

# **Water Quality in the LaPlatte River**

**2014-2015 Summary Report**

**March 9, 2016**

**Prepared for**

**VT DEC Watershed Management Division**

**Volunteer Water Quality Monitoring**

**LaRosa Analytical Services Partnerships**

**Prepared by**

**South Chittenden River Watch**

Water quality monitoring in LaPlatte River during 2014 and 2015 targeted high flows. Targeting was based on rainfall forecasts, rainfall at the Shelburne Waste Treatment Facility adjacent to McCabe’s Brook, and LaPlatte River discharge rates at Falls Road. Of samples collected during 2014-2015, nine were taken during periods of high flow, and one on October 4, 2015 when the flow was estimated to be moderate.

The SCRW monitoring program initiated targeting of high flows for three principal reasons. Firstly, it was the objective to sample within a range of discharge rates that would enhance the comparability of data from year to year and provide a sense of change in water quality over time, and more importantly, sediment and nutrient loadings to receiving waters. Secondly, a combination of high discharge rates and associated high sediment and phosphorus concentrations results in total loadings on the lake far exceed the total of those contributed at low and moderate flows. Thirdly, as indicated below, at low and moderate flow rates, solids and phosphorus are stored upstream to varying degrees, resulting in uncertainty as to what is being sampled. It is considered that high flow sampling provides a more representative and consistent picture of water quality throughout the river system.

When assessing and interpreting water quality results collected at high flows in 2014 and 2015, it is important to bear in mind that these data are, in general, not comparable to earlier results collected at random flow rates ranging from very low to high without a knowledge of associated instantaneous flow rates.

**Effects of Discharge Rates on Water Quality**

It is important to understand the impact on water quality results of the change from random flow sampling carried out between 2004 and 2012 to results observed when targeting high flows. The targeting of high flows was initiated in 2013, but targets were not fully achieved until 2014-2015. As demonstrated in the following table, the shift to targeted high flows (> 100 cfs) resulted in increases in concentrations, and more importantly, in instantaneous loading rates.

**Comparison of Stream Discharges and Phosphorus Concentrations and Loading Rates in the LaPlatte River at Falls Road on CCRW Sampling Dates and Times**

Year	Parameter	Discharge (cfs)	Phosphorus Concentrations			Instantaneous Phosphorus Loading Rates (Kg/day)		
			Total	Particulate	Dissolved	Total	Particulate	Dissolved
<b>2006-2011</b>	Average	34.64	67.82	39.53	28.29	7.62	4.28	3.34
	Minimum	1.05	16.90	7.70	7.19	0.11	0.05	0.05
	Maximum	172.00	396.00	302.90	93.10	51.14	35.58	18.90
	Median	18.50	42.95	20.60	21.40	1.88	0.85	0.88
<b>2013</b>	Average	155.14	87.24	54.56	32.68	34.92	22.13	12.79
	Minimum	8.70	30.30	12.30	18.00	0.65	0.26	0.38
	Maximum	585.00	178.00	133.90	44.10	120.81	74.58	46.23
	Median	56.00	76.80	43.60	33.20	9.14	4.69	4.91
<b>2014-2015</b>	Average	290.60	130.48	82.28	48.20	111.38	77.70	33.69
	Minimum	43.00	50.80	32.10	18.70	9.75	4.59	5.17
	Maximum	921.00	228.00	173.10	79.20	513.81	390.09	123.72
	Median	201.50	126.50	68.20	52.00	69.59	39.06	27.46

On the other hand, as indicated in the introduction, it is the high flow rates that contribute the bulk of the sediment and nutrients discharged into Shelburne Bay and Lake Champlain. This is illustrated in the following comparison of phosphorus concentrations and loading rates at high, moderate, and low stream flow rates based on SCRW-LWP monitoring results observed at Falls Road between 2004 and 2015:

**Median Phosphorus Concentrations and Loading Rates in the LaPlatte River at Falls Road at High, Moderate, and Low Discharge Rates: 2004-2015 Data**

	Discharge Range (cfs)	Median Discharge Rate (cfs)	Concentration (µg/l)			Instantaneous Loading Rate (Kg/d) <sup>1</sup>		
			Total Phosphorus	Particulate Phosphorus	Dissolved Phosphorus	Total Phosphorus	Particulate Phosphorus	Dissolved Phosphorus
High Flow <sup>2</sup>	>75	165	125	66.1	44.5	59.4	31.7	20.8
Moderate Flow	7.6-75	19	40.3	20.4	21.25	2.6	1.2	1.6
Low Flow <sup>3</sup>	<7.6	3.55	31.2	17.7	14.4	0.3	0.1	0.1

1. At time of sampling

2. Defined as flows exceeding a "critical" or "threshold" flow of 75 cfs. This discharge rate is exceeded about 17.5% of the time

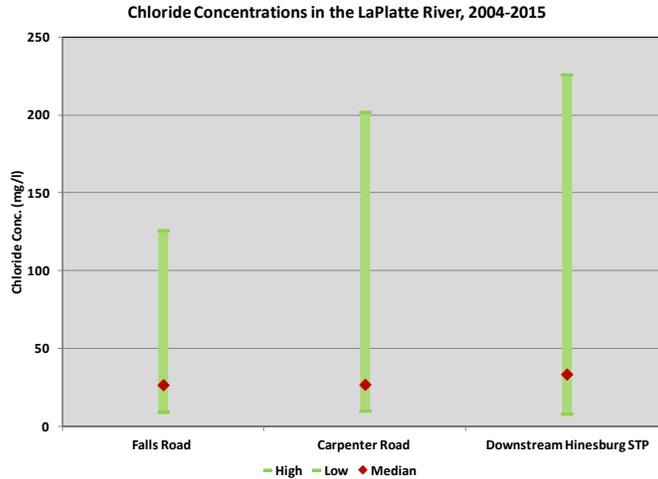
3. Defined as flows falling below 7.6 cfs. Discharge rates fall below this value 25% of the time.

These admittedly limited data suggest that around 87% of the phosphorus loading on Shelburne Bay is contributed when flows exceeded 75 cfs.

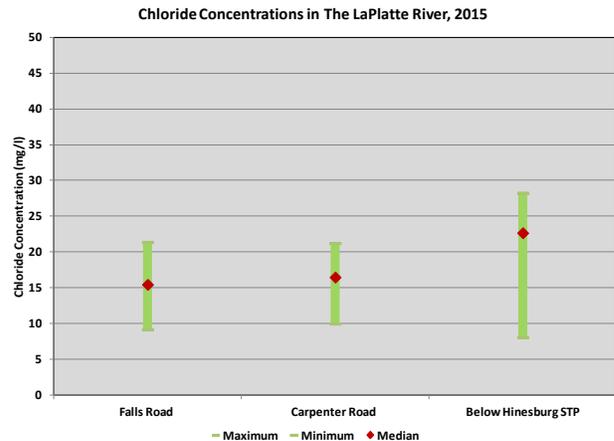
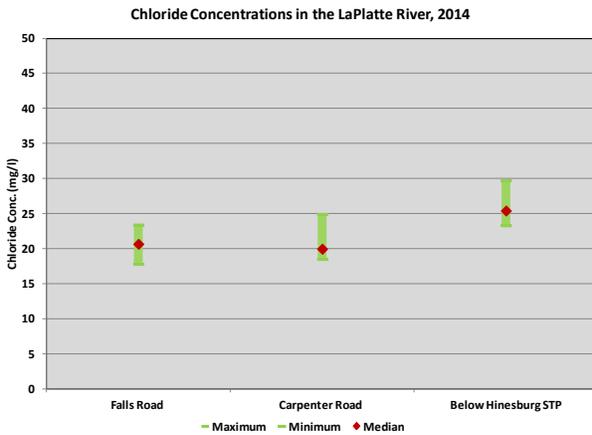
### **Chloride**

Chloride concentrations in streams may be influenced by human or animal wastes or by runoff from roads salted during the previous winter. In Champlain Valley streams unaffected by external sources of chloride, concentrations tend to vary between about 10 and 20 mg/l. Because chlorides occur in wastes and road salt, concentrations over and above background levels, they can serve as a useful indicator of external influences on water quality. Furthermore, because chloride is a non-reactive conservative element, it can serve also as a useful tool for interpreting other water quality data. In surface waters severely impacted by runoff from heavily salted roads, concentrations can exceed those which can harm aquatic life. The USEPA limit for acute toxicity is 860 mg/l, and that for chronic toxicity is 230 mg/l.

The primary source of chlorides observed in the LaPlatte River is the discharge from the Hinesburg waste treatment facility. During the early years of monitoring of water quality in the LaPlatte River, chloride concentrations proved useful as indicators of dilution downstream from the treatment facility. This is highlighted in the historical high concentrations associated particularly with low flows illustrated below:

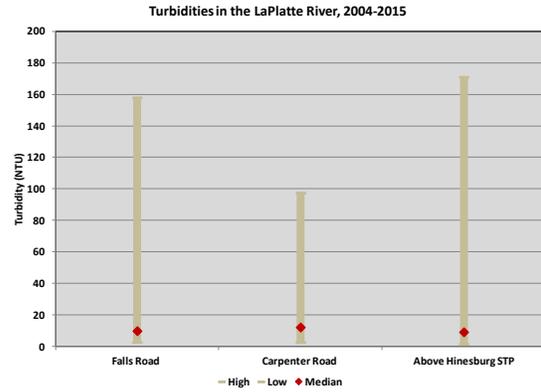
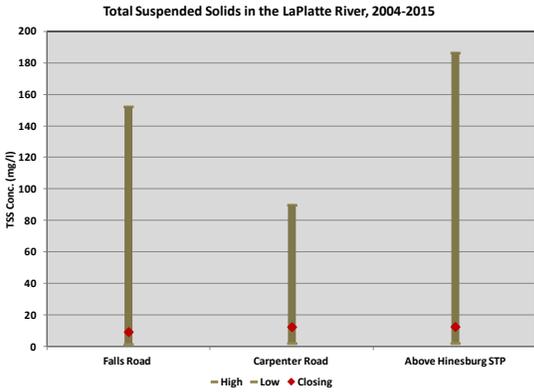


During 2014 and 2015 when stream flow rates were high, concentrations of chlorides downstream from the waste discharge were consistently low, and following a decrease to background levels at Carpenter Road as a result of dilution, decreased little to Falls Road. Maximum concentrations remained close to the median. Chloride concentrations failed to reflect increasing flows downstream when flow rates were high, contributing little to the value of the monitoring program, and could be dropped when monitoring water quality targeting high flows.

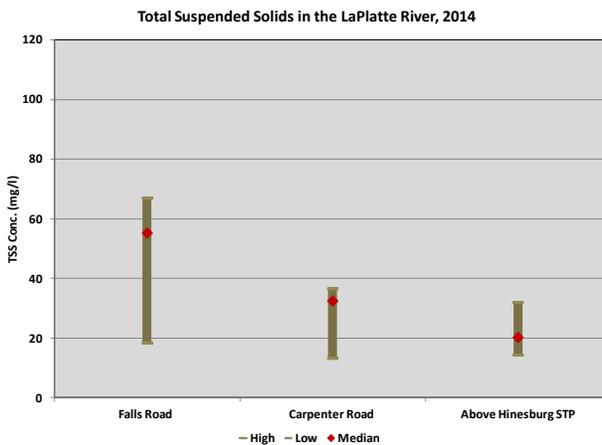


## Solids

Historically, under a random flow sampling regime which included many low and moderate flow results, levels of suspended sediment observed at the sentinel sampling stations on the LaPlatte River have tended to be low and under 20 mg/l total suspended solids (TSS), with occasional spikes.

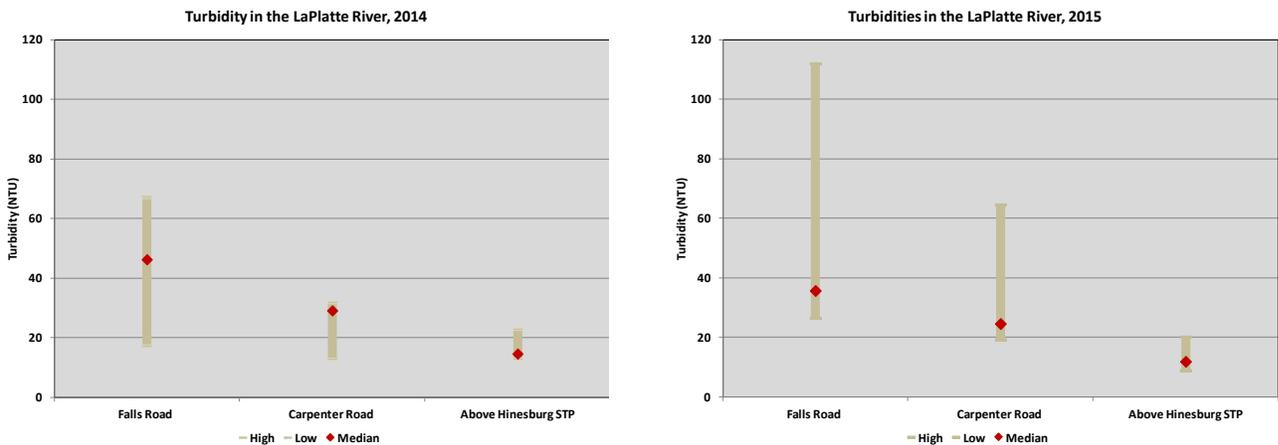


As demonstrated in 2013 when flow rates were monitored above the Hinesburg treatment plant outfall and Carpenter Road, and Falls Road in conjunction with monitoring of water quality, the TSS concentration fell between the treatment outfall and Carpenter Road when the flow was 8.7 cfs at Falls Road, but increased significantly when the downstream flow was 44 cfs as a result of stream bank erosion and bottom scour which is significant between the treatment plant and Leavenworth Road located 3.18 miles upstream from Carpenter Road. In each case, however, the sediment loading rate increased slightly. However, TSS concentrations decreased between Carpenter and Falls Roads, and most meaningfully, sediment was shown to settle out of suspension when the flow rates at Falls Road were 44 cfs and 8.7 cfs. That is, the stream acted as a sink removing sediment from suspension at flow rates of 44 cfs and to 8.7 cfs. At a higher flow rate of 95 cfs at Falls Road, sediment concentrations increased continuously downstream. At the same time, sediment loadings to each segment of the stream were high, and the loadings increased steadily downstream. This is an important consideration when interpreting and comparing results of monitoring targeting high flows with historical results of random flow sampling.



The overall pattern exhibited by solids observations during high flows at the sentinel stations on the LaPlatte River are not, therefore, comparable to that of concentrations observed during random flow monitoring unless they are compared with concentrations

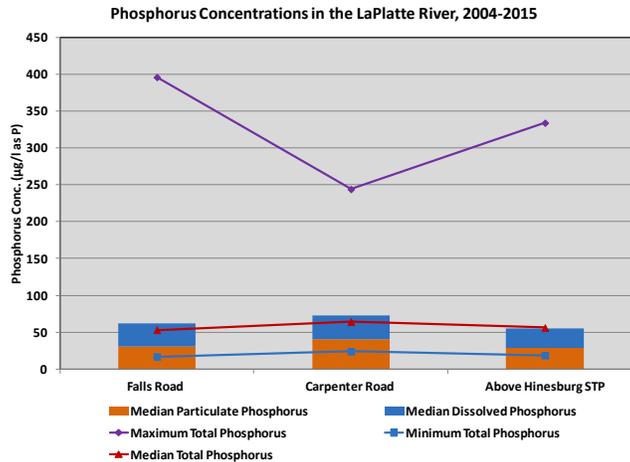
observed at high flows during earlier years. Sediment concentrations observed during 2014 and 2015 when the monitoring program targeted high flows exceeding 100 cfs at Falls Road illustrate the behavior of suspended solids in the stream and the effects of the mobilization of bottom sediment and stream erosion above the “critical” level. During both 2014 and 2015, median suspended solids concentrations were higher than historical median values, and they increased steadily downstream as they did in 2013. Furthermore, minimum solids concentrations were very much higher and also increased as expected. Maximum concentrations also followed this pattern, but did not reach maximum values attained over the previous 10 years.



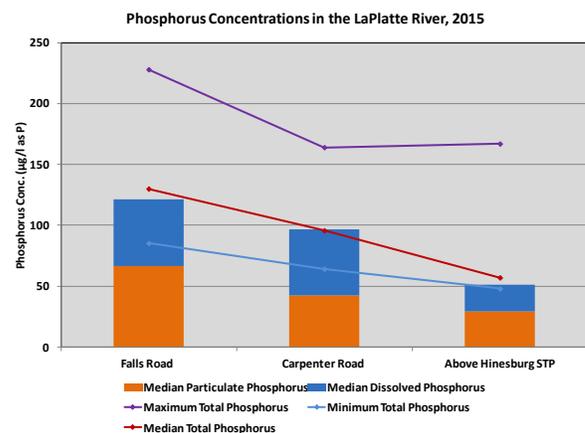
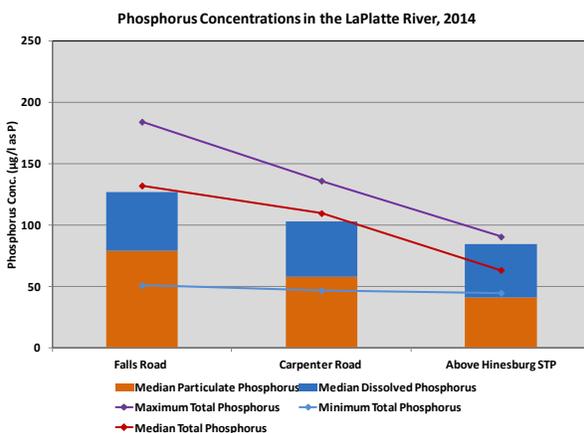
The increased suspended solids concentrations observed during high flow monitoring explain higher particulate phosphorus concentrations observed in 2014 and 2015, and contribute significantly to higher total phosphorus concentrations and their increase with flow downstream.

### Phosphorus

Historical phosphorus concentrations at sentinel stations in the LaPlatte River have been on average slightly above 50 µg/l, varying from lows of around 25 µg/l to very high values reaching 400 µg/l at Falls Road. Variations in total phosphorus concentrations were related to variations in particulate phosphorus and reflected directly suspended sediment concentrations. Thus, the increase in median and minimum concentrations of total phosphorus between the Hinesburg waste treatment facility and Carpenter Road reflected the effects of streambank erosion and bottom scour between the treatment plant and Leavenworth Road discussed above. The general decrease in the levels of total phosphorus between Carpenter and Falls Roads was directly related to the settling out of suspended sediment over this segment of the stream at low and moderate flows. The high total phosphorus values observed at the sentinel stations mirror the pattern exhibited by maximum suspended solids concentrations illustrated above.



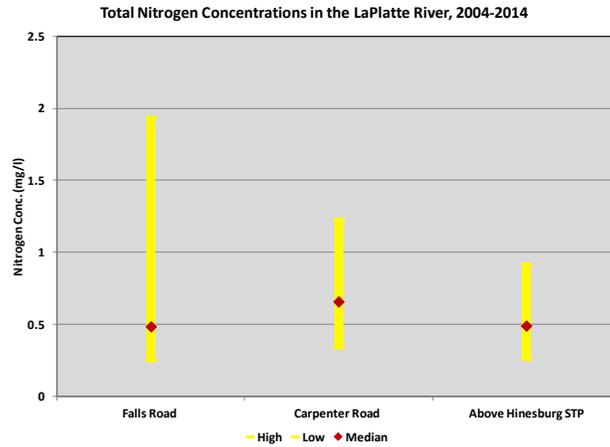
The picture exhibited by phosphorus observed in the LaPlatte River in 2014 and 2015 when high flows were targeted differed significantly from that seen in the historical record. Levels were in general higher than observed in the historical record, exceeding on average more than 100 µg/l at Carpenter and Falls Roads as a result both of higher dissolved and particulate phosphorus concentrations. Furthermore, total phosphorus concentrations consistently increased from the Hinesburg waste treatment facility to Carpenter Road and again from Carpenter Road to Falls Road. In general, dissolved phosphorus concentrations were fairly consistent throughout the stream. Increasing total phosphorus concentrations were entirely a result of increasing particulate phosphorus concentrations save upstream in 2015 associated with continuously increasing suspended sediment concentrations caused by bottom scour and streambank erosion between the treatment facility and Carpenter Road, and re-suspension of sediment between Carpenter and Falls Roads as demonstrated in 2013 and discussed above. Overall, phosphorus concentrations in the LaPlatte River are related directly to flow rates, and in particular, to the behavior of suspended sediment in response to flow.



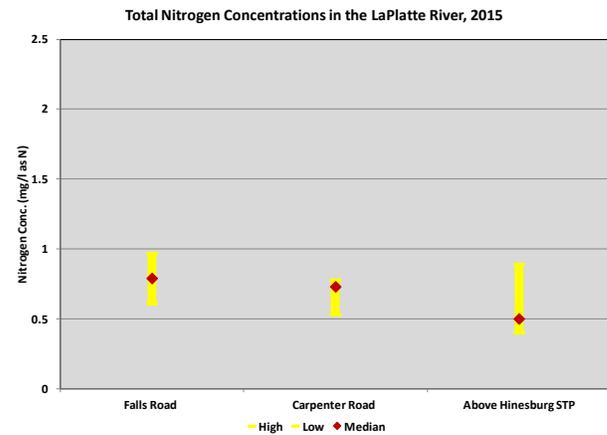
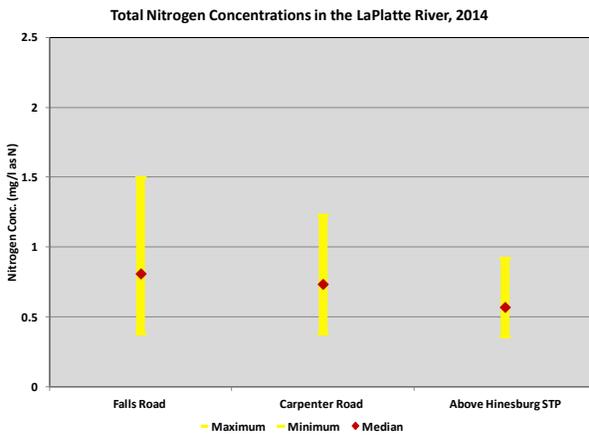
Of special note, is the close similarity of median total phosphorus concentrations in 2014 and 2015, suggesting the comparability of results from year to year, and the value of high flow monitoring as a tool for identifying changes in water quality over time.

## Nitrogen

In general, observed total nitrogen concentrations have been low. Historical records show that on average, levels have tended to increase between the Hinesburg treatment facility and Carpenter Road as a result of discharge from the treatment facility. Levels have subsequently decreased to Falls Road as a result of dilution, which during many past years has paralleled decreasing chloride concentrations. Over the same time period, maximum nitrogen concentrations increased steadily downstream.



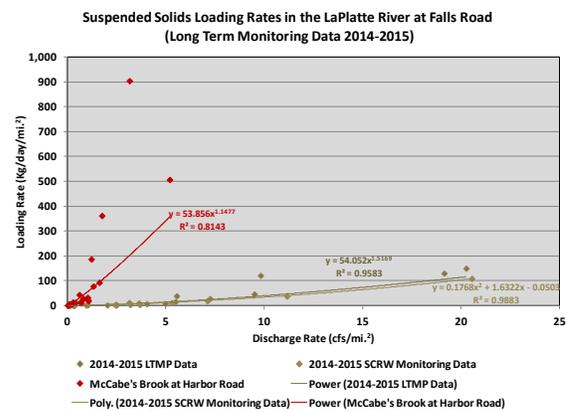
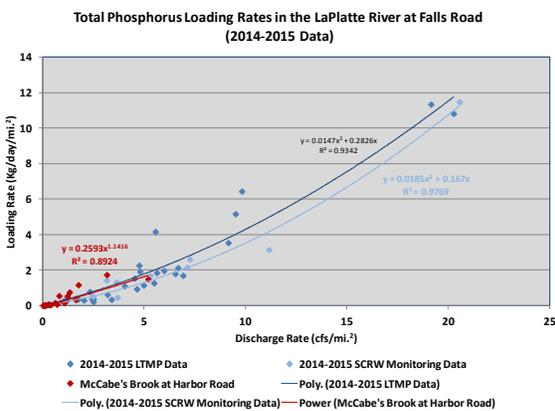
Levels of nitrogen monitored at high flow rates in 2014 and 2015 were similar to historical levels above the Hinesburg treatment facility and at Carpenter Road, but increased downstream to Falls Road. Otherwise, concentrations observed in 2014 were not significantly different from historical levels. Other than the upstream discharge from the Hinesburg waste treatment facility, sources of nitrogen are most likely natural runoff which increases during periods of high flow, thus explaining the increases between Carpenter and Falls Roads in 2014 and 2015.



The narrow range of values reported at Carpenter and Falls Roads in 2015 was unusual, but suggested that sampling within a specific flow class may enhance consistency of results. On average, median concentrations reported in 2015 were close to, and consistent with, those observed in 2014, again suggesting the value of high flow sampling when interpreting data over time.

### **Flow and Loading Rates**

Upstream discharge rates in the LaPlatte River were not monitored in 2014 or 2015. Comparisons between total phosphorus and suspended solids loading rates on SCRW sampling dates with Long Term Monitoring data collected at Falls Road shown below reveal nearly identical results. Furthermore, data in each case exhibited very little variation.



Total phosphorus and suspended solids loading rates in McCabe's Brook, which drains a small near-lake watershed about one tenth the size of the LaPlatte River watershed, and which is impacted upstream by agricultural runoff, and downstream by urban drainage, are shown for comparative purposes. As indicated, total phosphorus loading rates in the two watersheds are nearly identical. In contrast, suspended sediment loadings were in general higher in the small direct-to-lake watershed, and at times of high flows, reached more than 250 times those in the LaPlatte River. It is noted, however, that discharge rates in McCabe's Brook never have been observed to exceed 10.13 cfs/mi.<sup>2</sup>, about half that observed in the LaPlatte River and Thorp and Kimball Brooks in Charlotte.

## Conclusions

### General

- Monitoring of water quality in the LaPlatte River in 2014 and 2015 was carried out at 3 sentinel sites located upstream from the Hinesburg waste treatment facility, Carpenter Road, and Falls Road
- Monitoring of water quality targeted high flows >100 cfs
- Nine of 10 samples met the high flow objective
- Targeting of high flows results in increased concentrations of solids and phosphorus in the LaPlatte River. Results of high flow monitoring are not comparable to those obtained during random flow sampling.

### Flow Rates and Water Quality

- Flow rates have a significant impact on water quality, and particularly on suspended solids and nutrient concentrations and loading rates
- A rough estimate based on SCRW-LWP data suggests that around 87% of the phosphorus loading on Shelburne Bay from the LaPlatte River is associated with flows in excess of 75 cfs.

### Chlorides

- Chloride concentrations were generally low in 2014-2015, and particularly in 2015, when they were close to background levels
- At high flows, chlorides were of no practical value as indicators of dilution

### Solids

- Levels of solids observed upstream from the Hinesburg treatment facility in 2014-2015 were generally consistent with those observed over the total period 2004-2015
- Levels of solids at Carpenter Road were significantly higher when the monitoring program targeted high flows than in earlier years of random flow monitoring. This was a result of:
  - Streambank erosion and bottom scour between the waste treatment facility and Leavenworth Road, and
  - Bottom scour and re-suspension of settled solids downstream from Leavenworth Road
- Between Carpenter Road to Falls Road, solids concentrations rose further as a result particularly of re-suspension of solids which settle out of suspension when flows are moderate or low

### Phosphorus

- Like solids, phosphorus levels in the LaPlatte River were profoundly influenced by flow rates, resulting in higher phosphorus concentrations during 2014-2015 when high flows were targeted than during earlier years when random flows were monitored
- High levels of phosphorus observed in 2014-2015 were attributable to elevated concentrations of both dissolved and particulate phosphorus
- Phosphorus concentrations increased steadily from the Hinesburg treatment facility to Carpenter Road and again from Carpenter Road to Falls Road
- Particulate phosphorus concentrations in general constituted the predominate phosphorus phase
- Increases in the total phosphorus concentrations between the treatment plant and Carpenter Road, and between Carpenter and Falls Road were attributable to increases in concentrations in particulate phosphorus which reflected associated increases in concentrations of suspended solids
- The increases in median total phosphorus concentrations in 2014 and 2015 were almost identical, suggesting the value of high flow sampling as a tool for monitoring changes in water quality over time

### Nitrogen

- Nitrogen concentrations were typically low, falling below 1 mg/l throughout the 2004-2015 history of the SCRW-LWP monitoring program
- Where historical nitrogen levels fell between Carpenter and Falls Roads, they increased steadily downstream from the Hinesburg treatment facility to Falls Road in 2014-2015, probably reflecting effects of runoff.

## **RECOMMENDATIONS**

- There was a high degree of consistency among monitoring results for solids, phosphorus, and nitrogen from 2014 to 2015, suggesting that median concentrations determined at high flows may provide a useful tool for following trends and changes in water quality in response to mitigation efforts or other changes within the watershed
- Monitoring of water quality should continue to target high flows
- Drop monitoring of chlorides in the LaPlatte River when targeting high flows

## **ANNEX I**

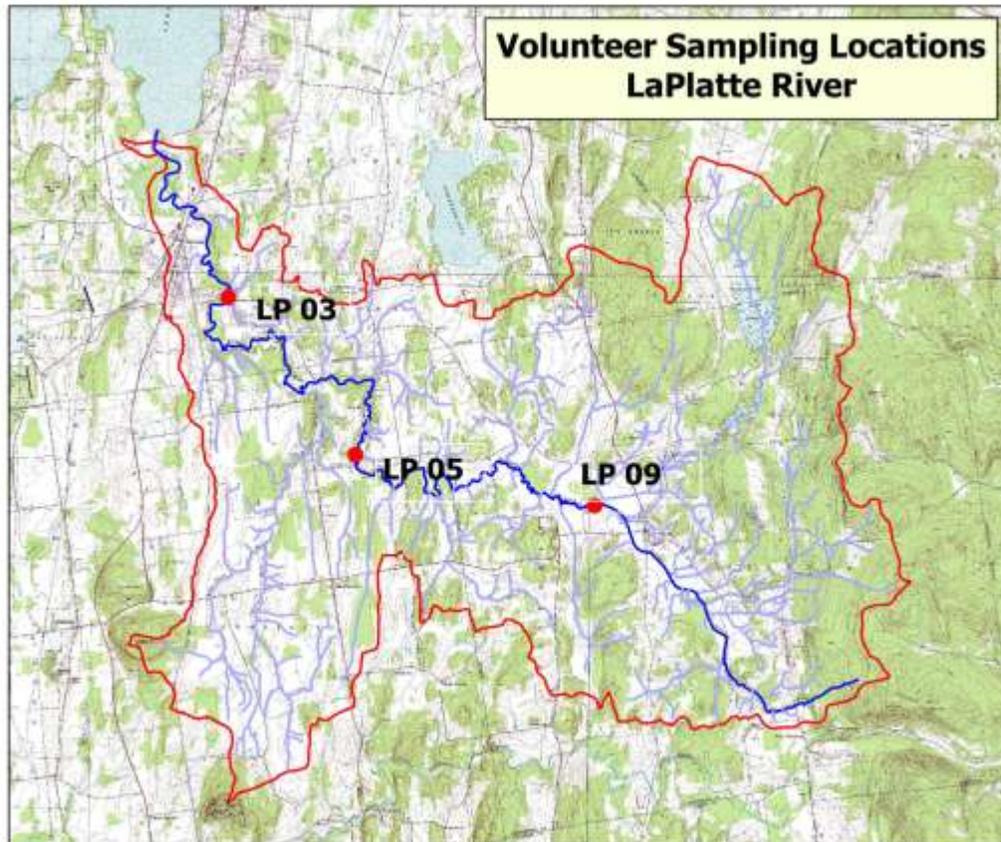
### **Sampling Stations**

## ANNEX I-A

### Station Descriptions

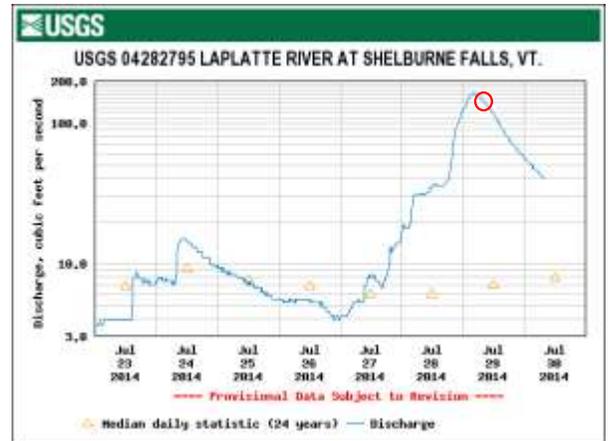
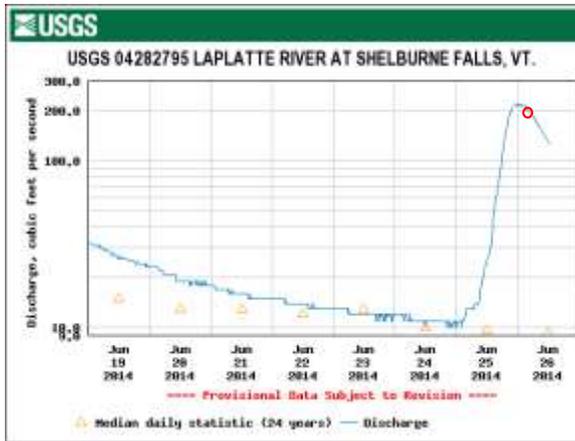
#### South Chittenden Riverwatch Sampling Station Locations - 2013

Station No.	River Mile	Coordinates	Town	Description	Remarks
LP 03 (LR 04)	LAP 3.46	44.37022 -73.21577	Shelburne	LaPlatte River, intersection of Thomas and Falls Roads. East (right bank), approximately 30 meters south of Falls Rd. bridge.	Dairy farms drain via tributaries below LP4. Upstream drainage 44.8 mi <sup>2</sup> .
LP 05	LAP 9.19	44.34176 -73.18383	Charlotte	LaPlatte River, Carpenter Rd. bridge. Left bank, 5 meters upstream from bridge.	Dairy farms drain from right bank downstream from LP4b. Bank erosion upstream. Upstream drainage 31.2 mi <sup>2</sup> .
LP 09	LAP 14.54	44.33395 -73.12598	Hinesburg	LaPlatte River, 15 meters upstream of Hinesburg sewage treatment plant outfall.	Drains fields adjacent to Hinesburg village. Upstream drainage 17.7 mi <sup>2</sup> .



## **ANNEX II-A**

### **Flow Characteristics – 2014**

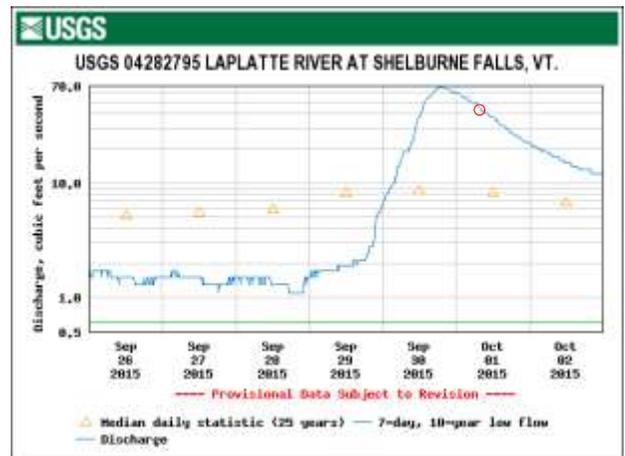
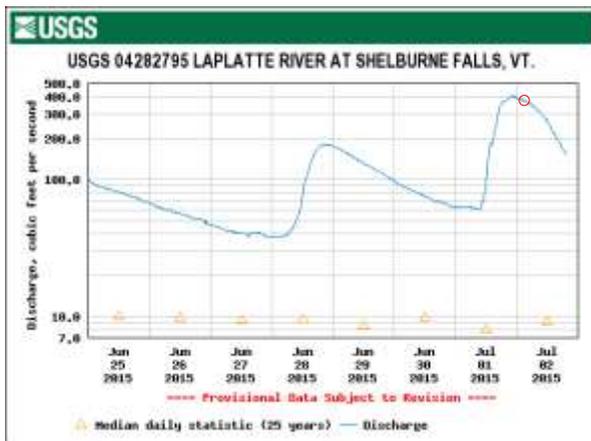
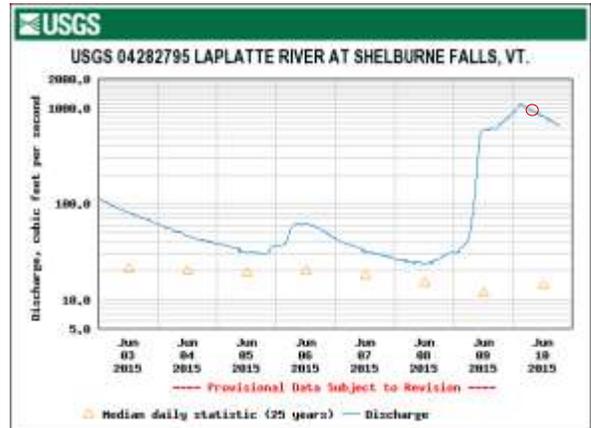
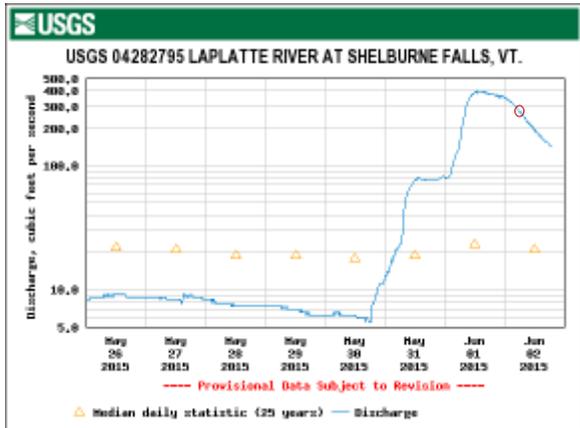
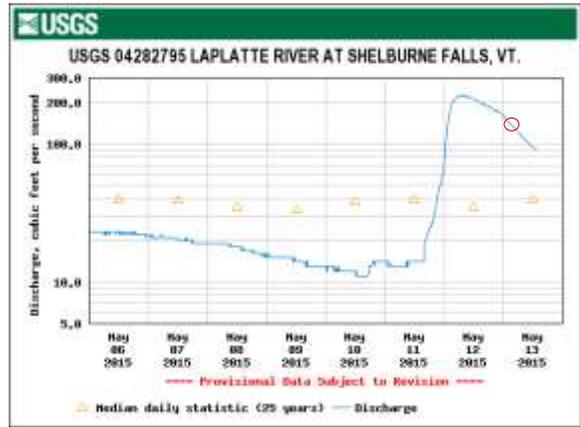
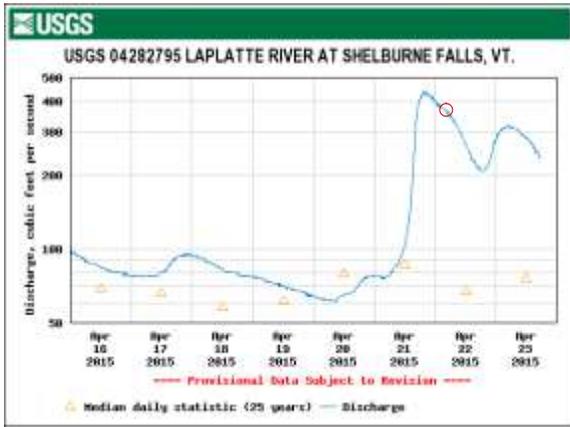


### Flow in the LaPlatte River at Harbor Road, 2014

Date	Flow (cfs)	Flow Status
17-Apr-14	480	Decreasing flow over 24 hrs from peak of about 1,250 cfs
5-May-14	165	Prolonged Peak
26-Jun-14	163	Early Decreasing
29-Jul-14	141	Early Decreasing

## **ANNEX II-B**

### **Flow Characteristics - 2015**



### Flow in the LaPlatte River at Harbor Road, 2015

<b>Date</b>	<b>Flow (cfs)</b>	<b>Flow Status</b>
4/22/2015	325	Decreasing from peak of 440 cfs from 20:15 to 20:30 on 4-21-2015
13-May-15	111	Decreasing from peak of 223 cfs from 5:45 to 8:45 on 5-12-2015
6/2/2015	238	Decreasing from peak of 400 cfs at 13:15 on 6-1-2015
6/10/2015	921	Decreasing from peak of 1,080 cfs at 4:00 on 6-10-2015
7/2/2015	319	Decreasing from peak of 406 cfs from 22:00 to 23:00 on 7-1-2015
10/1/2015	43	Decreasing from peak of 68 cfs at 20:45 on 9/30/2015

**ANNEX III-A**

**RAW DATA – 2014**

### Chloride Concentrations in the LaPlatte River - 2014

Sampling Location	4/17/2014	5/5/2014	6/26/2014	7/29/2014	Maximum	Minimum	Median
LP 03	19	22.3	17.8	23.4	23.4	17.8	20.65
LP 05	18.5	21.4	18.5	24.9	24.9	18.5	19.95
LP 08	23.3	24.2	26.6	29.7	29.7	23.3	25.4

### Solids Concentrations in the LaPlatte River - 2014

		4/17/2014	5/5/2014	6/26/2014	7/29/2014	Maximum	Minimum	Median
Flow	LP 03	500 cfs	165 cfs	163 cfs	141 cfs			
TSS	LP 03	61.5	18.4	49	67	67	18.4	55.25
	LP 05	31.7	13.2	33.2	36.5	36.5	13.2	32.45
	LP 09	32	21.2	19.2	14.3	32	14.3	20.2
Turbidity	LP 03	46.3	17.4	46.3	67.2	67.2	17.4	46.3
	LP 05	31.9	12.9	28.6	29.7	31.9	12.9	29.15
	LP 09	23	16	13.3	12.9	23	12.9	14.65
Specific Turbidity	LP 03	0.75	0.95	0.94	1.00	1.00	0.75	0.95
	LP 05	1.01	0.98	0.86	0.81	1.01	0.81	0.92
	LP 09	0.72	0.75	0.69	0.90	0.90	0.69	0.74

### Phosphorus Concentrations in the LaPlatte River - 2014

	Station No.	4/17/2014	5/5/2014	6/26/2014	7/29/2014	Maximum	Minimum	Median
Flow	LP 03	500	165	163	141			
TP	LP 03	115	50.8	149	184	184	50.8	132
	LP 05	104	46.5	115	136	136	46.5	109.5
	LP 09	61.5	44.6	64.9	90.4	90.4	44.6	63.2
PP	LP 03	88.3	32.1	69.8	115.7	115.7	32.1	79.05
	LP 05	79.6	27.3	44.9	70.7	79.6	27.3	57.8
	LP 09	47.6		21.4	40.8	47.6	21.4	40.8
DP	LP 03	26.7	18.7	79.2	68.3	79.2	18.7	47.5
	LP 05	24.4	19.2	70.1	65.3	70.1	19.2	44.85
	LP 09	13.9		43.5	49.6	49.6	13.9	43.5

### Nitrogen Concentrations in the LaPlatte River - 2014

	Station No.	4/17/2014	5/5/2014	6/26/2014	7/29/2014	Maximum	Minimum	Median
TN	LP 03	0.64	0.38	0.98	1.5	1.5	0.38	0.81
	LP 05	0.59	0.38	0.88	1.23	1.23	0.38	0.735
	LP 09	0.53	0.36	0.61	0.92	0.92	0.36	0.57
NOx	LP 03	0.07	0.12	0.05	0.1	0.12	0.05	0.085
	LP 05	0.06		0.2	0.13	0.2	0.06	0.13
	LP 09	0.09	0.1	0.19	0.12	0.19	0.09	0.11

**ANNEX III-B**

**RAW DATA – 2015**

### Chloride Concentrations in the LaPlatte River - 2015

Sampling Location	4/22/2015	5/13/2015	6/2/2015	6/10/2015	7/2/2015	10/1/2015	Maximum	Minimum	Median
LP 03	21.37	19.51	15.52	9.16	11.31	25.1	25.1	9.16	17.515
LP 05	20.6	21.23	16.75	9.98	12.35	23.9	23.9	9.98	18.675
LP 08	28.16	28.26	23.93	8.08	18.56	7.37	28.26	7.37	21.245

### Solids Concentrations in the LaPlatte River - 2015

		4/22/2015	5/13/2015	6/2/2015	6/10/2015	7/2/2015	10/1/2015	Maximum	Minimum	Median
Flow	LP 03	325 cfs	111 cfs	238 cfs	921 cfs	319 cfs	43 cfs			
TSS	LP 03	70	29.8	38.6	96.68	48.4	19.6	96.68	19.6	43.5
	LP 05	46.33	23	29.2	9.2	33.6	22.2	46.33	9.2	26.1
	LP 09	24.6	16.6	13.79	7.14	19.6	7.38	24.6	7.14	15.195
Turbidity	LP 03	58.5	26.5	35.7	112	32.3	25.1	112	25.1	34
	LP 05	35	19.3	24.6	64.6	20.5	23.9	64.6	19.3	24.25
	LP 09	20.2	11.9	9.24	12.2	8.95	7.37	20.2	7.37	10.57
Specific Turbidity	LP 03	0.84	0.89	0.92	1.16	1.16	1.16	1.16	0.84	1.04
	LP 05	0.76	0.84	0.84	7.02	7.02	7.02	7.02	0.76	3.93
	LP 09	0.82	0.72	0.67	1.71	1.71	1.71	1.71	0.67	1.26

### Phosphorus Concentrations in the LaPlatte River - 2015

	Station No.	4/22/2015	5/13/2015	6/2/2015	6/10/2015	7/2/2015	10/1/2015	Maximum	Minimum	Median
Flow		325 cfs	111 cfs	238 cfs	921 cfs	319 cfs	43 cfs			
TP	LP 03	147	85.3	130	228	123	92.7	228	85.3	126.5
	LP 05	90.5	64.2	102	164	95.7	104	164	64.2	98.85
	LP 09	64.5	47.9	56.7	167	57	47.6	167	47.6	56.85
PP	LP 03	118.5	49.5	65.6	173.1	66.6	43.6	173.1	43.6	66.1
	LP 05	62.3	36.4	42.4	96.3	41.4	42.6	96.3	36.4	42.5
	LP 09	51	25.8	41.1	26	29	21.1	51	21.1	27.5
DP	LP 03	28.5	35.8	64.4	54.9	56.4	49.1	64.4	28.5	52
	LP 05	28.2	27.8	59.6	67.7	54.3	61.4	67.7	27.8	56.95

LP 09	13.5	22.1	15.6	141	28	26.5	141	13.5	24.3
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### Nitrogen Concentrations in the LaPlatte River - 2015

	Station No.	4/22/2015	5/13/2015	6/2/2015	6/10/2015	7/2/2015	10/1/2015	Maximum	Minimum	Median
TN	LP 03	0.79	0.61	0.97	0.86	0.68	0.68	0.97	0.61	0.735
	LP 05	0.69	0.53	0.73	0.73	0.78	0.74	0.78	0.53	0.73
	LP 09	0.56	0.4	0.5	0.89	0.41	0.42	0.89	0.4	0.46
NOx	LP 03	0.18	0.06	0.27	0.09	0.05	0.16	0.27	0.05	0.125
	LP 05	0.15	0.08	0.09	0.05	0.05	0.17	0.17	0.05	0.085
	LP 09	0.2	0.09	0.08	0.05	0.05	0.06	0.2	0.05	0.07

**ANNEX IV-A**  
**Quality Control Analysis - 2014**

Parameter	Station	Date	Results		(S-D)	Absolute Value (S-D)	(S + D)/2	RPD
			Value	Units				
<b>Chloride</b>	MB 05 - McCabes Brook at Lime Kiln Road	4/17/2014	20.4	mg/L	0.6000	0.6000	20.1000	2.9851
	MB 05 DUP - McCabes Brook at Lime Kiln Road	4/17/2014	19.8	mg/L				
	LP 05 - LaPlatte River at Carpenter Road	4/17/2014	18.5	mg/L	-0.7000	0.7000	18.8500	3.7135
	LP 05 Dup - LaPlatte River at Carpenter Road	4/17/2014	19.2	mg/L				
	MB 04a - McCabes Brook at Teddy Bear Access Road	5/5/2014	40.4	mg/L	-0.3000	0.3000	40.5500	0.7398
	MB 04a DUP - McCabes Brook at Teddy Bear Access Ro	5/5/2014	40.7	mg/L				
	MB 05 - McCabes Brook at Lime Kiln Road	5/5/2014	23.3	mg/L	0.5000	0.5000	23.0500	2.1692
	MB 05 DUP - McCabes Brook at Lime Kiln Road	5/5/2014	22.8	mg/L				
	LP 05 - LaPlatte River at Carpenter Road	5/5/2014	21.4	mg/L	-0.1000	0.1000	21.4500	0.4662
	LP 05 DUP - LaPlatte River at Carpenter Road	5/5/2014	21.5	mg/L				
	MB 03 - McCabes Brook at Bostwick Road	6/26/2014	57	mg/L	3.0000	3.0000	55.5000	5.4054
	MB 03 DUP - McCabes Brook at Bostwick Road	6/26/2014	54	mg/L				
	LP 03 - LaPlatte River at Falls Road	6/26/2014	17.8	mg/L	0.0000	0.0000	17.8000	0.0000
	LP 03 - DUP - LaPlatte River at Falls Road	6/26/2014	17.8	mg/L				
	T 01 - Thorp Brook at Greenbush Road	6/26/2014	35.8	mg/L	0.4000	0.4000	35.6000	1.1236
	T 01 DUP - Thorp Brook at Greenbush Road	6/26/2014	35.4	mg/L				
	MB 03 - McCabes Brook at Bostwick Road	7/29/2014	48	mg/L	0.0000	0.0000	48.0000	0.0000
	MB 03 DUP - McCabes Brooka t Bostwick Road	7/29/2014	48	mg/L				
	LP 03 - LaPlatte River at Falls Road	7/29/2014	23.4	mg/L	-0.3000	0.3000	23.5500	1.2739
	LP 03 DUP - LaPlatte River at Falls Road	7/29/2014	23.7	mg/L				
T01 - Thorp Brook at Greenbush Road	7/29/2014	31.5	mg/L	1.2000	1.2000	30.9000	3.8835	
T01 DUP - Thorp Brook at Greenbush Road	7/29/2014	30.3	mg/L					

**Mean** 1.98  
**Target** 10%

**Total N**

MB 05 - McCabes Brook at Lime Kiln Road	4/17/2014	0.39	mg/L	0.0000	0.0000	0.3900	0.0000
MB 05 DUP - McCabes Brook at Lime Kiln Road	4/17/2014	0.39	mg/L				
LP 05 - LaPlatte River at Carpenter Road	4/17/2014	0.59	mg/L	-0.0200	0.0200	0.6000	3.3333
LP 05 Dup - LaPlatte River at Carpenter Road	4/17/2014	0.61	mg/L				
MB 04a - McCabes Brook at Teddy Bear Access Road	5/5/2014	0.44	mg/L	0.0000	0.0000	0.4400	0.0000
MB 04a DUP - McCabes Brook at Teddy Bear Access Ro	5/5/2014	0.44	mg/L				
MB 05 - McCabes Brook at Lime Kiln Road	5/5/2014	0.39	mg/L	0.0200	0.0200	0.3800	5.2632
MB 05 DUP - McCabes Brook at Lime Kiln Road	5/5/2014	0.37	mg/L				
LP 05 - LaPlatte River at Carpenter Road	5/5/2014	0.38	mg/L	-0.0200	0.0200	0.3900	5.1282
LP 05 DUP - LaPlatte River at Carpenter Road	5/5/2014	0.4	mg/L				
MB 03 - McCabes Brook at Bostwick Road	6/26/2014	3.85	mg/L	0.0000	0.0000	3.8500	0.0000
MB 03 DUP - McCabes Brook at Bostwick Road	6/26/2014	3.85	mg/L				
LP 03 - LaPlatte River at Falls Road	6/26/2014	0.98	mg/L	-0.0500	0.0500	1.0050	4.9751
LP 03 - DUP - LaPlatte River at Falls Road	6/26/2014	1.03	mg/L				
T 01 - Thorp Brook at Greenbush Road	6/26/2014	1.47	mg/L	0.0400	0.0400	1.4500	2.7586
T 01 DUP - Thorp Brook at Greenbush Road	6/26/2014	1.43	mg/L				
MB 03 - McCabes Brook at Bostwick Road	7/29/2014	6.23	mg/L	-0.1100	0.1100	6.2850	1.7502
MB 03 DUP - McCabes Brook at Bostwick Road	7/29/2014	6.34	mg/L				
LP 03 - LaPlatte River at Falls Road	7/29/2014	1.5	mg/L	-0.1000	0.1000	1.5500	6.4516
LP 03 DUP - LaPlatte River at Falls Road	7/29/2014	1.6	mg/L				
T01 - Thorp Brook at Greenbush Road	7/29/2014	2.71	mg/L	-0.0600	0.0600	2.7400	2.1898
T01 DUP - Thorp Brook at Greenbush Road	7/29/2014	2.77	mg/L				

**Mean** 2.90  
**Target** 15%

**NOx**

MB 05 - McCabes Brook at Lime Kiln Road	4/17/2014	0.05	mg/L	0.0000	0.0000	0.0500	0.0000
MB 05 DUP - McCabes Brook at Lime Kiln Road	4/17/2014	0.05	mg/L				
LP 05 - LaPlatte River at Carpenter Road	4/17/2014	0.18	mg/L	-0.0300	0.0300	0.1950	15.3846
LP 05 Dup - LaPlatte River at Carpenter Road	4/17/2014	0.21	mg/L				
MB 04a - McCabes Brook at Teddy Bear Access Road	5/5/2014	0.05	mg/L	0.0000	0.0000	0.0500	0.0000
MB 04a DUP - McCabes Brook at Teddy Bear Access Ro	5/5/2014	0.05	mg/L				
MB 05 - McCabes Brook at Lime Kiln Road	5/5/2014	0.05	mg/L	0.0000	0.0000	0.0500	0.0000
MB 05 DUP - McCabes Brook at Lime Kiln Road	5/5/2014	0.05	mg/L				
LP 05 - LaPlatte River at Carpenter Road	5/5/2014	0.09	mg/L	0.0000	0.0000	0.0900	0.0000
LP 05 DUP - LaPlatte River at Carpenter Road	5/5/2014	0.09	mg/L				
MB 03 - McCabes Brook at Bostwick Road	6/26/2014	2.52	mg/L	0.0000	0.0000	2.5200	0.0000
MB 03 DUP - McCabes Brook at Bostwick Road	6/26/2014	2.52	mg/L				
LP 03 - LaPlatte River at Falls Road	6/26/2014	0.15	mg/L	-0.0200	0.0200	0.1600	12.5000
LP 03 - DUP - LaPlatte River at Falls Road	6/26/2014	0.17	mg/L				
T 01 - Thorp Brook at Greenbush Road	6/26/2014	0.75	mg/L	0.0000	0.0000	0.7500	0.0000
T 01 DUP - Thorp Brook at Greenbush Road	6/26/2014	0.75	mg/L				
MB 03 - McCabes Brook at Bostwick Road	7/29/2014	4.99	mg/L	0.0000	0.0000	4.9900	0.0000
MB 03 DUP - McCabes Brooka t Bostwick Road	7/29/2014	4.99	mg/L				
LP 03 - LaPlatte River at Falls Road	7/29/2014	0.44	mg/L	-0.0100	0.0100	0.4450	2.2472
LP 03 DUP - LaPlatte River at Falls Road	7/29/2014	0.45	mg/L				
T01 - Thorp Brook at Greenbush Road	7/29/2014	1.49	mg/L	0.0000	0.0000	1.4900	0.0000
T01 DUP - Thorp Brook at Greenbush Road	7/29/2014	1.49	mg/L				

**Mean** 2.74  
**Target** 10%

**Total P**

LP 05 - LaPlatte River at Carpenter Road	4/17/2014	104	µg P/L	-25.0000	25.0000	116.5000	21.4592
LP 05 Dup - LaPlatte River at Carpenter Road	4/17/2014	129	µg P/L				
MB 05 - McCabes Brook at Lime Kiln Road	4/17/2014	40.2	µg P/L	0.9000	0.9000	39.7500	2.2642
MB 05 DUP - McCabes Brook at Lime Kiln Road	4/17/2014	39.3	µg P/L				
MB 05 - McCabes Brook at Lime Kiln Road	5/5/2014	34.7	µg P/L	-0.2000	0.2000	34.8000	0.5747
MB 05 DUP - McCabes Brook at Lime Kiln Road	5/5/2014	34.9	µg P/L				
MB 04a - McCabes Brook at Teddy Bear Access Road	5/5/2014	55	µg P/L	6.7000	6.7000	51.6500	12.9719
MB 04a DUP - McCabes Brook at Teddy Bear Access Ro	5/5/2014	48.3	µg P/L				
LP 05 - LaPlatte River at Carpenter Road	5/5/2014	46.5	µg P/L	1.5000	1.5000	45.7500	3.2787
LP 05 DUP - LaPlatte River at Carpenter Road	5/5/2014	45	µg P/L				
MB 03 - McCabes Brook at Bostwick Road	6/26/2014	196	µg P/L	1.0000	1.0000	195.5000	0.5115
MB 03 DUP - McCabes Brook at Bostwick Road	6/26/2014	195	µg P/L				
LP 03 - LaPlatte River at Falls Road	6/26/2014	149	µg P/L	-3.0000	3.0000	150.5000	1.9934
LP 03 - DUP - LaPlatte River at Falls Road	6/26/2014	152	µg P/L				
T 01 - Thorp Brook at Greenbush Road	6/26/2014	140	µg P/L	-4.0000	4.0000	142.0000	2.8169
T 01 DUP - Thorp Brook at Greenbush Road	6/26/2014	144	µg P/L				
MB 03 - McCabes Brook at Bostwick Road	7/29/2014	220	µg P/L	-2.0000	2.0000	221.0000	0.9050
MB 03 DUP - McCabes Brooka t Bostwick Road	7/29/2014	222	µg P/L				
LP 03 - LaPlatte River at Falls Road	7/29/2014	184	µg P/L	-3.0000	3.0000	185.5000	1.6173
LP 03 DUP - LaPlatte River at Falls Road	7/29/2014	187	µg P/L				
T01 - Thorp Brook at Greenbush Road	7/29/2014	151	µg P/L	-1.0000	1.0000	151.5000	0.6601
T01 DUP - Thorp Brook at Greenbush Road	7/29/2014	152	µg P/L				
K02 - Kimball Brook at Greenbush Road	7/29/2014	162	ug P/L	-1.0000	1.0000	162.5000	0.6154
K02 DUP - Kimball Brook at Greenbush Road	7/29/2014	163	ug P/L				

**Mean** 4.14  
**Target** 15%

**Dissolved P**

MB 05 - McCabes Brook at Lime Kiln Road	4/17/2014	23.3	µg P/L	-0.4000	0.4000	23.5000	1.7021
MB 05 DUP - McCabes Brook at Lime Kiln Road	4/17/2014	23.7	µg P/L				
LP 05 - LaPlatte River at Carpenter Road	4/17/2014	24.4	µg P/L	0.6000	0.6000	24.1000	2.4896
LP 05 Dup - LaPlatte River at Carpenter Road	4/17/2014	23.8	µg P/L				
MB 04a - McCabes Brook at Teddy Bear Access Road	5/5/2014	32.8	µg P/L	-0.1000	0.1000	32.8500	0.3044
MB 04a DUP - McCabes Brook at Teddy Bear Access Ro	5/5/2014	32.9	µg P/L				
LP 05 - LaPlatte River at Carpenter Road	5/5/2014	19.2	µg P/L	-0.4000	0.4000	19.4000	2.0619
LP 05 DUP - LaPlatte River at Carpenter Road	5/5/2014	19.6	µg P/L				
MB 03 - McCabes Brook at Bostwick Road	6/26/2014	137	µg P/L	-2.0000	2.0000	138.0000	1.4493
MB 03 DUP - McCabes Brook at Bostwick Road	6/26/2014	139	µg P/L				
LP 03 - LaPlatte River at Falls Road	6/26/2014	79.2	µg P/L	-4.6000	4.6000	81.5000	5.6442
LP 03 - DUP - LaPlatte River at Falls Road	6/26/2014	83.8	µg P/L				
T 01 - Thorp Brook at Greenbush Road	6/26/2014	63.1	µg P/L	1.8000	1.8000	62.2000	2.8939
T 01 DUP - Thorp Brook at Greenbush Road	6/26/2014	61.3	µg P/L				
LP 03 - LaPlatte River at Falls Road	7/29/2014	68.3	µg P/L	2.4000	2.4000	67.1000	3.5768
LP 03 DUP - LaPlatte River at Falls Road	7/29/2014	65.9	µg P/L				
MB 03 - McCabes Brook at Bostwick Road	7/29/2014	114	µg P/L	0.0000	0.0000	114.0000	0.0000
MB 03 DUP - McCabes Brooka t Bostwick Road	7/29/2014	114	µg P/L				
K02 - Kimball Brook at Greenbush Road	7/29/2014	108	ug P/L	-4.0000	4.0000	110.0000	3.6364
K02 DUP - Kimball Brook at Greenbush Road	7/29/2014	112	ug P/L				

**Mean** 2.38  
**Target** 15%

**TSS**

LP 05 - LaPlatte River at Carpenter Road	4/17/2014	31.7	mg/L	-2.3000	2.3000	32.8500	7.0015
LP 05 Dup - LaPlatte River at Carpenter Road	4/17/2014	34	mg/L				
MB 05 - McCabes Brook at Lime Kiln Road	4/17/2014	7.33	mg/L	0.3300	0.3300	7.1650	4.6057
MB 05 DUP - McCabes Brook at Lime Kiln Road	4/17/2014	7	mg/L				
MB 04 - McCabes Brook at Route 7	5/5/2014	6.27	mg/L	-0.1000	0.1000	6.3200	1.5823
MB 04a DUP - McCabes Brook at Teddy Bear Access Ro	5/5/2014	6.37	mg/L				
MB 05 - McCabes Brook at Lime Kiln Road	5/5/2014	3.23	mg/L	0.2700	0.2700	3.0950	8.7237
MB 05 DUP - McCabes Brook at Lime Kiln Road	5/5/2014	2.96	mg/L				
LP 05 - LaPlatte River at Carpenter Road	5/5/2014	13.2	mg/L	-0.8000	0.8000	13.6000	5.8824
LP 05 DUP - LaPlatte River at Carpenter Road	5/5/2014	14	mg/L				
MB 03 - McCabes Brook at Bostwick Road	6/26/2014	25.4	mg/l	-2.3000	2.3000	26.5500	8.6629
MB 03 DUP - McCabes Brook at Bostwick Road	6/26/2014	27.7	mg/l				
LP 03 - LaPlatte River at Falls Road	6/26/2014	49	mg/l	-5.7000	5.7000	51.8500	10.9932
LP 03 - DUP - LaPlatte River at Falls Road	6/26/2014	54.7	mg/l				
T 01 - Thorp Brook at Greenbush Road	6/26/2014	70	mg/l	-2.3000	2.3000	71.1500	3.2326
T 01 DUP - Thorp Brook at Greenbush Road	6/26/2014	72.3	mg/l				
MB 03 - McCabes Brook at Bostwick Road	7/29/2014	38	mg/l	0.0000	0.0000	38.0000	0.0000
MB 03 DUP - McCabes Brook at Bostwick Road	7/29/2014	38	mg/l				
LP 03 - LaPlatte River at Falls Road	7/29/2014	67	mg/l	-5.0000	5.0000	69.5000	7.1942
LP 03 DUP - LaPlatte River at Falls Road	7/29/2014	72	mg/l				
T01 - Thorp Brook at Greenbush Road	7/29/2014	63	mg/l	3.0000	3.0000	61.5000	4.8780
T01 DUP - Thorp Brook at Greenbush Road	7/29/2014	60	mg/l				

**Mean** 5.71  
**Target** 15%

## Turbidity

MB 05 - McCabes Brook at Lime Kiln Road	4/17/2014	7.37	NTU	-0.1200	0.1200	7.4300	1.6151
MB 05 DUP - McCabes Brook at Lime Kiln Road	4/17/2014	7.49	NTU				
LP 05 - LaPlatte River at Carpenter Road	4/17/2014	31.9	NTU	0.0000	0.0000	31.9000	0.0000
LP 05 Dup - LaPlatte River at Carpenter Road	4/17/2014	31.9	NTU				
MB 04a - McCabes Brook at Teddy Bear Access Road	5/5/2014	8.82	NTU	-0.0300	0.0300	8.8350	0.3396
MB 04a DUP - McCabes Brook at Teddy Bear Access Ro	5/5/2014	8.85	NTU				
LP 05 - LaPlatte River at Carpenter Road	5/5/2014	12.9	NTU	-1.0000	1.0000	13.4000	7.4627
LP 05 DUP - LaPlatte River at Carpenter Road	5/5/2014	13.9	NTU				
MB 03 - McCabes Brook at Bostwick Road	6/26/2014	32.3	NTU	4.2000	4.2000	30.2000	13.9073
MB 03 DUP - McCabes Brook at Bostwick Road	6/26/2014	28.1	NTU				
LP 03 - LaPlatte River at Falls Road	6/26/2014	46.3	NTU	-1.9000	1.9000	47.2500	4.0212
LP 03 - DUP - LaPlatte River at Falls Road	6/26/2014	48.2	NTU				
T 01 - Thorp Brook at Greenbush Road	6/26/2014	74	NTU	-0.6000	0.6000	74.3000	0.8075
T 01 DUP - Thorp Brook at Greenbush Road	6/26/2014	74.6	NTU				
MB 03 - McCabes Brook at Bostwick Road	7/29/2014	40.4	NTU	-4.7000	4.7000	42.7500	10.9942
MB 03 DUP - McCabes Brooka t Bostwick Road	7/29/2014	45.1	NTU				
LP 03 - LaPlatte River at Falls Road	7/29/2014	67.2	NTU	-4.2000	4.2000	69.3000	6.0606
LP 03 DUP - LaPlatte River at Falls Road	7/29/2014	71.4	NTU				
T01 - Thorp Brook at Greenbush Road	7/29/2014	75.8	NTU	1.0000	1.0000	75.3000	1.3280
T01 DUP - Thorp Brook at Greenbush Road	7/29/2014	74.8	NTU				

**Mean** 2.49  
**Target** 15%

**E. coli**

MB 04a - McCabes Brook at Teddy Bear Access Road	4/17/2014	6	MPN/100 ml	-13.0000	13.0000	12.5000	104.0000
MB 04a DUP - McCabes Brook at Teddy Bear Access R	4/17/2014	19	MPN/100 ml				
MB 04a - McCabes Brook at Teddy Bear Access Road	5/5/2014	60	MPN/100 ml	5.0000	5.0000	57.5000	8.6957
MB 04a DUP - McCabes Brook at Teddy Bear Access Ro	5/5/2014	55	MPN/100 ml				
MB 05 - McCabes Brook at Lime Kiln Road	5/5/2014	31	MPN/100 ml	8.0000	8.0000	27.0000	29.6296
MB 05 DUP - McCabes Brook at Lime Kiln Road	5/5/2014	23	MPN/100 ml				
MB 03 - McCabes Brook at Bostwick Road	6/26/2014	2419.6	MPN/100 ml	0.0000	0.0000	2419.6000	0.0000
MB 03 DUP - McCabes Brook at Bostwick Road	6/26/2014	2419.6	MPN/100 ml				
T 01 - Thorp Brook at Greenbush Road	6/26/2014	2419.6	MPN/100 ml	0.0000	0.0000	2419.6000	0.0000
T 01 DUP - Thorp Brook at Greenbush Road	6/26/2014	2419.6	MPN/100 ml				
MB 03 - McCabes Brook at Bostwick Road	7/29/2014	2419.6	MPN/100 ml	0.0000	0.0000	2419.6000	0.0000
MB 03 DUP - McCabes Brook at Bostwick Road	7/29/2014	2419.6	MPN/100 ml				
T01 - Thorp Brook at Greenbush Road	7/29/2014	2419.6	MPN/100 ml	0.0000	0.0000	2419.6000	0.0000
T01 DUP - Thorp Brook at Greenbush Road	7/29/2014	2419.6	MPN/100 ml				
						<b>Mean</b>	23.72
						<b>Target</b>	100%

**ANNEX IV-B**  
**Quality Control Analysis - 2015**

Parameter	Station	Date	Results		(S-D)	Absolute Value (S-D)	(S + D)/2	RPD
			Value	Units				
Chloride	MB 03 - McCabes Brook at Bostwick Road	4/22/2015	40.12	mg/L	-0.0200	0.0200	40.1300	0.0498
	MB 03 DUP - McCabes Brook at Bostwick Road	4/22/2015	40.14	mg/L				
	LP 03 - LaPlatte River at Falls Road	4/22/2015	21.37	mg/L	1.5700	1.5700	20.5850	7.6269
	LP 03 - DUP - LaPlatte River at Falls Road	4/22/2015	19.8	mg/L				
	T 01 - Thorp Brook at Greenbush Road	4/22/2015	45.09	mg/L	-0.3000	0.3000	45.2400	0.6631
	T 01 DUP - Thorp Brook at Greenbush Road	4/22/2015	45.39	mg/L				
	MB 04a - McCabes Brook at Teddy Bear Access Rd	5/13/2015	32.3	mg/L	0.0800	0.0800	32.2600	0.2480
	MB 04a DUP - McCabes Brook at Teddy Bear Access Rd	5/13/2015	32.22	mg/L				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	5/13/2015	35.54	mg/L	14.9600	14.9600	28.0600	53.3143
	LP 09 DUP - LaPlatte R above Hinesburg STP Outfall	5/13/2015	20.58	mg/L				
	MB 04a - McCabes Brook at Teddy Bear Access Rd	6/2/2015	23.38	mg/L	0.3200	0.3200	23.2200	1.3781
	MB 04a CUP - McCabes Brook at Teddy Bear Access Rd	6/2/2015	23.06	mg/L				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	6/2/2015	23.83	mg/L	0.3700	0.3700	23.6450	1.5648
	LP 09 DUP - LaPlatte R above Hinesburg STP Outfall	6/2/2015	23.46	mg/L				
	MB 02 - McCabes Brook at Harbor Road	6/10/2015	21.91	mg/L	0.3800	0.3800	21.7200	1.7495
	MB 02 DUP - McCabes Brook at Harbor Road	6/10/2015	21.53	mg/L				
	MB 02 - McCabes Brook at Harbor Road	7/2/2015	20.24	mg/L	0.1900	0.1900	20.1450	0.9432
	MB 02 DUP - McCabes Brook at Harbor Road	7/2/2015	20.05	mg/L				
	MB 05 - McCabes Brook at Lime Kiln Road	10/1/2015	15.88	mg/L	0.0900	0.0900	15.8350	0.5684
	MB 50 DUP - McCabes Brook at Lime Kiln Road	10/1/2015	15.79	mg/L				
LP 05 - LaPlatte River at Carpenter Road	10/1/2015	36.02	mg/L	2.3600	2.3600	34.8400	6.7738	
LP 05 DUP - LaPlatte River at Carpenter Road	10/1/2015	33.66	mg/L					
							<b>Mean</b>	6.81
							<b>Target</b>	10%

<b>Total P</b>	MB 03 - McCabes Brook at Bostwick Road	4/22/2015	92.6	ug P/L	2.5000	2.5000	91.3500	2.7367
	MB 03 DUP - McCabes Brook at Bostwick Road	4/22/2015	90.1	ug P/L				
	LP 03 - LaPlatte River at Falls Road	4/22/2015	147	ug P/L	-3.0000	3.0000	148.5000	2.0202
	LP 03 - DUP - LaPlatte River at Falls Road	4/22/2015	150	ug P/L				
	T 01 - Thorp Brook at Greenbush Road	4/22/2015	184	ug P/L	-2.0000	2.0000	185.0000	1.0811
	T 01 DUP - Thorp Brook at Greenbush Road	4/22/2015	186	ug P/L				
	MB 04a - McCabes Brook at Teddy Bear Access Rd	5/13/2015	68.5	ug P/L	0.4000	0.4000	68.3000	0.5857
	MB 04a DUP - McCabes Brook at Teddy Bear Access Rd	5/13/2015	68.1	ug P/L				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	5/13/2015	47.9	ug P/L	4.4000	4.4000	45.7000	9.6280
	LP 09 DUP - LaPlatte R above Hinesburg STP Outfall	5/13/2015	43.5	ug P/L				
	MB 04a - McCabes Brook at Teddy Bear Access Rd	6/2/2015	91	ug P/L	-3.9000	3.9000	92.9500	4.1958
	MB 04a CUP - McCabes Brook at Teddy Bear Access Rd	6/2/2015	94.9	ug P/L				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	6/2/2015	56.7	ug P/L	-0.2000	0.2000	56.8000	0.3521
	LP 09 DUP - LaPlatte R above Hinesburg STP Outfall	6/2/2015	56.9	ug P/L				
	MB 02 - McCabes Brook at Harbor Road	6/10/2015	285.9	ug P/L	-7.2000	7.2000	289.5000	2.4870
	MB 02 DUP - McCabes Brook at Harbor Road	6/10/2015	293.1	ug P/L				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	6/10/2015	167	ug P/L	7.0000	7.0000	163.5000	4.2813
	LP 09 DUP - LaPlatte River above Hinesburg STP Out	6/10/2015	160	ug P/L				
	MB 02 - McCabes Brook at Harbor Road	7/2/2015	105	ug P/L	-20.0000	20.0000	115.0000	17.3913
	MB 02 DUP - McCabes Brook at Harbor Road	7/2/2015	125	ug P/L				
	LP09 - laPlatte River above Hinesburg STP Outfall	7/2/2015	57	ug P/L	4.9000	4.9000	54.5500	8.9826
	LP09 DUP - LaPlatte River above Hinesburg STP Outf	7/2/2015	52.1	ug P/L				
	MB 05 - McCabes Brook at Lime Kiln Road	10/1/2015	106	ug P/L	1.0000	1.0000	105.5000	0.9479
	MB 50 DUP - McCabes Brook at Lime Kiln Road	10/1/2015	105	ug P/L				
	LP 05 - LaPlatte River at Carpenter Road	10/1/2015	104	ug P/L	2.0000	2.0000	103.0000	1.9417
	LP 05 DUP - LaPlatte River at Carpenter Road	10/1/2015	102	ug P/L				

**Mean** 4.36

**Target** 15%

<b>Dissolved P</b>	MB 03 - McCabes Brook at Bostwick Road	4/22/2015	27.2	ug P/L	-1.6000	1.6000	28.0000	5.7143
	MB 03 DUP - McCabes Brook at Bostwick Road	4/22/2015	28.8	ug P/L				
	LP 03 - LaPlatte River at Falls Road	4/22/2015	28.5	ug P/L	-2.6000	2.6000	29.8000	8.7248
	LP 03 - DUP - LaPlatte River at Falls Road	4/22/2015	31.1	ug P/L				
	T 01 - Thorp Brook at Greenbush Road	4/22/2015	17	ug P/L	0.8000	0.8000	16.6000	4.8193
	T 01 DUP - Thorp Brook at Greenbush Road	4/22/2015	16.2	ug P/L				
	MB 04a - McCabes Brook at Teddy Bear Access Rd	5/13/2015	68.5	ug P/L	0.4000	0.4000	68.3000	0.5857
	MB 04a DUP - McCabes Brook at Teddy Bear Access Rd	5/13/2015	68.1	ug P/L				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	5/13/2015	47.9	ug P/L	4.4000	4.4000	45.7000	9.6280
	LP 09 DUP - LaPlatte R above Hinesburg STP Outfall	5/13/2015	43.5	ug P/L				
	MB 04a - McCabes Brook at Teddy Bear Access Rd	6/2/2015	66.5	ug P/L	0.3000	0.3000	66.3500	0.4521
	MB 04a CUP - McCabes Brook at Teddy Bear Access Rd	6/2/2015	66.2	ug P/L				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	6/2/2015	15.6	ug P/L	-8.0000	8.0000	19.6000	40.8163
	LP 09 DUP - LaPlatte R above Hinesburg STP Outfall	6/2/2015	23.6	ug P/L				
	MB 02 - McCabes Brook at Harbor Road	6/10/2015	73.6	ug P/L	0.4000	0.4000	73.4000	0.5450
	MB 02 DUP - McCabes Brook at Harbor Road	6/10/2015	73.2	ug P/L				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	6/10/2015	141	ug P/L	1.0000	1.0000	140.5000	0.7117
	LP 09 DUP - LaPlatte River above Hinesburg STP Out	6/10/2015	140	ug P/L				
	MB 02 - McCabes Brook at Harbor Road	7/2/2015	57.4	ug P/L	-1.3000	1.3000	58.0500	2.2394
	MB 02 DUP - McCabes Brook at Harbor Road	7/2/2015	58.7	ug P/L				
	LP09 - laPlatte River above Hinesburg STP Outfall	7/2/2015	28	ug P/L	1.2000	1.2000	27.4000	4.3796
	LP09 DUP - LaPlatte River above Hinesburg STP Outf	7/2/2015	26.8	ug P/L				
	MB 05 - McCabes Brook at Lime Kiln Road	10/1/2015	78.6	ug P/L	2.4000	2.4000	77.4000	3.1008
	MB 50 DUP - McCabes Brook at Lime Kiln Road	10/1/2015	76.2	ug P/L				

**Mean** 6.81

**Target** 15%

<b>Total N</b>	MB 03 - McCabes Brook at Bostwick Road	4/22/2015	0.74	mg/L	0.0000	0.0000	0.7400	0.0000
	MB 03 DUP - McCabes Brook at Bostwick Road	4/22/2015	0.74	mg/L				
	LP 03 - LaPlatte River at Falls Road	4/22/2015	0.79	mg/L	0.0000	0.0000	0.7900	0.0000
	LP 03 - DUP - LaPlatte River at Falls Road	4/22/2015	0.79	mg/L				
	T 01 - Thorp Brook at Greenbush Road	4/22/2015	0.91	mg/L	-0.0100	0.0100	0.9150	1.0929
	T 01 DUP - Thorp Brook at Greenbush Road	4/22/2015	0.92	mg/L				
	MB 04a - McCabes Brook at Teddy Bear Access Rd	5/13/2015	0.66	mg/L	0.0100	0.0100	0.6550	1.5267
	MB 04a DUP - McCabes Brook at Teddy Bear Access Rd	5/13/2015	0.65	mg/L				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	5/13/2015	0.4	mg/L	0.0000	0.0000	0.4000	0.0000
	LP 09 DUP - LaPlatte R above Hinesburg STP Outfall	5/13/2015	0.4	mg/L				
	MB 04a - McCabes Brook at Teddy Bear Access Rd	6/2/2015	0.87	mg/L	-0.0100	0.0100	0.8750	1.1429
	MB 04a CUP - McCabes Brook at Teddy Bear Access Rd	6/2/2015	0.88	mg/L				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	6/2/2015	0.5	mg/L	0.0300	0.0300	0.4850	6.1856
	LP 09 DUP - LaPlatte R above Hinesburg STP Outfall	6/2/2015	0.47	mg/L				
	MB 02 - McCabes Brook at Harbor Road	6/10/2015	0.66	mg/L	-0.2400	0.2400	0.7800	30.7692
	MB 02 DUP - McCabes Brook at Harbor Road	6/10/2015	0.9	mg/L				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	6/10/2015	0.89	mg/L	0.0100	0.0100	0.8850	1.1299
	LP 09 DUP - LaPlatte River above Hinesburg STP Out	6/10/2015	0.88	mg/L				
	MB 02 - McCabes Brook at Harbor Road	7/2/2015	0.67	mg/L	0.0100	0.0100	0.6650	1.5038
	MB 02 DUP - McCabes Brook at Harbor Road	7/2/2015	0.66	mg/L				
	LP09 - laPlatte River above Hinesburg STP Outfall	7/2/2015	0.41	mg/L	0.0100	0.0100	0.4050	2.4691
	LP09 DUP - LaPlatte River above Hinesburg STP Outf	7/2/2015	0.4	mg/L				
	MB 05 - McCabes Brook at Lime Kiln Road	10/1/2015	0.83	mg/L	0.0100	0.0100	0.8250	1.2121
	MB 50 DUP - McCabes Brook at Lime Kiln Road	10/1/2015	0.82	mg/L				
	LP 05 - LaPlatte River at Carpenter Road	10/1/2015	0.74	mg/L	-0.0100	0.0100	0.7450	1.3423
	LP 05 DUP - LaPlatte River at Carpenter Road	10/1/2015	0.75	mg/L				

**Mean** 3.72  
**Target** 15%

NOx	Location	Date	Value	Unit	Observed	Model	Model + Observed	Model - Observed
	MB 03 - McCabes Brook at Bostwick Road	4/22/2015	0.16	mg-N/l	0.0300	0.0300	0.1450	20.6897
	MB 03 DUP - McCabes Brook at Bostwick Road	4/22/2015	0.13	mg-N/l				
	LP 03 - LaPlatte River at Falls Road	4/22/2015	0.18	mg-N/l	-0.0300	0.0300	0.1950	15.3846
	LP 03 - DUP - LaPlatte River at Falls Road	4/22/2015	0.21	mg-N/l				
	T 01 - Thorp Brook at Greenbush Road	4/22/2015	0.45	mg-N/l	0.0000	0.0000	0.4500	0.0000
	T 01 DUP - Thorp Brook at Greenbush Road	4/22/2015	0.45	mg-N/l				
	MB 04a - McCabes Brook at Teddy Bear Access Rd	5/13/2015	0.05	mg-N/l	0.0000	0.0000	0.0500	0.0000
	MB 04a DUP - McCabes Brook at Teddy Bear Access Rd	5/13/2015	0.05	mg-N/l				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	5/13/2015	0.09	mg-N/l	0.0000	0.0000	0.0900	0.0000
	LP 09 DUP - LaPlatte R above Hinesburg STP Outfall	5/13/2015	0.09	mg-N/l				
	MB 04a - McCabes Brook at Teddy Bear Access Rd	6/2/2015	0.17	mg-N/l	0.0000	0.0000	0.1700	0.0000
	MB 04a CUP - McCabes Brook at Teddy Bear Access Rd	6/2/2015	0.17	mg-N/l				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	6/2/2015	0.08	mg-N/l	0.0000	0.0000	0.0800	0.0000
	LP 09 DUP - LaPlatte R above Hinesburg STP Outfall	6/2/2015	0.08	mg-N/l				
	MB 02 - McCabes Brook at Harbor Road	6/10/2015	0.14	mg-N/l	0.0000	0.0000	0.1400	0.0000
	MB 02 DUP - McCabes Brook at Harbor Road	6/10/2015	0.14	mg-N/l				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	6/10/2015	0.05	mg-N/l	0.0000	0.0000	0.0500	0.0000
	LP 09 DUP - LaPlatte River above Hinesburg STP Out	6/10/2015	0.05	mg-N/l				
	MB 02 - McCabes Brook at Harbor Road	7/2/2015	0.05	mg-N/l	0.0000	0.0000	0.0500	0.0000
	MB 02 DUP - McCabes Brook at Harbor Road	7/2/2015	0.05	mg-N/l				
	LP09 - laPlatte River above Hinesburg STP Outfall	7/2/2015	0.05	mg-N/l	0.0000	0.0000	0.0500	0.0000
	LP09 DUP - LaPlatte River above Hinesburg STP Outf	7/2/2015	0.05	mg-N/l				
	MB 05 - McCabes Brook at Lime Kiln Road	10/1/2015	0.05	mg-N/l	0.0000	0.0000	0.0500	0.0000
	MB 50 DUP - McCabes Brook at Lime Kiln Road	10/1/2015	0.05	mg-N/l				
	LP 05 - LaPlatte River at Carpenter Road	10/1/2015	0.17	mg-N/l	0.0100	0.0100	0.1650	6.0606
	LP 05 DUP - LaPlatte River at Carpenter Road	10/1/2015	0.16	mg-N/l				

**Mean** 3.24  
**Target** 10%

**TSS**

MB 03 - McCabes Brook at Bostwick Road	4/22/2015	70.5	mg/l	-11.0000	11.0000	76.0000	14.4737
MB 03 DUP - McCabes Brook at Bostwick Road	4/22/2015	81.5	mg/l				
LP 03 - LaPlatte River at Falls Road	4/22/2015	70	mg/l	-6.5000	6.5000	73.2500	8.8737
LP 03 - DUP - LaPlatte River at Falls Road	4/22/2015	76.5	mg/l				
T 01 - Thorp Brook at Greenbush Road	4/22/2015	146	mg/l	-3.0000	3.0000	147.5000	2.0339
T 01 DUP - Thorp Brook at Greenbush Road	4/22/2015	149	mg/l				
MB 04a - McCabes Brook at Teddy Bear Access Rd	5/13/2015	8	mg/l	1.2000	1.2000	7.4000	16.2162
MB 04a DUP - McCabes Brook at Teddy Bear Access Rd	5/13/2015	6.8	mg/l				
LP 09 - LaPlatte River above Hinesburg STP Outfall	5/13/2015	16.6	mg/l	-0.4000	0.4000	16.8000	2.3810
LP 09 DUP - LaPlatte R above Hinesburg STP Outfall	5/13/2015	17	mg/l				
MB 04a - McCabes Brook at Teddy Bear Access Rd	6/2/2015	9.33	mg/l	-4.0000	4.0000	11.3300	35.3045
MB 04a CUP - McCabes Brook at Teddy Bear Access Rd	6/2/2015	13.33	mg/l				
LP 09 - LaPlatte River above Hinesburg STP Outfall	6/2/2015	13.79	mg/l	-0.9600	0.9600	14.2700	6.7274
LP 09 DUP - LaPlatte R above Hinesburg STP Outfall	6/2/2015	14.75	mg/l				
MB 02 - McCabes Brook at Harbor Road	6/10/2015	160	mg/l	10.0000	10.0000	155.0000	6.4516
MB 02 DUP - McCabes Brook at Harbor Road	6/10/2015	150	mg/l				
LP 09 - LaPlatte River above Hinesburg STP Outfall	6/10/2015	7.14	mg/l	-57.3800	57.3800	35.8300	160.1451
LP 09 DUP - LaPlatte River above Hinesburg STP Out	6/10/2015	64.52	mg/l				
MB 02 - McCabes Brook at Harbor Road	7/2/2015	44.75	mg/l	2.5500	2.5500	43.4750	5.8654
MB 02 DUP - McCabes Brook at Harbor Road	7/2/2015	42.2	mg/l				
LP09 - laPlatte River above Hinesburg STP Outfall	7/2/2015	19.6	mg/l	1.0000	1.0000	19.1000	5.2356
LP09 DUP - LaPlatte River above Hinesburg STP Outf	7/2/2015	18.6	mg/l				
MB 05 - McCabes Brook at Lime Kiln Road	10/1/2015	7	mg/l	0.2900	0.2900	6.8550	4.2305
MB 50 DUP - McCabes Brook at Lime Kiln Road	10/1/2015	6.71	mg/l				
LP 05 - LaPlatte River at Carpenter Road	10/1/2015	22.2	mg/l	-3.2000	3.2000	23.8000	13.4454
LP 05 DUP - LaPlatte River at Carpenter Road	10/1/2015	25.4	mg/l				

**Mean** 21.64  
**Target** 15%

Turbidity	Location	Date	Value	Unit	Min	Max	Mean	Target
	MB 03 - McCabes Brook at Bostwick Road	4/22/2015	63	NTU	2.2000	2.2000	61.9000	3.5541
	MB 03 DUP - McCabes Brook at Bostwick Road	4/22/2015	60.8	NTU				
	LP 03 - LaPlatte River at Falls Road	4/22/2015	58.5	NTU	-0.4000	0.4000	58.7000	0.6814
	LP 03 - DUP - LaPlatte River at Falls Road	4/22/2015	58.9	NTU				
	T 01 - Thorp Brook at Greenbush Road	4/22/2015	175	NTU	-14.8000	14.8000	182.4000	8.1140
	T 01 DUP - Thorp Brook at Greenbush Road	4/22/2015	189.8	NTU				
	MB 04a - McCabes Brook at Teddy Bear Access Rd	5/13/2015	8.22	NTU	0.2400	0.2400	8.1000	2.9630
	MB 04a DUP - McCabes Brook at Teddy Bear Access Rd	5/13/2015	7.98	NTU				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	5/13/2015	11.9	NTU	0.4000	0.4000	11.7000	3.4188
	LP 09 DUP - LaPlatte R above Hinesburg STP Outfall	5/13/2015	11.5	NTU				
	MB 04a - McCabes Brook at Teddy Bear Access Rd	6/2/2015	14.5	NTU	3.9000	3.9000	12.5500	31.0757
	MB 04a CUP - McCabes Brook at Teddy Bear Access Rd	6/2/2015	10.6	NTU				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	6/2/2015	9.24	NTU	-0.4500	0.4500	9.4650	4.7544
	LP 09 DUP - LaPlatte R above Hinesburg STP Outfall	6/2/2015	9.69	NTU				
	MB 02 - McCabes Brook at Harbor Road	6/10/2015	121	NTU	9.8000	9.8000	116.1000	8.4410
	MB 02 DUP - McCabes Brook at Harbor Road	6/10/2015	111.2	NTU				
	LP 09 - LaPlatte River above Hinesburg STP Outfall	6/10/2015	12.2	NTU	0.2000	0.2000	12.1000	1.6529
	LP 09 DUP - LaPlatte River above Hinesburg STP Out	6/10/2015	12	NTU				
	MB 02 - McCabes Brook at Harbor Road	7/2/2015	32.5	NTU	-0.1000	0.1000	32.5500	0.3072
	MB 02 DUP - McCabes Brook at Harbor Road	7/2/2015	32.6	NTU				
	LP09 - laPlatte River above Hinesburg STP Outfall	7/2/2015	8.95	NTU	0.0700	0.0700	8.9150	0.7852
	LP09 DUP - LaPlatte River above Hinesburg STP Outf	7/2/2015	8.88	NTU				
	MB 05 - McCabes Brook at Lime Kiln Road	10/1/2015	11.6	NTU	-0.1000	0.1000	11.6500	0.8584
	MB 50 DUP - McCabes Brook at Lime Kiln Road	10/1/2015	11.7	NTU				
	LP 05 - LaPlatte River at Carpenter Road	10/1/2015	23.9	NTU	-0.1000	0.1000	23.9500	0.4175
	LP 05 DUP - LaPlatte River at Carpenter Road	10/1/2015	24	NTU				

**Mean** 5.16

**Target** 15%

<b>E. coli</b>	MB 03 - McCabes Brook at Bostwick Road	4/22/2015	47.11	mpn/100ml	-2.4800	2.4800	48.3500	5.1293
	MB 03 DUP - McCabes Brook at Bostwick Road	4/22/2015	49.59	mpn/100ml				
	T 01 - Thorp Brook at Greenbush Road	4/22/2015	198.9	mpn/100ml	-73.4000	73.4000	235.6000	31.1545
	T 01 DUP - Thorp Brook at Greenbush Road	4/22/2015	272.3	mpn/100ml				
	MB 04a - McCabes Brook at Teddy Bear Access Rd	5/13/2015	141.37	mpn/100ml	-54.2200	54.2200	168.4800	32.1819
	MB 04a DUP - McCabes Brook at Teddy Bear Access Rd	5/13/2015	195.59	mpn/100ml				
	MB 04a - McCabes Brook at Teddy Bear Access Rd	6/2/2015	524.73	mpn/100ml	-161.9400	161.9400	605.7000	26.7360
	MB 04a CUP - McCabes Brook at Teddy Bear Access Rd	6/2/2015	686.67	mpn/100ml				

**Mean** 23.80

**Target** 100%



**Summary of Duplicates**

	<b>Chloride</b>	<b>TSS</b>	<b>Turbidity</b>	<b>TP</b>	<b>DP</b>	<b>TN</b>	<b>NOx</b>	<b><i>E. coli</i></b>
<b>Number of Duplicates</b>	11	13	13	13	12	13	13	4
<b>Percent of Total</b>	16.4	16.5	16.5	16.5	16.4	16.5	16.5	17.4
<b>Target Percent</b>	10%	10%	10%	10%	10%	10%	10%	10%

**Summary of RPD Results**

	<b>Chloride</b>	<b>Turbidity</b>	<b>TSS</b>	<b>Total P</b>	<b>Diss. P</b>	<b>Total N</b>	<b>NOx</b>	<b><i>E. coli</i></b>
<b>Mean RPD</b>	6.81	5.16	21.64	4.36	6.81	3.72	3.24	23.80
<b>Target Precision</b>	10%	15%	15%	15%	15%	15%	10%	100%