Whetstone Brook, Brattleboro and Marlboro Vermont

In 2015 the town of Brattleboro, Vermont, applied for technical assistance from the U. S. Environmental Protection Agency (EPA) under its Smart Growth Implementation Assistance Program. The town was eager to pursue design solutions that respond to climate change by creating resilient redevelopment and recreational opportunities within flood-prone areas of the town while protecting water quality and connecting people with the Whetstone brook (2016-0915 Whetstone Brook Design Concepts).

Whetstone Brook has been found to be impaired for E.coli bacteria in stormwater runoff. There are at least 120 stormwater discharges to the brook from the developed lands of Brattleboro and West Brattleboro Village. There are numerous farm drainages in the upper watershed. The largest urbanized discharge to the stream is drainage area 9 which drains Canal Street and the southern part of Brattleboro. 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, flood plain restoration, constructed wetlands, sand filters, infiltration trenches/basins, rain gardens and other bioretention systems are the most effective green infrastructure 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 will be completed in 2024 and efforts to implement practices and reduce E.coli have been ongoing.

In addition, efforts to reduce/exclude cattle from the stream or protect riparian buffers in the upper watershed are very important. An urban sanitary survey plan could 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 nitrogen and sediment currently being discharged to the Brook and the Connecticut River.

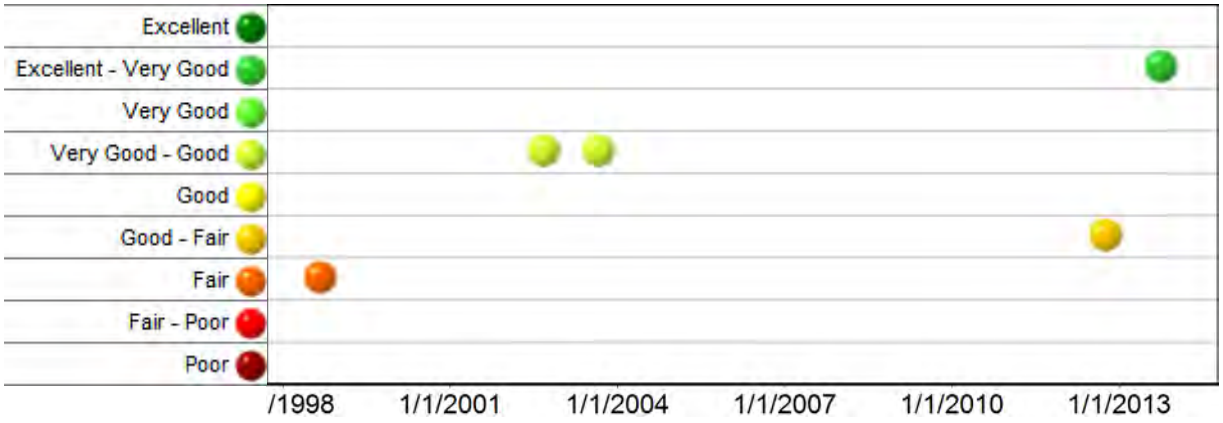
Monitoring Site Summary - River/Stream

Whetstone Brook

River Mile: 0.2
Behind Shopping Center on Canal St.
Brattleboro, VT (42.85060, -72.55939)

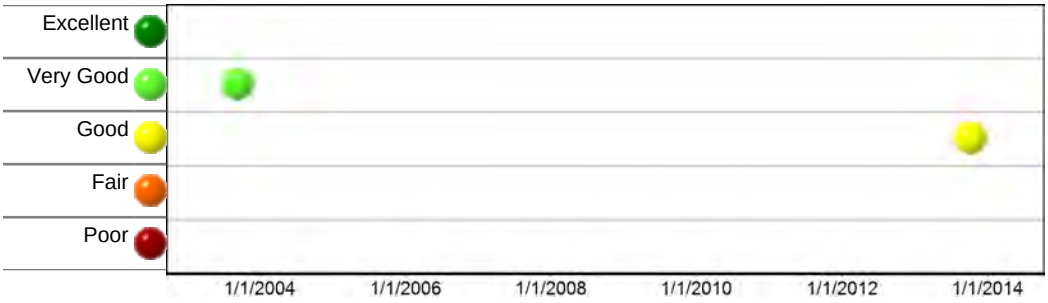
Macroinvertebrate Assessment

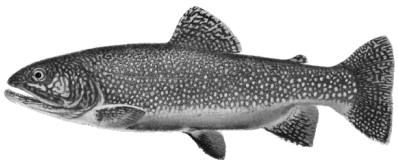
Macroinvertebrate population Assessments are a measure of the biological integrity of the macroinvertebrate community and an indicator of the health of the aquatic biota. (For More Details)



Fish Assessment

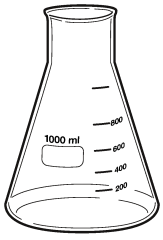
Fish populations provide a measurement of the general health of the aquatic biota. Since fish occupy the top of the food web their population integrates the conditions of lower community types. (For More Details)





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		36.4	27.3	20.6
Conductivity (umho/cm)			297.0	231.5	183.0
E. Coli Bacteria (#/100ml)	Indicator of pathogens		548.0	428.0	308.0
Nitrogen (mg/L)	Nutrient that may fuel algae blooms		0.8	0.4	0.2
pH	Acidity		7.8	7.6	7.3
Phosphorus (ug/L)	Nutrient that may fuel algae blooms		271.5	17.8	5.0
Turbidity (NTU)	Measure of suspended sediment		89.6	3.3	0.2

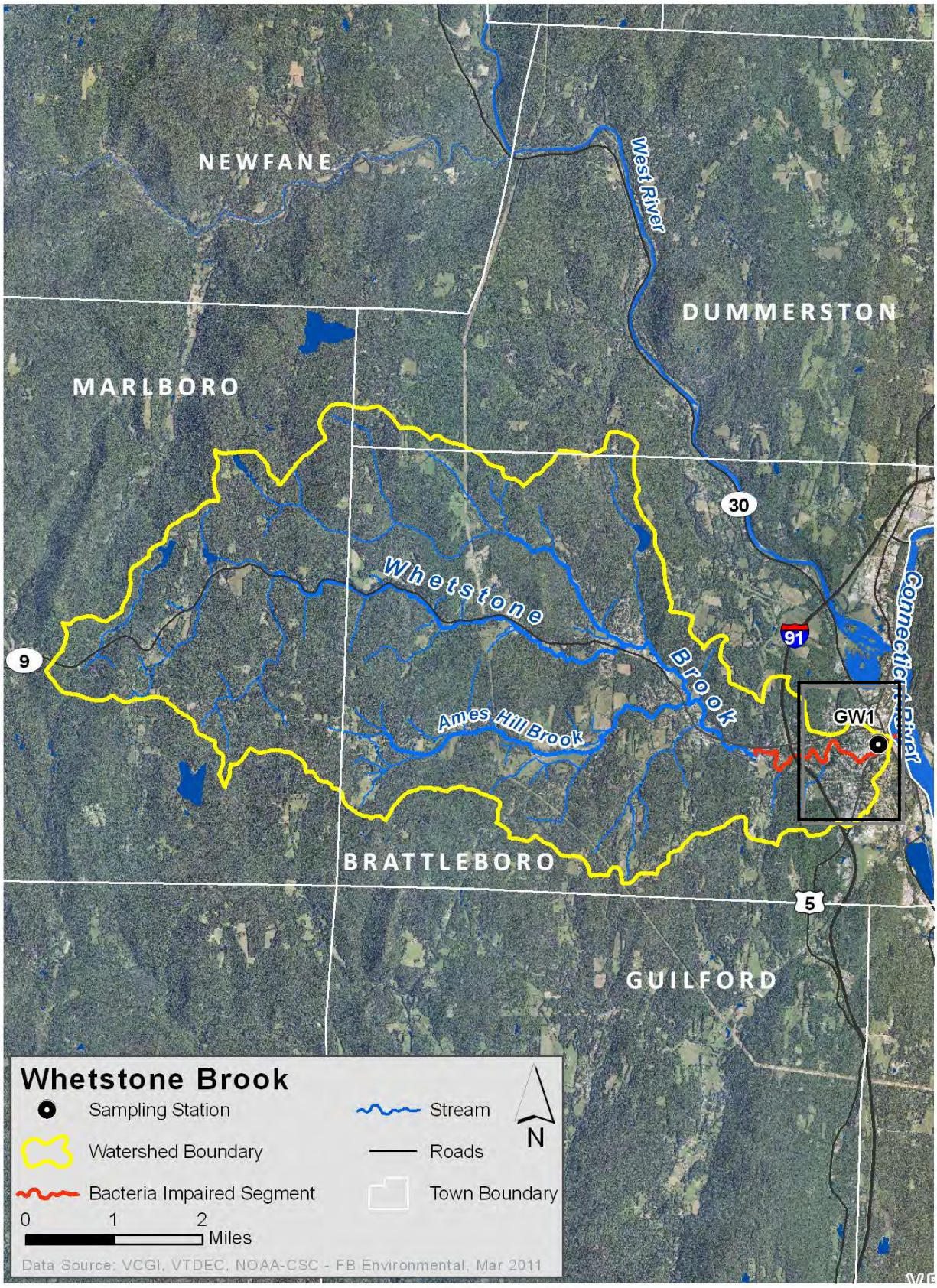
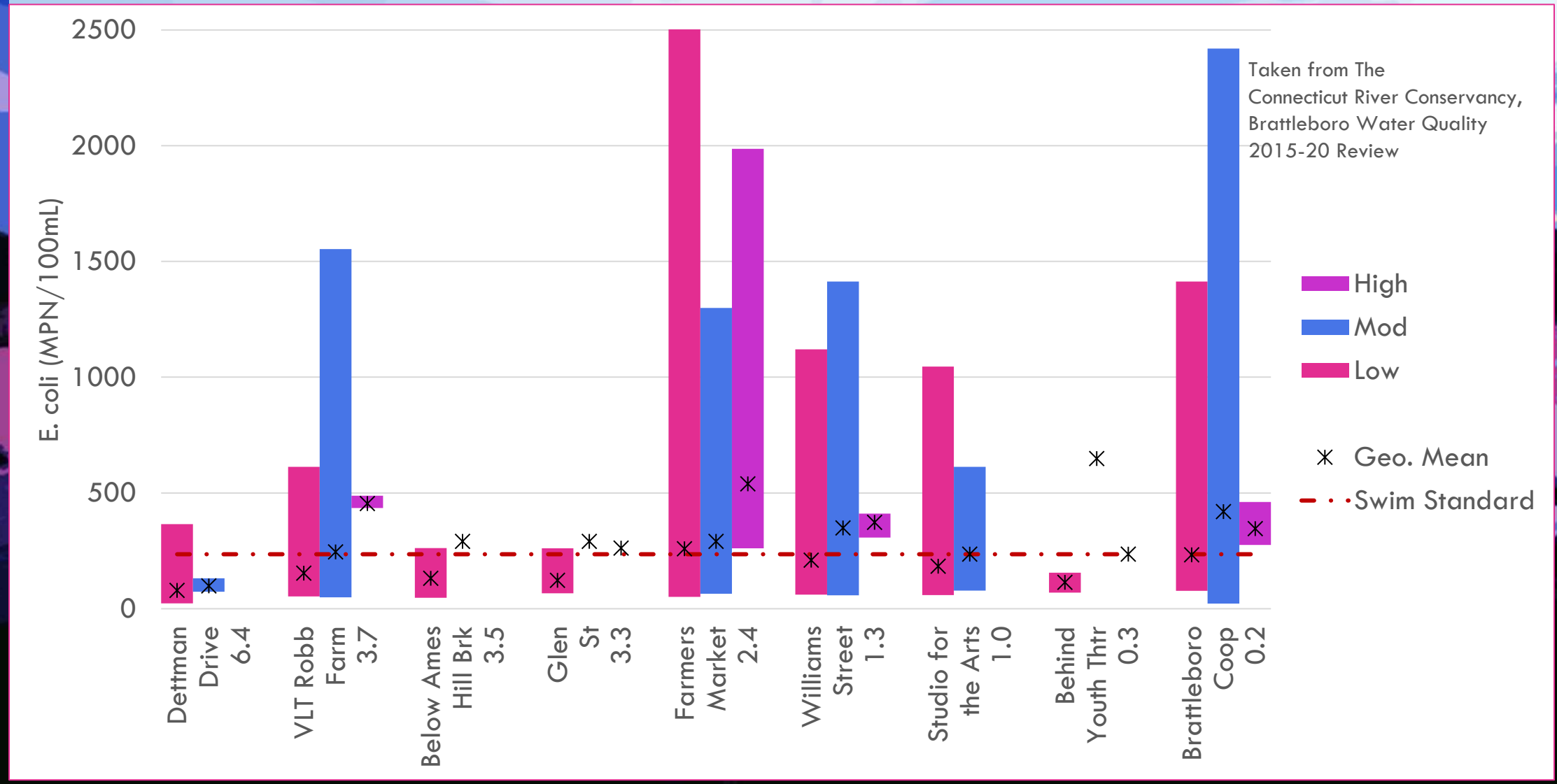
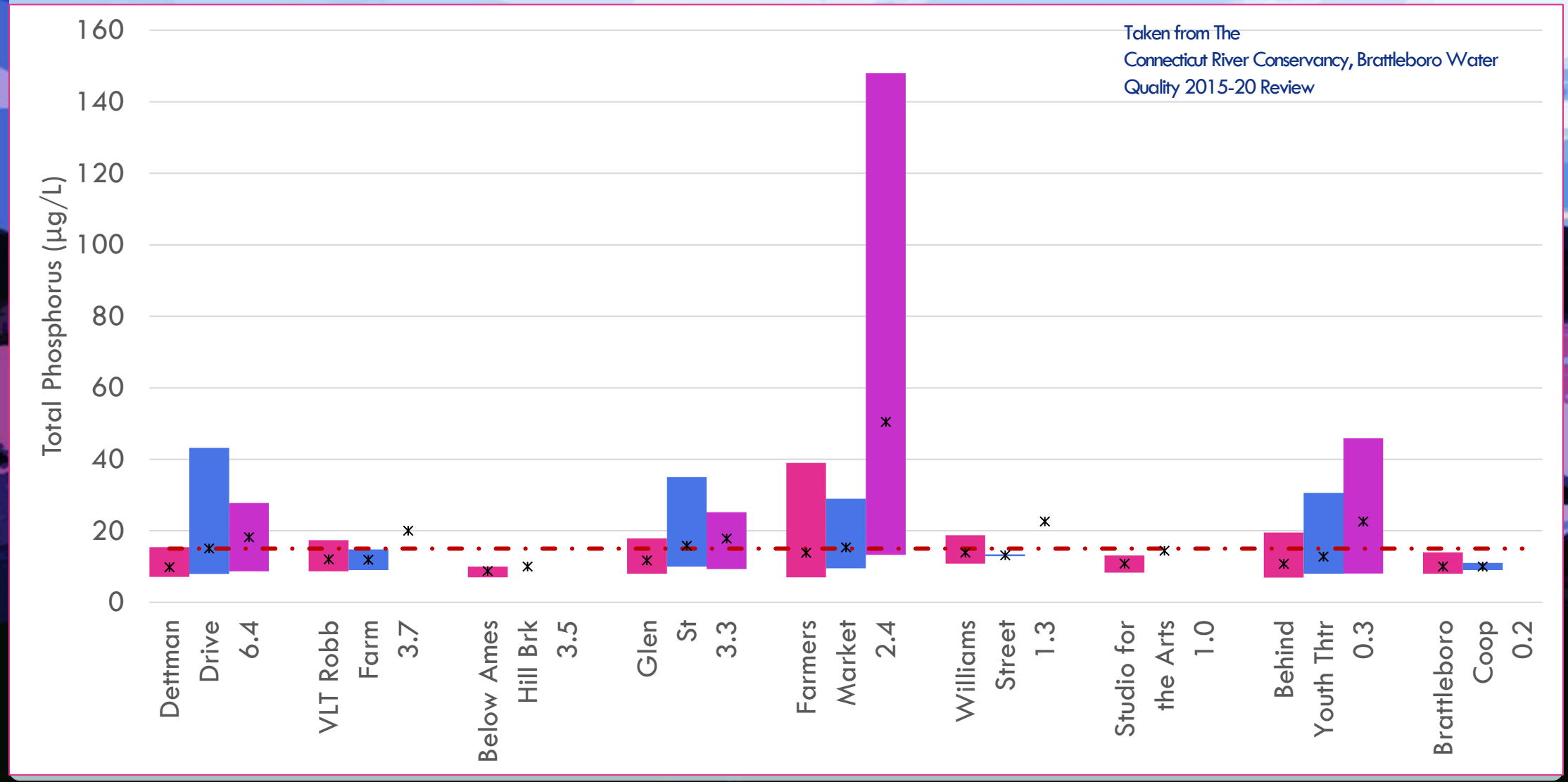


Figure 1: ***Map of Whetstone Brook watershed with impaired segment and sampling stations indicated. Insert area corresponds to figure 4 below.***

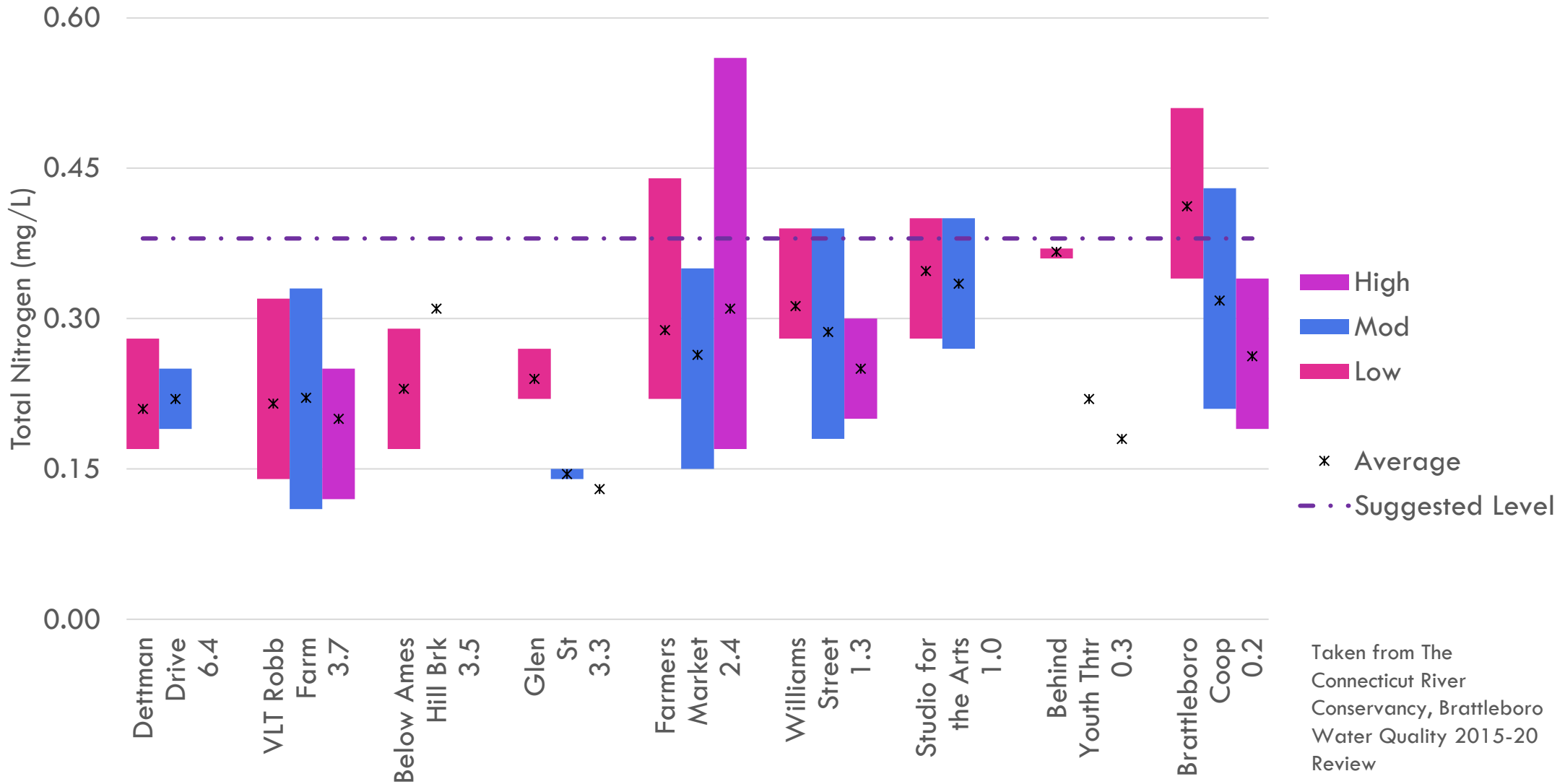
E. Coli by site and flow level



Total Phosphorus by site and flow level



Total Nitrogen by site and flow level



Taken from The Connecticut River Conservancy, Brattleboro Water Quality 2015-20 Review

Whetstone Brook Conclusions

- Excessive E. coli and phosphorus levels
- Inconsistent year to year
- Farmers Market likely locus of E. coli, nutrient pollution
- Temperature study shows thermal stress in warm/dry years and impact of runoff

Taken from The Connecticut River Conservancy, Brattleboro Water Quality 2015-20 Review

Watershed Number	Action List #	Proposed Action	Proposed or Existing Stormwater Treatment Practice	Permit Number	Watershed Area (Acres)	Percent Mapped Impervious Area (MIA)	EIA Equation (RANK)	Sediment Load with Current Reductions (lbs.)	Sediment Load with Priority Action (lbs.)	Nitrogen Load with Current Reductions (lbs.)	Nitrogen 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 or Nitrogen Removal Per Pound (based on annual nutrient load)	Assistance Program
9 Brattleboro	3	Swirl Separator/Sand Filter	SS-SF/CB/DS/IP	3423-9010.A	104.14	40.4	2	24497	17148	387.9	349.1	120747.9	$10,988,056		$1,495	$283,295	CWIP, SRF, LISFF, OTHER
10 Brattleboro			CB/DW		0.49	60.3	5	123	123	1.5	1.5	608.6					CWIP, SRF, LISFF, OTHER
11 Brattleboro			CB/DW/IB		1.86	48.7	5	325	325	4.1	4.1	1601.1					CWIP, SRF, LISFF, OTHER
13 Brattleboro			CB/DS/IG	3423-9010.A	3.71	83.5	5	1664	1664	20.8	20.8	8203.6					CWIP, SRF, LISFF, OTHER
27 Brattleboro			OF		8.33	47.3	1	3786	3786	31.5	31.5	9330.2					CWIP, SRF, LISFF, OTHER
28 Brattleboro			CB		4.91	45.8	2	2634	2634	22.0	22.0	6492.4					CWIP, SRF, LISFF, OTHER
29 Brattleboro			CB		0.99	62.6	2	743	743	6.2	6.2	1832.3					CWIP, SRF, LISFF, OTHER
30 Brattleboro			CB		7.32	64.6	2	5680	5680	47.3	47.3	13998.9					CWIP, SRF, LISFF, OTHER
31 Brattleboro			CB		16.24	55.6	3	11851	11851	98.8	98.8	29208.0					CWIP, SRF, LISFF, OTHER
32 Brattleboro			CB		5.75	34.0	2	2270	2270	18.9	18.9	5593.6					CWIP, SRF, LISFF, OTHER
33 Brattleboro			CB		1.11	49.7	2	650	650	5.4	5.4	1600.8					CWIP, SRF, LISFF, OTHER
34 Brattleboro			OF/GS		3.02	8.2	1	286	286	2.4	2.4	703.7					CWIP, SRF, LISFF, OTHER
36 Brattleboro			CB/GS		4.37	42.9	2	2187	2187	18.2	18.2	5390.3					CWIP, SRF, LISFF, OTHER
37 Brattleboro	See 2016 EPA	Whetstone Report	CB/GS		26.07	43.4	1	10614	10614	88.4	88.4	26158.3					CWIP, SRF, LISFF, OTHER
38 Brattleboro			CB/OF	4560-9003	4.83	65.4	2	3423	3423	28.5	28.5	9372.9					CWIP, SRF, LISFF, OTHER
39 Brattleboro	See 2016 EPA	Whetstone Report	CB		6.98	37.9	2	3072	3072	25.6	25.6	7571.9					CWIP, SRF, LISFF, OTHER
40 Brattleboro			CB		7.98	52.1	3	5488	5488	27.4	27.4	13525.0					CWIP, SRF, LISFF, OTHER
41 Brattleboro			OF/CB/WP		3.13	15.4	4	181	181	1.8	1.8	893.7					CWIP, SRF, LISFF, OTHER
42 Brattleboro			CB		2.43	66.2	2	1933	1933	16.1	16.1	4764.5					CWIP, SRF, LISFF, OTHER
43 Brattleboro			OF		3.52	22.9	1	693	693	5.8	5.8	1708.1					CWIP, SRF, LISFF, OTHER
44 Brattleboro			CB		3.15	84.7	3	3388	3388	28.2	28.2	8350.2					CWIP, SRF, LISFF, OTHER
45 Brattleboro			CB		2.48	58.0	3	1878	1878	15.6	15.6	4627.9					CWIP, SRF, LISFF, OTHER
46 Brattleboro			CB		0.43	92.9	3	502	502	4.2	4.2	1236.6					CWIP, SRF, LISFF, OTHER
47 Brattleboro	See 2016 EPA	Whetstone Report	OF	4384-9003	2.39	96.4	3	2622	2622	21.9	21.9	7181.4					CWIP, SRF, LISFF, OTHER

Watershed Number	Action List #	Proposed Action	Proposed or Existing Stormwater Treatment Practice	Permit Number	Watershed Area (Acres)	Percent Mapped Impervious Area (MIA)	EIA Equation (RANK)	Sediment Load with Current Reductions (lbs.)	Sediment Load with Priority Action (lbs.)	Nitrogen Load with Current Reductions (lbs.)	Nitrogen 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 or Nitrogen Removal Per Pound (based on annual nutrient load)	Assistance Program
48 Brattleboro	See 2016 EPA	Whetstone Report	OF	4384-9003	2.49	96.9	3	2743	2743	22.9	22.9	7511.5					CWIP, SRF, LISFF, OTHER
49 Brattleboro	See 2016 EPA	Whetstone Report	OF	4384-9003	0.64	79.6	2	559	559	4.7	4.7	1531.5					CWIP, SRF, LISFF, OTHER
50 Brattleboro	See 2016 EPA	Whetstone Report	OF	4384-9003	1.56	90.4	2	1588	1588	13.2	13.2	4348.3					CWIP, SRF, LISFF, OTHER
51 Brattleboro			CB		1.70	86.5	3	1868	1868	15.6	15.6	4603.7					CWIP, SRF, LISFF, OTHER
52 Brattleboro			CB		1.50	98.3	3	1853	1853	15.4	15.4	4566.7					CWIP, SRF, LISFF, OTHER
54 Brattleboro			OF		0.87	41.7	1	336	336	2.8	2.8	828.0					CWIP, SRF, LISFF, OTHER
55 Brattleboro			CB/BR	6233-9015 NOT BUILT	1.08	93.4	2	254	254	5.8	5.8	3128.5					CWIP, SRF, LISFF, OTHER
56 Brattleboro			OF/BR	6233-9015 NOT BUILT	0.45	54.2	3	64	64	1.5	1.5	794.5					CWIP, SRF, LISFF, OTHER
57 Brattleboro			CB/BR	6233-9015 NOT BUILT	0.73	98.8	3	181	181	4.1	4.1	2230.9					CWIP, SRF, LISFF, OTHER
58 Brattleboro	See 2016 EPA	Whetstone Report	CB		15.18	58.5	2	10574	10574	88.1	88.1	26060.1					CWIP, SRF, LISFF, OTHER
59 Brattleboro			OF		0.52	69.4	1	394	394	3.3	3.3	971.9					CWIP, SRF, LISFF, OTHER
60 Brattleboro			CB		4.38	40.8	2	2083	2083	17.4	17.4	5133.5					CWIP, SRF, LISFF, OTHER
61 Brattleboro			OF		1.71	37.9	1	588	588	4.9	4.9	1448.8					CWIP, SRF, LISFF, OTHER
62 Brattleboro			CB/OF		16.42	31.0	2	5913	5913	49.3	49.3	14572.3					CWIP, SRF, LISFF, OTHER
63 Brattleboro			CB		0.46	72.0	3	427	427	3.6	3.6	1052.8					CWIP, SRF, LISFF, OTHER
64 Brattleboro			CB/DW		0.87	42.9	5	124	124	1.6	1.6	612.4					CWIP, SRF, LISFF, OTHER
65 Brattleboro			CB		0.84	57.5	2	575	575	4.8	4.8	1417.7					CWIP, SRF, LISFF, OTHER
66 Brattleboro			CB		1.49	43.2	2	752	752	6.3	6.3	1853.5					CWIP, SRF, LISFF, OTHER
67 Brattleboro			OF		5.06	22.2	1	968	968	8.1	8.1	2386.6					CWIP, SRF, LISFF, OTHER
68 Brattleboro	1	Enhanced Catchbasin Cleaning and Street Sweeping	CB		61.87	63.1	2	46766	42090	389.7	370.2	115258.4					CWIP, SRF, LISFF, OTHER
70 Brattleboro			CB		36.56	17.9	2	7976	7976	66.5	66.5	19656.8					CWIP, SRF, LISFF, OTHER
71 Brattleboro			CB/GS/OF/RS	4040-9010	1.68	55.4	2	551	551	6.9	6.9	2714.7					CWIP, SRF, LISFF, OTHER
72 Brattleboro	See 2016 EPA	Whetstone Report	CB		0.78	51.0	2	468	468	3.9	3.9	1153.5					CWIP, SRF, LISFF, OTHER
73 Brattleboro	See 2016 EPA	Whetstone Report	OF		23.19	8.3	1	2193	2193	18.3	18.3	5405.9					CWIP, SRF, LISFF, OTHER
74 Brattleboro			CB		5.58	26.2	2	1710	1710	14.2	14.2	4214.1					CWIP, SRF, LISFF, OTHER

Watershed Number	Action List #	Proposed Action	Proposed or Existing Stormwater Treatment Practice	Permit Number	Watershed Area (Acres)	Percent Mapped Impervious Area (MIA)	EIA Equation (RANK)	Sediment Load with Current Reductions (lbs.)	Sediment Load with Priority Action (lbs.)	Nitrogen Load with Current Reductions (lbs.)	Nitrogen 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 or Nitrogen Removal Per Pound (based on annual nutrient load)	Assistance Program
75 Brattleboro			CB		0.71	21.4	2	181	181	1.5	1.5	446.1					CWIP, SRF, LISFF, OTHER
76 Brattleboro			OF		15.87	14.6	1	2114	2114	17.6	17.6	5209.0					CWIP, SRF, LISFF, OTHER
77 Brattleboro			OF		1.58	14.6	1	210	210	1.8	1.8	517.9					CWIP, SRF, LISFF, OTHER
78 Brattleboro			GS		5.22	2.7	1	374	374	3.1	3.1	920.8					CWIP, SRF, LISFF, OTHER
79 Brattleboro			CB/GS		11.28	21.3	1	2074	2074	17.3	17.3	5110.3					CWIP, SRF, LISFF, OTHER
80 Brattleboro			OF		3.85	25.8	1	857	857	7.1	7.1	2112.8					CWIP, SRF, LISFF, OTHER
81 Brattleboro	1	Rock Swale for erosion	RS/CB		4.74	35.8	2	1972	1183	13.1	9.2	4861.3		$75,000	$95	$19,012	CWIP, SRF, LISFF, OTHER
82 Brattleboro			OF		22.73	23.8	1	4649	4649	38.7	38.7	11458.2					CWIP, SRF, LISFF, OTHER
83 Brattleboro	2	Infiltration basins in median of I-91	EDPMP/CB/GS		110.38	18.1	1	17429	1743	145.2	14.5	42955.6	$300,689		$19	$2,300	CWIP, SRF, LISFF, OTHER
96 Brattleboro			OF		2.19	38.8	1	156	156	6.5	6.5	1920.9					CWIP, SRF, LISFF, OTHER
97 Brattleboro			CB		6.32	73.9	3	5998	5998	50.0	50.0	14782.8					CWIP, SRF, LISFF, OTHER
98 Brattleboro	See 2016 EPA	Whetstone Report	CB		4.40	89.3	3	4978	4978	41.5	41.5	12267.9					CWIP, SRF, LISFF, OTHER
99 Brattleboro			OF		0.59	92.3	3	688	688	5.7	5.7	1694.7					CWIP, SRF, LISFF, OTHER
100 Brattleboro			CB/OF		5.62	64.1	1	3814	3814	31.8	31.8	9398.8					CWIP, SRF, LISFF, OTHER
101 Brattleboro			DW		0.14	86.5	5	133	133	0.8	0.8	327.2					CWIP, SRF, LISFF, OTHER
102 Brattleboro			CB		5.95	68.0	2	2443	2443	40.7	40.7	12043.4					CWIP, SRF, LISFF, OTHER
118 Brattleboro	3	Modify existing permitted basin to extended detention	MOD/CB/GS/OF/ RS/DP	3375-9010	8.60	21.6	5	1051	525	5.3	2.6	2589.4	$10,254		$20	$3,904	CWIP, SRF, LISFF, OTHER
119 Brattleboro			CB		0.65	73.4	2	292	292	4.9	4.9	1438.3					CWIP, SRF, LISFF, OTHER
120 Brattleboro			CB/GS/OF		14.36	18.6	2	3242	3242	27.0	27.0	7989.4					CWIP, SRF, LISFF, OTHER
121 Brattleboro			CB/GS/IP/SB/DP		42.62	11.2	5	3458	3458	21.6	21.6	8522.8					CWIP, SRF, LISFF, OTHER
125 Brattleboro			DW		0.09	29.1	5	7	7	0.1	0.1	36.5					CWIP, SRF, LISFF, OTHER
194 Brattleboro			CB		29.46	1.6	2	2194	2194	18.3	18.3	5406.6					CWIP, SRF, LISFF, OTHER
195 Brattleboro			CB		4.81	66.3	2	3846	3846	32.0	32.0	9477.6					CWIP, SRF, LISFF, OTHER
196 Brattleboro			CB		67.49	0.5	2	4603	4603	38.4	38.4	11344.1					CWIP, SRF, LISFF, OTHER
197 Brattleboro			CB		6.42	49.7	1	3108	3108	25.9	25.9	7660.8					CWIP, SRF, LISFF, OTHER
198 Brattleboro			CB		22.90	5.4	2	2336	2336	19.5	19.5	5757.4					CWIP, SRF, LISFF, OTHER
200 Brattleboro			IG/PP/GS	3596-9015	13.65	24.0	5	369	369	8.5	8.5	4544.9					CWIP, SRF, LISFF, OTHER
201 Brattleboro			IG/PP/GS	3596-9015 5768-9015	30.01	8.4	5	449	449	10.3	10.3	5528.1					CWIP, SRF, LISFF, OTHER
202 Brattleboro			CB/GS		14.55	10.2	1	306	306	12.8	12.8	3772.7					CWIP, SRF, LISFF, OTHER
203 Brattleboro			CB		7.55	39.7	1	2757	2757	23.0	23.0	6793.7					CWIP, SRF, LISFF, OTHER
211 West Brattleboro			OF/GS/CB		238.01	3.8	1	17839	17839	148.7	148.7	43966.5					CWIP,SRF
212 West Brattleboro			OF/GS		10.03	9.4	1	1008	1008	8.4	8.4	2485.5					CWIP,SRF
213 West Brattleboro			CB/GS		12.90	20.7	1	2304	2304	19.2	19.2	5677.9					CWIP,SRF
214 West Brattleboro	2	Wet pond or wetland on south side of parking lot at 880 Western Ave	WP-WL/CB/GS		14.22	37.3	1	4813	3850	40.1	36.1	11861.1		$5,000	$5	$1,247	CWIP,SRF
215 West Brattleboro			CB/OF		36.12	14.4	2	6626	6626	55.2	55.2	16330.4					CWIP,SRF

Watershed Number	Action List #	Proposed Action	Proposed or Existing Stormwater Treatment Practice	Permit Number	Watershed Area (Acres)	Percent Mapped Impervious Area (MIA)	Sediment Load with Current Reductions (lbs.)	Sediment Load with Priority Action (lbs.)	Nitrogen Load with Current Reductions (lbs.)	Nitrogen 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 or Nitrogen Removal Per Pound (based on annual nutrient load)	Assistance Program
216 West Brattleboro	2	Riparian filter strip behind 929 Western Ave	FS/OF		9.80	32.4	2803	2522	23.4	21.0	6907.0		$5,000	$18	$2,141	CWIP,SRF
217 West Brattleboro			DW/CB		14.41	31.5	4000	4000	33.3	33.3	9858.1					CWIP,SRF
218 West Brattleboro			CB/GS		12.42	31.0	3377	3377	28.1	28.1	8322.5					CWIP,SRF
219 West Brattleboro			OF/GS		14.37	9.9	1489	1489	12.4	12.4	3669.4					CWIP,SRF
220 West Brattleboro			CB/GS		42.09	20.7	7533	7533	62.8	62.8	18565.5					CWIP,SRF
221 West Brattleboro	1	Infiltration basin behind 45 Greenleaf Street	IB/CB/GS		16.94	14.0	2182	218	18.2	1.8	5378.8	$112,955		$58	$6,901	CWIP,SRF
222 West Brattleboro			OF/GS		6.01	14.7	802	802	6.7	6.7	1977.3					CWIP,SRF
223 West Brattleboro			OF/GS/CB		1.13	27.8	273	273	2.3	2.3	671.9					CWIP,SRF
224 West Brattleboro			OF/GS/CB		5.09	12.6	609	609	5.1	5.1	1501.4					CWIP,SRF
225 West Brattleboro			OF/GS/CB		26.31	5.5	2149	2149	17.9	17.9	5297.2					CWIP,SRF
226 West Brattleboro			OF/CB		7.02	6.9	616	616	5.1	5.1	1518.0					CWIP,SRF
227 West Brattleboro	2	Wet pond or gravel wetland on community land at 128 Stockwell Drive	WP-WL/OF/CB/GS	3302-9010	34.25	27.5	8154	1631	67.9	27.2	20095.6			$0	$0	CWIP,SRF
228 West Brattleboro			OF/GS		20.71	8.9	2028	2028	16.9	16.9	4998.0					CWIP,SRF
229 West Brattleboro			OF/CB		7.01	19.1	1160	1160	9.7	9.7	2859.8					CWIP,SRF
231 West Brattleboro	2	Infiltration basin or raingarden at SE corner of Western Ave and Edward Heights Rd	IB/OF/GS/CB		33.59	19.0	5558	3890	46.3	32.4	13697.3		$10,000	$6	$720	CWIP,SRF
232 West Brattleboro			OF/GS/SB		16.20	17.0	1418	1418	14.3	14.3	4992.4					CWIP,SRF
233 West Brattleboro			CB/GS/OF		23.94	7.8	2208	2208	18.4	18.4	5441.9					CWIP,SRF
234 West Brattleboro			GS/OF/SD		5.79	63.6	4421	4421	36.8	36.8	10896.5					CWIP,SRF
235 West Brattleboro	1	Riparian filter strip behind 157 Marlboro Rd	FS/CB/WP/IB/GS		153.13	10.7	7133	6420	89.2	80.2	35158.8		$5,000	$7	$561	CWIP,SRF
236 West Brattleboro			CB/GS		57.87	7.0	5116	5116	42.6	42.6	12608.4					CWIP,SRF
237 West Brattleboro	1	Upgrade two Sherwood Circle ponds and two unpermitted ponds behind 15 Second Level Drive to Infiltration basins	IB(4)/SB(4)/CB/GS/OF	3838-9010, 4065-9010	60.46	20.1	5255	2628	58.4	17.5	21587.3		$75,000	$29	$1,835	CWIP,SRF
238 West Brattleboro			CB/IB	3562-9010	8.98	24.5	124	124	1.0	1.0	3050.1					CWIP,SRF
239 West Brattleboro			CB/GS		6.42	36.5	2111	2111	17.6	17.6	5201.7					CWIP,SRF
240 West Brattleboro			OF/GS/CB		24.33	22.9	4788	4788	39.9	39.9	11801.5					CWIP,SRF
241 West Brattleboro			OF/GS		12.36	33.6	3685	3685	30.7	30.7	9081.5					CWIP,SRF
242 West Brattleboro			CB/GS/OF		9.45	32.3	2698	2698	22.5	22.5	6650.1					CWIP,SRF
243 West Brattleboro			CB/GS/OF		4.95	19.1	820	820	6.8	6.8	2021.3					CWIP,SRF
244 West Brattleboro			CB/GS/OF		42.43	30.5	11345	11345	94.5	94.5	27959.8					CWIP,SRF
245 West Brattleboro			CB/GS/OF	3458-9010	25.84	10.7	1924	1924	18.0	18.0	5927.8					CWIP,SRF
246 West Brattleboro			OF/GS/CD	3458-9010	13.81	19.3	1539	1539	14.4	14.4	4740.8					CWIP,SRF
247 West Brattleboro			OF/GS/CB		22.39	23.3	4487	4487	37.4	37.4	11058.7					CWIP,SRF
248 West Brattleboro	1	Upgrade existing stormwater basin behind 49 Deepwood Drive	MOD/OF/GS/CB/SB	3458-9010	11.24	26.9	1753	877	16.4	13.1	5400.8		$10,000	$11	$3,042	CWIP,SRF
249 West Brattleboro			OF/GS/CB		13.08	14.4	1716	1716	14.3	14.3	4229.2					CWIP,SRF
250 West Brattleboro			OF/WP		9.01	13.4	158	158	4.0	4.0	1950.8					CWIP,SRF

Target Maps

Showing Priority Action List Drainage Areas

And Potential Retrofit Locations

PLAN

Key Plan

This zone is primarily comprised of open space, with residential and forested sections on the edges. Outside of the study area, the zone is bounded on the south, west, and east sides by steep and heavily wooded slopes. This largely undeveloped area offers the best opportunity in the study area for a significant floodplain restoration project that would provide flood storage, reduce flood energy, and allow for settling of sediments and other pollutants. Additionally, runoff that is currently entering the brook from a large untreated stormwater outfall could be rerouted and the stormwater treated in a constructed gravel wetland on the edge of the floodplain.

These two improvements (excavation of fill materials and construction of a gravel wetland) would make significant progress in increasing the health of the Whetstone brook, and, in addition to these benefits, this zone could present recreational opportunities including walking, running, bicycling, and cross country skiing.

Subwatersheds 38, 72
Treatment in Constructed Gravel Wetland

PROPOSED ELEMENTS

1 Meadow Planting
2 Pedestrian Path
3 Potential Pedestrian Bridge
4 Constructed Gravel Wetland

PLAN

Key Plan

This winding section of the Whetstone brook is bound by stone rip rap and on one side by steep vegetated slopes, and it flows between traditional pre-war residential neighborhoods and a large industrial use parcel. The proposed housing density transitions gradually between the downtown area and adjacent neighborhoods. Proposed mixed use, townhome, and single family homes on the industrial parcel face the brook, and common green spaces provide pedestrian access to, along, and across the brook. A vegetated swale would provide an expanded fluvial channel for increased flood storage capacity, and create recreational green space and habitat for riparian species. Pedestrian bridges could cross to the south side of the brook, linking to the Frost Place neighborhood and back east along the brook to the co-op. These pedestrian bridges could be constructed with a 'break-away' feature. Tethered on one end, this break-away feature would allow the bridge to swing harmlessly out of the way during flood events, so that it does not obstruct flood waters or debris, and can be reattached after the flood is over. The Frost Place neighborhood would include additional single family housing, a storm water treatment area, and pedestrian connections up to Birge and Canal Streets.

Subwatershed 39 Treatment in Wet Pond
Subwatershed 47-50,58 Treatment at Kiln
Dry south of Frost St

PROPOSED ELEMENTS

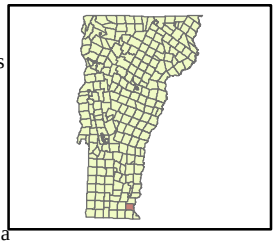
1. Mixed Use Development
2. Neighborhood Pedestrian Corridor
3. Duplex/Triplex
4. Single Family
5. Extended Whetstone Pathway
6. Pedestrian Bridge Connections
7. Vegetated Swale
8. Low-water Crossing
9. Stormwater Pond

Brattleboro, VT

DEC Stormwater Infrastructure Mapping Project

This map shows high priority subwatersheds which are ranked by connectedness, percent of impervious cover, field observations, and potential retrofit measures and locations.

The data shown on this map is only as accurate as the available sources and field observations allowed and should be used as a basic planning level tool only.



VERMONT

Stormwater points

- Pipe Cross (not connected)
- Catchbasin
- Dry Well
- Drop Inlet
- Grate/Curb Inlet
- Yard drain
- CB tied to sanitary sewer
- Junction Box
- Stormwater Manhole
- Outfall
- Culvert inlet
- Culvert outlet
- Control Structure
- Treatment feature (see notes)
- Retrofit
- Unknown Point
- Information Point

Stormwater line

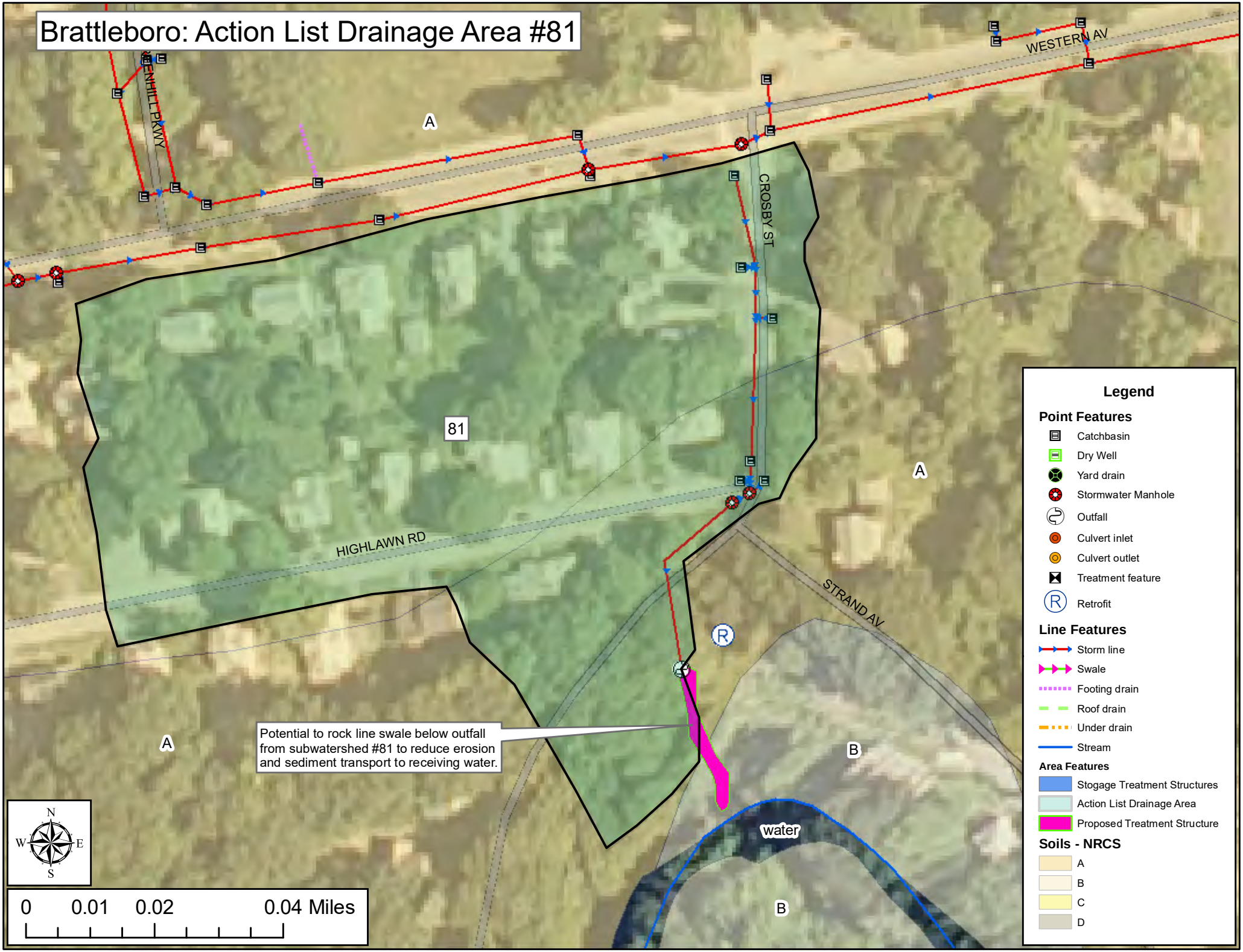
- Storm line
- Storm line (old Sanitary line)
- Tunnel (storm)
- Combined sewer
- Sanitary line
- Swale
- Footing drain
- Under drain
- Roof drain
- Infiltration pipe
- French drain
- Trench drain
- Emergency spillway
- Stream
- Overland flow

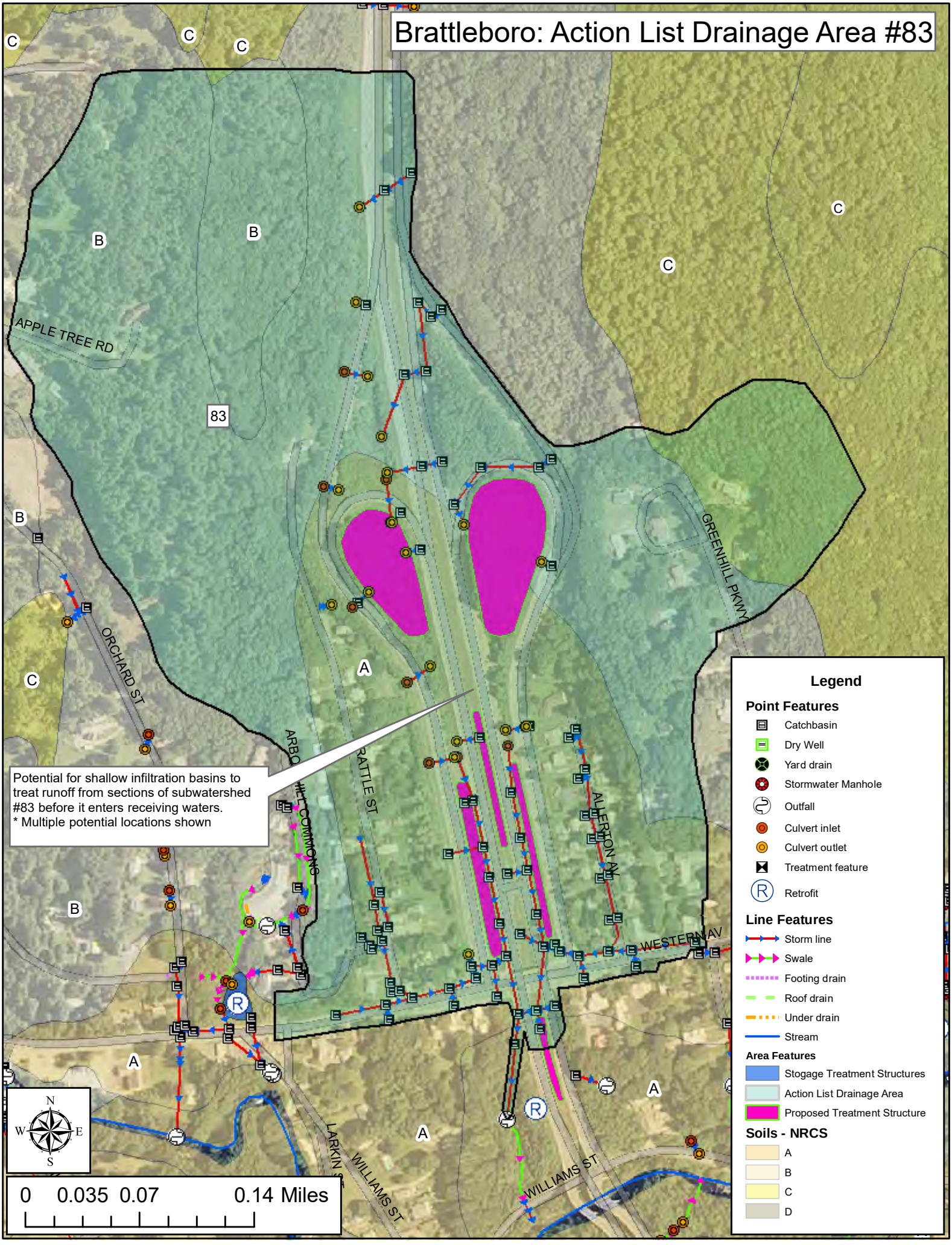
SubwatershedID

- Priority Subwatershed
- Stormwater Treatment Area
- Potential Stormwater Treatment Area

NRCS Soils

Creator: Jim Pease, David Ainley
DEC - WID - Clean Water Initiative Program
Plotted Date:7/7/2022
Data Sources: VTRANS Roads data, VT Hydrography data set, DEC Stormwater database, NRCS soils survery
Imagery Source: VCGI Best Available Imagery


Brattleboro: Action List Drainage Area #81
WESTERN AV
GLENHILL PKWY
CROSBY ST
HIGHLAWN RD
STRAND AV
81
A
A
A
B
B
water
Potential to rock line swale below outfall from subwatershed #81 to reduce erosion and sediment transport to receiving water.
N
W
E
S
0
0.01
0.02
0.04 Miles
Legend
Point Features
Catchbasin
Dry Well
Yard drain
Stormwater Manhole
Outfall
Culvert inlet
Culvert outlet
Treatment feature
Retrofit
Line Features
Storm line
Swale
Footing drain
Roof drain
Under drain
Stream
Area Features
Stogage Treatment Structures
Action List Drainage Area
Proposed Treatment Structure
Soils - NRCS
A
B
C
D


Brattleboro: Action List Drainage Area #83
APPLE TREE RD
83
GREENHILL PKWY
ORCHARD ST
RATTLE ST
ALLERTON AV
WESTERN AV
WILLIAMS ST
LARKIN
Potential for shallow infiltration basins to treat runoff from sections of subwatershed #83 before it enters receiving waters.
* Multiple potential locations shown
Legend
Point Features
Catchbasin
Dry Well
Yard drain
Stormwater Manhole
Outfall
Culvert inlet
Culvert outlet
Treatment feature
Retrofit
Line Features
Storm line
Swale
Footing drain
Roof drain
Under drain
Stream
Area Features
Stogage Treatment Structures
Action List Drainage Area
Proposed Treatment Structure
Soils - NRCS
A
B
C
D
N
W
E
S
0 0.035 0.07 0.14 Miles

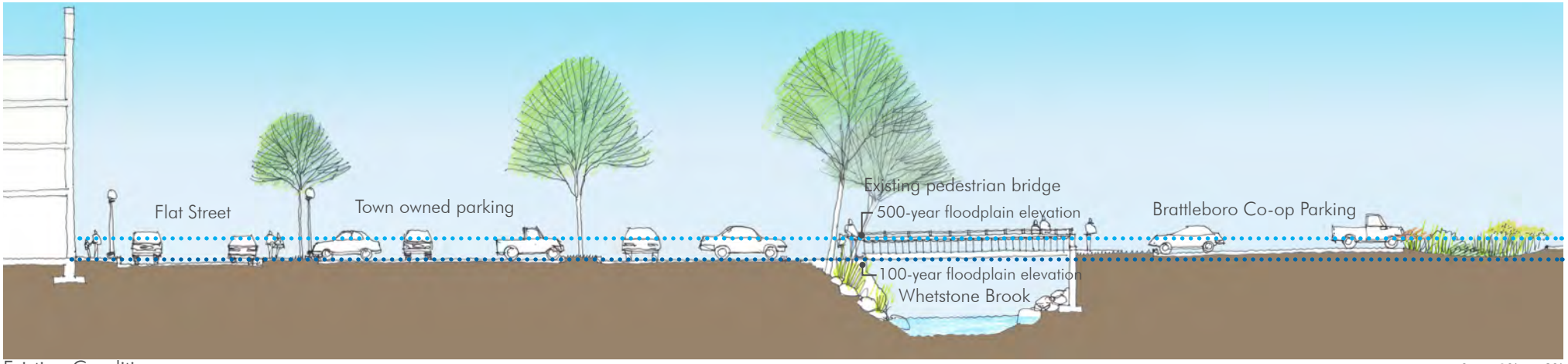
SECTIONS

Subwatershed 98 Treatment in Underground Cistern

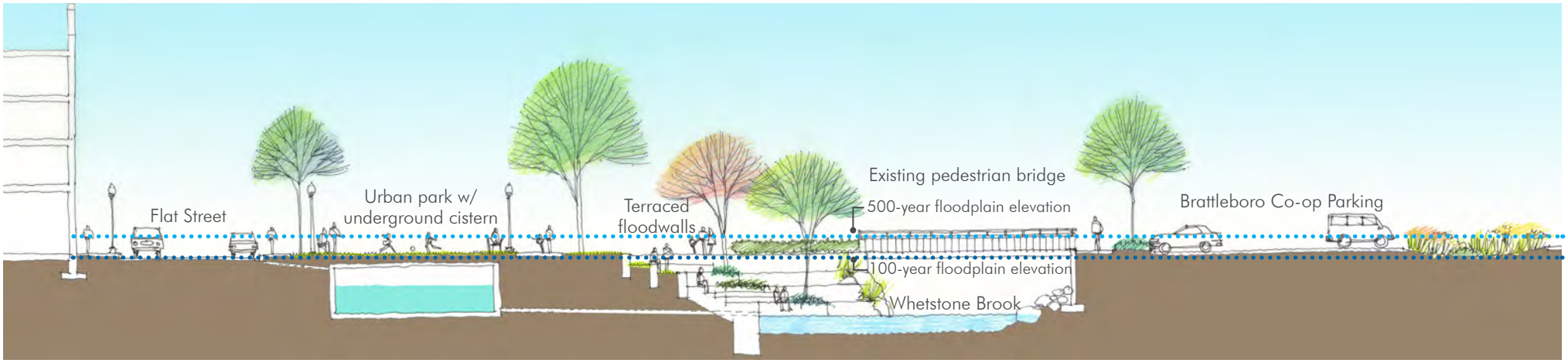
Key Plan

The existing conditions show the channelized portion of the Whetstone brook. The impervious surface of the Preston parking lot contributes runoff to the brook during storm events.

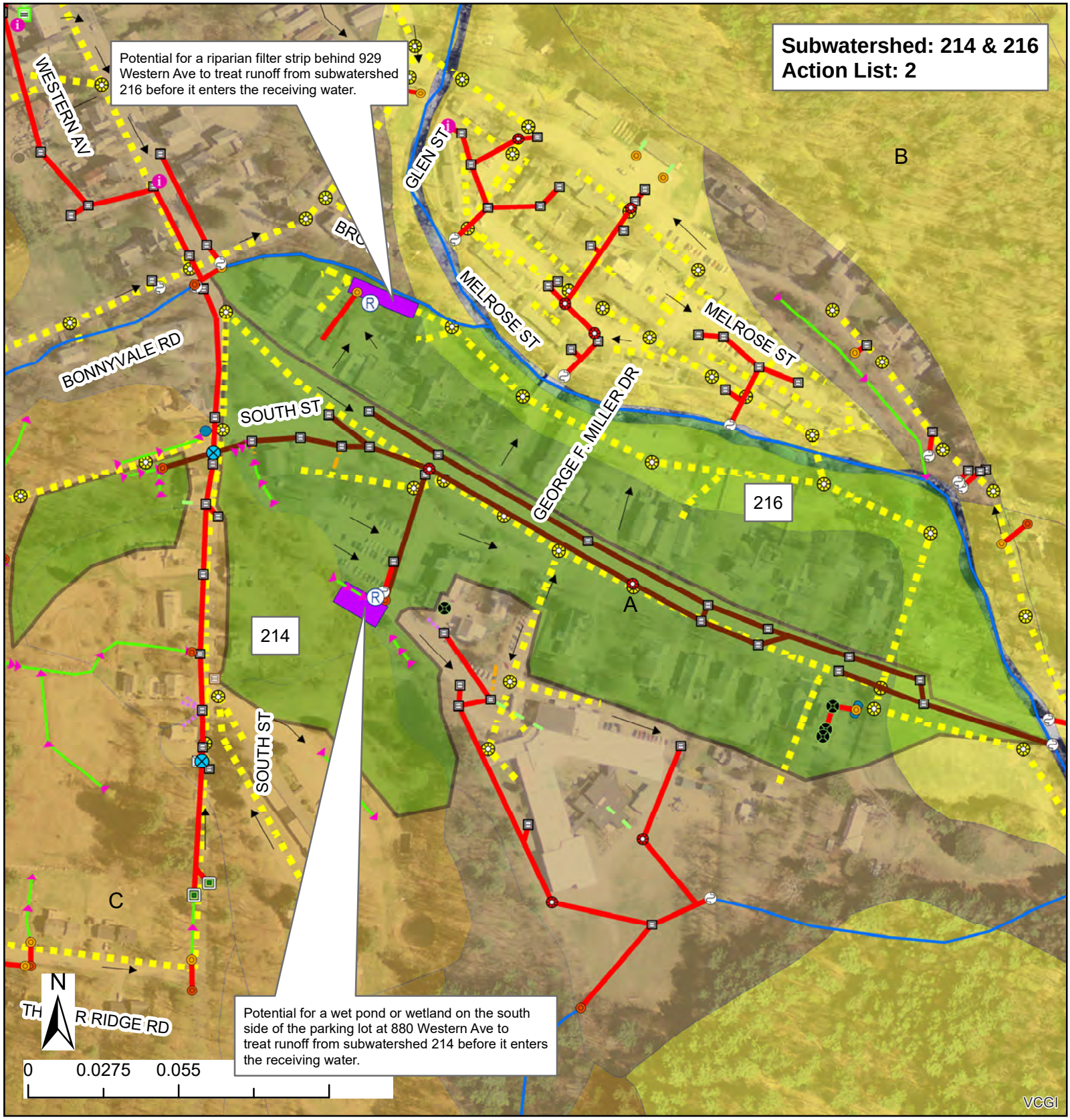
The proposed design concepts suggests converting the parking lot into a park, and accommodating the displaced parking in the adjacent municipal parking garage and elsewhere. This would not only eliminate large amounts of impervious surface, but would also allow for more water volume storage during large storm events through terraced flood walls. The flood walls would provide recreational opportunities for the community during dry weather.



Existing Conditions



Proposed Conditions

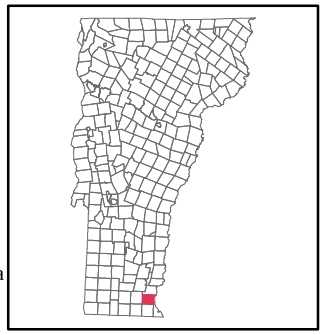


West Brattleboro, VT

DEC Stormwater Infrastructure Mapping Project

This map shows high priority subwatersheds which are ranked by connectedness, percent of impervious cover, field observations, and potential retrofit measures and locations.

The data shown on this map is only as accurate as the available sources and field observations allowed and should be used as a basic planning level tool only.



Stormwater points

- Pipe Cross (not connected)
- Catchbasin
- Dry Well
- Drop Inlet
- Grate/Curb Inlet
- Yard drain
- CB tied to sanitary sewer
- Junction Box
- Stormwater Manhole
- Outfall
- Culvert inlet
- Culvert outlet
- Pond outlet structure
- Treatment feature (see notes)
- Retrofit
- Unknown Point
- Information Point

Stormwater line

- Storm line
- Storm line (old Sanitary line)
- Tunnel (storm)
- Combined sewer
- Sanitary line
- Swale
- Footing drain
- Under drain
- Roof drain
- Infiltration pipe
- French drain
- Trench drain
- Emergency spillway
- Stream
- Overland flow

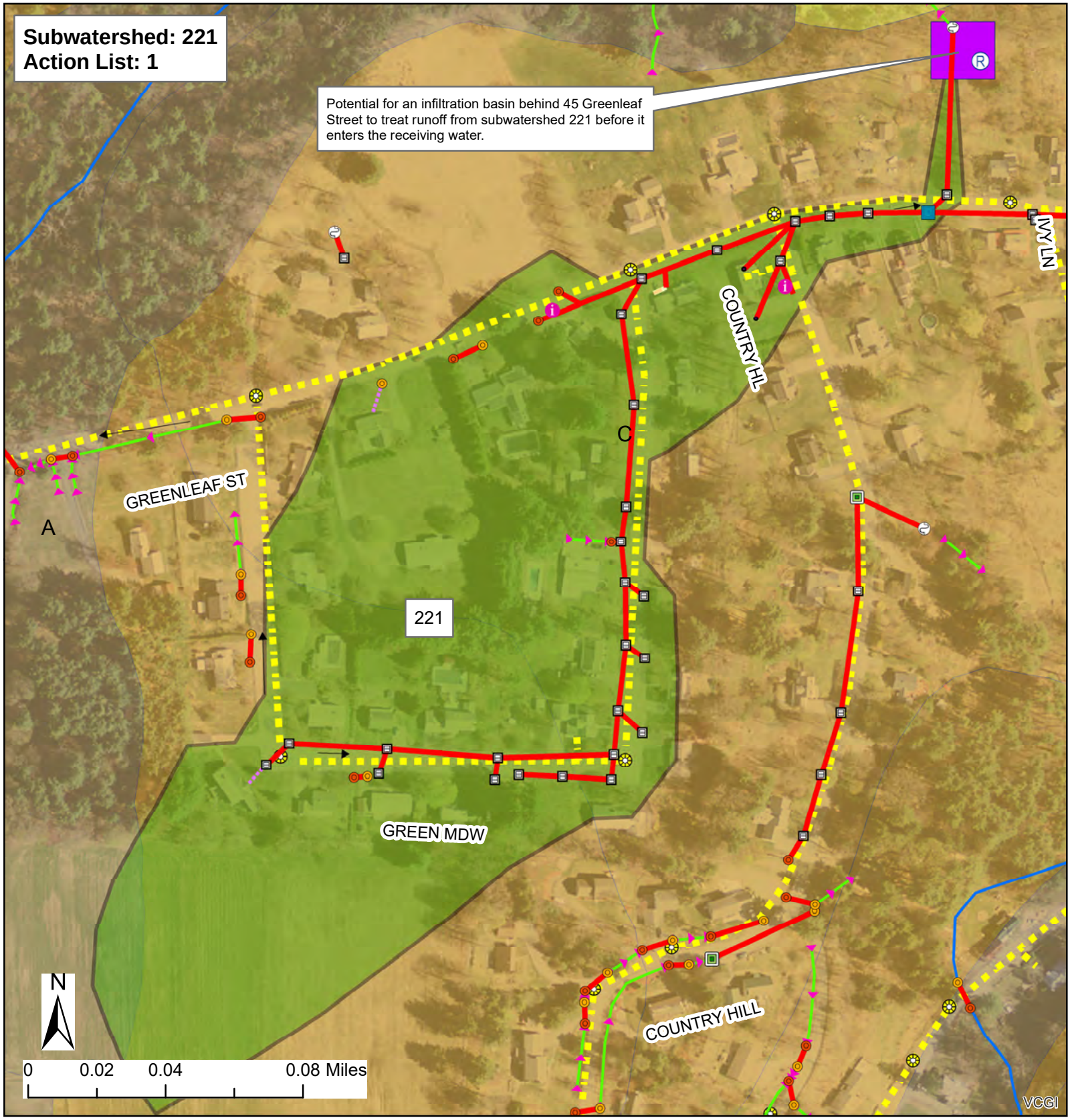
NRCS - Soils

- A
- B
- C
- D

SubwatershedID

- Priority Subwatershed
- Stormwater Treatment Area
- Potential Stormwater Treatment Area

Creator: Jim Pease, David Ainley
DEC - WSMD - Ecosystem Restoration Program
Plotted Date: 3/27/2017
Data Sources: VTRANS Roads data, VT Hydrography data set, DEC Stormwater database, NRCS soils survery
Imagery Source: VCGI Best Available

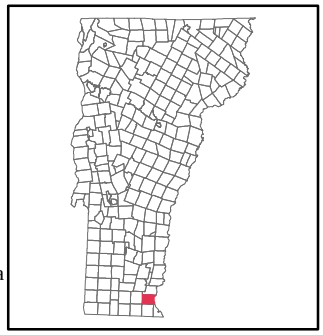


West Brattleboro, VT

DEC Stormwater Infrastructure Mapping Project

This map shows high priority subwatersheds which are ranked by connectedness, percent of impervious cover, field observations, and potential retrofit measures and locations.

The data shown on this map is only as accurate as the available sources and field observations allowed and should be used as a basic planning level tool only.



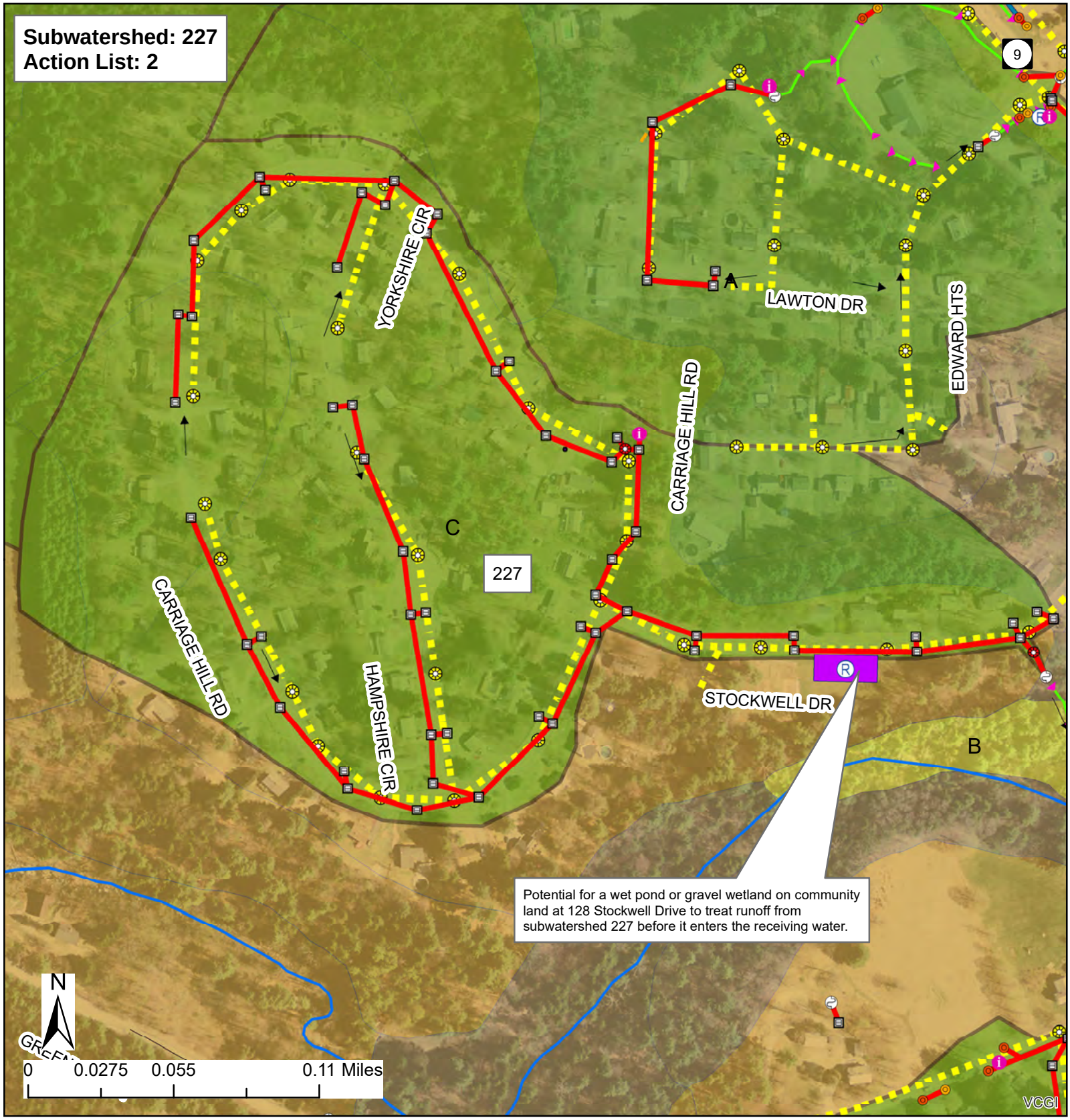
Stormwater points
- Pipe Cross (not connected)
- Catchbasin
- Dry Well
- Drop Inlet
- Grate/Curb Inlet
- Yard drain
- CB tied to sanitary sewer
- Junction Box
- Stormwater Manhole
- Outfall
- Culvert inlet
- Culvert outlet
- Pond outlet structure
- Treatment feature (see notes)
- Retrofit
- Unknown Point
- Information Point

Stormwater line
- Storm line
- Storm line (old Sanitary line)
- Tunnel (storm)
- Combined sewer
- Sanitary line
- Swale
- Footing drain
- Under drain
- Roof drain
- Infiltration pipe
- French drain
- Trench drain
- Emergency spillway
- Stream
- Overland flow

NRCS - Soils
- A
- B
- C
- D

SubwatershedID
- Priority Subwatershed
- Stormwater Treatment Area
- Potential Stormwater Treatment Area

Creator: Jim Pease, David Ainley
DEC - WSMD - Ecosystem Restoration Program
Plotted Date: 3/31/2017
Data Sources: VTRANS Roads data, VT Hydrography data set, DEC Stormwater database, NRCS soils survery
Imagery Source: VCGI Best Available

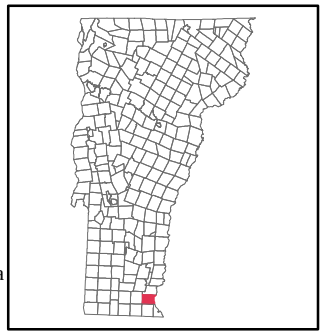


West Brattleboro, VT

DEC Stormwater Infrastructure Mapping Project

This map shows high priority subwatersheds which are ranked by connectedness, percent of impervious cover, field observations, and potential retrofit measures and locations.

The data shown on this map is only as accurate as the available sources and field observations allowed and should be used as a basic planning level tool only.



Stormwater points

- Pipe Cross (not connected)
- Catchbasin
- Dry Well
- Drop Inlet
- Grate/Curb Inlet
- Yard drain
- CB tied to sanitary sewer
- Junction Box
- Stormwater Manhole
- Outfall
- Culvert inlet
- Culvert outlet
- Pond outlet structure
- Treatment feature (see notes)
- Retrofit
- Unknown Point
- Information Point

Stormwater line

- Storm line
- Storm line (old Sanitary line)
- Tunnel (storm)
- Combined sewer
- Sanitary line
- Swale
- Footing drain
- Under drain
- Roof drain
- Infiltration pipe
- French drain
- Trench drain
- Emergency spillway
- Stream
- Overland flow

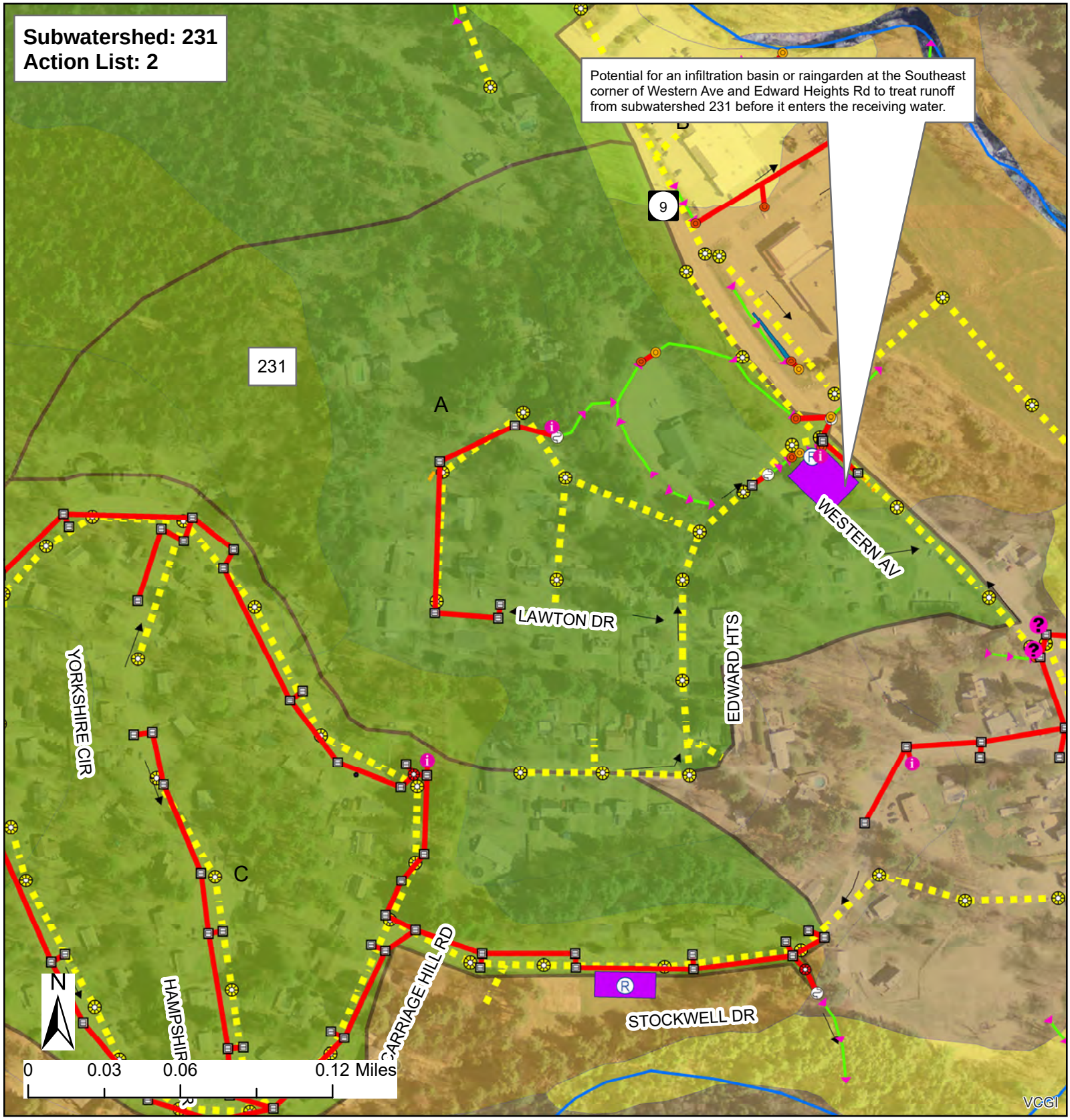
NRCS - Soils

- A
- B
- C
- D

SubwatershedID

- Priority Subwatershed
- Stormwater Treatment Area
- Potential Stormwater Treatment Area

Creator: Jim Pease, David Ainley
DEC - WSMD - Ecosystem Restoration Program
Plotted Date: 3/31/2017
Data Sources: VTRANS Roads data, VT Hydrography data set, DEC Stormwater database, NRCS soils survery
Imagery Source: VCGI Best Available

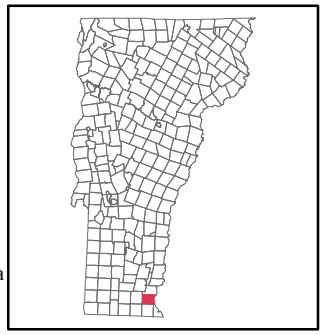


West Brattleboro, VT

DEC Stormwater Infrastructure Mapping Project

This map shows high priority subwatersheds which are ranked by connectedness, percent of impervious cover, field observations, and potential retrofit measures and locations.

The data shown on this map is only as accurate as the available sources and field observations allowed and should be used as a basic planning level tool only.



Stormwater points

- Pipe Cross (not connected)
- Catchbasin
- Dry Well
- Drop Inlet
- Grate/Curb Inlet
- Yard drain
- CB tied to sanitary sewer
- Junction Box
- Stormwater Manhole
- Outfall
- Culvert inlet
- Culvert outlet
- Pond outlet structure
- Treatment feature (see notes)
- Retrofit
- Unknown Point
- Information Point

Stormwater line

- Storm line
- Storm line (old Sanitary line)
- Tunnel (storm)
- Combined sewer
- Sanitary line
- Swale
- Footing drain
- Under drain
- Roof drain
- Infiltration pipe
- French drain
- Trench drain
- Emergency spillway
- Stream
- Overland flow

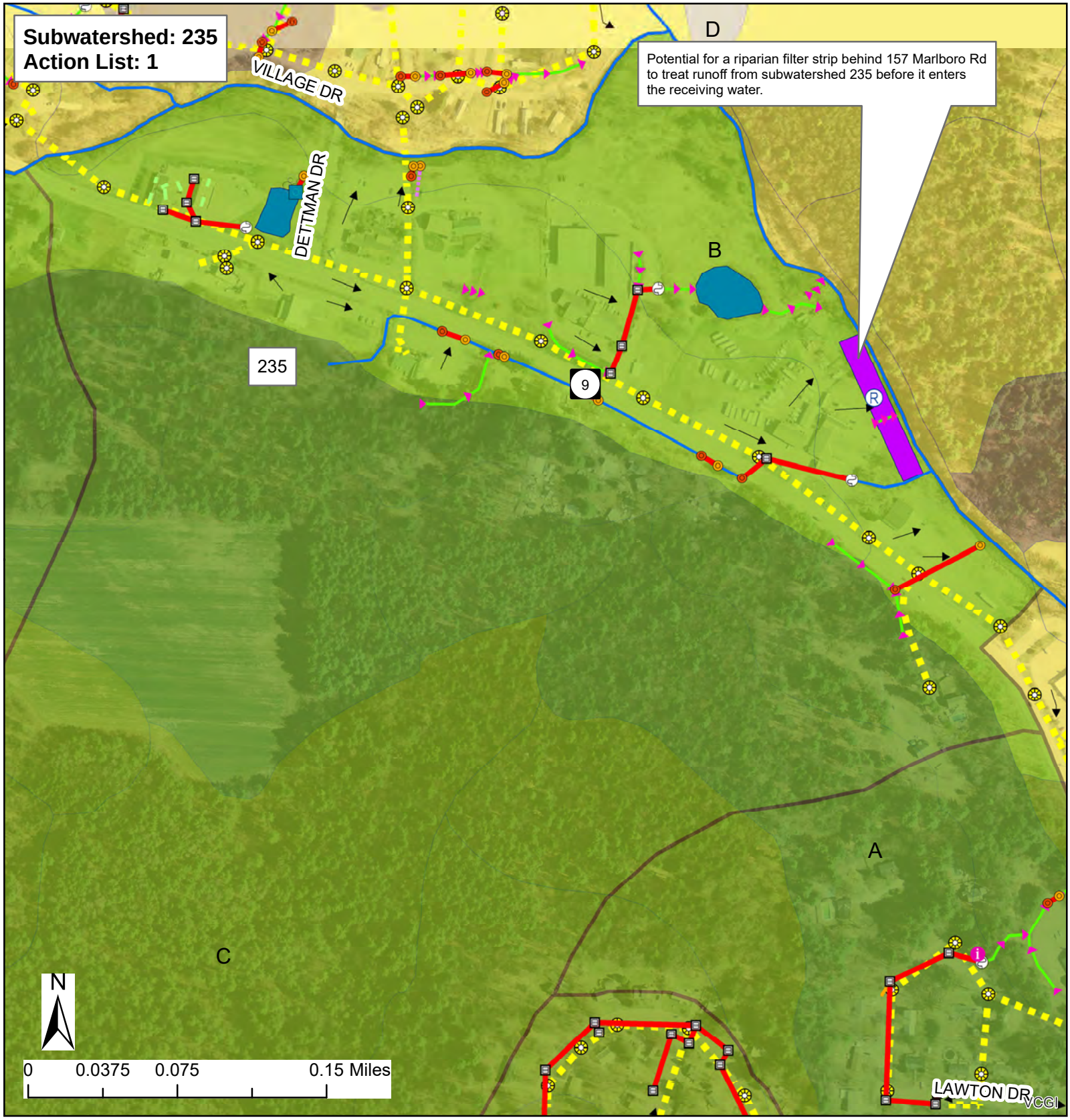
NRCS - Soils

- A
- B
- C
- D

SubwatershedID

- Priority Subwatershed
- Stormwater Treatment Area
- Potential Stormwater Treatment Area

Creator: Jim Pease, David Ainley
DEC - WSMD - Ecosystem Restoration Program
Plotted Date: 3/31/2017
Data Sources: VTRANS Roads data, VT Hydrography data set, DEC Stormwater database, NRCS soils survery
Imagery Source: VCGI Best Available

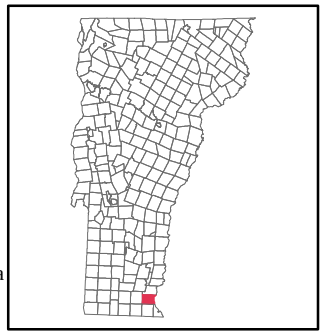


West Brattleboro, VT

DEC Stormwater Infrastructure Mapping Project

This map shows high priority subwatersheds which are ranked by connectedness, percent of impervious cover, field observations, and potential retrofit measures and locations.

The data shown on this map is only as accurate as the available sources and field observations allowed and should be used as a basic planning level tool only.



Stormwater points

- Pipe Cross (not connected)
- Catchbasin
- Dry Well
- Drop Inlet
- Grate/Curb Inlet
- Yard drain
- CB tied to sanitary sewer
- Junction Box
- Stormwater Manhole
- Outfall
- Culvert inlet
- Culvert outlet
- Pond outlet structure
- Treatment feature (see notes)
- Retrofit
- Unknown Point
- Information Point

Stormwater line

- Storm line
- Storm line (old Sanitary line)
- Tunnel (storm)
- Combined sewer
- Sanitary line
- Swale
- Footing drain
- Under drain
- Roof drain
- Infiltration pipe
- French drain
- Trench drain
- Emergency spillway
- Stream
- Overland flow

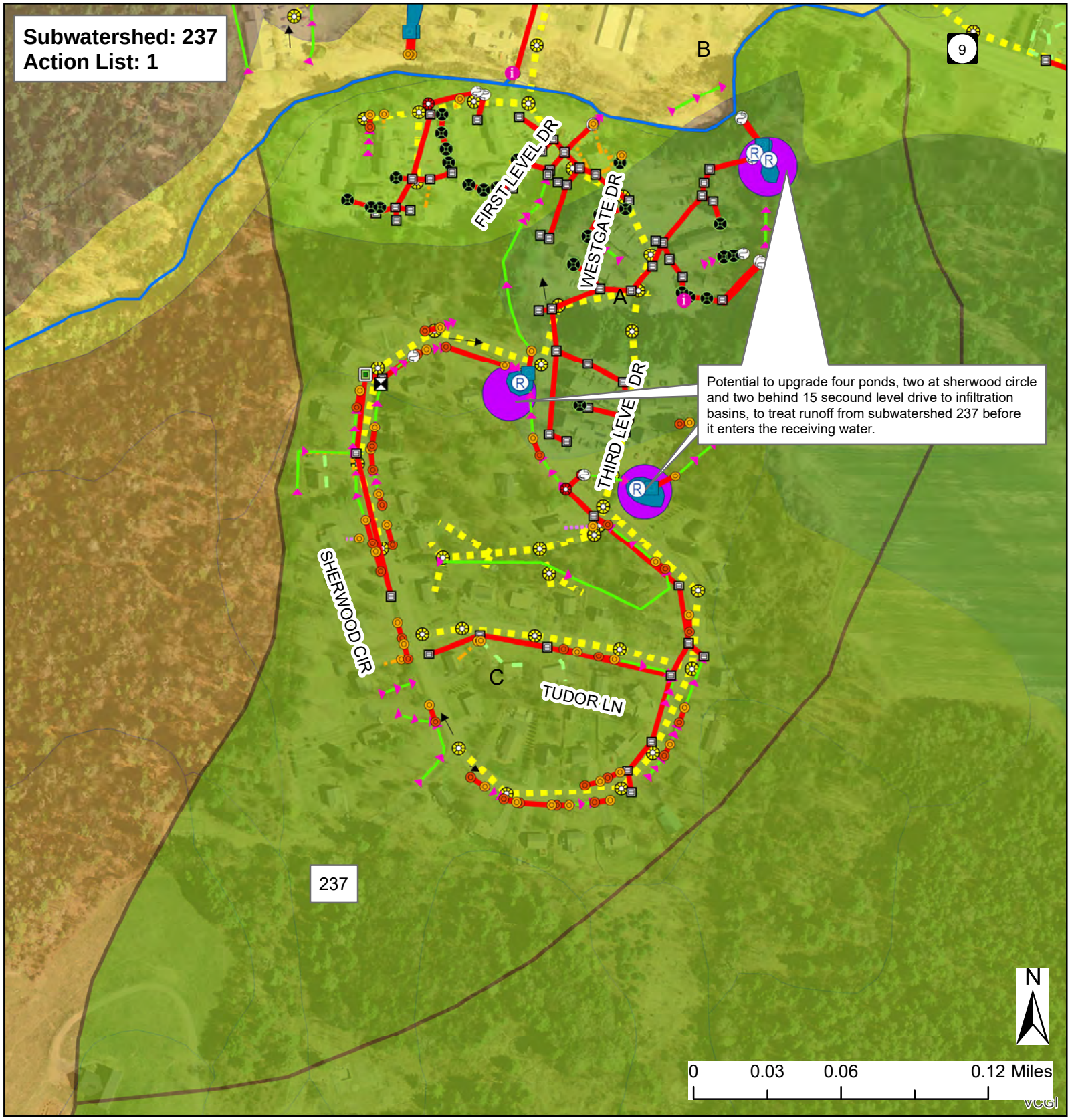
NRCS - Soils

- A
- B
- C
- D

SubwatershedID

- Priority Subwatershed
- Stormwater Treatment Area
- Potential Stormwater Treatment Area

Creator: Jim Pease, David Ainley
DEC - WSMD - Ecosystem Restoration Program
Plotted Date: 3/31/2017
Data Sources: VTRANS Roads data, VT Hydrography data set, DEC Stormwater database, NRCS soils survery
Imagery Source: VCGI Best Available

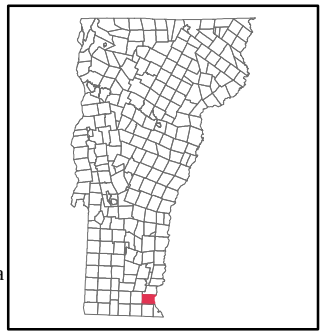


West Brattleboro, VT

DEC Stormwater Infrastructure Mapping Project

This map shows high priority subwatersheds which are ranked by connectedness, percent of impervious cover, field observations, and potential retrofit measures and locations.

The data shown on this map is only as accurate as the available sources and field observations allowed and should be used as a basic planning level tool only.



Stormwater points

- Pipe Cross (not connected)
- Catchbasin
- Dry Well
- Drop Inlet
- Grate/Curb Inlet
- Yard drain
- CB tied to sanitary sewer
- Junction Box
- Stormwater Manhole
- Outfall
- Culvert inlet
- Culvert outlet
- Pond outlet structure
- Treatment feature (see notes)
- Retrofit
- Unknown Point
- Information Point

Stormwater line

- Storm line
- Storm line (old Sanitary line)
- Tunnel (storm)
- Combined sewer
- Sanitary line
- Swale
- Footing drain
- Under drain
- Roof drain
- Infiltration pipe
- French drain
- Trench drain
- Emergency spillway
- Stream
- Overland flow

NRCS - Soils

- A
- B
- C
- D

SubwatershedID

- Priority Subwatershed
- Stormwater Treatment Area
- Potential Stormwater Treatment Area

Creator: Jim Pease, David Ainley
DEC - WSMD - Ecosystem Restoration Program
Plotted Date: 3/31/2017
Data Sources: VTRANS Roads data, VT Hydrography data set, DEC Stormwater database, NRCS soils survery
Imagery Source: VCGI Best Available