Town of Dover

Stormwater Infrastructure Mapping Project

September 2019

VTDEC – CLEAN WATER INITIATIVE PROGRAM, WATERSHED MANAGEMENT DIVISION

https://dec.vermont.gov/water-investment/cwi/solutions/developed-lands/idde

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Overview

This stormwater infrastructure mapping project was completed for the municipality by the Agency of Natural Resources Clean Water Initiative 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. They can be used to: (1) 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, (2) as a valuable tool for hazardous material spill planning and prevention, (3) 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, (4) better assist the municipality in planning and implementing combined stormwater-sewer separation projects, (5) inform options for cleaning up existing polluted stormwater discharges; this report provides information and guidance for potential retrofit treatment locations and opportunities, (6) 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, and (7) 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 using the best available 4 band imagery (2016 NAIP). 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 0.9-1.0-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.**

North Branch of the Deerfield Water Quality Remediation Plan

The North Branch of the Deerfield River upstream of Tannery Road in Dover is on the state's 303d list as a stormwater (sediment) impaired stream. The stream does not currently meet the Class B standards for fish and macroinvertebrates due to excessive sediment. Because Mt Snow owns or manages a large percentage of the property acreage upstream of Tannery Road (35% in 2011) the ski area was asked to implement a Water Quality Remediation Plan (WQRP). For properties/subdivisions not owned by the ski area the ski area can request that the state designate these parcels and require a stormwater upgrade under the state's residual designation authority.

As a result of the WQRP Mt Snow is required to implement a significant sediment reduction to this reach of the river. In 2011 Mt Snow engaged Vanasse, Hangen, Brustlin Inc. (VHB) to produce a long term sediment reduction plan for the river. The plan was to be implemented in association with the implementation of the Mt Snow Master Development Plan. To date only a small number of projects have been implemented due to economic conditions and the implementation scale of the master plan. The approximate sediment reduction from full implementation of the North Branch of the Deerfield WQRP is about 27% (based on the predevelopment and post development WQRP sediment load calculations).

In 2019 VTDEC repeated a similar analysis with new data based on a careful survey of the existing condition of the stormwater infrastructure, DEC also used digital elevation model datum for calculating the drainage areas to each discharge point. This analysis was done in part to complete a stormwater illicit discharge and elimination (IDDE) project for this area of the state (VT River Basin 12-Deerfield) as well as to provide a more educated estimate of the sediment production loadings in the drainage.

There were several significant differences in the Simple Method Loading Analysis between the state and VHB. For example the state's analysis only used one sediment loading coefficient (180 mg/l) for all impervious surfaces. The VHB analysis estimated sediment loadings from 8 classes of land use including forest, meadow and ski trails. However, the average VHB sediment loading rate was a loading coefficient of about 120 mg/l.

The newer analysis takes advantage of better infrastructure data and recommends some different alternatives for the implementation of the WQRP. These alternatives are summarized as the Red (high) Yellow (medium) and Brown (low) recommendations in the following final report. In the attached Table 2 the impact this will have on permitted stormwater facilities is described.

The VHB sediment loading model following full implementation of its WQRP strategy created a load reduction of 26.7% from the total existing sediment load to the North Branch of the Deerfield upstream of Tannery Rd. The DEC model created a load reduction of 29.6%. For VHB the existing sediment load would be reduced from 429,680 to 315,048 lbs./yr. For DEC the existing sediment load would be reduced from 188,191 to 142,587 lbs./yr.

The VHB project would implement the Table 2 permitted system upgrades #1-10 and 22 other practices on Mt Snow owned/controlled surfaces. In the DEC model 13 practices would be implemented including the redevelopment of the Carinthia area and the development of two properties not constructed at the time of the VHB model.

Act 64 Municipal Roads General Permit (MRGP)

The 2015 Vermont Legislature adopted Act 64 which will require all municipalities to address stormwater runoff from all hydrologically connected existing municipal roads. In January 2018 the final general permit was issued; municipalities must file a notice of intent to comply with the permit by July 31, 2018. As part of this permit all municipalities will be required, as explained below, to evaluate connected road segments with catch basin served infrastructure to determine compliance with MRGP Standards by December 31, 2020 as part of their road erosion inventory. The permit will require:

- Municipalities to develop road stormwater management plans. These plans will include a comprehensive (1) Road Erosion Inventory (REI) of hydrologically-connected road segments and (2) an Implementation Table.
- The inventory will include an evaluation of municipal hydrologically-connected road segments to determine if they meet the MRGP standards.
- Those road segments that do not currently meet MRGP standards and that can impact waterways will be prioritized for remediation within the Implementation Table. DEC has developed an Implementation Table-excel spread sheet template for this purpose.

Municipalities will submit annual reports to DEC due on April 1st starting in 2019. The Annual Reports will document progress in upgrading roads to meet MRGP standards. Municipalities will be able to use the spread sheet, mentioned above, for annual compliance reporting requirements. This report and the mapping information contained in it can be used by municipalities to develop the plan for the paved road segments with catchbasins that are hydrologically directly connected. The map(s) and data provided with this report indicate where these road segments outfalls are located using the best available mapping information DEC has to date. The MRGP standard for paved roads with catch basins is that any outfalls that are eroded will have to be stabilized with practices such as stone aprons, culvert headwalls, and stone-lined ditches. As with other classes of roads covered by this permit the municipality should first check the maps provided. DEC suggests municipalities take the following steps to check the maps and/or data provided to determine what outfalls will require municipal attention for erosion repair:

1. Using the provided maps and/or data as a guide confirm that the road draining to this outfall is paved, has at least two catch basins or drop inlets, and the discharge pipe from those catchbasins is directly discharging to waters of the state. Include any outfall from these road segments that discharges within 500 linear feet of surface waters.

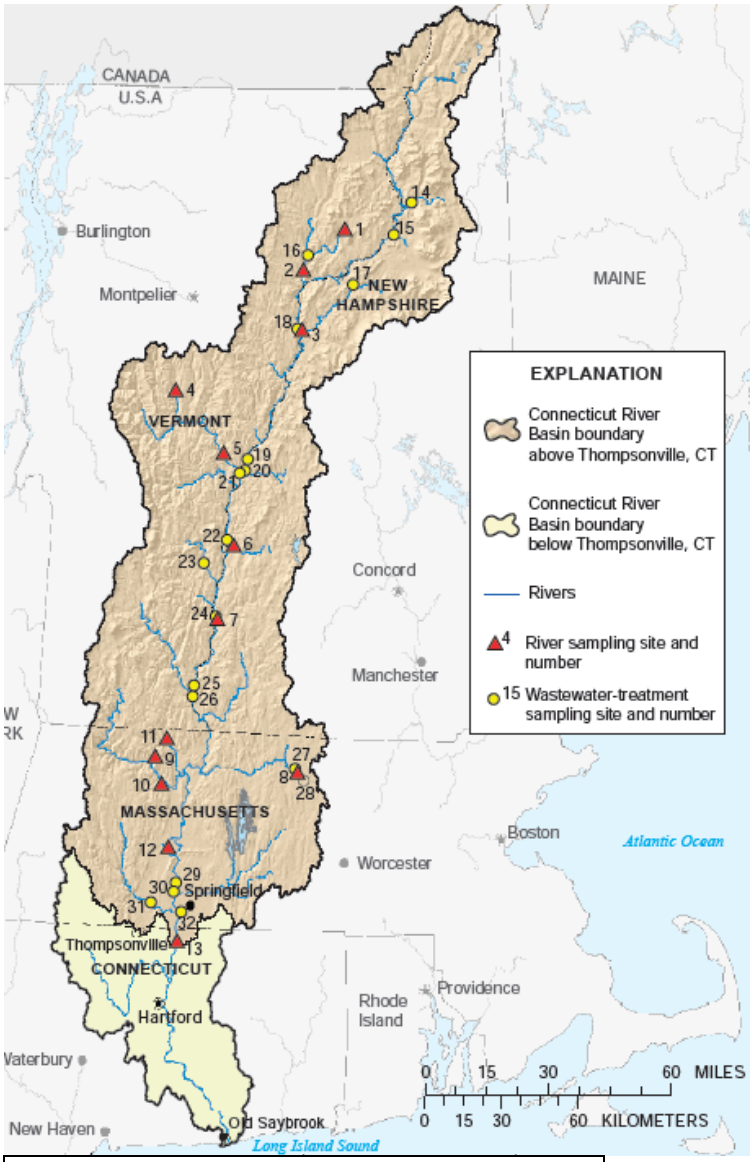
2. Using the maps locate the outfall and note any level of erosion present in the outfall and/or in the 500 foot or less long swale between the pipe outlet and waters of the state.

3. Prepare a list of all outfalls with notes pertaining to the erosion using the Guidance and Field Sheet or the i-phone application.
   Inventory Guidance:
   http://dec.vermont.gov/sites/dec/files/wsm/stormwater/docs/Permitinformation/MunicipalRoads/sw_MRGP_PavedRoadsWithCathBasins_REI-Supplement.pdf

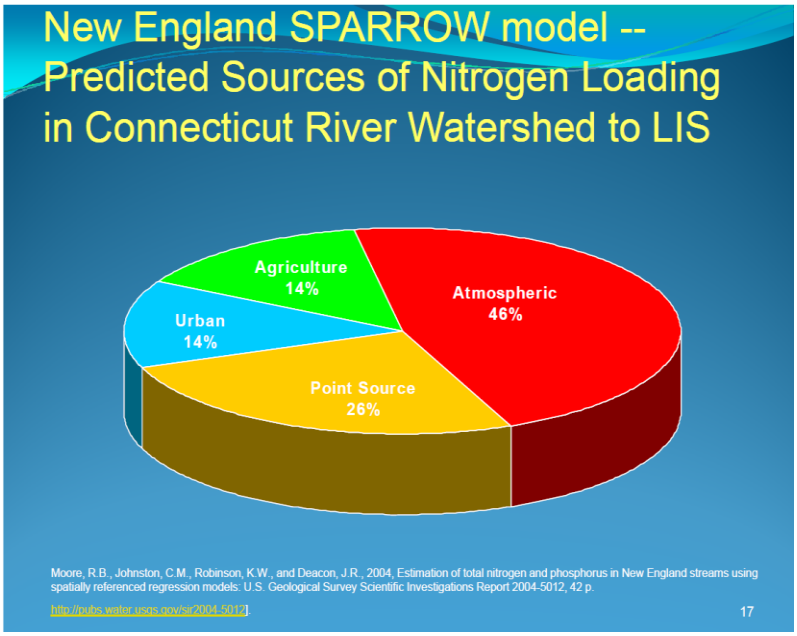
   Field Sheet (use form C only):
   http://dec.vermont.gov/sites/dec/files/wsm/stormwater/docs/Permitinformation/MunicipalRoads/sw_MRGP_RoadErosionInventory.pdf

   i-phone application: Please contact Ryan Knox at Ryan.Knox@vermont.gov

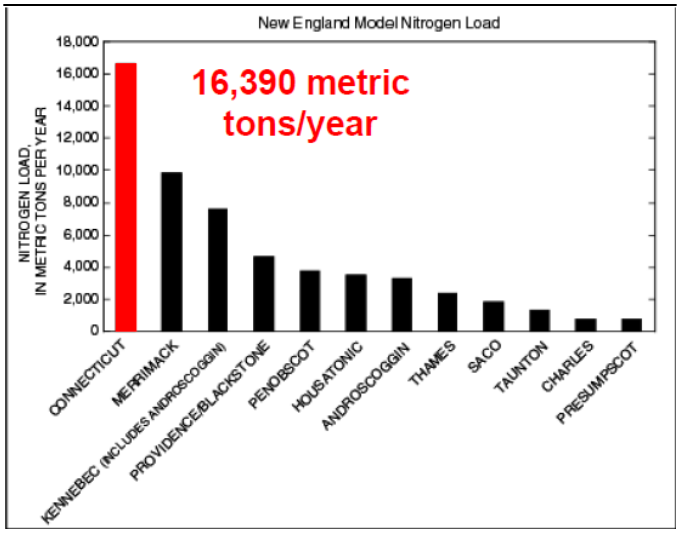
Long Island Sound – Connecticut River Watershed Nitrogen Overview



- This map shows an overview of the extent of the Connecticut River watershed including areas of Vermont, New Hampshire, Massachusetts, and Connecticut.



- This figure shows the modeled nitrogen loading contribution per year from the Connecticut River basin to the Long Island Sound.



- This graph shows the breakdown of the modeled nitrogen load from the Connecticut River watershed to the Long Island Sound from various sources.

- Above figure taken from USGS – *Assessment of Total Nitrogen in the Upper Connecticut River Basin in New Hampshire, Vermont, and Massachusetts, Dec 2002 – Sept 2005*. http://pubs.usgs.gov/sir/2006/5144/pdf/sir2006-5144.pdf

- Above figures taken from EPA/USGS – *Application of NHDPlus for SPARROW nutrient modeling of the Northeastern and Mid-Atlantic Region of the US* http://www.awra.org/orlando2010/presentations/Session22/NHDPlus_SPARROW_AWRA20100330-good.pdf

Subwatershed Data

Tables showing calculations and Priority drainage area retrofit possibilities

This is a key showing the abbreviations of the different funding programs listed in the calculation sheets.

Abbreviation Key	
Code	**Funding Program**
BR	Better Roads-VTrans
ERP/CWIP	VTDEC Clean Water Initiative Program
LCBP	Lake Champlain Basin Program
LISF	Long Island Sound Futures Fund
SRF	Clean Water State Revolving Loan Fund
VTrans	Vermont Agency of Transportation Alternatives or Municipal Highway and Stormwater Mitigation Programs

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
BRA	Bioretention Area or Raingarden
BS	Buffer Strip (25' Min.)
CB	Catch Basin
CBI	Catch Basin Insert
CD	Check Dam
CR or ESRD	Impervious Disconnection Credits
DP/DS	Dry Pond or Dry Swale
DW	Drywell
EDP (EDPMP)	Extended Detention Pond (with Micropool)
GS	Grass Swale
IB/ IG	Infiltration Basin or Infiltration Gallery
MOD	Modifications/upgrade to 2017 SW Standards
OF	Overland Flow
OGF	Organic Filter
PA/PC/PV	Pervious Asphalt or Pervious Concrete or Pervious Pavers
POP	Pocket Pond
PP	Perforated Pipe or Underdrain
PS	Pump Station
RDD	Roof Drain Disconnect
RR/RS	Rock Riprap or Rock Swale
SB	Sedimentation Basin
SF	Sand Filter (aka Surface Sand Filter)
SS or VS	Swirl Separator
SWPPP	Stormwater Pollution Prevention Plan
TT	Treatment Tank
WL/WP/WS	Wetland (Constructed) or Wet Pond or Wet Swale (aka Bioswale)

Dover - 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.)	Nitrogen Load with Current Reductions (lbs.)	Nitrogen Load with Priority Action (lbs.)
1 Dover			OF/WP		10.4	10.1	567	567	6.30	6.30
2 Dover			CB		2.8	40.9	1048	1048	8.73	8.73
3 Dover			OF		2.2	31.4	603	603	5.03	5.03
4 Dover			GS		103.7	7.2	9269	9269	77.24	77.24
5 Dover			GS		13.6	11.0	1498	1498	12.48	12.48
6 Dover			GS		29.7	10.9	3234	3234	26.95	26.95
7 Dover			GS		23.0	11.0	2524	2524	21.04	21.04
8 Dover			GS		6.7	16.9	1002	1002	8.35	8.35
9 Dover			GS		5.8	16.4	837	837	6.97	6.97
10 Dover			GS		88.2	8.2	8297	8297	69.14	69.14
11 Dover			OF		10.4	14.4	1367	1367	11.39	11.39
12 Dover	1	Extended Detention Micropool in front of school	EDP/GS		18.9	8.7	1836	367	15.30	9.18
13 Dover			GS		11.5	4.8	909	909	7.57	7.57
14 Dover			GS		30.7	4.1	2332	2332	19.44	19.44
15 Dover	1	Infiltration basins for parking lots at 189 Taft Brook Rd	IB(2)/GS		8.6	24.0	1782	178	14.85	1.48
16 Dover			GS		10.1	8.5	970	970	8.08	8.08
17 Dover			GS		16.7	5.7	1376	1376	11.46	11.46
18 Dover			GS		6.3	12.3	737	737	6.14	6.14
19 Dover			GS/WP	3511-9015.1A	79.8	2.9	537	537	26.85	26.85
20 Dover			GS/WP	3511-9015.1A	3.6	17.3	37	37	1.83	1.83
21 Dover	2	Extended Detention pond behind 64 Kingswood Rd	EDMP/GS		71.2	7.6	6486	649	54.05	32.43
22 Dover	2	Extended Detention pond north of recreational pool	EDMP/GS		17.4	13.0	2126	213	17.72	10.63
23 Dover			GS		8.3	7.0	729	729	6.08	6.08
24 Dover			GS	3386-9010	89.1	13.1	8759	8759	82.11	82.11
25 Dover			GS		56.4	14.9	7632	7632	63.60	63.60
26 Dover			GS		82.0	3.7	6136	6136	51.13	51.13
27 Dover			GS		123.9	1.4	8444	8444	70.37	70.37
28 Dover			GS		33.0	3.6	2451	2451	20.42	20.42
29 Dover			CB/GS/URB	3623-INDS	4.8	44.7	147	147	7.34	7.34
30 Dover			GS		233.3	0.3	15509	15509	129.25	129.25
31 Dover			GS		25.4	5.2	2042	2042	17.02	17.02
32 Dover			GS		1.7	55.9	944	944	7.86	7.86
33 Dover	3	Infiltration basin at corner of Handle Rd and Carinthia Rd	URB/SF/WP/GS/CB / GS	1- 0499, 5679-INDS.2	79.7	10.3	8411	6729	70.09	56.07
34 Dover			GS	5679-INDS.2	32.1	14.2	4182	4182	34.85	34.85
35 Dover			GS/WP		3.5	46.4	114	114	5.68	5.68
36 Dover			OF	1-0493	199.4	0.2	13241	13241	110.35	110.35
37 Dover	2	Extended Detention Micropool Pond on east side	EDMP/OF/GS	1-0821	2.9	40.6	982	196	8.64	5.18
38 Dover	1	Modify existing pond to 2002 standards	MOD/GS/WP(2)	7144-INDS	33.2	32.8	4910	2946	54.55	43.64
39 Dover			GS/CB/WP	WQRP	6.7	0.7	89	89	2.21	2.21
40 Dover	1	WQRP: Remove Deer Lake dam, restore floodplain and install 3 stormwater ponds	WP/GS/CB	WQRP	106.8	7.4	9629	1926	80.24	48.15
41 Dover	1	WQRP: install wet pond	WP/GS/CB	1-1282	1.1	61.9	733	147	6.11	3.66
42 Dover	1	Upgrade south detention pond to 2002 standards	MOD/SB(2)/CB/ GS	4437-9010	21.0	56.8	6593	3956	73.26	58.61
43 Dover	2	Install interceptor line and infiltration basin out of stream and on west side of Mt Snow Rd.	IB/SD/CR/CB		28.4	22.5	5514	551	45.95	4.60
44 Dover			GS/CB		12.3	47.2	5593	5593	46.61	46.61
45 Dover			GS/CB		135.0	5.3	10903	10903	90.86	90.86

Dover - Subwatershed Prioritization and Recommendations									
Watershed Number	Water Quality Volume (Acre-Feet)	Channel Protection (Acre-Feet)	Estimated Basin Construction Cost	Estimated Other BMP Construction Cost	Cost of Sediment Removal Per Pound (based on annual sediment load)	Cost of Nitrogen or Phosphorus Removal Per Pound (based on annual nutrient load)	Assistance Program	# LID-Roof Raingardens to Treat Water Quality Volume	Raingarden Cost
1 Dover	0.05	FALSE					CWIP,SRF,LISF	27	$12,294
2 Dover	0.06	FALSE					CWIP,SRF,LISF	30	$13,638
3 Dover	0.03	FALSE					CWIP,SRF,LISF	17	$7,850
4 Dover	0.52	0.82					CWIP,SRF,LISF	262	$120,618
5 Dover	0.08	0.17					CWIP,SRF,LISF	42	$19,490
6 Dover	0.18	0.35					CWIP,SRF,LISF	91	$42,078
7 Dover	0.14	0.28					CWIP,SRF,LISF	71	$32,850
8 Dover	0.06	0.12					CWIP,SRF,LISF	28	$13,043
9 Dover	0.05	0.10					CWIP,SRF,LISF	24	$10,887
10 Dover	0.47	0.79					CWIP,SRF,LISF	235	$107,964
11 Dover	0.08	0.16					CWIP,SRF,LISF	39	$17,785
12 Dover	0.10	0.18	$31,671		$22	$5,176	CWIP,SRF,LISF	52	$23,889
13 Dover	0.05	0.06					CWIP,SRF,LISF	26	$11,829
14 Dover	0.13	0.14					CWIP,SRF,LISF	66	$30,352
15 Dover	0.10	0.23	$92,216		$58	$6,901	CWIP,SRF,LISF	50	$23,186
16 Dover	0.05	0.09					CWIP,SRF,LISF	27	$12,621
17 Dover	0.08	0.10					CWIP,SRF,LISF	39	$17,902
18 Dover	0.04	0.08					CWIP,SRF,LISF	21	$9,591
19 Dover	0.30	0.25					CWIP,SRF,LISF	152	$69,881
20 Dover	0.02	0.07					CWIP,SRF,LISF	10	$4,752
21 Dover	0.37	0.59	$111,897		$19	$5,176	CWIP,SRF,LISF	183	$84,402
22 Dover	0.12	0.25	$36,684		$19	$5,176	CWIP,SRF,LISF	60	$27,670
23 Dover	0.04	0.06					CWIP,SRF,LISF	21	$9,493
24 Dover	0.62	1.28					CWIP,SRF,LISF	310	$142,468
25 Dover	0.43	0.93					CWIP,SRF,LISF	216	$99,321
26 Dover	0.35	0.33					CWIP,SRF,LISF	174	$79,846
27 Dover	0.48	0.18					CWIP,SRF,LISF	239	$109,883
28 Dover	0.14	0.13					CWIP,SRF,LISF	69	$31,890
29 Dover	0.08	0.24					CWIP,SRF,LISF	42	$19,112
30 Dover	0.88	0.08					CWIP,SRF,LISF	439	$201,822
31 Dover	0.12	0.15					CWIP,SRF,LISF	58	$26,574
32 Dover	0.05	0.10					CWIP,SRF,LISF	27	$12,281
33 Dover	0.48	0.90		$25,000	$15	$1,783	CWIP,SRF,LISF	238	$109,448
34 Dover	0.24	0.50					CWIP,SRF,LISF	118	$54,419
35 Dover	0.06	0.18					CWIP,SRF,LISF	32	$14,777
36 Dover	0.75	0.05					CWIP,SRF,LISF	375	$172,309
37 Dover	0.06	FALSE	$18,821		$24	$5,448	CWIP,SRF,LISF	31	$14,196
38 Dover	0.46	1.20		$20,000	$10	$815	CWIP,SRF,LISF	231	$106,479
39 Dover	0.03	FALSE					CWIP,SRF,LISF	13	$5,762
40 Dover	0.54	FALSE	$166,121		$22	$5,176	CWIP,SRF,LISF	272	$125,303
41 Dover	0.04	FALSE	$12,643		$22	$5,176	CWIP,SRF,LISF	21	$9,536
42 Dover	0.62	FALSE		$50,000	$19	$1,517	CWIP,SRF,LISF	311	$142,991
43 Dover	0.31	0.70	$285,404		$58	$6,901	CWIP,SRF,LISF	156	$71,759
44 Dover	0.32	0.64					CWIP,SRF,LISF	158	$72,777
45 Dover	0.62	0.78					CWIP,SRF,LISF	308	$141,883

Dover - 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.)	Nitrogen Load with Current Reductions (lbs.)	Nitrogen Load with Priority Action (lbs.)
46 Dover		Install infiltration basin at north end of maintenance facility and swirl separator at south end	IB/VS/GS/CB	5228-INDS	8.4	58.3	5808	2904	48.40	24.20
47 Dover			GS/SF/URB		189.6	1.9	2530	2530	63.26	63.26
48 Dover			GS		38.8	9.6	3941	3941	32.84	32.84
49 Dover			GS		7.0	34.7	2190	2190	18.25	18.25
50 Dover			GS		5.6	19.4	935	935	7.79	7.79
51 Dover			GS		30.3	17.0	4534	4534	37.78	37.78
52 Dover	2	Infiltration basin at bottom of Mountain View Loop	IB/GS/CB		29.8	22.0	5646	565	47.05	4.70
53 Dover			GS		86.5	3.9	6540	6540	54.50	54.50
54 Dover			GS	4307-INDS	21.9	5.6	1792	1792	14.93	14.93
55 Dover			CB/GS/WP(2)	1-0646	27.8	18.7	599	599	14.97	14.97
56 Dover			GS/WP(2)		41.1	21.3	1978	1978	28.85	28.85
57 Dover	2	Install swirl separator for 7 Snow Lake Rd.	VS/DW/CB/GS	1-0646	9.2	27.7	2967	1780	24.72	22.25
58 Dover	1	Fix eroded swale below inn parking lot.	ER/GS/CB/WP/G S	1-0646	31.2	34.4	2590	2331	37.77	30.22
59 Dover			GS	1-0646	27.1	26.2	6137	6137	51.14	51.14
60 Dover			GS/WP		18.2	19.2	804	804	11.72	11.72
61 Dover	1	Add infiltration basins between White Oaks Loop and Tanglewood Lane and near intersection of Tanglewood Lane and Silver Birch Lane	IB(2)/GS		84.3	21.0	15301	1530	127.51	12.75
62 Dover			GS/CB		18.7	23.0	3696	3696	30.80	30.80
63 Dover	1	Upgrade lower pond to infiltration basin	IB/GS/WP	4141-INDS	13.2	46.5	4324	2594	36.03	21.62
64 Dover			VS/SF/WP/GS	4141-INDS	19.7	21.9	487	487	12.18	12.18
65 Dover			GS/WP	4141-INDS	40.1	4.6	553	553	13.81	13.81
66 Dover			GS		7.7	5.6	378	378	4.20	4.20
67 Dover			GS		2.2	5.0	176	176	1.47	1.47
68 Dover			GS		3.2	6.7	276	276	2.30	2.30
69 Dover			GS		66.3	18.4	10630	10630	88.58	88.58
70 Dover			GS		5.8	11.0	634	634	5.28	5.28
71 Dover			GS	2-0160	8.2	16.5	1193	1193	9.94	9.94
72 Dover			DW/GS	4437-INDS	13.5	22.5	1825	1825	18.47	18.47
73 Dover			CB/SF/URB		12.3	17.9	257	257	6.42	6.42
74 Dover			GS/CB		39.6	14.6	5266	5266	43.88	43.88
75 Dover			GS		17.9	4.8	1414	1414	11.79	11.79
76 Dover			GS	2-0160	13.6	22.2	2595	2595	21.62	21.62
77 Dover			CB/GS		2.8	55.7	1097	1097	11.11	11.11
78 Dover			CB/GS		1.9	26.9	591	591	4.92	4.92
79 Dover			GS		33.5	15.0	4541	4541	37.84	37.84
80 Dover	2	Infiltration basin on west side of shopping center	IB/GS		23.7	28.8	5940	594	49.50	4.95
81 Dover			GS		10.3	37.4	3490	3490	29.08	29.08
82 Dover			GS		77.9	15.1	10634	10634	88.61	88.61
83 Dover			GS		35.3	14.6	4675	4675	38.96	38.96
84 Dover			GS	6754-9015, 6754-9015.1	6.1	14.7	816	816	6.80	6.80
85 Dover			GS/CB/SB/GS/O F/ WP	6754-9015.1	173.0	1.0	2298	2298	57.45	57.45
86 Dover			GS/CB	5629-9010	50.1	7.1	4449	4449	37.08	37.08
87 Dover			GS	5967-9010	41.7	12.8	5048	5048	42.07	42.07
88 Dover	2	Infiltration basin in front of Mt Park Plaza	IB/GS/WP/CB		83.4	16.0	11878	1188	98.99	9.90
89 Dover			GS/CB/WP		52.6	9.7	3746	3746	31.22	31.22
90 Dover			OF	5826-9010	33.2	0.1	2202	2202	18.35	18.35
91 Dover			GS		48.9	19.0	8068	8068	67.24	67.24
92 Dover			CB/WP		78.1	4.9	6188	6188	51.57	51.57
93 Dover			GS/WP		36.7	3.7	1642	1642	13.68	13.68
94 Dover			CB/GS/WP(2)		78.5	11.0	6905	6905	64.73	64.73
95 Dover			CB/GS		24.9	12.0	2885	2885	24.04	24.04
96 Dover			GS	3460-9010	12.7	14.8	1705	1705	14.21	14.21

Dover - Subwatershed Prioritization and Recommendations									
Watershed Number	Water Quality Volume (Acre-Feet)	Channel Protection (Acre-Feet)	Estimated Basin Construction Cost	Estimated Other BMP Construction Cost	Cost of Sediment Removal Per Pound (based on annual sediment load)	Cost of Nitrogen or Phosphorus Removal Per Pound (based on annual nutrient load)	Assistance Program	# LID-Roof Raingardens to Treat Water Quality Volume	Raingarden Cost
46 Dover	0.33	0.54	$157,000		$54	$6,488	CWIP,SRF,LISF	164	$75,575
47 Dover	0.72	0.40					CWIP,SRF,LISF	358	$164,632
48 Dover	0.22	FALSE					CWIP,SRF,LISF	111	$51,284
49 Dover	0.12	FALSE					CWIP,SRF,LISF	62	$28,496
50 Dover	0.05	FALSE					CWIP,SRF,LISF	26	$12,167
51 Dover	0.26	FALSE					CWIP,SRF,LISF	128	$59,002
52 Dover	0.32	FALSE	$84,000		$17	$1,984	CWIP,SRF,LISF	160	$73,469
53 Dover	0.37	0.37					CWIP,SRF,LISF	185	$85,098
54 Dover	0.10	FALSE					CWIP,SRF,LISF	51	$23,320
55 Dover	0.17	FALSE					CWIP,SRF,LISF	85	$38,956
56 Dover	0.28	FALSE					CWIP,SRF,LISF	140	$64,355
57 Dover	0.17	FALSE		$10,000	$8	$4,045	CWIP,SRF,LISF	84	$38,605
58 Dover	0.37	FALSE		$10,000	$39	$421	CWIP,SRF,LISF	183	$84,260
59 Dover	0.35	FALSE					CWIP,SRF,LISF	174	$79,856
60 Dover	0.11	FALSE					CWIP,SRF,LISF	57	$26,143
61 Dover	0.87	1.95	$210,000		$15	$1,830	CWIP,SRF,LISF	433	$199,109
62 Dover	0.21	FALSE					CWIP,SRF,LISF	105	$48,094
63 Dover	0.41	0.68		$25,000	$14	$650	CWIP,SRF,LISF	204	$93,773
64 Dover	0.14	FALSE					CWIP,SRF,LISF	69	$31,704
65 Dover	0.16	FALSE					CWIP,SRF,LISF	78	$35,950
66 Dover	0.04	FALSE					CWIP,SRF,LISF	18	$8,198
67 Dover	0.01	0.01					CWIP,SRF,LISF	5	$2,291
68 Dover	0.02	0.02					CWIP,SRF,LISF	8	$3,594
69 Dover	0.60	1.34					CWIP,SRF,LISF	301	$138,326
70 Dover	0.04	0.07					CWIP,SRF,LISF	18	$8,253
71 Dover	0.07	0.15					CWIP,SRF,LISF	34	$15,525
72 Dover	0.15	FALSE					CWIP,SRF,LISF	74	$33,934
73 Dover	0.07	FALSE					CWIP,SRF,LISF	36	$16,697
74 Dover	0.30	0.64					CWIP,SRF,LISF	149	$68,524
75 Dover	0.08	0.10					CWIP,SRF,LISF	40	$18,405
76 Dover	0.15	0.33					CWIP,SRF,LISF	73	$33,766
77 Dover	0.09	0.17					CWIP,SRF,LISF	44	$20,402
78 Dover	0.03	0.06					CWIP,SRF,LISF	17	$7,688
79 Dover	0.26	FALSE					CWIP,SRF,LISF	128	$59,087
80 Dover	0.34	FALSE	$307,409		$58	$6,901	CWIP,SRF,LISF	168	$77,292
81 Dover	0.20	FALSE					CWIP,SRF,LISF	99	$45,414
82 Dover	0.60	FALSE					CWIP,SRF,LISF	301	$138,375
83 Dover	0.26	FALSE					CWIP,SRF,LISF	132	$60,839
84 Dover	0.05	0.10					CWIP,SRF,LISF	23	$10,620
85 Dover	0.65	0.20					CWIP,SRF,LISF	325	$149,516
86 Dover	0.25	0.39					CWIP,SRF,LISF	126	$57,900
87 Dover	0.29	0.59					CWIP,SRF,LISF	143	$65,690
88 Dover	0.67	FALSE	$614,772		$58	$6,901	CWIP,SRF,LISF	336	$154,571
89 Dover	0.26	FALSE					CWIP,SRF,LISF	132	$60,940
90 Dover	0.12	FALSE					CWIP,SRF,LISF	62	$28,658
91 Dover	0.46	FALSE					CWIP,SRF,LISF	228	$104,991
92 Dover	0.35	FALSE					CWIP,SRF,LISF	175	$80,526
93 Dover	0.15	0.15					CWIP,SRF,LISF	77	$35,616
94 Dover	0.49	0.95					CWIP,SRF,LISF	244	$112,312
95 Dover	0.16	0.33					CWIP,SRF,LISF	82	$37,546
96 Dover	0.10	0.21					CWIP,SRF,LISF	48	$22,188

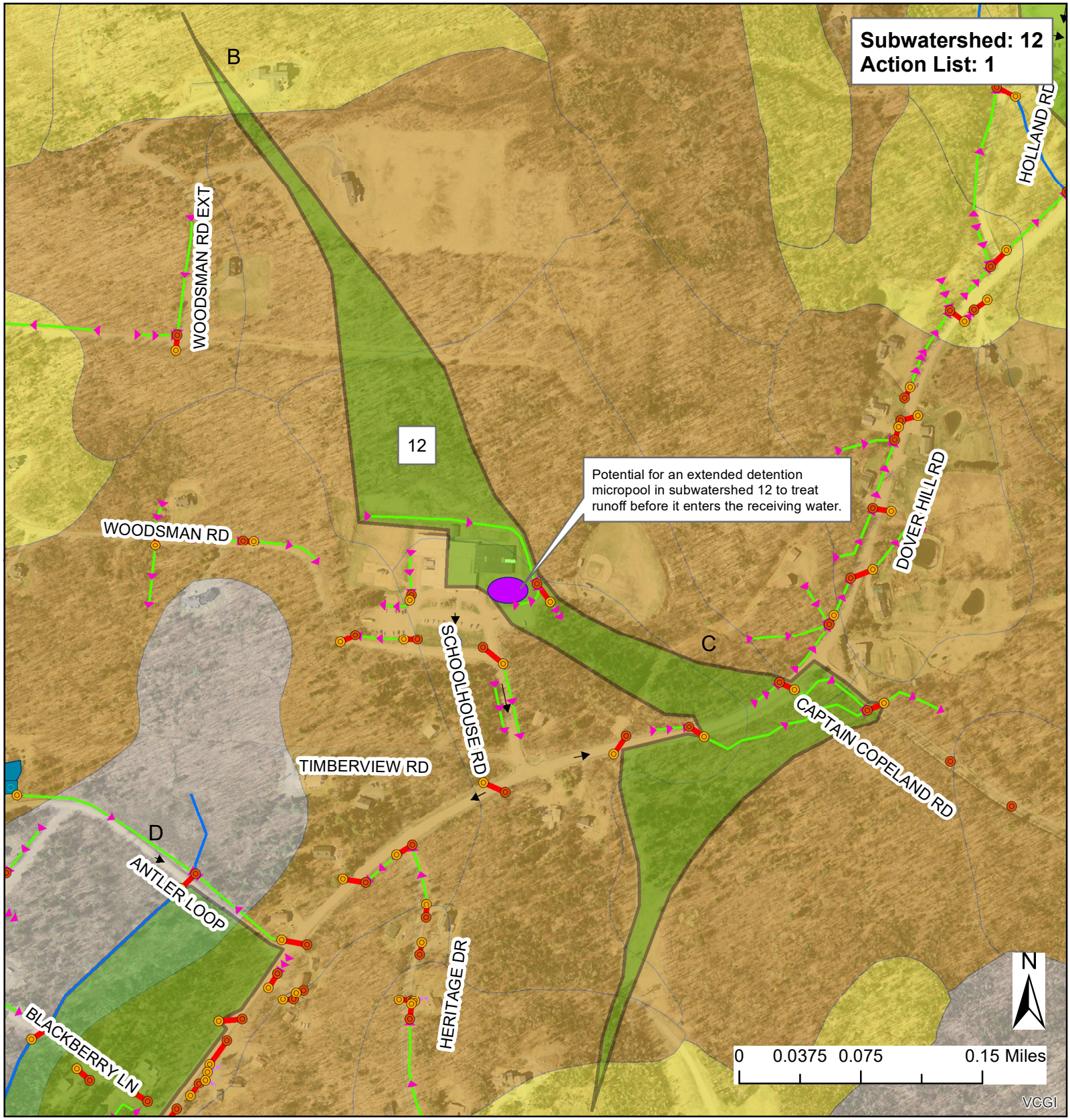
Dover - Subwatershed Prioritization and Recommendations										
Watershed Number	Action List #	Proposed Action	Proposed or Existing Stormwater Treatment Practice	Permit Number	Watershed Area (Acres)	Percent Mapped Impervious Area (MIA)	Sediment Load with Current Reductions (lbs.)	Sediment Load with Priority Action (lbs.)	Nitrogen Load with Current Reductions (lbs.)	Nitrogen Load with Priority Action (lbs.)
97 Dover			GS		23.8	12.7	1951	1951	18.29	18.29
98 Dover			GS/WP		25.3	9.3	1519	1519	16.87	16.87
99 Dover			GS	5318-9010	36.1	8.6	3483	3483	29.03	29.03
100 Dover			GS/CB/WP	5318-9010	20.9	37.8	990	990	24.76	24.76
101 Dover			GS/CB/WP		6.5	31.8	245	245	6.12	6.12
102 Dover			GS		5.2	11.6	595	595	4.96	4.96
103 Dover			CB/GS		2.8	47.4	1270	1270	10.58	10.58
104 Dover			GS/WP		175.8	4.7	7683	7683	85.37	85.37
105 Dover			GS/WP		84.8	3.0	3531	3531	39.24	39.24
106 Dover			GS		194.6	8.2	18349	18349	152.91	152.91
107 Dover			GS		34.1	7.0	3014	3014	25.12	25.12
108 Dover			GS		34.6	3.0	2508	2508	20.90	20.90
109 Dover			GS		87.3	6.7	7579	7579	63.16	63.16
110 Dover			GS		22.4	14.6	2975	2975	24.79	24.79
111 Dover			GS		69.6	7.3	6260	6260	52.17	52.17
112 Dover			GS		32.1	7.9	2975	2975	24.79	24.79
113 Dover			GS		29.5	7.3	2657	2657	22.14	22.14
114 Dover			GS		7.0	10.8	763	763	6.36	6.36
115 Dover			GS		5.3	8.9	523	523	4.36	4.36
116 Dover			CB/GS		7.1	18.9	1161	1161	9.67	9.67
117 Dover			GS	3619-9010	5.6	6.8	486	486	4.05	4.05
118 Dover	2	Infiltration basin on south side of Valley Center	IB/GS	5574-9010	14.2	33.8	2905	872	27.24	5.45
119 Dover			CB/GS	3388-9010	41.2	5.7	3109	3109	25.91	25.91
120 Dover			GS		45.0	7.9	3714	3714	30.95	30.95
121 Dover			CB		57.5	7.9	7096	7096	59.14	59.14
122 Dover			GS		46.7	7.4	4210	4210	35.08	35.08
123 Dover	1	Small infiltration basin for Rte 100 basin and outfall	IB/CB		35.9	7.8	4408	2645	36.73	22.04
124 Dover			CB		7.8	22.2	1490	1490	12.42	12.42
125 Dover			GS/CB		27.4	9.4	2759	2759	22.99	22.99
126 Dover			GS/CB		3.1	56.8	2080	2080	17.33	17.33
127 Dover			GS/CB		7.2	20.8	1285	1285	10.71	10.71
128 Dover			GS		120.8	2.5	8581	8581	71.51	71.51
129 Dover			GS		22.2	5.1	1775	1775	14.79	14.79
130 Dover			GS		19.7	7.7	1811	1811	15.09	15.09
131 Dover			GS		11.4	5.5	929	929	7.74	7.74
132 Dover			GS		27.0	7.3	2426	2426	20.22	20.22
133 Dover			GS		47.2	7.0	4175	4175	34.79	34.79
134 Dover			GS		30.6	7.9	2841	2841	23.67	23.67
135 Dover			GS		152.6	0.5	10169	10169	84.74	84.74
136 Dover			WP/GS		60.5	6.5	5197	5197	43.31	43.31
137 Dover			WP/GS		109.2	2.4	7728	7728	64.40	64.40
138 Dover			GS		49.3	5.2	3968	3968	33.07	33.07
139 Dover			GS		51.1	6.7	4436	4436	36.97	36.97
140 Dover			GS		47.4	4.6	3704	3704	30.87	30.87
141 Dover			GS		118.7	3.2	8694	8694	72.45	72.45
142 Dover			GS		41.5	7.1	3698	3698	30.82	30.82
143 Dover			GS		56.9	5.2	4571	4571	38.09	38.09
144 Dover			GS		62.8	6.6	5432	5432	45.26	45.26
145 Dover			GS		24.2	13.7	3063	3063	25.52	25.52
146 Dover	3	Fix erosion on tributary below Dover Hill Rd	GS	5164-9015	50.3	4.6	3935	3935	32.79	32.79
147 Dover			GS/GC		18.6	2.3	249	249	6.21	6.21
148 Dover			GS		3.3	19.0	548	548	4.56	4.56
149 Dover			GS		43.7	10.6	4707	4707	39.23	39.23
150 Dover			GS		14.1	7.8	1301	1301	10.84	10.84
151 Dover			GS		13.4	22.9	3638	3638	30.32	30.32
152 Dover			GS		20.8	7.5	1886	1886	15.72	15.72
153 Dover			GS		31.4	4.2	2407	2407	20.06	20.06
154 Dover			GS		18.0	10.9	1973	1973	16.44	16.44
155 Dover			OF		18.4	0.7	1230	1230	10.25	10.25
156 Dover			GS		11.9	2.1	829	829	6.91	6.91
157 Dover			CB/GS		11.4	6.1	963	963	8.03	8.03
158 Dover			GS		7.3	8.7	708	708	5.90	5.90
159 Dover			GS		6.7	14.7	899	899	7.49	7.49
160 Dover			CB		3.2	11.3	361	361	3.01	3.01
161 Dover			GS		5.0	4.1	382	382	3.18	3.18
162 Dover			GS		39.9	0.6	2671	2671	22.26	22.26

Dover - Subwatershed Prioritization and Recommendations									
Watershed Number	Water Quality Volume (Acre-Feet)	Channel Protection (Acre-Feet)	Estimated Basin Construction Cost	Estimated Other BMP Construction Cost	Cost of Sediment Removal Per Pound (based on annual sediment load)	Cost of Nitrogen or Phosphorus Removal Per Pound (based on annual nutrient load)	Assistance Program	# LID-Roof Raingardens to Treat Water Quality Volume	Raingarden Cost
97 Dover	0.14	0.33					CWIP,SRF,LISF	69	$31,739
98 Dover	0.14	0.26					CWIP,SRF,LISF	72	$32,935
99 Dover	0.20	0.34					CWIP,SRF,LISF	99	$45,330
100 Dover	0.28	0.87					CWIP,SRF,LISF	140	$64,435
101 Dover	0.07	0.23					CWIP,SRF,LISF	35	$15,919
102 Dover	0.03	0.07					CWIP,SRF,LISF	17	$7,740
103 Dover	0.07	0.15					CWIP,SRF,LISF	36	$16,520
104 Dover	0.72	0.90					CWIP,SRF,LISF	362	$166,630
105 Dover	0.33	0.28					CWIP,SRF,LISF	166	$76,587
106 Dover	1.04	FALSE					CWIP,SRF,LISF	519	$238,775
107 Dover	0.17	0.26					CWIP,SRF,LISF	85	$39,227
108 Dover	0.14	0.11					CWIP,SRF,LISF	71	$32,638
109 Dover	0.43	0.64					CWIP,SRF,LISF	214	$98,620
110 Dover	0.17	0.36					CWIP,SRF,LISF	84	$38,712
111 Dover	0.35	0.56					CWIP,SRF,LISF	177	$81,465
112 Dover	0.17	0.28					CWIP,SRF,LISF	84	$38,717
113 Dover	0.15	0.24					CWIP,SRF,LISF	75	$34,575
114 Dover	0.04	0.08					CWIP,SRF,LISF	22	$9,933
115 Dover	0.03	FALSE					CWIP,SRF,LISF	15	$6,812
116 Dover	0.07	FALSE					CWIP,SRF,LISF	33	$15,103
117 Dover	0.03	FALSE					CWIP,SRF,LISF	14	$6,323
118 Dover	0.21	FALSE	$110,880		$55	$5,089	CWIP,SRF,LISF	103	$47,255
119 Dover	0.18	FALSE					CWIP,SRF,LISF	88	$40,460
120 Dover	0.21	0.39					CWIP,SRF,LISF	105	$48,325
121 Dover	0.40	FALSE					CWIP,SRF,LISF	201	$92,344
122 Dover	0.24	FALSE					CWIP,SRF,LISF	119	$54,780
123 Dover	0.25	FALSE	$114,051		$65	$7,763	CWIP,SRF,LISF	125	$57,355
124 Dover	0.08	FALSE					CWIP,SRF,LISF	42	$19,389
125 Dover	0.16	FALSE					CWIP,SRF,LISF	78	$35,899
126 Dover	0.12	FALSE					CWIP,SRF,LISF	59	$27,068
127 Dover	0.07	FALSE					CWIP,SRF,LISF	36	$16,727
128 Dover	0.49	0.33					CWIP,SRF,LISF	243	$111,661
129 Dover	0.10	0.12					CWIP,SRF,LISF	50	$23,093
130 Dover	0.10	0.17					CWIP,SRF,LISF	51	$23,560
131 Dover	0.05	0.07					CWIP,SRF,LISF	26	$12,085
132 Dover	0.14	0.22					CWIP,SRF,LISF	69	$31,570
133 Dover	0.24	0.36					CWIP,SRF,LISF	118	$54,333
134 Dover	0.16	0.27					CWIP,SRF,LISF	80	$36,964
135 Dover	0.58	0.08					CWIP,SRF,LISF	288	$132,332
136 Dover	0.29	0.43					CWIP,SRF,LISF	147	$67,628
137 Dover	0.44	0.29					CWIP,SRF,LISF	219	$100,560
138 Dover	0.22	0.28					CWIP,SRF,LISF	112	$51,637
139 Dover	0.25	0.37					CWIP,SRF,LISF	125	$57,723
140 Dover	0.21	0.24					CWIP,SRF,LISF	105	$48,200
141 Dover	0.49	0.42					CWIP,SRF,LISF	246	$113,133
142 Dover	0.21	0.33					CWIP,SRF,LISF	105	$48,125
143 Dover	0.26	0.32					CWIP,SRF,LISF	129	$59,476
144 Dover	0.31	0.46					CWIP,SRF,LISF	154	$70,683
145 Dover	0.17	0.36					CWIP,SRF,LISF	87	$39,856
146 Dover	0.22	0.26					CWIP,SRF,LISF	111	$51,209
147 Dover	0.07	0.05					CWIP,SRF,LISF	35	$16,175
148 Dover	0.03	0.07					CWIP,SRF,LISF	15	$7,125
149 Dover	0.27	0.51					CWIP,SRF,LISF	133	$61,254
150 Dover	0.07	0.12					CWIP,SRF,LISF	37	$16,928
151 Dover	0.21	0.34					CWIP,SRF,LISF	103	$47,344
152 Dover	0.11	0.17					CWIP,SRF,LISF	53	$24,541
153 Dover	0.14	0.15					CWIP,SRF,LISF	68	$31,320
154 Dover	0.11	0.22					CWIP,SRF,LISF	56	$25,673
155 Dover	0.07	FALSE					CWIP,SRF,LISF	35	$16,005
156 Dover	0.05	0.03					CWIP,SRF,LISF	23	$10,788
157 Dover	0.05	0.08					CWIP,SRF,LISF	27	$12,532
158 Dover	0.04	FALSE					CWIP,SRF,LISF	20	$9,218
159 Dover	0.05	FALSE					CWIP,SRF,LISF	25	$11,693
160 Dover	0.02	FALSE					CWIP,SRF,LISF	10	$4,701
161 Dover	0.02	FALSE					CWIP,SRF,LISF	11	$4,968
162 Dover	0.15	FALSE					CWIP,SRF,LISF	76	$34,759

Target Maps

Showing Priority Action List Drainage Areas

And Potential Retrofit Locations

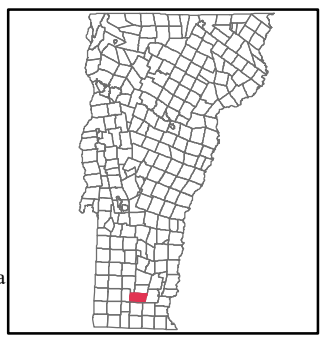


Dover, VT

DEC Stormwater Infrastructure Mapping Project

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

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



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

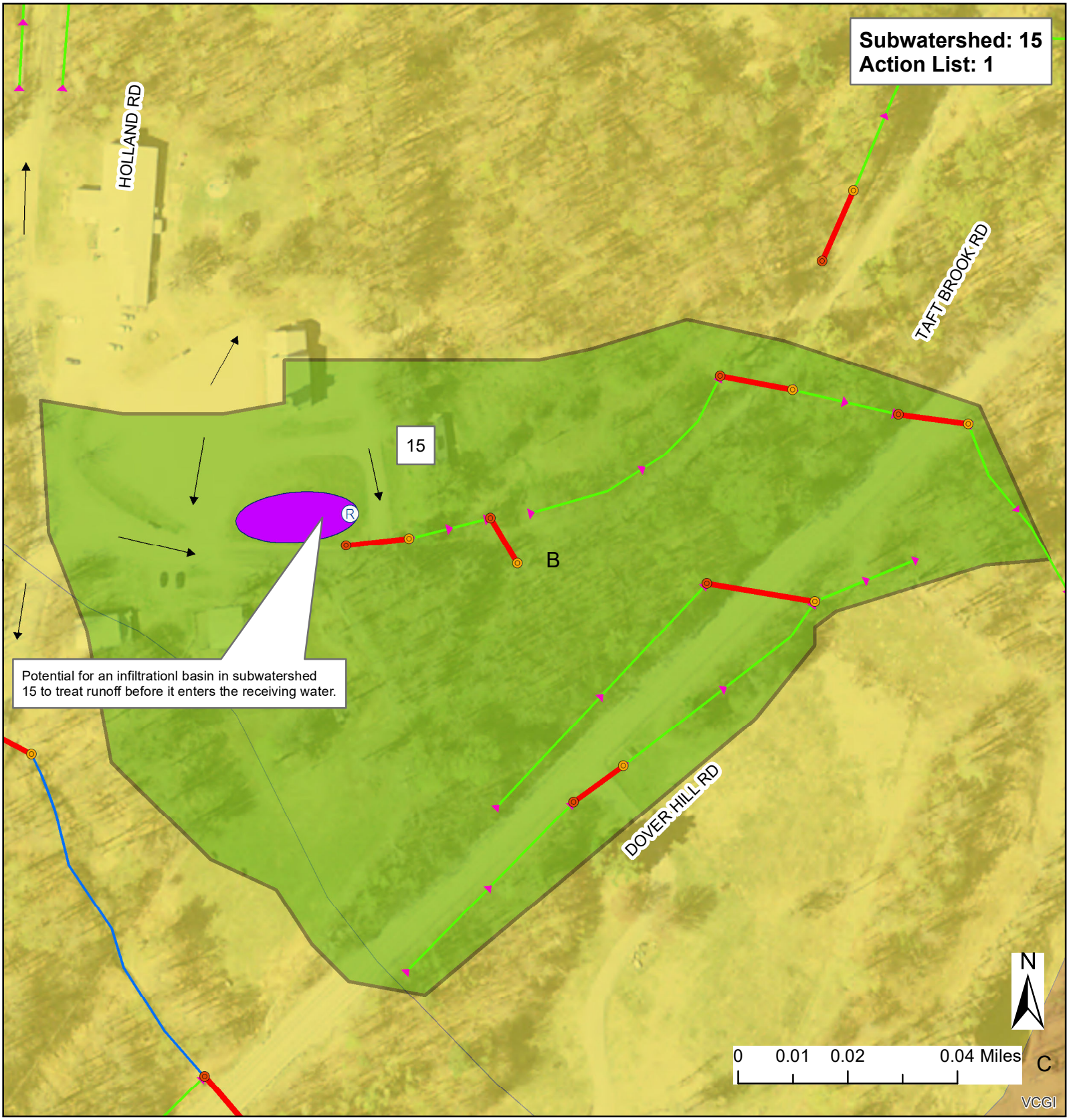
Stormwater line
- Storm line
- Storm line (old Sanitary line)
- Tunnel (storm)
- Combined sewer
- Sanitary line
- Swale
- Footing drain
- Under drain
- Roof drain
- Infiltration pipe
- French drain
- Trench drain
- Emergency spillway
- Stream
- Overland flow

NRCS - Soils
- A
- B
- C
- D

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

Creator: Jim Pease, David Ainley
DEC - WSMD - Clean Water Initiative Program
Plotted Date: 5/20/2019
Data Sources: VTRANS Roads data, VT Hydrography data set, DEC Stormwater database, NRCS soils survery
Imagery Source: VCGI Best Available

VERMONT



Dover, VT

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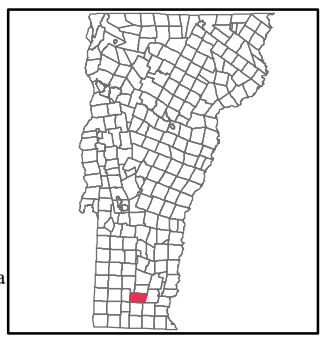

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NRCS - Soils

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SubwatershedID

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

Creator: Jim Pease, David Ainley
DEC - WSMD - Clean Water Initiative Program
Plotted Date: 5/20/2019
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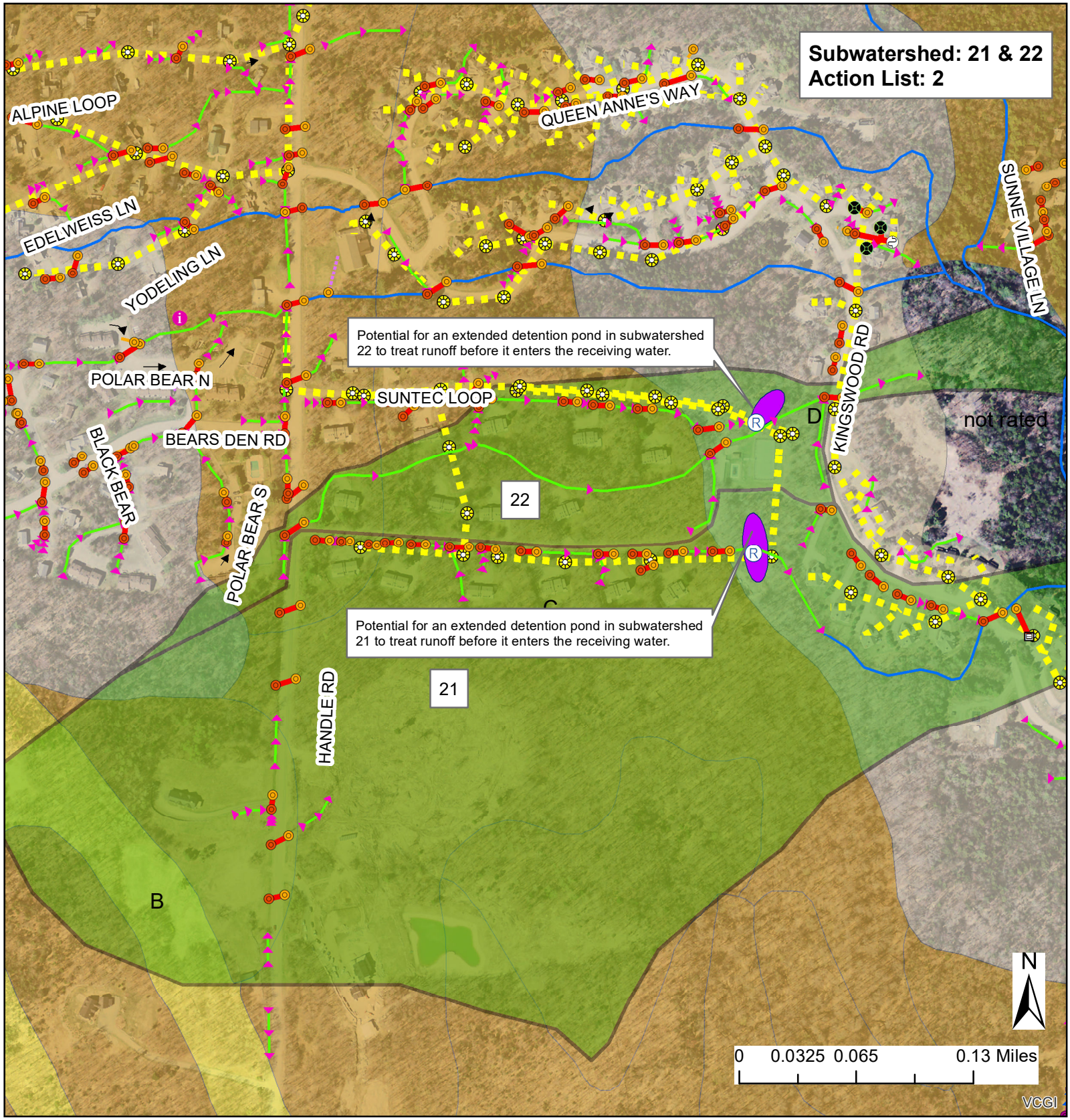

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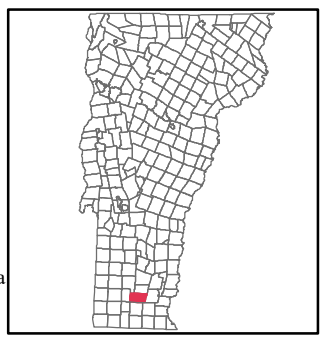

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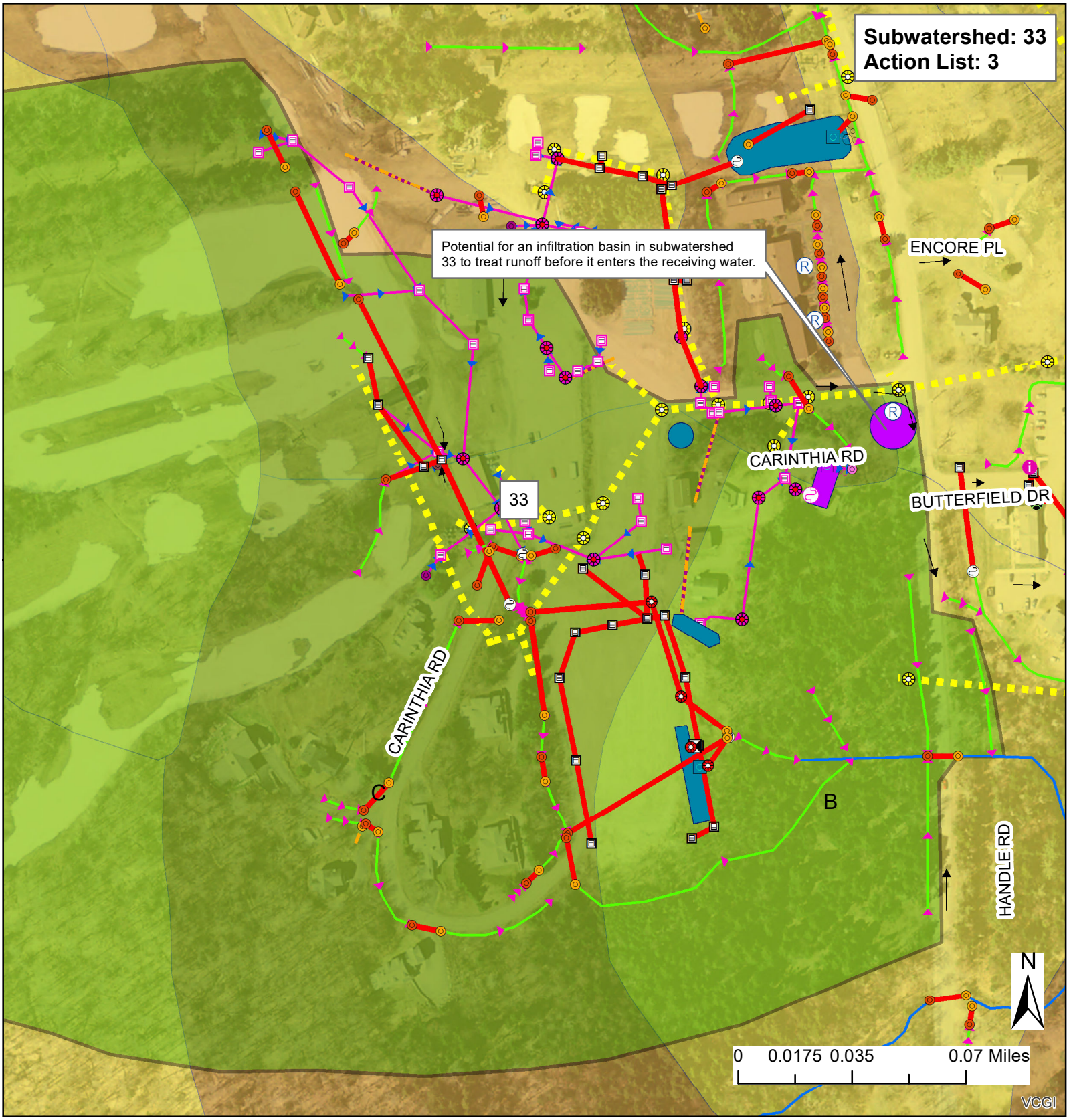

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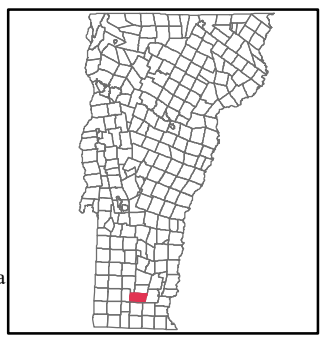

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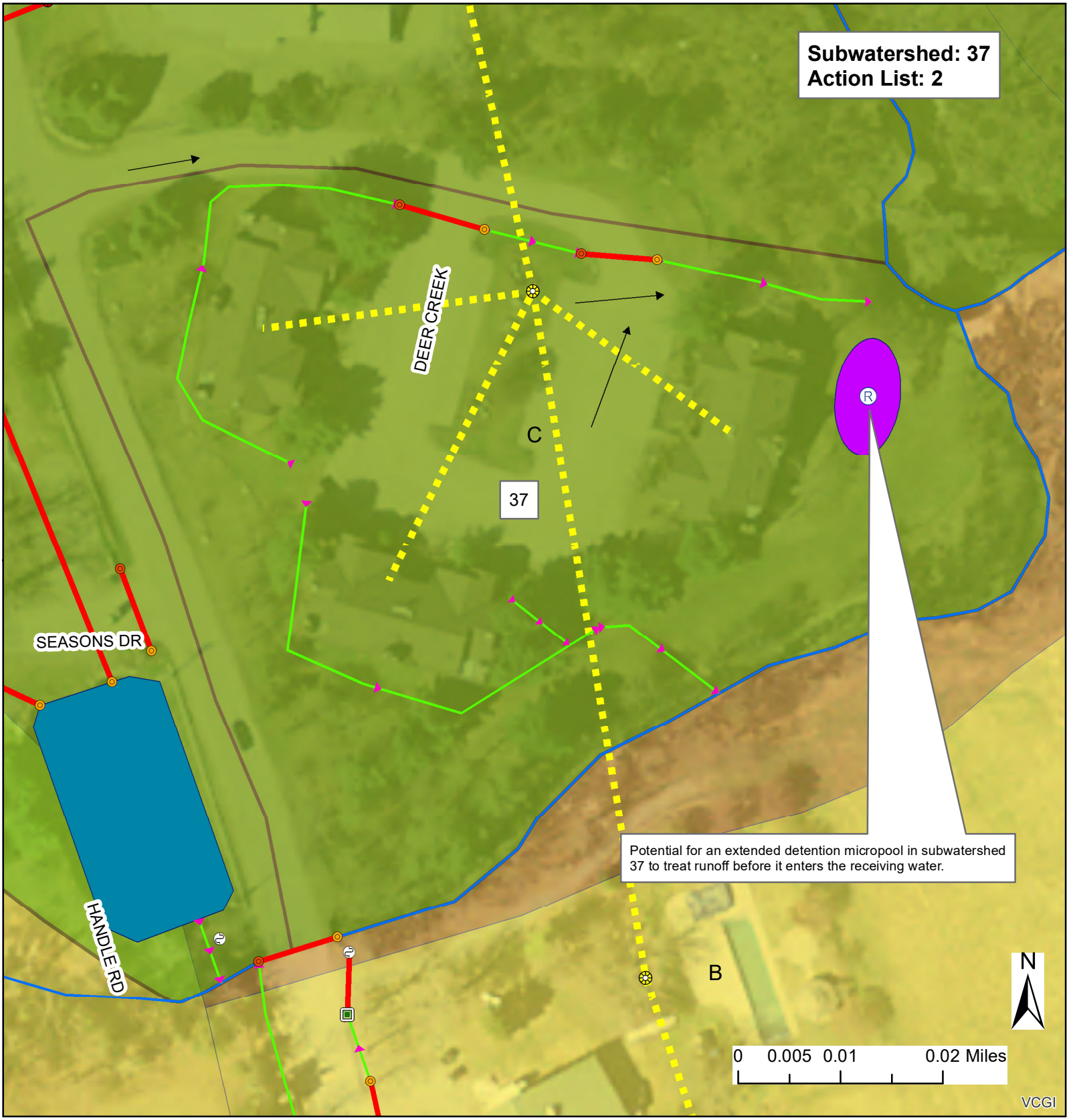

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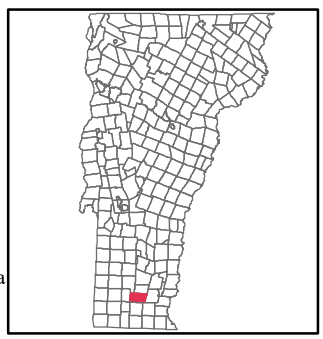

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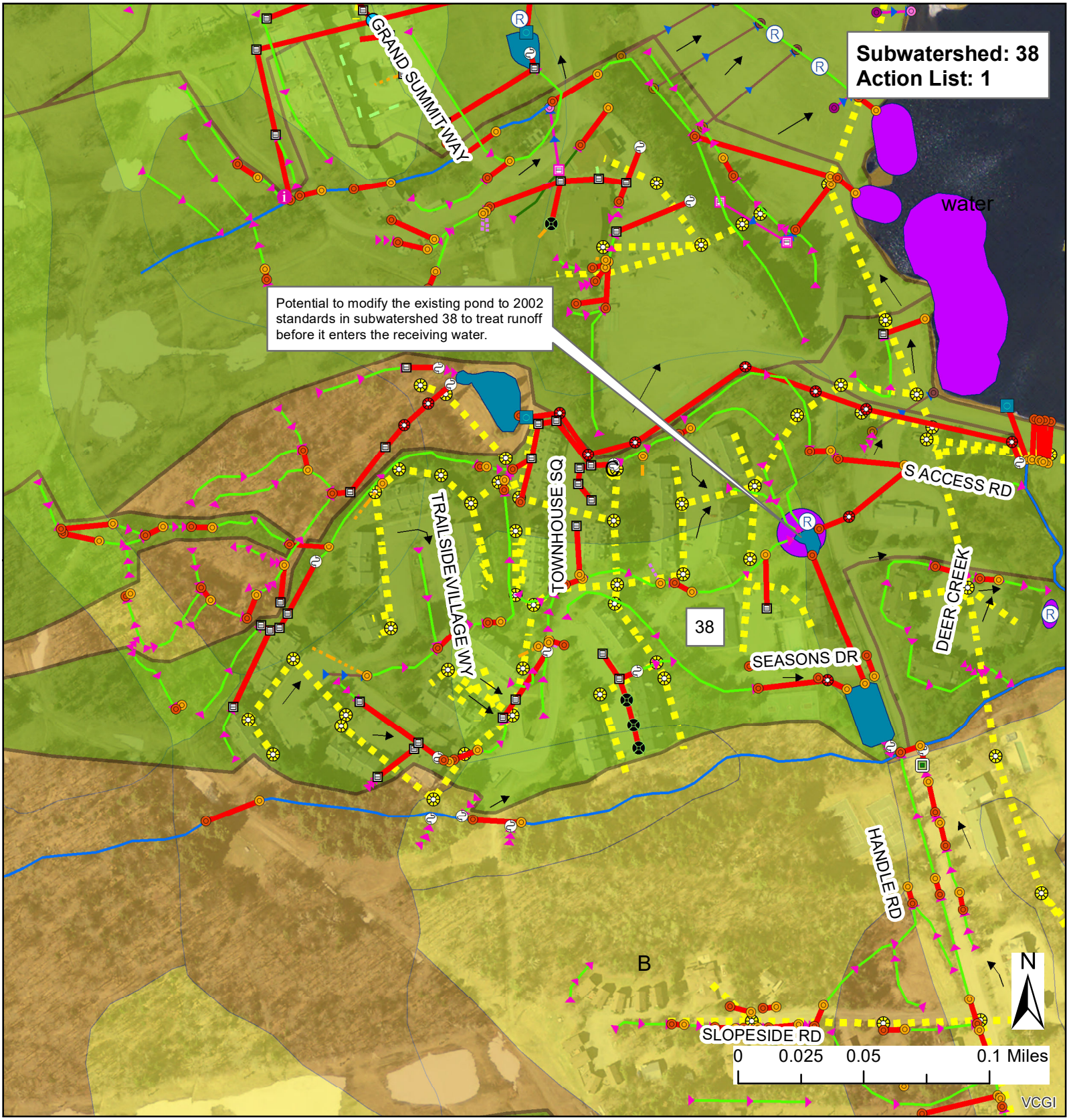

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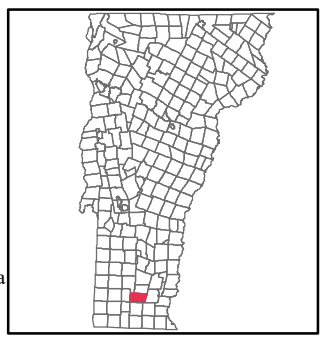

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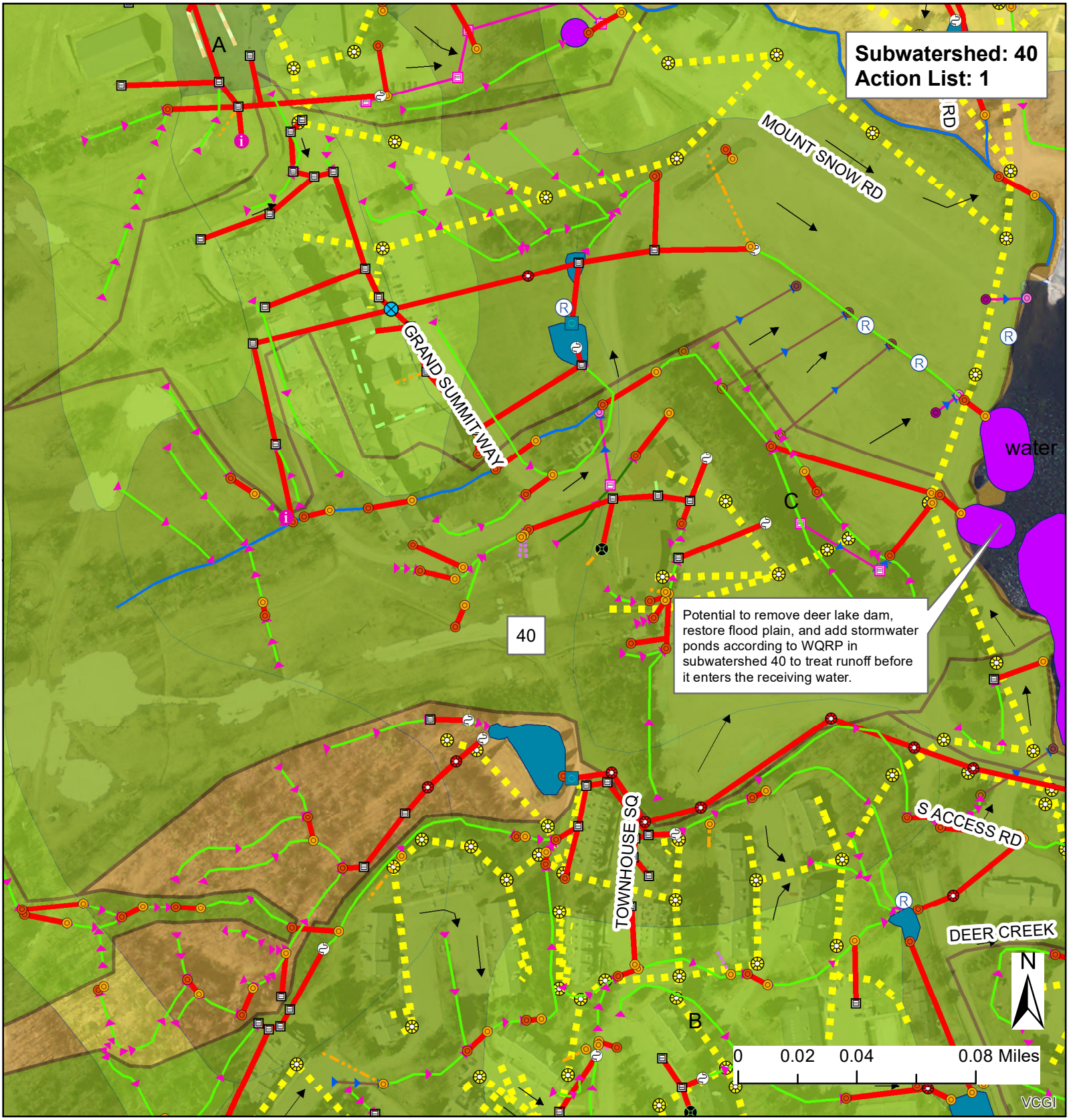

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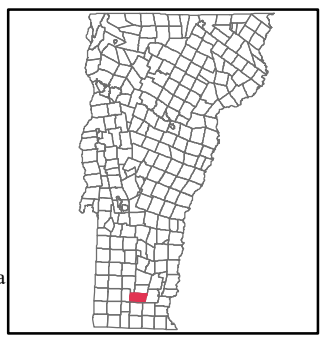

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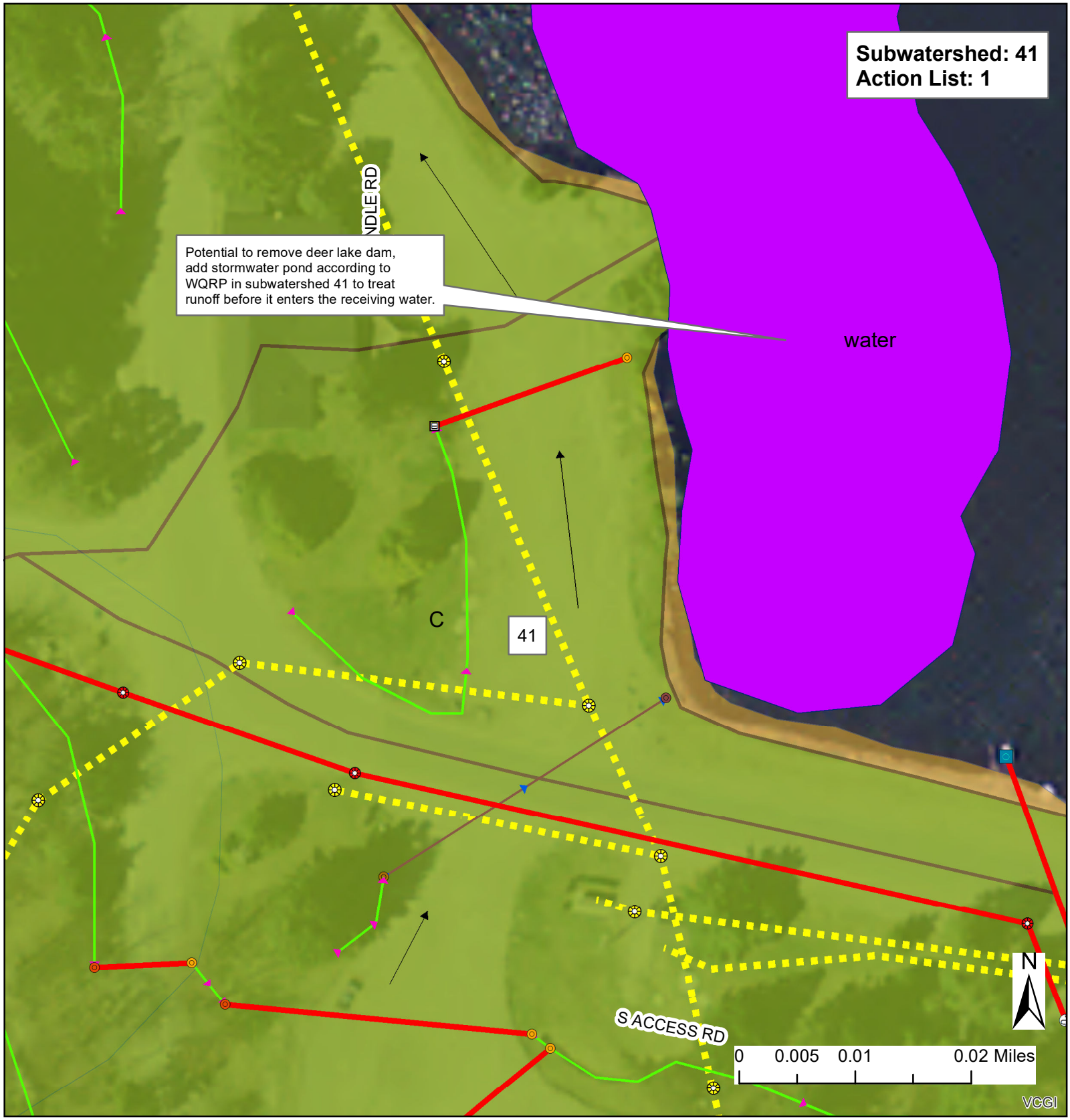

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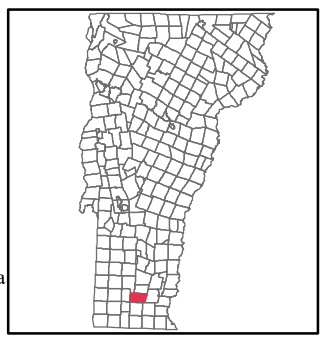

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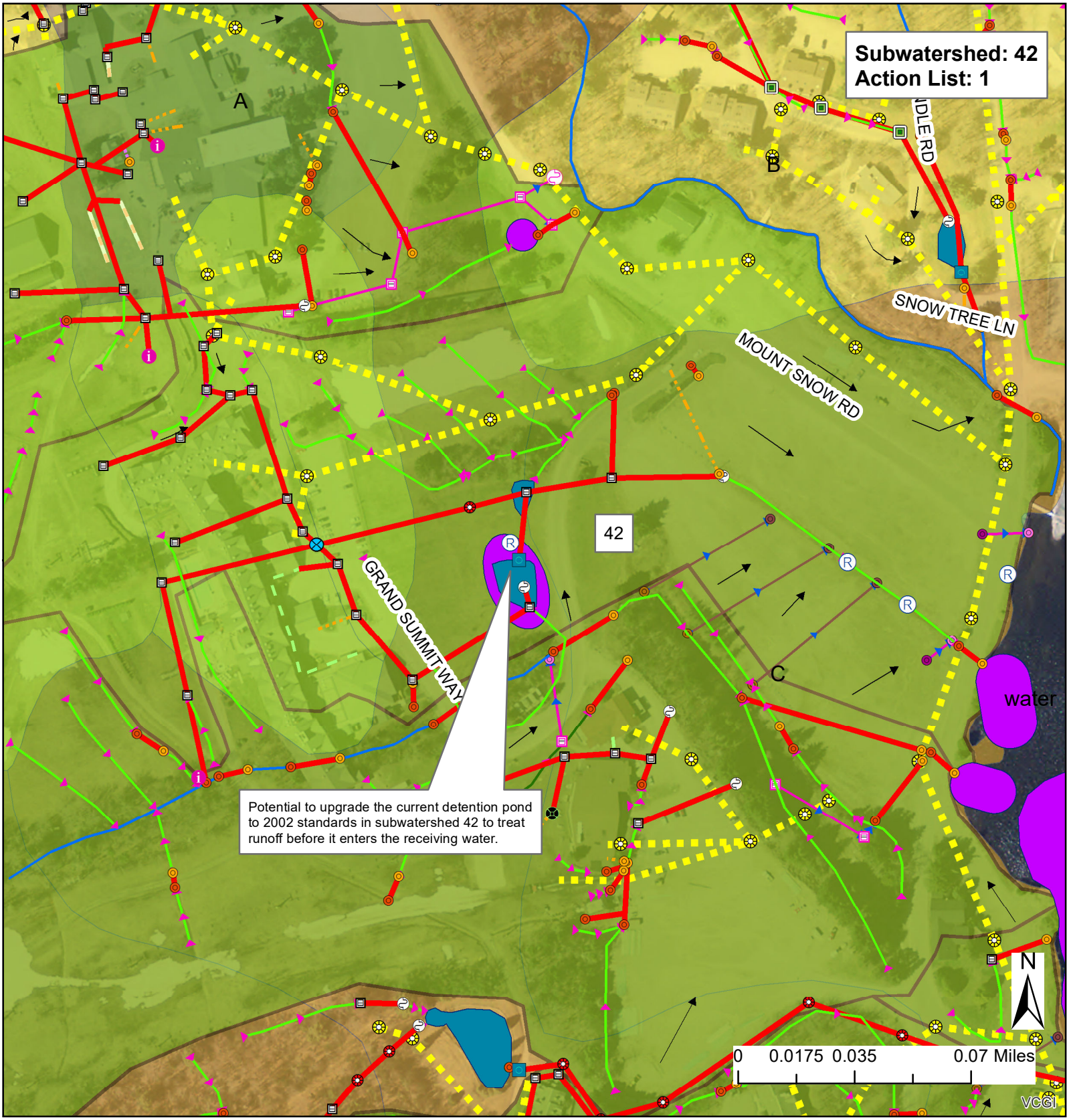

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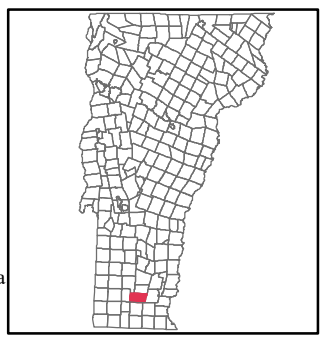

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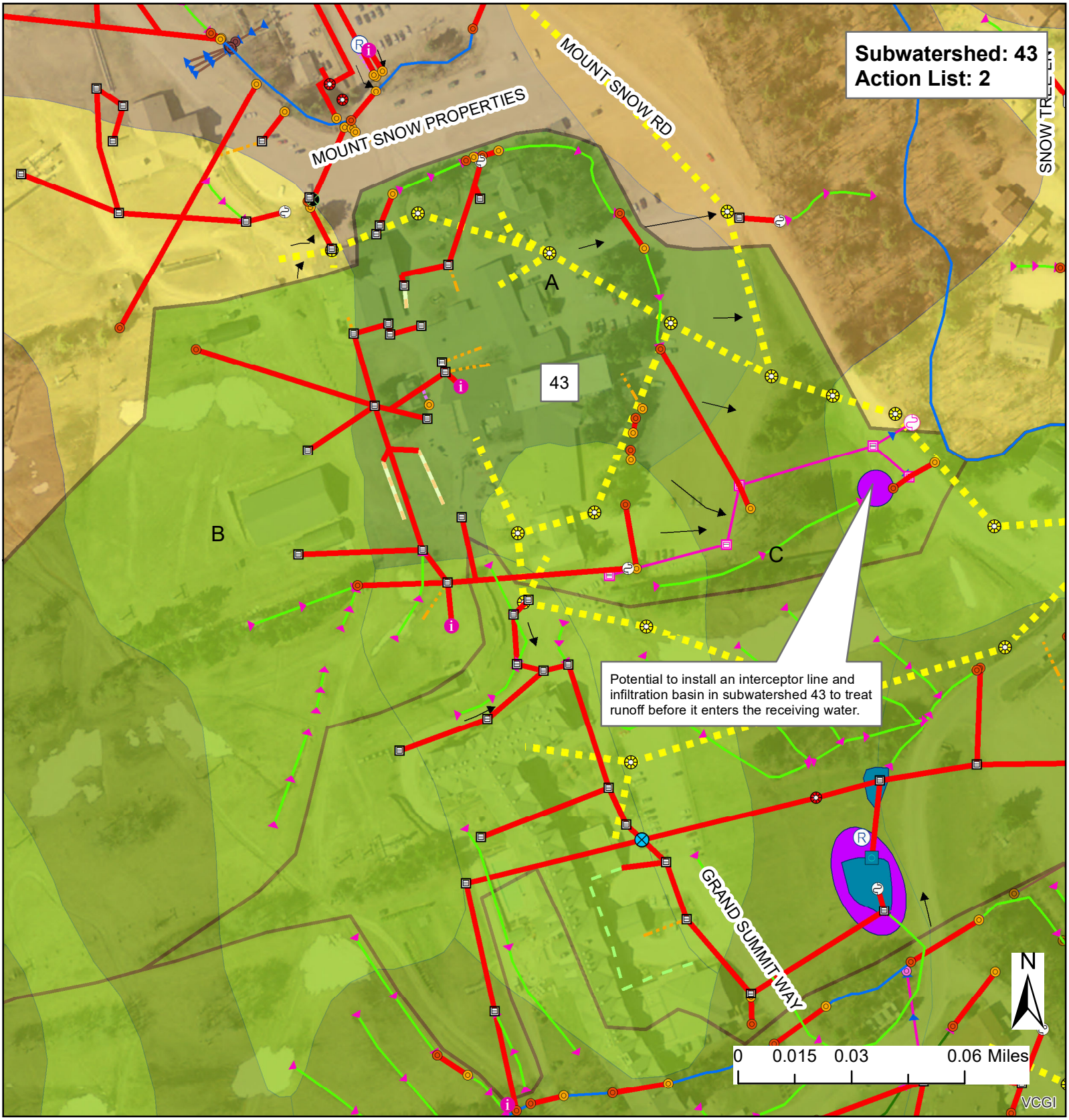

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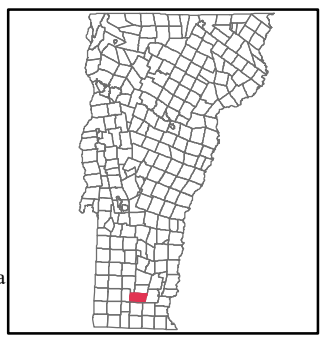

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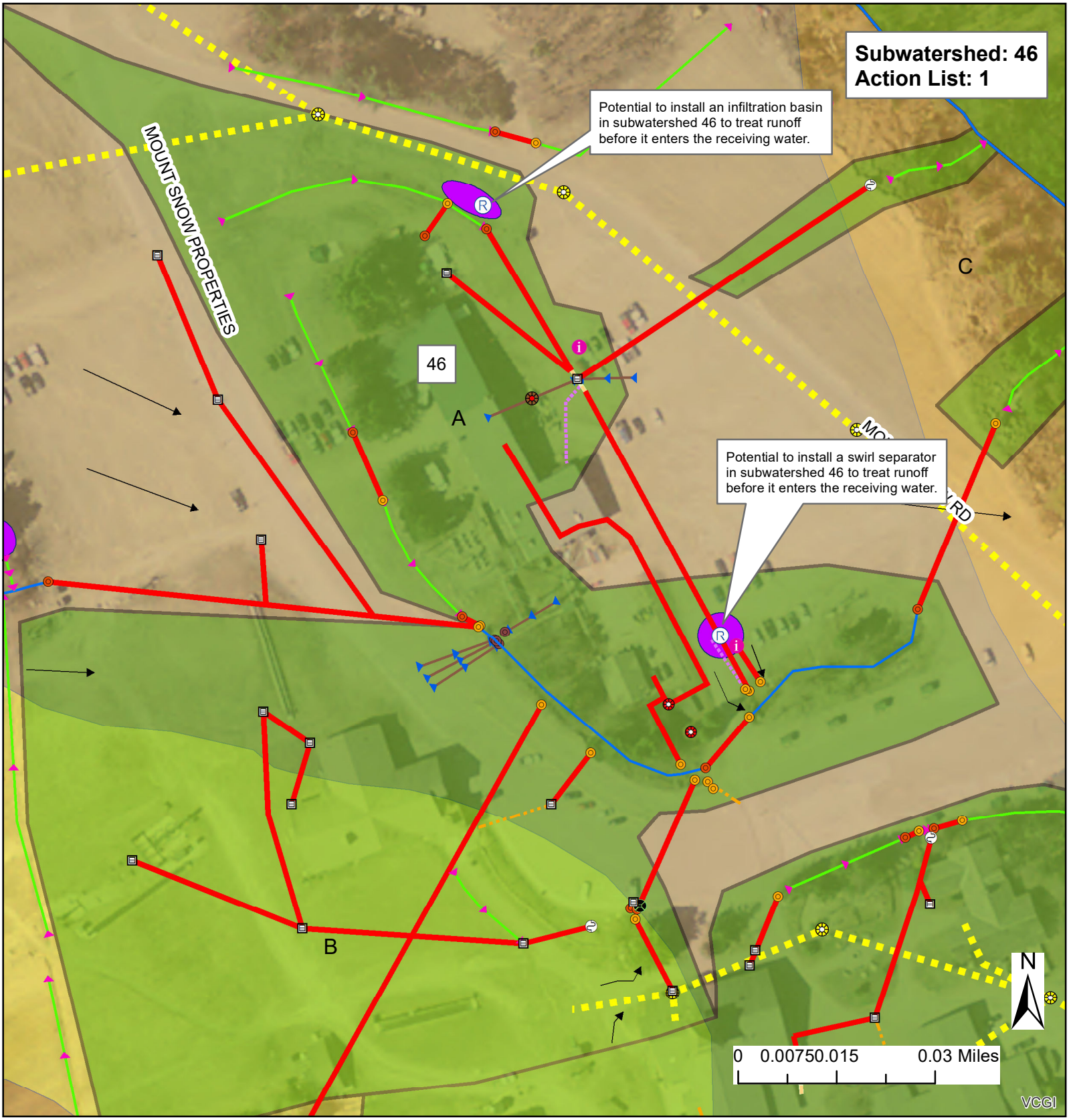

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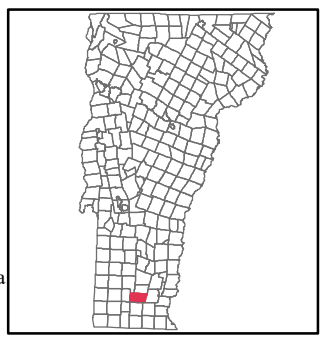

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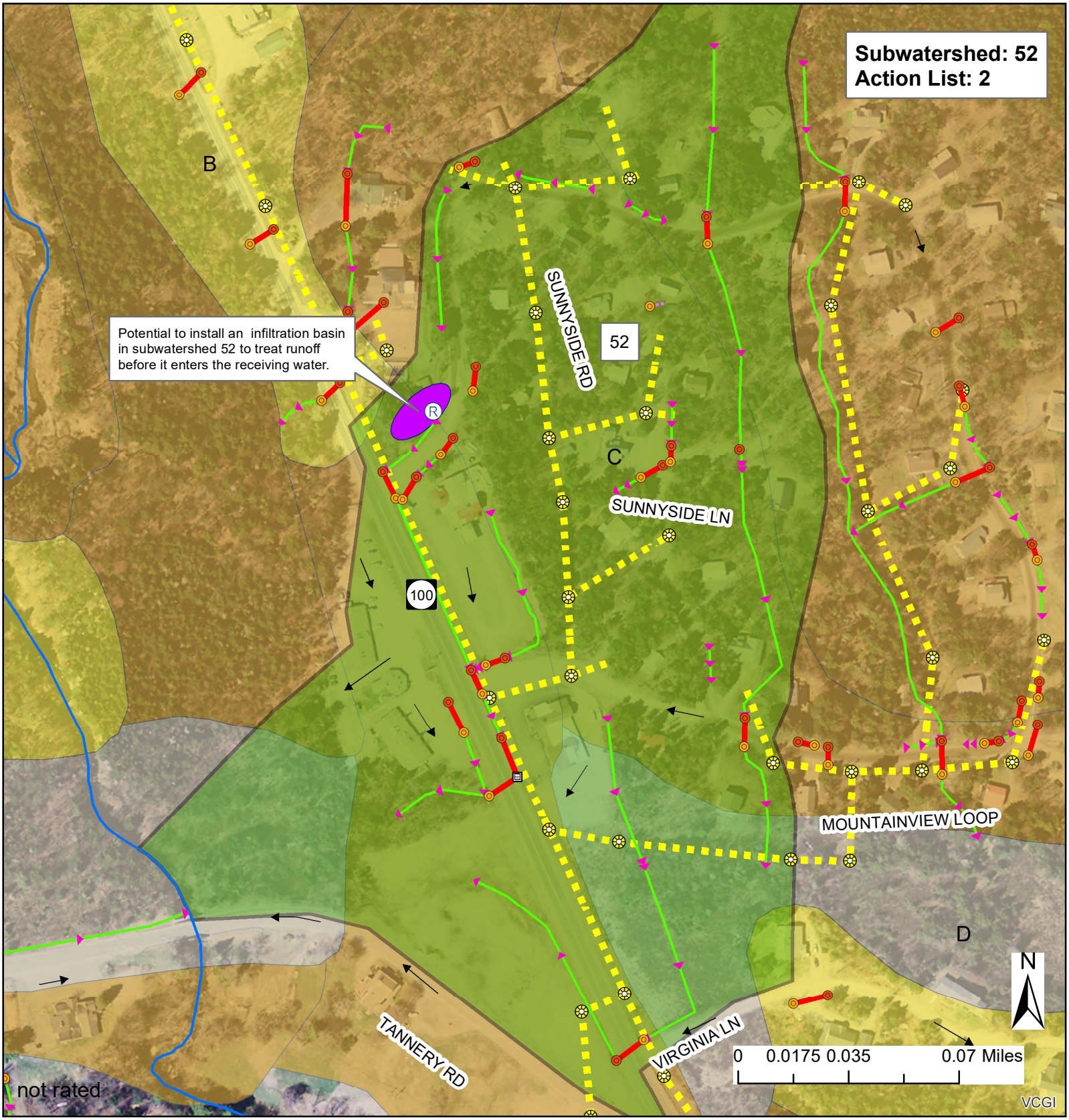

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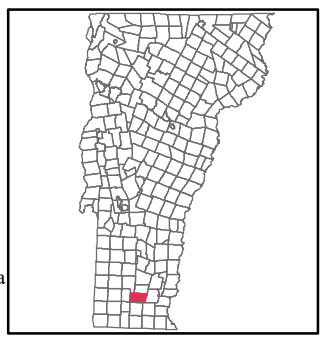

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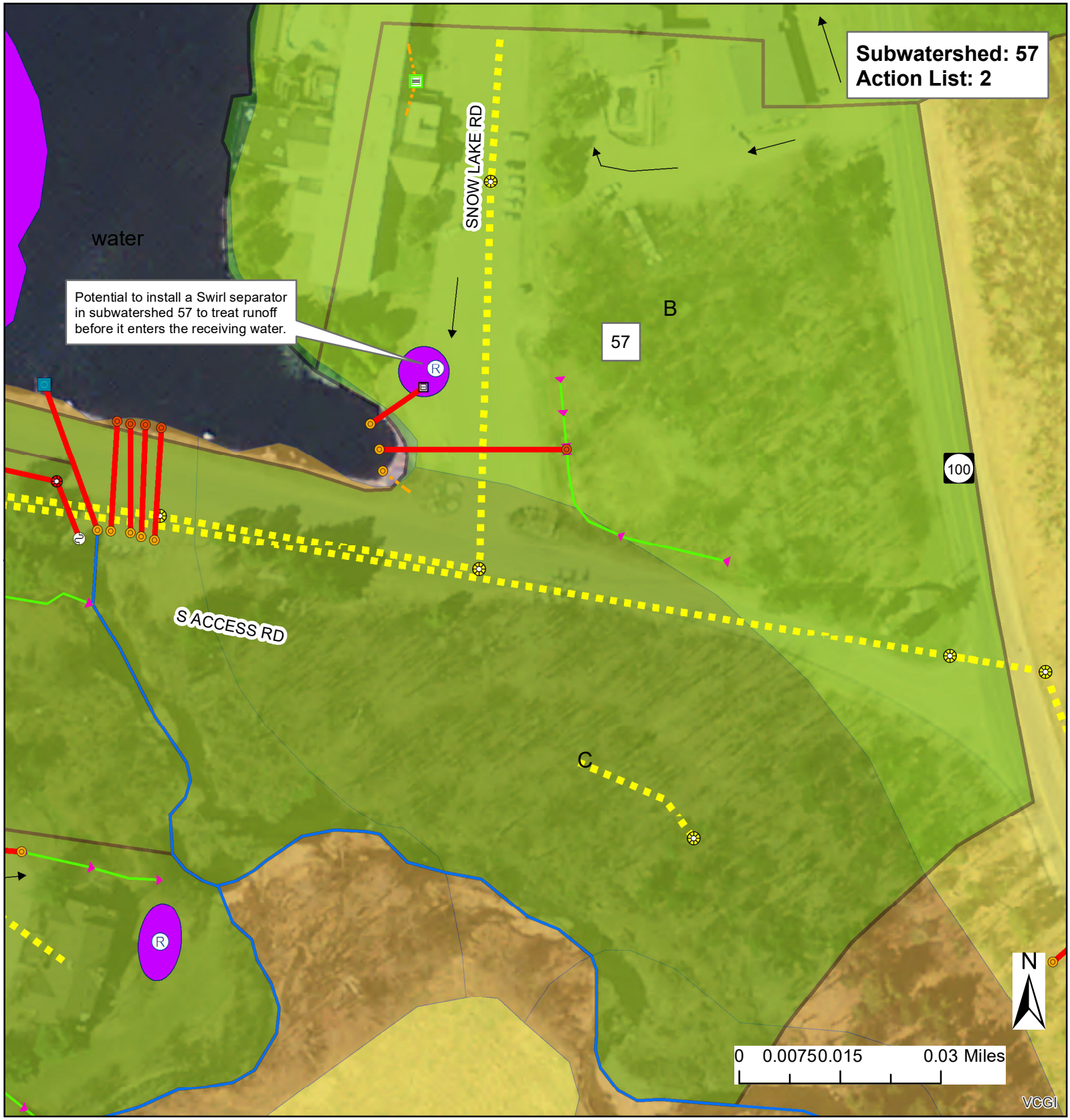

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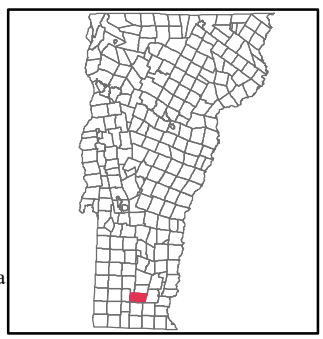

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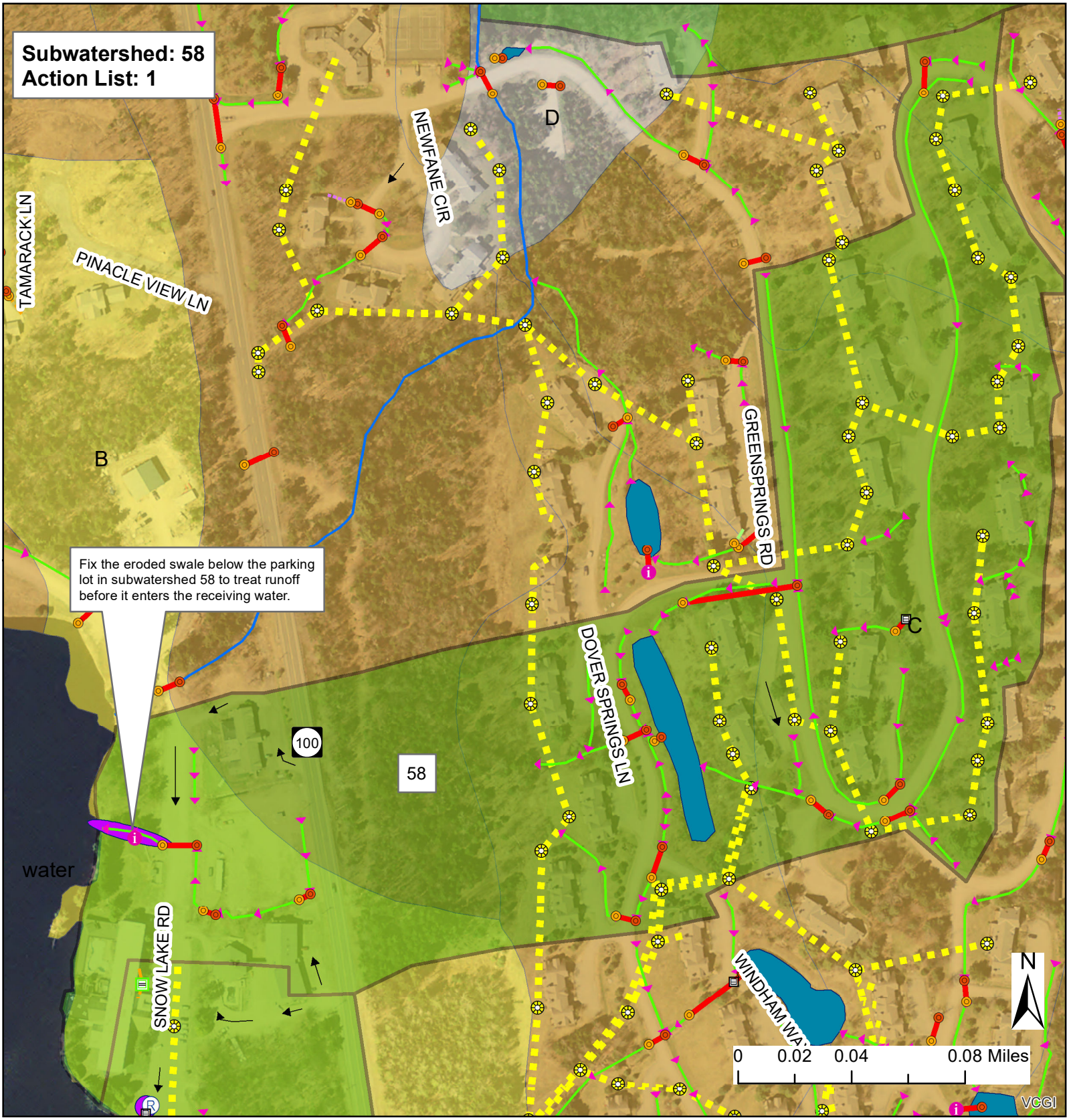

Dover, VT

DEC Stormwater Infrastructure Mapping Project

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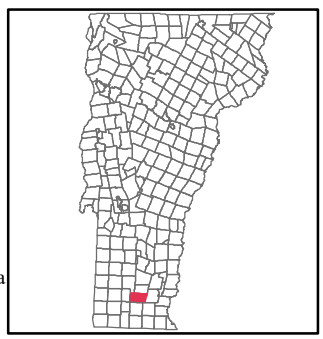

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NRCS - Soils

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SubwatershedID

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

Creator: Jim Pease, David Ainley
DEC - WSMD - Clean Water Initiative Program
Plotted Date: 5/20/2019
Data Sources: VTRANS Roads data, VT Hydrography data set, DEC Stormwater database, NRCS soils survery
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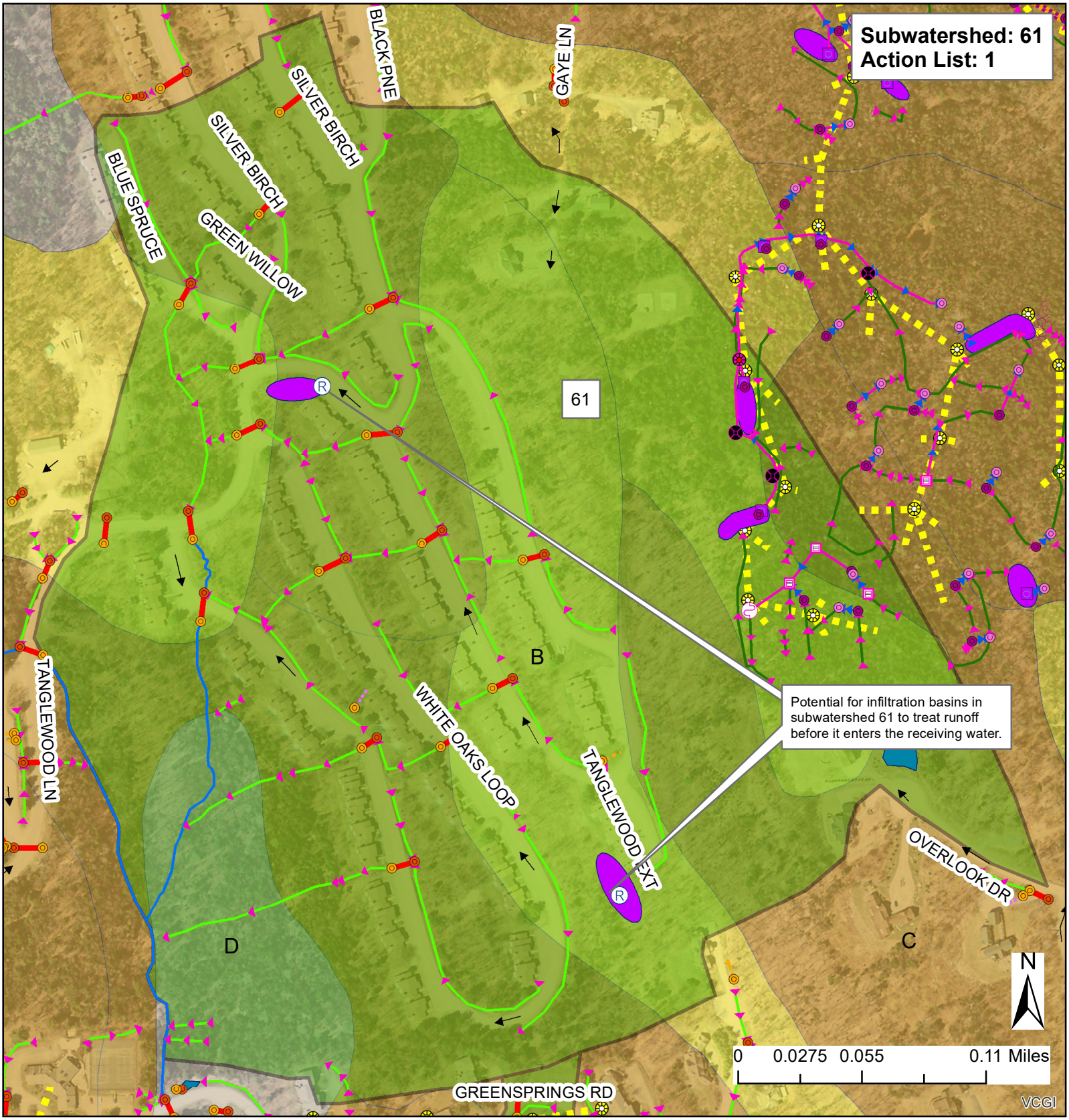

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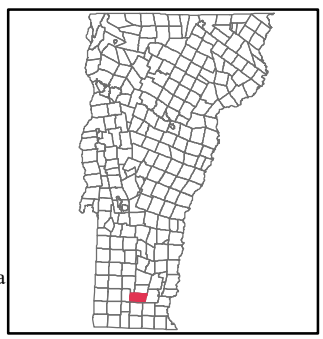

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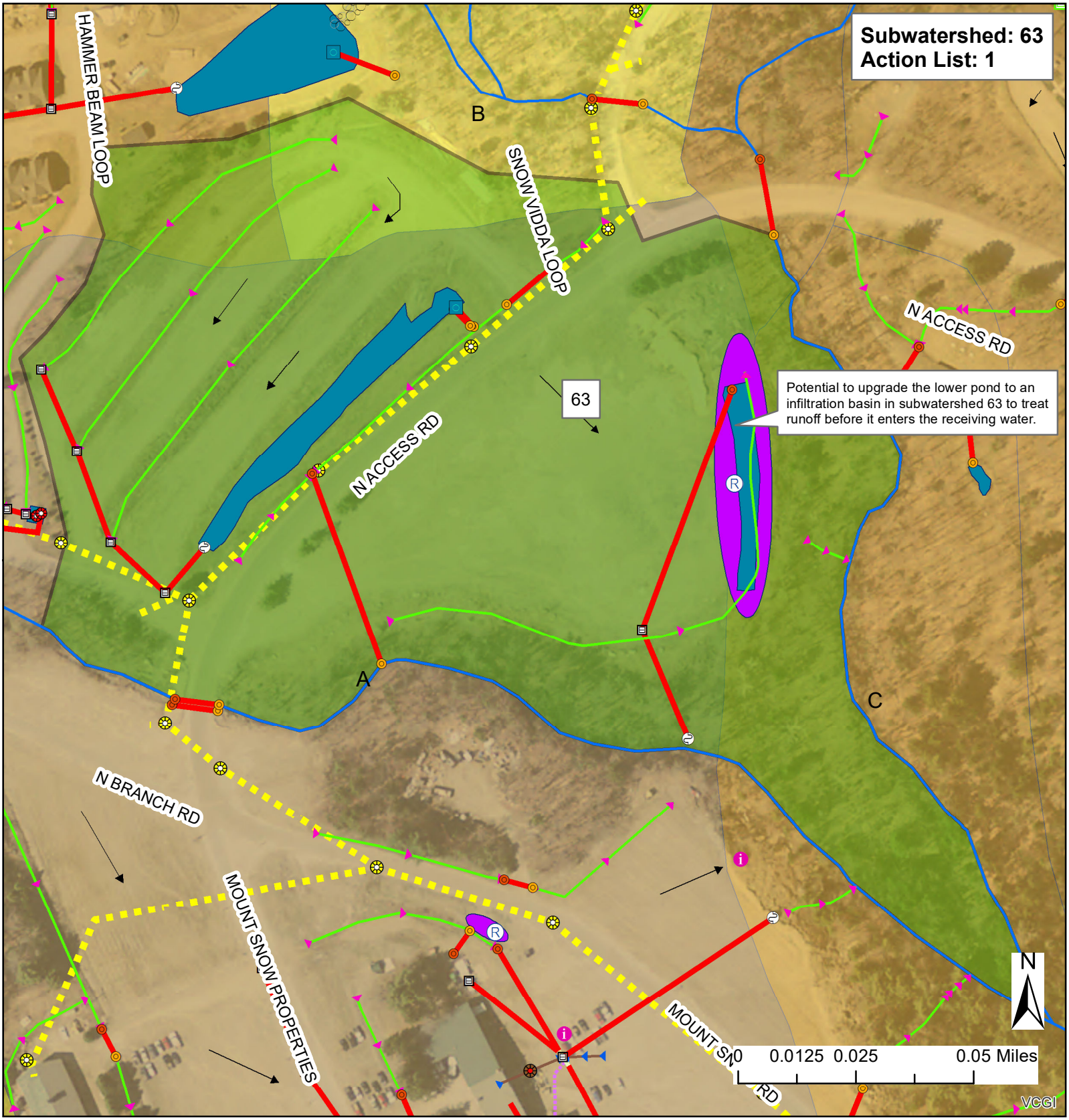

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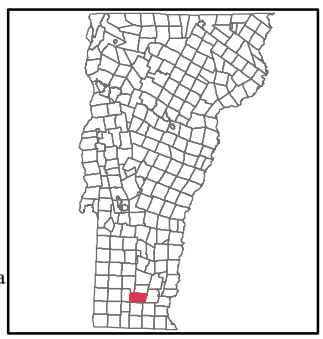

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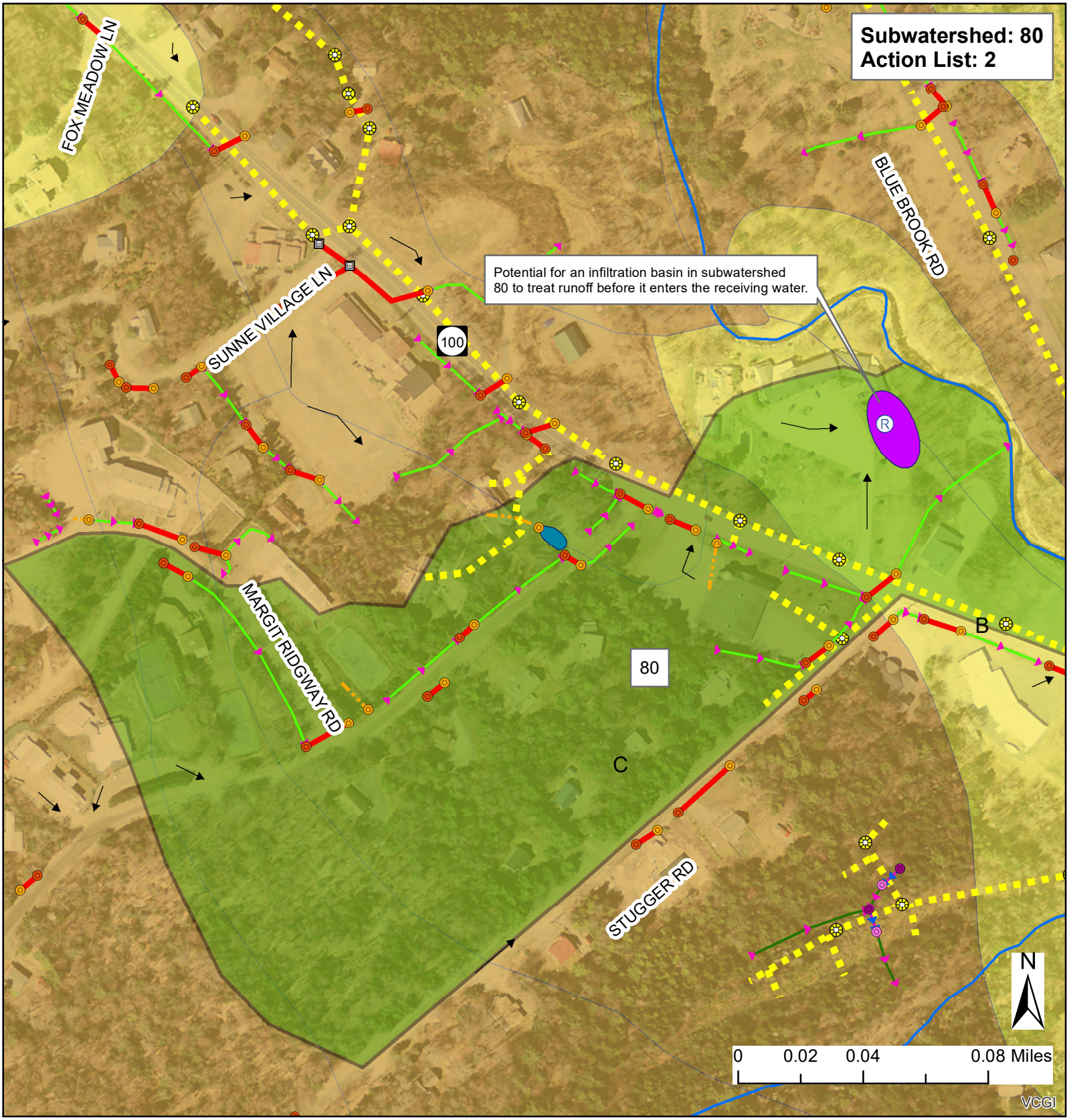

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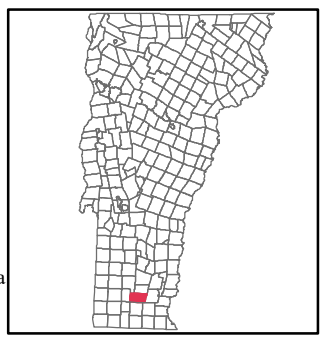

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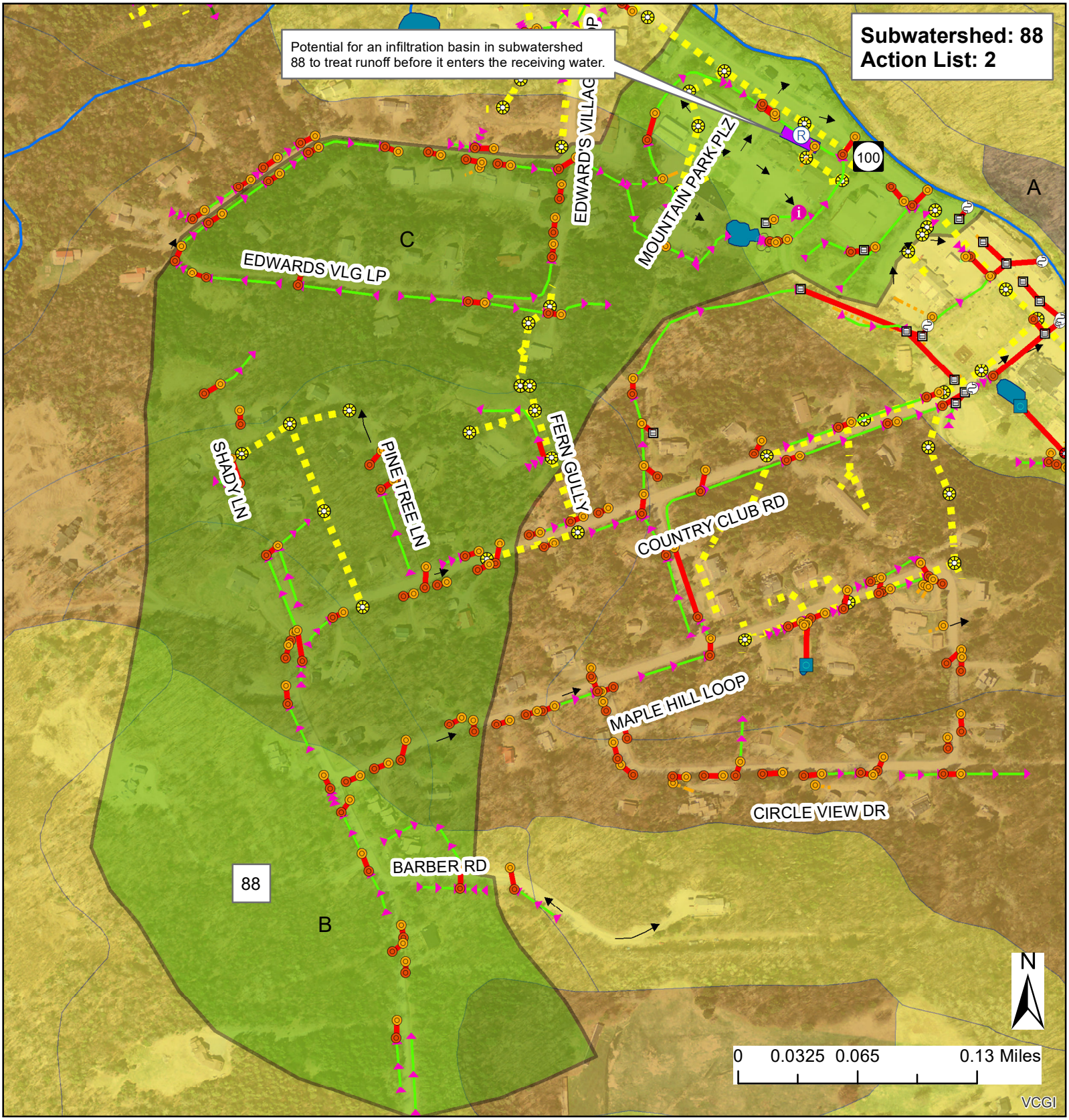

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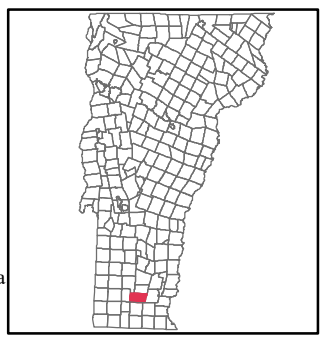

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VERMONT

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:

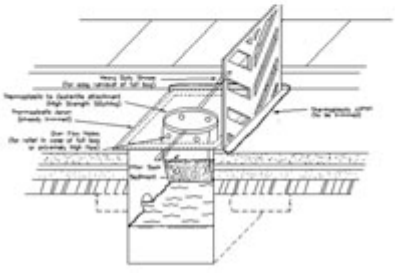
— Proper notification when a spill occurs;
— Site responsibility with respect to addressing the cleanup of a spill;
— Stopping the source of a spill;
— Cleaning up a spill;
— Proper disposal of materials contaminated by the spill;
— Location of spill response equipment programs; and
— Training for designated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

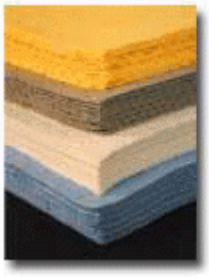
Absorbent socks are flexible tubes used to contain and clean-up spilled fluids. Socks are widely used in industrial applications and are ideal for Spill Kits. Fast spreading spills are quickly stopped with a sock.

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 water or recovered liquid. Rolls can easily be cut to the exact size required.

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.