Town of Barre

Stormwater Infrastructure Mapping Project

October 2016

VTDEC – ECOSYSTEM RESTORATION SECTION
WATERSHED MANAGEMENT DIVISION

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****See reverse for Overview and Project Summary***

Overview

This stormwater infrastructure mapping project was completed for the municipality by the Agency of Natural Resources Ecosystems Restoration program to supplement the existing drainage data collected by the town and with the intention of providing a tool for planning, maintenance, and inspection of the stormwater infrastructure.

The GIS maps and geodatabase are meant to provide an overall picture and understanding of the connectivity or connectedness of the storm system on both public and private properties in order to raise the awareness of the need for regular maintenance. The generation and transport of nonpoint source pollution increases with increasing connectivity of a drainage system. Having an understanding of the connectedness of the system is also a valuable tool for hazardous material spill planning and prevention. Knowledge of the extent of the system is also essential for the detection and elimination of illicit discharges. Outfall locations and system connectedness data are used as a base for locating illicit or illegal discharges of non-stormwater to the municipal storm system and tracing them up to the source. Knowledge of which areas of the sewer service area have combined stormwater and sewer systems can better assist the municipality in planning and implementing combined sewer separation projects. Knowledge of the layout and extent of the stormwater system can inform options for cleaning up existing polluted stormwater discharges. This project provides information and guidance for potential retrofit treatment locations and opportunities. Knowledge of where storm drains are located can also assist municipalities and residents with emergency preparedness for large rainfall events (i.e. Tropical Storm or Hurricanes) or spring snowmelt runoff events. By keeping storm drains clean, clear and open a good deal of localized flooding could be prevented. Finally, by providing a more thorough understanding of the system it is the hope that this project could be the basis for a local stormwater ordinance or be used to help enhance an existing stormwater management program.

Project Summary

The principal goal of this project was to develop up to date municipal drainage maps. These drainage maps were created showing the paths that stormwater runoff travels from where it falls on impervious surfaces such as parking lots, roads, and rooftops, to the outfall points in various receiving waters. These maps show the stormwater infrastructure including features like pipes, manholes, catchbasins, and swales within a municipality. Data sources included data collected from field work, a mapping grade Trimble GPS unit, available state permit plans, record drawings, town plans, WWMD plans, existing GIS data from contractors, and the input and guidance of knowledgeable members from the municipalities.

A second goal of this project was to establish potential locations for Best Management Practice (BMP) stormwater retrofit sites. These are sites where stormwater treatment structures could be added and where they would be most cost effective and efficient for sediment and phosphorus or nitrogen removal. In order to develop a retrofit site list, drainage area subwatersheds were delineated around the drainage networks. Determining how the stormwater infrastructure was connected was necessary in determining the subwatershed drainage areas within the town.

Delineating the drainage areas was done using the stormwater infrastructure maps, along with satellite imagery, a Digital Elevation Model (DEM), and USGS topographic maps. These data sources were used to approximate where the land area within each municipality was draining to; as well as where the high points were that divided the sub-drainage areas. The

completed maps show the drainage coverage for essentially the entire municipality, but with a focus on areas with greater concentrations of impervious cover.

Impervious cover layers were created by either hand digitization or by using a method of raster pixel calculation (with ArcGIS spatial analyst extension) to create a vegetation index from the National Agricultural Imagery Program (NAIP) 08 orthophotos. The area which contrasted with the vegetation represents impervious surfaces and was then modified with buffered water and roads layers to make it more accurate. A more detailed explanation of this process is available in a separate document. The impervious layer was used to calculate the percent of each delineated drainage area that would generate stormwater runoff. The percentage of impervious surface number for each subwatershed was then adjusted with a connectivity rating. A rating was assigned to each drainage area polygon describing how directly connected the impervious surfaces within that subwatershed are to the receiving water. By adjusting the percent impervious area numbers with this connectivity rating the effective impervious area (EIA) was established for each subwatershed (*Sutherland, 1995*). This effective impervious number is a more accurate description of the amount of runoff produced by each of the subwatersheds because it helps to take factors such as infiltration into account.

After the effective impervious numbers were calculated for the subwatersheds the Simple Method was used to estimate the annual sediment (TSS) and phosphorus (TP) or Nitrogen (TN) loads generated by each subwatershed. The Simple method uses information which includes the adjusted impervious value, average annual rainfall for the location, total subwatershed area, and a given pollutant concentration value to calculate an annual load for various pollutants (*Schueler,1987*). Pollutant loads estimated by the Simple Method in this project are planning level estimates and are meant to give a general idea of the amounts of sediment or nutrient wash-off produced by each subwatershed for prioritization purposes. Subwatersheds were then prioritized, using the loading calculations as well as other criteria, and given Action List numbers ranging from 1 to 3 (one being the highest priority). The Action List number depends both upon loading values and feasibility of potential retrofit treatment options. Potential retrofit options listed in the TARGET maps are based on field observations and not on actual availability of land or willingness of landowner.

Water Quality Volume (WQv – the amount of storage needed to treat stormwater from a 0.9 inch storm) and Channel Protection Volume (CPv – the volume of storage that is needed to hold and slowly release stormwater for a 2.1inch rain event) were also calculated for delineated subwatershed areas. CPv calculations are only applicable if the receiving water is not a large body of water and is therefore susceptible to channel erosion. These numbers were used in the retrofit recommendation process because the volume of water to be treated was a key factor in determining the type of retrofit.

Project References

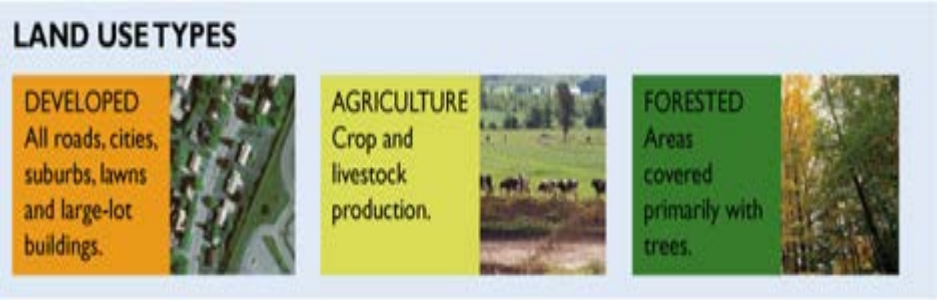
Schueler, T. 1987. Technical Documentation of a Simple Method for Estimating Urban Storm Pollutant Export. Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs. Appendix A.

Schueler, T. et.al., 2007. Urban Stormwater Retrofit Practices, Version 1.0. Manual 3, Center for Watershed Protection, August 2007.

Sutherland, R. 1995. Methodology for Estimating the Effective Impervious Area of Urban Watersheds. Technical Note 58 – Pervious Area Management. Watershed Protection Techniques. Vol. 2, No. 1

***All data was created in an ArcGIS 10 Geodatabase format and is available from VTDEC.**

Main Lake and Winooski River Nonpoint Phosphorus Overview



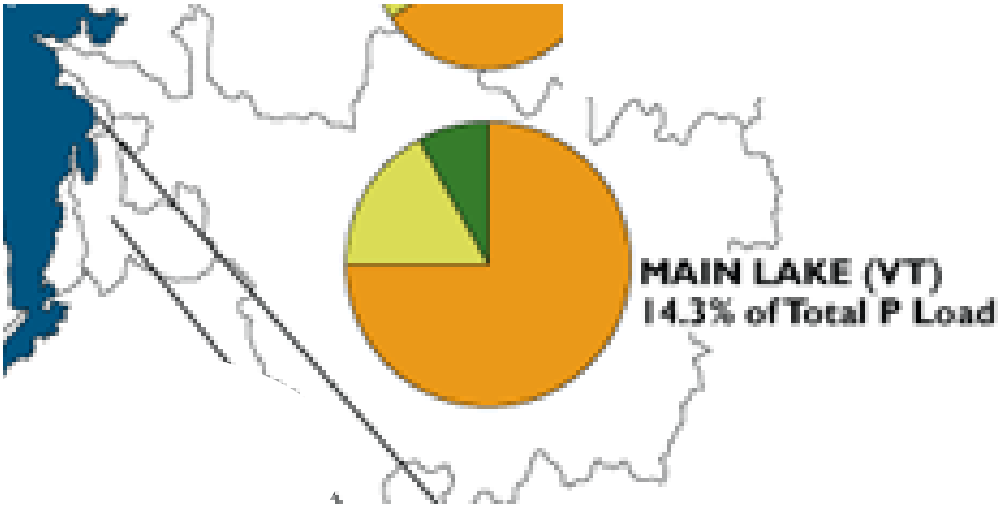
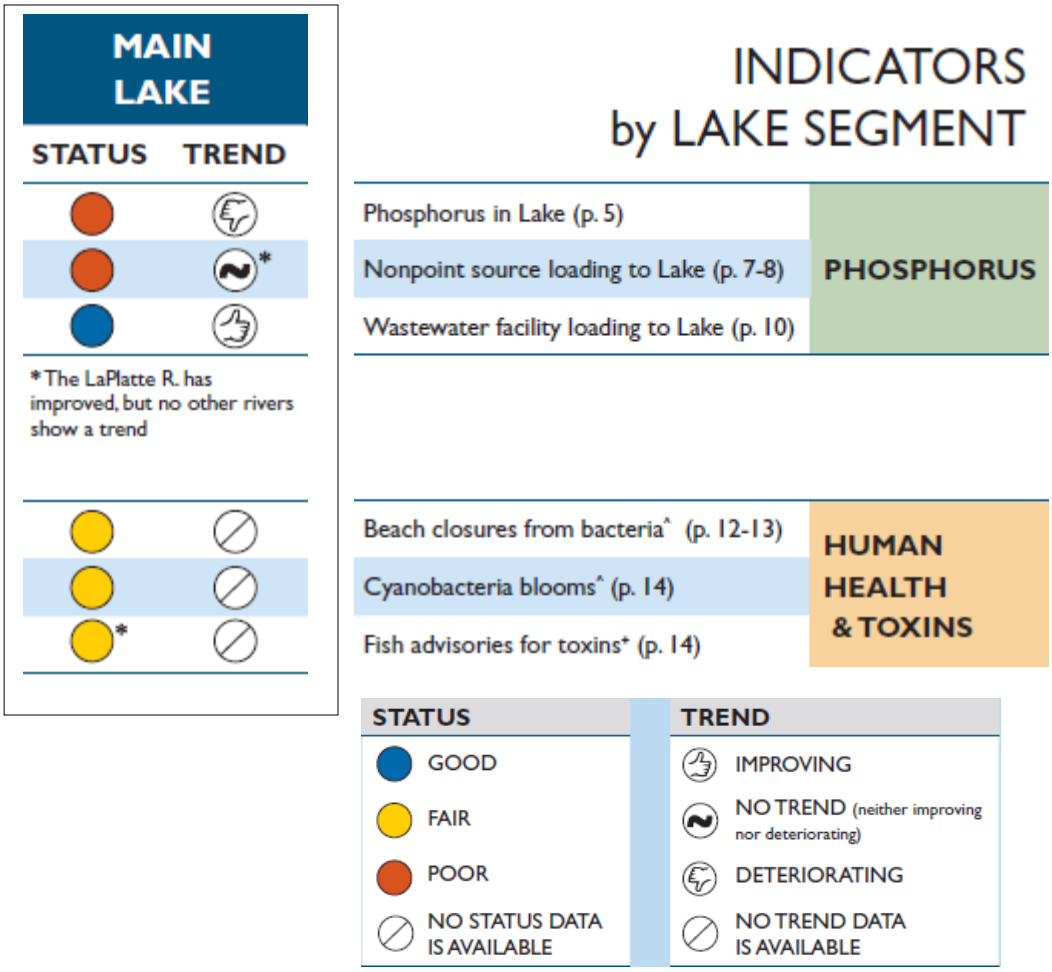


Figure shows the breakdown of contributions from developed, agricultural and forested land sources in the Main Lake-Winooski River Watershed to Total Phosphorus loading of the Main Lake, VT side.



* Figures taken from Lake Champlain Basin Program – *State of the Lake and Ecosystem Indicators Report (2012).* http://sol.lcbp.org/

Subwatershed Data

Tables showing calculations and Priority drainage area retrofit possibilities

This is a key showing the abbreviations of the different stormwater treatment structures or practices listed in the calculation sheets.

Abbreviation Key	
Code	**Structure Type**
BB	Baffle Box
BFCB	Baffled Catchbasin
BR	Bioretention Area (aka Bioretention Filter)
BS	Buffer Strip (25' Min.)
CB	Catch Basin
CBI	Catch Basin Insert
CD	Check Dam
DG	Detention Gallery
DI	Drop Inlet
DP	Dry Pond
DS	Dry Swale
DW	Drywell
EDPMP	Extended Detention Pond with Micropool (aka Micropool Extended Detention Basin)
GS	Grass Swale (aka Open Channel)
IB	Infiltration Basin
IG	Infiltration Gallery
IP	Infiltration Pipe
OF	Overland Flow
OGF	Organic Filter
POP	Pocket Pond
PP	Perforated Pipe
RDD	Roof Drain Disconnect
RR	Rock Riprap
RS	Riprap Swale
SB	Sediment Basin
SF	Sand Filter (aka Surface Sand Filter)
SS-SF	Swirl Separator – Sand Filter
ST	Septic Tank
SWPPP	Stormwater Pollution Prevention Plan
TT	Treatment Tank
WL	Wetland (Constructed)
WP	Wet Pond (Retention)
WS	Wet Swale

Barre Town - Subwatershed Prioritization and Recommendations

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)	Phosphorus Load with Current Reductions (lbs)	Phosphorus Load with Priority Action (lbs)	Water Quality Volume (Acre-Feet)	Channel Protection (Acre-Feet)
1 Barre Town	1	Riprap erosion	RR/CB/GS		6.7	35	2,124	1,062	5.9	4.4	0.12	0.26
2 Barre Town			CB/GS		4.2	14	524	524	1.5	1.5	0.03	0.06
3 Barre Town			GS/OF		25.4	4	1,953	1,953	5.4	5.4	0.11	0.12
4 Barre Town			GS/OF		6.1	15	835	835	2.3	2.3	0.05	0.10
5 Barre Town			GS/OF		1.5	17	222	222	0.6	0.6	0.01	0.03
6 Barre Town			CB/GS		13.2	14	1,703	1,703	4.7	4.7	0.10	0.20
7 Barre Town			CB/OF		3.1	12	351	351	1.0	1.0	0.02	0.04
8 Barre Town			GS/OF		6.4	7	561	561	1.6	1.6	0.03	0.05
9 Barre Town			GS/OF/CR/GS	5587-9015	137.7	4	10,691	10,691	29.7	29.7	0.60	0.68
10 Barre Town			CB/GS		5.2	28	1,245	1,245	3.5	3.5	0.07	0.16
11 Barre Town			CB/GS		1.8	28	434	434	1.2	1.2	0.02	0.06
12 Barre Town			CB/GS		8.7	16	1,241	1,241	3.4	3.4	0.07	0.15
13 Barre Town	1	Riprap erosion	RR/CB/GS		11.4	32	3,254	2,603	9.0	8.1	0.18	0.41
14 Barre Town			CB/GS/SB	4817-9010	59.6	7	4,662	4,662	13.0	9.7	0.26	0.44
15 Barre Town			CB/GS		15.3	14	2,002	2,002	5.6	5.6	0.11	0.24
16 Barre Town			CB/GS		2.5	23	494	494	1.4	1.4	0.03	0.06
17 Barre Town			CB/GS		29.3	7	2,540	2,540	7.1	7.1	0.14	0.21
18 Barre Town			CB/GS		145.5	3	10,383	10,383	28.8	28.8	0.59	0.42
19 Barre Town			CB/GS		96.7	11	10,532	10,532	29.3	29.3	0.60	1.15
20 Barre Town			OF		27.1	3	1,983	1,983	5.5	5.5	0.11	0.10
21 Barre Town			OF/WP/SWPPP	5322-9003	144.5	5	10,608	10,608	29.5	29.5	0.60	0.78
22 Barre Town			GS/CB		32.9	10	3,383	3,383	9.4	9.4	0.19	0.35
23 Barre Town			GS/CB		41.7	8	3,799	3,799	10.6	10.6	0.21	0.35
24 Barre Town			OF/GS	3237-9010	73.7	9	6,263	6,263	17.4	17.4	0.35	0.70
25 Barre Town			OF		2.0	9	205	205	0.6	0.6	0.01	0.02
26 Barre Town			GS/OF		23.3	11	2,500	2,500	6.9	6.9	0.14	0.27
27 Barre Town			GS/OF		1.2	40	461	461	1.3	1.3	0.03	0.06
28 Barre Town			CB/GS		32.8	17	4,957	4,957	13.8	13.8	0.28	0.62
29 Barre Town			CB/OF		1.8	28	426	426	1.2	1.2	0.02	0.05
30 Barre Town			GS/OF		1.9	30	496	496	1.4	1.4	0.03	0.06
31 Barre Town			CB		2.9	37	1,240	1,240	3.4	3.4	0.07	0.12
32 Barre Town			CB/GS		4.3	14	542	542	1.5	1.5	0.03	0.06
33 Barre Town			CB/OF		12.9	17	1,961	1,961	5.4	5.4	0.11	0.25
34 Barre Town			CB/OF		7.7	14	984	984	2.7	2.7	0.06	0.12
35 Barre Town			CB/GS		3.0	29	756	756	2.1	2.1	0.04	0.10
36 Barre Town			CB/OF		10.3	26	2,267	2,267	6.3	6.3	0.13	0.29
37 Barre Town			CB/GS		6.9	23	1,387	1,387	3.9	3.9	0.08	0.18
38 Barre Town			CB		29.6	21	7,377	7,377	20.5	20.5	0.42	0.68
39 Barre Town	2	Bioretention behind 2 Countryside Circle	BRA/CB/GS	3614-9010	10.8	28	2,666	533	7.4	4.4	0.15	0.34
40 Barre Town			GS/OF	3614-9010	3.1	12	350	350	1.0	1.0	0.02	0.04
41 Barre Town			GS/CB/OF	6130-9010	39.4	9	3,363	3,363	9.3	9.3	0.19	0.38
42 Barre Town			CB/GS	6130-9010	89.6	3	6,555	6,555	18.2	18.2	0.37	0.32
43 Barre Town			CB/GS		12.2	15	1,628	1,628	4.5	4.5	0.09	0.20
44 Barre Town			CB/GS	3614-9010	0.8	17	95	95	0.3	0.3	0.01	0.01
45 Barre Town			CB/GS		45.7	8	4,180	4,180	11.6	11.6	0.24	0.38
46 Barre Town			CB/GS		8.4	9	822	822	2.3	2.3	0.05	0.08
47 Barre Town			CB/GS/EDP	3613-9010	46.2	12	3,836	3,836	10.7	10.7	0.22	0.60
48 Barre Town			GS		4.9	12	565	565	1.6	1.6	0.03	0.06
49 Barre Town			GS/OF		3.9	13	467	467	1.3	1.3	0.03	0.05
50 Barre Town			GS		6.7	10	686	686	1.9	1.9	0.04	0.07

Barre Town - Subwatershed Prioritization and Recommendations

Watershed Number	Action List #	Proposed or Existing Stormwater Treatment Practice	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	Number of LID - Roof Raingardens to treat CPv (Residential)	Raingarden Cost
1 Barre Town	1	RR/CB/GS		1,000.00	$1	$678	ERP, Section 319, LCBP	130	$59,979
2 Barre Town	0	CB/GS						31	$14,291
3 Barre Town	0	GS/OF						60	$27,514
4 Barre Town	0	GS/OF						51	$23,463
5 Barre Town	0	GS/OF						14	$6,358
6 Barre Town	0	CB/GS						102	$46,925
7 Barre Town	0	CB/OF						20	$9,115
8 Barre Town	0	GS/OF						24	$11,084
9 Barre Town	0	GS/OF/CR/GS						340	$156,417
10 Barre Town	0	CB/GS						79	$36,347
11 Barre Town	0	CB/GS						28	$12,660
12 Barre Town	0	CB/GS						77	$35,222
13 Barre Town	1	RR/CB/GS		1,000.00	$2	$1,106	ERP, Section 319, LCBP	203	$93,231
14 Barre Town	0	CB/GS/SB						218	$100,377
15 Barre Town	0	CB/GS						120	$55,309
16 Barre Town	0	CB/GS						32	$14,516
17 Barre Town	0	CB/GS						107	$49,288
18 Barre Town	0	CB/GS						210	$96,776
19 Barre Town	0	CB/GS						577	$265,403
20 Barre Town	0	OF						48	$22,056
21 Barre Town	0	OF/WP/SWPPP						391	$179,711
22 Barre Town	0	GS/CB						177	$81,416
23 Barre Town	0	GS/CB						174	$79,896
24 Barre Town	0	OF/GS						351	$161,481
25 Barre Town	0	OF						11	$4,839
26 Barre Town	0	GS/OF						136	$62,342
27 Barre Town	0	GS/OF						28	$12,660
28 Barre Town	0	CB/GS						310	$142,463
29 Barre Town	0	CB/OF						27	$12,435
30 Barre Town	0	GS/OF						31	$14,348
31 Barre Town	0	CB						59	$27,007
32 Barre Town	0	CB/GS						32	$14,798
33 Barre Town	0	CB/OF						123	$56,434
34 Barre Town	0	CB/OF						59	$27,064
35 Barre Town	0	CB/GS						48	$21,943
36 Barre Town	0	CB/OF						145	$66,505
37 Barre Town	0	CB/GS						89	$40,792
38 Barre Town	0	CB						340	$156,361
39 Barre Town	2	BRA/CB/GS	34,688.59		$16	$11,712	ERP, Section 319, LCBP	169	$77,590
40 Barre Town	0	GS/OF						20	$9,059
41 Barre Town	0	GS/CB/OF						190	$87,380
42 Barre Town	0	CB/GS						158	$72,695
43 Barre Town	0	CB/GS						99	$45,350
44 Barre Town	0	CB/GS						7	$3,263
45 Barre Town	0	CB/GS						192	$88,336
46 Barre Town	0	CB/GS						41	$18,849
47 Barre Town	0	CB/GS/EDP						301	$138,300
48 Barre Town	0	GS						32	$14,685
49 Barre Town	0	GS/OF						27	$12,435
50 Barre Town	0	GS						36	$16,486

Barre Town - Subwatershed Prioritization and Recommendations (pg2)

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)	Phosphorus Load with Current Reductions (lbs)	Phosphorus Load with Priority Action (lbs)	Water Quality Volume (Acre-Feet)	Channel Protection (Acre-Feet)
51 Barre Town			GS		17.8	16	2,590	2,590	7.2	7.2	0.15	0.32
52 Barre Town			GS		1.2	19	195	195	0.5	0.5	0.01	0.02
53 Barre Town			CB/GS		2.9	30	765	765	2.1	2.1	0.04	0.10
54 Barre Town			GS/OF		1.6	28	392	392	1.1	1.1	0.02	0.05
55 Barre Town			GS/CB		2.5	20	436	436	1.2	1.2	0.02	0.06
56 Barre Town			OF		67.8	9	6,664	6,664	18.5	18.5	0.38	0.67
57 Barre Town			GS/CB		2.4	29	592	592	1.6	1.6	0.03	0.07
58 Barre Town			GS		2.2	29	551	551	1.5	1.5	0.03	0.07
59 Barre Town			GS		0.7	44	274	274	0.8	0.8	0.02	0.03
60 Barre Town			GS/WP		23.0	8	1,715	1,715	4.8	4.8	0.10	0.21
61 Barre Town			OF/GS		7.7	15	1,040	1,040	2.9	2.9	0.06	0.13
62 Barre Town			GS/OF/CB		27.0	9	2,726	2,726	7.6	7.6	0.15	0.28
63 Barre Town			CB/GS		16.9	24	3,425	3,425	9.5	9.5	0.19	0.44
64 Barre Town			OF/GS		36.7	7	3,279	3,279	9.1	9.1	0.19	0.29
65 Barre Town			CB/GS		31.7	11	3,440	3,440	9.6	9.6	0.19	0.38
66 Barre Town			CB/GS		7.3	19	1,202	1,202	3.3	3.3	0.07	0.15
67 Barre Town			CB/GS		4.9	19	811	811	2.3	2.3	0.05	0.10
68 Barre Town			CB/GS		52.4	25	11,245	11,245	31.2	31.2	0.64	1.44
69 Barre Town			GS/OF	3252-9010	5.4	14	582	582	1.6	1.6	0.03	0.08
70 Barre Town			GS/OF	3232-9010	23.1	13	2,383	2,383	6.6	6.6	0.13	0.33
71 Barre Town			CB/OF		10.8	36	3,570	3,570	9.9	9.9	0.20	0.44
72 Barre Town			CB/OF		8.6	18	1,347	1,347	3.7	3.7	0.08	0.17
73 Barre Town			OF		2.1	22	393	393	1.1	1.1	0.02	0.05
74 Barre Town			CB/GS		5.6	24	1,181	1,181	3.3	3.3	0.07	0.15
75 Barre Town			CB/GS		14.4	17	2,168	2,168	6.0	6.0	0.12	0.27
76 Barre Town			CB/OF		3.3	16	470	470	1.3	1.3	0.03	0.06
77 Barre Town			GS/EWP/OF	5714-9015	307.3	2	21,580	21,580	59.9	59.9	1.22	0.75
78 Barre Town			CB/OF		2.2	29	566	566	1.6	1.6	0.03	FALSE
79 Barre Town			CB/GS		5.9	6	501	501	1.4	1.4	0.03	FALSE
80 Barre Town			CB		4.5	16	626	626	1.7	1.7	0.04	FALSE
81 Barre Town			CB		3.2	9	311	311	0.9	0.9	0.02	FALSE
82 Barre Town			CB/OF		31.4	4	2,391	2,391	6.6	6.6	0.14	FALSE
83 Barre Town			OF		2.3	14	310	310	0.9	0.9	0.02	FALSE
84 Barre Town			GS/OF	3263-9010	3.1	12	302	302	0.8	0.8	0.02	0.04
85 Barre Town			GS/OF	3263-9010	1.0	20	150	150	0.4	0.4	0.01	0.02
86 Barre Town			GS/OF	3263-9010	9.4	3	652	652	1.8	1.8	0.04	0.03
87 Barre Town			GS/OF	3263-9010	5.4	8	442	442	1.2	1.2	0.03	0.05
88 Barre Town			OF/CB		195.1	2	13,728	13,728	38.1	38.1	0.78	0.49
89 Barre Town			GS/CB/OF		32.1	13	3,899	3,899	10.8	10.8	0.22	FALSE
90 Barre Town			GS/CB/OF		198.8	7	17,420	17,420	48.4	48.4	0.99	FALSE
91 Barre Town			GS/EDP	5175-9015	10.4	32	397	397	3.3	3.3	0.11	FALSE
92 Barre Town			CB/GS/OF		304.5	8	28,238	28,238	78.4	78.4	1.60	2.64
93 Barre Town			OF		168.2	2	11,818	11,818	32.8	32.8	0.67	FALSE
94 Barre Town			CB/SWPPP	5748-9003	34.3	19	5,671	5,671	15.8	15.8	0.32	FALSE
95 Barre Town			CB/SWPPP	5748-9003	76.6	10	7,771	7,771	21.6	21.6	0.44	FALSE
96 Barre Town			CB/GS		10.0	17	1,487	1,487	4.1	4.1	0.08	0.18
97 Barre Town			GS/CB		9.9	5	770	770	2.1	2.1	0.04	0.05
98 Barre Town			CB/GS		4.2	25	887	887	2.5	2.5	0.05	0.11
99 Barre Town			CB	3740-9010	5.7	59	3,171	3,171	8.8	8.8	0.18	0.37
100 Barre Town	1	Riprap Erosion	RR/OF		18.8	5	1,471	1,103	4.1	3.1	0.08	0.10
101 Barre Town	1	Extended Detention Basin between Rte 63 and gas station.	EDP/CB		4.2	33	1,230	246	3.4	2.1	0.07	FALSE
102 Barre Town			CB/GS		17.0	24	3,506	3,506	9.7	9.7	0.20	FALSE

Barre Town - Subwatershed Prioritization and Recommendations (pg2)

Watershed Number	Action List #	Proposed or Existing Stormwater Treatment Practice	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	Number of LID - Roof Raingardens to treat CPv (Residential)	Raingarden Cost
51 Barre Town	0	GS						161	$73,876
52 Barre Town	0	GS						12	$5,683
53 Barre Town	0	CB/GS						48	$22,112
54 Barre Town	0	GS/OF						25	$11,422
55 Barre Town	0	GS/CB						28	$12,772
56 Barre Town	0	OF						334	$153,773
57 Barre Town	0	GS/CB						37	$17,217
58 Barre Town	0	GS						35	$15,979
59 Barre Town	0	GS						16	$7,371
60 Barre Town	0	GS/WP						106	$48,782
61 Barre Town	0	OF/GS						63	$29,089
62 Barre Town	0	GS/OF/CB						141	$64,649
63 Barre Town	0	CB/GS						219	$100,715
64 Barre Town	0	OF/GS						146	$66,955
65 Barre Town	0	CB/GS						188	$86,536
66 Barre Town	0	CB/GS						76	$34,997
67 Barre Town	0	CB/GS						51	$23,631
68 Barre Town	0	CB/GS						718	$330,220
69 Barre Town	0	GS/OF						41	$18,961
70 Barre Town	0	GS/OF						164	$75,339
71 Barre Town	0	CB/OF						218	$100,096
72 Barre Town	0	CB/OF						85	$38,935
73 Barre Town	0	OF						25	$11,534
74 Barre Town	0	CB/GS						75	$34,716
75 Barre Town	0	CB/GS						135	$62,285
76 Barre Town	0	CB/OF						29	$13,391
77 Barre Town	0	GS/EWP/OF						375	$172,340
78 Barre Town	0	CB/OF						0	$0
79 Barre Town	0	CB/GS						0	$0
80 Barre Town	0	CB						0	$0
81 Barre Town	0	CB						0	$0
82 Barre Town	0	CB/OF						0	$0
83 Barre Town	0	OF						0	$0
84 Barre Town	0	GS/OF						20	$9,227
85 Barre Town	0	GS/OF						11	$5,289
86 Barre Town	0	GS/OF						15	$6,808
87 Barre Town	0	GS/OF						23	$10,747
88 Barre Town	0	OF/CB						243	$111,855
89 Barre Town	0	GS/CB/OF						0	$0
90 Barre Town	0	GS/CB/OF						0	$0
91 Barre Town	0	GS/EDP						0	$0
92 Barre Town	0	CB/GS/OF						1,322	$608,170
93 Barre Town	0	OF						0	$0
94 Barre Town	0	CB/SWPPP						0	$0
95 Barre Town	0	CB/SWPPP						0	$0
96 Barre Town	0	CB/GS						92	$42,536
97 Barre Town	0	GS/CB						25	$11,366
98 Barre Town	0	CB/GS						57	$26,051
99 Barre Town	0	CB						185	$85,298
100 Barre Town	1	RR/OF		1,000.00	$3	$979	ERP, Section 319, LCBP	48	$22,000
101 Barre Town	1	EDP/CB	21,222.44		$22	$15,527	ERP, Section 319, LCBP	0	$0
102 Barre Town	0	CB/GS						0	$0

Barre Town - Subwatershed Prioritization and Recommendations

(pg3)

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)	Phosphorus Load with Current Reductions (lbs)	Phosphorus Load with Priority Action (lbs)	Water Quality Volume (Acre-Feet)	Channel Protection (Acre-Feet)
103 Barre Town	1	Riprap Erosion	RR/CB/GS	3689-9010	18.2	33	4,535	3,401	12.6	9.4	0.26	FALSE
105 Barre Town			CB/GS		45.9	15	6,282	6,282	17.4	17.4	0.36	FALSE
106 Barre Town			OF/SWPPP	4807-9003	0.9	18	141	141	0.4	0.4	0.01	FALSE
107 Barre Town			OF		23.0	22	4,400	4,400	12.2	12.2	0.25	FALSE
108 Barre Town			CB/OF		6.9	23	1,378	1,378	3.8	3.8	0.08	0.18
109 Barre Town			GS/OF		5.8	15	805	805	2.2	2.2	0.05	0.10
110 Barre Town			CB/WP	4400-9010	2.3	8	174	174	0.5	0.5	0.01	0.02
111 Barre Town			CB/GS		7.8	16	1,129	1,129	3.1	3.1	0.06	0.14
112 Barre Town			CB/EDP/SWPPP/GS	3110-9010/6228-9003	20.9	25	580	580	4.8	4.8	0.16	FALSE
113 Barre Town			CB/EDP/SWPPP/GS	3110-9010/6329-9015	30.5	32	1,147	1,147	9.6	9.6	0.32	FALSE
114 Barre Town			CB		2.2	9	208	208	0.6	0.6	0.01	0.02
115 Barre Town			CB		89.9	3	6,560	6,560	18.2	18.2	0.37	0.31
116 Barre Town			CB/GS		3.3	41	1,230	1,230	3.4	3.4	0.07	0.15
117 Barre Town			CB		10.0	9	984	984	2.7	2.7	0.06	0.10
118 Barre Town			OF		2.4	34	742	742	2.1	2.1	0.04	0.09
119 Barre Town			CB/OF		3.1	30	827	827	2.3	2.3	0.05	0.10
120 Barre Town			CB/GS		13.6	21	2,498	2,498	6.9	6.9	0.14	0.32
121 Barre Town			CB		0.4	4	34	34	0.1	0.1	0.00	0.00
122 Barre Town			CB/GS		21.1	15	2,801	2,801	7.8	7.8	0.16	0.34
123 Barre Town			CB/GS		6.8	31	1,846	1,846	5.1	5.1	0.10	0.23
124 Barre Town			CB/GS		41.0	15	5,582	5,582	15.5	15.5	0.32	0.68
125 Barre Town			CB/GS	3686-9010	4.7	72	3,538	3,538	9.8	9.8	0.20	0.37
126 Barre Town			OF/GS		2.7	17	407	407	1.1	1.1	0.02	0.05
127 Barre Town			CB/GS/WP	3707-9010	2.7	44	820	820	2.3	2.3	0.05	0.13
128 Barre Town			SF/CB/GS	3686-9010	6.6	60	1,641	1,641	9.1	7.3	0.19	0.44
129 Barre Town			OF		12.7	17	1,919	1,919	5.3	5.3	0.11	0.24
130 Barre Town			OF		1.2	19	191	191	0.5	0.5	0.01	0.02
131 Barre Town	1	Bioretention or Sedimentation Basin at downhill side of Town Garage yard	BRA/SB/OF/GS		18.3	19	3,020	1,812	8.4	6.7	0.17	0.38
132 Barre Town			CB/OF		10.0	10	1,032	1,032	2.9	2.9	0.06	0.11
133 Barre Town			OF		91.1	2	6,387	6,387	17.7	17.7	0.36	FALSE
134 Barre Town			CB/SB/SWPPP/GS	4547-9003/3707-9010	16.3	36	3,562	3,562	9.9	9.9	0.20	0.64
135 Barre Town			OF		150.8	8	13,945	13,945	38.7	38.7	0.79	FALSE
136 Barre Town			OF/GS		3.8	25	805	805	2.2	2.2	0.05	0.10
137 Barre Town			OF		250.4	7	22,028	22,028	61.2	61.2	1.25	1.90
138 Barre Town			OF		48.6	5	3,861	3,861	10.7	10.7	0.22	0.26
139 Barre Town			OF		6.7	13	815	815	2.3	2.3	0.05	0.10
140 Barre Town			OF/CB/SWPPP	4547-9003/3707-9010	17.6	17	2,175	2,175	6.0	6.0	0.12	0.32
141 Barre Town			GS/OF	4400-9015	25.2	12	2,342	2,342	6.5	6.5	0.17	0.33
142 Barre Town			OF/GS/CB		31.1	8	2,841	2,841	7.9	7.9	0.16	0.26
143 Barre Town			OF		4.1	21	731	731	2.0	2.0	0.04	0.09
144 Barre Town			CB		13.7	40	5,099	5,099	14.2	14.2	0.29	FALSE

Barre Town - Subwatershed Prioritization and Recommendations (pg3)

Watershed Number	Action List #	Proposed or Existing Stormwater Treatment Practice	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	Number of LID - Roof Raingardens to treat CPv (Residential)	Raingarden Cost
103 Barre Town	1	RR/CB/GS		5,000.00	$4	$1,588	ERP, Section 319, LCBP	0	$0
105 Barre Town	0	CB/GS						0	$0
106 Barre Town	0	OF/SWPPP						0	$0
107 Barre Town	0	OF						0	$0
108 Barre Town	0	CB/OF						88	$40,511
109 Barre Town	0	GS/OF						49	$22,619
110 Barre Town	0	CB/WP						11	$4,895
111 Barre Town	0	CB/GS						70	$32,184
112 Barre Town	0	CB/EDP/SWPPP/GS						0	$0
113 Barre Town	0	CB/EDP/SWPPP/GS						0	$0
114 Barre Town	0	CB						10	$4,670
115 Barre Town	0	CB						157	$72,019
116 Barre Town	0	CB/GS						73	$33,703
117 Barre Town	0	CB						50	$22,844
118 Barre Town	0	OF						46	$21,043
119 Barre Town	0	CB/OF						52	$23,913
120 Barre Town	0	CB/GS						159	$73,313
121 Barre Town	0	CB						1	$450
122 Barre Town	0	CB/GS						169	$77,871
123 Barre Town	0	CB/GS						116	$53,171
124 Barre Town	0	CB/GS						340	$156,473
125 Barre Town	0	CB/GS						186	$85,748
126 Barre Town	0	OF/GS						25	$11,703
127 Barre Town	0	CB/GS/WP						67	$30,608
128 Barre Town	0	SF/CB/GS						218	$100,152
129 Barre Town	0	OF						120	$55,140
130 Barre Town	0	OF						12	$5,570
131 Barre Town	1	BRA/SB/OF/GS	39,303.07		$33	$23,423	ERP, Section 319, LCBP	191	$87,942
132 Barre Town	0	CB/OF						54	$25,038
133 Barre Town	0	OF						0	$0
134 Barre Town	0	CB/SB/SWPPP/GS						320	$147,246
135 Barre Town	0	OF						0	$0
136 Barre Town	0	OF/GS						51	$23,631
137 Barre Town	0	OF						952	$437,968
138 Barre Town	0	OF						132	$60,935
139 Barre Town	0	OF						48	$21,887
140 Barre Town	0	OF/CB/SWPPP						162	$74,382
141 Barre Town	0	GS/OF						167	$76,802
142 Barre Town	0	OF/GS/CB						130	$59,979
143 Barre Town	0	OF						47	$21,437
144 Barre Town	0	CB						0	$0

Barre Town - Subwatershed Prioritization and Recommendations

(pg4)

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)	Phosphorus Load with Current Reductions (lbs)	Phosphorus Load with Priority Action (lbs)	Water Quality Volume (Acre-Feet)	Channel Protection (Acre-Feet)
145 Barre Town			OF		32.7	14	4,299	4,299	11.9	11.9	0.24	0.52
146 Barre Town			OF/CB		20.6	27	4,735	4,735	13.2	13.2	0.27	0.60
147 Barre Town			CB/SWPPP	5071-9003	4.0	68	2,911	2,911	8.1	8.1	0.16	0.30
148 Barre Town			CB		7.1	25	1,519	1,519	4.2	4.2	0.09	FALSE
149 Barre Town			GS/OF/CB		43.5	6	3,738	3,738	10.4	10.4	0.21	FALSE
150 Barre Town			OF/CB		44.7	3	3,199	3,199	8.9	8.9	0.18	FALSE
151 Barre Town			OF		45.8	3	3,363	3,363	9.3	9.3	0.19	FALSE
152 Barre Town			OF		44.2	8	4,221	4,221	11.7	11.7	0.24	FALSE
153 Barre Town			CB/GS		5.8	37	1,959	1,959	5.4	5.4	0.11	0.24
154 Barre Town			GS/OF	4400-9010	8.2	12	821	821	2.3	2.3	0.05	0.11
155 Barre Town			CB/OF		34.9	17	5,354	5,354	14.9	14.9	0.30	0.67
156 Barre Town			CB.GS		9.8	15	1,326	1,326	3.7	3.7	0.08	0.16
157 Barre Town			GS/CB		43.4	9	4,270	4,270	11.9	11.9	0.24	0.43
158 Barre Town			OF		10.5	0	695	695	1.9	1.9	0.04	0.00
159 Barre Town			OF/GS		28.1	9	2,797	2,797	7.8	7.8	0.16	FALSE
160 Barre Town			OF/WP		62.2	2	4,149	4,149	11.5	11.5	0.23	FALSE
161 Barre Town			GS	3612-9010	5.3	5	385	385	1.1	1.1	0.02	0.03
162 Barre Town			GS/OF	3612-9010	33.7	11	3,189	3,189	8.9	8.9	0.18	0.41
163 Barre Town			GS/OF	3612-9010	9.3	15	1,080	1,080	3.0	3.0	0.06	0.16
164 Barre Town			OF/GS/SB/CB	3379-9010	40.2	11	4,007	4,007	11.1	11.1	0.25	FALSE
171 Barre Town			GS/CB		6.6	32	1,856	1,856	5.2	5.2	0.11	FALSE
172 Barre Town			GS/CB		2.8	25	606	606	1.7	1.7	0.03	FALSE
173 Barre Town			GS/CB		1.8	41	677	677	1.9	1.9	0.04	FALSE
174 Barre Town			CB		1.2	68	886	886	2.5	2.5	0.05	FALSE
175 Barre Town			CB/GS		2.0	37	663	663	1.8	1.8	0.04	FALSE
176 Barre Town			CB/OF		3.0	47	1,356	1,356	3.8	3.8	0.08	FALSE
177 Barre Town			CB		3.0	74	2,713	2,713	7.5	7.5	0.15	FALSE
179 Barre Town			CB/GS		10.9	35	3,461	3,461	9.6	9.6	0.20	0.42
180 Barre Town			OF/GS		85.5	2	5,955	5,955	16.5	16.5	0.34	0.19
181 Barre Town			CB/GS		55.0	4	4,210	4,210	11.7	11.7	0.24	0.25
182 Barre Town			OF/GS		17.3	10	1,819	1,819	5.1	5.1	0.10	0.19
183 Barre Town			GS/CB		7.2	13	899	899	2.5	2.5	0.05	0.11
184 Barre Town			OF/GS		18.2	5	1,456	1,456	4.0	4.0	0.08	0.10
185 Barre Town			OF/GS		6.5	15	886	886	2.5	2.5	0.05	0.11
186 Barre Town			GS/CB		5.5	15	761	761	2.1	2.1	0.04	0.09
187 Barre Town			CB/GS		16.9	24	3,432	3,432	9.5	9.5	0.19	0.44
188 Barre Town			OF		31.5	3	2,273	2,273	6.3	6.3	0.13	0.10
189 Barre Town	2	Stabilize erosion in park area	RR/GS/CB		6.4	38	2,192	1,753	6.1	5.5	0.12	0.27
190 Barre Town			OF		39.2	2	2,702	2,702	7.5	7.5	0.15	0.07
191 Barre Town			OF		15.4	27	3,613	3,613	10.0	10.0	0.20	0.46
192 Barre Town			OF/GS		32.1	4	2,411	2,411	6.7	6.7	0.14	0.13
193 Barre Town			OF		27.0	14	3,550	3,550	9.9	9.9	0.20	FALSE
200 Barre Town			OF/GS/EWP	3828-9015	6.1	41	318	318	2.6	2.6	0.09	0.27

Barre Town - Subwatershed Prioritization and Recommendations (pg4)

Watershed Number	Action List #	Proposed or Existing Stormwater Treatment Practice	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	Number of LID - Roof Raingardens to treat CPv (Residential)	Raingarden Cost
145 Barre Town	0	OF						259	$119,170
146 Barre Town	0	OF/CB						301	$138,581
147 Barre Town	0	CB/SWPPP						148	$68,193
148 Barre Town	0	CB						0	$0
149 Barre Town	0	GS/OF/CB						0	$0
150 Barre Town	0	OF/CB						0	$0
151 Barre Town	0	OF						0	$0
152 Barre Town	0	OF						0	$0
153 Barre Town	0	CB/GS						119	$54,746
154 Barre Town	0	GS/OF						55	$25,488
155 Barre Town	0	CB/OF						335	$154,279
156 Barre Town	0	CB.GS						81	$37,079
157 Barre Town	0	GS/CB						214	$98,520
158 Barre Town	0	OF						2	$900
159 Barre Town	0	OF/GS						0	$0
160 Barre Town	0	OF/WP						0	$0
161 Barre Town	0	GS						14	$6,302
162 Barre Town	0	GS/OF						205	$94,075
163 Barre Town	0	GS/OF						79	$36,235
164 Barre Town	0	OF/GS/SB/CB						0	$0
171 Barre Town	0	GS/CB						0	$0
172 Barre Town	0	GS/CB						0	$0
173 Barre Town	0	GS/CB						0	$0
174 Barre Town	0	CB						0	$0
175 Barre Town	0	CB/GS						0	$0
176 Barre Town	0	CB/OF						0	$0
177 Barre Town	0	CB						0	$0
179 Barre Town	0	CB/GS						212	$97,621
180 Barre Town	0	OF/GS						94	$43,262
181 Barre Town	0	CB/GS						127	$58,442
182 Barre Town	0	OF/GS						97	$44,644
183 Barre Town	0	GS/CB						53	$24,409
184 Barre Town	0	OF/GS						51	$23,483
185 Barre Town	0	OF/GS						54	$24,832
186 Barre Town	0	GS/CB						47	$21,429
187 Barre Town	0	CB/GS						219	$100,905
188 Barre Town	0	OF						50	$23,111
189 Barre Town	2	RR/GS/CB		1,000.00	$2	$1,643	ERP, Section 319, LCBP	133	$61,043
190 Barre Town	0	OF						37	$16,860
191 Barre Town	0	OF						230	$105,586
192 Barre Town	0	OF/GS						67	$30,861
193 Barre Town	0	OF						0	$0
200 Barre Town	0	OF/GS/EWP						135	$62,117

Barre Town - Subwatershed Prioritization and Recommendations

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)	Phosphorus Load with Current Reductions (lbs)	Phosphorus Load with Priority Action (lbs)	Water Quality Volume (Acre-Feet)	Channel Protection (Acre-Feet)
201 Barre Town			CB/GS		73.3	8.8	7,157	7,157	19.9	19.9	0.40	0.71
202 Barre Town			CB		31.5	25.0	9,254	9,254	25.7	25.7	0.52	0.87
203 Barre Town			CB		2.1	42.6	827	827	2.3	2.3	0.05	0.10
204 Barre Town			OF/WP		63.7	7.7	5,847	5,847	16.2	16.2	0.33	FALSE
205 Barre Town			GS/CB		52.8	7.9	4,902	4,902	13.6	13.6	0.28	0.46
206 Barre Town			CB		79.4	6.9	9,082	9,082	25.2	25.2	0.51	0.60
207 Barre Town			CB		11.8	22.6	2,284	2,284	6.3	6.3	0.13	0.29
208 Barre Town			BFCB/OF		12.2	17.3	928	928	3.4	3.4	0.09	0.23
209 Barre Town			CB/GS		22.4	3.8	1,683	1,683	4.7	4.7	0.10	0.09
210 Barre Town			CB		4.5	34.8	1,835	1,835	5.1	5.1	0.10	0.17
211 Barre Town			OF		35.3	9.2	3,507	3,507	9.7	9.7	0.20	0.36
212 Barre Town			CB		26.1	14.9	4,922	4,922	13.7	13.7	0.28	0.43
213 Barre Town			OF/GS/WP/SWPPP	4407-9003	122.3	9.0	8,436	8,436	26.4	26.4	0.60	FALSE
214 Barre Town			CB/GS/SWPPP	4717-9003	270.1	4.3	20,781	20,781	57.7	57.7	1.18	1.28
215 Barre Town			OF/WP		62.2	3.8	845	845	7.0	7.0	0.24	FALSE
216 Barre Town			CB/GS/WP		30.0	2.9	434	434	3.6	3.6	0.12	FALSE
217 Barre Town			CB/GS/WP		4.2	21.2	152	152	1.3	1.3	0.04	FALSE
218 Barre Town			CB/GS/WP		2.0	25.8	89	89	0.7	0.7	0.03	FALSE
219 Barre Town			CB/GS/WP		13.0	28.1	637	637	5.3	5.3	0.18	FALSE
220 Barre Town			OF		4.3	0.3	58	58	0.5	0.5	0.02	0.00
221 Barre Town			CB/GS		59.9	8.2	5,652	5,652	15.7	15.7	0.32	0.54
222 Barre Town			CB/GS		17.7	13.9	2,272	2,272	6.3	6.3	0.13	0.27
223 Barre Town			CB/GS/WP		12.8	27.7	404	404	3.4	3.4	0.11	FALSE
224 Barre Town			CB/GS/WP		18.7	12.4	317	317	2.6	2.6	0.09	FALSE
225 Barre Town			GS		19.8	4.0	1,350	1,350	3.7	3.7	0.08	FALSE
226 Barre Town			CB/BRA	4032-9015	2.8	21.7	70	70	0.6	0.6	0.02	0.07
227 Barre Town			OF/GS	4032-9015	1.8	9.4	32	32	0.3	0.3	0.01	FALSE
228 Barre Town			CB/GS	4032-9015	31.5	3.1	2,296	2,296	6.4	6.4	0.13	0.11
229 Barre Town			CB/GS		10.5	6.4	899	899	2.5	2.5	0.05	0.07
230 Barre Town			CB		13.2	13.6	1,658	1,658	4.6	4.6	0.09	0.20
231 Barre Town			CB		4.7	19.7	804	804	2.2	2.2	0.05	0.10
232 Barre Town			CB/GS		29.5	12.3	3,470	3,470	9.6	9.6	0.20	0.40
233 Barre Town			CB/GS		4.0	29.9	1,035	1,035	2.9	2.9	0.06	0.13
234 Barre Town			CB/GS/WP		2.1	42.9	121	121	1.0	1.0	0.03	FALSE
235 Barre Town			CB/GS		6.7	21.7	1,245	1,245	3.5	3.5	0.07	0.16
236 Barre Town			GS/OF		30.0	9.3	3,010	3,010	8.4	8.4	0.17	0.31
237 Barre Town			CB		1.2	37.1	411	411	1.1	1.1	0.02	0.05
238 Barre Town			CB/GS		1.5	26.6	339	339	0.9	0.9	0.02	0.04
239 Barre Town			CB		1.9	18.8	318	318	0.9	0.9	0.02	0.04
240 Barre Town			CB/GS		2.1	28.2	506	506	1.4	1.4	0.03	0.06
241 Barre Town			CB/GS/WP		3.0	36.0	131	131	1.1	1.1	0.04	FALSE

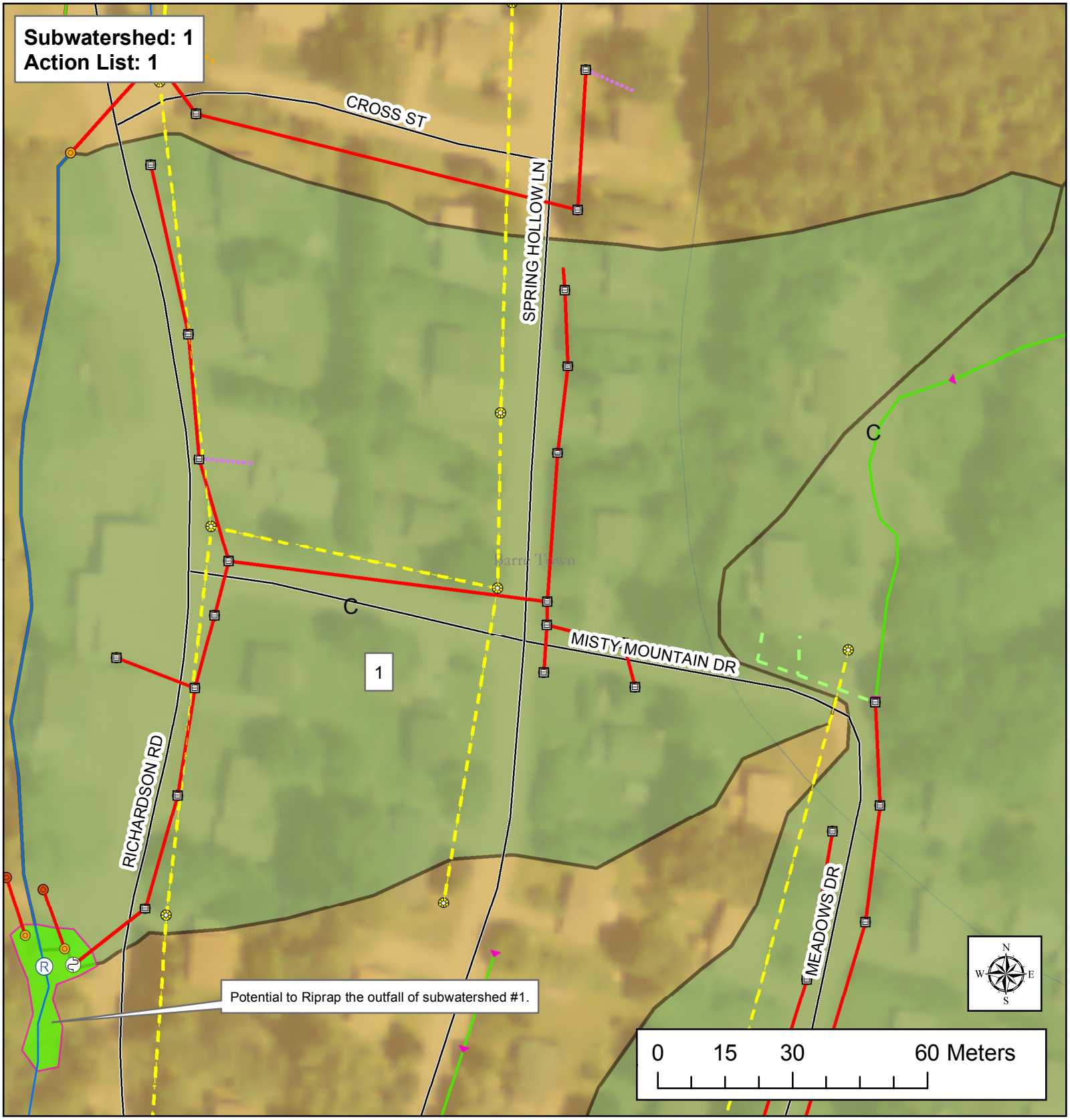
Barre Town - Subwatershed Prioritization and Recommendations

Watershed Number	Action List #	Proposed or Existing Stormwater Treatment Practice	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	Number of LID - Roof Raingardens to treat CPv (Residential)	Raingarden Cost
201 Barre Town	0	CB/GS					ERP/Vtrans/LCBP	357	$163,988
202 Barre Town	0	CB					ERP/Vtrans/LCBP	434	$199,508
203 Barre Town	0	CB					ERP/Vtrans/LCBP	49	$22,403
204 Barre Town	0	OF/WP					ERP/Vtrans/LCBP	0	$0
205 Barre Town	0	GS/CB					ERP/Vtrans/LCBP	230	$105,702
206 Barre Town	0	CB					ERP/Vtrans/LCBP	300	$137,807
207 Barre Town	0	CB					ERP/Vtrans/LCBP	146	$67,162
208 Barre Town	0	BFCB/OF					ERP/Vtrans/LCBP	116	$53,281
209 Barre Town	0	CB/GS					ERP/Vtrans/LCBP	47	$21,588
210 Barre Town	0	CB					ERP/Vtrans/LCBP	87	$39,988
211 Barre Town	0	OF					ERP/Vtrans/LCBP	178	$81,862
212 Barre Town	0	CB					ERP/Vtrans/LCBP	214	$98,554
213 Barre Town	0	OF/GS/WP/SWPPP					ERP/Vtrans/LCBP	0	$0
214 Barre Town	0	CB/GS/SWPPP					ERP/Vtrans/LCBP	640	$294,430
215 Barre Town	0	OF/WP					ERP/Vtrans/LCBP	0	$0
216 Barre Town	0	CB/GS/WP					ERP/Vtrans/LCBP	0	$0
217 Barre Town	0	CB/GS/WP					ERP/Vtrans/LCBP	0	$0
218 Barre Town	0	CB/GS/WP					ERP/Vtrans/LCBP	0	$0
219 Barre Town	0	CB/GS/WP					ERP/Vtrans/LCBP	0	$0
220 Barre Town	0	OF					ERP/Vtrans/LCBP	1	$298
221 Barre Town	0	CB/GS					ERP/Vtrans/LCBP	271	$124,437
222 Barre Town	0	CB/GS					ERP/Vtrans/LCBP	136	$62,355
223 Barre Town	0	CB/GS/WP					ERP/Vtrans/LCBP	0	$0
224 Barre Town	0	CB/GS/WP					ERP/Vtrans/LCBP	0	$0
225 Barre Town	0	GS					ERP/Vtrans/LCBP	0	$0
226 Barre Town	0	CB/BRA					ERP/Vtrans/LCBP	34	$15,611
227 Barre Town	0	OF/GS					ERP/Vtrans/LCBP	0	$0
228 Barre Town	0	CB/GS					ERP/Vtrans/LCBP	54	$24,954
229 Barre Town	0	CB/GS					ERP/Vtrans/LCBP	37	$17,040
230 Barre Town	0	CB					ERP/Vtrans/LCBP	98	$45,217
231 Barre Town	0	CB					ERP/Vtrans/LCBP	51	$23,481
232 Barre Town	0	CB/GS					ERP/Vtrans/LCBP	199	$91,722
233 Barre Town	0	CB/GS					ERP/Vtrans/LCBP	65	$29,969
234 Barre Town	0	CB/GS/WP					ERP/Vtrans/LCBP	0	$0
235 Barre Town	0	CB/GS					ERP/Vtrans/LCBP	80	$36,570
236 Barre Town	0	GS/OF					ERP/Vtrans/LCBP	154	$70,821
237 Barre Town	0	CB					ERP/Vtrans/LCBP	25	$11,483
238 Barre Town	0	CB/GS					ERP/Vtrans/LCBP	22	$9,933
239 Barre Town	0	CB					ERP/Vtrans/LCBP	20	$9,247
240 Barre Town	0	CB/GS					ERP/Vtrans/LCBP	32	$14,729
241 Barre Town	0	CB/GS/WP					ERP/Vtrans/LCBP	0	$0

Target Maps

Showing Priority Action List Drainage Areas

And Potential Retrofit Locations



Barre Town, VT

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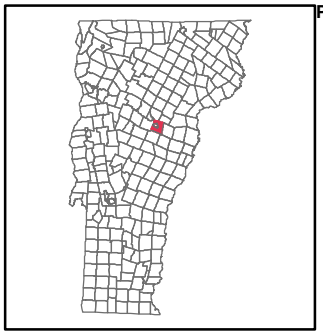

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Creator: Jim Pease, David Ainley
DEC - WSMD - Ecosystem Restoration Section
Plotted Date: 4/16/2013
Data Sources: VTRANS Roads data, VT Hydrography data set, DEC Stormwater database
Imagery Source: NAIP 2012

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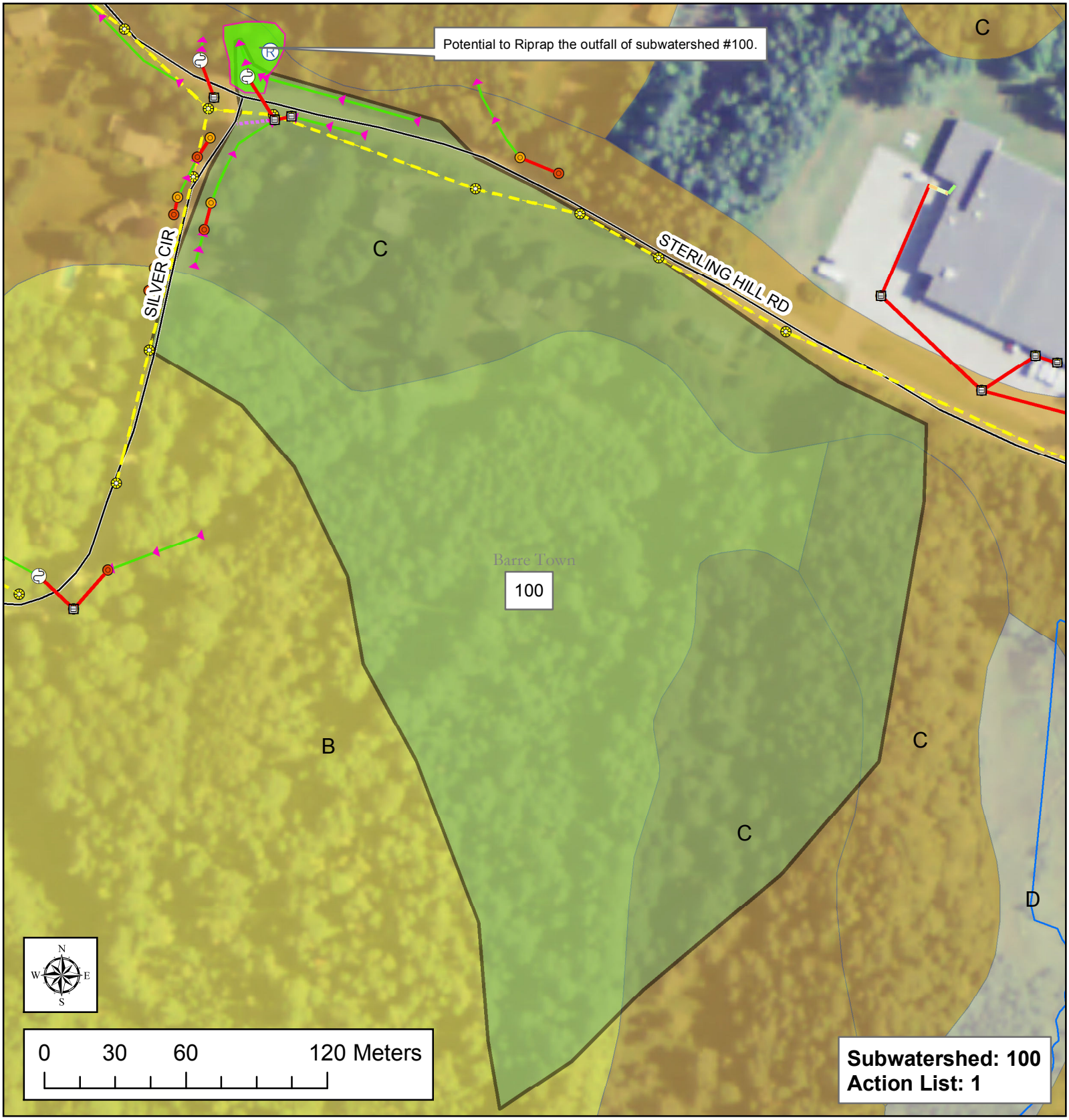
Agency of Natural Resources



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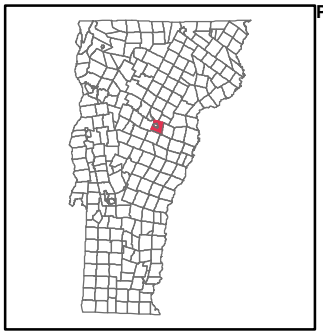

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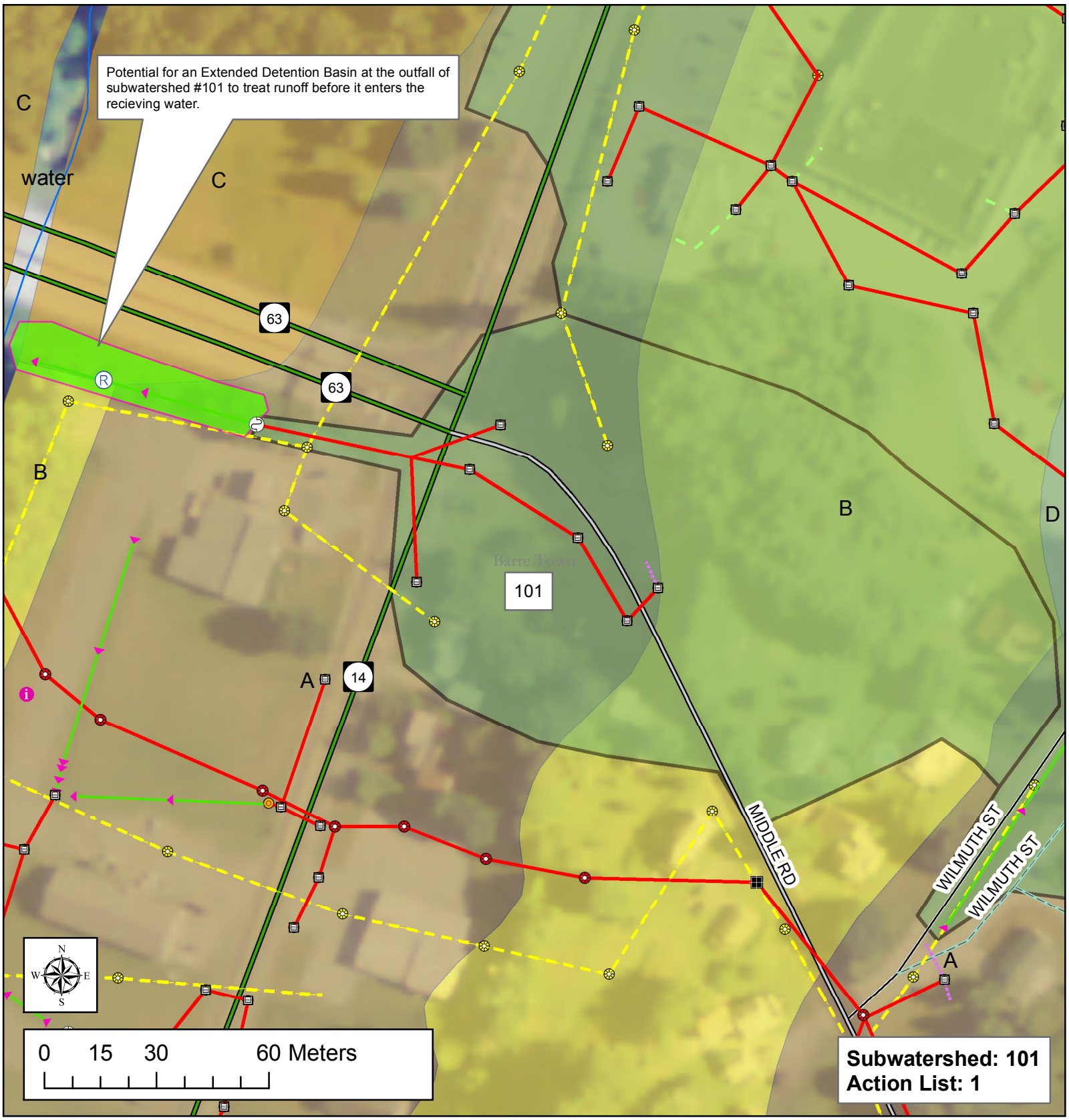

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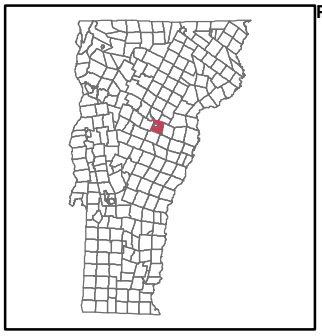

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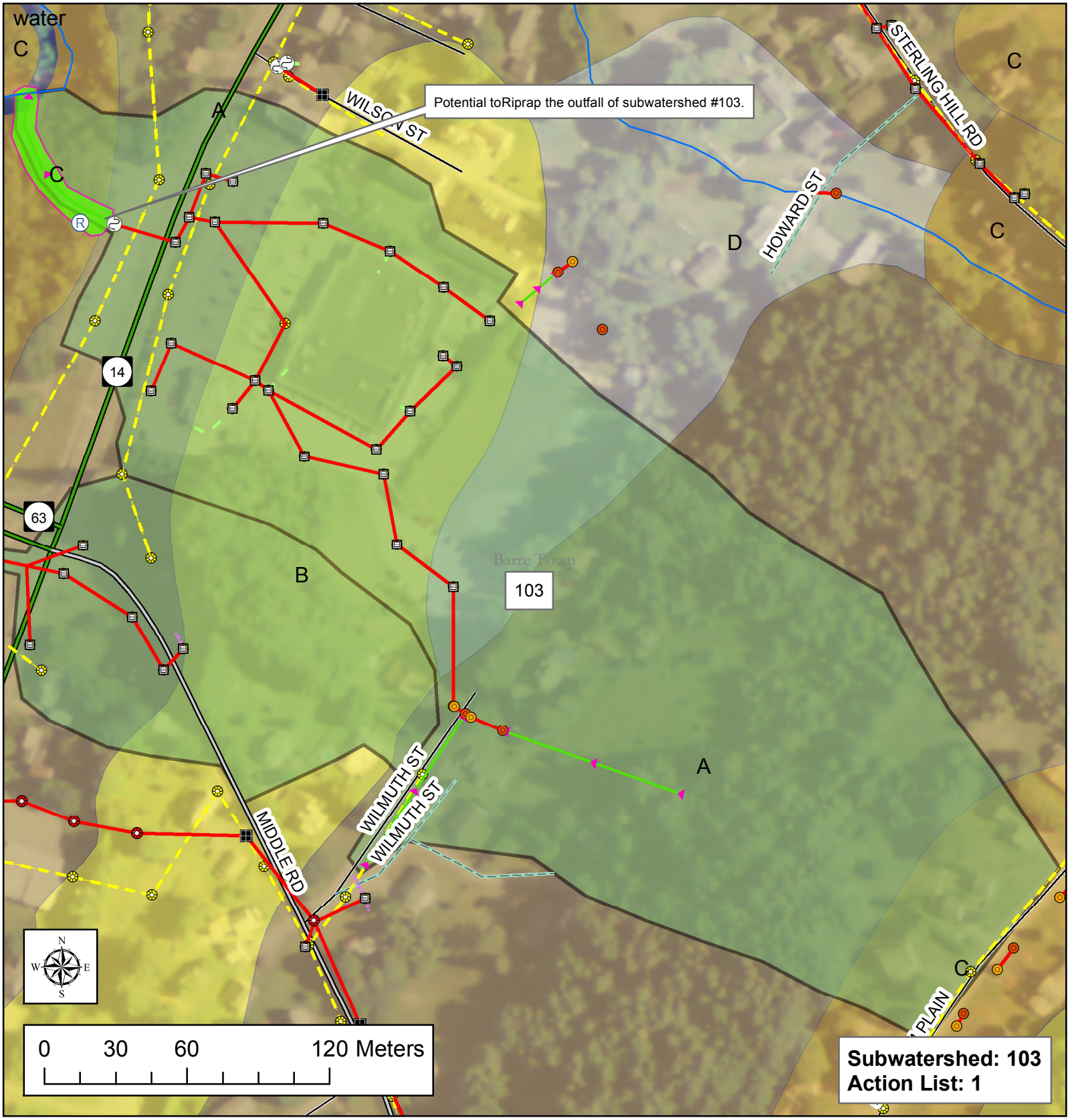

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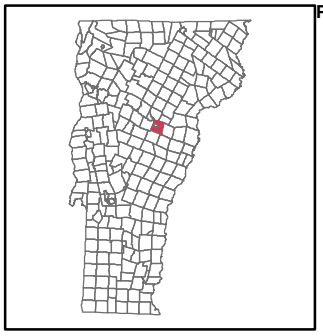

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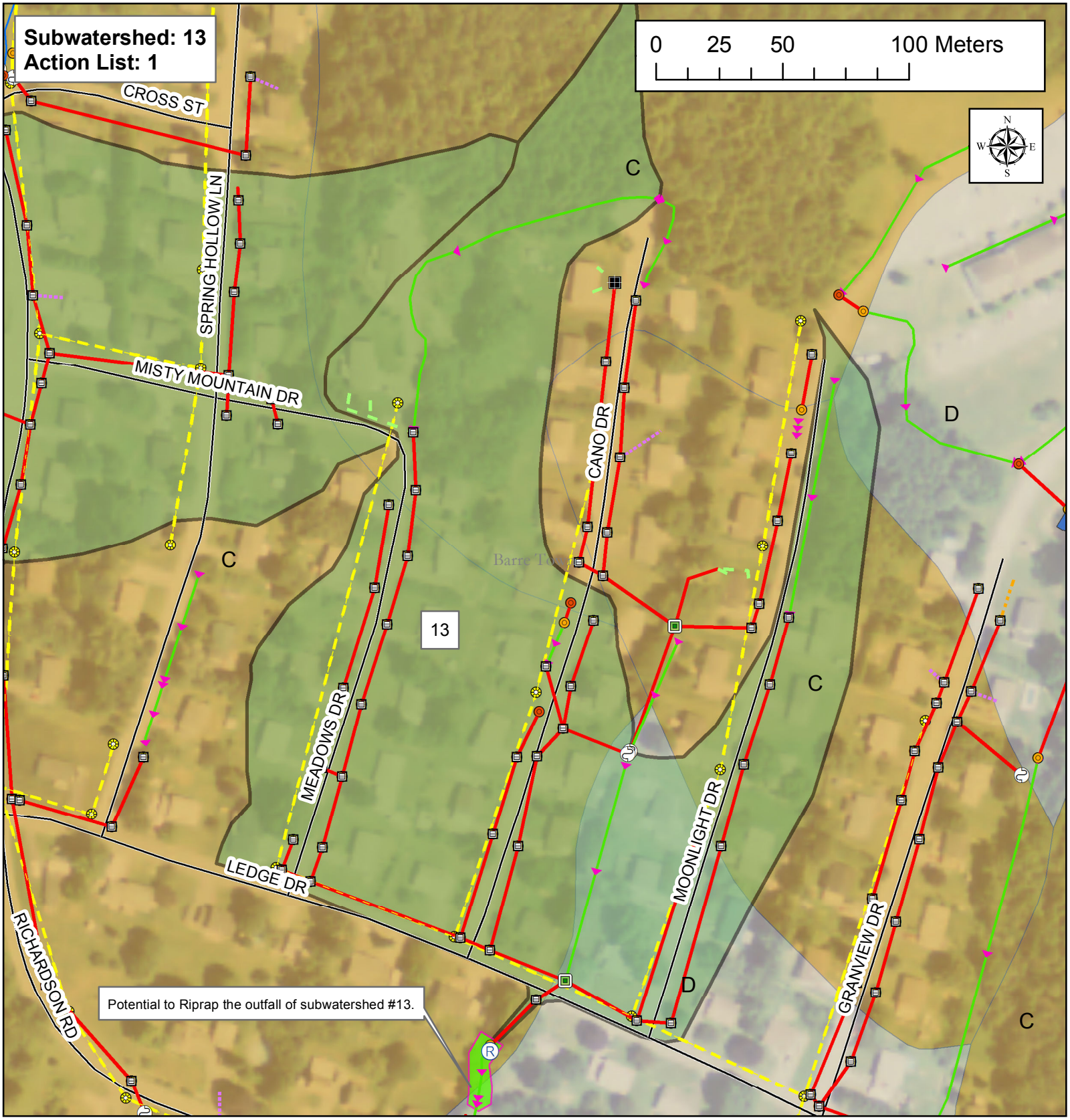

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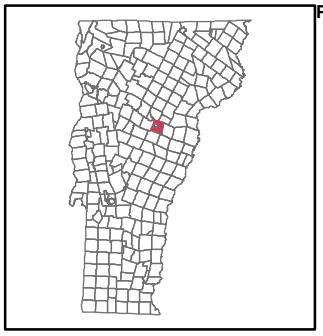

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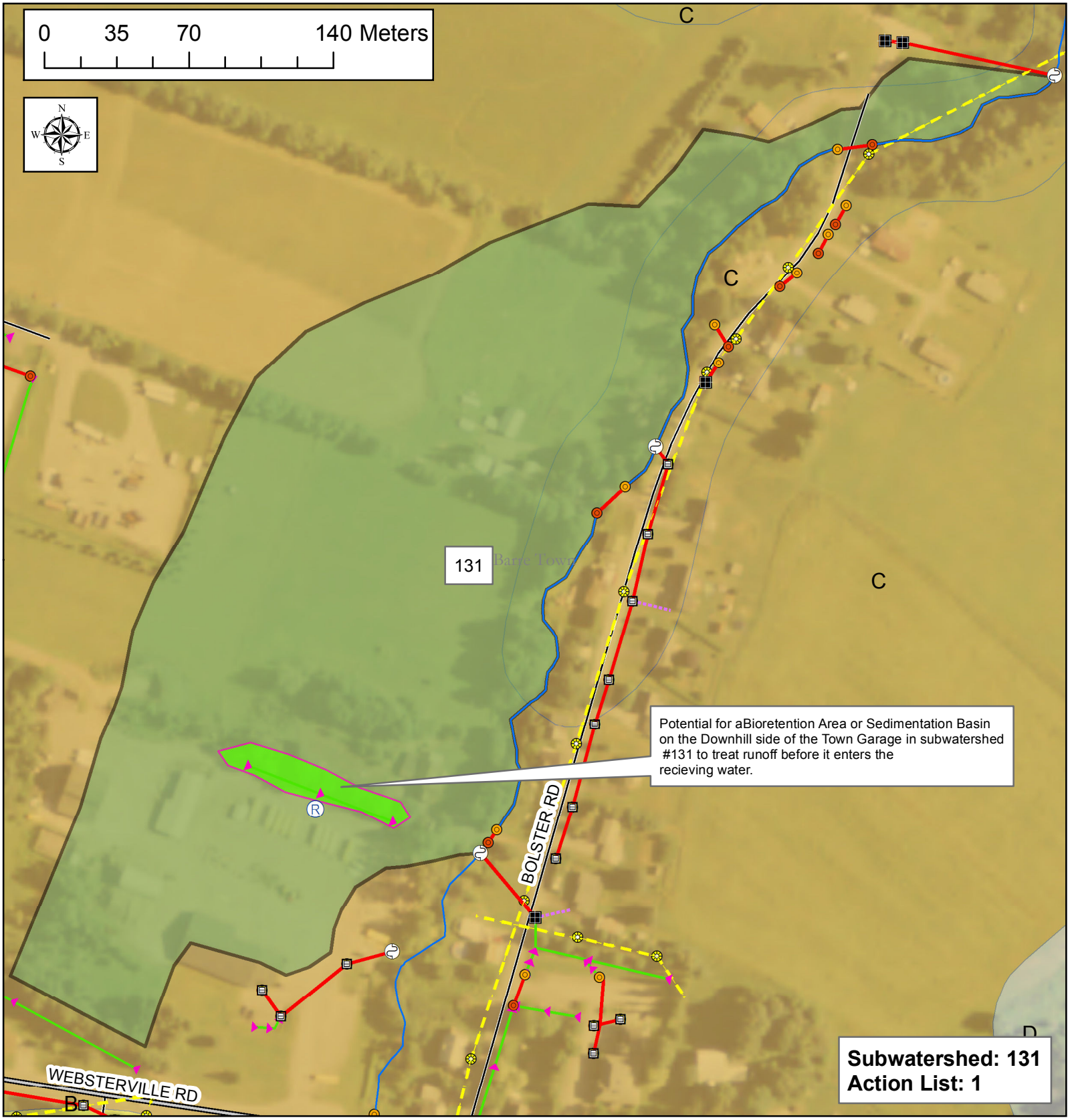

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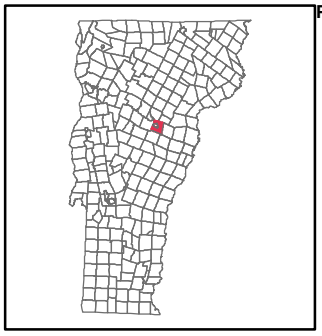

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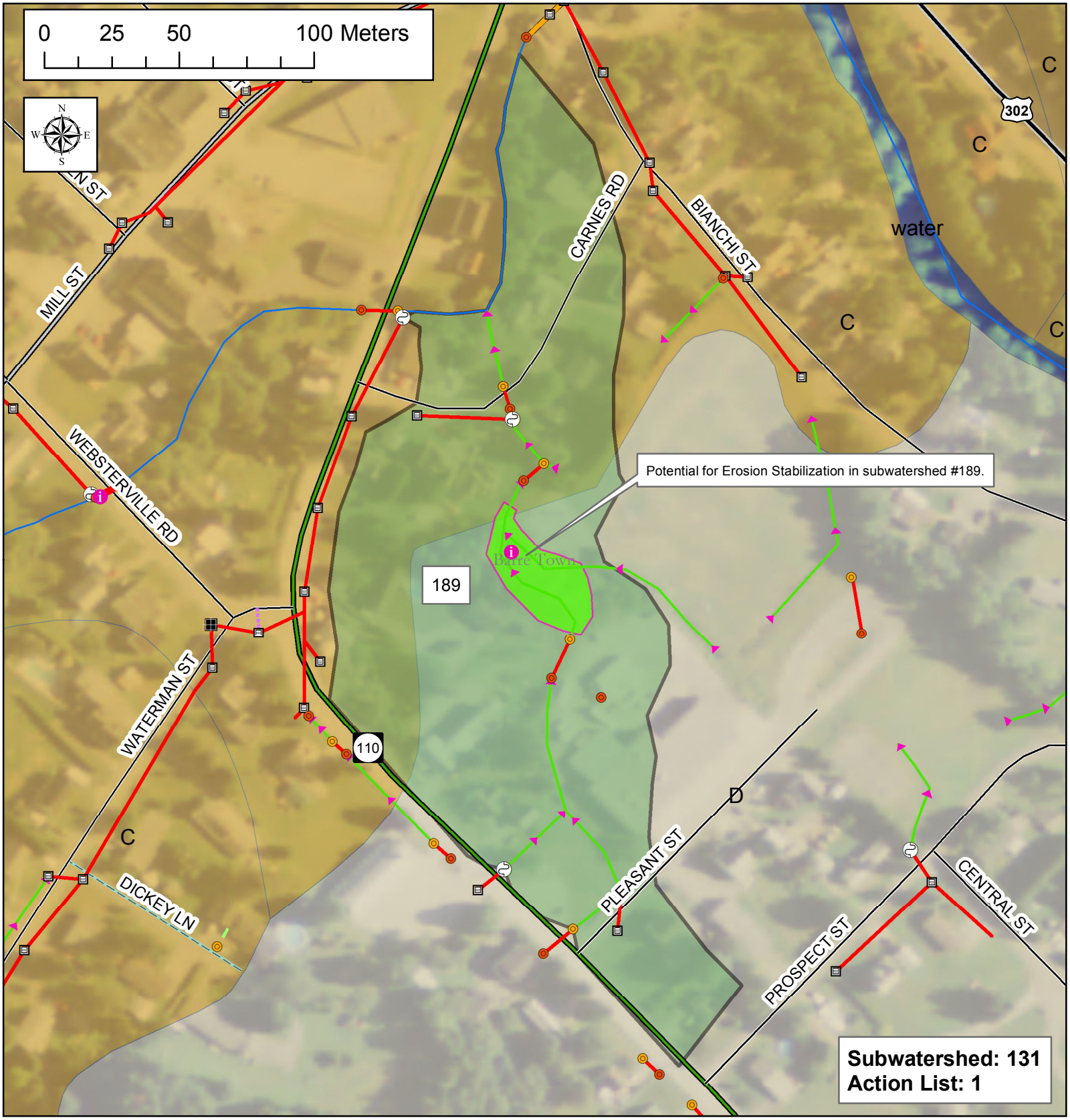

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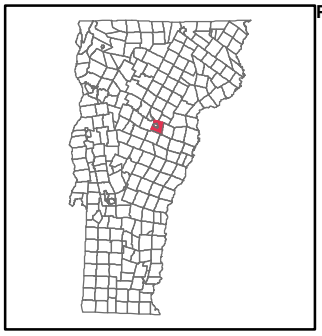

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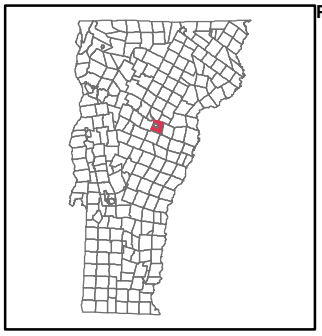

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Spill Control

and

Vermont Hazardous Waste Management Regulations

Have a spill control plan for accidental spills at municipal facilities and on municipal streets

These stormwater infrastructure maps show the connectivity of the stormwater system for the municipality as accurately as it could be determined with the collected and existing data. In the event of a spill this can be a valuable tool for controlling spills and in spill response.

Towns should be equipped with suitable equipment to contain and clean up spills of hazardous materials. Accidental spills of materials can be sources of runoff pollution if not addressed appropriately. If possible Towns should be prepared to address spills on municipal streets while at the same time contacting the state Waste Management Division. DPW managers should be aware of all applicable requirements and should contact regulatory authorities if requirements are not known.

All spills should be cleaned up immediately after they occur. For municipal facilities the creation of a site specific spill control and response plan in combination with spill response training for designated on-site personnel can be effective in dealing with accidental spills and preventing the contamination of soil, water, and runoff. Preparation of a spill containment, control, and countermeasures (SPCC) plan might be required to meet regulatory requirements (e.g., requirements regarding storage of specified chemicals above certain volume thresholds).

Even if a formal plan is not required, preparing one is a good idea. In general, an SPCC plan should include guidance to site personnel on the following:

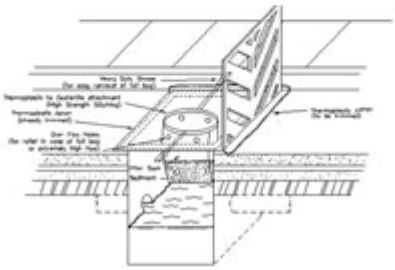
— Proper notification when a spill occurs;
— Site responsibility with respect to addressing the cleanup of a spill;
— Stopping the source of a spill;
— Cleaning up a spill;
— Proper disposal of materials contaminated by the spill;
— Location of spill response equipment programs; and
— Training for designated on-site personnel.

A periodic spill “fire drill” should be conducted to help prepare Town personnel in the event of a spill.

Spill Prevention and Response Measures

Catch Basin Inserts

Catch Basin Inserts (Drain Guards / Sediment Traps) protect our rivers and streams by capturing sediment, debris, oil and grease at storm water catch basins. Catch Basin Inserts are an economical and effective method to protect you from costly clean-up work.



The standard filter material is a non-woven geotextile with built-in overflow ports for cases of abnormally high water flow or over-filled filter bags. Catch Basin Inserts are available with a replaceable 5” x 15” oil absorbent boom that floats to absorb any oil, gas or diesel entering a storm water catch basin.

Urethane Drain Protector

Urethane Drain Protectors are positive sealing drain covers that ensure spills do not enter drains. Drain Protectors are environmentally safe and resistant to chemicals, solvents and hydrocarbons. After use, the Drain Protector can be washed and stored in its tube storage container.

Absorbent Socks

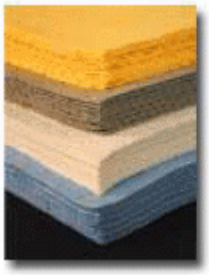
Absorbent socks are flexible tubes used to contain and clean-up spilled fluids. Socks are widely used in industrial applications and are ideal for Spill Kits. Fast spreading spills are quickly stopped with a sock.

Drums & Intermediate Bulk Containers (IBC's)

New and reconditioned steel drums are ideal for storing solid and liquid waste. Poly drums available for durable outdoor storage or for building your own spill kits. Steel and poly drums are available in both tight-head (TH) and full open-head styles (FOH).

Pads & Rolls

Absorbent pads and rolls made from polypropylene fibers are the most popular form of absorbents on the market. Various types of absorbent pads and rolls can be used for different liquids and site applications.



The most widely used absorbent pads and rolls are oil-only (white) and universal (grey). Pads and rolls are great for spills on land, easily absorbing 20 to 25 times their own weight in recovered liquid. Rolls can easily be cut to the exact size required.

water or

Booms

Linkable Absorbent Booms

Absorbent booms are ideal for containing and cleaning up spills on water. Booms repel water and float even when completely saturated. Absorbent booms are constructed with a strong mesh outer skin encasing non-linting and highly absorbent polypropylene filler. Linkable booms come complete with end rings and clips attached to nylon rope running the length of the boom.

Collection basins
Collection basins are permanent structures in which large spills or contaminated storm water is contained and stored before cleanup or treatment. Collection basins are designed to receive spills, leaks, etc., and to prevent pollutants from being released into the environment. Unlike containment dikes, collection basins can receive and contain materials from many locations across a facility.

Containment diking
Containment dikes are temporary or permanent earth or concrete berms or retaining walls that are designed to hold spills. Diking can be used at any industrial facility, but is most common for controlling large spills or releases from liquid storage and transfer areas. Diking can provide one of the best protective measures against the contamination of storm water because it surrounds the area of concern and keeps spilled materials separated from the storm water outside of the diked area.

Curbing
Similar to containment diking, a curb is a barrier that surrounds an area of concern. Unlike diking, curbing is unable to contain large spills and is usually implemented on a small-scale basis. However, curbing is common at many facilities and in small areas where liquids are handled and transferred.

Granular Absorbents
A variety of granular and powdered absorbents are available for the effective clean-up of spills on streets, construction sites and in repair shops. These products absorb spilled liquids of various kinds to greatly lower the viscosity, aiding in the clean-up of the spill.

Sorbents, Gels, and Foams
Sorbents are compounds that immobilize materials by surface absorption or adsorption in the sorbent bulk. Gelling agents interact with the spilled chemical(s) by concentrating and congealing to form a rigid or viscous material more conducive to a mechanical cleanup. Foams are mixtures of air and aqueous solutions of proteins and surfactant-based foaming agents. The primary purpose of foams is to reduce the vapor concentration above the spill surface, thereby controlling the rate of evaporation.

§ **7-105** EMERGENCY AND CORRECTIVE ACTIONS
(a) Emergency actions
(1) In the event of a discharge of hazardous waste or a release of a hazardous material, the person in control of such waste or material shall:
(A) Take all appropriate immediate actions to protect human health and the environment including, but not limited to, emergency containment measures and notification as described below; and
(B) Take any further clean up actions as may be required and approved by federal, state, or local officials, or corrective actions as specified under **subsection (b)** of this section so that the discharged waste or released material and related contaminated materials no longer present a hazard to human health or the environment.
(2) Reporting
(A) All discharges and/or releases that meet any of the following criteria shall be immediately reported to the Secretary by the person or persons exercising control over such waste by calling the Waste Management Division at **(802) 241-3888**, Monday

through Friday, 7:45 a.m. to 4:30 p.m. or the Department of Public Safety, Emergency Management Division at **(800) 641-5005**, 24 hours/day:

(i) A discharge of hazardous waste, or release of hazardous material that exceeds 2 gallons;

(ii) A discharge of hazardous waste, or release of hazardous material that is less than or equal to 2 gallons and poses a potential or actual threat to human health or the environment; or

(iii) A discharge of hazardous waste, or release of hazardous material that equals or exceeds its corresponding reportable quantity under CERCLA as specified under **40 CFR § 302.4.**

Note: Under the Federal Water Pollution Control Act, certain spills of "oil" and/or "hazardous substances" are prohibited and must be reported pursuant to the requirements of **40 CFR Part 110** / Discharge of Oil. Certain spills of hazardous substances must also be reported pursuant to CERCLA. In both cases, the National Response Center must be notified at **(800) 424-8802**. Finally, in addition to federal and state spill reporting, EPCRA requires that spills are also reported to local authorities.

(B) A written report shall be submitted to the Secretary within ten (10) days following any discharge or release subject to **subsection (a)(1)** of this section. The report should be sent to: The Vermont Department of Environmental Conservation, Waste Management Division, 103 South Main Street, Waterbury, VT 05671-0404. The person responsible for submitting the written report may request that it not be submitted for small discharges and/or releases that were reported pursuant to subsection (a)(2)(A) of this section, and that have been entirely remediated within the ten (10) day period immediately following the discharge and/or release

(3) If the discharge or release occurred during transportation, the transporter shall, in addition to notifying the Secretary:

(A) Notify the National Response Center at (800) 424-8802 or (202) 426-2675, if required by **49 CFR § 171.15**; and

(B) Report in writing to the Director, Office of Hazardous Materials Regulations, Materials Transportation Bureau, Department of Transportation, Washington, D.C. 20590, if required by **49 CFR § 171.16**; and

(C) A water (bulk shipment) transporter who has discharged hazardous wastes must give the same notice as required by **33 CFR § 153.203** for oil and hazardous substances.

(4) If a discharge or release occurs and the Secretary determines that immediate removal of the waste is necessary to protect human health or the environment, the Secretary may authorize its removal by unpermitted transporters without the preparation of a manifest. Such hazardous waste may be transported to a site authorized by the Secretary under the provisions of **§ 7-503** to temporarily accept hazardous waste generated during an emergency cleanup of a discharge or release.

(5) In the case of an explosives or munitions emergency response, if a Federal, State, Tribal or local official acting within the scope of his or her official responsibilities, or an explosives or munitions emergency response specialist, determines that immediate removal of the material or waste is necessary to protect human health or the environment, that official or specialist may authorize the removal of the material or waste by transporters who do not have EPA identification numbers or hold Vermont hazardous waste transportation permits and without the preparation of a manifest. In the case of emergencies involving military munitions, the responding military emergency response specialist's organizational unit must retain records for three years identifying the dates of the response,

the responsible persons responding, the type and description of material addressed, and its disposition.

(6) All clean up debris and residues that are hazardous waste must be transported ultimately to either:

(A) A designated facility;

(B) A person authorized by the Secretary to use such waste if the waste has been delisted pursuant to **§ 7-218**;

(C) Some other location specified and authorized by the Secretary to receive clean up debris and residues if the waste has been delisted pursuant to **§ 7-218**; or

(D) For hazardous waste not defined as hazardous in 40 CFR Part 261 (i.e., waste regulated as hazardous by Vermont), to a facility, that is not a designated facility, located in a state other than Vermont provided the facility can receive such waste under applicable state and local laws, regulations and ordinances.

(b) Corrective actions

(1) If a discharge of hazardous waste, or a release of hazardous material has not been adequately addressed under **subsection (a)(1)(A)** of this section the Secretary may require that the person or persons responsible pursuant to **10 V.S.A. § 6615** complete the following:

(A) Engage the services of an environmental consultant experienced in the investigation and remediation of hazardous waste-contaminated sites; and

(B) Within thirty (30) days from either the date of the discharge/release or the date that the release was discovered if the date of discharge/release is not known, or within a period of time established by an alternative schedule approved by the Secretary, submit for approval by the Secretary a work plan for an investigation of the contaminated site (i.e., site investigation) prepared by the environmental consultant. The site investigation shall define the nature, degree and extent of the contamination; and shall assess potential impacts to human health and the environment (refer to the document titled: "Site Investigation Procedure" which is available from the Secretary upon request); and

(C) Perform the site investigation within either ninety (90) days of receiving written approval of the work plan by the Secretary, or a period of time established by an alternative schedule approved by the Secretary. A report detailing the findings of the site investigation shall be sent to the Secretary for review; and

(D) Within either thirty (30) days from the date of final acceptance of the site investigation report by the Secretary, or a period of time established by an alternative schedule approved by the Secretary, submit a corrective action plan prepared by the environmental consultant (refer to the document titled: "Corrective Action Guidance" which is available from the Secretary upon request); and

(E) Implement the corrective action plan within either ninety (90) days of receiving written approval of the plan by the Secretary, or a period of time established by an alternative schedule approved by the Secretary. The corrective action activity shall continue until the contamination is remediated to levels approved by the Secretary; and

(F) Submit to the Secretary all investigative, corrective action and monitoring reports, and all analytical results related to subsections (b)(1)(C) through (E) of this section, as they become available.

(2) A used or fired military munition is a waste and is potentially subject to corrective action authorities pursuant to 10 V.S.A. § 6615, and the process described by subsection (b)(1) of this section if the munition lands off-range and is not promptly rendered safe or retrieved. Any imminent and substantial threats associated with any remaining material must be addressed. If remedial action is infeasible, the operator of the range must maintain a record of the event for as long as any threat remains. The record must include the type of munition and its location (to the extent the location is known).

§ 7-106 LAND DISPOSAL RESTRICTIONS

(a) Certain hazardous wastes shall not be disposed of in or on the land. **40 CFR Part 268**, which is hereby incorporated by reference, except for 40 CFR §§ 268.5, 268.6, and 268.42(b), identifies those wastes which shall not be land disposed and describes the limited circumstances under which an otherwise prohibited waste may continue to be land disposed. The authority for implementing the CFR sections not incorporated by reference remains with the EPA.

Note: A copy of 40 CFR Part 268 (the Land Disposal Restrictions rule), as incorporated by these regulations, is available from the Secretary upon request.

(b) In addition to the prohibitions of **40 CFR Part 268**, the Secretary may restrict the land disposal of any hazardous waste in the State of Vermont:

(1) Which may present an undue risk to human health or the environment, immediately or over a period of time; or

(2) Which would be incompatible with the **groundwater protection rule and strategy** of chapter 12 of the environmental protection rules.

(c) Dilution of hazardous waste subject to the land disposal restrictions of **40 CFR Part 268** is prohibited pursuant to **40 CFR § 268.3.**

§ 7-107 ENFORCEMENT

(a) Information that the generation, transportation, treatment, storage or disposal of hazardous waste may present an actual or potential threat to human health or the environment, or is a violation of the 10 V.S.A. chapter 159, or these regulations, or any term or condition of certification, order, or assurance, may serve as grounds for an enforcement action by the Secretary, including, but not limited to:

(1) After notice and opportunity for hearing, issuing an order directing any person to take such steps as are necessary to:

(A) Immediately cease and desist any operation or practice;

(B) Correct or prevent environmental damage likely to result from any deficiency in operation or practice;

(C) Suspend or revoke any certification and require temporary or permanent cessation of the operation of such facility;

(2) A request that the Attorney General or appropriate State's Attorney commence an action for injunctive relief, the imposition of penalties and fines provided in **10 V.S.A. § 6612** and other relief as may be appropriate.

(3) An order for reimbursement to any agency of federal, state, or local government from any person whose act caused governmental expenditures under **10 V.S.A § 1283**.

(4) All other powers of enforcement available to the Secretary through **10 V.S.A., chapter 201**.

(b) The hearing by the Secretary identified under **subsection (a)(1)** of this section shall be conducted as a contested case. Pursuant to **10 V.S.A. § 6610(b)**, the Secretary may issue an emergency order without a prior hearing when an ongoing violation presents an immediate threat of substantial harm to the environment or an immediate threat to public health. An emergency order shall be effective upon actual notice to the person against whom the order is issued. Any person to whom an emergency order is issued shall be given the opportunity for a hearing within five (5) business days of the date the order is issued.

(c) Inspections, investigations, and property access **(10 V.S.A. § 8005)**

(1) Inspections and investigations

(A) An investigator may perform routine inspections to determine compliance.

(B) An investigator may investigate upon receipt or discovery of information that an activity is being or has been conducted that may constitute or cause a violation.

(C) An investigator, upon presentation of credentials, may seek permission to inspect or investigate any portion of the property, fixtures, or other appurtenances belonging to or used by a person whose activity is required to be in compliance. The investigator shall state the purpose of the inspection or investigation. An inspection or investigation may include monitoring, sampling, testing, and copying of any records, reports, or other documents relating to the purposes to be served by compliance.

(D) If permission for an inspection or investigation is refused, the investigator may seek an access order from the district or superior court in whose jurisdiction the property is located enabling the investigator to perform the inspection or investigation.

(2) Access orders

(A) If access has been refused, an access order may be sought pursuant to either **10 V.S.A. § 80**05 or **10 V.S.A. § 6609**.

(B) Issuance of an access order shall not negate the Secretary's authority to initiate criminal proceedings in the same matter by referring the matter to the office of the attorney general or a state's attorney.

(d) In an action to enforce these regulations, anyone raising a claim that a certain material is not a hazardous waste, or is exempt from regulation as hazardous waste, must demonstrate that there is a known market or disposition for the material, and that they meet the terms of the exclusion or exemption. Appropriate documentation (such as contracts showing that a second person uses the material as an ingredient in a production process) to demonstrate that the material is not a waste, or is exempt from regulation, must be provided. Owners and operators of facilities claiming that they are actually recycling materials must show that they have the necessary equipment to do so.