Town of Berlin

Stormwater Infrastructure Mapping Project

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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

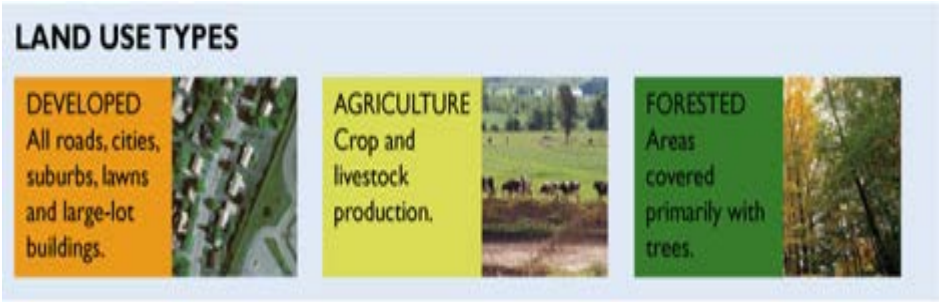
Schueler, T. 1987. Technical Documentation of a Simple Method for Estimating Urban Storm Pollutant Export. Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs. Appendix A.

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



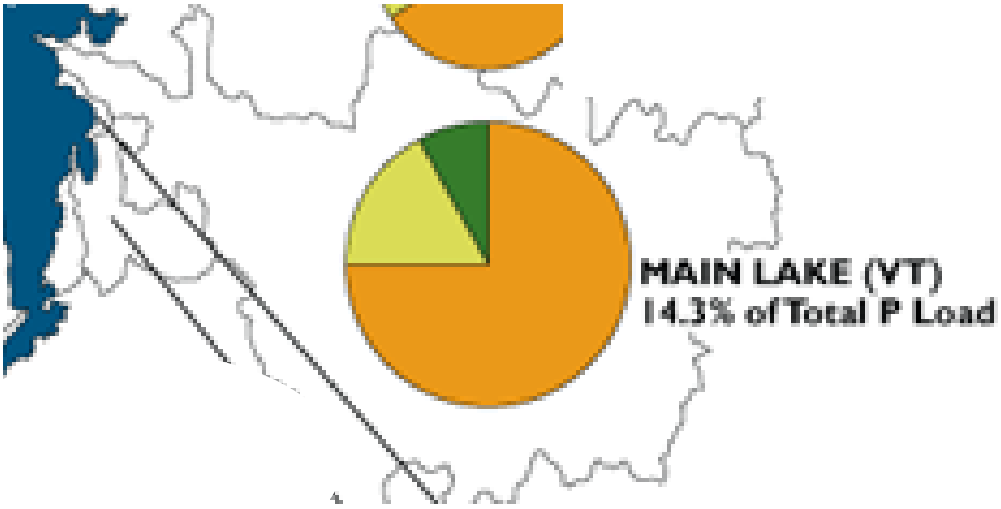
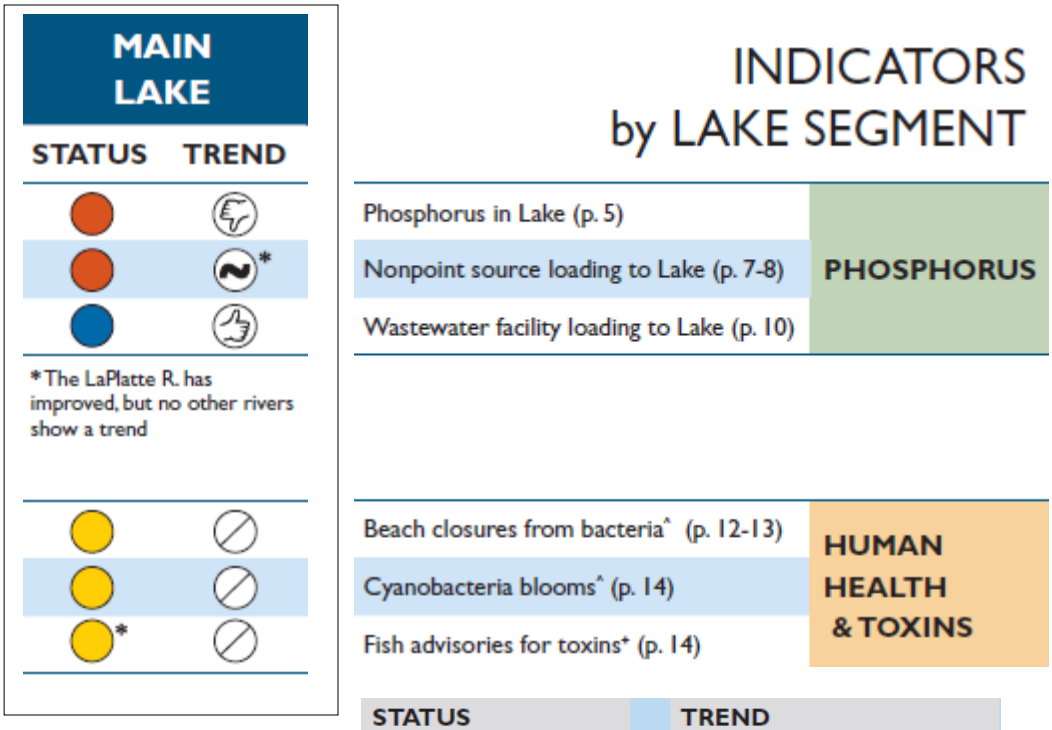


Figure shows the breakdown of contributions from developed, agricultural and forested land sources in the Main Lake-Winooski River Watershed to Total Phosphorus loading of the Main Lake, VT side.



* 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

Berlin - 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)
2 Berlin			WP/RS/SB/SWPPP	4365-9003/4365-9010	8.1	63	4,970	4,970	13.8	13.8	0.28	0.56
3 Berlin			WP/IG/UD/SWPPP	4582-9003/ 4582-9015/ 4582-9010	66.7	23	4,329	4,329	14.4	14.4	0.49	1.69
4 Berlin			WP/IG/UD/SWPPP	4582-9003/ 4582-9015/ 4582-9010	49.6	38	6,005	6,005	20.0	20.0	0.68	2.09
5 Berlin			UD/SWPPP	4582-9003/ 4582-9015/ 4582-9010	4.9	1	329	329	0.9	0.9	0.02	0.01
6 Berlin			OF		268.6	5	21,387	21,387	59.4	59.4	1.21	1.48
7 Berlin			CB/GS		15.6	37	5,183	5,183	14.4	14.4	0.29	0.63
8 Berlin			GS		4.3	20	759	759	2.1	2.1	0.04	0.10
9 Berlin			GS/CB/EDP	3002-9010	2.9	65	1,669	1,669	4.6	4.6	0.09	0.21
10 Berlin			GS/CB/EDP	3002-9010	6.4	69	4,041	4,041	11.2	11.2	0.23	0.48
11 Berlin			GS/WP/CB	5176-9015	8.5	49	600	600	5.0	5.0	0.17	0.46
12 Berlin			OF		3.7	44	1,529	1,529	4.2	4.2	0.09	0.18
13 Berlin	2	Modify outlet of EDP, Combine with 21,153	EDPMP/CB/GS	3243-9010	18.4	19	2,021	1,010	5.6	3.9	0.11	0.39
14 Berlin			GS/CB		2.3	73	1,898	1,898	5.3	5.3	0.11	0.19
15 Berlin			OF		0.2	80	212	212	0.6	0.6	0.01	0.02
16 Berlin			GS/EDP		0.5	73	333	333	0.9	0.9	0.02	0.04
17 Berlin			OF		3.7	37	1,275	1,275	3.5	3.5	0.07	0.15
18 Berlin			CB		1.0	85	1,036	1,036	2.9	2.9	0.06	0.09
19 Berlin			CB		0.6	88	631	631	1.8	1.8	0.04	0.06
20 Berlin	2	Bioretention in median of Route 62	EDPMP/GS/CB		5.5	41	2,626	1,313	7	5.1	0.15	0.25
21 Berlin	2	Combine with 13,153	EDPMP/CB/GS		2.1	52	823	412	1.4	1.0	0.05	0.12
22 Berlin			WL/GS/CB	3799-9010	26.3	32	979	979	13.6	13.6	0.28	0.92
23 Berlin			GS		5.6	24	1,144	1,144	3.2	3.2	0.06	0.15
26 Berlin			OF		74.6	2	5,133	5,133	14.3	14.3	0.29	0.14
27 Berlin			CB/OF	6689-9015	0.6	101	142	142	1.2	1.2	0.04	FALSE
28 Berlin			GS/EDP	6689-9015	1.1	78	180	180	1.5	1.5	0.05	0.10
29 Berlin			GS/EDP	4244-9015	0.5	16	9	9	0.1	0.1	0.00	0.01
30 Berlin			GS/EDP	4244-9015	0.9	71	118	118	1.0	1.0	0.03	0.07
31 Berlin			GS		1.2	65	861	861	2.4	2.4	0.05	0.09
32 Berlin			GS		2.2	59	1,317	1,317	3.7	3.7	0.07	0.14
33 Berlin			GS/WP/CB	3933-9015	5.1	56	444	444	3.7	3.7	0.13	0.31
34 Berlin			OF/GS	6689-9015	8.8	37	2,932	2,932	8.1	8.1	0.17	0.36
35 Berlin			GS		2.6	38	882	882	2.4	2.4	0.05	0.11
36 Berlin			CB/GS/WP/SWPPP	3909-9015/5409-9003	5.8	83	1,042	1,042	8.7	8.7	0.29	0.53
37 Berlin			OF		2.8	63	1,888	1,888	5.2	5.2	0.11	0.20
38 Berlin			GS/CB/OF		24.3	50	11,923	11,923	33.1	33.1	0.67	1.34
39 Berlin			GS/WP/CB	4104-9015	13.5	25	1,346	1,346	4.5	4.5	0.11	0.38
40 Berlin			OF		4.8	59	2,927	2,927	8.1	8.1	0.17	0.31
41 Berlin			GS/WP	5471-9010	5.7	14	523	523	1.5	1.5	0.03	0.09
42 Berlin			SB/CB/GS/SWPPP	4997-9003	10.4	50	4,567	4,567	12.7	12.7	0.26	0.58
45 Berlin			GS		0.5	39	185	185	0.5	0.5	0.01	0.02

Berlin - 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
2 Berlin	0	WP/RS/SB/SWPPP						281	$129,185
3 Berlin	0	WP/IG/UD/SWPPP						846	$389,355
4 Berlin	0	WP/IG/UD/SWPPP						1,047	$481,742
5 Berlin	0	UD/SWPPP						3	$1,235
6 Berlin	0	OF						739	$339,796
7 Berlin	0	CB/GS						316	$145,164
8 Berlin	0	GS						48	$22,225
9 Berlin	0	GS/CB/EDP						105	$48,219
10 Berlin	0	GS/CB/EDP						241	$111,067
11 Berlin	0	GS/WP/CB						229	$105,553
12 Berlin	0	OF						89	$41,130
13 Berlin	2	EDPMP/CB/GS	96,333.53		$40	$23,867	ERP, Section 319, LCBP	193	$88,955
14 Berlin	0	GS/CB						94	$43,212
15 Berlin	0	OF						10	$4,670
16 Berlin	0	GS/EDP						19	$8,777
17 Berlin	0	OF						77	$35,560
18 Berlin	0	CB						46	$21,156
19 Berlin	0	CB						28	$12,828
20 Berlin	2	EDPMP/GS/CB	57,050.71		$43	$26,069	ERP, Section 319, LCBP	124	$57,051
21 Berlin	2	EDPMP/CB/GS	Combine with 13,153					61	$27,851
22 Berlin	0	WL/GS/CB						459	$210,926
23 Berlin	0	GS						73	$33,647
26 Berlin	0	OF						68	$31,115
27 Berlin	0							0	$0
28 Berlin	0	GS/EDP						49	$22,394
29 Berlin	0	GS/EDP						4	$1,913
30 Berlin	0	GS/EDP						34	$15,867
31 Berlin	0	GS						44	$20,424
32 Berlin	0	GS						71	$32,465
33 Berlin	0	GS/WP/CB						156	$71,682
34 Berlin	0	OF/GS						178	$82,035
35 Berlin	0	GS						53	$24,588
36 Berlin	0	CB/GS/WP/SWPPP						267	$122,827
37 Berlin	0	OF						99	$45,350
38 Berlin	0	GS/CB/OF						671	$308,670
39 Berlin	0	GS/WP/CB						188	$86,311
40 Berlin	0	OF						156	$71,851
41 Berlin	0	GS/WP						46	$20,987
42 Berlin	0	SB/CB/GS/SWPPP						288	$132,392
45 Berlin	0	GS						11	$5,120

Berlin - 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)
46 Berlin			CB		1.9	37	632	632	1.8	1.8	0.04	0.08
47 Berlin			CB/OF		3.5	38	1,227	1,227	3.4	3.4	0.07	0.15
48 Berlin			CB/GS/OF		8.1	32	2,237	2,237	6.2	6.2	0.13	0.28
49 Berlin			GS		2.6	26	600	600	1.7	1.7	0.03	0.08
50 Berlin			GS		9.3	18	1,493	1,493	4.1	4.1	0.08	0.19
51 Berlin			OF/WP		53.9	10	4,221	4,221	11.7	11.7	0.24	0.60
52 Berlin			OF		36.3	7	3,285	3,285	9.1	9.1	0.19	0.30
53 Berlin			WP/CB/GS	3761-9010	27.2	62	2,880	2,880	24.0	24.0	0.81	1.86
55 Berlin			GS		8.1	49	3,841	3,841	10.7	10.7	0.22	0.44
56 Berlin			BRA/GS/CB	3825-9015	3.4	96	795	795	6.6	6.6	0.22	0.36
57 Berlin			CB		0.2	76	219	219	0.6	0.6	0.01	0.02
58 Berlin			CB		1.3	66	1,014	1,014	2.8	2.8	0.06	0.09
59 Berlin			GS	6720-9015	2.0	86	944	944	3.9	3.9	0.11	0.19
60 Berlin	2	Bioretention at front of dealership	BRA/GS	6720-9015	2.0	83	893	179	3.7	2.6	0.10	0.18
61 Berlin			OF/GS		2.4	66	1,678	1,678	4.7	4.7	0.09	0.17
62 Berlin	2	Bioretention below rear parking lot	BRA/GS/IB/CB	3064-9015	3.0	57	274	55	2.3	1.6	0.08	0.19
63 Berlin			CB	3064-9010	3.6	89	4,009	4,009	11.1	11.1	0.23	0.35
64 Berlin			CB		1.0	91	1,106	1,106	3.1	3.1	0.06	0.10
65 Berlin			CB		9.6	41	4,603	4,603	12.8	12.8	0.26	0.43
66 Berlin	1	Bioretention at 765 Granger Rd	BRA/CB/GS		7.2	51	4,288	858	11.9	9.5	0.24	0.40
67 Berlin			CB	3064-9010	2.8	83	2,839	2,839	7.9	7.9	0.16	0.25
68 Berlin			URB/CB/GS	3064-9010	3.9	84	3,734	3,734	10.4	10.4	0.21	0.36
69 Berlin			CB		6.4	20	1,114	1,114	3.1	3.1	0.06	0.14
70 Berlin			CB		0.2	82	252	252	0.7	0.7	0.01	0.02
71 Berlin			OF/GS		48.6	10	5,168	5,168	14.4	14.4	0.29	0.56
72 Berlin			GS		2.9	35	929	929	2.6	2.6	0.05	0.11
73 Berlin	1	Extended Detention Pond in median of Rte 62	EDPMP/CB/GS		9.1	32	2,600	520	7.2	4.3	0.15	0.32
74 Berlin			CB/GS		1.7	51	870	870	2.4	2.4	0.05	0.10
75 Berlin			OF		11.2	10	1,185	1,185	3.3	3.3	0.07	0.13
76 Berlin			CB/GS		0.8	14	97	97	0.3	0.3	0.01	0.01
77 Berlin			CB/GS		0.8	36	258	258	0.7	0.7	0.01	0.03
78 Berlin			CB/GS		4.5	16	630	630	1.7	1.7	0.04	0.08
79 Berlin			GS		8.3	3	606	606	1.7	1.7	0.03	0.03
80 Berlin			GS		7.4	7	644	644	1.8	1.8	0.04	0.05
81 Berlin			OF/GS		16.0	16	2,302	2,302	6.4	6.4	0.13	0.28
82 Berlin			GS	5160-9010	5.4	14	708	708	2.0	2.0	0.04	0.09
83 Berlin			OF		50.5	6	4,230	4,230	11.7	11.7	0.24	0.33
84 Berlin			GS/OF		25.4	5	2,032	2,032	5.6	5.6	0.11	0.14
85 Berlin			OF/CB		70.6	16	10,121	10,121	28.1	28.1	0.57	1.25
86 Berlin			OF		20.2	10	2,085	2,085	5.8	5.8	0.12	0.22
87 Berlin			OF		14.0	11	1,551	1,551	4.3	4.3	0.09	0.17
88 Berlin			GS/WP	6929-9015	46.7	12	791	791	6.6	6.6	0.22	0.64
89 Berlin			GS/CB		5.4	22	1,030	1,030	2.9	2.9	0.06	0.13
90 Berlin			CB/GS/OF		39.9	6	3,360	3,360	9.3	9.3	0.19	0.27
91 Berlin			GS		1.9	25	404	404	1.1	1.1	0.02	0.05
92 Berlin			GS		0.7	30	197	197	0.5	0.5	0.01	0.02
93 Berlin			GS/CB		4.5	27	1,045	1,045	2.9	2.9	0.06	0.13

Berlin - 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
46 Berlin	0	CB						38	$17,667
47 Berlin	0	CB/OF						74	$34,097
48 Berlin	0	CB/GS/OF						140	$64,311
49 Berlin	0	GS						38	$17,555
50 Berlin	0	GS						94	$43,324
51 Berlin	0	OF/WP						298	$137,006
52 Berlin	0	OF						149	$68,362
53 Berlin	0	WP/CB/GS						932	$428,718
55 Berlin	0	GS						218	$100,209
56 Berlin	0	BRA/GS/CB						180	$82,879
57 Berlin	0	CB						9	$4,332
58 Berlin	0	CB						46	$21,324
59 Berlin	0	GS						94	$43,099
60 Berlin	2	BRA/GS	23,248.55		$33	$20,821	ERP, Section 319, LCBP	92	$42,368
61 Berlin	0	OF/GS						86	$39,611
62 Berlin	2	BRA/GS/IB/CB	17,843.91		$81	$26,026	ERP, Section 319, LCBP	95	$43,662
63 Berlin	0	CB						177	$81,472
64 Berlin	0	CB						49	$22,394
65 Berlin	0	CB						217	$99,983
66 Berlin	1	BRA/CB/GS	55,799.49		$16	$23,423	ERP, Section 319, LCBP	200	$92,162
67 Berlin	0	CB						126	$58,178
68 Berlin	0	URB/CB/GS						180	$82,822
69 Berlin	0	CB						71	$32,578
70 Berlin	0	CB						11	$5,176
71 Berlin	0	OF/GS						278	$127,891
72 Berlin	0	GS						57	$26,220
73 Berlin	1	EDPMP/CB/GS	44,860.73		$22	$15,527	ERP, Section 319, LCBP	162	$74,495
74 Berlin	0	CB/GS						49	$22,394
75 Berlin	0	OF						64	$29,314
76 Berlin	0	CB/GS						6	$2,644
77 Berlin	0	CB/GS						16	$7,258
78 Berlin	0	CB/GS						39	$17,836
79 Berlin	0	GS						15	$6,752
80 Berlin	0	GS						27	$12,435
81 Berlin	0	OF/GS						142	$65,436
82 Berlin	0	GS						43	$19,637
83 Berlin	0	OF						166	$76,521
84 Berlin	0	GS/OF						71	$32,859
85 Berlin	0	OF/CB						625	$287,571
86 Berlin	0	OF						110	$50,414
87 Berlin	0	OF						86	$39,554
88 Berlin	0	GS/WP						319	$146,514
89 Berlin	0	GS/CB						66	$30,271
90 Berlin	0	CB/GS/OF						134	$61,554
91 Berlin	0	GS						26	$11,872
92 Berlin	0	GS						12	$5,683
93 Berlin	0	GS/CB						66	$30,552

Berlin - 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)
94 Berlin			CB/GS/SB	5624-9010	5.3	23	703	703	2.0	2.0	0.04	0.14
95 Berlin			GS		14.9	10	1,519	1,519	4.2	4.2	0.09	0.16
96 Berlin			GS		1.6	26	371	371	1.0	1.0	0.02	0.05
97 Berlin	2	Extended Detenton Pond below Green Mt Drive outfall	EDPMP/GS/OF		4.6	30	1,241	248	3.4	2.1	0.07	0.16
98 Berlin			GS/CB/OF	5624-9010	7.5	22	1,184	1,184	3.3	3.3	0.07	0.18
99 Berlin			CB	5624-9010	6.1	17	764	764	2.1	2.1	0.04	FALSE
100 Berlin			CB/GS		8.2	39	3,695	3,695	10.3	10.3	0.21	FALSE
101 Berlin			CB		5.5	62	4,113	4,113	11.4	11.4	0.23	FALSE
102 Berlin	1	Sand Filter or Extended Detention Basin in Vtrans district garage yard/Stormwter Pollution Prevention Plan	EDP/SF/SWPPP/CB		3.9	71	3,387	677	9.4	5.6	0.19	FALSE
103 Berlin			CB		0.8	86	806	806	2.2	2.2	0.05	FALSE
104 Berlin			GS/CB		22.1	21	4,003	4,003	11.1	11.1	0.23	0.51
105 Berlin			CB		1.5	74	1,392	1,392	3.9	3.9	0.08	FALSE
106 Berlin			CB		1.1	72	940	940	2.6	2.6	0.05	FALSE
107 Berlin			CB/GS		12.6	28	2,999	2,999	8.3	8.3	0.17	FALSE
108 Berlin			CB/GS		3.7	57	2,156	2,156	6.0	6.0	0.12	FALSE
109 Berlin	3	Sand Filter or Extended Detention Basin, combine with 110	SF/EDP/CB/GS		7.1	53	4,478	896	12.4	7.5	0.25	FALSE
110 Berlin	3	Sand Filter or Extended Detention Basin, combine with 109	SF/EDP/CB/GS		12.4	64	9,581	1,916	26.6	16.0	0.54	FALSE
111 Berlin	1	Bioretention on either side of entrance to shopping center	BRA/CB/GS		5.0	62	3,703	741	10.3	6.2	0.21	FALSE
112 Berlin			CB/GS		18.0	24	5,156	5,156	14.3	14.3	0.29	0.48
113 Berlin			CB/GS		22.1	17	3,277	3,277	9.1	9.1	0.19	0.41
114 Berlin			CB		13.2	30	3,428	3,428	9.5	9.5	0.19	0.43
115 Berlin	1	Sedimentation Basin and pipe conveyance needed. Water overflows area.	SB/SD/CB		18.5	14	2,319	1,159	6.4	5.2	0.13	FALSE
116 Berlin			CB/RS		5.9	10	612	612	1.7	1.7	0.03	FALSE
117 Berlin			CB/IG		4.5	38	1,539	1,539	4.3	4.3	0.09	FALSE
118 Berlin			CB/GS		12.9	16	1,803	1,803	5.0	5.0	0.10	FALSE
119 Berlin			CB/GS	3717-9010	19.6	45	10,334	10,334	28.7	28.7	0.58	FALSE
120 Berlin			GS/CB		24.8	12	2,843	2,843	7.9	7.9	0.16	FALSE

Berlin - 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
94 Berlin	0	CB/GS/SB						69	$31,621
95 Berlin	0	GS						79	$36,291
96 Berlin	0	GS						24	$10,859
97 Berlin	2	EDPMP/GS/OF	21,413.45		$22	$15,527	ERP, Section 319, LCBP	78	$35,841
98 Berlin	0	GS/CB/OF						91	$41,805
99 Berlin	0	CB						0	$0
100 Berlin	0	CB/GS						0	$0
101 Berlin	0	CB						0	$0
102 Berlin	1	EDP/SF/SWPPP/CB	58,431.65		$22	$15,527	ERP, Section 319, LCBP	0	$0
103 Berlin	0	CB						0	$0
104 Berlin	0	GS/CB						255	$117,425
105 Berlin	0	CB						0	$0
106 Berlin	0	CB						0	$0
107 Berlin	0	CB/GS						0	$0
108 Berlin	0	CB/GS						0	$0
109 Berlin	3	SF/EDP/CB/GS	242,549.62		$22	$15,527	ERP, Section 319, LCBP	0	$0
110 Berlin	3	SF/EDP/CB/GS	Combine with 110					0	$0
111 Berlin	1	BRA/CB/GS	48,192.29		$16	$11,712	ERP, Section 319, LCBP	0	$0
112 Berlin	0	CB/GS						241	$110,955
113 Berlin	0	CB/GS						204	$93,794
114 Berlin	1	SB/SD/CB						216	$99,252
115 Berlin	1	SB/SD/CB	40,001.31		$35	$31,053	ERP, Section 319, LCBP	0	$0
116 Berlin		CB/RS						0	$0
117 Berlin		CB/IG						0	$0
118 Berlin		CB/GS						0	$0
119 Berlin		CB/GS						0	$0
120 Berlin		GS/CB						0	$0

Berlin - 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)
121 Berlin	1	Bioretention area at 451 Partridge Farm Rd and near RR crossing at 149 Partridge Farm Rd	BRA/GS	3147-9010	61.1	9	5,212	1,042	14.5	8.7	0.29	FALSE
122 Berlin			GS	3147-9010	2.2	27	424	424	1.2	1.2	0.02	FALSE
123 Berlin			OF	5160-9010	79.6	2	5,518	5,518	15.3	15.3	0.31	0.16
124 Berlin			OF/GS	3170-9010	9.9	44	4,115	4,115	11.4	11.4	0.23	FALSE
125 Berlin			OF/GS		19.2	10	1,951	1,951	5.4	5.4	0.11	FALSE
126 Berlin			OF		4.4	44	2,225	2,225	6.2	6.2	0.13	FALSE
127 Berlin			CB/GS	3717-9010	19.9	27	6,220	6,220	17.3	17.3	0.35	FALSE
128 Berlin			CB		1.3	87	1,364	1,364	3.8	3.8	0.08	FALSE
129 Berlin			CB/GS		2.5	74	2,243	2,243	6.2	6.2	0.13	FALSE
130 Berlin			CB/GS		12.0	11	1,306	1,306	3.6	3.6	0.07	FALSE
131 Berlin			CB		2.7	65	2,102	2,102	5.8	5.8	0.12	FALSE
132 Berlin			GS		2.5	37	1,059	1,059	2.9	2.9	0.06	FALSE
133 Berlin			CB/GS		8.0	30	2,126	2,126	5.9	5.9	0.12	FALSE
134 Berlin			OF		8.9	14	1,144	1,144	3.2	3.2	0.06	FALSE
136 Berlin			CB/GS		26.5	18	4,114	4,114	11.4	11.4	0.23	FALSE
137 Berlin			OF/GS		26.1	17	3,868	3,868	10.7	10.7	0.22	FALSE
138 Berlin			OF/GS		5.1	39	1,798	1,798	5.0	5.0	0.10	FALSE
139 Berlin			GS/CB		45.6	8	4,243	4,243	11.8	11.8	0.24	FALSE
140 Berlin	1	Stabilize erosion on both sides of Highland Ave and down to Rte 302	RR/OF/GS/CB		59.6	6	5,068	3,547	14.1	12.7	0.29	FALSE
141 Berlin			GS		1.9	29	647	647	1.8	1.8	0.04	FALSE
142 Berlin			OF		1.6	36	516	516	1.4	1.4	0.03	FALSE
143 Berlin			OF		2.9	52	1,802	1,802	5.0	5.0	0.10	FALSE
144 Berlin			OF		7.3	11	804	804	2.2	2.2	0.05	FALSE
145 Berlin			OF/CB		6.4	32	1,813	1,813	5.0	5.0	0.10	FALSE
146 Berlin	1	Stabilize erosion below Rte 62, Extended Detention Basin for west drainage on west side of outfall	RR/EDP/OF/CB		1353.1	2	92,875	55,725	258.0	206.4	5.25	2.34
147 Berlin			CB/GS	5160-9010	115.4	7	10,177	10,177	28.3	28.3	0.58	0.88
148 Berlin			CB/GS		49.1	2	3,475	3,475	9.7	9.7	0.20	FALSE
149 Berlin			CB/GS		92.6	7	8,172	8,172	22.7	22.7	0.46	FALSE
150 Berlin			CB		17.4	5	1,417	1,417	3.9	3.9	0.08	FALSE
151 Berlin			CB		14.6	4	1,088	1,088	3.0	3.0	0.06	FALSE
152 Berlin			CB		127.3	1	8,685	8,685	24.1	24.1	0.49	0.19
153 Berlin	2	Combine with 13,21	EDPMP/WP/EDP/ CB/GS	6458-9015	12.5	36	1,918	959	6.5	4.5	0.16	0.49
154 Berlin			CB/GS	4582-9010	10.6	37	2,989	2,989	8.3	8.3	0.17	0.42
175 Berlin			CB	4820-9010	2.1	74	1,893	1,893	5.3	5.3	0.11	0.17

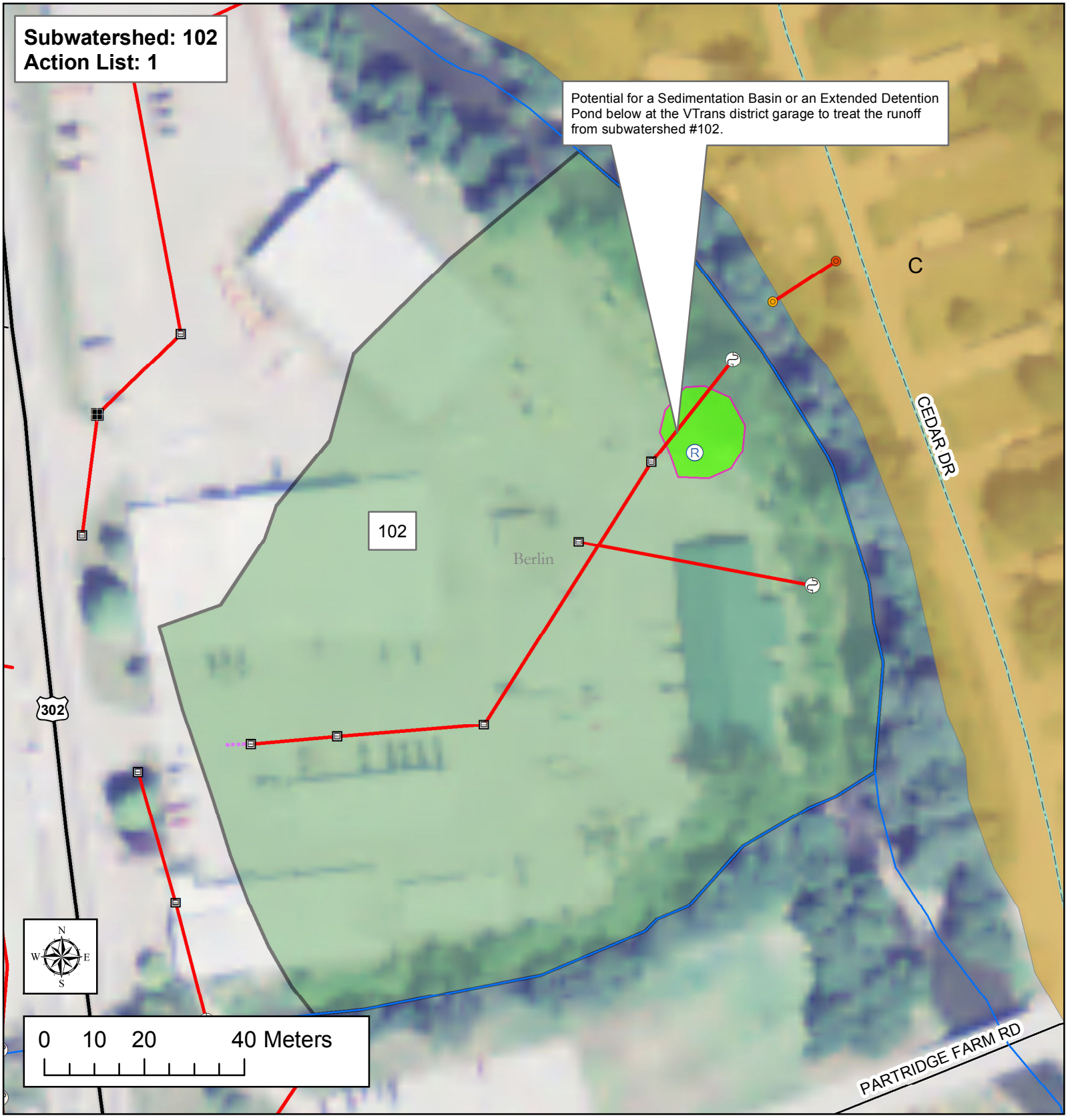
Berlin - Subwatershed Prioritization and Recommendations (pg4)

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
121 Berlin	1	BRA/GS	67,822.10		$16	$11,712	ERP, Section 319, LCBP	0	$0
122 Berlin	0	GS						0	$0
123 Berlin	0	OF						81	$37,416
124 Berlin	0	OF/GS						0	$0
125 Berlin	0	OF/GS						0	$0
126 Berlin	0	OF						0	$0
127 Berlin	0	CB/GS						0	$0
128 Berlin	0	CB						0	$0
129 Berlin	0	CB/GS						0	$0
130 Berlin	0	CB/GS						0	$0
131 Berlin	0	CB						0	$0
132 Berlin	0	GS						0	$0
133 Berlin	0	CB/GS						0	$0
134 Berlin	0	OF						0	$0
136 Berlin	0	CB/GS						0	$0
137 Berlin	0	OF/GS						0	$0
138 Berlin	0	OF/GS						0	$0
139 Berlin	0	GS/CB						0	$0
140 Berlin	1	RR/OF/GS/CB		5,000.00	$3	$3,552	ERP, Section 319, LCBP	0	$0
141 Berlin	0	GS						0	$0
142 Berlin	0	OF						0	$0
143 Berlin	0	OF						0	$0
144 Berlin	0	OF						0	$0
145 Berlin	0	OF/CB						0	$0
146 Berlin	1	RR/EDP/OF/CB	140,000.00	15,000.00	$4	$3,004	ERP, Section 319, LCBP	1,172	$539,189
147 Berlin	0	CB/GS						442	$203,342
148 Berlin	0	CB/GS						0	$0
149 Berlin	0	CB/GS						0	$0
150 Berlin	0	CB						0	$0
151 Berlin	0	CB						0	$0
152 Berlin	0	CB						96	$44,224
153 Berlin	2	EDPMP/WP/EDP/CB/C	Combine with 13, 21					246	$113,149
154 Berlin	0	CB/GS						212	$97,676
175 Berlin	0	CB						85	$39,316

Target Maps

Showing Priority Action List Drainage Areas

And Potential Retrofit Locations



Berlin, VT

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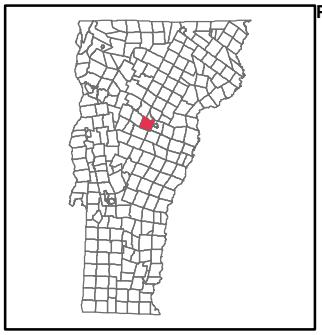

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- Potential Stormwater Treatment Area

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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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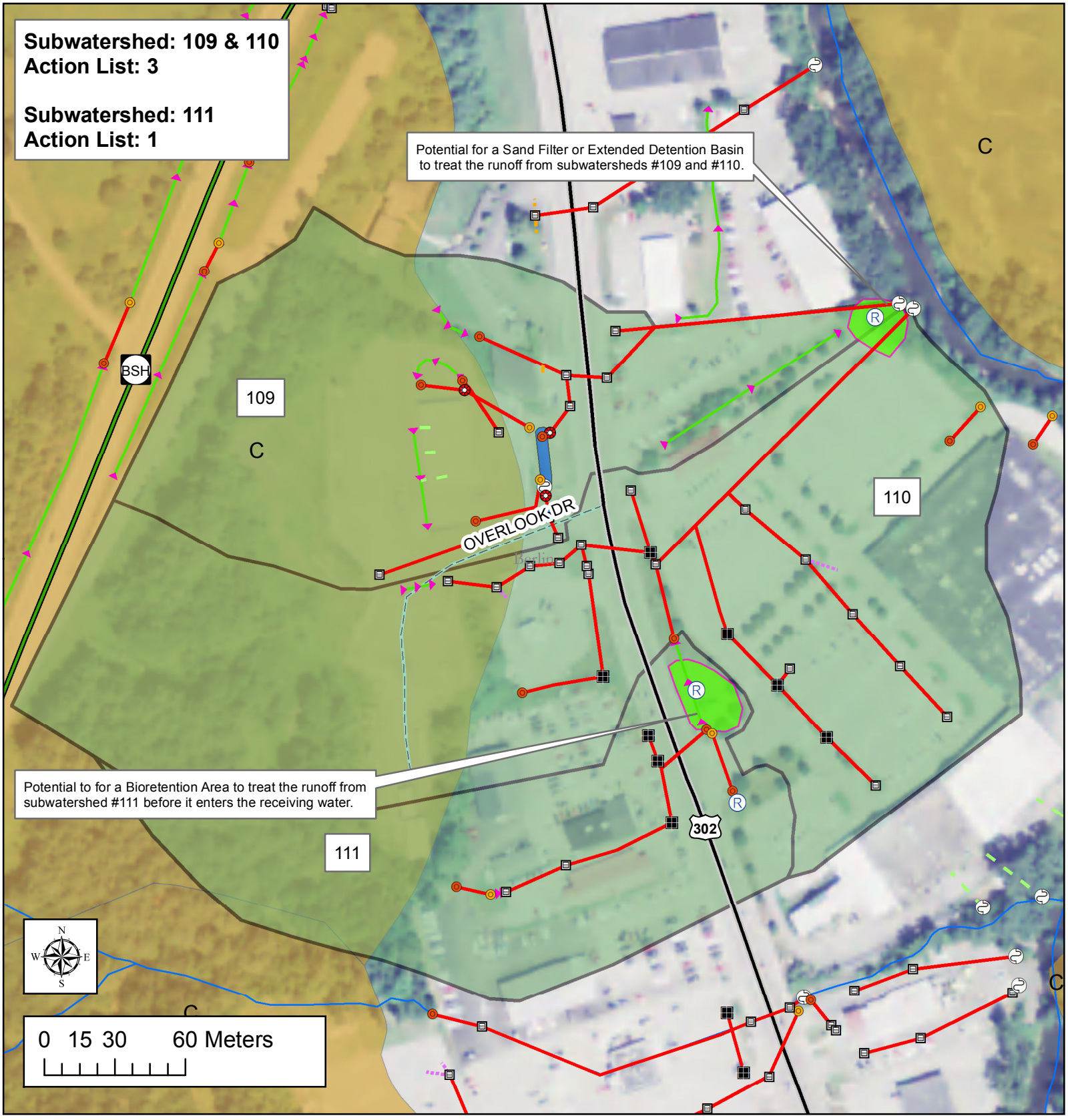

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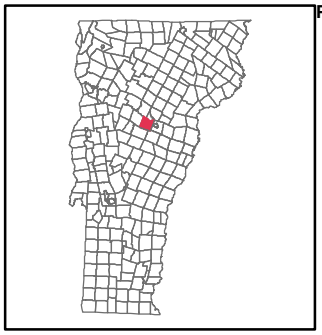

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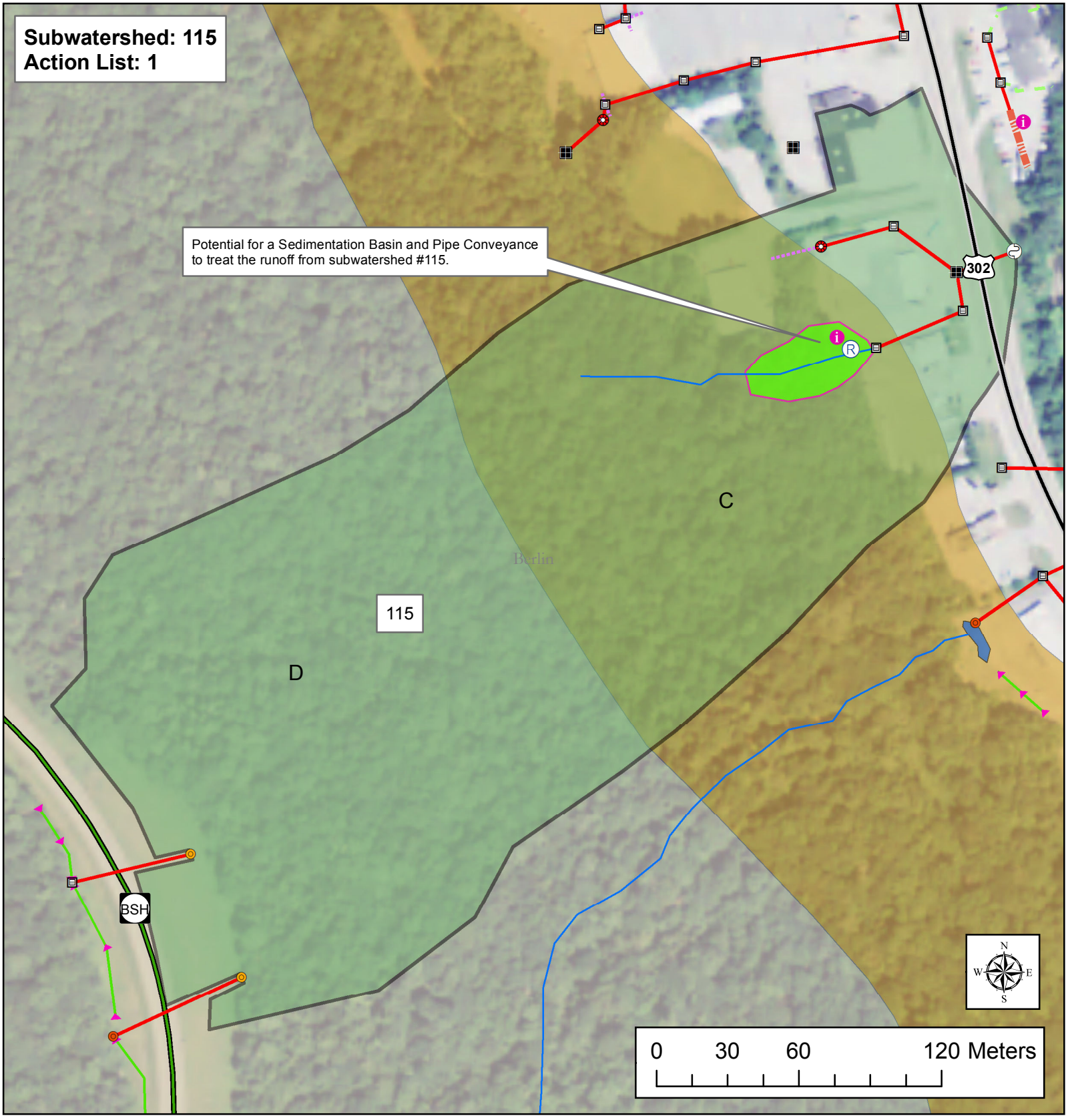

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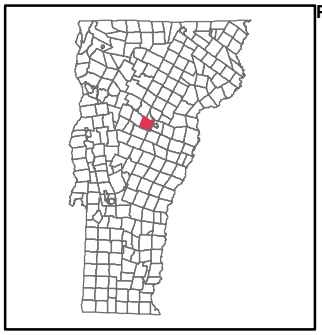

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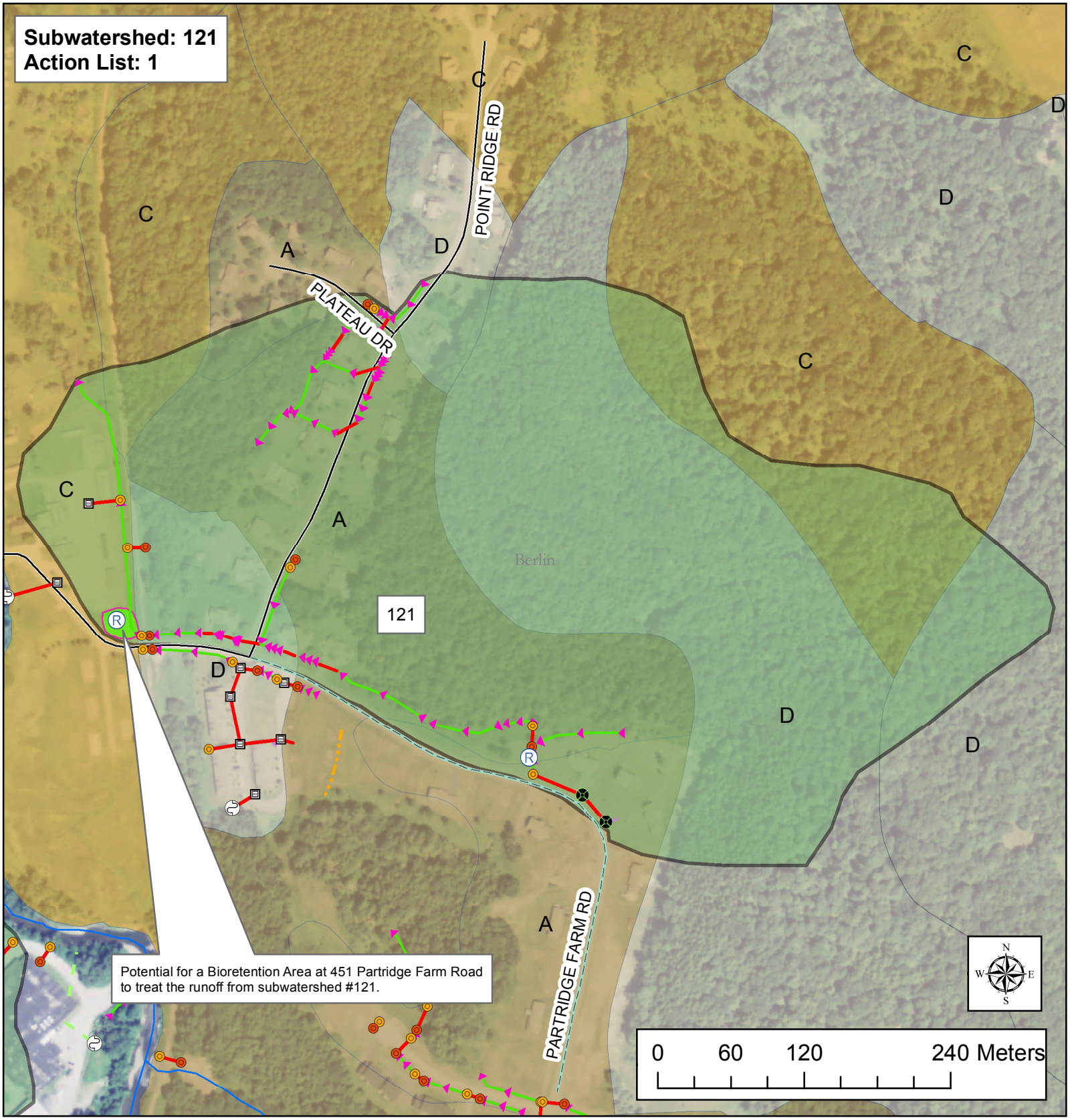

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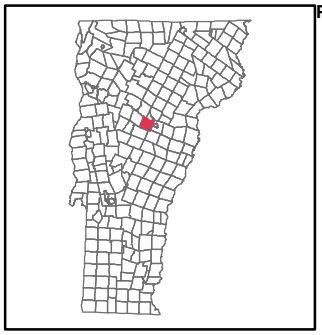

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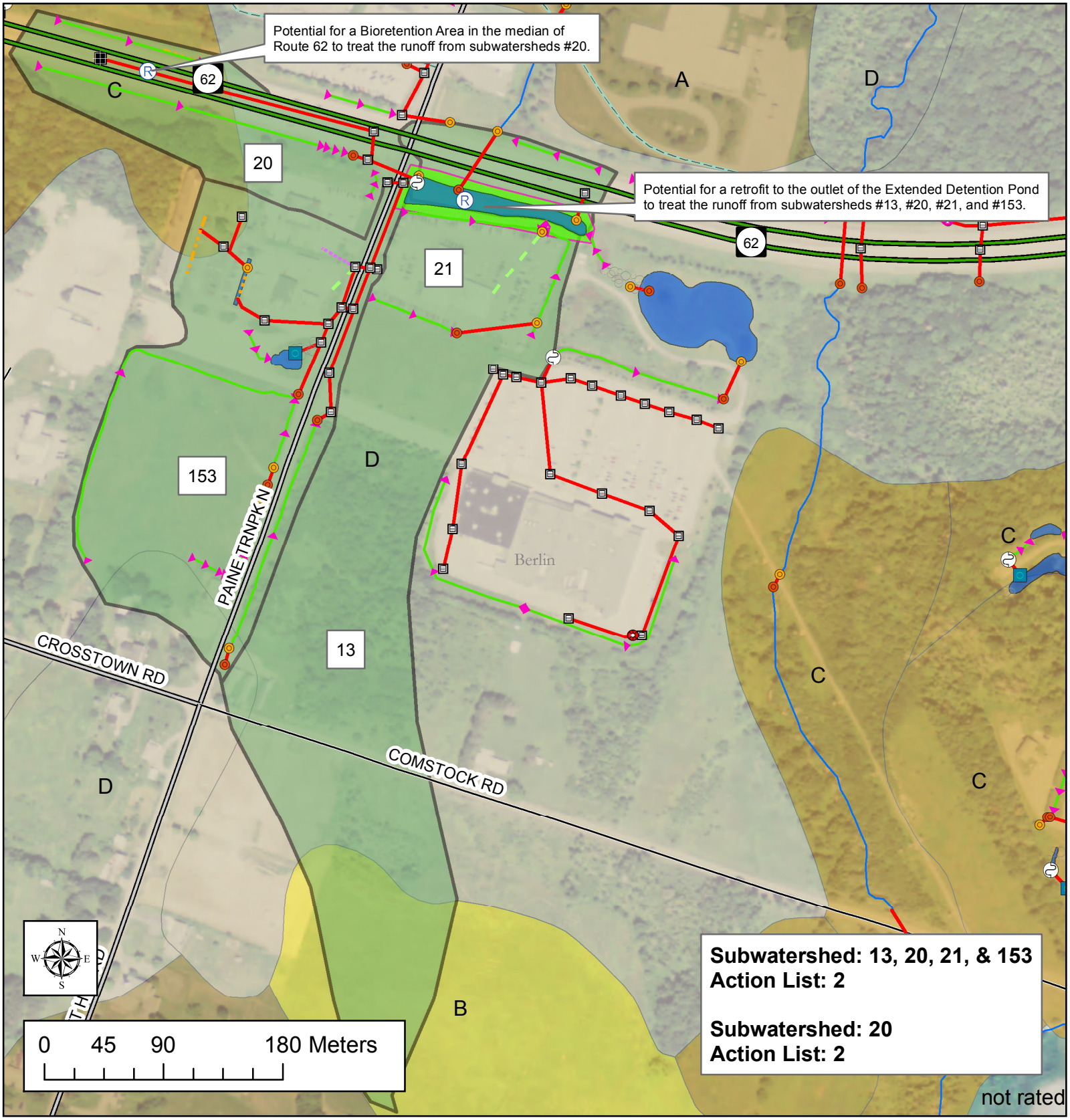

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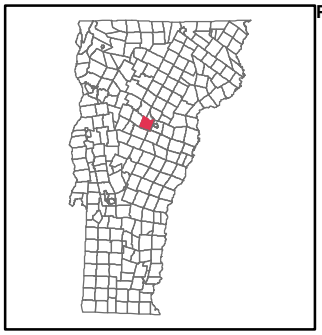

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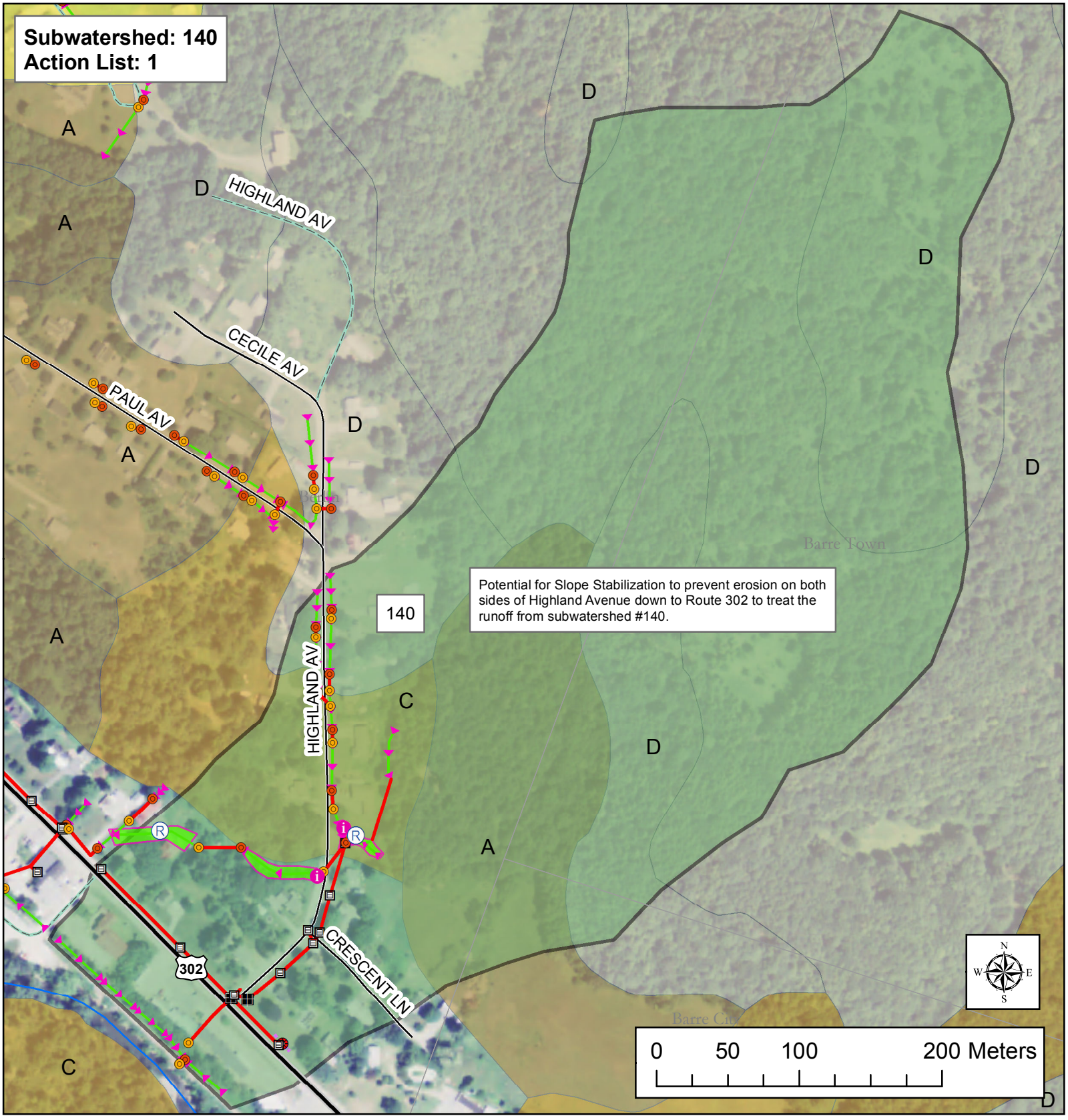

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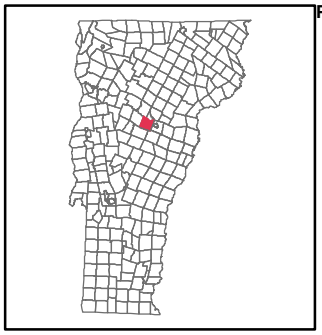

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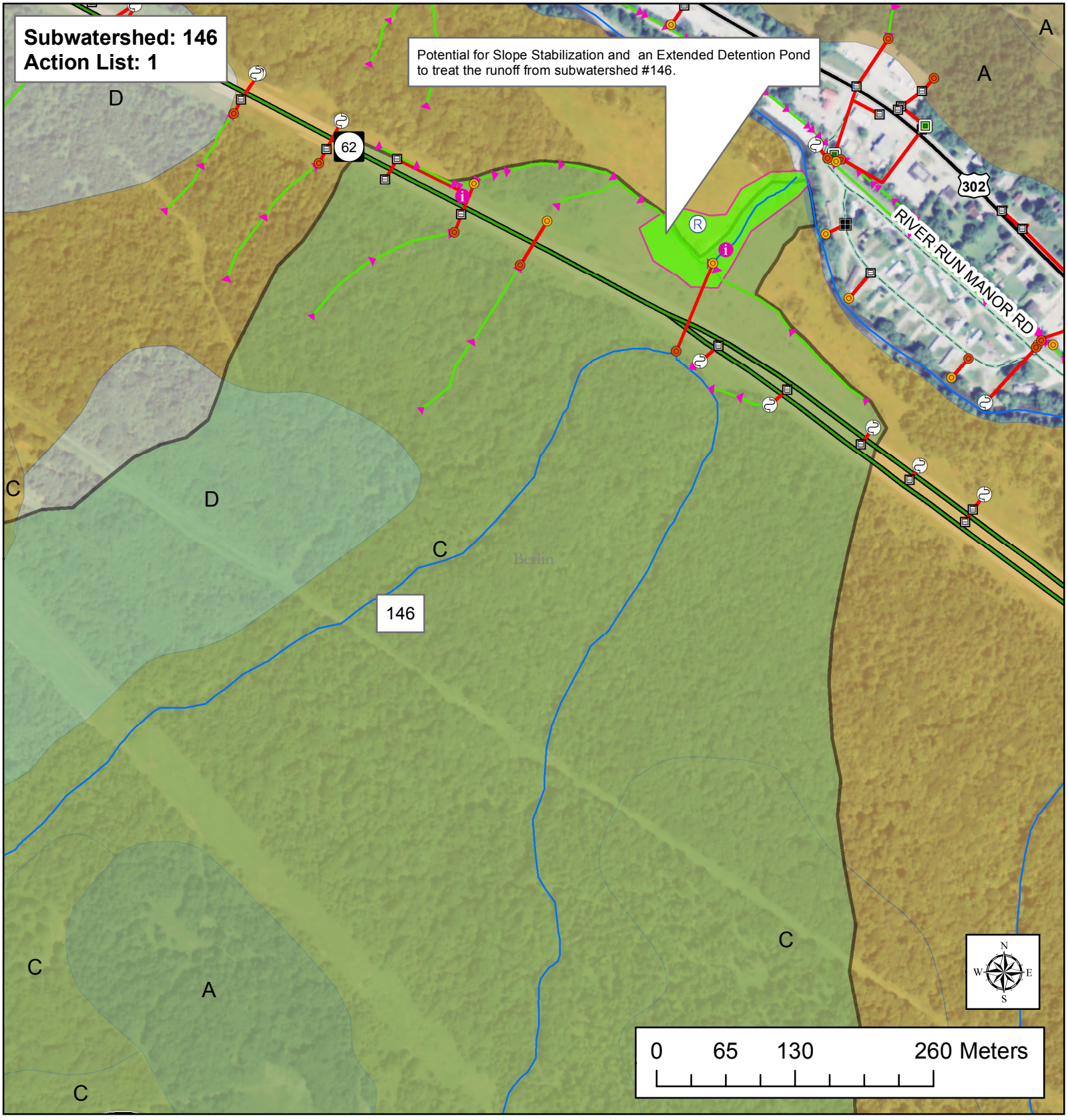

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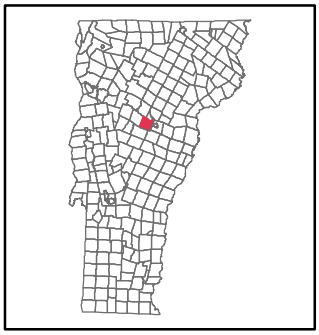

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Creator: Jim Pease, David Ainley
DEC - WSMD - Ecosystem Restoration Section
Plotted Date: 4/16/2013
Data Sources: VTRANS Roads data, VT Hydrography data set, DEC Stormwater database
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VERMONT
Agency of Natural Resources

Berlin, VT

DEC Stormwater Infrastructure Mapping Project

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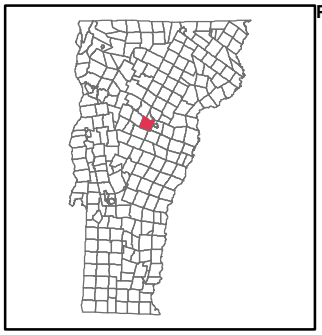

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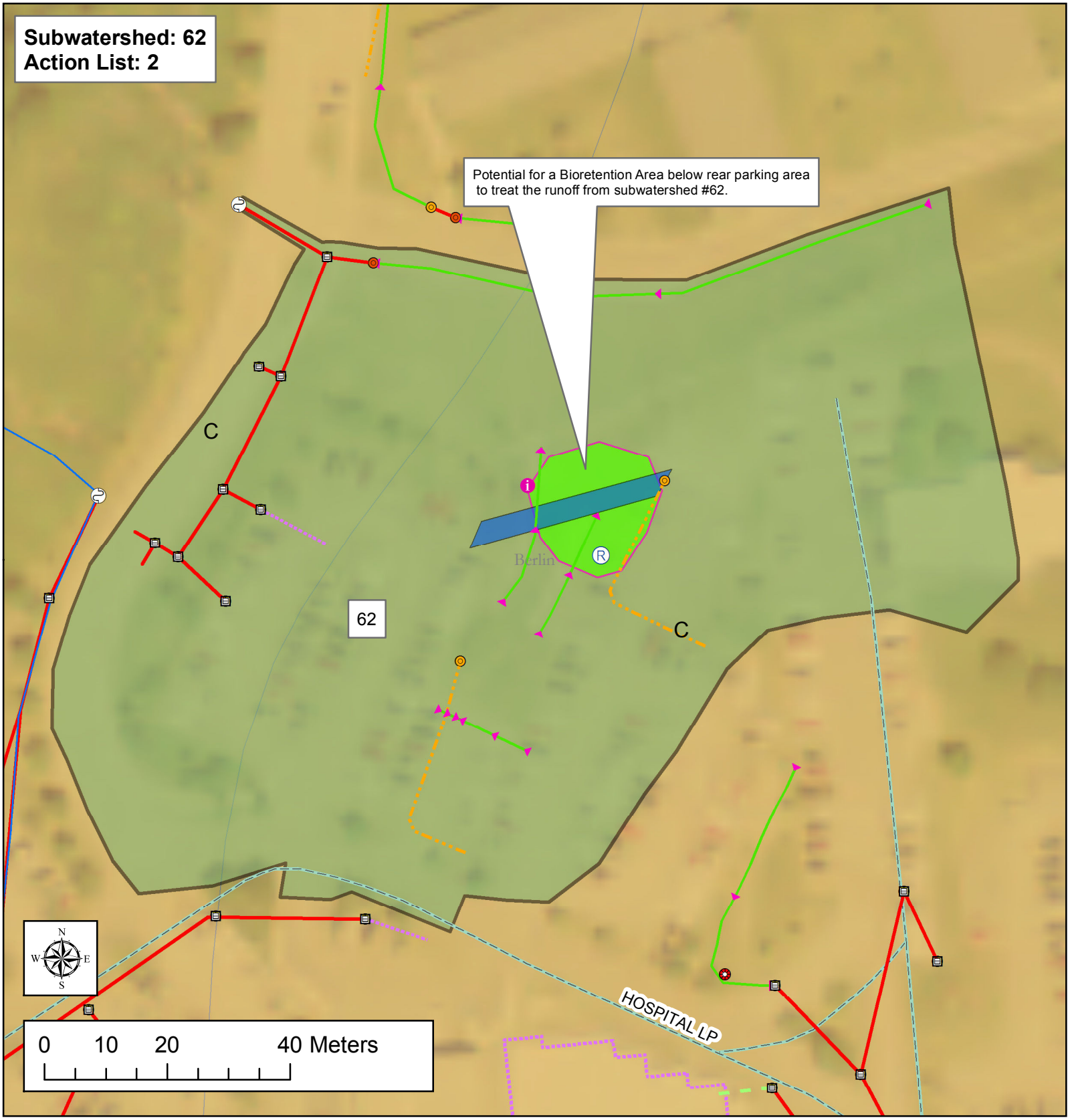

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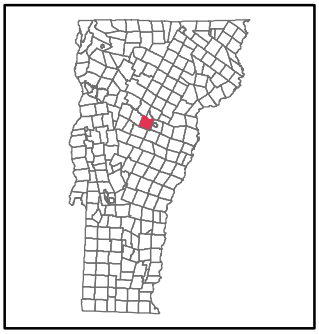

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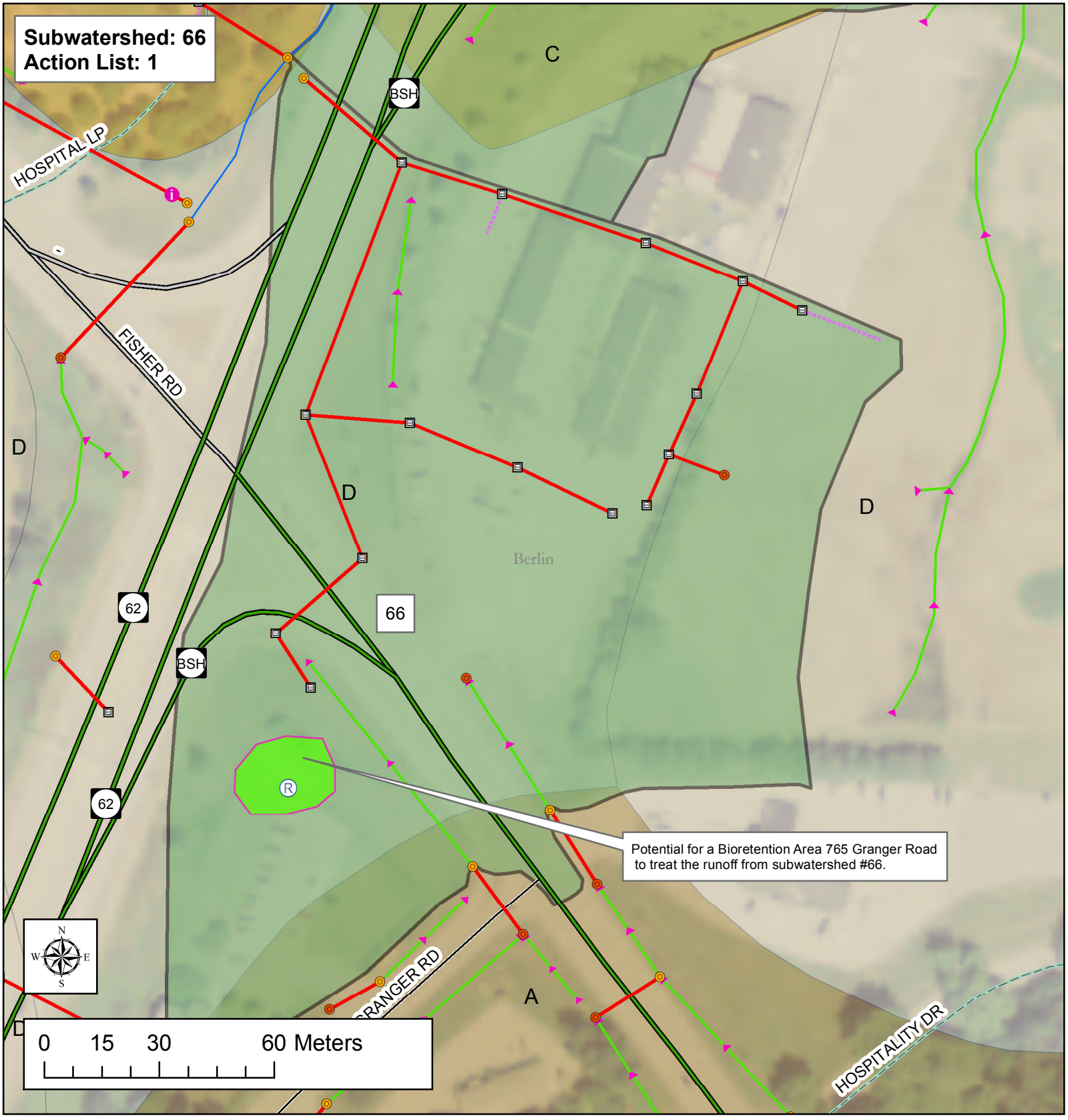

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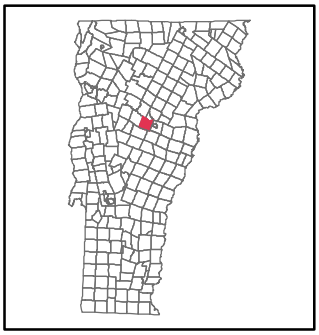

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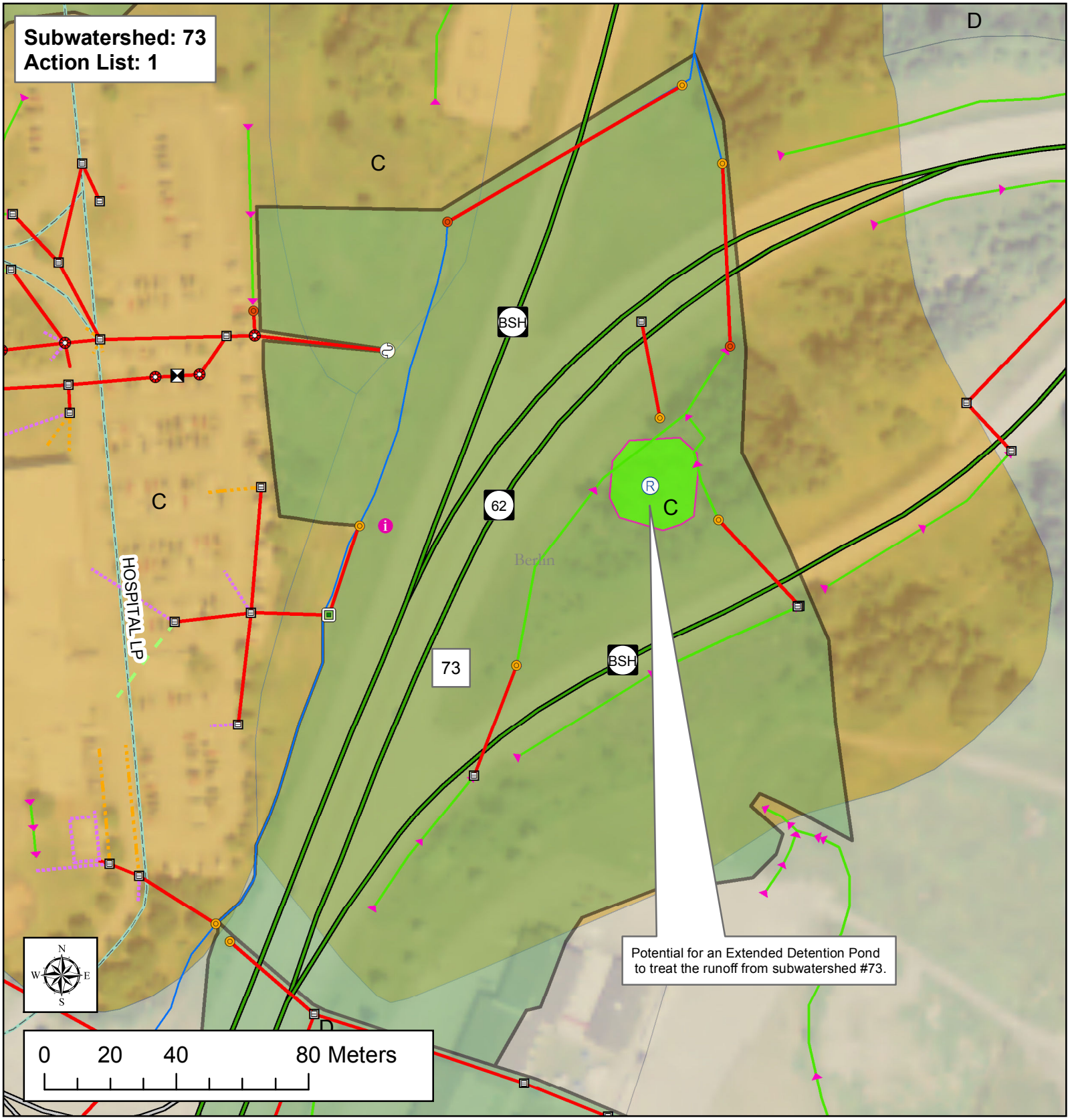

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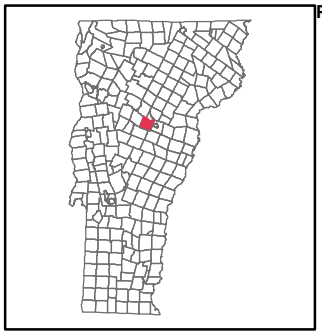

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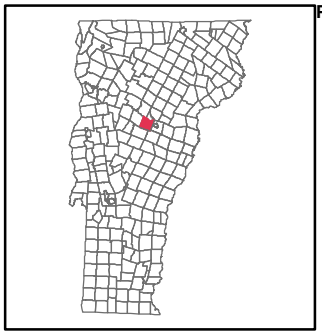

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Spill Control

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:

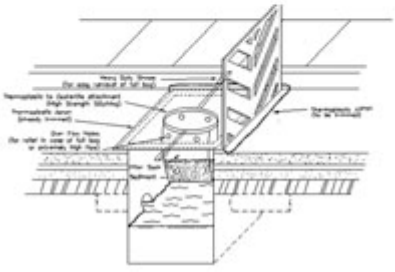
— Proper notification when a spill occurs;
— Site responsibility with respect to addressing the cleanup of a spill;
— Stopping the source of a spill;
— Cleaning up a spill;
— Proper disposal of materials contaminated by the spill;
— Location of spill response equipment programs; and
— Training for designated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

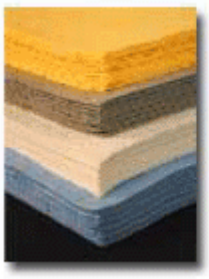
Absorbent socks are flexible tubes used to contain and clean-up spilled fluids. Socks are widely used in industrial applications and are ideal for Spill Kits. Fast spreading spills are quickly stopped with a sock.

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.