Towns of Shelburne and Charlotte

Stormwater Infrastructure Mapping Project-McCabes Brook Watershed

August 2022





VTDEC – CLEAN WATER INITIATIVE PROGRAM, WATERSHED MANAGEMENT DIVISION

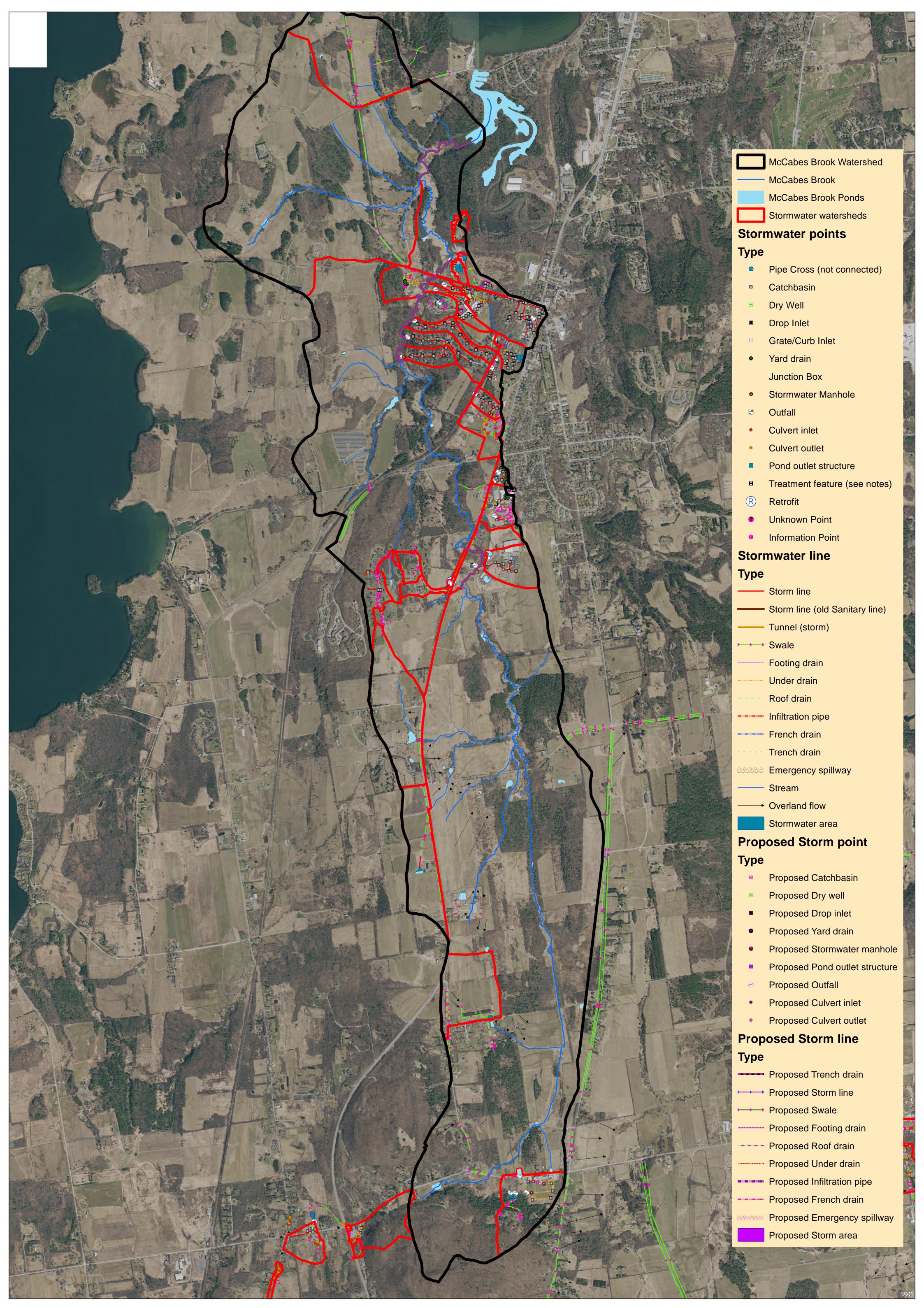
https://dec.vermont.gov/water-investment/cwi/solutions/developed-lands/idde

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McCabes Brook, Shelburne-Charlotte, Vermont

McCabes Brook in Shelburne and Charlotte, Vermont has been found to be impaired by stormwater water quality from farms and development as measured by the biological community of the stream. There are at least 33 significant discharges to the stream from the developed lands of Shelburne and Charlotte. The largest discharge to the stream is the discharge of drainage #50 which drain Bay Rd and Shelburne Farms. The stream often has very low flows during the summer months and several recommended practices increase retention and release of runoff to address this problem. The recommended course of action is to install a stormwater treatment structure that controls both the water quality volume and the channel protection volume from these discharges near the outfall. A map showing the location of the discharges and a possible retrofit location on private land is provided. A cost estimate (excluding land costs) is provided. The Town of Shelburne is currently developing a Stormwater Master Plan for McCabes Brook. Parcels listed as an Action List #4 must comply with General Permit 3-9050 which requires treatment of 50% of the water quality volume.

Addressing the large discharges of stormwater to the brook will reduce contamination and stream channel erosion and will help prevent the stream from becoming declared stormwater impaired on the state of Vermont's 303d list of impaired waters. It will also reduce phosphorus currently being discharged to Shelburne Bay and Lake Champlain.



				Macr	oinverte	brate Sit	e Summ	ary				
Location:		es Brook	Location ID		798							
Town:	Shelbur	ne								Bio Site ID:	520	100000012
Description:	ion: 200m below Harbor Rd. Take Turtle Rd to town sandpiles and access from there. (This appears to be immediately downstream from Shelburne-Harbor Rd. WWTF -RBL).											95-11
Stream Type	e: Hybrid L	ow Gradient										
Date	Density	EOT Richness	BCG Intolerant Richness	PMA-O	B.I.	Amphipod + Isopod - Hyallela	EOT/EOT +C	PPCS-F	Sensitive COTE%	Shredders / Collector	IBI Score	Community Assessment
10/13/2006	5660	5.0	2.0	21.7	6.17	79.6	0.297	0.277	0.282	0.009	17	Poor
9/16/2011	1057	6.5	1.5	26.9	6.34	48.5	0.294	0.358	0.309	0.035	17	Poor
10/8/2012	800	5.0	1.5	20.7	7.76	0.9	0.869	0.381	0.589	0.015	22	Poor
10/13/2015	1399	5.0	2.0	32.0	6.14	67.4	0.172	0.330	0.245	0.019	16	
10/13/2015	1395	4.0	1.0	31.9	6.00	67.8	0.172	0.375	0.246	0.020	18	Poor
10/13/2016	2700	4.0	0.0	10.4	6.11	87.6	0.324	0.165	0.000	0.000	17	Poor
10/5/2017	5280	4.0	1.0	49.3	5.66	36.4	0.019	0.204	0.000	0.003	17	
10/5/2017	5448	4.0	1.0	49.7	6.43	38.0	0.019	0.220	0.000	0.003	16	Poor
IBI 5	≥ 500	≥ 15	≥ 14	≥ 75	≤ 4	0	≥ 0.5	≥ 0.57	≥ 28	≥ 0.5		
IBI 4	≥ 400	≥ 13	≥ 11	≥ 65	≤ 5	≤ 1	≥ 0.38	≥ 0.49	≥ 20	≥ 0.35		
IBI 3	≥ 300	≥ 11	≥ 9	≥ 55	≤ 6	≤ 5	≥ 0.26	≥ 0.41	≥ 13	≥ 0.2		
IBI 2	≥ 200	≥7	≥ 5	≥ 45	≤ 6.5	≤ 25	≥ 0.13	≥ 0.36	≥ 5	≥ 0.1		
IBI 1	≥ 0	≥ 0	≥ 0	≥ 0	>6.5	>25	≥ 0	≥ 0	≥ 0	≥ 0		

			Fi	ish Site I	Report				
Location:	McCabes Brook			Bio Site ID	: 52010000012	Latitude:	44.38461	River Mile:	1.2
Town:	Shelburne			Location II	D: 500798	Longitude:	-73.23710	Drainage (km ²):	12.3 4
Description: 200m below Harbor Rd. Take T sandpiles and access from there immediately downstream from S WWTF -RBL).		re. (This appe	ars to be	WBID:	VT05-11	Elevation (ft):	97		т
		10/13/06	9/16/11	10/8/12	10/13/15				
Event ID		2006-45	2011-06	2012-52	2015-61				
Sampling Meth	hod	ES	ES	ES	ES				
Richness #		10	7	6	10				
Intolerant Spe	cies #	0	0	0	0				
Benthic Insect	ivores #	1	1	1	1				
Cr Chub-Wht	Sucker %	18.2	3.7	25	11.3				
Generalist Fee	eders %	76	26	38	75				
Insectivores %		24	67	50	25				
Top Carnivore	s %	0	7	13	1				
Cold Water Sp	becies %	0	0	0	0				
Density per 10	00m²	84.8	10.8	4.1	42.9				
Brook Trout D	ensity	-							
Brook Trout Ag	ge Class		no brook	no brook	no brook				
Mixed Water II	BI	30	trout 36	trout 12	trout 31				
Cold Water IB		00							
Assessment	•	Good	Good	Poor	Fair				
Species	% Composition	#/100m ²	#/100m ²	#/100m ²	#/100m ²				
Banded Killifis	•	10.2							
Blacknose Da	ce	1.5							
Bluntnose Min	now	2.5			8.9				
Common Shin	er			0.5	7.7				
Creek Chub		15.4	0.4	0.5	4.5				
Emerald Shine	er	4.9							
Golden Shiner	•	0.3			0.8				
Largemouth B	ass	_			0.4				
Mimic Shiner		43.2							
Mudminnow		2.8	1.6		2.0				
		-							

				Macr	oinverte	brate Sit	e Summ	ary					
Location:	McCabe	cCabes Brook										900	
Town:	Shelbur	Shelburne									Bio Site ID: 52010000021		
Description: Off path starting from the end of School Street in Shelburne. Right bank.										WBID:	VTC	5-11	
Stream Type	e: Hybrid L	ow Gradient	t										
Date	Density	EOT Richness	BCG Intolerant Richness	PMA-O	B.I.	Amphipod + Isopod - Hyallela	EOT/EOT +C	PPCS-F	Sensitive COTE%	Shredders / Collector		Community Assessment	
10/5/2017	1744	9.0	6.0	59.0	5.84	12.8	0.058	0.367	26.376	0.429	28	Fair	
IBI 5	≥ 500	≥ 15	≥ 14	≥ 75	≤ 4	0	≥ 0.5	≥ 0.57	≥ 28	≥ 0.5			
IBI 4	≥ 400	≥ 13	≥ 11	≥ 65	≤ 5	≤ 1	≥ 0.38	≥ 0.49	≥ 20	≥ 0.35	1		
IBI 3	≥ 300	≥ 11	≥ 9	≥ 55	≤ 6	≤ 5	≥ 0.26	≥ 0.41	≥ 13	≥ 0.2	1		
IBI 2	≥ 200	≥7	≥ 5	≥ 45	≤ 6.5	≤ 25	≥ 0.13	≥ 0.36	≥ 5	≥ 0.1]		
IBI 1	≥ 0	≥ 0	≥ 0	≥ 0	>6.5	>25	≥ 0	≥ 0	≥ 0	≥ 0]		

	Macroinvertebrate Site Summary											
Location:	McCabes Bro	ook	Location	ID: 510253								
Town:	Shelburne	helburne Bio Site ID:										
Description:	Above Bostw	bove Bostwick Road ~100m WBID: VT05-11										
Stream Type:	eam Type: Warm Water Medium Gradient											
Date	Density	Richness	EPT Richness	PMA-O	B.I.	Oligo.	EPT/EPT + Chiro	PPCS-F	Community Assessment			
10/13/201	5 477	31.0	7.0	62.0	4.49	4.75	0.59	0.57	Fair			
Full Support	≥ 300	≥ 30	≥ 16	≥ 45	≤ 5.4	≤ 12	≥ 0.45	≥ 0.4				
Indeterminate	≥ 250	≥ 28	≥ 15	≥ 40	≤ 5.65	≤ 14.5	≥ 0.43	≥ 0.35				
Non-Support	< 250	< 28	< 15	< 40	> 5.65	> 14.5	< 0.43	< 0.35				

*Scoring Guidelines for Stream Type WWMG and WQ Class B(2).

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	Ext.Det.Pond with Micropool (aka Micropool ED Pond)							
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 Attenuator							
RDD	Roof Drain Disconnect							
RR	Rock RipRap							
RS	RipRap Swale							
SB	Sediment Basin (10 YR OR >)							
SF	Sand Filter (aka Surface Sand Filter)							
SS-SF	Swirl Separator – Sand Filter							
ST	Septic Tank							
TT	Treatment Tank							
WL	Wetland (Constructed)							
WP	Wet Pond (Retention)							
WS	Wet Swale							

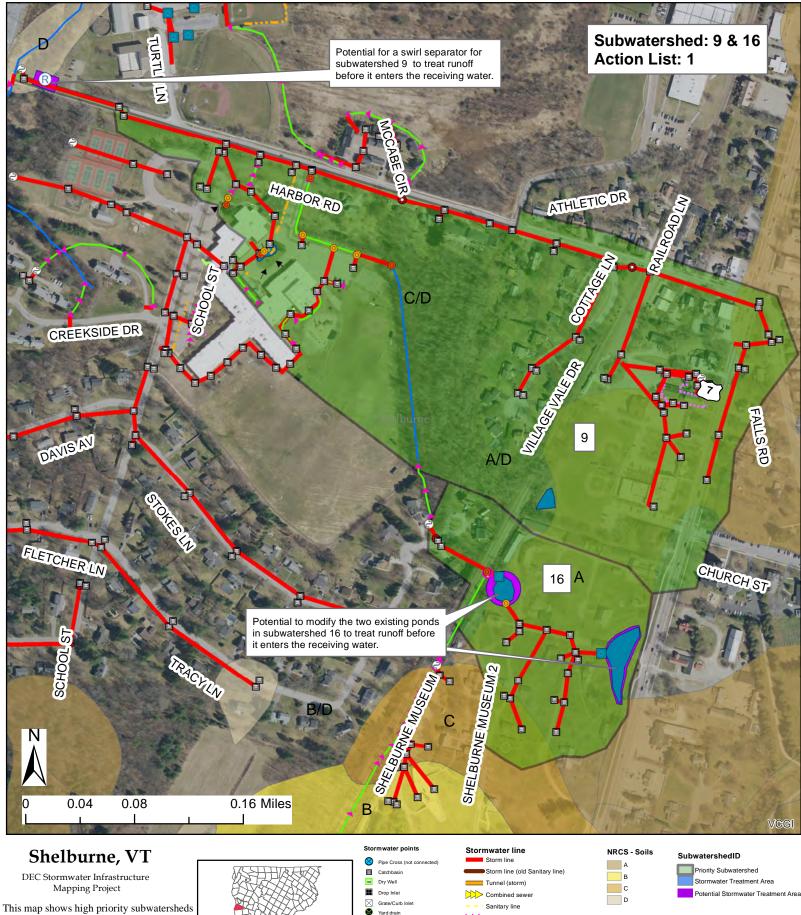
Shelburne - Subwatershed	Prioritization and Recomme	ndations								
Watershed Number	Action List #	Proposed Action	Proposed or Existing Stormwater Treatment Practice	Permit Number	Watershed Area (Acres)	Percent Mapped Impervious Area (MIA)	Sediment Load with Current Reductions (lbs.)	Sediment Load with Priority Action (lbs.)	Phosphorus Load with Current Reductions (lbs.)	Phosphorus Load with Priority Action (lbs.)
1 Shelburne			OF/GS/CR	6540-9015	131.88	4.2	6071	6071	16.9	16.9
2 Shelburne			OF/GS	4734-9003	679.94	3.7	50782	50782	141.1	141.1
3 Shelburne			CB/GS/BRA	4734 5005	4.38	51.6	1400	1400	3.9	3.9
4 Shelburne			OF		3.72	22.2	712	712	2.0	2.0
5 Shelburne			CB/GS/BRA		11.97	18.0	1102	1102	3.1	3.1
6 Shelburne			GS/CB/2 GW/CR	3421-9010.1	5.66	12.6	97	97	0.8	0.8
7 Shelburne			GS/CB/2 GW/CR	3421-9010.1	1.33	72.2	184	184	1.5	1.5
8 Shelburne			GS/OF	3913-9050	23.13	11.3	1330	1330	4.9	4.9
9 Shelburne	1	Swirl separator in Bay Rd	VS/CB/GS/ BRA/GW	3919-9010, 7924- 9015.A	51.12	33.7	9131	1826	32.6	29.4
10 Shelburne			СВ		4.75	24.7	1010	1010	2.8	2.8
11 Shelburne			CB/GS	3919-9050	12.92	28.9	2185	2185	6.8	6.8
12 Shelburne			CB/OF		19.06	26.7	5959	5959	16.6	16.6
13 Shelburne			OF/GS/CB	4954-9010	28.52	10.2	1818	1818	6.1	6.1
14 Shelburne			CB/OF		27.18	17.4	5796	5796	16.1	16.1
15 Shelburne			CB/ST/OF	3921-9010	16.27	17.9	1486	1486	5.0	5.0
	1	Modify two existing ponds to meet 9050 requirements	MOD/CB/GS/WP	3920-9010	13.49	25.0	2035	1018	6.9	3.8
16 Shelburne		· · · · · · · · · · · · · · · · · · ·	07/07				-			
17 Shelburne		-	CB/OF		11.09	22.1	735	735	2.0	2.0
18 Shelburne			CB/GS/OF	3338-9010	9.56	39.7	1812	1812	6.7	6.7
19 Shelburne			CB/GS/OF	3338-9010	22.75	27.8	2762	2762	10.2	10.2
20 Shelburne 21 Shelburne			CB/WP/SB/GS/SWPP P CB/GS/EPMP	6542-9003, 6534- 9010 3338-9010	20.62 5.65	39.1 35.8	1026 247	1026 247	8.6 2.1	8.6
22 Shelburne			CB/GS/EPIMP CB/WP	3561-9010	30.34	27.1	933	933	7.8	7.8
22 Shelburne 23 Shelburne			OF/GS	3561-9010	18.07	17.6	1398	1398	5.2	5.2
24 Shelburne			CB/GS/OF	3301-9010	10.16	17.9	1594	1594	4.4	4.4
	2	Modify wet pond to receive runoff from	MOD/GS/OF/WP		10.93	20.9	1970	394	5.5	3.3
25 Shelburne		development	00/05		10.01	40.0	1252	4262	2.5	2.5
26 Shelburne			GS/OF GS/OF		10.21 1.17	13.2	1260	1260 110	3.5 0.3	3.5 0.3
27 Shelburne 28 Shelburne			GS/OF GS/OF		12.34	8.2	110	1280	3.6	3.6
29 Shelburne			OF/GS		71.34	9.9 3.8	1280 5364	5364	3.6 14.9	3.6
	Prioritization and Recommer	dations	0F/03		71.34	3.0	5304	5304	14.9	14.9
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.)
1 Charlotte	1	Modify Wet Pond on 383 Hinesburg Rd parcel.	MOD/CB/GS/2WP	5154-9010	60.22	11.7	4112	2056	13.9	10.4
2 Charlotte	1	Extended Detention Pond at control structure/culvert on Mutton Hill Rd	WP/GS/OF		67.38	4.7	5284	1057	14.7	8.8
3 Charlotte	1	Enlarge Wet Pond on 1046 US Rte 7 parcel or on adjacent Town Park	MOD/WP/GS		70.65	5.4	3436	2062	12.7	10.2
4 Charlotte	2	Enlarge Wet Ponds on 544 US Rte. 7 parcel.	MOD/WP/GS		99.08	6.4	5096	3058	18.9	15.1

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 Phosphorus or Nitrogen Removal Per Pound (based on annual nutrient load)	Assistance Program	# LID-Roof Raingardens to Treat Water Quality Volume	Raingarden Cost
1 Shelburne	0.57	0.62					CWIP, SRF, LCBP	286	\$131,661
2 Shelburne	2.87	2.75					CWIP, SRF, LCBP	1437	\$660,825
3 Shelburne	0.11	0.25					CWIP, SRF, LCBP	57	\$26,023
4 Shelburne	0.04	0.09					CWIP, SRF, LCBP	20	\$9,264
5 Shelburne	0.09	0.24					CWIP, SRF, LCBP	45	\$20,487
6 Shelburne 7 Shelburne	0.03 0.05	0.08 0.11					CWIP, SRF, LCBP CWIP, SRF, LCBP	14 26	\$6,285 \$11,967
8 Shelburne	0.03	0.29					CWIP, SRF, LCBP CWIP, SRF, LCBP	63	\$11,967 \$28,850
9 Shelburne	0.74	1.90		\$75,000	\$10.27	\$22,998	CWIP, SRF, LCBP	369	\$169,750
10 Shelburne	0.06	0.13					CWIP, SRF, LCBP	29	\$13,142
11 Shelburne	0.15	0.41					CWIP, SRF, LCBP	77	\$35,545
12 Shelburne	0.34	0.56					CWIP, SRF, LCBP	169	\$77,538
13 Shelburne	0.15	0.32					CWIP, SRF, LCBP	73	\$33,801
14 Shelburne	0.33	0.52					CWIP, SRF, LCBP	164	\$75,422
15 Shelburne	0.12	0.32					CWIP, SRF, LCBP	60	\$27,616
16 Shelburne	0.16	0.37	\$56,752		\$56	\$18,371	CWIP, SRF, LCBP	82	\$37,835
17 Shelburne	0.04	0.27					CWIP, SRF, LCBP	21	\$9,569
18 Shelburne	0.17	0.42					CWIP, SRF, LCBP	85	\$39,300
19 Shelburne	0.26	0.70					CWIP, SRF, LCBP	130	\$59,899
20 Shelburne	0.29	0.89					CWIP, SRF, LCBP	145	\$66,784
21 Shelburne	0.07	0.22					CWIP, SRF, LCBP	35	\$16,100
22 Shelburne	0.26	0.90					CWIP, SRF, LCBP	132	\$60,676
23 Shelburne	0.13	0.35					CWIP, SRF, LCBP	66	\$30,330
24 Shelburne 25 Shelburne	0.09	0.20	\$19,227		\$12	\$8,784	CWIP, SRF, LCBP CWIP, SRF, LCBP	45 56	\$20,736 \$25,636
26 Shelburne	0.07	0.45						26	¢16 200
27 Shelburne	0.07	0.15 0.01					CWIP, SRF, LCBP CWIP, SRF, LCBP	36 3	\$16,399 \$1,426
28 Shelburne	0.01	0.14					CWIP, SRF, LCBP	36	\$16,653
29 Shelburne	0.30	0.30					CWIP, SRF, LCBP	152	\$69,801
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 Phosphorus or Nitrogen Removal Per Pound (based on annual nutrient load)	Assistance Program	# LID-Roof Raingardens to Treat Water Quality Volume	Raingarden Cost
1 Charlotte	0.33	0.78	\$57,334		\$28	\$16,534	CWIP, SRF, LCBP	166	\$76,446
2 Charlotte	0.30	0.35	\$49,486		\$12	\$8,429	CWIP, SRF, LCBP	149	\$68,760
3 Charlotte	0.32	0.42	\$55,897		\$41	\$21,959	CWIP, SRF, LCBP	162	\$74,530
4 Charlotte	0.48	0.70	\$82,900		\$41	\$21,959	CWIP, SRF, LCBP	240	\$110,533

Target Maps

Showing Priority Action List Drainage Areas

And Potential Retrofit Locations



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.



Junction Box 0 Stormwater Ma Outfall e 0 Culvert inlet 0 Culvert outlet Control Structure H Treatment feature (see no R Retrofi 6 Unknown Point 1 Information Point

CB tied to sanitary sew

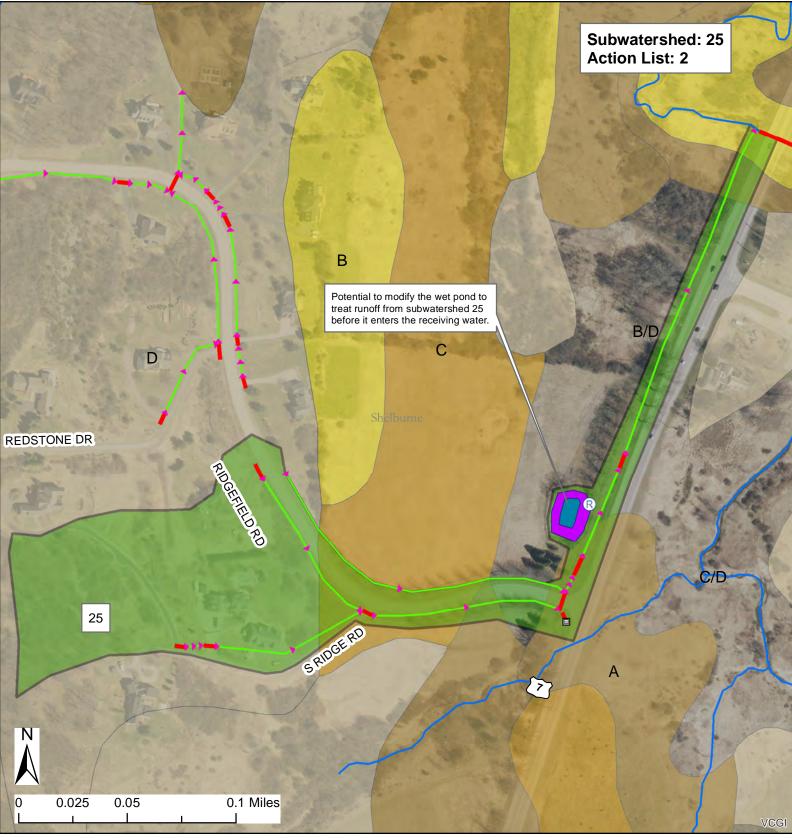
Storm line (old Sa Tunnel (storm) Combined sewer - Sanitary line Swale Footing drain Under drain Infitration pipe III French drain Trench drain

Emergency spillway

Stream

Overland flow

Creator: Jim Pease, David Ainley DEC - WID - Clean Water Initiative Program Plotted Date: 7/22/2022 Data Sources: VTRANS Roads data, VT Hydrography data set, DEC Stormwater database, NRCS soils survery Imagery Source: VCGI Best Available Imagery

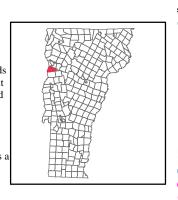


Shelburne, VT

DEC Stormwater Infrastructure Mapping Project

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NRCS - Soils

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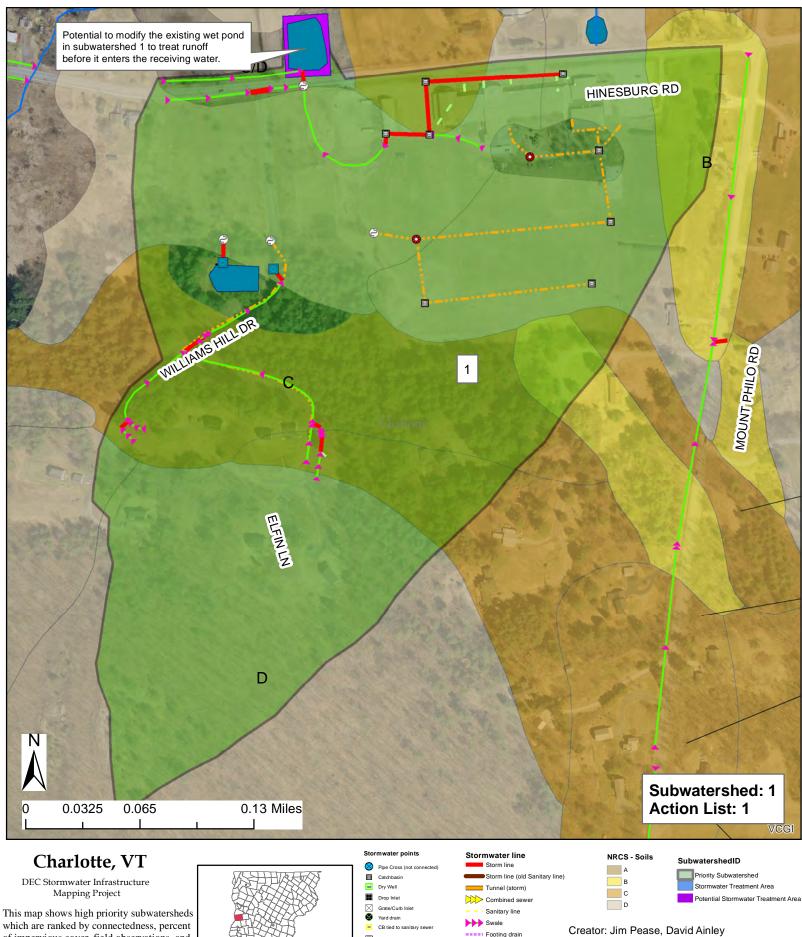
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Priority Subwatershed Stormwater Treatment Area Potential Stormwater Treatment Area

Creator: Jim Pease, David Ainley DEC - WID - Clean Water Initiative Program Plotted Date: 7/22/2022 Data Sources: VTRANS Roads data, VT Hydrography data set, DEC Stormwater database, NRCS soils survery Imagery Source: VCGI Best Available Imagery



Footing drain

Under drain

Roof drain

Infiltration pipe

French drain

Trench drain

Emergency spillway

Stream

Overland flow

DEC - WID - Clean Water Initiative Program

Data Sources: VTRANS Roads data, VT

Hydrography data set, DEC Stormwater

Imagery Source: VCGI Best Available Imagery

Plotted Date: 7/22/2022

database, NRCS soils survery

Junction Box

Outfall e

0 Culvert inlet

0 Culvert outlet

H

R Retrofi

6 Unknown Point

Stormwater Manhole

Control Structure

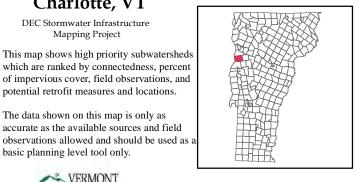
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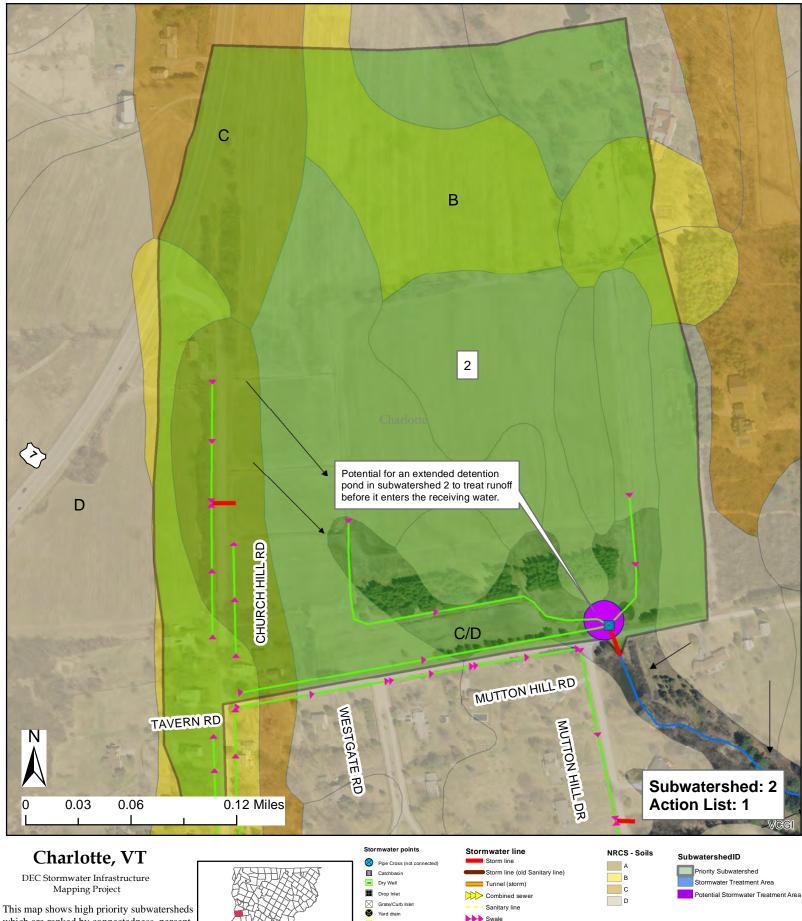
Treatment feature (see no

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

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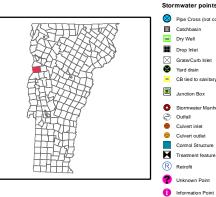




This map shows high priority subwatersheds which are ranked by connectedness, percent of impervious cover, field observations, and potential retrofit measures and locations.

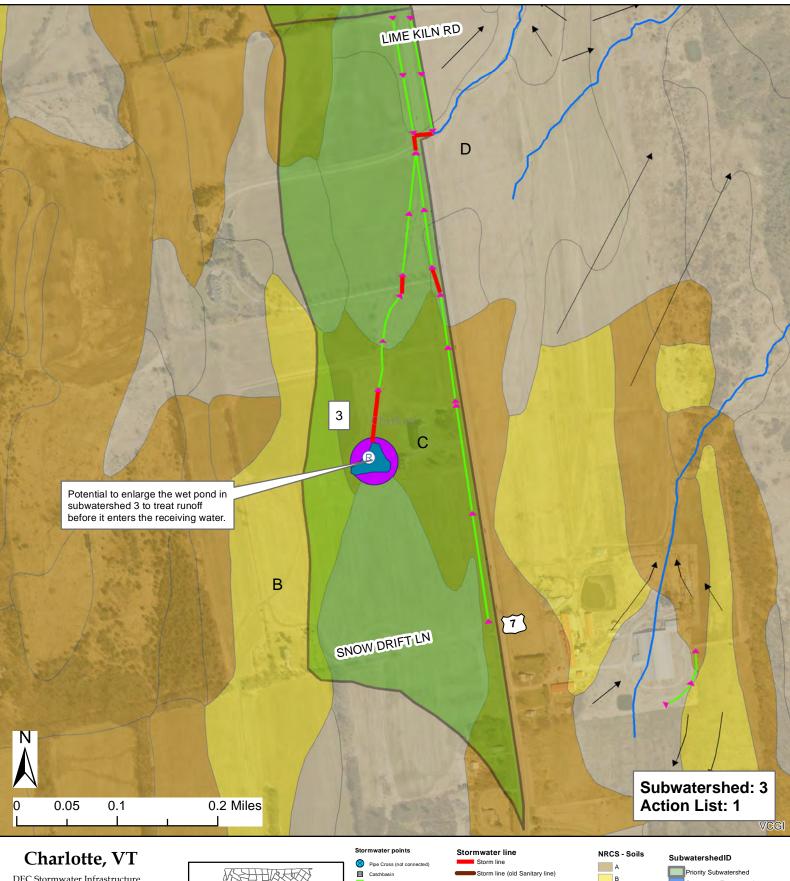
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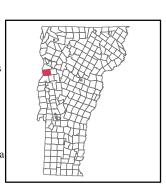
Creator: Jim Pease, David Ainley DEC - WID - Clean Water Initiative Program Plotted Date: 7/22/2022 Data Sources: VTRANS Roads data, VT Hydrography data set, DEC Stormwater database, NRCS soils survery Imagery Source: VCGI Best Available Imagery



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.

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Tunnel (storm) Combined sewer Sanitary line Swale Footing drain Under drain Roof drain Infiltration pipe

French drain Trench drain Emergency spillway

Stream

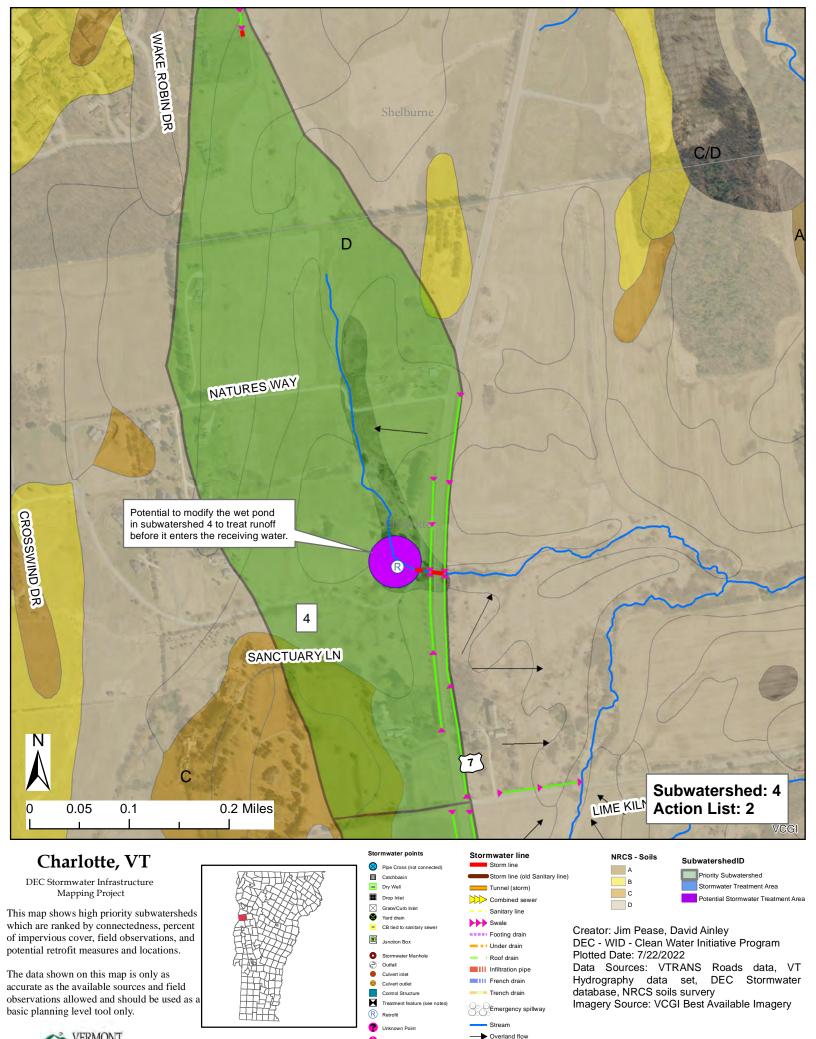
Overland flow

Stormwater Treatment Area Potential Stormwater Treatment Area

Creator: Jim Pease, David Ainley DEC - WID - Clean Water Initiative Program Plotted Date: 7/22/2022 Data Sources: VTRANS Roads data, VT Hydrography data set, DEC Stormwater database, NRCS soils survery Imagery Source: VCGI Best Available Imagery

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1 Information Point