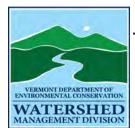
Gunner Brook, Barre City, Vermont

The lower reach of Gunner Brook in Barre City, Vermont has been found to be impaired for sediment in stormwater as measured by the biological community of the brook. There are at least 43 discharges to the brook from the developed lands of Barre City and Town between the mouth and Plainfield Brook Rd. The largest discharge to the river is drainage #149 Barre City which drains the Barre City Auditorium and Ice Arena. Under General Permit 3-9050 3 parcels including this one will have to implement or improve their existing stormwater discharges by 2028. It is estimated that if the 9050 retrofits were installed and the 3 parcels achieve compliance the net reduction for all modeled stormwater controls would be about 11% of the sediment load and 9% of the phosphorus load to the brook. A number of sites are outside the urbanized area and do not have pollutant load modeling but are suggested in the Stormwater Master Plans for Barre Town and Plainfield.

The recommended course of action is to install a stormwater treatment structure on many of these discharges that controls the water quality volume and the channel protection volume. Maps showing the location of these discharges and other possible retrofit locations on private or public land are provided.

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 the Winooski River and Lake Champlain.



Monitoring Site Summary - River/Stream

Gunner Brook

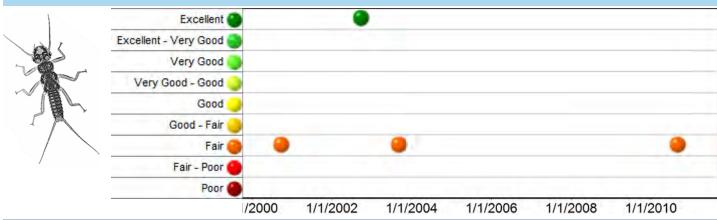
River Mile: 0.2

Located below 3rd bridge (Seminary St) up from Stevens Branch.

Barre City, VT (44.20386, -72.50648)

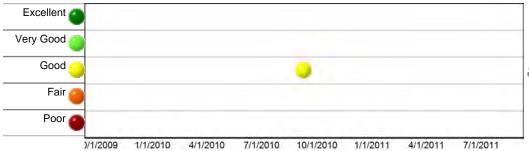
Macroinvertebrate Assessment

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



Fish Assessment

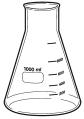
Fish populations provide a measurement of the general health of the aquatic biota. Since fish occupy the top of the food web their population integrates the conditions of lower community types. (For More Details)





Water Quality Measurements

Chemical and physical parameters provide a "snapshot" of current conditions and are used to detect changes in water quality and to make determinations about a waterbody and its watershed. (For More Details)



Characteristic	Description	Trend	Max	Mean	Min
Chloride (mg/L)	At elevated values mostly from deicing	•—•	50.3	49.4	48.6
Conductivity (umho/cm)			556.0	491.2	327.0
Nitrogen (mg/L)	Nutrient that may fuel algae blooms	•	1.1	1.0	0.9
рН	Acidity	• • • •	8.2	8.1	7.9
Phosphorus (ug/L)	Nutrient that may fuel algae blooms	•	30.0	15.3	6.0
Turbidity (NTU)	Measure of suspended sediment	•	1.8	1.2	0.8



Monitoring Site Summary - River/Stream

Gunner Brook

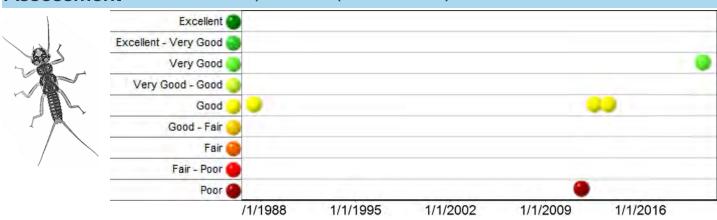
River Mile: 0.8

Located adjacent to old dump site and new ball field.

Barre City, VT (44.21142, -72.50247)

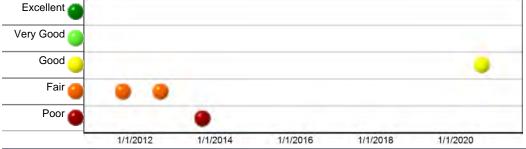
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Fish Assessment

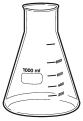
Fish populations provide a measurement of the general health of the aquatic biota. Since fish occupy the top of the food web their population integrates the conditions of lower community types. (For More Details)





Water Quality Measurements

Chemical and physical parameters provide a "snapshot" of current conditions and are used to detect changes in water quality and to make determinations about a waterbody and its watershed. (For More Details)



Characteristic	Description	Trend	Max	Mean	Min
Chloride (mg/L)	At elevated values mostly from deicing		57.0	41.8	28.2
Conductivity (umho/cm)			564.0	482.8	430.8
Nitrogen (mg/L)	Nutrient that may fuel algae blooms	•	1.2	1.0	0.8
рН	Acidity	•••	8.4	7.9	7.6
Phosphorus (ug/L)	Nutrient that may fuel algae blooms	\	36.7	11.9	5.1
Turbidity (NTU)	Measure of suspended sediment		2.3	1.4	0.7



Monitoring Site Summary - River/Stream

Gunner Brook

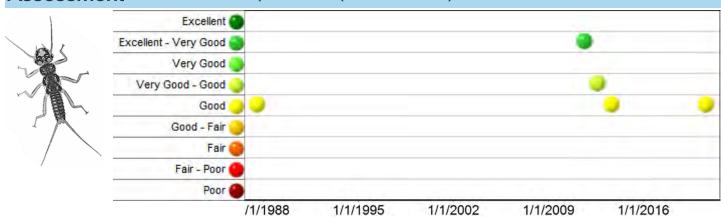
River Mile: 1.1

Located just above old Farwell St dump about 30m.

Barre City, VT (44.21405, -72.50006)

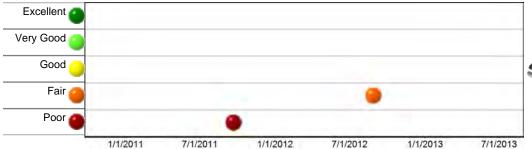
Macroinvertebrate Assessment

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



Fish Assessment

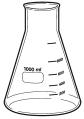
Fish populations provide a measurement of the general health of the aquatic biota. Since fish occupy the top of the food web their population integrates the conditions of lower community types. (For More Details)





Water Quality Measurements

Chemical and physical parameters provide a "snapshot" of current conditions and are used to detect changes in water quality and to make determinations about a waterbody and its watershed. (For More Details)



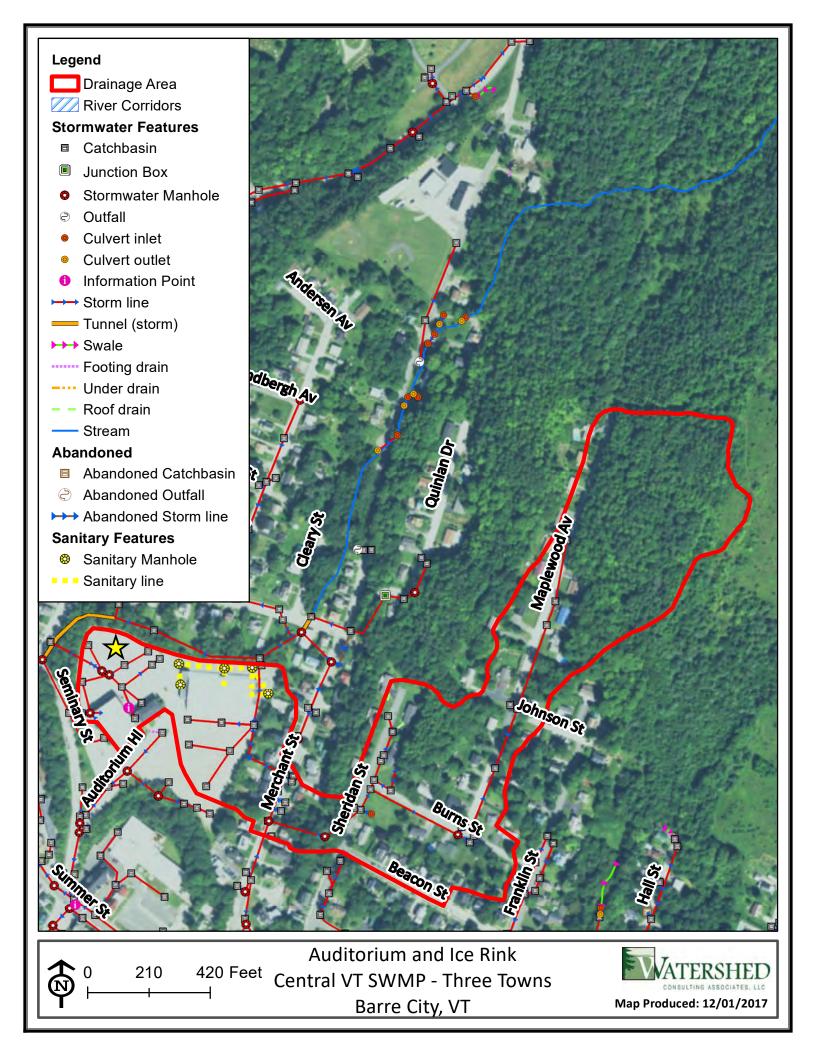
Characteristic	Description	Trend	Max	Mean	Min
Chloride (mg/L)	At elevated values mostly from deicing		52.5	35.3	20.8
Conductivity (umho/cm)		•••	522.0	432.5	389.0
Nitrogen (mg/L)	Nutrient that may fuel algae blooms	•	0.8	0.8	0.7
рН	Acidity	•••	8.8	8.3	8.0
Phosphorus (ug/L)	Nutrient that may fuel algae blooms	\.	56.7	23.7	6.3
Turbidity (NTU)	Measure of suspended sediment		0.6	0.3	0.0

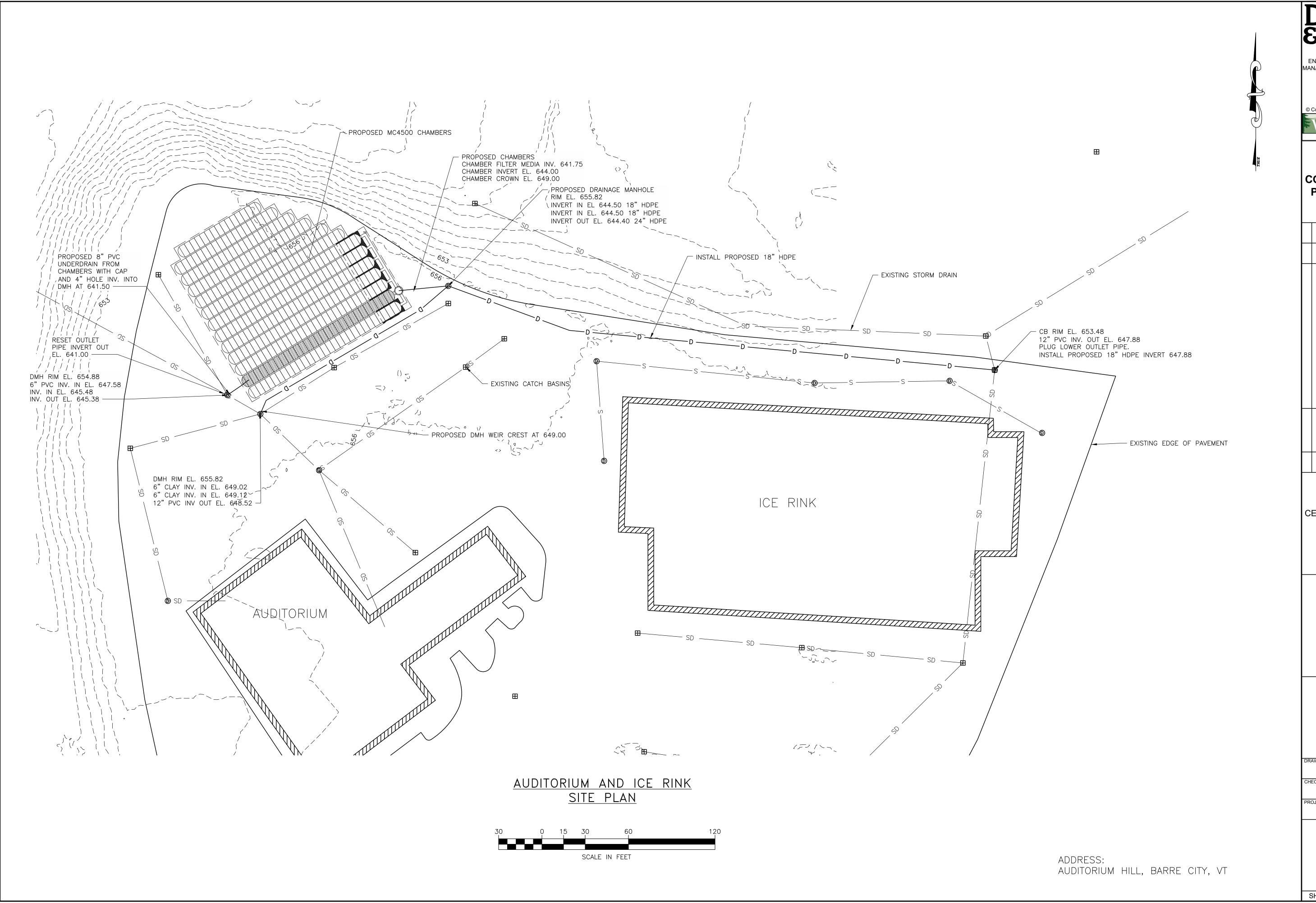
Watershed Number	Action List	Proposed Action	Proposed or Existing Stormwater Treatment Practice	Permit Number	Watershed Area (Acres)	Percent Effective Impervious Area	Sediment Load with Current Reductions (lbs)	Priority Action Sediment Reduction Credit	Sediment Load with Priority Action (lbs)	Phosphorus Load with Current Reductions (lbs)	Priority Action Phosphorus Reduction Credit	Phosphorus Load with Priority Action (lbs)	Estimated Basin Construction Cost	Estimated Other BMP Constructio n Cost	Cost of Sediment Removal Per Pound (based on annual	Cost of Phosphorus Removal Per Pound (based on annual phosphorus	Assistance Program
21 Barre Town			OF/WP/SWPPP	5322- 9003	144.5	0.6	10608	0%	10608	29.47	0%	29.47					ERP, SRF, LCBP
21 Buile 10Wil		Underground		3003	144.0	0.0	10000	070	10000	20.41	070	20.47					Lita , Ola , LODI
	1	infiltration basin on	ID (OO)OD														
	1	west side of	IB/GS/CB														
22 Barre Town		developed area			32.9	3.1	3383	70%	1015	9.40	70%	2.82	\$87,551		\$37	\$13,309	ERP, SRF, LCBP
23 Barre Town			GS/CB		41.7	2.1	3799	0%	3799	10.55	0%	10.55					ERP, SRF, LCBP
04 D T.			OF/GS	3237-	70.7	4.0	2000	00/	0000	47.40	00/	47.40					EDD ODE LODD
24 Barre Town 25 Barre Town			OF	9010	73.7 2.0	1.6 2.9	6263 205	0% 0%	6263 205	17.40 0.57	0% 0%	17.40 0.57					ERP, SRF, LCBP ERP, SRF, LCBP
26 Barre Town			GS/OF		23.3	3.4	2500	0%	2500	6.95	0%	6.95					ERP, SRF, LCBP
30 Barre Town			GS/OF		1.9	16.4	496	0%	496	1.38	0%	1.38					ERP, SRF, LCBP
42 Barre City			OF/CB		47.3	0.9	3630	0%	3630	10.08	0%	10.08					ERP, SRF, LCBP
43 Barre City			OF/CB		15.9	1.1	1269	0%	1269	3.52	0%	3.52			1		ERP, SRF, LCBP
44 Barre City			CB		6.1	18.8	1767	0%	1767	4.91	0%	4.91			l		ERP, SRF, LCBP
45 Barre City			OF/CB		1.8	4.6	212	0%	212	0.59	0%	0.59					ERP, SRF, LCBP
		Infiltraton basin on															, , ,
	1,4	west side of E	IB/OF/CB														
47 Barre City		Montpelier Rd			69.5	2.7	6847	40%	4108	19.02	30%	13.31	\$177,195		\$65	\$31,053	ERP, SRF, LCBP
48 Barre City	4		OF/CB		45.9	4.4	5442	40%	3265	15.12	30%	10.58					ERP, SRF, LCBP
143 Barre City			OF		0.08	0.1	5354	0%	5354	14.87	0%	14.87					ERP, SRF, LCBP
144 Barre City			CB/OF		12.8	9.0	2234	0%	2234	6.21	0%	6.21					ERP, SRF, LCBP
145 Barre City			CB/OF		2.3	32.6	1028	0%	1028	2.86	0%	2.86					ERP, SRF, LCBP
146 Barre City			CB/OF	1	9.7	6.0	1339	0%	1339	3.72	0%	3.72					ERP, SRF, LCBP
147 Barre City			OF CB/OF	1	13.0 5.7	0.3 13.8	915 1315	0% 0%	915 1315	2.54 3.65	0% 0%	2.54					ERP, SRF, LCBP
148 Barre City		Underground	CB/OF		5.7	13.8	1315	0%	1315	3.65	0%	3.65					ERP, SRF, LCBP
		Underground infiltration basin in															
	1,4	northwest corner of	IB/CB														
149 Barre City		parking lot			23.2	44.8	13934	25%	10450	38.70	25%	29.03	\$536,000		\$154	\$55.393	ERP, SRF, LCBP
150 Barre City		p=g	CB/OF		5.2	12.0	1086	0%	1086	3.02	0%	3.02	4000,000		7.5.	700,000	ERP. SRF. LCBP
176 Barre City	4		СВ		16.4	44.3	9738	0%	9738	27.05	0%	27.05					ERP, SRF, LCBP
223 Barre City			СВ		5.3	9.7	968	0%	968	2.69	0%	2.69					ERP, SRF, LCBP
224 Barre City			OF/CB		5.0	15.8	1262	0%	1262	3.51	0%	3.51					ERP, SRF, LCBP
225 Barre City			OF/CB		3.7	10.5	708	0%	708	1.97	0%	1.97					ERP, SRF, LCBP
226 Barre City			OF/CB	ļ	3.8	14.9	935	0%	935	2.60	0%	2.60			ļ		ERP, SRF, LCBP
227 Barre City			СВ	ļ	0.4	60.1	348	0%	348	0.97	0%	0.97			ļ	ļ	ERP, SRF, LCBP
228 Barre City			OF/CB	<u> </u>	1.0	23.6	350	0%	350	0.97	0%	0.97			ļ		ERP, SRF, LCBP
229 Barre City			CB	ļ	2.4	49.6	1550	0%	1550	4.30	0%	4.30			1		ERP, SRF, LCBP
230 Barre City			CB		1.4	67.2	1236 1135	0%	1236	3.43 3.15	0%	3.43 3.15		-	1		ERP, SRF, LCBP
231 Barre City 232 Barre City			CB OF		1.1	78.9 8.2	1135 164	0% 0%	1135 164	3.15 0.46	0% 0%	3.15 0.46		-	1		ERP, SRF, LCBP
232 Barre City			OF OF	1	1.0	47.2	741	0%	741	2.06	0%	2.06		1	1		ERP, SRF, LCBP
234 Barre City			CB	1	1.5	20.2	471	0%	471	1.31	0%	1.31		†	 	 	ERP, SRF, LCBP
235 Barre City			OF	1	1.2	28.5	497	0%	497	1.38	0%	1.38		 	1		ERP, SRF, LCBP
236 Barre City			CB		0.7	54.3	491	0%	491	1.37	0%	1.37		1	1		ERP, SRF, LCBP
237 Barre City			OF		0.2	49.4	163	0%	163	0.45	0%	0.45			l		ERP, SRF, LCBP
238 Barre City			OF	1	2.2	22.4	728	0%	728	2.02	0%	2.02			İ	İ	ERP, SRF, LCBP
239 Barre City			OF		1.1	21.9	347	0%	347	0.96	0%	0.96			1		ERP, SRF, LCBP
240 Barre City			OF		1.2	15.9	307	0%	307	0.85	0%	0.85					ERP, SRF, LCBP
241 Barre City			OF		1.5	50.7	1031	0%	1031	2.86	0%	2.86					ERP, SRF, LCBP
242 Barre City			OF		0.8	26.2	319	0%	319	0.89	0%	0.89					ERP, SRF, LCBP
243 Barre City			CB		2.1	76.5	2066	0%	2066	5.74	0%	5.74					ERP, SRF, LCBP

Target Maps

Showing Priority Action List Drainage Areas

And Potential Retrofit Locations





DuBois EKing Inc.

MANAGEMENT • DEVELOPMENT

28 NORTH MAIN ST.

RANDOLPH, VT 05060

TEL: (802) 728-3376

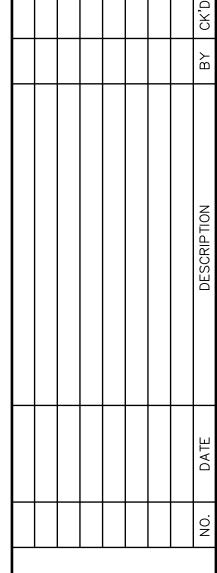
FAX: (802) 783-7101

www.dubois-king.com

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CONSULTING ASSOCIATES,
PROFESSIONAL SEAL

NOT FOR
CONSTRUCTION
PRELIMINARY
PLANS



CENTRAL VERMONT STORMWATER MASTER PLAN

> STORMWATER MASTER PLAN

> > SHEET TITLE

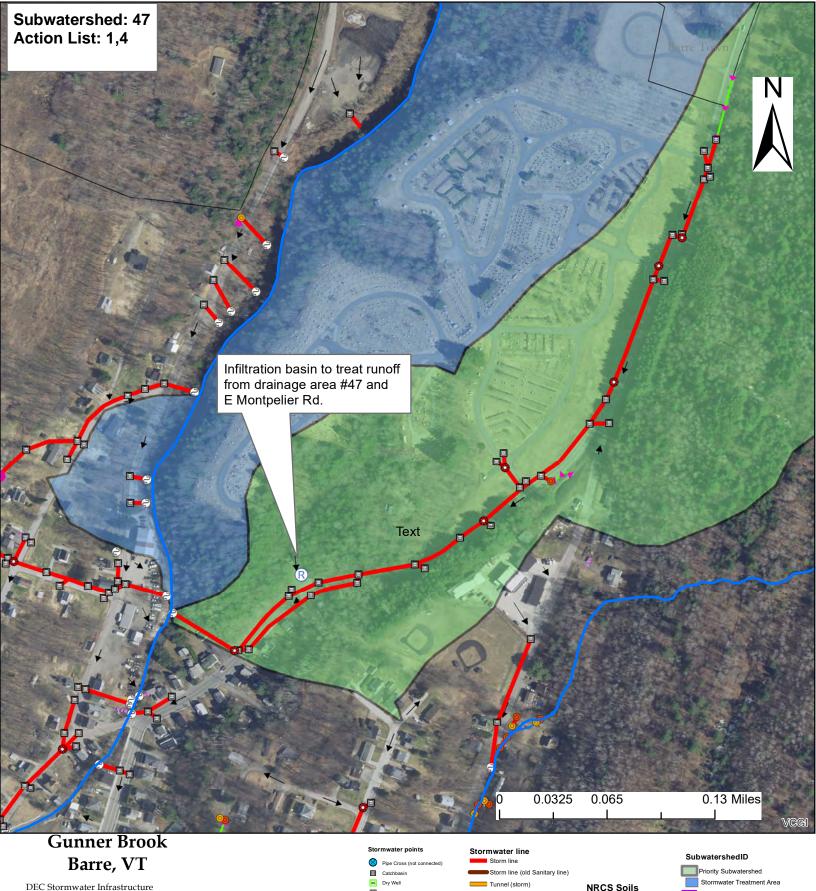
AUDITORIUM AND ICE RINK SITE PLAN

DRAWN BY	DATE
AS	JAN. 2018
CHECKED BY	D&K PROJECT #
ATH	123722
PROJ. ENG.	D&K ARCHIVE #
ATH	
	AS CHECKED BY ATH PROJ. ENG.

SHEET NUMBER

2

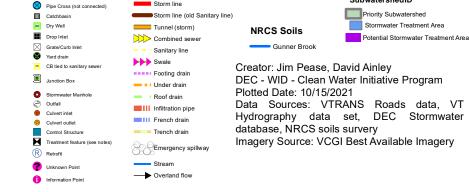
SHEET 2 OF 7

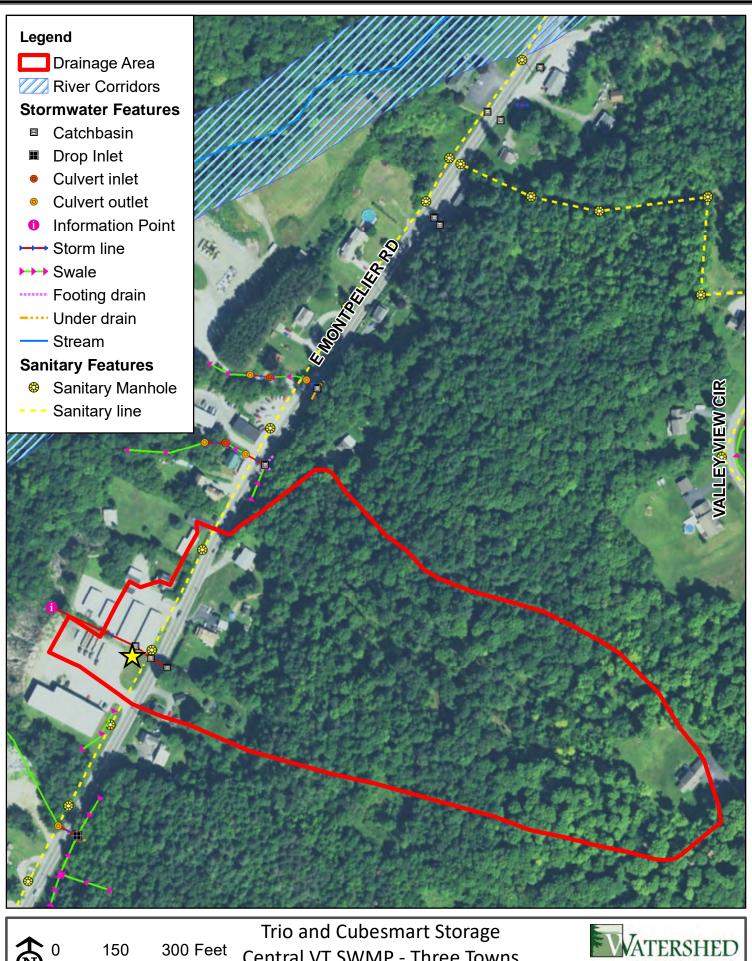


Mapping Project
This map shows high priority subwatersheds
which are ranked by connectedness, percent
of impervious cover, field observations, and

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.

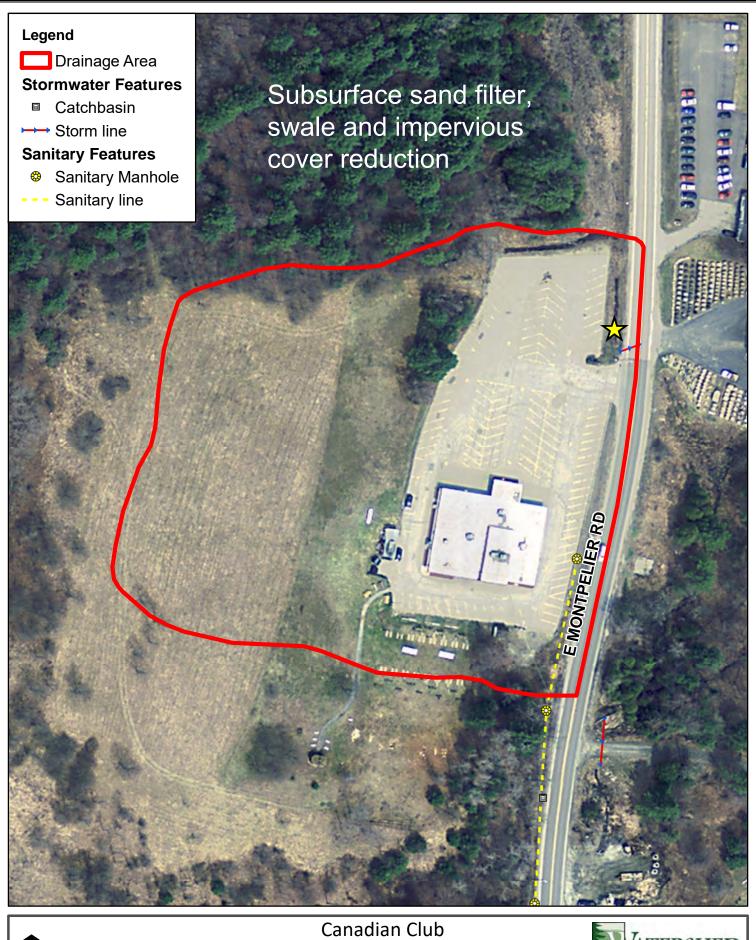




Central VT SWMP - Three Towns Barre Town, VT

Map Produced: 12/20/2017

Sites that are outside the Barre urbanized area and do not have modeling but are suggested in the Stormwater Master Plans for Barre Town and Plainfield.







	BMP Summary Sheet		BMP ID #:	19
Site name:	Browning Stone	Municipality:	Barre Town	
Approximate address:	424 E Montpelier Rd		Assessment Date	2017-06-02

Cistern

Proposed	l BMP d	lescription:
----------	---------	--------------

Gutter roof and add cistern for water reuse.

Site Description

private, not permitted, stone work

Feasibility concerns:

Ownership of Site

Proposed BN	/IP details
Current site type	Commercial
Relative drainage area	Small
Impervious area (approx %)	High
BMP pollutant reduction	Low
BMP design required	Minimal
Hydrologic soil group	С
Proximity to water	Low
Stormwater permit?	No
Pollution visible	
Land owner where BMP is	Private
located	
If existing, BMP type	
Relative project cost	Low
Retrofit priority	Low
Project score	94
Project rank by municipality	41

Site map



Site photo



		BMP ID #:	31		
Site name:	Eastman Auto	Municipality:	Barre Town		
Approximate address:	431 E Montpelier Rd		Assessment Date	2017-06-02	

Proposed BMP type: Infiltration Trench, Cistern

Proposed BMP description:

Construct infiltration trench along roadside in front of parking area and Browning Stone to capture runoff from Eastman's Auto. Gutter roof and direct to cistern. Rainwater can be used for car washing.

Site Description

private, not permitted, car dealership

Feasibility concerns:

Ownership of Site, Utilities

Proposed BI	MP details
Current site type	Commercial
Relative drainage area	Small
Impervious area (approx %)	Medium
BMP pollutant reduction	Medium
BMP design required	Minimal
Hydrologic soil group	В
Proximity to water	Low
Stormwater permit?	No
Pollution visible	
Land owner where BMP is	Private
located	
If existing, BMP type	
Relative project cost	Low
Retrofit priority	Low
Project score	83
Project rank by municipality	53





	BMP Summary Sheet		BMP ID #:	32
Site name:	F.W. Webb Co	Municipality:	Barre Town	
Approximate address:	10 Clark Rd		Assessment Date	2017-06-02

Proposed BMP type: Infiltration Basin

Proposed BMP description:

Construct linear grass infiltration basin with overflow to existing culvert.

Site Description

private, not permitted, pretty well vegetated, not a large volume

Feasibility concerns:

Ownership of Site, Wetlands Across Street

Proposed BI	MP details
Current site type	Commercial
Relative drainage area	Small
Impervious area (approx %)	Medium
BMP pollutant reduction	Medium
BMP design required	Minimal
Hydrologic soil group	В
Proximity to water	Low
Stormwater permit?	No
Pollution visible	
Land owner where BMP is	Private
located	
If existing, BMP type	
Relative project cost	Low
Retrofit priority	Low
Project score	83
Project rank by municipality	53





	BMP Summary Sheet		BMP ID #:	22
Site name:	Gonyeau Rd near Upper Rd	Municipality:	Plainfield	
Approximate address:	Gonyeau Rd and Upper Rd		Assessment Date	2017-06-20

Swale Improvements

Proposed BMP description:

Stone line roadside ditch and add check dams. Stone line ditch and add check dams along Gonyea Rd (both sides around intersection).

Site Description

D soils, ROW, moderate steepness, no permit, noted by town: Town noted newly replaced culvert is too small, assess contributing stormwater impacts.

Feasibility concerns:

Proximity to Stream, Poor Soils, Space, Utilities

Proposed BMP details		
Current site type	Road / ROW	
Relative drainage area	Medium	
Impervious area (approx %)	Low	
BMP pollutant reduction	Low	
BMP design required	Medium	
Hydrologic soil group	D	
Proximity to water	High	
Stormwater permit?	No	
Pollution visible		
Land owner where BMP is	Town /City	
located		
If existing, BMP type		
Relative project cost	Medium	
Retrofit priority	Medium	
Project score	81	
Project rank by municipality	38	

Site photo

Site map





	BMP Summary Sheet		BMP ID #:	16
Site name:	Flood Rd Swale	Municipality:	Plainfield	
Approximate address:	Flood Rd, east of intersection with Lower Rd		Assessment Date	2017-06-09

Swale enhancements

Proposed BMP description:

Stone armor existing swale and add check dams to reduce stormwater velocity, prevent erosion, and allow for settling of materials. Road is steep and swale is currently eroding.

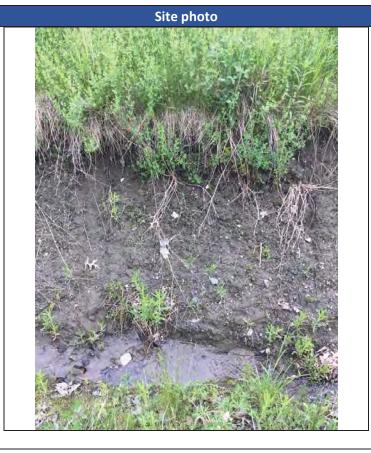
Site Description

Roadside swale

Feasibility concerns:

Proposed BMP details		
Current site type	Road / ROW	
Relative drainage area	Small	
Impervious area (approx %)	Medium	
BMP pollutant reduction	Low	
BMP design required	Minimal	
Hydrologic soil group	D	
Proximity to water	Low	
Stormwater permit?	No	
Pollution visible	Excessive Erosion	
Land owner where BMP is	Town /City	
located		
If existing, BMP type		
Relative project cost	Low	
Retrofit priority	Low	
Project score	90	
Project rank by municipality	25	





	BMP Summary Sheet		BMP ID #:	21
Site name:	Gonyeau Rd	Municipality:	Plainfield	
Approximate address:	Gonyeau Rd		Assessment Date	2017-06-20

Road Resurfacing, Vegetated Swale, Swale Improvements

Proposed BMP description:

Town noted class 4 road is eroding. There is a spring running down middle of unimproved road. Redirect water off road into stone lined or vegetated channel. Regrade road. Consider resurfacing road with appropriate material (i.e., stay mat).

Site Description

public ROW, relatively steep, no permit, noted by town

Feasibility concerns:

Poor Soils

Proposed BMP details		
Current site type	Road / ROW	
Relative drainage area	Medium	
Impervious area (approx %)	Low	
BMP pollutant reduction	Medium	
BMP design required	Medium	
Hydrologic soil group	С	
Proximity to water	Medium	
Stormwater permit?	No	
Pollution visible	Excessive Erosion	
Land owner where BMP is	Town /City	
located		
If existing, BMP type		
Relative project cost	Medium	
Retrofit priority	Medium	
Project score	74	
Project rank by municipality	42	





	BMP Summary Sheet		BMP ID #:	28
Site name:	Middle Rd Ditch	Municipality:	Plainfield	
Approximate address:	Middle Rd		Assessment Date	2017-06-20

Swale Improvements, Cross Culvert

Proposed BMP description:

Formalize roadside ditch. Add cross culverts to distribute road runoff to vegetated areas. Stone line ditch and add check dams.

Site map

Site Description

Ditches along Middle Rd, road runoff

Feasibility concerns:

Space

Proposed BMP details		
Current site type	Road / ROW	
Relative drainage area	Small	
Impervious area (approx %)	Low	
BMP pollutant reduction	Low	
BMP design required	Minimal	
Hydrologic soil group	С	
Proximity to water	Low	
Stormwater permit?	No	
Pollution visible		
Land owner where BMP is	Town /City	
located		
If existing, BMP type		
Relative project cost	Low	
Retrofit priority	Low	
Project score	84	
Project rank by municipality	32	

Legend Typoposed BMP Site Parcel Boundaries Town Boundaries Curvert inlet



	BMP Summary Sheet		BMP ID #:	40
Site name:	L&D Safety Marking Corporation	Municipality:	Barre Town	
Approximate address:	304 E Montpelier Rd		Assessment Date	2017-06-02

Infiltration Trench, Vegetated Swale, Cistern / Rain Barrel, Dry Well

Proposed BMP description:

Direct roof runoff to cistern or dry well for lower building. Construct infiltration trench and swale along parking lot to the left of the driveway.

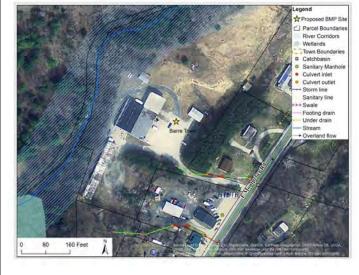
Site Description

A soils, private, not permitted

Feasibility concerns:

Ownership of Site

Proposed BMP details		
Current site type	Commercial	
Relative drainage area	Small	
Impervious area (approx %)	Medium	
BMP pollutant reduction	Medium	
BMP design required	Medium	
Hydrologic soil group	А	
Proximity to water	High	
Stormwater permit?	No	
Pollution visible		
Land owner where BMP is	Private	
located		
If existing, BMP type		
Relative project cost	Low	
Retrofit priority	Low	
Project score	89	
Project rank by municipality	47	





	BMP Summary Sheet		BMP ID #:	47
Site name:	Upper Rd near Gonyeau Rd	Municipality:	Plainfield	
Approximate address:	Gonyeau Rd and Upper Rd		Assessment Date	2017-06-20

Swale Improvements

Proposed BMP description:

Stone line roadside ditch and add check dams. Along Upper Rd, add stone lined stormwater turnouts to vegetated areas prior to stream spaced along road dependent on grade.

Site Description

D soils, ROW, moderate steepness, no permit, noted by town: Town noted newly replaced culvert is too small, assess contributing stormwater impacts.

Feasibility concerns:

Proximity to Stream, Poor Soils, Space, Utilities

Proposed BMP details		
Current site type	Road / ROW	
Relative drainage area	Medium	
Impervious area (approx %)	Low	
BMP pollutant reduction	Medium	
BMP design required	Medium	
Hydrologic soil group	D	
Proximity to water	High	
Stormwater permit?	No	
Pollution visible		
Land owner where BMP is	Town /City	
located		
If existing, BMP type		
Relative project cost	Low	
Retrofit priority	Medium	
Project score	101	
Project rank by municipality	13	



