**Lake Champlain Basin Program**

**Quarterly Report**

**June 10, 2017**

**Organization Name:** Stone Environmental, Inc.

**Project Name:** Assessment of Tile Drainage System Impacts to Lake Champlain and Phosphorus Loads in Tile Drainage in the Jewett Brook Watershed of St Albans Bay

**NEI Job Code:** 0100-310-002

**Project Code:** L-2016-060

**Final Report Due Date:** September 2018

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**Summary of Activities:**

***Task 1: Literature Review Examining Tile Drainage Systems***

Completed

***Task 2: Assessment of Tile Drainage Systems in the Jewett Brook Watershed***

In early April 2017, construction was completed at the last three monitoring stations (JBT05, JBT18, and JBT19), and various improvements were made at the nine stations already in operation. Problems with three of the modems were resolved.



Completing monitoring station construction at JBT01.

Flow monitoring and sample collection continues at all twelve stations. Flow-paced, composite samples are collected approximately weekly. To date, 14 rounds of sampling have been performed at the tile drain monitoring sites. Flow-pacing settings are adjusted at the start of each sampling round, based on recently measured flow rates and the weather forecast. The goal is to produce between 5–10 L of composite sample at each site. Stone’s subcontractor, the Friends of Northern Lake Champlain, is performing the sample processing. Various maintenance activities are performed on every sample collection date, including checking/changing instrument desiccant and removing vegetation shading solar panels.

A report describing station construction and instrumentation was submitted on April 15, 2017. On May 3, 2017, a project status update and the first set of analytical results were presented to the LCBP TAC. Each month, a brief monitoring report is prepared summarizing monitoring data collected to date.

***Task 3: Phosphorus Load Estimation of Tile Drainage Systems in the Jewett Brook Watershed***

No activity.

**Project Status:**

All 12 stations are operational. In late March 2017, flow data collection began at several sites. Sample collection commenced in April 2017. Table 1 identifies the start dates for monitoring activities at each station.

On April 5, 2017, autosampling programs were initiated at 8 of the 12 stations (JBT01, JBT02, JBT04, JBT06, JBT07, JBT11, JBT14, and JBT16). The following week, on April 11, 2017, the first set of weekly composite samples was collected and processed in accordance with the project Quality Assurance Project Plan, Version 1.0, Amendment 1. Immediately after sample collection on April 11, autosamplers were restarted at the first eight stations and sampling was initiated at station JBT13. Flow monitoring and sample collection began at JBT05 on April 20 and at JBT18 and JBT19 on April 22, 2017.

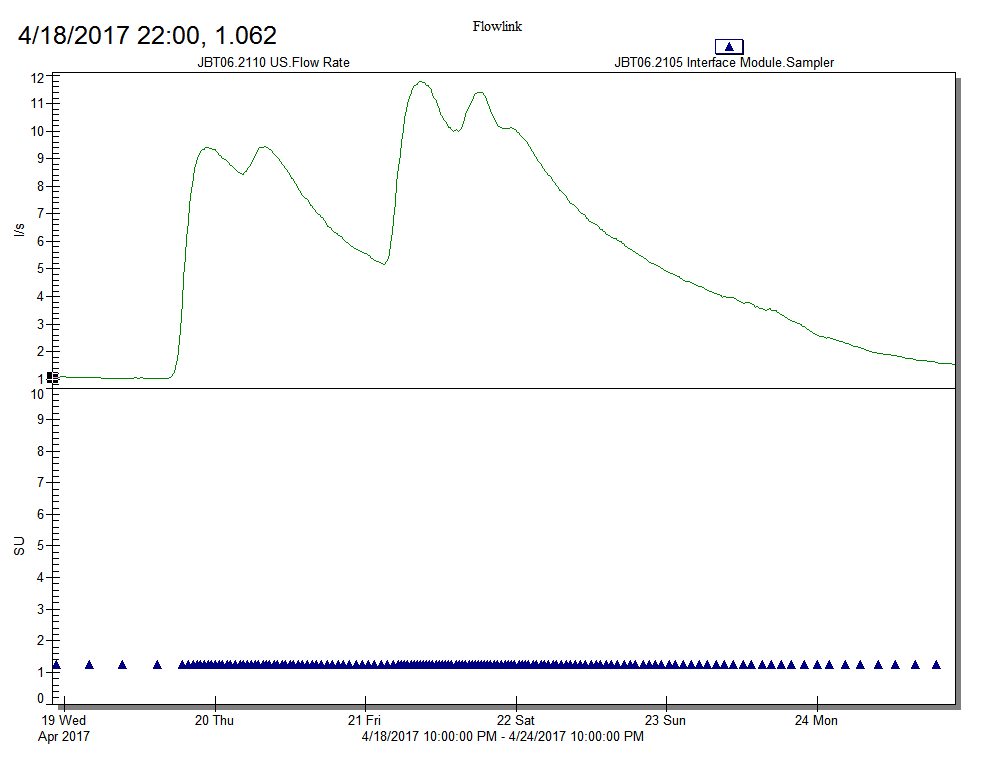
Upon start up, it became apparent that the JBT05 flowmeter was malfunctioning. A substitute ISCO 2150 area-velocity flowmeter has been installed to minimize data losses, until the Waterflux 3000 flowmeter can be replaced. Stone is currently waiting to receive shipment of a replacement Waterflux 3000 meter.

Table : Start dates for monitoring activities at each station

| Station | Start flow monitoring | Start autosampling |
| --- | --- | --- |
| JBT01 | 3/23/17 | 4/5/17 |
| JBT02 | 3/23/17 | 4/5/17 |
| JBT04 | 4/3/17 | 4/5/17 |
| JBT05 | 4/20/17 | 4/20/17 |
| JBT06 | 4/5/17 | 4/5/17 |
| JBT07 | 3/30/17 | 4/5/17 |
| JBT11 | 4/5/17 | 4/5/17 |
| JBT13 | 4/3/17 | 4/11/17 |
| JBT14 | 4/5/17 | 4/5/17 |
| JBT16 | 3/30/17 | 4/5/17 |
| JBT18 | 4/22/17 | 4/22/17 |
| JBT19 | 4/22/17 | 4/22/17 |

Every 30 minutes, flow and sampling data are transmitted to Stone’s server. These data are checked periodically to assess whether the sampling program is working as intended. Figure 1 displays an example of flow data (top panel) at station JBT06, along with the time each sample aliquot was dispensed to the sample carboys (bottom panel).

Figure . Example flow rate and sampling marks from Station JBT06



Composite samples collected at the tile drain monitoring stations are analyzed by the Vermont Agriculture and Environmental Laboratory for concentrations of total phosphorus (TP), total dissolved phosphorus (TDP), and total nitrogen (TN).

**Challenges Encountered:**

With the exception of the flowmeter problem at station JBT05 and the problems, since resolved, with modems at three sites, there have been few technical difficulties since startup of the 12 monitoring stations. The JBT02 station experienced two power failures due to poor solar exposure. Some trees were cut to improve solar exposure. Though exposure is still marginal, the JBT02 station now appears adequately powered.

Flow proportional sampling is inherently challenging. Adjustments in the autosampler flow pacing settings are made every week based on sampling rates in the prior week and the weather forecast. With the recent heavy rains, the total capacities of the composite sample carboys (four at each station) were exceeded at several stations, causing the autosampler to stop before personnel could visit the stations. On May 30, 2017, following heavy rains, an unscheduled sampling trip was made to process and restart several stations so that the autosampling programs would not end prematurely. The total number of samples collected and the labor to process them have exceeded our estimates, straining our resources to conduct this study.

**Work Anticipated Next Quarter:**

Weekly sampling and maintenance of the tile drain monitoring stations will continue in the next quarter. The data collected will be summarized in monthly monitoring summaries submitted to LCBP.