

Flower Brook, Danby and Pawlet, Vermont

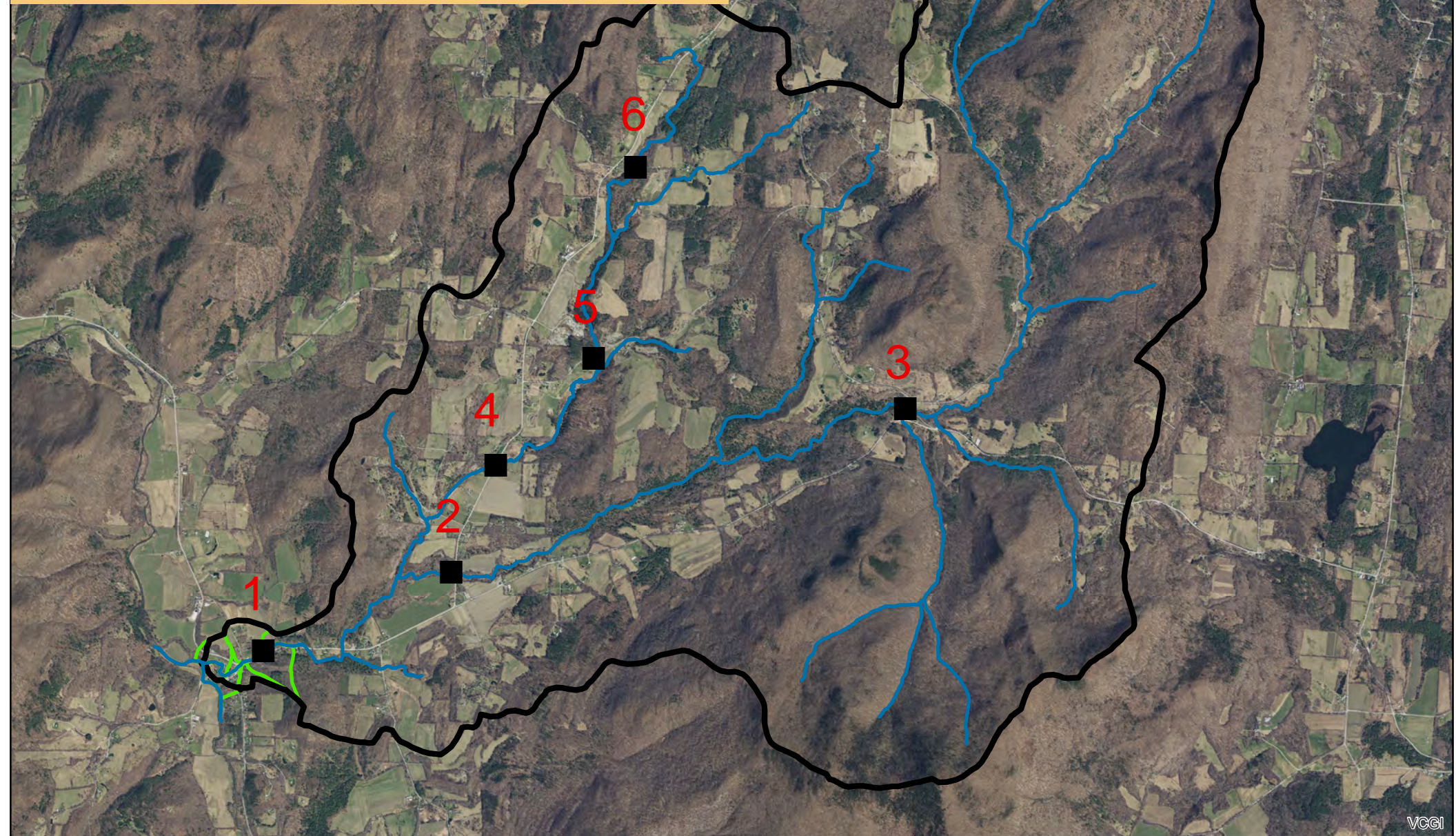
Flower Brook in Danby-Pawlet has been found to be impaired for E.coli bacteria in stormwater runoff. There are at least 6 significant discharges to the brook from the developed lands of Pawlet Village and numerous farm drainages in the upper watershed. The largest urbanized discharge to the stream is drainage area 3 which drains the Village green and property. The recommended course of action for bacteria impacted streams is to install a treatment structure that controls the water quality volume from these discharges. Riparian buffers, constructed wetlands, sand filters, infiltration trenches/basins, rain gardens and other bioretention systems are the most effective treatments. Dense vegetative buffers facilitate bacteria removal through detention, filtration by vegetation, and infiltration into the soil. A map showing the location of the discharges and a possible retrofit location is provided. A cost estimate (excluding land costs) is provided for structural stormwater practices. A stormwater master plan was completed in 2016 and efforts to implement practices and reduce E.coli have been ongoing. A number of the proposed practices in the master plan have been completed.

In addition efforts to reduce/exclude cattle from the stream or protect riparian buffers is very important. The 2016 report also describes a septic sanitary survey plan that should be implemented.

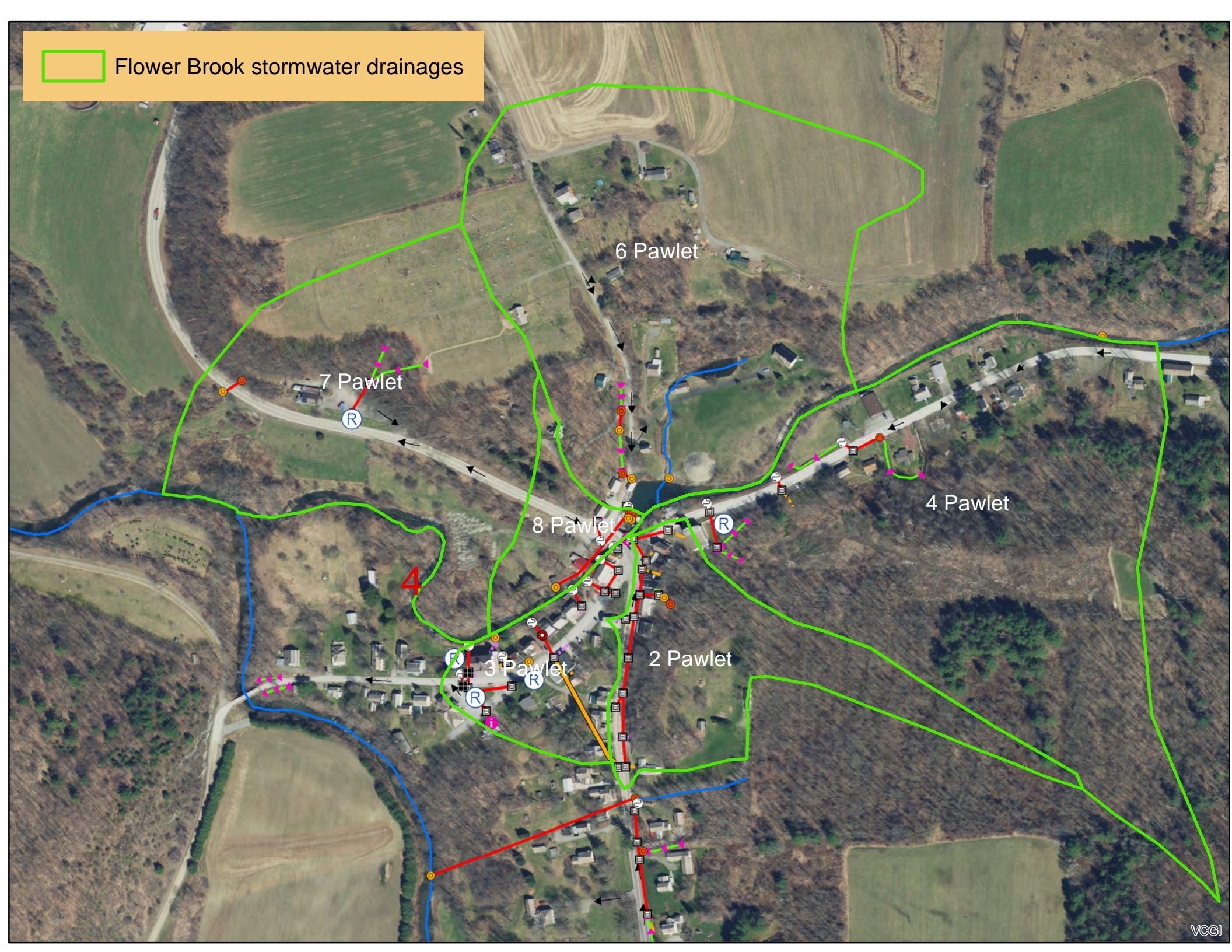
Addressing the large discharges of stormwater to the brook will reduce contamination and flooding and will remove the stream from the state of Vermont's 303d list of impaired waters. It will also reduce phosphorus and sediment currently being discharged to the Mettawee River and Lake Champlain.

Flower Brook Monitoring Sites

- Flower_Brook
- Flower Brook Watershed
- Flower Brook stormwater drainages



Flower Brook stormwater drainages





Monitoring Site Summary - River/Stream

Flower Brook Map ID 1

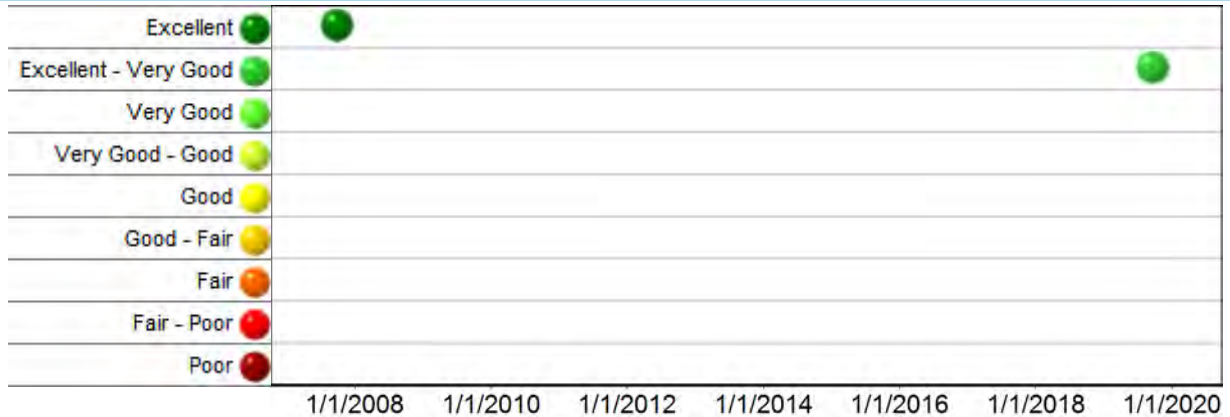
River Mile: 0.5

Behind Pawlet Volunteer Fire Station on left off Route 133.

Pawlet, VT (43.34790, -73.17474)

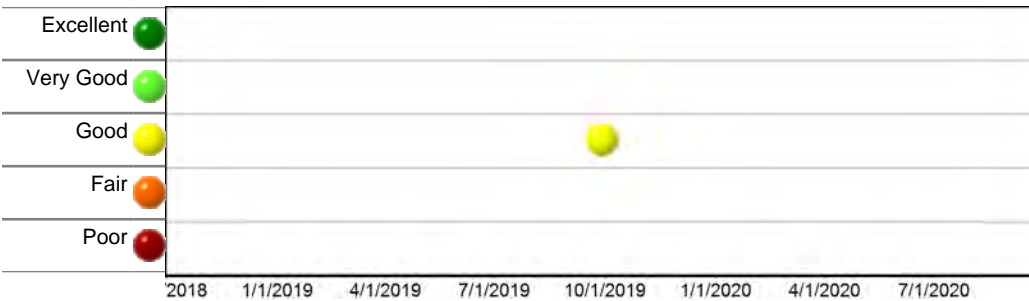
Macroinvertebrate Assessment

Macroinvertebrate population Assessments are a measure of the biological integrity of the macroinvertebrate community and an indicator of the health of the aquatic biota. (For More Details)



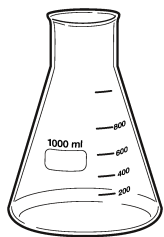
Fish Assessment

Fish populations provide a measurement of the general health of the aquatic biota. Since fish occupy the top of the food web their population integrates the conditions of lower community types. (For More Details)

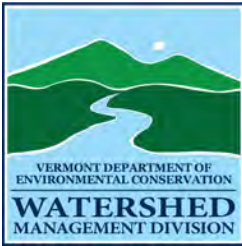


Water Quality Measurements

Chemical and physical parameters provide a “snapshot” of current conditions and are used to detect changes in water quality and to make determinations about a waterbody and its watershed. (For More Details)



Characteristic	Description	Trend	Max	Mean	Min
Chloride (mg/L)	At elevated values mostly from deicing		11.8	11.8	11.8
Conductivity (umho/cm)			318.5	309.2	304.0
E. Coli Bacteria (#/100ml)	Indicator of pathogens		727.0	119.6	32.3
Nitrogen (mg/L)	Nutrient that may fuel algae blooms		1.1	1.0	0.9
pH	Acidity		8.4	8.3	8.1
Phosphorus (ug/L)	Nutrient that may fuel algae blooms		78.7	11.2	5.4
Turbidity (NTU)	Measure of suspended sediment		4.6	1.0	0.2

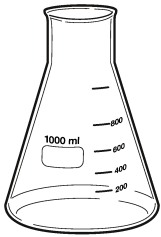


Flower Brook Map ID 2

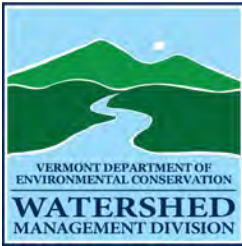
At downstream of 133 bridge, temp mon site Pawlet,
VT (43.35456, -73.15329)

Water Quality Measurements

Chemical and physical parameters provide a “snapshot” of current conditions and are used to detect changes in water quality and to make determinations about a waterbody and its watershed. (For More Details)



Characteristic	Description	Trend	Max	Mean	Min
E. Coli Bacteria (#/100ml)	Indicator of pathogens		488.0	122.4	28.8
Phosphorus (ug/L)	Nutrient that may fuel algae blooms		83.2	11.6	5.7
Turbidity (NTU)	Measure of suspended sediment		5.8	1.7	0.3

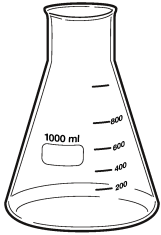


Flower Brook Map ID 3

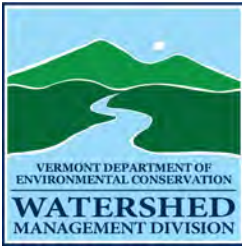
At Lily Hill Road Bridge Pawlet, VT (43.36848, -73.10159)

Water Quality Measurements

Chemical and physical parameters provide a “snapshot” of current conditions and are used to detect changes in water quality and to make determinations about a waterbody and its watershed. (For More Details)



Characteristic	Description	Trend	Max	Mean	Min
E. Coli Bacteria (#/100ml)	Indicator of pathogens		81.3	24.1	2.0
Nitrogen (mg/L)	Nutrient that may fuel algae blooms		0.3	0.2	0.1
Phosphorus (ug/L)	Nutrient that may fuel algae blooms		466.0	28.7	7.2
Turbidity (NTU)	Measure of suspended sediment		2.7	0.8	0.2

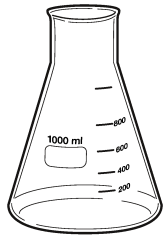


Beaver Brook Map ID 4

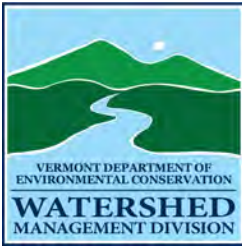
Beaver Brook upstream of 133 bridge, temp mon site Pawlet, VT
 (43.36352, -73.14830)

Water Quality Measurements

Chemical and physical parameters provide a “snapshot” of current conditions and are used to detect changes in water quality and to make determinations about a waterbody and its watershed. (For More Details)



Characteristic	Description	Trend	Max	Mean	Min
E. Coli Bacteria (#/100ml)	Indicator of pathogens		2420.0	355.8	33.0
Nitrogen (mg/L)	Nutrient that may fuel algae blooms		1.8	1.1	0.7
Phosphorus (ug/L)	Nutrient that may fuel algae blooms		44.5	20.9	10.0
Turbidity (NTU)	Measure of suspended sediment		10.8	1.9	0.6

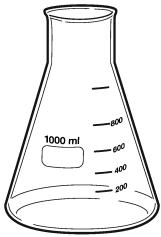


Beaver Brook Map ID 5

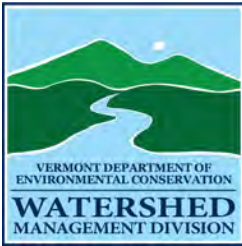
Pawlet, VT (43.37246, -73.13719)

Water Quality Measurements

Chemical and physical parameters provide a “snapshot” of current conditions and are used to detect changes in water quality and to make determinations about a waterbody and its watershed. (For More Details)



Characteristic	Description	Trend	Max	Mean	Min
E. Coli Bacteria (#/100ml)	Indicator of pathogens		1414.0	169.0	18.7
Nitrogen (mg/L)	Nutrient that may fuel algae blooms		1.4	1.1	0.7
Phosphorus (ug/L)	Nutrient that may fuel algae blooms		47.1	17.2	11.1
Turbidity (NTU)	Measure of suspended sediment		12.2	2.3	0.5

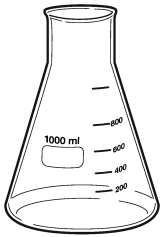


Beaver Brook Map ID 6

At Brimstone Road Crossing Pawlet, VT (43.38841, -73.13258)

Water Quality Measurements

Chemical and physical parameters provide a “snapshot” of current conditions and are used to detect changes in water quality and to make determinations about a waterbody and its watershed. (For More Details)



Characteristic	Description	Trend	Max	Mean	Min
E. Coli Bacteria (#/100ml)	Indicator of pathogens		1732.9	170.8	13.4
Nitrogen (mg/L)	Nutrient that may fuel algae blooms		1.3	0.8	0.6
Phosphorus (ug/L)	Nutrient that may fuel algae blooms		72.9	26.8	11.2
Turbidity (NTU)	Measure of suspended sediment		17.6	3.5	1.1

	Action List #	Proposed Action	Proposed or Existing Stormwater Treatment Practice	Watershed Area (Acres)	Percent Effective Impervious Area	Current BMP Sediment Reduction Credit	Sediment Load with Current Reductions (lbs.)	Priority Action Sediment Reduction Credit	Sediment Load with Priority Action (lbs.)	Phosphorus Load with Current Reductions (lbs.)	Phosphorus Load with Priority Action (lbs.)	Water Quality Volume (ft ³)	Estimated Basin Construction Cost	Estimated Other BMP Construction Cost	Cost of Sediment Removal Per Pound (based on annual sediment load)	Cost of Phosphorus Removal Per Pound (based on annual phosphorus load)	Assistance Program	# LID-Roof Raingardens to Treat Water Quality Volume	
2	Pawlet		CB/OF	8.9	8.8	0%	1529		1529	4.2	4.2	3769.1					ERP,SRF, LCBP	43	
3	Pawlet	1	Modify outlet with plunge pools, optional rain garden in village island, and add catchbasin inserts and bioretention area at 75 School St	RR/CBI/BRA/CB/OF	4.8	32.9	0%	2221	60%	889	6.2	4.3	5474.6	\$28,906		\$22	\$15,615	ERP,SRF, LCBP	63
4	Pawlet	1	Bioretention area at Pawlet Community Church	BRA/GS/OF/CB	30.1	1.9	0%	2678	50%	1339	7.4	4.5	6600.3		\$15,740	\$12	\$5,290	ERP,SRF, LCBP	76
6	Pawlet		GS	27.3	2.0	0%	2473	0%	2473	6.9	6.9	6095.2					ERP,SRF, LCBP	70	
7	Pawlet	1	Bioretention area at the Barn Restaurant	BRA/OF/GS	17.9	1.7	0%	1547	60%	619	4.3	2.6	3813.6		\$10,575	\$11	\$6,151	ERP,SRF, LCBP	44
8	Pawlet		OF/CB	2.9	10.0	0%	540	0%	540	1.5	1.5	1329.7					ERP,SRF, LCBP	15	

Target Maps

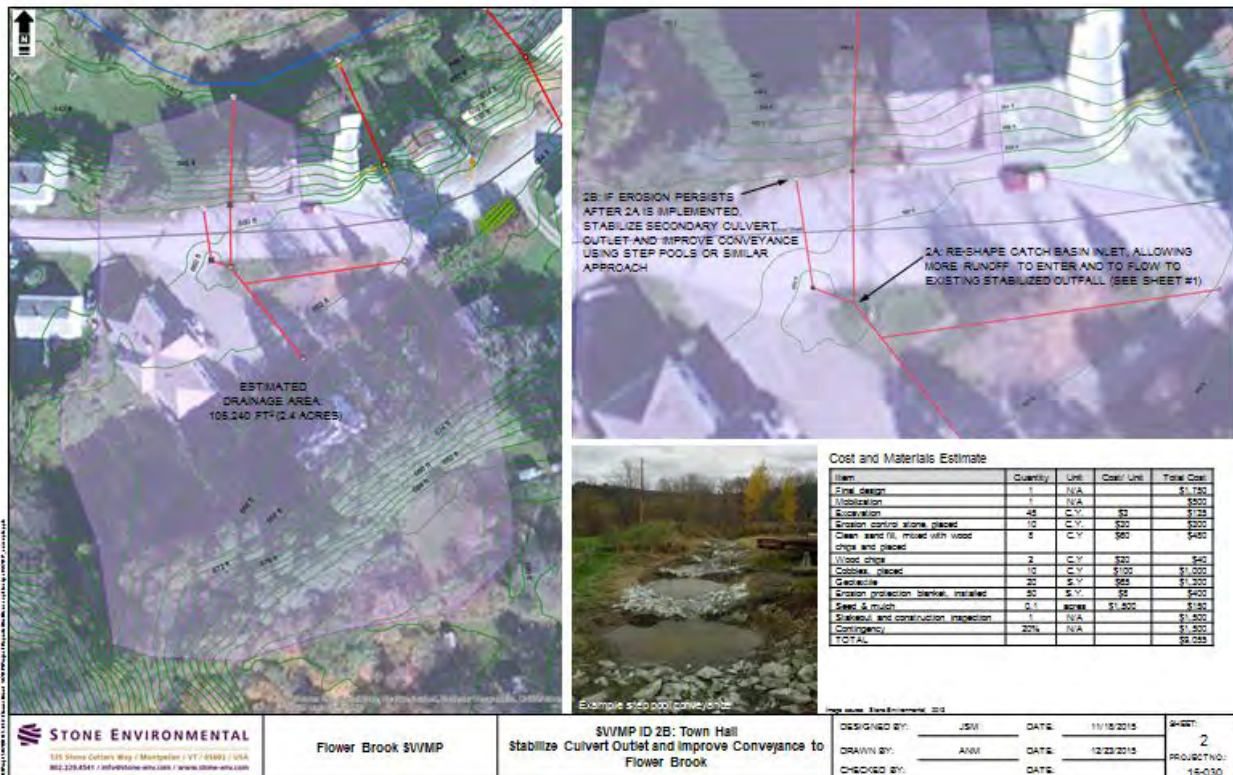
*Showing Priority Action List
Drainage Areas*

And Potential Retrofit Locations

Appendix 4: Reduced-size Conceptual Designs for High-Priority Projects



3 Pawlet



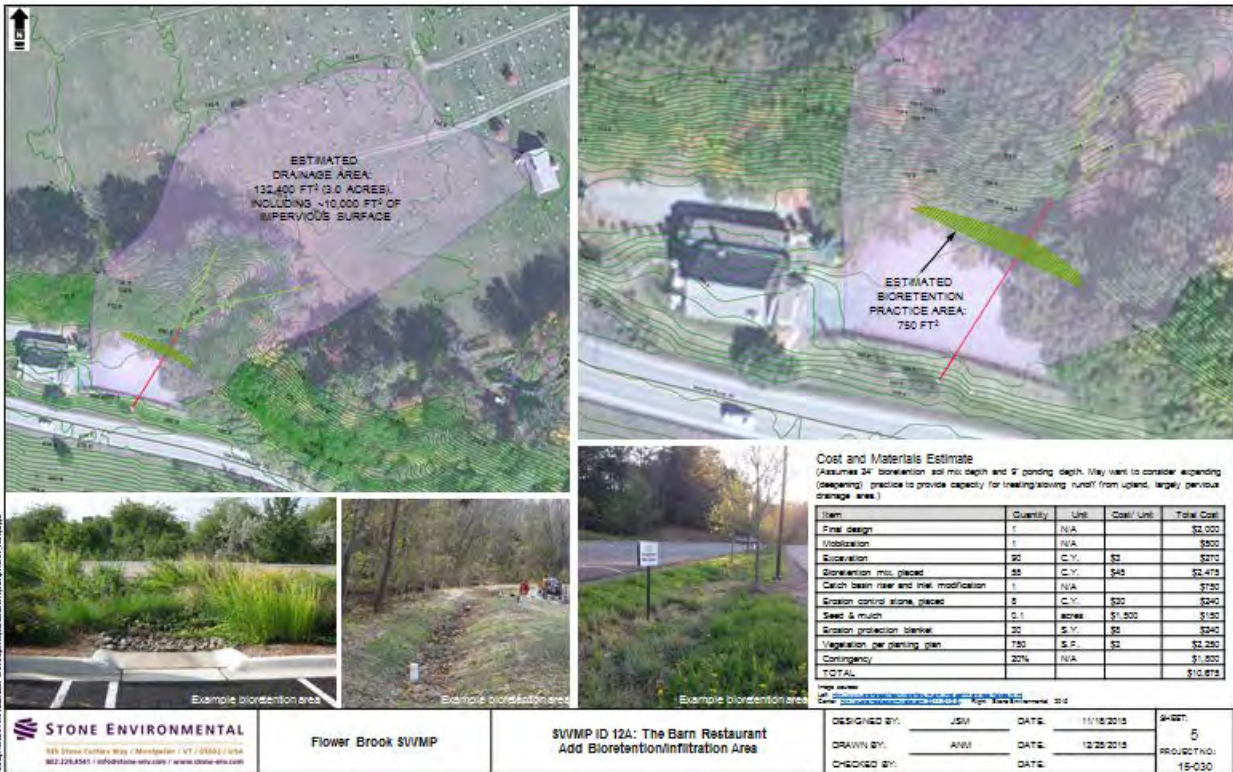
3 Pawlet



3 Pawlet



4 Pawlet



7 Pawlet

