

TOWN OF WILLISTON
ALLEN BROOK FLOW RESTORATION PLAN
DRAFT REPORT



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Prepared for:



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I. INTRODUCTION

The State of Vermont Agency of Natural Resources Department of Environmental Conservation (VTDEC) has issued a Draft National Pollutant Discharge Elimination System (NPDES) General Permit 3-9014 (2010) for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4). The draft permit requires MS4 communities such as the Town of Williston that drain to waters that are impaired for stormwater runoff to develop a Flow Restoration Plan (FRP) for these waters. Allen Brook is currently included on the Vermont Agency of Natural Resources (VANR) Stormwater Impaired List (EPA's approved 303(d) List). In anticipation of the finalized permit requirements, the Town of Williston and the Vermont Agency of Transportation (VTrans) have been working cooperatively to develop an Allen Brook FRP. The goal of this effort has been to identify best management practices (BMPs) that will achieve compliance with the flow targets set forth in the Total Maximum Daily Load (TMDL) for Allen Brook approved in September 2008.

II. BACKGROUND

The purpose of the FRP is to identify stormwater treatment practices (including retrofits to existing practices) that will be recommended for implementation in an effort to achieve established EPA approved Total Maximum Daily Load (TMDL) Targets for Allen Brook and eventually allow Allen Brook to be removed from the State's Stormwater Impaired List.

In doing so, MS4 Permittees discharging to Allen Brook will be working towards compliance with the NPDES General Permit FRP requirements which has been drafted and is anticipated to be re-issued in 2012. The draft permit requirement states that all MS4 Permittees (Municipal and Non-Traditional MS4s) create a FRP for all stormwater impaired waters within their jurisdiction. The Allen Brook Impaired Watershed is located entirely within the Williston Municipal limits and is the only Stormwater Impaired Waterway needing a FRP in Williston.

Understanding that the Vermont Agency of Transportation (VTrans) has been designated a Non-Traditional MS4 and that VTrans Highway right-of-way (I-89, US 2 & US 2A) and facilities (I-89 Welcome Centers) comprise approximately 16% (63 acres) of the impervious surface within the Allen Brook Watershed, the development of this FRP includes coordination with VTrans as a partner in this FRP effort. In doing so, VTrans and the Town of Williston have entered into a Memorandum of Understanding to jointly develop and implement the Allen Brook FRP.

The Town of Williston has been investigating the possibilities of how to fund stormwater improvements and maintenance of existing systems. This FRP and the Town's ongoing efforts to develop a Stormwater Management Program (SWMP) will intensify the process to educate and inform the community of the importance of water quality in the Allen Brook watershed as well as other important waterways throughout the Town.

As of the draft MS4 permit date of issuance, the Vermont Department of Environmental Conservation (VTDEC) has EPA approved stormwater TMDLs for the Allen Brook impaired waters. This TMDL includes an aggregate waste load allocation (WLA) which applies to numerous watershed sources. No specific-MS4 WLAs were specified. The flow targets were set forth in the *Total Maximum Daily Load to Address Biological Impairment for Allen Brook* (September 2008).

The flow targets were set based upon the exceedance flow where the % designates the % of time that stream flows are equal to or greater than them. For the Allen Brook watershed the high flow (Q0.3%) and low flow (Q95%) values were evaluated for the TMDL targets. The TMDL incorporated a reduction FRP regulatory target for only the Q0.3 value. This was set in consultation with the EPA since it was determined that it was not appropriate to include low flow targets (Q95) as an actual allocation in the TMDL.

However, the restoration of base flows is important to the health of the biological communities and thus it is a VTDEC management objective to increase the low flow Q95. This management objective is not being addressed as part of the FRP, but the associated results have been included for use in future SWMP planning and updates to the expired permits. The use of infiltration and other BMP practices which improve the Q95 will be encouraged by Town of Williston and VTrans during implementation of the FRP practices where practical. As the MS4 entities, the Town of Williston and VTrans will discuss potential VT DEC Engineering Feasibility Analysis updates for Allen Brook once the final MS4 permit is issued. Additionally, the Town of Williston has enacted Planning & Zoning requirements unrelated to the FRP which provide for development practices which would improve these flows.

Table 1: Allen Brook TMDL Target Percentages

TMDL Target (Waste Load Allocation including future growth)	Q0.3	Q95
	-3.30%	7.40%

III. IDENTIFICATION OF REQUIRED CONTROLS

A. Expired Stormwater Discharge Permits

VTDEC provided a current listing of expired stormwater discharge permits that discharged to the impaired Allen Brook. These permitted sites are comprised of a mix of residential and commercial developments throughout the watershed. As developed parcels, these locations have increased impervious areas and the potential to negatively contribute to the Allen Brook Q0.3 high flow volumes. Each of these sites were previously permitted under VTDEC stormwater discharge regulations which required various BMP practices to be implemented as conditions of construction. These BMP's however would not meet current 2002 Vermont Stormwater Manual requirements and in some cases were never built. To bring these permits into compliance, these sites would need to meet current 2002 standards or perform an engineering feasibility analysis in accordance with VT DEC procedures. In either event, these expired permit sites are stormwater runoff contributors to Allen Brook which should be addressed as part of this FRP. The Town and VTrans agreed that these developments should bear the initial burden of their permit requirements. The ancillary benefit that these upgrades would have on the FRP targets would then be reviewed and any shortfall in meeting the targets would be addressed in the development of other BMP's by the Town or VTrans.

Each of these sites has been reviewed to determine their ability to meet the channel protective volume (CPv) criteria of the 2002 Vermont Stormwater Manual requirements. The CPv criteria requires 12 hours extended detention of post-developed 1-year, 24-hour rainfall event in coldwater fish habitats (24 hr. detention in warm water fish habitats). For the Allen Brook watershed as a coldwater fish habitat, the 12 hour detention requirement would govern. This criteria was utilized as part of the FRP evaluation since the 1 year 24-hour rainfall event is approximately the storm event associated with the Q0.3 stream flow. With this being the 2002 criteria closest to the Q0.3 which requires TMDL reduction, the expired permits sites were modeled to include detention of the CPv. The associated detention ponds were then utilized in evaluating the entire watershed.

The above evaluation started with a field visit to the expired permits sites to determine that adequate space was available on site to implement improvements to their current BMPs. These field visits found that the sites may have adequate space for the implementation of an improvement. However, detailed hydrologic analysis, property research, engineering or other necessary studies were not performed to confirm ability to meet the 2002 requirements at each site. Thus it is entirely feasible that any particular site may have restraints that may limit the ability to fully meet the 2002 standards. This determination would require the expired permittees to procure engineering services to perform an Engineering Feasibility Analysis which is outside the realm of the FRP. Of additional note is that since the Allen Brook FRP is focused on the CPv, other larger storm events and potential BMP requirements as outlined in the 2002 standards were not evaluated during any of the site visits.

With the assumption that each expired discharge permit site has at least adequate space to implement additional BMPs, an evaluation was undertaken to determine what the Allen Brook flow impacts would be once these sites were in compliance with the 2002 CPv standards. To address this as it relates to the FRP, the type of BMP device that would be utilized at each site is secondary to the resulting flow reductions that would result. Thus hydrocad models provided by the VTDEC of the exiting sites were utilized to develop a CPv detention pond for each site. The CPv ponds were sized to provide 12 hour detention of non-infiltrated runoff from the 1 year storm. Each of these ponds were modeled to determine the approximate size of a detention pond BMP that would meet the 2002 CPv criteria. The resulting detention pond BMPs with associated drainage area mapping were then given to the VTDEC to incorporate into their Allen Brook Best Management Practice Support System (BMPDSS) model and determine their affect in meeting the high flow TMDL target. These model runs are summarized in section D below.

Table 2 outlines the discharge permit sites identified by VTDEC as being expired and requiring updates to meet the 2002 standards. The associated modeled BMP detention pond and associated drainage area were utilized to perform the initial BMPDSS model runs. As the FRP is implemented, this listing of expired permits would be reviewed annually to determine if additional expired permit sites and any required upgrades should be incorporated. These would be identified in the SWMP annual report.

Table 2: Expired Stormwater Discharge Permits

Permit No	Permittee	Development Name	Location	Drainage Area (acre)	Modeled CPv Detention Pond Size (acre-feet)
1-0513	Taft Farms Comm. and Res. Park	Taft Farm	Talcott Rd	9.45	0.57
1-0664	South Ridge Homeowners Association	South Ridge Estates	South Ridge Rd	70.12	2.49
1-0792	Sterling Construction Inc.	Turtle Crossing	Brookside Dr	9.32	0.15
1-0963	Williston Elder Housing Inc.	Whitney Hill	Whitney Hill Rd	9.39	0.29
1-1047	Northshore Development, Inc.	Pinecrest Village	Timothy Way	9.56	0.41
1-1052	Retrovest Associates	The Commons at Williston	Commons Rd	23.90	0.70
1-1217	Indian Ridge	Indian Ridge	Isham Circle	16.00	0.98
1-1258	Heritage Meadows Homeowner Association	Heritage Meadows	Old Stage Rd	16.05	0.75
1-1272 s/n 2	Brennan Woods	Brennan Woods	Hanon Dr	79.34	1.60
1-1507	Andre & Patricia Martel	Coyote Run	Coyote La/Raven Circle	31.33	1.35
2-0231	Leo Compagna & Thomas Blanchette	Pleasant Acres	Pleasant Acres Dr	11.48	0.70
2-0954	Allenbrook Meadows	Allenbrook Meadows	LeFebvre Lane	5.48	0.01
2-1107	Meadow Ridge Homeowners Association	Meadow Ridge	Meadow Ridge Rd	133.45	5.80
2-1146	Hickock & Boardman Referral Services Inc.	Old Stage Estates	Southfield Dr/Paddock Lane	22.90	1.05
2-1180	Ralph Goodrich	Golf Links	Tamarack Dr/Hillcrest La	11.19	0.90
2-1190	Meadowrun Homeowners Association	Meadowrun-Forest Run	Meadowrun Rd	6.10	0.14
2-1191	Sterling Construction	Turtle Pond	Turtle Pond Rd	7.95	0.85
HURRICANE LANE					
1-1078	Hillside East Commercial Park	Lots 10, 11, 15	Hurricane Lane	2.51	0.25
1-1205	Hillside East Commercial Park	Lot 7	Hurricane Lane	2.15	0.16

Permit No	Permittee	Development Name	Location	Drainage Area (acre)	Modeled CPv Detention Pond Size (acre-feet)
1-1245	Hillside East Commercial Park	Lots 16 & 17	Hurricane Lane	9.64	0.55
1-1301	Hillside East Commercial Park	Lots 12, 13, 13A	Hurricane Lane	1.72	0.17
2-1172	Hillside East Commercial Park	Access Road	Hurricane Lane	2.23	0.12

B. Town of Williston Parcel Best Management Practices

The Town of Williston as the MS4 permittee for the Allen Brook watershed has also identified parcels which would have the potential for the installation of stormwater best management practices. These parcels were chosen based upon the ownership of the property by the Town, location within Allen Brook subwatersheds, space available for a BMP practice, and ability to capture larger drainage areas.

The first location identified for a BMP was to the south and behind the Town offices located off of U.S. Route 2. This parcel location is currently undeveloped meadowland which is occasionally hayed. The BMP practice is intended to be installed near the south side of the parcel where it abuts Interstate I-89. From this location the BMP is situated to capture the drainage area of a portion of I-89 and the wooded areas to the south. The runoff from this drainage area enters the site via I-89 culvert crossings.

This BMP location has been modeled as a detention/retention pond with a 1.50 acre-feet of storage at the 1 year 24-hour rainfall event flows.

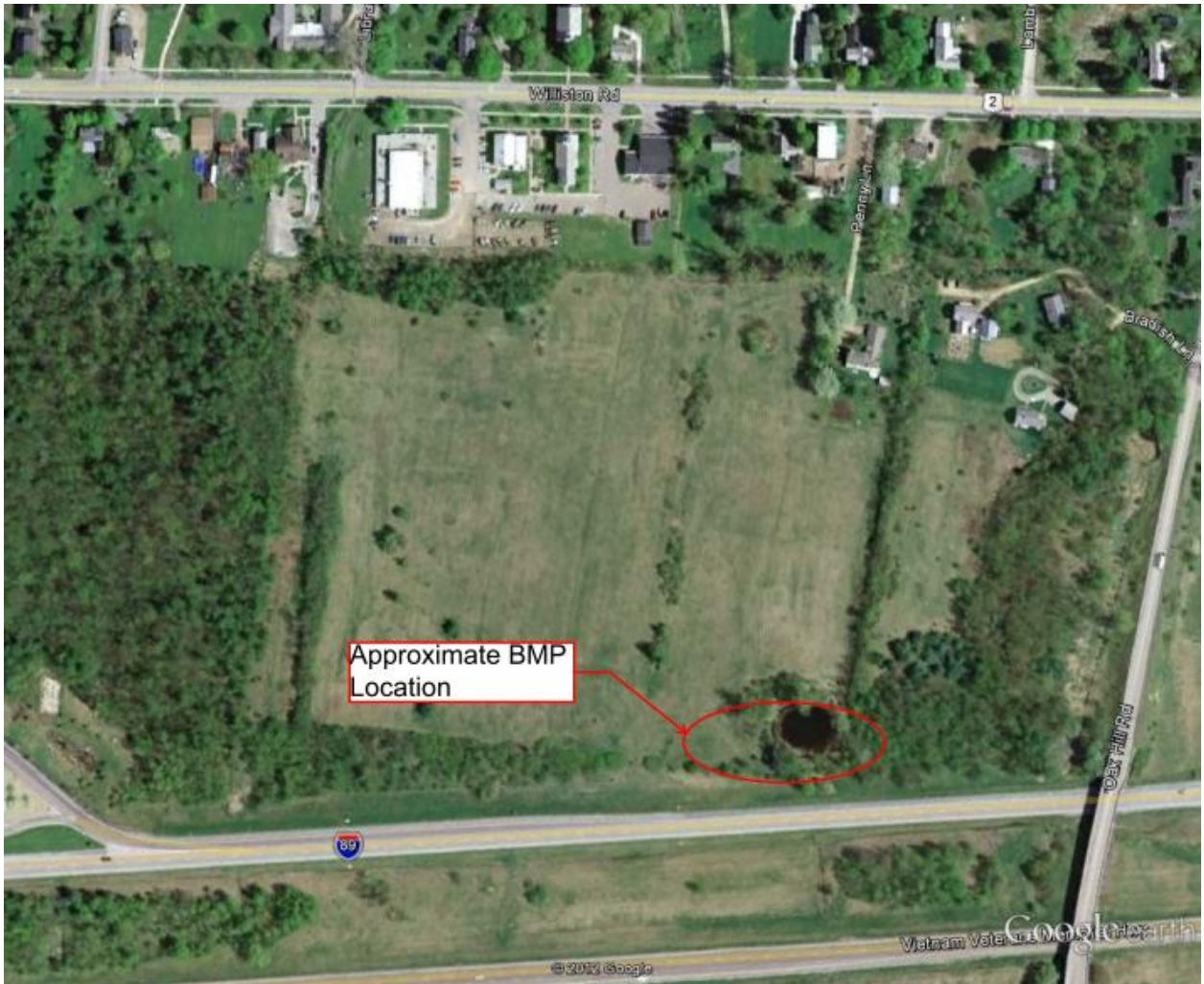


Figure 1: Williston Parcel Behind Town Offices

The second location identified for a BMP was for a parcel between U.S Route 2 and Interstate I-89. This parcel location is currently undeveloped and for portions it is utilized as farmland. The BMP practice is intended to be installed near the south side of the parcel where it abuts Interstate I-89. From this location the BMP is situated to capture the drainage area of a portion of I-89, Hurricane Lane and the wooded areas to the south. The runoff from this drainage area enters the site via multiple I-89 culvert crossings. Implementation of this BMP would potentially require collaboration with VTrans for work within the Interstate Right-of-Way to direct stormwater flows to the practice.

This BMP location has been modeled as a detention/retention pond with a 2.40 acre-feet of storage at the 1 year 24-hour rainfall event flows.



Figure 2: Williston Parcel between US Route 2 and I-89

C. VTrans Interstate 89 Best Management Practices

VTrans as the non-traditional MS4 permittee in the Allen Brook watershed has also identified locations which would have the potential for the installation of stormwater best management practices. These locations were chosen based upon being in the I-89 ROW, location within Allen Brook subwatersheds, space available for a BMP practice, and ability to capture larger drainage areas.

The first location that VTrans identified was the Interstate I-89 Welcome Center. This location was developed by the Vermont Department of Buildings and General Services under a land lease from VTrans. The development is covered by stormwater discharge general permit No. 1-1401 which has an expiration date of March 31, 2005. Implementation of a BMP at this location will require a collaborative effort between these two state agencies.

The development of this site under this discharge permit incorporated stormwater management practices including grass swales, stormwater piping, and a detention pond. As this site was developed prior to the 2002 Vermont Stormwater Manual requirements update, the channel protective volume (CPv) criteria was not incorporated. Thus this location was updated for the

FRP modeling to include a CPv addition to its detention pond. The CPv portion of the BMP has been modeled to be a detention/retention pond with an 0.85 acre-feet of storage at the 1 year 24-hour rainfall event flows.

The second and third locations that VTrans identified were the modification of existing Interstate culvert and catch basin crossings located in the median between the northbound and southbound lanes. Adjacent to these existing culvert crossings, the grades would be modified to create shallow infiltration/detention practices. The first section of median area to be modified (Median A&B) is located between Exit 12 and the Williston Welcome Center. The second section of median area to be modified (Median C-G) is located adjacent to South Road.



Figure 3: Williston and VTrans BMP Locations

D. VTDEC BMPSS Watershed Model Runs

The flow targets for Allen Brook (Table 1) were set forth in the *Total Maximum Daily Load to Address Biological Impairment for Allen Brook* (September 2008). As described above the Allen Brook TMDL target for high flow is Q0.3 = -3.30%. The management objective for low flow Q95 = 7.40%

TMDL targets are expressed in % change in flow. To assess the effects of various management options on watershed flow, the Vermont Department of Environmental Conservation (VTDEC) has developed a watershed model for the Allen Brook watershed using the Vermont Best Management Practice Decision Support System (BMPDSS). For modeling purposes, percent reductions in flow are compared to the flow under base conditions, which for the purpose of this exercise are considered to be the conditions of the watershed prior to the adoption of the 2002 Vermont Stormwater Management Manual. Therefore, any BMPs that were built prior to the adoption of the manual are included in the base scenario.

In addition to a “base scenario” model run, VTDEC has updated the Allen Brook watershed model to reflect development and BMPs that have been built since the adoption of the 2002 manual. The hydrologic benefits from these BMPs are counted as credit towards the TMDL target.

In anticipation of the of the new requirements under the proposed MS4 permit, Dubois & King Consulting Engineers, representing the Town of Williston and VTrans, provided VTDEC with preliminary designs for upgraded and new BMPs. VTDEC then added these treatment practices to the BMPDSS to assess the change in flows (Table 3).

Table 3: VTDEC BMPDSS Model Results

Model Run	Q0.3		Q95	
	Cumulative % Change in flow	% of TMDL FRP target	Cumulative % Change in flow	% of TMDL management objective
Current Development	-0.29%	9%	-0.47%	-6%
Expired Permit Site Upgrades	-2.03%	62%	-0.47%	-6%
Proposed BMPs for MS4 owned properties (VTrans & Town Parcels)	-4.10%	124%	-0.43%	-6%

Explanation of VTDEC Model Results:

- **Current Development:** This model scenario represents the current development of the watershed, based on best available information.
- **Expired Permit Upgrades:** This model iteration includes upgrades to expired permitted systems, as presented to representatives of the Town of Williston, VTrans, and Dubois & King at an October 21st, 2011 meeting at the Town of Williston offices as well as expired permits along Hurricane Lane in Williston.
- **Proposed BMPs for MS4 owned properties (VTrans & Town Parcels) – Proposed BMPs** described above for the Town of Williston and VTrans properties. These were incorporated since the previous model iterations failed to meet the TMDL target.

The above VTDEC model results for the identified BMPs exceed the Q0.3 target of -3.30% by approximately 24%. This factor of safety has been utilized for this FRP to address unknowns at the identified BMP locations which may reduce the affect that they would have on the high flow Q0.3 model results once designed and fully implemented. With the factor of safety set as such, it should not be necessary to identify additional potential sites throughout implementation of the FRP.

As described previously, the above results for the low flow Q95 have been shown for SWMP planning purposes only since the current Allen Brook TMDL does not have a Q95 FRP target requirement.

IV. DESIGN AND CONSTRUCTION SCHEDULE

In accordance with the draft MS4 permit, a FRP requires a design and construction schedule for the identified BMPs. This schedule must provide for implementation of the BMPs within a 10-year period beginning from the effective date of the MS4 General Permit re-issuance. The permittees will implement the identified BMPs upon the schedule as set forth in the Final MS4 General Permit once issued.

V. FINANCIAL PLAN

In accordance with the draft MS4 permit, a FRP requires a financing plan that estimates the costs for implementing the FRP and describes a strategy for financing the plan.

The implementation costs for the proposed BMPs for the Allen Brook FRP have been calculated utilizing the VTDEC BMPDSS planning cost rates as outlined in a memorandum from Tetra Tech, Inc. dated October 30, 2007. These cost rates are at a base year 2000 and have been updated to account for inflation to year 2012 utilizing a 2.5% rate of inflation. This calculation incorporates the following for calculation of the construction costs for BMPs

Total Cost = Installation Cost [I] + Land Cost [L] + Fixed Cost [F]

Detention BMP

I = \$5 per ft³ which inflated at 2.5% to year 2012 rates = \$6.72 per ft³

I = \$292,723 per acre-foot

Infiltration BMP

I = \$6 per ft³ which inflated at 2.5% to year 2012 rates = \$8.07 per ft³

I = \$351,529 per acre-foot

L = \$0 for our BMPs since no property is anticipated to be purchased

F = \$2000 for design & permitting

Table 4: BMP Implementation Costs

Permit No	Development Name	Detention Pond Size (acre-feet)	Implementation Costs
1-0513	Taft's Farm	0.57	\$168,852
1-0664	South Ridge Estates	2.49	\$730,880
1-0792	Turtle Crossing	0.15	\$45,908
1-0963	Whitney Hill	0.29	\$86,890
1-1047	Pincrest Village	0.41	\$122,016
1-1052	The Commons at Williston	0.70	\$206,906
1-1217	Indian Ridge	0.98	\$288,869
1-1258	Heritage Meadows	0.75	\$221,542
1-1272 s/n 2	Brennan Woods	1.60	\$470,357
1-1507	Coyote Run	1.35	\$397,176
2-0231	Pleasant Acres	0.70	\$206,906
2-0954	Allenbrook Meadows	0.01	\$5,220
2-1107	Meadow Ridge	5.80	\$1,699,793
2-1146	Old Stage Estates	1.05	\$309,359
2-1180	Golf Links	0.90	\$265,451
2-1190	Meadowrun-Forest Run	0.14	\$42,981
2-1191	Turtle Pond	0.85	\$250,815
1-1078	Lots 10, 11, 15	0.25	\$75,181
1-1205	Lot 7	0.16	\$48,836
1-1245	Lots 16 & 17	0.55	\$162,998
1-1301	Lots 12, 13, 13A	0.17	\$51,763
2-1172	Access Road	0.12	\$37,127
TOTAL EXPIRED PERMIT SITES			\$5,895,825

Permit No	Development Name	Detention Pond Size (acre-feet)	Implementation Costs
TOWN PARCELS			
	Town Offices Fields	1.50	\$441,085
	North of I-89	2.40	\$704,535
TOTAL WILLISTON PARCEL BMPS			\$1,145,620
VTRANS I-89 BMPS			
1-1401	Williston Rest Area	0.85	\$250,815
	Median A	5040 CF	\$42,673
	Median B	3390 CF	\$29,354
	Median C	3642 CF	\$31,388
	Median D	3705 CF	\$31,898
	Median E	5090 CF	\$43,080
	Median F	4902 CF	\$41,556
	Median G	5846 CF	\$49,180
TOTAL VTRANS I-89 BMPS			\$519,943

The above construction cost estimates provide a planning level estimate for overall FRP planning. Individual sites and BMP's will require additional review through design and engineering feasibility analysis to confirm if their costs are higher or lower than these. For instance, many of the expired permitted sites already have structural practices that may make implementation easier or even potentially harder. The MS4 SWMP annual report should look to update these costs periodically based additional available information.

Funding for the implementation of the FRP will be addressed by the Town and VTrans for their individual identified BMPs only. For Town parcel BMPs, funding will be evaluated as part of the Williston Town General Fund. For VTrans I-89 BMPs, funding will be incorporated as part of the State Transportation budget which also has the potential for Federal Aid Highway funding. As private entities, the controlling interests at the expired permit sites would primarily be responsible for funding their stormwater improvements. However, if grants become available, these will be utilized to provide funding for any of the above as able.

VI. REGULATORY ANALYSIS

In accordance with the draft MS4 permit, a FRP requires a regulatory analysis that identifies and describes what, if any additional regulatory authorities, including authority to require low impact development BMPs, that the permittees (Williston and VTrans) will need to effectively implement the FRP.

Currently, stormwater runoff within the Allen Brook watershed is regulated primarily by the VTDEC, Town of Williston, and VTrans. VTDEC regulates new developments through issuance of Stormwater Discharge Permits with technical requirements as outlined in the 2002 Vermont Stormwater Manual. The Town of Williston requires improved stormwater practices and low impact development for new developments through the Town bylaws. VTrans regulates stormwater discharges to the state Right of Way through 19V.S.A.1111 “Permitted use of the right-of-way”.

The implementation of the Allen Brook FRP does not require a modification to the above current regulatory framework. Since the Town and VTrans have identified BMPs for the expired permit sites, Town parcels, and VTrans I-89 locations which reduce Allen Brook flows beyond the TMDL target, no additional regulatory authority would be required as part of this FRP.

VII. IDENTIFICATION OF REGULATORY ASSISTANCE

In accordance with the draft MS4 permit, a FRP requires an identification of regulatory assistance the permittees (Williston and VTrans) will need in order to effectively implement the FRP (e.g. use of residual designation authority by the Secretary) Stormwater discharges that the permitting authority determine requires stormwater controls based on waste load allocations that are part of TMDLs that address the pollutants of concern is a discharge category that may be residually designated under 40 CFR 122.26 (a)(9)).

Since the Town and VTrans have identified BMPs for the expired permit sites, Town parcels, and VTrans I-89 locations which reduce Allen Brook flows beyond the TMDL reduction threshold, no additional regulatory assistance would be required as part of this FRP.

VIII. THIRD PARTY IMPLEMENTATION

In accordance with the draft 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.

The controlling interest for each of the above listed expired permit sites will need to implement the 2002 Vermont Stormwater Manual requirements to meet their current VTDEC permit requirements. This in turn, will address a component of the TMDL target reductions as described in this FRP. To ensure the compliance of these expired permit sites, the MS4 permittees request that the VTDEC utilize its current residual designation authority to enforce these permit requirements.

IX. SUMMARY

The Town of Williston and VTrans as the MS4 permittees, have developed the foregoing Flow Restoration Plan for the impaired Allen Brook Watershed under a Memorandum of Understanding. This agreement was developed to provide for the development of a shared plan within the watershed. The resulting Best Management Practices that constitute the Allen Brook FRP are as follows:

- Update of above listed VTDEC expired stormwater discharge permit properties to 2002 standards by the individual property controlling interests.
- Town of Williston to implement BMP practices at the following locations
 - Parcel between U.S. Route 2 & Interstate I-89
 - Parcel behind Town Offices
- VTrans to implement BMP practices within the Interstate I-89 corridor at the following locations
 - Williston Welcome Center
 - Median Area A & B
 - Median Area C – G

Upon approval by the Secretary, this Flow Restoration Plan shall be part of the permittee's SWMP. The permittee shall estimate and discuss in its annual report any progress towards meeting the flow restoration target from its MS4 in the previous year. The permittee shall base the estimate on quantifiable measures attributable to implementation of its FRP and its overall SWMP. The permittee shall submit to the Secretary the status of completion and implementation of stormwater BMPs identified in the FRP in the SWMP annual report.