State is working to provide additional funding to the CWF in the future. In December 2016, the State Treasurer and State agencies will be delivering a report to the Vermont legislature that provides options for raising significant money to fund the CWF. The City of South Burlington intends to work closely with our legislative representatives to ensure that this funding is made available for the stormwater improvements included in the FRPs. The City of South Burlington will also pursue funding from existing and new grant sources from other organizations including, but not limited to, VTDEC, the Vermont Agency of Transportation, and the Lake Champlain Basin Program.

7.2 City of Burlington Financial Plan

In 2009, the City of Burlington followed the example of the City of South Burlington in implementing an impervious area based stormwater fee to provide the City of Burlington with a stable funding source to maintain stormwater infrastructure throughout the City and to comply with numerous State and Federal stormwater regulations including the Stormwater TMDLs, Lake Champlain TMDL and Combined Sewer requirements. Implementation of retrofits for which the

City is responsible will ultimately be the responsibility of the stormwater ratepayers. In order to limit the impact to the ratepayers, the City intends to leverage existing and new grant and loan sources, as they are available. Later analyses will determine exactly which retrofit financial obligations (i.e. paying into project completed elsewhere in the watershed) will be necessary for the City to meet its obligations in Centennial Brook as the City continues to work in partnership with the other Centennial Brook MS4s. Additionally, as part of the Integrated Planning effort, the City will be completing a financial capability assessment (FCA) to evaluate the long-term ability of ratepayers to fund these and other Clean Water Act obligations. An FCA doesn't mean that Clean Water Act obligations won't be met – but may point to an adjustment of the overall schedule of implementation of all of the City of Burlington's obligations, including implementation of this and other Flow Restoration Plan projects, in order to mitigate the impact of stormwater and wastewater rates increasing at an unsustainable rate for the Burlington community. This FRP and SWMP will be amended with an updated financial plan, including stormwater rate projections for this and other Clean Water Act obligations once the FCA under the Integrated Plan is completed (end of 2018). The City is aware that due to the nature of the several joint/regional projects that are part of the Centennial Brook watershed plan and the fact that other MS4s may not be pursuing the possible scheduling flexibilities associated with integrated permitting, it is likely that significant adjustments of implementation schedules and associated financial planning will not be plausible for this watershed. This reality will be evaluated within the context of the FCA and the Integrated Planning effort.

7.3 University of Vermont Financial Plan

Under the current budgeting process, the University would establish project funds to fulfill the University of Vermont's obligation. We would endeavor to pursue federal and state stormwater grant opportunities.

7.4 Vermont Agency of Transportation Financial Plan

Planning level costs were independently estimated for each VTrans project using a consistent spreadsheet-based method for all projects. As such, some cost estimates may differ slightly from those presented in other FRP documents. VTrans will request state and federal funding for the appropriate amount to implement the BMPs as outlined in their design and construction schedule. For those projects that will require a joint effort with another municipality, VTrans will request funding for their portion of the cost share. In watersheds where VTrans is either not meeting or exceeding their allocated target there may be cost sharing between MS4s.

7.5 Burlington International Airport Financial Plan

A financial plan that estimates the costs for implementing the BMPs and describes a strategy for financing is a required element of the FRP. The financing plan includes the steps each permittee will take to implement the financing plan. The City of South Burlington Potash Brook and Centennial Brook FRPs include cost estimates for each of the BMPs, using 2014 cost estimates with an annual 3% inflation rate as noted above. The VTDEC and the contributing MS4 permittees within these watersheds have signed a Memorandum of Agreement (MOA) to perform monitoring and other data collection required under the MS4 permitting program. Each MS4 permittee, including BTV, has been assigned a percentage of the total cost of the contracted work

over a five-year timeframe. This type of collaborative arrangement will also apply to implementation and financing of the BMPs.

As described in the FRPs, it is BTV's expectation that significant funding from the State of Vermont and other Federal sources will be available to help with the cost of stormwater TMDL implementation. In 2015, the Vermont legislature created the Clean Water Fund (CWF). This fund was provided with $2,005,000 in 2015 and $7,688,000 in 2016, and will likely receive additional funding in the years to come. The City of South Burlington and Burlington Airport intend to work closely with legislative representatives to ensure that this funding is made available for the stormwater improvements included in the FRPs.

The Burlington Airport also intends to seek funding for implementing its commensurate share of the BMPs within the watersheds, including requests from the CWF and other sources. BTV is committed to participating in a cost share with the City of South Burlington to implement its FRP in a manner that is fair and reasonable for the airport. It is also noted that BTV reserves the right to achieve its FRP commitments through implementing projects of its own choosing that may not be identified on South Burlington's present list of proposed watershed improvement projects.

8. Regulatory Analysis

In accordance with the MS4 permit, an FRP requires a regulatory analysis that identifies and describes any additional regulatory authorities, including authority to require low impact development BMPs, that the permittees will need in order to effectively implement the FRP.

Currently, stormwater runoff within the Centennial Brook watershed is regulated primarily by the VTDEC, City of South Burlington, City of Burlington, and VTrans. VTDEC regulates new developments through issuance of Stormwater Discharge Permits with technical requirements as outlined in the 2002 Vermont Stormwater Manual. The cities of South Burlington and Burlington require improved stormwater practices and low impact development for new developments through their stormwater ordinances and Land Development Regulations (LDRs). VTrans regulates stormwater discharges to the state Right of Way through 19 V.S.A.§1111 "Permitted use of the right-of-way".

The City of South Burlington updated stormwater requirements in its LDRs in June 2016.[1] The revised LDRs require that any project resulting in ½ acre or more of impervious area implement stormwater controls that prioritize infiltration. The revised LDRs also contain new requirements for properties that are being redeveloped. It is the City's expectation that these changes will result in gradual improvements in stormwater management over the course of the BMP implementation schedule.

The City of South Burlington also revised its "Ordinance Regulating the Use of Public and Private Sanitary Sewerage and Stormwater Systems" in October 2015.[2] The ordinance provides a policy regarding the

[1] Section 12.03 – Stormwater Management Standards, "South Burlington Land Development Regulations," dated 6/27/16, can be viewed at the following link: http://www.sburl.com/vertical/Sites/%7BD1A8A14E-F9A2-40BE-A701-417111F9426B%7D/uploads/LDRs_Effective_6-27-2016__Complete_reduced_size.pdf

[2] South Burlington's "Ordinance Regulating the Use of Public and Private Sanitary Sewerage and Stormwater Systems," dated 10/5/15, can be viewed at the following link:

handling of expired VTDEC stormwater permits located in South Burlington. The City will continue to take over responsibility for exclusively residential stormwater systems that complete upgrades. In addition, the revised ordinance allows commercial properties with expired permits to obtain coverage under the City's MS4 permit if upgrades to the stormwater system are completed. These properties will still be responsible for maintaining their systems, but the permit coverage required by the State of Vermont can now be provided through the City's MS4 permit, instead of obtaining coverage under one of VTDEC's other permit programs.

While the City of South Burlington has taken significant steps to alleviate the problems caused by expired State of Vermont stormwater permits within its boundaries, there is still a significant role that the VTDEC needs to play in order to support these efforts. The City's revised ordinance provides the opportunity for properties to obtain their required State of Vermont stormwater permit coverage through the City's MS4 permit, but it does not require it. It is anticipated that some property owners will want to work directly with VTDEC to obtain this permit coverage. In order for South Burlington to effectively implement its FRP, VTDEC needs to update its State permit programs so that properties with expired stormwater permits in stormwater impaired watersheds can obtain permit coverage directly from VTDEC. This updated permit program should require stormwater treatment on the properties that are, at minimum, equal to the stormwater treatment requirements included in the City's LDRs and referenced in the City's Stormwater Ordinance. If VTDEC fails to take this step and creates a permit program that allows properties to obtain permits with minimal stormwater improvements it has the strong potential to undermine the City's efforts to meet the FRP targets.

A full list of the expired State of Vermont permits with discharges to Centennial Brook is presented in Table 1 in Section 2.2. BMPs with expired State of Vermont permits proposed for retrofit under this FRP are included in Table C-1: Final Proposed BMPs for Centennial Brook FRP in Appendix C.

9. Third Party Implementation

In accordance with the MS4 permit, a FRP requires identification of the name of any party, other than the permittee, that is responsible for implementing any portion of the FRP. A full list of expired permits, identifying the third party permittee, within the Centennial Brook watershed is presented in Table 1 in Section 2.2.

10. Conclusion

This Centennial Brook FRP was completed to meet the requirements under Part III of the MS4 general permit for the contributing MS4s; City of South Burlington, City of Burlington, BTV, UVM, and VTrans. In accordance with Subpart IV.C.1. of the General Permit, the MS4s were required to submit a final FRP within 3 years of the permit issuance. This Centennial Brook FRP fulfills those requirements. The Centennial Brook FRP will become a part of the permittees' SWMP upon approval by VTDEC. Once the final Centennial Brook FRP is approved by VTDEC, implementation of this FRP by the contributing MS4s is required. Additionally, updates on FRP progress toward the flow target reductions are required as a part of the MS4 annual reports.

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http://www.sburl.com/vertical/sites/%7BD1A8A14E-F9A2-40BE-A701-417111F9426B%7D/uploads/Sewer_and_Stormwater_Ordinance_Final_Clean_10.5.15.pdf

11. Appendices

Appendix A - Stormwater BMP Site Inspection Field Sheets

Appendix B – Future Growth Memorandum

Appendix C – Centennial Brook Flow Restoration Plan Proposed Best Management Practices
- Table C-1: Final Proposed BMPs for Centennial Brook FRP
- Map C-1: Final Proposed BMPs for Centennial Brook FRP
- Centennial Brook FRP BMP Summary Sheets

Appendix D – Project Ranking
- Table D-1: BMP Ranking Criteria Key
- Table D-2: BMP Ranking Scoring Key

Appendix E – Proposed Cost Estimates, Prioritization Ranking, and Implementation Schedule
- Table E-1: Project Cost Estimates
- Table E-2: Centennial Brook Watershed BMP Project Scoring
- Table E-3: Centennial Brook Watershed BMP Project Implementation Schedule

APPENDIX A

STORMWATER BMP SITE INSPECTION FIELD SHEETS

ID#: Retrofit 12A

Name: **University Rd. soccer field**

Concept Description:
UVM proposed a dry swale along the western edge of the soccer field to capture a poriton of University Road. The site has been designed (K&L) and is currently under construction.

Notes/Feasibility:
The portion of the soccer field that does not flow to practice drains and infiltrates under bleachers. University Rd. was recently paved. West side of University Rd. is the drainage/watershed boundary.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: UVM	**Project Candidate:** Ok
Ownership: Public	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Institutional	**Proposed Retrofit Practice 1:** Dry Swale
Land Use 2: -None Selected-	**Proposed Retrofit Practice 2:** -None Selected-
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Nutrients / Organics	**Maintenance Burden:** Low
Sources/pollutants 2: Sediment	**Benefits:** Storage: NO Water Quality: YES Recharge: YES Demo: YES Repair: NO Reuse: NO **Other:** None
Soils: Good Infiltration	**Conflicts:** Soils: NO Access: NO Land Use: NO Utilities: NO Polluted: NO High WT: NO Wetlands: NO **Other:** None
Use in Retrofit DA: Street and field	
SIZING INFO	
Drainage Area (ac): 1.16	
Impervious Area (ac): 0.31	
Practice Area Available (ft^2): 3,200	
Existing Head Available? --	

Date Assessed: May 16, 2013, 2:07 PM **Assessed by:** KMH/AGM

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

80

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Retrofit #12A: University Soccer Field

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 13

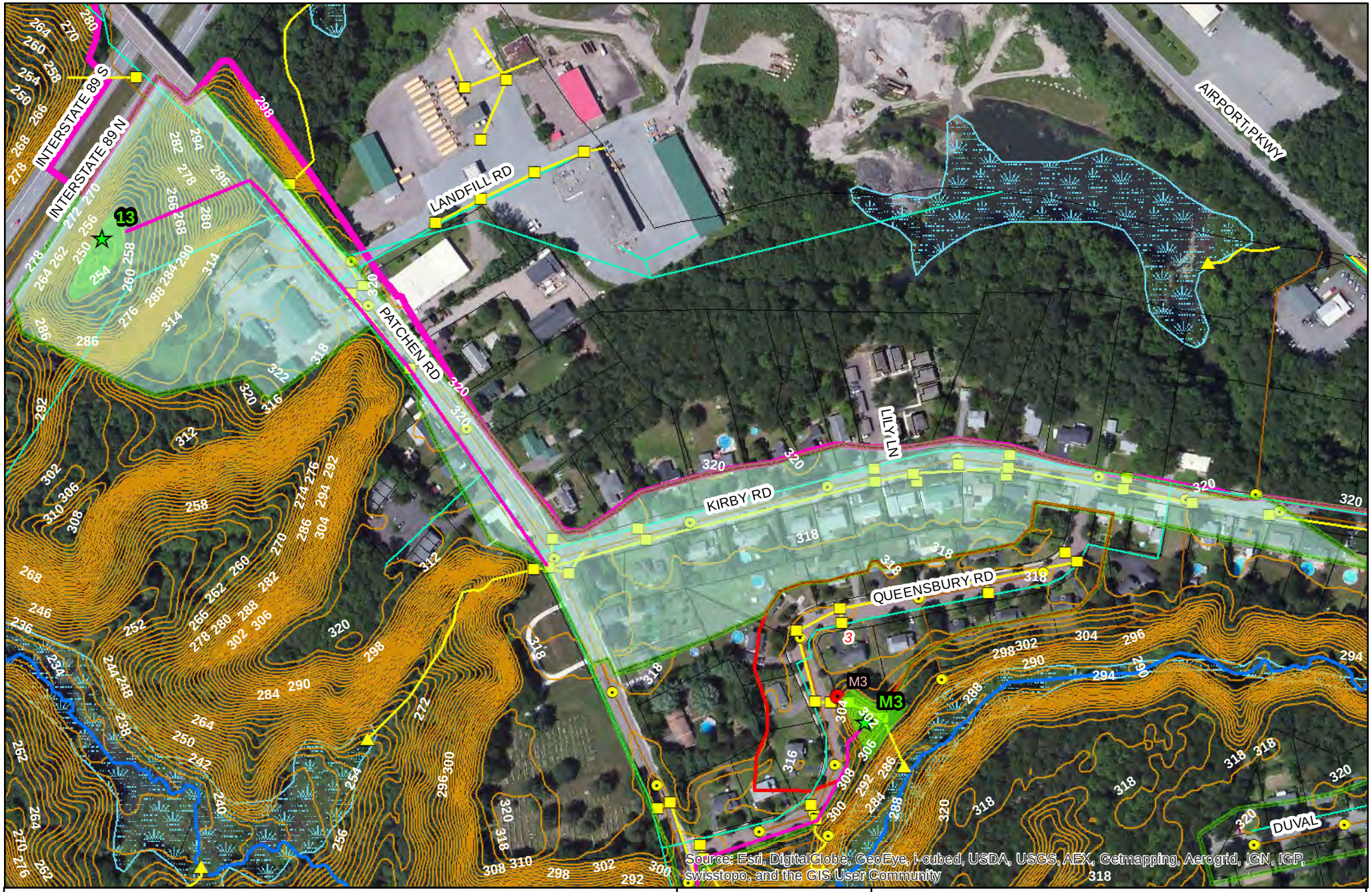
Name: **I-89 Kettle Hole**

Concept Description:
Detention Pond (or infiltration basin-if soils are acceptabe). Directly convey runoff from contributing area off Patchen Road down slope to sediment forebay. Modify existing 30" culvert headwall (under I-89) to achieve required flow control. Could pick up Kirby Rd.

Notes/Feasibility:
Good site; final feasibility will require verification of wetland limits (small area of wetland vegetation, but soils generally upland), assessment of impacts to existing water main (runs through parcel, see blow-off valve in photo), and coordination with VTrans for ponding against I-98 R/W.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: VTrans and private owner	**Project Candidate:** Yes
Ownership: Public and Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Forest	**Proposed Retrofit Practice 1:** Pond
Land Use 2: waterline ROW	**Proposed Retrofit Practice 2:** Infiltration if feasible possible HW issues with water line
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** -Low
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: NO Recharge: YES Demo: NO Repair: NO Reuse: NO **Other:** None
Soils: Good Infiltration	**Conflicts:** Soils: NO Access: NO Land Use: NO Utilities: YES Polluted: NO High WT: NO Wetlands: YES **Other:** Small wetland pockets
Use in Retrofit DA: Street, SF Res	
SIZING INFO	
Drainage Area (ac): 14.06	
Impervious Area (ac): 5.05	
Practice Area Available (ft^2): 10,160	
Existing Head Available? n/a	

Date Assessed: May 16, 2013, 8:56 AM **Assessed by:** RAC, NBP, SMM



Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

250

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Retrofit #13 Kettle Hole at I-89

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 14A

Name: **Chamberlain School (east)**

Concept Description:
Underground detention in open space of school property. It seems possible to collect drainage off of White Street (and upgradient residential neighborhood) and connect to existing system via school entrance. Underground chambers could be designed as infiltration pending results of soils testpitting. (note HSG – D on east side of school property).

Notes/Feasibility:
Existing drainage system (12" cmp) drains parking lot. Would need to verify capacity to add addition upgradient lands – only need to be sized for 1- YR. Cp_v.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: School	**Project Candidate:** Undecided
Ownership: Public	**Retrofit of new or existing BMP:** New BMP
Land Use 1: School	**Proposed Retrofit Practice 1:** Pre-treament chambers
Land Use 2: -None Selected-	**Proposed Retrofit Practice 2:** Underground storage, no infiltration
Existing BMP on site? No	**Non-Structural Controls:** Educational signage for school
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** -None Selected-
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: NO Recharge: NO Demo: NO Repair: NO Reuse: NO **Other:** -None Selected-
Soils: Poor (HSG D, according to soils mapping)	
Use in Retrofit DA: streets, single family res	
SIZING INFO	
Drainage Area (ac): 31.56 (with #14B)	
Impervious Area (ac): 10.08 (with #14B)	
Practice Area Available (ft^2): 9,220	
Existing Head Available? n/a	

Conflicts:
Soils: YES
Access: NO
Land Use: NO
Utilities: NO
Polluted: NO
High WT: YES
Wetlands: NO

Other: -None Selected-

Date Assessed: May 16, 2013, 3:52 PM **Assessed by:** RAC, NBP, SMM

ID#: Retrofit 14B

Name: **Chamberlain School (west)**

Concept Description:
Underground detention in open space of school property. It seems possible to collect drainage off of White Street (and upgradient residential neighborhood) and connect to existing system via school entrance. Underground chambers could be designed as infiltration pending results of soils testpitting. (note HSG – B on west side of school property). Would be in addition to Site 14A as its unlikely to be able to manage all area on one locations.

Notes/Feasibility:
Existing drainage system (12" cmp) drains Bldg and parking lot. Would need to verify capacity to add addition upgradient lands – only need to be sized for 1- YR. Cp_v.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: School	**Project Candidate:** Ok
Ownership: Public	**Retrofit of new or existing BMP:** New BMP
Land Use 1: School	**Proposed Retrofit Practice 1:** Infiltration
Land Use 2: -None Selected-	**Proposed Retrofit Practice 2:** Requires pretreatment
Existing BMP on site? No	**Non-Structural Controls:** Educational signage
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** -None Selected-
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: YES Demo: NO Repair: NO Reuse: **Other:** -None Selected-
Soils: Unknown, presumed OK (HSG B)	
Use in Retrofit DA: school, streets, single family res.	
SIZING INFO	
Drainage Area (ac): 31.56 (with #14A)	
Impervious Area (ac): 10.08 (with #14A)	
Practice Area Available (ft^2): 23,780	
Existing Head Available? n/a	

Conflicts:
Soils: NO
Access: NO
Land Use: NO
Utilities: NO
Polluted: NO
High WT: POSSIBLE
Wetlands: NO

Other: -None Selected-

Date Assessed: May 16, 2013, 4:31 PM **Assessed by:** RAC, NBP, SMM

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

200 Feet

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Retrofit #14: Chamberlain School

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 15

Name: Jaycee Park

Concept Description:
Pretreatment tank to underground infiltration chambers. Pretreatment could be proprietary device (e.g, StormCeptor or equal) before underground chambers. Access would need to be coordinated with playing fields. Flow diversion structure would be in Patchen Road, with depth to drain pipe at approx 6.5 feet.

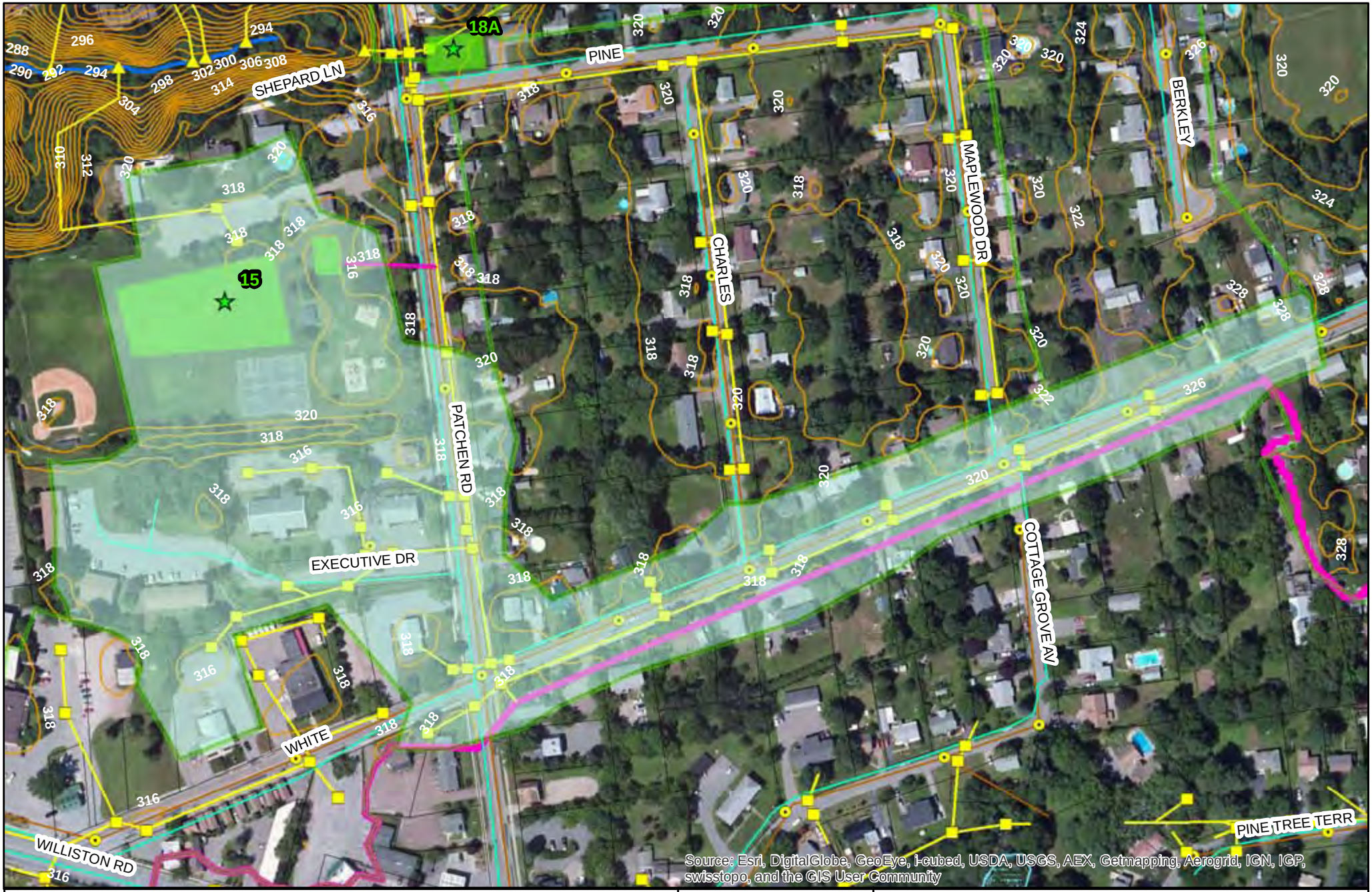
Notes/Feasibility:
Flow diversion from Patchen Road drives depth of inflow approx 10.5 feet below grade (bottom of chambers 12-13 feet). Existing trees in park, reconstruction of fields
Soils at design depth, unknown.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: South Burlington Parks and Rec.	**Project Candidate:** Yes.
Ownership: Public	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Park	**Proposed Retrofit Practice 1:** Underground infiltration
Land Use 2: -None Selected-	**Proposed Retrofit Practice 2:** Pretreatment structure
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** Medium
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: YES Demo: NO Repair: NO Reuse: NO **Other:** -None Selected-
Soils: Good Infiltration	
Use in Retrofit DA: streets, SF res, some commercial	
SIZING INFO	
Drainage Area (ac): 15.74	
Impervious Area (ac): 5.81	
Practice Area Available (ft^2): 32,220 + 2,530 (pretreatment area)	
Existing Head Available? Yes (12- 13 ft depth, overflow ok)	

Conflicts:
Soils: NO
Access: NO
Land Use: YES
Utilities: YES
Polluted: NO
High WT: NO
Wetlands: NO

Other: -None Selected-

Date Assessed: May 17, 2013, 10:42 AM **Assessed by:** RAC, SMM



Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

200

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Retrofit #15: Jaycee Park

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 16 (revised)

Name: **I-89 Outfall**

Concept Description:
Detention storage facility. Location is flexible depending on evaluation of constraints. Most downstream location would be across from drainage outlet, below water main (best location for embankment – maximizes storage), but impact to water main R/W likely and partially on private property. Alternative is to move embankment upgradient to limit of I-89 R/W – would reduce available storage, but keep all work within VTrans jurisdiction.

Notes/Feasibility:
Feasible, but contraints need to be quantified, including property ownership, wetlands impacts (see Phrag in photo), water main. Construction and maintenance access good, via water main R/W. Vtrans noted that prior riprap work was NOT a permitting issues with COE or DEC.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: VTrans, unknown private owner	**Project Candidate:** Yes
Ownership: Public and private (depending on option)	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Highway R/W	**Proposed Retrofit Practice 1:** Detention Pond
Land Use 2: Open space next to interstate	**Proposed Retrofit Practice 2:** Could be a const wetland
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** -None Selected-
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: NO Demo: NO Repair: NO Reuse: NO **Other:** -None Selected-
Soils: Poor Infiltration	**Conflicts:** Soils: YES Access: NO Land Use: YES Utilities: YES Polluted: NO High WT: NO Wetlands: YES **Other:** -None Selected-
Use in Retrofit DA: Street, Interstate highway	
SIZING INFO	
Drainage Area (ac): 52.25	
Impervious Area (ac): 18.88	
Practice Area Available (ft^2): 23,550	
Existing Head Available? n/a	

Date Assessed: May 16, 2013, 1:52 PM **Assessed by:** RAC, NBP, SMM

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

300

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Retrofit #16: I-89 Outfall

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 16A

Name: **I-89 on-ramp (west)**

Concept Description:
Depression bounded by eastern on-ramp, eastern off-ramp and northbound lanes of I-89. Not an ideal site because the 6' pipe runs under this area at a depth of approx. 8 feet – would have to daylight pipe.

Notes/Feasibility:
Feasible, but would require daylighting 8 ft deep pipe and addressing safely issues off or highway.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: VTrans	**Project Candidate:** No
Ownership: Public	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Road	**Proposed Retrofit Practice 1:** Detention Pond
Land Use 2: -None Selected-	**Proposed Retrofit Practice 2:** Dry detention basin
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** -None Selected-
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: NO Recharge: NO Demo: NO Repair: NO Reuse: NO **Other:** -None Selected-
Soils: Poor Infiltration	**Conflicts:** Soils: NO Access: NO Land Use: NO Utilities: YES Polluted: NO High WT: NO Wetlands: NO **Other:** Fed highway approval
Use in Retrofit DA: Highway interchange	
SIZING INFO	
Drainage Area (ac): --	
Impervious Area (ac): --	
Practice Area Available (ft^2): 8,700	
Existing Head Available? n/a	

Date Assessed: May 16, 2013, 2:09 PM **Assessed by:** RAC, NBP, SMM

ID#: Retrofit 16B

Name: **I-89 cloverleaf (northeast)**

Concept Description:
Detention structure bounded by northbound lanes and off-ramp (directing traffic to westbound Williston Rd). Existing culvert drains all upgradient area from interchange and Williston Rd. Modify outlet to install new control structure for Cp_v storage.

Notes/Feasibility:
Good location for detention retrofit. Existing outlet pipe (48" CMP) easily accessable for constructin and maintenance. Contraints include safety considerations from highway and existing wetlands (though mapped- all areas appear to be phrag dominated and isolated). Approx 14 of grade from invert to low point on off-ramp.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Jennifer Callahan- VTrans	**Project Candidate:** Yes, possibly combined with Site #16
Ownership: Public	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Road	**Proposed Retrofit Practice 1:** Extended Detention
Land Use 2: Highway interchange	**Proposed Retrofit Practice 2:** Const Wetland options
Existing BMP on site? No	**Non-Structural Controls:** limit highway turf
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: -None Selected-	**Maintenance Burden:** Moderate
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: NO Demo: NO Repair: NO Reuse: NO **Other:** -None Selected-
Soils: Unknown	
Use in Retrofit DA: Highway Interchange	
SIZING INFO	
Drainage Area (ac): 39.23	
Impervious Area (ac): 15.65	
Practice Area Available (ft^2): 62,650	
Existing Head Available? n/a	

Conflicts:
Soils: NO
Access: NO
Land Use: NO
Utilities: NO
Polluted: NO
High WT: NO
Wetlands: YES

Other: -None Selected-

Date Assessed: May 16, 2013, 2:21 PM **Assessed by:** RAC, NBP, SMM

ID#: Retrofit 16D

Name: **Sheraton (in front)**

Concept Description:
Underground detention structure, possibly infiltration – flow diversion from drainage inlets in Williston Road.

Notes/Feasibility:
Feasibly but not terrible cost effective. Small drainage area, private ownership (Sheraton) + coordination with VTrans required (drains to I-89 internchange), depth of pipe (~7.5 ft) require 6 – 8 ft deep facility, daylight to pipe system within I-89 R/W just barely works.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Sheraton	**Project Candidate:** No, suggest #16 or #16B
Ownership: Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Commercial	**Proposed Retrofit Practice 1:** Underground Detention
Land Use 2: -None Selected-	**Proposed Retrofit Practice 2:** Pretreatment structure needed
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? Yes	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** Medium
Sources/pollutants 2: Metals	**Benefits:** Storage: YES Water Quality: YES Recharge: NO Demo: NO Repair: NO Reuse: NO **Other:** -None Selected-
Soils: Poor – HSG D	
Use in Retrofit DA: Williston Rd	
SIZING INFO	
Drainage Area (ac): 1.6 ac	
Impervious Area (ac): ~ 0.7	
Practice Area Available (ft^2): ~11,500	
Existing Head Available? Yes, but only about 2-3 ft.	

Conflicts:
Soils: YES
Access: YES
Land Use: YES
Utilities: YES
Polluted: 0
High WT: NO
Wetlands: NO

Other: -None Selected-

Date Assessed: May 15, 2013 **Assessed by:** RAC, SMM

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

300

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Retrofit #16B: I-89 Cloverleaf (northeast)

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 17 (revised)

Name: **"Jug handle" at Spear & Main St. (east)**

Concept Description:
Underground detention chambers (UDC) at existing green space to capture drainage from Spear Street and East Terrace. Modify existing drainage inlets to divert flows into basin. Drainage area is currently unmanaged and could be routed to Main St. Pond retrofit #M5A/24 or M5A2, alternatively. Retrofit includes the option of adding paved flumes from the roadways and risers to the outlet structures for the existing swales that run the perimeter of green space. Alternative option for an above ground detention basin may be considered for a reduced construction cost.

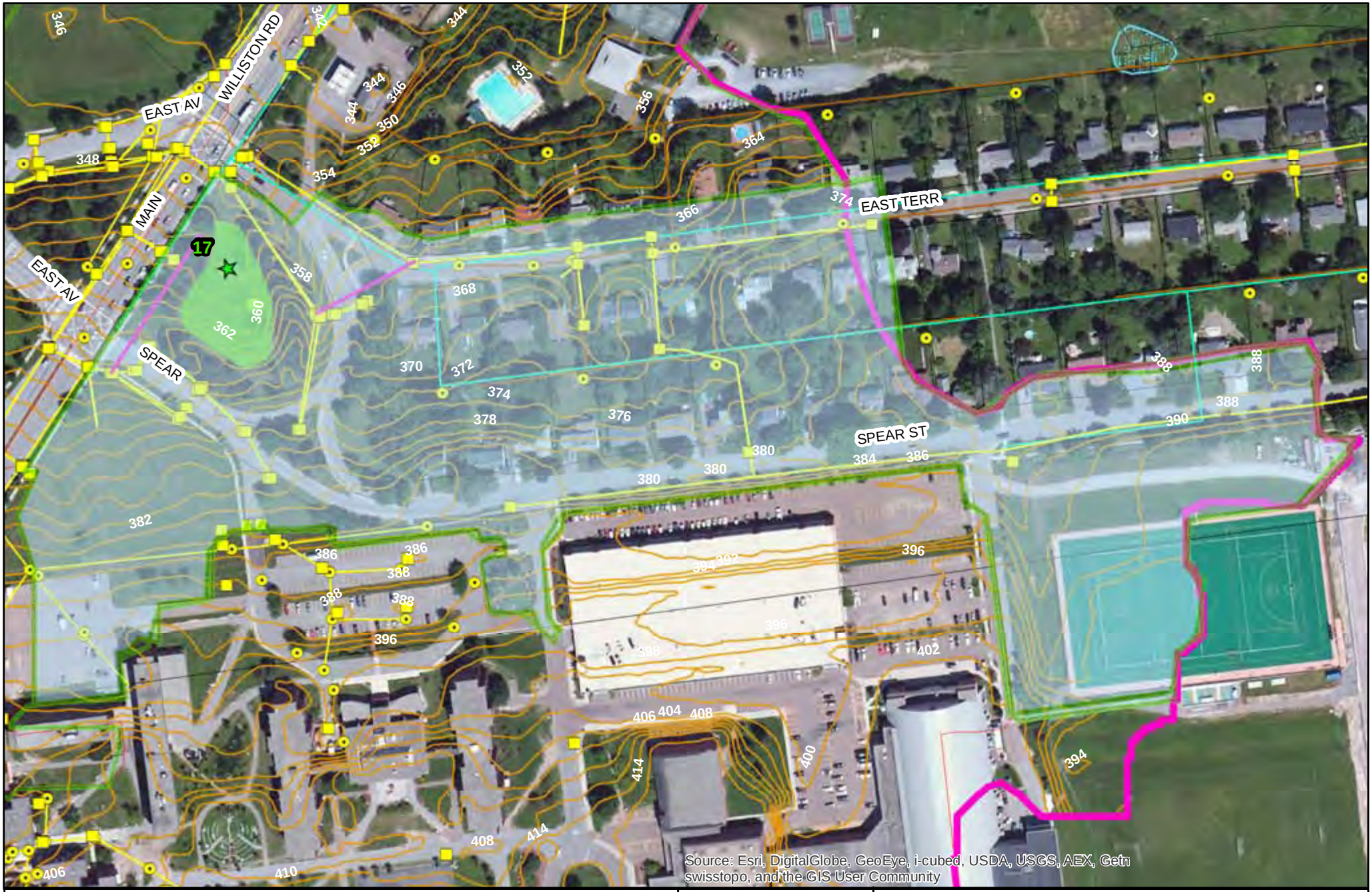
Notes/Feasibility:
Original concept was for a surface detention feature, which UVM was not interested in (K&L email dated 6/5/13) due to aesthetics.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: UVM	**Project Candidate:** Ok
Ownership: Public	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Institutional	**Proposed Retrofit Practice 1:** UDC or Dry Pond
Land Use 2: Landscaped green space	**Proposed Retrofit Practice 2:** Surface swale w/ riser
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** Low
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: YES Demo: NO Repair: NO Reuse: NO **Other:** None
Soils: Poor Infiltration	
Use in Retrofit DA: Street	
SIZING INFO	
Drainage Area (ac): 22.01	
Impervious Area (ac): 7.28	
Practice Area Available (ft^2): 21,600	
Existing Head Available? Yes	

Conflicts:
Soils: YES
Access: NO
Land Use: YES
Utilities: NO
Polluted: NO
High WT: NO
Wetlands: NO

Other: None

Date Assessed: May 16, 2013, 11:36 AM **Assessed by:** KMH/AGM



Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

200

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Horsley Witten Group
Sustainable Environmental Solutions

Retrofit #17: "Jug handle" at Spear & Main St.

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 18

Name: Fielding Lane Condos – Clover Street

Concept Description:
Detention-retention facility. Open parcel adjacent to Fielding Lane Condos – seems to be owned by Fielding Lane Condos, existing surface storage available below outfall pipe. Would require access from Fielding Lane

Notes/Feasibility:
Likely private land -
Major constraint is construction and maintenance access.
Homeowners on Clover Street most impacted.
Downgradient wetlands/stream below outfall pipe.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Tom DiPietro – S. Burl.	**Project Candidate:** Yes
Ownership: Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Single Family Residential	**Proposed Retrofit Practice 1:** Detention Pond
Land Use 2: Adjacent Fielding Lane condos	**Proposed Retrofit Practice 2:** -None Selected-
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? -No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** Medium
Sources/pollutants 2: Leaf dumping area	**Benefits:** Storage: YES Water Quality: YES Recharge: NO Demo: NO Repair: NO Reuse: NO **Other:** -None Selected-
Soils: Good Infiltration	
Use in Retrofit DA: streets, single family res.	
SIZING INFO	
Drainage Area (ac): 17.11	
Impervious Area (ac): 5.24	
Practice Area Available (ft^2): 6,950	
Existing Head Available? N/A	

Conflicts:
Soils: NO Access: YES Land Use: YES Utilities: NO Polluted: NO High WT: YES Wetlands: YES **Other:** -None Selected-

Date Assessed: May 17, 2013, 8:39 AM **Assessed by:** RAC, SMM

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

250

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Retrofit #18: Fielding Ln Condos

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 18A (revised)

Name: **Lot at corner of Patchen & Pine St.**

Concept Description:
Underground recharge chambers. Diversion of flows from Patchen Road feasible, incoming pipe from open space/low point behind lots too deep to capture. Single lot also contains SF house (see photo). Would require diversion structure and pretreatement tank/structure.

Notes/Feasibility:
Pipe inverts in Patchen Rd. feasible to divert to underground storage, except west side of road would require crossing water and sewer. Depth of construction ~ 8 to 10 ft. Site owned by Yellow Dog Real Estate, LLC. Existing 20' wide drainage easement in the project area.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Century 21 "Jack"	**Project Candidate:** Yes
Ownership: Public/Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Multi-family Residential	**Proposed Retrofit Practice 1:** Pre-treatment Str
Land Use 2: -None Selected-	**Proposed Retrofit Practice 2:** Underground recharge
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** Medium
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: NO Recharge: NO Demo: NO Repair: NO Reuse: NO **Other:** -None Selected-
Soils: Unknown – HSG A on maps	
Use in Retrofit DA: street, SF residential	
SIZING INFO	
Drainage Area (ac): 20.42	
Impervious Area (ac): 6.02	
Practice Area Available (ft^2): 5,180	
Existing Head Available? n/a	

Conflicts: Soils: YES Access: YES Land Use: YES Utilities: YES Polluted: NO High WT: NO Wetlands: NO **Other:** -None Selected-	

Date Assessed: May 17, 2013, 11:19 AM **Assessed by:** RAC, SMM

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

220

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Retrofit # 18A Lot at corner of Patchen & Pine St.

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 19

Name: **Bilodeau Court**

Concept Description:
Divert flow from existing catchbasins to proposed underground infiltration behind Bilodeau Parkway residential properties. Residential drainage currently discharges directly to the stream corridor. Larger events would bypass to existing outfall.

Notes/Feasibility:
Low feasibility due to ownership & use issues; existing garden and backyard.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Megan Moir, Burlington	**Project Candidate:** No
Ownership: Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Single Family Residential	**Proposed Retrofit Practice 1:** Infiltration
Land Use 2: Backyard/Garden	**Proposed Retrofit Practice 2:** Underground infiltration or detention system
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** Medium
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: YES Demo: YES Repair: NO Reuse: **Other:** None
Soils: Good Infiltration	**Conflicts:** Soils: NO Access: YES Land Use: NO Utilities: NO Polluted: NO High WT: NO Wetlands: NO **Other:** None
Use in Retrofit DA: Street	
SIZING INFO	
Drainage Area (ac): 0.81	
Impervious Area (ac): 0.52	
Practice Area Available (ft^2): 9,340	
Existing Head Available? --	

Date Assessed: May 17, 2013, 10:42 AM **Assessed by:** KMH/AGM

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

80

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Retrofit #19: Bilodeau Court

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 20

Name: **Grove St. City Parking Lot**

Concept Description:
Divert existing drainage network and capture runoff from parking lot and direct to proposed underground recharge system. Low point in road drainage area is immediately south of the City parking lot. Consider replacing parking lot with permeable pavement.

Notes/Feasibility:
High feasibility since parking lot is currently in poor condition. Adequate head to capture roadway drainage. Test pits or borings needed to confirm soils and depth to groundwater.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Megan Moir, Burlington	**Project Candidate:** Yep, Love It
Ownership: Public	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Road	**Proposed Retrofit Practice 1:** Infiltration
Land Use 2: Parking lot	**Proposed Retrofit Practice 2:** Permeable pavements
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: No	**Maintenance Burden:** -None Selected-
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: YES Demo: NO Repair: NO Reuse: NO **Other:** None
Soils: Good Infiltration	**Conflicts:** Soils: NO Access: NO Land Use: NO Utilities: NO Polluted: NO High WT: NO Wetlands: NO **Other:** None
Use in Retrofit DA: Street and public park	
SIZING INFO	
Drainage Area (ac): 8.39	
Impervious Area (ac): 2.29	
Practice Area Available (ft^2): 8,850	
Existing Head Available? --	

Date Assessed: May 16, 2013, 3:13 PM **Assessed by:** KMH/AGM

ID#: Retrofit 20A

Name: **SD Ireland Property**

Concept Description:
SD Ireland proposed redevelopment to a housing complex. Site will reportedly be required to manage runoff on-site. Site currently drains to city drainage system in Grove St. Plans should address severe bank erosion at Centennial Brook culvert under SD Ireland driveway.

Notes/Feasibility:
Centennial Brook runs between property and Grove St.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Megan Moir, Burlington	**Project Candidate:** Undecided
Ownership: Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Commercial/Industrial	**Proposed Retrofit Practice 1:** -None Selected-
Land Use 2: -None Selected-	**Proposed Retrofit Practice 2:** -None Selected-
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? Yes	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** Low
Sources/pollutants 2: Concrete plant	**Benefits:** Storage: NO Water Quality: NO Recharge: NO Demo: NO Repair: NO Reuse: NO **Other:** None
Soils: Unknown	**Conflicts:** Soils: NO Access: NO Land Use: NO Utilities: NO Polluted: NO High WT: NO Wetlands: NO **Other:**
Use in Retrofit DA: -None Selected-	
SIZING INFO	
Drainage Area (ac): 4.67	
Impervious Area (ac): 3.82	
Practice Area Available (ft^2): --	
Existing Head Available? --	

Date Assessed: May 16, 2013, 4:00 PM **Assessed by:** KMH/AGM

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

180

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Retrofit #20/20A: Grove St. Parking Lot/ Ireland Property

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 21

Name: **Dumont Ave. lot**

Concept Description:
Divert flows from existing catch basin on southeast corner of White St. and Delaware across White St. and convey down Dumont Ave. via pipe or swale to underground recharge chambers on empty lot. Options exist for practice type, siting and conveyance mechansim depending on depth to groundwater, existing inverts, and future use by Airport (e.g., there are other open parcels, could daylight into dry swale, consider surface filtering options). Discharge to existing pipe outlet at Airport basin.

Notes/Feasibility:
Invert at White St. 321.40. Distance to vacant lot on corner – approx. 580' @ .005 slope; pipe outlets at 318.5'. Storage would need to be below grade. Depth to GW could be an issue and eliminate infiltration option (i.e., system would be detention only). For an above grade system inverts at White/Delaware would need to be raised. This may be possible by resetting pipe inverts starting at the intersection of Delaware and Maryland. Possible to create sand filter on top of underground chambers or a large shallow infiltration basin, but can't have standing water due to airport proximity. We have copy of White St. repair plans with sewer line and water lines (both are deep).

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Airport	**Project Candidate:** Yep, Love It
Ownership: Public	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Single Family Residential	**Proposed Retrofit Practice 1:** Infiltration
Land Use 2: None Selected	**Proposed Retrofit Practice 2:** Dry swale
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? -No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: -None Selected-	**Maintenance Burden:** -None Selected-
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: YES Demo: NO Repair: NO Reuse: **Other:** -None Selected-
Soils: Good Infiltration	
Use in Retrofit DA: streets, driveways	
SIZING INFO	
Drainage Area (ac): 13.88	
Impervious Area (ac): 4.90	
Practice Area Available (ft^2): 15,000	
Existing Head Available? n/a	

Conflicts:
Soils: NO
Access: NO
Land Use: NO
Utilities: YES
Polluted: NO
High WT: YES
Wetlands: NO

Other: Need a test pit to find clay layer and water table. Sewer line elevation on White St.

Date Assessed: May 16, 2013, 9:00 AM **Assessed by:** ACK, BK, TD

ID#: Retrofit 21A

Name: **Dumont/Existing Airport basin**

Concept Description:
Abandoned detention basin on airport property could be a location for discharge from the proposed underground chambers (retrofit #21), be an area for expanded storage capacity if needed, or designed to provide for extra water quality "polishing."

Notes/Feasibility:
Not likely that this can be used for surface storage due to FAA standing water restrictions.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Airport	**Project Candidate:** Undecided
Ownership: Public / Airport Authority	**Retrofit of new or existing BMP:** -None Selected-
Land Use 1: Industrial	**Proposed Retrofit Practice 1:** -None Selected-
Land Use 2: -None Selected-	**Proposed Retrofit Practice 2:** 0
Existing BMP on site? -Yes, abandoned	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: -None Selected-	**Maintenance Burden:** -None Selected-
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: MAYBE Water Quality: YES Recharge: NO Demo: NO Repair: NO Reuse: NO **Other:** -None Selected-
Soils: -None Selected-	
Use in Retrofit DA: -None Selected-	
SIZING INFO	
Drainage Area (ac): 1.16	
Impervious Area (ac): 0.10	
Practice Area Available (ft^2): 7,600	
Existing Head Available? N/A	

Conflicts:
Soils: NO
Access: YES
Land Use: YES
Utilities: NO
Polluted: NO
High WT: NO
Wetlands: MAYBE

Other: -None Selected-

Date Assessed: May 16, 2013, 11 AM **Assessed by:** ACK, BK

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

200

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Retrofit #21: Dumont Ave.

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 21C

Name: **Maryland St. lot**

Concept Description:
Underground recharge chambers under grassed lot. Expensive and high hanging fruit, since lot is currently privately owned and existing neighborhood drainage inlets are deep.

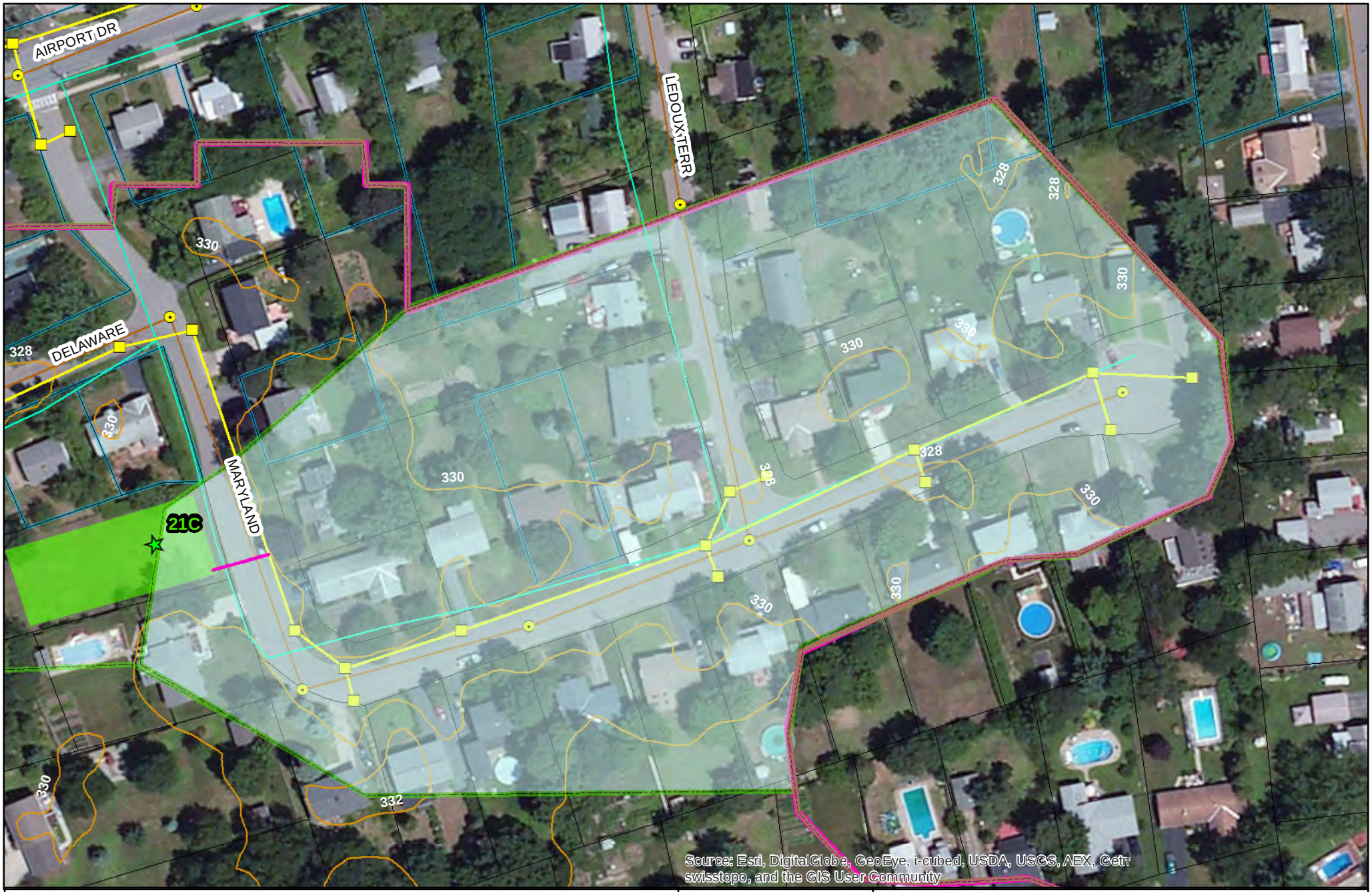
Notes/Feasibility:
Would have to re-plumb drainage network to get it here.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Unknown	**Project Candidate:** Undecided
Ownership: Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Single Family Residential	**Proposed Retrofit Practice 1:** Infiltration
Land Use 2: None Selected-	**Proposed Retrofit Practice 2:** None Selected-
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** None Selected-
Sources/pollutants 1: -None Selected-	**Maintenance Burden:** -None Selected-
Sources/pollutants 2: None Selected-	**Benefits:** Storage: YES Water Quality: NO Recharge: YES Demo: NO Repair: NO Reuse: **Other:** None Selected-
Soils: Good Infiltration	
Use in Retrofit DA: Street	
SIZING INFO	
Drainage Area (ac): 6.51	
Impervious Area (ac): 2.46	
Practice Area Available (ft^2): 9,800	
Existing Head Available? N/A	

Conflicts:
Soils: NO
Access: NO
Land Use: YES
Utilities: NO
Polluted: NO
High WT: NO
Wetlands: NO

Other: None Selected-

Date Assessed: May 20, 2013, 12:19 AM **Assessed by:** ACK, BK



Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

100

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Retrofit #21C: Maryland St. lot

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 22

Name: **Best Western/Windjammer Inn (north)**

Concept Description:
Outfall is located north of Best Western. Site drainage area currently includes only the Best Western property. Outfall is severely eroded and is headcutting to the east and may soon reach the paved access road. Concept includes stabilizing the outfall and constructing a detention basin within the existing gully. Expand the current drainage area to intercept runoff from the Williston Road drainage network and redirect drainage from abutting commercial properties.

The proposed drainage network is depicted by the mangenta lines in the concept drainage area map.

Notes/Feasibility:
Priority project. The proposed site could manage a large drainage area that is currently unmanaged and unstable. Since the outfall is in need of immediate repair, feasibility is high. Planning considerations include the redirection of flow from abutting commercial properties.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Tom Dipietro, S. Burlington	**Project Candidate:** Yep, Love It
Ownership: Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Commercial/Industrial	**Proposed Retrofit Practice 1:** Pond
Land Use 2: Woods	**Proposed Retrofit Practice 2:** Possible infiltration
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: No	**Maintenance Burden:** Low
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: NO Recharge: YES Demo: NO Repair: YES Reuse: NO **Other:** None
Soils: Good Infiltration	
Use in Retrofit DA: Parking Lot	
SIZING INFO	
Drainage Area (ac): 29.39	
Impervious Area (ac): 21.70	
Practice Area Available (ft^2): 10,900	
Existing Head Available? --	

Conflicts:
Soils: NO
Access: NO
Land Use: NO
Utilities: NO
Polluted: NO
High WT: NO
Wetlands: YES

Other: Possible wetland conflicts

Date Assessed: May 15, 2013, 1:07 PM **Assessed by:** KMH/AGM

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

250

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Retrofit #22: Best Western Windjammer Inn (north)

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 22A

Name: **Best Western/Windjammer Inn (west/south)**

Concept Description:
Outfall is located west of Best Western. Site drainage area currently includes only the Best Western property. Moderate erosion has occurred. Concept includes stabilizing outfalls and constructing a detention basin within the existing gully. Expand the current drainage area to intercept runoff from the Williston Road drainage network. A portion of this drainage area could be directed to Retrofit 22, if necessary.

Notes/Feasibility:
Good. May make economic sense to divert some or all of this area to Retrofit site #22.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Tom Dipietro, S. Burlington	**Project Candidate:** Yep, Love It
Ownership: Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Commercial/Industrial	**Proposed Retrofit Practice 1:** Pond
Land Use 2: Woods	**Proposed Retrofit Practice 2:** Possible infiltration
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: No	**Maintenance Burden:** Low
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: NO Demo: NO Repair: NO Reuse: NO **Other:** None
Soils: Good Infiltration	
Use in Retrofit DA: Parking Lot	
SIZING INFO	
Drainage Area (ac): 6.45	
Impervious Area (ac): 2.88	
Practice Area Available (ft^2): 13,800	
Existing Head Available? --	

Conflicts:
Soils: NO
Access: NO
Land Use: NO
Utilities: NO
Polluted: NO
High WT: NO
Wetlands: YES

Other: Possible wetland conflicts

Date Assessed: May 15, 2013, 3:12 PM **Assessed by:** KMH/AGM

ID#: Retrofit 22B

Name: Best Western/Windjammer Inn (south)/Gulf Station

Concept Description:
Proposed bioretention in existing grass depression to manage sheet flow from the Gulf Station parking lot and roof. Overflow (if required) could connect to existing Best Western drainage system, or be directed to Retrofit 22.

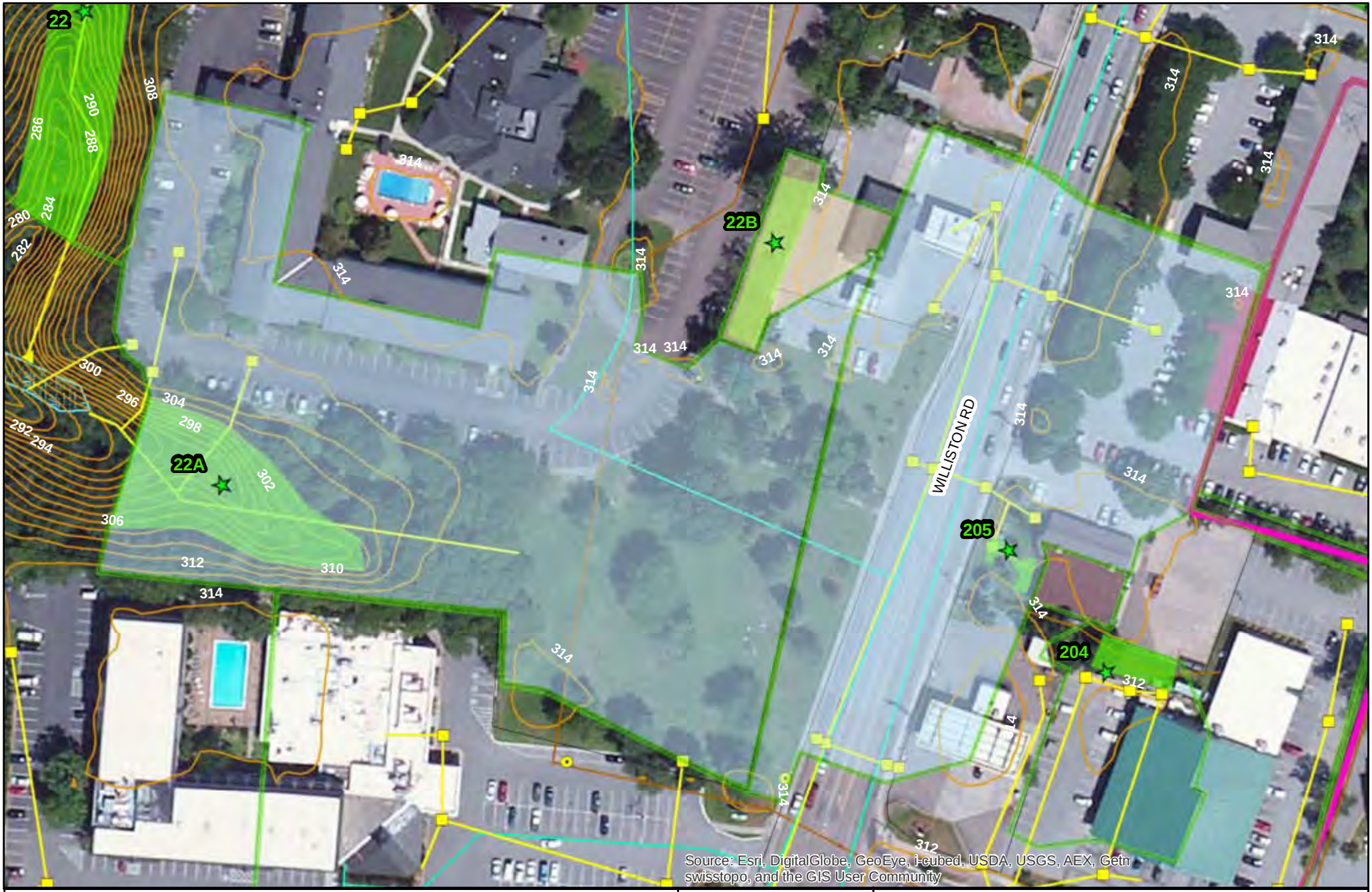
Notes/Feasibility:
Site is an existing depression that appears to already infiltrate. Retrofit would only enhance treatment. Small drainage area.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Tom Dipietro, S. Burlington	**Project Candidate:** Undecided
Ownership: Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Commercial/Industrial	**Proposed Retrofit Practice 1:** Bioretention
Land Use 2: Grass island	**Proposed Retrofit Practice 2:** -None Selected-
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** Medium
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: NO Water Quality: YES Recharge: YES Demo: YES Repair: NO Reuse: NO **Other:** None
Soils: Good Infiltration	
Use in Retrofit DA: Parking Lot	
SIZING INFO	
Drainage Area (ac): 0.22	
Impervious Area (ac): 0.13	
Practice Area Available (ft^2): 3,670	
Existing Head Available? --	

Conflicts:
Soils: NO
Access: NO
Land Use: NO
Utilities: NO
Polluted: NO
High WT: NO
Wetlands: NO

Other: None

Date Assessed: May 15, 2013, 6:45 PM **Assessed by:** KMH/AGM



Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

100

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Retrofit #22A/B: Best Western Windjammer Inn (west/south)

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 23A

Name: **Staples Plaza**

Concept Description:
Convert existing landscape island in front of PetCo into a bioswale with underground storage to manage runoff from parking lot and small roof area. Overflow into existing drain inlets. Add some trees for canopy cover, shading, and interception. Reduce existing one-way aisle width to allow for widening of proposed bioswale. This collects drainage from the parking area, as well as from the small awning roof. It appears that this area drains across Williston Rd. and is piped under the East Campus pond for a direct discharge to the stream.

Notes/Feasibility:
This area could be managed in a larger retrofit downstream (Site # 24_M5). Primary outlet in catch basin at lot entrance/exit. Rim to invert = 5.05'. Stalls are 18'x8', with a 27' drive aisle (60' and 57' curb to curb on the north and south side of island, respectively).

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Unknown	**Project Candidate:** Ok
Ownership: Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Commercial/Industrial	**Proposed Retrofit Practice 1:** Bioretention
Land Use 2: None Selected-	**Proposed Retrofit Practice 2:** Underground storage chambers
Existing BMP on site? No	**Non-Structural Controls:** Impervious Cover Removal
Is site a hotspot? Possibly	**Non-Structural Other:** None Selected-
Sources/pollutants 1: -None Selected-	**Maintenance Burden:** Medium
Sources/pollutants 2: None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: NO Demo: NO Repair: NO Reuse: **Other:** Aesthetics, tree canopy increase
Soils: Poor Infiltration	
Use in Retrofit DA: Parking Lot	
SIZING INFO	
Drainage Area (ac): 1.29	
Impervious Area (ac): 1.15	
Practice Area Available (ft^2): 6,530	
Existing Head Available? n/a	

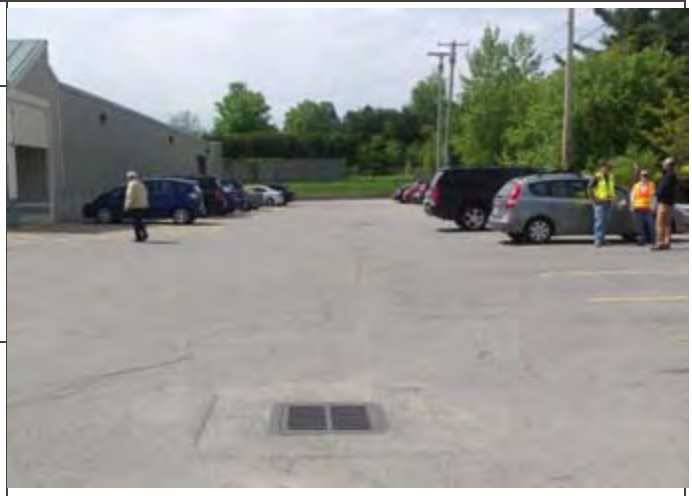
Conflicts:
Soils: YES
Access: NO
Land Use: NO
Utilities: YES
Polluted: NO
High WT: NO
Wetlands: NO

Other: None Selected-

Date Assessed: May 15, 2013, 11:40 AM **Assessed by:** ACK, BK, KH, AM

ID#: Retrofit 23B

Name: **Staples Plaza (roof)**



Concept Description:
Flat portion of roof drains internally and is discharged into drain inlet on the east side of the building. Modify internal roof drains, install trays, or use other blue roof design to provide temporary detention.

Notes/Feasibility:
May be able to manage all of this drainage downstream at Site #24 behind Sheraton /M5A Main St. Pond.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Unknown	**Project Candidate:** Ok
Ownership: Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Commercial/Industrial	**Proposed Retrofit Practice 1:** -None Selected-
Land Use 2: Roof	**Proposed Retrofit Practice 2:** Blue roof
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: -None Selected-	**Maintenance Burden:** Low
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: NO Recharge: NO Demo: NO Repair: NO Reuse: MAYBE **Other:** Not Selected
Soils: -None Selected-	
Use in Retrofit DA: Individual Rooftop	
SIZING INFO	
Drainage Area (ac): 1.06	
Impervious Area (ac): 1.06	
Practice Area Available (ft^2): 46,300	
Existing Head Available? n/a	

Conflicts:
Soils: NO
Access: NO
Land Use: NO
Utilities: YES
Polluted: NO
High WT: NO
Wetlands: NO

Other: Structural? Need to investigate drains and structural capacity.

Date Assessed: May 15, 2013, 10:51 AM **Assessed by:** ACK, NP, BK

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

100

TRUDELL CONSULTING ENGINEERS

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Sustainable Environmental Solutions

Retrofit #23 A/B: Staples Plaza

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 24 (revised)

Name: Sheraton Hotel (back)

Concept Description:
Install embankment and construct detention basin or constructed wetland to manage portion of Sheraton parking lot and other surrounding areas (e.g., Williston Rd., Staples plaza) as part of a regional stormwater complex in conjunction with Main St. Pond retrofit (M5A). The parking lot at Sheraton currently drains to three rip rap channels, and evidence of channelized flow and sedimentation from parking lot and eroding slope were observed into the open area and wetlands below. The Main St. Pond (M5A) would serve as a forebay to this facility, and rerouting of existing drain pipes from #23 and #17 could be feasible.

Notes/Feasibility:
Need to check in with DEC on potential impact to wetlands. If the Main St Pond was expanded (M5A2) then there would be minimal need for a facility at this location.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: UVM	**Project Candidate:** Yep, love it
Ownership: Public	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Commercial/Industrial	**Proposed Retrofit Practice 1:** Pond
Land Use 2: Open field	**Proposed Retrofit Practice 2:** Constructed Wetland
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** Low
Sources/pollutants 2: None Selected	**Benefits:** Storage: YES Water Quality: YES Recharge: NO Demo: NO Repair: NO Reuse: NO **Other:** Erosion down slide slopes, evidence of sediment in wetland area. New rip rap channels have been installed.
Soils: Unknown (A-D according to soils mapping)	**Conflicts:** Soils: NO Access: NO Land Use: NO Utilities: NO Polluted: NO High WT: NO Wetlands: YES **Other:** -None Selected-
Use in Retrofit DA: parking lot	
SIZING INFO	
Drainage Area (ac): 74.04 (w. M5A) / 6.11	
Impervious Area (ac): 31.12 (w. M5A) / 2.08	
Practice Area Available (ft^2): 61,000 (not including M5A)	
Existing Head Available? n/a	

Date Assessed: May 15, 2013, 8:57 AM **Assessed by:** RAC, SM

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

300

TRUDELL CONSULTING ENGINEERS

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Retrofit M5A/24: Main St. Pond and Sheraton (rear open space)

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 25

Name: **Picard Circle**

Concept Description:
Subsurface infiltration system. All houses within Picard Circle have been purchased by Airport and are now abandoned. Significant site area exists within yards and the road for major underground infilration/detention system. Constraints include depth of existing drainage pipe and depth above groundwater (adjacent brook approx 14 feet below existing ground).

Notes/Feasibility:
Depth of existing drainage line in Airport Pkwy may preclude piping from existing infrastructure to new system. One option would be to install diversion structure and partially submerge existing piping system.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Airport, So. Burlington	**Project Candidate:** Undecided (allowable reuse ??)
Ownership: Public (Airport buyout program)	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Multi-family Residential	**Proposed Retrofit Practice 1:** Infiltration
Land Use 2: Decommissioned buildings bought by airport	**Proposed Retrofit Practice 2:** Underground detention
Existing BMP on site? No	**Non-Structural Controls:** Impervious Cover Removal
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** Medium
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: YES Demo: YES Repair: NO Reuse: NO **Other:** -None Selected-
Soils: Good Infiltration	
Use in Retrofit DA: Street, single family res	
SIZING INFO	
Drainage Area (ac): 51.88	
Impervious Area (ac): 16.71	
Practice Area Available (ft^2): 40,420	
Existing Head Available? n/a	

Conflicts:
Soils: NO
Access: NO
Land Use: NO
Utilities: YES
Polluted: NO
High WT: YES
Wetlands: NO

Other: Depth of existing trunk line may preclude piping from existing infrastructure to new system

Date Assessed: May 16, 2013, 11:30 AM **Assessed by:** RAC, NBP, SMM

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

350

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Retrofit #25: Picard Circle

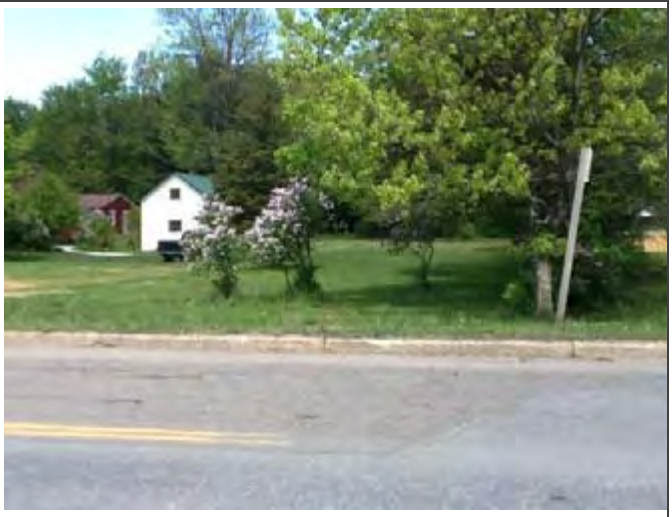
Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 25A

Name: **White St. ROW**

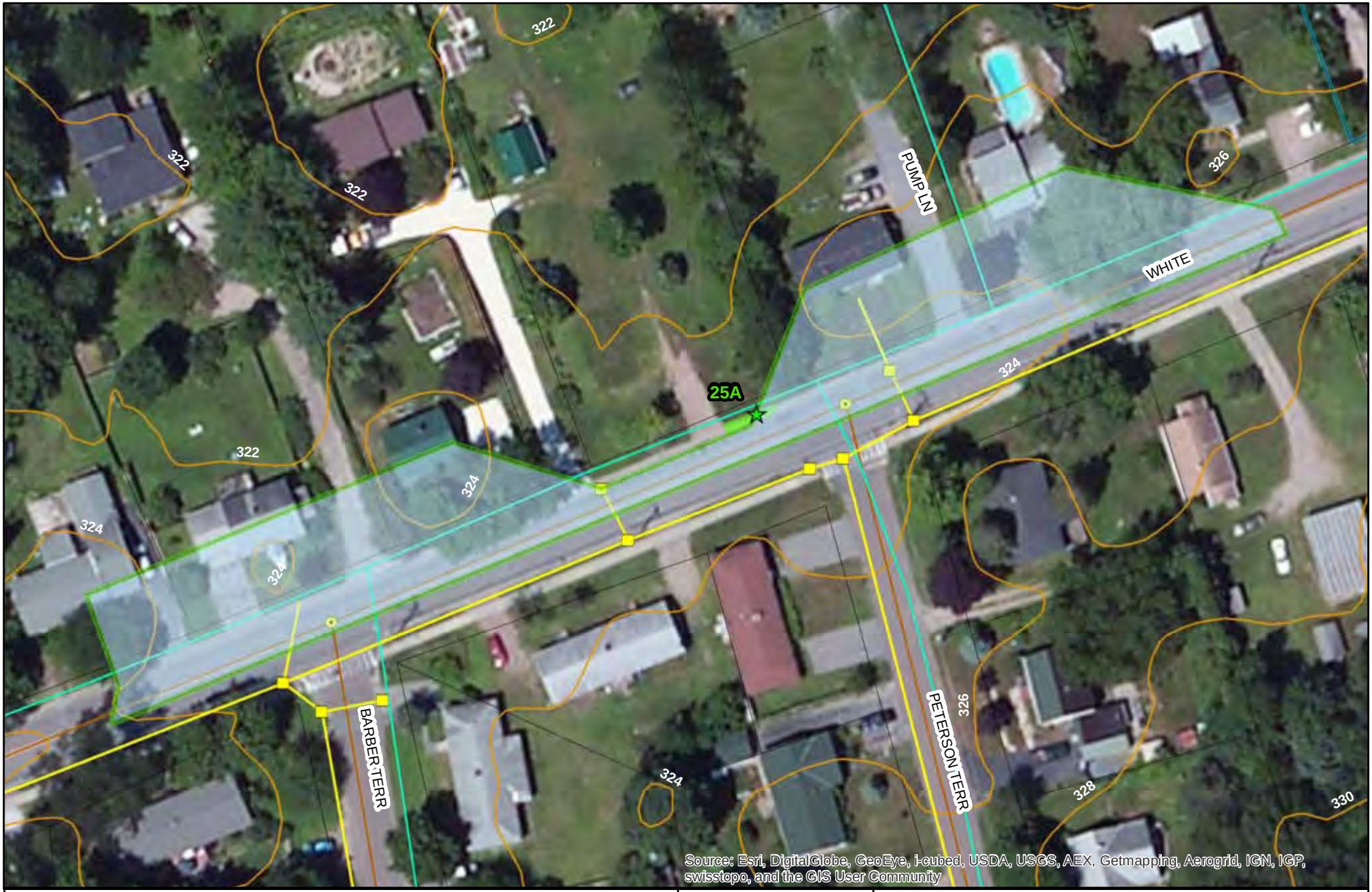
Concept Description:
Block or modify two existing drain inlets on White Rd. to direct flow through curb cuts/outlets into grass filter strip and infiltrating catchbasin. Localized flooding issue in front of property owners driveway that could be solved by this.

Notes/Feasibility:
Low. Depending on size of ROW, ability to modify drain inlets, property owner. Small green infrastructure project, but doesn't capture a lot of area, plus is within drainage area to #25.



GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: So. Burlington	**Project Candidate:** Probably not
Ownership: Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Road	**Proposed Retrofit Practice 1:** Infiltration
Land Use 2: None Selected-	**Proposed Retrofit Practice 2:** Pretreatment swale
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** None Selected-
Sources/pollutants 1: -None Selected-	**Maintenance Burden:** -None Selected-
Sources/pollutants 2: None Selected-	**Benefits:** Storage: NO Water Quality: YES Recharge: YES Demo: NO Repair: YES Reuse:	**Conflicts:** Soils: NO Access: NO Land Use: YES Utilities: NO Polluted: NO High WT: NO Wetlands: NO
Soils: Good Infiltration	
Use in Retrofit DA: Street	
SIZING INFO	
Drainage Area (ac): 0.66	
Impervious Area (ac): 0.36	**Other:** Low point in road with signs of deterioration. Gavel Driveway entrance beamed up to prevent flooding/erosion.	**Other:** There could be more room here to do a larger practice if needed, but currently confined to ROW. May be issue with blocking of drain inlets.
Practice Area Available (ft^2): 130	
Existing Head Available? N/A	

Date Assessed: May 16, 2013, 1:15 PM **Assessed by:** ACK, BK



Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

60

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Retrofit #25A: White St. ROW

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 26 & 27

Name: **Duval St. & Clover St.**

Concept Description:
30-ft wide residential streets with direct outfalls to streams, flat terrain, and good soils offer green street and neighborhood-scale disconnection opportunities (e.g., dry wells, rain gardens, pervious driveways, bump outs).

Notes/Feasibility:
Small drainage area; requires participation by homeowners.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: So. Burlington and private owners	**Project Candidate:** OK, green infrastructure
Ownership: Public and Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Single Family Residential	**Proposed Retrofit Practice 1:** green streets
Land Use 2: -None Selected-	**Proposed Retrofit Practice 2:** dry wells, rain gardens
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: -None Selected-	**Maintenance Burden:** -Medium
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: NO Water Quality: YES Recharge: YES Demo: YES Repair: NO Reuse: NO **Other:** None Selected-
Soils: Good Infiltration	**Conflicts:** Soils: NO Access: NO Land Use: YES Utilities: YES Polluted: NO High WT: NO Wetlands: NO **Other:** None Selected-
Use in Retrofit DA: Streets, driveways, and rooftops	
SIZING INFO	
Drainage Area (ac): 3.59 Duval St./ 3.81 Clover St.	
Impervious Area (ac): 1.19 / 1.4	
Practice Area Available (ft^2): --	
Existing Head Available? n/a	

Date Assessed: May 17, 2013 **Assessed by:** RAC, SMM

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

150 Feet

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Sustainable Environmental Solutions

Retrofit # 26/27. Duval St. & Clover St.

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 200

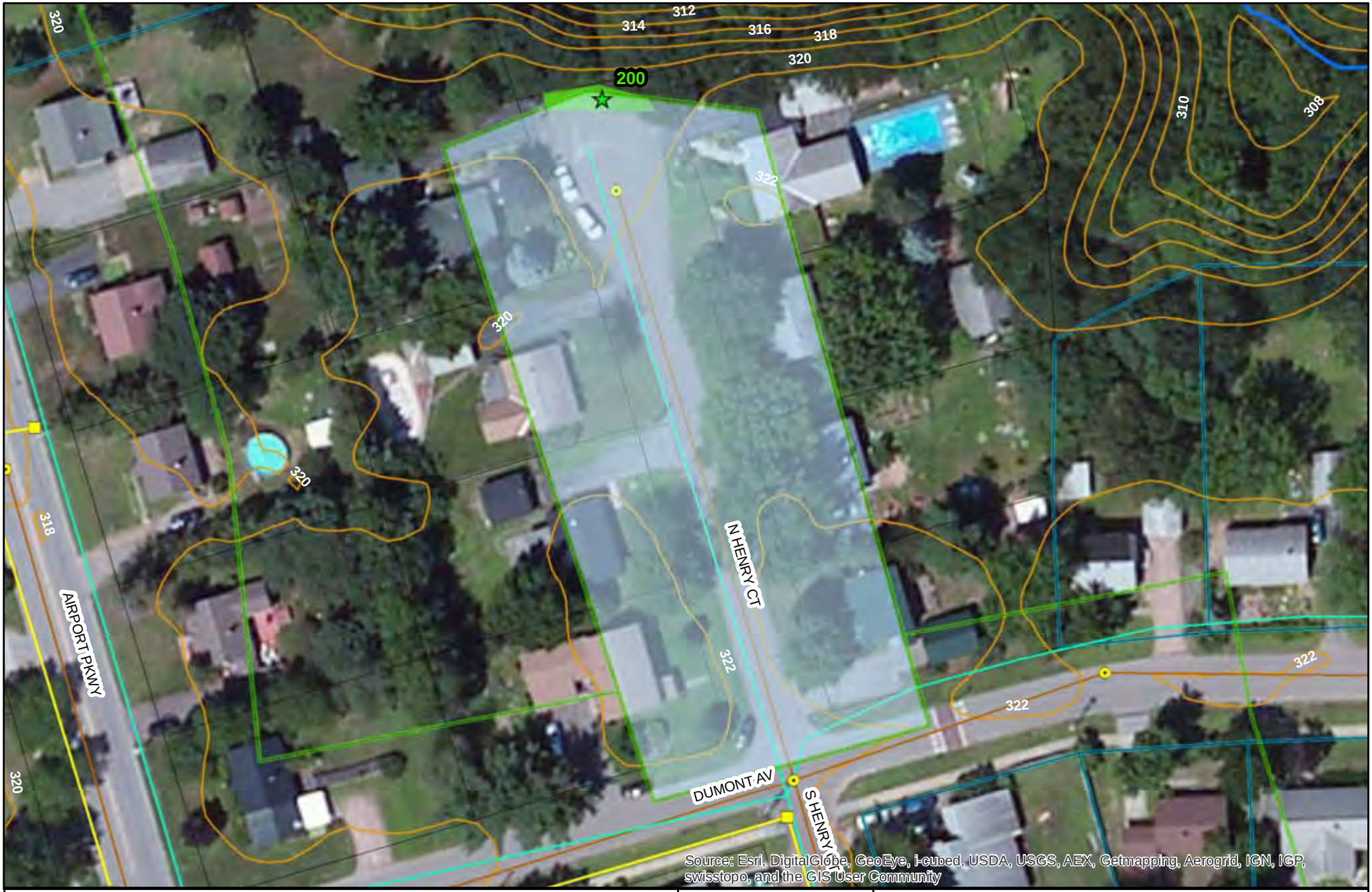
Name: **N. Henry Court**

Concept Description:
Dead-end road with excess impervious cover. Currently, drainage comes down the the road and flows directly down a steep slope to the stream/wetland area below. Install a rain garden/bio with an overflow to a leaching catch basin at end of road. Dumping of yard waste and debris was also observed down the slope. An old corrugated discharge pipe was found down in stream.

Notes/Feasibility:
Small project, but could be a good GI demonstration.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: So. Burlington	**Project Candidate:** Ok
Ownership: Public	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Single Family Residential	**Proposed Retrofit Practice 1:** Raingarden
Land Use 2: Road	**Proposed Retrofit Practice 2:** Infiltrating catchbasin
Existing BMP on site? No	**Non-Structural Controls:** Impervious Cover Removal
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** -None Selected-
Sources/pollutants 2: yard waste/debris	**Benefits:** Storage: NO Water Quality: YES Recharge: YES Demo: NO Repair: YES Reuse: **Other:** none
Soils: Good infiltration	**Conflicts:** Soils: NO Access: NO Land Use: NO Utilities: NO Polluted: NO High WT: NO Wetlands: NO **Other:** Large oaks and ash
Use in Retrofit DA: -Street	
SIZING INFO	
Drainage Area (ac): 1.03	
Impervious Area (ac): 0.45	
Practice Area Available (ft^2): 490	
Existing Head Available? n/a	

Date Assessed: May 16, 2013, 10:38 AM **Assessed by:** ACK, BK



Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

60

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Retrofit #200: N. Henry Court

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 201

Name: **Lynn St./Barber Tr. (north)**

Concept Description:
Small green infrastructure example for neighborhood application. Remove pavement at corner and install a curb "bump out" with vegetated pretreatment pretreatment bioretention with overflow into leaching catchbasin.

Notes/Feasibility:
In road ROW, however homeowner would be part of maintenance. Right at park, so high visibility.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: So. Burlington	**Project Candidate:** Ok
Ownership: -Public	**Retrofit of new or existing BMP:** -None Selected-
Land Use 1: -Single Family Residential	**Proposed Retrofit Practice 1:** bioretention
Land Use 2: None Selected-	**Proposed Retrofit Practice 2:** infiltrating catch basin
Existing BMP on site? -No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** None Selected-
Sources/pollutants 1: -None Selected-	**Maintenance Burden:** Medium
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: NO Water Quality: YES Recharge: YES Demo: YES Repair: NO Reuse: NO **Other:** -None Selected-
Soils: -Good Infiltration	**Conflicts:** Soils: NO Access: NO Land Use: YES Utilities: NO Polluted: NO High WT: NO Wetlands: NO **Other:** -None Selected-
Use in Retrofit DA: -Street	
SIZING INFO	
Drainage Area (ac): 0.67	
Impervious Area (ac): 0.11	
Practice Area Available (ft^2): 250	
Existing Head Available? N/A	

Date Assessed: May 16, 2013, 1:44 PM **Assessed by:** ACK, BK

ID#: Retrofit 202

Name: **Lynn St./Barber ter. (south)**

Concept Description:
Replace existing catch basin at corner of driveway with an infiltrating catch basin. Provide pretreatment grass swale, or simple rain garden between the park entrance and adjacent residence.

Notes/Feasibility:
Small green infrastructure example for neighborhood application.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: 0	**Project Candidate:** -Probably not
Ownership: Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Single Family Residential	**Proposed Retrofit Practice 1:** Infiltration
Land Use 2: Road	**Proposed Retrofit Practice 2:** Pretreatment swale
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: -None Selected-	**Maintenance Burden:** -None Selected-
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: NO Water Quality: NO Recharge: YES Demo: NO Repair: NO Reuse: **Other:** -None Selected-
Soils: Good Infiltration	**Conflicts:** Soils: NO Access: NO Land Use: NO Utilities: NO Polluted: NO High WT: NO Wetlands: NO **Other:** -None Selected-
Use in Retrofit DA: street	
SIZING INFO	
Drainage Area (ac): 0.54	
Impervious Area (ac): 0.05	
Practice Area Available (ft^2): 150	
Existing Head Available? N/A	

Date Assessed: May 16, 2013, 1:44 PM **Assessed by:** ACK, BK

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

50

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Retrofit #201/202: Lynn St./Barber Terrace

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 203

Name: **Suburban Sq. neighborhood**

Concept Description:
This neighborhood has 30ft road width and 90% of homes have potential for downspout disconnection. Green street options to include infiltrating catch basins, dry wells for individual roofs, and rain gardens for roofs and driveways are options here.

Notes/Feasibility:
Neighborhood is in area draining to Retrofit #14. Could be a good GI neighborhood for demonstration, if needed. 4.1' invert at drain inlet pictured here.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: So. Burlington; individual homeowners	**Project Candidate:** -Probably not
Ownership: public and private	**Retrofit of new or existing BMP:** -New BMP
Land Use 1: Single family residential	**Proposed Retrofit Practice 1:** -None Selected-
Land Use 2: -None Selected-	**Proposed Retrofit Practice 2:** -None Selected-
Existing BMP on site? No	**Non-Structural Controls:** downspout disconnection
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: -None Selected-	**Maintenance Burden:** -None Selected-
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: NO Water Quality: NO Recharge: NO Demo: NO Repair: NO Reuse: **Other:** -None Selected-
Soils: Good for infiltration	
Use in Retrofit DA: -streets	
SIZING INFO	
Drainage Area (ac): 7.15	
Impervious Area (ac): 2.96	
Practice Area Available (ft^2): --	
Existing Head Available? 0	

Conflicts:
Soils: NO
Access: NO
Land Use: NO
Utilities: NO
Polluted: NO
High WT: NO
Wetlands: NO

Other: -None Selected-

Date Assessed: May 16, 2013 **Assessed by:** ACK, BK

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

100

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Retrofit 203: Suburban Ave Green Infrastructure

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 204

Name: **Greers at Dorset St./Williston Rd.**

Concept Description:
Install bioretention with underground storage in existing grassed area to capture roof and parking lot runoff. Runoff drains to this area already, but would need to divert from existing drain inlets and overflow back into existing drainage network.

Notes/Feasibility:
Could get roof area from VT Gift barn and upper lot if needed.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: unknown	**Project Candidate:** Ok
Ownership: Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Commercial/Industrial	**Proposed Retrofit Practice 1:** Bioretention
Land Use 2: -None Selected-	**Proposed Retrofit Practice 2:** Underground storage chambers
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: -None Selected-	**Maintenance Burden:** Medium
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: NO Demo: YES Repair: NO Reuse: **Other:** -None Selected-
Soils: Poor Infiltration	**Conflicts:** Soils: NO Access: NO Land Use: NO Utilities: NO Polluted: NO High WT: NO Wetlands: NO **Other:** -None Selected-
Use in Retrofit DA: small parking lot, roof	
SIZING INFO	
Drainage Area (ac): 0.45	
Impervious Area (ac): 0.38	
Practice Area Available (ft^2): 1,650	
Existing Head Available? N/A	

Date Assessed: May 16, 2013, 4:01 PM **Assessed by:** ACK, BK

ID#: Retrofit 205

Name: **Vermont Gift Barn**

Concept Description:
Disconnect rooftop drainage onto parking lot by diverting downspouts into a bioretention in the existing grassed area in front of store. Tie underdrain and overflow into existing drain inlet.

Notes/Feasibility:
Would be an easy retrofit since grassed area already depressed with a yard inlet. Disconnect rooftop runoff going onto parking lot. Area is currently mowed and is lush grass.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: 0	**Project Candidate:** Ok
Ownership: Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Commercial/Industrial	**Proposed Retrofit Practice 1:** Bioretention
Land Use 2: None Selected-	**Proposed Retrofit Practice 2:** None Selected-
Existing BMP on site? No	**Non-Structural Controls:** Disconnection
Is site a hotspot? Possibly	**Non-Structural Other:** Dumpster and grease management
Sources/pollutants 1: Sediment	**Maintenance Burden:** Medium
Sources/pollutants 2: In rear lot, dumpsters and grease	**Benefits:** Storage: YES Water Quality: YES Recharge: NO Demo: YES Repair: NO Reuse: **Other:** None Selected-
Soils: Poor Infiltration	
Use in Retrofit DA: Individual Rooftop	
SIZING INFO	
Drainage Area (ac): 0.16	
Impervious Area (ac): 0.12	
Practice Area Available (ft^2): 660	
Existing Head Available? N/A	

Conflicts:
Soils: YES
Access: NO
Land Use: NO
Utilities: NO
Polluted: NO
High WT: NO
Wetlands: NO

Other: Trees

Date Assessed: May 16, 2013, 4:10 PM **Assessed by:** ACK, BK

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

50

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Retrofit #204/205: Greers/Vermont Gift Barn

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 206

Name: **Northfield Savings Bank**

Concept Description:
Convert existing landscape island into a bioretention facility, overflow into existing drain inlet.

Notes/Feasibility:
Low feasibility considering private property, however could be relatively easy since there is an existing drain line for overflow. Could be a good green infrastructure demonstation.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: 0	**Project Candidate:** Ok
Ownership: Private	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Commercial/Industrial	**Proposed Retrofit Practice 1:** Bioretention
Land Use 2: Bank	**Proposed Retrofit Practice 2:** None Selected-
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** None Selected-
Sources/pollutants 1: -None Selected-	**Maintenance Burden:** Medium
Sources/pollutants 2: None Selected-	**Benefits:** Storage: NO Water Quality: YES Recharge: NO Demo: YES Repair: NO Reuse: NO **Other:** None Selected-
Soils: Poor Infiltration	
Use in Retrofit DA: Parking Lot	
SIZING INFO	
Drainage Area (ac): 0.17	
Impervious Area (ac): 0.15	
Practice Area Available (ft^2): 950	
Existing Head Available? N/A	

Conflicts:
Soils: NO
Access: NO
Land Use: NO
Utilities: NO
Polluted: NO
High WT: NO
Wetlands: NO

Other: None Selected-

Date Assessed: May 16, 2013, 4:34 PM **Assessed by:** ACK, BK

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

20

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Horsley Witten Group
Sustainable Environmental Solutions

Retrofit #206: Northfield Savings Bank

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 207

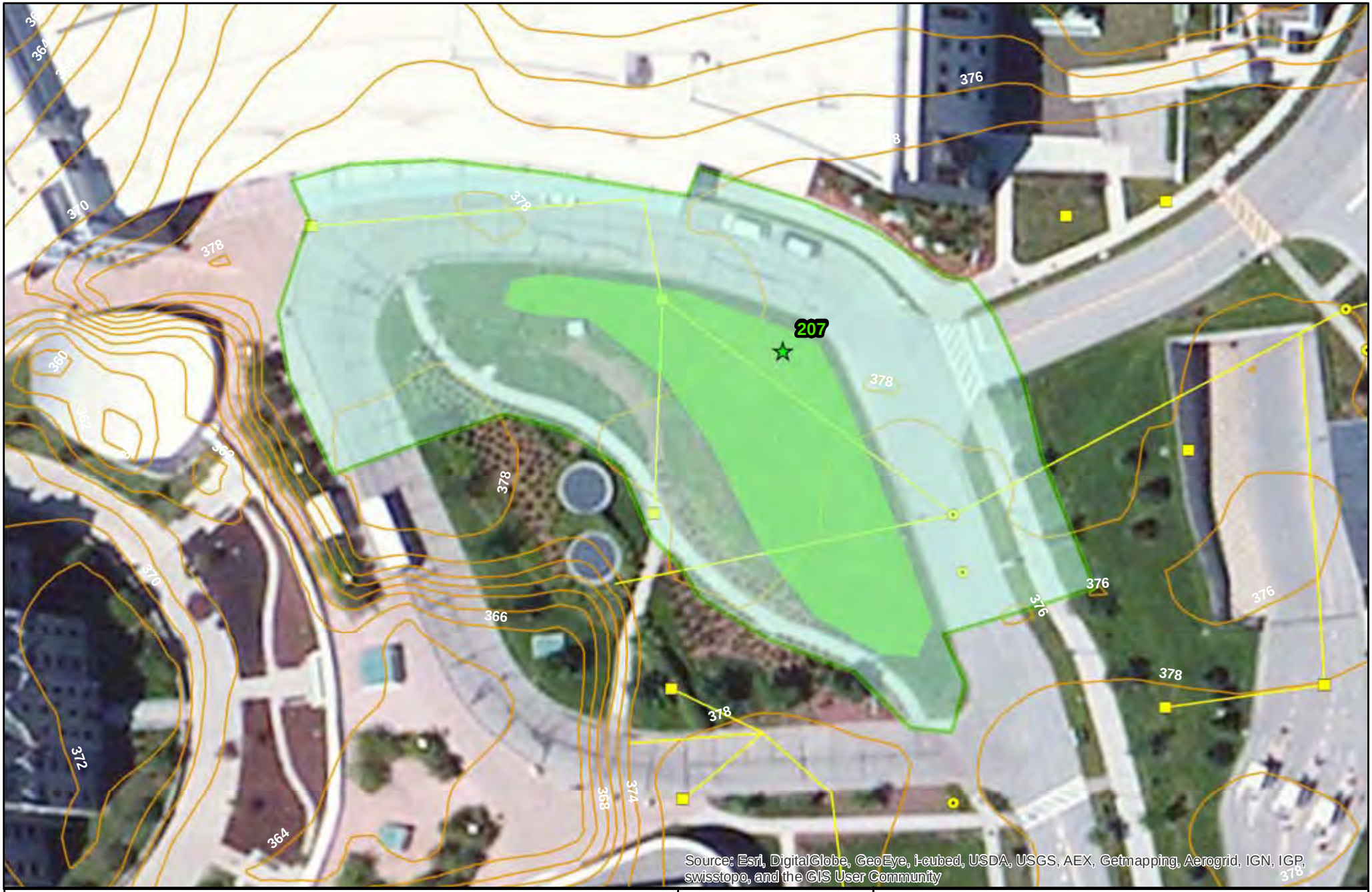
Name: **Fletcher Allen green space**

Concept Description:
Proposed bioretention area in green space near hospital entrance. Redirect existing roadway trench drains into practice. Site currently drains to the UVM East Campus Pond.

Notes/Feasibility:
Moderate feasibility. Trench drain outlets are shallow so daylighting is possible. Plenty of green space for practice area. High profile location.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: UVM/Burlington	**Project Candidate:** Ok
Ownership: Public	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Institutional	**Proposed Retrofit Practice 1:** Bioretention
Land Use 2: Street/Grass Landscape island	**Proposed Retrofit Practice 2:** -None Selected-
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** Medium
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: NO Water Quality: YES Recharge: NO Demo: YES Repair: NO Reuse: **Other:** None
Soils: Poor Infiltration	**Conflicts:** Soils: NO Access: NO Land Use: NO Utilities: YES Polluted: NO High WT: NO Wetlands: NO **Other:** Electric and irrigation in island.
Use in Retrofit DA: Street	
SIZING INFO	
Drainage Area (ac): 0.91	
Impervious Area (ac): 0.87	
Practice Area Available (ft^2): 8,700	
Existing Head Available? --	

Date Assessed: May 17, 2013, 11:28 AM **Assessed by:** KMH/AGM



Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

50 Feet

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Horsley Witten Group
Sustainable Environmental Solutions

Retrofit #207: Fletcher Allen Green Space

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit 208

Name: **Fletcher Allen parking lot**

Concept Description:
Proposed bioretention area in existing drainage feature. Site is currently managed by existing swales, curb cuts, and a drainage depression. Swales and depression are currently eroding. Raise existing catchbasin frame/grate to provide ponding for bioretention.

Notes/Feasibility:
Easy retrofit and aesthetic improvement. Parking lot already has features necessary directing drainage to the retrofit practice location.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: UVM/Burlington	**Project Candidate:** Ok
Ownership: Public	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Institutional	**Proposed Retrofit Practice 1:** Bioretention
Land Use 2: Parking Lot	**Proposed Retrofit Practice 2:** -None Selected-
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** Medium
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: NO Water Quality: YES Recharge: NO Demo: YES Repair: YES Reuse: NO **Other:** None
Soils: Poor Infiltration	
Use in Retrofit DA: Parking Lot	
SIZING INFO	
Drainage Area (ac): 0.85	
Impervious Area (ac): 0.53	
Practice Area Available (ft^2): 6,400	
Existing Head Available? --	

Conflicts:
Soils: NO
Access: NO
Land Use: NO
Utilities: NO
Polluted: NO
High WT: NO
Wetlands: NO

Other: None

Date Assessed: May 17, 2013, 11:48 AM **Assessed by:** KMH/AGM

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

60 Feet

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Retrofit #208: Fletcher Allen Parking Lot

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit M1A

Name: **Centennial Court Apartments**

Concept Description:
Retrofit of existing dry basin to an infiltration basin. Increase contributing drainage area and add riser to outlet structure for improved flow control. Redirect road drainage from Centennial Court to basin. Site only takes runoff currently from a portion of the apartment roofs.

Notes/Feasibility:
Very good. Must adjust existing sewer manhole located with basin. This currently discharges to the UVM East Campus Pond.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: UVM / Art Shields (property manager)	**Project Candidate:** Yep, Love It
Ownership: Public	**Retrofit of new or existing BMP:** Existing BMP
Land Use 1: Multi-family Residential	**Proposed Retrofit Practice 1:** Pond
Land Use 2: Campus Apartments	**Proposed Retrofit Practice 2:** -None Selected-
Existing BMP on site? Yes	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** Low
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: YES Demo: NO Repair: NO Reuse: **Other:** None
Soils: Good Infiltration	**Conflicts:** Soils: NO Access: NO Land Use: NO Utilities: YES Polluted: NO High WT: NO Wetlands: NO **Other:** Must raise frame/cover of sewer manhole near basin edge above ponding elevation.
Use in Retrofit DA: Roof	
SIZING INFO	
Drainage Area (ac): 6.45	
Impervious Area (ac): 2.85	
Practice Area Available (ft^2): 13,000	
Existing Head Available? --	

Date Assessed: May 17, 2013, 12:28 PM **Assessed by:** KMH/AGM

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

120

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Retrofit #M1A: Centennial Court

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit M1B (revised)

Name: **East Campus Pond**

Concept Description:
Retrofit of the existing East Campus Pond outlet structure to maximize storage and attenuation for to target design storm(s).

Notes/Feasibility:
Priority location with high feasibility. No significant space available for expansion of the facility. Low cost improvement.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: UVM	**Project Candidate:** Yep, Love It
Ownership: Public	**Retrofit of new or existing BMP:** Existing BMP
Land Use 1: Institutional	**Proposed Retrofit Practice 1:** Outlet structure modification
Land Use 2: -None Selected-	**Proposed Retrofit Practice 2:** --
Existing BMP on site? Yes	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: No	**Maintenance Burden:** Low
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: NO Demo: NO Repair: NO Reuse: NO **Other:** None
Soils: Poor Infiltration	
Use in Retrofit DA: -None Selected-	
SIZING INFO	
Drainage Area (ac): 69.80	
Impervious Area (ac): 43.67	
Practice Area Available (ft^2): --	
Existing Head Available? --	

Conflicts:
Soils: YES
Access: NO
Land Use: NO
Utilities: NO
Polluted: NO
High WT: NO
Wetlands: NO

Other:

Date Assessed: May 16, 2013, 11:15 AM **Assessed by:** KMH/AGM

ID#: Retrofit M3

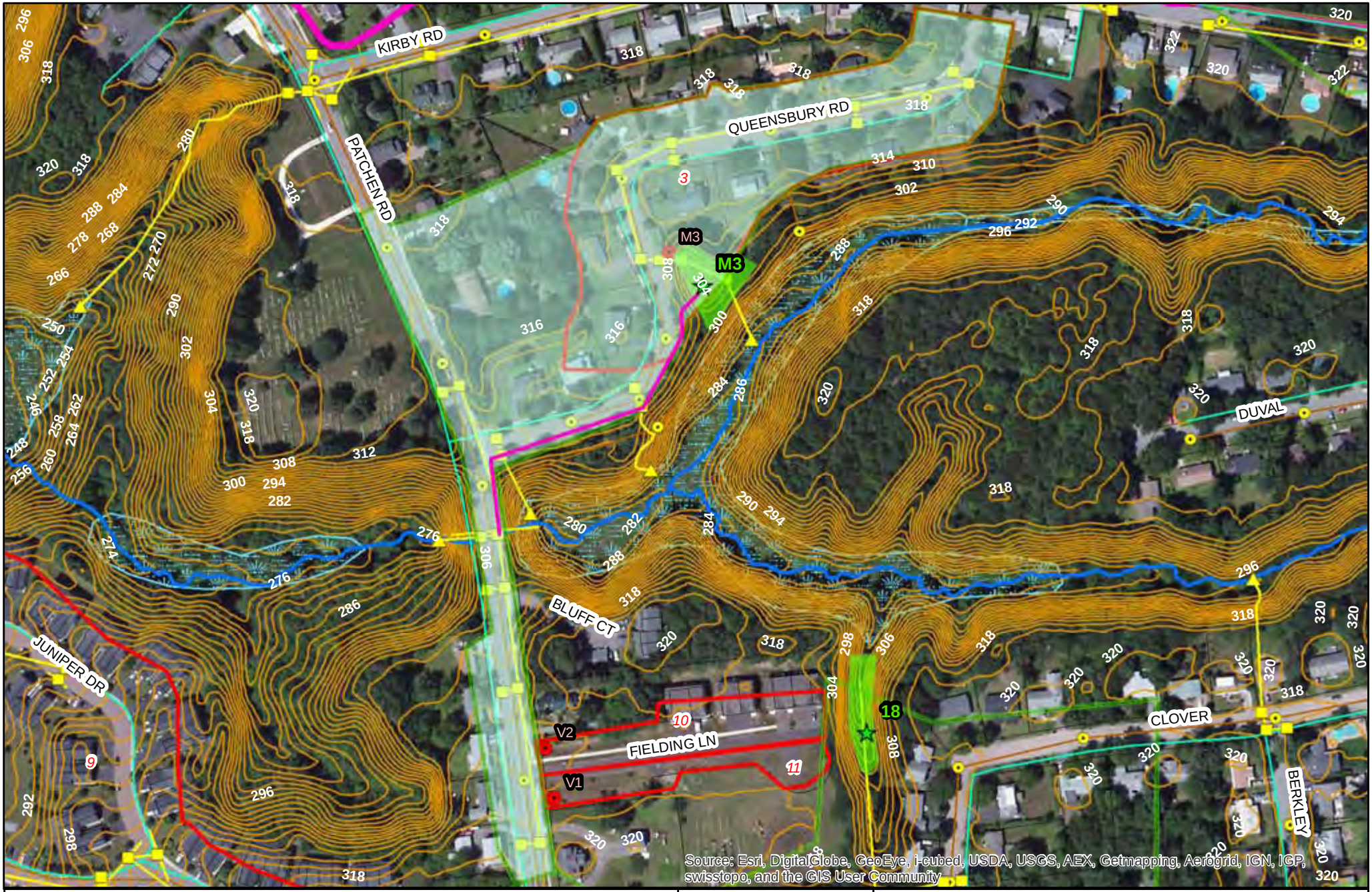
Name: **Queensbury Pond**

Concept Description:
Existing dry detention pond. Modifiy outlet to create an infiltration basin. Existing pond might predate subdivision (newer PVC outlet connects to older CMP barrel). Facility appears to have additional storage capacity to expand drainage area (level run confirmed this is feasible).

Notes/Feasibility:
Old CMP barrel
New 15" PVC outlet
Sink hole evidence – top of existing embankment
Scour hole at barrel outlet
Incoming 15" HDPE
Eroded inflow channel

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Queensbury HOA	**Project Candidate:** Yes.
Ownership: Private	**Retrofit of new or existing BMP:** Existing BMP
Land Use 1: Single Family Residential	**Proposed Retrofit Practice 1:** Infiltration Basin
Land Use 2: -None Selected-	**Proposed Retrofit Practice 2:** 0
Existing BMP on site? Yes	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** Low
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: YES Demo: NO Repair: NO Reuse: NO **Other:** 0
Soils: Good Infiltration	**Conflicts:** Soils: NO Access: NO Land Use: NO Utilities: YES Polluted: NO High WT: NO Wetlands: NO **Other:** 0
Use in Retrofit DA: Streets, single family res.	
SIZING INFO	
Drainage Area (ac): 7.67	
Impervious Area (ac): 3.05	
Practice Area Available (ft^2): 8,930	
Existing Head Available? n/a	

Date Assessed: May 16, 2013, 10:36 AM **Assessed by:** RAC, NBP, SMM



Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

200 Feet

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Retrofit #M3: Queensbury Court

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

ID#: Retrofit M5A / M5A2 (revised)

Name: **Main St. Pond**

Concept Description:
The Main Street Pond outlet structure is currently not functioning properly and must be repaired. Two potential retrofit options include: **M5A** involves converting the existing basin to a forebay for proposed Retrofit #24; **M5A2** involves expanding the existing Main St. Pond southward toward Williston Rd. and excavating to a deeper depth (see attached sketch). HW expanded upon the proposed K&L design of this facility to include a modified outlet structure and a concrete wall for additional storage and attenuation. The parking lot to the north (currently draining to M1 East Campus Pond, was rerouted here in the model).

Notes/Feasibility:
Priority location with high feasibility. Retrofit **M5A2** will likely require significant ledge removal for the proposed construction activities. Ledge removal is not anticipated for the **M5A/24** retrofit scenario.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: UVM	**Project Candidate:** Yep, Love It
Ownership: Public	**Retrofit of new or existing BMP:** Existing BMP
Land Use 1: Institutional	**Proposed Retrofit Practice 1:** Forebay for Retrofit 24 (M5A)
Land Use 2: -None Selected-	**Proposed Retrofit Practice 2:** Expand ex. basin (M5A2)
Existing BMP on site? Yes	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: No	**Maintenance Burden:** Low
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: NO Demo: NO Repair: NO Reuse: NO **Other:** None
Soils: Poor Infiltration	
Use in Retrofit DA: -None Selected-	
SIZING INFO	
Drainage Area (ac): M5A/24 74.04; M5A2 67.93	
Impervious Area (ac): M5A/24 31.12; M5A2 29.04	
Practice Area Available (ft^2): 61,000	
Existing Head Available? --	

Conflicts:
Soils: YES
Access: NO
Land Use: NO
Utilities: NO
Polluted: NO
High WT: NO
Wetlands: NO

Other: Ledge at bottom of existing pond

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

300

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Retrofit M5/24: Main St. Pond and Sheraton (rear open space)

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

Retrofit M5A2 – Proposed Main Street Pond Expansion (HW modified K&L design)

ID#: Retrofit M7A / M7A2 (revised)

Name: **North Campus Pond**

Concept Description:
This retrofit of the of existing North Campus Pond includes two proposed expansion options to over control existing runoff (**M7A**) and manage runoff from proposed future impervious cover (**M7A2**) . The retrofits include raising the existing embankment by either 3'+/- (**M7A**) or 6'+/- (**M7A2**) to provide additional attenuation capacity. May consider horizontal expansion to the north and/or south.

Notes/Feasibility:
UVM has provided an estimate of the additional proposed drainage area that will be redirected to the basin. UVM to complete a build-out analysis of the contributing drainage area for accommodation within the potential modified basin. An increased berm height of 6' may require elevating the existing high-tension electric lines.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: UVM	**Project Candidate:** Yep, Love It
Ownership: Public	**Retrofit of new or existing BMP:** Existing BMP
Land Use 1: Institutional	**Proposed Retrofit Practice 1:** 3' add. berm height (M7A)
Land Use 2: -None Selected-	**Proposed Retrofit Practice 2:** 6' add. berm height (M7A2)
Existing BMP on site? Yes	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: No	**Maintenance Burden:** Low
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: YES Water Quality: YES Recharge: NO Demo: NO Repair: NO Reuse: NO **Other:** None
Soils: Good Infiltration	**Conflicts:** Soils: NO Access: NO Land Use: NO Utilities: YES Polluted: NO High WT: NO Wetlands: NO **Other:** Overhead utility lines may limit berm height.
Use in Retrofit DA: Parking lots, streets, rooftop	
SIZING INFO	
Drainage Area (ac): 83.84 (M7A) / 2.28 (M7A2)	
Impervious Area (ac): 47.43 (M7A) / 1.36 (M7A2)	
Practice Area Available (ft^2): 66,000	
Existing Head Available? --	

Date Assessed: May 16, 2013, 1:21 PM **Assessed by:** KMH/AGM

ID#: Retrofit M7B

Name: **Open area east of Case Parkway**

Concept Description:
Proposed underground recharge system to capture drainage from Bilodeau Court and Case Parkway. Add additional drainage lines to direct existing drainage networks to retrofit. Drainage area could also include areas directed to Retrofit #M7C and M7D.

Notes/Feasibility:
Site is located on UVM property so an agreement between MS4s would be needed. Site is currently partially wooded but existing trees are in poor health.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Megan Moir, Burlington / UVM	**Project Candidate:** Ok
Ownership: Public	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Institutional	**Proposed Retrofit Practice 1:** Infiltration
Land Use 2: Green space east of Case Pkwy	**Proposed Retrofit Practice 2:** -None Selected-
Existing BMP on site? No	**Non-Structural Controls:** -None Selected-
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: No	**Maintenance Burden:** Medium
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: NO Water Quality: YES Recharge: YES Demo: NO Repair: NO Reuse: NO **Other:** None
Soils: Good Infiltration	
Use in Retrofit DA: -None Selected-	
SIZING INFO	
Drainage Area (ac): 7.05	
Impervious Area (ac): 3.24	
Practice Area Available (ft^2): 9,300	
Existing Head Available? --	

Conflicts:
Soils: NO
Access: NO
Land Use: NO
Utilities: NO
Polluted: NO
High WT: NO
Wetlands: NO

Other: Existing trees, many in poor health

Date Assessed: May 17, 2013, 9:56 AM **Assessed by:** KMH/AGM

ID#: Retrofit M7C

Name: **Case Parkway center island**

Concept Description:
Proposed bioretention area in center island on Case Parkway. Direct road drainage to bioretention using a speed bump across Case Parkway. The bioretention could underdrain/overflow to existing drainage system and outfall.

Notes/Feasibility:
Site currently is within the drainage area for the UVM North Campus Pond.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Megan Moir, Burlington	**Project Candidate:** Ok
Ownership: Public	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Single Family Residential	**Proposed Retrofit Practice 1:** Bioretention
Land Use 2: Grass island	**Proposed Retrofit Practice 2:** optional green street bumpouts along Case Pkwy
Existing BMP on site? No	**Non-Structural Controls:** Impervious Cover Removal
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** Medium
Sources/pollutants 2: None	**Benefits:** Storage: NO Water Quality: YES Recharge: YES Demo: YES Repair: NO Reuse: **Other:** None
Soils: Good Infiltration	**Conflicts:** Soils: NO Access: NO Land Use: NO Utilities: YES Polluted: NO High WT: NO Wetlands: NO **Other:** Existing E/T/C in island along western edge
Use in Retrofit DA: Street	
SIZING INFO	
Drainage Area (ac): 0.90	
Impervious Area (ac): 0.51	
Practice Area Available (ft^2): 1,500	
Existing Head Available? --	

Date Assessed: May 17, 2013, 10:11 AM **Assessed by:** KMH/AGM

ID#: Retrofit M7D

Name: **140 East Ave. Residence**

Concept Description:
Construct a bioretention area in underutilized private green space. Divert drainage from existing drainage structure in Bilodeau Court. Alternative practice may include permeable pavement shoulders/parking lanes in the road ROW.

Notes/Feasibility:
Proposed site location is on private property. Utilities may present conflicts for retrofit opportunities.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info: Megan Moir, Burlington	**Project Candidate:** Ok
Ownership: Public	**Retrofit of new or existing BMP:** New BMP
Land Use 1: Single Family Residential	**Proposed Retrofit Practice 1:** Bioretention
Land Use 2: Backyard/ROW	**Proposed Retrofit Practice 2:** Permeable parking lanes on Bilodeau Ct
Existing BMP on site? No	**Non-Structural Controls:** Other
Is site a hotspot? No	**Non-Structural Other:** -None Selected-
Sources/pollutants 1: Sediment	**Maintenance Burden:** Low
Sources/pollutants 2: -None Selected-	**Benefits:** Storage: NO Water Quality: YES Recharge: YES Demo: NO Repair: NO Reuse: NO **Other:** None
Soils: Good Infiltration	
Use in Retrofit DA: Street	
SIZING INFO	
Drainage Area (ac): 0.67	
Impervious Area (ac): 0.37	
Practice Area Available (ft^2): 2,240	
Existing Head Available? --	

Conflicts:
Soils: NO
Access: NO
Land Use: NO
Utilities: YES
Polluted: NO
High WT: NO
Wetlands: NO

Other: Gas, fiber optics, and above ground electric in ROW

Date Assessed: May 17, 2013, 11:29 AM **Assessed by:** KMH/AGM

Legend

- Retrofit
- Retrofit DA
- PracticeArea
- Outfalls
- Catch basins
- Manholes
- Existing BMP
- AirportProperties
- Watershed
- Wetlands_SoBu
- Parcels
- Existing BMP DA
- 2ft_Contours
- stream
- Storm
- Sanitary
- Combined
- Waterline

N

Feet

120

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Retrofit #M7B: Case Pkwy (east)/ #M7C: Case PKWY Center Island/ #M7D: 140 East Ave

Path: H:\Projects\2012\12106 Chittenden County-Centennial Brook WS\GIS\Maps\130610_iPad_Export_ack.mxd

APPENDIX B

FUTURE GROWTH MEMORANDUM

CHITTENDEN COUNTY RPC
Communities Planning Together

Date: July 18, 2013

To: Thomas J. DiPietro Jr., Stormwater Superintendent, City of South Burlington

Megan Moir, Plangineer, City of Burlington

From: Melanie Needle, Senior Planner, CCRPC

RE: Impervious Surface Analysis in the Centennial Brook Watershed

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This memo documents the process for quantifying additional non-jurisdictional impervious area in the Centennial Brook Watershed. Centennial Brook watershed is located in the City of Burlington and the City of South Burlington. Non-Jurisdictional growth is impervious surface that is less than one acre.

Procedure

1. Identify parcels that do not have a state storm water permit within the Centennial Brook Watershed study. Parcels that do not have a state stormwater permit are considered to be non-jurisdictional. Parcels with no potential for impervious growth (Centennial Woods and the Green Mount Cemetery) are removed. The S.D. Ireland parcel in Burlington was not included because it has over 1 acre of impervious area and any expansion greater than 5,000 sf of impervious area would require it to obtain a State stormwater permit.

2. Determine the annual rate of change of non-jurisdictional impervious area between two time periods. The formula for calculating the growth rate is (Power((end value/start value),(1/N))-1)*100). The end value is the total impervious area for the watershed in each city. The start value is the total impervious area for the earliest year. **According to this method, impervious area has increased 3.37% per year in Burlington and .36% per year in South Burlington.**

3. Apply the impervious area growth rate from step 2 to each parcel within the study area to determine the acreage of non-jurisdictional impervious growth potential.

    a. Parcels cannot exceed the lot coverage per municipal regulations. Determine if a parcel can add more impervious area by dividing existing impervious and the total parcel acreage. If existing lot coverage does not exceed lot coverage then estimate the total future impervious area in 2025. The formula for this is (1+growth rate)^(future year-recent year)* recent year's impervious area.

b. If the future potential impervious area is greater than the lot coverage, then use the remaining lot coverage percentage to estimate the growth. The formula is

(lot coverage –(existing lot area/parcel area)* parcel + existing impervious area.

4. Using the resulting impervious values for 2025 estimated in step 3, parcels are "jurisdictional" if the sum of the existing and projected future impervious growth is greater than 1 acre. If a parcel's total future impervious area is less than 1 acre then the new impervious is considered "non-jurisdictional". The increase in new impervious area on the parcels with build out potential is shown in the table 1 below and is an estimate of the likely non-jurisdictional impervious area growth for the watershed by 2025.

Table 1 2025 Projected Impervious Area for Parcels

that do not have a State Stormwater Permit

	Existing Impervious Area (acres)	2025 Total Impervious Area (acres)	New Non-Jurisdictional Additional Impervious Area (acres)
Burlington (Total)			
Non Jurisdictional	4.61	6.11	1.50
South Burlington (Total)	**54.34**	**57.13**	**2.79**
JURISDICTIONAL	16.46	17.23	0.76
NON JURISDICTIONAL	37.87	39.90	2.03
Grand Total for Watershed	**58.95**	**63.24**	**4.29**

5. Estimate the total impervious area potential on a parcel based on lot coverage. The formula for this is (Lot Cov – Existing % imp area)* parcel area + existing imp area. The estimation of total impervious area will assist in the identification of parcels that could become jurisdictional if a large development is planned and developed all at once. Table 2 shows the amount of impervious area possible if every parcel built out to the maximum lot coverage independent of time.

Table 2 Total Impervious Area for Parcels that do not have a State Stormwater Permit

	Existing Impervious Area (acres)	Total Impervious Area (Remaining Lot Coverage)	Difference Between Total Imp Area & Existing
Burlington (Total)			
NON JURISDICTIONAL	4.61	7.97	3.36
South Burlington (Total)	**54.34**	**132.69**	**78.36**
JURISDICTIONAL	19.47	68.90	49.43
NON JURISDICTIONAL	34.87	63.79	28.92
Grand Total for Watershed	**58.95**	**140.66**	**81.72**

4. Roads were not included in this analysis because they are not built out in the same manner as parcels and are not subject to lot coverage requirements. Any new roads in this watershed are likely to be for access to large future developments on larger parcels. Also any new expansions or sidewalk additions will likely put the impervious area threshold over 1 acre making the road subject to state stormwater standards.

APPENDIX C

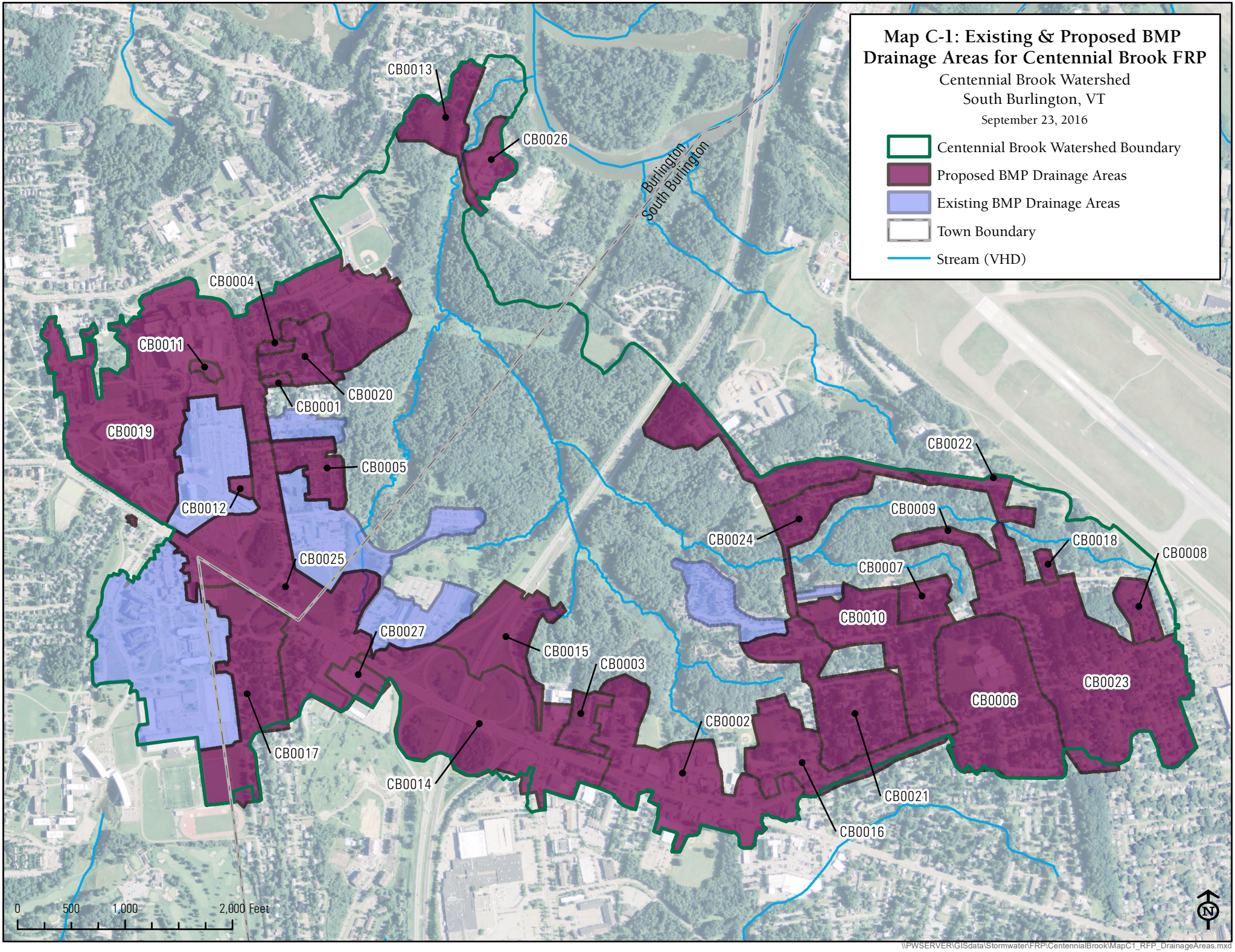
CENTENNIAL BROOK FLOW RESTORATION PLAN
PROPOSED BEST MANAGEMENT PRACTICES

Centennial Brook Flow Restoration Plan
Table C-1: Final Proposed BMPs for the Centennial Brook FRP

Project ID	Project Name	BMP Address	BMP Landowner	MS4s with Impervious Area	New or Existing	BMP Type	Expired Permit	Drainage Area (acres)	Impervious Area Managed	Impervious %	CPv Managed (ac-ft)	Volume Infiltrated (ac-ft)	BMP Description
CB0001	140 East Ave Residence	Bilodeau Ct, Burlington	MS4 Owned	Burlington	New	Bio		0.63	0.18	28%	0.046	0.046	Construct a bioretention area in underutilized private green space. Divert drainage from existing drainage structure in Bilodeau Court. Alternative practice may include permeable pavement shoulders/parking lanes in the road ROW.
CB0002	Best Western Windjammer Infiltration Basin A	North of Williston Rd and east of Dorset St, South Burlington	Private	South Burlington	New	IB	6323-9030	29.42	21.82	74%	2.023	2.023	Site drainage area currently includes only Best Western property. Outfall is severely eroded and is headcutting to the east and may soon reach paved access road. Concept includes stabilizing outfall and constructing a detention basin within existing gully. Expand current drainage area to intercept runoff from Williston Road drainage network and redirect drainage from abutting commercial properties.
CB0003	Best Western Windjammer Infiltration Basin B	North of Williston Rd and east of Dorset St, South Burlington	Private	South Burlington	New	IB	6323-9030	4.09	1.33	33%	0.053	0.053	Outfall is located west of Best Western. Site drainage area currently includes only Best Western property. Moderate erosion occurring. Concept includes stabilizing outfalls and constructing a detention basin within existing gully. Expand current drainage area to intercept runoff from the Williston Road drainage network. A portion of this drainage area could be directed to Retrofit 22 if necessary.
CB0004	Case Parkway Center Island	Case Pkwy, South Burlington	MS4 Owned	Burlington	Existing	Bio		0.86	0.23	27%	0.042	0.042	Proposed bioretention area in center island on Case Parkway. Direct road drainage to bioretention using a speed bump across Case Parkway. The bioretention could underdrain/overflow to existing drainage system and outfall.
CB0005	Centennial Court Apartments Infiltration	Centennial Ct, Burlington	MS4 Owned	Burlington, UVM	Existing	IB	No Permit	6.54	2.74	42%	0.067	0.067	Retrofit of existing dry basin to an infiltration basin. Increase contributing drainage area and add riser to outlet structure for improved flow control. Redirect road drainage from Centennial Court to basin. Site only takes runoff currently from a portion of the apartment roofs.
CB0006	Chamberlin School	South of Hanover St and west of Airport Pkwy, South Burlington	MS4 Owned	South Burlington	New	IG	No Permit	31.49	9.69	31%	1.955	1.955	Underground detention in open space of school property. It seems possible to collect drainage off of White Street (and upgradient residential neighborhood) and connect to existing system via school entrance. Underground chambers could be designed as infiltration pending results of soils test pitting. (note HSG – D on east side of school property; HSG – B on west side of school property).
CB0007	Clover St GSI	Clover St and Berkley St, South Burlington	MS4 Owned/ Private	South Burlington	New	IG	No Permit	3.82	1.40	37%	0.073	0.073	30-ft wide residential streets with direct outfalls to streams, flat terrain, and good soils offer green street and neighborhood-scale disconnection opportunities (e.g., dry wells, rain gardens, pervious driveways, bump outs).
CB0008	Dumont Ave Infiltration Chambers	Dumont Ave, South Burlington	MS4 Owned	South Burlington, BTV	New	IG	No Permit	3.93	0.86	22%	0.047	0.047	Divert flows from existing catchbasins and convey down Dumont Ave via pipe or swale to underground recharge chambers on empty lot. Options exist for practice type, siting and conveyance mechanism depending on depth to GW, existing inverts, and future use by Airport. Discharge to existing pipe outlet at Airport basin.
CB0009	Duval St GSI	Duval St, South Burlington	MS4 Owned/ Private	South Burlington	New	IG	No Permit	3.57	0.99	28%	0.048	0.048	30-ft wide residential streets with direct outfalls to streams, flat terrain, and good soils offer green street and neighborhood-scale disconnection opportunities (e.g., dry wells, rain gardens, pervious driveways, bump outs).

CB0010	Fielding Lane Condos Infiltration Gallery	Richard Terr and Clover St, South Burlington	Private	South Burlington	New	IG	No Permit	18.74	5.14	27%	0.148	0.148	Detention-retention facility. Open parcel adjacent to Fielding Lane Condos – seems to be owned by Fielding Lane Condos, existing surface storage available below outfall pipe. Would require access from Fielding Lane.
CB0011	Fletcher Allen Green Space	Carrigan Dr, Burlington	MS4 Owned	Burlington, UVM	Existing	Bio		0.89	0.53	59%	0.131	0.131	Proposed bioretention area in green space near hospital entrance. Redirect existing roadway trench drains into practice. Site currently drains to the UVM East Campus Pond.
CB0012	Fletcher Allen Parking Lot	Carrigan Dr, Burlington	MS4 Owned	Burlington	Existing	Bio		0.83	0.61	74%	0.097	0.097	Proposed bioretention area in existing drainage feature. Site is currently managed by existing swales, curb cuts, and a drainage depression. Swales and depression are currently eroding. Raise existing catchbasin frame/grate to provide ponding for bioretention.
CB0013	Grove Street Parking Lot	Grove St, Burlington	MS4 Owned	Burlington	New	IG	1-0811	8.82	2.33	26%	0.205	0.205	Divert existing drainage network and capture runoff from parking lot and direct to proposed underground recharge system. Low point in road drainage area is immediately south of the City parking lot. Consider replacing parking lot with permeable pavement.
CB0014	I-89 Cloverleaf Underground Detention	I-89 Exit 14 interchange, South Burlington	MS4 Owned	South Burlington, VTrans	Existing	UD	2-0126; 6323-9030; 2-0619	39.17	17.18	44%	2.354844	0	Detention structure bounded by northbound lanes and off-ramp (directing traffic to westbound Williston Rd). Existing culvert drains all upgradient area from interchange and Williston Rd. Modify outlet to install new control structure for Cpv storage.
CB0015	I-89 Exit 14 Detention Pond	I-89 Exit 14 interchange, South Burlington	Public or MS4 Owned (depending on option)	South Burlington, VTrans	New	DP	No Permit	13.07	3.58	27%	2.869972	0	Location flexible depending on evaluation. Most downstream location would be across from drainage outlet, below water main (best location for embankment – maximizes storage), but impact to water main R/W likely and partially on private property. Alternative is to move embankment upgradient to limit of I-89 R/W – would reduce available storage, but keep all work w/in VTrans jurisdiction.
CB0016	Jaycee Park	Patchen Rd north of White St, South Burlington	MS4 Owned	South Burlington	New	IG	No Permit	15.73	6.42	41%	0.898	0.898	Pretreatment tank to underground infiltration chambers. Pretreatment could be proprietary device (e.g, StormCeptor or equal) before underground chambers. Access would need to be coordinated with playing fields. Flow diversion structure would be in Patchen Road, with depth to drain pipe at approx 6.5 feet.
CB0017	Jug handle Underground Detention	East Terr and Main St, South Burlington	MS4 Owned	South Burlington, UVM	New	UD		22.01	8.60	39%	1.623737	0	Dry detention basin in existing green space to capture drainage from Spear Street and East Terrace. Modify existing drainage inlets to divert flows into basin. Drainage area is currently unmanaged and could be routed to Retrofit #M5A/24, alternatively. Retrofit includes the option of adding paved flumes from the roadways and risers to the outlet structures for the existing swales that run the perimeter of green space.
CB0018	N Henry Court	N Henry Ct, South Burlington	MS4 Owned	South Burlington, BTV	New	IG	No Permit	1.03	0.33	32%	0.024	0.024	Dead-end road with excess impervious cover. Currently, drainage comes down the road and flows directly down a steep slope to the stream/wetland area below. Install a rain garden/bio with an overflow to a leaching catch basin at end of road. Dumping of yard waste and debris was also observed down the slope. An old corrugated discharge pipe was found down in stream.
CB0019	North Campus Pond Retrofit	University Rd, Burlington	MS4 Owned	Burlington, UVM	Existing	DP		76.94	45.99	60%	4.719995	0	Proposed expansion of existing North Campus Pond to over control existing and future development. Raise existing embankment (10' +/-) to provide additional capacity. May consider horizontal expansion to the north and/or south.

CB0020	Open Area East of Case Parkway	Case Pkwy, Burlington	MS4 Owned	Burlington, UVM	New	IG		7.04	2.34	33%	0.27	0.27	Proposed underground recharge system to capture drainage from Bilodeau Court and Case Parkway. Add additional drainage lines to direct existing drainage networks to retrofit. Drainage area could also include areas directed to Retrofit #M7C and M7D.
CB0021	Patchen Rd & Pine St Infiltration Gallery	Pine St and Patchen Rd, South Burlington	Private	South Burlington	New	IG	No Permit	20.41	5.40	26%	0.913	0.913	Underground detention or infiltration (depending on soils). Diversion of flows from Patchen Road feasible, incoming pipe from open space/low point behind lots too deep to capture. Single lot also contains SF house (see photo). Would require diversion structure and pretreatment tank/structure.
CB0022	Patchen Road Kettle Hole	Patchen Rd south of I-89, South Burlington	MS4 Owned/ Private	South Burlington, VTrans	New	IG	6292-9030	14.06	5.45	39%	0.268	0.268	Detention Pond (or infiltration basin if soils are acceptable). Directly convey runoff from contributing area off Patchen Road down slope to sediment forebay. Modify existing 30" culvert headwall (under I-89) to achieve required flow control. Could pick up Kirby Rd.
CB0023	Picard Circle Infiltration	Picard Cir, South Burlington	MS4 Owned	South Burlington, BTV	New	IG	No Permit	51.85	15.84	31%	0.682	0.682	Subsurface infiltration system. All houses within Picard Circle have been purchased by Airport and are now abandoned. Significant site area exists within yards and the road for major underground infiltration/ detention system. Constraints include depth of existing drainage pipe and depth above groundwater (adjacent brook approx 14 feet below existing ground).
CB0024	Queensbury Pond Retrofit	Queensbury Rd, South Burlington	Private	South Burlington	Existing	IB	1-0946	7.60	2.88	38%	0.16	0.16	Existing dry detention pond. Modify outlet to create an infiltration basin. Existing pond might predate subdivision (newer PVC outlet connects to older CMP barrel). Facility appears to have additional storage capacity to expand drainage area (level run confirmed this is feasible).
CB0025	Retrofit of Main Street UVM Pond	North of Williston Rd and East Terr, South Burlington	MS4 Owned	South Burlington, Burlington, UVM	Existing	DP		39.64	17.51	44%	3.894927	0	Repair outlet structure. Retrofit options include expanding the pond southward toward Williston Road or eastward as part of Retrofit #24 for additional storage, extended detention, and improved water quality. Site has the ability to capture drainage from Williston Road, adjacent commercial properties, and unmanaged UVM land.
CB0026	SD Ireland Property (20A)	Grove St, Burlington	Private	Burlington	New	IG		4.66	3.47	74%	0.613	0.613	SD Ireland proposed redevelopment to a housing complex. Site will reportedly be required to manage runoff on-site. Site currently drains to city drainage system in Grove St. Plans should address severe bank erosion at Centennial Brook culvert under SD Ireland driveway.
CB0027	Staples Plaza Underground Detention A	West of I-89 Exit 14 interchange, South Burlington	Private	South Burlington	New	UD	No Permit	2.50	2.50	100%	0.261065	0	Convert landscaped island to bioswale w/ UG storage to manage parking and small roof. Overflow to existing drain. Add trees for cover, shading, interception. Reduce width of one-way aisle for bioswale. Flat roof drains internally, discharges to drain inlet east of building. Modify internal roof drains, install trays, or use other blue roof design to provide temporary detention.



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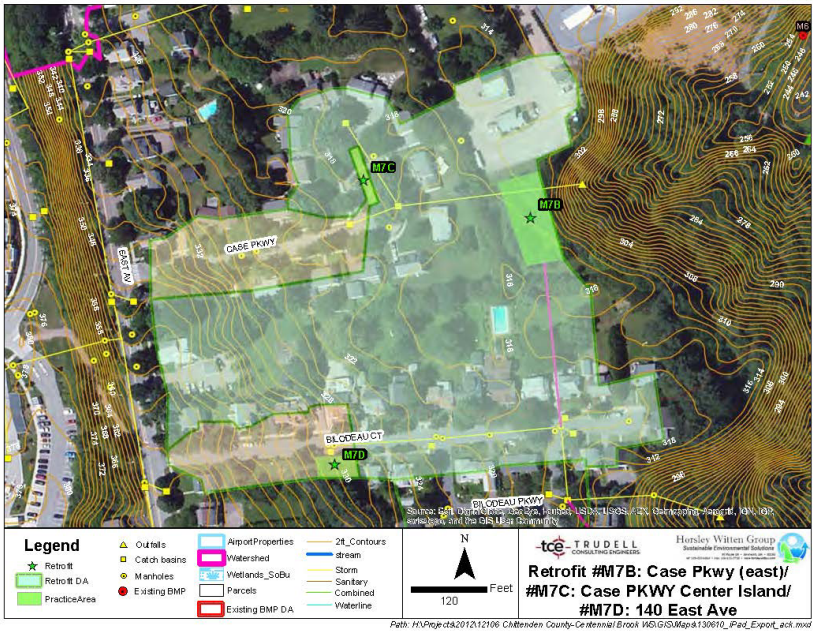
Centennial Brook FRP BMP Summary Sheet					
Site name:	140 East Ave Residence	**South Burlington ID:**	CB0001		
Approximate address:	Bilodeau Ct, Burlington	**MS4 where BMP is located:**	Burlington	**New or existing BMP?**	New
Proposed BMP type:	Bioretention				



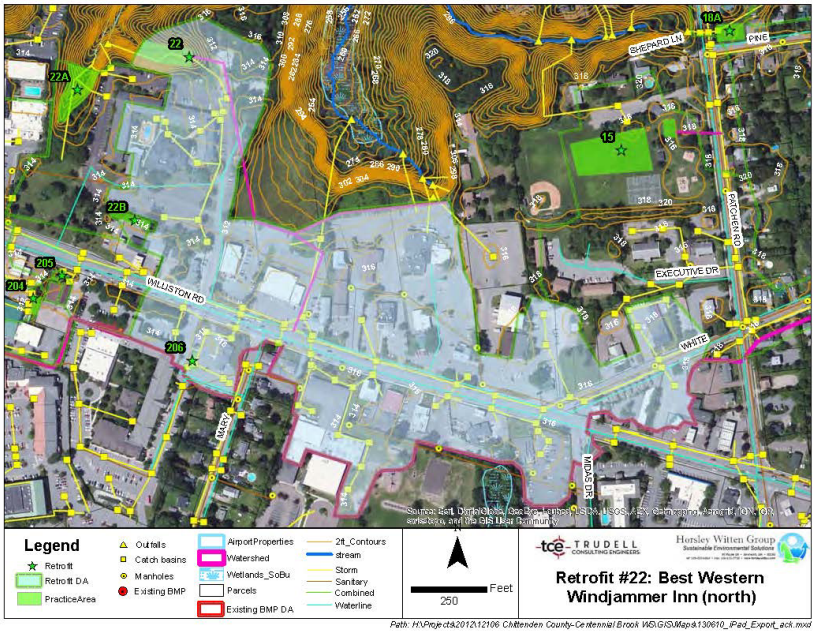
Estimated project cost	$44,000		MS4s contributing drainage to BMP	Burlington
Drainage area (acres)	0.63			
Impervious acres managed	0.18		Primary land use in drainage	Residential
% Impervious	28%		2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned		CPv managed (ac-ft)	0.05
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	0.05
BMP Depth (feet)			Primary or secondary BMP?	Secondary
Hydrologic soil group	A/B		Expired permit(s)?	

Proposed BMP description:	Feasibility concerns:
Construct a bioretention area in underutilized private green space. Divert drainage from existing drainage structure in Bilodeau Court. Alternative practice may include permeable pavement shoulders/parking lanes in the road ROW.	Proposed site location is on private property. Utilities may present conflicts for retrofit opportunities.

Centennial Brook FRP BMP Summary Sheet

Site name:	Best Western Windjammer Infiltration Basin A	**South Burlington ID:**	CB0002

Approximate address:	North of Williston Rd and east of Dorset St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Basin				

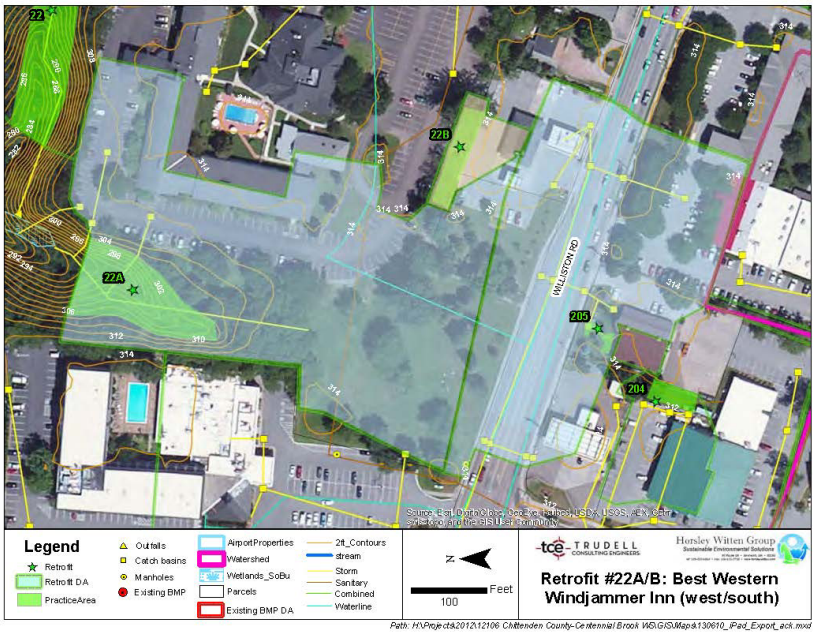


Estimated project cost	$557,000		MS4s contributing drainage to BMP	South Burlington
Drainage area (acres)	29.42			
Impervious acres managed	21.82		Primary land use in drainage	Commercial/Industrial
% Impervious	74%		2 or more landowners?	Yes
Land owner of BMP location	Private		CPv managed (ac-ft)	2.02
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	2.02
BMP Depth (feet)			Primary or secondary BMP?	Primary
Hydrologic soil group	A		Expired permit(s)?	6323-9030

Proposed BMP description:	**Feasibility concerns:**
Site drainage area currently includes only Best Western property. Outfall is severely eroded and is headcutting to the east and may soon reach paved access road. Concept includes stabilizing outfall and constructing a detention basin within existing gully. Expand current drainage area to intercept runoff from Williston Road drainage network and redirect drainage from abutting commercial properties.	Priority project. The proposed site could manage a large drainage area that is unmanaged and unstable. Since the outfall is in need of immediate repair, feasibility is high. Planning considerations include the redirection of flow from abutting commercial properties.

Centennial Brook FRP BMP Summary Sheet

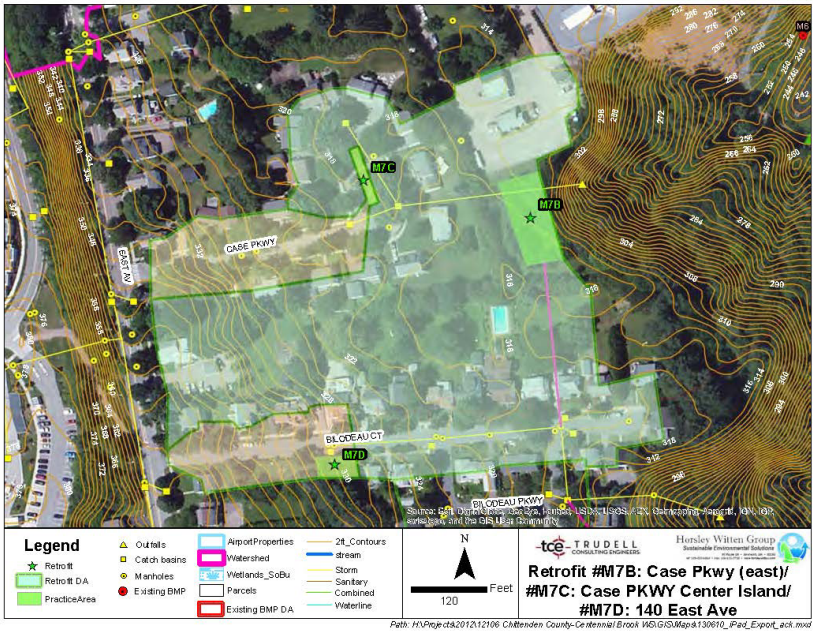
Site name:	Best Western Windjammer Infiltration Basin B	**South Burlington ID:**	CB0003		
Approximate address:	North of Williston Rd and east of Dorset St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Basin				



Estimated project cost	$81,000		MS4s contributing drainage to BMP	South Burlington
Drainage area (acres)	4.09			
Impervious acres managed	1.33		Primary land use in drainage	Commercial/Industrial
% Impervious	33%		2 or more landowners?	No
Land owner of BMP location	Private		CPv managed (ac-ft)	0.05
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	0.05
BMP Depth (feet)			Primary or secondary BMP?	Primary
Hydrologic soil group	A/B		Expired permit(s)?	6323-9030

Proposed BMP description:	**Feasibility concerns:**
Outfall is located west of Best Western. Site drainage area currently includes only Best Western property. Moderate erosion occurring. Concept includes stabilizing outfalls and constructing a detention basin within existing gully. Expand current drainage area to intercept runoff from the Williston Road drainage network. A portion of this drainage area could be directed to Retrofit 22 if necessary.	Good. May make economic sense to divert some or all of this area to Retrofit site #22.

Centennial Brook FRP BMP Summary Sheet					
Site name:	Case Parkway Center Island	**South Burlington ID:**	CB0004		
Approximate address:	Case Pkwy, South Burlington	**MS4 where BMP is located:**	Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Bioretention				

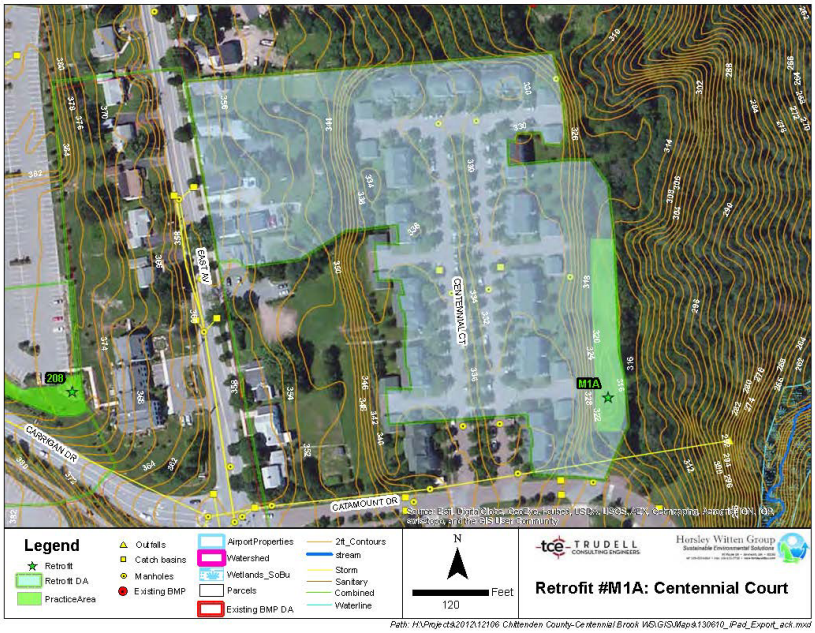


Estimated project cost	$25,000		MS4s contributing drainage to BMP	Burlington
Drainage area (acres)	0.86			
Impervious acres managed	0.23		Primary land use in drainage	Residential
% Impervious	27%		2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned		CPv managed (ac-ft)	0.04
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	0.04
BMP Depth (feet)			Primary or secondary BMP?	Secondary
Hydrologic soil group	A		Expired permit(s)?	

Proposed BMP description:	Feasibility concerns:
Proposed bioretention area in center island on Case Parkway. Direct road drainage to bioretention using a speed bump across Case Parkway. The bioretention could underdrain/overflow to existing drainage system and outfall.	Site currently is within the drainage area for the UVM North Campus Pond.

Centennial Brook FRP BMP Summary Sheet

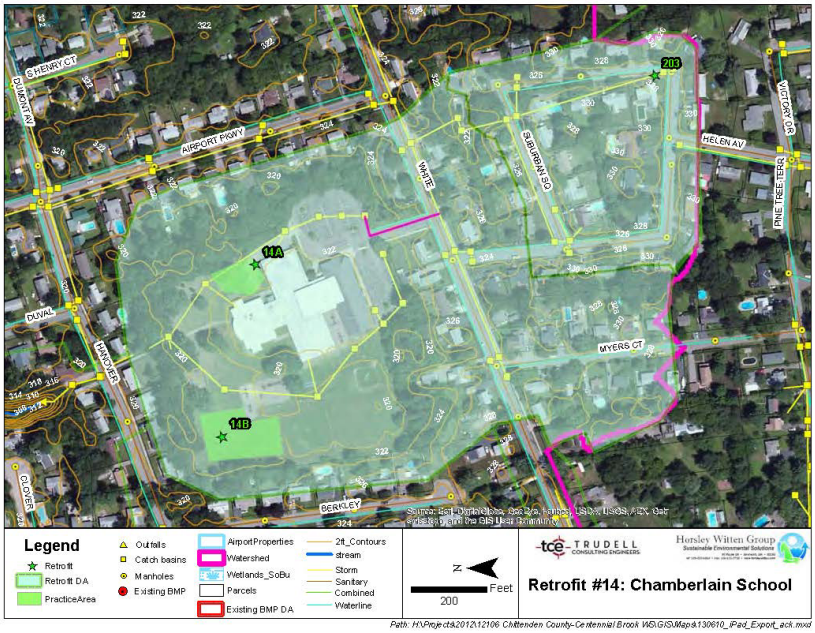
Site name:	Centennial Court Apartments Infiltration	**South Burlington ID:**	CB0005		
Approximate address:	Centennial Ct, Burlington	**MS4 where BMP is located:**	UVM	**New or existing BMP?**	Existing
Proposed BMP type:	Infiltration Basin				



Estimated project cost	$167,000		MS4s contributing drainage to BMP	Burlington, UVM
Drainage area (acres)	6.54			
Impervious acres managed	2.74		Primary land use in drainage	Residential
% Impervious	42%		2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned		CPv managed (ac-ft)	0.07
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	0.07
BMP Depth (feet)			Primary or secondary BMP?	Secondary
Hydrologic soil group	B		Expired permit(s)?	No Permit

Proposed BMP description:	**Feasibility concerns:**
Retrofit of existing dry basin to an infiltration basin. Increase contributing drainage area and add riser to outlet structure for improved flow control. Redirect road drainage from Centennial Court to basin. Site only takes runoff currently from a portion of the apartment roofs.	Very good. Must adjust existing sewer manhole located with basin. This currently discharges to the UVM East Campus Pond.

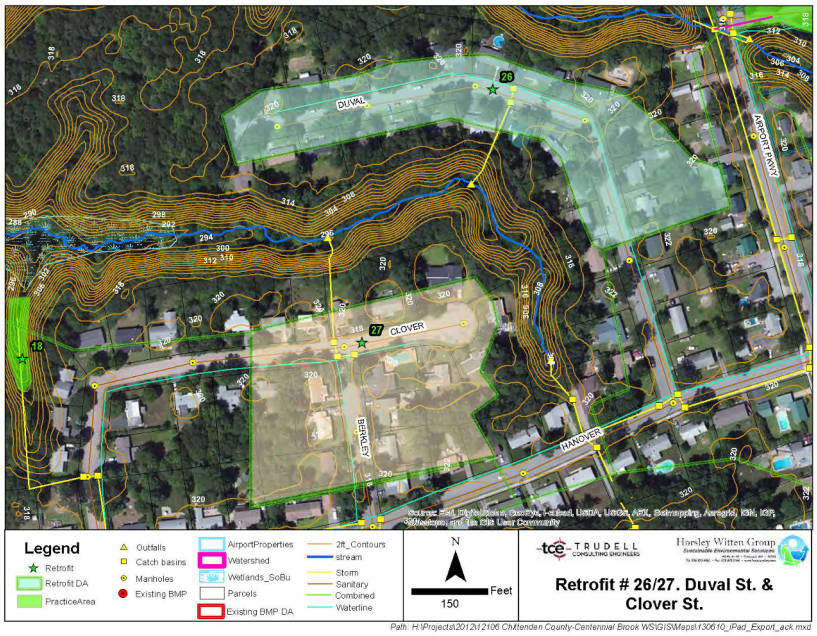
Centennial Brook FRP BMP Summary Sheet					
Site name:	Chamberlin School	**South Burlington ID:**	CB0006		
Approximate address:	South of Hanover St and west of Airport Pkwy, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Gallery				



Estimated project cost	$1,216,000		MS4s contributing drainage to BMP	South Burlington
Drainage area (acres)	31.49			
Impervious acres managed	9.69		Primary land use in drainage area	Institutional
% Impervious	31%		2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned		CPv managed (ac-ft)	1.96
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	1.96
BMP Depth (feet)			Primary or secondary BMP?	Primary
Hydrologic soil group	B/Not Rated		Expired permit(s)?	No Permit

Proposed BMP description:	Feasibility concerns:
Underground detention in open space of school property. It seems possible to collect drainage off of White Street (and upgradient residential neighborhood) and connect to existing system via school entrance. Underground chambers could be designed as infiltration pending results of soils test pitting. (note HSG – D on east side of school property; HSG – B on west side of school property).	Existing drainage system (12” cmp) drains building and parking lot. Would need to verify capacity to add addition upgradient lands – only need to be sized for 1- YR. Cpv.

Centennial Brook FRP BMP Summary Sheet					
Site name:	Clover St GSI	**South Burlington ID:**	CB0007		
Approximate address:	Clover St and Berkley St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Gallery				

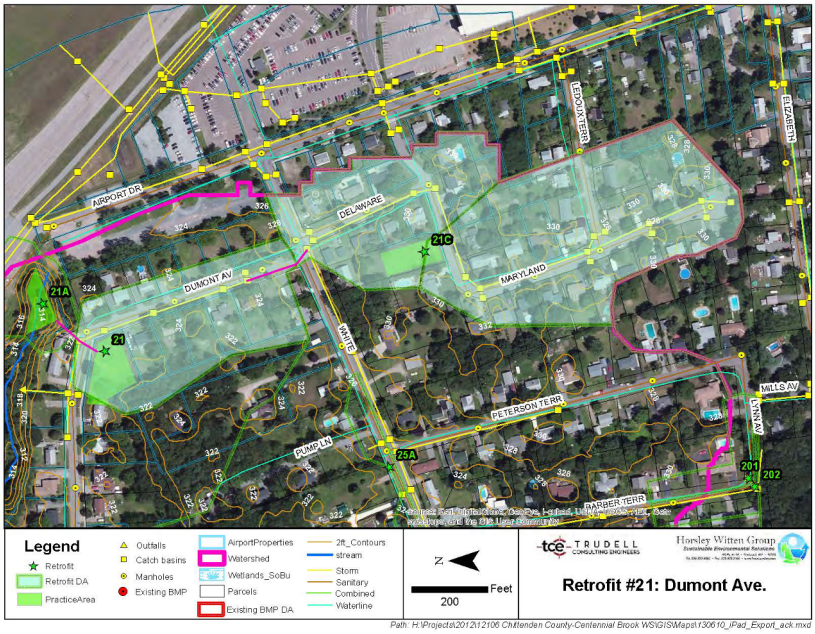


Estimated project cost	$72,000	MS4s contributing drainage to BMP	South Burlington
Drainage area (acres)	3.82		
Impervious acres managed	1.40	Primary land use in drainage area	Residential
% Impervious	37%	2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned/ Private	CPv managed (ac-ft)	0.07
BMP Footprint Size (acres)		Volume infiltrated (ac-ft)	0.07
BMP Depth (feet)		Primary or secondary BMP?	Primary
Hydrologic soil group	A	Expired permit(s)?	No Permit

Proposed BMP description:	Feasibility concerns:
30-ft wide residential streets with direct outfalls to streams, flat terrain, and good soils offer green street and neighborhood-scale disconnection opportunities (e.g., dry wells, rain gardens, pervious driveways, bump outs).	Small drainage area; requires participation by homeowners.

Centennial Brook FRP BMP Summary Sheet

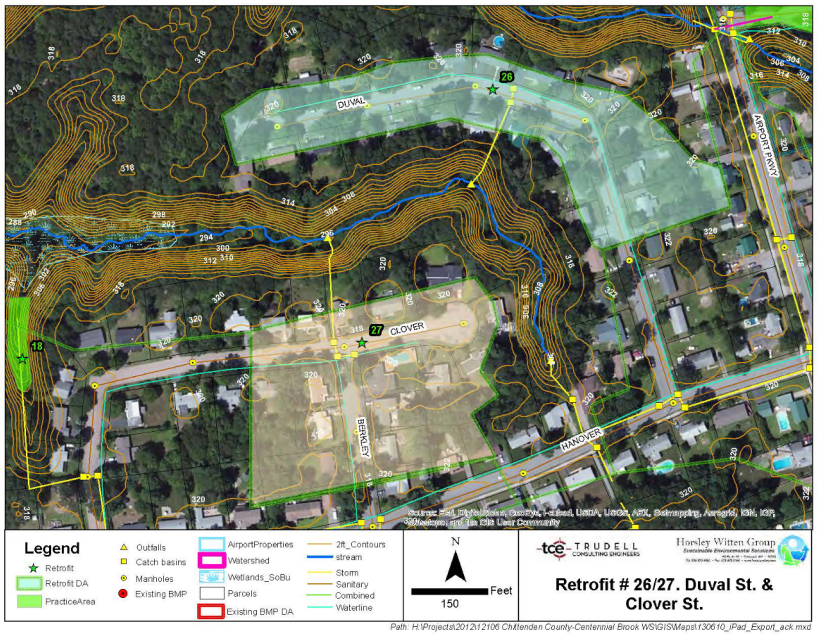
Site name:	Dumont Ave Infiltration Chambers	**South Burlington ID:**	CB0008		
Approximate address:	Dumont Ave, South Burlington	**MS4 where BMP is located:**	BTV	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Gallery				



Estimated project cost	$27,000	MS4s contributing drainage to BMP	South Burlington, BTV
Drainage area (acres)	3.93		
Impervious acres managed	0.86	Primary land use in drainage	Residential
% Impervious	22%	2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned	CPv managed (ac-ft)	0.05
BMP Footprint Size (acres)		Volume infiltrated (ac-ft)	0.05
BMP Depth (feet)		Primary or secondary BMP?	Primary
Hydrologic soil group	A	Expired permit(s)?	No Permit

Proposed BMP description:	**Feasibility concerns:**
Divert flows from existing catchbasins and convey down Dumont Ave via pipe or swale to underground recharge chambers on empty lot. Options exist for practice type, siting and conveyance mechanism depending on depth to GW, existing inverts, and future use by Airport. Discharge to existing pipe outlet at Airport basin.	Invert at White St. 321.40. Distance to vacant lot on corner – approx. 580' @ .005 slope; pipe outlets at 318.5'. Storage would be below grade. Depth to GW could be an issue and eliminate infiltration option. For above grade system inverts at White/Delaware would need to be raised. May be possible by resetting pipe inverts. Possible to create sand filter on top of UG chambers or shallow infiltration basin. Standing water not allowed due to airport proximity.

Centennial Brook FRP BMP Summary Sheet					
Site name:	Duval St GSI	**South Burlington ID:**	CB0009		
Approximate address:	Duval St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Gallery				



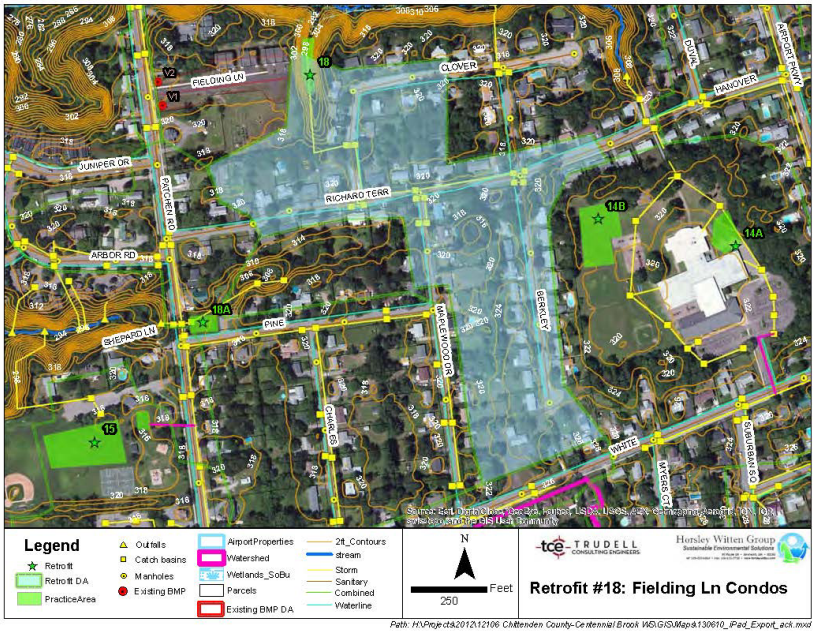
Estimated project cost	$79,000	MS4s contributing drainage to BMP	South Burlington
Drainage area (acres)	3.57		
Impervious acres managed	0.99	Primary land use in drainage area	Residential
% Impervious	28%	2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned/ Private	CPv managed (ac-ft)	0.05
BMP Footprint Size (acres)		Volume infiltrated (ac-ft)	0.05
BMP Depth (feet)		Primary or secondary BMP?	Primary
Hydrologic soil group	A	Expired permit(s)?	No Permit

Proposed BMP description:	Feasibility concerns:
30-ft wide residential streets with direct outfalls to streams, flat terrain, and good soils offer green street and neighborhood-scale disconnection opportunities (e.g., dry wells, rain gardens, pervious driveways, bump outs).	Small drainage area; requires participation by homeowners.

Centennial Brook FRP BMP Summary Sheet

Site name:	Fielding Lane Condos Infiltration Gallery	**South Burlington ID:**	CB0010

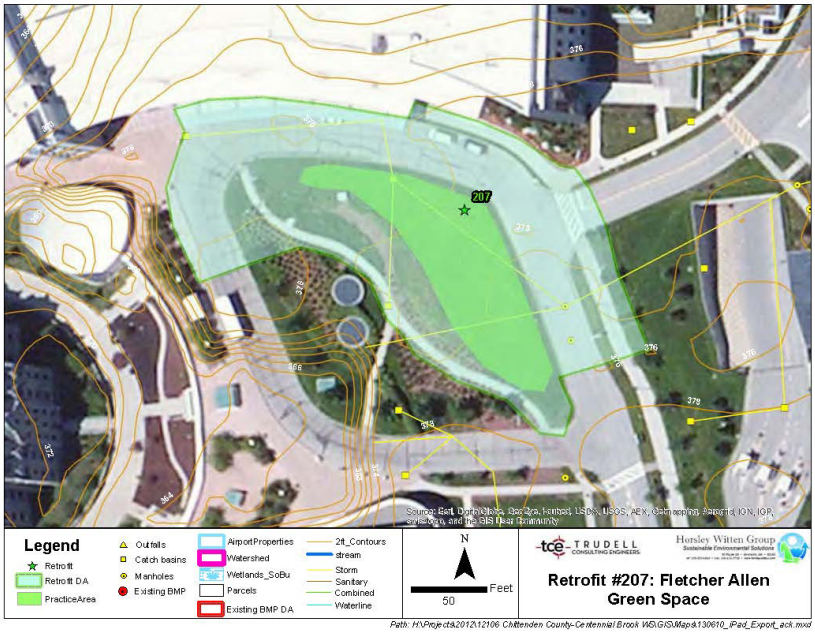
Approximate address:	Richard Terr and Clover St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Gallery				



Estimated project cost	$208,000		MS4s contributing drainage to BMP	South Burlington
Drainage area (acres)	18.74			
Impervious acres managed	5.14		Primary land use in drainage	Residential
% Impervious	27%		2 or more landowners?	Yes
Land owner of BMP location	Private		CPv managed (ac-ft)	0.15
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	0.15
BMP Depth (feet)			Primary or secondary BMP?	Primary
Hydrologic soil group	A		Expired permit(s)?	No Permit

Proposed BMP description:	**Feasibility concerns:**
Detention-retention facility. Open parcel adjacent to Fielding Lane Condos – seems to be owned by Fielding Lane Condos, existing surface storage available below outfall pipe. Would require access from Fielding Lane.	Likely private land - Major constraint is construction and maintenance access. Homeowners on Clover Street most impacted. Downgradient wetlands/stream below outfall pipe.

Centennial Brook FRP BMP Summary Sheet					
Site name:	Fletcher Allen Green Space	**South Burlington ID:**	CB0011		
Approximate address:	Carrigan Dr, Burlington	**MS4 where BMP is located:**	Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Bioretention				



Estimated project cost	$50,000		MS4s contributing drainage to BMP	Burlington, UVM
Drainage area (acres)	0.89			
Impervious acres managed	0.53		Primary land use in drainage area	Institutional
% Impervious	59%		2 or more landowners?	No
Land owner of BMP location	MS4 Owned		CPv managed (ac-ft)	0.13
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	0.13
BMP Depth (feet)			Primary or secondary BMP?	Secondary
Hydrologic soil group	Not Rated		Expired permit(s)?	

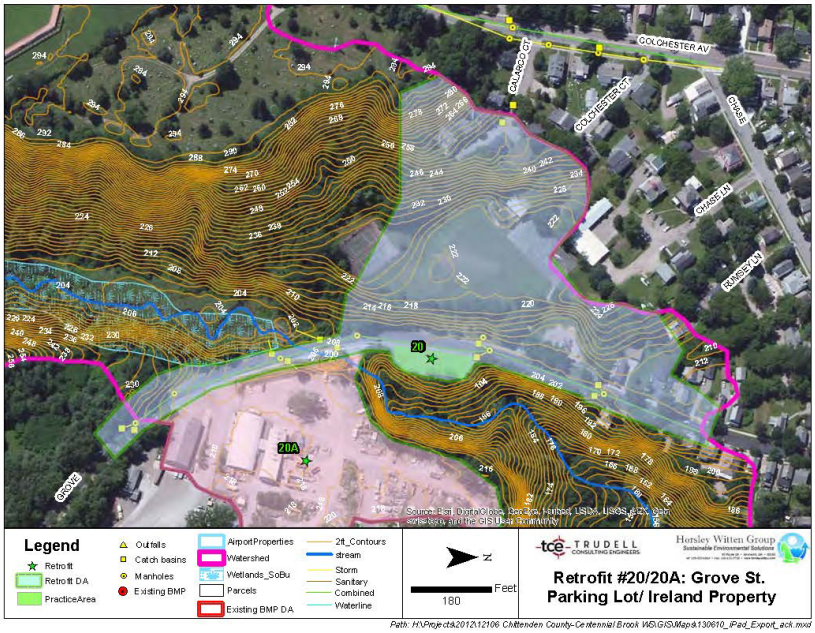
Proposed BMP description:	Feasibility concerns:
Proposed bioretention area in green space near hospital entrance. Redirect existing roadway trench drains into practice. Site currently drains to the UVM East Campus Pond.	Moderate feasibility. Trench drain outlets are shallow so daylighting is possible. Plenty of green space for practice area. High profile location.

Centennial Brook FRP BMP Summary Sheet					
Site name:	Fletcher Allen Parking Lot	**South Burlington ID:**	CB0012		
Approximate address:	Carrigan Dr, Burlington	**MS4 where BMP is located:**	Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Bioretention				

Estimated project cost	$37,000	MS4s contributing drainage to BMP	Burlington
Drainage area (acres)	0.83		
Impervious acres managed	0.61	Primary land use in drainage	Institutional
% Impervious	74%	2 or more landowners?	No
Land owner of BMP location	MS4 Owned	CPv managed (ac-ft)	0.10
BMP Footprint Size (acres)		Volume infiltrated (ac-ft)	0.10
BMP Depth (feet)		Primary or secondary BMP?	Secondary
Hydrologic soil group	D	Expired permit(s)?	

Proposed BMP description:	Feasibility concerns:
Proposed bioretention area in existing drainage feature. Site is currently managed by existing swales, curb cuts, and a drainage depression. Swales and depression are currently eroding. Raise existing catchbasin frame/grate to provide ponding for bioretention.	Easy retrofit and aesthetic improvement. Parking lot already has features necessary directing drainage to the retrofit practice location.

Centennial Brook FRP BMP Summary Sheet					
Site name:	Grove Street Parking Lot	**South Burlington ID:**	CB0013		
Approximate address:	Grove St, Burlington	**MS4 where BMP is located:**	Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Gallery				



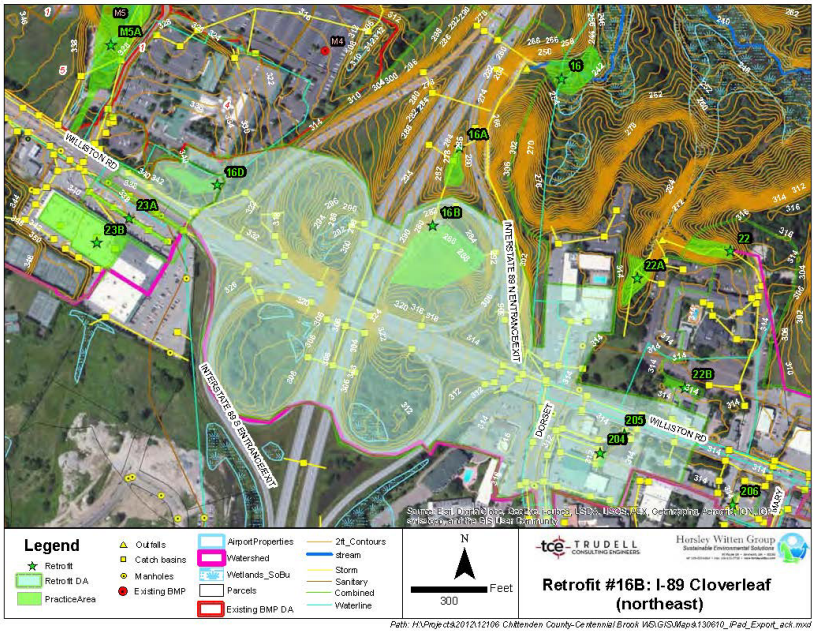
Estimated project cost	$156,000	MS4s contributing drainage to BMP	Burlington
Drainage area (acres)	8.82		
Impervious acres managed	2.33	Primary land use in drainage	Road
% Impervious	26%	2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned	CPv managed (ac-ft)	0.20
BMP Footprint Size (acres)		Volume infiltrated (ac-ft)	0.20
BMP Depth (feet)		Primary or secondary BMP?	Primary
Hydrologic soil group	B	Expired permit(s)?	1-0811

Proposed BMP description:	Feasibility concerns:
Divert existing drainage network and capture runoff from parking lot and direct to proposed underground recharge system. Low point in road drainage area is immediately south of the City parking lot. Consider replacing parking lot with permeable pavement.	High feasibility since parking lot is currently in poor condition. Adequate head to capture roadway drainage. Test pits or borings needed to confirm soils and depth to groundwater.

Centennial Brook FRP BMP Summary Sheet

Site name:	I-89 Cloverleaf Underground Detention	**South Burlington ID:**	CB0014

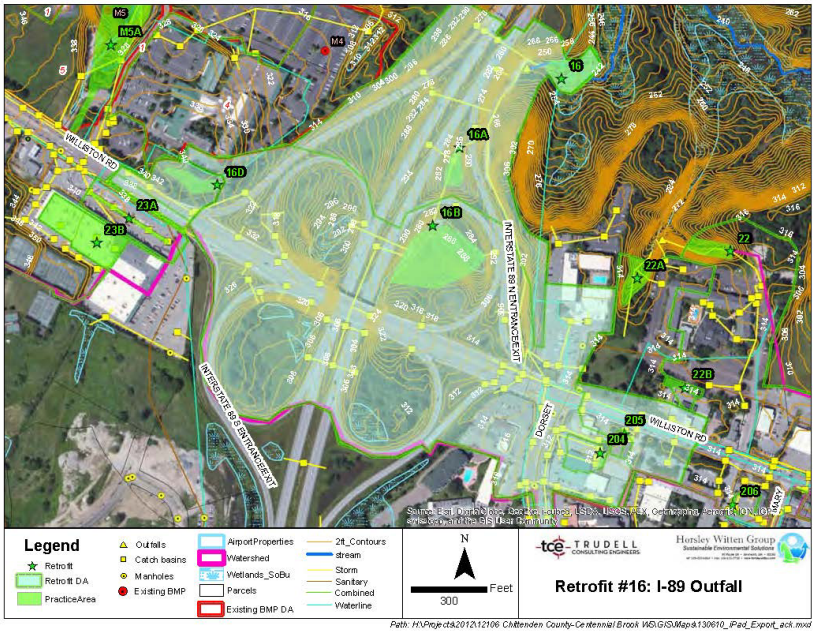
Approximate address:	I-89 Exit 14 interchange, South Burlington	**MS4 where BMP is located:**	VTrans	**New or existing BMP?**	Existing
Proposed BMP type:	Underground Detention				



Estimated project cost	$432,000		MS4s contributing drainage to BMP	South Burlington, VTrans
Drainage area (acres)	39.17			
Impervious acres managed	17.18		Primary land use in drainage	Transportation
% Impervious	44%		2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned		CPv managed (ac-ft)	2.35
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	0.00
BMP Depth (feet)			Primary or secondary BMP?	Secondary
Hydrologic soil group	Not Rated		Expired permit(s)?	2-0126; 6323-9030; 2-0610

Proposed BMP description:	**Feasibility concerns:**
Detention structure bounded by northbound lanes and off-ramp (directing traffic to westbound Williston Rd). Existing culvert drains all upgradient area from interchange and Williston Rd. Modify outlet to install new control structure for Cpv storage.	Good location for retrofit. Existing outlet pipe (48” CMP) is easily accessible. Constraints: safety considerations from highway and existing wetlands (though mapped- all areas appear to be phrag dominated and isolated). Approx 14 of grade from invert to low point on off-ramp.

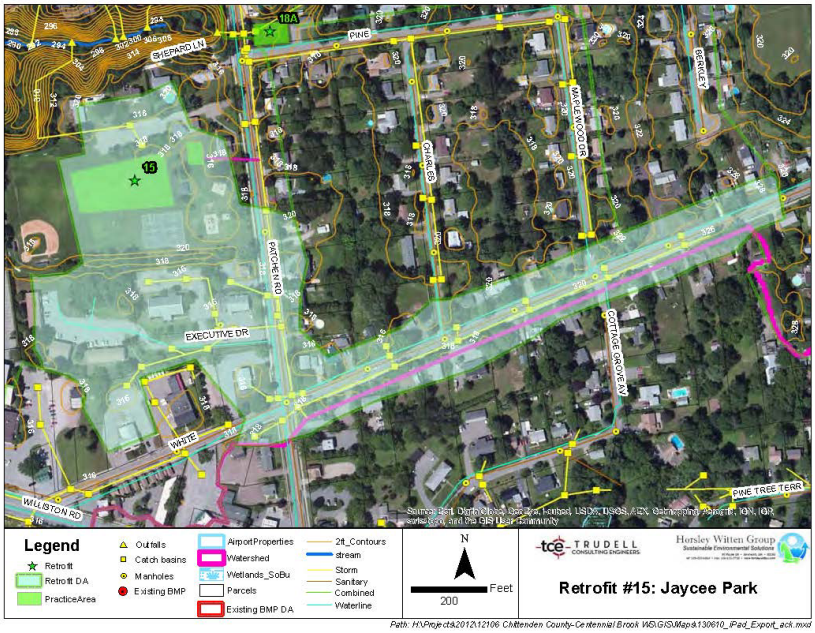
Centennial Brook FRP BMP Summary Sheet					
Site name:	I-89 Exit 14 Detention Pond	**South Burlington ID:**	CB0015		
Approximate address:	I-89 Exit 14 interchange, South Burlington	**MS4 where BMP is located:**	VTrans	**New or existing BMP?**	New
Proposed BMP type:	Detention Pond				



Estimated project cost	$1,419,000		MS4s contributing drainage to BMP	South Burlington, VTrans
Drainage area (acres)	13.07			
Impervious acres managed	3.58		Primary land use in drainage area	Highway R/W
% Impervious	27%		2 or more landowners?	No
Land owner of BMP location	Public or MS4 Owned (depending on option)		CPv managed (ac-ft)	2.87
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	0.00
BMP Depth (feet)			Primary or secondary BMP?	Primary
Hydrologic soil group	Not Rated		Expired permit(s)?	No Permit

Proposed BMP description:	Feasibility concerns:
Location flexible depending on evaluation. Most downstream location would be across from drainage outlet, below water main (best location for embankment – maximizes storage), but impact to water main R/W likely and partially on private property. Alternative is to move embankment upgradient to limit of I-89 R/W – would reduce available storage, but keep all work w/in VTrans jurisdiction.	Feasible, but constraints need to be quantified, including property ownership, wetlands impacts (see Phrag in photo), water main. Construction and maintenance access good, via water mail R/W. VTrans noted that prior rip rap work was NOT a permitting issues with COE or DEC.

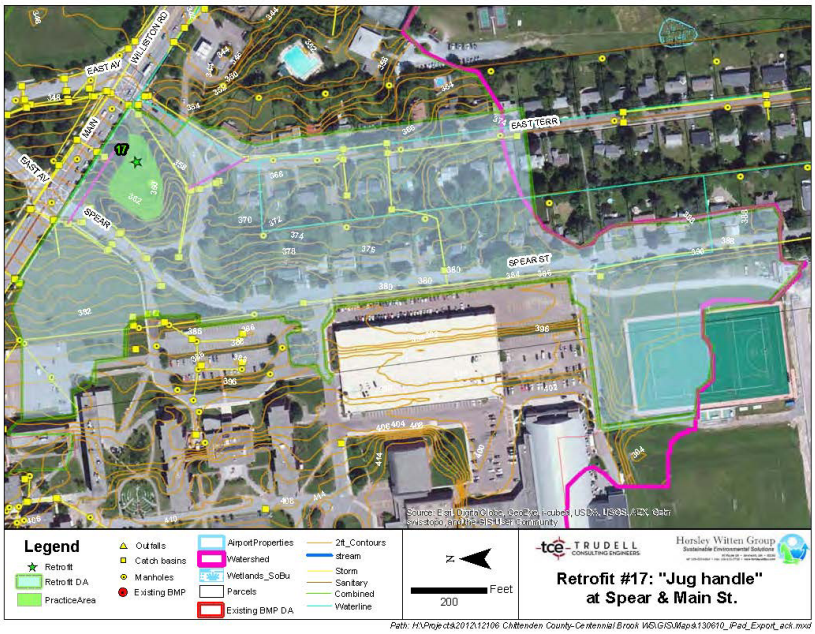
Centennial Brook FRP BMP Summary Sheet					
Site name:	Jaycee Park	**South Burlington ID:**	CB0016		
Approximate address:	Patchen Rd north of White St, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Gallery				



Estimated project cost	$418,000		MS4s contributing drainage to BMP	South Burlington
Drainage area (acres)	15.73			
Impervious acres managed	6.42		Primary land use in drainage area	Park
% Impervious	41%		2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned		CPv managed (ac-ft)	0.90
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	0.90
BMP Depth (feet)			Primary or secondary BMP?	Primary
Hydrologic soil group	A		Expired permit(s)?	No Permit

Proposed BMP description:	Feasibility concerns:
Pretreatment tank to underground infiltration chambers. Pretreatment could be proprietary device (e.g, StormCeptor or equal) before underground chambers. Access would need to be coordinated with playing fields. Flow diversion structure would be in Patchen Road, with depth to drain pipe at approx 6.5 feet.	Flow diversion from Patchen Road drives depth of inflow approx 10.5 feet below grade (bottom of chambers 12-13 feet). Existing trees in park, reconstruction of fields Soils at design depth, unknown.

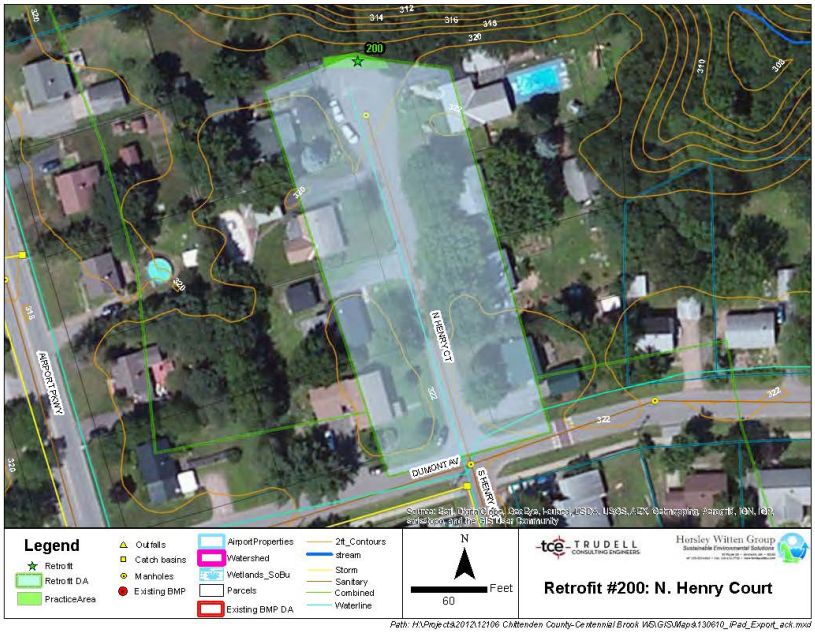
Centennial Brook FRP BMP Summary Sheet					
Site name:	Jug handle Underground Detention	**South Burlington ID:**	CB0017		
Approximate address:	East Terr and Main St, South Burlington	**MS4 where BMP is located:**	UVM	**New or existing BMP?**	New
Proposed BMP type:	Underground Detention				



Estimated project cost	$1,577,000	MS4s contributing drainage to BMP	South Burlington, UVM
Drainage area (acres)	22.01		
Impervious acres managed	8.60	Primary land use in drainage	Institutional
% Impervious	39%	2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned	CPv managed (ac-ft)	1.62
BMP Footprint Size (acres)		Volume infiltrated (ac-ft)	0.00
BMP Depth (feet)		Primary or secondary BMP?	Secondary
Hydrologic soil group	A	Expired permit(s)?	

Proposed BMP description:	Feasibility concerns:
Dry detention basin in existing green space to capture drainage from Spear Street and East Terrace. Modify existing drainage inlets to divert flows into basin. Drainage area is currently unmanaged and could be routed to Retrofit #M5A/24, alternatively. Retrofit includes the option of adding paved flumes from the roadways and risers to the outlet structures for the existing swales that run the perimeter of green space.	Land is identified by UVM for development; UVM has requested that the "jug-handle" lot be removed from the candidate list (K&L email dated 6/5/13).

Centennial Brook FRP BMP Summary Sheet					
Site name:	N Henry Court	**South Burlington ID:**	CB0018		
Approximate address:	N Henry Ct, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Gallery				

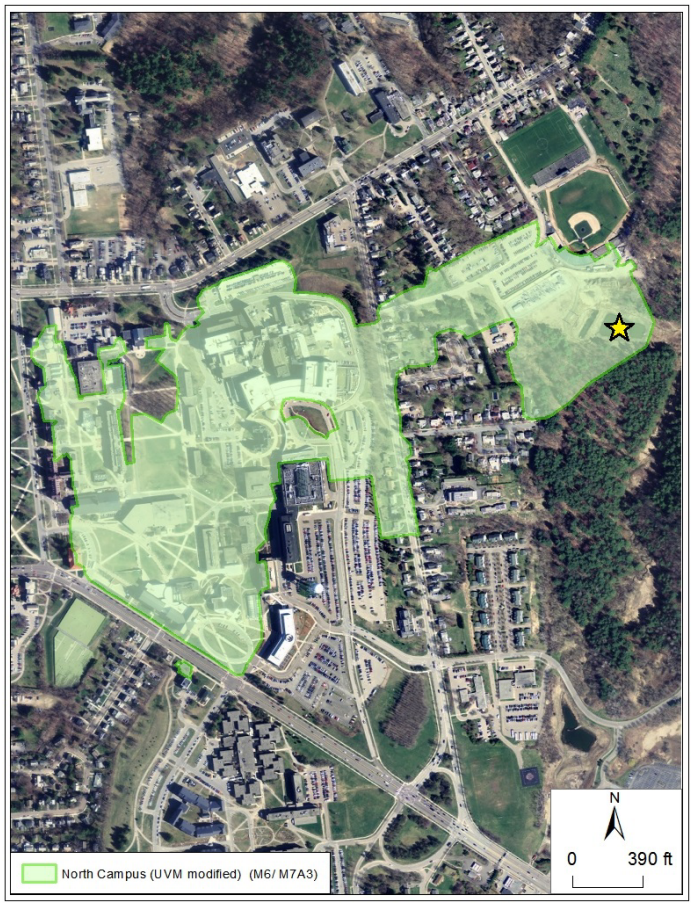


Estimated project cost	$27,000	MS4s contributing drainage to BMP	South Burlington, BTV
Drainage area (acres)	1.03		
Impervious acres managed	0.33	Primary land use in drainage	Residential
% Impervious	32%	2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned	CPv managed (ac-ft)	0.02
BMP Footprint Size (acres)		Volume infiltrated (ac-ft)	0.02
BMP Depth (feet)		Primary or secondary BMP?	Primary
Hydrologic soil group	A	Expired permit(s)?	No Permit

Proposed BMP description:	Feasibility concerns:
Dead-end road with excess impervious cover. Currently, drainage comes down the road and flows directly down a steep slope to the stream/wetland area below. Install a rain garden/bio with an overflow to a leaching catch basin at end of road. Dumping of yard waste and debris was also observed down the slope. An old corrugated discharge pipe was found down in stream.	Small project, but could be a good GI demonstration.

Centennial Brook FRP BMP Summary Sheet

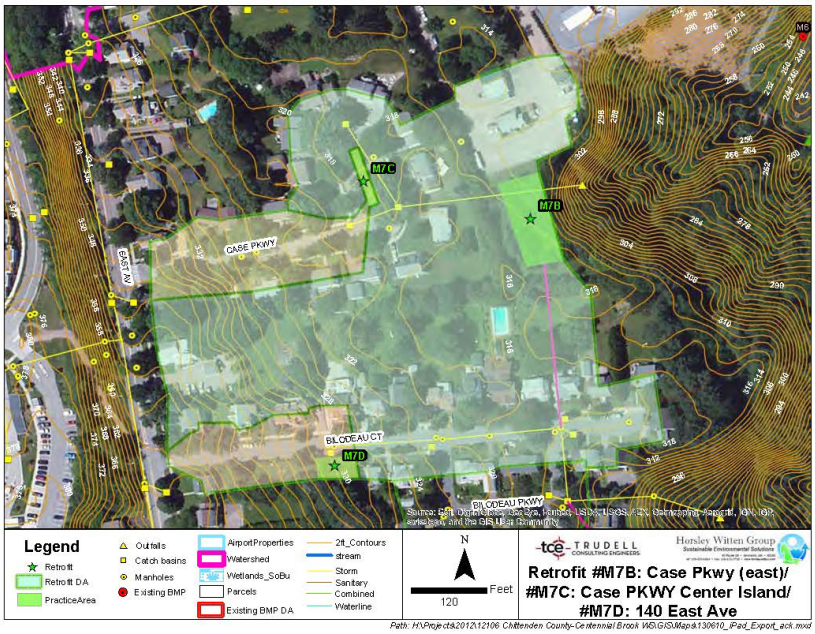
Site name:	North Campus Pond Retrofit	**South Burlington ID:**	CB0019		
Approximate address:	University Rd, Burlington	**MS4 where BMP is located:**	UVM	**New or existing BMP?**	Existing
Proposed BMP type:	Detention Pond				



Estimated project cost	$725,000	MS4s contributing drainage to BMP	Burlington, UVM
Drainage area (acres)	76.94		
Impervious acres managed	45.99	Primary land use in drainage	Institutional
% Impervious	60%	2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned	CPv managed (ac-ft)	4.72
BMP Footprint Size (acres)		Volume infiltrated (ac-ft)	0.00
BMP Depth (feet)		Primary or secondary BMP?	Primary
Hydrologic soil group	B	Expired permit(s)?	

Proposed BMP description:	**Feasibility concerns:**
Proposed expansion of existing North Campus Pond to over control existing and future development. Raise existing embankment (10’ +/-) to provide additional capacity. May consider horizontal expansion to the north and/or south.	Prior to advancing design, UVM will provide a build-out analysis of the contributing drainage area. Drainage area to be updated to reflect the additional portion of UVM that will be redirected to the North Campus Pond.

Centennial Brook FRP BMP Summary Sheet					
Site name:	Open Area East of Case Parkway	**South Burlington ID:**	CB0020		
Approximate address:	Case Pkwy, Burlington	**MS4 where BMP is located:**	Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Gallery				



Estimated project cost	$153,000		MS4s contributing drainage to BMP	Burlington, UVM
Drainage area (acres)	7.04			
Impervious acres managed	2.34		Primary land use in drainage	Institutional
% Impervious	33%		2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned		CPv managed (ac-ft)	0.27
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	0.27
BMP Depth (feet)			Primary or secondary BMP?	Secondary
Hydrologic soil group	A/B		Expired permit(s)?	

Proposed BMP description:	Feasibility concerns:
Proposed underground recharge system to capture drainage from Bilodeau Court and Case Parkway. Add additional drainage lines to direct existing drainage networks to retrofit. Drainage area could also include areas directed to Retrofit #M7C and M7D.	Site is located on UVM property so an agreement between MS4s would be needed. Site is currently partially wooded but existing trees are in poor health.

Centennial Brook FRP BMP Summary Sheet

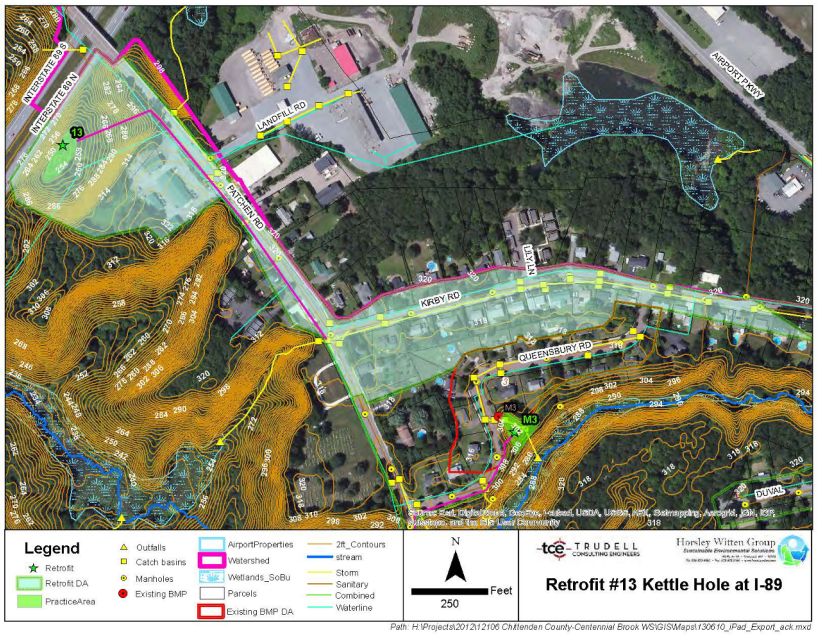
Site name:	Patchen Rd & Pine St Infiltration Gallery	**South Burlington ID:**	CB0021

Approximate address:	Pine St and Patchen Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Gallery				

Estimated project cost	$427,000		MS4s contributing drainage to BMP	South Burlington
Drainage area (acres)	20.41			
Impervious acres managed	5.40		Primary land use in drainage	Residential
% Impervious	26%		2 or more landowners?	Yes
Land owner of BMP location	Private		CPv managed (ac-ft)	0.91
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	0.91
BMP Depth (feet)			Primary or secondary BMP?	Primary
Hydrologic soil group	A		Expired permit(s)?	No Permit

Proposed BMP description:	**Feasibility concerns:**
Underground detention or infiltration (depending on soils). Diversion of flows from Patchen Road feasible, incoming pipe from open space/low point behind lots too deep to capture. Single lot also contains SF house (see photo). Would require diversion structure and pretreatment tank/structure.	Pipe inverts in Patchen Rd. feasible to divert to underground storage, except west side of road would require crossing water and sewer. Depth of construction ~8 to 10 ft. Private ownership of parcel biggest constraint.

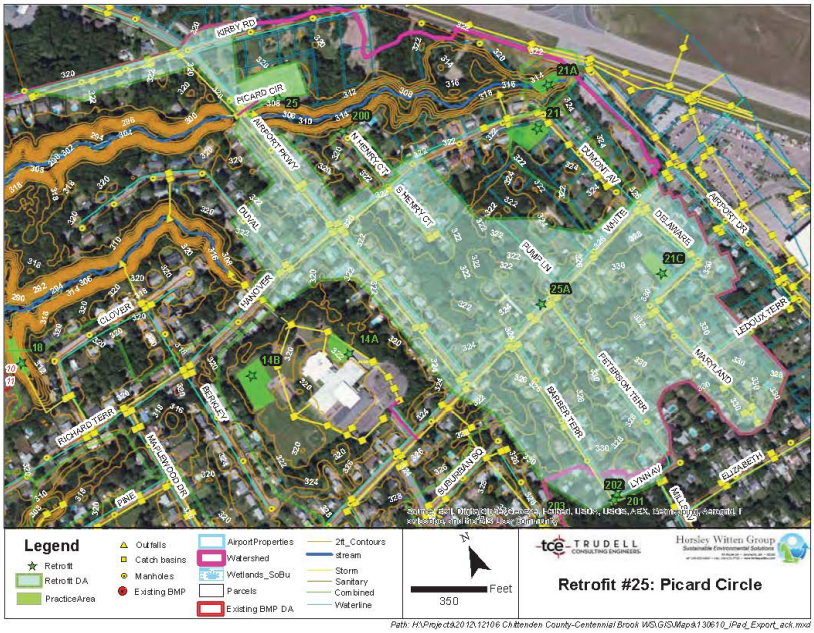
Centennial Brook FRP BMP Summary Sheet					
Site name:	Patchen Road Kettle Hole	**South Burlington ID:**	CB0022		
Approximate address:	Patchen Rd south of I-89, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Gallery				



Estimated project cost	$275,000		MS4s contributing drainage to BMP	South Burlington, VTrans
Drainage area (acres)	14.06			
Impervious acres managed	5.45		Primary land use in drainage	Forest
% Impervious	39%		2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned/ Private		CPv managed (ac-ft)	0.27
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	0.27
BMP Depth (feet)			Primary or secondary BMP?	Primary
Hydrologic soil group	A		Expired permit(s)?	6292-9030

Proposed BMP description:	Feasibility concerns:
Detention Pond (or infiltration basin if soils are acceptable). Directly convey runoff from contributing area off Patchen Road down slope to sediment forebay. Modify existing 30" culvert headwall (under I-89) to achieve required flow control. Could pick up Kirby Rd.	Good site; final feasibility will require verification of wetland limits (soils generally upland), assessment of impacts to existing water main (runs through parcel, see blow-off valve in photo), and coordination with VTrans for ponding against I-89 R/W.

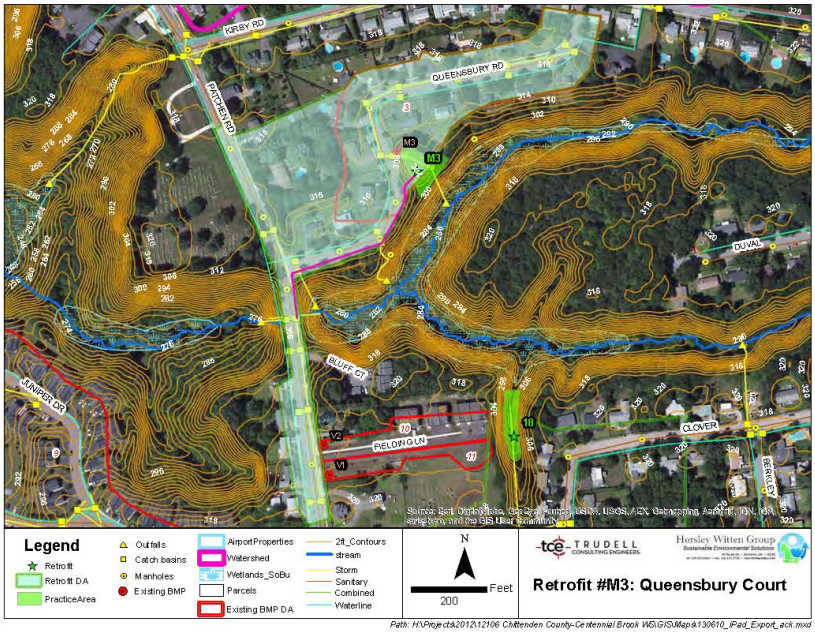
Centennial Brook FRP BMP Summary Sheet					
Site name:	Picard Circle Infiltration	**South Burlington ID:**	CB0023		
Approximate address:	Picard Cir, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Gallery				



Estimated project cost	$318,000		MS4s contributing drainage to BMP	South Burlington, BTV
Drainage area (acres)	51.85			
Impervious acres managed	15.84		Primary land use in drainage area	Residential
% Impervious	31%		2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned		CPv managed (ac-ft)	0.68
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	0.68
BMP Depth (feet)			Primary or secondary BMP?	Primary
Hydrologic soil group	A		Expired permit(s)?	No Permit

Proposed BMP description:	Feasibility concerns:
Subsurface infiltration system. All houses within Picard Circle have been purchased by Airport and are now abandoned. Significant site area exists within yards and the road for major underground infiltration/ detention system. Constraints include depth of existing drainage pipe and depth above groundwater (adjacent brook approx 14 feet below existing ground).	Depth of existing drainage line in Airport Pkwy may preclude piping from existing infrastructure to new system. One option would be to install diversion structure and partially submerge existing piping system.

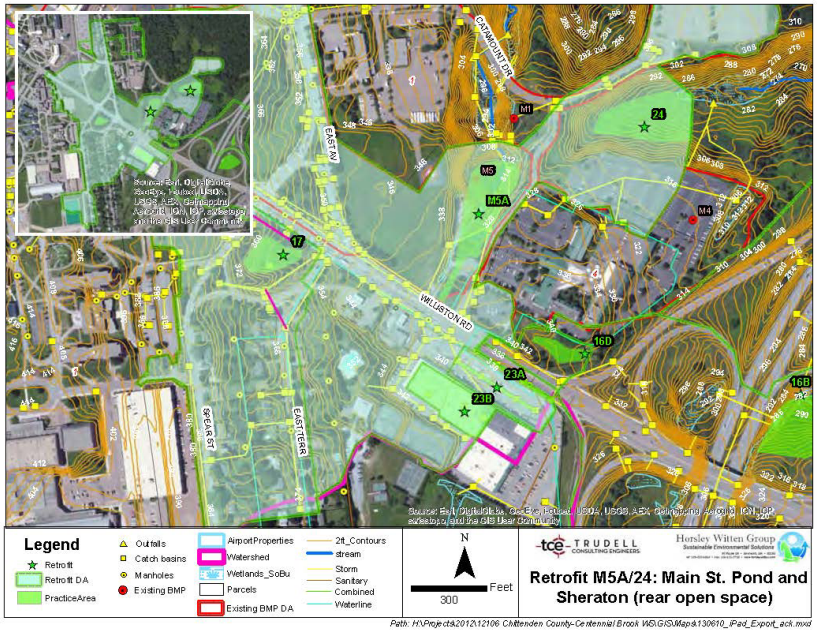
Centennial Brook FRP BMP Summary Sheet					
Site name:	Queensbury Pond Retrofit	**South Burlington ID:**	CB0024		
Approximate address:	Queensbury Rd, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	Existing
Proposed BMP type:	Infiltration Basin				



Estimated project cost	$110,000		MS4s contributing drainage to BMP	South Burlington
Drainage area (acres)	7.60			
Impervious acres managed	2.88		Primary land use in drainage area	Residential
% Impervious	38%		2 or more landowners?	Yes
Land owner of BMP location	Private		CPv managed (ac-ft)	0.16
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	0.16
BMP Depth (feet)			Primary or secondary BMP?	Primary
Hydrologic soil group	A		Expired permit(s)?	1-0946

Proposed BMP description:	Feasibility concerns:
Existing dry detention pond. Modify outlet to create an infiltration basin. Existing pond might predate subdivision (newer PVC outlet connects to older CMP barrel). Facility appears to have additional storage capacity to expand drainage area (level run confirmed this is feasible).	Old CMP barrel, new 15" PVC outlet, sink hole evidence – top of existing embankment, scour hole at barrel outlet, Incoming 15" HDPE, eroded inflow channel

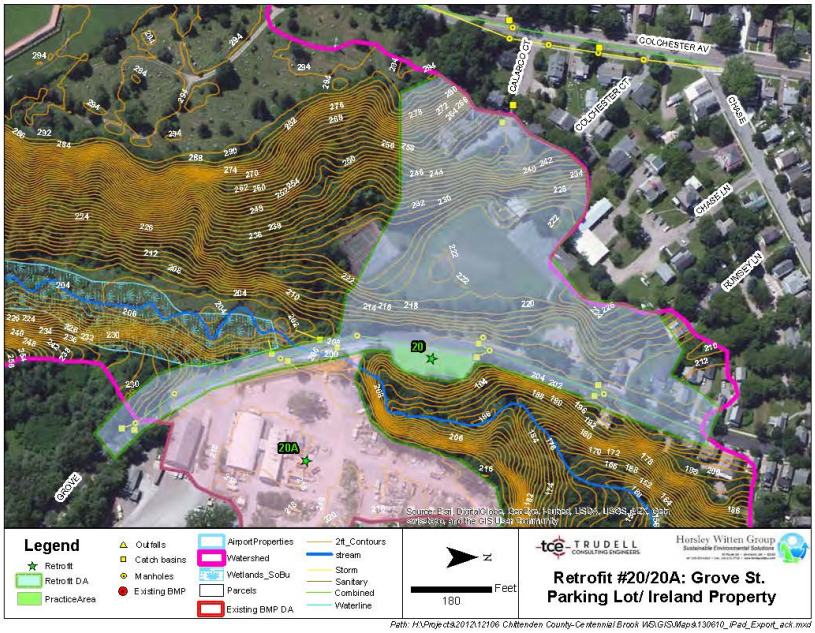
Centennial Brook FRP BMP Summary Sheet					
Site name:	Retrofit of Main Street UVM Pond	**South Burlington ID:**	CB0025		
Approximate address:	North of Williston Rd and East Terr, South Burlington	**MS4 where BMP is located:**	UVM	**New or existing BMP?**	Existing
Proposed BMP type:	Detention Pond				



Estimated project cost	$566,000		MS4s contributing drainage to BMP	South Burlington, Burlington, UVM
Drainage area (acres)	39.64			
Impervious acres managed	17.51		Primary land use in drainage	Institutional
% Impervious	44%		2 or more landowners?	Yes
Land owner of BMP location	MS4 Owned		CPv managed (ac-ft)	3.89
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	0.00
BMP Depth (feet)			Primary or secondary BMP?	Primary
Hydrologic soil group	C		Expired permit(s)?	

Proposed BMP description:	Feasibility concerns:
Repair outlet structure. Retrofit options include expanding the pond southward toward Williston Road or eastward as part of Retrofit #24 for additional storage, extended detention, and improved water quality. Site has the ability to capture drainage from Williston Road, adjacent commercial properties, and unmanaged UVM land.	Priority location with high feasibility. Additional storage volume can be added by excavating southward toward the adjacent dirt parking lot and Williston Road.

Centennial Brook FRP BMP Summary Sheet					
Site name:	SD Ireland Property (20A)	**South Burlington ID:**	CB0026		
Approximate address:	Grove St, Burlington	**MS4 where BMP is located:**	Burlington	**New or existing BMP?**	New
Proposed BMP type:	Infiltration Gallery				



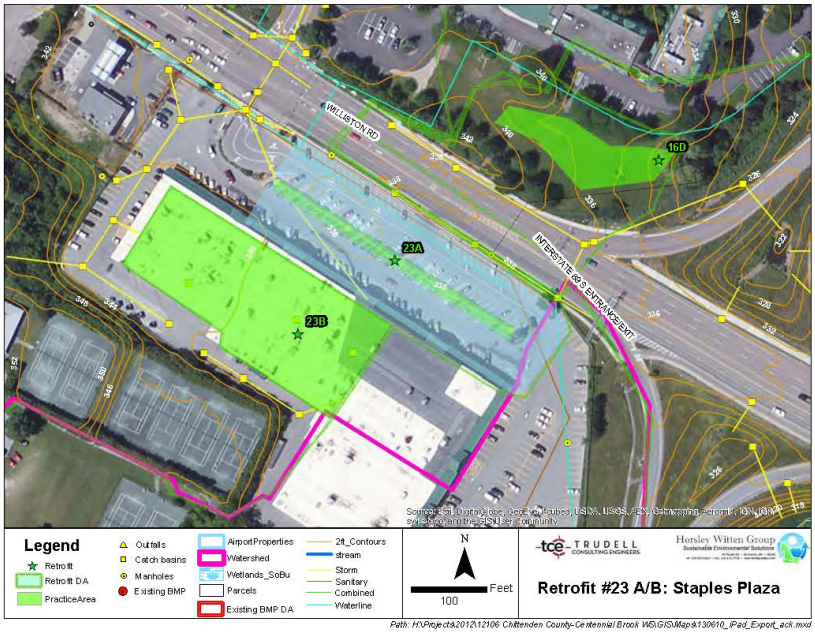
Estimated project cost	$558,000	MS4s contributing drainage to BMP	Burlington
Drainage area (acres)	4.66		
Impervious acres managed	3.47	Primary land use in drainage	Commercial/Industrial
% Impervious	74%	2 or more landowners?	No
Land owner of BMP location	Private	CPv managed (ac-ft)	0.61
BMP Footprint Size (acres)		Volume infiltrated (ac-ft)	0.61
BMP Depth (feet)		Primary or secondary BMP?	Primary
Hydrologic soil group	Not Rated	Expired permit(s)?	

Proposed BMP description:	Feasibility concerns:
SD Ireland proposed redevelopment to a housing complex. Site will reportedly be required to manage runoff on-site. Site currently drains to city drainage system in Grove St. Plans should address severe bank erosion at Centennial Brook culvert under SD Ireland driveway.	Centennial Brook runs between property and Grove St.

Centennial Brook FRP BMP Summary Sheet

Site name:	Staples Plaza Underground Detention A	**South Burlington ID:**	CB0027

Approximate address:	West of I-89 Exit 14 interchange, South Burlington	**MS4 where BMP is located:**	South Burlington	**New or existing BMP?**	New
Proposed BMP type:	Underground Detention				



Estimated project cost	$334,000		MS4s contributing drainage to BMP	South Burlington
Drainage area (acres)	2.50			
Impervious acres managed	2.50		Primary land use in drainage	Commercial/Industrial
% Impervious	100%		2 or more landowners?	No
Land owner of BMP location	Private		CPv managed (ac-ft)	0.26
BMP Footprint Size (acres)			Volume infiltrated (ac-ft)	0.00
BMP Depth (feet)			Primary or secondary BMP?	Secondary
Hydrologic soil group	Not Rated		Expired permit(s)?	No Permit

Proposed BMP description:	**Feasibility concerns:**
Convert landscaped island to bioswale w/ UG storage to manage parking and small roof. Overflow to existing drain. Add trees for cover, shading, interception. Reduce width of one-way aisle for bioswale. Flat roof drains internally, discharges to drain inlet east of building. Modify internal roof drains, install trays, or use other blue roof design to provide temporary detention.	This area could be managed in a larger retrofit downstream (Site # 24_M5). Primary outlet in catchbasin at lot entrance/exit. Rim to invert = 5.05'. Stalls are 18'x8', with a 27' drive aisle (60' and 57' curb to curb on the north and south side of island, respectively).

APPENDIX D

PROJECT RANKING

Centennial Brook Flow Restoration Plan
Table D-1: BMP Ranking Criteria Key

Category	ID	Criteria	Technical Description	Description
Cost/Operations	A	Project Cost	The project costs were grouped into categories from >$50,000 to $1,000,000 based on the range of projects proposed. Cost estimates were developed using the latest unit costs from VTrans as well as local experience. More expensive projects are ranked lower.	Project Costs include additional engineering, permitting, and construction. Transportation and utility conflicts, as well as overall constructability is also reflected in the cost.
Project Design Metrics	B	Impervious Acres Managed (ac)	Natural groupings within the range of impervious managed for the proposed projects were identified. More impervious managed receives a higher score.	The more impervious managed by a project, the higher the potential pollutant reduction. Additionally, the goal of the FRP is to manage existing impervious surfaces.
	C	Channel Protection Volume (CPv) Mitigated, (i.e.. 1-year Storm)	Groupings within the range of CPv volume storage were identified. The largest grouping receives the highest score. The CPv was estimated in HydroCAD, using local rainfall data.	The Channel Protection Volume (CPv) is the volume of stormwater runoff generated from the 1-year design storm (1.98" in Burlington). A BMP which provides CPv storage was determined to reduce the High-flow (Q0.3%), which is the flow rate exceeded 0.3% of the time (output from the State's BMPDSS model). Mitigating the CPv reduces channel erosion and excessive
	D	Volume Infiltrated (ac-ft)	Natural groupings within the range of volumes infiltrated for the BMPs were identified to which relative points were be assigned. The largest volume infiltrated was assigned the highest score. Volumes were calculated in HydroCAD.	The Volume Infiltrated indicates the amount of stormwater runoff that is infiltrated into the groundwater, and provides baseflow for the stream. The TMDL flow targets include a low-flow target, which is addressed by an infiltration-based BMP.
Project Implementation	E	Permitabilty	Permitabilty is simplified into two categories to reflect the common scenarios in permitting, as 1) minimal permitting, versus 2) Complex permitting issues. An itemized list of permits was included to inform the ranking, but was not used in the scoring.	Permitabilty is a measure of the expected level of effort to permit the project, based on knowledge that each type of permit takes varying amounts of time. Some common permits include Stormwater Construction, Local Zoning, Act 250 amendments, VTRANS ROW, etc.
	F	Land Availability	Public land is preferred, followed by regulated private land, and private land where the owners are known to be open to participate. Private land, in which participation of the owner is unknown is lower priority.	Land availability is critical for BMPs requiring open space for detention and access for the City. Properties owned by the City are ranked the highest, followed by privately owned land that has an expired permit, which provides leverage for owner participation.
Other Project Benefits	G	Flood Mitigation	Flood mitigation is categorized by the scale of the impact.	Flood mitigation is categorized by the scale of the impact. A neighborhood flooding issue is weighed more heavily than a localized drainage issue.
	H	TMDL Flow Target Addressed (Q03, Q95)	More weight is on BMPs that address both TMDL targets- the high-flow (Q0.3%) and low-flow targets (Q95%). The high-flow target is addressed by detention BMPs which storage the CP volume.	The goal of the FRP is to implement projects which address the TMDL flow targets. The high-flow target is measured as a **reduction** in the stream flow rate exceeded 0.3% of the time, while the low-flow target is an **increase** in the stream flow rate exceeded 95% of the time (baseflow). Projects which address both targets through storage or infiltration of the 1-year design storm are weighted the highest, followed by projects which address just the high-flow. Projects which do not address the full 1-year storm volume are weighted the lowest.
	I	Lake Champlain Phosphorus TMDL	Yes or no whether the proposed practice will provide benefit toward the Lake Champlain Phosphorus TMDL. This will be determined once the TMDL compliance metrics are released.	The Lake Champlain Phosphorus TMDL has been developed in the effort to reduce nutrient loading and consequential toxic algal blooms in Lake Champlain. The TMDL will require stormwater BMPs to meet a certain level of Total Phosphorus reduction. Each BMP will be evaluated against the TMDL compliance metrics, and scored yes or no if the project meets the TMDL standards.
	J	Other Project Benefits/Constraints	This criteria is to account for indirect project benefits like infrastructure improvements (e.g. aging culvert replacement, wetlands enhancement, and if it addresses an expired permit), or potential constraints (e.g. utility issues encountered during construction).	This criteria is to account for indirect project benefits like infrastructure improvements, community benefits, habitat creation, etc., as well as things that might constrain the project such as the potential of encountering utilities during construction.

Centennial Brook Flow Restoration Plan
Table D-2: BMP Ranking Scoring Key

Category	ID	Criteria	Quality	Score
Cost/Operations	A	Relative Project Cost	$1.00 - $24,999	4
			$25,000 - $49,999	3
			$49,999 - $99,999	2
			$100,000 - $199,999	1
			$200,000 - $499,999	0
			$500,000 +	-1
Project Design Metrics	B	Impervious Acres Managed (ac)	>10 acres	6
			>5-10 acres	5
			>4-5 acres	4
			>2-4 acres	3
			>1-2 acres	2
			< 1 acre	1
			0 acres	0
	C	Channel Protection Volume (CPv) Mitigated, (ie. 1-year Storm)	0.6-1.0 ac-ft	5
			0.4-0.6 ac-ft	4
			0.2-0.4 ac-ft	3
			0.05-0.2 ac-ft	2
			>0-0.05 ac-ft	1
			0 ac-ft	0
	D	Volume Infiltrated (ac-ft)	>2 ac-ft	5
			1 - 2 ac-ft	4
			0.5-1 ac-ft	3
			0.1- 0.5 ac-ft	2
			>0.01 - 0.1 ac-ft	1
			no infiltration	0
Project Implementation	E	Permitabilty	Minimal Issues/Concerns or no permits	2
			Complex issues/Potential permit denial	0
	F	Land Availability	MS4 owned	4
			Non MS4 owned regulated (expire permit)	3
			Non MS4 owned/Participatory Owner	2
			Unknown	0
			Not MS4 owned/Non participatory owner	-2
Other Project Benefits	G	Flood Mitigation (Is existing flooding issue mitigated by project?)	Neighborhood Wide Flooding Issue	3
			Infrastructure damage (e.g. Wet Basement)	2
			Nuisance Issue (ie. ponding, puddles, etc).	1
			None	0
	H	TMDL Flow Target Addressed (Q03, Q95)	High and Low Flow Targets	3
			High Flow Target	2
			No target addressed in BMPDSS (just WQ treatment)	1
	I	Lake Champlain Phosphorus TMDL	Addressed TMDL	1
			Does not address TMDL	0
	J	Other Project Benefits	Infrastructure Improvement (e.g. Culvert Replacement)	1
			Educational/Functional Benefit	1
			Recreational Benefit	1
			Natural Habitat Creation/Protection	1
			Outfall Erosion Control	1
			Utility Issues/Uncertainty	-1

APPENDIX E

PROPOSED COST ESTIMATES, PRIORITIZATION RANKING, AND IMPLEMENTATION SCHEDULE

Centennial Brook Flow Restoration Plan
Table E-1: Project Cost Estimates

BMP ID	Project Name	Retrofit Description	Impervious Area Mangaged (acres)	Design Control Volume (ft3)	Base Unit Cost ($/cu.ft.)	Site Adjust Factor	Site Specific Cost	Base Constr. Cost	Permits & Eng.	Land Cost	Summed Project Cost	Minimum Project Cost	Final Project Cost	Cost/ Imp. Acre	O&M
CB0001	140 East Ave Residence	Bio	0.18	1,800	$10	1.5	$0	$27,000	$10,000	$7,200	$44,200	$25,000	$44,200	$249,000	$1,300
CB0002	Best Western Windjammer Infiltration Basin A	IB	21.82	181,000	$4	0.5	$50,000	$412,000	$145,000	$0	$557,000	$25,000	$557,000	$26,000	$10,000
CB0003	Best Western Windjammer Infiltration Basin B	IB	1.33	30,000	$4	0.5	$0	$60,000	$21,000	$0	$81,000	$25,000	$81,000	$61,000	$2,400
CB0004	Case Parkway Center Island	Bio	0.23	1,000	$10	1.5	$0	$15,000	$6,000	$0	$21,000	$25,000	$25,000	$110,000	$800
CB0005	Centennial Court Apartments Infiltration	IB	2.74	30,800	$4	1	$0	$123,200	$44,000	$0	$167,200	$25,000	$167,200	$61,000	$5,000
CB0006	Chamberlin School	IG	9.69	60,473	$12	1.5	$0	$1,088,514	$127,000	$0	$1,215,514	$25,000	$1,215,514	$125,000	$10,000
CB0007	Clover St GSI	IG	1.40	1,700	$12	1.5	$0	$30,600	$11,000	$30,000	$71,600	$25,000	$71,600	$51,000	$2,100
CB0008	Dumont Ave Infiltration Chambers	IG	0.86	1,100	$12	1.5	$0	$19,800	$7,000	$0	$26,800	$25,000	$26,800	$31,000	$800
CB0009	Duval St GSI	IG	0.99	1,100	$22	1.5	$0	$36,300	$13,000	$30,000	$79,300	$25,000	$79,300	$80,000	$2,400
CB0010	Fielding Lane Condos Infiltration Gallery	IG	5.14	21,700	$4	1	$0	$86,800	$31,000	$90,000	$207,800	$25,000	$207,800	$40,000	$6,200
CB0011	Fletcher Allen Green Space	Bio	0.53	3,700	$10	1	$0	$37,000	$13,000	$0	$50,000	$25,000	$50,000	$94,000	$1,500
CB0012	Fletcher Allen Parking Lot	Bio	0.61	2,700	$10	1	$0	$27,000	$10,000	$0	$37,000	$25,000	$37,000	$60,000	$1,100
CB0013	Grove Street Parking Lot	IG	2.33	4,800	$12	2	$0	$115,200	$41,000	$0	$156,200	$25,000	$156,200	$67,000	$4,700
CB0014	I-89 Cloverleaf Underground Detention	UD	17.18	320,000	$2	0.5	$0	$320,000	$112,000	$0	$432,000	$25,000	$432,000	$25,000	$10,000
CB0015	I-89 Exit 14 Detention Pond	DP	3.58	566,000	$2	1	$0	$1,132,000	$227,000	$60,000	$1,419,000	$25,000	$1,419,000	$397,000	$10,000
CB0016	Jaycee Park	IG	6.42	19,211	$12	1.5	$0	$345,798	$72,000	$0	$417,798	$25,000	$417,798	$65,000	$10,000
CB0017	Jug handle Underground Detention	UD	8.60	73,000	$12	1.5	$0	$1,314,000	$263,000	$0	$1,577,000	$25,000	$1,577,000	$183,000	$10,000
CB0018	N Henry Court	IG	0.33	600	$22	1.5	$0	$19,800	$7,000	$0	$26,800	$25,000	$26,800	$82,000	$800
CB0019	North Campus Pond Retrofit	DP	45.99	1,008,000	$2	0.25	$100,000	$604,000	$121,000	$0	$725,000	$25,000	$725,000	$16,000	$10,000
CB0020	Open Area East of Case Parkway	IG	2.34	6,300	$12	1.5	$0	$113,400	$40,000	$0	$153,400	$25,000	$153,400	$65,000	$4,600
CB0021	Patchen Rd & Pine St Infiltration Gallery	IG	5.40	8,600	$12	1.5	$0	$353,970	$55,000	$18,000	$426,970	$25,000	$426,970	$79,000	$10,000
CB0022	Patchen Road Kettle Hole	IG	5.45	66,800	$4	0.25	$25,000	$91,800	$33,000	$150,000	$274,800	$25,000	$274,800	$50,000	$8,200
CB0023	Picard Circle Infiltration	IG	15.84	14,700	$12	1.5	$0	$264,600	$53,000	$0	$317,600	$25,000	$317,600	$20,000	$9,500
CB0024	Queensbury Pond Retrofit	IB	2.88	26,700	$4	0.25	$25,000	$51,700	$19,000	$39,600	$110,300	$25,000	$110,300	$38,000	$3,300
CB0025	Main Street UVM Pond	DP	17.51	370,900	$2	0.5	$100,000	$470,900	$95,000	$0	$565,900	$25,000	$565,900	$32,000	$10,000
CB0026	SD Ireland Property (20A)	IG	3.47	28,700	$12	1.5	$0	$516,600	$41,000	$0	$557,600	$25,000	$557,600	$161,000	$10,000
CB0027	Staples Plaza Underground Detention A	UD	2.50	11,600	$12	2	$0	$278,400	$56,000	$0	$334,400	$25,000	$334,400	$134,000	$10,000

Centennial Brook Flow Restoration Plan
Table E-2: Centennial Brook Watershed BMP Project Scoring

Project ID	Project Name	Expired Permit	MS4	BMP Type	Project Cost Estimate	BMP Description	Total Score
CB0023	Picard Circle Infiltration	No Permit	South Burlington	IG	$318,000	Subsurface infiltration system. All houses within Picard Circle have been purchased by Airport and are now abandoned. Significant site area exists within yards and the road for major underground infiltration/ detention system. Constraints include depth of existing drainage pipe and depth above groundwater (adjacent brook approx 14 feet below existing ground).	27
CB0002	Best Western Windjammer Infiltration Basin A	6323-9030	South Burlington	IB	$557,000	Site drainage area currently includes only Best Western property. Outfall is severely eroded and is headcutting to the east and may soon reach paved access road. Concept includes stabilizing outfall and constructing a detention basin within existing gully. Expand current drainage area to intercept runoff from Williston Road drainage network and redirect drainage from abutting commercial properties.	27
CB0025	Retrofit of Main Street UVM Pond		UVM	DP	$566,000	Repair outlet structure. Retrofit options include expanding the pond southward toward Williston Road or eastward as part of Retrofit #24 for additional storage, extended detention, and improved water quality. Site has the ability to capture drainage from Williston Road, adjacent commercial properties, and unmanaged UVM land.	24
CB0016	Jaycee Park	No Permit	South Burlington	IG	$418,000	Pretreatment tank to underground infiltration chambers. Pretreatment could be proprietary device (e.g, StormCeptor or equal) before underground chambers. Access would need to be coordinated with playing fields. Flow diversion structure would be in Patchen Road, with depth to drain pipe at approx 6.5 feet.	24
CB0019	North Campus Pond Retrofit		UVM	DP	$1,216,000	Proposed expansion of existing North Campus Pond to over control existing and future development. Raise existing embankment (10' +/-) to provide additional capacity. May consider horizontal expansion to the north and/or south.	23
CB0006	Chamberlin School	No Permit	South Burlington	IG	$725,000	Underground detention in open space of school property. It seems possible to collect drainage off of White Street (and upgradient residential neighborhood) and connect to existing system via school entrance. Underground chambers could be designed as infiltration pending results of soils test pitting. (note HSG – D on east side of school property; HSG – B on west side of school property).	22
CB0014	I-89 Cloverleaf Underground Detention	2-0126; 6323-9030; 2-0619	VTrans	UD	$432,000	Detention structure bounded by northbound lanes and off-ramp (directing traffic to westbound Williston Rd). Existing culvert drains all upgradient area from interchange and Williston Rd. Modify outlet to install new control structure for Cpv storage.	21
CB0024	Queensbury Pond Retrofit	1-0946	South Burlington	IB	$110,000	Existing dry detention pond. Modify outlet to create an infiltration basin. Existing pond might predate subdivision (newer PVC outlet connects to older CMP barrel). Facility appears to have additional storage capacity to expand drainage area (level run confirmed this is feasible).	20
CB0020	Open Area East of Case Parkway		Burlington	IG	$153,000	Proposed underground recharge system to capture drainage from Bilodeau Court and Case Parkway. Add additional drainage lines to direct existing drainage networks to retrofit. Drainage area could also include areas directed to Retrofit #M7C and M7D.	20
CB0013	Grove Street Parking Lot	1-0811	Burlington	IG	$156,000	Divert existing drainage network and capture runoff from parking lot and direct to proposed underground recharge system. Low point in road drainage area is immediately south of the City parking lot. Consider replacing parking lot with permeable pavement.	19
CB0005	Centennial Court Apartments Infiltration	No Permit	UVM	IB	$167,000	Retrofit of existing dry basin to an infiltration basin. Increase contributing drainage area and add riser to outlet structure for improved flow control. Redirect road drainage from Centennial Court to basin. Site only takes runoff currently from a portion of the apartment roofs.	18

CB0021	Patchen Rd & Pine St Infiltration Gallery	No Permit	South Burlington	IG	$427,000	Underground detention or infiltration (depending on soils). Diversion of flows from Patchen Road feasible, incoming pipe from open space/low point behind lots too deep to capture. Single lot also contains SF house (see photo). Would require diversion structure and pretreatment tank/structure.	18
CB0022	Patchen Road Kettle Hole	6292-9030	South Burlington	IG	$275,000	Detention Pond (or infiltration basin if soils are acceptable). Directly convey runoff from contributing area off Patchen Road down slope to sediment forebay. Modify existing 30" culvert headwall (under I-89) to achieve required flow control. Could pick up Kirby Rd.	18
CB0010	Fielding Lane Condos Infiltration Gallery	No Permit	South Burlington	IG	$208,000	Detention-retention facility. Open parcel adjacent to Fielding Lane Condos – seems to be owned by Fielding Lane Condos, existing surface storage available below outfall pipe. Would require access from Fielding Lane.	18
CB0026	SD Ireland Property (20A)		Burlington	IG	$558,000	SD Ireland proposed redevelopment to a housing complex. Site will reportedly be required to manage runoff on-site. Site currently drains to city drainage system in Grove St. Plans should address severe bank erosion at Centennial Brook culvert under SD Ireland driveway.	16
CB0011	Fletcher Allen Green Space		Burlington	Bio	$50,000	Proposed bioretention area in green space near hospital entrance. Redirect existing roadway trench drains into practice. Site currently drains to the UVM East Campus Pond.	16
CB0012	Fletcher Allen Parking Lot		Burlington	Bio	$37,000	Proposed bioretention area in existing drainage feature. Site is currently managed by existing swales, curb cuts, and a drainage depression. Swales and depression are currently eroding. Raise existing catchbasin frame/grate to provide ponding for bioretention.	16
CB0015	I-89 Exit 14 Detention Pond	No Permit	VTrans	DP	$1,419,000	Location flexible depending on evaluation. Most downstream location would be across from drainage outlet, below water main (best location for embankment – maximizes storage), but impact to water main R/W likely and partially on private property. Alternative is to move embankment upgradient to limit of I-89 R/W – would reduce available storage, but keep all work w/in VTrans jurisdiction.	16

Centennial Brook Flow Restoration Plan
Table E-3: Centennial Brook Watershed BMP Project Implementation Schedule

Project ID	Project Name	Expired Permit	MS4	BMP Type	BMP Description	Implementation Year	Project Cost Estimate	Project Cost Estimate w/ Inflation
CB0026	SD Ireland Property (20A)		Burlington	IG	SD Ireland proposed redevelopment to a housing complex. Site will reportedly be required to manage runoff on-site. Site currently drains to city drainage system in Grove St. Plans should address severe bank erosion at Centennial Brook culvert under SD Ireland driveway.	2017	$558,000	$610,000
CB0005	Centennial Court Apartments Infiltration	No Permit	UVM	IB	Retrofit of existing dry basin to an infiltration basin. Increase contributing drainage area and add riser to outlet structure for improved flow control. Redirect road drainage from Centennial Court to basin. Site only takes runoff currently from a portion of the apartment roofs.	2019	$167,000	$194,000
CB0008	Dumont Ave Infiltration Chambers	No Permit	BTV	IG	Divert flows from existing catchbasins and convey down Dumont Ave via pipe or swale to underground recharge chambers on empty lot. Options exist for practice type, siting and conveyance mechanism depending on depth to GW, existing inverts, and future use by Airport. Discharge to existing pipe outlet at Airport basin.	2020	$27,000	$32,000
CB0023	Picard Circle Infiltration	No Permit	South Burlington	IG	Subsurface infiltration system. All houses within Picard Circle have been purchased by Airport and are now abandoned. Significant site area exists within yards and the road for major underground infiltration/ detention system. Constraints include depth of existing drainage pipe and depth above groundwater (adjacent brook approx 14 feet below existing ground).	2020	$318,000	$380,000
CB0027	Staples Plaza Underground Detention A	No Permit	South Burlington	UD	Convert landscaped island to bioswale w/ UG storage to manage parking and small roof. Overflow to existing drain. Add trees for cover, shading, interception. Reduce width of one-way aisle for bioswale. Flat roof drains internally, discharges to drain inlet east of building. Modify internal roof drains, install trays, or use other blue roof design to provide temporary detention.	2021	$334,000	$411,000
CB0002	Best Western Windjammer Infiltration Basin A	6323-9030	South Burlington	IB	Site drainage area currently includes only Best Western property. Outfall is severely eroded and is headcutting to the east and may soon reach paved access road. Concept includes stabilizing outfall and constructing a detention basin within existing gully. Expand current drainage area to intercept runoff from Williston Road drainage network and redirect drainage from abutting commercial properties.	2022	$557,000	$706,000
CB0003	Best Western Windjammer Infiltration Basin B	6323-9030	South Burlington	IB	Outfall is located west of Best Western. Site drainage area currently includes only Best Western property. Moderate erosion occurring. Concept includes stabilizing outfalls and constructing a detention basin within existing gully. Expand current drainage area to intercept runoff from the Williston Road drainage network. A portion of this drainage area could be directed to Retrofit 22 if necessary.	2022	$81,000	$103,000
CB0019	North Campus Pond Retrofit		UVM	DP	Proposed expansion of existing North Campus Pond to over control existing and future development. Raise existing embankment (10' +/-) to provide additional capacity. May consider horizontal expansion to the north and/or south.	2023	$1,216,000	$1,587,000
CB0006	Chamberlin School	No Permit	South Burlington	IG	Underground detention in open space of school property. It seems possible to collect drainage off of White Street (and upgradient residential neighborhood) and connect to existing system via school entrance. Underground chambers could be designed as infiltration pending results of soils test pitting. (note HSG – D on east side of school property; HSG – B on west side of school property).	2023	$725,000	$946,000

CB0024	Queensbury Pond Retrofit	1-0946	South Burlington	IB	Existing dry detention pond. Modify outlet to create an infiltration basin. Existing pond might predate subdivision (newer PVC outlet connects to older CMP barrel). Facility appears to have additional storage capacity to expand drainage area (level run confirmed this is feasible).	2024	$110,000	$148,000
CB0025	Retrofit of Main Street UVM Pond		UVM	DP	Repair outlet structure. Retrofit options include expanding the pond southward toward Williston Road or eastward as part of Retrofit #24 for additional storage, extended detention, and improved water quality. Site has the ability to capture drainage from Williston Road, adjacent commercial properties, and unmanaged UVM land.	2025	$566,000	$783,000
CB0011	Fletcher Allen Green Space		Burlington	Bio	Proposed bioretention area in green space near hospital entrance. Redirect existing roadway trench drains into practice. Site currently drains to the UVM East Campus Pond.	2026	$50,000	$71,000
CB0012	Fletcher Allen Parking Lot		Burlington	Bio	Proposed bioretention area in existing drainage feature. Site is currently managed by existing swales, curb cuts, and a drainage depression. Swales and depression are currently eroding. Raise existing catchbasin frame/grate to provide ponding for bioretention.	2026	$37,000	$53,000
CB0013	Grove Street Parking Lot	1-0811	Burlington	IG	Divert existing drainage network and capture runoff from parking lot and direct to proposed underground recharge system. Low point in road drainage area is immediately south of the City parking lot. Consider replacing parking lot with permeable pavement.	2026	$156,000	$222,000
CB0021	Patchen Rd & Pine St Infiltration Gallery	No Permit	South Burlington	IG	Underground detention or infiltration (depending on soils). Diversion of flows from Patchen Road feasible, incoming pipe from open space/low point behind lots too deep to capture. Single lot also contains SF house (see photo). Would require diversion structure and pretreatment tank/structure.	2026	$427,000	$609,000
CB0022	Patchen Road Kettle Hole	6292-9030	South Burlington	IG	Detention Pond (or infiltration basin if soils are acceptable). Directly convey runoff from contributing area off Patchen Road down slope to sediment forebay. Modify existing 30" culvert headwall (under I-89) to achieve required flow control. Could pick up Kirby Rd.	2026	$275,000	$392,000
CB0015	I-89 Exit 14 Detention Pond	No Permit	VTrans	DP	Location flexible depending on evaluation. Most downstream location would be across from drainage outlet, below water main (best location for embankment – maximizes storage), but impact to water main R/W likely and partially on private property. Alternative is to move embankment upgradient to limit of I-89 R/W – would reduce available storage, but keep all work w/in VTrans jurisdiction.	2027	$1,419,000	$2,084,000
CB0007	Clover St GSI	No Permit	South Burlington	IG	30-ft wide residential streets with direct outfalls to streams, flat terrain, and good soils offer green street and neighborhood-scale disconnection opportunities (e.g., dry wells, rain gardens, pervious driveways, bump outs).	2028	$72,000	$109,000

ENGLESBY BROOK FLOW RESTORATION PLAN

September 30, 2016

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ACKNOWLEDGEMENTS

This project was completed by Stone Environmental, Inc., Horsley Witten Group, and Stantec.

DISCLAIMER

The intent of this document is to present the data, evaluations, alternatives, preliminary designs, and opinions of probable costs needed to support the development of a flow restoration plan for Englesby Brook, as required by the National Pollutant Discharge Elimination System (NPDES) General Permit 3-9014 (VTDEC 2012) for stormwater discharges to impaired waters from municipal separate storm sewer systems (MS4). The presented plan is a working document and, at this time, the MS4s are not bound in any way to the proposed BMP list.

EXECUTIVE SUMMARY

Stone Environmental, Inc., and its partners Horsley Witten Group and Stantec, were retained by the City of Burlington to develop a Flow Restoration Plan (FRP) for Englesby Brook. The FRP was developed in accordance with the MS4 General Permit (3-9014), subpart IV.C.1. The purpose of the FRP is to serve as a planning tool for the MS4 entities in the Englesby Brook watershed (the cities of Burlington and South Burlington, the Vermont Agency of Transportation (VTrans) and the University of Vermont (UVM)) to implement stormwater Best Management Practices (BMPs) in an effort to return Englesby Brook to its attainment condition.

In developing the FRP, an assessment was completed to determine to what extent current stormwater controls have reduced high flows (e.g., flows occurring less than 0.3% of the time) from the pre-2002 conditions as required by the *Total Maximum Daily Load [TMDL] to Address Biological Impairment in Englesby Brook* (VTDEC 2007). The Vermont Best Management Practice Decision Support System (VTBMPDSS), a GIS-based hydrologic model used to assess the impacts of various BMP scenarios while developing the TMDL, was used to evaluate the impact of current stormwater controls on flows in Englesby Brook.

As part of this effort, a comprehensive evaluation of the future growth allocation contained in the TMDL was also completed. This is important because the TMDL requires reductions from currently developed areas that are equal to the anticipated future impacts of new impervious surfaces that will not be subject to State of Vermont stormwater permitting requirements ("non-jurisdictional"). Our analysis shows that the TMDL significantly overstates the amount of non-jurisdictional impervious surface that is likely to be constructed over the next fifteen years in the Englesby Brook watershed, and thus the needed reduction in peak flows to achieve the desired flow regime.

A suite of potential BMPs and retrofit projects were identified as part of FRP development which fall into the following categories:

- Retrofits to existing stormwater management practices in the watershed to improve control of high flows;
- Retrofits to sites with expired state-issued stormwater permits;
- New stormwater management practices for sites currently without stormwater controls; and,
- Neighborhood-scale disconnection/green stormwater infrastructure (GSI) retrofit practices to reduce the effective impervious area in specific subwatersheds.

Field forms were prepared for each of the potential BMPs and retrofit projects and presented to the City of Burlington. Retrofits to existing stormwater management practices in the watershed were generally found to be cost-efficient and therefore were prioritized for implementation. These projects, combined with retrofits to sites with expired state-issued permits and a single new, centralized treatment practice on Flynn Avenue adjacent to the planned Champlain Parkway, were assessed with VTBMPDSS and determined to be sufficient to meet the high-flow target. A conceptual engineering design and planning level cost estimate has been prepared for each of these practices. Although the flow reduction possible via additional, new stormwater management practices and neighborhood-scale disconnection were evaluated, planning level cost estimates were not developed. It is anticipated that, as part of the City's on-going integrated permitting project, neighborhood-scale initiatives may receive further consideration and may ultimately be reprioritized.

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1. BACKGROUND

The Englesby Brook watershed is located in Chittenden County, primarily in the City of Burlington with a small portion in the City of South Burlington. Englesby Brook drains an area of approximately 605 acres in the Burlington Bay watershed, flowing from east to west into Lake Champlain. (Figure 1). The entire stream and its tributaries are Class B waters designated as cold water fish habitat pursuant to the Vermont Water Quality Standards (WQS). Land use in the Englesby Brook watershed is 96% developed land and 4% forested.

Englesby Brook was designated as a stormwater-impaired watershed on the 2006 Vermont 303(d) list due to multiple impacts associated with excess stormwater runoff throughout the watershed. The Vermont Department of Environmental Conservation (VT DEC) developed a total maximum daily load (TMDL) for Englesby Brook that was approved by the U.S. Environmental Protection Agency in 2007. The TMDL identifies changes in watershed hydrology – a reduction in stormwater high flows and an increase in baseflow – that are needed to restore water quality.

The TMDL establishes a high flow reduction target (Q0.3) of 34.4% and a low flow augmentation target (Q95) of 11.2% measured at the mouth during the one-year storm event. There is an underlying assumption that a sufficient number of BMPs (and associated storage volumes) can be identified and sited in the watershed to achieve the required flow restoration targets and subsequent aquatic life benefits. VT DEC relies on the VTBMPDSS model to quantify flows and to evaluate if flow restoration targets are achieved. The flow targets are the basis for development of the flow restoration plan (FRP).

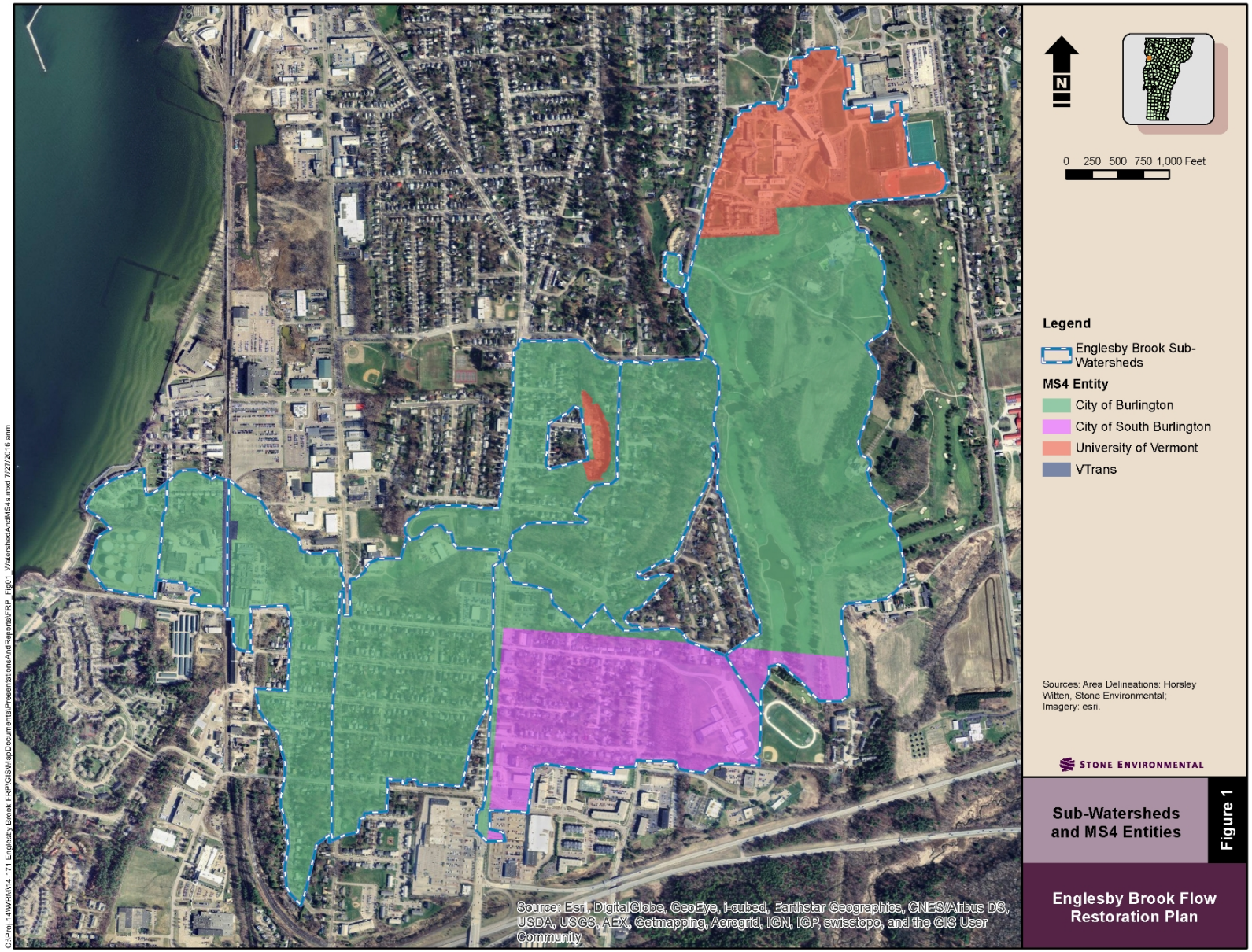
The FRP identifies the scope and scale of the best management practice (BMP) retrofits of existing impervious surface that, when implemented, are projected to meet the flow targets established in the TMDL and ultimately, to attain compliance with the Class B WQS. In addition, the Municipal Separate Storm Sewer System (MS4) general permit (issued December 5, 2012) outlines the following components of an FRP: identification of required controls, a construction and design schedule, a financial plan, regulatory analysis of any additional authorities needed to implement the FRP including support from the Vermont Department of Environmental Conservation (VT DEC), and any third party(ies) that have responsibility for implementing the FRP.

There are four MS4s with impervious cover contributing to stormwater high flows in Englesby Brook – the City of Burlington, the City of South Burlington, the University of Vermont (UVM), and the Vermont Agency of Transportation (VTrans). The relative share of impervious cover in each MS4's portion of the watershed, based on 2003 QuickBird high-resolution satellite imagery, is presented in Table 1, below. This, together with Table 4: Remaining Untreated High Flow Allocation, by MS4 (page 10) will provide a foundation for how implementations costs for retrofits may be shared in the future.

Table 1: Summary of Impervious Cover in the Englesby Brook Watershed.

Jurisdiction	Total Area (ac)	Impervious Area (ac)	Fraction of Watershed Impervious Area (%)
City of Burlington	431.2	101.6	67.5%
City of South Burlington	83.5	24.8	16.5%
University of Vermont	56.6	22.9	15.2%
VTrans	2.6	1.3	0.8%
TOTAL	**573.9**	**150.6**	**100.0%**

Figure 1. Englesby Brook Watershed Boundaries and MS4 Landholdings



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1.1. TMDL Flow Targets

In developing the TMDLs for waters that were determined to be impaired by stormwater runoff, VT DEC chose to use flow as a surrogate. Flow was used as a surrogate because the impacts on streams of increased stormwater flows resulting from urbanization are cumulative and include multiple stressors. Using flow was thought to integrate the effects of multiple stressors, which are all related to stormwater runoff. In general, the basis for the TMDL flow targets was a comparison of modeled flow duration curves (FDCs) between the impaired watershed and attainment watersheds with similar hydrologic characteristics where the WQS are currently met. In the case of Englesby Brook, there are seven attainment streams with similar hydrologic characteristics.

A FDC displays the percentage of time that a flow equals or exceeds a certain value, with low or baseflow represented by the 95th percentile ($Q_{95\%}$) of the curve and stormwater high flows at the 0.3% exceedance interval ($Q_{0.3\%}$). The FDC for Englesby Brook and its attainment watersheds were compared to determine the percent change (e.g., reduction in high flows and increase in base flows) required from current conditions. The percent change was codified in the TMDL document, and is presented in Table 2 below.

Table 2: TMDL Flow Restoration Targets, with and without Future Growth Allocations.

Flow Target	High Flow ($Q_{0.3\%}$) Reduction Target (%) [1]	Low Flow ($Q_{95\%}$) Increase Target (%) [2]
TMDL Targets	-25.5%	11.2%
TMDL Targets with 20 acres of non-jurisdictional future growth	-34.4%	11.2%

[1] *The high flow reduction target is negative (-), indicating there needs to be a reduction in high glow from the baseline condition.*

[2] *The low flow target is positive (+), indicating there needs to be an increase in low flow from the baseline condition. The low flow target is not actionable under the TMDL, but is included because improving base flow in the watershed is also a water quality goal*

The high flow target ($Q_{0.3\%}$) was determined to be relatively equivalent to the 1-year design storm flow, and therefore BMPs were sized to manage the channel protection volume (CP_v), as described in the 2002 Vermont Stormwater Management Manual.Future Growth

VT DEC added a future growth allocation to the TMDL flow targets to account for non-jurisdictional (e.g., not subject to state regulation and therefore unlikely to be managed by a BMP) impervious area that could reasonably be estimated to be constructed in the Englesby Brook watershed during the next 10-15 years while the TMDL is implemented. New, non-jurisdictional impervious surfaces are typically created as a part of smaller projects – such as the construction of a single family home – that are not part of a common plan of development and therefore do not rise to the state regulatory threshold of one acre of post-construction impervious cover. The future growth allocation in the TMDL assumes that no local zoning or land use regulations would be in place that require stormwater management for smaller projects. The Englesby Brook TMDL assumes that 20 acres of non-jurisdictional impervious surface will be created.

In order to incorporate the future growth estimate into the flow restoration target, 20 acres was added to the watershed's existing impervious cover to simulate projected watershed conditions when the TMDL is fully implemented. With the projected non-jurisdictional growth of 20 acres of impervious surface, the high flow target reduction was changed by -8.9% and the low flow target was unchanged (Table 2).

As a result, the reduction in peak flows required to account for future growth amounted to more than 25% of the total high flow reduction required. Given this outcome, and existing land use and development patterns in

the Englesby Brook watershed, a careful re-examination of the allocation was completed. Each parcel in the watershed was categorized in one of four categories based on the most recent impervious surface data developed by each jurisdiction[1] and stormwater permit information available through the State of Vermont's Environmental Research Tool[2]:

- Parcels less than one acre in area;
- Parcels that are greater than one acre but currently contain less than one acre of impervious surface;
- Parcels that are greater than one acre, currently contain more than one acre of impervious surface, and currently have a state stormwater permit; and
- Parcels that are greater than one acre, currently have more than one acre of impervious surface, but do not have a state stormwater permit.

Roads were not included in this analysis, consistent with the impervious cover analysis conducted by CCRPC during the development of the TMDL. Parcels covered by an existing state-issued Stormwater Permit were excluded from this analysis, as it was assumed there could be no additional subjurisdictional development on these parcels. A summary of impervious cover by parcel type and by municipality in the Englesby Brook watershed is presented in **Error! Reference source not found.**, below.

Table 3: Summary of Impervious Cover by Parcel Type in the Englesby Brook Watershed

	Parcel Type	Parcel Count	Current IA (ac)	Maximum Subjurisdictional IA (ac)
Burlington	Less than 1ac	662	50.80	15.54
	>1ac with <1ac IA	23	8.01	5.48
	>1ac with >1ac IA and no SW permit	17	25.58	0.72
	SUBTOTAL	*702*	*84.39*	*21.74*
South Burlington	Less than 1ac	172	8.30	5.57
	>1ac with <1ac IA	8	2.71	2.45
	>1ac with >1ac IA and no SW permit	7	7.40	0.38
	SUBTOTAL	*187*	*18.41*	*8.40*
Watershed-wide	**TOTAL**	**889**	**102.79**	**30.36**

The maximum amount of additional, subjurisdictional impervious area that can be created in the Englesby watershed, given current state regulatory thresholds and current lot coverage maximums contained in local land development regulations, is slightly more than 30 acres. It is highly unlikely that this amount of impervious surface will ever be developed, as it would require every landowner within the watershed to

[1] Burlington impervious cover dataset produced in 2012; So. Burlington impervious cover dataset produced in 2010

[2] https://anrweb.vt.gov/DEC/ERT/StormWater.aspx

maximize their lot coverage to the limits allowed by zoning coverage limits. Both the ultimate increase in subjurisdictional impervious cover and the increase predicted during the next 10-15 years would ideally be extrapolated based on the change in the amount of impervious cover in the watershed between 2003 – which served as the base condition when the TMDL was developed – and the 2010/2012 data.

Unfortunately, the impervious cover dataset from 2003 (often referred to as the QuickBird high-resolution satellite imagery), is of such poor quality that it is virtually impossible to make an accurate comparison between the datasets. Therefore, we selected a reasonable annual growth rate using a recent paper from the U.S. Forest Service, which assessed changes in impervious cover over time in 20 cities. In this work, Nowak et al. found that the overall average rate of increase in impervious cover was 0.31% per year. We applied this impervious area growth rate to impervious areas within the Englesby Brook watershed to determine the acreage of non-jurisdictional impervious growth potential using the following equation:

Non-jurisdictional impervious acres = 2010/2012 impervious acres * ((1 + % change per year) $^{\#\ years}$)
= 102.79 acres * $(1 + 0.31)^{15}$) = 107.67 acres or <u>4.88 acres increase between 2012 and 2027</u>

This estimate is conservative because it does not consider whether each parcel could actually add more impervious area given site and/or setback constraints (e.g., only lot coverage was considered). Even with these conservative assumptions, it was estimated that a net increase of 4.88 acres of non-jurisdictional impervious cover could reasonably be expected to be constructed between 2012 and 2027. Reducing the estimated future growth in non-jurisdictional impervious surface to 4.88 acres has a significant impact on the high flow target reduction (see Section 2.3).

2. VTBMPDSS MODEL ASSESSMENT

The VTBMPDSS model is a continuous hydrological simulation model that estimates the effect of land use changes and stormwater BMPs on streamflow. This model was applied to the Englesby Brook watershed to predict progress toward the TMDL flow targets based on proposed BMP implementation scenarios. The most important inputs to the model for this study are the GIS layers of land use, impervious cover, and soil, as well as the locations, configuration, and connections of the BMPs themselves. The VTBMPDSS model is used to predict stormwater high flows and baseflows at the watershed outlet for a base condition (pre-2002) and then a future BMP implementation condition; VT DEC requires the use of the model to document compliance with the TMDL flow restoration targets. VT DEC established both a base and a credit (existing conditions) model scenario to determine the remaining high flow reduction needed under the flow restoration plan. As described below, the Base and Credit Model Scenarios were updated to correct errors, utilize updated impervious cover datasets, add BMPs constructed since the VTBMPDSS was last updated, and make subwatershed boundary adjustments.

2.1. Baseline Conditions

The Base Scenario establishes watershed conditions and flows against which the 2007 Englesby Brook TMDL flow restoration targets are applied. The original Base Scenario includes five existing stormwater BMPs (all stormwater ponds) designed prior to the 2002 Vermont Stormwater Management Manual, when only large storms (i.e. 10-year storm events) required flow reduction. In coordination with VT DEC, a revised Base Scenario was created to address the following:

- Minor errors in the VTBMPDSS setup;
- Updated impervious cover datasets. The updated impervious cover layer for the Credit model (see below) was used as a starting point, and then the 2003 QuickBird high-resolution satellite imagery was used to subtract new areas of impervious cover; and
- Slight changes in subwatershed boundaries resulting from new development and refinement of combined sewer system (CSS) boundaries.

2.2. Current (Credit) Conditions

The Credit Scenario represents current conditions and includes changes in the watershed that have occurred since the time of the base scenario's creation. For the original Credit Scenario, VT DEC added one new BMP, the O8 Pond, which was a large storage retrofit that was a priority project identified in the *Englesby Brook Watershed Restoration Project Final Report* (CWP, 2001). In addition, several of the existing ponds in the north east corner of the watershed – owned and operated by the University of Vermont and the Burlington Country Club – had been retrofitted since baseline conditions were established. VT DEC also increased impervious cover in the watershed by 4.2 acres and changed subwatershed boundaries from the Base Scenario.

In coordination with VT DEC, a revised Credit Scenario was created to account for the following:

- Minor errors in the VTBMPDSS setup;
- Updated impervious cover datasets. The latest impervious cover layer from Burlington and South Burlington was used as a starting point, and then the 2013 (circa) imagery was used to add missing areas of impervious cover;
- Removal of the O8 Pond regulator #1;
- Corrected subwatershed boundaries (described above);
- Addition of three BMPs (M7/M8/M9) to represent the forebay and two west ponds for the SM06 retrofit from the Watershed Plan, which provided water quality treatment but little flow reduction capacity; and
- Addition of three newly constructed BMPs, brought on-line as part of new development or redevelopment projects.

Under the Credit Scenario there are ten BMPs used to manage stormwater within the Englesby Brook watershed; these BMPs are discussed in more detail in Section 3 of this report. Not all of these BMPs, however, are able to meet current (2002) stormwater standards for controlling high flows and thus provide the same level of support in terms of achieving the goals of the FRP. Assuming responsibility for the high flow allocation should be apportioned based on impervious area, it is possible to estimate the current amount of high flow treatment credit toward to the TMDL that should be assigned to each MS4 based on the amount of impervious area in each MS4 being treated by BMPs which provide high flow treatment. The high flow treatment credit is the MS4's high flow allocation multiplied by the proportion of the MS4's impervious area currently receiving high flow treatment (impervious acres within the MS4 treated by the BMP / MS4 impervious acres), and is summarized in Table 4 below.

Table 4: Remaining Untreated High Flow Allocation, by MS4

MS4 Entity	Allocation (%)	High Flow Treatment Credit (%)	High Flow Allocation Remaining Untreated (%)
Burlington	18.7	-4.5	14.2
South Burlington	4.6	-4.1	0.5
UVM	4.2	-7.5	-
VTrans	0.3	-	0.3
TOTAL	**27.7**	**-15.7**	**14.7**

It should be noted that UVM's facilities currently generate more high flow treatment credit (-7.5%) than their allocation (-4.2%) requires. This excess treatment credit has NOT been assigned to another MS4 for the purpose of this summary, however may play a role in determining the final cost sharing as the MS4s negotiate implementation costs in this, as well as other impaired watersheds.

Additionally, it should also be noted that the only "impervious" that VTrans owns in the watershed is believed to be rail-bed. Based on conversations between VTrans and VTDEC, a determination has been made regarding rail-bed not being considered as impervious. As such, this impervious needs to be removed from the model and theoretically the VTrans allocation nullified.

2.3. Future (Restoration) Condition

The Flow Restoration Scenario represents the retrofits needed to sufficiently manage high flows in order to achieve the flow restoration target in the TMDL. In addition, as discussed in Section 1.2, the future growth allocation was revisited and a more reasonable assumption about potential growth in non-jurisdictional impervious surfaces was established. In preparing this FRP, a number of restoration scenarios were modeled to evaluate the efficacy of 28 stormwater retrofit opportunities that were identified in the field, as well as a number of neighborhood-scale impervious disconnection options. These retrofit opportunities are discussed further in Section 3, and field forms for each opportunity are included as Appendix A of this report. After an initial evaluation of BMP performance and discussions with the City of Burlington on BMP implementation feasibility, a preferred flow restoration scenario was selected that meets the revised TMDL high flow reduction target. The restoration scenario includes an upgrade to the existing O8 Pond, a retrofit in the vicinity of the proposed Champlain Parkway, and three retrofits at sites where the current stormwater permits have expired.

Taken together these adjustments to the VTBMPDSS base scenario resulted in updated flow restoration targets and the flow restoration scenario results presented in Table 5, below. VTBMPDSS model files for the Flow Restoration Scenario were provided to VT DEC for review and comment; the summary presented below incorporates feedback from VT DEC on the modeling of the BMPs.

Table 5: Summary of Modeling Scenarios.

Model Scenario		Purpose	High Flow ($Q_{0.3\%}$) Target		Conclusion
			(cfs)	% reduction	
Original Base	Five pre-2002 BMPs	These flows are the baseline	20.9	-	Successfully replicated

Model Scenario		Purpose	High Flow ($Q_{0.3\%}$) Target		Conclusion
			(cfs)	% reduction	
Scenario		from which restoration/ treatment is measured			VT DEC's model.
Revised Base Scenario	Original Base with corrections and updated IA	Allow for more accurate comparison with restoration scenarios.	25.6	-	New baseline to measure achieved flow reductions.
Original Credit Scenario	Original Base + new O8-Pond; updated IA and subwatersheds	What is the change in baseline flow given current conditions?	19.2	8.0	Successfully replicated VT DEC's model.
Revised Credit Scenario	Original Credit with corrections + SM6 retrofit + new BMPs; revised IA and subwatersheds	Update to today's existing conditions.	21.6	15.7	Corrections result in higher flow reductions than VT DEC's original prediction.
Flow Restoration Scenario	Revised Credit + retrofit of O8-Pond + Champlain Pkwy retrofit + retrofit of 3 BMPs in need of permit renewal	What is the max. flow reduction achievable with implementation of most feasible retrofits.	18.5	27.7	Meets the revised TMDL target, assuming 4.88 acres of future growth. Some BMPs have greater than 12-hr detention times.

3. IDENTIFICATION OF REQUIRED CONTROLS

In 2015, field studies were performed throughout the Englesby Brook watershed to identify and assess existing BMPs that were candidates for retrofits, view newly constructed BMPs that needed to be included in the Credit Scenario, and evaluate potential locations for new BMPs. A comprehensive list of all of the BMPs considered in developing the Englesby Brook FRP is presented in Table 6 and Figure 2. The table lists the candidate BMP sites, provides general information about each BMP, and highlights practices that were ultimately included as part of the Flow Restoration Scenario. Because the ultimate goal of the Englesby Brook FRP is flow control, all new BMPs were modeled as dry basins in order to maximize the amount of storage that could be achieved within a given footprint.[3] More detailed information for each BMP site is provided in Appendix A.

Table 6: Summary of BMPs Considered in Developing Englesby Brook FRP.

Model ID	Permit ID	Model Run	Location / Description	Address	Practice
M1		Base	BCC Lower Pond		Wet basin
M2		Base	BCC Upper Pond 2		Wet basin
M3		Base	BCC Upper Pond 1		Wet basin
M4	3753-INDS	Base	Catamount Lower Pond	UVM	Wet basin
M5	3753-INDS	Base	Catamount Upper Pond	UVM	Wet basin

3 This basis of design will be revisited during future Integrated Planning and Phosphorus Control Plan developments under the Lake Champlain TMDL.

Model ID	Permit ID	Model Run	Location / Description	Address	Practice
M6		Credit	O8 Pond	Champlain School	Wet basin
M7, M8, M9		Credit	SM6		Treatment wetland
M10		FRP	O8 Pond retrofit		Retrofit existing wet basin
M11			SM6 retrofit		Retrofit existing wetland w/ underground storage
M12	6298-9030		Harbor Watch retrofit		Dry basin
M13	3-1239 (w/w)	Base	Tank Farm	38 Flynn Ave	Dry basin
M14	6308-9030		Switchback et al	160 Flynn Ave	Underground storage
M15	6290-9030 & 6315-9030		208 Flynn Ave, west edge of parcel	208 Flynn Ave	Swale
M16	6290-9030 & 6315-9030		208 Flynn Ave, north end of parking lot	208 Flynn Ave	Underground storage
M17		FRP	Green space between CP alignment and parking lot	288 Flynn Ave	Dry basin
M18	1-1087	FRP	Flynn Ave Co-Op retrofit	288 Flynn Ave	Dry basin
M19	1-0337	FRP	Pine Street Counseling Center retrofit	300 Flynn Ave	Dry basin
M20			Pine Street Deli	316 Flynn Ave	Wet basin
M21			Burlington Subaru		Underground storage
M22			Rice High School		Dry basin
M23			Harrison Ave	Harrison Ave, near Central Ave	Detention basin + swale
M24			Sears Lane	Sears Lane	unsuitable
M25	2-0789	FRP	Overlake Condos retrofit		Dry basin
M26			Champlain Parkway – Englesby Brook	208 Flynn Ave	Gravel wetland
M27	6145-INDS	Credit	Hickok & Boardman (H&B)	346 Shelburne Rd	Swale/wet pond /infiltration chamber
M28			Walgreens	514 Farrell St	Underground storage
M29		FRP	Champlain Co-op	810 Pine St	Underground storage
M30		Credit	Pizzigalli Properties	462 Shelburne Rd	Permeable pavement
M31		Credit	847 Pine St. redevelopment	847 Pine St.	Bioretention
M32	6756-INDS		Route 7 roundabout	Rte 7-S. Willard St.	Underground storage
M33	2-0999		Champlain Apartments	817 Pine St	Underground storage, combined with M29
M34	2-1052		Crescent Terrace		unsuitable

Each site was reviewed to determine its ability to site a BMP capable of meeting the CP_v criteria of the 2002 Vermont Stormwater Management Manual. The CP_v criteria was utilized as part of the FRP evaluation, since

the 1-year, 24-hour storm event is a close approximation to the storm event associated with the $Q_{0.3\%}$ flow. The CP_v criteria requires 12 hours of detention for cold water fish habitats, such as Englesby Brook. Several sites were constrained such that they were found to be unsuitable for meeting this criterion, and were therefore not considered further.

The suite of BMPs ultimately included in the Flow Restoration Scenario is summarized in Table 7, including an estimated drainage area and impervious area managed through each practice, as well as the modeled impact the practice has on attainment of the high flow target. A visual summary of the areas in the watershed receiving treatment is offered in Figure 3, with grey indicating the portion of the watershed draining to a flow BMP. While some field work was performed as part of identifying these candidate sites, no detailed hydrologic analysis, property research, engineering, or other studies were performed, and thus unidentified constraints may exist that prevent certain sites from being utilized in the FRP.

In addition to the site-specific controls identified in developing the FRP, neighborhood-scale disconnection efforts were also considered. In general, it was assumed that 50% of the currently directly connected impervious areas could be disconnected. The disconnection efforts were found to have varying degrees of impact on high flow conditions at the watershed outlet and will likely be considered further as part of the City of Burlington's on-going integrated planning project.

Figure 2. Locations and Drainage Areas of BMPs Considered in Developing Englesby Brook FRP

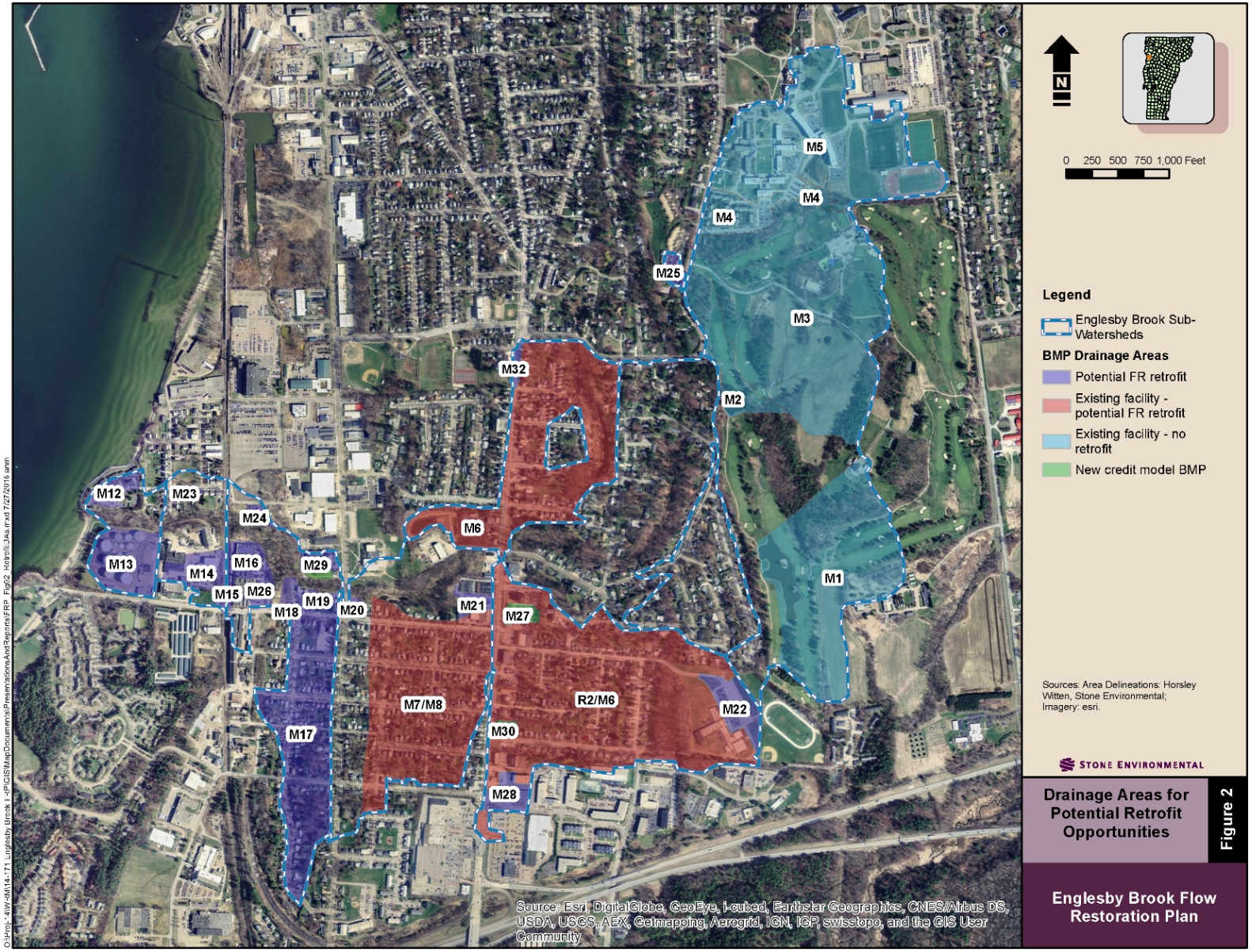


Table 7: Summary of BMPs Included in Englesby Brook Flow Restoration Scenario.

Site ID	Site Name	BMP Type	Model Scenario	DA (ac)	IA (ac)	% Difference in Q03[1]		Detention Time[4] (min)
						BMP[2]	Water-shed[3]	
M1	BCC Lower Pond	Wet Basin	Base/ Credit	43.40	1.28	-6.7	-3.0	997
M2	BCC Upper Pond 2	Wet Basin	Base/ Credit	9.34	0.54	-0.2	0.7	33
M3	BCC Upper Pond 1	Wet Basin	Base/ Credit	67.94	5.60	-0.1	0.0	17
M4	Catamount Lower Pond	Wet Basin	Base/ Credit	7.46	3.36	-37.5	-1.6	517
M5	Catamount Upper Pond	Wet Basin	Base/ Credit	45.23	20.61	-46.3	-8.5	843
M6B (M10)	Englesby 08 Pond Retrofit	Wet Basin	Credit/**FRP**	129.76	48.55	-63.4	-36.9	721
M7/M8/M9	Englesby SM6 Ponds	Forebay/ 2 Wet Basins	Credit	44.09	19.52	3.5	0.05	47
M17	288 Flynn Ave/ Champlain Pkwy	Dry Basin	**FRP**	30.77	13.07	-49.4	-5.1	763
M18	288 Flynn Ave Coop	Dry Basin	**FRP**	0.42	0.30	-66.7	0.0	758
M19	Pine St. Counseling Ctr.	Dry Basin	**FRP**	0.80	0.48	-50.0	-0.1	704
M25	Overlake Condos	Dry Basin	**FRP**	1.19	0.73	-62.5	-0.8	647
V27/M27A/ M27B	Hickok & Boardman	Swale/Wet Pond/Infil. Chamber	Credit	1.29	0.92	-100.0	-0.9	55
M29	Champlain Co-op	Dry Basin	**FRP**	1.59	1.09	-57.1	-0.6	847
M30	Pizzagalli Properties	Permeable Pavement	Credit	0.64	0.58	-100.0	-0.3	360
M31	847 Pine St.	Dry Basin	Credit	0.45	0.23	-100.0	-0.1	101

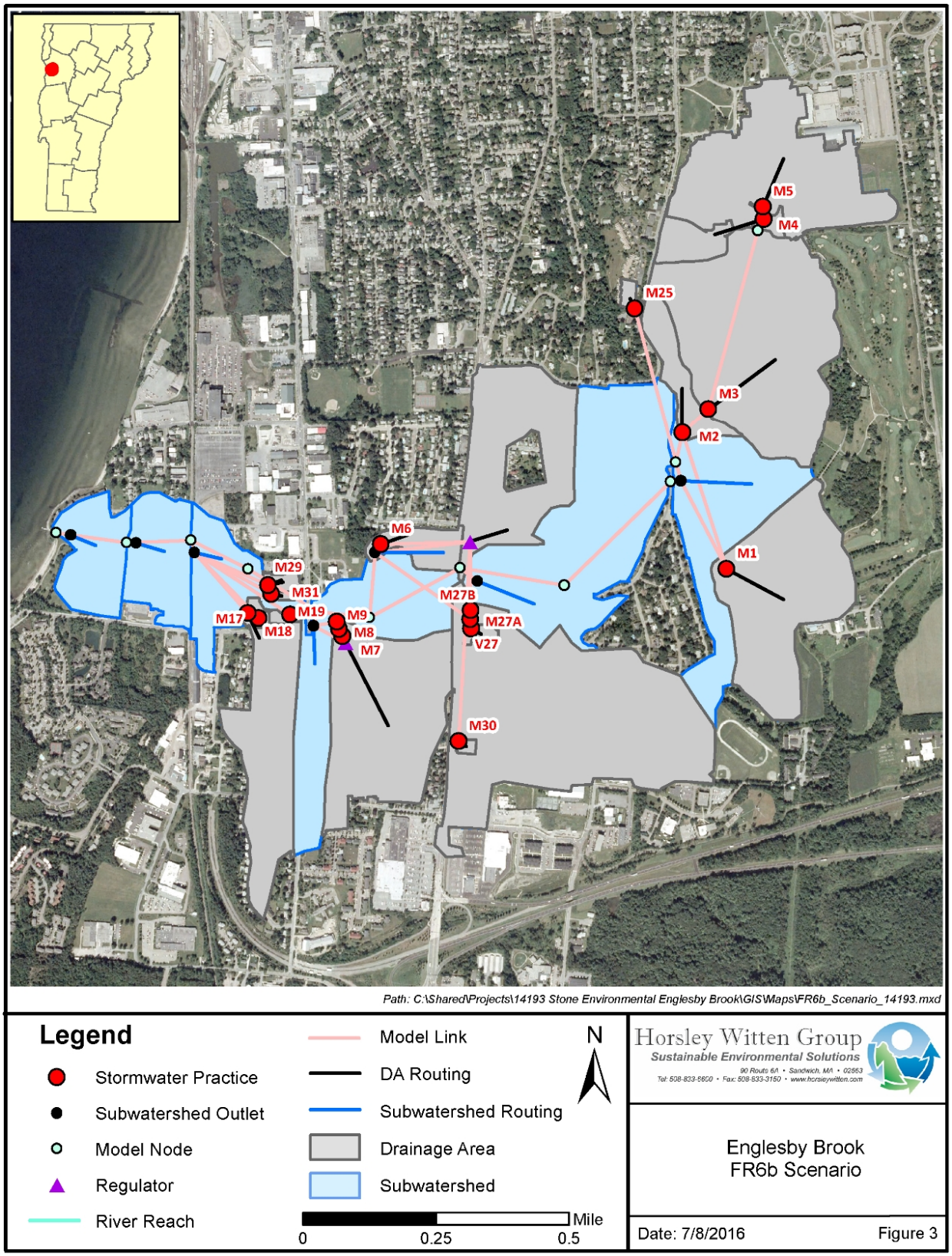
[1] Percent difference in high flows is negative when showing a reduction. The model was run with all BMPs turned on and then with individual BMPs turned off, one at a time, to quantify differences in flow and relative performance.

[2] Differences at each BMP were determined by comparing the inflows and outflows in the BMP. 100% represents no surface discharge; BMPs with less than 50% at the BMP outlet could be opportunities to enhance performance.

[3] Differences in flow at the watershed outlet are intended as a relative comparison of BMP effectiveness, but are not absolute or additive. Individual BMP values do not add up to corresponding total watershed reductions due to other losses in the system.

[4] Detention times are restricted to ~12 hrs (720 mins) per cold water fisheries requirements.

Figure 3: Englesby Brook Watershed Areas Receiving Treatment in the Flow Restoration Scenario



STONE ENVIRONMENTAL INC

4. DESIGN AND CONSTRUCTION SCHEDULE

The 2012 MS4 permit requires that this FRP include a design and construction schedule for the stormwater BMPs that have "been identified by the permittee[s] as necessary to achieve the flow restoration targets." The schedule must provide for implementation of the BMPs as soon as possible, but no later than 20 years from the effective date of MS4 permit, which is December 5, 2012—meaning that the BMPs must be implemented by the end of 2032. The BMPs included in this FRP will, at a minimum, require permitting and design work prior to construction, and will have varying costs. In addition, and as discussed in more detail in Section 6, an undetermined level of effort will likely be required to support expired permit holders in implementing necessary upgrades to their systems and obtaining current permit coverage, even though the City of Burlington's intention is to not take over these permits.

Flow restoration efforts are one of several Clean Water Act obligations, including the Lake Champlain Phosphorus TMDL, similar Flow Restoration efforts in Centennial and Potash Brooks, the Englesby Brook Bacteria TMDL, and improvements to the City's combined sewer system. Implementation of the two highest priority retrofit BMPs (M10 and M17) included in the Flow Restoration Scenario will fall largely to the City of Burlington. The City of Burlington is actively engaged in developing an integrated plan, and anticipates this integrated plan will have broad implications for the prioritization and timing of flow restoration projects in the context of the full suite of the City's Clean Water Act obligations. The schedule presented in Appendix E is a coarse, draft schedule derived from prioritization of projects based solely on their impact on the Flow based TMDL. Under the Integrated Planning effort, these projects will be evaluated against other projects in the City based on their ability[4] to meet Clean Water Act goals other than flow reductions only. As such, this schedule is largely subject to modification once the Integrated Planning effort is complete.

5. FINANCIAL PLAN

The 2012 MS4 permit also requires that this FRP include a financing plan that estimates the costs for implementing the FRP and describes a strategy for financing the FRP. A conceptual design, showing the location and layout for each BMP included in the Flow Restoration Scenario is included in Appendix C. Itemized cost estimates were developed for the top two priority projects, as discussed in Section 5.1 below. For the other BMPs included in the Flow Restoration Scenario – retrofits for sites with expired permits – a modified spreadsheet method was used to develop cost estimates, as detailed in Section 5.2. Financial Plans are listed for the two MS4s which have financial obligations identified in this plan. No financial plan is presented for UVM, whose existing BMPs' performance appears to exceed their flow allocation, nor for VTrans who theoretically will have no flow allocation once adjustments are made to the model to reflect a reclassification of rail bed as non-impervious.

5.1. City of Burlington Financial Plan

In 2009, the City of Burlington followed the example of the City of South Burlington in implementing an impervious area based stormwater fee to provide the City of Burlington with a stable funding source to maintain stormwater infrastructure throughout the City and to comply with numerous State and Federal stormwater regulations including the Stormwater TMDLs, Lake Champlain TMDL and Combined Sewer

4 Or the ability of alternative design variants.

requirements. Implementation of retrofits for which the City is directly responsible[5] (M10 and M17; see section 6, Regulatory Analysis, for discussion of responsibility of other retrofits related to expired permits) will ultimately be the responsibility of the stormwater rate payers. In order to limit the impact to the rate payers, the City intends to leverage existing and new grant and loan sources as they are available. Additionally, as part of the Integrated Planning effort, the City will be completing a financial capability assessment (FCA) to evaluate the long term ability of rate payers to fund this and other Clean Water Act obligations[6]. The FCA won't mean that Clean Water Act obligations won't be met – but may point to an adjustment of the overall schedule of implementation of all of Burlington's obligations, including implementation of this and other Flow Restoration Plan projects, in order to mitigate the impact of stormwater and wastewater rates increasing at an unsustainable rate for our community. This FRP and SWMP will be amended with an updated financial plan, including stormwater rate projections for this and other Clean Water Act obligations once the FCA under the Integrated Plan is completed (end of 2018).

5.2. City of South Burlington Financial Plan

In 2005, the City of South Burlington created Vermont's first stormwater utility. Under the stormwater utility system, all developed properties in the City pay an impervious area-based stormwater fee using an Equivalent Residential Unit (ERU) system. These stormwater fees provide the City with a stable funding source that is used to comply with State and Federal stormwater regulations and maintain stormwater infrastructure throughout the City. The stormwater utility was created with the understanding that there would be future stormwater costs related to the five stormwater impaired watersheds located in South Burlington, as well as costs related to future implementation of projects required by the Lake Champlain Phosphorous TMDL. The City anticipates using funds generated from stormwater utility fees to fund its portion of FRP related costs in the Englesby Brook watershed. The City of South Burlington will also pursue funding from existing and new grant sources from other organizations including, but not limited to, VTDEC, the Vermont Agency of Transportation, and the Lake Champlain Basin Program.

5.3. Itemized Cost Estimates

An engineer's opinion of probable cost estimate was developed for the two highest priority projects – the retrofit of the O8 Pond (M10) and the centralized treatment area bordered by Flynn Ave, 288 Flynn Ave, and the future location of the Champlain Parkway (M17). The cost estimate includes an itemized list of materials as well as final design and construction engineering costs in 2016 dollars. The cost estimates are summarized in Table 8, below, and presented in full in Appendix D.

5 As part of the Integrated Planning effort, the City of Burlington will also be evaluating mechanisms for incentivizing the construction of retrofits identified on private property, particularly if the City can get improvements that go above the Flow Restoration Plan requirements and make gains in phosphorus control.

6 https://www.epa.gov/sites/production/files/2015-10/documents/municipal_fca_framework.pdf

Table 8: Proposed Priority BMP Cost Estimates.

BMP ID	Site Name	Storage Volume (cf)	Total Cost ($)	Impervious Area (ac)	Cost per Impervious Acre
M10	O8 Pond retrofit[1]	136,061	$360,850	48.55	$7,433
M17	288 Flynn Ave/ Champlain Pkwy	74,201	$385,500	13.07	$29,495
TOTAL			**$746,350**	**61.62**	

[1] *This is an expansion of an existing practice which increases available storage and optimizes detention; costs reflect only the incremental cost of the retrofit.*

5.4. Spreadsheet Cost Estimates

Estimating costs for implementing BMP retrofits for sites with expired permits utilized a somewhat less robust approach. Cost estimates were calculated as a base construction cost plus a 30% contingency factor for final design and permitting. The base cost was estimated on a unit cost basis, using a specified design volume (cu. ft.) multiplied by a unit cost ($/cu. ft.). Unit costs were calculated based on the memorandum from Tetra Tech, Inc. dated October 30, 2007. These rates use a 2000 base year and have been updated to account for inflation to the year 2016, using a 2.5% inflation rate. The costs are calculated based on the following equation:

total cost = installation cost (I) + land cost (L) + fixed cost (F)

Where:

I = $6/cf of infiltration, inflated at 2.5% to year 2016 = $8.70/cf

L = $0 as it is not anticipated that property will be required to be purchased

F = design/permitting costs (30% of I)

The anticipated costs associated with implementing the expired permit BMP retrofits, as identified in Table 7 as part of the Flow Restoration Scenario, are presented below in Table 9. Although all of these projects would be located on private land, no cost has been assigned for land acquisition.

Table 9: Proposed Expired Permit BMP Retrofit Cost Estimates.

BMP ID	Site Name	Treatment Volume (cf)	I ($)	F ($)	Total Cost ($)	Impervious Area (ac)	Cost per Impervious Acre
M18	208 Flynn Ave Coop	1,370	$11,919	$3,576	$15,495	0.30	$51,649
M19	Pine St Counseling Ctr	2,349	$20,436	$6,131	$26,567	0.48	$55,348
M25	Overlake Condos	3,537	$30,772	$9,232	$40,004	0.73	$54,799
M29	Champlain Co-op[1]	5,089	$55,343	$16,603	$71,946	1.09	$66,005
TOTAL					**$154,011**	**2.60**	

[1] *Any BMP at this location will likely need to be subsurface, and therefore the assumed unit cost per cf treated was increased by 25%.*

6. REGULATORY ANALYSIS

As part of this plan, retrofits are being proposed on sites tied to expired State operational stormwater permits. A field assessment of each of the five systems in the Englesby Brook watershed with expired stormwater permits has been completed, and is included as Appendix B; all five systems are located within the City of Burlington. Ultimately, the permit holders will either have to have their permit adopted under the MS4 permit, or to request coverage under a Residual Designation Authority (RDA) permit from the State.

The expired permits were written broadly with few enforceable items and typically focus on curb-and-gutter system elements, including catch basins. At this time the City will only be incorporating permits which contain City Public Right of Way as part of the permitted system. Of the five systems, only the Crescent Terrace system (2-1052) will be incorporated at this time. Given that the proposed retrofit for 288 Flynn Ave (1-1087) will address both the expired permit coverage of 288 Flynn as well as treat off-site runoff from City streets and neighborhoods, it is possible that this permit will be incorporated in the future depending on the final feasibility and design of retrofits M17[7]. While the only alternative at this time for the remaining expired permits is residual designation, the e City of Burlington is reluctant to formally request residual designation of this permit until the State has developed and made public the engineering feasibility assessment (EFA) it will use for these residually designated permits, since it is important that such an EFA reference the Flow Restoration Plan and ensure that retrofits under the RDA permit meet the goals of the flow restoration plan. Since the State has not yet made clear what requirements such residually designated permits will have to meet, the City feels that it cannot determine the proper course of action for the remaining permits at this time. The City of Burlington welcomes a discussion with VTDEC as to the proper course of action for these facilities.

7. THIRD PARTY IMPLEMENTATION

In accordance with the MS4 permit, a FRP requires identification of the name of any party, other than the permittee, that is responsible for implementing any portion of the FRP. A full list of expired permits, identifying the third party permittee, within the Englesby Brook watershed is presented in Table 1 in Appendix B.

8. CONCLUSION

This Englesby Brook FRP was completed to meet the requirements under Part III of the MS4 general permit for the contributing MS4s; City of South Burlington, City of Burlington, UVM, and VTrans. In accordance with Subpart IV.C.1. of the General Permit, the MS4s were required to submit a final FRP within 3 years of the permit issuance. This Englesby Brook FRP fulfills those requirements. The Englesby Brook FRP will become a part of the permittees' SWMP upon approval by VTDEC. Once the final Englesby Brook FRP is approved by VTDEC, implementation of this FRP by the contributing MS4s is required under the General MS4 Permit. Additionally, updates on FRP progress toward the flow target reductions are required as a part of the MS4 annual reports.

7 i.e. if M17 is not feasible, then M18 may be pursued and this manages only private impervious.

APPENDICES

APPENDIX A: CONSIDERED FLOW REDUCTION BMPS

ID#: M10

Name: O8 Pond retrofit

Concept Description:
Expand the existing pond to the east toward the forebay and raise permanent pool to create additional storage volume and extend detention.

Notes/Feasibility:
Existing pond is lined, so it will be slightly more complicated than simply digging

GENERAL SITE INFORMATION

Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	Y
Is site a hotspot?	N
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	Y

SIZING INFORMATION

Drainage Area (ac):	131.50
Impervious Area (ac):	49.97
Practice Area Available (ft^2):	
Existing Head Available?	Y

RETROFIT DETAILS

Project Candidate:	1st tier
Retrofit of new or existing BMP:	retrofit
Proposed Retrofit Practice 1:	expand existing facility
Proposed Retrofit Practice 2:	
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	moderate, but existing

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	Y	Access:
Recharge:	N	Land Use:
Demonstration:	N	Utilities:
Repair:	Y	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 04/10/15 Assessed by: JSM

Englesby Brook, VT

Retrofit Summary Sheet

ID#: M11

Name: SM6 retrofit

Concept Description:
Modify existing treatment wetland system to provide detention storage in addition to water quality functions.

Notes/Feasibility:
Limited available space for additional storage without relocating stream channel; concept would result in some loss of WQ function.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info:	Project Candidate: N
Ownership:	Retrofit of new or existing BMP:
Land Use Type:	Proposed Retrofit Practice 1:
Land Use Detail:	Proposed Retrofit Practice 2:
Existing BMP on Site?	Non-Structural Controls:
Is site a hotspot?	Non-Structural Other:
Sources/pollutants:	Maintenance Burden:
Soils:	
Use in Retrofit DA:	
SIZING INFORMATION	
Drainage Area (ac):	
Impervious Area (ac):	
Practice Area Available (ft^2):	
Existing Head Available?	

Benefits:	Conflicts:
Storage:	Soils:
Water Quality:	Access:
Recharge:	Land Use:
Demonstration:	Utilities:
Repair:	Polluted:
Reuse:	High WT:
	Wetlands:
Other:	Other:

Date:

Assessed by:

ID#: M12

Name: Harbor Watch

Concept Description:
Following EFA, runoff from a portion of the parking lot is diverted using speed bump to existing green space where it flows overland to the storm sewer system. Detention area could be constructed in green space to control peak flows; additional impervious areas (roofs and parking) could be redirected to improved stormwater practice.

Notes/Feasibility:
Existing practice has limited effectiveness.

GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	N

SIZING INFORMATION	
Drainage Area (ac):	2.30
Impervious Area (ac):	1.70
Practice Area Available (ft^2):	6,970
Existing Head Available?	Y

RETROFIT DETAILS	
Project Candidate:	2nd tier
Retrofit of new or existing BMP:	Retrofit
Proposed Retrofit Practice 1:	Bioretention
Proposed Retrofit Practice 2:	Dry basin
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	Moderate

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	Y	Access:
Recharge:	Y	Land Use:
Demonstration:	N	Utilities:
Repair:	N	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 04/10/15 Assessed by: JSM

ID#: M13

Name: Tank Farm

Concept Description:
None.

Notes/Feasibility:
Existing w/w permit (3-1239) requires that storm flows are controlled such that "it does not exceed 100 gallons per minute". VTBMPDSS was modified to reflect this level of control.

GENERAL SITE INFORMATION

Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	Added to base model

SIZING INFORMATION

Drainage Area (ac):	8.76
Impervious Area (ac):	8.67
Practice Area Available (ft^2):	10,890
Existing Head Available?	Y

RETROFIT DETAILS

Project Candidate:	N
Retrofit of new or existing BMP:	
Proposed Retrofit Practice 1:	
Proposed Retrofit Practice 2:	
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	N	Access:
Recharge:	N	Land Use:
Demonstration:	N	Utilities:
Repair:	N	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 04/10/15 Assessed by: JSM

ID#: M14

Name: 160 Flynn Ave

Concept Description:
Infrastructure maps shows two outfalls at the northwest corner of the property draining. The one slightly to the east receives stormwater from the back parking lot (shown in photo) and roof drains from the building currently occupied by Booska Movers, approximately 6.1 acres of impervious. Outfall was NOT located during initial field work.

Concept includes constructing underground storage in the parking lot. It may be possible to also capture stormwater being carried in 12" VCP line immediately to the west.

Notes/Feasibility:
Feasible, but constraints including actual use of area by existing owner/tenant need to be more fully understood

GENERAL SITE INFORMATION

Site Contact Info:	
Ownership:	private
Land Use Type:	Commercial/industrial
Land Use Detail:	
Existing BMP on Site?	no
Is site a hotspot?	no
Sources/pollutants:	
Soils:	Silt loam, poorly drained
Use in Retrofit DA:	

SIZING INFORMATION

Drainage Area (ac):	6.1
Impervious Area (ac):	4.21
Practice Area Available (ft^2):	13,000
Existing Head Available?	Y

RETROFIT DETAILS

Project Candidate:	Y
Retrofit of new or existing BMP:	New BMP
Proposed Retrofit Practice 1:	Underground storage
Proposed Retrofit Practice 2:	Dry pond
Non-Structural Controls:	none
Non-Structural Other:	none
Maintenance Burden:	

Benefits:

Storage:	Yes
Water Quality:	Yes
Recharge:	?
Demonstration:	No
Repair:	Yes
Reuse:	No

Other:

Conflicts:

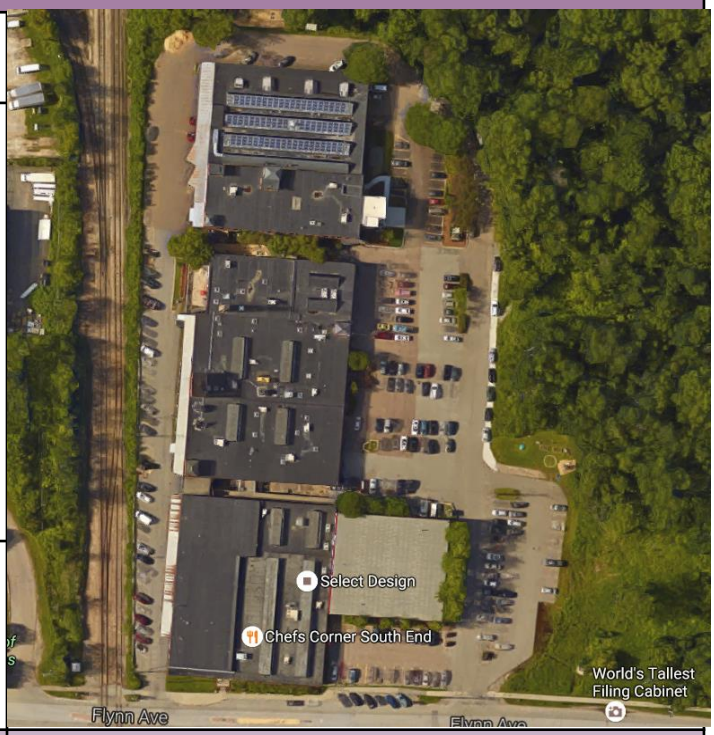
Soils:	No
Access:	Maybe
Land Use:	Maybe
Utilities:	No
Polluted:	Maybe
High WT:	No
Wetlands:	No

Other:

Date: 04/10/15 Assessed by: JSM

ID#: M15

Name: 208 Flynn Ave, west edge of parcel (along railroad)



Concept Description:
Runoff from paved areas and canopy roofs on the west side of 208 Flynn drain west and north toward green space between the lot and railroad. A bioswale (or other linear treatment practice) could potentially be installed in the green space; there is also a limited amount of room at the northwest corner of the parking lot that could potentially be used for detention storage.

Notes/Feasibility:
Daycare facility has outdoor play yard at the north end of the parcel; it would be important to ensure any practice did not interfere with their use of this area. It may be challenging to work within the railroad ROW.

GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	

SIZING INFORMATION	
Drainage Area (ac):	2.60
Impervious Area (ac):	2.50
Practice Area Available (ft^2):	3,000
Existing Head Available?	Y

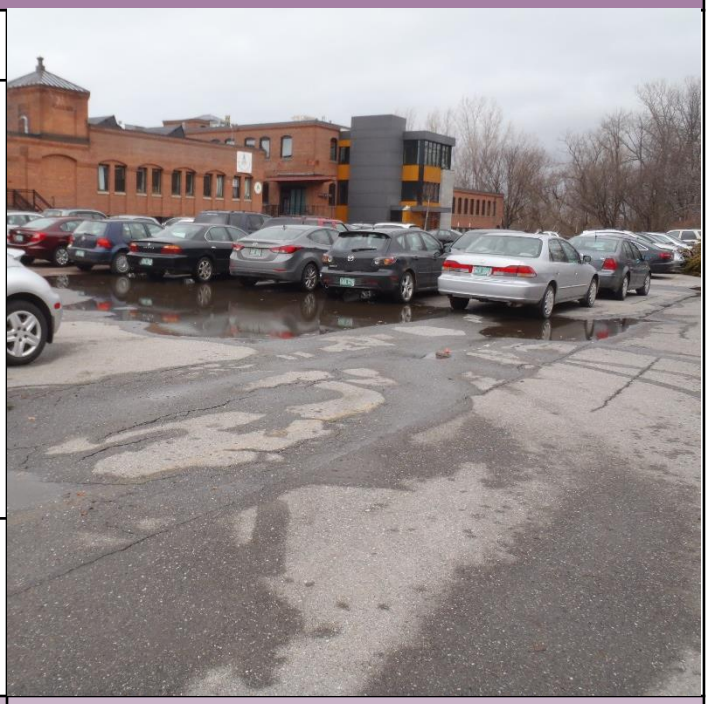
RETROFIT DETAILS	
Project Candidate:	2nd tier
Retrofit of new or existing BMP:	new
Proposed Retrofit Practice 1:	Bioswale
Proposed Retrofit Practice 2:	Dry basin
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	Y	Access:
Recharge:	Y	Land Use:
Demonstration:	N	Utilities:
Repair:	N	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 04/10/15 Assessed by: JSM

ID#: M16

Name: 208 Flynn Ave, north end of parking lot



Concept Description:
Currently stormwater runoff from parking is being diverted to rock-lined swale and conveyed to Englesby Brook. Evidence of erosion in stone-lined channel. Underground storage could be constructed at the northeast corner of the lot. Some runoff from parking lot will be captured and treated in stormwater facility planned for Champlain Parkway.

Notes/Feasibility:
Field inspection found that it would be extremely challenging to convey sufficient runoff volume to the proposed facility.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info:	Project Candidate: N
Ownership:	Retrofit of new or existing BMP:
Land Use Type:	Proposed Retrofit Practice 1:
Land Use Detail:	Proposed Retrofit Practice 2:
Existing BMP on Site?	Non-Structural Controls:
Is site a hotspot?	Non-Structural Other:
Sources/pollutants:	Maintenance Burden:
Soils:	
Use in Retrofit DA:	
SIZING INFORMATION	
Drainage Area (ac):	
Impervious Area (ac):	
Practice Area Available (ft^2):	
Existing Head Available?	

Benefits:	Conflicts:
Storage:	Soils:
Water Quality:	Access:
Recharge:	Land Use:
Demonstration:	Utilities:
Repair:	Polluted:
Reuse:	High WT:
	Wetlands:
Other:	Other:

Date: 04/10/15 Assessed by: JSM

ID#: M17

Name: 288 Flynn Ave/Champlain Pkwy

Concept Description:
Planned Champlain Parkway alignment leaves a modest amount of green space between the roadway and the parking lot for 288 Flynn Ave. Stormwater flows from Pine St can be diverted down Flynn Ave and to this facility, allowing for treatment of a significant volume at this site

Notes/Feasibility:
Concept design maximizes use of available space; unlikely the residents of 288 Flynn Ave would support this level of exposure to the planned Champlain Parkway

GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	

SIZING INFORMATION	
Drainage Area (ac):	31.70
Impervious Area (ac):	13.63
Practice Area Available (ft^2):	30,500
Existing Head Available?	Y

RETROFIT DETAILS	
Project Candidate:	1st tier
Retrofit of new or existing BMP:	new
Proposed Retrofit Practice 1:	Dry basin
Proposed Retrofit Practice 2:	Bioretention
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	Y	Access:
Recharge:	Y	Land Use:
Demonstration:	N	Utilities:
Repair:	N	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 04/10/15 Assessed by: JSM

ID#: M18

Name: Flynn Ave Co-op Parking Lot

Concept Description:
An underground storage facility could be constructed in the parking lot to attenuate flows flow the parking lot and building roofs draining to the west side of the site.

Notes/Feasibility:
Expired permit 1-1087. Area could also potentially be made to flow to M17.

GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	

SIZING INFORMATION	
Drainage Area (ac):	0.42
Impervious Area (ac):	0.30
Practice Area Available (ft^2):	3,000
Existing Head Available?	Y

RETROFIT DETAILS	
Project Candidate:	1st tier
Retrofit of new or existing BMP:	new
Proposed Retrofit Practice 1:	Underground storage
Proposed Retrofit Practice 2:	
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	High

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	N	Access:
Recharge:	N	Land Use:
Demonstration:	N	Utilities:
Repair:	N	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 04/10/15 Assessed by: JSM

ID#: M19

Name: Pine Street Counseling Center

Concept Description:
Install dry basin or possibly bioretention area in north central area of lot to capture flows from roof and parking areas.

Notes/Feasibility:
Expired permit 1-0337

GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	

SIZING INFORMATION	
Drainage Area (ac):	0.80
Impervious Area (ac):	0.48
Practice Area Available (ft^2):	1750
Existing Head Available?	Y

RETROFIT DETAILS	
Project Candidate:	1st tier
Retrofit of new or existing BMP:	New
Proposed Retrofit Practice 1:	Dry basin
Proposed Retrofit Practice 2:	Bioretention
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	moderate

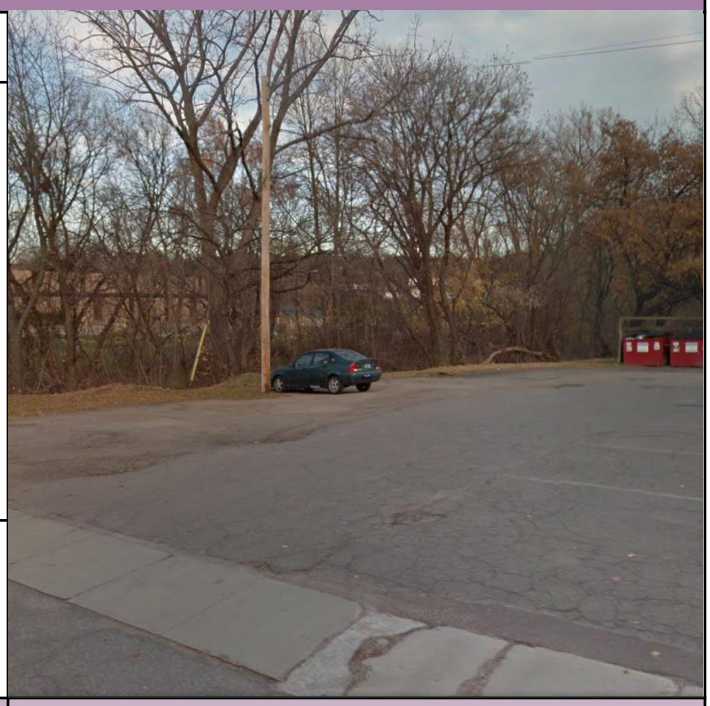
Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	Y	Access:
Recharge:	M	Land Use:
Demonstration:	N	Utilities:
Repair:	N	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 04/10/15 Assessed by: JSM

ID#: M20

Name: Pine Street Deli

Concept Description:
As part of planned renovation of Pine Street Deli, City is requiring improved stormwater management. CAD files were provided by owner's engineer.



Notes/Feasibility:
Although modeled, proposed BMP resulted in 0% change in high flows at watershed outlet and therefore was not included in the Flow Restoration Scenario

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info:	Project Candidate: Proposed
Ownership:	Retrofit of new or existing BMP:
Land Use Type:	Proposed Retrofit Practice 1:
Land Use Detail:	Proposed Retrofit Practice 2:
Existing BMP on Site?	Non-Structural Controls:
Is site a hotspot?	Non-Structural Other:
Sources/pollutants:	Maintenance Burden:
Soils:	
Use in Retrofit DA:	
SIZING INFORMATION	
Drainage Area (ac):	
Impervious Area (ac):	
Practice Area Available (ft^2):	
Existing Head Available?	

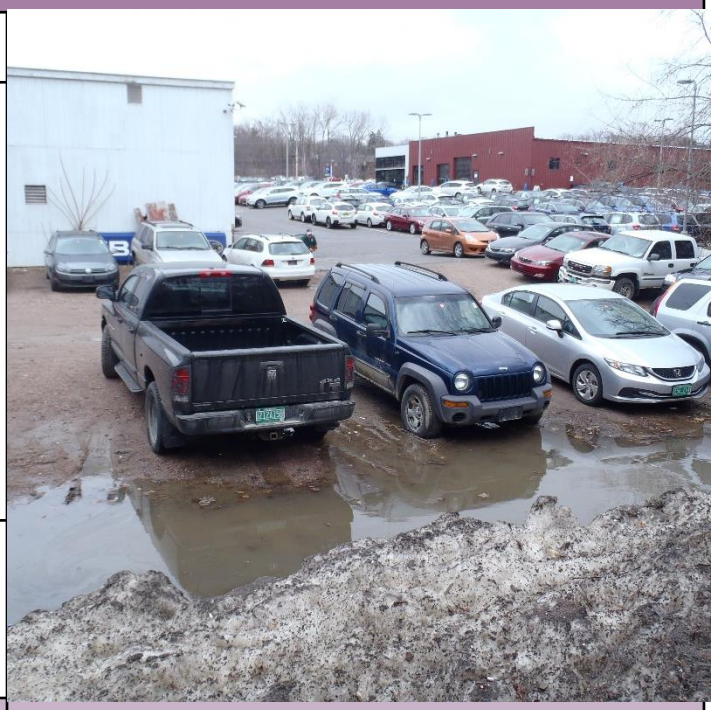
Benefits:	Conflicts:
Storage:	Soils:
Water Quality:	Access:
Recharge:	Land Use:
Demonstration:	Utilities:
Repair:	Polluted:
Reuse:	High WT:
	Wetlands:
Other:	Other:

Date: 04/10/15 Assessed by: JSM

ID#: M21

Name: Burlington Subaru

Concept Description:
Underground storage could be installed along back edge of Burlington Subaru dealership to manage parking lot runoff.



Notes/Feasibility:
As shown in photo, area is currently used for vehicle parking/storage, therefore any practice would need to be underground, increasing the cost

GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	

SIZING INFORMATION	
Drainage Area (ac):	1.58
Impervious Area (ac):	1.56
Practice Area Available (ft^2):	3,920
Existing Head Available?	Y

RETROFIT DETAILS	
Project Candidate:	2nd tier
Retrofit of new or existing BMP:	New
Proposed Retrofit Practice 1:	Underground storage
Proposed Retrofit Practice 2:	
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	Y	Access:
Recharge:	N	Land Use:
Demonstration:	N	Utilities:
Repair:	Y	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 04/10/15 Assessed by: JSM

ID#: M22

Name: Rice High School

Concept Description:
Runoff from Rice High School currently flows to O8 Pond, but a nested treatment practice could be built on-site at the school to create additional storage capacity in the O8 Pond.

Notes/Feasibility:
Green space available both immediately adjacent to parking lot, as well as along access road.

GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	

SIZING INFORMATION	
Drainage Area (ac):	4.85
Impervious Area (ac):	2.12
Practice Area Available (ft^2):	4,350
Existing Head Available?	Y

RETROFIT DETAILS	
Project Candidate:	2nd tier
Retrofit of new or existing BMP:	New
Proposed Retrofit Practice 1:	Dry basin
Proposed Retrofit Practice 2:	
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	Y	Access:
Recharge:	Y	Land Use:
Demonstration:	N	Utilities:
Repair:	N	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 04/10/15 Assessed by: JSM

ID#: M23

Name: Harrison Ave., near Central Ave.

Concept Description:
Install "green street" style practice in green space between road and sidewalk along Harrison Ave.

Notes/Feasibility:
Also considered opportunity to shunt flow to existing green space to north of Harrison Ave, but would not have head to allow gravity flow.

GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	

SIZING INFORMATION	
Drainage Area (ac):	0.38
Impervious Area (ac):	0.31
Practice Area Available (ft^2):	875
Existing Head Available?	Y

RETROFIT DETAILS	
Project Candidate:	3rd tier
Retrofit of new or existing BMP:	
Proposed Retrofit Practice 1:	Swale
Proposed Retrofit Practice 2:	Dry basin
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	Y	Access:
Recharge:	Y	Land Use:
Demonstration:	Y	Utilities:
Repair:	N	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 04/10/15 Assessed by: JSM

ID#: M24

Name: Sears Ln

Concept Description:
Looked for opportunities to capture runoff from Sears Ln and several adjacent structures; much of the runoff from this area flows north to the Pine St Barge Canal. Area was determined to be inefficient/unsuitable for retrofit based on field inspection.

Notes/Feasibility:
Estimated drainage area may be generous.

GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	

SIZING INFORMATION	
Drainage Area (ac):	0.77
Impervious Area (ac):	0.34
Practice Area Available (ft^2):	1,300
Existing Head Available?	

RETROFIT DETAILS	
Project Candidate:	N
Retrofit of new or existing BMP:	
Proposed Retrofit Practice 1:	
Proposed Retrofit Practice 2:	
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	

Benefits:	Conflicts:
Storage:	Soils:
Water Quality:	Access:
Recharge:	Land Use:
Demonstration:	Utilities:
Repair:	Polluted:
Reuse:	High WT:
	Wetlands:
Other:	Other:

Date: 04/10/15 Assessed by: JSM

ID#: M25

Name: Overlake Condos

Concept Description:
Opportunity to capture the front (eastern half of the roofs of most residential building, as well as garages and parking area in a centralized facility at the southern end of the complex. May require elimination of 2 parking spot to have sufficient area for the treatment practice.

Notes/Feasibility:
Expired permit 2-0789. Northern portion of complex appears to drain overland to Prospect St where it likely enters the combined sewer system

GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	

SIZING INFORMATION	
Drainage Area (ac):	1.19
Impervious Area (ac):	0.73
Practice Area Available (ft^2):	2,200
Existing Head Available?	

RETROFIT DETAILS	
Project Candidate:	1st tier
Retrofit of new or existing BMP:	New
Proposed Retrofit Practice 1:	Dry basin
Proposed Retrofit Practice 2:	Bioretention
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	Y	Access:
Recharge:	M	Land Use:
Demonstration:	N	Utilities:
Repair:	N	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 04/10/15 Assessed by: JSM

ID#: M26

Name: Champlain Parkway

Concept Description:
Stormwater management will be provided as part of the Champlain Parkway. Based on current plans for the roadway, a gravel wetland will be constructed to the west of the alignment in this area and will also provide treatment for a portion of the parking lot at 208 Flynn Ave. The timeline for the Champlain Pkwy is outside the purview of this project and therefore it has not been included as part of the FRP.

Notes/Feasibility:
Were the Champlain Pkwy project to be abandoned there is an opportunity for a large, centralized facility on this site that could be expanded to include M17.

GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	

SIZING INFORMATION	
Drainage Area (ac):	1.67
Impervious Area (ac):	1.23
Practice Area Available (ft^2):	3,500
Existing Head Available?	Y

RETROFIT DETAILS	
Project Candidate:	Proposed
Retrofit of new or existing BMP:	New
Proposed Retrofit Practice 1:	Gravel wetland
Proposed Retrofit Practice 2:	
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	Y	Access:
Recharge:	N	Land Use:
Demonstration:	Y	Utilities:
Repair:	N	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

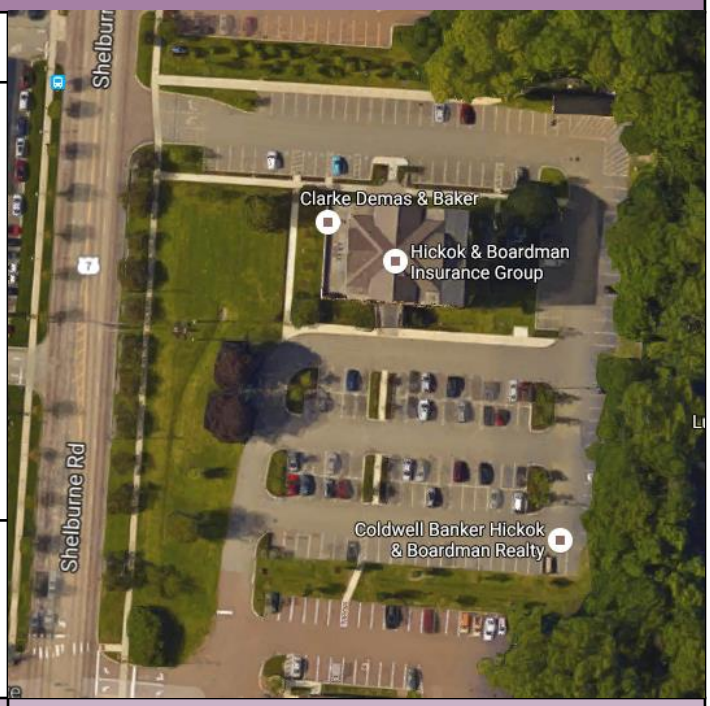
Date: 04/10/15 Assessed by: JSM

ID#: M27

Name: Hickock & Boardman

Concept Description:
Retrofit of this property was completed as part of redevelopment and includes a suite of green stormwater infrastructure practices: grass swales, disconnection, infiltration/Stormtech.

Notes/Feasibility:
Permit 6145-INDS. No changes considered.



GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	

SIZING INFORMATION	
Drainage Area (ac):	1.29
Impervious Area (ac):	0.92
Practice Area Available (ft^2):	1,300
Existing Head Available?	Y

RETROFIT DETAILS	
Project Candidate:	Constructed
Retrofit of new or existing BMP:	Existing
Proposed Retrofit Practice 1:	
Proposed Retrofit Practice 2:	
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	Y	Access:
Recharge:	Y	Land Use:
Demonstration:	N	Utilities:
Repair:	N	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 11/16/15 Assessed by: JSM

ID#: M28

Name: Walgreens

Concept Description:
Stormwater runoff from existing parking lot at Walgreens and travel lane that connects through to Bacon St is unmanaged. The concept design for this site would involve underground storage to manage parking lot runoff.

Notes/Feasibility:
Travel lane is unpaved and there was evidence of significant sediment transport to Bacon St. Runoff from this area ultimately ends up in the O8 Pond

GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	

SIZING INFORMATION	
Drainage Area (ac):	2.94
Impervious Area (ac):	2.61
Practice Area Available (ft^2):	3,900
Existing Head Available?	Yes

RETROFIT DETAILS	
Project Candidate:	3rd tier
Retrofit of new or existing BMP:	New
Proposed Retrofit Practice 1:	Underground storage
Proposed Retrofit Practice 2:	
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	Y	Access:
Recharge:	N	Land Use:
Demonstration:	N	Utilities:
Repair:	N	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 11/16/15 Assessed by: JSM

ID#: M29

Name: Champlain Co-op, 810 Pine St.

Concept Description:
Concept would include underground storage due to surface site constraints; practice would be used to manage runoff from roofs and parking areas.

Notes/Feasibility:
City infrastructure mapping suggests significant underground utility constrains are also likely present on this site.

GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	

SIZING INFORMATION	
Drainage Area (ac):	1.59
Impervious Area (ac):	1.09
Practice Area Available (ft^2):	3,900
Existing Head Available?	Y

RETROFIT DETAILS	
Project Candidate:	3rd tier
Retrofit of new or existing BMP:	New
Proposed Retrofit Practice 1:	Underground storage
Proposed Retrofit Practice 2:	
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	Y	Access:
Recharge:	N	Land Use:
Demonstration:	N	Utilities:
Repair:	N	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 04/10/15 Assessed by: JSM

ID#: M30

Name: Pizzigalli Properties, 462 Shelburne Rd.

Concept Description:
As part of redevelopment effort, permeable pavement was installed in parking bays in this lot.

Notes/Feasibility:
Permeable paver walk at E. end of S. lot was considered too small to effectively include in VTBMPDSS.

GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	

SIZING INFORMATION	
Drainage Area (ac):	0.64
Impervious Area (ac):	0.58
Practice Area Available (ft^2):	11,800
Existing Head Available?	Y

RETROFIT DETAILS	
Project Candidate:	Constructed
Retrofit of new or existing BMP:	Existing
Proposed Retrofit Practice 1:	Permeable pavement
Proposed Retrofit Practice 2:	
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	Y	Access:
Recharge:	Y	Land Use:
Demonstration:	N	Utilities:
Repair:	N	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 11/16/15 Assessed by: JSM

Englesby Brook, VT

Retrofit Summary Sheet

ID#: M31

Name: 847 Pine St redevelopment

Concept Description:
A rain garden/bioretention facility was constructed at this site as part of a redevelopment effort.

Notes/Feasibility:

GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	

SIZING INFORMATION	
Drainage Area (ac):	0.45
Impervious Area (ac):	0.23
Practice Area Available (ft^2):	2,100
Existing Head Available?	

RETROFIT DETAILS	
Project Candidate:	Constructed
Retrofit of new or existing BMP:	Existing
Proposed Retrofit Practice 1:	Bioretention
Proposed Retrofit Practice 2:	
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	Y	Access:
Recharge:	Y	Land Use:
Demonstration:	N	Utilities:
Repair:	N	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 11/16/15

Assessed by: JSM

ID#: M32

Name: Route 7/South Willard St roundabout

Concept Description:
A roundabout is planned for the intersection of Route 7 and So Willard St. As part of the project, underground storage with a sand filter has been proposed. The timeline for this project is outside the purview of the City and therefore is has not been included as part of the FRP.

Notes/Feasibility:
Permit 6756-INDS. Stormwater runoff from this area ultimately flows to the O8 Pond.

GENERAL SITE INFORMATION	
Site Contact Info:	
Ownership:	
Land Use Type:	
Land Use Detail:	
Existing BMP on Site?	
Is site a hotspot?	
Sources/pollutants:	
Soils:	
Use in Retrofit DA:	

SIZING INFORMATION	
Drainage Area (ac):	0.73
Impervious Area (ac):	0.60
Practice Area Available (ft^2):	1,300
Existing Head Available?	Y

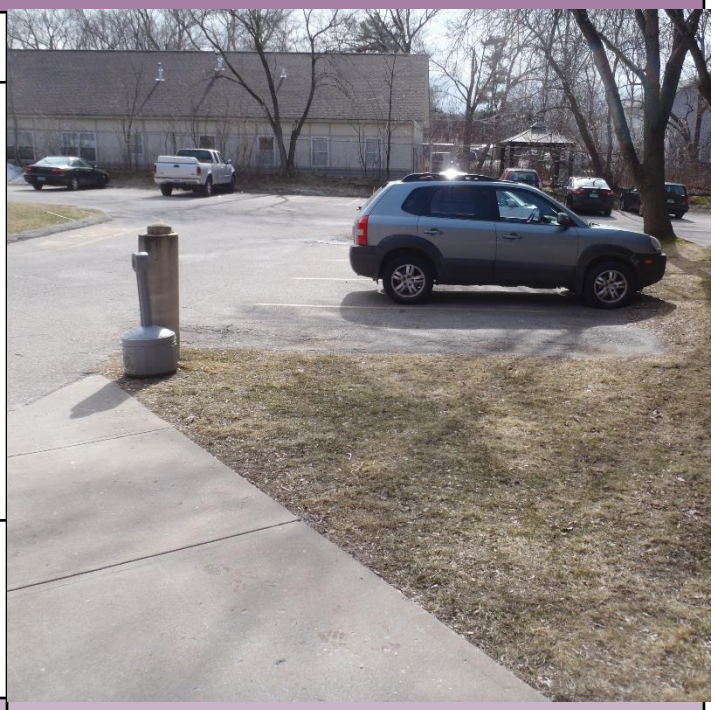
RETROFIT DETAILS	
Project Candidate:	Proposed
Retrofit of new or existing BMP:	
Proposed Retrofit Practice 1:	
Proposed Retrofit Practice 2:	
Non-Structural Controls:	
Non-Structural Other:	
Maintenance Burden:	

Benefits:		Conflicts:
Storage:	Y	Soils:
Water Quality:	Y	Access:
Recharge:	N	Land Use:
Demonstration:	N	Utilities:
Repair:	N	Polluted:
Reuse:	N	High WT:
		Wetlands:
Other:		Other:

Date: 11/16/15 Assessed by: JSM

ID#: M33

Name: Champlain Apartments, 817 Pine St.



Concept Description:
Concept for this location is a combined underground storage facility that would also serve M29. See that summary sheet for additional detail.

Notes/Feasibility:
Expired permit 2-0999.

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info:	Project Candidate: N
Ownership:	Retrofit of new or existing BMP:
Land Use Type:	Proposed Retrofit Practice 1:
Land Use Detail:	Proposed Retrofit Practice 2:
Existing BMP on Site?	Non-Structural Controls:
Is site a hotspot?	Non-Structural Other:
Sources/pollutants:	Maintenance Burden:
Soils:	
Use in Retrofit DA:	
SIZING INFORMATION	
Drainage Area (ac):	
Impervious Area (ac):	
Practice Area Available (ft^2):	
Existing Head Available?	

Benefits:	Conflicts:
Storage:	Soils:
Water Quality:	Access:
Recharge:	Land Use:
Demonstration:	Utilities:
Repair:	Polluted:
Reuse:	High WT:
	Wetlands:
Other:	Other:

Date: 03/29/16 Assessed by: JSM/HA

ID#: M34

Name: Crescent Terrace

Concept Description:
Given the neighborhood constraints, no location for a single centralized facility was identified. There are opportunities into this area for lot-scale disconnection and small bioretention/rain garden practices.

Notes/Feasibility:
Expired permit 2-1052

GENERAL SITE INFORMATION	RETROFIT DETAILS
Site Contact Info:	Project Candidate: N
Ownership:	Retrofit of new or existing BMP:
Land Use Type:	Proposed Retrofit Practice 1:
Land Use Detail:	Proposed Retrofit Practice 2:
Existing BMP on Site?	Non-Structural Controls:
Is site a hotspot?	Non-Structural Other:
Sources/pollutants:	Maintenance Burden:
Soils:	
Use in Retrofit DA:	
SIZING INFORMATION	
Drainage Area (ac):	
Impervious Area (ac):	
Practice Area Available (ft^2):	
Existing Head Available?	

Benefits:	Conflicts:
Storage:	Soils:
Water Quality:	Access:
Recharge:	Land Use:
Demonstration:	Utilities:
Repair:	Polluted:
Reuse:	High WT:
	Wetlands:
Other:	Other:

Date: 03/29/16 Assessed by: JSM/HA

APPENDIX B: REVIEW OF EXPIRED STORMWATER PERMITS IN THE ENGLESBY BROOK WATERSHED

STONE ENVIRONMENTAL

535 Stone Cutters Way / Montpelier / VT / 05602 / USA
802.229.4541 / info@stone-env.com / www.stone-env.com

MEMO

March 29, 2016

To: Megan Moir, CPESC, CPSWQ

From: Julie Moore, PE

Stone Project No. 16-030

Subject: Englesby Watershed Expired Stormwater Permit Review

Stone completed a field assessment of each of the five systems in the Englesby Brook watershed with expired stormwater permits. These systems are identified in Table 1, below.

Table 1: Expired Stormwater Permits in the Englesby Brook Watershed

Permit Number	Project Name	Permit Issued
1-0337	Howard Mental Health Services	3/4/1982
1-1087	Flynn Ave Coop Housing	9/15/1992
2-0789	Overlake Condominiums	11/24/1988
2-0999	Champlain Apartments	4/20/1982
2-1052	Crescent Terrace	12/20/1985

In general, the permits are written rather broadly with few enforceable items and typically focus on curb-and-gutter system elements, including catch basins. Further, the site plans available in the permit files tend of lack the specificity and level of detail provided for systems constructed post-2002. A brief summary of our observations is provided below, including recommendations for completing any actions that would be required to bring the facilities into compliance.

1-0337, Howard Mental Health Services, 300 Flynn Ave.

Permit covers the discharge of roof drainage via "stone lined ditch in natural drainage swale" to Englesby Brook; parking lot runoff does not appear to be regulated under the permit. During the site visit we found that the stone lined ditch is not well defined. The majority of flow leaving the site and discharging to Englesby Brook appears to occur via subsurface drain pipes not included in the permit; four outfalls were identified during the site visit that are not included in the City's stormwater GIS layer, including one of which appears to divert water directly from Pine Street. In order to bring this facility into compliance with its existing permit, the stone lined ditch would need to be improved. In addition, the source of the water draining to each of the subsurface drains should be confirmed. As part of the Englesby Brook Flow

Restoration Plan (FRP), a potential retrofit was identified for managing runoff from parking lots draining to the existing green space behind 300 Flynn Ave.

Photo 1: Presumed Location of Natural Drainage Swale and Unknown Subsurface Drainage Outlet

1-1087, Flynn Ave Coop Housing, 288 Flynn Ave

Permit covers the discharge of stormwater runoff from roofs and paved parking lots following treatment "via grass-lined swales, through rip-rapped areas at the top of bank of Englesby Ravine, and via overland flow across vegetated terrain…" During the site visit we found that there are grass-lined to the north of the apartment complex which appear to convey stormwater runoff to rip-rapped areas that lead down to the ravine. We also noted during our site visit that the parking lot catch basin indicated in the City's stormwater GIS layer does not exist. This site was generally found to be in compliance with its permit. As part of the Englesby Brook FRP, a significant potential retrofit was identified for in the green space immediately to the west of 288 Flynn Ave. and to the east of the proposed Champlain Parkway alignment.

Photo 2: Rip-rapped Slope Behind 288 Flynn Ave

2-0789, Overlake Properties, 545 Prospect St

Permit covers the discharge of stormwater runoff from paved road and parking lots after treatment by "passage through trap catch basins" to a stone bed and "approximately 1000 feet overland flow through wooded area and grassed drainage swale to the stream." During the site visit we observed that sediment levels in the catch basin were below the invert of the outlet pipe, but that the outlet lacked a trap or hood. In addition, we observed a PVC pipe passing through the basin (not draining into). The stone bed noted in the permit could not be located. A 15" concrete pipe and 6" PVC pipe were both located approximately 100 feet southeast of Prospect St, which discharged into a small wetland area (see Photo 3). We followed the outflow from the wetland area for a considerable distance but could not see where it connected to the stream; a portion of the flow appeared to cross Prospect Pkwy. In order to bring this facility into compliance with its existing permit, a trap or hood would need to be fitted onto the catch basin outlet and a stone bed or other

energy dissipation measures added at the outlet. In addition, it would also be prudent to determine the source of the water passing through the catch basin in the PVC pipe in order to guard against a potential illicit discharge were it to carry something other than stormwater. As part of the Englesby Brook FRP, a potential retrofit was identified for managing runoff in the green space at the southern end of the parcel.

Photo 3: Looking Downstream from the 15" Concrete Pipe Outfall

2-0999, Champlain Apartments, 817 Pine St

Permit covers the discharge of stormwater runoff from paved parking areas after "passage through trap catch basins and a 1500 gallon septic tank in series" before being piped directly to the city stormwater system. During our site visit we observed that sediment in all three parking lot catch basins has accumulated above the invert of the outlet pipe. No access manholes (or similar) for the septic tank were observed; the septic tank may be located under the dumpster cage in the south west corner of the parking lot (see Photo 4). The catch basin indicated in the City's stormwater GIS layer in the green space/courtyard area near the building could not be located. In order to bring this facility into compliance with its existing permit, the catch basins would need to be serviced and a trap or hood would fitted onto each of the outlets. In addition, the septic tank should be formally located and likely serviced. As part of the Englesby Brook FRP, a potential retrofit was identified along/underneath the western edge of the parking lot.

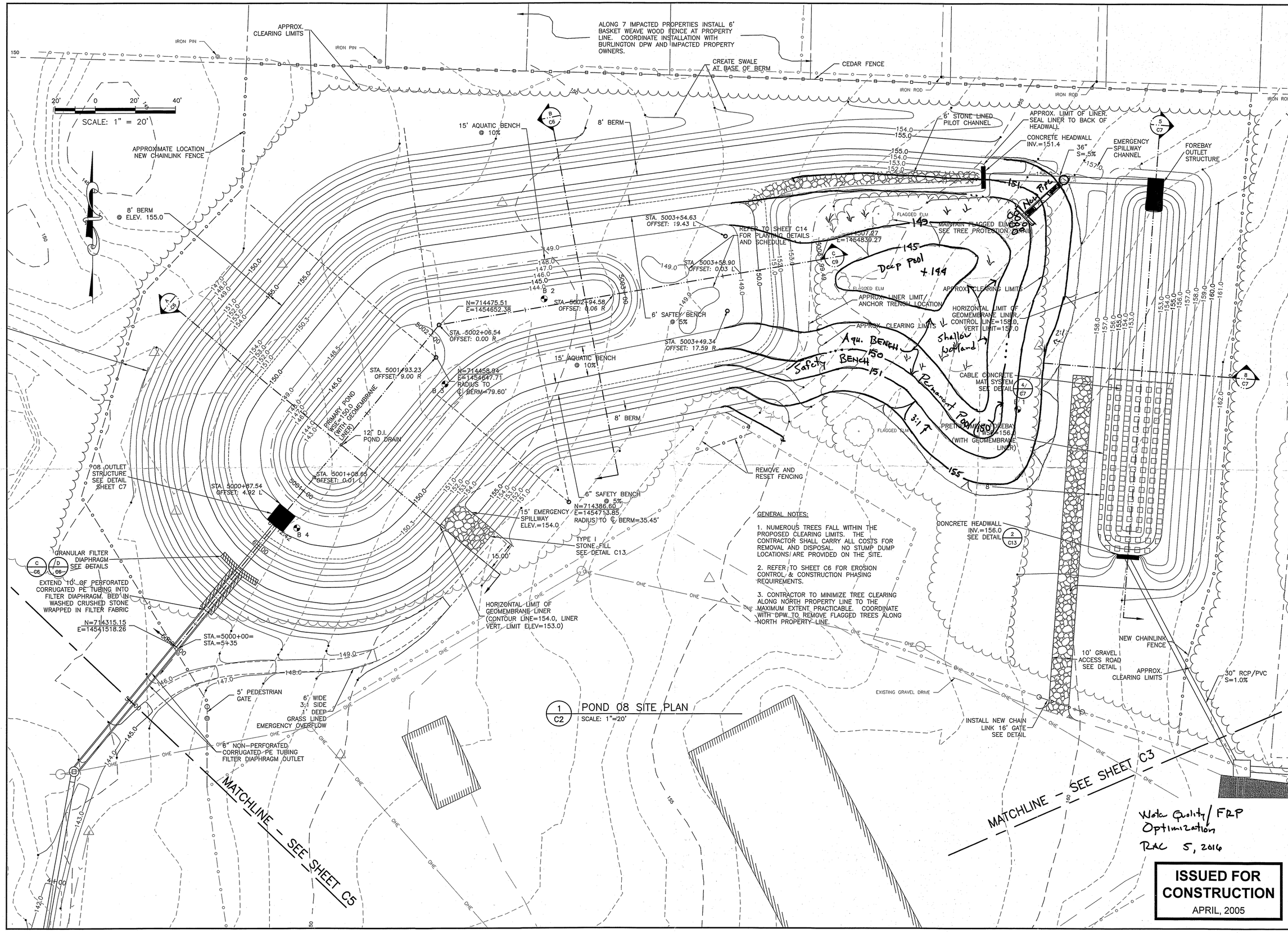
Photo 4: Looking East toward Dumpster Cage and Probable Septic Tank Location

2-1052, Crescent Terrace

Permit covers the discharge of stormwater runoff from the paved roads and driveways, roofs and natural terrain, via overland flow across "grassed and/or vegetated terrain to a catch basin and rip-rapped outfall, prior to discharge to an unnamed tributary…" During our site visit we observed that sediment levels in the three catch basins indicated in the City's stormwater GIS layer were below the invert of the outlet pipes. The vegetated terrain and rip-rapped outfall were observed as described in the permit. This site was generally found to be in compliance with its permit. No specific retrofit for this site is currently contemplated at part of the Englesby Brook FRP, however this is a part of a neighborhood generally being evaluated for targeted disconnection.

Photo 5: Large Stone Rip-Rap at Outfall

APPENDIX C: FLOW RESTORATION BMP CONCEPT DESIGNS



1 C2 POND 08 SITE PLAN
SCALE: 1"=20'

ISSUED FOR CONSTRUCTION
APRIL, 2005

Dufresne-Henry
South Burlington, Vermont
Tel. (802) 864-0223 • • Fax (802) 864-0165
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Rev.	Description	By	Date
1	ISSUED FOR REBID	JTM	3/2005

VERMONT

ENGLESBY WATERSHED IMPROVEMENTS

POND 08 SITE PLAN

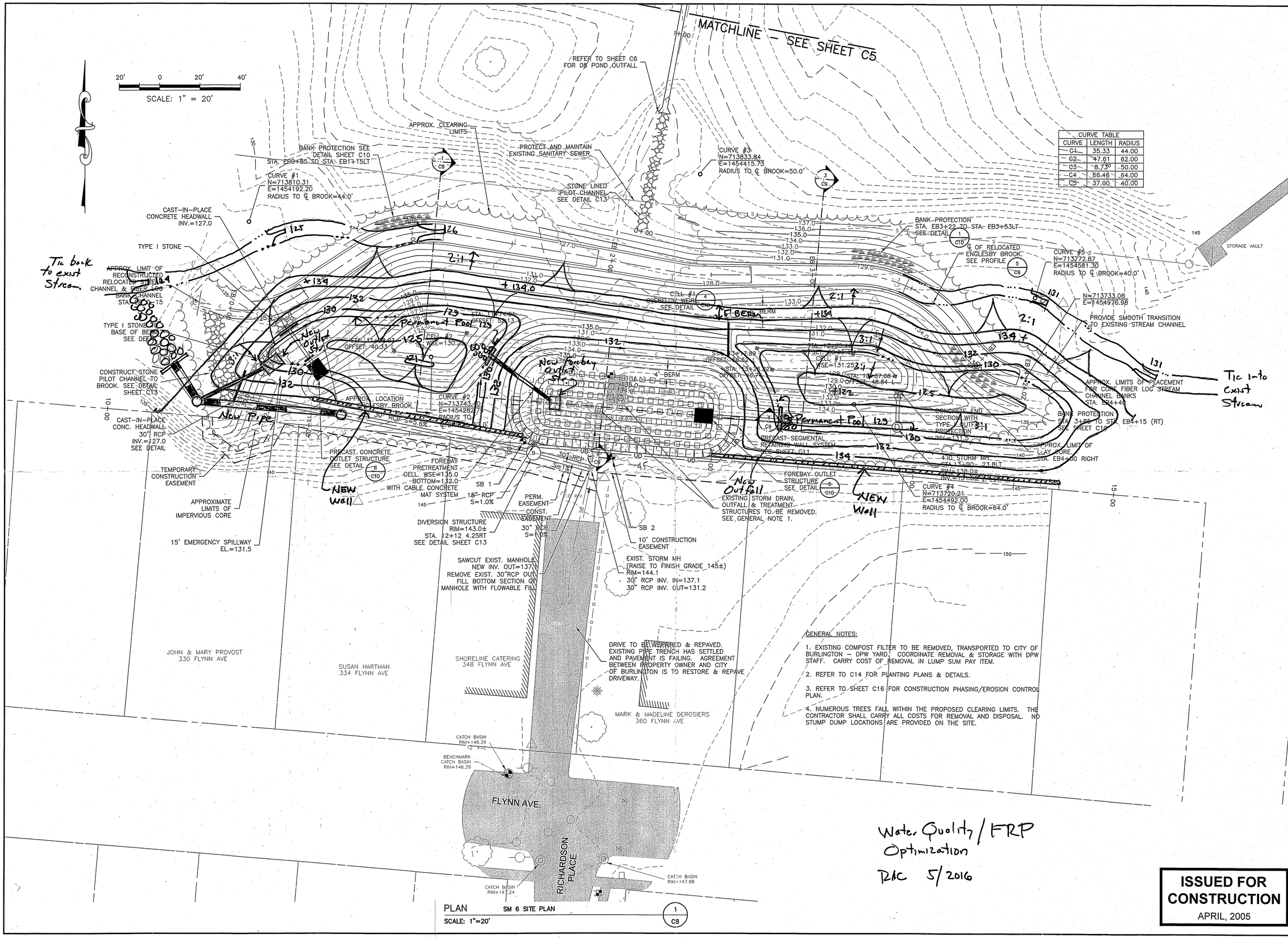
BURLINGTON

Project No.	6523004
Proj. Manager	JTM
Proj. Designer	JTM
Drawn By	JSK
Checked By	
Scale	1"=20'
Approved	
Date	APRIL, 2005

C2

Sheet 3 of 18

D 6523004



CURVE TABLE		
CURVE	LENGTH	RADIUS
C1	35.33	44.00
C2	47.61	62.00
C3	8.73	50.00
C4	66.46	64.00
C5	37.00	40.00

GENERAL NOTES:

1. EXISTING COMPOST FILTER TO BE REMOVED, TRANSPORTED TO CITY OF BURLINGTON – DPW YARD. COORDINATE REMOVAL & STORAGE WITH DPW STAFF. CARRY COST OF REMOVAL IN LUMP SUM PAY ITEM.
2. REFER TO C14 FOR PLANTING PLANS & DETAILS.
3. REFER TO SHEET C16 FOR CONSTRUCTION PHASING/EROSION CONTROL PLAN.
4. NUMEROUS TREES FALL WITHIN THE PROPOSED CLEARING LIMITS. THE CONTRACTOR SHALL CARRY ALL COSTS FOR REMOVAL AND DISPOSAL. NO STUMP DUMP LOCATIONS ARE PROVIDED ON THE SITE.

PLAN SM 6 SITE PLAN (1 / C8)
SCALE: 1"=20'

Water Quality / FRP Optimization
RAC 5/2016

ISSUED FOR CONSTRUCTION
APRIL, 2005

Dufresne-Henry
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Tel. (802) 864-0223 • Fax (802) 864-0165
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Rev.	Description	By	Date
1	ISSUED FOR REBID	JTM	3/2005

VERMONT

ENGLESBY WATERSHED IMPROVEMENTS

SM 6 SITE PLAN

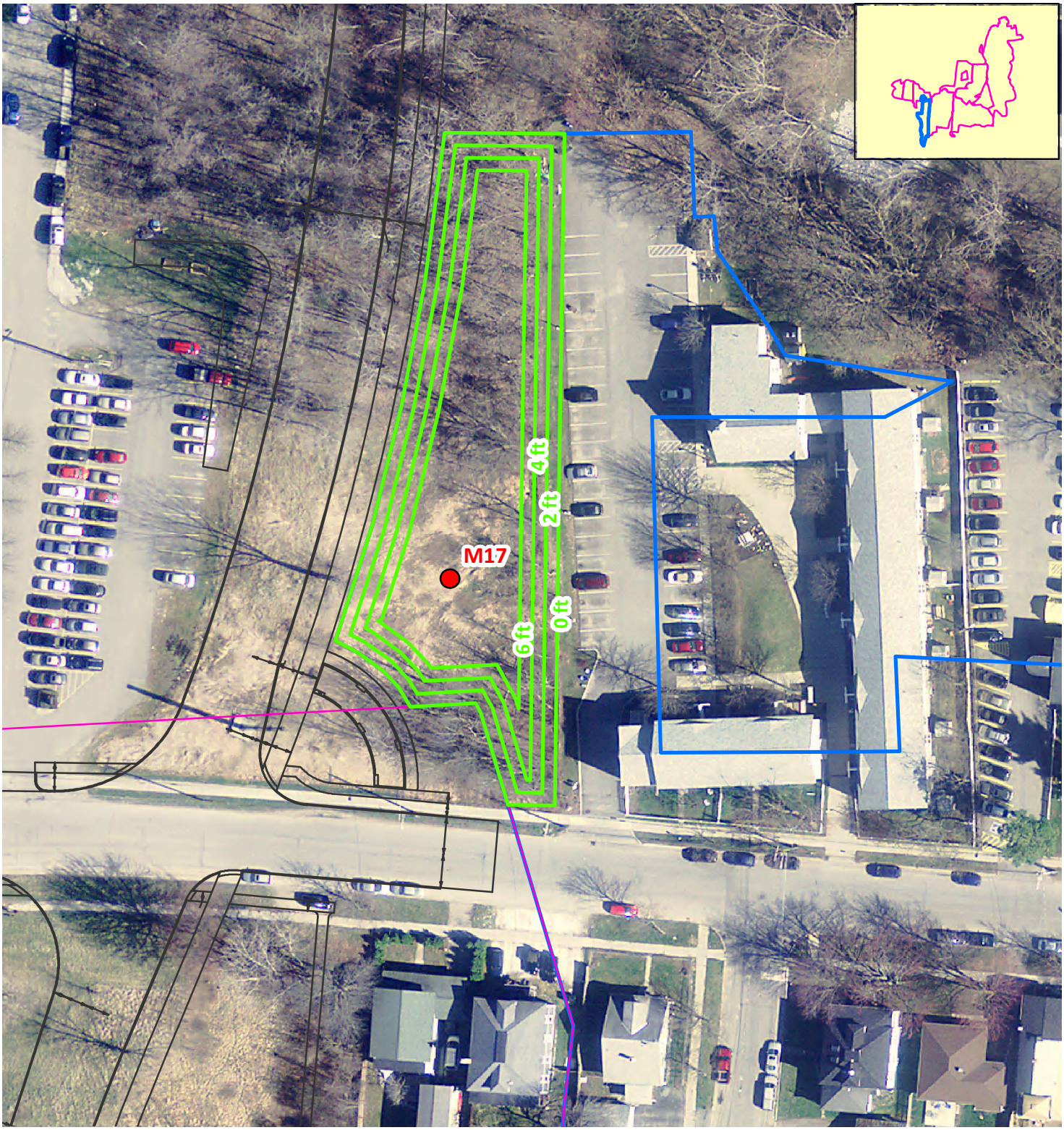
BURLINGTON

Project No.	6523004
Proj. Manager	JTM
Proj. Designer	JTM
Drawn By	JSK
Checked By	
Scale	AS SHOWN
Approved	
Date	APRIL, 2005

C8

Sheet 9 of 18

D 6523004



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Legend

- Proposed M17 BMP
- Proposed M17 Depth Contours
- Proposed M17 Drainage Area
- Proposed Champlain Parkway
- Sub-watersheds

N

Feet
0 25 50

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Sandwich, MA • 02563
Tel: 508-833-6600 • Fax: 508-833-3150 • www.horsleywitten.com

M17 Concept Design

Date: 7/22/2016

Figure C.1

Path: O:\Proj-14\WRM\14-171 Englesby Brook FRP\GIS\MapDocuments\PresentationsAndReports\FR_concepts\Englesby_Concept_14193_M18.mxd

Legend

- Proposed M18 BMP
- Proposed M18 Depth Contours
- Proposed M18 Drainage Area
- Sub-watersheds

N

0 25 50 Feet

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M18 Concept Design

Date: 8/2/2016

Figure C.4

Path: \\CIFS1\netdrv-o\Proj-14\WRM\14-171 Englesby Brook FRP\GIS\MapDocuments\PresentationsAndReports\FR_concepts\Englesby_Concept_14193_M19.mxd

Legend

- Proposed M19 BMP
- Proposed M19 Depth Contours
- Proposed M19 Drainage Area
- Sub-watersheds

N

0 25 50 Feet

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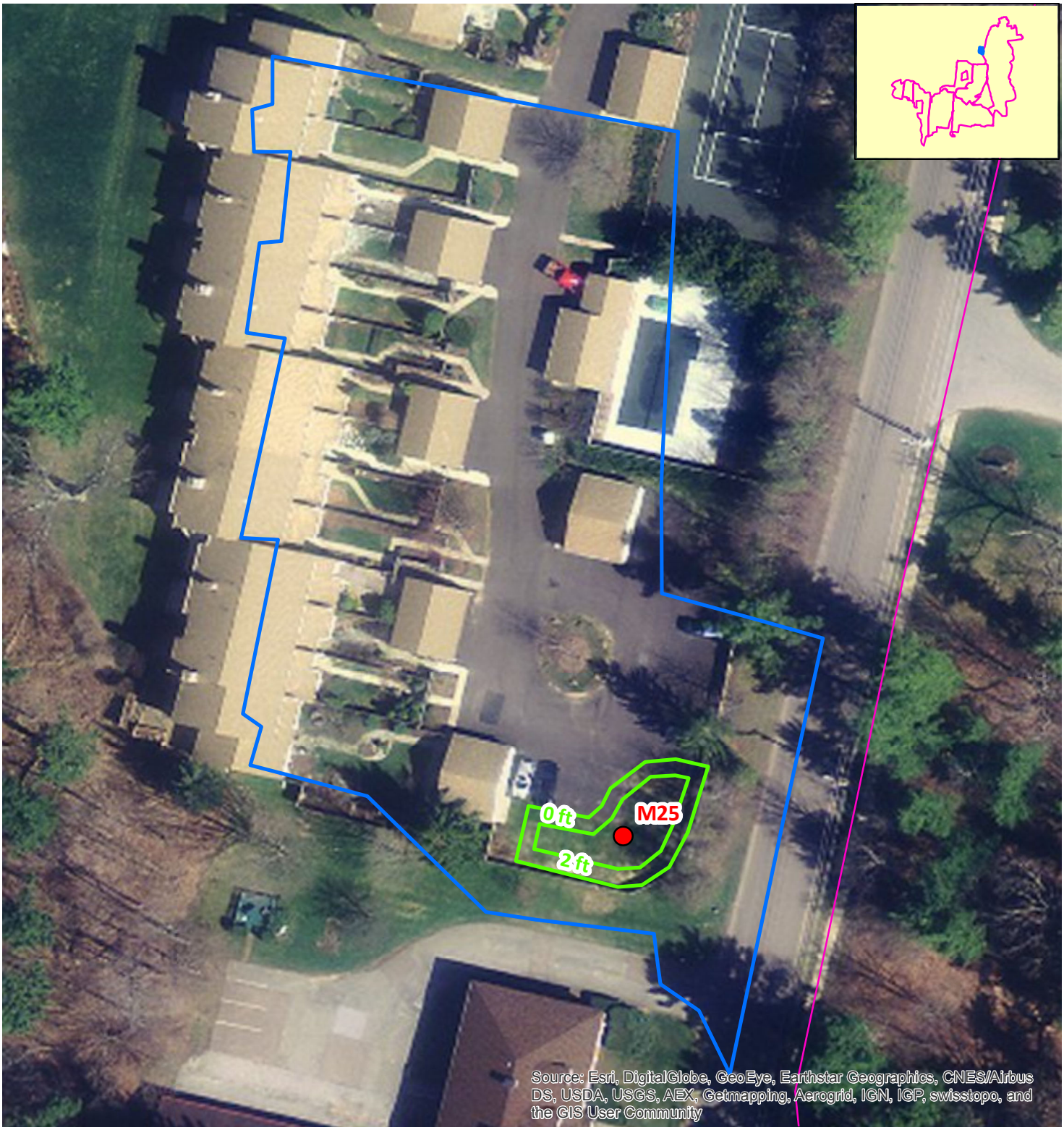
M19 Concept Design

Date: 7/29/2016

Figure C.3



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Legend

- Proposed M25 BMP
- Proposed M25 Depth Contours
- Proposed M25 Drainage Area
- Sub-watersheds

N

0 25 50 Feet

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M25 Concept Design

Date: 8/2/2016

Figure C.6

Path: O:\Proj-14\WRM\14-171 Englesby Brook FRP\GIS\MapDocuments\PresentationsAndReports\FR_concepts\Englesby_Concept_14193_M31.mxd

Legend

- Proposed M31 BMP
- Proposed M31 Depth Contours
- Proposed M31 Drainage Area
- Sub-watersheds

N

0 25 50 Feet

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M31 Concept Design

Date: 8/2/2016

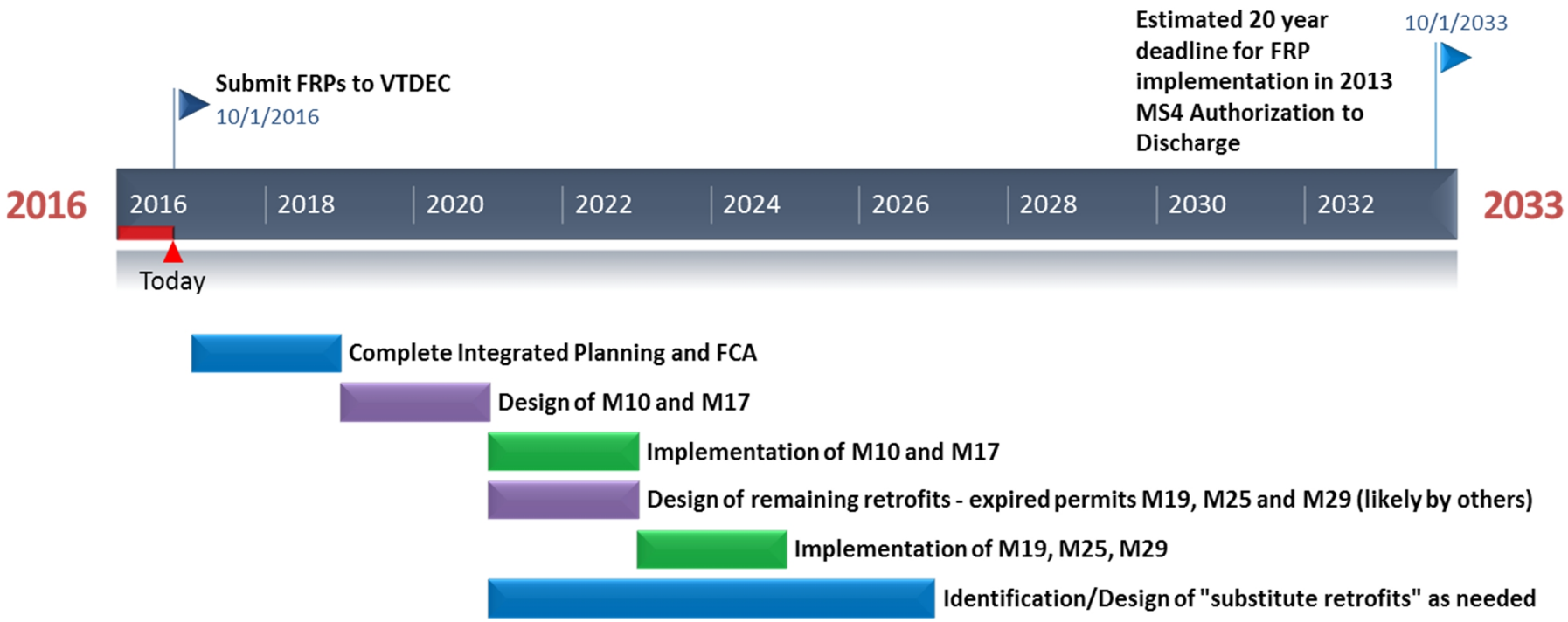
Figure C.7

APPENDIX D: M10 AND M17 OPINIONS OF PROBABLE COST

Table D.1: M10, O8-Pond Retrofit, Cost Estimate

Item #	Item Description	Unit	Unit Price	Amount	Total Price
1	36" RCP Pipe	LF	$ 75	30	$ 2,250
2	6. Dia Manhole	each	$ 7,500	1	$ 7,500
3	New Headwall	each	$ 5,000	1	$ 5,000
4	Excavation and Material Disposal	CY	$ 40	3600	$ 144,000
5	Extend PVC Liner.	SF	$ 3	18200	$ 54,600
6	Rip Rap	CY	$ 70	50	$ 3,500
7	Access Drive	LS	$ 5,000		$ -
8	Sidewalk Replacement	SF	$ 10		$ -
9	Concrete Curb Replacement	LF	$ 30		$ -
10	Rock and Boulder Excavation	CY	$ 200	0	$ -
11	Erosion Control	LS	$ 10,800	1	$ 10,800
12	Landscaping	LS	$ 10,000	1	$ 10,000
13	Mobilization and Miscellaneous Work (10%)	LS	$ 23,800	1	$ 23,800
				SUB-TOTAL:	**$ 261,450**
	Design and Construction Engineering (20%)	LS	$52,300	1	$ 52,300
	Contingency (15%)	LS	$47,100	1	$ 47,100
				TOTAL:	**$ 360,850**

Table D.2: M17, 288 Flynn Ave/Champlain Parkway, Cost Estimate

Item #	Item Description	Unit	Unit Price	Amount	Total Price
1	24" RCP Pipe	LF	$ 65	300	$ 19,500
2	4' Dia Catch Basin	each	$ 3,000	2	$ 6,000
3	New Drainage Manhole	each	$ 5,000	1	$ 5,000
4	6' x 6' Detention Pond Outlet Structure	each	$ 15,000	1	$ 15,000
5	Excavation and Material Disposal	CY	$ 1,100	150	$ 165,000
6	Rip Rap	CY	$ 70	50	$ 3,500
7	Access Drive	LS	$ 5,000	1	$ 5,000
8	Sidewalk Replacement	SF	$ 10	100	$ 1,000
9	Concrete Curb Replacement	LF	$ 30	20	$ 600
10	Rock and Boulder Excavation	CY	$ 200	0	$ -
11	Erosion Control	LS	$ 11,000	1	$ 11,000
12	Landscaping	LS	$ 10,000	1	$ 10,000
13	Mobilization and Miscellaneous Work (10%)	LS	$ 24,200	1	$ 24,200
				SUB-TOTAL:	**$ 265,800**
	Design and Construction Engineering (20%)	LS	$53,200	1	$ 53,200
	Contingency (25%)	LS	$66,500	1	$ 66,500
				TOTAL:	**$ 385,500**

APPENDIX E: DRAFT SCHEDULE