Annual Report for General Permit 3-9014 (2012) MS4

National Pollutant Discharge Elimination System (NPDES) Number: VTR040000 for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4)

Prepared for:

Burlington International Airport
South Burlington, Vermont

Prepared by:

Stantec Consulting Services, Inc.
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April 1, 2019

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APPENDICES

1.0 ANNUAL REPORT FOR GENERAL PERMIT 3-9014 (2012) MS4

1.1 INTRODUCTION

In accordance with Section V. C. Reporting, contained in MS4 General Permit 3-9014, the Burlington International Airport (BTV) is required to submit an annual report overviewing the status of compliance with permit conditions by April 1 of each year of the permit term.

1.1.1 Background

In June 2003, April 2008, June 2013, and most recently on January 23, 2019, the Burlington International Airport (BTV) submitted a Notice of Intent (NOI) for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) to the Vermont Agency of Natural Resources to meet the regulations associated with the Environmental Protection Agency Phase II Stormwater Rule.

The Vermont Department of Environmental Conservation (VT DEC) issued General Permit 3-9014 (2012) for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) on December 5, 2012. Designed to address pollution from stormwater runoff, the re-issued MS4 permit then applied to twelve municipalities and three institutional entities in the Lake Champlain watershed. The primary additional condition of General Permit 3-9014 (2012) was the requirement to develop and submit a Flow Restoration Plan (FRP) for the portion of each stormwater–impaired watershed located within a permittee's boundaries.

BTV was re-authorized under General Permit No. 3-9014 (2012) for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) on October 1, 2013. Per the re-authorized permit, BTV is required to submit a report on a semi-annual basis on the development and implementation of the FRP.

The Vermont DEC) issued General Permit 3-9014 (2018) for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) on July 27, 2018. Designed to address pollution from stormwater runoff, the re-issued MS4 permit applies to thirteen municipalities and three institutional entities in the Lake Champlain watershed. Communities already subject to the 2003 MS4 General Permit include Burlington, Colchester, Essex, Essex Junction, Milton, Shelburne, South Burlington, Williston and Winooski, as well as the non-municipal or non-traditional entities including the Burlington International Airport, the University of Vermont, and the Vermont Agency of Transportation (VTrans) within the geographical boundaries of these municipalities. VT DEC has since authorized the TS4 Permit to address VTrans' responsibilities.

The primary additional condition of General Permit 3-9014 (2018) is the requirement to develop and submit a Phosphorus Control Plan (PCP) for developed lands in the associated Total Maximum Daily Loads (TMDL) lake segments as applied to municipally owned developed lands.

To satisfy the requirements of the MS4 permit, BTV has developed and annually updated a Stormwater Management Program (SWMP) designed to reduce the discharge of pollutants from the airport, to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act.

The SWMP contains information on how BTV has implemented six minimum stormwater runoff control measures and BTV's compliance with the re-authorized MS4 permit Section 8.0 (TMDL Implementation) for the development and implementation of a Stormwater Flow Restoration Plan, Lake Champlain Phosphorus Control Plan (PCP) and Municipal Road Requirements.

The SWMP also contains the Stormwater Pollution Prevention Plan which describes the BTV facility and its operations, develops an inventory of potential pollutant sources, identifies controls and best management practices (BMPs) for reducing the discharge of pollutants in stormwater runoff, and outlines measures for implementation and review of this plan. The Stormwater Pollution Prevention Plan was developed as a requirement of the Multi-Sector General Permit 3-9003 (MSGP).

As noted above, BTV submitted a Notice of Intent (NOI) for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) including updated SWMP for VT DEC review and approval on January 23, 2019. Review and approval of Permit No. 7021-9014.A2 are currently pending.

1.2 VERMONT DEC MS4 2018 ANNUAL REPORT FORM

BTV is required to submit an annual report overviewing the status of compliance with permit conditions by April 1 of each year of the permit term. A completed Municipal Separate Storm Sewer System (MS4) 2018 Annual Report form as provided by VT DEC is presented on the following pages of this report.

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
STORMWATER PROGRAM

Municipal Separate Storm Sewer System (MS4)
2018 Annual Report

A. Permittee Information	
1. Name of MS4: Burlington International Airport	
2. Permit Number: 7021 - 9014 .A2	
B. Minimum Control Measures	
1. Public Education and Outreach	
1.1 Website address: http://www.btv.aero/index.php/airport-guide/community-connection	
1.2 Participation in Regional Outreach Strategy ☐ No ■ Yes, summary of activities attached	See Appendix A.
2. Public Involvement and Participation	
2.1 Participation in Regional Involvement Strategy ☐ No ■ Yes, summary of activities attached	See Appendix B.
3. Illicit Discharge Detection and Elimination	
3.1 Stormwater infrastructure mapping complete or continuing: ☐ No ■ Yes	
3.1 Number of stormwater outfalls inspected: 15	Reference 2018 MSGP Annual Report for Details dated April 1, 2019
3.2 Number of stormwater outfalls tested: 15	Reference 2018 MSGP Annual Report for Details dated April 1, 2019
3.3 Number of illicit discharges detected and eliminated: 0	
3.4 Additional information attached ☐ No ■ Yes	See Appendix C for MCM #3 Update and Site Drainage Map.
4. Construction Site Runoff Control	
4.1 Continued implementation of an Erosion Control Ordinance ☐ No ■ Yes	
4.2 Additional information attached ☐ No ■ Yes	See Appendix D for a listing of BTV's INDC Permit authorizations.
5. Post Construction Management for New Development and Redevelopment	
5.1 Continued implementation of an ordinance for disturbances of greater than one acre that are not subject to the Agency's post-construction permit program ☐ No ■ Yes	
5.2 Additional information attached ☐ No ■ Yes	See Appendix E for BTV's Operational Permit authorizations.
6. Pollution Prevention and Good Housekeeping	
6.1 Participation in the Municipal Compliance Assistance Program ☐ No ■ Yes; Participation year: 2016	
6.2 Number of catch basins inspected: 310 catch basins plus 125 drainage manholes	
6.3 Number of catch basins cleaned: 9 catch basins	
6.4 Lane miles swept: 45 miles	6.5 Cubic yards of material collected by street sweeping: 10 cubic yards
6.6 Number of staff who attended training: Zero. No BTV staff attended during this reporting period.	
6.7 Additional information attached ☐ No ■ Yes	See Appendix F for Field Inspection Maintenance Recommendations.
C. Flow Restoration Plan Implementation	See Appendix G for BTV's Annual FRP Report dated April 1, 2019.
1. Summary of FRP implementation in stormwater impaired waters is attached: ☐ NA ■ Yes	
D. Phosphorus Control Plan Implementation	See Appendix H for VT DEC direction for Annual PCP Report submission.
1. Has a Road Erosion Inventory (REI) been completed for your municipality? ■ NA ☐ No ☐ Yes	

E. Incorporated Previously Permitted Stormwater Systems

1. Has the municipality incorporated permitted stormwater systems into its MS4 authorization? ☐ No ■ Yes

2. If yes, complete the following table or include this information as an attachment

Stormwater Treatment Practice Name	State Stormwater Permit No.	Date of Last Inspection	Maintenance Completed
BTV's Master Permit	3028-9010.A	05/30/2018	☐ NA ■ Yes
South Apron Expansion	1-1391	05/09/2018	☐ NA ■ Yes
Redirect Airfield Drainage to North Outfall	1-0839	05/15/2018	☐ NA ■ Yes
Reconstruct TW B & C ... Muddy Brook	3028-9010.2	05/30/2018	☐ NA ■ Yes
Reconstruct TW B & C ... Potash Brook	3028-INDS.AR	05/16/2018	☐ NA ■ Yes
Heritage Flight Aviation Campus Expansion	3845-9010	05/30/2018	☐ NA ■ Yes
Quarry Area Access Road	3028-9015.1	05/10/2018	☐ NA ■ Yes
Aircraft Sewage Receiving Station	3028-INDS.3	05/03/2018	☐ NA ■ Yes
Heritage Aviation Parking Lot	3845-9015.1	05/07/2018	☐ NA ■ Yes
Construct, Mark and Light Taxiway "G"/"K"	3028-9015.2	05/16/2018	☐ NA ■ Yes
BTV Consolidated Car Rental Facility	3028-INDS.4	Not Constructed to Date	■ NA ☐ Yes
Note: Permit Nos. 3028.9015.3, ~~3028-INDS.6~~ 3028-INDS.6A, and 3028-INDS.7 are under review and pending incorporation.			■ NA ☐ Yes

F. Other Reporting Requirements

1. Summary of stormwater activities planned for next reporting cycle:
   See Appendix I for a summary of the stormwater activities BTV plans to undertake during the next reporting cycle.

2. Proposed changes to the SWMP:
   See Appendix J for a summary of proposed changes to BTV's SWMP.

3. Reliance on other entities to meet permit obligations: BTV relies on the CCRPC for meeting MCM #1 and MCM #2.
   See Appendix K for notice that BTV is also relying on another entity to satisfy the FRP, Flow and Precipitation Monitoring Program.

G. 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.

Gene Richards, III — Print Name

Director of Aviation — Title

Signature

3-28-19 — Date

2.0 ANNUAL REPORTING SUMMARY FOR INCORPORATED OPERATIONAL STORMWATER DISCHARGE PERMITS

2.1 INTRODUCTION

During the 2018 reporting year, BTV was subject to fourteen operational Stormwater Discharge Permits. On December 22, 2017, eleven of the fourteen operational Stormwater Discharge Permits, both active and expired, were incorporated into BTV's MS4 General Permit authorization.

As part of the NOI for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) as submitted on January 23, 2019, BTV requested incorporation of the three remaining operational Stormwater Discharge Permits.

2.1.1 Current Status of Operational Stormwater Discharge Permits

BTV operational Stormwater Discharge Permits and their current status are listed as follows:

- Permit No. 3028-9010.A (BTV's Master Permit) – **Incorporated into MS4**
- Permit No. 1-1391 (South Apron Expansion) – **Incorporated into MS4**
- Permit No. 1-0839 (Redirect Airfield Drainage to North Outfall) – **Incorporated into MS4**
- Permit Nos. 3028-9010.2 (Taxiways 'B', 'C', 'J', and 'G'); Muddy Brook watershed -- **Incorporated into MS4**
- Permit No. 3028-INDS.AR (Taxiways 'B', 'C', 'J', and 'G'); Potash Brook watershed -- **Incorporated into MS4**
- Permit No. 3028-9010.1 (Reconstruct, Mark, and Groove Runway 15-33) -- **Terminated**
- Permit No. 3845-9010 (Heritage Flight Aviation Campus Expansion) – **Incorporated into MS4**
- Permit No. 3028-9015.1 (Quarry Area Access Road) -- **Incorporated into MS4**
- Permit No. 3028-INDS.3 (Aircraft Sewage Receiving Station) -- **Incorporated into MS4**
- Permit No. 3845-9015.1 (Heritage Aviation Parking Lot) -- **Incorporated into MS4**
- Permit No. 3028-9015.2 (Construct, Mark, and Light Taxiway 'G'/'K') – **Incorporated into MS4**
- Permit No. 3028-INDS.4 (BTV Consolidated Car Rental Facility) **- Incorporated into MS4; Construction has not yet commenced. Anticipated during Year 2019.**
- Permit No. 3028-INDS.3 (Taxiway B Extension) – **Active; Construction has not yet commenced. Anticipated during Year 2021.**

- 3028-INDS.6 (Parallel Taxiway 'G', Phase 2) – **Active; Construction has not yet been completed. Overall project construction began in September of 2017 with anticipated completion in 2020. S/N 001 completion anticipated in the Spring of 2019 with S/N 002 anticipated completion in 2020.**
- 3028-INDS.7 (VT ANG Taxiway 'F' Widening and a portion of Reconstruct, Mark, and Groove Runway 15-33) – **Active; Overall project construction began in the Fall of 2016 with anticipated completion in 2019. S/N 002 completion anticipated in the Spring 2019.**

No new Operational Stormwater Discharge Permits were issued during the 2018 reporting period.

2.1.2 Inspection Summary

MS4 Permit Nos. 3028-9010.A, 3028-9010.2, 3028-INDS.AR, 3845-9010, 3028-INDS.3, 3845-9015.1, 3028-9015.2, 3028-INDS.3, and 3028-9010.1 (now terminated) each require an annual inspection to evaluate and document the operation, maintenance, and condition of the stormwater collection, treatment, and control systems. Stantec personnel performed these annual on-site inspections between April 18 and May 31, 2018. See **Appendix F** for a listing of Field Inspection Maintenance Recommendations.

MS4 Permit Nos. 1-1391 and 1-0839 require quarterly inspections to be performed. Stantec personnel performed these quarterly on-site inspections on May 3, September 27, and December 21, 2018; as well as March 20, 2019.

MS4 Permit No. 3028-9015.1 requires semi-annual inspections to be performed. Stantec personnel performed these semi-annual on-site inspections on May 10 and November 8, 2018.

MS4 Permit No. 3028-INDS.4 (BTV Consolidated Car Rental Facility) has not been constructed to date and was not inspected during the 2018 reporting period.

2.1.3 ANR Online Annual Reporting Forms

ANR Online Annual Reporting Forms were completed and submitted to VT DEC for the three remaining active Operational Stormwater Discharge Permits noted below.

Permit No. 3028-INDS.3 (Taxiway B Extension) has not been constructed to date and was not inspected during the 2018 reporting period.

Permit No. 3028-INDS.6 (Parallel Taxiway G Phase 2) was under construction for the 2018 reporting period and was not inspected.

Permit No. 3028-INDS.7 was under construction and the responsibility of VTANG for the 2018 reporting year. This was also not inspected.

BURLINGTON INTERNATIONAL AIRPORT

Annual Report for General Permit 3-9014 (MS4) including Annual Reporting Summary for MS4-Incorporated Operational Stormwater Discharge Permits

April 1, 2019

Appendix A

Public Education and Outreach (MCM#1) Including RSEP 2018 Summary of Activities

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Appendix A

Minimum Control Measure #1 - Public Education and Outreach

1) BMP # 1: Effective with meetings commencing in November 2015, the Regional Stormwater Education Program (RSEP) and the Chittenden County Stream Team (CCST) efforts were overseen by a separate *MS-4 Subcommittee* of the Chittenden County Clean Water Advisory Committee (CWAC). In April 2017, the twelve MS4 permittees in Chittenden County formally adopted an agreement that merged the RSEP and CCST – two regional efforts for which CCRPC has acted as the lead agency. The agreement became effective July 1, 2017, and Rethink Runoff was formed as an ongoing campaign managed by the Chittenden County Regional Planning Commission to help the MS4 permittees to meet the requirements of federal Environmental Protection Agency (EPA) permits regarding stormwater systems. The effort represents the unification of two previously separate permit-driven efforts: the RSEP and the CCST. The RSEP had been formed to meet the Public Education and Outreach requirement of the MS4 permit, while the CCST had been formed to meet the Public Involvement and Participation requirement. BTV will continue to work with the CWAC MS-4 Subcommittee and Rethink Runoff in the ongoing pursuit to educate the public as it relates to water quality issues.

Status: **Implemented. The RSEP Summary of Activities for the 2018 calendar year is presented at the end of this Appendix.**

BTV has also provided an environmental page on the airport website. Links to the MS4 annual reports, the Smart Waterways website and the City of Burlington stormwater management websites are included on the environmental page of the website. The environmental page address is http://www.btv.aero/index.php/airport-guide/community-connection

Timeframe: Not applicable.

Measurable Goals: Stormwater education influences public behavior. This change will be assessed through a behavior survey contracted by the MS4 Subcommittee approximately every 5 years. The contractor responsible for conducting the survey will report findings to the MS4 Subcommittee. There is a current outreach campaign in progress.

Person(s) Responsible for BMP: **The CWAC and RSEP/Rethink Runoff**

Rationale for Selection: With an ever-increasing number of people utilizing the internet daily, a website is a cost-effective way to reach the public and educate them about water quality related issues.

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MCM #1
REGIONAL STORMWATER EDUCATION PROGRAM
RETHINK RUNOFF

JANUARY–DECEMBER 2018
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 their 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 2018 Calendar Year report recaps the work done primarily related to Minimum Control Measure #1.

2018 Initiatives

Having completed the initial rebranding to Rethink Runoff and the website redesign in 2017, we focused on updating the advertising in 2018.

We revised initial digital display advertising and introduced three :30 second animations. Each animation targeted a specific action that could help reduce either stormwater runoff, or the chemicals introduced into stormwater drainage. We placed an emphasis on Lake Champlain, creating a link between the small streams throughout the Lake Champlain Basin and their larger impact on the health of the lake. The audio of the :30 second animations was also repurposed as a radio spot.

Display advertising was rolled out seasonally, with new ads appearing throughout the calender year, according to seasonal activities, such as a swimming or fishing. In addition, we included a series of ads identifying pet waste as a contributor to pollution in Lake Champlain via stormwater discharge. Videos were uploaded to Youtube. Video advertising was targeting by subject matter, age, geographic location and other demographics. Videos were also shown on WCAX in limited quantity as well as on Comcast/Infinity cable stations. The radio spot was broadcast locally, in addition to VPR underwriting.

Print advertising in *Seven Days VT* also reflected this seasonal approach, increasing visibility for specific activities at specific times, including a smaller campaign during Clean Water Week.

In addition to advertising, we continued to work on the website. We updated content site-wide. We redesigned the stream monitoring pages, including HTML5 graphs highlighting NaCL, Phosphorus and Turbidity measurements, providing a stronger visual display of information.

We also introduced an Events portal, allowing the Stream Team representative to post events relating to outreach efforts. We also included regional events during Clean Water Week.

For Stream Team outreach, we programmed a new HTML email template for use in MailChimp, that allows monthly e-newsletters sent to our contact list.

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Media Buy Breakdown

Below is a cost breakdown of media buys, compared with spring and fall 2016. Overall, we reduced our television spend and increased our online digital ad spend. Over the past two years, we've also shifted some of our advertising spending to the mid-summer. This helps to provide a longer timeframe for advertising outreach from spring into fall, when many people are focused on the rivers, lakes and streams in the area.

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	$3,393.96	$7,533.96	2986.82
TV	$3,710	-	$2,472
PRINT	$1,755	-	$1,006
TOTAL	$8,140.96	$7,533.96	$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 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. Video and radio creative was modified to include a new URL, but otherwise remained the same.

Advertising for 2018 included 2017 creative as well as updated ads released from April–July, tied to spring/summer activities. In addition, we included a mini-campaign promoting Clean Water Week. All ads were rolled out in 8–10 different sizes.

Three :30 second videos were launched in April, May and June. A :30 second radio spot that ran in spring and fall used the voice over of the Fertilizer video spot.

2017 Creative

WATER RECREATION

STREAM TEAM

FERTILIZER

GENERAL CHAMP

SLOW THE FLOW

2018 Creative: Spring Rollout

FERTILIZER

RAIN GARDEN

PET WASTE

FISHING

Summer Rollout

WATER RECREATION

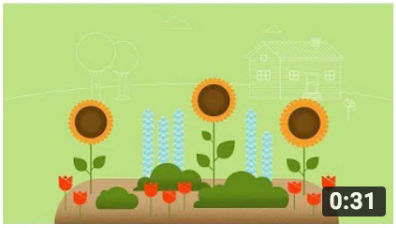
GENERAL CHAMP

Clean Water Week

CLEAN WATER WEEK

Videos

April - Fertilizer
https://www.youtube.com/watch?v=7gTbzJN-oeE



May - Rain Garden
https://www.youtube.com/watch?v=imZKTaOtD04

June - Rain Barrel
https://www.youtube.com/watch?v=r4-NEvelP40

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Advertising Click-through Rates

SOURCE	IMPRESSIONS	INTERACTIONS/ VIEWS	COST	COST PER CLICK
DISPLAY ADS	4,091,143	3,988	$6,238.46	$1.56
VIDEO (YOUTUBE)	417,346	210,979	$3,942.31	$0.02
WCAX DIGITAL	84,467	35	$750	$21.42

Google Display Ads Overview

Most Popular by Impressions

CALENDER YEAR 2018 NAME
GENERAL CHAMP
PET WASTE
WATER RECREATION

SPRING: 4/15-MEMORIAL DAY NAME
RAIN GARDEN
GENERAL CHAMP
PET WASTE

SUMMER: MEMORIAL-LABOR DAY NAME
WATER RECREATION
PET WASTE
GENERAL CHAMP

FALL: LABOR DAY-10/31 NAME
GENERAL CHAMP
PET WASTE
FERTILIZER

Most Popular by Interaction

CALENDER YEAR 2018 NAME
GENERAL CHAMP
PET WASTE
WATER RECREATION

SPRING: 4/15-MEMORIAL DAY NAME
PET WASTE
RAIN GARDEN
GENERAL CHAMP

SUMMER: MEMORIAL-LABOR DAY NAME
WATER RECREATION
PET WASTE
GENERAL CHAMP

FALL: LABOR DAY-10/31 NAME
GENERAL CHAMP
PET WASTE
FERTILIZER

Most Effective by Cost-per-click

CALENDER YEAR 2018	
TOTAL	TIME PERIOD
WATER REC.	$0.45/CLICK
RAIN GARDEN	$0.46/CLICK
SLOW THE FLOW	$0.63/CLICK

SPRING: 4/15-MEMORIAL DAY	
TOTAL	TIME PERIOD
RAIN GARDEN	$0.39/CLICK
SLOW THE FLOW	$0.39/CLICK
GENERAL CHAMP	$0.39/CLICK

SUMMER: MEMORIAL-LABOR DAY	
TOTAL	TIME PERIOD
WATER REC.	$0.45/CLICK
RAIN GARDEN	$0.54/CLICK
SLOW THE FLOW	$0.64/CLICK

FALL: LABOR DAY-10/31	
TOTAL	TIME PERIOD
WATER REC.	$0.46/CLICK
FERTILIZER	$0.54/CLICK
GENERAL CHAMP	$0.65/CLICK

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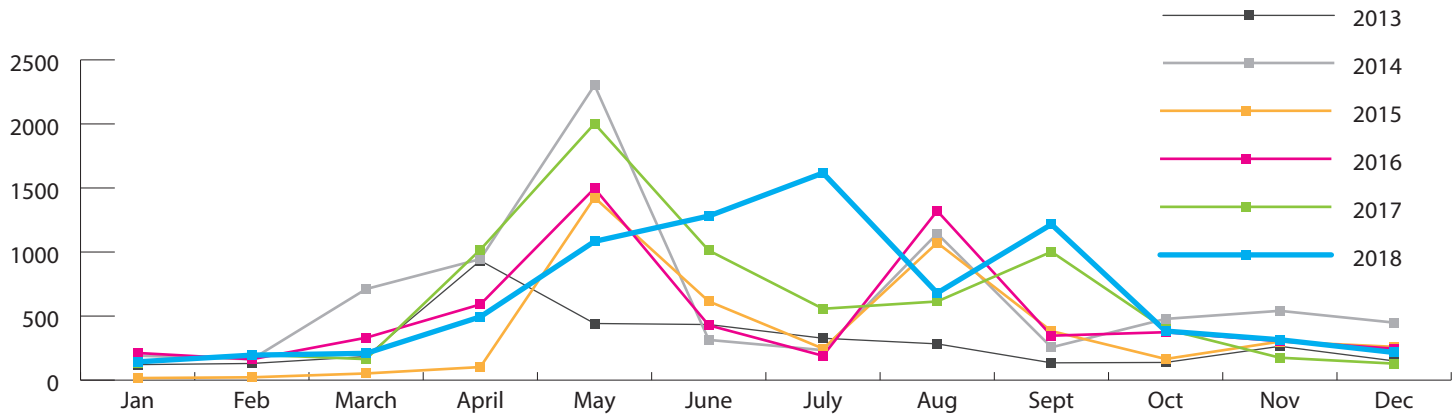
Website Metrics for 2013–2018



Total Sessions/Visits (1/1–12/31)

TOTAL	TIME PERIOD
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	2018	2017	2016
DESKTOP	50.1%	52.8%	65.7%
TABLET	40.6%	36.4%	24.5%
MOBILE	9.3%	10.8%	9.8%

Top Vermont Cities and Towns, 2018

TOTAL	USERS	
BURLINGTON	1318	19.25%
SOUTH BURLINGTON	767	11.34%
COLCHESTER	519	7.58%
ESSEX/ESSEX JCT.	456	6.66%
SHELBURNE	171	2.5%
WILLISTON	93	1.36%
MONTPELIER	76	1.11%
SAINT ALBANS CITY	71	1.04%
STOWE	66	.96%

New York, 149 Users
Boston, 67 Users

Most visited pages, 2018

TOTAL
HOMEPAGE
GET EDUCATED PROBLEMS & SOLUTIONS/PET WASTE
GET EDUCATED /PROBLEMS & SOLUTIONS/RAIN GARDEN
GET INVOLVED/STREAM TEAM
GET EDUCATED/FOR KIDS
GET EDUCATED/PROBLEMS & SOLUTIONS/FERTILIZER & LAWN CARE
GET EDUCATED/PROBLEMS & SOLUTIONS
ABOUT RETHINK RUNOFF
GET EDUCATED
GET EDUCATED/PROBLEMS & SOLUTIONS/REDIRECT YOUR DOWNSPOUTS

BURLINGTON INTERNATIONAL AIRPORT

Annual Report for General Permit
3-9014 (MS4)
including
Annual Reporting Summary for
MS4-Incorporated Operational
Stormwater Discharge Permits

April 1, 2019

Appendix B

Public Involvement / Participation (MCM #2)
Including Rethink Runoff Stream Team
2018 Summary of Activities

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Appendix B

Minimum Control Measure #2 - Public Participation/Involvement

1) **BMP # 1:** The Chittenden County Regional Planning Commission (CCRPC) contracted with the Winooski Natural Resources Conservation District (WNRCD) to create a Chittenden County Stream Team (CCST). This Team oversees community outreach related to stormwater issues. In April 2017, Rethink Runoff campaign was launched as a merging of two previously separate permit-driven efforts: RSEP and the Chittenden County Stream Team (CCST), with the outreach arm now known as the Rethink Runoff Stream Team (RRST). The Chittenden County Regional Planning Commission manages this campaign to assist MS4 entities to meet the requirements of federal EPA permits regarding stormwater systems.

   As noted above, the Rethink Runoff efforts are overseen by a separate *MS-4 Subcommittee* of the CWAC. BTV will continue to work with the CWAC MS-4 Subcommittee and Rethink Runoff in the ongoing pursuit to promote public participation and involvement as it relates to water quality issues.

Status: In the fall of 2009, the MS4 communities began to explore a collaborative approach to fulfilling their Minimum Control Measure #2 (MCM2) permit requirement. At the request of these MS4s, the CCRPC received two grants to assist the MS4s in developing a regional pilot project called the CCST. In its pilot year, CCST created a logo, launched a website and Facebook page, surveyed local residents, hosted a number of workshops, and completed a variety of local projects. The success of the pilot project led to the formal adoption of the CCST program in 2011 by eleven of the MS4 communities including Burlington, South Burlington, Williston, Winooski, Shelburne, Milton, Essex, Essex Junction, the University of Vermont, VTrans, and BTV. The program was put out to bid and awarded to the WNRCD, a regional entity focused on natural resource protection and management. Since that time, under the guidance of the participating MS4s, the WNRCD has continued this role in fulfilling MCM2 requirement. This continues as part of the RRST.

The 2018 Summary of Activities completed by the RRST and the 2018 Water Quality Monitoring Report are presented at the end of this Appendix. This includes a description of activities including social media summaries, organizational partnerships, media appearances, varied outreach activities, event driven tasks, storm drain mural campaign, water quality monitoring program, and the *Adopt a Rain Garden* program.

Timeframe: Contingent on the goals and timeframes of those goals by the organization.

Measurable Goals: The program will engage citizens across the MS4 entities in implementing programs to reduce non-point source pollution and stormwater volume at the local level to enable compliance by these MS4 permittees with MCM2. The program will utilize social networking tools to form a cadre of concerned citizens and professionals interested in hands-on activities to reduce the harmful effects of stormwater. The program will then organize a series of events and workshops to engage the Stream Team members and citizens at large in discussion

and use of key Best Management Practices designed to address the negative effects of stormwater. The scope of services for the Rethink Runoff Stream Team is as follows:

1. Regular Tasks:
    - Maintain Facebook page with regular postings;
    - Maintain website with up to date information on stormwater related workshops and projects sponsored by Rethink Runoff as well as other partners;
    - Recruit and maintain volunteers from member communities, recruit neighborhood leaders to help spread the word and build esprit de corps by articulating the mission and vision of Rethink Runoff, staying in touch with volunteers and keeping it fun!
    - Organize quarterly Steering Committee meetings and communicate with members between meetings.
    - Build relationships with and leverage expertise from other organizations working on water quality issues (i.e. Friends of the Winooski, Winooski Natural Resources Conservation District, Lake Champlain Committee, Green Up Day, Lake Champlain Basin Program) including potential joint sponsorship of workshops and projects.

2. Event-driven tasks
    - Host a Spring kickoff event to get neighborhood leaders in touch with one another and excited about the upcoming field season;
    - Hold outreach events at spring farmers' markets or other spring/early summer events in three municipalities per year to continue to reach new volunteers;
    - Complete three workshops or projects in each year with at least one event in each of the areas of the full members over the five-year permit period;
    - Provide guidance to volunteers on techniques and materials they can use to host their own projects or workshops.

3. Annual Tasks
    - Prepare an annual summary including the number of events, number of participants and other measurable quantities showing how Rethink Runoff met the MCM2 requirements that members can use in their annual reports to Vermont ANR.

Person(s) Responsible for BMP: **The CWAC and Rethink Runoff Stream Team.**

Rationale for Selection: The CCRPC created a program to support and extend the stormwater mitigation efforts in the County's impaired waters. The CCRPC determined that their pilot project implemented from Spring 2010 through Spring 2011 was a success, and that momentum has carried forward with the RRST stormwater program.

Following up on discussions regarding a merger between the RSEP and the CCST to reduce administrative duplication, an agreement was executed by all participating MS4 communities. A signed copy of the *Chittenden County MS4 Stormwater Program Agreement, Effective July 1, 2017,* was previously presented in Appendix E of the MS4 Annual Report dated April 1, 2018.

MCM #2
Rethink Runoff Stream Team
2018 Summary of Activities

Social Media

Facebook

- 219 total "likes"- a 23% increase from 2017 (177 in at end of 2017)
- 222 total "follows" (29 posts this year)

Instagram

- 120 total "follows" (13 posts this year)

RRST Website

- See final report from Dave Barron (Pluck Design)

Newsletter and e-correspondence

- As of 11/28/18, there were **508** subscribers to the RRST newsletter which is an 8% increase in 2018 (from 467 in 2017) It is the highest subscription to date. The average open rate for emails was 24%
- Arbor Day Volunteer Solicitation Email Published on 4/4/18 Opens: 99 Clicks: 7
- Summer Newsletter Published 9/13/18 Opens: 97 Clicks: 6
- Fall Newsletter Published on 11/18/18 Opens: 125 Clicks: 17

Organizational Partnerships

The Rethink Runoff Stream Team partnered with 18 different organizations in 2018 (15 non-municipal partners, 3 municipal partners)

- Vermont Community Garden Network (Organized state-wide Day in the Dirt event which resulted in 10 volunteers signing up to help with Rain Garden Cleanup at the Coast Guard station)
- VHB (Rain Garden Cleanup)
- Winooski Valley Parks District (Provided land for S. Burlington Arbor Day tree planting, also hosted the Conservation Field Day)
- US Fish and Wildlife (Cost share on trees for Arbor Day)
- Williston Central School (students volunteered for Arbor Day tree planting)
- Lake Champlain Basin Program (Provided funding for much of Arbor Day tree planting event)
- Intervale Conservation Nursery (Supplied trees and staff for Arbor Day tree planting)
- South Burlington NR Committee (Helped with the Trees For Stream planting on Muddy Brook)
- Community Sailing Center (Invited RRST to participate in an on-board education program during the Maritime Festival)
- Chamberlin School - S. Burlington - (A stormwater lesson was taught to Chris Provost's 4th grade class at the as part of a field trip at the Community Sailing Center in Burlington)

- Milton Youth Coalition (Provided tabling opportunity for RRST at Milton Activities Fair)
- Shelburne Farms (Provided tabling opportunity for RRST at Shelburne Harvest Festival)
- VT DEC (La Rosa Program funded WQ sampling lab analysis)
- ECHO (Provided tabling opportunity for RRST in the museum during Clean Water Week)
- Colchester High School (students volunteered to stencil storm drains in Colchester as part of an AP Environmental Science project)
- Burlington Parks and Rec (Provided tabling opportunity for RRST at Kid's Day)
- Winooski Department of Recreation and Parks (Provided tabling opportunity for RRST at Winooski Wednesdays event)
- Winooski DPW (Assisted in selection of storm drain mural locations, cleaned catch basins and provided day-of support to artists)

Media

The Rethink Runoff Stream Team had **six** media appearances in 2018, exceeding the work plan goal of five articles:

- Article: Call for Tree Planting Volunteers: Williston Observer & The Other Paper (April)
  http://www.willistonobserver.com/streambank-tree-planters-needed/
  http://otherpapersbvt.com/community-tree-planting-event-celebrate-arbor-day-with-your-friends-and-neighbors.html
- Article: The Citizen - Survey Results (May)
  http://www.thecitizenvt.com/2018/05/03/survey-shows-increased-awareness-stormwater-runoff-problem-solutions/
- Article: Call for Stream Team Volunteers, Williston Observer (June)
  http://www.willistonobserver.com/chittenden-county-water-quality-volunteers-needed/
- TV Coverage: Clean Water Week (August)
  http://www.wcax.com/content/news/Lend-a-hand-with-nonpoint-water-pollution-489666141.html
- TV Coverage: Winooski Storm Drain Mural Project (October)
  https://www.wcax.com/content/news/Winooski-mural-aims-to-educate-on-stormwater-pollution-496723301.html
- TV Coverage: Burlington Storm Drain Stenciling (October)
  https://www.mychamplainvalley.com/news/protecting-vermont-s-water-by-rethinking-runoff/1510638055

Outreach

Outreach includes any educational opportunities or tabling events where resources or information are provided to the community about the RRST program. There were **seven** outreach events in 2018, with an estimated total outreach to **470** people.

Outreach events in 2018 targeted the municipalities of **Milton, Shelburne and Burlington. Winooski** carried over from last year due to a venue cancellation experienced in 2017.

- **Burlington** Kid's Day (5/5/18) 150 people reached
- **Burlington** Clean Water Week Tabling at ECHO (8/1/18 & 8/2/18) Reached 117 people total (35 from our 9-municipality area)
- **Burlington** Lake Champlain Maritime Festival. In partnership with the Community Sailing Center, Rethink Runoff took our education ON the lake. The Rethink Runoff coordinator sailed aboard a small sailboat with 4 community members and shared information about the watershed and how to get involved with Stream Team. 3 adults, 1 kid reached
- **Shelburne** Harvest Festival (9/15/17) 61 adults, 77 kids reached
- **Winooski** Wednesdays (9/5/18) Reached 12 adult Winooski residents and 8 kids
- **Milton** Activities Fair (9/27/18) Reached 40 adults and 60 kids from Milton Brought 'Build a Rain Garden" activity and information about green lawn care
- **Burlington** and **Colchester:** Storm Drain Stencils were loaned to Jenna Olson and Karen Adams for independent projects. 39 drains marked. 20 students reached

The 2018 work plan goal for outreach participation was 400 people, which was surpassed. A total of **470** people that were engaged in outreach and educational opportunities in 2018. Chosen outreach towns for 2019 are Essex, Essex Junction, and Colchester.

New Outreach Activity Created: Stream team coordinator, Kristen, created a new activity to bring to tabling events to engage kids and families. The activity is called "Design Your Own Rain Garden." Using a tray of dirt and laminated pictures of plants that thrive in VT rain gardens (taped on toothpicks), participants can imagine in 3-D space what a rain garden might look like in their own backaryd or school. The activity has been a hit so far. To engage adults, the coordinator brought pamphlets about green lawn care and a booklet about how to build a rain garden.

Figure 1: Build-a-Rain Garden Activity at a tabling event at ECHO

Event-Driven Tasks

There were **seven** hands-on events held in 2018. Event-Driven Tasks involve community members in some form of hands-on engagement. This most often means volunteering, but can also include hands-on education activities with school groups.

- Rain Garden Clean Up at Burlington Coast Guard Station (4/28/18)
    - Partnered with VT Community Garden Network to carry out this event
    - 10 volunteers
- Trees for Streams Arbor Day Planting: Williston (5/4/18)
    - Partnered with Winooski Valley Parks District, The Intervale Conservation Nursery, US Fish and Wildlife, The Lake Champlain Basin Program and Williston Central School to carry out this event
    - 50 volunteers (36 students, 14 adults)
    - 560 trees planted along Allen Brook
- Trees for Streams Arbor Day Planting: South Burlington (5/4/18)
    - Partnered with Winooski Valley Parks District, The Intervale Conservation Nursery, US Fish and Wildlife and The Lake Champlain Basin Program and to carry out this event
    - 22 volunteers
    - 840 trees planted along Muddy Brook
- Conservation Field Day at Ethan Allen Homestead (5/16/18)
    - Reached 71 students from S. Burlington, Colchester and Essex
    - This environmental education event was hosted by WVPD at Ethan Allen Homestead in Burlington. 5th grade students from regional schools spent the day rotating through a series of workshops focused on conservation stewardship. RRST coordinator taught a workshop about stormwater
- Stream Team Water Quality Volunteer Training Day at WNRCD office (7/9/18)
    - 14 people trained, materials distributed for stream sampling
- Stormwater Lesson with Chamberlin School at the Community Sailing Center (CSC)
    - 26 students (4th graders from S. Burlington) participated in a field trip at the CSC. Kristen provided 1.5 hours of watershed education at the end of the sailing segment. Students used markers and paper to trace the watershed around their school, sung a song about watersheds and interacted in small groups with hands-on watershed models. They experimented with what happened when "rain" from a spray bottle hit different surfaces and then distributed "pollution" (sprinkles, confetti, etc.) on the landscape to see where it would flow.
- Winooski Storm Drain Mural Project - Winooski (10/10/18)
    - Partnered with the Winooski DPW and local artists to carry out this event
    - 3 artists painted a total of 2 murals. Artists reported speaking to about 75 people about the project while they were out painting.

Hands-on participation events in 2018 targeted the towns of Winooski, South Burlington, and Williston. Details about engagement in those communities can be seen above.

A total of 74 people participated in hands-on RRST events in 2018. A total of 94 people volunteered their time in a RRST activity in 2018; just falling short of the 100 volunteer goal. Chosen project towns for 2019 are Burlington, Milton, and Shelburne

RRST Outreach Demographic Impacts

The table on this next page displays the interaction from each of the nine MS4 communities at tabling events and 2018 project events and workshops. Please note: this is not a comprehensive list of all 703 people reached, as town residence was only acquired when offered.

Town	# of participants
Burlington	255
Colchester	25
Essex Town	20
Village of Essex Junction	10
Milton (O)	100
Shelburne (O)	58
Williston*	59
South Burlington*	81
Winooski* (O)	95
TOTAL	703

Table 1: Interaction with RRST by member town (* = 2018 project towns (O) = outreach town)

City of Winooski Project: Storm Drain Murals

RRST coordinated a storm drain mural event for the City of Winooski in 2018. A "call for artists" was published by the Essex Reporter on May 31, 2017 and the opportunity was shared with artists involved in past RRST projects. Four concepts were submitted by two artist teams and two were selected to be painted around catch basins pre-selected with guidance from the City's Public Works Department.

On the morning of October 10, 2018, the three artists, Holly Greenleaf, Rachael Forando, and Stephen Welter were stationed at their assigned catch basins: Holly at the catch basin outside Chick's Market at the corner of River St and Hickock St. and Rachael and Stephen as an artist team on Winooski Falls way by the bus stop. The artists signed contracts stipulating the requirements and procedures they had to adhere to in order to participate in the project. Instead of traffic paint, self-priming porch and floor enamel was used by all artists. Public Works staff assisted with thoroughly cleaning the areas to be painted and ensuring safety of the artists by providing traffic cones and vests. All murals were completed by the end of the day. Throughout the day, the RRST coordinator checked in with the artists. Each artist was given a pack of Rethink Runoff stickers and a mailing list sign up sheet. Artists reported speaking with about 75 passers-by about the project. They gave away about 30 stickers, and 2 people signed up for the mailing list. WCAX covered the story (see link in Media list above) and Facebook likes and shares were higher for this post than any other post in RRST history. About 2,800 people digitally interacted with the post.

The total estimated cost to plan, manage, and implement this project was **$1,411.** The approximate personnel time used to plan and execute the project was 20 hours ($900). The artists were paid a $250 stipend each; a total of $500. The mileage was about $11.

Figure 2: Winooski murals (Chick's Market: artist Holly Greenleaf, left Winooski Falls Way: artists Rachael Forando and Stephen Welter, right)

Town of Williston Project: Arbor Day Community Riparian Buffer Planting

On May 4, 2018, 50 community volunteers (including 36 students from Williston Central School) joined a crew from The Intervale Center at Allen Brook behind the Williston Central School soccer fields in Williston to plant native trees along the bare banks of this stretch of river. Volunteers planted 560 trees, covering 1.4 acres of river with native vegetation.

Prior to the volunteer day, RRST coordinator used funds from the Lake Champlain Basin Program (LCBP) Trees for Streams grant to scope sites and secure landowner agreements for the planting projects. RRST money was used to solicit volunteers and coordinate the volunteer work days on the day of the planting event.

The estimated cost to RRST to plan and carry out the tree planting event was approximately **$1,530**. Supplies, including trees and tree protection, were purchased with funds from the LCBP grant and cost-share from the US Fish and Wildlife Partners. Personnel time used to plan and execute the project was roughly 33 hours or $1,400. Refreshments were approximately $30 and mileage was approximately $15.

Figure 3: Volunteers in Williston plant trees along Allen Brook on Arbor Day, 2018 (5/4/18)

Figure 4: Some major partners for both Arbor Day Riparian Buffer Planting Projects

Town of South Burlington: Arbor Day Community Riparian Buffer Planting

On May 4, 2018, 16 community volunteers joined RRST coordinator and a crew from The Intervale Center at Muddy Brook Wetland Reserve in South Burlington to plant native trees along the bare banks of this stretch of river. Volunteers planted approximately 400 trees, covering one acre of river with native vegetation.

Prior to the volunteer day, RRST coordinator used funds from the Lake Champlain Basin Program (LCBP) Trees for Streams grant to scope sites and secure landowner agreements for the planting projects. RRST money was used to solicit volunteers and coordinate the volunteer work days on the day of the planting event.

The estimated cost to RRST to plan and carry out the tree planting event was approximately **$1,530**. Supplies, including trees and tree protection, were purchased with funds from the LCBP grant and cost-share from the US Fish and Wildlife Partners. Personnel time used to plan and execute the project was roughly 33 hours or $1,400. Refreshments were approximately $30 and mileage was approximately $15.

Figure 5: Volunteers in S. Burlington plant trees along Muddy Brook on Arbor Day, 2018 (5/4/18)

Water Quality Monitoring Program Summary

RRST has maintained an ongoing water quality monitoring program since 2012. These urban or suburban streams are impacted by sedimentation, excessive nutrient loading, high temperatures, bacteria, and other pollution. With another year of support from VT DEC's LaRosa program, RRST collected biweekly water quality samples at twenty three sites on twelve streams in 2018 (an increase by five sites and three streams from 2017). Thirteen volunteers and one intern helped collect grab samples on five, biweekly Tuesdays from 7/10 - 9/4. Grab samples were analyzed for turbidity, total phosphorus, and chloride. These parameters were also sampled at five of the sites during one rain event on 8/18. See the 2018 Water Quality Monitoring

Report in Appendix A for more information.

The training day for citizen science samplers took place on 7/9/18. 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 UVM lab. All volunteers received a hand-written thank-you card at the end of the sampling season. A volunteer appreciation event is planned for spring 2019. Volunteers expressed an interest in having an educational experience, rather than a pizza party, so the plan is to host a tour of the Essex Wastewater Treatment Plant, followed by snacks.

New this year, the RRST coordinator sent bi-weekly emails to WQ volunteers to check in about sampling procedure and share interesting local water tidbits. This frequent communication was well received by the volunteers. The coordinator also solicited feedback on the training materials and field data sheets and made significant edits for 2019 to improve clarity.

WNRCD sponsored an (unpaid) water quality intern for the sampling season. James Mazzola, a recent graduate, helped collect 5-8 samples each sampling day. He also helped the RRST coordinator scope the five new sampling sites for safety and suitability and helped update directions for all sites, adding pictures and more descriptive landmarks.

Stream	*Location*	*Site ID*	*Lat / Long*
Centennial Brook	Grove Street in Burlington (by the parking lot for Schmanska Park)	Centennial 10	44.48453, -73.18423
	Patchen Road in South Burlington (through cemetery)	Centennial 20	44.47402, -73.17334
Indian Brook	Parking lot B of Essex High School	Indian 10	44.49668, -73.11093
	Lang Farm in Essex	Indian 20	44.50442, -73.09190
Malletts Creek	McMullen Road	Milton 10	44.60855, -73.10693
Munroe Brook	Route 7 and Bay Road (by Red Apple Motel)	Munroe 10	44.40532, -73.21735
	Spear & Webster Intersection (just south of Kwiniaska Golf Course)	Munroe 20	44.38984, -73.20103
Morehouse Brook (one old site: 10 one new site: 20)	Landry Park Winooski (Eastern trib)	Morehouse 10	44.50035, -73.19226
	Landry Park Winooski (main branch - west of Morehouse 10)	Morehouse 20	44.50041, -73.19444
Muddy Brook (20- site changed for safety)	River Cove Road in Williston	Muddy 10	44.47293, -73.13505
	S. Brownell Road Williston	Muddy 20	44.44196, -73.13228
	Van Sicklen Road in Williston	Muddy 30	44.42823, -73.14622
Potash Brook (40 - site changed for safety)	Kindness Court in South Burlington near Humane Society	Potash 10	44.44572, -73.21348
	Farrell Street in South Burlington near	Potash 20	44.44660, -73.20415

	Klinger's Bakery		
	Dorset Street in South Burlington	Potash 30	44.45150, -73.17849
	Kimball Ave South Burlington	Potash 40	44.45394, -73.14809
Engelsby Brook	Pine St in Burlington near Champlain Elementary Community Gardens	Engelsby 10	44.45627, -73.21394
	Behind UVM Redstone Campus in Burlington	Engelsby 20	44.46654, -73.19741
Alder Brook (new)	Off Chapin Road in Essex	Alder 10	44.51742, -73.06559
Bartlett Brook (new)	By Shearer Chevrolet in South Burlington	Bartlett 10	44.42596, -73.21345
Sunnyside Brook (new)	Mountain View Drive in Colchester	Sunnyside 10	44.50654, -73.17823
Sunderland Brook (new)	In Pearl Street Park in Essex Junction	Sunderland 10	44.50179, -73.12983
	Off Pine Island Road in Colchester	Sunderland 20	44.51685, -73.20421

Table 2: 2018 Stream Sampling Site Locations

Figure 6: ***Volunteers sampling at Indian 10, Indian 20 and Muddy 30 on 8/7/18***

Town	Number of Stream Team Volunteers
Essex Junction	3
Colchester	2
S. Burlington	2
Burlington	2
Williston	2
Shaftsbury	1
Hinesburg	1

Table 3: Stream Team Water Quality Sampling Volunteers by town

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 eleven public rain gardens managed by RRST. In 2018, there were four official adopters, but about 10 community members volunteered time to clean the Coast Guard Station garden this year as part of the Vermont Community Garden Network's Day in the Dirt event. Efforts will be made in 2010 to find individuals or groups to adopt all gardens.

This summer, the RRST coordinator visited all the gardens to remove out of date signage. The signs will be re-laminated with the current RRST logos and information and will be returned next spring. The re-branding of the signs has been organized by Dave Barron of Pluck Designs.

An assessment of each garden was conducted in summer 2018 and the status of each is provided below.:

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, over-story 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 2019.

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 2018 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. It is in good condition. Efforts will be made to find a volunteer for 2019.

Correctional Facility

Location: 7 Farrell St., South Burlington

This garden is visible from the road and appears to be functioning well. Originally, employees of the prison adopted this garden and would occasionally clean the garden with inmates. There has been a lot of staff turnover in the past few years without a clear adopter. No formal adoption of this garden was made in 2018. MS4 representative, Tom DiPietro, has been in communication with Correctional Facility staff about proper maintenance. He will continue to be the main contact for 2019, with support offered from The Stream Team as needed. There is not a RRST garden sign at this garden, but one will not be installed here as visiting the area is discouraged.

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 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. RRST would like to find another adopter in 2019, primarily to weed the site and to bring any issues to our attention.

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. It would be beneficial to the functionality of the garden to have the sediment vacuumed out and RRST has spoken with the City of Winooski DPW about this maintenance task. It is expected to be completed in spring 2019. In 2016, a group of UVM students in an Ecosystem Design course developed recommendations to repair the garden. There is no current adopter; and RRST coordinator will attempt to find one for the 2019 season.

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, but additional work needs to be done at this site to weed, thin larger shrubs, re-plant in bare spots, and mulch 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. The flowering plants may need to be thinned out in 2019. 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.

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 volunteered to adopt this rain garden as well in 2019.

Rain Garden	Adopter 2018	Previous adopters
Chamberlin School, South Burlington	Chris Provost and students	Chris Provost
Coast Guard Station, Burlington	None	Wily Reading
Landry Park, Winooski	None	None
Williston Annex	Rita Dessau	Rita Dessau
Williston Town Library	Town Library Staff	Andrew Wolf
Callahan Park, Burlington	Brad Ketterling	Brad Ketterling
Farrell Park, South Burlington	None	None
Department of Corrections, South Burlington	None	Dana Scofield and Lori Farley
Brownell Library, Essex Junction	None	None

South Burlington Fire Station	Cub Scouts 678 (Bill Kett)	Cub Scouts 678 (Amy Niggel)
South Burlington Library	Cub Scouts 678 (Bill Kett)	None

Table 4: 2018 Rain Garden Adopters

2018 Staffing Notes

In 2018, WNRCD experienced a full staff turnover. At the end of May 2018, Holly Kreiner left her position with WNRCD and was replaced by Kristen Balschunat. In July 2018, District Manager Corrina Parnapy left her position, and was replaced by Gianna Petito. Kristen has taken primary responsibility for Stream Team activities.

2018 Water Quality Monitoring Report

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 non-point source pollution and stormwater volume at the local level. The participating towns are Burlington, Colchester, Essex, Essex Junction, Milton, Shelburne, South Burlington, Williston, and Winooski. The Water Quality Monitoring program is managed by the Chittenden County Regional Planning Commission Clean Water Advisory Committee MS4 subcommittee, 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 2018 collection season; the seventh, 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 2018: on five, scheduled bi-weekly dates and on one unscheduled "high-flow" date (i.e. during 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 turbidity, total phosphorus, and chloride at all 23 sites.

Biweekly sampling dates occurred on July 10th, July 24th, August 7th, and August 21st and September 4th, and all regular bi-weekly sampling occurred during dry/baseflow conditions. The proposed sampling dates (originally 6/26/18-8/21/18) were pushed two weeks later due to staff turnover within WNRCD to give the new Stream Team coordinator time to prepare for the volunteer training and sampling season. One rainy day sampling event occurred on August 18th at sites on Indian, Muddy, Potash, Centennial and Morehouse brooks. Table 1 indicates total rainfall in inches for the day of sampling and the day immediately preceding sampling. While baseflow sampling days all had less than 0.5 inches of rainfall, freshet sampling on August 18th had 1.65 inches.

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Winooski Natural Resources Conservation District

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

Table 1. Average regional rainfall, in inches, for the preceding day and day of sampling. Rainfall data for each day was gathered from several station sites across the sampling region (Burlington, Colchester, and Essex) and a daily mean was calculated. Daily means were then summed for the preceding and day-of sampling events. Rainfall data was collected from the National Oceanic and Atmospheric Administration through their daily summaries maps: https://gis.ncdc.noaa.gov/maps/ncei/summaries/daily The specific sampling sites and their locations are listed in Table 2. A map of the sites is shown in Figure 1.

Date	Total Rainfall (inches)
07/10/18	0.4
07/24/18	0.3
08/07/18	0.362
08/18/18	1.65 (freshet)
08/21/18	0
09/04/18	0.2

Table 2. Rethink Runoff Stream Team 2018 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.

Stream	*Location*	*Site ID*	*Lat / Long*
Centennial Brook	Grove Street in Burlington (by the parking lot for Schmanska Park)	Centennial 10	44.48453, -73.18423
	Patchen Road in South Burlington (through cemetery)	Centennial 20	44.47402, -73.17334
Indian Brook	Parking lot B of Essex High School	Indian 10	44.49668, -73.11093
	Lang Barn in Essex	Indian 20	44.50442, -73.09190
Malletts Creek	McMullen Road	Milton 10	44.60855, -73.10693
Munroe Brook	Route 7 and Bay Road (by Red Apple Motel)	Munroe 10	44.40532, -73.21735
	Spear & Webster Intersection (just south of Kwiniaska Golf Course)	Munroe 20	44.38984, -73.20103
Morehouse Brook (One new site: 20)	Landry Park Winooski (Eastern trib)	Morehouse 10	44.50035, -73.19226
	Landry Park Winooski (main branch - west of Morehouse 10)	Morehouse 20	44.50041, -73.19444

Muddy Brook (20- site changed)	River Cove Road in Williston	Muddy 10	44.47293, -73.13505
	S. Brownell Road Williston	Muddy 20	44.44196, -73.13228
	Van Sicklen Road in Williston	Muddy 30	44.42823, -73.14622
Potash Brook (40 - site changed)	Kindness Court in South Burlington near Humane Society	Potash 10	44.44572, -73.21348
	Farrell Street in South Burlington near Klinger's Bakery	Potash 20	44.44660, -73.20415
	Dorset Street in South Burlington	Potash 30	44.45150, -73.17849
	Kimball Ave South Burlington	Potash 40	44.45394, -73.14809
Engelsby Brook	Pine St in Burlington near Champlain Elementary Community Gardens	Engelsby 10	44.45627, -73.21394
	Behind UVM Redstone Campus in Burlington	Engelsby 20	44.46654, -73.19741
Alder Brook (new)	Off Chapin Road in Essex	Alder 10	44.51742, -73.06559
Bartlett Brook (new)	By Shearer Chevrolet in South Burlington	Bartlett 10	44.42596, -73.21345
Sunnyside Brook (new)	Mountain View Drive in Colchester	Sunnyside 10	44.50654, -73.17823
Sunderland Brook (new)	In Pearl Street Park in Essex Junction	Sunderland 10	44.50179, -73.12983
	Off Pine Island Road in Colchester	Sunderland 20	44.51685, -73.20421

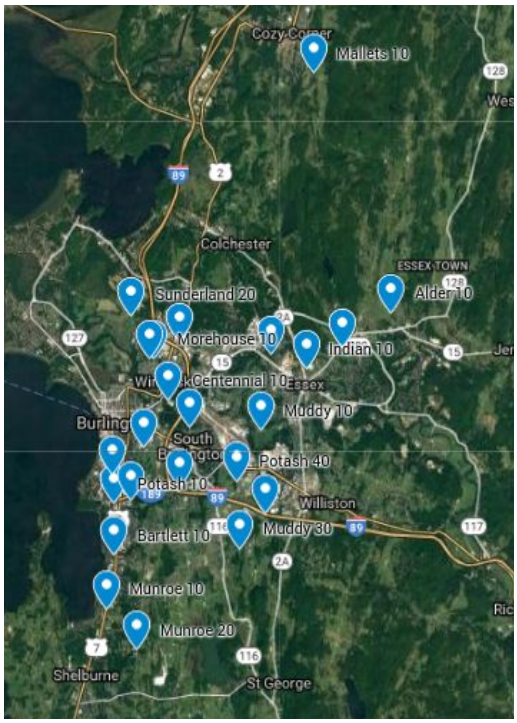


Figure 1: 2018 Rethink Runoff Stream Team Sample Sites. An interactive version of this map is available here:

https://drive.google.com/a/winooskinrcd.org/open?id=1K98F4bBO2E6p5lLKgSw7bxRSpQlzoo8Q&usp=sharing

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.

Phosphorus sample results continue to be high across all sampling sites. The VT 2016 water quality standard for phosphorus in Class B warm water medium-gradient streams is 27 µg/L but the mean 2018 phosphorus level for every site exceeded this standard (see Table 2).

Table 3. 2018 RRST Phosphorus Results Summary: Mean phosphorus levels in µg/L during both baseflow (dry) and high-flow (rain) sampling events in 2018. 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. Recalculated means with this data removed resulted in very similar values such that it was decided to keep them for descriptive statistics reporting purposes. Raw data is presented in Appendix C.

Location	Mean Phosphorus during Baseflow - Dry Conditions	Phosphorus during Rain Event
Alder 10*	102.06	--
Bartlett 10	57.02	--
Centennial 10	50.94	88.9
Centennial 20*	62.44	--
Englesby 10*	82.12	--
Englesby 20	98.56	--
Indian 10	41.66	180
Indian 20	97.48	--
Mallets Creek 10	39.68	--
Morehouse 10	30.9	48.8
Morehouse 20	35.86	76.5
Muddy 10	50.4	--
Muddy 20	41.6	--

Muddy 30	116.46	92.3
Munroe 10*	60.86	--
Munroe 20	88.96	--
Potash 10	44.66	--
Potash 20	35.82	--
Potash 30	89.58	--
Potash 40	318.54	--
Sunderland 10	92.94	--
Sunderland 20	55.26	--
Sunnyside 10	27.36	--

Phosphorus levels in Chittenden County Streams 2012-2018

Since the onset of this monitoring program in 2012, mean concentrations of phosphorus during baseflow have remained notably above the 27 µg/L standard at all stream sites. In fact only 7 out of the 23 sites sampled have ever exhibited phosphorus concentrations below this standard (Indian 20, Malletts 10, Morehouse 10 and 20, Potash 10 and 20, and Sunnyside 10). Out of these 7, only one site (Sunnyside 10) reports a median below the standard but the 1-yr sampling mean still falls above the standard (see Table 2 above). Sites of notable historic levels include Engelsby 20, Muddy 10, 20 and 30, Munroe 20, Potash 40, and Sunderland 10.

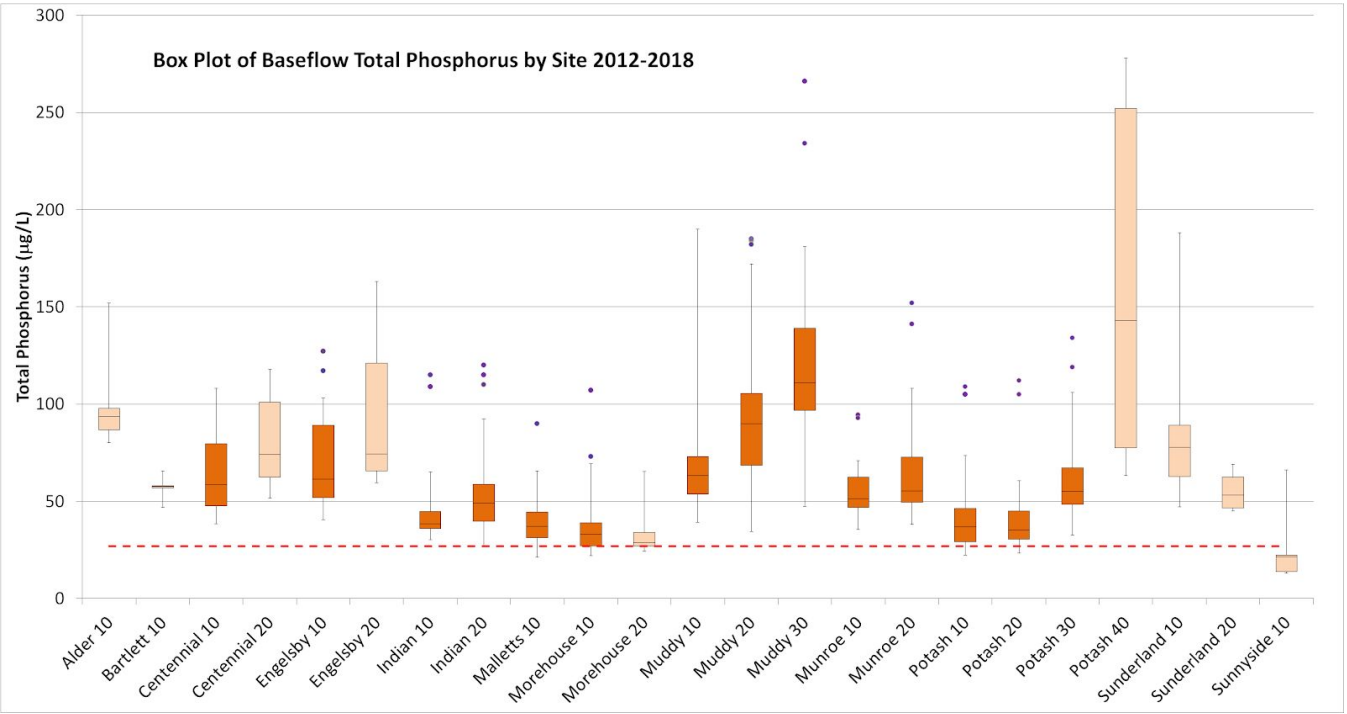


Figure 2. Comparison of total phosphorus levels across sites 2012-2018. Box plots indicate first and third quartiles and median values of total phosphorus concentrations for all sites. These values were calculated including sampling dates that may or may not have associated flagged dupe or blank samples. Lighter colored boxes indicate 1-2 years of sampling data, darker boxes indicate 6-7 years of sampling data. Dots indicate outliers which were identified as equal to or greater than 2 times the site's standard deviation. Red line indicates Vermont's 2016 Water Quality Standard of 27 micrograms/L.

Figure 2 suggests that phosphorus levels increase as sampling moves upstream. To test this hypothesis, RRST used scatter plots to graph phosphorus data over time by stream and ran statistical analyses on 8 streams that had more than one sampling site. Of the 8 streams that have more than one sampling location, 6 indicated a statistically significantly different value of phosphorus between sites, all of which presented statistically significantly higher concentrations of total phosphorus upstream . Table 4 summarizes the results of these tests. Appendix D summarizes statistics and graph visualizations. This result was somewhat surprising and merits more consideration since we assumed that total phosphorus increased in concentration as water moves downstream and more inputs are introduced.

Table 4 Statistical Results of Phosphorus trends along stream lengths. Statistical tests selected because data either had too small a sample size or was not normally distributed and therefore it was not appropriate to do a Paired T-test. While Wilcoxon Signed Rank recognizes dependent samples as could be the case up and down the same stream, the Kruksal-Wallis was the best tool available to reporter but it assumes independent samples so results should be seen with caution. Location of higher concentration was estimated through graphing. Note that all values and sampling dates were included in analysis as long as they could be paired (in the case of the Wilcoxon Signed Rank), including outliers and those flagged with dupe or blank concerns.

Stream	# of Sites	Statistical Test Used	Statistically significant difference?	Location of higher concentration?
Centennial	2	Wilcoxon Signed Rank	Y	Upstream
Engelsby	2	Wilcoxon Signed Rank	N	--
Indian	2	Wilcoxon Signed Rank	Y	Upstream
Morehouse	2	Wilcoxon Signed Rank	N	--
Munroe	2	Wilcoxon Signed Rank	Y	Upstream
Sunderland	2	Wilcoxon Signed Rank	Y	Upstream
Muddy	3	Kruksal-Wallis	Y	Upstream
Potash	4	Kruksal-Wallis	Y	Upstream

Figure 2 also suggests that Muddy Brook has shown consistently high levels of Phosphorus as compared to other sites including some extremely high outliers. Interestingly, temporal data is suggesting a non-significant downward trend of Phosphorus concentrations at sites Muddy 20 and Muddy 30 with Muddy 10 holding relatively constant. This is unique to Muddy Brook and it's not clear what land use changes or restoration efforts could have contributed to this. Figures 3 and 4 show the suggested trends for Muddy 20 and 30 respectively.

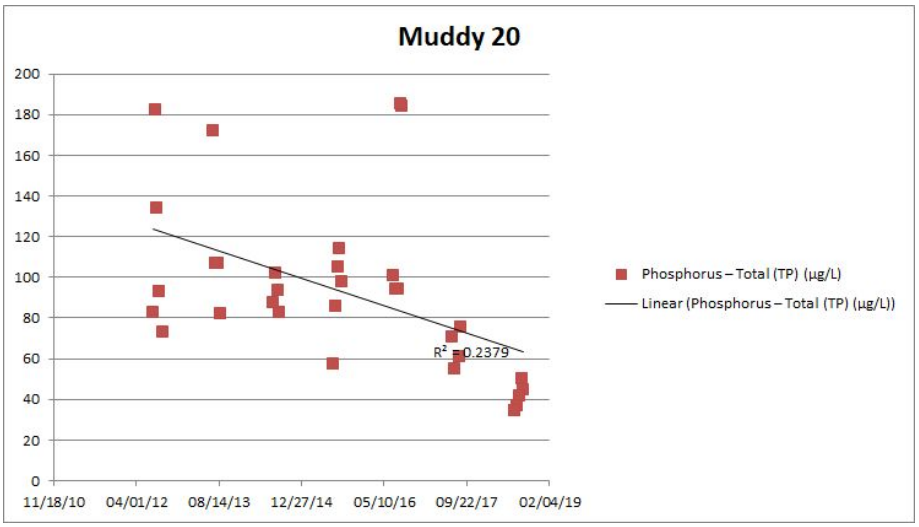


Figure 3. Total Phosphorus in Muddy 20 since 2012. Scatter plot visually suggests a downward trend but R2 of the best fit line is still only about 0.24 and not significant.

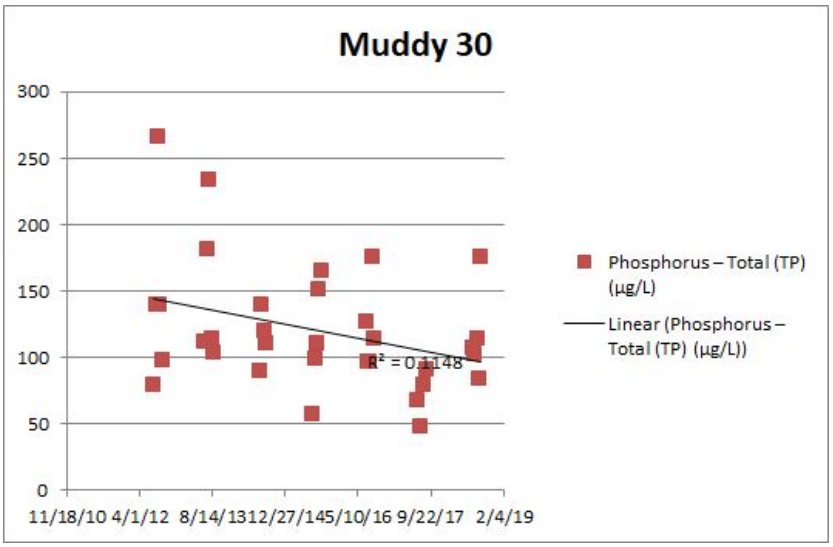


Figure 4. Total Phosphorus in Muddy 30 since 2012. Scatter plot visually suggests a downward trend but R2 of the best fit line is still only about 0.12 and not significant.

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, according to the Vermont Surface Water Management Strategy. 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). 230 mg/L is the highest concentration of chloride to which aquatic life can safely be

exposed for one hour once every 3 years. 860 mg/L is the highest concentration of chloride to which aquatic life can safely be exposed for four consecutive days once every 3 years.

Table 5. 2018 RRST Chloride Results Summary: This table depicts mean chloride levels in mg/L during baseflow (dry) and high-flow (rain) sampling events in 2018. Values exceeding the Vermont chronic chloride standard of 230 mg/L are shown in red. No sites had a sampling date in which blank or dupe results were flagged for chloride. Raw data is presented in Appendix C.

Location	Mean Chloride in Dry Conditions Only	Chloride during Rain Events
Alder 10	10.93	--
Bartlett 10	256	--
Centennial 10	728	248
Centennial 20	176.2	--
Englesby 10	401.8	--
Englesby 20	711.8	--
Indian 10	257.6	41.55
Indian 20	180.5	--
Mallets Creek 10	50.09	--
Morehouse 10	133.17	38.65
Morehouse 20	490.1	111
Muddy 10	231.2	--
Muddy 20	596	--
Muddy 30	34.2	35.7
Munroe 10	341.4	--
Munroe 20	169.54	--
Potash 10	570.4	--
Potash 20	600.2	--
Potash 30	330	--

Potash 40	737.1	--
Sunderland 10	187.2	--
Sunderland 20	168.2	--
Sunnyside 10	773	--

While in 2017 only thee sampled brooks presented mean values above of 230 mg/L, in 2018 nine brooks presented exceedances although this increase is partially attributed to the addition of new sampling sites of concern. Similar to 2017, chloride levels were higher during baseflow conditions in the majority of cases which is suspected to be due to dilution. Chloride grab sample levels exceeded 860 mg chloride/L, in Centennial 10 and Engelsby 20 in 2018. Both streams exceeded this value on 7/10/18 and 7/24/18. This is the first time this value was surpassed in any individual sample over this seven year period. This could result in a need for more continuous monitoring at these sites to gain continuous-flow data.

Chloride levels in Chittenden County Streams 2012-2018

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 standard. Recently added sampling sites have also presented alarmingly high data including Engelsby 20, Morehouse 20, Potash 40, and Sunnyside 10.

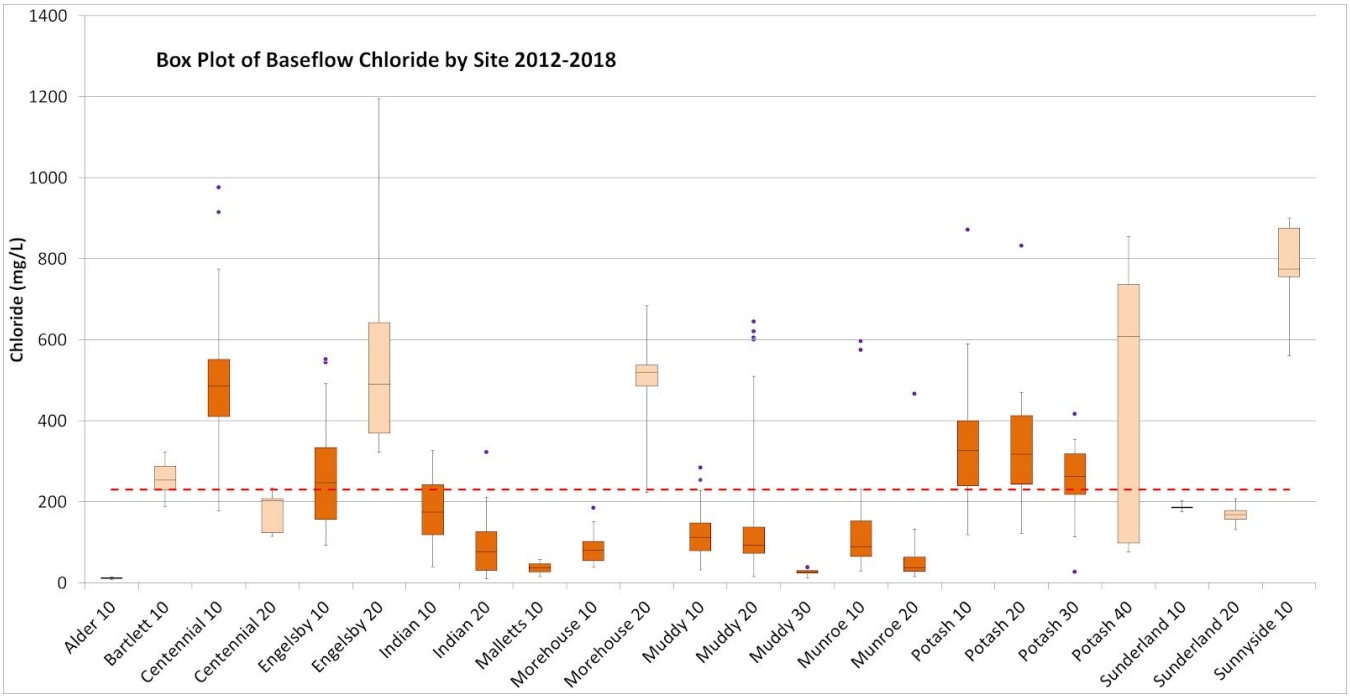


Figure 5 - Comparison of Chloride levels across sites 2012-2018. Box plots indicate first and third quartiles and median values of chloride levels (mg/L) for all sites. Lighter colored boxes indicate 1-2 years of sampling data, darker boxes indicate 6-7 years of sampling data. Dots indicate outliers which were identified as equal to or greater than 2 times the site's standard deviation. EPA's and Vermont's standard for 4-day average chloride levels (230 mg/L) is shown by the red line.

There is not as clear a link between location in the watershed and chloride levels as there is for phosphorus levels but several streams presented statistically significantly different chloride levels across sampling sites. Of the 8 streams that have more than one sampling location, 7 indicated a statistically significantly different value of Chloride between sites. This information could be useful in pin-pointing chloride pressure points along the stream length for intervention purposes. Table 6 summarizes the results of these statistical tests. Appendix E summarizes statistics and graph visualizations.

Table 6 Statistical Results of Chloride trends along stream lengths. See Table 4 note for details.

Stream	# of Sites	Statistical Test Used	Statistically significant difference?	Location of higher concentration?
Centennial	2	Wilcoxon Signed Rank	Y	Downstream
Engelsby	2	Wilcoxon Signed Rank	Y	Upstream
Indian	2	Wilcoxon Signed Rank	Y	Downstream
Morehouse	2	Wilcoxon Signed Rank	Y	Upstream
Munroe	2	Wilcoxon Signed Rank	Y	Downstream
Sunderland	2	Wilcoxon Signed Rank	N	--
Muddy	3	Kruksal-Wallis	Y	Midstream (site 20)
Potash	4	Kruksal-Wallis	Y	Unclear

Chloride data from this sampling program suggests that of the 14 sites that have been sampled for 6 or more years, chloride levels are trending upwards in 10 of them (Centennial 10, Engelsby 10, Indian 10 and 20, Malletts 10, Muddy 30, Munroe 10 and 20,and Potash 10 and 20). These trends are not statistically significant but highlight an important stressor to monitor closely. Appendix F documents graphs of these trends.

Aggregated data also suggests a general increasing trend in chloride. Figure 6 below shows that e mean, median, and standard deviation values have all increased slightly over time.

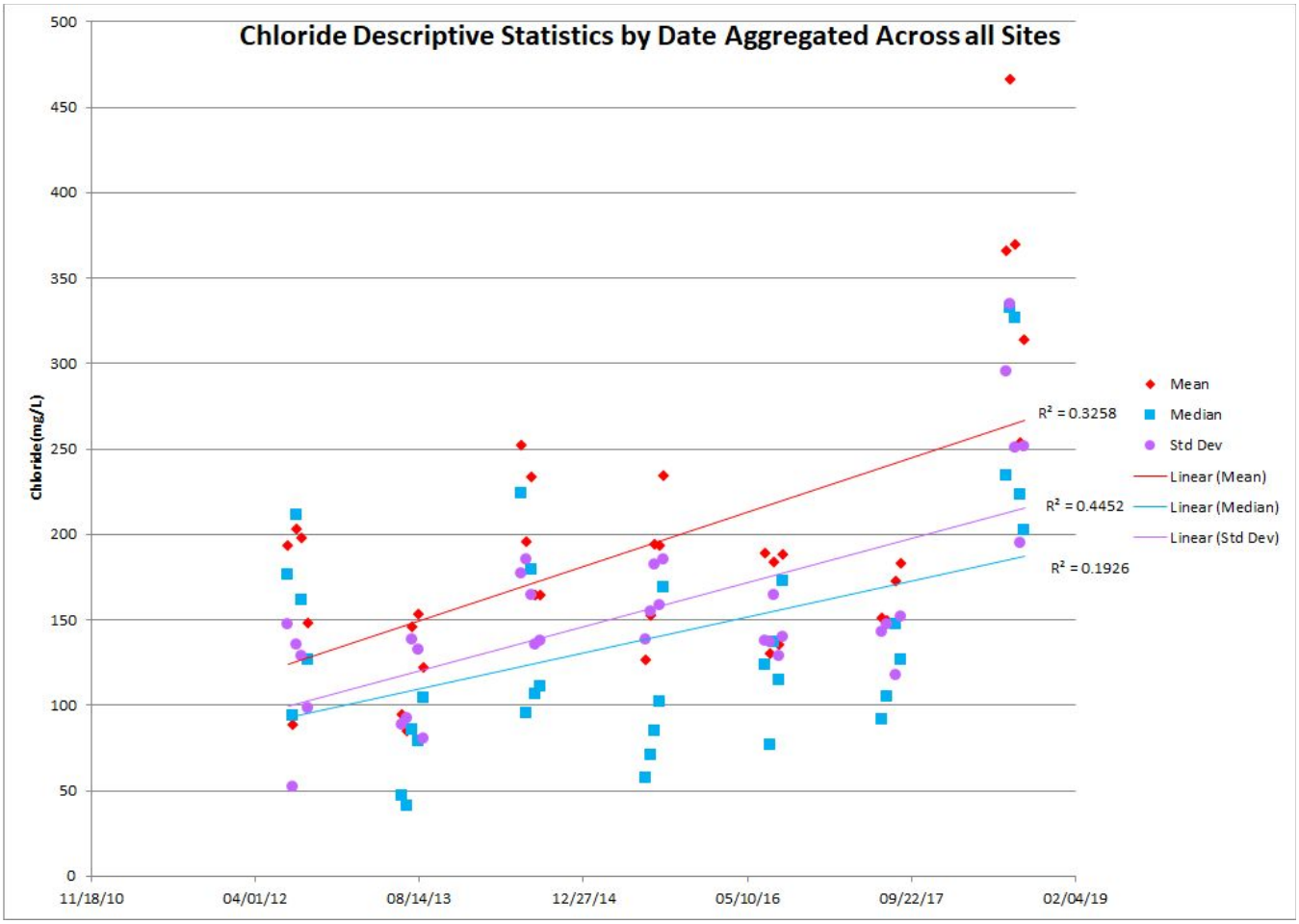


Figure 6. Descriptive Statistics for chloride data gathered across sites aggregated by date. Each sampling date since June 2016 had chloride values across sites averaged to determine mean, median, and standard deviation for the entire sampling area.

Turbidity Results

The turbidity of a water sample refers to its cloudiness. This measurement is based on the amount of algae, microbes, and sediment suspended in the water. High turbidity levels can negatively impact aquatic life by raising water temperature, decreasing forage and cover, and harming gill function, and has the potential to increase the presence and number disease-causing organisms. Turbidity measurements can also be used as an indicator for erosion and increased nutrient levels in streams. The Vermont Water Quality Standards state that turbidity should not exceed 10 NTU (nepholometric turbidity units) in cold-water fish habitat and 25 NTU in warm-water fish habitat.

Table 7. 2018 RRST Turbidity Results Summary. Mean turbidity levels in NTU baseflow (dry) and high-flow (rain) sampling events in 2018. Overall mean values exceeding the Vermont standard of 25 NTU are shown in red. Raw data is presented in Appendix C.

Location	Mean Turbidity in Dry Conditions Only	Turbidity during Rain Event
Alder 10	30.9	--
Bartlett 10	11.402	--
Centennial 10	5.198	18.2
Centennial 20	3.462	--
Englesby 10	6.92	--
Englesby 20	2.242	--
Indian 10	7.738	64.9
Indian 20	9.104	--
Mallets Creek 10	4.772	--
Morehouse 10	5.938	8.52
Morehouse 20	2.816	21.3
Muddy 10	6.252	--
Muddy 20	5.928	--
Muddy 30	17.68	11.5
Munroe 10	6.724	--
Munroe 20	18.9	--
Potash 10	4.868	--
Potash 20	1.488	--
Potash 30	10.782	--
Potash 40	39.32	--
Sunderland 10	8.032	--

Sunderland 20	10.106	--
Sunnyside 10	11.044	--

Mean baseflow turbidity levels did not exceed the VT Water Quality standard for turbidity of 25 nephelometric units (NTU) for warm-water fish habitat in 2018 except at Potash 40 and Alder 10. This represents an increase of two sites as compared to 2017 but one of these sites was newly added in 2018. As suspected, turbidity concentrations were mostly higher during rain events, and surpassed standards on Indian Brook alone.

Turbidity Levels in Chittenden County Streams 2012-2018

Mean, baseflow turbidity values have only rarely exceeded the VT standard for warm-water streams of 25 NTU over the seven year sampling period. Of note, however, is the high turbidity recorded for new sampling sites Alder 10 and Potash 40. Higher turbidity in Alder 10 is not surprising because the site is comparatively more agricultural with a couple farms and potential field runoff nearby. Turbidity has not been included in sampling support requests for the 2019 field season but will be revisited in 2020.

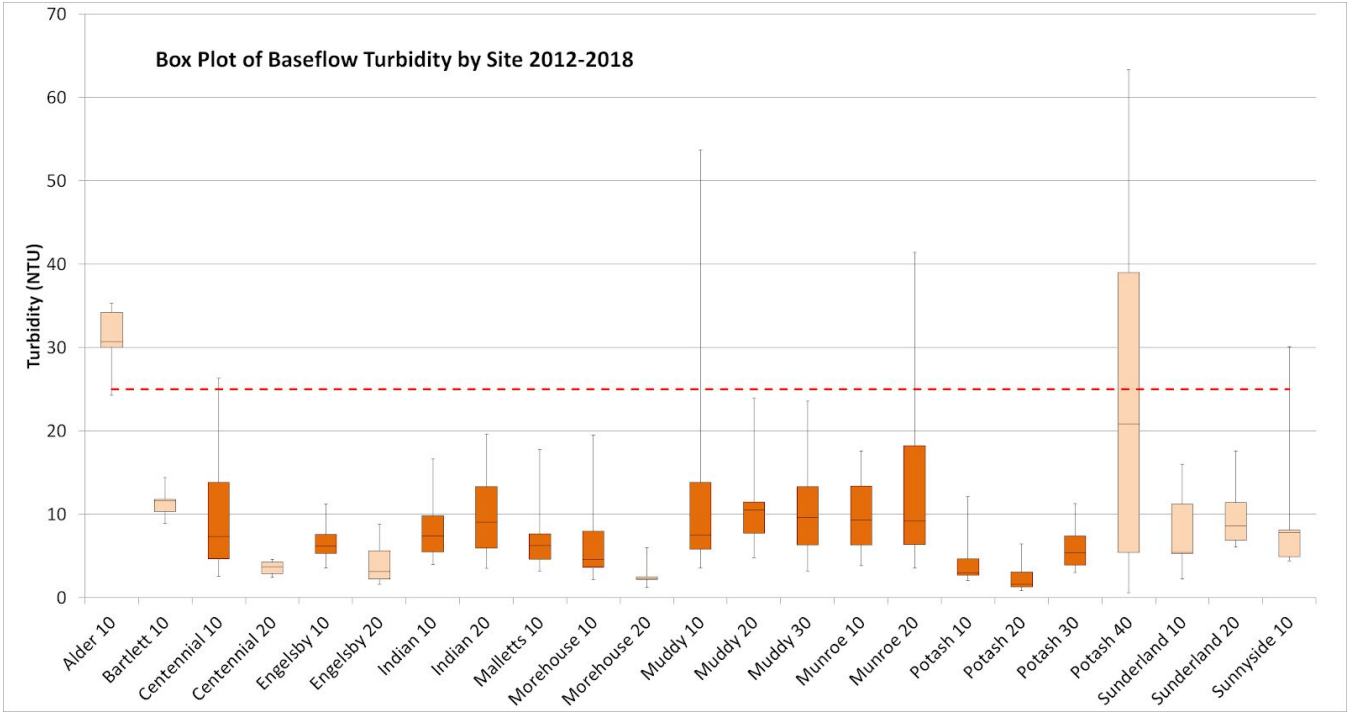


Figure 7 - Comparison of turbidity levels 2012-2018 during baseflow (dry) conditions. The standard proposed by the State of Vermont for mean turbidity at baseflow in medium gradient, warm water streams (25 NTU) is indicated by the red line. These values were calculated including sampling dates that may or may not have associated flagged dupe or blank samples.

Importantly, it was challenging to secure valid turbidity data for the 2018 sampling season. Appendix A will reveal a mean relative percent difference between duplicate and actual samples above the acceptable 15%. Some but not all of this was due to having very low sample values in relation to test sensitivity.

This adds to the Stream Team's resolve to remove this parameter from future sampling activities for the time being.

Turbidity was statistically significantly different along only two streams (Morehouse and Potash). The Morehouse site results, while significant, both fell under the water quality standards such that the difference is of less interest to the research team. In contrast, Potash 40 presented turbidity levels which both exceeded water quality standards and were significantly different from other sites along that brook. The sampling team suspects this could be due to the unique hydrology of Potash 40 which is located among a complex of artificial wetlands within an industrial park. The water has no noticeable flow rate or direction and presents less as a stream and more as a marsh. It is suspected that in-stream sampling practices might disturb a lot of bottom sediment in such a setting thereby leading to higher turbidity readings. Considering this, Potash 40 has been removed from the 2019 sampling program.

Visualization revealed no notable trends in turbidity data over time and it is therefore not currently recognized as a high priority threat.

Conclusion

The Rethink Runoff Stream Team has monitored chloride, phosphorus, and turbidity in various, stormwater impaired streams in Chittenden County for the past seven consecutive years (2012-2018). The 2018 season's results are similar to those obtained over the past six years, and indicate that all stream sites have sustained phosphorus levels well above the Vermont standard and that chloride is becoming a prevalent and growing concern.

Phosphorus levels in almost all sampled streams have remained two to four times the Vermont water quality standard of 27 µg/L. Muddy Brook continues to maintain high levels of phosphorus although values are potentially trending downwards. Six streams sampled also showed statistically significantly higher concentrations of total phosphorus upstream as opposed to downstream which presents an opportunity to explore localized stressors. It's important to consider that while phosphorus levels are presenting high in many sites, turbidity levels are low. This provides some clues as to sources of phosphorus and should inform phosphorus reduction efforts. For example, it is possible these high phosphorus values can be attributed to more urban-like runoff such as car wash detergents, liquid lawn fertilizers, and pet waste.

Chloride levels continue to surpass standards in several streams, most notably at Centennial 10, Engelsby 20, Morehouse 20, Potash 40, and Sunnyside 10. For the first time in Stream Team's sampling history, chloride levels exceeded the EPA's and VT's acute standard of 860 mg chloride/L on the same two sampling dates at both Centennial 10 and Engelsby 20. As mentioned in prior year reports it is suspected that Engelsby's high levels are due to a nearby parking lots on the UVM campus but further assessments should consider rising stressors across the sampling region at all sites of concern.

Low turbidity values in most sites reveal this does not appear to be a significant stressor in the Chittenden County area although research team should consider potential sediment inputs upstream of

Alder 10 for remediation. After seven years of showing minimal concern, turbidity will be abandoned at most locations in the 2019 season.

There will be a few sampling adjustments made to the 2019 sampling effort. Potash 40 will be removed because of its unique and confounding hydrological conditions that complicates data analysis. Munroe 10 seems to be located physically too close to Munroe 20 to be giving any valuable information on landscape impacts so it will similarly be abandoned. Munroe 20 will be kept, however as a valuable data point because a housing development is planned and will be implemented upstream soon. Finally, Bartlett 10 will be removed because it is already sampled by a team from UVM.

It became clear this year that, moving forward, the Stream Team needs explicit guidance and documented practices in the QAPP for dealing with outliers and data points whose duplicates or blanks were flagged. For 2018 analysis all data points were included because those whose duplicates or blanks were flagged, still had values less than two standard deviations from the mean. Outliers, similarly, only presented when multi-year data was assessed such that for 2018-specific descriptive statistics, all data points were included. Given the small sampling sizes, however, (5 - 6 data points per site per year) this may not be a reliable practice for future analysis and consultation will be sought from the La Rosa Partnership for technical guidance on this practice.

Finally, it is the goal of this team to improve outward reporting of these data such that each stream could eventually receive some type of scorecard and summary sheet across the multiple parameters evaluated. We expect that scoring, and then ranking streams holistically is one step towards simplifying where to direct remediation efforts.This may be attempted in the 2019 report.

Appendix A. Quality Assurance Measures for phosphorus, chloride, and turbidity sampling in 2018.

RPD Analysis			
Date	Location	Test	RPD (%)
07/10/18	Munroe 20	Chloride (mg/L)	0.00
		TP(ug P/L)	17.52
		Turbidity (NTU)	7.92
	Muddy 10	Chloride (mg/L)	0.59
		TP(ug P/L)	4.96
		Turbidity (NTU)	3.79
	Engelsby 10	Chloride (mg/L)	1.61
		TP(ug P/L)	71.28
		Turbidity (NTU)	1.00
07/24/18	Potash 20	Chloride (mg/L)	0.48
		TP(ug P/L)	0.00
		Turbidity (NTU)	18.62
	Muddy 30	Chloride (mg/L)	1.20
		TP(ug P/L)	0.98
		Turbidity (NTU)	2.96
	Indian 10	Chloride (mg/L)	3.28
		TP(ug P/L)	0.78
		Turbidity (NTU)	2.57
08/07/18	Potash 30	Chloride (mg/L)	0.00
		TP(ug P/L)	0.91
		Turbidity (NTU)	7.76
	Munroe 10	Chloride (mg/L)	0.87
		TP(ug P/L)	10.23
		Turbidity (NTU)	20.16
	Indian 20	Chloride (mg/L)	0.49
		TP(ug P/L)	4.08
		Turbidity (NTU)	20.61
08/21/18	Potash 40	Chloride (mg/L)	0.70
		TP(ug P/L)	2.81
		Turbidity (NTU)	52.12
	Malletts 10	Chloride (mg/L)	1.94
		TP(ug P/L)	0.60
		Turbidity (NTU)	4.62
	Bartlett 10	Chloride (mg/L)	0.78
		TP(ug P/L)	1.69
		Turbidity (NTU)	5.22
09/04/18	Sunderland 10	Chloride (mg/L)	1.00
		TP(ug P/L)	9.52
		Turbidity (NTU)	33.93
	Morehouse 10	Chloride (mg/L)	2.80
		TP(ug P/L)	12.66
		Turbidity (NTU)	89.69
	Centennial 20	Chloride (mg/L)	0.81
		TP(ug P/L)	24.39
		Turbidity (NTU)	38.43

Mean RPD	Parameter	Actual	Target
	Chloride (mg/L)	1.10	≤5
	TP(ug P/L)	10.83	≤30
	Turbidity (NTU)	20.63	≤15

Appendix B. Project Completeness
Project proposal anticipated 5 dates for baseflow sampling across 23 sites (115 samples per parameter) as well as 2 rain dates sampling across 5 sites (10 samples per parameter). This is a total of 125 samples per parameter not including duplicates and blanks.

Parameter	Number of Samples Anticipated (not including blanks and Dupes) = 23 sites*5 sampling dates	Number of Valid Samples* Collected and Analyzed	Percent Complete
Chloride	125	121	97%
Total Phosphorus	125	116	93%
Turbidity	125	117	94%

*"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 issue flagged by inconsistent blank result. Boxes highlighted in red indicate sample whose duplicate is notably different in value. All values included in graphing and statistical analyses of 2018 report.

Sample Number	Location	Date	Chloride (mg/L)	TP(ug P/L)	Turbidity (NTU)
181280-01	Alder 10	7/10/2018	12	152	35.3
181398-01	Alder 10	7/24/2018	13.4	97.8	24.3
181538-01	Alder 10	8/7/2018	9.73	86.7	30
181652-01	Alder 10	8/21/2018	7.82	80.1	34.2
181809-01	Alder 10	9/4/2018	11.7	93.7	30.7
181280-02	Alder 10 Blank	7/10/2018	< 2	5.48	< 0.2
181280-03	Bartlett 10	7/10/2018	229	57.8	11.6
181398-02	Bartlett 10	7/24/2018	322	56.8	10.3
181538-02	Bartlett 10	8/7/2018	288	65.7	14.4

181652-02	Bartlett 10	8/21/2018	254	46.9	11.8
181809-02	Bartlett 10	9/4/2018	187	57.9	8.91
181652-03	Bartlett 10 Field Dup	8/21/2018	256	47.7	11.2
181398-04	Centannial 10 Blank	7/24/2018	< 2	< 5	< 0.2
181280-04	Centennial 10	7/10/2018	915	46.4	3.79
181398-03	Centennial 10	7/24/2018	976	57.7	7.39
181538-03	Centennial 10	8/7/2018	775	40.9	3.2
181629-01	Centennial 10	8/18/2018	248	88.9	18.2
181652-04	Centennial 10	8/21/2018	430	47.7	6.08
181809-03	Centennial 10	9/4/2018	544	62	5.53
181280-05	Centennial 10 Blank	7/10/2018	< 2	< 5	< 0.2
181280-06	Centennial 20	7/10/2018	234	74.1	2.88
181398-05	Centennial 20	7/24/2018	202	62.3	3.7
181538-04	Centennial 20	8/7/2018	207	51.6	2.43
181652-05	Centennial 20	8/21/2018	114	66.6	3.74
181809-05	Centennial 20	9/4/2018	124	57.6	4.56
181538-05	Centennial 20 Blank	8/7/2018	< 2	9.17	0.5
181809-04	Centennial 20 Dup	9/4/2018	123	73.6	3.09
181280-07	Engelsby 10	7/10/2018	492	102	6.05
181398-06	Engelsby 10	7/24/2018	544	44.4	5.94
181538-06	Engelsby 10	8/7/2018	480	51.9	4.36
181652-06	Engelsby 10	8/21/2018	296	117	14.1

181809-06	Engelsby 10	9/4/2018	197	95.3	4.15
181398-07	Engelsby 10 Blank	7/24/2018	< 2	< 5	< 0.2
181280-08	Engelsby 10 Field Dup	7/10/2018	500	48.4	5.99
181280-09	Engelsby 20	7/10/2018	1030	103	3.12
181398-08	Engelsby 20	7/24/2018	1195	121	2.56
181538-07	Engelsby 20	8/7/2018	642	129	1.58
181652-07	Engelsby 20	8/21/2018	370	74.2	2.25
181809-07	Engelsby 20	9/4/2018	322	65.6	1.7
181538-08	Engelsby 20 Blank	8/7/2018	< 2	< 5	< 0.2
181280-10	Indian 10	7/10/2018	288	38.9	14.5
181398-09	Indian 10	7/24/2018	300	38.5	3.94
181538-09	Indian 10	8/7/2018	326	37.8	5.46
181629-02	Indian 10	8/18/2018	41.55	180	64.9
181652-08	Indian 10	8/21/2018	140	43.2	4.96
181809-08	Indian 10	9/4/2018	234	49.9	9.83
181652-09	Indian 10 Blank	8/21/2018	< 2	< 5	< 0.2
181398-10	Indian 10 Field Dup	7/24/2018	310	38.8	3.84
181280-11	Indian 20	7/10/2018	131	115	13.6
181398-11	Indian 20	7/24/2018	322	110	6.63
181538-10	Indian 20	8/7/2018	206	120	5.92
181652-10	Indian 20	8/21/2018	55.5	68.3	11.8
181809-09	Indian 20	9/4/2018	188	74.1	7.57

181809-10	Indian 20 Blank	9/4/2018	< 2	< 5	0.23
181538-11	Indian 20 Field Dup	8/7/2018	205	125	7.28
181809-11	Mallets 10	9/4/2018	54.5	44.4	4.61
181280-12	Malletts 10	7/10/2018	48.15	41.2	6.25
181398-12	Malletts 10	7/24/2018	57	36.7	3.22
181538-12	Malletts 10	8/7/2018	47.35	42.6	4.28
181652-11	Malletts 10	8/21/2018	43.45	33.5	5.5
181652-12	Malletts 10 Field Dup	8/21/2018	44.3	33.7	5.76
181280-13	Morehouse 10	7/10/2018	136	32.9	10.2
181398-13	Morehouse 10	7/24/2018	185	26.2	6.18
181538-13	Morehouse 10	8/7/2018	150	26	2.18
181629-03	Morehouse 10	8/18/2018	38.65	48.8	8.52
181652-13	Morehouse 10	8/21/2018	49.85	32.4	3.59
181809-12	Morehouse 10	9/4/2018	145	37	7.54
181280-14	Morehouse 10 Blank	7/10/2018	< 2	< 5	< 0.2
181809-13	Morehouse 10 Dup	9/4/2018	141	42	19.8
181280-15	Morehouse 20	7/10/2018	537.5	27.1	5.99
181398-14	Morehouse 20	7/24/2018	684	24.4	1.23
181538-14	Morehouse 20	8/7/2018	486	65.3	2.48
181629-04	Morehouse 20	8/18/2018	111	76.5	21.3
181652-14	Morehouse 20	8/21/2018	223	28.5	2.18
181809-14	Morehouse 20	9/4/2018	520	34	2.2

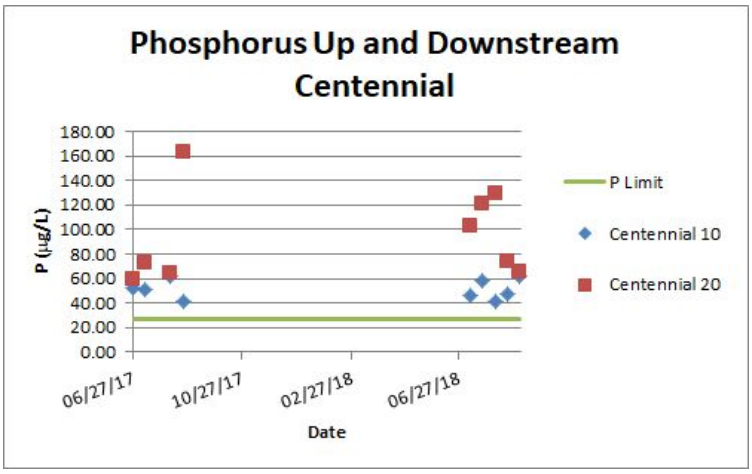
181629-05	Morehouse 20 Blank	8/18/2018	< 2	< 5	0.22
181280-16	Muddy 10	7/10/2018	170	55.1	7.5
181398-15	Muddy 10	7/24/2018	220	51.8	6.87
181538-15	Muddy 10	8/7/2018	228	43.1	4.11
181652-15	Muddy 10	8/21/2018	254	49.8	6.31
181809-15	Muddy 10	9/4/2018	284	52.2	6.47
181398-16	Muddy 10 Blank	7/24/2018	< 2	< 5	0.23
181280-17	Muddy 10 Field Dup	7/10/2018	171	57.9	7.79
181280-18	Muddy 20	7/10/2018	645	34.5	4.97
181398-17	Muddy 20	7/24/2018	620	36.9	4.77
181538-16	Muddy 20	8/7/2018	600	41.8	5.9
181652-16	Muddy 20	8/21/2018	510	50.2	7.72
181809-16	Muddy 20	9/4/2018	605	44.6	6.28
181538-17	Muddy 20 Blank	8/7/2018	< 2	< 5	< 0.2
181280-19	Muddy 30	7/10/2018	31.2	107	21.1
181398-18	Muddy 30	7/24/2018	33.4	102	13.3
181538-18	Muddy 30	8/7/2018	34	114	13.9
181629-06	Muddy 30	8/18/2018	35.7	92.3	11.5
181652-17	Muddy 30	8/21/2018	38.25	84.3	16.5
181809-17	Muddy 30	9/4/2018	34.15	175	23.6
181652-18	Muddy 30 Blank	8/21/2018	< 2	< 5	< 0.2
181398-19	Muddy 30 Field Dup	7/24/2018	33	103	13.7

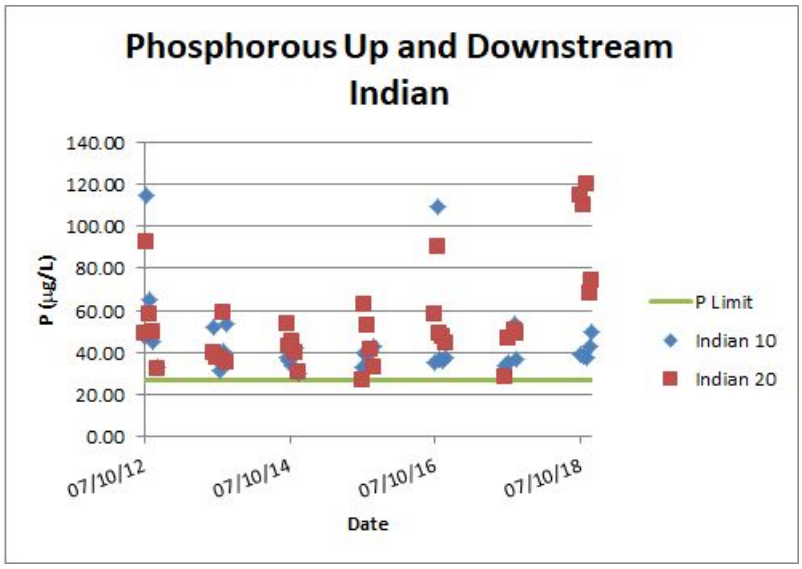
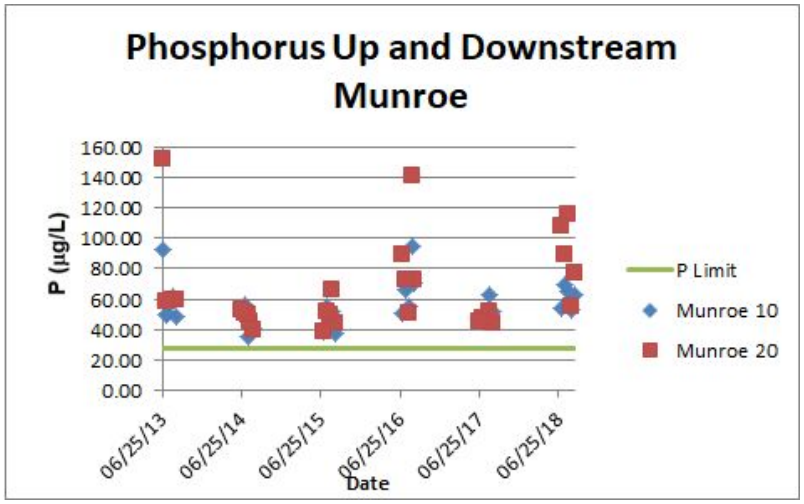
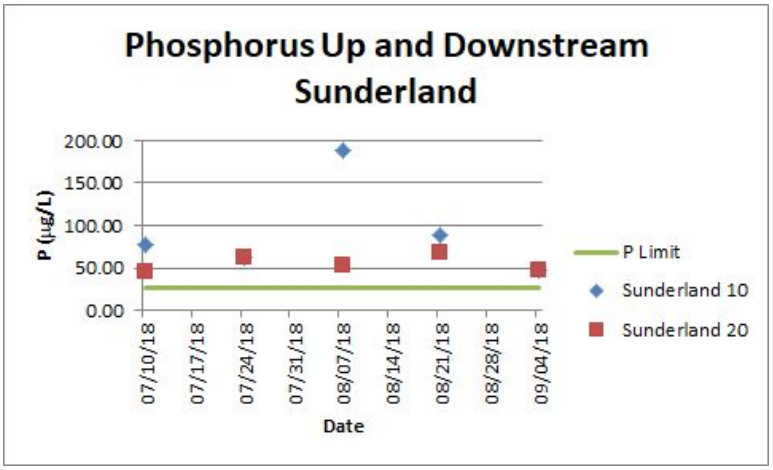
181280-20	Munroe 10	7/10/2018	230	54.4	5.25
181398-20	Munroe 10	7/24/2018	596	69.5	8.69
181538-19	Munroe 10	8/7/2018	575	64.9	8.25
181652-19	Munroe 10	8/21/2018	152	52.6	5.28
181809-18	Munroe 10	9/4/2018	154	62.9	6.15
181809-19	Munroe 10 Blank	9/4/2018	< 2	7.58	< 0.2
181538-20	Munroe 10 Field Dup	8/7/2018	570	71.9	10.1
181280-21	Munroe 20	7/10/2018	92.9	108	30.2
181398-21	Munroe 20	7/24/2018	466	88.8	33.9
181538-21	Munroe 20	8/7/2018	132	116	9.2
181652-20	Munroe 20	8/21/2018	63	55.2	6.7
181809-20	Munroe 20	9/4/2018	93.8	76.8	14.5
181280-22	Munroe 20 Field Dup	7/10/2018	92.9	90.6	27.9
181280-23	Potash 10	7/10/2018	490	32	2.84
181398-22	Potash 10	7/24/2018	872	31.6	2.39
181538-22	Potash 10	8/7/2018	484	41.4	4.09
181652-21	Potash 10	8/21/2018	416	74.3	12.1
181809-21	Potash 10	9/4/2018	590	44	2.92
181280-24	Potash 20	7/10/2018	470	31.7	0.98
181398-23	Potash 20	7/24/2018	832	30.3	1.12
181538-23	Potash 20	8/7/2018	416	33.8	1.02
181629-07	Potash 20	8/18/2018	187	74	8.71

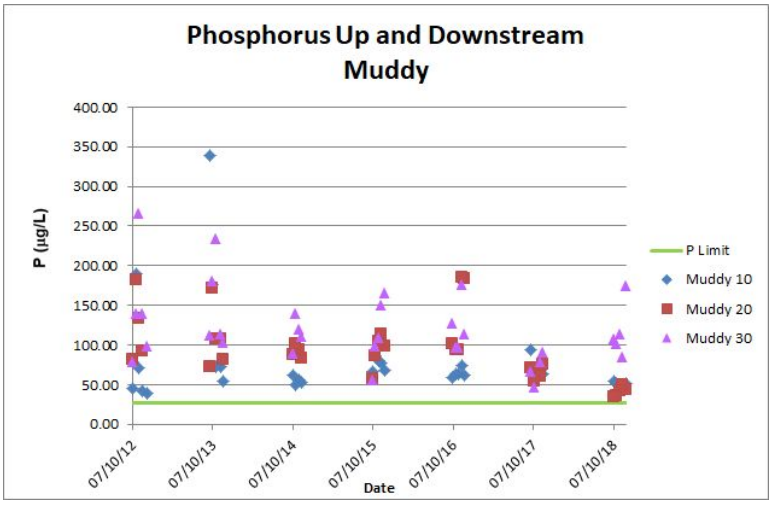
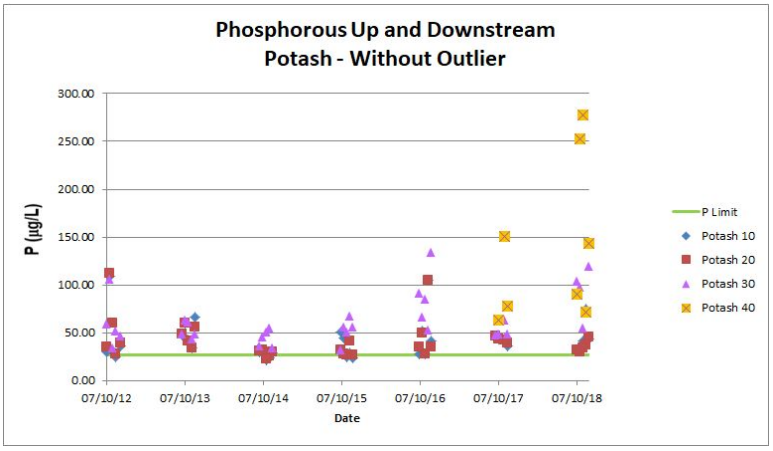
181652-22	Potash 20	8/21/2018	460	37.8	1.39
181809-22	Potash 20	9/4/2018	823	45.5	2.93
181398-24	Potash 20 Field Dup	7/24/2018	828	30.3	1.35
181280-25	Potash 30	7/10/2018	338	104	3.13
181398-25	Potash 30	7/24/2018	332	98	3.39
181538-24	Potash 30	8/7/2018	416	55.1	4.09
181652-23	Potash 30	8/21/2018	348	71.8	32
181809-23	Potash 30	9/4/2018	216	119	11.3
181538-25	Potash 30 Field Dup	8/7/2018	416	54.6	4.42
181280-26	Potash 40	7/10/2018	607.5	252	50.2
181398-26	Potash 40	7/24/2018	736	277.8	39
181538-26	Potash 40	8/7/2018	855	847.8	23.3
181652-24	Potash 40	8/21/2018	720	72.1	20.8
181809-24	Potash 40	9/4/2018	767	143	63.3
181652-25	Potash 40 Field Dup	8/21/2018	715	70.1	12.2
181280-27	Sunderland 10	7/10/2018	176	77.8	11.2
181398-27	Sunderland 10	7/24/2018	185	62.7	5.41
181538-27	Sunderland 10	8/7/2018	186	188	16
181652-26	Sunderland 10	8/21/2018	187	89.2	2.24
181809-25	Sunderland 10	9/4/2018	202	47	5.31
181652-27	Sunderland 10 Blank	8/21/2018	< 2	< 5	< 0.2
181809-26	Sunderland 10 Dup	9/4/2018	200	51.7	7.48

181280-28	Sunderland 20	7/10/2018	208	45.1	6.07
181398-28	Sunderland 20	7/24/2018	156	62.4	11.4
181538-28	Sunderland 20	8/7/2018	178	53.3	8.57
181652-28	Sunderland 20	8/21/2018	131	68.9	17.6
181809-27	Sunderland 20	9/4/2018	168	46.6	6.89
181809-28	Sunderland 20 Blank	9/4/2018	< 2	< 5	< 0.2
181280-29	Sunnyside 10	7/10/2018	900	21.5	4.91
181398-29	Sunnyside 10	7/24/2018	875	22.3	8.07
181538-29	Sunnyside 10	8/7/2018	775	13	4.37
181652-29	Sunnyside 10	8/21/2018	560	13.9	7.77
181809-29	Sunnyside 10	9/4/2018	755	66.1	30.1

Appendix D. Statistically Different Phosphorus Up and Downstream

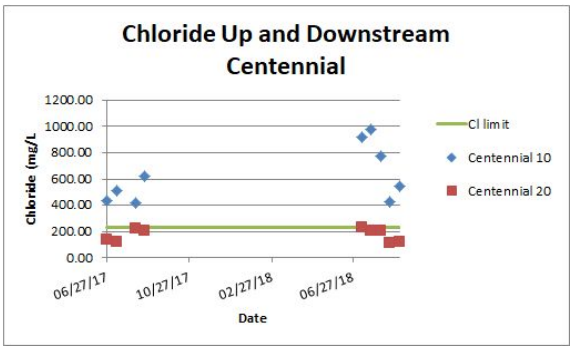
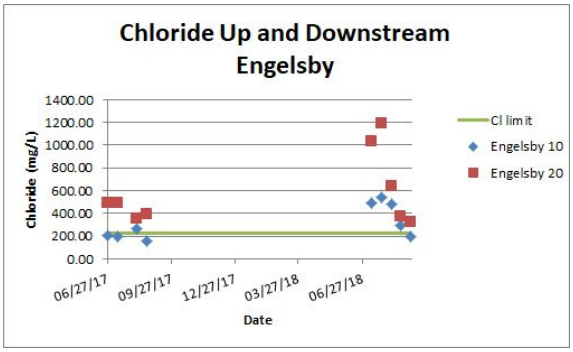
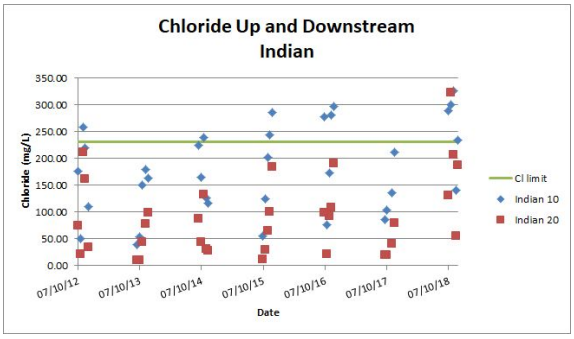
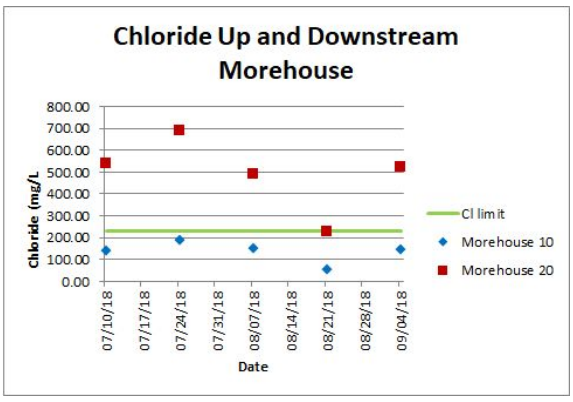
Stream	Test statistic, Critical Value, Two-tailed Alpha Value	Visualization
Centennial	0,6,0.05	

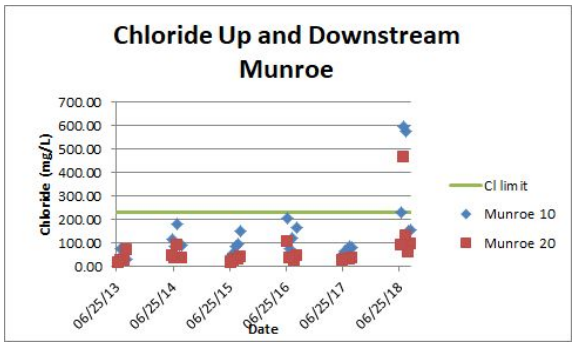
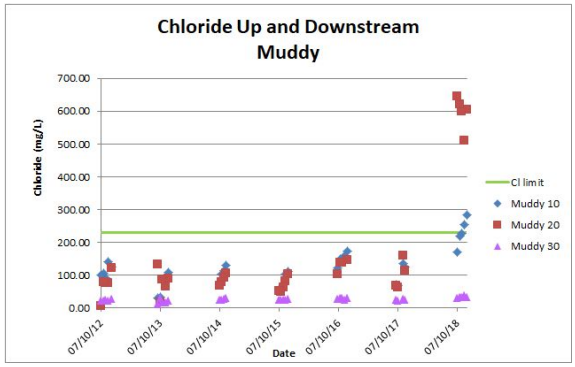
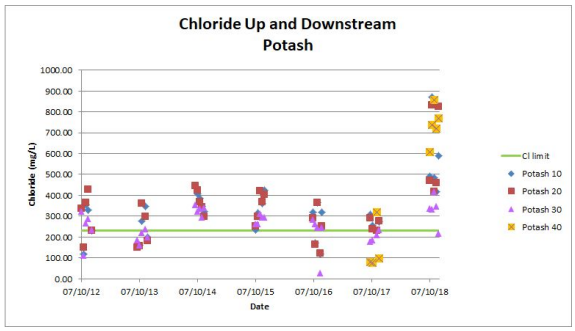
Indian	159, 187, 0.05	
Munroe	90,127,0.05	
Sunderland	0,1, 0.1	

Site	K, Critical Value, Two tailed Alpha Value	Visualization
Muddy	26.85, 5.99, 0.05	
Potash	43.94, 7.81, 0.05	

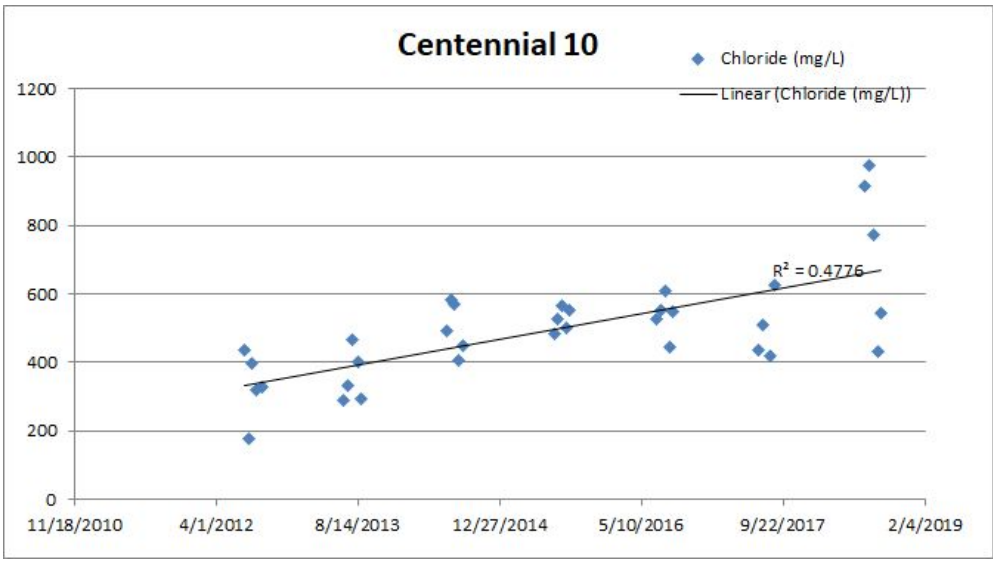
Appendix E. Statistically Different Chloride Up and Downstream

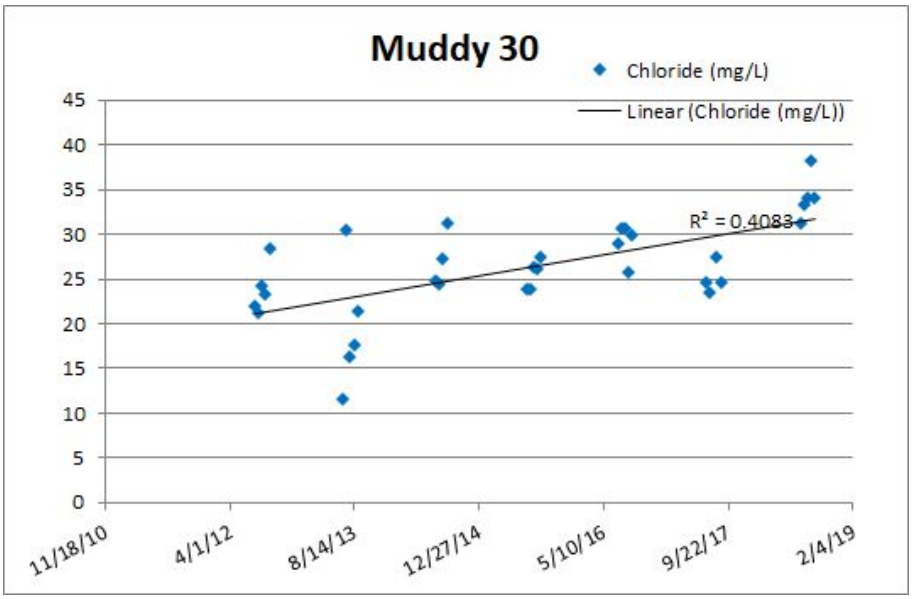
Stream	Test statistic, Critical Value, Two-tailed Alpha Value	Visualization

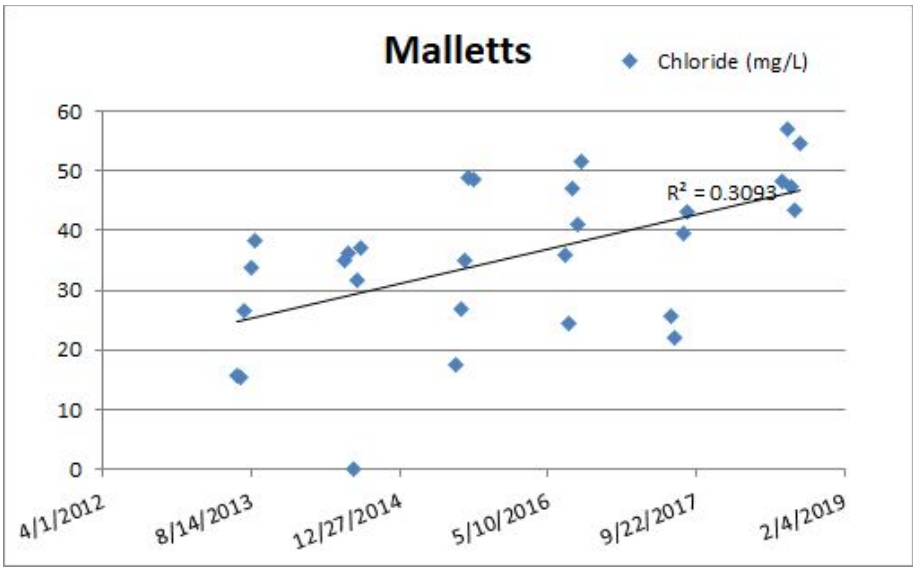
Centennial	0, 6, 0.05	
Engelsby	0, 6, 0.05	
Indian	1, 187, 0.05	
Morehouse	0, 1, 0.1	

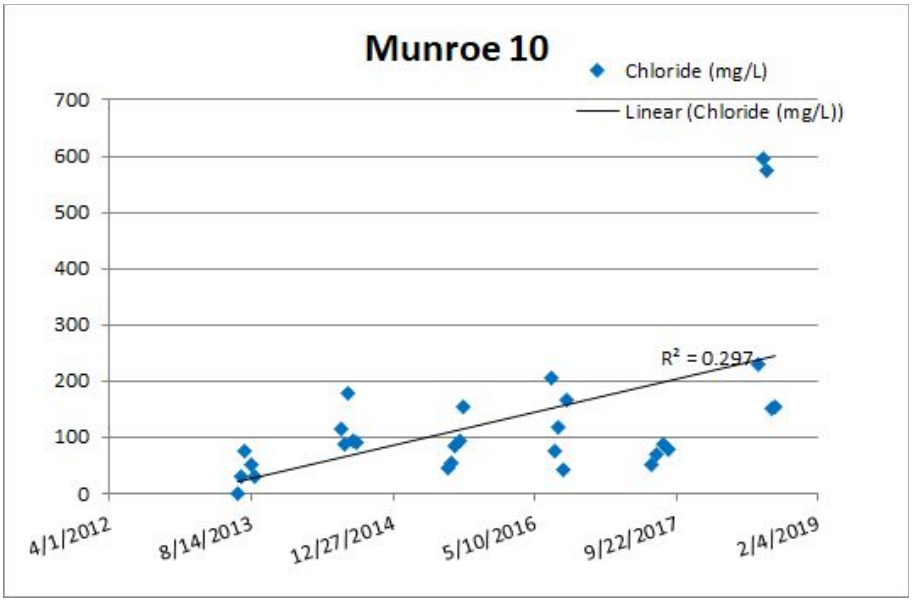
Munroe	9, 117, 0.05	
Site	**K, Critical Value, Two tailed Alpha Value**	**Visualization**
Muddy	57.23, 5.99, 0.05	
Potash	8.33, 7.81, 0.05	

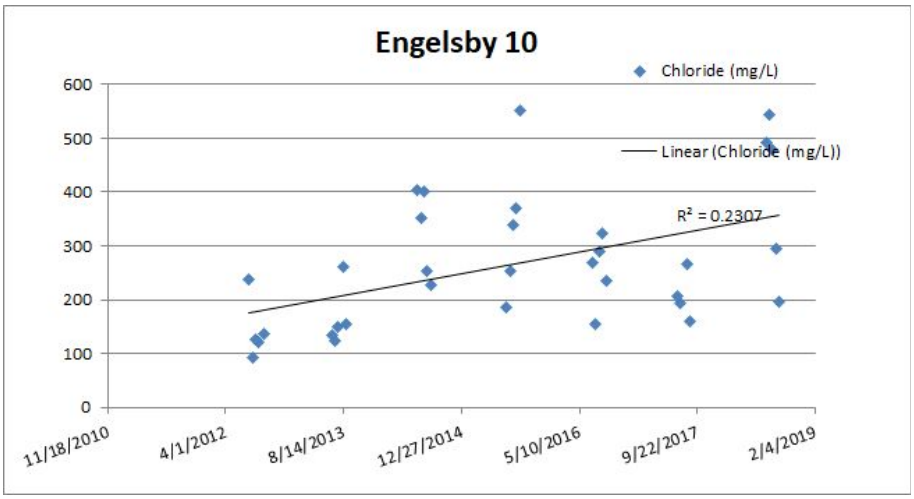
Appendix F. Notable Trends in Chloride Increases Over Time By Site. Sorted in descending order by R2 values.

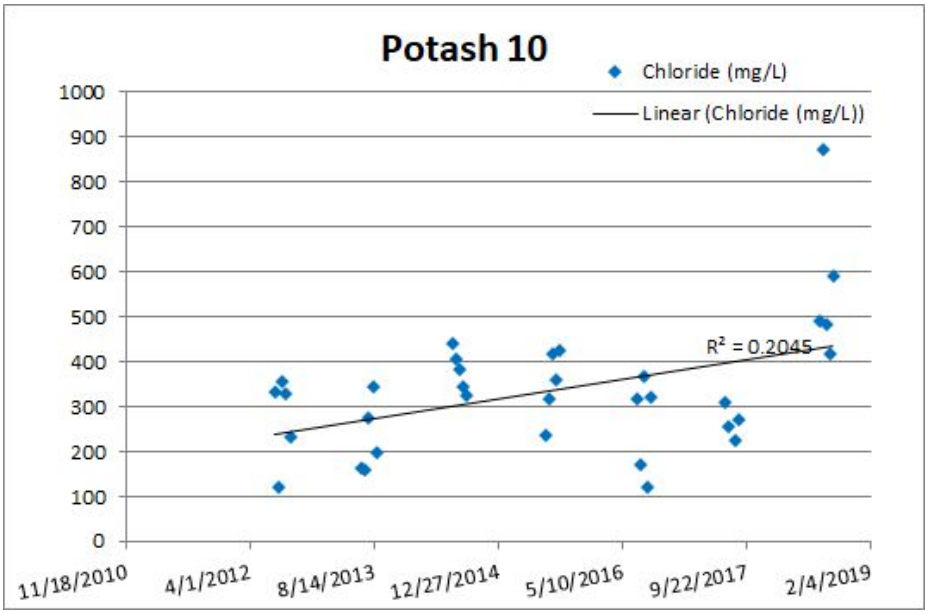

Centennial 10
Chloride (mg/L)
Linear (Chloride (mg/L))
R² = 0.4776
1200
1000
800
600
400
200
0
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019

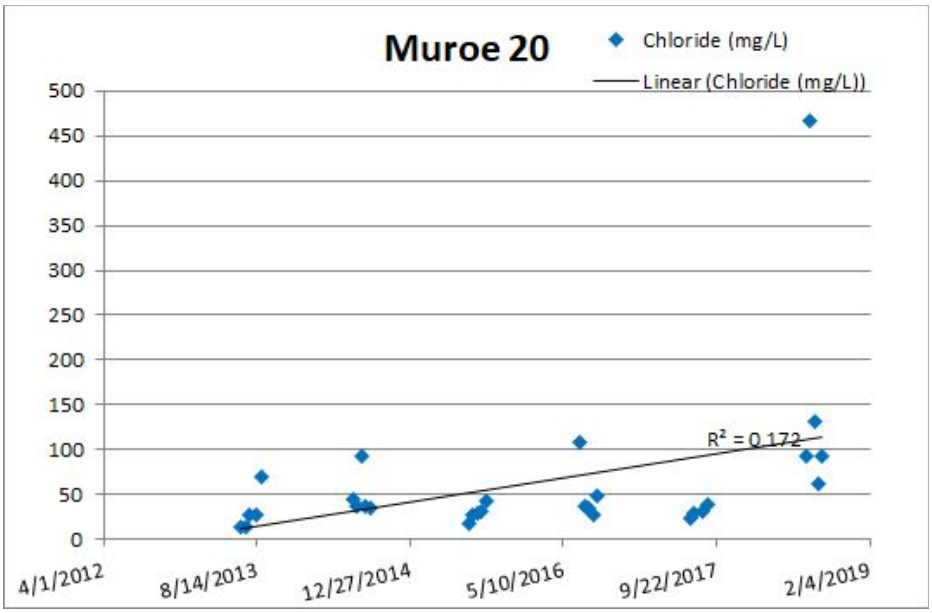

Muddy 30
Chloride (mg/L)
Linear (Chloride (mg/L))
R² = 0.4083
45
40
35
30
25
20
15
10
5
0
11/18/10
4/1/12
8/14/13
12/27/14
5/10/16
9/22/17
2/4/19

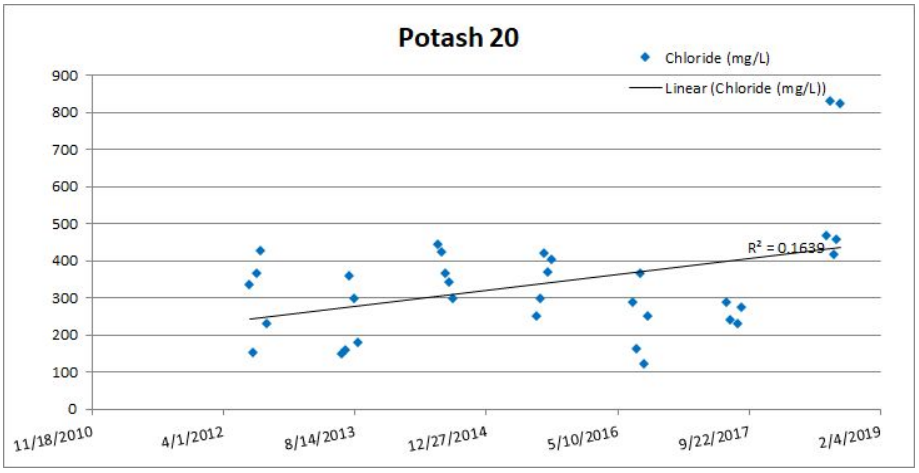

Malletts
Chloride (mg/L)
60
50
40
30
20
10
0
R² = 0.3093
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019

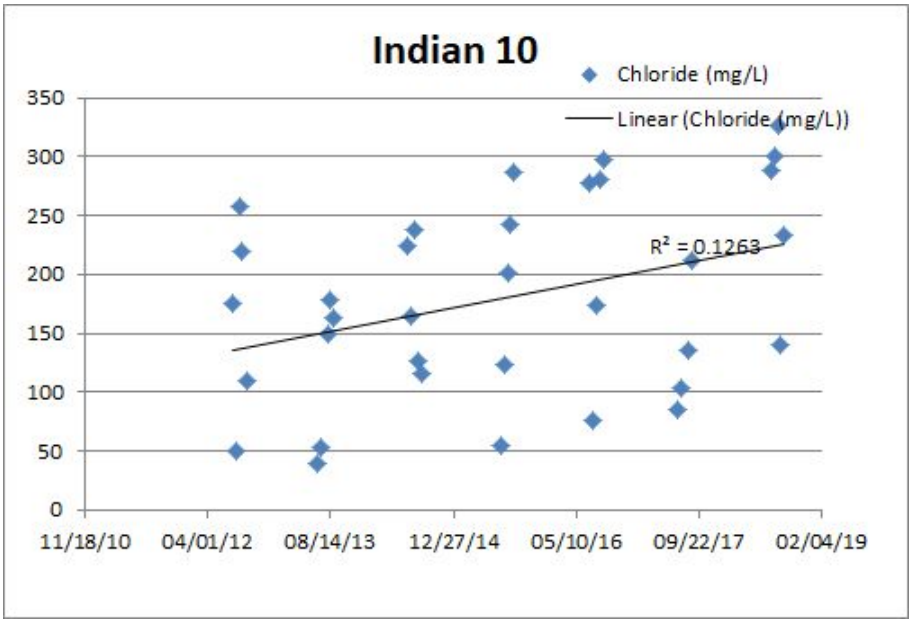

Munroe 10
Chloride (mg/L)
Linear (Chloride (mg/L))
700
600
500
400
300
200
100
0
R² = 0.297
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019

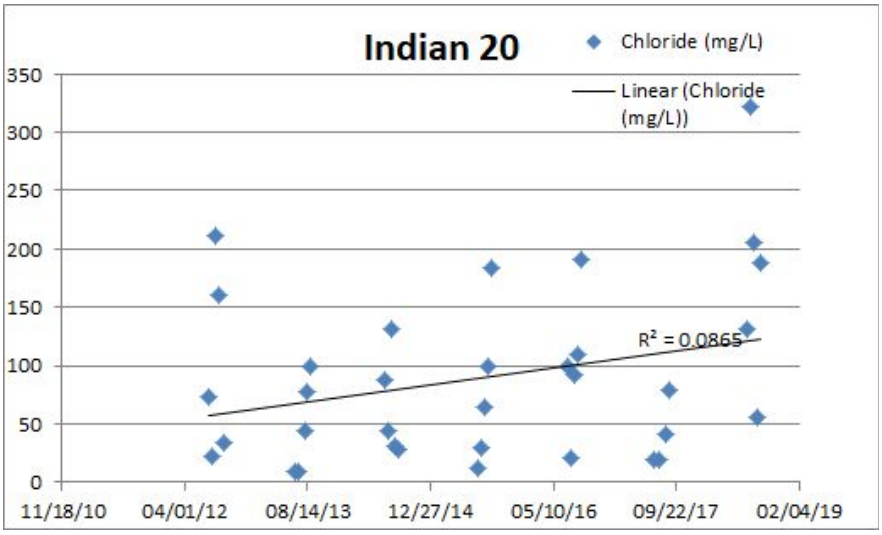

Engelsby 10
Chloride (mg/L)
Linear (Chloride (mg/L))
R² = 0.2307
600
500
400
300
200
100
0
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019


Potash 10
Chloride (mg/L)
Linear (Chloride (mg/L))
R² = 0.2045
1000
900
800
700
600
500
400
300
200
100
0
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019


Muroe 20
Chloride (mg/L)
Linear (Chloride (mg/L))
500
450
400
350
300
250
200
150
100
50
0
R² = 0.172
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019


Potash 20
Chloride (mg/L)
Linear (Chloride (mg/L))
900
800
700
600
500
400
300
200
100
0
R² = 0.1639
11/18/2010
4/1/2012
8/14/2013
12/27/2014
5/10/2016
9/22/2017
2/4/2019


Indian 10
Chloride (mg/L)
Linear (Chloride (mg/L))
R² = 0.1263
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


Indian 20
Chloride (mg/L)
Linear (Chloride (mg/L))
R² = 0.0865
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

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BURLINGTON INTERNATIONAL AIRPORT

Annual Report for General Permit 3-9014 (MS4) including Annual Reporting Summary for MS4-Incorporated Operational Stormwater Discharge Permits

April 1, 2019

Appendix C

Illicit Discharge Detection and Elimination (MCM #3) Including Site Drainage Map

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Appendix C

Minimum Control Measure #3 – Illicit Discharge Detection and Elimination

1) **BMP # 1:** A plan to detect and eliminate all illicit discharges will be developed, implemented, and enforced as part of the SWMP.

   Status: **Completed.** A complete SWMP was submitted in April 2008 for ANR review, and subsequently approved. It has been updated as needed. **The complete SWMP was reviewed and updated on January 23, 2019 as part of the General Permit 3-9014 (2018) MS4 Notice of Intent (NOI) submission including request for incorporation of three (3) Operational Stormwater Discharge Permits, Flow Restoration Plan (FRP), Phosphorus Control Plan (PCP), and Stormwater Pollution Prevention Plan (SWPPP).**

   Timeframe: The SWMP will be reviewed and updated (as required) by December 31st of each year**.**

   Measurable Goals: Measurable goals of this BMP as outlined in the 2013 NOI, and status of these goals in subsequent years are found in the SWMP Summary of Updates found in **Appendix J**. This year's goals are as follows:

   1) BTV will review and update the SWMP each year.

      The SWMP was updated as noted above.

      The SWPPP (SWMP, Volume 2) was updated on January 23, 2019 and on April 1, 2019 to include minor mapping updates including updated outfall numbers, linework from recent construction projects, addition of parcels acquired under the FAA's Airport Noise Compatibility Planning Program since April 1, 2018, addition of the StormTrap stormwater detention/infiltration facility (BMP 20), and documentation of minor fuel spills.

      No other major revisions to the SWMP were required.

      The facility's site drainage plan entitled *Burlington International Airport, Multi-Sector General Permit (MSGP) Site Drainage Map* dated April 1, 2012 with revisions dated April 1, 2019 is presented at the end of Appendix C for reference.

   2) BTV will complete outfall monitoring as outlined in the monitoring schedule contained in the SWPPP (see SWMP – Volume 2).

      BTV has completed outfall monitoring in accordance with the SWPPP for the 2018 – 2019 de-icing season.

3) BTV will participate in annual trainings for airport staff and tenants provided by DEC.

BTV Maintenance staff were unable to attend DEC's municipal employee annual training workshop during the reporting period. BTV plans to send employees to the training in 2019.

Person(s) Responsible for BMP: The Burlington International Airport's illicit discharge detection and elimination plan, and each of the associated activities, will be implemented and overseen by the **Stormwater Management Program Manager**, who is responsible for the overall coordination of the storm water management program at the airport. BTV's Stormwater Management Program Manager is Gene Richards III, Director of Aviation.

Rationale for Selection: Development and implementation of a plan to detect and eliminate illicit discharges, as well as continuation of the ongoing BTV stormwater study program, are paramount to meeting and achieving the goals outlined in the MS4 General Permit.

2) BMP # 2: BTV has revised its approach to providing education on stormwater pollution awareness and water quality issues to employees and tenants as follows:

a. BTV staff were provided with a live training presentation on June 15, 2017, including educational information on stormwater pollution awareness and water quality issues as they affect the BTV facility. The approximately 45-minute training presentation was developed and presented by representatives of Stantec Consulting Services, Inc., who are knowledgeable in stormwater pollution awareness and current water quality issues.

   The presentation was tape-recorded by trained CCTV (Center for Media and Democracy, Channel 17) staff. **Going forward, staff and tenants will be provided with a web based link and a request to view the presentation and accompanying quiz per MS4 permit requirements.**

Status: **On-going.** The presentation took place and was recorded on June 15, 2017. This includes educational information on stormwater pollution awareness and water quality issues as they affect the BTV facility.

Measurable Goals: **BTV documented the number of BTV staff who have received the educational presentation using a sign-in attendance sheet. Going forward, the presentation and quiz will be made available to BTV staff and tenants.**

Person(s) Responsible for BMP: The Burlington International Airport's illicit discharge detection and elimination program and each of the associated activities will be implemented and overseen by the **Stormwater Management Program Manager**, who is responsible for the overall coordination of the storm water management program (SWMP) at the airport.

Rationale for Selection: Providing education on stormwater pollution awareness and water quality issues affords prospective employees and tenants with knowledge of how the BTV site is interconnected with the surrounding environment, and in what way can their actions have a direct impact on that environment.

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STORMWATER DISCHARGE POINTS FOR THE BURLINGTON INTERNATIONAL AIRPORT

OUTFALL NUMBER	DISCHARGE DESIGNATION	STRUCTURE DESIGNATION	LATITUDE – NORTH				LONGITUDE – WEST			
			DEGREES	MINUTES	DEGREES	DECIMAL	DEGREES	MINUTES	DEGREES	DECIMAL
1	Q001A	S1.000	44	28	56.68	44.482411	73	10	12.06	73.170017
2	AP700	S7.001	44	28	41.52	44.478200	73	10	5.55	73.168208
3	CN001	CN001	44	28	26.26	44.473961	73	9	35.46	73.159850
4	SW001	SW001	44	27	47.51	44.463197	73	9	14.50	73.154028
5	P007	S2.042	44	27	46.85	44.463014	73	9	8.82	73.152450
6	P006	S2.033	44	27	47.09	44.463081	73	9	8.48	73.152356
7	P005	S2.020	44	27	48.23	44.463397	73	9	1.84	73.150511
8	P001	S2.001	44	27	48.19	44.463386	73	8	57.68	73.149356
9	P002	S3.001	44	27	46.54	44.462928	73	8	54.60	73.148500
10	MU01	S3.043	44	27	43.78	44.462161	73	8	49.62	73.147117
11	MU02	S3.007	44	27	47.10	44.463083	73	8	42.67	73.145186
12	MU03	S3.039	44	27	43.33	44.462036	73	8	38.86	73.144128
13	MU04	S3.033	44	27	41.16	44.461433	73	8	34.77	73.142992
14	MU05	S3.023	44	27	39.65	44.461014	73	8	34.88	73.143022
15	D018	S4.001	44	27	52.01	44.464447	73	8	19.50	73.138750
16	NG001–P	S6.016	44	28	46.20	44.479500	73	9	23.74	73.156594
17	NG002–N	S6.012	44	28	49.05	44.480292	73	9	32.34	73.158983
18	NG003–O	S6.005.0	44	28	52.44	44.481233	73	9	36.89	73.160247
19	NG004–M	S6.001	44	28	54.67	44.481853	73	9	40.56	73.161267

Stantec

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55 Green Mountain Drive
South Burlington VT U.S.A.
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Consultants

BURLINGTON INTERNATIONAL AIRPORT

Legend

- BTV APPROXIMATE PRINCIPAL BOUNDARY (AIRPORT PROPER)
- APPROXIMATE LEASE LINE(S) TO FEDERAL GOVERNMENT
- BTV APPROXIMATE RUNWAY SAFETY AREA
- DRAINAGE AREA BOUNDARY
- ADDITIONAL PROPERTIES OWNED BY THE BURLINGTON INTERNATIONAL AIRPORT OBTAINED THROUGH THE HOME ACQUISITION NOISE COMPATIBILITY PROGRAM

Notes

1. PROPERTY LINES SHOWN ARE FROM GIS MAPPING AND HAVE BEEN MODIFIED SLIGHTLY TO BETTER DEPICT THE BOUNDARY OF THE BURLINGTON INTERNATIONAL AIRPORT.

2. DUE TO SOME DISTORTION IN THE PHOTOGRAPH BASE, SOME GIS PROPERTY LINES MAY NOT FIT THE PHYSICAL FEATURES SHOWN IN THE PHOTO.

3. A BASE PHOTO, FROM THE AUTUMN OF 2011, HAS BEEN USED AS A BASIS OF CALCULATING IMPERVIOUS AREAS. THE PHOTO DID NOT ADEQUATELY COVER THE AREA SHOWN BETWEEN AIRPORT PARKWAY AND THE WINOOSKI RIVER, THEREFORE, A PHOTO FROM 2006 HAS BEEN STITCHED IN TO SHOW THAT AREA.

4. THE DRAINAGE SYSTEM MAPPING SHOWN ON THIS DRAWING WAS ORIGINALLY PREPARED IN 1997 BY DONALD L. HAMLIN CONSULTING ENGINEERS, INC. THE HAMLIN DRAINAGE SYSTEM MAPPING WAS UPDATED BY STANTEC TO REFLECT NEW IMPROVEMENT PROJECTS COMPLETED THROUGH APRIL, 2013 AND A PARTIAL FIELD SURVEY PERFORMED IN THE SUMMER AND FALL OF 2011. THE UPDATED MAPPING DOES NOT INCLUDE DRAINAGE SYSTEM INFORMATION FOR THE ARMY AVIATION SUPPORT FACILITY LOCATED AT THE NORTH END OF THE AIRPORT.

5. "VTANG INSPECTED AREA" INDICATES DRAINAGE FEATURES THAT ARE PORTIONS OF PERMITS ISSUED TO THE VERMONT AIR NATIONAL GUARD RATHER THAN THE BURLINGTON AIRPORT AND INSPECTED BY THE GUARD.

Supplemental Legend

DRAINAGE DISCHARGE POINT
- AP__ FINAL DISCHARGE TO UNNAMED TRIBUTARY OF THE WINOOSKI RIVER
- CN__ NON-POINT SOURCE DISCHARGE TO CENTENNIAL BROOK
- D__ FINAL DISCHARGE TO MUDDY BROOK
- MU__ INTERNAL DISCHARGE TO MUDDY BROOK
- NG__ ALONG NATIONAL GUARD AVENUE
- PO__ TO POTASH BROOK
- Q__ TO UNNAMED TRIBUTARY OF WINOOSKI RIVER
- SW__ TO SO. BURLINGTON MUNICIPAL SEWER SYSTEM
- ____ MSGP BENCHMARK SAMPLING POINT

BMP (BEST MANAGEMENT PRACTICE)
- BMP__ STORMWATER DETENTION BASIN
- BMP__ STORMWATER INFILTRATION CHAMBER
- BMP__ OIL/GREASE SEPARATOR
- BMP__ EXFILTRATING SAND FILTER
- BMP__ SWIRL CONCENTRATOR DEVICE

PPS (POSSIBLE POLLUTION SOURCE)
- PPS__ CONTAMINANT STORAGE
- PPS__ AIRCRAFT DE-ICING
- PPS__ GAS/FUEL PUMP OR STORAGE
- PPS__ OLD EQUIPMENT STORAGE
- PPS__ MATERIAL STOCKPILE LOCATION
- 35 BUILDING NUMBER, SEE TABLE 1 OF REPORT
- DRAINAGE MANHOLE
- DRAINAGE MANHOLE (NOT BTV RESPONSIBILITY)
- CATCH BASIN
- CATCH BASIN (NOT BTV RESPONSIBILITY)
- S1.040.0 DRAINAGE STRUCTURE NUMBER
- DIRECTION OF FLOW

PROPOSED FRP BMP:
- CB00__ CENTENNIAL BROOK FRP
- PB00__ POTASH BROOK FRP

		By	Appd.	YY.MM.DD
10	MINOR CHANGES FOR 2019 REPORT	DDH	DMC	19.04.01
9	RE-NUMBER OUTFALLS; ADD NEW CONSTRUCTION	DDH	DMC	19.01.23
8	DRAWING CHANGES/ADDITONS; REDEFINE BMP13	DDH	DMC	18.04.01
7	DRAWING CHANGES/ADDITIONS; PERMIT NUMBERS	DDH	DMC	17.04.01
6	FRP SUBMISSION	DDH	DMC	16.10.01

Revision

Issued — By — Appd. — YY.MM.DD

File Name: Bedsheet.dwg — DDH Dwn. — DMC Chkd. — DMC Dsgn. — 12.04.01 YY.MM.DD

Permit-Seal

Client/Project
CITY OF BURLINGTON
BURLINGTON INTERNATIONAL AIRPORT

Title
MULTI - SECTOR GENERAL PERMIT (MSGP) SITE DRAINAGE MAP

Project No.	Scale	
195311640	1" = 200'	
Drawing No.	Sheet	Revision
1	1 of 1	10

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BURLINGTON INTERNATIONAL AIRPORT

Annual Report for General Permit 3-9014 (MS4) including Annual Reporting Summary for MS4-Incorporated Operational Stormwater Discharge Permits

April 1, 2019

Appendix D

Construction Site Stormwater Runoff Control (MCM #4) Including Individual Construction Stormwater Discharge Permits (INDC's) Issued in 2018

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Appendix D

Minimum Control Measure #4 – Construction Site Runoff Control

1) **BMP # 1:** A plan to prevent or reduce pollutants in construction site runoff will be developed, implemented, and enforced as part of the SWMP.

   Status: **Completed. The Construction Site Runoff Control Plan is contained in the SWMP, Volume 1 – Section 2.4.**

   Timeframe: The SWMP will be reviewed and updated (as required) by December 31st of each year.

   Measurable Goals: All new projects will be covered by the applicable State stormwater permit and/or conform to BTV policy.

   BTV is now required to submit Individual Construction Stormwater Discharge Permit (INDC) applications rather than Construction General Permit (CGP) applications for all construction at the airport. BTV applied for no INDC Permit authorizations during the reporting period.

   Person(s) Responsible for BMP: The Burlington International Airport's construction site runoff control plan and each of the associated policies will be implemented and overseen by the **Stormwater Management Program Manager**, who is responsible for the overall coordination of the storm water management program at the airport.

   Rationale for Selection: Development and implementation of a plan to prevent or reduce pollutants in construction site runoff, including compliance with the ANR CGP, is the most effective way to ensure appropriate protection of waters of the state during construction activities.

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BURLINGTON INTERNATIONAL AIRPORT

Annual Report for General Permit 3-9014 (MS4) including Annual Reporting Summary for MS4-Incorporated Operational Stormwater Discharge Permits

April 1, 2019

Appendix E

Post Construction Stormwater Management for New Development and Redevelopment (MCM #5) Including Operational Stormwater Discharge Permits Issued in 2018

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Appendix E

Minimum Control Measure #5 – Post-Construction Runoff Control

1) **BMP # 1:** A plan to prevent or reduce pollutants in post-construction site runoff will be developed, implemented, and enforced as part of the SWMP.

   Status: **Completed. The Post-Construction Runoff Control Plan is contained in SWMP, Volume 1 – Section 2.5.**

   Timeframe: The SWMP will be reviewed and updated (as required) by December 31st of each year.

   Measurable Goals: 1) All new projects will be covered by the applicable State stormwater permit and/or conform to BTV policy.

   In order to identify projects that may require an operational Stormwater Discharge Permit, the following processes have been followed:

   - Meet with VT ANR Stormwater Section personnel to discuss and review the project during design phase.
   - Follow direction or finding(s) provided by VT ANR Stormwater Section personnel as to whether an operational Stormwater Discharge Permit is required.
   - Document direction or finding(s) in meeting notes or meeting minutes.

BTV applied for no new INDC Permit authorizations during the reporting period. However, BTV submitted one INDS Permit amendment during the reporting period for the following:

- **A permit amendment was submitted on January 22, 2019 for Permit No. 3028-INDS.6 (Parallel Taxiway 'G', Phase 2) as issued March 27, 2017 for VT DEC review and approval. Amendment authorization is currently pending. It is anticipated that the Amendment will be authorized on or about March 25, 2019.**

A Post-construction site inspection was completed in 2018 for the following projects:

- **House Removal on Airport-Acquired Land.**
- **A segment of Parallel Taxiway 'G', Phase 2 including Phases 1A & 1B**
- **Various segments of VT ANG Taxiway 'F' Widening and a portion of Reconstruct, Mark, and Groove Runway 15-33 (inspected by VT ANG).**

Person(s) Responsible for BMP: The Burlington International Airport's post construction runoff control plan and each of the associated policies will be implemented and overseen by the **Stormwater Management Program Manager**, who is responsible for the overall coordination of the storm water management program at the airport.

Rationale for Selection: Development and implementation of a plan to prevent or reduce pollutants in post-construction site runoff, including compliance with the ANR Stormwater Rule, is the most effective way to ensure appropriate protection of waters of the state following the completion of construction activities.

BURLINGTON INTERNATIONAL AIRPORT

Annual Report for General Permit
3-9014 (MS4)
including
Annual Reporting Summary for
MS4-Incorporated Operational
Stormwater Discharge Permits

April 1, 2019

Appendix F

Pollution Prevention and Good Housekeeping (MCM #6)
Including Field Inspection Maintenance Recommendations

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Appendix F

Minimum Control Measure #6 – Pollution Prevention/Good Housekeeping

1) BMP # 1: A plan to ensure good housekeeping practices and pollution prevention will be developed, implemented, and enforced as part of the SWMP. The plan will be developed and implemented such that is also meets the requirements of the SWPPP as outlined in the MSGP.

Status: **Completed.** The Burlington International Airport is a non-traditional MS4 and it has coverage under the NPDES Phase II Multi Sector General Permit (MSGP). One condition under the MSGP is development of a Storm Water Pollution Prevention Plan (SWPPP) that includes measures for pollution prevention and good housekeeping. BTV has included the SWPPP as Volume 2 of the SWMP to meet the requirements of this BMP. As previously discussed, the SWPPP has been revised and updated by Stantec annually since 2011. **The SWMP has been reviewed and updated as part of the General Permit 3-9014 MS4 conditions.**

In addition, BTV now has a Spill Prevention, Control, and Countermeasure Plan (SPCCP) prepared by ATC Group Services, LLC (dated February 8, 2017) to help meet this measure. The SPCCP has been incorporated as an appendix into BTV's SWPPP.

Timeframe: The SWMP will be reviewed and updated (as required) by December 31st of each year.

Measurable Goals: Annually, all catch basins will be inspected and cleaned if necessary. In the event that a catch basin with a standard sump depth of 24" is inspected and found to contain greater than 12" depth of sediment, a recommendation will be made to clean out the sump.

Nearly all catch basins were inspected in 2018, with many proposed for maintenance. In 2018, a total of 10 cubic yards of sediment was removed from catch basins. A listing of catch basins and drainage manholes requiring further maintenance is presented at the end of this Appendix in the Summary of Maintenance Recommendations for 2018.

Person(s) Responsible for BMP: The Burlington International Airport's pollution prevention and good housekeeping plan and each of the associated policies will be implemented and overseen by the **Stormwater Management Program Manager**, who is responsible for the overall coordination of the storm water management program at the airport.

Rationale for Selection: Development and implementation of a plan to prevent or reduce pollutants in site runoff and encourage good housekeeping and pollution prevention practices is the most effective way to ensure appropriate protection of waters of the state.

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The following maintenance items are recommended to be performed on structures inside the airport perimeter security fence:

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3028-9010.A, BTV Master Permit) S/N 001 (Terminal apron trench; airport runway; attenuation basin) S1.003.0 – S1.016.0 replaced during 2018 Taxiway Golf replacement project and not made part of these recommendations	
SEDIMENT ISSUES: remove sediment from the following: Main Air Carrier Ramp area 1. ~~S1.024.0, possible depth issue. S1.026, S1.027, S1.032~~ 2. Excavate S1.002 and S1.002.1 (during Taxiway G construction)	DONE 2018
VEGETATION ISSUES: remove sod, plant grass, etc. S1.024.5, sod in area gone, soil entering structure, seed and stabilize	30 Sep 2019
CULVERT ISSUES: remove brush from inlet and outlet ~~S1.073 and S1.074 located at the north end of the north service road near the ILS crossing~~	DONE

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3028-9010.A, BTV Master Permit) S/N 002 (NOTE2 apron; swirl chamber; infiltration galleries)	
SEDIMENT ISSUES: remove sediment from the following: ~~S1.016.1, [11' deep]~~ S1.021.0 along edge north service road.	DONE INACCESSIBLE

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3028-9010.A, BTV Master Permit) S/N 003 (Deck of new parking garage; rental lot; Loop Road extension, parking garage exit ramp)	
None this report.	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3028-9010.A, BTV Master Permit) S/N 005 (Pratt and Whitney building and parking area)	
None this report.	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3028-9010.A, BTV Master Permit) S/N 007 (Aviation Support Hangar roof and paved parking area)	
None this report.	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3028-9010.A, BTV Master Permit) S/N 008 (Parking areas, swirl chamber, Valley West Apron)	
None this report.	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 1-1391) S/N 001 (South Apron Expansion; Vortechnics unit, pipes, and basins)	
BOOM ISSUE: remove stray hydrophobic booms from the following: ~~S2.028.3, and~~ S2.028.5.0, on the south end of the Main Air Carrier Ramp.	DONE NOT FOUND

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 1-0839) S/N 002 (Both edges of R/W 1-19, south of T/W ‘A’ and T/W ‘B’); additional structures near Maintenance Shop and Aviatron	
None this report	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3028-9010.2) S/N 001 (Taxiway B, C, J, and G to Muddy Brook)	
SEDIMENT ISSUE: ~~S4.010 and S4.011.0 (T/W Kilo)~~	DONE

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly 3028-INDS.AR) Reconstruct TW B & C; Relocate TW J; Construct TW G (Potash Brook) S/N 002 (northerly and parallel to T/W Charlie)	
None this report.	N/A

Permit 3028-INDS.7 VT ANG Taxiway 'F' Widening and a Portion of Reconstruct, Mark, and Groove Runway 15-33. S/N 001 (East of T/W Golf and West of R/W 15-33)	
None this report.	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit 3028-INDS.7 VT ANG Taxiway 'F' Widening and a Portion of Reconstruct, Mark, and Groove Runway 15-33. S/N 002 (Vermont Air National Guard side of the airfield, north end)	
None this report.	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit 3028-INDS.7 VT ANG Taxiway 'F' Widening and a Portion of Reconstruct, Mark, and Groove Runway 15-33. S/N 004 (Infield formed by R/W 15-33, R/W 1-19, and T/W Bravo)	
None this report	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit 3028-INDS.7 VT ANG Taxiway 'F' Widening and a Portion of Reconstruct, Mark, and Groove Runway 15-33. S/N 006 (Vermont Air National Guard side of the airfield, south end)	
None this report.	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3845-9010) S/N 001 (Heritage Aviation Campus; rooftops and roadways	
None this report	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3028-INDS.3) Aircraft Sewage Receiving Station S/N 001 (Aircraft Sewage Receiving Station)	
None this report.	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly 3028-9015.2) Construct, Mark and Light Taxiway "G"/"K' S/N 001 (Both sides of T/W Kilo between T/W Juliet and T/W Bravo)	
SEDIMENT ISSUES: remove sediment from the following: ~~S4.011.1 and S4.011.2 (T/W Kilo)~~	DONE
SINKHOLE ISSUES: remove erosion mat and fix sinkholes ~~S4.012.1 (T/W Kilo)~~	DONE
EROSION MATS: remove erosion mats and dispose of them ~~S4.011.1, S4.012.1, S4.013.1, S4.011.2, S4.011.3, S4.011.4, S4.011.5, S4.011.6, (T/W Kilo)~~	DONE

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4, areas not associated with any other numbered permit Area 001 (Near intersection of Airport Drive and Williston Road)	
BRICK ISSUES: replace broken rim bricks at the following: S2.025.1 near Heritage West Terminal/Beacon	30 Sep 2019

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4, areas not associated with any other numbered permit Area 002 (Terminal Loop; carwash area; cell phone lot; FAA ATCT complex)	
None this report.	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4, areas not associated with any other numbered permit Area 003 (South end of airfield; Valley Road; “the Valley;” Vermont Air National Guard)	
SINKHOLE ISSUES: fill and stabilize sinkholes at: south of south overrun **S4.004.0, rim off center as well, potential hazard** S4.004.1, sinkholes around discharge apron	**ASAP** 30 Sep 2019

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4, areas not associated with any other numbered permit Area 004 (890 Ramp; Heritage Aviation)	
None this report.	N/A

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Note: On October 1, 2018, officials of the Burlington International Airport developed a list of maintenance items beyond the scope of their maintenance workers equipment and/or capabilities. The resulting document will be advertised for completion by an outside contractor. Those items appear in the tables below as "Added to the expanded maintenance list."

The following maintenance items are recommended to be performed on structures outside the airport perimeter security fence:

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3028-9010.A, BTV Master Permit) S/N 001 (Terminal apron trench; airport runway; attenuation basin)	
1. ATTENUATION BASIN: basin in poor condition but working During the 2019 construction season, the channel linking the system outfall at S1.000 (Q001A) and the attenuation basin will be cleaned up and lined with stone, sediment will be removed from the basin.	During 2020 Construction Season
2. Repair the rim grout at S1.048.1 in the rental vehicle carwash: ADDED TO EXPANDED MAINTENANCE LIST	30 Sep 2019

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3028-9010.A, BTV Master Permit) S/N 003 (Deck of new parking garage; rental lot; Loop Road extension, parking garage exit ramp)	
S1.054: drill out Allen head screws, replace with bolts S1.058.0: repair frame and cover so it will easily open	30 Sep 2019 30 Sep 2019

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3028-9010.A, BTV Master Permit) S/N 004 (Employee and long term parking lot defined as "Catchment #2")	
SEDIMENT ISSUES: remove sediment from the following: S1.039.0, S1.039.1, S1.040.0, & S1.040.1 in taxi overflow parking area	30 Sep 2019
CULVERT ISSUE: Remove sediment and trash from: S1.071 and S1.072 inside the rental carwash area	30 Sep 2019

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3028-9010.A, BTV Master Permit) S/N 005 (Pratt and Whitney building and parking area)	
Clean up stone and sod around catch basin inlet: S3.010.2	30 Sep 2019
Repair erosion of bricks under the frame: S3.010.3 ADDED TO EXPANDED MAINTENANCE LIST	30 Sep 2019

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3028-9010.A, BTV Master Permit) S/N 006 (Pratt and Whitney access road and overland flow and culvert)	
None this report.	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3028-9010.A, BTV Master Permit) S/N 007 (Aviation Support Hangar roof and paved parking area)	
SEDIMENT ISSUE: remove sediment from the following:	
S3.009.9: repair lawn where sand is running into catch basin first, then remove sediment from sump	30 Sep 2019

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3028-9010.A, BTV Master Permit) S/N 009 (Old South End Quarry)	
No structures to inspect, site is in good condition.	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 1-0839) S/N 002 (Both edges of R/W 1-19, south of T/W 'A' and T/W 'B'); additional structures near Maintenance Shop and Aviatron	
VEGETATION ISSUE: S3.005, remove brush, leaves, other debris from discharge apron in the vicinity of the Aviatron building adjacent to Aviation Avenue and S3.006, the catch basin at the easterly end of the Aviatron building CULVERT ISSUE: Culvert S3.045, S3.046 to be filled with concrete fill ADDED TO THE EXPANDED MAINTENANCE LIST.	30 Sep 2019 Requires 3rd party contractor (pending)

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit 3028-INDS.7 VT ANG Taxiway 'F' Widening and a Portion of Reconstruct, Mark, and Groove Runway 15-33 S/N 002 (Vermont Air National Guard side of the airfield, north end)	
Provide a discharge apron on the culvert at S6.008 below National Guard Avenue. ADDED TO THE EXPANDED MAINTENANCE LIST	30 Sep 2019

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3845-9010) S/N 001 (Heritage Aviation Campus; rooftops and roadways	
None this report.	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3845-9010) S/N 002 (Heritage Flight Facility campus, bio-retention basin)	
VEGETATION ISSUES: S3.018.0, S3.019.0, remove debris from behind screen at basin inlet	30 Sep 2019

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3028-9015.1) Quarry Access Road S/N 001 (Quarry Access Road)	
None this inspection	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4 (formerly Permit 3845-9015.1) Heritage Aviation Parking Lot S/N 001 (Heritage Flight Parking Lot)	
None this inspection	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4, areas not associated with any other numbered permit Area 001 (Near intersection of Airport Drive and Williston Road)	
None this report.	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4, areas not associated with any other numbered permit Area 002 (Terminal Loop; carwash area; cell phone lot; FAA ATCT complex)	
SEDIMENT ISSUE: investigate grate and remove sediment from: S2.027.8, rim loose, cover will not open, northwest corner of North Hangar S1.061.1, and S1.063.1 next to the terminal loop road	 30 Sep 2019 30 Sep 2019

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4, areas not associated with any other numbered permit Area 003 (South end of airfield; Valley Road; "the Valley;" Vermont Air National Guard)	
DISCHARGE APRON: add discharge apron below outlet pipe S3.023 below Valley Road: ADDED TO EXPANDED MAINTENANCE LIST	30 Sep 2019
SEDIMENT ISSUE: clean the sediment blocking the discharge openings S3.024.0, S3.025, and S3.026 dry wells, northeast end of Valley Road	30 Sep 2019
SEDIMENT ISSUE: remove sediment from the following: S3.028.0, S3.028.1, and S3.029	30 Sep 2019
VEGETATION ISSUE: remove brush around catch basin S3.040 near flight school but outside of fence	30 Sep 2019

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4, areas not associated with any other numbered permit Area 004 (890 Ramp; Heritage Aviation)	
None this report.	N/A

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Permit MS-4, areas not associated with any other numbered permit Area 005 (700 Airport Parkway)	
SEDIMENT ISSUES: remove sediment from the following: S7.004 and S7.005 in the along the roadside edge of the parking lot	30 Sep 2019
BROKEN GRATES: replace the following grates: S7.004: 2 ft x 2 ft square grate S7.005; 2 ft diameter ADDED TO EXPANDED MAINTENANCE LIST	 30 Sep 2019 30 Sep 2019

PERMIT NUMBER/DISCHARGE SERIAL NUMBER	ANTICIPATED COMPLETION DATE
Additional items added to the Expanded Maintenance List after the comprehensive inspection of May 2018	
ADJUST FRAMES AND GRATES, REPAIR BRICKS, REPAIR GROUT, ADJUST ELEVATION, RE-PAVE PER EXPANDED MAINT. LIST: - S1.058.1; S1.058.2; S1.058.3; S1.060.0; S1.061.0; S1.063.0; S1.064.2.1; S1.064.3; and S1.056.1.2 on the Terminal Loop Road - S1.040.0; S1.040.1; S1.041.1; S1.047.3.0 in the parking areas north of the parking garage	30 Sep 2019

BURLINGTON INTERNATIONAL AIRPORT

Annual Report for General Permit 3-9014 (MS4) including Annual Reporting Summary for MS4-Incorporated Operational Stormwater Discharge Permits

April 1, 2019

Appendix G

Semi-Annual Flow Restoration Plan (FRP) Report Dated April 1, 2019

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April 1, 2019
File: 195311640

Attention: Christy Witters, AICP, MS4 and MSGP Program Coordinator
Vermont DEC – Watershed Management Division
Stormwater Management Program
One National Life Drive, Main 2
Montpelier, VT 05620-3522

Dear Christy,

Reference: Burlington International Airport (BTV)
General Permit 3-9014 (2012) MS4
Semi-Annual Flow Restoration Report for Permit No. 7021-9014

On behalf of the City of Burlington, Burlington International Airport (BTV), this report shall serve as BTV's Semi-Annual Flow Restoration Plan (FRP) Report for Permit No. 7021-9014 [Municipal Separate Storm Sewer System (MS4) General Permit 3-9014]. This semi-annual report details BTV's development and implementation progress of the FRP from October 1, 2018 through April 1, 2019. The report includes a status update on BTV's FRP, Flow Monitoring Program, and incorporation of expired permits.

It is important to note that to date, BTV is currently covered under the General Permit 3-9014 (2012) MS4 as issued on December 5, 2012. General Permit 3-9014 (2018) MS4 was issued on July 27, 2018. Subsequently, BTV submitted a Notice of Intent (NOI) along with an updated SWMP for VT. DEC review and approval on January 23, 2019. BTV anticipates Permit No. 7021-9014.A2R to be issued sometime in the near future. Once issued, the FRP reporting requirement will change from semi-annual to annual. BTV's next annual report will, therefore, be submitted on or before April 1, 2020.

The original text from BTV's FRP as submitted to Vermont DEC on September 30, 2016 and as revised on May 5, 2017 is included below in *italics* with status updates noted in a **bold** font.

INTRODUCTION

BTV has five outfalls that discharge to Potash Brook, a stormwater impaired water with an approved Total Maximum Daily Load (TMDL). The outfalls discharge to a Class 2 wetland that is contiguous to Potash Brook. In addition, BTV has one non-point source discharge to Centennial Brook, another stormwater impaired water with an approved TMDL. As such, BTV is responsible for development and implementation of an FRP for the portions of the Potash Brook and Centennial Brook watersheds within its boundaries. MS4 communities that discharge into the same

stormwater impaired watershed may elect to cooperate to develop a single FRP for the watershed. To that end, BTV is collaborating with the City of South Burlington on these FRPs.

FLOW RESTORATION PLAN

The City of South Burlington has developed an FRP for the Potash Brook watershed. The Potash Brook FRP will become part of the Stormwater Management Plans (SWMPs) prepared by the MS4 permittees in the Potash Brook watershed, including the City of South Burlington, the Vermont Agency of Transportation (VTrans), the City of Burlington, the University of Vermont (UVM), and BTV. The Potash Brook FRP will act as a guidance document for the MS4 entities as they implement the stormwater Best Management Practices (BMPs) necessary to attain the flow restoration targets established by the Potash Brook TMDL. The Potash Brook TMDL was approved by the U.S. Environmental Protection Agency (EPA) on December 19, 2006. The TMDL suggests an 11.2% increase in stream flow during low flow conditions, and requires a 16.5% reduction in stream flow during high flow conditions (established as the 1-year storm event).

The City of South Burlington has also developed an FRP for the Centennial Brook watershed, which will act as a guidance document for the MS4 entities as they implement the stormwater BMPs necessary to attain the flow restoration targets established by the Centennial Brook TMDL. The Centennial Brook TMDL was approved by the U.S. EPA on September 28, 2007. This TMDL suggests a 23.2% increase in stream flow during low flow conditions, and requires a 63.4% reduction in stream flow during high flow conditions (established as the 1-year storm event). The Chittenden County Regional Planning Commission (CCRPC) completed a study in July, 2013 to estimate the expected non-jurisdictional impervious area future growth in the Centennial Brook watershed over the next 20 years. The CCRPC study resulted in a reduction of the high flow target from 63.4% to 51.6%, and this is the target used in the City of South Burlington's Centennial Brook FRP.

In accordance with the requirements in the MS4 General Permit, the FRP for discharges to impaired waters with an approved TMDL (Potash Brook and Centennial Brook) contain the following elements:

- *Identification of Required Controls*
- *Design and Construction Schedule*
- *Financial Plan*
- *Regulatory Analysis*
- *Identification of Regulatory Assistance*
- *Third-Party Implementation*

Reference: Burlington International Airport
General Permit 3-9014 (2012) MS4
Semi-Annual Flow Restoration Report for Permit No. 7021-9014

April 1, 2019 FRP Status Update:

A. Background Information

As previously noted in the Semi-Annual Flow Restoration Report dated April 1, 2018, the VT. DEC issued Permit No. 7021-9014.A2 to BTV on December 22, 2017.

The amended permit replaced the previously issued authorization 7021-9014.A1 for the following reasons:

1. **An approved Flow Restoration Plan (FRP) for Potash Brook was made part of B T V ' s Stormwater Management Plan (SWMP).**
2. **An approved Flow Restoration Plan (FRP) for Centennial Brook was made part of BTV's Stormwater Management Plan (SWMP).**
3. **Eleven previously authorized State Stormwater Discharge Permits were incorporated into BTV's re-authorized MS4 permit:**

3028-9010.A	**3028-9010.2**	**3028-INDS.AR**
3028-INDS.4	**3028-9015.1**	**3028-INDS.3**
3028-9015.2	**3845-9010**	**3845-9015.1**
1-0839 (Formerly Expired)	**1-1391 (Formerly Expired)**	

The amended MS4 permit authorization incorporated BTV's two expired permits noted above (Permit Nos. 1-0839 and 1-1391) *per subsection IV., C., 1.,c), (3), Schedule of Compliance, Month 24,*. BTV's nine other active operational stormwater discharge permits were also incorporated into the amended MS4 authorization.

It is noted that Stormwater Discharge Permit No. 3028-9010.1 was terminated and not incorporated into the MS4 permit as the impervious a r e a s covered under that permit were previously reauthorized under Permit Nos. 3028-INDS.5 and 3028-INDS.7.

Reference: Burlington International Airport
General Permit 3-9014 (2012) MS4
Semi-Annual Flow Restoration Report for Permit No. 7021-9014

B. MS4 General Permit No. 3-9014 (2012) Reauthorization

A draft MS4 General Permit No. 3-9014 (2018) was placed on public notice from February 14, 2018 through March 23, 2018. Subsequently, MS4 General Permit No. 3-9014 (2018) was issued on July 27, 2018.

BTV submitted a Notice of Intent (NOI) along with an updated SWMP for VT. DEC review and approval on January 23, 2019. As part of the January 23, 2019 NOI submittal, BTV made a formal request to incorporate three active operational stormwater discharge permits. The three active operational stormwater discharge permits requested for incorporation are listed as follows:

- **Permit No. 3028-9015.3 (BTV Taxiway 'B' Extension)**
- **Permit No. 3028-INDS.6 (BTV Parallel Taxiway 'G', Phase 2)**
- **Permit No. 3028-INDS.7 (VT ANG Taxiway 'F' Widening and a portion of Reconstruct, Mark, and Groove Runway 15-33)**

The amended authorization, Permit No. 7021-9014.A2, will continue to be in effect until such time as authorization is provided by VT. DEC in issuance of Permit No. 7021-9014.A2R. Issuance of Permit No. 7021-9014.A2R is anticipated in April of 2019.

C. Proposed BMP's

The City of South Burlington has identified three (3) BMPs in the Centennial Brook FRP for which BTV could achieve its commensurate share of the flow restoration targets. The City of South Burlington has advanced one of these BMP's to the construction phase as described below:

- **South Burlington ID CB0023/Retrofit #25, the Picard Circle Infiltration Gallery, includes construction of a subsurface infiltration gallery within the lots acquired by BTV where houses were removed in 2015. The City of South Burlington Stormwater Utility received a grant from the Vermont Agency of Transportation (VTrans) to improve the existing stormwater system on Airport Parkway and install an underground stormwater treatment practice in Picard Circle.**

  Currently, untreated stormwater runoff generated from a 51-acre drainage area, including 15 acres of impervious surfaces, discharges directly to the impaired Centennial Brook near the intersection of Airport Parkway and Picard Circle. The project includes the design and construction of a new stormwater infiltration basin within the Picard Circle right-of-way (ROW) and new drainage infrastructure along Airport Parkway which would allow for the treatment of up to a 51-acre drainage area that consists primarily of City-owned roadways.

This system would reduce peak flows and remove sediment load. Based on HydroCAD modeling conducted by the City of South Burlington's consultant, the project could reduce the peak flow of the 1-year, 24-hour storm event by 87%, from 9.09 cubic feet per second (cfs) to 0.38 cfs.

The project has received funding support from the Transportation Alternatives Grant Program administered by VTrans. The remaining project costs will be paid using stormwater utility capital project funding.

Construction is currently scheduled for 2019.

Designed by Aldrich + Elliot, PC, The City of South Burlington advertised for bids for the Picard Circle Stormwater Infiltration & Drainage Improvements project in February of 2019.

More specifically, the project includes installation of 500 linear feet of new 30" storm drain, five new catch basins, three new storm drain manholes, relocation of 20 linear feet of 10" ductile iron water pipe, 345 linear feet of cast-in-place concrete curb, 60 linear feet of ¾" copper water pipe, 60 linear feet of 4" PVC sewer pipe, and one stormwater infiltration chamber system constructed in the footprint of the Picard Circle cul-de-sac.

A non-mandatory pre-bid conference was held on February 14, 2019 at the South Burlington, Department of Public Works (DPW) office. Subsequently, bids were opened on March 5, 2019.

Initial estimated project cost including inflation was $380,000. The City of South Burlington received seven bids from local contractors on March 5, 2019. Bids ranged from the low bid of $685,435 to the highest bid of $1,156,675. The low bid for the project was submitted by Dirt Tech Company, Inc. in the amount of $685,435. DPW and the Engineer subsequently reviewed the bids and recommended award of the contract to Dirt Tech. The City Council approved the award recommendation at a council meeting held on March 18, 2019.

A photo of the project site is presented below for reference.

Reference: Burlington International Airport
General Permit 3-9014 (2012) MS4
Semi-Annual Flow Restoration Report for Permit No. 7021-9014

Picard Circle – Looking East from Airport Parkway

BTV and the City of South Burlington still intend to move forward with cost sharing discussions. It is also noted that BTV reserves the right to achieve its FRP commitments through implementing projects of its own choosing that may not be identified on South Burlington's present list of proposed watershed improvement projects.

D. Flow Monitoring Program

In September of 2015, VTDEC received bids from three independent contractors/consultants to perform a joint MS4 flow monitoring program. Under the proposed flow monitoring program, eleven stream gauge stations will be established and maintained for a period of three years with an option for two additional years. After bid review by DEC and selected MS4 community representatives, Stone Environmental, Inc., of Montpelier, Vermont was selected as the primary consultant for establishing and maintaining the stream gauge stations.

During review of the bids, several cost allocation formulas for covering the cost of the flow monitoring program were circulated and reviewed amongst all MS4 communities. A proposed formula was subsequently agreed upon by all MS4 communities, including BTV.

Reference: Burlington International Airport
General Permit 3-9014 (2012) MS4
Semi-Annual Flow Restoration Report for Permit No. 7021-9014

A draft Memorandum of Agreement (MOA) between VTDEC and the MS4 communities, including proposed cost allocations, was circulated to MS4 communities in November, 2015 for review. The final MOA was subsequently issued for public notice beginning on November 17, 2015, and extending through December 17, 2015. No external comments were received during the public notice period. The final MOA was distributed to MS4 community members for approval and signature on February 22, 2016.

The final cost sharing for BTV includes $3,623 for Year 2017, $2,805 for Year 2018, $2,796 for Year 2019, $2,087 for Year 2020, and $2,140 for Year 2021. The fees will begin for Fiscal Year 2017 with invoices to be sent out to individual MS4 communities on July 1, 2016. Invoices will be due May 1, 2017.

April 1, 2019 Status Update:

BTV is cooperatively pursuing an MS4 precipitation and streamflow monitoring program with Chittenden County's other MS4 entities in compliance with NPDES General Permit 3-9014, Section IV. C. 1. (e) (7). This group has approved a Memorandum of Agreement (MOU) with Stone Environmental, Inc. to install, maintain, and collect data, and report for all flow monitoring stations to obtain compliance with the flow monitoring requirements of their MS4 permits. Under the flow monitoring program, eleven stream gauge stations have been established and will be maintained for a period of three years with an option for two additional years. Streamflow monitoring stations have been installed on Allen, Bartlett, Centennial, Englesby, Indian, Morehouse, Monroe, Potash, Rugg, Stevens, and Sunderland Brooks.

Establishment and maintenance of the stream gauge stations began in 2016. Each streamflow monitoring station collects data at five minute intervals, and the gaging data is available for review on a website: http://vt-ms4-flow.stone-env.com/FlowDev/index.html. The data generated by the monitoring program will be used to compute flow duration curves of measured streamflows, which will be compared to the flow duration curves used to establish the TMDL targets.

The website is actively collecting data, but summary data has not yet been completed. Currently, daily stream flow data for Potash Brook and Centennial Brook, including rain gauge data and stream gauge data, are available on the website for all of 2017, and through September 30, 2018. Daily average watershed precipitation and daily mean discharge data are available for all of 2017 only.

Reference: Burlington International Airport
General Permit 3-9014 (2012) MS4
Semi-Annual Flow Restoration Report for Permit No. 7021-9014

E. Status of Expired Permits

On September 30, 2015, BTV formally requested incorporation of BTV's two (2) expired operational stormwater discharge permits (Permit Nos. 1-0839 and 1-1391) into BTV's General Permit 3-9014 (2012) MS4 authorization per subsection IV., C., 1.,c), (3), Schedule of Compliance, Month 24.

As part of this submittal, BTV submitted a Notice of Intent (NOI) for Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4) General Permit 3-9014, Initial Designer's Statement of Compliance for Permit Nos. 1-0839 and 1-1391, revisions to Volume 1 of BTV's SWMP, and the application fee. The fee was subsequently refunded as VTDEC determined that incorporation of an operational permit by the MS4 does not constitute a "change in activities."

Stormwater system evaluations for both expired permit systems as prepared by Stantec Consulting Services. Inc., for the South Burlington Stormwater Utility and as documented in the BTV Stormwater Utility Credit Analysis dated February 22, 2013 were also submitted for VTDEC review.

VTDEC review and MS4 permit amendment were pending authorization of the Lake Champlain TMDL by U.S. EPA. On June 17, 2016, EPA established new phosphorus TMDLs *for the twelve Vermont segments of* Lake Champlain. *VTDEC made the following comment during review:*

> *"The compliance schedule in the 2012 MS4 permit includes a requirement that expired state stormwater permits be addressed. Permits may be addressed either by incorporation into your MS4 General Permit authorization, provided the systems are verified as being in compliance with the most recent expired permit, or by requesting that they be issued a permit under DEC's authority. The airport has chosen to incorporate both active expired permits, 1-0839 and 1-1391, and the majority of the currently issued permits into their MS4."*

April 1, 2019 Status Update:

As noted above, the amended MS4 Permit No. 7021-9014.A2 authorization incorporated BTV's two expired permits (Permit Nos. 1-0839 and 1-1391) per subsection IV., C., 1.,c), (3), Schedule of Compliance, Month 24,.

There are no further FRP updates to report at this time.

Reference: Burlington International Airport
General Permit 3-9014 (2012) MS4
Semi-Annual Flow Restoration Report for Permit No. 7021-9014

Should you have any questions, or require further information, please do not hesitate to contact us.

Regards,

STANTEC CONSULTING SERVICES INC.

Douglas M. Campbell, P.E.
Senior Project Engineer, Transportation
Phone: (802) 864-0223
Fax: (802) 864-0165
Cell: (802) 825-8216
doug.campbell@stantec.com

cc: Larry Lackey (BTV Director of Engineering and Environmental Compliance)
Jon B. Leinwohl, P.E. (Stantec)
Christopher Gendron, P.E. (Stantec)
Stantec File

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BURLINGTON INTERNATIONAL AIRPORT

Annual Report for General Permit 3-9014 (MS4) and Annual Reporting Summary for MS4-Incorporated Operational Stormwater Discharge Permits

April 1, 2019

Appendix H

VT. DEC Direction for Annual Phosphorus Control Plan (PCP) Report Submission Dated April 1, 2019

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Campbell, Douglas (South Burlington)

From: Dan Albrecht <dalbrecht@ccrpcvt.org>
Sent: Monday, March 04, 2019 9:35 AM
To: Megan Moir; Jenna Olson; 'Bryan Osborne'; acostandi@essex.org; chelsea@essexjunction.org; Jim Jutras; crobinson@shelburnevt.org; 'Tom DiPietro (South Burlington)'; James Sherard (jsherrard@willistonvt.org); Bruce Hoar; john; 'Lani.Ravin@uvm.edu'; Callahan, Jennifer; christy.witters@vermont.gov; Dennis Lutz; Warner Rackley; Claire Forbes; Karen Adams; Lindsey Beaudoin; Dave Allerton; Justin Rabidoux; Harris, Polly; Campbell, Douglas (South Burlington); LLackey@BTV.aero; jrauscher@winooskivt.org; Hanson, Tyler; Tim Grover; Ryan Lambert
Cc: Pease, Jim (Jim.Pease@vermont.gov); 'danielle.owczarski@vermont.gov'; Bates, Karen (Karen.Bates@vermont.gov); 'ethan.swift@vermont.gov'; 'padraic.monks@vermont.gov'; Ryan, Jim; Charles Baker; Regina Mahony; Chris Dubin; Eleni Churchill
Subject: MS4 Permitees: Requirements for first Annual PCP report due April 1st

To: MS4 Subcommittee See discussion below. There is no need for submission of a separate document by April 1st called "Annual PCP report."

Dan Albrecht, MA, MS
CCRPC Senior Planner
*(802) 846-4490 ext. *29*

From: Witters, Christy <Christy.Witters@vermont.gov>
Sent: Monday, March 4, 2019 9:26 AM
To: Dan Albrecht <dalbrecht@ccrpcvt.org>
Subject: RE: Requirements for first Annual PCP report

Yes, that is correct. At this time, acknowledgement of completing (or not completing) the REI satisfies the Annual PCP report requirement. This will change next year, after the new MS4 NOIs and SWMPs are approved.

Thanks, Christy

From: Dan Albrecht <dalbrecht@ccrpcvt.org>
Sent: Thursday, February 28, 2019 4:37 PM
To: Witters, Christy <Christy.Witters@vermont.gov>
Subject: RE: Requirements for first Annual PCP report

So just to confirm…… the only thing an MS4 needs to do is

1) Not actually file an *"Annual PCP report"*

2) Just checking the REI box on the *2018 MS4 Annual Report Form* meets the requirement of "filing the Annual PCP report."

3) By April 1st, they do not need to submit any sort of report on:
a) Implementation of the Municipal Road Standards (in Subpart 8.3),
b) Street sweeping and catch basin cleaning practices,
c) Retrofits to municipally owned properties,
d) Implementation of stormwater treatment practice upgrades or retrofits to treat existing impervious after the adoption of the 2002 Vermont State Stormwater Manual,
e) Implementation of stormwater treatment practices after July 1, 2010, on developed lands that are not subject to the state's operational stormwater permit.
f) Implementation of municipal ordinances or regulations to address sub-jurisdictional impervious surfaces.

Dan Albrecht, MA, MS
CCRPC Senior Planner
*(802) 846-4490 ext. *29*

From: Witters, Christy <Christy.Witters@vermont.gov>
Sent: Thursday, February 28, 2019 3:48 PM
To: Dan Albrecht <dalbrecht@ccrpcvt.org>
Subject: RE: Requirements for first Annual PCP report

Yes. To meet the PCP reporting requirement due April 1, 2019, MS4s shall check off whether or not they have completed their REI.

For the MRGP municipalities, on their Annual Reports, we asked if they had completed their REIs. At this point, completion of the REI is the first measure of PCP progress. Once we approve the new SWMPs, we will develop a new annual report with additional PCP reporting requirements.

Thanks and see you on Wednesday. -Christy

From: Dan Albrecht <dalbrecht@ccrpcvt.org>
Sent: Thursday, February 28, 2019 3:40 PM
To: Witters, Christy <Christy.Witters@vermont.gov>
Subject: Requirements for first Annual PCP report

Got your voicemail. Thanks.

So are you saying that to meet this requirement:

D. Schedule of Compliance. The permittee shall complete implementation of the PCP no later than June 17, 2036.

The permittee shall, according to the following schedule:

April 1, 2019 - Submit the first Annual PCP Report

That an MS4 permittee only needs to complete their *2018 MS4 Annual Report Form* and check the box Yes that they have completed their REI?

Thanks, Dan

Dan Albrecht, MA, MS
Senior Planner
Chittenden County Regional Planning Commission
110 West Canal Street, Suite 202
Winooski, VT 05404
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BURLINGTON INTERNATIONAL AIRPORT

Annual Report for General Permit 3-9014 (MS4) and Annual Reporting Summary for MS4-Incorporated Operational Stormwater Discharge Permits

April 1, 2019

Appendix I

Summary of Planned Stormwater Activities

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Appendix I

Reporting Condition V.C.3. – Summary of Stormwater Activities

The 2018 Annual Report includes a summary of the stormwater activities BTV plans to undertake during the next reporting cycle including an implementation schedule.

The current status and anticipated schedules for the 2019 reporting cycle are as follows:

a) Parallel Taxiway 'G', Phase 2

- **This project consists of relocating +/- 5,800-lf of the Taxiway G, as well as construction of a new holding bay, and reconstruction of portions of Taxiways 'A', 'M' and 'H'. This project will be conducted in three phases over a several year period. Phase 1A was completed in 2017; this phase included reconstruction of 175 linear feet of stub Taxiway G and construction of an underground stormwater detention system. Phase 1B (2018 - 2019) includes relocation of 2,300 linear feet of parallel Taxiway G from the limits of Phase 1A to north of Taxiway H, as well as new stormwater infrastructure along both sides of the taxiway, a temporary paved crossover to connect Phase 1B to the existing alignment of Taxiway G. Phase 2 (2019/2020) includes construction of the remaining 3,500 linear feet of parallel Taxiway G southerly to Taxiway 'B', stormwater infrastructure, reconstruction of Taxiway 'A', and construction of an aircraft holding bay at the north end of Taxiway 'G'.**

- **This project received Individual Permit #3028-INDC.6 (Parallel Taxiway 'G', Phase 2) on March 27, 2017 and operational Stormwater Discharge Permit #3028-INDS.6 on March 27, 2017. An INDS permit amendment is currently pending.**

b) Rehabilitate a Portion of Terminal Apron

- **This ongoing project consists of reconstruction of the existing air carrier ramp to strengthen the pavement in the aircraft parking area. The overall project involves removing and replacing the existing Portland cement concrete pavement and subbase. Construction of a portion of this project will occur in 2019.**

- **This project received an INDC (3028-INDC.2) and is covered under the existing operational Stormwater Permit (3028-9010.A), BTV's Master Permit.**

c) Consolidated Car Rental Facility

- **This project consists of a Quick Turn-Around (QTA) system for the rental car facilities at BTV. The overall project includes construction of a single QTA/fueling area shared by multiple rental car operators. This project was designed in 2016 and is currently scheduled for construction in 2019.**

- **This project received an INDC (3028-INDC.4) and an Operational Stormwater Discharge Permit (3028-INDS.4) on July 19, 2016.**

d) Quarry Fill Project

- **This ongoing project consists of placing material excavated from airport construction projects in the former quarry on the BTV property. The resulting fill will encompass 19 ± acres and raise the grade from 0' to 20' ±_at the deepest location. The proposed grading plan accommodates 328,000 ± cy of raw fill. Material placed in the quarry area will be free of asphalt pavement or regulated hazardous material. Turf will be established once the fill is placed. This project began in 2017 and will continue in 2019.**

- **This project received an INDC (3018-INDC.7) on May 12, 2017.**

e) Housing Removal on Airport Acquired Land

- **This ongoing project involves the removal of structures on parcels acquired under the FAA's Airport Noise Compatibility Planning Program. Under this phase, additional houses will be removed and turf will be established. Currently, there two houses remaining to be demolished. It is unknown at this time whether or not either house will be demolished in 2019.**

- **This project received an INDC (3028-INDC.A) on November 6, 2017.**

f) VT ANG Taxiway 'F' Widening and a portion of Reconstruct, Mark, and Groove Runway 15-33

- **The Vermont Air National Guard Base project involves redevelopment and widening of Taxiway 'D', Taxiway 'F', and the North and South Arm/Pads, as well as repair of the existing VT ANG aircraft parking apron. Construction of this project will continue with completion anticipated in 2019.**

- **NOTE: Upon issuance of the operational stormwater permits for this project, S/N 001, 002, 004, 005, and 006 are now covered under Permit #3028-INDS.7 (VT ANG Taxiway 'F' Widening and a portion of Reconstruct, Mark, and Groove Runway 15-33), and S/N 003 is covered under Permit #3028-INDS.5 (VT ANG Taxiway 'F' and 'D' Widening, North and South Arm Pad, Apron Repair Project, and a portion of Reconstruct, Mark, and Groove Runway 15-33). As a result, Permit 3028-9010.1 (Reconstruct, Mark, and Groove Runway 15-33) has been terminated.**

g) Burlington International Airport (BTV) Hotel

- **BTV is currently in the conceptual planning stage for construction of a 103-room hotel at the Burlington International Airport. The hotel will be located at the southern end of the existing parking garage located along Airport Drive.**

- **General work required for this construction project includes excavation and construction of the new hotel building. Additional project features include underground fuel tank installation, site utilities, lighting, signage, drainage improvements, stormwater treatment,**

sidewalk construction, erosion prevention and sediment control, site restoration, and ancillary appurtenances.

- **The City of Burlington will enter into a 49-year lease agreement with BTV Hotel, LLC for this facility.**

- **It is anticipated that BTV will submit an INDC and INDS applications in the Spring of 2019 for VT DEC review and approval.**

- **It is anticipated that construction of this project will begin in mid-2019 with completion in late-2020.**

h) Heritage Aviation Hangar, Pod 3

- **Heritage Aviation is currently in the conceptual planning stage for construction of a 47,885 SF hangar located between the existing Heritage Hangar (228 Aviation Avenue) and the Pratt and Whitney Hangar. Access to the building will be from the existing Heritage Aviation parking lot.**

- **General work required for this construction project includes excavation and construction of the new hangar building. Additional project features include underground oil/water separator installation, site utilities including water and stormwater relocation and new sanitary sewer service, lighting, signage, sidewalk and driveway construction, erosion prevention and sediment control, site restoration, and ancillary appurtenances.**

- **The existing bio-retention basin was permitted under Permit No. 3845-9010 as issued on August 13, 2015 and sized to treat the future Pod 3 hangar. A permit amendment may be necessary should the new building site features interfere with the basin.**

- **It is anticipated that BTV will submit an INDC application and an amended INDS application in the Spring of 2019 for VT DEC review and approval.**

- **It is anticipated that construction of this project will begin in late-2019 with completion in 2020.**

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BURLINGTON INTERNATIONAL AIRPORT

Annual Report for General Permit 3-9014 (MS4)
and
Annual Reporting Summary for MS4-Incorporated Operational Stormwater Discharge Permits

April 1, 2019

Appendix J

Proposed SWMP Changes

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Appendix J

Reporting Condition V.C.4. – Proposed Changes to the SWMP

The 2018 Annual Report will include proposed changes to BTV's SWMP, including changes to any BMP's or any identified goals that apply to the program elements.

BTV's SWPPP, including site map and listing of BMP's, have been updated annually since 2011 as summarized as at the end of this Appendix.

BTV's SWMP was updated during the 2018 reporting period for the following reasons:

- **The SWPPP, including site map, was updated on April 1, 2019 for the 2018 Annual Report submission. Updates were minor including several note and flow arrow revisions to the site map.**

No additional updates to the SWMP or SWPPP were required for the 2018 reporting period since the last update on January 23, 2019.

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11.0 SUMMARY OF UPDATES

Date Program or Map Amended	Summary of Updates
April 1, 2012	BTV's SWPPP, including site map and listing of BMP's, was updated for the following reasons: • To reflect re-authorization of General Permit 3-9003 (MSGP) dated August 4, 2012. • To reflect the construction of several new BMP's covered under newly acquired operational Stormwater Discharge Permits since the previous SWPPP was developed in 2008. No other changes to the SWMP other than updating the SWPPP dated April 1, 2012 were required for 2011.
April 1, 2013	BTV's SWPPP, including site map and listing of BMP's, was updated for the following reasons: • To reflect the construction of one new BMP (BMP 17) covered under Underground Injection Control (UIC) Permit #6-0117 (Aircraft Deicing Fluid Treatment System, 890 Ramp) as issued since the SWPPP was last updated on April 1, 2012. • To reflect one PPS location that is no longer valid. The glycol storage facility formerly identified as PPS11 has been relocated (see PPS3) and is no longer a potential pollutant source. In turn, deicing and aircraft fueling operations performed at the Valley West Apron (formerly PPS12) have been renumbered from PPS12 to PPS11. No other changes to the SWMP other than updating the SWPPP dated April 1, 2012 and as amended April 1, 2013 were required for 2012.
April 1, 2014	BTV's SWPPP, including site map and listing of BMP's, was updated for the following reasons: • To reflect the construction of one new BMP (BMP #18) covered under the recently issued Stormwater Discharge Permit No. 3028-INDS.3 (Aircraft Sewage Receiving Station) and associated construction including a new building since the SWPPP was last updated on April 1, 2013. Construction of the infiltration trench is complete at this time. Grading, seeding, and mulching of swales is not complete to date. It is anticipated that BMP #18 will be complete and fully operational by June 1, 2014. A Designer's Certification will be submitted with the 2014 MS4 and Individual Stormwater Permits Annual Report. • To reflect changes to the drainage system on the easterly side of Runway 1-19 due to the reconstruction of Taxiway 'B'. • As part of the General Permit 3-9014 (2012) MS4 NOI submission and re-authorization, the SWMP was updated in June 2013.

Date Program or Map Amended	Summary of Updates
April 1, 2015	BTV's SWPPP, including site map and listing of BMP's, was updated for the following reasons: • To include information regarding the change in status of Muddy Brook, as it is no longer considered an impaired water according to the State of Vermont 2014 303(d) List of Waters, Part A – Impaired Surface Waters in Need of TMDL. • To include mapping updates to drainage structures associated with construction projects. Construction projects at BTV for the 2014 reporting year include the following: • Aircraft Sewage Receiving Station was largely completed in March, 2014, but grading, seeding, and mulching of swales, and general site cleanup activities continued into summer, 2014. A Designer's Certification was submitted to ANR as part of the *Annual Report for General Permit 3-9014 (2012) MS4 and Annual Report for Operational Stormwater Discharge Permits* (dated April 1, 2015). • Taxiway 'B' Reconstruction Project was completed in December, 2013, but site cleanup activities continued into summer, 2014 • Concrete Apron for Gate 11 at Terminal Building Reconstruction Project, including associated infiltration trench work, was partially constructed in 2014. This work will continue in 2015. • Cargo Apron Reconstruction Project, Phase 2, was partially constructed in 2014. This work will continue in 2016.
April 1, 2016	BTV's SWPPP, including site map and listing of BMP's, was updated for the following reasons: • The site map was revised to include minor drawing changes as well as updated permit numbers. Construction projects at BTV for the 2015 reporting year include the following: • Construct, Mark, and Light Taxiway G/K, Phase 1 • Rehabilitate a Portion of Terminal Apron, Phase 2 • Heritage Aviation Parking Lot Reconstruction • Marcelino Project: Material to be removed from Marcelino Property and placed in the Airport Quarry. • Housing Removal on Airport-Acquired Land.

Date Program or Map Amended	Summary of Updates
May 9, 2016	BTV's SWPPP was updated for the following reason: • **Date of fuel spill:** 5/2/16 • **Where did the spill occur?** Gate 3 of Terminal Apron • **Is the cause of the spill known? If so, what was it?** United Aircraft leaking overnight. • **How much material was lost during the spill?** 25 gallons. • **Please list the source materials here (i.e. Jet Fuel):** Jet Fuel. • **Was the spill stopped at the source?** No. • **Did the spill enter any enter any storm drains, waterways, drainage ditches, etc.? Please specify.** Yes, the fuel ran downgrade on the terminal apron and entered the trench drain. • **Was the spill contained? If so, what was it contained in?** Absorbent pads and a frac tank were used to clean up the fuel spill. • **Was the spill completely cleaned up so that it no longer poses any ecosystem threat?** Yes.
September 30, 2016	BTV's SWPPP, including site drainage map, was updated for the following reasons: • To include information regarding the Flow Restoration Plan (FRP) as required under BTV's Municipal Separate Storm Sewer System (MS4) General Permit 3-9014. • To include information on the Centennial Brook watershed, an impaired watershed within BTV's MS4 area due to BTV ownership of house removal properties. • As part of the General Permit 3-9014 (2012) MS4 Flow Restoration Plan submission, the SWMP, Volume 1 was updated in September 2016. This includes the request to incorporate ten (10) existing, currently valid operational stormwater permits into the MS4.
April 1, 2017	BTV's SWPPP, including site map and listing of BMP's, were updated for the following reasons: • The site map was revised to include minor drawing changes as well as updated permit numbers, and line work was added to depict features from construction done under Permit 3028-9015.2. Parcels acquired under the FAA's Airport Noise Compatibility Planning Program were also added to the site map. • Two building numbers added, one from a recent acquisition by the Burlington International Airport. • BMP12 and BMP13 were deleted due to their removal during construction activities at the Vermont Air National Guard, Taxiway 'Foxtrot' Widening project. • BMP and PPS descriptions were revised for clarity. • Three newly identified PPS locations were added to the PPS listing (PPS0, PPS12, and PPS13). • Information was added regarding the administratively continued MSGP General Permit 3028-9003.

Date Program or Map Amended	Summary of Updates
April 1, 2017 (continued)	Construction projects at BTV for the 2016 reporting year include the following: • Construct, Mark, and Light Taxiway 'G'/'K', Phase 1 • Heritage Aviation Parking Lot • Main Air Carrier Apron, Glycol Treatment System Improvements (UIC Permit 6-0075) • VTANG - Taxiway Foxtrot Widening project
April 1, 2018	BTV's SWPPP, including site map and listing of BMP's, were updated for the following reasons: • The site map was revised to include minor drawing changes, including updated permit numbers and linework from recent construction. • Parcels acquired under the FAA's Airport Noise Compatibility Planning Program since April 1, 2017 were added to the site map. • Building use descriptions have been changed to reflect an update of building usages provided by BTV. • BMP5 (oil/water separator) was removed as it is not part of the stormwater collection system. • BMP13 is shown in its new configuration per the VT ANG Taxiway Foxtrot reconstruction plans. Other VT ANG BMP's along Foxtrot were added. • The benchmark sampling location was changed from DO18 to MU02. • Minor fuel spills were documented. Construction projects at BTV for the 2017 reporting year include the following: • Construct, Mark, and Light Parallel Taxiway 'G', Phase 1A & 1B • Rehabilitation of Portions of the Terminal Apron, Phases 3-9 • Main Air Carrier Apron, Glycol Treatment System Improvements (UIC Permit #6-0075) • VTANG Taxiway 'F' Widening and a portion of Reconstruct, Mark, and Groove Runway 15-33. • VTANG Taxiway 'F' and 'D' Widening, North and South Arm Pad, Apron Repair Project, and a portion of Reconstruct, Mark, and Groove Runway 15-33. • Quarry fill project • Housing Removal on Airport Acquired Land Project
January 23, 2019	BTV's SWPPP, including site map and listing of BMP's, was updated in January 2019 for the following reasons: • The site map was revised to include minor drawing changes, including updated outfall numbers, and linework from recent construction projects. • Parcels acquired under the FAA's Airport Noise Compatibility Planning Program since April 1, 2018 were added to the site map. • BMP 20, the StormTrap stormwater detention/infiltration facility, was added. • Minor fuel spills were documented.

Date Program or Map Amended	Summary of Updates
	Construction projects at BTV during 2018 include the following: • Construct, Mark, and Light Parallel Taxiway 'G', Phase 1A & 1B • Main Air Carrier Apron, Glycol Treatment System Improvements (UIC Permit #6-0075) • VT ANG Taxiway 'F' Widening and a portion of Reconstruct, Mark, and Groove Runway 15-33. • VT ANG Taxiway 'F' and 'D' Widening, North and South Arm Pad, Apron Repair Project, and a portion of Reconstruct, Mark, and Groove Runway 15-33. • Quarry fill project. • Housing Removal on Airport Acquired Land Project.
April 1, 2019	BTV's SWPPP, including site map, was updated again on April 1, 2019 for the 2018 Annual Report submission. Updates were minor including several note and flow arrow revisions to the site map. Additional projects proposed for construction at BTV during 2018 include the following: • Parallel Taxiway 'G', Phase 2 • Rehabilitate a Portion of Terminal Apron • Consolidated Car Rental Facility • Burlington International Airport (BTV) Hotel • Heritage Aviation Hangar, Pod 3

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BURLINGTON INTERNATIONAL AIRPORT

Annual Report for General Permit 3-9014 (MS4)
and
Annual Reporting Summary for MS4-Incorporated Operational Stormwater Discharge Permits

April 1, 2019

Appendix K

Flow and Precipitation Monitoring Program

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Appendix K

Reporting Condition V.C.5. – Flow and Precipitation Monitoring Program

The 2018 Annual Report will include notice that BTV is relying on another entity to satisfy some of the permit obligations, if applicable.

The VT DEC and the contributing MS4s permittees within these watersheds have signed an MOA to perform monitoring and other data collection required under the MS4 permitting program. This group has approved a Memorandum of Agreement (MOA) with Stone Environmental, Inc. to install, maintain, and collect data, and report for all flow monitoring stations to obtain compliance with the flow monitoring requirements of their MS4 permits. Establishment and maintenance of the stream gauge stations began in 2016. Each streamflow monitoring station collects data at five minute intervals, and the gauging data is available for review on a website: http://vt-ms4-flow.stone-env.com/FlowDev/index.html. **Each MS4 permittee, including BTV, has been assigned a percentage of the total cost of the contracted work over a five-year timeframe (see attached).**

This type of collaborative arrangement will also apply to implementation and financing of the BMPs outlined in the FRPs for Potash Brook and Centennial Brook. The City of South Burlington and BTV intend to work closely with legislative representatives to ensure that Clean Water Act funding is made available for the stormwater improvements included in the FRPs. VT DEC has determined that even where grant funding is available, MS4's are required to provide some level of match funding.

BTV is committed to participating in a cost share with the City of South Burlington to implement its FRP in a manner that is fair and reasonable for the airport. It is also noted that BTV reserves the right to achieve its FRP commitments through implementing projects of its own choosing that may not be identified on South Burlington's present list of proposed watershed improvement projects.

Status:

BTV is cooperatively pursuing an MS4 precipitation and streamflow monitoring program with Chittenden County's other MS4 entities in compliance with NPDES General Permit 3-9014, Section IV. C. 1. (e) (7). This group has approved a Memorandum of Agreement (MOU) with Stone Environmental, Inc. to install, maintain, and collect data, and report for all flow monitoring stations to obtain compliance with the flow monitoring requirements of their MS4 permits. Under the flow monitoring program, eleven stream gauge stations have been established and will be maintained for a period of three years with an option for two additional years. The data generated by the monitoring program will be used to compute flow duration curves of measured streamflows, which will be compared to the flow duration curves used to establish the TMDL targets.

Streamflow monitoring stations have been installed on Allen, Bartlett, Centennial, Englesby, Indian, Morehouse, Monroe, Potash, Rugg, Stevens, and Sunderland Brooks. **See below for further detailed information regarding Stone Environmental's real-time flow monitoring data collection**

and a signed copy of the MOA. The final streamflow report for the year will be issued in September since they are awaiting USGS data on reference streams to incorporate into the findings.

Flow Monitoring Program Verification

All MS4's that discharge to a stormwater impaired water are required to implement a flow and precipitation monitoring program. In compliance with the January 2, 2014 due date as noted in the General Permit 3-9014 (2012) MS4, BTV submitted a flow and precipitation monitoring program on January 2, 2014.

BTV is required to provide verification for implementation of the flow and precipitation monitoring program.

Status:

Background: The legislative bill, H. 650, entitled *An Act Relating to Establishing the Ecosystem Restoration and Water Quality Improvement Special Fund*, passed in 2014. This bill was intended to ensure compliance with the flow and precipitation monitoring requirements for MS4 communities while reducing the fiscal and other pressures on these communities. Under the bill, VT ANR was authorized to collect funds from MS4's to implement a comprehensive flow and precipitation monitoring program for MS4's that wish to participate. However, the bill did not specify how the funds would be collected, and at what cost to each of the participating MS4 communities.

The bill H. 650 passed both the House and Senate in 2014.

In 2015, this bill was incorporated into House Bill No.35. The bill passed on June 16, 2015 as Vermont Legislative Act 64, the Vermont Clean Water Act. In part, Act 64 authorizes the creation of the Clean Water Fund. The Fund will serve as a mechanism for financing the improvement of water quality in the State of Vermont.

MS4's are now eligible for grants and other financial assistance from the VT ANR Ecosystem Restoration Program, the Clean Water Fund, or any other State water quality financing program, regardless of whether the proposed project is a regulatory requirement of the MS4 permit program. VT DEC has determined that even where grant funding is available, MS4's are required to provide some level of match funding.

A Memorandum of Agreement (MOA) was developed by ANR to establish the Ecosystem Restoration and Water Quality Improvement Special Fund for regulated MS4 communities, including BTV. This MOA between ANR and the MS4 communities is intended to aid MS4 permittees in obtaining compliance with their flow monitoring requirements, and includes a cost to perform monitoring and data collection. The MOA was approved on June 8, 2016 and effective beginning on July 1, 2016 and extending through June 31, 2021. **See below for a copy of the signed MOA and proposed fee structure.**

Streamflow and Precipitation Monitoring for Vermont MS4s

About the Project

Stone Environmental and Fitzgerald Environmental Associates are working with Vermont DEC and many of Vermont's Municipal Separate Storm Sewer Systems (MS4) General Permit holders to conduct precipitation and streamflow monitoring. Section IV.C.1.e(7)(a) of the MS4 General Permit requires certain permittees—namely Burlington, Colchester, Essex, Essex Junction, Shelburne, South Burlington, St. Albans City, St. Albans Town, Williston, Winooski, the Burlington Airport, the University of Vermont, and the Vermont Agency of Transportation—to implement, or otherwise fund, a flow and precipitation monitoring program, subject to approval by the Secretary, in their respective stormwater impaired watersheds.

The stormwater impaired watersheds requiring monitoring are Allen, Bartlett, Centennial, Englesby, Indian, Morehouse, Munroe, Potash, Rugg, Stevens, and Sunderland Brooks. Biomonitoring data have indicated that portions of each of these streams do not fully support designated aquatic uses (aquatic life), and that the biological impairment results from multiple impacts associated with excess stormwater runoff. Monitoring of the primary stressor (flow) is necessary to reveal if practices intended to improve the hydrologic regime of these streams are having or will have the desired impact.

The Stone team is implementing a rigorous monitoring plan that will enable Vermont DEC and the MS4s to evaluate progress towards attainment of flow targets specified in the total maximum daily load (TMDL) document promulgated for each stream. The data generated by this monitoring program will be used to compute flow duration curves of measured streamflows, which may be compared to the flow duration curves upon which the TMDL targets are based.

Streamflow and precipitation monitoring station at Sunderland Brook.

Click here for precipitation-only stations:
http://vt-ms4-flow.stone-env.com/precip/index.html

About this Website

This website displays the current status of streamflow and precipitation monitoring stations throughout the network, which was established in the fall/winter of 2016.

Each streamflow monitoring station has a separate page that can be accessed by navigating through the tabs at the top of the screen.

All measurements are collected at five minute intervals and indexed to time and date. Monitoring stations are enabled to provide near-real-time remote data access with a communications and data loss notification system.

Final, quality-controlled streamflow and precipitation datasets will be provided via this website on a quarterly basis (see Final Data tab).

Available Data and Disclaimers

ALL NEAR-REAL-TIME DATA DISPLAYED ON THIS SITE ARE PROVISIONAL AND SUBJECT TO REVISION.

Date/time is reported in the Atlantic time zone (UTC-4:00) without correction for Daylight Savings Time. Wintertime time/date stamps will appear to be an hour ahead of local time.

Data available at the 11 streamflow stations:

- Air temperature (within monitoring enclosure), degrees Celsius
- Water temperature, degrees Celsius
- Stream stage, feet
- Discharge, cubic feet/second (not currently displayed, pending development of initial stage-discharge rating curves)

Data available at the 10 precipitation monitoring stations:

- Air temperature (within monitoring enclosure), degrees Celsius
- Total rainfall (inches)

Note that five of the precipitation monitoring stations are co-located with streamflow monitoring stations. In these instances, real-time streamflow and precipitation data are displayed on the same web page.

For More Information

For further information about this project or the data we are generating, please contact one of the individuals listed below:

Vermont DEC:
Blaine Hastings, Project Coordinator
blaine.hastings@vermont.gov

Stone Environmental:
Dave Braun, Senior Scientist
dbraun@stone-env.com

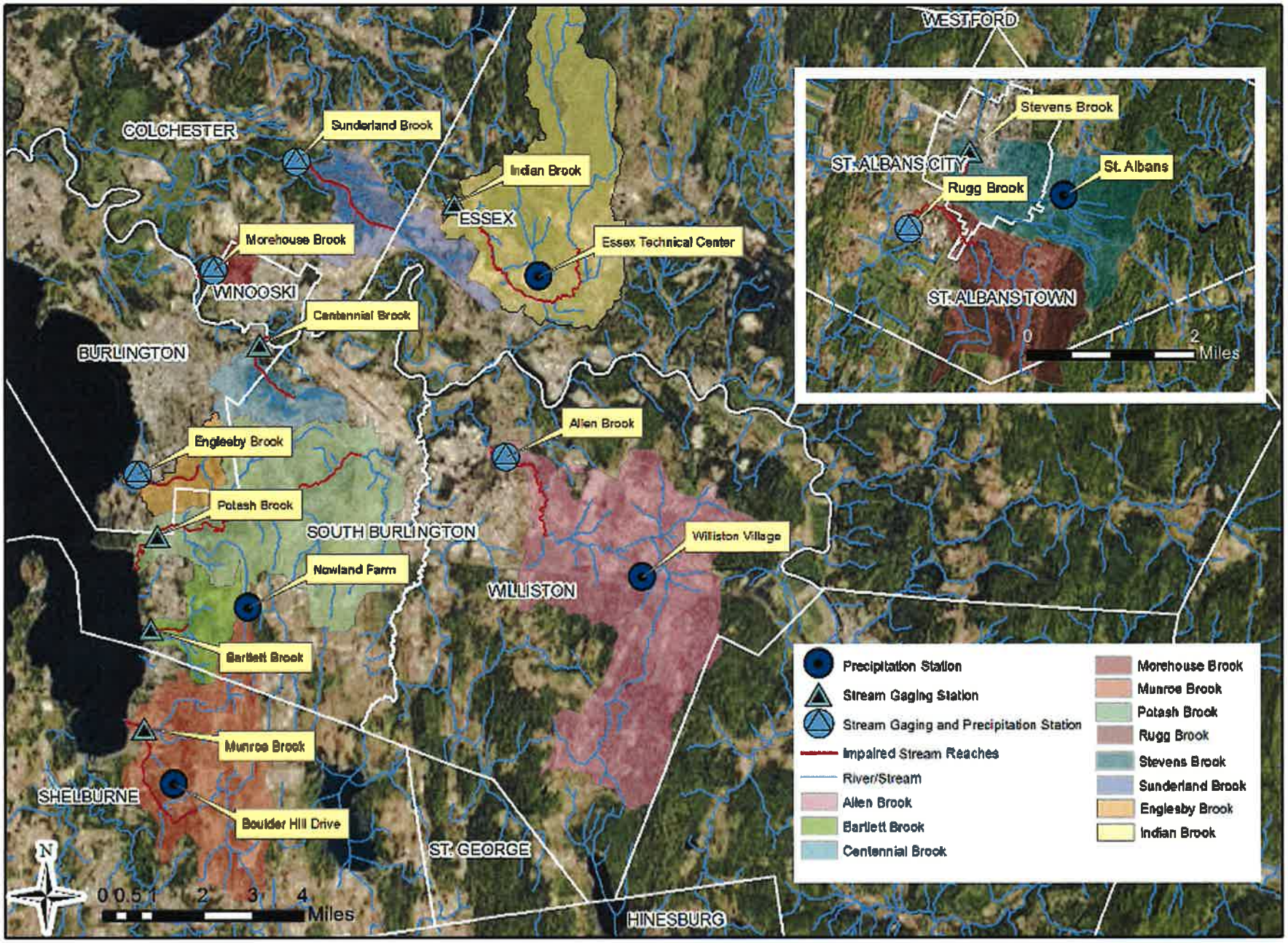
Fitzgerald Environmental:
Joe Bartlett, Project Hydrologist
joe@fitzgeraldenvironmental.com

VERMONT
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

STONE ENVIRONMENTAL

Fitzgerald Environmental Associates, LLC.
Applied Watershed Science & Ecology

Streamflow and Precipitation Monitoring for Vermont MS4s



VERMONT
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

STONE ENVIRONMENTAL

Fitzgerald Environmental Associates, LLC.
Applied Watershed Science & Ecology

Streamflow and Precipitation Monitoring for Vermont MS4s

Final Data, All Stations

5-minute precipitation totals, 5-minute stream stage, daily mean discharge, and daily watershed average precipitation totals for each monitoring station. Included with each data category is a key to flags.

Rain Gauge Data

(5-minute totals)

Key to Precipitation Flags

Allen Rain Gauge @ Allen Brook: 2017 2018

WillVil Rain Gauge @ Allen Brook: 2017 2018

Nowland Farm Rain Gauge @ Bartlett Brook: 2017 2018

Englesby Rain Gauge @ Englesby Brook: 2017 2018

Essex Junction Rain Gauge @ Indian Brook: 2017 2018

Morehouse Rain Gauge @ Morehouse Brook: 2017 2018

Boulder Hill Rain Gauge @ Munroe Brook: 2017 2018

Rugg Rain Gauge @ Rugg Brook: 2017 2018

St. Albans Rain Gauge @ Stevens Brook: 2017 2018

Sunderland Rain Gauge @ Sunderland Brook: 2017 2018

Stream Stage Data

(5-minute average)

Key to Stream Stage Flags

Allen Brook: 2017 2018

Bartlett Brook: 2017 2018

Centennial Brook: 2017 2018

Englesby Brook: 2017 2018

Indian Brook: 2017 2018

Morehouse Brook: 2017 2018

Munroe Brook: 2017 2018

Potash Brook: 2017 2018

Rugg Brook: 2017 2018

Stevens Brook: 2017 2018

Sunderland Brook: 2017 2018

Daily Average Watershed Precipitation

2017

Daily Mean Discharge

2017

Key to Daily Mean Flow Flags

Centennial Brook Streamflow Station

Provisional Data, Subject to Revision

Communication Status Alarm:  (Modem powered down 12:00 to 07:00 daily)

Battery voltage (hourly min.): 12.5 volts

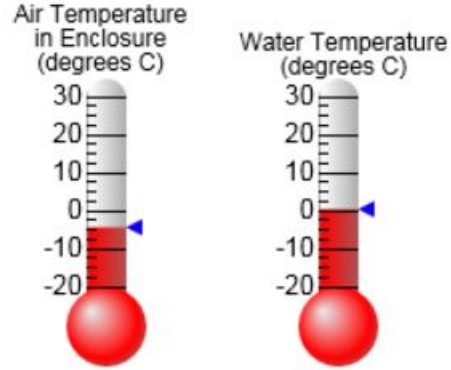
Latest Values (5-Minute Data)

1/15/2019 2:00:00 PM

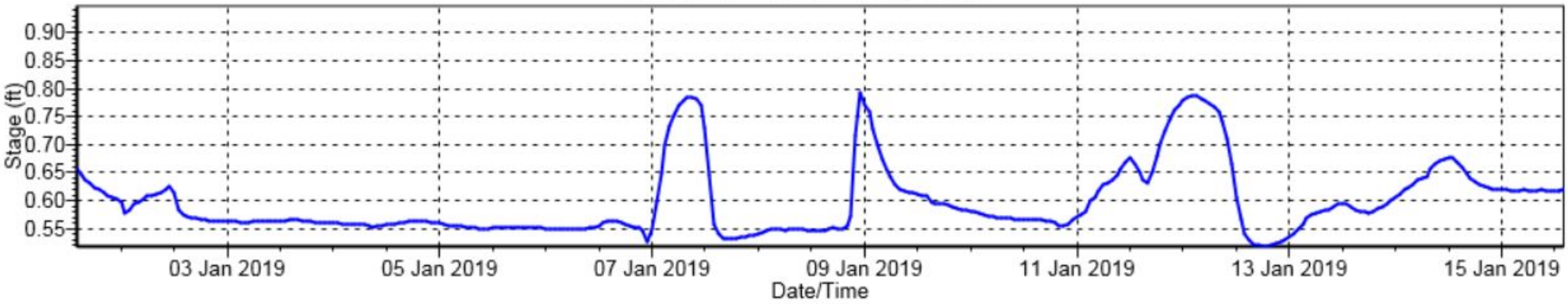
All dates and times reported at this station are Atlantic Time (UTC-4:00), without adjustment for Daylight Savings Time.

Stage (avg): 0.618 feet

Discharge (avg): In development



Centennial Brook: Hourly Stage



Centennial Brook: Hourly Temperature and Stage Data

Timestamp	Air Temp. (Enclosure), deg. C	Water Temp., deg. C	Stage (avg.), ft.
1/15/2019 2:00:00 PM	-4.38	0.37	0.62
1/15/2019 1:00:00 PM	-5.54	0.37	0.62
1/15/2019 12:00:00 PM	-6.77	0.35	0.62
1/15/2019 11:00:00 AM	-7.75	0.35	0.62
1/15/2019 10:00:00 AM	-8.58	0.33	0.62
1/15/2019 9:00:00 AM	-9.14	0.33	0.62
1/15/2019 8:00:00 AM	-9.57	0.32	0.62
1/15/2019 7:00:00 AM	-10.17	0.32	0.62

Centennial Brook Streamflow Station

Provisional Data, Subject to Revision

Communication Status Alarm: (Modem powered down 12:00 to 07:00 daily)

Battery voltage (hourly min.): 12.5 volts

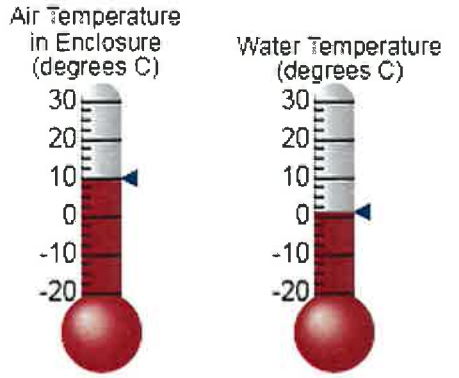
Latest Values (5-Minute Data)

2/20/2018, 4:00:00 PM

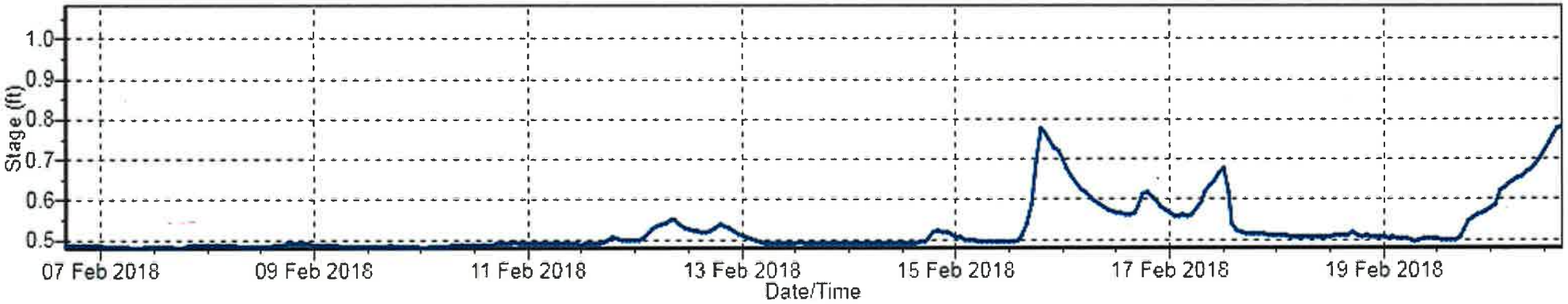
All dates and times reported at this station are Atlantic Time (UTC-4:00), without adjustment for Daylight Savings Time.

Stage (avg): 0.780 feet

Discharge (avg): In development



Centennial Brook: Hourly Stage



Centennial Brook: Hourly Temperature and Stage Data

Timestamp	Air Temp. (Enclosure), deg. C	Water Temp., deg. C	Stage (avg.), ft.
2/20/2018, 4:00:00 PM	9.78	1.02	0.78
2/20/2018, 3:00:00 PM	9.09	1.02	0.78
2/20/2018, 2:00:00 PM	8.72	0.97	0.76
2/20/2018, 1:00:00 PM	8.00	0.92	0.74
2/20/2018, 12:00:00 PM	7.50	0.85	0.72
2/20/2018, 11:00:00 AM	6.96	0.75	0.70
2/20/2018, 10:00:00 AM	5.97	0.76	0.68
2/20/2018, 9:00:00 AM	5.26	0.72	0.68

VERMONT
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

STONE ENVIRONMENTAL

fitzgerald Environmental Associates, LLC.
Applied Watershed Science & Ecology

Potash Brook Streamflow Station

Provisional Data, Subject to Revision

Communication Status Alarm:  (Modem powered down 12:00 to 07:00 daily)

Battery voltage (hourly min.): 12.6 volts

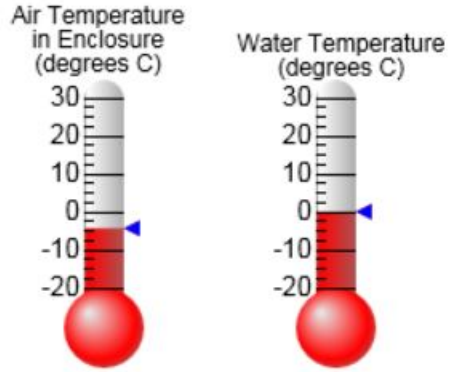
Latest Values (5-Minute Data)

1/15/2019 2:00:00 PM

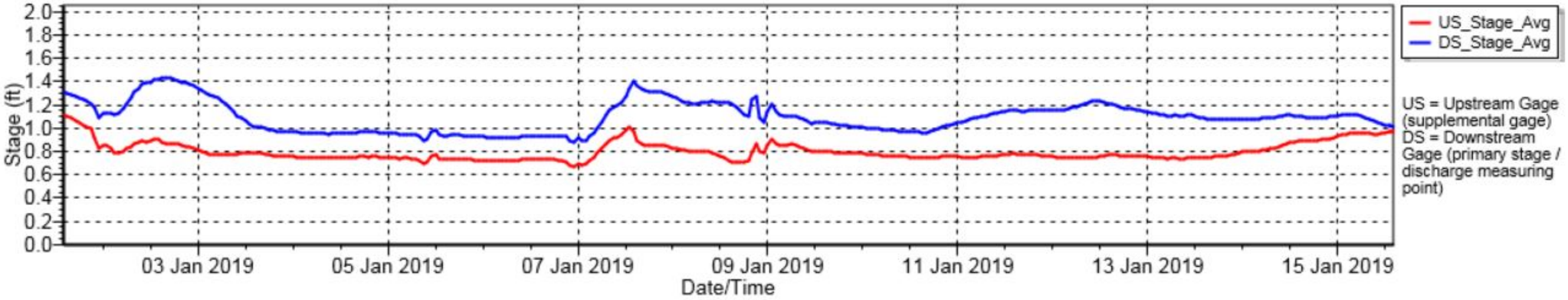
All dates and times reported at this station are Atlantic Time (UTC-4:00), without adjustment for Daylight Savings Time.

Stage (avg): 1.008 feet

Discharge (avg): In development



Potash Brook: Hourly Stage



Potash Brook: Hourly Temperature and Stage Data - Downstream Gage

Timestamp	Air Temp. (Enclosure), deg. C	Water Temp., deg. C	Stage (ft.)
1/15/2019 2:00:00 PM	-4.32	0.06	1.01
1/15/2019 1:00:00 PM	-5.52	0.06	1.02
1/15/2019 12:00:00 PM	-6.64	0.05	1.03
1/15/2019 11:00:00 AM	-7.48	0.05	1.04
1/15/2019 10:00:00 AM	-8.22	0.05	1.06
1/15/2019 9:00:00 AM	-8.77	0.04	1.07
1/15/2019 8:00:00 AM	-9.19	0.04	1.08
1/15/2019 7:00:00 AM	-9.60	0.04	1.09

VERMONT
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

STONE ENVIRONMENTAL

Fitzgerald Environmental Associates, LLC.
Applied Watershed Science & Ecology

Potash Brook Streamflow Station

Provisional Data, Subject to Revision

Communication Status Alarm: (Modem powered down 12:00 to 07:00 daily)

Battery voltage (hourly min.): 12.7 volts

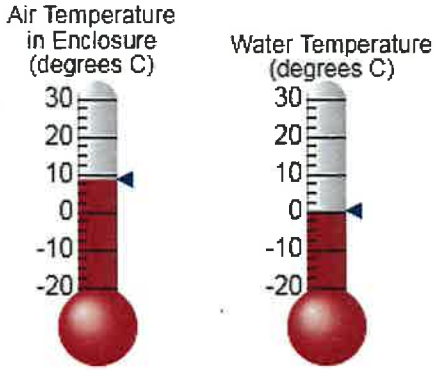
Latest Values (5-Minute Data)

2/20/20 18. 4:00:00 PM

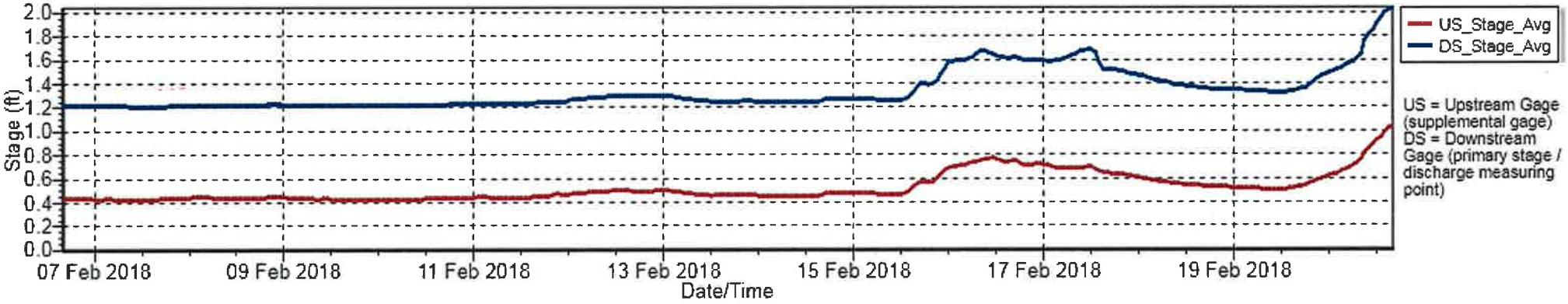
All dates and times reported at this station are Atlantic Time (UTC-4:00), without adjustment for Daylight Savings Time.

Stage (avg): 2.040 feet

Discharge (avg): In development



Potash Brook: Hourly Stage



Potash Brook: Hourly Temperature and Stage Data - Downstream Gage

Timestamp	Air Temp. (Enclosure), deg. C	Water Temp., deg. C	Stage (ft.)
2/20/2018, 4:00:00 PM	8.68	0.24	2.04
2/20/2018, 3:00:00 PM	8.70	0.23	2.03
2/20/2018, 2:00:00 PM	8.42	0.25	2.00
2/20/2018, 1:00:00 PM	7.81	0.25	1.96
2/20/2018, 12:00:00 PM	6.88	0.23	1.91
2/20/2018, 11:00:00 AM	6.26	0.25	1.86
2/20/2018, 10:00:00 AM	5.76	0.24	1.82
2/20/2018, 9:00:00 AM	5.33	0.21	1.77

VERMONT
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

STONE ENVIRONMENTAL

fitzgerald Environmental Associates, LLC.
Applied Watershed Science & Ecology

Streamflow and Precipitation Monitoring for Vermont MS4s

Final Data, All Stations

Final datasets are anticipated to be published here when available. However, if this platform (which is primarily designed to serve real-time datalogger results) cannot ultimately serve the final datasets, they will be published to a separate website and links to the final data will be provided here.

Data will be available in comma-delimited text file format per streamflow and/or precipitation station. Anticipated data deliverables are listed in the tables at right.

Streamflow Monitoring Data

Latest Dataset Available: Qxx, 2017

Watershed Name	Stage / Discharge Data			Daily Total Precipitation (Watershed Average)
	5-minute	Hourly	Daily	
Allen Brook				
Bartlett Brook				
Centennial Brook				
Englesby Brook				
Indian Brook				
Morehouse Brook				
Munroe Brook				
Potash Brook				
Rugg Brook				
Stevens Brook				
Sunderland Brook				

Precipitation Monitoring Data

Latest Dataset Available: Qxx, 2017

Watershed or Station Name	Precipitation Data		
	5-minute	Hourly	Daily
Allen Brook			
Englesby Brook			
Essex Junction			
Morehouse Brook			
Munroe Brook			
Nowland Farm			
Rugg Brook			
St. Albans			
Sunderland Brook			
Williston Village			

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: e-Signed by George Desch on 2016-06-08 18:31:23 GMT

Commissioner

Dept of Environmental Conservation

Date: _____

THE PARTICIPATING PARTIES:

BURLINGTON INTERNATIONAL AIRPORT

By: [signature]

Gene Richards, III

Title: Director of Aviation

Burlington International Airport

Date: 5/11/16

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

STATE OF VERMONT

Dept of Environmental Conservation

By: e-Signed by George Desch on 2016-06-08 18:31:23 GMT

Commissioner

Dept of Environmental Conservation

Date: _____

THE PARTICIPATING PARTIES:

CITY OF BURLINGTON

By: _____

Title: Director

City of Burlington

Date: 5/2/16

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

STATE OF VERMONT

Dept of Environmental Conservation

By: e-Signed by George Desch on 2016-06-08 18:31:23 GMT

Commissioner

Dept of Environmental Conservation

Date: _____

THE PARTICIPATING PARTIES:

TOWN OF COLCHESTER

By: Bryan K. Osborne

Title: Director of Public Works

Town of Colchester

Date: 3/21/16

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

STATE OF VERMONT

Dept of Environmental Conservation

By: e-Signed by George Desch on 2016-06-08 18:31:23 GMT

Commissioner

Dept of Environmental Conservation

Date: _____

THE PARTICIPATING PARTIES:

VILLAGE OF ESSEX JUNCTION

By: Patrick C. Scheidel

Title: Municipal Manager

Village of Essex Junction

Date: March 15, 2016

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

STATE OF VERMONT

Dept of Environmental Conservation

By: e-Signed by George Desch on 2016-06-08 18:31:23 GMT

Commissioner

Dept of Environmental Conservation

Date: _____

THE PARTICIPATING PARTIES:

TOWN OF ESSEX

By: Patrick C. Scheidel

Title: Municipal Manager

Town of Essex

Date: March 15, 2016

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

STATE OF VERMONT

Dept of Environmental Conservation

By: e-Signed by George Desch on 2016-06-08 18:31:23 GMT

Commissioner

Dept of Environmental Conservation

Date: _____

THE PARTICIPATING PARTIES:

TOWN OF SHELBURNE

By: _____

Title: Town Manager

Town of Shelburne

Date: 22-FEB-2016

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

STATE OF VERMONT

Dept of Environmental Conservation

By: e-Signed by George Desch on 2016-06-08 18:31:23 GMT

Commissioner

Dept of Environmental Conservation

Date: _____

THE PARTICIPATING PARTIES:

CITY OF SOUTH BURLINGTON

By: _____

Title: City Manager

City of South Burlington

Date: 3/9/16

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

STATE OF VERMONT

Dept of Environmental Conservation

By: e-Signed by George Desch on 2016-06-08 18:31:23 GMT

Commissioner

Dept of Environmental Conservation

Date: _____

THE PARTICIPATING PARTIES:

CITY OF ST. ALBANS

By: _____

Title: City Manager

City of St. Albans

Date: 2/23/16

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

STATE OF VERMONT

Dept of Environmental Conservation

By: e-Signed by George Desch on 2016-06-08 18:31:23 GMT

Commissioner

Dept of Environmental Conservation

Date: _____

THE PARTICIPATING PARTIES:

TOWN OF ST. ALBANS

By: _____

Title: Town Manager

Town of St. Albans

Date: 5/3/16

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

STATE OF VERMONT

Dept of Environmental Conservation

By: e-Signed by George Desch on 2016-06-08 18:31:23 GMT

Commissioner

Dept of Environmental Conservation

Date: _____

THE PARTICIPATING PARTIES:

UNIVERSITY OF VERMONT

By: Linda Seavey

Title: Director Campus Planning S&C

University of Vermont

Date: 5/3/16

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

STATE OF VERMONT

Dept of Environmental Conservation

By: e-Signed by George Desch on 2016-06-08 18:31:23 GMT

Commissioner

Dept of Environmental Conservation

Date: _____

THE PARTICIPATING PARTIES:

VERMONT AGENCY OF TRANSPORTATION

By: e-Signed by Chris Cole on 2016-05-19 14:09:05 GMT

Title: _____

Vermont Agency of Transportation

Date: _____

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

STATE OF VERMONT

Dept of Environmental Conservation

By: e-Signed by George Desch on 2016-06-08 18:31:23 GMT

Commissioner

Dept of Environmental Conservation

Date: _____

THE PARTICIPATING PARTIES:

TOWN OF WILLISTON

By: _____

Title: Town Manager

Town of Williston

Date: February 22, 2016

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

STATE OF VERMONT

Dept of Environmental Conservation

By: e-Signed by George Desch on 2016-06-08 18:31:23 GMT

Commissioner

Dept of Environmental Conservation

Date: _____

THE PARTICIPATING PARTIES:

CITY OF WINOOSKI

By: _____

Title: City Manager

City of Winooski

Date: 2.25.16

Attachment A

Project Contacts

Parties Contacts

Burlington International Airport
Amanda Hanaway-Corrente, Director of Environmental Compliance
802-863-2874
ahanaway@btv.aero

City of Burlington
Megan Moir, Stormwater Program Manager
802-540-1748
mmoir@burlingtonvt.gov

Town of Colchester
Bryan Osborne, Public Works Director
802-264-5625
bosborne@cochestervt.gov

Village of Essex Junction
Jim Jutras, Public Works
802-878-6943
jim@essexjunction.org

Town of Essex
Dennis Lutz, Public Works Director
802-878-1344
dennis@essex.org

City of South Burlington
Tom DiPietro, Public Works Deputy
802-658-7961
tdipietro@sburl.com

Town of Shelburne
Chris Robinson, Water Quality Superintendent
802-985-3700
crobinson@shelburnevt.org

City of St. Albans
Chip Sawyer, Planner
802-524-1500
c.sawyer@stalbansvt.com

Town of St. Albans
Nathaniel Neider, Planner
802-524-7589
satplanner@comcast.net

University of Vermont
Linda Seavey, Planning Director
802-656-0215
Linda.seavey@uvm.edu

Vermont Agency of Transportation
Craig DiGiammarino, Manager
802-922-4681
Craig.digiammarino@vermont.gov

Town of Williston
James Sherrard, Stormwater Coordinator
802-878-1239
jsherradrd@willistonvt.org

City of Winooski
John Choate, Utility Manager
802-655-6421
jchoate@winooskivt.org