VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
STORMWATER PROGRAM

Municipal Separate Storm Sewer System (MS4)
2019 Annual Report

A. Permittee Information

1. Name of MS4: Town of Williston

2. Permit Number: 7030 - 9014.A1RA

B. Attached Documents

The following documents have been prepared and submitted with this Annual Report:

- ✓ Annual Report Workbook (.xlsx)
- ✓ BMP Tracking Table (.xlsx)

C. Certification of STPs constructed to comply with the FRP or PCP

The following BMPs were built or implemented within the past calendar year and were constructed in compliance with the approved Flow Restoration Plan (FRP) or Phosphorus Control Plan (PCP).

Name of System	Location
Indian Ridge (Taft Farms)	44.45049 / -73.10157
Taft Farms Condominiums	44.44831 -73.10175
Meadowridge Ponds 1,2,3	Pond 1: 44.41940 / -73.06231 Pond 2: 44.42882 / -73.06318 Pond 3: 44.42769 / -73.05839
Old Stage Estates Ponds 1 & 2	Pond 1: 44.44540 / -73.07362 Pond 2: 44.44549 / -73.07199
Williston Commons	44.43947 -73.08126

Christine Dougherty
Name of Qualified Designer

Stormwater Coordinator
Title

Christine Dougherty
Signature

03/30/2020
Date

D. MS4 Operator Certification

This Annual Report shall be signed by a principal executive officer, ranking elected official or other duly authorized employee consistent with 40 CFR §122.22(b) and certified as follows:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Bruce K. Hoar
Print Name

Public Works Director
Title

Bruce K. Hoar
Signature

4/1/2020
Date

Revised February 2020

BMP Identification									Design, Construction and Maintence						Basin Information
Unique ID	Project Name	Land Owner	Responsible Party	Latitude (decimal degrees)	Longitude (decimal degrees)	Existing SW permit number (if applicable)	Watershed Projects Database ID (if known)	Part of MS4/ Incorporated into MS4	Cost Estimate (optional)	BMP Status	Year Planned Construction	Date Constructed	Date of last inspection	Maintence needed?	Applicable FRP
ABC0001	Test BMP	Townsville MS4	Colchest	44.11111	-73.00002	3000-9010		Yes		Complete		7/1/2018	7/1/2018	No	Sunderland Brook
2-0231	Pleasant Acres	Pleasant Acres Subdivision	Williston	44.45131	-73.06262	2-0231		Yes		Final Design (100%)					Allen Brook
1-1507 P1	Coyote Run	Coyote Run Subdivision	Williston	44.45062	-73.08943	1-1507		Yes		Final Design (100%)					Allen Brook
1-1507 P2	Coyote Run	Coyote Run Subdivision	Williston	44.45060	-73.09018	1-1507		Yes		Final Design (100%)					Allen Brook
2-0954	Allenbrook Meadows	Allenbrook Meadows	Williston	44.43875	-73.06325	2-0954		Yes		Complete		12/5/2016	Incorporated into MS4 Permit		Allen Brook
1-1272	Brennan Woods	Brennan Woods	Williston	44.45584	-73.10120	1-1272		Yes		Complete		10/5/2017	7/15/2019		Allen Brook
2-1180 North	Golf Links	Golf Links	Williston	44.44689	-73.06189	2-1180		Yes		Complete		9/7/2018	7/15/2019		Allen Brook
2-1180 South	Golf Links	Golf Links	Williston	44.44480	-73.06303	2-1180		Yes		Complete		9/7/2018	7/15/2019		Allen Brook
1-1258	Heritage Meadows	Heritage Meadows	Williston	44.44780	-73.06907	1-1258		Yes		Complete		10/1/2018	7/15/2019		Allen Brook
1-1217 Isham	Indian Ridge (Taft Farms)	Indian Ridge (Taft Farms)	Williston	44.45049	-73.10157	1-1217		Yes		Complete		11/11/2019	Incorporated into MS4 Permit		Allen Brook
2-1190 Meadov	Meadow Run and Forest Run	Meadow Run and Forest Ru	Williston	44.46262	-73.10762	2-1190		Yes		Complete		10/19/2018	7/15/2019		Allen Brook
2-1190 Forest	Meadow Run and Forest Run	Meadow Run and Forest Ru	Williston	44.46067	-73.10631	2-1190		Yes		Complete		10/19/2018	7/15/2019		Allen Brook
2-1107 P1	Meadowridge	Meadowridge	Williston	44.41940	-73.06231	2-1107		Yes		Under Construction		10/19/2019			Allen Brook
2-1107 P2	Meadowridge	Meadowridge	Williston	44.42882	-73.06318	2-1107		Yes		Under Construction		10/19/2019			Allen Brook
2-1107 P3	Meadowridge	Meadowridge	Williston	44.42769	-73.05839	2-1107		Yes		Under Construction		10/19/2019			Allen Brook
2-1146 P1	Old Stage Estates	Old Stage Estates	Williston	44.44540	-73.07362	2-1146		Yes		Complete		7/12/2019	Incorporated into MS4 Permit		Allen Brook
2-1146 P3	Old Stage Estates	Old Stage Estates	Williston	44.44549	-73.07199	2-1146		yes		Complete		7/12/2019	Incorporated into MS4 Permit		Allen Brook
1-0664 sn1	South Ridge	South Ridge	Williston	44.44660	-73.09097	1-0664		yes		Complete		10/25/2017	7/15/2019		Allen Brook
1-0664 sn2	South Ridge	South Ridge	Williston	44.44565	-73.08852	1-0664		yes		Complete		10/25/2017	7/15/2019		Allen Brook
1-0664 sn5	South Ridge	South Ridge	Williston	44.44307	-73.08517	1-0664		yes		Complete		10/25/2017	7/15/2019		Allen Brook
1-0664 sn6	South Ridge	South Ridge	Williston	44.44382	-73.08950	1-0664		Yes		Complete		10/25/2017	7/15/2019		Allen Brook
1-0513 4	Taft Farms Condominiums	Taft Farms Condominiums	Williston	44.44831	-73.10175	1-0513		Yes		Complete		11/11/2019	Incorporated into MS4 Permit		Allen Brook
2-1191	Turtle Pond	Turtle Pond	Williston	44.44520	-73.07867	2-1191		Yes		Complete		9/17/2018	7/15/2019		Allen Brook
1-0963	Whitney Hill	Whitney Hill	Williston	44.43863	-73.07881	1-0963		Yes		Preliminary Design (<100%)					Allen Brook
1-1052	Delete	Delete	Williston	44.43947	-73.08126	1-1052		Yes				12/10/2019			Allen Brook
4306-INDO	Meadowbrook	Town of Williston	Williston	44.46246	-73.11642	4306-INDO		Yes		Complete			7/15/2019		Allen Brook
Delete	Delete	Town of Williston	Williston	44.45814	-73.11964	N/A		Yes							Allen Brook
Lamplite	Lamplite	Town of Williston	Williston	44.45814	-73.11964	N/A		Yes		Complete					Allen Brook
1-1052	Williston Commons	Williston Commons	Williston	44.43947	-73.08126	1-1052		Yes		Complete		12/10/2019	Incorporated into MS4 Permit		Allen Brook

		BMP Tracking Specifications											Phosphorus Calculations					
LC TMDL Drainage Area	LC TMDL Lake Segment	Eligible for Phosphorus Credit?	BMP Type	Impervious area (acres)	Pervious Entry Method	Pervious HSG A	Pervious HSG B	Pervious HSG C	Pervious HSG D	Total Pervious area (acres)	Storage volume (ft^3)	Infiltration rate (in/hr)	* Load Before Treatment (kg/ac/yr)	* Storage Depth (inches)	* Practice Efficiency	* P Reduction (kg/year)	Manual P Reduction (kg/yr)	Is this an upgrade to an existing BMP?
Winooski River	Main Lake	Yes	Gravel Wetland	16.11	Total Pervious					64.11	75,000		32.80	0.71	54.36%	17.83		Yes
Winooski River	Main Lake	Yes	Extended Dry Detention Pond	0.19	Total Pervious					2.05	3,140		0.69	1.07	11.15%	0.08		No
Winooski River	Main Lake	Yes	Wet pond/ Created Wetland	2.99	Total Pervious					10.08	41,400		5.67	1.55	53.53%	3.03		Yes
Winooski River	Main Lake	Yes	Wet pond/ Created Wetland	2.48	Total Pervious					4.95	37,250		3.91	1.98	57.76%	2.26		
Winooski River	Main Lake	Yes	Extended Dry Detention Pond	1.06	Total Pervious					2.97	-		1.87	0.00				
Winooski River	Main Lake	Yes	Wet pond/ Created Wetland	14.91	Total Pervious					56.5	102,000		29.71	0.94	46.83%	13.91		Yes
Winooski River	Main Lake	Yes	Wet pond/ Created Wetland	3.15	Total Pervious					15.55	31,800		7.11	1.10	49.02%	3.49		Yes
Winooski River	Main Lake	Yes	Wet pond/ Created Wetland	4.24	Total Pervious					34.23	30,884		12.64	0.74	42.05%	5.32		Yes
Winooski River	Main Lake	Yes	Extended Dry Detention Pond	4.84	Total Pervious					11.95	14,500		8.17	0.59	7.85%	0.64		Yes
Winooski River	Main Lake	Yes	Wet pond/ Created Wetland	4.15	Total Pervious					12.54	37,900		7.53	1.23	50.33%	3.79		Yes
Winooski River	Main Lake	Yes	Wet pond/ Created Wetland	4.67	Total Pervious					6.44	24,050		6.70	1.02	48.18%	3.23		No
Winooski River	Main Lake	Yes	Wet pond/ Created Wetland	3.18	Total Pervious					3.37	21,600		4.33	1.34	51.40%	2.23		Yes
Winooski River	Main Lake	Yes	Extended Dry Detention Pond	7.87	Total Pervious					70.42	33,370		25.06	0.51	7.08%	1.77		No
Winooski River	Main Lake	Yes	Wet pond/ Created Wetland	2.94	Total Pervious					11.84	51,620		6.02	1.68	54.79%	3.30		No
Winooski River	Main Lake	Yes	Wet pond/ Created Wetland	2.02	Total Pervious					27.17	33,540		8.53	0.98	47.53%	4.06		No
Winooski River	Main Lake	Yes	Wet pond/ Created Wetland	2.94	Total Pervious					11.84	24,000		6.02	1.04	48.37%	2.91		No
Winooski River	Main Lake	Yes	Extended Dry Detention Pond	1.68	Total Pervious					13.76	10,889		5.06	0.69	8.44%	0.43		No
Winooski River	Main Lake	Yes	Extended Dry Detention Pond	4.14	Total Pervious					9.89	37,810		6.91	1.33	11.67%	0.81		Yes
Winooski River	Main Lake	Yes	Extended Dry Detention Pond	6.76	Total Pervious					28.91	55,890		14.23	1.02	11.05%	1.57		Yes
Winooski River	Main Lake	Yes	Extended Dry Detention Pond	2.67	Total Pervious					7.86	11,720		4.80	0.75	8.73%	0.42		Yes
Winooski River	Main Lake	Yes	Extended Dry Detention Pond	2.28	Total Pervious					6.23	22,650		3.99	1.35	11.70%	0.47		Yes
Winooski River	Main Lake	Yes	Wet pond/ Created Wetland	1.77	Total Pervious					2.95	11,590		2.66	1.17	49.68%	1.32		Yes
Winooski River	Main Lake	Yes	Wet pond/ Created Wetland	1.77	Total Pervious					9.24	66,600		4.11	2.00	58.00%	2.38		Yes
Winooski River	Main Lake	Yes	Extended Dry Detention Pond	2.65	Total Pervious					5.53	9,450		4.24	0.70	8.48%	0.36		Yes
																		Yes
Winooski River	Main Lake	Yes	Wet pond/ Created Wetland	2.75	Total Pervious					7.83	21,344		4.88	1.13	49.27%	2.40		No
																		No
Winooski River	Main Lake	Yes	Infiltration Trench	2.63	Total Pervious					6.83	16,500	2.41 in/hr	4.52	1.00	96.00%	4.33		
Winooski River	Main Lake	Yes	Wet pond/ Created Wetland	3.79	Total Pervious					20.03	84,420		8.86	1.73	55.32%	4.90		Yes

			Drainage Area Prior to Upgrade							BMP Specifications Prior to Upgrade							
Does the upgrade changed the drainage area?	% Credit to MS4	* P Credit (kg/yr)	Prior Impervious area (acres)	Pervious Entry Method 2	HSG A	HSG B	HSG C	HSG D	Total Pervious Area	BMP type prior to upgrade	Previous storage volume (ft^3)	Infiltration rate prior to upgrade (in/hr)	* Prior Load Before Treatment (kg/acre/year)	* Prior Storage Depth (inches)	* Prior Practice Efficiency	* Estimated P removal of Prior Practice (kg/yr)	Manual P Reduction - Prior Practice (kg/yr)
Yes	100%	15.92	10.00	Total Pervious					50.00	Extended Dry Detention Pond	30,000		22.72	0.49	8.43%	1.92	
	100%	0.08												0.00			
Yes	100%	2.55	2.99	Total Pervious					10.08	Extended Dry Detention Pond	13,070		5.67	0.72	8.58%	0.49	
	100%	2.26												0.00			
	100%													0.00			
Yes	100%	3.61	14.91	Total Pervious					56.50	Wet pond/ Created Wetland	48,800		29.71	0.56	34.69%	10.30	
Yes	100%	0.42	3.15	Total Pervious					15.55	Wet pond/ Created Wetland	18,425		7.11	0.78	43.13%	3.07	
Yes	100%	1.35	4.24	Total Pervious					34.23	Wet pond/ Created Wetland	16,900		12.64	0.51	31.38%	3.97	
Yes	100%	0.64	4.84	Total Pervious					11.95	Extended Dry Detention Pond	1,950		8.17	0.10	0.07%	0.01	
Yes	100%	3.79	4.15	Total Pervious					12.54	Extended Dry Detention Pond	1,700		7.53	0.10	0.07%	0.01	
	100%	3.23												0.00			
Yes	100%	1.75	3.18	Total Pervious					3.37	Extended Dry Detention Pond	15,550		4.33	1.03	11.06%	0.48	
	100%	1.77												0.00			
	100%	3.30												0.00			
	100%	4.06												0.00			
	100%	2.91												0.00			
	100%	0.43												0.00			
Yes	100%	0.80	4.14	Total Pervious					9.89	Extended Dry Detention Pond	1,630		6.91	0.10	0.01%	0.00	
Yes	100%	1.57	6.76	Total Pervious					28.91	Extended Dry Detention Pond	2,850		14.23	0.10	0.05%	0.01	
Yes	100%	0.42	2.67	Total Pervious					7.86	Extended Dry Detention Pond	1,080		4.80	0.10	0.04%	0.00	
Yes	100%	0.47	2.28	Total Pervious					6.23	Extended Dry Detention Pond	910		3.99	0.10	0.02%	0.00	
Yes	100%	1.07	1.77	Total Pervious					2.95	Extended Dry Detention Pond	7,450		2.66	0.83	9.34%	0.25	
Yes	100%	0.05	1.77	Total Pervious					9.24	Wet pond/ Created Wetland	44,430		4.11	1.87	56.66%	2.33	
Yes	100%	0.36	2.65	Total Pervious					5.53	Extended Dry Detention Pond	1,050		4.24	0.10	0.06%	0.00	
Yes	100%	Enter Info -->	3.79	Total Pervious					20.03	Extended Dry Detention Pond	1,650		#REF!				
	100%	2.40												0.00			
	100%																
	100%	4.33												0.00			
Yes	100%	4.90	3.79	Total Pervious					20.00	Extended Dry Detention Pond	1,650		8.85	0.10	0.06%	0.00	

Town of Williston MS4 Annual Report

MCM #1

Low Risk Runoff & Erosion Control Checklist

Rethink Runoff Annual Report

Town of Williston

LOW IMPACT RUNOFF & EROSION CONTROL CHECKLIST

This checklist must ordinarily be submitted whenever a development will involve clearing, grading, or disturbance of between 0.25 (1/4) and 2 acres of land. Larger developments and all development that impacts a watershed protection buffer or a slope of 8% or more must submit a Runoff and Erosion Control Plan. By initialling the checklist, the applicant indicates he/she will comply with the performance standards. Failure to implement and maintain the required runoff and erosion control measures is a violation of the *Williston Development Bylaw*, subject to enforcement as provided by WDB 7.4 and 7.5 For more information on how to implement erosion control measures, please refer to the State of Vermont's *Low Risk Site Handbook for Erosion and Sediment Control,* which is available online at: http://www.vtwaterquality.org/stormwater/docs/construction/sw_low_risk_site_handbook.pdf).

applicant	administrator	
		Mark Construction Limits. Before beginning construction, the limits of construction impact must be physically marked on-site, using orange flagging or safety fence. A protection zone must also be established around any existing vegetation that is to be retained, to the dripline of the vegetation). All Class 2 wetlands and land in Watershed Protection Buffers must be outside the marked construction limits.
		Stabilize Construction Entrance/Exit. If you are going to be driving ***any*** vehicles on and off the construction site, the construction entrance/exit must be stabilized. Geotextile filter cloth must be put down and covered with clean 1" to 4" gravel at least 8 inches thick. The stabilized entrance must be 12 feet in width and a minimum of 40 feet in length (or the length of the driveway if this is shorter than 40').
		Install Silt Fence. Silt fence must be installed on the downhill side of construction activiites in order to intercept runoff and allow sediment to settle out. Ensure that the silt fence catches all runoff from bare soil, and is installed across the slope *prior to the start of construction activi*ty. Hay bales may NOT be substituted for silt fence.
		Divert Upland Runoff. Create diversion berms to intercept and divert upslope runoff before it reaches your construction site. Compact the berm with a shovel and stabilize it and the channel below it with seed or erosion control matting.
		Slow Down Channelized Runoff. Stone check dams must be installed in all channels and/or ditches which will be used to divert or direct stormwater flow. The spacing of check dams must be equal to the height of the check dam divided by the channel slope. Hay bales may not be used as check dams.

☐ ☐ **Stabilize Exposed Soil**. All areas of disturbed soil must have temporary or permanent stabilization within 14 days of initial disturbance. Temporary stabilization can be achieved by seeding and mulching, or applying erosion control matting after the day's construction activity is finished. After final grade is achieved, permanent stabilization must follow within 48 hours, via seeding and mulching, or hydroseeding.

I understand the erosion and runoff control requirements of the *Williston Development Bylaw*, as they are embodied in this checklist and certify that, if approved, the development I have proposed will proceed in full compliance with these requirments.

Applicant's Signature: _____ Date: _____

MCM #1
REGIONAL STORMWATER EDUCATION PROGRAM
RETHINK RUNOFF

JANUARY–DECEMBER 2019
ANNUAL REPORT

Prepared by:

Pluck

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Introduction

Since 2003, Chittenden County's twelve MS4s have worked to pool resources to professionally engage the public in a one message, one outreach effort known as the Regional Stormwater Education Program. Through regular spring and summer advertisements to drive people to the program's website, www.smartwaterways.org, this cooperative approach to fulfilling its NPDES Permit Minimum Control Measure #1 (Public Education & Outreach) requirements has built a regional awareness among the public of the need for individual action to assist in fighting stormwater problems.

In the summer of 2016, the MS4s contracted with Tally Ho through their Lead Agency, the Chittenden County Regional Planning Commission, to rebrand the Smart Waterways campaign into a combined effort with the MS4's Minimum Measure #2 regional effort known as the Chittenden County Stream Team. The goal was to create one cohesive organization and outreach effort to both educate the public about stormwater and boost public participation in implementation of projects to combat the negative impacts of stormwater. In spring of 2017, Rethink Runoff was publicly launched, including a new website and revised creative.

In late 2017, Tally Ho transitioned to Pluck, retaining the same client contact. Pluck subsequently took over the creative, administration, and management of Rethink Runoff.

This 2019 calendar year report recaps the work done primarily related to Minimum Control Measure #1.

2019 Initiatives

Having completed the initial rebranding to Rethink Runoff and the website redesign in 2017, and a focus on updating the advertising in 2018, this past year left us a canvas to improve on the work done.

We revised digital display advertising and updated all three video animations for YouTube. Similar to last year, we targeted various demographics in all MS-4 towns based on subject matter and interests (home improvement, gardening, fishing, water recreation, pets, etc.).

In addition to a heavy YouTube presence, videos were also shown on WCAX in limited quantity as well as on Comcast/Infinity cable stations.

Print advertising in *Seven Days* also continued our seasonal approach, increasing visibility for specific activities at specific times.

In addition to advertising, we revised content across the website. We simplifed top-level messaging, simplifying terms and making headlines and introductions more conversational in nature. The same shift in content was carried throughout the subpages as well.

We also created a new system of materials for the Stream Team. For events, we created a tabling system, including a branded tablecloth and a large-scale pop-up banner with top-level messaging. In addition, we finalized the Rain Garden signage.

We created a series of print materials:

- A rack card highlighting simplified actions that homeowners can take to mitigate runoff.
- Another rack card highlighting the Stream Team and its various activities and initiatives.
- A small call-to-action card, printed on seed-based paper that could be planted with wildflowers native to the Northeast.
- Series of downloadable posters, 8.5x11 and 11x17, for each of our ad series: Champ, Car Care, Rain Gardens, Pets, Rain Barrels, and The Stream Team.

pluck

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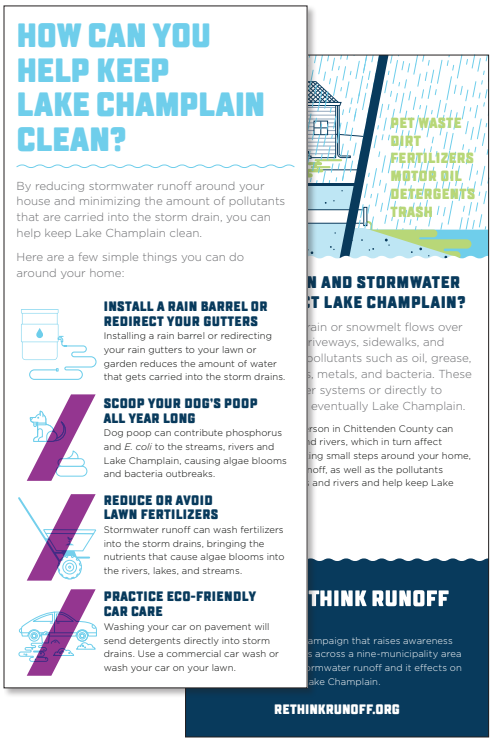
Stream Team Outreach Materials

COMMUNITY RAIN GARDEN SIGNAGE

POP-UP BANNER

CALL-TO-ACTION SEED CARD



RACK CARDS

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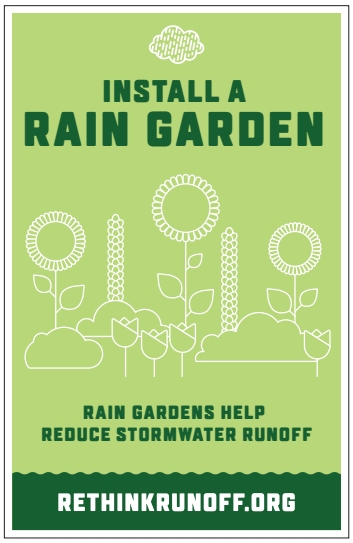
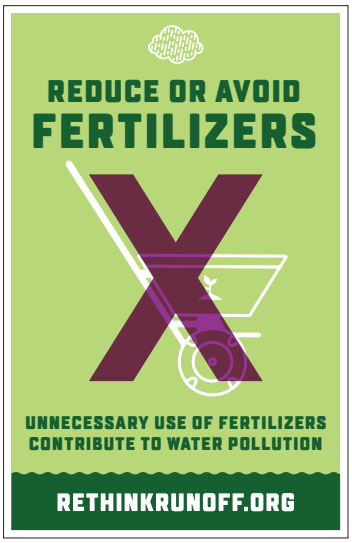
Downloadable Posters





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Media Buy Breakdown

Below is a cost breakdown of media buys, compared with 2016, 2017, and 2018. Overall, we've continued to reduce our radio media buys, shifting to a larger digital media buy. This past year, we also increased our television media buy, since we have three different focused animated spots.

We added a small media buy in January/February, focused on pet waste pick-up—something we will continue to do in 2020. In addition, we've continued to roll over any excess spring digital media buys into a longer summer media buy.

2016 – MEDIA BUY			
SOURCE	SPRING	SUMMER	FALL
RADIO	$4,500	-	$3,258
DIGITAL	$7,500	-	$4,985
TV	$5,500	-	$2,379
PRINT	$2,500	-	
TOTAL	$20,000	-	$10,622

2017 – MEDIA BUY			
SOURCE	SPRING	SUMMER* 05/28–08/02	FALL
RADIO	$3,088	-	$1,080
DIGITAL	$3,600	$3,826	$4,582
TV	$2,015	-	$1,833
PRINT	$1,755	$585	$1,170
TOTAL	$13,191	$4,235	$8,666

2018 – MEDIA BUY			
SOURCE	SPRING	SUMMER* 6/16–08/27	FALL
RADIO	$2,675	-	$1,044
DIGITAL	$3,394	$7,534	$2,987
TV	$3,710	-	$2,472
PRINT	$1,755	-	$1,006
TOTAL	$11,534	$7,534	$7,509

2019– MEDIA BUY				
SOURCE	WINTER	SPRING	SUMMER* 5/27–09/2	FALL
RADIO	$360	$1,008		$1,025
DIGITAL	$1,800	$2,320	$5,830	$3,000
TV		$5,830		$3,306
PRINT	$503	$2,012		$1,006
TOTAL	$2,663	$11,170	$5,830	$7,509

* For 2017 and 2018, Summer was initially planned as part of the spring 2018 budget. Moving forward, the spring media buy will include all purchases made through 7/1. The Fall media buy will include any media buys made from 7/1 to the end of the summer.

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Creative

Advertising during 2017 included redesigned creative, incorporating existing messaging with a new visual language based on Rethink Runoff. In, 2018, we created a series of three :30 animated video spots (installing a rain garden, installing a rain barrel, and avoiding fertilizer), exporting one as a radio spot. In addition, we began introducing additional seasonal display advertising, including a series for Clean Water Week.

Advertising for 2019 included updated 2017 creative as well as new ads released from April–July, tied to spring/summer activities. All ads were rolled out in 8–10 different sizes. Fertilizer and Rain Garden ads were positioned in early spring and fall. Rain Barrel and Fishing ads were positioned in late spring through fall. Water Recreation was pushed through summer to early fall while the General, Champ and Stream Team ads were positioned from early spring through fall. The media buys for the video reflected the display ad media buys. We also created winter-specific Pet Waste ads to target pet owners who may not pick up their pet waste in the winter, placing media buys in late January/February 2019.

Revised Creative

GENERAL LAKE

STREAM TEAM

FERTILIZER

GENERAL CHAMP

SLOW THE FLOW

RAIN GARDEN

RAIN BARREL

FISHING

PET WASTE 1

PET WASTE 2

WATER RECREATION

Videos

APRIL - FERTILIZER
HTTPS://WWW.YOUTUBE.COM/WATCH?V=T8BY6UBQSUW

MAY - RAIN GARDEN
HTTPS://WWW.YOUTUBE.COM/WATCH?V=E9RNXJSYE1G

JUNE - RAIN BARREL
HTTPS://WWW.YOUTUBE.COM/WATCH?V=ZZJ_MEP9Q_Q

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Advertising Click-through Rates, 2019

SOURCE	IMPRESSIONS	INTERACTIONS/ VIEWS	COST	COST PER CLICK
DISPLAY ADS	4,432,126	4,870	$6,910	$1.41
VIDEO (YOUTUBE)	380,633	176,983	$3,850	$0.02
WCAX DIGITAL	200,004	116	$1,500	$12.93

Google Display Ads Overview, 2019

Most Popular by Impressions

CALENDAR YEAR 2019 NAME	SPRING: 4/15–MEMORIAL DAY NAME	SUMMER: MEMORIAL-LABOR DAY NAME	FALL: LABOR DAY-10/31 NAME
GENERAL LAKE	RAIN GARDEN	RAIN GARDEN	GENERAL LAKE
PET WASTE	GENERAL CHAMP	GENERAL LAKE	FERTILIZER
RAIN GARDEN	GENERAL LAKE	GENERAL CHAMP	GENERAL CHAMP

Most Popular by Interaction

CALENDAR YEAR 2019 NAME	SPRING: 4/15–MEMORIAL DAY NAME	SUMMER: MEMORIAL-LABOR DAY NAME	FALL: LABOR DAY-10/31 NAME
GENERAL LAKE	GENERAL LAKE	RAIN GARDEN	GENERAL LAKE
PET WASTE	GENERAL CHAMP	GENERAL LAKE	FERTILIZER
RAIN GARDEN	RAIN GARDEN	PET WASTE	GENERAL CHAMP

Most Effective by Cost-per-click

CALENDAR YEAR 2019		SPRING: 4/15–MEMORIAL DAY		SUMMER: MEMORIAL-LABOR DAY		FALL: LABOR DAY-10/31	
TOTAL	TIME PERIOD	TOTAL	TIME PERIOD	TOTAL	TIME PERIOD	TOTAL	TIME PERIOD
FERTILIZER	$0.55/CLICK	GENERAL CHAMP	$0.55/CLICK	RAIN GARDEN	$0.58/CLICK	FERTILIZER	$0.54/CLICK
RAIN GARDEN	$0.58/CLICK	RAIN GARDEN	$0.56/CLICK	GENERAL CHAMP	$0.63/CLICK	GENERAL CHAMP	$0.58/CLICK
GENERAL CHAMP	$0.59/CLICK	GENERAL LAKE	$0.67/CLICK	GENERAL LAKE	$0.69/CLICK	GENERAL LAKE	$0.76/CLICK

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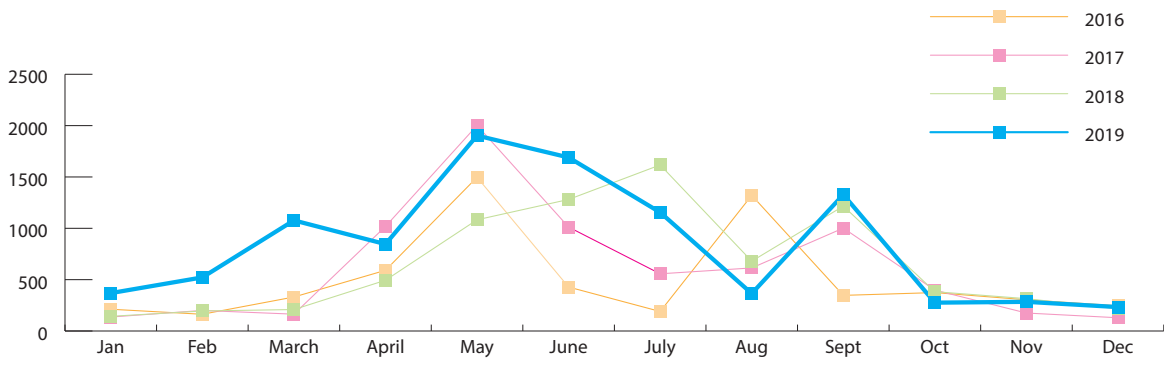
Website Metrics for 2013–2019



2019 vs. 2018 Users

+26.05%

8,531 vs 6,768

New Users

+27.95%

8,529 vs 6,666

Pageviews

+30.64%

15,769 vs 12,071

Total Sessions/Visits (1/1–12/31)

TOTAL	TIME PERIOD
10,111	2019
7,832	2018
7,407	2017
6,004	2016
4,659	2015
7,728	2014
3,541	2013
2,787	2012

Website visits by device

DEVICE	2019	2018	2017	2016
DESKTOP	40.2%	50.1%	52.8%	65.7%
MOBILE	44%	40.6%	36.4%	24.5%
TABLET	15.8%	9.3%	10.8%	9.8%

Top Vermont Cities and Towns, 2019

TOTAL	USERS	
BURLINGTON	1354	27.32%
SOUTH BURLINGTON	877	17.73%
COLCHESTER	784	15.84%
ESSEX/ESSEX JCT.	770	15.56%
SHELBURNE	254	5.12%
HINESBURG	120	2.43%
WILLISTON	98	1.98%
SAINT ALBANS CITY	97	1.96%
MONTPELIER	59	1.17%

New York, 193 Users
Boston, 47 Users

Most visited pages, 2019

TOTAL
HOMEPAGE
GET EDUCATED/PROBLEMS & SOLUTIONS/RAIN GARDEN
GET EDUCATED/PROBLEMS & SOLUTIONS/PET WASTE
GET EDUCATED
GET EDUCATED/PET WASTE
GET INVOLVED
EXPLORE THE LAKE CHAMPLAIN BASIN
GET EDUCATED/KIDS
GET EDUCATED/REDUCE FERTILIZER
GET EDUCATED/ALGAE BLOOMS

Town of Williston MS4 Annual Report

MCM #2

Rethink Runoff Stream Team Summary of Activities

MCM #2: Rethink Runoff Stream Team Summary of Activities
2019 Calendar Year

Social Media

Facebook

- Total Posts = 29
- 254 total "likes"
- 294 total "follows"

Instagram

- Total Posts = 16
- 179 total "follows"

RRST Website

- See final report from Dave Barron (Pluck Design)
- Added outreach events to calendar on website

Newsletter and e-correspondence

- As of 12/9/19 there were **629** subscribers to the RRST newsletter (an increase from 508 in 2018) The average open rate for emails was about 30%
- Spring Newsletter Published on 2/26/19 Opens: 179 Clicks: 21
- Summer Newsletter Published on 7/9/19 Opens: 185 Clicks: 29
- Fall Newsletter Published on 11/22/19 Opens: 172 Clicks: 23

Organizational Partnerships

The Rethink Runoff Stream Team partnered with 11 organizations in 2019:

1. **Shelburne Community School** - A teacher at Shelburne Community School invited the RRST coordinator to teach a 1-hour class to 5th graders to kick off their watershed and ecology unit - Lesson taught to 90 students on 4/4/19, 40 of those students also helped complete the Storm Drain Mural project in Shelburne by designing and painting raindrops to contribute to Julie Holmes's mural on 9/27/19
2. **Essex Middle School** - Taught a mini rain barrel workshop to 8 students 5/10/19
3. **Williston Master Naturalists** - The Master Naturalists volunteered to help organize riparian stewardship days at the Allen Brook tree planting site from last year. They recruited community volunteers to help weed, clear trash and inventory tree survival rates. (4/28/19 and 5/4/19)
4. **Winooski Valley Parks District** - WVPD hosted Conservation Field Day 5/15/19 bringing together area schools for a day in Ethan Allen Homestead Park. RRST facilitated a station called "Build a Watershed" where students created a 3D model of a fictional community and used a spray bottle to observe the impact of runoff and pollution in their community.
5. **Cub Scout Pack 678** - Rain Garden adopters in S. Burlington
6. **Marsh-Billings Rockefeller National Historical Park** A guest intern from the park visited for a day to assist the Stream Team coordinator with checking in samples and to learn about the structure of the citizen science program.
7. **Williston Conservation Commission** - Coordinated to decrease the cost of delivering water quality samples to the new lab in Randolph by sharing a courier service.

8. **Brownell Library** - Allowed RRST to host a kid's watershed activity hour as part of their "Wonder Wednesday" series and to set up a "pop up" style information table before their most popular speaker series for adults. (11/6/19) Also displayed books from the Clean Water Reading List for the month of November.
9. **State of Vermont: LaRosa Water Quality Sampling Grant** - The RRST coordinator successfully applied for a grant from the State of Vermont to cover for the cost of analyzing water quality samples at the VAEL lab in Randolph. The value of the lab services that this grant made available this year was approximately $3,000.
10. **Shelburne Farms** - Invited RRST to table at the annual Shelburne Harvest Festival
11. **Watersheds United Vermont (WUV) & Watershed Consulting Associates (WCA)**: WNRCD was awarded a grant that allows them to meet with a watershed data professional to discuss the analysis of water quality sampling data. Discussions with WCA will inform the Stream Team water quality sampling program in 2020 and beyond.

Media Rethink Runoff Stream Team had **7** media appearances in 2019:

1. Article published in international Stormwater Management publication (published by WEF Stormwater Institute) Volume 7, Issue 1 Spring 2019 - Cover picture and article on pages 20-21 https://www.wef.org/resources/publications/all-magazines/world-water-stormwater/
2. Article published in The Other Paper to recruit water quality monitoring volunteers (5/9/19) https://www.otherpapersbvt.com/news/around_town/volunteer-as-a-summer-water-quality-monitor/article_e0a70cd2-7290-11e9-b09b-a3c0e2ed59fc.html
3. Call for Artists published in Milton Independent on (7/4/19) https://issuu.com/miltonindependent/docs/2019_0704_forweb
4. Milton Independent Follow-Up (7/31/19) https://www.miltonindependent.com/art-for-awareness-muralists-adorn-milton-storm-drains/
5. Call for Artists Shelburne News (8/29/19) http://www.shelburnenews.com/2019/08/29/call-artists-storm-drain-mural-project/
6. Stream Clean Up Article in Williston Observer (9/26/19) https://issuu.com/vermontmaturity/docs/9-26-19_no._2__final
7. Shelburne Storm Drain Mural Article in Shelburne News (10/3/19) http://www.shelburnenews.com/2019/10/03/pavement-murals-point-trouble-water-runoff-real-problem/

Figure 1: Thumbnails of some 2019 RRST appearances in local newspapers

This document was prepared by the Winooski Natural Resources Conservation District, who is contracted by Chittenden County's MS4 Committee to run the RRST program.

Outreach

Outreach includes any educational opportunities or tabling events where resources or information are provided to the community about the RRST program. There were **six** outreach events in 2019, with an estimated total outreach to = **278** people.

Outreach events in 2019 targeted the municipalities of **Colchester, Essex and Essex Junction**

- **Colchester** Community Dinner Tabling Event (3/4/19)
    - **25** residents reached
- **Shelburne** Watershed Lesson at Shelburne Community School (4/4/19)
    - Reached 90 5th grade students and 10 adults = **100** total
- **Various Municipalities:** Conservation Field Day with Winooski Valley Parks District (5/15/19)
    - Taught a 25-minute station called "Build a Watershed" to 5 groups of 5th grade students
    - Reached **60** students and chaperones (equal amounts from S. Burlington, Burlington, Colchester and Essex Junction)
- **Various Municipalities:** Shelburne Harvest Festival (9/21/19)
    - Table was hosted by Winooski NRCD with a portion of the table dedicated to Stream Team materials. Many residents in the RRST area had questions about water quality and engaged with the stream team materials. About **50** total people reached: 10 Burlington, 10 S. Burlington, 10 Essex & Essex Junction, 20 Shelburne)
- **Essex Junction** Library Project 11/6/19
    - The RRST coordinator taught a kid's watershed activity hour as part of the ongoing "Wonder Wednesday" series. 13 kids and 10 parents attended. Kids played "Butterfly River" and "Build a Watershed." Kids who arrived early also studied that map of the Lake Champlain Basin to look for clues about the meaning of the word "Watershed." Many families took handouts and copies of the Stormwater Maze at the end of the session.
    - RRST set up a "pop up" style information table before their most popular speaker series for adults. The RRST coordinator spoke with 20 people. Many people took handouts or asked questions about stormwater on their property. Many residents expressed frustration at living in condo associations where they feel less empowered to make water-friendly changes to their space. We may explore opportunities for outreach to condo associations in the future to address this need.
    - Total in-person outreach = **43 residents**
    - The library also displayed books from the Clean Water Reading List for the month of November. The books were available for library members to check out and RRST stickers and handouts were also available for anyone to take for free.
- **Essex** Library Project
    - An outreach event was planned at Essex Library for fall 2019 that was similar to the Brownell Library program, but the library experienced flooding in their community room. This program has been rescheduled to January 2020

Figure 2: Left: Books from the Clean Water Reading List on display at Brownell Library. Right: Tabling display set-up including the new Clean Water Trivia Board and newly printed Rethink Runoff tablecloth

The 2019 work plan goal for outreach was 80 people, which was surpassed. A total of **278** people were engaged through outreach in 2019. Outreach towns for 2020 are Williston, Winooski and South Burlington.

New Outreach Activities Created:

1. Clean Water Reading List
2. Trivia Board
3. Watershed Curriculum from Shelburne Community School Program

New Outreach Tools Created with assistance from Pluck

1. "Get Involved" Rack Card
2. "Keep Lake Champlain Clean Rack Card"
3. Large standing sign
4. Tablecloth printed with RRST logo

Projects

Six hands-on events were held in 2019. Event-Driven Tasks involve community members in some form of hands-on engagement. Hands-on participation events in 2019 targeted the towns of Burlington, Shelburne, and Milton.

- **Burlington** Rain Barrel Workshop (5/4/19)
    - 32 barrels built, **47** Burlington residents attended
- **Essex** Mini Rain Barrel Workshop (5/10/19) 10 Essex residents reached (8 students, 2 adult chaperones = **10** total), 3 barrels created.
- **Williston** Riparian Stewardship Days
    - Williston, Allen Brook (4/28/19 and 5/4/19)
    - Over the course of both days about **20** volunteers helped tend to trees planted along the brook last year. They removed choking vines, weeded around the base of the trees and took an inventory of the trees to estimate survival rate (over 90%)
- **Milton** Storm Drain Murals (7/29/19)
    - Two murals painted in Milton - articles published in Milton Independent, great social media coverage. People involved included 2 artists, 5 family members of artists and 1 reporter.

Total: **8** people directly engaged.

- **Williston** Stream Clean Up (9/14/19)
    - **11** volunteers removed 15 bags of trash from tributaries to Muddy Brook
- **Shelburne** Storm Drain Murals (9/27/19)
    - Two murals painted in Shelburne. People involved included 2 artists, 40 local students involved in painting process and 1 reporter. (Total: **43)** Article published in Shelburne News.

A total of **139** people participated in hands-on RRST events in 2019. (A subcategory: A total of **86** people volunteered their time through RRST activities in 2019). Project towns for 2020 are Essex, Essex Junction, and Colchester.

City of Burlington Project: Rain Barrel Workshop

Summary: RRST coordinated a rain barrel workshop for the City of Burlington on May 4, 2019. 47 people attended and 34 barrels were constructed. Registration was $35 and sign-ups were coordinated online through Google Forms and the WRNCD PayPal account.

Advertising: Planning for the event began in January. The City of Burlington created a poster and the RRST coordinator created a press release and Facebook event. The following media venues were used to spread the word: Facebook, Instagram, Front Porch Forum, Rethink Runoff website, City of Burlington website, posters around town. This outreach garnered interest from 100 people (50 from Burlington, who were given top priority and 50 from other towns).

Challenges: RRST did encounter some challenges sourcing materials. The main supplier of plastic barrels discontinued ordering products in those containers, so the RRST coordinator sought other sources in the community. Unfortunately, the price of each barrel was more than double with the alternate sources. Plenty of staff time was spent troubleshooting this challenge. In the future we anticipate this project taking less time and costing less money.

Impact: The 34 barrels that were built will be installed at residences around Burlington and will help decrease the volume of stormwater during rain events. Participants will become advocates for clean water solutions in the City. The mailing list increased by 70 people due to folks who signed up for the list during the event registration period. Finally, we know there is high demand for rain barrel workshops. The RRST coordinator will work to secure a more stable source for the plastic barrels so that we can offer the workshop at an affordable rate for many years to come.

Costs: The total estimated cost to plan, manage, and implement this project was **$3,300.** The approximate personnel time used to plan and execute the project was 70 hours ($3,150). The total cost of supplies (less registration income) was $100. The mileage was about $50.

Figure 3: Participants at the Burlington Rain Barrel Workshop drill, assemble and caulk their new barrels.

Town of Milton Project: Storm Drain Mural

Summary: RRST coordinated a storm drain mural project in Milton. Four artist applications were received and two were selected: Erin Schmitt (a high school art teacher from Milton) and Jessica Zawicki (from St. Albans). On July 29, 2019 the artists painted their murals working from 9am to 5pm to complete the artwork.

Advertising: The RRST coordinator created a call for artists press release and used the following media venues to spread the word: Facebook, Instagram, Front Porch Forum and in the Milton Independent. A reporter from the Milton Independent also interviewed the RRST coordinator and took pictures of the artists on the day of the event. An article was published on 7/31/19. A link to the article can be found in the summary of publications on page 2.

Impact: The murals will stand as an enduring reminder to the residents of Milton that everyone is responsible for keeping storm water and Lake Champlain clean.

Costs: The total estimated cost to plan, manage, and implement this project was **$1,940.** The approximate personnel time used to plan and execute the project was 30 hours ($1,350). The total cost of supplies was $20. The mileage was about $40. Each of the artists was granted a $250 stipend for their materials and time, creating a contractual cost of $500.

Figure 4: Artist Jessi Zawicki paints her mural at the corner of Rt. 7 and Main St (7/29/19) Text says: "Drains to Champlain"

Figure 5: Artist Erin Schmitt paints her mural of Champ on Center Drive between Kinney Drugs and VT Federal Credit Union (7/29/19) Text says: "Only Rain in the Drain"

Fig 6: Social Media Splash! The Facebook post about the completed murals was shared by more than 10 people or organizations and seen by over 4.500 people.

Town of Shelburne: Storm Drain Mural

Summary: RRST coordinated a storm drain mural project in Shelburne in September. Twenty-four applications were received and two were selected. Heatheranne Lee (a high school student from Shelburne) and Julie Holmes (an artist and music teacher from Charlotte) submitted the winning designs. On September

27, 2019, the artists painted their murals. 40 Students from Shelburne Community School helped artist Holmes create her mural. Holmes's message was "Every Drop Counts." She wanted each student to paint a unique raindrop in the lake to represent how each person is unique and how each person's actions make a difference.

Advertising: The RRST coordinator created a call for artists press release and used the following media venues to spread the word: Facebook, Instagram, Front Porch Forum and a press release in the Shelburne News. A reporter from Shelburne News interviewed the RRST coordinator and artists. An article was published on 10/3/19. A link to the article be found in the summary of publications on page 2.

Impact: The murals will stand as an enduring reminder to the residents of Shelburne that everyone is responsible for keeping storm water and Lake Champlain clean.

Cost: The total estimated cost to plan, manage, and implement this project was **$1,960.** The approximate personnel time used to plan and execute the project was 30 hours ($1,350). The total cost of supplies was $55. The mileage was about $25. Each of the artists was granted a $250 stipend for their materials and time, creating a contractual cost of $500.

Figure 7: Artist Heatheranne Lee's Mural outside of Shelburne Country Store (9/27/19) Text says: "Keep the Water Clear, Remember Champ Lives Here"

Figure 8: Artist Julie Holmes's Mural outside of Pierson Library (9/27/19) Text says: "Every Drop

Counts, Keep It Clean"

Figure 9: Students from Shelburne Community School help Artist Julie Holmes's paint her mural outside of Pierson Library (9/27/19) Each student created a unique design to fit the theme "Every Drop Counts"

Stream Clean Up Program Summary

In partnership with Winooski NRCD, RRST completed a Stream Clean Up event in Williston on Sept 14, 2019. Eleven people attended and removed 15 bags of trash out of two tributaries to Muddy Brook. Most of the time spent on this event was covered by Winooski NRCD's independent agreement with the Town of Williston. Some advertising time was charged to RRST and Stream Team tabling materials and shirts were shared with all participants on the day of the event. The cost to RRST was approximately 10 hours or **$450**. Matching funds from WNRCD to fully execute the event were approximately $3,500.

Figure 10: Volunteers at the Williston Stream Clean Up 9/14/19

Water Quality Monitoring Program Summary

RRST has maintained an ongoing water quality monitoring program since 2012. Citizen science volunteers take water samples in urban or suburban streams that are impacted by sedimentation, excessive nutrient loading, high temperatures, bacteria, and other pollution. This data provides information to towns about long term trends and may help towns identify good locations for stormwater BMPs.

With another year of support from VT DEC's LaRosa program, RRST collected biweekly water quality samples at twenty-one sites on twelve streams in 2019. Twenty-one volunteers and one intern helped collect grab samples on five, biweekly Tuesdays from 6/25/19 - 8/20/19. Grab samples were analyzed for total phosphorus and chloride. These parameters were also sampled at five of the sites during one rain event. See

the 2019 Water Quality Monitoring Report in Appendix A for more information.

The training day for citizen science samplers took place on 6/11/19 at Landry Park in Winooski. This year two sessions were offered (morning and evening) to accommodate volunteers' schedules. RRST coordinator demonstrated sampling procedures, described the data collection sheets and answered questions. Throughout the season, volunteers returned their samples to the WNRCD office after sampling, and the RRST coordinator ensured all samples were accounted for and delivered to the lab. A challenge this year was that the lab moved from Burlington to Randolph VT. RRST partnered with the Williston Conservation Commission (which takes weekly water samples) to share the cost of a courier service (Green Mountain Messenger) to deliver samples and bringing back supplies. Volunteers were recognized at the volunteer appreciation event in Williston on 9/18/19.

The RRST coordinator sent bi-weekly emails to WQ volunteers to check in about sampling procedure and share interesting local water tidbits, and other ways to get involved. The coordinator also joined volunteers in the field periodically to discuss technique or clarify site locations.

Cost: The total estimated cost to plan, manage, and implement this project was **$3,650.** The approximate personnel time used to plan and execute the project was 80 hours ($3,600). The mileage was about $50. For match, the LaRosa grant offset approximately $2,600 of lab analysis fees.

Municipality	Number of Volunteers
Essex & Essex Junction	3
Colchester	2
S. Burlington	7
Burlington	4
Williston	3
Shelburne	1
Hinesburg	1
TOTAL	**21**

Table 1: Stream Team Water Quality Sampling Volunteers by town

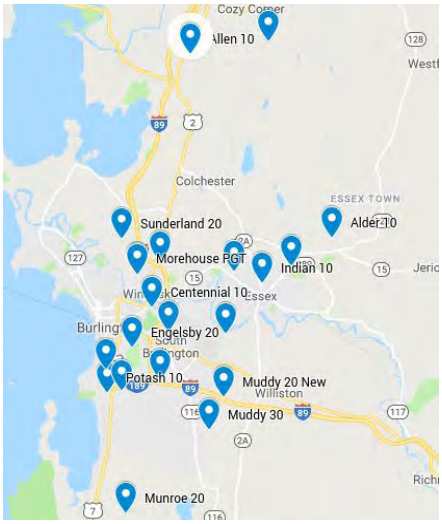


Figure 11: Map of Stream Team Sampling Sites 2019 Link to Interactive Map:
https://drive.google.com/open?id=1K98F4bBO2E6p5lLKgSw7bxRSpQlzoo8Q&usp=sharing

Figure 12: Stream Team volunteers learn sampling protocol at the evening training (6/11/19)

Adopt-a Rain Garden Program Summary

The Stream Team's Adopt-a-Rain Garden program is an opportunity for individuals to assist in keeping Chittenden County's public rain gardens functional and attractive. This involves basic maintenance activities like picking up trash, pruning, pulling weeds, installing new mulch, and informing the coordinator of non-functioning gardens. There are currently ten public rain gardens managed by RRST. In 2018, there were four official adopters. In 2019, all ten gardens were cared for by various partners and volunteers. See table 2 for more details.

Signage: This year, with the help of Pluck, we rebranded the signs in all of the gardens with the new Rethink Runoff logo. A volunteer was recruited to assist with installing the signs.

Cost: The cost to manage and grow this program in 2019 was approximately 15 hours or **$675** for staff time.

Garden Status Update

Callahan Park Rain Garden

Location: 45 Locust St., Burlington

This garden has been functioning well for some time thanks to efforts by Brad Ketterling, who has adopted this garden for several years. In 2017, Burlington Public Works brought a load of mulch to the garden and Brad spread the mulch and kept up with weeding and monitoring the garden. Several understory shrubs and flowers have been shaded out by larger, overstory plants that need to be thinned. There are several locations that also need to be replanted, so efforts will be made to locate surplus plants that can be added in 2020.

Chamberlain School

Location: 262 White Street, South Burlington

This garden was installed in partnership with WNRCD and the Let it Rain Program in 2013. This is one of several rain gardens on the grounds of Chamberlain Elementary. School teacher Chris Provost adopted this garden again in 2019 and has actively maintained it for several years.

Coast Guard Station

Location: Depot Street, Burlington

This small garden is located in the parking lot abutting the bike path next to the Burlington Coast Guard Station. In 2014, RRST worked with the ECHO summer kids program to engage elementary school children in cleaning the garden and in 2015 a local resident, Wiley Reading, adopted the garden. The garden did not have an adopter from 2016-2018, but this garden got a "boost" of energy from 10 community volunteers through the Day in the Dirt event hosted by the Vermont Community Garden Network in spring of 2018. In 2019, it was adopted by Larry Kaupferman.

Farrell Park

Location: Swift Street, South Burlington

This garden is unique in terms of its design. It is called an "advanced wetland stormwater filter" and was installed in 2012. Stormwater enters the garden through an inlet, flows through the gravel wetland filter

media, is cleaned and exits through the other end. The garden requires very little maintenance because it has a flushing system that prevents sediment from building up. This garden had an active adopter for its entire life, until 2015 when the adopter moved away. The garden was never in need of additional plants or maintenance. It would not be appropriate to add mulch to this garden. In 2019, this garden was adopted by the O'Leary family. They completed a work day weeding and clearing the inlet and plan to keep an eye on the garden.

Landry Park
Location: North St., Winooski
This garden was constructed in 2006 as two, separate gardens along the narrow strip of grass between a fence at Landry Park and the road. Over the years, the gardens have become overgrown, but Winooski DPW officials believe it still functions well, even with the tall, dense shrubs. A few years ago, nearby road construction altered the slope of the road carrying larger volumes of water into the garden. The increased flows have killed some of the vegetation and caused gullies to form, but the vegetation seems to have rebounded. In 2016, a group of UVM students in an Ecosystem Design course developed recommendations to repair the garden. In 2019, RRST coordinator spoke with Tim Grover and Jon Choate of Winooski DPW who agreed to take on responsibility for the garden.

Williston Town Hall Annex
Location: 7900 Williston Rd, Williston
This small garden near the entrance walkway to the Annex building and the parking lot has had an active adopter since 2014: Rita Desseau. Rita maintained the garden in 2018. In 2019, additional work done was weeding, thinning larger shrubs, re-planting in bare spots, and mulching the garden.

Williston Library (aka. Dorothy Alling Memorial Library)
Location: 21 Library Lane, Williston
The Williston Library garden is in good condition and is primarily being cared for by the staff of the library. This garden was previously cared for by Andrew Wolf.

South Burlington High School (formerly the location of the South Burlington Library)
540 Dorset St., South Burlington
WNRCD received a grant to construct a rain garden at the entrance to what was the South Burlington Library (now South Burlington High School) in 2013. The rain garden received minimal maintenance by the library staff over the years, and was formally adopted in 2016 by Amy Niggel's Cub Scout 678 pack. The pack's leadership changed hands in 2018 and the new cubmaster Bill Kett agreed to continue maintenance of the garden with his pack. In 2019, scout parent Eric Bishop-vonWettberg took ownership of the garden stewardship program with the scouts. The RRST coordinator hosted an orientation and work day for a small group of scouts and leaders in spring 2019 and they have been keeping an eye on the garden ever since.

South Burlington Fire Department
575 Dorset St., South Burlington
The City of South Burlington installed this bioretention area/rain garden in 2015 to improve stormwater management at the Fire Department. Cub Scout pack 678 has volunteered to adopt this rain garden since

2016. Since there is new leadership in the pack, the RRST coordinator hosted an orientation and work day for a small group of scouts and leaders in spring 2019 and they have been keeping an eye on the garden since.

Rain Garden	Adopter 2019	Notes
Chamberlin School, South Burlington	Chris Provost and students	Long-time volunteer
Coast Guard Station, Burlington	Larry Kupferman	New volunteer this year - met in the fall for an orientation
Landry Park, Winooski	Town of Winooski	Spoke with Tim Grover in spring about maintenance plan
Williston Annex	Rita Dresseau	Long-time volunteer
Williston Town Library	Library grounds staff	Spoke with library leadership in 2018. Next year plan to formalize and agreement.
Callahan Park, Burlington	Brad Ketterling	Long-time volunteer.
Farrell Park, South Burlington	Roan O'Leary	New volunteer this year - local high school student. Met for orientation and work day.
Department of Corrections, South Burlington	Town of S. Burlington	Spoke with Tom DiPietro in spring about town taking on responsibility.
South Burlington Fire Station	Cub Scouts 678 (Eric Bishop-vonWettberg)	Met with leaders and scouts in spring for a work day/orientation
South Burlington Library	Cub Scouts 678 (Eric Bishop-vonWettberg)	Met with leaders and scouts in spring for a work day/orientation

Table 2: 2019 Rain Garden Adopters

Volunteer Appreciation Event Summary

2018 Appreciation Event

- In March 2019, we hosted a volunteer appreciation event for the previous year's volunteers. All rain garden adopters and water quality monitors from the 2018 field season were invited. Three people attended. A tour of the Essex Junction Wastewater Treatment Facility was given by Chelsea Mandigo and the RRST coordinator discussed the results of the 2019 season.

2019 Appreciation Event

- In September 2019, we hosted a volunteer appreciation event at CSWD Materials Recycling Facility in Williston for 2019 field season volunteers. The event was attended by 11 people. The tour was led by Lauren Layn, a Stream Team volunteer who also works for CSWD. Attendees provided positive feedback noting that they enjoy educational appreciation events and also enjoyed the breakfast spread.

Figure 13: Volunteers tour the Essex Junction Wastewater Treatment Facility as part of the 2018 volunteer appreciation event. (3/20/19)

Figure 14: Volunteers enjoy breakfast and tour the CSWD Materials Recycling Facility as part of the 2019 volunteer appreciation event. (9/18/19)

RRST Estimated Impact by Municipality

The table below depicts an estimate of the number of individuals engaged in-person in each RRST municipality in 2019.

Town	# of people reached in-person in 2019
Burlington (Project)	78
Colchester (Outreach)	42
Town of Essex (Outreach)	18
Village of Essex Junction (Outreach)	67
Milton (Project)	10
Shelburne (Project)	163
Williston	28
South Burlington	43
Winooski	0
TOTAL	**449**

Table 3: Interaction with RRST by member town. Note that although no residents in Winooski were directly reached with programming this year, two storm drain murals are still highly visible in the city.

Appendix A: Clean Water Reading List

Rethink Runoff Stream Team Clean Water Reading List			
This list was developed by the Rethink Runoff Stream Team (RRST). RRST is a stormwater education campaign managed by the Chittenden County Regional Planning Commission and run by the Winooski Natural Resources Conservation District. RRST offers community outreach, volunteer opportunities, workshops, and events in the municipalities of: Burlington, Colchester, Essex, Essex Junction, Milton, Shelburne, South Burlington, Williston & Winooski. If you would like to use this list please display the following text "This list was created by Rethink Runoff Stream team in collaboration with the Lake Champlain Basin Program Resource Library." If you are located in one of the nine municipalities we serve we may be able to run a clean water workshop or activity hour for adults or kids for free and/or loan items to you (like water sampling vials and informational brochures) for a display. Contact kristen@winooskinrcd.org for more information.			
Title	**Author**	**Category**	**Source of Recommendation**
A Drop of Water	Walter Wick	Adult	LCBP Resource Library at Echo
Disconnected Rivers: Linking Rivers to Landscapes	Ellen Wohl	Adult	Brownell Librarians
In the Land of the Wild Onion: Travels Along Vermont's Winooski River	Charles Fish	Adult	LCBP Resource Library at Echo
Lake Champlain: A Natural History	Mike Winslow	Adult	LCBP Resource Library at Echo
One Life At A Time Please	Edward Abbey	Adult	Stream Team: James Sherard
Paddler's Guide to the Champlain Valley : Exploring the Rivers, Creeks, Wetland and Ponds	Margret Holden	Adult	Kristen Balschunat: Stream Team
Round River	Aldo Leopold	Adult	Stream Team: James Sherard
Snow Crystals	WA Bentley	Adult	LCBP Resource Library at Echo
The Art of Lake Champlain: Inspiring Landscape	Unknown	Adult	LCBP Resource Library at Echo
The Death & Life of the Great Lakes	Dan Egan	Adult	Stream Team: Chelsea Mandigo
The Water Between: A Photographic Celebration of Lake Champlain		Adult	LCBP Resource Library at Echo
Vernal Pools: Natural History and Conservation	Elizabeth A. Colburn	Adult	Brownell Librarians
Water: A Natural History	Alice Outwater	Adult	Stream Team: Tom DiPietro
Watersheds: A Practical Handbook for Healthy Water	Clive Dobson	Adult	LCBP Resource Library at Echo
Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont	Elizabeth H. Thompson	Adult	Stream Team: Kristen Balschunat

Around the Pond: Who's Been Here?	Lindsay Barrett George	Childrens	LCBP Resource Library at Echo
Champ and me by the Maple Tree	Ed Shankman	Childrens	LCBP Resource Library at Echo
Dwayne the Storm Drain	Mass. Water Professionals	Childrens	Stream Team: Chelsea Mandigo
From Raindrop to Tap	Michael Bright	Childrens	Brownell Librarians
Muskrat will be Swimming	Cheryl Savageau	Childrens	LCBP Resource Library at Echo
Over and Under the Pond	Kate Messner	Childrens	LCBP Resource Library at Echo
Racoon's Last Race	Joseph Bruchac and James Bruchac	Childrens	LCBP Resource Library at Echo
Song of the Water Boatman and Other Poems	Joyce Sidman	Childrens	LCBP Resource Library at Echo
Thirteen Moons on the Turtle's Back	Joseph Bruchac and Jonathan London	Childrens	LCBP Resource Library at Echo
Trout are Made of Trees	April Pulley Sayre	Childrens	LCBP Resource Library at Echo
Water: Up, Down, and All Around	Natalie M. Rosinsky	Childrens	LCBP Resource Library at Echo
Hatchet & The River	Gary Paulsen	Young Adult	Stream Team: James Sherard

Town of Williston MS4 Annual Report

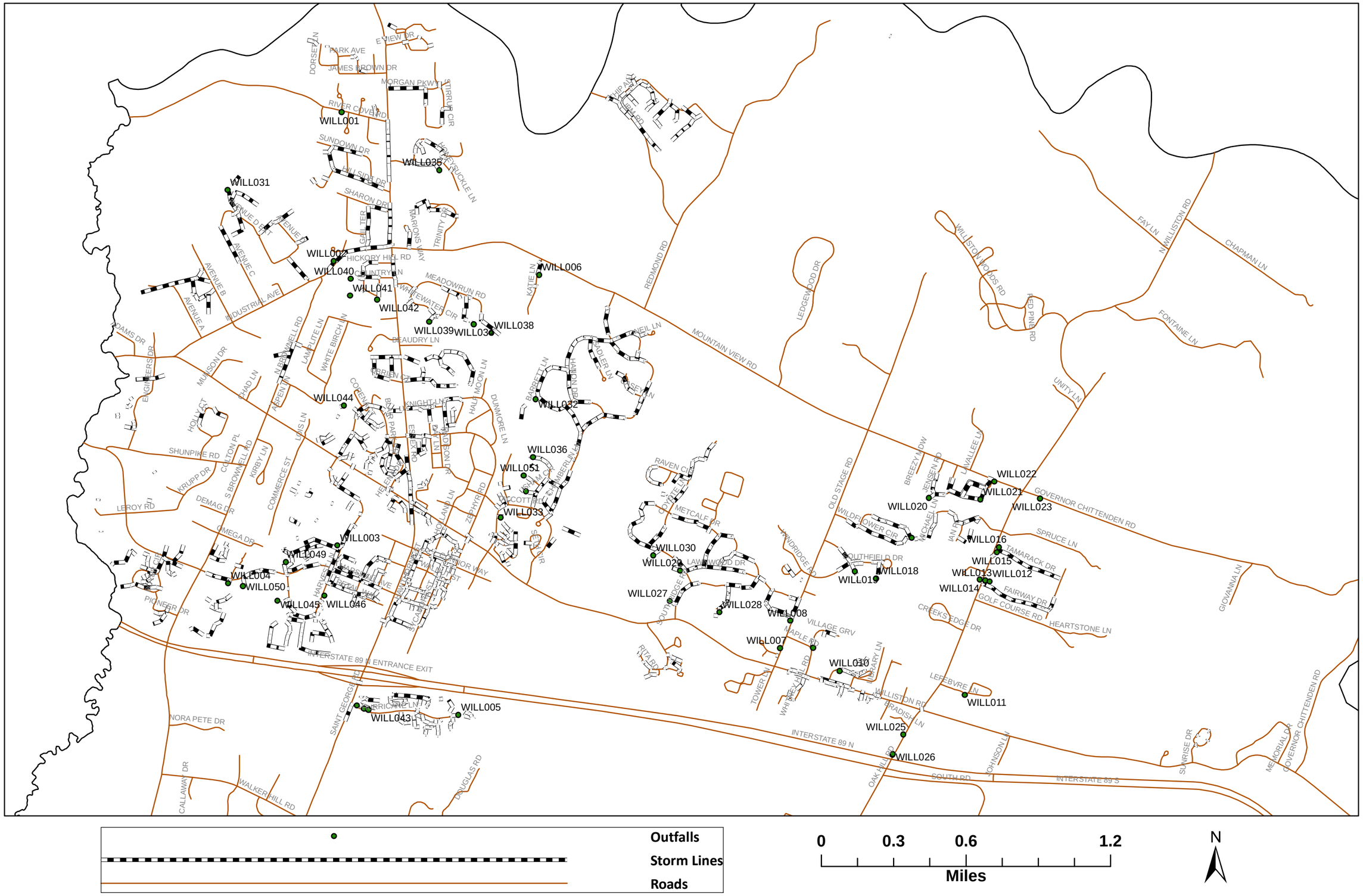
MCM #3

Map of Storm Sewers and Outfalls in MS4

IDDE Map and Summary Sheet

IDDE Door Hanger

MS4 2019 Annual Report Storm Lines & Outfalls Map



Outfalls

Storm Lines

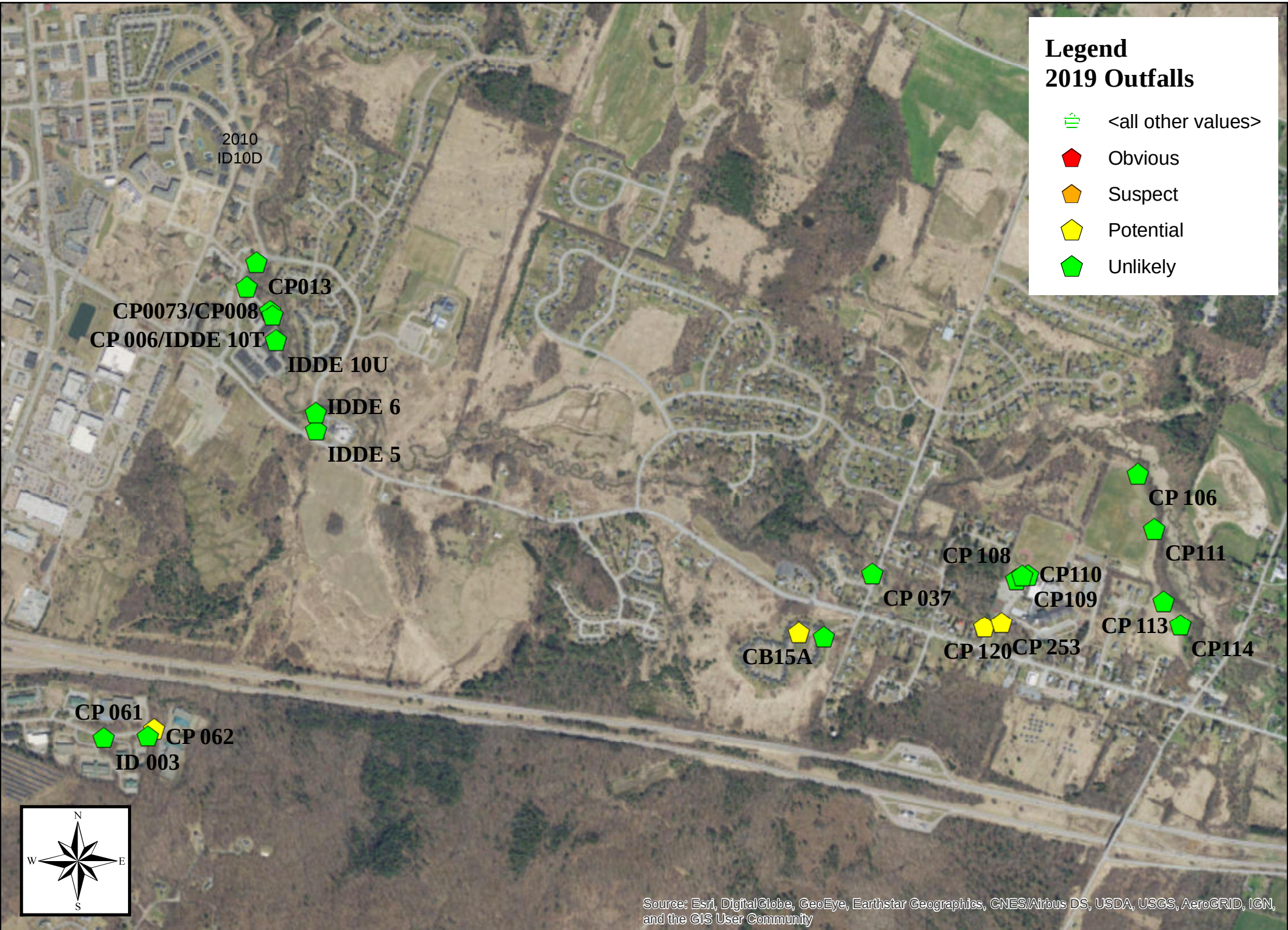
Roads

0 0.3 0.6 1.2

Miles

N

IDDE Monitoring 2019



Town of Williston IDDE 2019

OBJECTID	DATE	SITE_ID	TIME	LAND_USE	LOCATION	MATERIAL	SHAPE	SUBMERGED	FLOW	FLOW-Volume and Time to Fill	ODOR	COLOR	COLOR_SEVERITY	TURBITITY	TURBIDITY_SEVERITY
1	8/12/19	CP 113	12:25	Open Space	Closed Pipe	CMP	Single	Not submerged	NONE		No	Not Present			
2	8/12/19	CP114	12:35	Open Space	Open Drainage	CMP	Circular	Not submerged	NONE		No	Not Present			
3	8/12/19	CP111	12:45	Institutional	Closed Pipe	CMP	Single	Not submerged	NONE		No	Not Present			
4	8/12/19	CP 106	12:55	Institutional	Closed Pipe	HDPE	Single	Not submerged	NONE		No	Not Present			
5	8/12/19	CP110	13:25	Institutional	Closed Pipe	CMP	Single	Partially submerged in sed	NONE		No	Not Present			
6	8/12/19	CP 108	13:35	Institutional	Closed Pipe	PVC	Single	Not submerged	NONE		No				
7	8/12/19	CP109	13:39	Institutional	Closed Pipe	CMP	Single	Not submerged	TRICKLE		No				
8	8/14/19	CP 007/IDDE 10S	14:42	Suburban residental	Closed Pipe	HDPE	Circular		NONE		No				
9	8/14/19	CP 006/IDDE 10T	14:46	Suburban residental	Closed Pipe	CMP	Circular	Not submerged	NONE		No				
10	8/14/19	IDDE 10U	14:51	Suburban residental	Closed Pipe	HDPE	Circular	Partially submerged in H2O	NONE		No	Clear			
11	8/14/19	CP0073/CP008	15:10	Suburban residental	Closed Pipe	PVC	Circular	Not submerged	NONE		No				
12	8/14/19	CP013	15:20	Suburban residental	Closed Pipe	PVC	Circular	Not submerged	TRICKLE		No	Clear			
13	8/14/19	IDDE 5	15:31	Suburban residental	Closed Pipe	HDPE	Circular	Partially submerged in H2O	NONE		No	Not Present			
14	8/14/19	IDDE 6	15:35	Suburban residental	Closed Pipe	Steel & Concrete	Circular	Not submerged	NONE						
15	7/24/19	CP 120	14:08	Institutional	Closed Pipe	CMP	Circular	Not submerged	TRICKLE						
16	7/24/19	CP 253	14:16	Institutional	Closed Pipe	HDPE	Circular	Not submerged	TRICKLE						
19	8/15/19	Commons Road	15:02	Suburban residental	Closed Pipe	PVC	Circular	Partially submerged in sed	NONE		No	Not Present			
20	8/15/19	CB15A	15:09	Suburban residental	Closed Pipe	PVC	Circular	Partially submerged in H2O	NONE		No				
21	8/15/19	CP 037	15:19	Suburban residental	Closed Pipe	HDPE	Circular	Not submerged			No	Not Present			
22	8/15/19	CP 062	19:15	Commercial	Closed Pipe	PVC	Circular	Not submerged	NONE		No				
23	8/15/19	CP 061	19:20	Commercial	Closed Pipe	PVC	Circular	Partially submerged in sed	NONE						
24	8/15/19	ID 003	19:25	Commercial	Closed Pipe	Steel	Circular	Not submerged	TRICKLE		No	Clear			

FLOATABLES	DAMAGE	FLOATABLES_SEVERITY	DEPOSITS/STAINS	VEGETATION	WATERSHED	POOL_QUALITY	BENTH_GROWTH	OVERALL_CHARACTER	DATA_COLLECTION	GlobalID	pH	TEMP (F)
					AB			Unlikely	No Sample for Lab	fbf6cd9a-ca7e-4ad8-a248-eaa0cd6d1ec1		
	NONE				AB			Unlikely		6ad72f42-120f-43b3-a498-1ceb2481c222		
			Other		AB			Unlikely	No Sample for Lab	af287ff3-49e0-450b-9fee-3363756b64c7		
			None		AB			Unlikely	No Sample for Lab	939fba87-abbb-4637-acff-a341d9777972		
					AB			Unlikely	No Sample for Lab	08dcb87a-20f8-4240-9e5b-1da96b8e60be		
					AB			Unlikely	No Sample for Lab	dcf1bea5-c49a-4e11-82e7-f93229d89686		
					AB	Oil sheen		Unlikely	No Sample for Lab	c01bff04-4a70-4033-a057-93f2b3111c12		
	NONE				AB			Unlikely	No Sample for Lab	d726d04c-c892-4415-b895-59d047132678		
			Flow Line		AB			Unlikely	No Sample for Lab	75d0fd19-49a9-4893-86ea-98274151a7bc		
	NONE		Flow Line	Normal	AB	Good		Unlikely	No Sample for Lab	3b6d9d4f-8640-4d45-92ae-de6188096a9e		
	OTHER			Normal	AB			Unlikely	No Sample for Lab	8ea16f62-bee1-4721-8370-9726dd27d578		
	NONE		Flow Line	Normal	AB			Unlikely	No Sample for Lab	cf7c12f7-23ad-4fde-990d-d04cb747dfe8		
	NONE		None	Normal	AB	Slightly brown/cloudy, lots of pant life nearby		Unlikely	No Sample for Lab	47d9180b-0c9a-417f-a923-67f1fa2a8364		
	NONE		None	Normal	AB			Unlikely	No Sample for Lab	20c736f0-ae9b-4cee-bb4d-ac392667a84a		
Suds		1			AB	Poor, Excessive algae, oil sheen, floatables	Brown	Potential	No Sample for Lab	6038c8da-755e-473c-a4b9-1bd6e9f87633		
					AB	Poor; suds, colors, floatables	Green	Potential	No Sample for Lab	5b26beb6-84dd-4a7b-8004-8d8b8318d4fd		
	NONE		None	Normal	AB			Unlikely	No Sample for Lab	b81fd639-626d-4850-9ae7-768d06af7a13		
	NONE		Flow Line		AB	Colors	Brown	Potential	No Sample for Lab	b8941754-a785-4441-8339-9168db3538dd		
	NONE		None	Normal	AB			Unlikely	No Sample for Lab	51c5bcbe-9c6e-452f-8290-fb1012cbcc67		
	NONE		Flow Line		AB	Colors		Potential	No Sample for Lab	26e43850-6aa3-4126-bcd8-85c4e92636eb		
	NONE				AB			Unlikely	No Sample for Lab	877e3fe2-ac69-40a0-8050-2f95a33d47af		
	OTHER			Normal				Unlikely	No Sample for Lab	cfedaf85-1770-4947-801d-a8fcaa5dfa63		

DIAMETER (IN)	NOTES	#PIPES	ODOR_SEVERITY	INTERMITTENT_FLOW_TRAP	ASSESSED_BY	x	y
				NO	Conservation Intern (Maddy Zimmerman)	-73.06909288	44.44039901
				NO	Conservation Intern	-73.06846314	44.43977043
17				NO	Conservation Intern	-73.06943916	44.44234378
16.5				NO	Conservation Intern	-73.07005981	44.44382548
32				NO	Conservation Intern	-73.07417162	44.44108935
4				NO	Conservation Intern	-73.07461033	44.44099048
7				NO	Conservation Intern	-73.07438643	44.44108607
14.5	Very small amount of water in the bottom on the pipe, not flowing			NO	Conservation Intern	-73.10261404	44.44819242
22				NO	Conservation Intern	-73.1025322	44.44806211
16				NO	Conservation Intern	-73.10238916	44.44738817
	Damage: cracked pipe near the mouth			NO	Conservation Intern	-73.10349854	44.44882276
13	Single outfall			NO	Conservation Intern	-73.10313419	44.44947656
22	Pool water is slightly brown, a little cloudy			NO	Conservation Intern	-73.10088868	44.44499452
20				NO	Conservation Intern	-73.10089847	44.44545302
18.5		SINGLEPIPE		NO	Conservation Intern	-73.07581365	44.4397142
13.5		DOUBLE		NO	Conservation Intern	-73.07517528	44.43982528
16				NO	Conservation Intern	-73.08183277	44.43944385
				NO	Conservation Intern	-73.08277432	44.43956045
13				NO	Conservation Intern	-73.08002428	44.44113441
				NO	Conservation Intern	-73.10696817	44.43698597
				NO	Conservation Intern	-73.10720087	44.43678229
	Cracked/broken near the mouth			NO	Conservation Intern	-73.10886101	44.43673672

STORMWATER POLLUTON FOUND IN YOUR AREA!

This is not a citation.

This is to inform you that our staff found the following pollutants in the storm sewer system in your area. This storm sewer system leads untreated to local streams and to LAKE CHAMPLAIN.

- ☐ Motor Oil
- ☐ Oil filters
- ☐ Antifreeze/transmission fluid
- ☐ Paint
- ☐ Solvent/degreaser
- ☐ Cooking grease
- ☐ Detergent
- ☐ Home improvement waste (concrete, mortar)
- ☐ Pet waste
- ☐ Yard waste (leaves, grass, mulch)
- ☐ Excessive dirt and gravel
- ☐ Trash
- ☐ Construction debris
- ☐ Pesticides and fertilizers
- ☐ Other _____

Dumping of wastes into storm drains is PROHIBITED under municipal ordinances. Illegal dumping can carry severe penalty. For more information or to report an illegal discharge of pollutants, please call the Town of Williston Public Works Department at 878-1239.

TOWN OF WILLISTON PUBLIC WORKS

Stormwater runoff is rain or snowmelt that flows over the ground. As it flows, it can pick up debris, chemicals, dirt and other pollutants and deposit them into a storm sewer system and flow ***untreated*** into the water bodies we use for swimming, fishing and providing drinking water.

To keep the stormwater leaving your home or workplace clean, follow these simple guidelines:

- Use pesticides and fertilizers sparingly.
- Repair auto leaks.
- Dispose of household hazardous waste, used auto fluids (antifreeze, oil, etc.) and batteries at your local Chittenden Solid Waste District drop off center.
- Clean up after your pet and dispose of it properly.
- Use a commercial car wash or wash your car on a lawn or other unpaved surface.
- Sweep up yard debris rather than hosing it to a drain. Compost or recycle yard waste.
- Clean paint brushes in a sink, not outdoors. Properly dispose of excess paints through the CSWD household hazardous waste collection program.
- Sweep up and properly dispose of construction debris like concrete and mortar.

REMEMBER: ONLY rain down the drain!

CSWD
Chittenden Solid Waste District
1021 Redmond Rd., Williston, VT 05495
872-8111 • www.cswd.net

RETHINK RUNOFF

http://rethinkrunoff.org/

Town of Williston MS4 Annual Report

MCM #4 & MCM #5

Unified Development Bylaws Chapter 29: Watershed Health Ordinance

Low Impact Runoff and Erosion Control Checklist

Runoff and Erosion Control Checklist

Public Works Standards Section 6: Erosion Control Measures

Administrative Permit Application

Administrative Permit Summary

Chapter 29

Watershed Health

These standards help protect water quality and watershed health in Williston by regulating construction site erosion and stormwater management in new developments and on redevelopment sites. This chapter also establishes standards for the provision and protection of watershed protection buffers along streams and around wetlands and lakes.

29.1 Purpose - Authority

29.1.1 What is the purpose of these standards? In adopting these standards the Selectboard makes the following findings:

- it is well documented that land development - which alters the volume, velocity, and quality of surface runoff – is likely to adversely affect nearby streams, including the capacity and stability of their channels, their physical and chemical characteristics, and the health of the biological communities they support;

- federal law (see 33 U.S.C. 1293(d)) requires the State of Vermont to maintain a list of streams that are impaired, that is, that do not fully support certain functions due to poor water quality;

- the Allen Brook, Williston's principal stream, appears on that list because scientific surveys have shown it to be impaired for aquatic life support and contact recreation due to land development and the accompanying stormwater runoff and erosion;

- the Muddy Brook, Williston's natural boundary with South Burlington, also appears on Vermont's list of impaired waters because it fails to provide aquatic life support due to a lack of riparian buffers, land development, and erosion;

> See http://www.anr.state.vt.us/dec/waterq/planning/docs/pl_2008.303d_Final.pdf for Vermont's list of impaired waters. For factual background see the *Watershed Improvement Plan and Recommendations for a Total Maximum Daily Load (TMDL) for Sediment: Allen Brook, Williston Vermont: Final Report – March 29, 2003* by Lori Barg, Kari Dolan, Cully Hession, Chris Cianfrani, and Bob Kort, State of Vermont, Department of Environmental Conservation, Water Quality Division.

- the Town of Williston is subject to state and federal permitting requirements as a municipal small separate storm sewer (MS4) operator;

- the general permit (3-9017, as amended) under which Williston operates as an MS4 requires the town to adopt "minimum control measures," including programs for the reduction of pollutants from construction sites and for the post-construction management of stormwater runoff from new developments and redevelopment sites;

- while the town has actively worked on watershed health through its investments in stream restoration and the application of its regulations, restoring the health of the Allen Brook, preventing the addition of other local streams to the list of impaired waters, and complying with the requirements imposed by the MS4 permit make it necessary to adopt these standards.

29.1.2 Under what authority does the town adopt these standards? These standards are adopted under the authority of 24 V.S.A. § 4417(9). As noted in WDB 29.1.1, above, their adoption is also specifically required by 4.2.3 and 4.2.5 of General Permit 3-9014 (as amended January 17, 2013), as issued by Vermont Agency of Natural Resources, Department of Environmental Conservation.

29.2 Applicability

29.2.1 What activities are subject to these standards? These standards apply to any development for which a permit is required by this bylaw.

29.2.2 Are there any exceptions from these standards? As provided by WDB 4.2.1.2., accepted agricultural and forestry practices are exempt from the standards adopted in this chapter. Developments in which the total cumulative land disturbance including all clearing, grading, and excavation, is less than ¼ (one-quarter) acre are exempt from the runoff and erosion control standards provided in sections WDB 29.3 – 29.6 in this chapter, but are encouraged to monitor and minimize runoff and erosion, taking whatever measures are needed to protect neighboring properties and water quality.

29.2.3 What about small projects? These standards recognize that the level of runoff and erosion control required to protect water quality varies with the size and location of the proposed development.

29.2.3.1 Low Risk Development. WDB 29.3 sets relatively simple runoff and erosion control standards for smaller developments that pose a relatively low risk of accelerated runoff, erosion, and sedimentation.

29.2.3.2 All Other Development. WDB 29.4 establishes runoff and erosion control standards for larger developments and development in vulnerable areas.

29.2.4 What about routine maintenance? What about emergencies? These standards do not apply to the routine maintenance of public and private roads or utilities, including stormwater management works, nor do they apply to emergency repairs required by flooding, slope failures, or other natural hazards or civil emergencies, like a bridge failure. It is understood, however, that runoff and erosion control measures will be incorporated into maintenance activities where necessary, as part of the "good housekeeping" practices required by the town's MS4 permit.

29.3 Low Risk Development

29.3.1 What is a Low Risk Development? A low risk development is one in which the cumulative land disturbance is greater than ¼ (one-quarter) acre, but less than two (2) acres, in which all land that will be disturbed is outside the watershed protection buffers established by this chapter, and in which all land that will be disturbed has a slope of less than eight percent (8%).

29.3.2 What runoff and erosion control standards apply to Low Risk Development?

29.3.2.1 State Handbook. Applications for permits for low risk developments shall be accompanied by a completed Runoff and Erosion Control Checklist that shows how the applicant will comply with the guidance provided in the current edition of Vermont's *Low Risk Site Handbook for Erosion Prevention and Erosion Control*.

Where can I find the *Low Risk Site Handbook for Erosion Prevention and Erosion Control*? On-line at: http://dec.vermont.gov/sites/dec/files/wsm/stormwater/docs/StormwaterConstructionDischargePermits/sw_low_risk_site_handbook.pdf

29.3.2.2 Additional Standards. Low risk developments must also comply with WDB 29.5.1 and 29.5.9-12.

29.4 Runoff and Erosion Control Plans for Other Developments

29.4.1 When must a runoff and erosion control plan be submitted? All applications for permits for developments that are not exempted by WDB 29.2.3.1, or defined as 'low risk' by WDB 29.3.1, above, shall be accompanied by a professionally-prepared runoff and erosion control plan that shows how compliance with the performance standards of WDB 29.5 will be attained both during the construction of the proposed development and the continuing use of the site.

29.4.2 What must be included in a runoff and erosion control plan? Runoff and erosion control plans shall be based on a grading plan of the site and its immediate environs, showing existing and proposed contours at intervals of no more than two feet and all information required by the Erosion and Runoff Control Plan Checklist. EXCEPTION: Detailed contour mapping is not required for portions of a site that will not be disturbed, but sufficient information must be provided to show how the transition from disturbed to undisturbed areas will be made.

29.4.3 How will a proposed runoff and erosion control plan be reviewed? The town's review of a proposed runoff and erosion control plan will begin with a meeting between the Administrator and the DPW or their designees and the applicant's designer. This meeting will ordinarily be on-site. If the application for a permit is approved, there will also be a pre-construction meeting, as required by WDB 29.5.3.

29.5 Runoff and Erosion Control Standards. Because these performance standards recognize that there is a different solution for every site, they sometimes use permissive terms, like 'should.' The use of permissive terms does not constitute an exception to a performance standard. It indicates only that the town is willing to review a variety of possible ways of achieving compliance.

29.5.1 Design to minimize runoff and erosion. The proposed site plan should fit the site, with the area to be disturbed, cut and fill, and impervious surfaces being minimized.

29.5.1.1 Avoid Slopes. Development should be directed away from slopes. This bylaw calls for reduced densities on slopes over 15% (see Chapter 19 and the various zoning districts). Development is prohibited (except where a variance can be justified) on slopes of 30% or more.

29.5.1.2 Fit the Terrain. Architectural forms and site improvements should fit the terrain. Access drives and roads, parking and loading areas, utility lines, and the long axes of buildings should run more or less parallel to, not more or less perpendicular to slopes. Where buildings

cross slopes, floors should be staggered with the slope. Additional site planning and design standards designed to ensure that development fits the terrain are imposed in some zoning districts, including the ARZD, GZDN, GZDS, and RZD.

29.5.1.3 Phase Construction. The area disturbed at any one time shall be minimized in both time and space. The runoff and erosion control plan shall show how clearing, grading, excavation, and fill will be phased so that disturbance is promptly followed by revegetation, and/or structural stabilization of the site, including temporary stabilization where areas will remain disturbed for more than 15 days. A copy of the phasing schedule and a checklist on which the installation of measures by phases is recorded shall be maintained on the site for review by the town when inspections are made.

29.5.1.4 Minimize Impervious Surfaces. The extent of paving and other impervious surfaces should be minimized by thoughtful site planning that keeps roads as narrow and as short as possible, and that keeps surface parking areas small. The use of porous pavements where site conditions permit is also strongly encouraged, and may be required of uses that propose to place extensive parking areas in impaired watersheds.

29.5.2 Mark disturbance limits. Land disturbance (clearing, grading, excavation, and fill) shall be confined within limits that are clearly marked on the site during construction. Disturbance limits must be shown on the runoff and erosion control plan, then established in the field, subject to inspection before any clearing, grading, excavation, or fill begins. Disturbance limits must be marked with a fence or other barrier sufficiently durable to last through the anticipated construction period. This fence or barrier should be supplemented with brightly colored flagging or tape. Work outside the approved disturbance limits is a violation of this bylaw, subject to enforcement, as provided by WDB 7.4-7.6.

29.5.3 Hold a pre-construction meeting. Before any work for which a runoff and erosion control plan is required is begun, the disturbance limits shall be marked on the site and the applicant shall arrange an on-site preconstruction meeting between the town staff and all design professionals, contractors, and subcontractors who will be responsible for the observance of those limits. The purpose of this meeting shall be to review the runoff and erosion control plan for construction, including the sequence and schedule for the installation of runoff and erosion control measures, and the importance of maintaining those measures during the construction period.

29.5.4 Divert runoff from disturbed areas. Disturbed areas shall be protected from surface runoff by diversion dikes or channels, silt barriers, filter strips, or other measures until they are revegetated or otherwise stabilized.

29.5.5 Stockpile and replace topsoil. All topsoil removed shall be stockpiled and used in the revegetation of the site. To put it another way, the topsoil from the site shall be used there, and not replaced with an inferior material.

29.5.5.1 Silt Fence. Topsoil stockpiles shall be surrounded by a silt fence or an equally effective sediment control measure that also protects the stockpile from damage during construction activity.

29.5.5.2 Temporary Cover. Topsoil stockpiles shall be stabilized with mulch that is renewed weekly or, if the stockpile will not be worked for more than a week, by a mulch followed by a temporary cover crop.

29.5.6 Protect retained vegetation. Existing vegetation that is to be retained must be protected from damage during construction, as required here and, in more detail, by the *Public Works Standard*s. The runoff and erosion control plan must include a schedule (see the *Runoff and Erosion Control Plan Checklist*) showing that all measures required to protect existing vegetation will be put in place before other construction activities begin. This schedule may apply to the entire site or to sequential phases of construction.

29.5.6.1 Earthwork Within the Dripline. There should be no clearing, grading, excavation, or other construction activity, including the placement of underground utilities, within the drip line of trees that are to be retained. The Administrator may permit minor exceptions to this standard where the terrain or the location of existing utilities and/or buildings make compliance infeasible.

29.5.6.2 Storage Within the Dripline. There shall be no storage or parking of construction equipment, materials, vehicles, or waste on or around trees and roots or other vegetation that is to be retained. This specifically prohibits the dumping of paint, petroleum products, concrete or stucco mix, dirty water, or any other material that may be deleterious to vegetation that is to be retained.

29.5.6.3 Use of Trees. The use of trees as a winch supports or anchorages, as temporary power poles, as sign posts, or for other similar functions is prohibited.

29.5.6.4 Pruning. Trees and shrubs that are to be retained should be properly pruned before construction begins. This will maximize their ability to withstand damage.

29.5.6.5 Porous Pavement. See WDB 29.5.1.4, above. The use of porous pavements protects existing root systems.

29.5.7 Anticipate and limit accelerated runoff

29.5.7.1 Channel Design. All filter strips, swales, grassed waterways, other channels, and outlets shall be designed and constructed to handle the anticipated increase in the volume and velocity of runoff without flooding or channel erosion.

29.5.7.2 Pre-Construction Rate. Runoff shall be retained on site and infiltrated and/or released at a rate not exceeding the pre-development rate of release.

29.5.8 Trap sediment on-site. Sediment resulting from accelerated soil erosion shall be retained on the site, with proposed provisions for regular maintenance and sediment disposal included in the construction schedule and in the maintenance manual and schedule required by the *Runoff and Erosion Control Plan Checklist*.

29.5.9 Make runoff and erosion control measures an asset. Filter strips, swales, grassed waterways and others channels, stormwater ponds, and other erosion and runoff structures shall be integrated into the landscaping plan for a site, contributing to the appearance and marketability of the proposed development and the community, as well as to watershed protection.

29.5.9.1 Lower Density Development. In lower density developments, erosion and runoff control measures should blend in with the topography and vegetation of surrounding woods

and fields. As much runoff retention and sediment trapping as possible shall occur on the surface or in shallow structures that mimic the vegetative composition and structure of natural wetlands and riparian areas.

29.5.9.2 Higher Density Development. Landscaped areas in higher density developments, including those required by Chapter 18 of this bylaw, should also, to the extent possible, be used for stormwater management. Given the higher impervious coverage, underground storage and mechanical treatment may also be used to comply with these performance standards.

29.5.10 Use appropriate plant materials. Proposed plant materials and planting mixes shall be suitable for the site and the intended application. The requirements of WDB 23.7 apply to all plant materials specified in runoff and erosion control plans.

29.5.11 Maintain runoff and erosion control measures. Runoff and erosion control measures must be installed as designed and properly maintained. Failure to maintain the required measures is a violation of this bylaw, subject to enforcement as provided by WDB 7.4-7.6.

29.5.12 Schedule inspections during construction. In order to ensure proper functioning and maintenance of required erosion and runoff control measures during the construction period, the applicant shall provide for regular inspections of all runoff and erosion control measures by a qualified professional during the construction period. An inspection and the repair or restoration of all measures is required after any precipitation event exceeding one inch. Reports on routine inspections shall be provided to the Administrator and DPW within five working days after each inspection is made.

29.5.13 Winter Construction. It is best to avoid winter construction, but Williston recognizes that this is not always possible. Where it is not, additional runoff and erosion control measures may be required. These measures are established in the state handbooks that are adopted by reference in WDB 29.5.14.

29.5.14 Where can I find more specific guidance for complying with these performance standards?

29.5.14.1 State Handbook: Construction**.** All construction site erosion control measures shall comply with the *Vermont Handbook for Soil Erosion and Sediment Control on Construction Sites*, Special Publication No. 3, Vermont Geological Survey, or its successors, and with the current edition of the *Town of Williston Public Works Standards*.

29.5.14.2 State Handbook: Permanent. All long-term runoff and erosion control measures shall comply with *The Vermont Stormwater Management Manual for Watershed Improvement Permits, Volumes I and II*, Vermont Agency of Natural Resources, April and August, 2002 or their successors, and with the current edition of the *Town of Williston Public Works Standards*.

Additional Resources. The Vermont Agency of Natural Resources provides resources about low impact design to minimize stormwater runoff at
https://anrweb.vt.gov/PubDocs/DEC/WSMD/stormwater/docs/sw_LID%20Guide.pdf

29.6 Required Improvements. All runoff and erosion control measures required for compliance with the standards established in this chapter are required improvements, subject to the requirements of Chapter 7 of this bylaw.

29.7 Discharge of Non-Stormwater Waste. Discharging non-stormwater wastes into any stormwater or street drainage system, public or private is a violation of this bylaw, subject to enforcement, as provided by WDB 7.4-7.6.

29.7.1 May I connect footing, foundation, or roof drains, or sump pumps to stormwater systems? Footing, foundation, and roof drains, and sump pumps should ordinarily be daylighted or infiltrated. They may be connected directly to a stormwater system only with the written permission of the DPW.

29.7.2 Must existing connections to stormwater systems be disconnected from stormwater systems? Whenever possible. Approval of any permit may be conditioned on the disconnection of existing footing, foundation, and/or roof drains or sump pumps.

29.8 Wetlands Protection

29.8.1 How will I know if I have wetlands on the site of my proposed development? A wetlands delineation prepared by a professional wetlands scientist in accord with the current guidelines of the Army Corps of Engineers must accompany all applications for discretionary permits for development on sites where wetlands are known or suspected to exist. The need for a wetlands delineation will be determined during pre-application review.

What is a wetland? Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of the year."

29.8.2 Are Class II wetlands protected in Williston? Class II wetlands are protected by state law and this bylaw. They must generally remain in their natural vegetation, but may be crossed by roads, trail, or utility lines where there is no feasible alternative to such a crossing and where all work is conducted in compliance with an approved runoff and erosion control plan and a Conditional Use Permit approved by the Agency of Natural Resources.

29.8.3 Are Class III wetlands protected in Williston? Class III wetlands generally are not protected by state law, but may be protected by this bylaw and are definitely regulated by the Army Corps of Engineers. The DRB may, upon the recommendation of the Conservation Commission, require that Class III wetlands with significant functional values remain in their natural vegetation. The Conservation Commission may also recommend, and the DRB require, that a functional assessment of the Class III wetlands on the proposed development site be provided along with the delineation.

Wetlands Classes? State and Federal Wetland Regulations. There are no Class I wetlands in Williston. Class II wetlands appear on, or are contiguous to wetlands that appear on, the *Vermont Significant Wetlands Inventory Maps* prepared by the Agency of Natural Resources. Class III includes all other wetlands. Information on Vermont's state wetlands regulations may be found on-line at: http://dec.vermont.gov/watershed/wetlands. Information on the Army Corps of Engineers regulation of wetlands may be found at http://www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/

29.9 Watershed Protection Buffers. This section establishes watershed protection buffers for all streams, ponds, and lakes, and for certain wetlands.

29.9.1 Are buffers required around lakes and ponds? Yes. There shall be a buffer of at least 150 feet above the ordinary high water mark of all ponds or lakes that have more than a half-acre (21,780 SF) of water surface, except for properties in the Lake Iroquois Shoreland Protection Area defined in WDB 29.9.2;

29.9.2 Lake Iroquois Shoreland Protection Area. The Lake Iroquois Shoreland Protection Area (LISPA) means all land located within 250 of the mean water level of Lake Iroquois. All development within this area must comply with the Vermont Lake Shoreland Protection Standards as provided by 10 V.S.A. § 1441-1454. All applications for an administrative permit will be required to provide documentation that the proposed development will be in conformance with these standards.

29.9.2.1 New structures. New structures in the LISPA must be set back a minimum of 100 feet from the mean water level of Lake Iroquois.

29.9.2.2 Existing structures. Existing, non-conforming structures within the LISPA may be expanded under limited circumstances as provided by WDB 31.3.4.

29.9.3 Are buffers required along streams? Yes.

29.9.3.1 Named Streams. There shall be a buffer of at least 150 feet above the ordinary high water mark of the Allen Brook, the Muddy Brook, the Sucker Brook, and the Winooski River.

29.9.3.2 Other Streams. There shall be a buffer of at least 50 feet above the ordinary high water mark of all unnamed streams – perennial or intermittent - identified on the 7.5' U.S. Geological Survey quadrangles covering the town, or on the Williston Field Stream Survey maps of the Allen and Muddy Brook watersheds prepared by the Vermont Department of Environmental Conservation.

29.9.4 Are buffers required around wetlands? Yes.

29.9.4.1 Class II Wetlands. There shall be a buffer of at least 50 feet above the delineated boundary of any Class II wetland.

29.9.4.2 Class III Wetlands. The DRB may, upon the recommendation of the Conservation Commission, require a buffer above Class III wetlands that have important functional values.

29.9.5 What is the relationship of watershed protection buffers and special flood hazard areas? The watershed protection buffers required by WDB 28.6.1through 28.6.3 shall be expanded, where necessary, to include special flood hazard areas.

Special Flood Hazard Areas. These areas are mapped for the National Flood Insurance Program and may sometimes include more area than the watershed protection buffers required by WDB 29.8. The official maps are on file with Williston Planning. See Chapter 28 of this bylaw for additional regulations applicable to Special Flood Hazard Areas.

29.9.6 Can any use be made of the land in watershed protection buffers? Watershed protection buffers shall remain undeveloped, except as provided here.

29.9.6.1 Vegetation. Watershed protection buffers shall remain in native or cultivated vegetation that serves as an effective filter for surface runoff. Where effective filtering

vegetation is not present, the buffer shall be restored to a combination of wetland, riparian, forest, and/or meadow vegetation appropriate to the site. Removal or cutting of live or dead vegetation from a watershed protection buffer is prohibited except where the buffer is used for accepted agricultural or forestry practices, where a hazardous tree is present, or where it is necessary to control invasive species. All native vegetation cut within the buffer should be left in place whenever possible.

29.9.6.2 Lawns. Conventional turf grass lawns do not provide an effective filter for surface runoff and may not be included in the watershed protection buffers required by this section.

29.9.6.3 Impervious Surfaces. Development within watershed protection buffers shall be limited to utility and road crossings; trails and trail crossings, with minor related facilities like signs and benches; and runoff and erosion control measures.

- All work within a watershed protection buffer shall proceed in accordance with the runoff and erosion control standards of this chapter.
- Utility and road crossings of watershed protection buffers shall be consolidated wherever possible, and both the width and length of such crossings minimized. Minimum disturbance trenching may be required for utility lines.

- The runoff and erosion control measures permitted in watershed protection buffers shall be limited to outfall structures or other measures whose function requires such a location. Permanent stormwater works, including above or below ground detention and treatment, shall be permitted only where no alternative, upland location is feasible.

29.9.6.4 Outdoor Storage. Outdoor storage is not permitted in watershed protection buffers.

29.9.6.5 Lawn Chemicals. No lawn chemicals, including fertilizers, herbicides, and pesticides may be used in watershed protection buffers. The Administrator may permit an exception to this standard for the control of invasive plants by, or under the direction, of a public agency. This prohibition does not apply to accepted farm and forest practices, which are exempt, nor does it prohibit the use of compost or another organic fertilizer in conservation plantings.

29.9.6.6 Owners' Responsibilities. The covenants for developments that include watershed protection buffers shall include a reference to the standards adopted here (WDB 29.9.5) and in WDB 29.9.6. In developments where an owner's association is required, that association is responsible for the protection of the watershed protection buffers.

29.9.7 How will people know where watershed protection buffers are? Watershed protection buffers must be marked on the ground as well as on the final plans. This may be accomplished using plantings, fences, or other landscape features, like a line of boulders. The DRB may permit an exception to this standard where a watershed protection buffer is marked by a definite change in the terrain.

29.9.8 Is it possible to obtain a variance to permit more development within a watershed protection buffer? Additional development within watershed protection buffers may be made possible by variance, as provided by Chapter 8 of this bylaw. To approve such a variance, the DRB must make all of the findings required by WDB 29.9.7.1 and 29.9.7.2 as well as all findings required by WDB 8.1.

29.9.8.1 Impervious Cover. The development permitted by variance will result in a total impervious cover of no more than 10 percent within the buffer.

29.9.8.2 Buffer Width. The development permitted by variance will leave the largest buffer possible consistent with the need to allow a permitted use. In no case shall a 150-foot buffer be reduced below 75 feet or a 50-foot buffer be reduced below 25 feet.

29.9.8.3Special Flood Hazard Areas. There are additional limitations on variances in special flood hazard areas. See WDB 28.7.1.

29.9.9 What about nonconforming uses and structures in watershed protection buffers? Nonconforming uses and structures located within watershed protection buffers may be changed, maintained, repaired, enlarged, and replaced as provided by Chapter 2 of this bylaw, but only if all work complies with the standards established in this chapter. EXCEPTION: No change in use that permits the processing, manufacture, storage, or handling of regulated hazardous materials, other potential pollutants, or materials that could be dispersed downstream during a flood will be permitted.

29.10 Source Water Protection Areas

29.10.1 What is a source water protection area? Source water protection areas contribute, or at least potentially contribute, ground or surface water to drinking water supplies.

Source Water Protection? Williston currently includes two source water protection areas. One surrounds the well that serves the Porterwood development on Old Creamery Road. The other is the watershed of Lake Iroquois, which is part of the larger watershed of Shelburne Bay. Shelburne Bay is the source for the Champlain Water District, which supplies water to Williston and other communities.

29.10.2 What additional standards apply to development in source water areas? No specific standards apply, but the administrator may refer any proposed development in a source water protection area to the water provider for comment.

Town of Williston

LOW IMPACT RUNOFF & EROSION CONTROL CHECKLIST

This checklist must ordinarily be submitted whenever a development will involve clearing, grading, or disturbance of between 0.25 (1/4) and 2 acres of land. Larger developments and all development that impacts a watershed protection buffer or a slope of 8% or more must submit a Runoff and Erosion Control Plan. By initialling the checklist, the applicant indicates he/she will comply with the performance standards. Failure to implement and maintain the required runoff and erosion control measures is a violation of the *Williston Development Bylaw*, subject to enforcement as provided by WDB 7.4 and 7.5 For more information on how to implement erosion control measures, please refer to the State of Vermont's *Low Risk Site Handbook for Erosion and Sediment Control,* which is available online at: http://www.vtwaterquality.org/stormwater/docs/construction/sw_low_risk_site_handbook.pdf).

applicant	administrator	
		Mark Construction Limits. Before beginning construction, the limits of construction impact must be physically marked on-site, using orange flagging or safety fence. A protection zone must also be established around any existing vegetation that is to be retained, to the dripline of the vegetation). All Class 2 wetlands and land in Watershed Protection Buffers must be outside the marked construction limits.
		Stabilize Construction Entrance/Exit. If you are going to be driving ***any*** vehicles on and off the construction site, the construction entrance/exit must be stabilized. Geotextile filter cloth must be put down and covered with clean 1" to 4" gravel at least 8 inches thick. The stabilized entrance must be 12 feet in width and a minimum of 40 feet in length (or the length of the driveway if this is shorter than 40').
		Install Silt Fence. Silt fence must be installed on the downhill side of construction activiites in order to intercept runoff and allow sediment to settle out. Ensure that the silt fence catches all runoff from bare soil, and is installed across the slope *prior to the start of construction activi*ty. Hay bales may NOT be substituted for silt fence.
		Divert Upland Runoff. Create diversion berms to intercept and divert upslope runoff before it reaches your construction site. Compact the berm with a shovel and stabilize it and the channel below it with seed or erosion control matting.
		Slow Down Channelized Runoff. Stone check dams must be installed in all channels and/or ditches which will be used to divert or direct stormwater flow. The spacing of check dams must be equal to the height of the check dam divided by the channel slope. Hay bales may not be used as check dams.

☐ ☐ **Stabilize Exposed Soil**. All areas of disturbed soil must have temporary or permanent stabilization within 14 days of initial disturbance. Temporary stabilization can be achieved by seeding and mulching, or applying erosion control matting after the day's construction activity is finished. After final grade is achieved, permanent stabilization must follow within 48 hours, via seeding and mulching, or hydroseeding.

I understand the erosion and runoff control requirements of the *Williston Development Bylaw*, as they are embodied in this checklist and certify that, if approved, the development I have proposed will proceed in full compliance with these requirments.

Applicant's Signature: _____ Date: _____

Town of Williston

RUNOFF & EROSION CONTROL PLAN CHECKLIST, AS REQUIRED BY WDB 29.4.1

This checklist must be submitted with permit applications for proposed developments that will result in significant clearing and grading (greater than 2 acres) or where development will occur in a vulnerable area, such as a watershed protection buffer or on slopes greater than 8%. Smaller projects that are outside vulnerable areas will need to submit the Low Impact Runoff and Erosion Control Checklist. Please see WDB 29.2-4 to determine which checklist you need to submit. If you are required to use this checklist, attach it to the Discretionary Permit Application Checklist or Administrative Permit Application.

Applicant	Administrator	All runoff and erosion control plans must contain:
		Hydrology. Runoff and erosion control plans shall show existing wetlands, springs, streams, ponds, lakes, drainage ditches, wells, and other hydrologic features of the proposed development site. They shall also show nearby waters that may be affected by the proposed development, including those that will receive runoff from the proposed development and those from which a watershed protection buffer extends onto the proposed development site. A separate vicinity map may be used to show nearby waters.
		Existing Condtions. Runoff and erosion control plans shall show all existing impervious surfaces and surface drainage and stormwater management measures on the proposed development site. They shall also show all existing surface drainage and stormwater management installations, including catch basins, that will receive runoff from the proposed development. A separate vicinity map may be used to show nearby installations.
		Buffers. Where applicable, required watershed protection buffers shall be clearly delineated on all runoff and erosion control plans.
		Soils. Runoff and erosion control plans shall show the soil mapping units found on the site, as identified by the Natural Resources Conservation Service, as well as any prominent geologic features, including bedrock outcrops. The relevant characteristics of each soil mapping unit, including slope, erosion hazard, hydrologic group, and “k” value shall be shown in an accompanying legend or table.

Vegetation. Runoff and erosion control plans shall show the existing vegetation on the site in sufficient detail to demonstrate compliance with the performance standards of Chapter 29. This may include mapping individual trees and other plants. The level of mapping needed shall be determined at the pre-application conference. A starting point for that determination shall be the mapping of all live trees and snags with a dbh of six (6) or more inches.

Construction Measures. Runoff and erosion control plans shall show disturbance limits and all other measures proposed to prevent accelerated runoff and erosion during construction including all details needed to demonstrate compliance with the performance standards of Chapter 29.

Permanent Measures. Runoff and erosion control plans shall show all measures proposed to manage runoff and limit erosion during the long-term use of the proposed development, including all details needed to demonstrate compliance with the performance standards of Chapter 29.

Calculations. Runoff and erosion control plans shall be accompanied by all calculations used to size the measures proposed.

Schedule. Runoff and erosion control plans shall include a coordinated schedule for the clearing and grading of the site and for the installation of all measures required to implement these performance standards.

Inspections. Runoff and erosion control plans shall include an inspection schedule for runoff and erosion control measures used during the construction period.

Maintenance. A maintenance manual and schedule shall be provided for all permanent measures.

Images. The use of aerial and/or still photography or visual simulations illustrating existing site conditions and proposed features of the runoff and erosion control plan may be required. The need for such illustration will be determined at the pre-application conference.

I understand the erosion and runoff control requirements of the Williston Development Bylaw, as they are embodied in this checklist and certify that, if approved, the development I have proposed will proceed in full compliance with these requirments.

Applicant's Signature: _____ Date: _____

SECTION 6

EROSION CONTROL MEASURES

SECTION 6 EROSION CONTROL MEASURES

6.1 GENERAL

It is not intended by the Town of Williston that this “Section” be a complete set of specifications. It is to be used as a basic standard for any person planning work in Williston. All materials listed shall be acceptable to the Public Works Director and any items not listed will require acceptance by the Public Works Director before installation. Failure to receive acceptance of materials and methods prior to their incorporation into the work shall leave the person having the said work done liable for the replacement of those substandard materials with acceptable materials at his/her expense.

The person(s) proposing any construction activity that disturbs ¼ or more acres of land shall be responsible for complying with all applicable rules, regulations, and ordinances (local, state, federal). Said persons shall submit all necessary documentation, including but not limited to, plans, details and drawings, specifications, permits and applications and shall have obtained all Town acceptances and paid all applicable fees.

All work on the project site shall have the Design/Project Engineer on site during construction who is hired by the Developer to see that construction is completed according to specifications. The inspector’s costs shall be borne by the Developer.

Erosion control measures for developments shall comply with the requirements in Chapter 29, Watershed Health, of the Unified Development Bylaws.

Low risk development as defined in Chapter 29, shall comply with the guidance in the State of Vermont Low Risk Handbook for Erosion and Sediment Control, latest edition. Erosion control measures for other developments shall comply with the standards in Chapter 29 and will require an Erosion and Prevention and Sediment Control Plan in accordance with the Vermont Standards and Specifications for Erosion Prevention and Sediment Control Plan.

6.2 MATERIALS

The materials for the temporary and permanent erosion control measures shall comply with the State of Vermont Low Risk Handbook for Erosion and Sediment Control and the Vermont Standards and Specifications for Erosion Prevention and Sediment Control Plan.

6.3 INSTALLATION

6.3.1 Dust Control

Water and/or calcium chloride shall be applied to travelled areas and stockpiles as construction progresses to control the dust. Blowing and accumulation of dust shall be controlled so that it does not become a nuisance to adjoining properties

or cause a deterioration of surface water quality. The number of applications and the amount of water and chloride used shall be based on field and weather conditions and as ordered by the Public Works Director.

6.3.2 Dewatering

All water flowing off the project site shall be free of sediment. Any water that accumulates on the project site within a trench or pit, or from dewatering activities, shall be properly treated to remove sediment prior to being discharged from the site.

AP - _____ - _____

WILLISTON, VERMONT
ADMINISTRATIVE PERMIT
AS REQUIRED BY WILLISTON
DEVELOPMENT BYLAW 5.1.3

Date Received:

Notice of Recording

Williston, VT Town Clerk's Office
Received for Record
_____AD _____
At _____O'clock_____minutes____M
And recorded in Book _____ Pages_____
Attest _____ Town Clerk

For complete document, see the Planning Office

Site Information:

Development Site Address: _____ Lot Size: _____ Lot #: _____

Tax Parcel #: ___ ___ : ___ ___ ___ : ___ ___ ___ . ___ ___ ___ Zoning District: _____

Property Owner's Information:

Property Owner's Name: _____

Property Owner's Mailing Address: _____

Telephone: _____ Email: _____

Property Owners Acknowledgment: *As the owner of the property described above or the owner's guardian/trustee, I hereby apply for a permit to alter or construct the structure or structures described on this form. I understand that if this application is approved, I must post notice on the property and allow a* ***15-day appeal period*** *before work begins.* ***I understand that VT law allows 30 days to find this application complete.*** *The information and representations contained in this application are true and accurate to the best of my knowledge.*

PROPERTY OWNER'S SIGNATURE: _____ Date: _____

NAME PRINTED: _____

**Property owner must also read and sign the acknowledgements on the bottom of page 3.*

Applicant/Owner's Representative Information:

Name: _____ Mailing Address: _____

Telephone: _____ Email: _____

Briefly describe the proposed change in use or improvements to the property:

_____

_____

_____

_____

ZONING ADMINISTRATORS ACTION:

After reviewing the proposed change in use and/or improvement, the Administrator has taken the following action:
_____ Denied _____ Approved _____ Approved this permit request with the conditions listed on page 4.

Zoning Administrator: Date:

PUBLIC WORKS ACTION, WHEN REQUIRED:

The DPW finds that the proposed improvements comply with all applicable standards, including, but not limited to, the requirements for access to town roads and connection to town utilities.

Director of Public Works: Date:

AP - _____ - _____

Please answer all of the questions below.

1. **List any applicable subdivision or site plan approvals that may be related to this application request:**

   Permit #: _____ (and/or) Subdivision Name: _____

   Prior subdivision or site plan approvals may contain conditions of approval that could affect your project.

2. **What is the existing use of the property?**

   _____ Residential _____ Commercial _____ Office _____ Industrial _____ Public _____ Institutional

3. **Is the application for a change in use?** _____Yes _____No

   What is the PROPOSED use?_____

   _____ Residential _____ Commercial _____ Office _____ Industrial _____ Public _____ Institutional

4. **Is this an application for a new single family home?** _____Yes _____No **Multi Family Home?** _____Yes _____No

   For a Single Family Home: Finished Floor Area: _____ (sf)

   # of Bedrooms: _____ Finished Basement: _____ Yes _____ No

   For Multi-Family Homes: # of Units: _____ Finished Floor Area (Total): _____ (sf)

   # of Bedrooms (total): _____ Finished Basements: _____ Yes _____ No

   If building a new single or multi-family home, please attach a New Home Checklist . An application for a new home must include documentation of Residential Growth Management Allocation.

5. **Is this an application for an accessory dwelling?** _____Yes _____No

   Floor Area: _____ (sf) # of Bedrooms: _____ Floor Area of PRIMARY Residence: _____ (sf)

6. **What is the existing or proposed wastewater treatment system?**

   ____Municipal ____ On-Site Septic ____ Community Septic

   Applications for improvements, expansions, or changes in use that will result in greater sewage flows are required to submit documentation of the necessary wastewater treatment capacity. Documentation may include a valid wastewater permit from the State of Vermont or a certificate from Williston Public Works confirming the available treatment capacity for those projects connected to the municipal wastewater system.

7. **Please check all that apply and attach a checklist for each of the following categories.**

   This is this an application for a(n):

   _____ Deck or Patio _____ Fence _____ Telecommunications Facility

   _____ Pool _____ Home Business _____ New Home

   _____ Accessory Structure *(including detached garages, play stuctures, sheds, etc)*

   _____ Residential Improvement *(any expansion or improvement to an existing structure)*

8. **If there will be any change in building height or if a new building is proposed, what is the proposed building height?** ____

9. **Will your proposed project alter the amount of existing or required parking?** _____Yes _____No

10. **Is there a stream or wetland within 150 feet of the proposed work?** _____Yes _____No

    If yes, please attach a completed Watershed Health Checklist . Please consult Williston Planning staff if you are unsure. A professional wetlands delineation may be required.

11. **Is any of the proposed work in a Special Flood Hazard Area?** _____Yes _____No

    If any of the work proposed is in a Special Flood Hazard Area, this application will be referred to Vermont's National Flood Insurance Coordinator. This application will not be considered complete and will not be processed until that review is finished.

AP - _____ - _____

12. Will land be cleared of vegetation, graded, or otherwise disturbed? _____Yes _____No

If yes, how many square feet?_____

_____ **High Risk:** My project will disturb *more* than 87,118 SF (2 acres) and /or is within 150 feet of a stream/wetland.

_____ **Low Risk**: My project will disturb *more* than a 10,890 SF (1/4 acre) but *less* than than 87,118 SF (2 acres).

_____ **Exempt**: My project will disturb *less* than 10,890 SF (1/4 acre).

A *Runoff & Erosion Control Plan Checklist* must accompany all application for High Risk developments. A *Low Risk Runoff & Erosion Control Checklist* must accompany all applications for Low Risk developments.

13. What is the total square footage of the NEW impervious surface (hardscape) such as roof, deck, porch, pavement, driveway, patio, etc., that will be added to the site? _____ (sf)

14. Is this application for a project in the Village Zoning District? _____Yes _____No

Work proposed in the Village Zoning District may require a Certificate of Appropriateness from the DRB.

15. Have you attached a drawing of all proposed work? _____ Yes _____ No

Applications for administrative permits must include a dimensioned drawing of all work. Anything being constructed or demolished must include dimensions (length, width, height). The drawing must include all property lines, existing and proposed buildings and other improvements, floorplans (all levels), driveways and parking areas, existing and proposed setbacks from all property lines, watercourses and wetlands, a north arrow, and any information required by applicable checklists.

16. Cost of Labor: $_____ **+ Cost of Materials: $**_____ **= Total Cost: $**_____

The cost of labor cannot be $0. Even if you are doing the work yourself, a reasonable value for labor must be provided.

FEES (To be completed by Williston Planning staff)	**Recording Fee: $** _____
Application Type: _____ Simple _____ Major	**Permit Fee: $** _____
Impact: School $ _____ Rec. $_____ Trans. $ _____	**Total Impact: $** _____
Is a Certificate of Compliance required? _____Yes _____No	**Cert. of Compliance Fee: $** _____
Fees Paid? _____ Check # _____ Collected By: _____	**Total: $** _____

ACKNOWLEDGEMENTS: By signing this form, the owner acknowledges that they understand and accept the principles adopted in WDB 1.3 and WDB 5.6.1.

1.3 Basic Principles Applicants Should Understand. Your signature on an application for a permit is an acknowledgement of the following basic principles:

1.3.1 State and federal regulations may apply. Applicants should understand that state and federal regulations apply to many projects. Where those regulations are not as restrictive as this bylaw, this bylaw applies.

1.3.2 Private agreements may apply. Applicants should be aware that covenants, deed restrictions, easements, and similar private agreements affect many projects. Those agreements may be more restrictive than this bylaw.

1.3.3 Burden of proof. Applicants should understand that the burden of demonstrating compliance with this bylaw rests with them. Be sure you understand the relevant requirements of this bylaw before submitting a permit application.

1.3.4 Representations are binding. All representations made on application forms and checklists, and in the drawings and other materials that accompany an application, are binding.

5.6.1 What happens if I change a project after an administrative permit is approved? Failure to build in accord with the approved final plans is a violation of this bylaw, subject to enforcement as provided by WDB 7.4-7.6. A fine may be imposed and you may be required to remove all work that is not in accord with the approved final plans.

Permission to Enter: Your signature on this application constitutes permission for on-site inspection of the property described on this application form as provided by WDB 5.2.2.3

PROPERTY OWNERS SIGNATURE: _____

AP - _____ - _____

CONDITIONS AND REQUIREMENTS OF THIS PERMIT AS DETERMINED BY THE ZONING ADMINISTRATOR:

_____ **Inspections.** One or more inspections are required for the permitted work, as provided in the development agreement or in the specific conditions of approval. You must call the Zoning Administrator and/or Williston Public Works during regular business hours at least 7 days before an inspection is needed.

_____ **Certificate of Compliance.** A Certificate of Compliance (CC) is required before the permitted work is considered complete and the premises may be occupied. A CC will be issued within 15 working days following the final inspection. Be sure that all required inspections have been made or are scheduled BEFORE filing a request for a CC.

Special Conditions and Requirements set forth by the Zoning Administrator:

The Zoning Administrator has approved this permit with the following conditions:
The Zoning Administrator has determined that this application is incomplete and can neither be approved nor denied without the following information:

KEEP THIS PERMIT! A copy of the approved permit must be present on the job site during construction. After that, this permit should be placed in your permanent records. Retaining it and passing it on to future owners will save everyone time and money.

Williston Administrative Permits (edited)

Zoning Permit #	Tax Parcel #	Development Site Street #	Development Site Street Name	Subdivision Name	Lot Size (acres)	Date Received	Decision Date	Area of Disturbance (square feet)	New Impervious (square feet)
AP-19-0219	15:099:033.111	175	Creek's Edge Drive	Creek's Edge		4/5/2019	4/15/2019	3908	3749
AP-19-0220	08:104:010.401	132	Stillwater Lane	Finney Crossing		4/11/2019	4/15/2019	13125	12398
AP-19-0221	08:104:010.402	132	Stillwater Lane	Finney Crossing		4/11/2019	4/15/2019	13125	12398
AP-19-0222	08:104:010.403	132	Stillwater Lane	Finney Crossing		4/11/2019	4/15/2019	13125	12398
AP-19-0223	08:104:010.404	132	Stillwater Lane	Finney Crossing		4/11/2019	4/15/2019	13125	12398
AP-19-0224	08:104:010.405	132	Stillwater Lane	Finney Crossing		4/11/2019	4/15/2019	13125	12398
AP-19-0225	08:104:010.406	132	Stillwater Lane	Finney Crossing		4/11/2019	4/15/2019	13125	12398
AP-19-0226	08:104:010.407	132	Stillwater Lane	Finney Crossing		4/11/2019	4/15/2019	13125	12398
AP-19-0227	08:104:010.408	132	Stillwater Lane	Finney Crossing		4/11/2019	4/15/2019	13125	12398
AP-19-0228	08:104:010.409	132	Stillwater Lane	Finney Crossing		4/11/2019	4/15/2019	13125	12398
AP-19-0234	13:057:007.000	145	Oak Knoll Road		0.92	4/12/2019	4/15/2019	11200	3868
AP-19-0248	08:143:010.504			Finney Crossing		4/18/2019	5/6/2019	66211	59677
AP-19-0257	15:099:033.106	231	Creek's Edge Drive			4/29/2019	5/7/2019	3720	3915
AP-19-0267	15:099:033.104	279	Creek's Edge Drive			5/3/2019	5/7/2019	3155	3398
AP-19-0302	15:099:033.109	199	Creek's Edge Drive			5/24/2019	6/10/2019	2940	3565
AP-19-0301	14:031:022.000	235	Tower Lane		1.5	5/28/2019	6/10/2019	1872	1872
AP-19-0296	15:099:033.107	221	Creek's Edge Drive	Creek's Edge		5/31/2019	6/10/2019	3460	3723
AP-19-0308	19:098:069.400	1004	Old Creamery Road	Gravelstone	0.8	6/12/2019	6/21/2019	30000	9202
AP-19-0310	15:099:033.110	187	Creek's Edge Drive	Creek's Edge		6/13/2019	6/17/2019	3958	3750
AP-19-0317	15:099:033.102	301	Creek's Edge Drive	Creek's Edge		6/21/2019	9/16/2019	3347	3740
AP-20-0002	10:009:103.000	2368	Mountain View Road		1	7/3/2019	7/8/2019	672	672
AP-20-0005	15:099:033.101	311	Creek's Edge Drive	Creek's Edge Drive		7/3/2019	7/15/2019	3790	3820
AP-20-0007	10:144:021.000	275	Fairway Drive		0.5	7/5/2019	7/8/2019	40	80
AP-20-0008	08:089:011.000	47	Bingham Lane		0.75	7/8/2019	7/8/2019	132	132
AP-20-0023	07:108:002.000	316	Engineers Drive		2.92	7/22/2019		1250	1250
AP-20-0024	20:098:154.000	1897	Old Creamery Road		0.82	7/22/2019	7/22/2019	180	180
AP-20-0034	21:023:034.000	1300	East Hill Road		2	7/26/2019	7/29/2019	3500	200
AP-20-0035	19:098:069.100	1350	Sunset Hill Road	Gravelstone	0.6	7/29/2019	8/5/2019	21000	3313
AP-20-0039	15:099:033.103	291	Creek's Edge Drive	Creek's Edge		8/6/2019	8/19/2019	3360	3750
AP-20-0041	04:012:109.000	1337	Old Stage Road			8/9/2019	8/23/2019	600	600
AP-20-0042	18:170:001.000	158	Charles Road		27	8/9/2019	8/12/2019	640	640
AP-20-0045	20:100:105.001	2318	Oak Hill Road		10.15	8/13/2019	8/23/2019	1700	1700

AP-20-0046	27:028:025.000	418	Beartown Road		20	8/20/2019	8/23/2019	260	260
AP-20-0048	07:085:006.000	380	Boyer Circle		1.75	8/23/2019	8/23/2019	1790	1790
AP-20-0054	07:105:069.700	347	Shunpike Road	Robear Subdivision	2	8/28/2019	9/16/2019	86800	51400
AP-20-0057	15:099:033.129	198	Creek's Edge Drive	Creek's Edge		9/6/2019	9/9/2019	9455	13570
AP-20-0058	15:099:033.130	194	Creek's Edge Drive	Creek's Edge		9/6/2019	9/9/2019	9455	13570
AP-20-0059	15:099:033.131	184	Creek's Edge Drive	Creek's Edge		9/6/2019	9/9/2019	9455	13570
AP-20-0060	15:099:033.132	180	Creek's Edge Drive	Creek's Edge		9/6/2019	9/9/2019	9455	13570
AP-20-0069	14:138:002.001	19	Balsam Circle		0.96	9/20/2019	9/23/2019	300	252
AP-20-0071	20:020:041.000	295	Bradley Lane			9/27/2019	10/2/2019	4000	2000
AP-20-0072	02:067:038.000	599	Avenue D			9/27/2019	10/9/2019	5000	1100
AP-20-0074	15:099:033.132	180	Creek's Edge Drive	Creek's Edge		10/2/2019	10/9/2019	9455	13570
AP-20-0075	15:099:033.131	184	Creek's Edge Drive	Creek's Edge		10/2/2019	10/9/2019	9455	13570
AP-20-0076	15:099:033.130	194	Creek's Edge Drive	Creek's Edge		10/2/2019	10/9/2019	9455	13570
AP-20-0077	15:099:033.129	198	Creek's Edge Drive	Creek's Edge		10/2/2019	10/9/2019	9455	13570
AP-20-0080	07:003:023.000	830	South Brownell Road		0.44	10/2/2019	10/9/2019	6100	482
AP-20-0079	21:023:022.000	1538	East Hill Road			10/8/2019	10/18/2019	400	400
AP-20-0081	18:103:155.000	4886	St George Rd		1.3	10/10/2019	10/19/2019	240	240
AP-20-0084	27:129:174.000	800	Beebe Lane		1.04	10/10/2019	10/29/2019	896	500
AP-20-0085	08:143:010.501	Bldg J	Finney Crossing	Finney Crossing		10/11/2019	10/16/2019	125453	105110
AP-20-0097	02:053:013.000	346	Avenue A			10/31/2019	11/4/2019	600	500
AP-20-0098	08:104:011.000	6180	Williston Road	Cottonwood	17	11/4/2019	1/8/2020	326700	300564
AP 20-0118	07:108:002.000	316	Engineers Drive		2.92	12/16/2019	12/17/2019	1250	1250
AP 20-0121	15:099:033.126	272	Creek's Edge Drive	Creeks Edge		12/16/2019	12/17/2019	6980	8713
AP 20-0122	15:099:033.126	260	Creek's Edge Drive	Creeks Edge		12/16/2019	12/17/2019	6980	8713
AP 20-0123	15:099:033.126	268	Creek's Edge Drive	Creeks Edge		12/16/2019	12/17/2019	6980	8713
AP 20-0140	21:023:055.000	TBD	Sherwood Forest Road		1.8	1/27/2020	2/13/2020	18000	1600
AP 20-0145	15:099:033.126	272	Creek's Edge Drive	Creek's Edge		2/12/2020	2/13/2020	6980	8713
AP 20-0146	15:099:033.127	268	Creek's Edge Drive	Creek's Edge		2/12/2020	2/13/2020	6980	8713
AP 20-0147	15:099:033.128	260	Creek's Edge Drive	Creek's Edge		2/12/2020	2/13/2020	6980	8713

Town of Williston MS4 Annual Report

MCM #6

Stormwater Training Summary

League of Cities and Towns Public Works Facility Inspection Letter

2019/2020 Stormwater Training

Chittenden County Road Foreman's Meeting - 4/24/2019
(See attached flyer)

Facility Compliance Roads Scholar Workshop - 06/18/2019
(See attached flyer)

Road Salt Education Workshop – 10/24/2019
(See attached flyer)

Green Mountain Water Environment Association – 10/30/2019
https://www.gmwea.org/fall-trade-show.html

Green Infrastructure Operation and Maintenance Summit 02/27/2020
https://www.uvm.edu/seagrant/programs/events/green-infrastructure-operation-and-maintenance-summit

Chittenden County Road Foreman's Meeting

AGENDA

Wednesday, April 24th, 2019. 9:00 am – 12:00 pm

CCRPC offices

110 West Canal Street, Winooski VT

9:00 **Welcome and Introductions**

9:10 **All things Municipal Roads General Permit (MRGP) –** *Jim Ryan, DEC/ANR*

- MRGP update and timeline
- New road and bridge standards
- New Municipal Grant in Aid round

10:00 **Interactive Session –** *Alan May – VTRANS Better Roads*

10:30 **BREAK**

10:40 **REI inventory results – Maps/Data/Reporting –** *Chris Dubin, CCRPC*

11:15 **Round table discussion on current issues facing Chittenden County roadways**

12:00 **Adjourn**

Please contact Chris Dubin (cdubin@ccrpcvt.org) for any questions.

Please register me for the "*Facility Compliance*" workshop:

Name_____

Town Address_____

Municipality/District/Agency_____

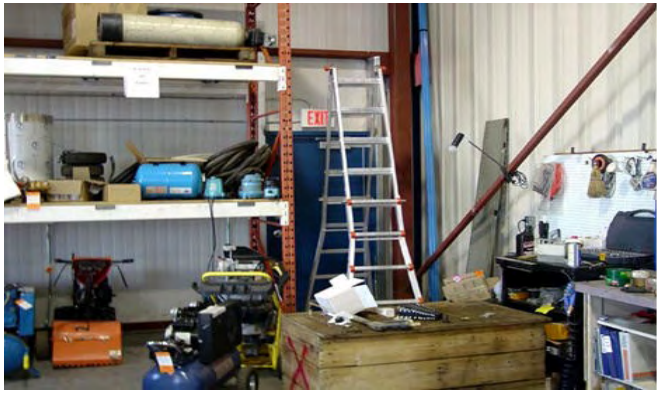
Area Code/Phone_____

Email_____

☐ Tuesday, June 18, 2019 - Williston Town Garage, 291 Avenue A, Williston, VT

☐ Wednesday, June 19 2019 - Norwich Town Garage, 26 New Boston Road, Norwich, VT

Vermont Local Roads Program | VTrans Training Center | 1716 US Route 302 | Berlin, VT 05633-5001



Disclaimer: The town acknowledges and accepts that its participating representatives are acting in their scope of employment while attending this workshop.

Cancellation Policy

If you need to cancel your registration, please call us since we often have waiting lists for classes. Someone may substitute for you at any time. We will notify registrants if the workshop needs to be cancelled for any reason. If you have any concerns about the weather or other circumstances that may affect the workshop please call 802-828-3537.

Photos/Videos: By registering for this workshop, you understand and agree that VLR will be taking photos and may publish them in any format or media without additional permission from you if you are in the photo.

2019 workshop facilitated by the Vermont Local Roads Program.

Sponsored jointly by the Federal Highway Administration & Agency of Transportation.

VERMONT LOCAL ROADS

U.S. Department of Transportation Federal Highway Administration

Facility Compliance Roads Scholar Workshop: 4 Safety Hours

Vermont Local Roads

VTrans Working to Get You There
TRAINING CENTER

Instructor

Hazel Hunter - Hazel has been employed with Project WorkSAFE for 16 years as a safety consultant.

Luke McCarthy - Luke has been employed with Project WorkSAFE for 6 years as a safety consultant.

Shawn Barth - Shawn has been employed with Project WorkSAFE for 4 years as a safety consultant.

About

This workshop is designed to provide procedural guidance and to identify all the necessary resources a Highway Department will need to have a fully compliant facility.

OSHA/VOSHA, Hazardous Waste, Written Plans and requirements for providing and recording will be the highlights of the course.

Attendees will come away with a clear pathway for achieving facility compliance and list of free resources to achieve that goal.

Agenda

- Introductions
- A power point that explains the top 10 OSHA /VOSHA violations.
- Written Programs required by VOSHA (and a little info about each one).
- Slide show showing the items that we typically find in garage locations.
- Walk about of the host facility to point out possible areas to approve upon.

REGISTER ONLINE AT:
localroads.vermont.gov
Or through LMS at:
vermont.csod.com

MAIL TO:
Vermont Local Roads Program
VTrans Training Center
1716 US Route 302
Berlin, VT
05633-5001

Fax:
802-828-1932

Questions please call:
802-828-3537

Class Running Time

8:00 - 8:15 am:	Registration
8:15 am:	Workshop Begins
12:00 pm	Workshop Ends

Audience

- Highway Foreman
- Highway Maintenance Employees
- Facility Maintenance Employees
- Administrators

Locations

Tuesday - June 18, 2019
Williston Town Garage

Wednesday - June 19, 2019
Norwich Town Garage

Maximum class size 20

Road Salt Education Workshop
October 24, 2019
UVM, Rubenstein School's Spear St Forestry Lab conference room
705 Spear St, South Burlington VT

8:00 AM	Welcome – Kris Stepenuck, Lake Champlain Sea Grant Extension
8:10 AM	Science of Salt – Stu Johnson, Vermont Local Roads
9:00 AM	Insurance and Safety Precautions That Can Prevent Accidents and Reduce Claims – Jeff Theis, VLCT
9:45 AM	New Opportunities in Liquid Deicers – Frank Beliveau, Innovative Solutions
10:30 AM	Operator's Experience on Salt Reduction and Brine Preparation – Rob Volopleus, Town of Lake George, and Chris Navitsky, FUND for Lake George and Lake George Waterkeeper
11:15 AM	Cirus Control Systems, Back Up Cameras and Other New Winter Management Technologies – Mike Murray, Viking Cives
NOON	Adjourn

VERMONT LEAGUE OF CITIES & TOWNS

Serving and Strengthening Vermont Local Governments

March 5, 2019

Member Name: Williston Town
PACIF Contact: Richard McGuire
Address: 7900 Williston Rd
Williston, VT 05495

Visit Date: February 26, 2019
Consultant: Jeff Theis

I recently completed a visit to your municipality for the purpose of meeting with Erik in January, and recently completing a Public Works garage survey with Bruce and staff. It's always a pleasure to work with the Town.

This letter is provided to you as a summary of my visit and primary activities while onsite. If you also received a separate loss control report as part of this email, I encourage you to take note of the suggested correction dates and risk priority assignments as these are used for underwriting purposes and PACIF grant qualification and reimbursement calculation.

I had met with Erik to review a recent claim, and to follow-up on recent discussions about a town safety committee, and a designated medical provider. I understand that the town is working with Champlain Medical. We touched on wellness activities, to include the fitness equipment at the fire station. I understand that a member orients new users to the equipment; other good practices include waivers for users, and a periodic external servicing of the equipment.

On Feb 24 I surveyed the PW garage with Bruce, Mark, and Lisa. As you well know, it's a state of the art building, and well managed and maintained. I have no facility-related recommendations. The only item that we did discuss, and I know Bruce intends to follow-up on, is to make separate, clear public access to sand (and salt?) available, keeping the pubic away from the large pile, and away from buildings and operations in general.

We also looked at a 3 year loss history, with DPW's claims broken out. Again, great results, contributing to the Town's overall .87 workers comp experience mod rate. We also spoke of the PACIF grants, and some online resources: PACIF Online University, and a selection of tailgate safety talks.

If there are any questions about the visit correspondence, or if I can be of further assistance, please let me know.

Sincerely,

Our service visits are designed to assist you in your loss control efforts. We do not assume responsibility for the discovery or elimination of all hazards which could possibly cause accidents or losses. Recommendations are developed from the conditions observed at the time of the survey and may not include every possible cause of loss. Compliance with these recommendations does not guarantee the fulfillment of your obligation under local, state, or federal laws or regulations.

Sponsor of:

VLCT Employment Resource and Benefits Trust, Inc.

VLCT Municipal Assistance Center

VLCT Property and Casualty Intermunicipal Fund Inc.

Jeff Theis
Sr. Loss Control Consultant
jtheis@vlct.org

VERMONT LEAGUE OF CITIES & TOWNS

Serving and Strengthening Vermont Local Governments

Sponsor of:

VLCT Employment Resource and Benefits Trust, Inc.

VLCT Municipal Assistance Center

VLCT Property and Casualty Intermunicipal Fund Inc.

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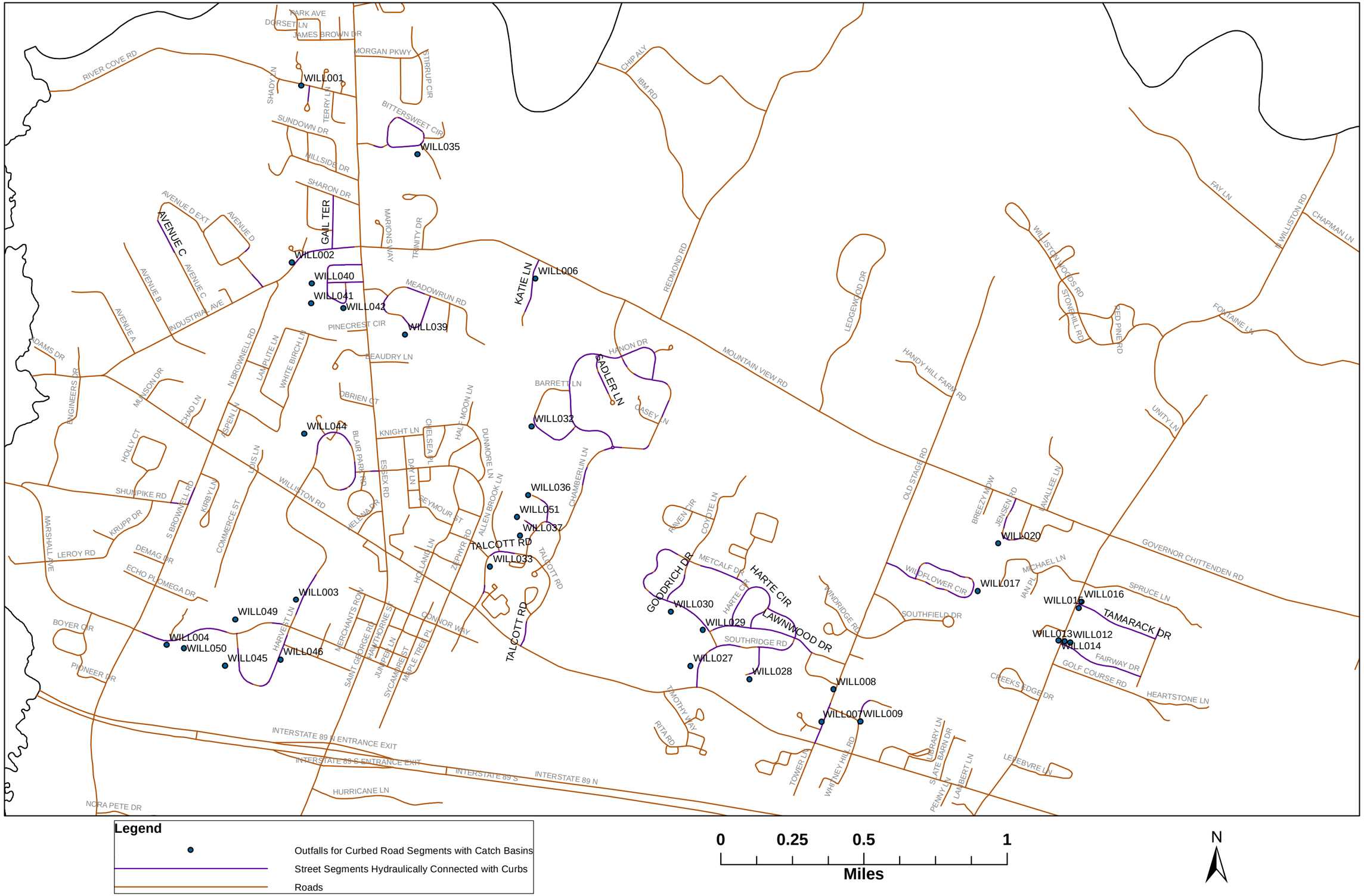
Town of Williston MS4 Annual Report

Map of Outfalls for Curbed Sections of Hydraulically Connected Roads with Catch Basins

Outfalls for Curbed Sections of Hydraulically Connected Roads with Catch Basins



Town of Williston MS4 Annual Report

Reliance on Other Entities to Meet Permit Obligations:

Chittenden County MS4 Stormwater Program Agreement
Memorandum of Agreement Between VTDEC and MS4
Stream Team 2019 Water Quality Monitoring Report

CHITTENDEN COUNTY MS4
STORMWATER PROGRAM AGREEMENT
EFFECTIVE July 1, 2017
Amended effective July 1, 2018

Preamble

This Stormwater Program Agreement ("Agreement") is entered into by and between a group of Municipal Separate Storm Sewer System ("MS4") permittees ("MS4 Permittees") and the Chittenden County Regional Planning Commission ("CCRPC") to operate an MS4 Stormwater Program ("Program") that conforms with and satisfies the relevant requirements of both Minimum Control Measure One (Public Outreach and Education) and Minimum Control Measure Two (Public Involvement and Participation) of the Phase II NPDES Permit issued by the Vermont Department of Environmental Conservation ("DEC") on December 2012 through General Permit 3-9014 ("MS4 Permit"), as these requirements may be continued, renewed, amended, or otherwise modified during the term of this Agreement.

1. **Prior Agreements** – Effective July 1, 2017, this Agreement

    a. supersedes an MOU signed by the CCRPC and twelve MS4 permittees, effective March 10, 2013 through March 9, 2018, governing the operation of a Regional Stormwater Education Program to satisfy the relevant requirements of Minimum Control Measure One (Public Outreach and Education), and

    b. supersedes an MOU signed by the CCRPC and eleven MS4 permittees, effective July 1, 2011 through June 30, 2016, and an amendment to this MOU extending its effective date through June 30, 2017, governing the operation of a Regional Stormwater Public Involvement and Participation Program to satisfy the relevant requirements of Minimum Control Measure Two (Public Involvement and Participation).

2. **Service Agreement** – This Agreement constitutes a service agreement pursuant to 24 V.S.A. § 4345b (Intermunicipal Service Agreements).

3. **Definitions**—For purposes of this Agreement, the term "MS4 Permittees" includes the Vermont Agency of Transportation, which on December 28, 2016 became eligible for coverage under General Permit 3-9007 for Stormwater Discharges from the State Transportation Separate Storm Sewer System (TS4).

4. **Parties** – The following are the parties to this Agreement:

    a. **MS4 Permittees** – the undersigned MS4 Permittees, and

    b. **CCRPC** – the undersigned regional planning commission.

5. **MS4 Steering Committee**

    a. **Composition** – The Members of the Steering Committee shall consist of one representative from each of the signatory MS4 Permittees to this Agreement. Another MS4 permittee may request

to join this Agreement if approved by a two-thirds vote of the Members. The Members shall be appointed either by the governing bodies of their municipalities at publicly warned meetings or, if a Member representing an MS4 Permittee is non-municipal agency, via a process consistent with that agency's policies. At its first meeting, the Steering Committee shall elect a Chair by a majority vote. The Chair shall serve until such time as the Chair resigns or the Steering Committee elects a new Chair.

b. **Duties** – The Steering Committee shall direct the CCRPC on the development and performance of Program Services in particular and on all other matters bearing on the administration of this Agreement. All actions of the Steering Committee shall be by majority vote unless otherwise specified in this Agreement.

c. **Organization of Meetings** – The Steering Committee shall meet on a quarterly basis at a minimum. The CCRPC shall provide Steering Committee Members with reasonable notice of meetings. Notice shall include a meeting agenda and draft meeting minutes. In addition, the CCRPC shall post notice of Steering Committee meetings on its website and on the Program website.

6. **CCRPC**

a. **Duties** – The CCRPC shall:

1) Administer this Agreement and agreements with contractors (including executing contracts approved by the Steering Committee, receiving and disbursing funds, and monitoring the provision of services) for the benefit of the MS4 Permittees.

2) Provide other services contributing to the operation of the Program (including, but not limited to, social media management, public relations, grant writing, creating and managing a Program website, organizing meetings as set forth in Section 4.c, above, etc.) as directed by the Steering Committee; and at a level consistent with each year's Program Budget as described in Section 8.b, below.

3) Provide a quarterly budget report to the Steering Committee detailing expenses the CCRPC incurred and the payments it has received.

4) Pay contractors and vendors for charges consistent with the relevant contract, using funds from the Program Budget, as defined in Section 8, below.

5) Upon approval of the Steering Committee or its designee, reimburse itself for personnel and other expenses for charges consistent with its duties, using funds from the Program Budget.

6) Consult with the Steering Committee prior to authorizing any contractor activities or charges outside the scope of work of a contract.

7) Notify the Steering Committee when 75% of the annual budget (as defined in Section 8, below) for an individual category of expenses (e.g., contractors, CCRPC fees, advertising, etc.) is reached. When these levels are reached, subsequent expenditures by the CCRPC in that category shall be reviewed and approved by the Steering Committee Chair in advance.

8) At the request of the Steering Committee, assign any or all contracts that the CCRPC has entered into pursuant to this Agreement to the MS4 Permittees who are signatories to this Agreement at the time or to another contractor of the Steering Committee's choosing.

9) Comply with all applicable federal, state, and local laws, including Burlington's Livable Wage Ordinance as applicable.

b. **Compensation** – Through the Program Budget, the MS4 Permittees shall compensate the CCRPC for the actual costs of performing its duties defined in Section 5.a, above; provided, however, that the CCRPC shall not be entitled to compensation that would exceed ten percent (10%) of the Program Budget as specified in Section 8.b, below, without the prior approval of a majority of the Steering Committee.

c. **Invoices** – The CCRPC shall invoice the Program to cover personnel charges, mileage reimbursement, and other direct expenses necessary to perform its duties. Personnel charges for CCRPC staff shall be calculated at a rate of salary plus fringe plus CCRPC's applicable indirect rate as required by 24 V.S.A. § 4345b. As set forth in Section 5.b, above, upon approval of the Steering Committee or its designee, the CCRPC may reimburse itself for charges consistent with its duties, using funds from the Program Budget.

7. **Selection of Contractors**

a. The CCRPC, in consultation with the Steering Committee, shall competitively bid for contract(s) for Program services that collectively satisfy the requirements for Minimum Control Measure One (Public Outreach and Education) and Minimum Control Measure Two (Public Involvement and Participation) of the Phase II NPDES Permit then in effect. The parties to the contracts shall be the contractors and the CCRPC. All contracts shall require the contractor to indemnify and hold harmless the MS4 Permittees from any claims related to the contract and to procure and maintain liability insurance for all services performed under the contract.

b. All contracts shall be awarded based on qualifications, price, and the ability of the entity to provide services that meet the relevant MS4 Permit requirements. The selection of contractors shall comply with the procurement policy of the CCRPC and with applicable state and federal procurement laws and procedures.

c. Contracts shall generally be 1 to 5 years in length and shall include, but not be limited to, a Maximum Limiting Amount and the right of the CCRPC to 1) cancel a contract if services are not being adequately provided, 2) specify that payments to contractors shall be made only for services rendered, 3) specify the annual scope of work and budget as approved by the Steering Committee, 4) allow a contract extension if desired, and 5) assign the contract to the MS4 Permittees that are signatories to this Agreement at the time of the assignment or to a contractor of the Steering Committee's choosing.

d. Contracting for services under this Agreement shall comply with the Fair Employment Act and Americans with Disabilities Act: the CCRPC shall comply with the requirement of Title 21 V.S.A Chapter 5, Subchapter 6, relating to fair employment practices, to the full extent applicable. The CCRPC shall also ensure, to the full extent required by the Americans with Disabilities Act of

1990, that qualified individuals with disabilities receive equitable access to the services, programs, and activities provided by the Steering Committee under this Agreement. This provision shall also be included in all contracts and subcontracts executed under this Agreement.

e. The CCRPC and the Steering Committee recognize the important contribution and vital impact which small businesses have on the State's economy. In this regard, the CCRPC shall ensure a free and open bidding process that affords all businesses equal access and opportunity to compete, except under circumstances where competitive bidding may not be practicable and is not required by applicable procurement policies. The CCRPC and the Steering Committee also recognize the existence of businesses owned by minorities and women, and the CCRPC shall make a good faith effort to encourage these firms to compete for contracts involving state or federal funds and comply with applicable law relating to civil rights and disadvantaged business enterprises.

8. **Program Services** – The Steering Committee, assisted by the CCRPC and its contractors, shall implement a unified Program that satisfies the relevant requirements of Minimum Control Measure One (Public Education and Outreach) and Minimum Control Measure Two (Public Involvement and Participation) of the MS4 Permit.

   The Program Content for each Program Year shall be as defined in writing by a majority of the Steering Committee. The Program Year shall be the State of Vermont's fiscal year. The Program Content shall implement the following deliverables:

   a. **Public Education and Outreach** – Elements shall include, at a minimum:

      1) operating the Program's website, www.smartwaterways.org, or its equivalent; and

      2) advertising in various media.

   b. **Public Involvement and Participation** – Elements shall include, at a minimum:

      1) operating the Program's website, www.ccstreamteam.org, or its equivalent;

      2) hosting and/or organizing workshops, projects, and other events to engage the public; and

      3) recruiting volunteers to support projects, promote events, and/or engage the public.

   c. **End of MS4 permit year annual reporting** – Elements shall include preparation of a narrative report 25 business days prior to the MS4 Permittees' reporting deadline to DEC.

9. **Program Dues, Budget, Costs, and Payments**

   a. **Dues**

      1) For State Fiscal Year, FY18, July 2017-June 2018, the annual dues for each of the undersigned MS4 Permittees shall be $5,500.

2) For the following fiscal years, the annual dues shall be set by a two-thirds majority by October 15th of the preceding calendar year. In the absence of agreement, the dues shall remain at $5,500.

3) The CCRPC shall invoice each MS4 Permittee on or about July 1st of each year with payment to the CCRPC due 30 days later.

4) All Members shall pay equal dues.

b. **Program Budget**

1) The annual Program Budget shall consist of the sum of the annual payments for each Program Year made by MS4 Permittees, plus any funds from other sources made available to the Program by majority vote of the Steering Committee.

2) Prior to the start of each Program Year, the Steering Committee shall adopt a Program Budget governing expenditures for the subsequent Program Year. Budget categories shall include, but not be limited to: CCRPC Duties, Contractual Services, and Expenses.

3) Once the Program Year starts, a majority of the Steering Committee may amend the Program Budget as needed, for example to reflect any surplus or deficits from the prior Program Year, receipt of new sources of funds, or a desired change in the Program Budget, subject to Section 8.a, above.

4) In the event that costs are less than anticipated or that grants or other funding sources become available, a majority of the voting Members of the Steering Committee may decide to reduce each Member's payment by an equal amount or to credit all or part of the following Program Year assessment to each MS4 Permittee.

c. **Maximum Annual Costs and Payments** – Except as otherwise provided by this section, each MS4 Permittee shall within 30 days of receipt of an invoice make a single annual dues payment, as provided by Section 8.a, above.

d. **Other Funds** – Any funds made available to the Program shall be dedicated to reducing the annual costs of each MS4 Permittee participating in the Program, except as a majority of the voting Members of the Steering Committee may decide.

e. **Excess Funds** – Any funds remaining at the end of a Program Year shall be carried over to the next Program Year, unless a majority of the voting Members of the Steering Committee decides otherwise.

f. **Non-appropriation** – The obligations of each MS4 Permittee to make payments under this Agreement shall constitute a current expense of the MS4 Permittee and shall not in any way be construed to be a debt of the MS4 Permittee in contravention of any applicable constitutional or statutory limitation or requirement, or the MS4 Permittee's charter or articles of incorporation; nor shall anything contained in this Agreement constitute a pledge of the credit or tax revenues, funds, or monies of the MS4 Permittee. The decision whether or not to budget and appropriate funds during each fiscal year of the MS4 Permittee is within the discretion of the governing body

of the MS4 Permittee. The obligations of a MS4 Permittee under the Agreement are subject to annual appropriations by the governing body of the MS4 Permittee, except as provided by Section 12 of this Agreement. An MS4 Permittee cannot choose to not appropriate funds and then withdraw in a manner that shifts prior contractual obligations on to the others. Non-appropriation will be considered withdrawal and must be prospective in fairness to all signatories as per Section 13.

10. **Contract Approval** – All CCRPC contracts shall be conditioned upon approval by a majority of the voting Members of the Steering Committee and shall be consistent with Section 6, above.

11. **Termination of CCRPC** – The CCRPC on its own or the Steering Committee by a majority vote of its full Membership may elect to terminate the CCRPC's future participation in this Agreement by providing 90 days' written notice to the other. In the event of termination under this section, the CCRPC shall continue to administer and comply with each existing contract, and the MS4 Permittees shall continue to reimburse the CCRPC from the Program Budget for the actual costs of administering and complying with each contract, as provided by this Agreement, unless and until the CCRPC assigns the contract pursuant to Sections 5.a.8 and 6.c of this Agreement.

12. **Termination of Agreement**

    a. This Agreement shall become null and void with no further obligation of the parties if:

        1) Two-thirds of the Members of the Steering Committee vote to end participation, or

        2) DEC determines that the Program outlined in this Agreement does not meet the relevant requirements for Minimum Control Measure One (Public Education and Outreach) or Minimum Control Measure Two (Public Involvement and Participation), and the parties to this Agreement are unable to craft a Program to satisfy DEC.

    b. In the event of termination, any funds remaining in the Program Budget (after payment of obligations to vendors or to satisfy debts) shall be reimbursed to the MS4 Permittees with each MS4 Permittee receiving a share proportional to the number of MS4 Permittees at the time of termination. For example, if there are twelve MS4 Permittees at the time of termination, each MS4 Permittee shall receive a 1/12th share.

13. **Withdrawal of Member** – An MS4 Permittee may withdrawal from participation in this Agreement only at the end of a state fiscal year. If an MS4 Permittee wishes to withdrawal from participation, it shall provide at least 90 days' notice to the other MS4 Permittees and the CCRPC. After withdrawal, a MS4 Permittee shall remain responsible for its share of the costs of contracts that the Steering Committee approved prior to the effective date of the withdrawal.

14. **Effective Date and Duration of Agreement** – The effective date of this Agreement shall be July 1, 2017, and this Agreement shall terminate June 30, 2022.

15. **Amendment** – This Agreement may be amended only upon unanimous action of all the Members.

16. **Counterparts** – This Agreement may be executed in multiple counterparts, each of which is deemed an original and all of which constitute one and the same document. Each such counterpart may be a facsimile or PDF copy, and such facsimile or PDF copy shall be deemed an original.

17. **Public Records** – Any and all records submitted to the CCRPC or MS4 Permittees - including Bids, Proposals, Qualifications, Contracts, etc.-- whether electronic, paper, or otherwise recorded, are subject to the Vermont Public Records Act.

Signature of CCRPC

Christopher D. Roy, Board Chair, Chittenden County Regional Planning Commission — Date: 5/24/18

Signatures of Members

Name	Title		Date
		The Burlington International Airport	
		The City of Burlington	
		The Town of Colchester	
		The Town of Essex	
		The Village of Essex Junction	
		The Town of Milton	

14. **Effective Date and Duration of Agreement** – The effective date of this Agreement shall be July 1, 2017, and this Agreement shall terminate June 30, 2022.

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Signature of CCRPC

_____ _____

Christopher D. Roy, Board Chair, Chittenden County Regional Planning Commission Date

Signatures of Members

Director of Aviation 3-28-18

Name Title The Burlington International Airport Date

Name Title The City of Burlington Date

Name Title The Town of Colchester Date

Name Title The Town of Essex Date

Name Title The Village of Essex Junction Date

Name Title The Town of Milton Date

14. **Effective Date and Duration of Agreement** – The effective date of this **Agreement** shall be July 1, 2017, and this **Agreement** shall **terminate** June 30, 2022.

15. **Amendment** – This **Agreement** may be **amended** only upon unanimous action of all the Members.

16. **Counterparts** – This **Agreement** may be **executed** in multiple **counterparts**, each of which is deemed an original and all of which **constitute** one and the same **document**. Each such **counterpart** may be a **facsimile** or PDF copy, and such **facsimile** or PDF copy shall be **deemed** an **original**.

17. **Public Records** – Any and all **records submitted** to the CCRPC or **MS4** Permittees - **including** Bids, **Proposals, Qualifications, Contracts,** etc.-- **whether** electronic, paper, or **otherwise recorded,** are **subject** to the Vermont Public **Records** Act.

Signature of CCRPC

_____ _____

Christopher D. Roy, Board Chair, **Chittenden County Regional** Planning **Commission** Date

Signatures of Members

_____ _____

Name Title The Burlington **International Airport** Date

S. Chapin Spencer - Director _____ 4/9/18

Name Title The City of **Burlington** Date

_____ _____

Name Title The Town of **Colchester** Date

_____ _____

Name Title The Town of Essex Date

_____ _____

Name Title The **Village** of Essex **Junction** Date

_____ _____

Name **Title** The Town of **Milton** Date

14. **Effective Date and Duration of Agreement** – The effective date of this Agreement shall be July 1, 2017, and this Agreement shall terminate June 30, 2022.

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Signature of CCRPC

_____ _____

Christopher D. Roy, Board Chair, Chittenden County Regional Planning Commission Date

Signatures of Members

_____ _____

Name Title The Burlington International Airport Date

_____ _____

Name Title The City of Burlington Date

Jacob H. Jancis Town Manager Town of Colchester 3/27/18

Name Title The Town of Colchester Date

_____ _____

Name Title The Town of Essex Date

_____ _____

Name Title The Village of Essex Junction Date

_____ _____

Name Title The Town of Milton Date

14. **Effective Date and Duration of Agreement** – The effective date of this Agreement shall be July 1, 2017, and this Agreement shall terminate June 30, 2022.

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Signature of CCRPC

_____ _____

Christopher D. Roy, Board Chair, Chittenden County Regional Planning Commission Date

Signatures of Members

_____ _____

Name Title The Burlington International Airport Date

_____ _____

Name Title The City of Burlington Date

_____ _____

Name Title The Town of Colchester Date

Public Works Director 4-11-18

Name Title The Town of Essex Date

_____ _____

Name Title The Village of Essex Junction Date

_____ _____

Name Title The Town of Milton Date

14. **Effective Date and Duration of Agreement** – The effective date of this Agreement shall be July 1, 2017, and this Agreement shall terminate June 30, 2022.

15. **Amendment** – This Agreement may be amended only upon unanimous action of all the Members.

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17. **Public Records** – Any and all records submitted to the CCRPC or MS4 Permittees - including Bids, Proposals, Qualifications, Contracts, etc.-- whether electronic, paper, or otherwise recorded, are subject to the Vermont Public Records Act.

Signature of CCRPC

_____ _____

Christopher D. Roy, Board Chair, Chittenden County Regional Planning Commission Date

Signatures of Members

_____ _____

Name Title The Burlington International Airport Date

_____ _____

Name Title The City of Burlington Date

_____ _____

Name Title The Town of Colchester Date

_____ _____

Name Title The Town of Essex Date

James [illegible] Water Quality Supt 4/13/2018

Name Title The Village of Essex Junction Date

_____ _____

Name Title The Town of Milton Date

14. **Effective Date and Duration of Agreement** – The effective date of this Agreement shall be July 1, 2017, and this Agreement shall terminate June 30, 2022.

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Signature of CCRPC

_____ _____

Christopher D. Roy, Board Chair, Chittenden County Regional Planning Commission Date

Signatures of Members

_____ _____

Name Title The Burlington International Airport Date

_____ _____

Name Title The City of Burlington Date

_____ _____

Name Title The Town of Colchester Date

_____ _____

Name Title The Town of Essex Date

_____ _____

Name Title The Village of Essex Junction Date

Town Manager 5/8/18

Name Title The Town of Milton Date

Joe Colangelo	Town Manager	The Town of Shelburne	6-March-2018
Name	Title	The City of South Burlington	Date
Name	Title	Vermont Agency of Transportation	Date
Name	Title	The University of Vermont	Date
Name	Title	The Town of Williston	Date
Name	Title	The City of Winooski	Date

Name	Title		Date
		The Town of Shelburne	
Helen Riehle	Chair		4/2/18
Name	Title	The City of South Burlington	Date
Name	Title	Vermont Agency of Transportation	Date
Name	Title	The University of Vermont	Date
Name	Title	The Town of Williston	Date
Name	Title	The City of Winooski	Date

Name	Title	The Town of Shelburne	Date
Name	Title	The City of South Burlington	Date
Joe Flynn		e-Signed by Joe Flynn on 2018-04-02 12:47:56 GMT	April 02, 2018
Name	Title	Vermont Agency of Transportation	Date
Name	Title	The University of Vermont	Date
Name	Title	The Town of Williston	Date
Name	Title	The City of Winooski	Date

Name	Title	The Town of Shelburne	Date
Name	Title	The City of South Burlington	Date
Name	Title	Vermont Agency of Transportation	Date
Linda Seavey			3/28/2018
Linda Seavey, Director, Campus Planning Services		The University of Vermont	Date
Name	Title	The Town of Williston	Date
Name	Title	The City of Winooski	Date

Name	Title	The Town of Shelburne	Date
Name	Title	The City of South Burlington	Date
Name	Title	Vermont Agency of Transportation	Date
Name	Title	The University of Vermont	Date
Richard McGuire	Town Manager	The Town of Williston	3/21/18
Name	Title	The City of Winooski	Date

Name	Title	The Town of Shelburne	Date
Name	Title	The City of South Burlington	Date
Name	Title	Vermont Agency of Transportation	Date
Name	Title	The University of Vermont	Date
Name	Title	The Town of Williston	Date
Jessie Baker - City Manager	City Manager	The City of Winooski	3/23/18 Date

MEMORANDUM OF AGREEMENT BETWEEN THE VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION AND THE LISTED MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) COMMUNITIES

This Memorandum of Agreement sets forth the agreement between the parties, Vermont Department of Environmental Conservation (DEC) and the following Municipal Separate Storm Sewer System (MS4) Permittees: Burlington International Airport (BTV), City of Burlington (Burlington), Town of Colchester (Colchester), Village of Essex Junction (Essex Junction), Town of Essex (Essex), Town of Shelburne (Shelburne), City of South Burlington (South Burlington), City of Saint Albans (St. Albans City), Town of Saint Albans (St. Albans Town), University of Vermont (UVM), Vermont Agency of Transportation (VTrans), Town of Williston (Williston), and City of Winooski (Winooski) (collectively referred to as "the Parties"), for the purpose of participating in the Ecosystem Restoration and Water Quality Improvement Special Fund to perform the monitoring and other data collection required under the MS4 permitting program.

I. PROJECT PURPOSE:

The purpose of this Agreement, per Act 171 (H.650), Titled: Conservation and land development; stormwater; municipal separate storm sewer systems, is to aid participating MS4 Permittees in obtaining compliance with the flow monitoring requirements of their MS4 permits.

II. SCOPE OF WORK:

The parties agree to the following:

DEC will develop and manage a contract with a third party to carry out flow monitoring requirements as outlined in the existing MS4 permits. Upon signature of this Agreement, DEC will work with the undersigned MS4 Permittees and the contractor to ensure the flow monitoring requirements are met. As long as the MS4 Permittee contributes to the Water Quality Improvement Special Fund as outlined in Section V, they will be considered in compliance with the flow monitoring requirement of the MS4 permit. All management of the Contractor and non-compliance due to the Contractor will be the responsibility of DEC and will not result in any violations under the MS4 permit for any MS4 Permittee signed onto this MOU. DEC will provide the deliverables as outlined in section VIII.

The Parties will provide data on existing flow monitoring gauge sites, precipitation gauge sites, and other information considered to be necessary for the Contractor to complete the work. The Parties will provide funds, as agreed to in Section V, in order to initiate the flow monitoring. Failure to provide the funds as specified will be considered as non-compliance

with this Agreement and the Party will be responsible for maintaining compliance with the MS4 flow monitoring requirements through other means.

III. PROJECT BENEFITS

This project will help to assess the effectiveness of flow restoration plans for up to eleven stormwater impaired streams. Vermont's stormwater Total Maximum Daily Loads (TMDL) utilize flow targets to represent a range of stressors to water quality, from pollutant loads, land based and instream erosion, to increased flooding. Implementation of the flow restoration may take over fifteen years in some watersheds. Flow monitoring will be used by DEC and the Parties to ensure that the management practices implemented under the flow restoration plans are making progress towards the TMDL targets, and redirect efforts if needed.

IV. ENTITY ELIGIBILITY

The entities eligible to participate under the memorandum of understanding include any entity that is subject to the Vermont Municipal Separate Storm Sewer System (MS4) General Permit, signed on December 12, 2012. This includes the following MS4 Permittees: Burlington, Colchester, Essex, Essex Junction, Milton, Rutland Town, Rutland City, St. Albans City, St. Albans Town, Shelburne, South Burlington, Williston, Winooski, UVM, BTV, and VTrans.

V. FINANCIAL CONTRIBUTIONS

As developed by the eligible entities, all participating MS4 communities will divide the costs of the contracted work and pay DEC according to the table below.

		Costs by State Fiscal Years (July 1 – June 30)				
MS4 Permittee	**% of Total Cost**	**2017**	**2018**	**2019**	**2020**	**2021**
BTV	2.1%	$3,623	$2,805	$2,796	$2,087	$2,140
Burlington	7.4%	$12,782	$9,898	$9,866	$7,364	$7,549
Colchester	5.3%	$9,232	$7,149	$7,126	$5,319	$5,452
Essex Junction	6.1%	$10,625	$8,228	$8,201	$6,122	$6,275
Essex	6.0%	$10,473	$8,111	$8,084	$6,034	$6,185
Shelburne	7.0%	$12,185	$9,436	$9,405	$7,021	$7,196
South Burlington	17.4%	$30,170	$23,363	$23,287	$17,383	$17,818
St. Albans City	6.6%	$11,418	$8,842	$8,813	$6,579	$6,743
St. Albans Town	7.1%	$12,287	$9,515	$9,483	$7,079	$7,256
UVM	5.5%	$9,564	$7,407	$7,382	$5,510	$5,648
VTrans	16.6%	$28,794	$22,298	$22,225	$16,590	$17,005
Williston	6.2%	$10,668	$8,261	$8,234	$6,146	$6,300
Winooski	6.6%	$11,363	$8,799	$8,770	$6,547	$6,711

		Costs by State Fiscal Years (July 1 – June 30)				
MS4 Permittee	**% of Total Cost**	**2017**	**2018**	**2019**	**2020**	**2021**
Total	**100.0%**	**$173,184**	**$134,112**	**$133,672**	**$99,781**	**$102,278**

Each participating MS4 Permittee to this agreement is required to submit the payment listed above on or before May 1 each year in order to be considered in compliance with the terms of the agreement for that year. Payments shall be made directly to DEC. If payment is not received in time, monitoring services as provided by the Contractor to the State will be discontinued.

Actual costs are dependent on the finalization of the Contract with the selected Contractor. Fiscal year 2020 and 2021 are anticipated costs based on renewal of the Contract for monitoring services with the selected Contractor.

VI. PROJECT CONTACTS

Parties Contacts
See Attachment A

DEC Contact
David Pasco
Admin. and Innovation Division
802-490-6112
david.pasco@vermont.gov

VII. EFFECTIVE DATE; MODIFICATION

This Memorandum of Agreement shall be effective from the date of execution and shall terminate on June 30, 2021. This Memorandum of Agreement may be amended or modified at any time by mutual written agreement of all Parties.

This agreement will provide monitoring services for the participating MS4 Permittees from State Fiscal Year 2017 (July 1, 2016) through State Fiscal Year 2021 (June 30, 2021).

VIII. DELIVERABLES

Each of the Parties will provide the following deliverables to DEC:

1. Data on existing flow monitoring gauge sites, precipitation gauge sites, and other information considered to be necessary for the Contractor to complete the work, as requested.

2. Notification of any changes in the MS4 Communities' participation in this agreement as early as practicable.

3. Payment of funds as outlined in Section V.

DEC will provide the following deliverables to all participating entities:

1. A comprehensive report outlining Quality Assurance/Quality Control protocols, shall be submitted to all participating entities prior to the initiation of monitoring.

2. Mean daily discharge in cubic feet per second at each site for each day of the monitoring period calculated from measurements taken at five minute intervals.

3. A platform for continuous remote access to streamflow gaging station data (i.e., satellite, radio, or cellular telemetry) complete with real-time data loss notification systems.

4. Mean daily depth of precipitation in inches (to the nearest 0.01 inch) at each site for each day of the monitoring period, calculated from measurements taken at five minute intervals and form of precipitation identified (rain vs. snow).

5. An annual report on each impaired stream with the flow duration curve and calculated flow metrics, and a brief narrative describing the preceding field season, gage configuration, and how data was collected and compiled.

6. On an annual basis, compiled sub-daily data, with field notes available upon request.

WE, THE UNDERSIGNED PARTIES, AGREE TO BE BOUND BY THIS AGREEMENT.

STATE OF VERMONT

Dept of Environmental Conservation

By:

_____

Commissioner

Dept of Environmental Conservation

Date: _____

THE PARTICIPATING PARTIES:

BURLINGTON INTERNATIONAL AIRPORT

By:

_____

Title:_____

Burlington International Airport

Date: _____

WE, THE UNDERSIGNED PARTIES, AGREE TO BE BOUND BY THIS AGREEMENT.

STATE OF VERMONT	**THE PARTICIPATING PARTIES:**
Dept of Environmental Conservation	**CITY OF BURLINGTON**
By:	**By:**
_____	**_____**
Commissioner	**Title: _____**
Dept of Environmental Conservation	**City of Burlington**
Date: _____	**Date: _____**

WE, THE UNDERSIGNED PARTIES, AGREE TO BE BOUND BY THIS AGREEMENT.

STATE OF VERMONT	**THE PARTICIPATING PARTIES:**
Dept of Environmental Conservation	**TOWN OF COLCHESTER**
By:	**By:**
_____	**_____**
Commissioner	**Title: _____**
Dept of Environmental Conservation	**Town of Colchester**
Date: _____	**Date: _____**

WE, THE UNDERSIGNED PARTIES, AGREE TO BE BOUND BY THIS AGREEMENT.

STATE OF VERMONT	**THE PARTICIPATING PARTIES:**
Dept of Environmental Conservation	**VILLAGE OF ESSEX JUNCTION**
By:	**By:**
_____	**_____**
Commissioner	**Title: _____**
Dept of Environmental Conservation	**Village of Essex Junction**
Date: _____	**Date: _____**

WE, THE UNDERSIGNED PARTIES, AGREE TO BE BOUND BY THIS AGREEMENT.

STATE OF VERMONT	**THE PARTICIPATING PARTIES:**
Dept of Environmental Conservation	**TOWN OF ESSEX**
By:	**By:**
_____	**_____**
Commissioner	**Title: _____**
Dept of Environmental Conservation	**Town of Essex**
Date: _____	**Date: _____**

WE, THE UNDERSIGNED PARTIES, AGREE TO BE BOUND BY THIS AGREEMENT.

STATE OF VERMONT	**THE PARTICIPATING PARTIES:**
Dept of Environmental Conservation	**TOWN OF SHELBURNE**
By:	**By:**
_____	**_____**
Commissioner	**Title: _____**
Dept of Environmental Conservation	**Town of Shelburne**
Date: _____	**Date: _____**

WE, THE UNDERSIGNED PARTIES, AGREE TO BE BOUND BY THIS AGREEMENT.

STATE OF VERMONT	**THE PARTICIPATING PARTIES:**
Dept of Environmental Conservation	**CITY OF SOUTH BURLINGTON**
By:	**By:**
_____	**_____**
Commissioner	**Title: _____**
Dept of Environmental Conservation	**City of South Burlington**
Date: _____	**Date: _____**

WE, THE UNDERSIGNED PARTIES, AGREE TO BE BOUND BY THIS AGREEMENT.

STATE OF VERMONT	**THE PARTICIPATING PARTIES:**
Dept of Environmental Conservation	**CITY OF ST. ALBANS**
By:	**By:**
_____	**_____**
Commissioner	**Title: _____**
Dept of Environmental Conservation	**City of St. Albans**
Date: _____	**Date: _____**

WE, THE UNDERSIGNED PARTIES, AGREE TO BE BOUND BY THIS AGREEMENT.

STATE OF VERMONT	**THE PARTICIPATING PARTIES:**
Dept of Environmental Conservation	**TOWN OF ST. ALBANS**
By:	**By:**
_____	**_____**
Commissioner	**Title: _____**
Dept of Environmental Conservation	**Town of St. Albans**
Date: _____	**Date: _____**

WE, THE UNDERSIGNED PARTIES, AGREE TO BE BOUND BY THIS AGREEMENT.

STATE OF VERMONT	**THE PARTICIPATING PARTIES:**
Dept of Environmental Conservation	**UNIVERSITY OF VERMONT**
By:	**By:**
_____	**_____**
Commissioner	**Title: _____**
Dept of Environmental Conservation	**University of Vermont**
Date: _____	**Date: _____**

WE, THE UNDERSIGNED PARTIES, AGREE TO BE BOUND BY THIS AGREEMENT.

STATE OF VERMONT

Dept of Environmental Conservation

By:

_____

Commissioner

Dept of Environmental Conservation

Date: _____

THE PARTICIPATING PARTIES:

VERMONT AGENCY OF TRANSPORTATION

By:

_____

Title: _____

Vermont Agency of Transportation

Date: _____

WE, THE UNDERSIGNED PARTIES, AGREE TO BE BOUND BY THIS AGREEMENT.

STATE OF VERMONT	**THE PARTICIPATING PARTIES:**
Dept of Environmental Conservation	**TOWN OF WILLISTON**
By:	**By:**
_____	_____
Commissioner	**Title:** Town Manager
Dept of Environmental Conservation	**Town of Williston**
Date: _____	**Date:** February 22, 2016

WE, THE UNDERSIGNED PARTIES, AGREE TO BE BOUND BY THIS AGREEMENT.

STATE OF VERMONT	**THE PARTICIPATING PARTIES:**
Dept of Environmental Conservation	**CITY OF WINOOSKI**
By:	**By:**
_____	**_____**
Commissioner	**Title: _____**
Dept of Environmental Conservation	**City of Winooski**
Date: _____	**Date: _____**

Attachment A

Project Contacts

Parties Contacts

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2019 Water Quality Monitoring Report

2019 Stream Team Volunteers say “cheers” to clean water during the volunteer training day in June.

Report prepared by: Kristen Balschunat & Gianna Petito
Winooski Natural Resources Conservation District

Funded by: LaRosa Partnership, VT
Department of Environmental Conservation
Watershed Management Division

Monitoring Team

The Rethink Runoff Stream Team (formerly known as the Chittenden County Stream Team) is a program that engages citizens across a nine-municipality region to implement projects that reduce nonpoint source pollution and stormwater volume at the local level. The participating municipalities are Burlington, Colchester, Essex, Essex Junction, Milton, Shelburne, South Burlington, Williston, and Winooski. The Water Quality Monitoring program is managed by the Chittenden County's Municipal Stormwater Separate System Committee, coordinated by the Winooski Natural Resources Conservation District, and made possible through the support of the Vermont Department of Environmental Conservation LaRosa program. This report describes the results from the 2019 collection season; the eighth, consecutive year data was collected by this volunteer-led stream water quality monitoring effort in Chittenden County.

When, Where, and What the Stream Team Monitors

The Rethink Runoff Stream Team (RRST) has collected biweekly water quality samples at several pollutant "impaired" or "stressed" stream sites in Chittenden County since 2012. These urban or suburban streams suffer from excessive nutrient loads, sodium chloride, sedimentation, high temperatures, bacteria, and/or other pollutants. Samples were collected on six different dates in 2019: on five, scheduled bi-weekly dates and on one "high-flow" date (i.e. during or shortly after a rain event). High-flow sampling provides a snapshot of the potentially elevated or diluted pollutant-loads moving through these systems when it rains. Samples were analyzed for total phosphorus and chloride at all 21 sites. The specific sampling sites and their locations are listed in Table 1 and a map of the sites is shown in Figure 1.

Biweekly sampling occurred on: June 25th, July 9th, July 23th, August 6th, and August 20th. Rain event sampling or "high-flow" (freshet) sampling occurred on August 8th at sites on Indian, Muddy, Potash, Centennial and Morehouse brooks. Between August 7th and 8th, 1.19 inches of rain fell overnight, therefore the sampling on August 8th is classified as a highflow event. All other biweekly sampling dates fell during dry conditions or base flow events.

Date	Type of Day	Total Rainfall (inches)
06/25/19	Bi-weekly	0.00
07/09/19	Bi-weekly	0.00
07/23/19	Bi-weekly	0.08
08/06/19	Bi-weekly	0.00
08/08/19	Rainy Day	1.22 (freshet flow)
08/20/19	Bi-weekly	0.07

Table 1. Average regional rainfall, in inches, for the preceding day and day of sampling. Sum of rainfall data for each day was gathered from the Burlington International Airport Weather Station.

Stream	*Location*	*Site ID*	*Sampling Reason*	*Types of Samples*	*Lat / Long*
Centennial Brook	Grove Street in Burlington	Centennial 10	Long Term monitoring since 2012	TP, Chloride	44.48453, -73.18423
	Patchen Road in Burlington	Centennial 20	Monitoring since 2017	TP, Chloride	44.47402, -73.17334
Indian Brook	Essex High School	Indian 10	Long Term monitoring since 2012	TP, Chloride	44.49668, -73.11093
	Lang Farm in Essex	Indian 20	Long Term monitoring since 2012	TP, Chloride	44.50442, -73.09190
Malletts Creek	McMullen Road	Malletts 10	Long Term monitoring since 2012	TP, Chloride	44.60855, -73.10693
Munroe Brook	Spear & Webster Intersection	Munroe 20	Monitor impact of new housing development upstream. Monitored since 2012	TP, Chloride, Turbidity	44.38984, -73.20103
Morehouse Brook	Landry Park Winooski - Pine Grove Terrace Branch	Morehouse PGT	Town of Winooski will install a detention pond this year. Monitor effectiveness.	TP, Chloride, Turbidity	44.50081, -73.194
	Landry Park - Industrial Park Branch	Morehouse IPB	Compare two branches of Morehouse brook	TP, Chloride, Turbidity	44.50015, -73.1937
Muddy Brook	River Cove Road in Williston	Muddy 10	Long Term monitoring since 2012	TP, Chloride	44.47293, -73.13505
	Whale Tails walking path in S. Burlington	Muddy 20a	Monitor effectiveness of new town easements in watershed	TP, Chloride	44.44356, -73.13648
	Van Sicklen Road in Williston	Muddy 30	Long Term monitoring since 2012	TP, Chloride	44.42823, -73.14622
Potash Brook	Kindness Court in South Burlington	Potash 10	Long Term monitoring since 2012	TP, Chloride	44.44572, -73.21348
	Farrell Street in South Burlington	Potash 20	Long Term monitoring since 2012	TP, Chloride	44.44660, -73.20415
	Spear Street in S. Burlington	Potash 30	Long Term monitoring since 2012	TP, Chloride	44.45150, -73.17849
Engelsby Brook	Pine St in Burlington	Engelsby 10	Long Term monitoring since 2012	TP, Chloride	44.45627, -73.21394

	Redstone Campus in Burlington	Engelsby 20	Monitoring since 2017	TP, Chloride	44.46654, -73.19741
Sunderland Brook	Pearl St Park in Essex Junction	Sunderland 10	Part of Town of Essex /Essex Junction chloride Study	TP, Chloride	44.50179, -73.12983
	Just above Rte 2/7 culvert in Colchester	Sunderland 20	Part of Town of Essex /Essex Junction chloride Study	TP, Chloride	44.51685, -73.20421
Sunnyside Brook	Near Hercules Rd. Colchester	Sunnyside 10	Brook impaired for chloride, awaiting TMDL	TP, Chloride	44.50654, -73.17823
Allen Brook*	Milton	Allen 10	Currently NOT stormwater impaired. Will monitor for changes	TP, Chloride, Turbidity	44.59229, -73.16283
Alder Brook	Off of Rte 289 in Essex	Alder 10	Part of Town of Essex/Essex Junction chloride Study	TP, Chloride	44.51742, -73.06559

* Although we planned to sample on Allen Brook, our volunteer experienced issues accessing the site so we were not able to submit any samples to the lab. We will try to find a better site in 2020.

Table 2. Rethink Runoff Stream Team 2019 Water Quality Sampling Sites. Note that sites located further up a streamshed are labeled with high numbers except at Sunderland where this labeling was switched and Sunderland 20 is actually downstream of Sunderland 10. Stream Team will look into fixing this labeling anomaly with our records and those of the lab starting next field season.

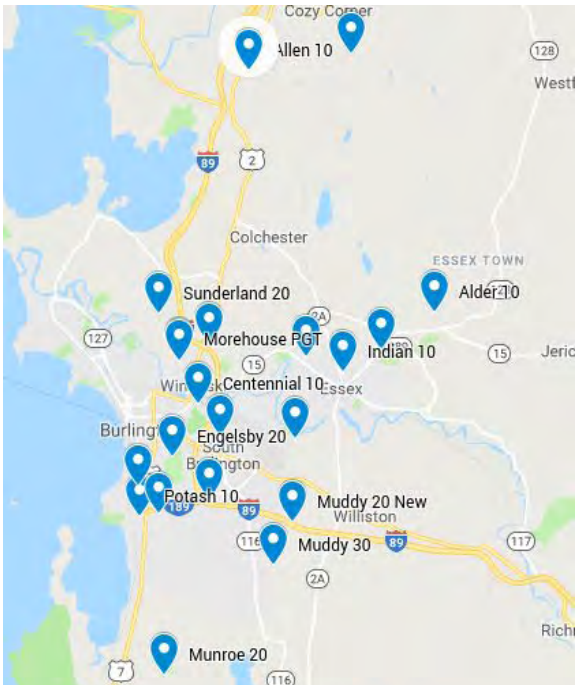

Figure 1: 2019 Rethink Runoff Stream Team Sample Sites. An interactive version of this map is available here: https://drive.google.com/open?id=1bVQHKJYIEUkII75Yw8HVXVvNLZF_rLXe&usp=sharing

Stream Profiles

Alder Brook (1 site) This brook originates in agricultural headwaters and then winds through the Town of Essex . Our sampling is currently in the headwaters. The phosphorus values at this site have exceeded the standard for two years in a row. The chloride values are very low, likely because there is less impervious surface in this sub-watershed than other sites.

Allen Brook (1 site) "The headwaters of Allen Brook are in Milton west of Cobble Hill. The brook flows westerly and then southerly through the subdivisions of Milton along Route 7. After the brook crosses into the town of Colchester, it flows southeasterly for about a mile before curving sharply and going under Route 7 and into Malletts Creek Marsh."[1] This brook is not currently listed as impaired for stormwater, but there is growing concern that it may be heading in that direction. We were unable to collect samples this year due to challenges with site access, but are eager to help monitor the health of this stream in the coming years as the Town implements water quality improvement projects.

Centennial Brook (2 sites) This brook has its origins near the Burlington Airport and winds through the Centennial Woods natural area. The phosphorus values at this site have exceeded the standard for many years. The chloride values are high, especially at Centennial 10 where there was a median chloride value of 716mg/L this year. Data demonstrates a significant increasing trend in chloride at this site over the past 8 years.

Engelsby Brook (2 sites) "Englesby Brook flows east to west across south central Burlington before eventually emptying into Lake Champlain in Burlington Bay. The brook's headwaters originate within the Burlington Country Club near the South Burlington town line. Throughout its course the brook flows through dense residential development."[2] Sections of this brook are impaired for stormwater and e.coli and a Total Maximum Daily Load (TMDL) is in place.[3] Both phosphorus and chloride levels are very high in this brook. Engelsby displayed the highest median values for chloride of all the streams sampled by our team this year.

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[1] https://dec.vermont.gov/sites/dec/files/wsm/mapp/docs/mp_MallettsBayStreams.pdf
[2] https://dec.vermont.gov/sites/dec/files/documents/WSMD_mapp_8englesbybrook.pdf
[3] https://dec.vermont.gov/sites/dec/files/wsm/mapp/docs/mapp_2015b05tbp.pdf

Indian Brook (2 sites) "Indian Brook rises in the hills around Colchester Pond and Indian Brook Reservoir. The brook was dammed to create the reservoir for a public water supply in the late 1800s. From the reservoir, the brook flows south to Essex Junction and then makes a wide sweep in the village and heads northwesterly to Colchester. It continues northwesterly in Colchester to Mill Pond dammed for a sawmill that once operated there and then on to Malletts Creek Marsh adjacent to Malletts Bay. A portion of Indian Brook is stormwater impaired and a TMDL has been written and approved for this stream."[4] This brook displayed phosphorus levels above the standard and an increasing trend in chloride over the past 5 years.

Mallets Creek (1 site) "Malletts Creek originates in the northeastern portion of Milton at Milton Pond. It flows southwesterly towards the town core of Milton. A small stream joins Malletts Creek from the north as the creek turns and flows in a southerly direction parallelling East Road in Milton. It continues winding generally south to the Milton-Colchester town line. In the southeastern portion of Milton, the creek flows through a large wetland complex, which has been recognized as an important wetland. In Colchester, the creek meanders in an overall southwesterly direction and near the mouth, it is part of another large wetland complex."[5] This brook displayed phosphorus levels above the standard and one of the lowest values for chloride of all our sites.

Muddy Brook (3 sites) "Muddy Brook runs along Williston's western border forming the boundary to South Burlington … The Muddy Brook watershed includes the retail centers in Taft Corners and Maple Tree Place."[6] Muddy Brook is a tributary to the Winooski River. This brook has been listed as impaired for chloride with a plan to develop a TMDL.[7] This brook displayed phosphorus levels above the standard and one of the highest values for chloride of all our sites. There is an increasing trend in chloride at this site over the past 8 years.

Munroe Brook (1 site) Munroe Brook flows through the City of South Burlington and Town of Shelburne and outlets directly into Lake Champlain. Sections of this brook are impaired for stormwater and a TMDL is in place.[8] This brook displayed phosphorus levels above the standard and lower values for chloride compared to all our sites.

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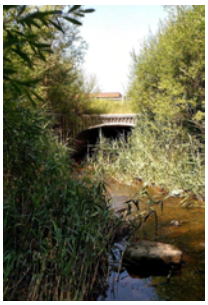
[4] https://dec.vermont.gov/sites/dec/files/wsm/mapp/docs/mp_MallettsBayStreams.pdf
[5] https://dec.vermont.gov/sites/dec/files/wsm/mapp/docs/mp_MallettsBayStreams.pdf
[6] https://www.town.williston.vt.us/?SEC=90A15155-DB82-4B3C-A06B-7A5E00BEF218
[7] https://dec.vermont.gov/sites/dec/files/documents/2018%20Winooski%20River%20TBP.pdf
[8] https://dec.vermont.gov/sites/dec/files/wsm/mapp/docs/mapp_2015b05tbp.pdf

Morehouse Brook (2 sites) "Morehouse Brook drains a small, highly urbanized 262 acre watershed that straddles the town boundary between the City of Winooski and the Town of Colchester. The land use breakdown within the Morehouse Brook watershed is 88% developed land, 1% open land and 11% forested areas."[9] This brook outlets directly into Lake Champlain. It is listed as impaired for stormwater and has a TMDL. The brook displayed phosphorus levels above the standard and high chloride values.



Potash Brook (3 sites) Sections of this brook are impaired for stormwater and e.coli and a TMDL is in place.[10] "The brook is principally located in the municipality of South Burlington, and encompasses an area of approximately 7.13 square miles. The land uses within the watershed are 53% developed land (residential,commercial, industrial, etc.), 30% agricultural or open land, and 17% forest, wetland or open water. Recent surveys indicate a watershed that is approximately 22% impervious."[11] This brook outlets directly into Lake Champlain. It displayed phosphorus levels above the standard and one of the highest values for chloride of all our sites.

Sunnyside Brook (2 sites) "Located in Colchester in the northwest portion of the state, the stream drains highly developed urban lands. The watershed area is 350.6 acres, 106.2 of which are impervious." [12] This brook has been listed as impaired for chloride with a plan to develop a TMDL.[13] This brook displayed phosphorus levels below the standard but had alarmingly high levels of chloride.

Sunderland Brook (1 site) "The headwaters in Essex Junction originate in the highly developed areas adjacent to Route 15. The main stem and minor tributaries flow to the north of Camp Johnson through more forested and less developed areas until the downstream end of the impaired segment is reached at the river at Route 7."[14] This brook displayed phosphorus levels well above the standard but comparatively low levels of chloride.

Sampling Summary Altogether, samplers collected 200 field samples (100 phosphorus samples and 100 chloride samples). Additionally they collected ~20 duplicate samples and ~20 blank samples for data quality checking purposes. These duplicate and blank numbers represent 10% of the total sampling effort, aligning with the requirements in the Quality Assurance Project Plan (QAPP) and the guidance of the lab. The combined total resulted in **140** samples submitted to the lab.

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[9] https://dec.vermont.gov/sites/dec/files/wsm/stormwater/docs/Permitinformation/ResidualDesignationAuthority/sw_mor_tmdl_approved.pdf
[10] https://dec.vermont.gov/sites/dec/files/wsm/mapp/docs/mapp_2015b05tbp.pdf
[11] https://www.epa.gov/sites/production/files/2015-09/documents/sw_pot_tmdl_final_epa_submittal.pdf
[12] https://www.stormh2o.com/home/article/13025322/monitoring-and-tracking-chloride-trends
[13] https://dec.vermont.gov/sites/dec/files/documents/2018%20Winooski%20River%20TBP.pdf
[14] https://dec.vermont.gov/sites/dec/files/wsm/stormwater/docs/SWImpaired/sw_sun_tmdl_approved.pdf

Phosphorus Results

Phosphorus is an essential nutrient for plants and animals that is naturally limited in most freshwater systems. Even a modest increase can set off a chain of undesirable events, such as algal blooms, accelerated plant growth, low dissolved oxygen, and the subsequent die off of aquatic life. Although phosphorus occurs naturally in soils and rocks, additional phosphorus enters waterways through runoff from sources such as fertilized lawns and cropland, pet waste, failing septic systems, animal manure from storage areas or livestock access, wastewater treatment plants, and streambank erosion.

Stream Conditions - Phosphorus - One year

Phosphorus sample results continue to be high across most every sampling site. The VT 2016 water quality standard for phosphorus in Class B warm water medium-gradient streams is 27 µg/L but the median 2019 phosphorus level for every site except Sunnyside 10 exceeded this standard (see Table 3). Medians are calculated instead of means to account for possible outlier values. A few sampling occurrences were exceptionally high but still included in median calculations because they remained less than twice the site's standard deviation above the mean (i.e. were not technically outliers). While this is expected given the small sample size for any given year, it is worth recognizing that TP on 6/25 for both Centennial 10 and Centennial 20 were unusually high (845 µg/L and 364 µg/L respectively). Similarly, TP for Sunnyside 10 on 8/6/19 was 282 µg/L. Since 6/25 generated two high TP results for the same stream, it is worth giving this sampling a closer analysis to see if a common date or volunteer sampler contributed to this.

Location	Median Phosphorus during Baseflow - Dry Conditions	Phosphorus during Rain Event
Alder 10	62	--
Centennial 10	58	70
Centennial 20	58	--
Englesby 10	53	--
Englesby 20	74	--
Indian 10	35	115
Indian 20	54	--
Mallets Creek 10	36	--
Morehouse IPB	37	32
Morehouse PGT	33	70
Muddy 10	55	--

Muddy 20a	103.5	--
Muddy 30	67	105
Munroe 20	55	--
Potash 10*	32	--
Potash 20	38	139
Potash 30*	92	--
Sunderland 10*	61	--
Sunderland 20	62	--
Sunnyside 10	12	--

Table 3. 2019 RRST Phosphorus Results Summary: Median phosphorus levels in µg/L during both baseflow (dry) and high-flow (rain) sampling events in 2019. Dupe values are not included in calculations.Values exceeding the Vermont chronic chloride standard of 27 µg/L are shown in red. Sites denoted with an * had at least one sampling date in which blank or dupe results were flagged but still included in median calculations. Raw data is presented in Appendix C.

Stream Conditions - Phosphorus- Multi-year aggregate data

Phosphorus levels in Chittenden County Streams 2012-2019

Since the onset of this monitoring program in 2012, mean and/or median concentrations of phosphorus during baseflow have remained notably above the 27 µg/L standard at all stream sites. In fact only 5 out of the 20 sites sampled in 2019 have ever exhibited phosphorus concentrations below this standard (Indian 20, Malletts 10, Potash 10 and 20, and Sunnyside 10). Out of these 5, only one site (Sunnyside 10) reports a median below the standard but the 2-yr sampling mean still falls above the standard. Sites of notable historic levels include Engelsby 20, Muddy 10 and 30, Munroe 20, Potash 30, and Sunderland 10 although newer sites like Alder 10, Muddy 20a, Sunderland 10 and Sunnyside 10 have some alarming medians and/or outliers.

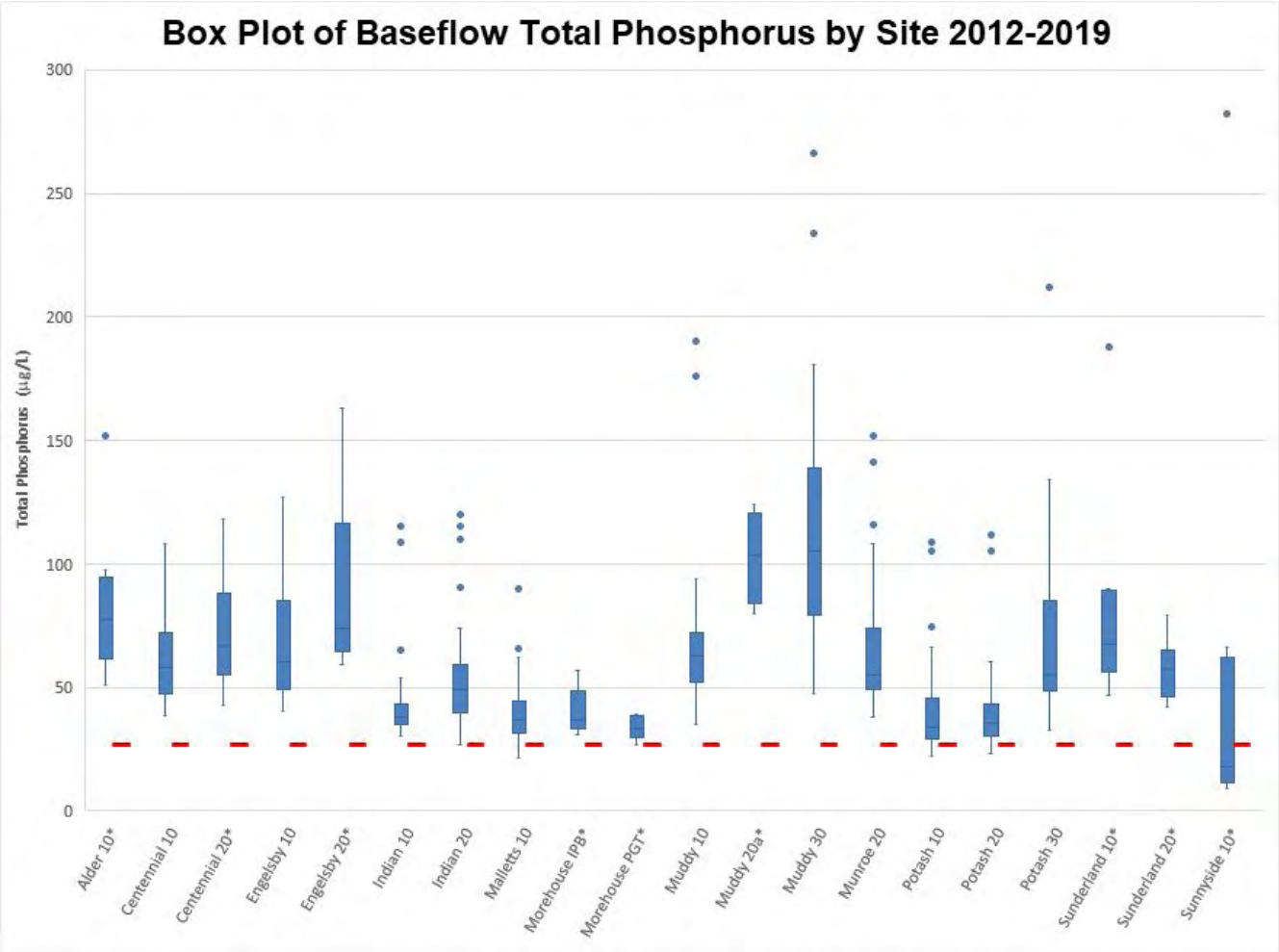


Figure 2. Comparison of total phosphorus levels across sites 2012-2019. Box plots indicate first and third quartiles and median values of total phosphorus concentrations for all sites. These values were calculated including sampling dates that may or may not have associated flagged dupe or blank samples. Asterixed sites indicate 1-3 years of sampling data, all other sites represent 7-8 years of sampling data. Dots indicate outliers which were identified as equal to or greater than 1.5 times the site's interquartile range. Red line indicates Vermont's 2016 Water Quality Standard of 27 µg/L. Three outliers were excluded from this graph for easier viewing: Centennial 10, 6/25/19, 845 µg/L, Centennial 20, 6/25/19 364 µg/L, Muddy 10, 6/25/13, 339 µg/L. Note that box plots do not reveal trends over time but, rather, aggregate many years of data to provide a more comprehensive view of each stream's condition.

Chloride Results

Chloride is a component of salt found naturally in minerals and in oceans. While a low level of instream chloride can originate from natural sources, higher levels are generally due to the use of deicing salts. Elevated chloride levels in surface waters can negatively impact the health and reproduction of aquatic species. The Stream Team took grab samples of chloride, which do not provide adequate data to label a stream impaired or acute, however, the data acts as a spot check. For reference, the Environmental Protection Agency's (EPA) and State of Vermont's (VT) current water quality standard for chloride is 230 mg/L (chronic criteria) and 860 mg/L (acute criteria). 860 mg/L is the highest concentration of chloride to which aquatic life can safely be exposed for one hour once every 3 years. 230mg/L is the highest concentration of chloride to which aquatic life can safely be exposed for four consecutive days once every 3 years.[15]

Stream Conditions - Chloride - One year

In 2019, six sampled brooks presented median values above 230 mg/L and chloride levels were higher during baseflow conditions in four of the six streams sampled under both conditions. Chloride grab sample levels exceeded the acute standard (860 mg/L) in Sunnyside 10 (6/25, 7/9, 7/23, 8/6, 8/20), Centennial 20 (8/6) and Engelsby 20 (6/25, 7/9, 7/23, 8/6) in 2019. Notably this presents 10 occurrences across our sampling area in which the acute standard was surpassed in 2019. This is up from four occurrences in 2018, the first time this value had been surpassed in any individual sample over the eight year sampling period. This data suggests that we are continuing to see an increase in chloride levels.

Location	Median Chloride in Dry Conditions Only	Chloride during Rain Events
Alder 10	11.7	--
Centennial 10	716	600
Centennial 20	226	--
Englesby 10	519	--
Englesby 20	1457.5	--
Indian 10	247.5	152
Indian 20	193	--
Mallets Creek 10	45.8	--
Morehouse IPB	131.5	358
Morehouse PGT	332	65.8

[15] https://dec.vermont.gov/sites/dec/files/documents/wsmd_water_quality_standards_2016.pdf
https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#table

Muddy 10	139.2	--
Muddy 20a*	93.85	--
Muddy 30	28.2	38.3
Munroe 20	36.4	--
Potash 10	438	--
Potash 20	442	183.4
Potash 30	324	--
Sunderland 10	177	--
Sunderland 20	187	--
Sunnyside 10	1320	--

Table 5. 2019 RRST Chloride Results Summary: This table depicts median chloride levels in mg/L during baseflow (dry) and high-flow (rain) sampling events in 2019. Values exceeding the Vermont chronic chloride standard of 230 mg/L are shown in red. Sites denoted with an * had at least one sampling date in which blank or dupe results were flagged but still included in the median calculations. Raw data is presented in Appendix C.

Stream Conditions - Chloride - Multi-year aggregate data

Chloride levels in Chittenden County Streams 2012-2019

Since the onset of this monitoring program, mean chloride levels at Centennial 10 and Potash 10, 20 and 30 have remained notably above 230 mg/L. Recently added sampling sites have also presented alarmingly high data including Engelsby 20, Morehouse PGT, and Sunnyside 10.

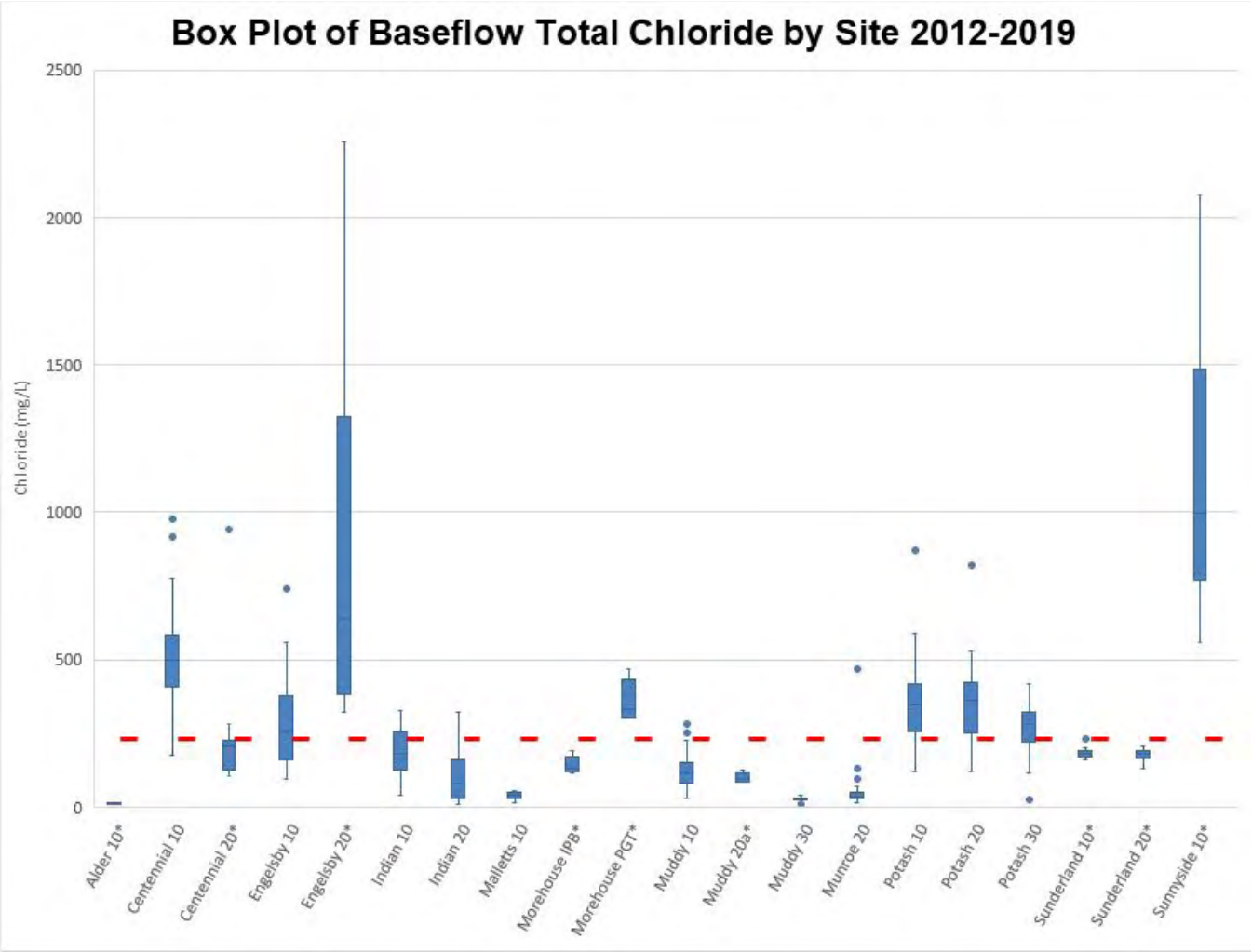


Figure 5 - Comparison of Chloride levels across sites 2012-2019. Box plots indicate first and third quartiles and median values of chloride levels (mg/L) for all sites. Asterixed sites indicate 1-3 years of sampling data, all other sites represent 7-8 years of sampling data. Dots indicate outliers which were identified as equal to or greater than 1.5 times the site's interquartile range. Red line indicates EPA's and Vermont's standard for 4-day average chloride levels (230 mg/L). Note that box plots do not reveal trends over time but, rather, aggregate many years of data to provide a more comprehensive view of each stream's condition.

Aggregated data also suggests a general increasing trend in chloride. Figure 6 below shows that the mean and standard deviation values have increased slightly over time (although medians are holding relatively constant). Also, notably, the R^2 value of the best fit line for the mean and standard deviation have both increased from 2018 values; from 0.32 to 0.42, and from 0.45 to 0.56 respectively. This suggests that as we add more years of data, this increasing trend is gaining significance. With medians remaining somewhat constant this is suggesting an increase in more extreme values.

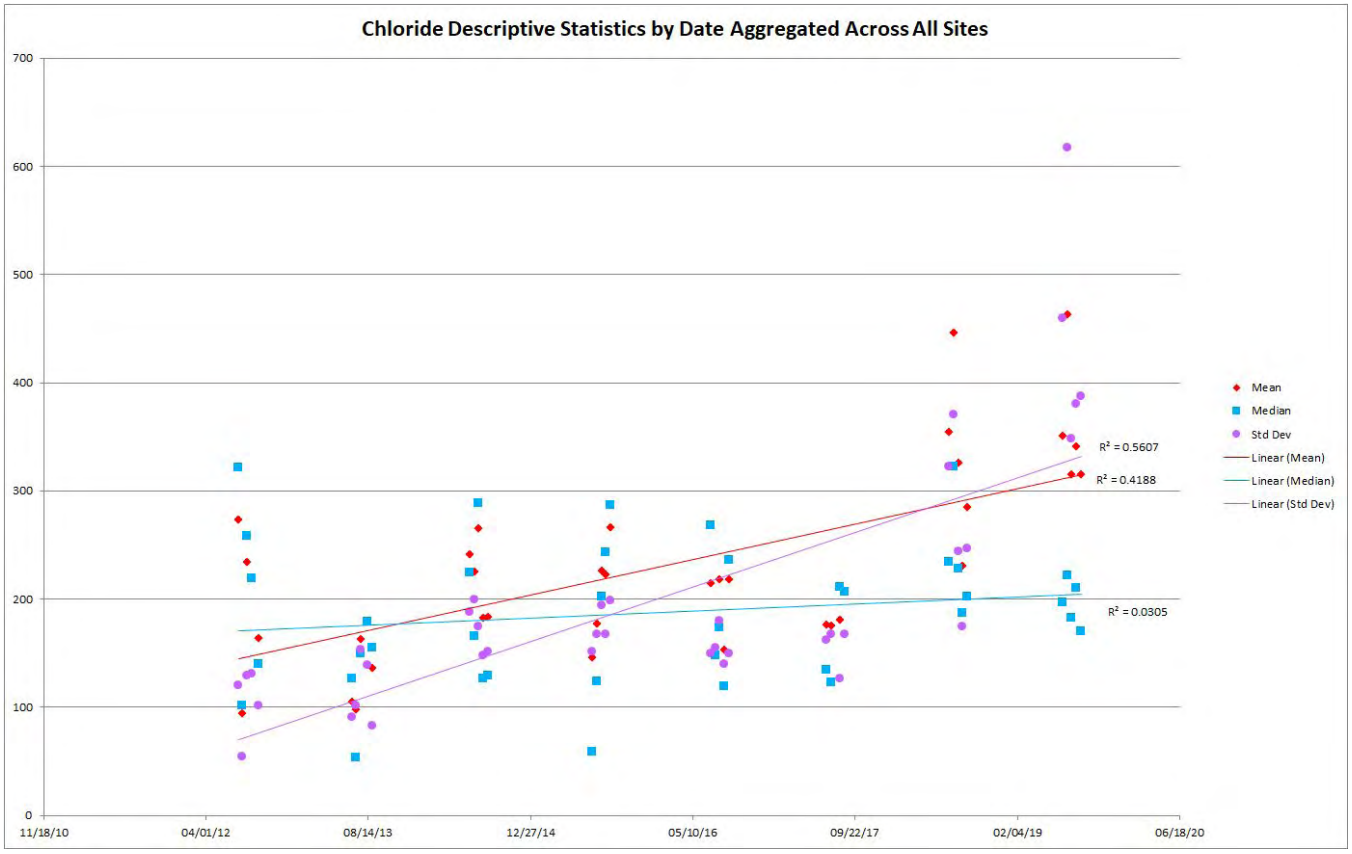


Figure 6. Descriptive Statistics for chloride data gathered across sites aggregated by date. Each sampling date had chloride values across sites averaged to determine mean, median, and standard deviation for the entire sampling area.

Conclusion

The Rethink Runoff Stream Team has monitored chloride and phosphorus in various streams in Chittenden County for the past eight consecutive years (2012-2019). The 2019 season results are similar to those obtained over the past seven years. This year's data indicates that all stream sites have sustained phosphorus levels well above the Vermont standard and that chloride continues to be a growing concern.

Phosphorus levels in almost all sampled streams have remained two to four times the Vermont water quality standard of 27 µg/L. Especially high levels of phosphorus were recorded along Engelsby Brook, Muddy Brook and Sunderland Brook this year.

Chloride levels continue to be elevated in several streams, most notably in Centennial Brook, Engelsby Brook, Indian Brook, Morehouse Brook, Potash Brook and Sunnyside Brook. For only the second year in Stream Team's sampling history, median chloride levels exceeded 860 mg chloride/L at two sites (Engelsby 20 and Sunnyside 10). Our data shows a general increasing trend in chloride across all sites over the 8-year sampling period.

In the years to come Stream Team will use this data to communicate with individuals, property management companies and municipalities about local water quality issues, with the hope of inspiring changes in behavior and management techniques. Future sampling will focus on identifying "problem areas" of streams rather than completing long-term monitoring at the same sites.

The Stream Team continues to request explicit guidance and documented practices in the QAPP for dealing with outliers and data points whose duplicates or blanks were flagged. For 2019 analysis, as with prior years, all data points were included because of a lack in standardized practice for dealing with this. The Stream Team did converse with Becky Tharpwho will be working with Kristen Underwood to develop some statewide guidance for groups working under the Watersheds United Vermont Train The Trainer Grant (WUV TTT).

This year the analysis team decided to not include information about spatial variation (upstream/downstream differences) in phosphorus and chloride. Through working with Becky Tharp and the WUV TTT program, we have learned more accurate techniques to account for spatial differences by delineating sub-basins and combining that data with regional flow rates. In the future we plan to use these methods to more accurately describe differences in parameters upstream and downstream, but this year our capacity to complete that analysis is limited.

Finally, when faced with the issues of non-point source pollution, we need everyone to pitch in to create a healthier, cleaner environment. Below are a few ideas about how you can help improve water quality.

1. Join the Rethink Runoff Stream Team community to learn about volunteer opportunities by signing up for our newsletter, connecting with us on social media or visiting our website www.rethinkrunoff.org.
2. Reduce the use of lawn fertilizer (a source of phosphorus) and de-icing salt (a source of chloride) on your property.
3. If you have a dog, always be sure to scoop the poop (a source of phosphorus) even in the woods, even in the winter
4. Install a rain barrel or a rain garden to help collect rain water and soak it into the soil before it reaches surfaces like pavement where it will pick up pollutants before reaching streams
5. Tell your friends! Share what you've learned and encourage other people to get educated and get involved in creating a cleaner Lake Champlain.

Appendix A. Quality Assurance Measures for phosphorus, chloride, and turbidity sampling in 2019. Values highlighted in red indicate a failed duplicate sample.

Location	Date	Test	Sample	Dup	RPD%	Precision for Field Duplicates (RPD)
Alder 10	6/25/19 8:20 AM	Chloride	8.85	8.12	8.603417796	≤ 5%
Engelsby 10	7/9/19 1:24 PM	Chloride	478	487	1.865284974	≤ 5%
Engelsby 20	7/9/19 9:15 AM	Chloride	1455	1470	1.025641026	≤ 5%
Mallets 10	7/23/19 9:30 AM	Chloride	44.2	41.7	5.820721769	≤ 5%
Munroe 20	7/23/19 10:10 AM	Chloride	36.9	36.3	1.639344262	≤ 5%
Muddy 10	8/6/19 6:45 AM	Chloride	139.2	137.4	1.301518438	≤ 5%
Muddy 20	8/6/19 8:00 AM	Chloride	93.5	382	121.3459516	≤ 5%
Potash 20	8/20/19 7:45 AM	Chloride	420	424	0.9478672986	≤ 5%
Potash 30	8/20/19 8:05 AM	Chloride	285	286	0.350262697	≤ 5%
Alder 10	6/25/19 8:20 AM	TP	75	73	2.702702703	≤30%
Engelsby 20	7/9/19 9:15 AM	TP	74	77	3.973509934	≤30%
Mallets 10	7/23/19 9:30 AM	TP	38	39	2.597402597	≤30%
Munroe 20	7/23/19 10:10 AM	TP	92	72	24.3902439	≤30%
Muddy 10	8/6/19 6:45 AM	TP	48	49	2.06185567	≤30%
Muddy 20	8/6/19 8:00 AM	TP	124	124	0	≤30%
Potash 20	8/20/19 7:45 AM	TP	41	34	18.66666667	≤30%
Potash 30	8/20/19 8:05 AM	TP	92	60	42.10526316	≤30%

	Parameter	Mean	Median	Target
RPD	Chloride	15.81	1.64	≤ 5%
	TP	12.06	3.34	≤30%

Appendix B. Project Completeness

Project proposal anticipated 5 dates for baseflow sampling across 21 sites (105 samples per parameter) as well as 2 rain dates sampling across 6 sites (12 samples per parameter). The number of anticipated samples also includes 10% blank and duplicate samples. Of note: It was only possible to sample during one high-flow event. Furthermore, the Allen Brook site was inaccessible by our volunteer and was not sampled at all this season, contributing to a lower percent completeness than in years past.

Parameter	**Number of Samples Anticipated (including blanks and dups)**	**Number of Valid Samples* Collected and Analyzed**	**Percent Complete**
Chloride	129	121	94%
Total Phosphorus	129	116	90%

*"Valid sample" includes all samples not flagged by issues that arose from blank or dupe results

Appendix C. Individual Sample Results. Boxes highlighted in yellow indicate issues flagged by inconsistent blank or duplicate results. All values in black text were included in graphing and statistical analyses of the 2019 report. Values in red text indicate blank samples and values in blue text indicate duplicate samples. See appendix A for more information about the use of blank and duplicate samples for quality assurance.

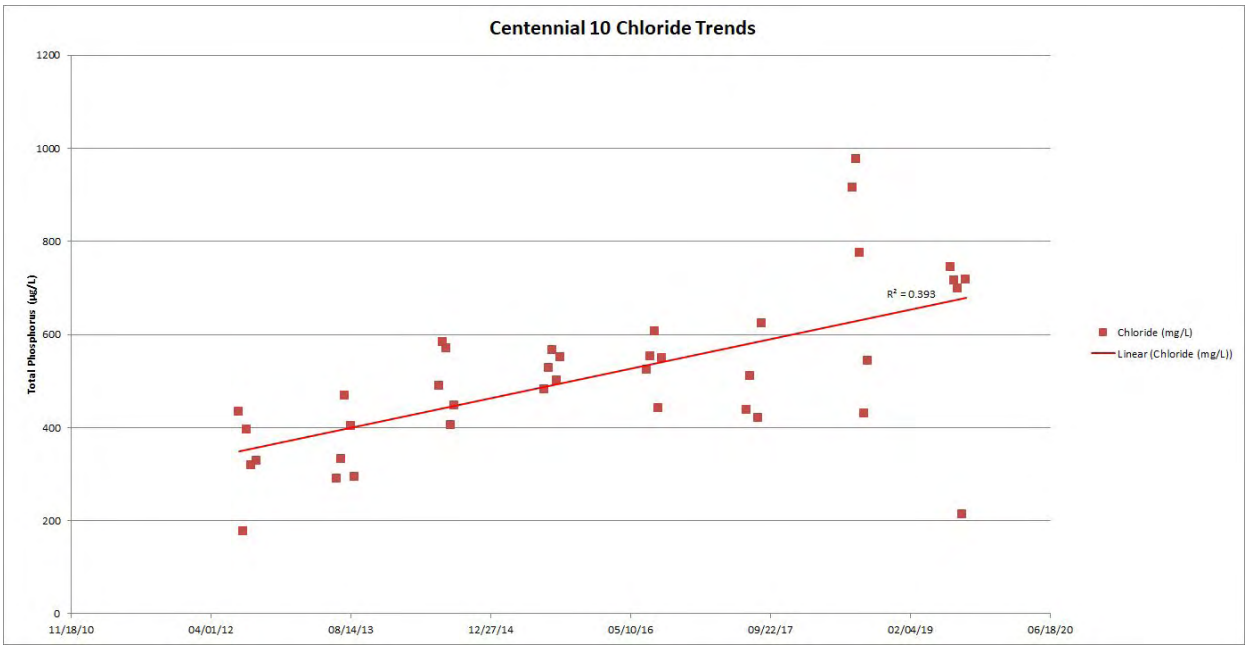
All Data 2019- ReThink Runoff Stream Team				
Lab Sample ID	**Location**	**Collected On**	**Total Phosphorus mg/L**	**Chloride ug P/L**
1900164-002	Alder 10	6/25/19 8:20 AM	75	8.85
1900321-002	Alder 10	7/9/19 8:45 AM	64	11.70
1900627-002	Alder 10	7/23/19 8:40 AM	62	11.60
1900629-002	Alder 10	8/6/19 9:00 AM	60	12.90
1900630-002	Alder 10	8/20/19 9:00 AM	51	11.70
1900164-023	Alder 10 DUP	6/25/19 8:20 AM	73	8.12
1900164-003	Centennial 10	6/25/19 1:00 PM	845	744.00
1900321-003	Centennial 10	7/9/19 10:05 AM	39	716.00
1900627-003	Centennial 10	7/23/19 8:51 AM	60	698.00
1900629-003	Centennial 10	8/6/19 8:48 AM	56	213.00
1900323-002	Centennial 10	8/8/19 9:35 AM	70	600.00
1900630-003	Centennial 10	8/20/19 9:32 AM	58	718.00
1900164-024	Centennial 10 BLANK	6/25/19 1:00 PM	<5	<2.00

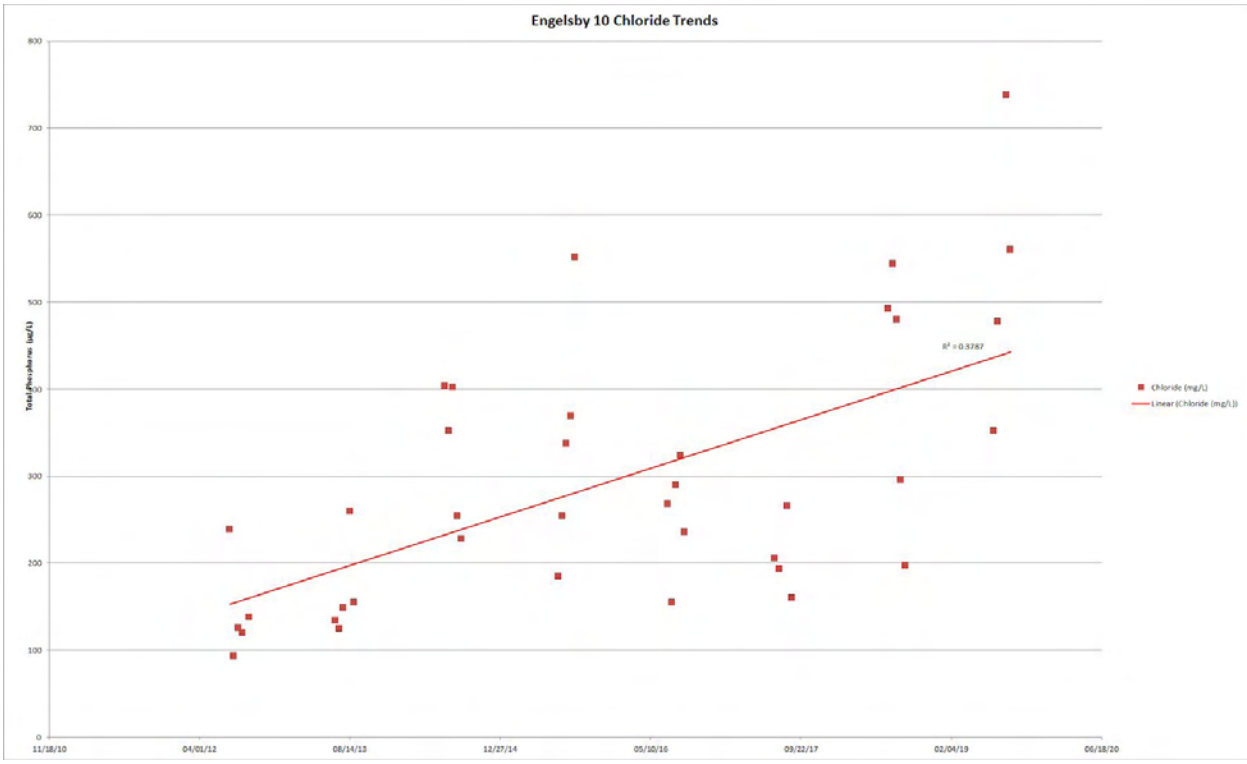
1900164-004	Centennial 20	6/25/19 1:20 PM	364	103.00
1900321-004	Centennial 20	7/9/19 9:45 AM	58	280.00
1900627-004	Centennial 20	7/23/19 8:42 AM	68	226.00
1900629-004	Centennial 20	8/6/19 8:37 AM	52	942.00
1900630-004	Centennial 20	8/20/19 9:28 AM	43	152.00
1900164-025	Centennial 20 BLANK	6/25/19 1:20 PM	<5	<2.00
1900164-005	Engelsby 10	6/25/19 8:00 AM	46	352.00
1900321-005	Engelsby 10	7/9/19 1:24 PM	44	478.00
1900627-005	Engelsby 10	7/23/19 7:15 AM	53	
1900629-005	Engelsby 10	8/6/19 7:30 AM	55	738.00
1900630-005	Engelsby 10	8/20/19 7:00 AM	75	560.00
1900321-022	Engelsby 10 DUP	7/9/19 1:24 PM		487.00
1900164-006	Engelsby 20	6/25/19 9:10 AM	75	1460.00
1900321-006	Engelsby 20	7/9/19 9:15 AM	74	1455.00
1900627-006	Engelsby 20	7/23/19 8:40 AM	64	990.00
1900629-006	Engelsby 20	8/6/19 8:00 AM		2255.00
1900321-023	Engelsby 20 DUP	7/9/19 9:15 AM	77	1470.00
1900164-007	Indian 10	6/25/19 9:10 AM	35	170.00
1900321-007	Indian 10	7/9/19 9:10 AM	38	219.00
1900627-007	Indian 10	7/23/19 9:07 AM	42	247.50
1900629-007	Indian 10	8/6/19 9:05 AM	34	312.00
1900323-006	Indian 10	8/8/19 8:45 AM	115	152.00
1900630-007	Indian 10	8/20/19 9:05 AM	33	296.00
1900321-024	Indian 10 BLANK	7/9/19 9:10 AM	<5	<2.00
1900164-008	Indian 20	6/25/19 9:30 AM	46	59.00
1900321-008	Indian 20	7/9/19 9:30 AM	56	201.00
1900627-008	Indian 20	7/23/19 9:20 AM	71	108.00
1900629-008	Indian 20	8/6/19 9:20 AM	50	230.00
1900630-008	Indian 20	8/20/19 9:30 AM	54	193.00
1900321-025	Indian 20 BLANK	7/9/19 9:30 AM	<5	<2.00
1900164-009	Mallet 10	6/25/19 6:30 AM	31	37.00
1900321-009	Mallets 10	7/9/19 6:20 AM	48	45.80
1900627-009	Mallets 10	7/23/19 9:30 AM	38	44.20
1900629-009	Mallets 10	8/6/19 6:15 AM	36	54.00
1900630-009	Mallets 10	8/20/19 7:45 AM	34	54.80
1900627-022	Mallets 10 DUP	7/23/19 9:30 AM	39	41.70
1900164-012	Morehouse IPB	6/25/19 8:00 AM	31	116.50

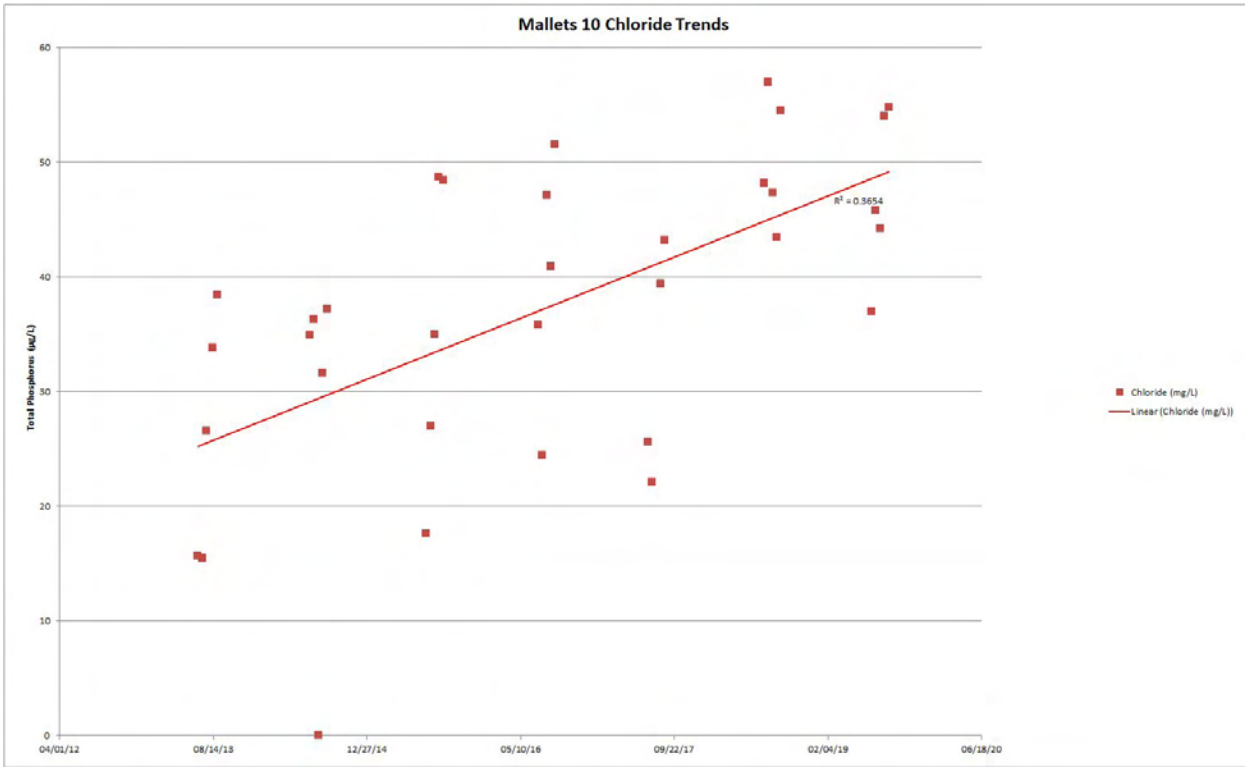
1900321-012	Morehouse IPB	7/9/19 7:00 AM	37	127.00
1900627-012	Morehouse IPB	7/23/19 7:15 AM	36	131.50
1900629-012	Morehouse IPB	8/6/19 7:00 AM	40	154.00
1900323-004	Morehouse IPB	8/8/19 9:25 AM	32	358.00
1900630-012	Morehouse IPB	8/20/19 7:15 AM	57	188.60
1900627-024	Morehouse IPB BLANK	7/23/19 7:15 AM	<5	<2.00
1900164-011	Morehouse PGT	6/25/19 8:00 AM	27	307.00
1900321-011	Morehouse PGT	7/9/19 7:00 AM	38	332.00
1900627-011	Morehouse PGT	7/23/19 7:15 AM	32	301.00
1900629-011	Morehouse PGT	8/6/19 7:00 AM	33	398.00
1900323-003	Morehouse PGT	8/8/19 9:20 AM	70	65.80
1900630-011	Morehouse PGT	8/20/19 7:15 AM	39	466.00
1900627-025	Morehouse PGT BLANK	7/23/19 7:15 AM	<5	<2.00
1900164-013	Muddy 10	6/25/19 7:00 AM	63	90.00
1900321-013	Muddy 10	7/9/19 6:45 AM	55	116.50
1900627-013	Muddy 10	7/23/19 6:45 AM	68	151.00
1900629-013	Muddy 10	8/6/19 6:45 AM	48	139.20
1900630-013	Muddy 10	8/20/19 9:00 AM	35	193.80
1900629-022	Muddy 10 DUP	8/6/19 6:45 AM	49	137.40
1900321-014	Muddy 20	7/9/19 9:00 AM	80	85.00
1900627-014	Muddy 20	7/23/19 7:45 AM	97	94.20
1900629-014	Muddy 20	8/6/19 8:00 AM	124	93.50
1900630-014	Muddy 20	8/20/19 7:45 AM	110	125.00
1900629-023	Muddy 20 DUP	8/6/19 8:00 AM	124	382.00
1900164-015	Muddy 30	6/25/19 7:40 AM	75	25.70
1900321-015	Muddy 30	7/9/19 7:15 AM	67	28.20
1900627-015	Muddy 30	7/23/19 8:00 AM	65	28.90
1900629-015	Muddy 30	8/6/19 8:04 AM	59	27.00
1900323-001	Muddy 30	8/8/19 10:00 AM	105	38.30
1900630-015	Muddy 30	8/20/19 8:00 AM	73	32.10
1900629-024	Muddy 30 BLANK	8/6/19 8:04 AM	<5	<2.00
1900164-010	Munroe 20	6/25/19 11:00 AM	59	39.20
1900321-010	Munroe 20	7/9/19 9:40 AM	55	33.40
1900627-010	Munroe 20	7/23/19 10:10 AM	92	36.90
1900629-010	Munroe 20	8/6/19 10:07 AM	55	36.40
1900630-010	Munroe 20	8/20/19 9:30 AM	44	35.00
1900627-023	Munroe 20 DUP	7/23/19 10:10 AM	72	36.30

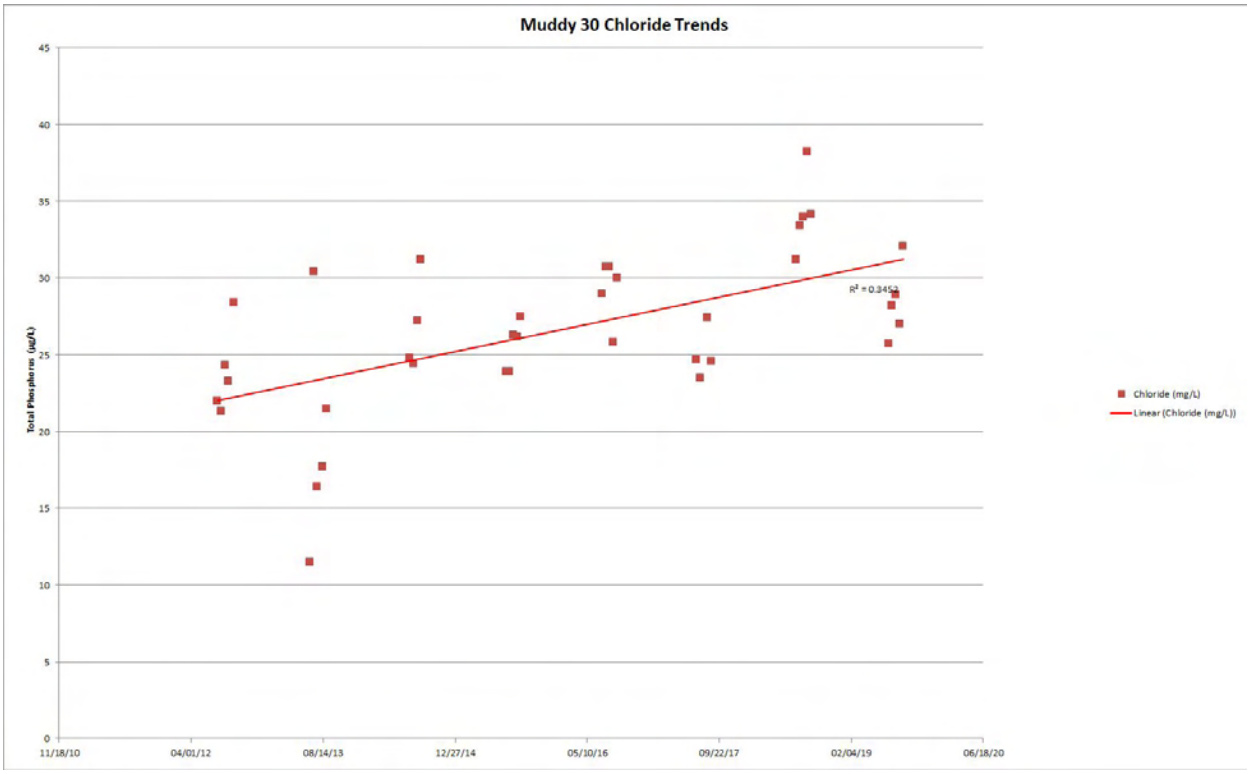
1900164-016	Potash 10	6/25/19 7:20 AM	34	374.00
1900321-016	Potash 10	7/9/19 7:20 AM		400.00
1900627-016	Potash 10	7/23/19 7:15 AM		446.00
1900629-016	Potash 10	8/6/19 7:25 AM	29	480.00
1900630-016	Potash 10	8/20/19 7:25 AM	32	438.00
1900629-025	Potash 10 BLANK	8/6/19 7:25 AM	6	<2.00
1900164-017	Potash 20	6/25/19 7:35 AM	38	371.00
1900321-017	Potash 20	7/9/19 7:45 AM	33	442.00
1900627-017	Potash 20	7/23/19 7:25 AM	40	462.00
1900629-017	Potash 20	8/6/19 7:40 AM	30	528.00
1900323-005	Potash 20	8/8/19 8:20 AM	139	183.40
1900630-017	Potash 20	8/20/19 7:45 AM	41	420.00
1900630-022	Potash 20 DUP	8/20/19 7:45 AM	34	424.00
1900164-018	Potash 30	6/25/19 7:45 AM	48	289.00
1900321-018	Potash 30	7/9/19 8:03 AM	49	328.00
1900627-018	Potash 30	7/23/19 8:10 AM	103	336.00
1900629-018	Potash 30	8/6/19 7:55 AM	212	324.00
1900630-018	Potash 30	8/20/19 8:05 AM	92	285.00
1900630-023	Potash 30 DUP	8/20/19 8:05 AM	60	286
1900164-019	Sunderland 10	6/25/19 11:15 AM	90	161.50
1900321-019	Sunderland 10	7/9/19 7:26 AM	58	165.00
1900627-019	Sunderland 10	7/23/19 11:02 AM	61	177.00
1900629-019	Sunderland 10	8/6/19 10:02 AM	72	177.40
1900630-019	Sunderland 10	8/20/19 10:30 AM	51	230.00
1900630-024	Sunderland 10 BLANK	8/20/19 10:30 AM	5	<2.00
1900164-020	Sunderland 20	6/25/19 8:18 AM	62	189.50
1900321-020	Sunderland 20	7/9/19 9:20 AM	42	187.00
1900627-020	Sunderland 20	7/23/19 6:54 AM	79	182.50
1900629-020	Sunderland 20	8/6/19 7:05 AM	64	171.60
1900630-020	Sunderland 20	8/20/19 7:00 AM	52	196.60
1900630-025	Sunderland 20 BLANK	8/20/19 7:00 AM	<5	<2.00
1900164-021	Sunnyside 10	6/25/19 10:10 AM	10	1090.00
1900321-021	Sunnyside 10	7/9/19 10:30 AM	9	1170.00
1900627-021	Sunnyside 10	7/23/19 9:15 AM	12	1320.00
1900629-021	Sunnyside 10	8/6/19 10:48 AM	282	1980.00
1900630-021	Sunnyside 10	8/20/19 9:20 AM	61	2075.00

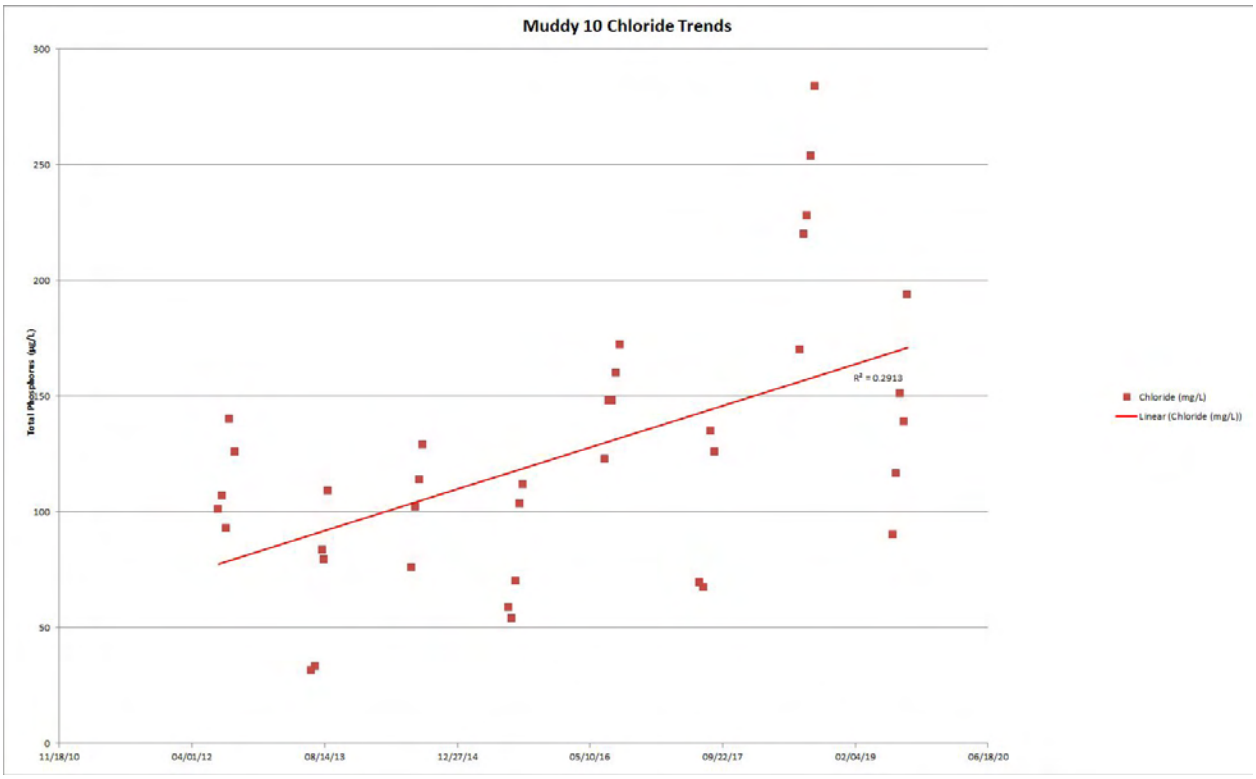
Appendix D. Notable Trends in Chloride Increases Over Time By Site. Sorted in descending order by R2 values.

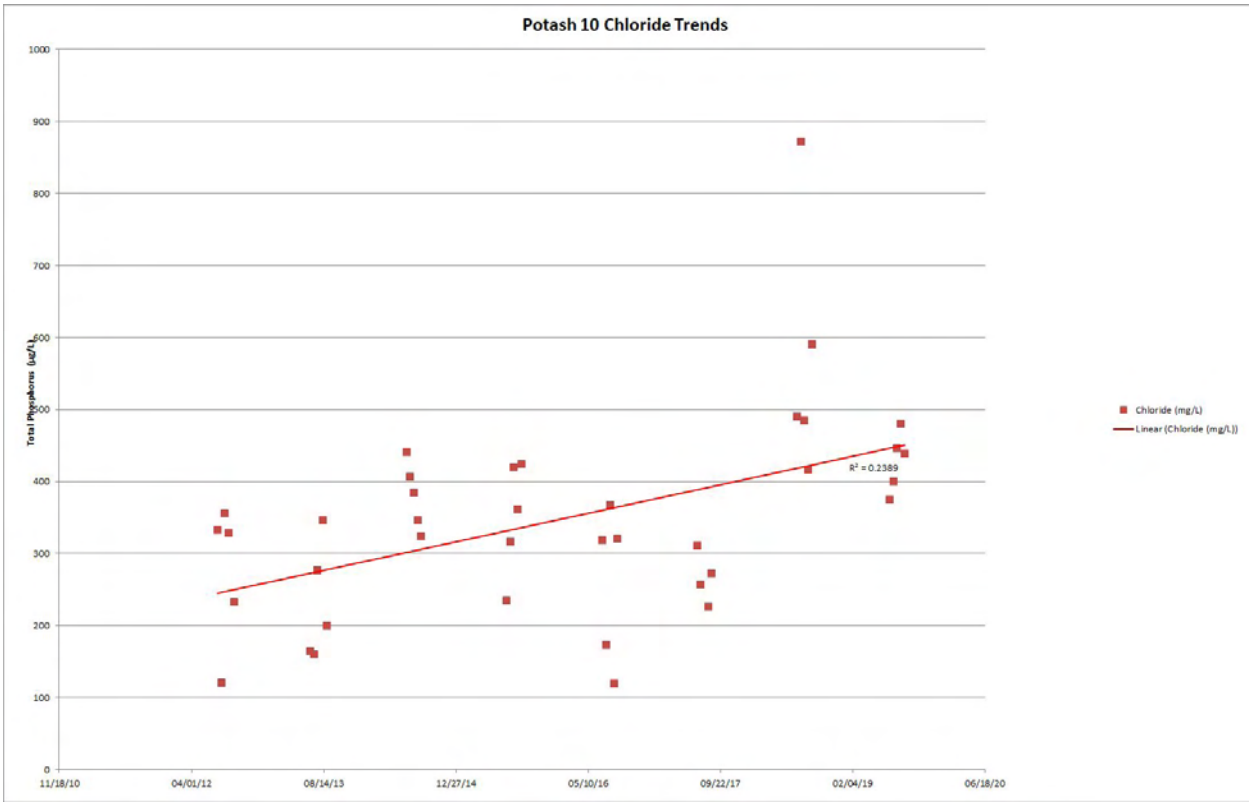


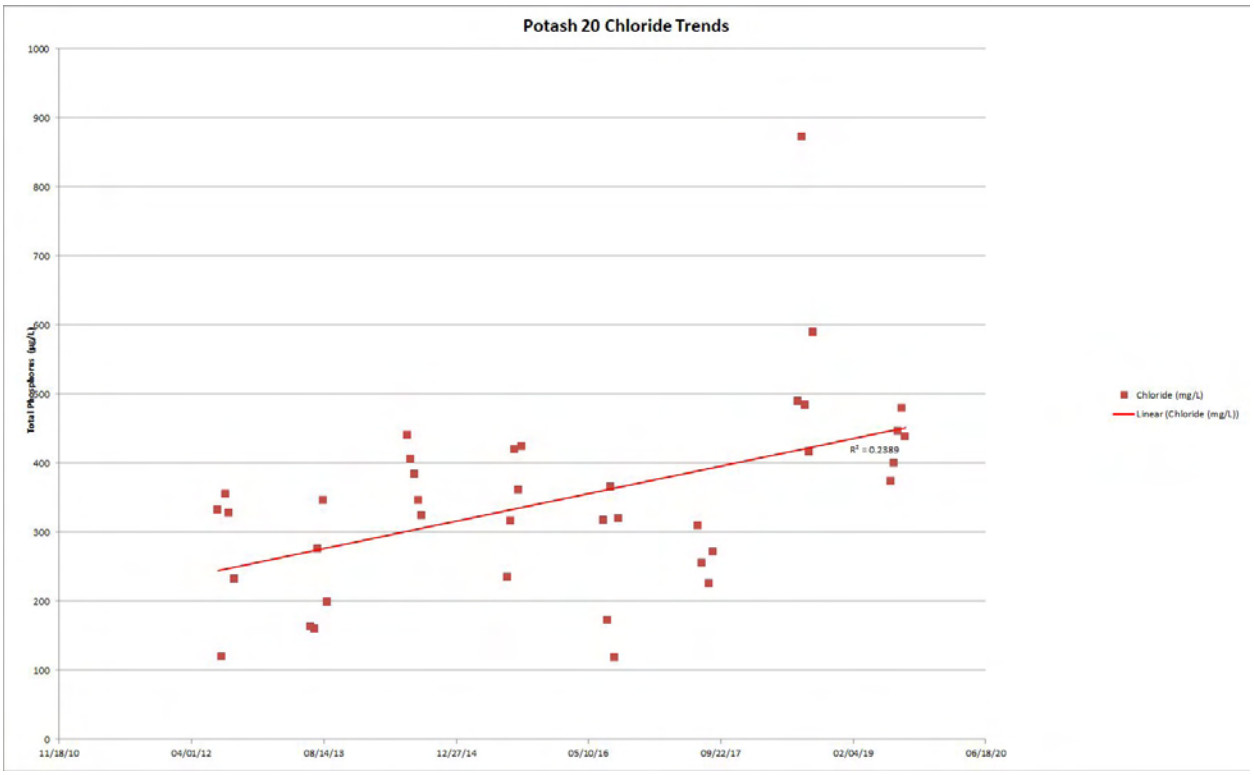


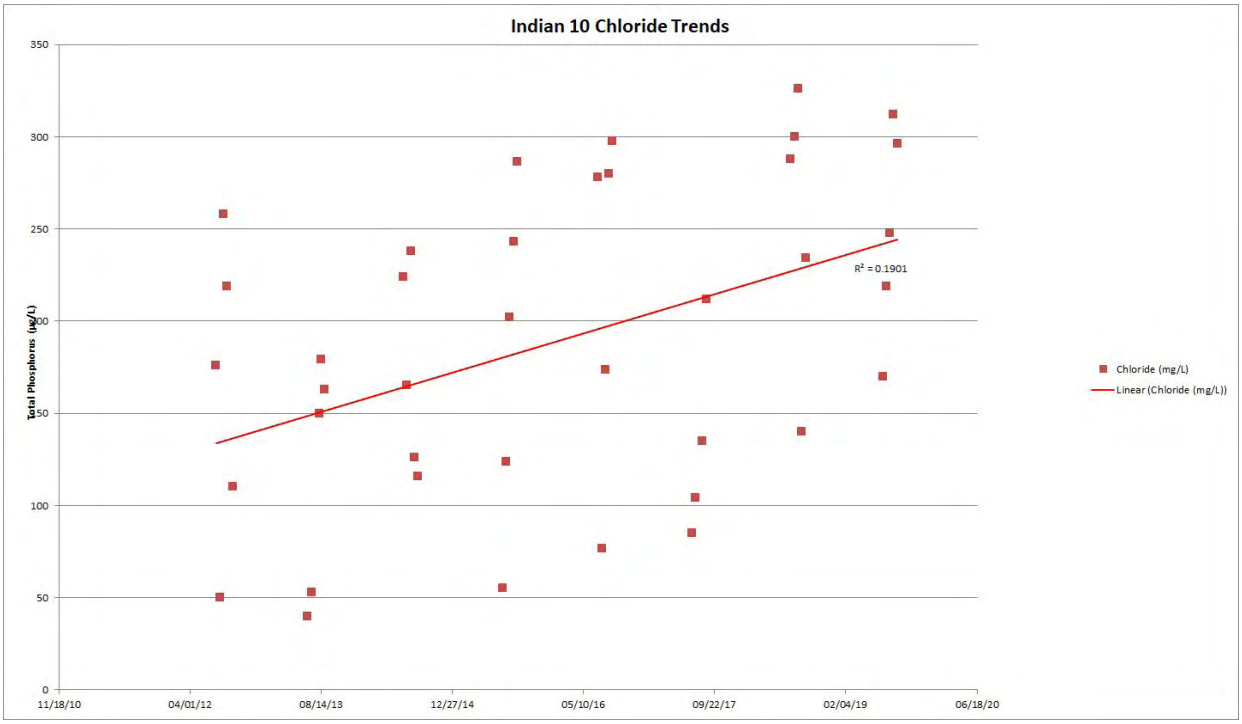

Mallets 10 Chloride Trends
Total Phosphorus (µg/L)
60
50
40
30
20
10
0
04/01/12
08/14/13
12/27/14
05/10/16
09/22/17
02/04/19
06/18/20
R² = 0.3654
Chloride (mg/L)
Linear (Chloride (mg/L))

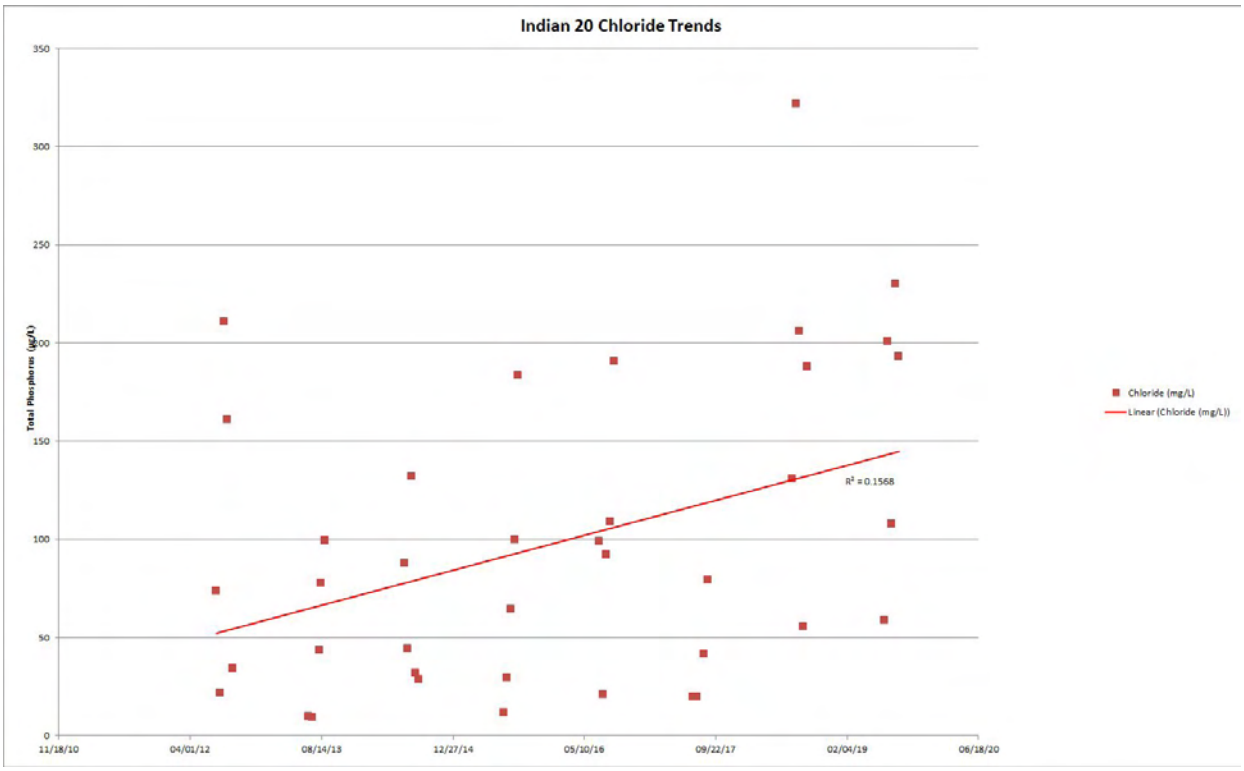

Muddy 30 Chloride Trends
Total Phosphorus (µg/L)
45
40
35
30
25
20
15
10
5
0
11/18/10
04/01/12
08/14/13
12/27/14
05/10/16
09/22/17
02/04/19
06/18/20
R² = 0.3459
Chloride (mg/L)
Linear (Chloride (mg/L))

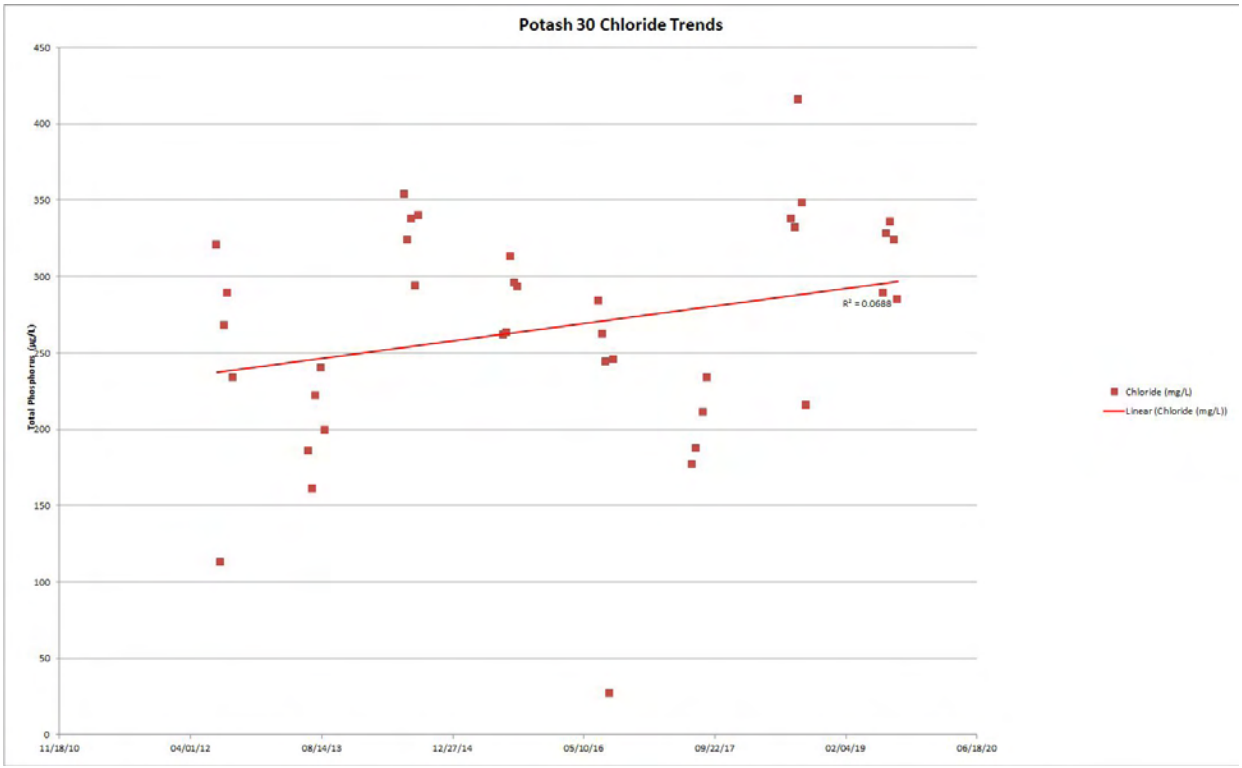

Muddy 10 Chloride Trends
Total Phosphorus (µg/L)
300
250
200
150
100
50
0
11/18/10
04/01/12
08/14/13
12/27/14
05/10/16
09/22/17
02/04/19
06/18/20
R² = 0.2913
Chloride (mg/L)
Linear (Chloride (mg/L))

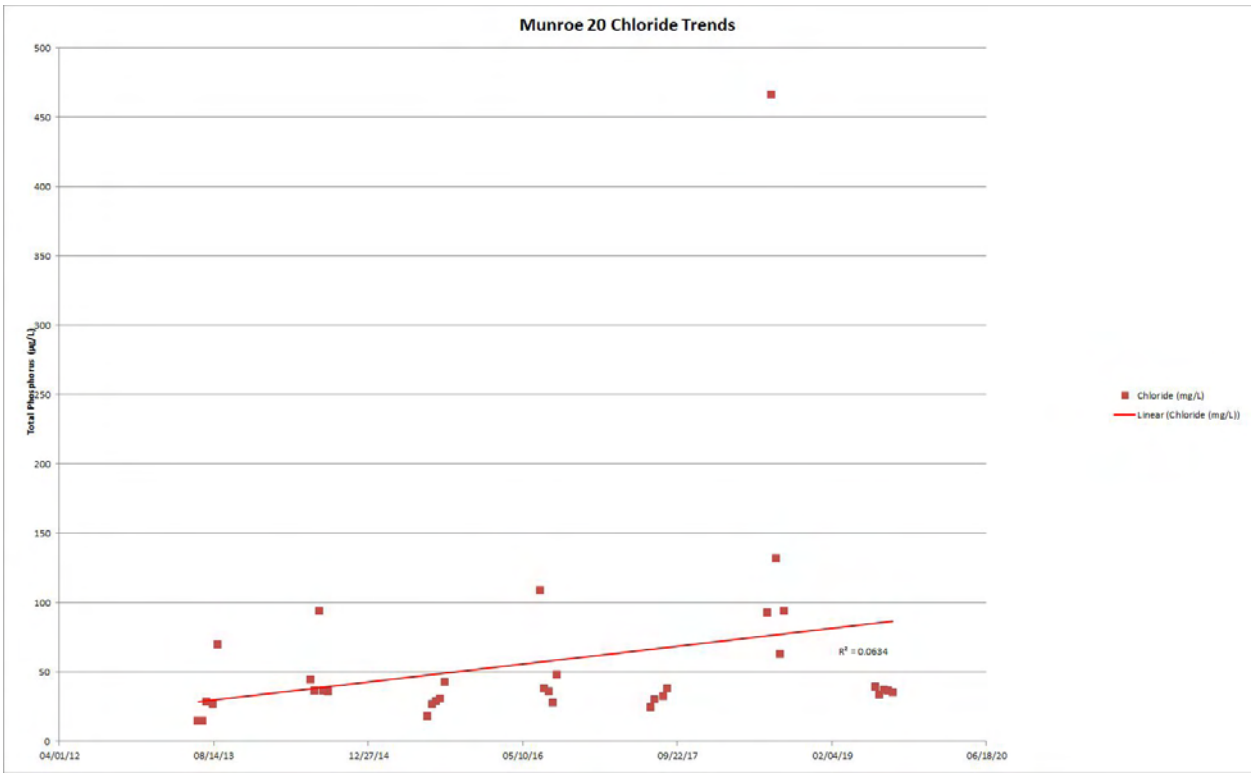

Potash 10 Chloride Trends
Total Phosphorus (µg/L)
1000
900
800
700
600
500
400
300
200
100
0
11/18/10
04/01/12
08/14/13
12/27/14
05/10/16
09/22/17
02/04/19
06/18/20
R² = 0.2389
Chloride (mg/L)
Linear (Chloride (mg/L))


Potash 20 Chloride Trends
Total Phosphorus (µg/L)
1000
900
800
700
600
500
400
300
200
100
0
11/18/10
04/01/12
08/14/13
12/27/14
05/10/16
09/22/17
02/04/19
06/18/20
R² = 0.2389
Chloride (mg/L)
Linear (Chloride (mg/L))


Indian 10 Chloride Trends
Total Phosphorus (µg/L)
350
300
250
200
150
100
50
0
11/18/10
04/01/12
08/14/13
12/27/14
05/10/16
09/22/17
02/04/19
06/18/20
R² = 0.1901
Chloride (mg/L)
Linear (Chloride (mg/L))


Indian 20 Chloride Trends
Total Phosphorus (µg/L)
350
300
250
200
150
100
50
0
11/18/10
04/01/12
08/14/13
12/27/14
05/10/16
09/22/17
02/04/19
06/18/20
R² = 0.1568
Chloride (mg/L)
Linear (Chloride (mg/L))


Potash 30 Chloride Trends
Total Phosphorus (µg/L)
450
400
350
300
250
200
150
100
50
0
11/18/10
04/01/12
08/14/13
12/27/14
05/10/16
09/22/17
02/04/19
06/18/20
R² = 0.0688
Chloride (mg/L)
Linear (Chloride (mg/L))


Munroe 20 Chloride Trends
Total Phosphorus (µg/L)
500
450
400
350
300
250
200
150
100
50
0
04/01/12
08/14/13
12/27/14
05/10/16
09/22/17
02/04/19
06/18/20
R² = 0.0634
Chloride (mg/L)
Linear (Chloride (mg/L))