Centre for Alternative Wastewater Treatment

CFS Alert Wetland Report 2014

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March 2015

Fleming College

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EXECUTIVE SUMMARY

The performance of the terraced wetland located at CFS Alert, Nunavut was monitored over the summer months (June to September) in 2014 by the Centre for Alternative Wastewater Treatment (CAWT), a research facility of Fleming College in Lindsay, Ontario. This wetland is used to treat the sanitary waste and grey water generated at the Canadian Forces Station. The wetland in its present location was commissioned in the summer of 2010. CFS Alert produces on average approximately 100 m^3 of wastewater per day that is directed to the terraced wetland for treatment. The current water licence (No. 3BC-ALT1015) issued in August 2010 to the Department of National Defence by the Nunavut Water Board stipulates that treated wastewater effluent from the station should be equal to or less than 80 mg L^{-1} BOD_5, 70 mg L^{-1} TSS, 5 mg L^{-1} oil and grease and have a pH between 6 and 9.

The four compliance parameters of the water licence mentioned above, along with an additional 19 water quality parameters and 30 trace elements within the wastewater, were monitored to assess the performance and treatment efficiency of the terraced wetland. The assessment period began shortly after the initiation of the spring melt in late June and continued until early September. Samples were collected from a defined set of 18 locations strategically placed throughout the wetland to ensure adequate monitoring at all major regions within the wetland.

Physical filtration and or entrapment of organic matter appear to be the major treatment processes occurring within this wetland. This means that the organic portion of the wastewater is being retained in the upper portions of the wetland with the result that the wastewater exiting the wetland is lower in BOD_5, volatile suspended solids (the organic fraction of TSS), organic nitrogen (e.g., TKN + TAN) and the particulate fraction of total phosphorus. Dissolved phosphorus (e.g., ortho-phosphate) appears to be significantly removed from the wastewater, likely through the process of adsorption onto particle and rock surfaces within the wetland.

The averaged summertime values of the treated effluent exiting the wetland indicate that BOD_5 is reduced, with the final concentrations leaving the wetland around 76 mg BOD_5 per L, which is below the compliance value of 80 mg BOD_5 per L. The summertime average of total suspended solids (TSS) exiting the wetland was 805 mg L^{-1}, a concentration above the compliance value of 70 mg TSS per L. However, it appears that the majority (approximately 90%) of the TSS burden exiting the wetland is composed of inorganic particles likely generated from erosional forces occurring during spring freshet where disturbed soils from the August 2012 re-modification of the wetland are still being washed off the site. The organic portion of TSS (i.e., volatile suspended solids, VSS) exiting the wetland was 58 mg L^{-1}. The summertime average of oil and grease leaving the wetland was approximately 23 mg L^{-1} which is above the compliance criteria of 5 mg L^{-1}. The pH was well within compliance levels with an average of approximately 7.8.

This was the fourth season the wetland was monitored by the CAWT and the second field season after the major 2012 renovations. Significant remodelling of the lower half of the wetland occurred once again, late in the 2014 season, with little time remaining in the 2014 field season to assess the impacts of this action. While it is generally believed that the 2012 renovations enhanced treatment, the magnitude of enhancement is difficult to assess. Confounding the interpretation of these results is the fact that the overall strength of the wastewater entering the wetland is variable from year to year. This can be seen in Table A-1 which illustrates that in regards to BOD, VSS, Fats/Oils/Grease, the overall strength of the wastewater was lower in 2013 compared to 2012 and higher in 2014 compared to 2013. The treatment performance of the wetland expressed as a percent change between influent to effluent (e.g., negative values represent a reduction in the concentration of a parameter) is tabulated for years 2011 to 2014 in Table A-2. Although year-to-year results are variable, the overall magnitude of change for individual parameters is similar suggesting that for the most part, the treatment performance of the wetland remains comparable between the four years of monitoring.

Table A-1: Overview of individual wastewater constituents of the influent entering the wetland. All values represent summertime averages expressed as percent change from the summertime averages of the previous field season.

Parameter		2012	2013	2014
		% Change in Conc of Influent from 2011	% Change in Conc of Influent from 2012	% Change in Conc of Influent from 2013
BOD_5	mg L^{-1}	56	-82	14
$cBOD_5$	mg L^{-1}	48	-62	60
TSS	mg L^{-1}	588	-66	61
VSS	mg L^{-1}	758	-68	39
FOG	mg L^{-1}	1315	-13	6
COD	mg L^{-1}	115	-48	44
TN	mg L^{-1}		-7	-12
TKN	mg L^{-1}	36	-8	-11
TAN	mg L^{-1}	-9	-23	-10
TP	mg L^{-1}	233	-26	-37
PO_4	mg L^{-1}	1567	-43	-48
TC	cfu/100mL	16567	-68	-65
EC	cfu/100mL	8991	-66	-50

Table A-2: **Treatment efficiency expressed as a percent change in the concentration between influent entering the wetland and effluent leaving the wetland over the four years of assessment.**

Parameter		2011	2012	2013	2014
		% Treatment	% Treatment	% Treatment	% Treatment
BOD_5	mg L^{-1}	-97	-85	-71	-50
$cBOD_5$	mg L^{-1}	-91	-76	-85	-74
TSS	mg L^{-1}	392	-63	418	340
VSS	mg L^{-1}	8	-83	-52	-58
FOG	mg L^{-1}	-10	-36	-73	-57
COD	mg L^{-1}	-67	-45	-52	-47
TN	mg L^{-1}		-46	-39	-28
TKN	mg L^{-1}	-54	-46	-38	-29
TP	mg L^{-1}	-47	-63	-62	-24
PO_4	mg L^{-1}	-100	-90	-74	-91

1.0 INTRODUCTION

This document provides a review of the terrace wetland located at the Canadian Forces Station in Alert, Nunavut and its performance in the treatment of domestic wastewater generated at the base in the summer of 2014. The report summarizes the data collected at specified sampling points within the wetland between the dates of June 10 and September 11. The performance of the wetland was assessed by monitoring the changes in water quality and biological parameters of the wastewater as it traversed the wetland. Treated wastewater exiting the wetland was then compared to the compliance parameters stipulated in CFS Alert's water licence issued by the Nunavut Water Board (see below). Additional water quality parameters along with physical and chemical properties of wetland soil were also analyzed to provide greater insight into performance of the treatment wetland. Results from similar studies in 2011, 2012 and 2013 were also compared with this current data to assess yearly differences. This report also provides a list of recommendations intended to enhance the overall performance in future years.

1.1 Nunavut Water Board Licenced Water Quality Parameters

The Nunavut Water Board licence (No. 3BC-ALT1015) issued in August 2010 to the Department of National Defence stipulates that treated wastewater effluent from the station should meet the following criteria:

Parameter	Maximum Concentration of any Grab Sample
BOD_5	80 mg L^{-1}
Total Suspended Solids	70 mg L^{-1}
Oil and grease	5 mg L^{-1} and no visible sheen
pH	between 6 and 9

1.2 Background

This study was undertaken by the Centre for Alternative Wastewater Treatment (CAWT) at the request of the Canadian Department of National Defence (DND). The CAWT is an applied research facility at Fleming College, Lindsay, Ontario, Canada and has extensive expertise in the monitoring and assessment of treatment wetlands located in Canada's Far North. Of note was a research grant from the Canadian government through the International Polar Year program (IPY award: 2007 – 2011) to investigate the efficacy of northern treatment wetlands and to document efficiencies in the treatment of municipal sewage received from six hamlets in the Kivalliq region

of Nunavut. Subsequently, Environment Canada (Aquatic Ecosystem Management Research Division) contracted the CAWT to investigate the performance of seven additional wetlands because of the CAWT's prior IPY experience and its demonstrated capacity to conduct this type of research.

In December of 2008, DND contacted FSC Architects and Engineers (now Stantec) to investigate options that could be implemented for the treatment of the domestic wastewater generated at CFS Alert. It was decided that the wastewater could be treated by an overland flow system that utilized terraces to trap and delay the wastewater prior to entering Parr Inlet of the Arctic Ocean bounding CFS Alert. It was assumed that water quality of the wastewater would be improved through the physical removal of suspended material and by biological mechanisms as the wastewater flowed over biofilms that had developed on the substrate of this site. For the purposes of this document, the treatment area is referred to as a terraced wetland.

In 2010, the Nunavut Water Board, on behalf of the Nunavut Territorial government, issued DND a water licence (No. 3BC-ALT1015) establishing the water quality compliance criteria that must be met by DND in the management of the terraced wetland. The water quality parameters stipulated in the licence include the five day biochemical oxygen demand (BOD_5), total suspended solids (TSS), oil and grease and pH. In preparation for this licence, DND expressed the difficulty in having BOD_5 analyzed within the short time frame required by this test since these samples need to be shipped to larger centres in the south for analysis. DND expressed interest in determining if a consistent relationship exists between BOD_5 and the chemical oxygen demand (COD) of the wastewater. If a consistent relationship was found, then DND would like to present this evidence to the NWB with the hope that the more easily analyzed COD may be used as a surrogate for the more commonly used BOD_5 water quality parameter. Data from the 2012 and 2013 field season failed to show any consistent relationship between carbonaceous biochemical oxygen demand ($cBOD_5$) and COD. This comparison was examined once again in 2014 to determine if the findings are consistent with the data from 2012, and 2013.

The terrace wetland was established in the summer of 2010 and has operated since. The daily volume of wastewater can range from approximately 70 cubic metres per day during winter months to a high of approximately 120 cubic metres per day in the summertime, which is reflective of the fluctuation in the number of personnel stationed at the base. Water is constantly allowed to bleed through the collection and distribution systems to prevent freezing; therefore wastewater is constantly flowing to the terraced wetland. This wastewater is a combination of bleed water, garburated food wastes, along with grey water and sanitary sewer waste. This means that the consistency of the wastewater can be quite variable and range in strength from very dilute to moderately strong, depending on the time of day or the type of activities

occurring at the station.

Late in the summer of 2010, the CAWT spent a week at the newly constructed terraced wetland mapping the site, establishing sample collection sites and performing a limited number of analyses on the wastewater. In 2011, the CAWT visited the terraced wetland for approximately one month to monitor its performance in the treatment of the wastewater. The field season in 2012 and 2013 was extended to a little more than three months. In 2014 the CAWT once again visited the wetland for approximately three months to monitor wetland performance. Portions of the terraces (often called berms in this report) were eroded between the 2011 and 2012 site visits and most likely occurred in the early spring of 2012 during freshet. Because of erosion, a major reconstruction/modification of the terraced system was undertaken in late August of 2012. At the end of the 2014 field season the lower portion of the wetland was once again modified, however, because of time, no performance sample could be taken and thus an assessment of how this impacted overall treatment will have to wait till the 2015 field season.

1.3 Overview of Treatment Processes Operative in Wetlands

Many of the processes (biochemical, chemical, physical) operating in the treatment of municipal sewage / effluents are common to both wastewater treatment plants and to treatment wetlands. In brief, the treatment of municipal sewage and effluents can be summarized as: i) oxidizing organic and chemical constituents to harmless products, ii) the removal of viable pathogens, and iii) removal of suspended solids along with inorganic and or organic contaminants associated with the solids. Performance standards for wastewater effluents are currently in transition within Canada as the federal government is developing national performance standards (NPS) for municipal wastewater effluent. In 2009, the Canadian Council of Ministers of the Environment (CCME) released the final draft of the Canada-wide Strategy for the Management of Municipal Wastewater Effluent which details regulatory changes to be implemented through the Canadian Fisheries Act. The intent of the strategy is to ensure there are no deleterious effects to the water bodies receiving the treated effluent, particularly with regard to fish health and or fish habitat. This strategy has identified specific national performance standards for effluent of Canadian wastewater treatment facilities at 25 mg L^{-1} for the parameters of $cBOD_5$ and TSS, 1.25 mg L^{-1} for un-ionized ammonia expressed as NH_3-N @ 15°C±1°C and a standard of 0.02 mg L^{-1} of total residual chlorine (TRC) (Canadian Council of Ministers of the Environment, 2009). The Federal Government recognizes that conditions in portions of Canada's Far North (Nunavut, Northwest Territories, and regions located north of the 54th parallel in Quebec and Newfoundland and Labrador) are unique and as

such national performance standards have not yet been determined for these areas. A five-year research period was initiated in 2009 to determine what NPS (treated effluent concentration levels) would be appropriate in the Canadian north (Canadian Council of Ministers of the Environment, 2009). At the end of the five year period, federal and territorial governments determined that more work was needed and there is now a movement to work towards developing a risk level approach were risk level criteria may be implemented at specific sites rather than a single national performance standard applied to all locations (CCME 2014).

BOD refers to the amount of oxygen that is consumed during the microbial degradation of organic matter within the sewage or effluent. The underlying concern is related to the potential for significant oxygen depletion to occur in receiving waters when sewage or effluent is poorly treated before its release to the environment and thus has the potential to significantly reduce oxygen levels in the receiving environment as microbial degradation continues. If the oxygen depletion in the receiving environment is significant and occurs for an extended period of time, then there is the potential to negatively affect the biota of that region. The ability of the wetland to mediate this process before effluents are released to the environment can be influenced by several factors including mechanical filtration (removal) of organic matter readily oxidized by microorganisms, temperature and contact time. Microbial action is known to be influenced by temperature. In addition, BOD is also influenced by the contact time between the microorganisms and the effluent's organic constituents. If the contact time is too short or too long, this treatment process can be impeded. To date, little is known about the rate that effluent flows through the Alert terraced wetland. This rate is linked to the hydraulic retention time (HRT) of the wetland and it is a function of both the rate of flow and the water holding capacity of the wetland. The HRT provides an estimate of the volume of water that the wetland can hold at any one time and how quickly that defined volume of water changes over. HRT is therefore a measure of how long the microbial population is in contact with a unit of wastewater.

It is generally known that municipal sewage and effluent have the potential to contain pathogens in significant quantity and virulence to cause harm to humans if released to the environment through the contamination of drinking water or country foods or to impact biota directly or through a reduction of habitat quality. Several indicator organisms exist to provide an indication that human pathogens potentially exist within municipal effluents, with *E. coli* generally being the organism most often used for surveillance purposes, along with the surveillance of fecal coliforms which is an indicator of fecal contamination (animal or human). In conventional municipal wastewater treatment plants, strong oxidants such as chlorine (or its various forms) are used as a disinfection technique designed to significantly reduce the number of harmful organisms. Wetlands can often achieve disinfection levels similar to what is

achieved through chlorination or other chemical means. The mechanisms of action are, however, more through the entrapment of harmful organisms on biofilms within the wetland or through the filtration of suspended particles which the pathogens have attached themselves. Once trapped, these microorganisms are often eliminated through a variety of mechanisms such as bacteriophages or consumption by nematodes or natural death. Once again, many of the pathogen elimination processes operative in treatment wetlands can be influenced by temperature, HRT, and other biological/chemical/physical processes which can be both unique to the site and easily influenced by natural and human events.

Wetlands can be effective in the removal of suspended solids contained within municipal effluents. The removal process is usually one of entrapment within the matrices of the wetlands substrate or attachment to biofilms and the force of gravitational pull causing solids to fall out of solution. Some of the prime factors affecting a wetland's effectiveness in reducing the concentration of total suspended solids (TSS) are water velocity, HRT, and the size and volume of the interstitial spaces through which the effluent flows. The release of high concentrations of suspended solids to the receiving environment can have deleterious effects on natural habitats or biota through the burial of vital habitat components or through the co-transport of other harmful contaminants or pathogens. The potential for wetlands to reduce TSS provides a surrogate measure for the removal of other potentially more harmful contaminants attached to suspended solids such as trace elements, pathogens, nutrients like phosphorus and other chemicals. Thus removal of the suspended solids often correlates to a reduction in the concentration of these contaminants within the treated effluent.

Nitrogen constituents are often monitored during the treatment process since some nitrogenous forms like un-ionized ammonia (NH_3-N) can be quite toxic to certain aquatic biota, while other nitrogen forms can also consume oxygen during transformation of nitrogen species. As with the other water quality parameters, treatment efficiencies are often influenced by many factors intrinsic to the individual wetland.

1.4 Study Location

CFS Alert is a weather/military station located on the northeastern tip of Ellesmere Island in Nunavut (82°30'05"N 62°20'20"W), approximately 817 km from the geographic North Pole (Figure 1-1). The topography is characterized by rocky hills and valleys composed of shale and slate. The station is bounded to the east and south east by the Arctic Ocean. The mean daily temperature is -33°C in January and 3° C in

July and pack ice is present year round.

The terraced wetland is located to the south east of the main buildings on a rocky hillside with a moderate slope to the ocean. The landscape has been altered by the placement of five berms to create a terraced area where wastewater is diverted in a zigzag fashion as it travels to Parr Inlet of the Arctic Ocean. The berms were created from the local gravel/rock overburden and are intended to retard the velocity of the wastewater as it is forced to travel a winding path between the berms. The purpose of this pattern is to enhance the settling of larger particles in the wastewater and to also function as a mechanical sieve as a portion of wastewater permeates through the detention berms.

The wastewater is delivered from the main building of the station to the wetland via a heated pipe (utilidor) where the wastewater is allowed to discharge into a collection depression lined with larger rocks (Figure 1-2). A series of sampling stations have been geo-referenced to the site. These stations follow the primary flow path of the wastewater. Additional ephemeral flow paths have developed at different times in response to increased volumes during the spring freshet and in erosional areas where berms have been temporarily breached. Additional stations have been added to some of these ephemeral flow paths, however the number of times they were sampled depended on times they had a significant flow through them.

The down slope portion of the wetland flattens out in the shore zone of the inlet where a silt fence has been installed to intercept residual silt. Station 14SH-3 was positioned to capture the major flow of treated effluent originating from berm #4 and for the purpose of this study is considered to be the primary site for sampling of the treated effluent prior to its release into Parr Inlet. Stations 14SH-1, 14SH-3c and 14SH-3e sampled additional flow paths of lesser volumes that originated from the ice sheet of winter-accumulated wastewater which was released during spring melt. Flow paths were changeable over the course of the field season due to changing conditions of the ice sheet.

In 2010 at the time of the wetland's construction, a weir box was installed near the shoreline of Parr Inlet. The weir box was positioned in such a manner as to intercept a significant portion of the flow as it left the treatment wetland and discharged into the ocean. The weir box was considered in the NWB licence as the final sampling point of the wetland and was to provide a designated site from which wastewater samples could be taken and analyzed to assess the performance of the wetland. Unfortunately, the bulk of the wastewater flow changed direction within that first year, moving more to the east leaving the weir box dry. Sample site 14SH-3 has been considered by the CAWT to be a more representative discharge location for analyzing the wastewater as it exited the terraced wetland in 2014. Similar locations located in close proximity to 14SH-3 were used in the 2011, 2012 and 2013 field seasons.

Figure 1-1: **CFS Alert, located on the northern tip of Ellesmere Island.**

Figure 1-2: The discharge pipe delivering wastewater to the wetland.

1.5 Purpose

The purpose of this report is to:

- Assess the performance of the terrace wetland during the summer of 2014 in reference to the NWB licence compliance values for BOD_5, TSS, Oil and Grease, and pH.
- Compare the performance of the terrace wetland in the summer of 2014 with the performance in 2013, 2012 and 2011.
- Review the data to determine if there is a consistent relationship between COD and BOD_5 that would allow COD to be used as a surrogate for BOD_5.
- Provide recommendations on how the wetland could be modified or operated to enhance overall treatment.

2.0 METHODOLOGY

2.1 Site Reconnaissance

The start of the CAWT field season at the Alert terraced wetland began in early June 2014. At this time much of the winter's wastewater that had accumulated as ice was still frozen and most of the wetland was covered in ice and snow. The frozen accumulated wastewater had already started to melt by the start of the 2014 field season. Much of the melted wastewater, however, flowed along the ground underneath the ice and was therefore difficult to access and sample. The wetland was walked by foot to observe and record how the wetland had changed from the previous year. The most frequently encountered changes involved the formation of new preferential flow paths that differed slightly from the previous field season. The team also located the sampling sites that were used in the 2011, 2012 and 2013 field seasons and found that many of these sites could still be used as the primary sampling sites for the 2014 period, thus allowing greater sampling consistency between the four years. Additional sampling sites were established on an as-needed-basis to capture preferential flows that were more ephemeral by nature and often disappeared later in the season as the wetland became drier. These additional sampling sites are identified in the site map (Figure 2-1) and site photo (Figure 2-2), both of which also identify the primary sampling sites that followed the dominant flow path of the wastewater.

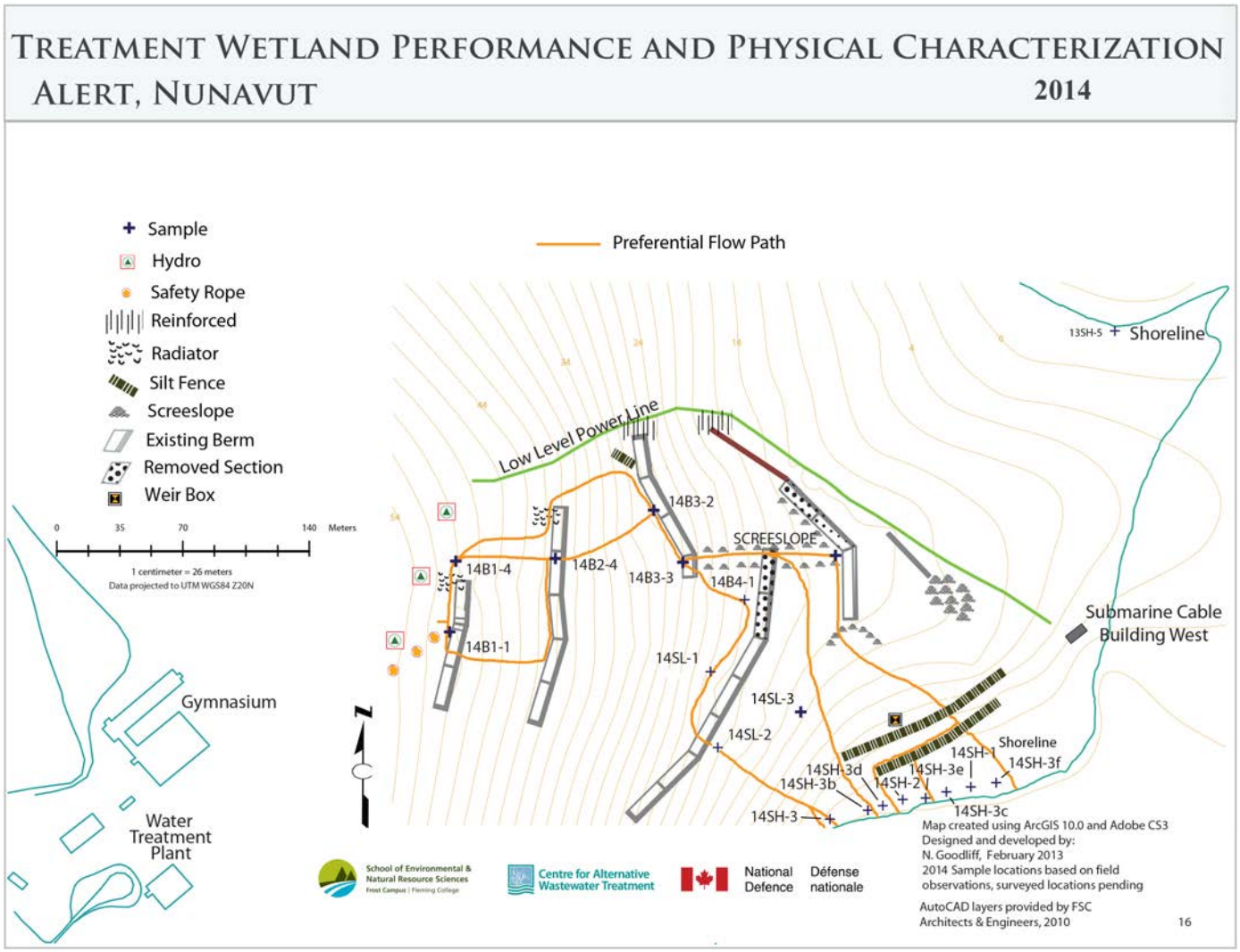

Figure 2-1: Location of sampling sites at the Alert terraced wetland during the 2014 field season.

Figure 2-2: **Photo Illustration of Sampling Sites at the Alert Terraced Wetland During the 2014 Field Season.**

2.2 Primary Flow Path

The primary flow path throughout the summer was directed to Parr Inlet and because of this, all observations used to assess the functioning of the terraced wetland utilized the following collection sites in the sequential order presented below:

Berm 1:
- 14B1-1 (Influent)
- 13B1-4

Berm 2:
- 13B2-4

Berm 3:
- 13B3-3

Berm 4:
- 14B4-1

Slope
- 14SL-1
- 14SL-2
- 14SL-3

Screeslope

Shoreline
- 14SH-1 (from screeslope through SL-3 and silt fence-intermittent)
- 14SH-2 (ephemeral exit during spring freshet)
- 14SH-3 (Effluent) and primary exit to Parr Inlet
- 14SH-3b (ephemeral exit during spring freshet)
- 14SH-3c (from screeslope through SL-3 and silt fence-ceased mid-July)
- 14SH-3d (from screeslope through SL-3 and silt fence)
- 14SH-3e (from screeslope through SL-3 and silt fence-moderate flow)
- 14SH-3f (from screeslope through SL-3 and silt fence)

Reference site (Downs Bridge – 5km south of Alert station)

The primary flow path was from berm 1 to berm 2, to berm 3 and along the screeslope to berm 4, past the radiators and through the silt fence to Parr Inlet. A secondary path originated during the spring freshet during a period of thick ice on the terraced wetland. This secondary path was rerouted from berm 3 to berm 4, thus bypassing the screeslope. The flow temporarily bisected berm 4 as it travelled to Parr Inlet.

2.3 Surface Water Sampling

The surface water samples were collected from surface flow or preferential flow locations. Surface samples were often collected into the sample bottle by submerging the sampling container below the water surface; where water depth is shallow, syringes were used. The use of syringes minimized the disturbance of sediment that could have been collected inadvertently in the sample bottle.

The chemical and biochemical water quality parameters surveyed in surface waters are summarized in Table 2-1. Likewise, physical and ionic parameters of surface water samples are summarized in Table 2-2 with the trace elemental parameters identified in Table 2-3. In addition, surface water temperature was recorded during the site visit with the placement of a HOBO® tidbit data logger into the surface water of the wetland in one location. Air temperature was also logged during this time by the suspension of one HOBO® tidbit data logger at one location in the wetland.

Table 2-1: Chemical and biochemical water quality parameters surveyed in surface waters collected from the CFS Alert wetland (2014).

Ammonia (NH_3-N)	Phosphate (PO_4)
Nitrite (NO_2-N)	Dissolved Organic Carbon (DOC)
Nitrate (NO_3-N)	Dissolved Oxygen (DO)
Total Kjeldahl Nitrogen (TKN-N)	Chemical Oxygen Demand (COD)
Total Coliforms (TC)	Biochemical Oxygen Demand - 5 Day (BOD_5)
Escherichia coli (EC)	Carbonaceous Biochemical Oxygen Demand 5-Day ($cBOD_5$)
Total Phosphorus (TP)	Fat, Oil and Grease (FOG)

Table 2-2: Physical chemistry and ionic parameters surveyed in surface water samples collected from the CFS Alert wetland (2014).

Temperature	Total Suspended Solids (TSS)
Conductivity	Volatile Suspended Solids (VSS)
pH	

Table 2-3: Trace elements surveyed in surface water samples collected from the CFS Alert wetland (2014).

Aluminum (Al)	Copper (Cu)	Selenium (Se)
Antimony (Sb)	Iron (Fe)	Silver (Ag)
Arsenic (As)	Lead (Pb)	Sodium (Na)
Barium (Ba)	Lithium(Li)	Strontium (Sr)
Beryllium (Be)	Magnesium (Mg)	Thallium (Tl)
Boron (B)	Manganese (Mn)	Tin (Sn)
Cadmium (Cd)	Mercury (Hg)	Titanium (Ti)
Calcium (Ca)	Molybdenum (Mo)	Uranium (U)
Chromium (Cr)	Nickel (Ni)	Vanadium (V)
Cobalt (Co)	Potassium (K)	Zinc (Zn)

2.4 Quality Assurance / Quality Control

HDPE bottles were used for the collection of all water samples. Each sample bottle was labeled with the sample location and Fleming College and packed with ice packs in appropriate coolers. Together, with a chain of custody form identifying each bottle and the analyses required, the bottles were shipped to the appropriate lab for analysis. On average the shipment of samples took approximately 24 to 48 hours.

A series of measures were adopted to ensure that all water samples collected in the wetland had not been contaminated by poor handling, or pre-assessment contamination of sampling bottles.

Nutrient parameters were also preserved with acid at the site of collection prior to being shipped for analysis.

2.5 Statistical Analysis

Water quality parameters were analysed using the Welch's unpaired t-test designed for unequal sample sizes and unequal variances ($p < 0.05$) using the statistical functions provided by GraphPad, an online statistical package (http://www.graphpad.com/quickcalcs/ttest1.cfm accessed March 11, 2014). Comparisons were made between only the influent flowing into the wetland (e.g., site 14B1-1) and the effluent leaving the wetland (e.g., site 14SH-3).

2.6 Analytical Laboratories Utilized

The City of Peterborough Environmental Protection Laboratory (EPL) was contracted to analyze the influent and effluent of the CFS Alert wetland for BOD_5, $cBOD_5$, oil and grease, TC, EC and all wastewater samples for TSS, VSS, COD, dissolved organic carbon (DOC), TKN, NH_3, NO_2, NO_3, TP, PO_4, and trace elements. The EPL is ISO 17025 certified and has been accredited with the Association for Laboratory Accreditation (CALA) since 2004 and is licenced by the Ontario Ministry of the Environment for drinking water testing.

The CAWT performed additional testing at the Alert site for QA/QC purposes and to augment the number of samples tested to increase the understanding of the wetland's performance. Test conducted by the CAWT at the CFS Alert site included dissolved oxygen, conductivity, pH, BOD_5, $cBOD_5$, TC and EC.

3.0 RESULTS

3.1 NWB Licences Parameters

The water licence issued to CFS Alert by the Nunavut Water Board stipulates that the effluent exiting the treatment wetland should meet the following criteria: BOD_5 = 80 mg L^{-1}; TSS = 70 mg L^{-1}; Oil and Grease = 5 mg L^{-1} with no visible sheen and pH in the range of 6 to 9. Of the four criteria, the summertime mean values for BOD_5 and pH were in compliance, while TSS and Oil and Grease were out of compliance. The average summer time BOD_5 concentration of the treated effluent was 79 mg L^{-1} (station 14SH-3). The BOD_5 concentration in a smaller adjacent flow path (14SH^{-1}) was lower at 19 mg L^{-1}. The pH of the treated effluent sampled at these same two final stations (14SH-3 and 14SH-1) was similar at 7.9 and 8.0, respectively. The mean summer concentration of TSS exiting the wetland (14SH-3) was elevated to approximately 805 mg L^{-1}, a value well above the 70 mg L^{-1} compliance target. The volatile suspended solids (VSS) portion of TSS was, however, only 58 mg L^{-1} which is below the NWB target. It is suspected that the majority inorganic portion of the TSS (e.g., 747 mg L^{-1}) was likely generated from erosional processes within the wetland and does not reflect the suspended solids originating from the wastewater. The summertime average of Oil and Grease in the treated effluent measured at station 14SH-3 was 23 mg L^{-1} which is above the NWB target of 5 mg L^{-1}.

3.1.1 Biochemical Oxygen Demand (5 day)

The concentration of BOD_5 entering the wetland (influent) fluctuated during the duration of the summer collections. These fluctuations are illustrated in Figure 3-1, which captures the fluctuation of BOD_5 both entering the wetland (collection site 14B1-1) and at the last point of collection (14SH-3) prior to discharge into Parr Inlet. Although sampling of the influent began on June 10th, samples of the effluent leaving the wetland could not be obtained until July 24th due to the thick layer of ice still covering the wetland at this location. The data collected does not show a strong seasonal trend in the concentration of BOD_5 entering the wetland except for the unusually high value for August 5th. The fluctuations in concentration of BOD_5 exiting the wetland generally mimic the same pattern as the influent. Although the mean summertime concentration of BOD_5 exiting the wetland was lower than the mean influent concentration, the difference between the means was not significant ($p = 0.333$) primarily due to the relatively small sample size and high variability in the data. The overall reduction in the concentration of BOD_5 is best illustrated in Figure 3-2. The data points in Figure 3-2 represent the averaged (arithmetic mean) BOD_5 concentration measured during the field season (means include data from both the Peterborough laboratory and the data analyzed on site by the CAWT). The vertical bars bracketing the data points represent the maximum and minimum BOD_5

concentrations recorded during this time period. As shown in this figure, BOD_5 concentrations entering the wetland and persisting until near berm 4 were quite variable. BOD_5 concentrations tend to be less variable beyond berm 4 and into the slope area; and the average BOD_5 concentrations at and beyond 14SL-3 are at or below the compliance value of 80 mg BOD_5 per L of effluent.

It should also be noted that the influent at site 14B1-1 consisted of grab samples, and as such may have missed the periods of peak wastewater strength. The strength of the wastewater exiting the discharge (utilidor) pipe is known to be quite variable and reflective of recent activities on the military base. An explanation for higher BOD_5 at 12B1-4 and beyond, in relationship to the mean BOD_5 for the influent, may be that greater pooling and retention of organic material could be occurring at these sites and thus resulting in elevated BOD_5 concentrations.

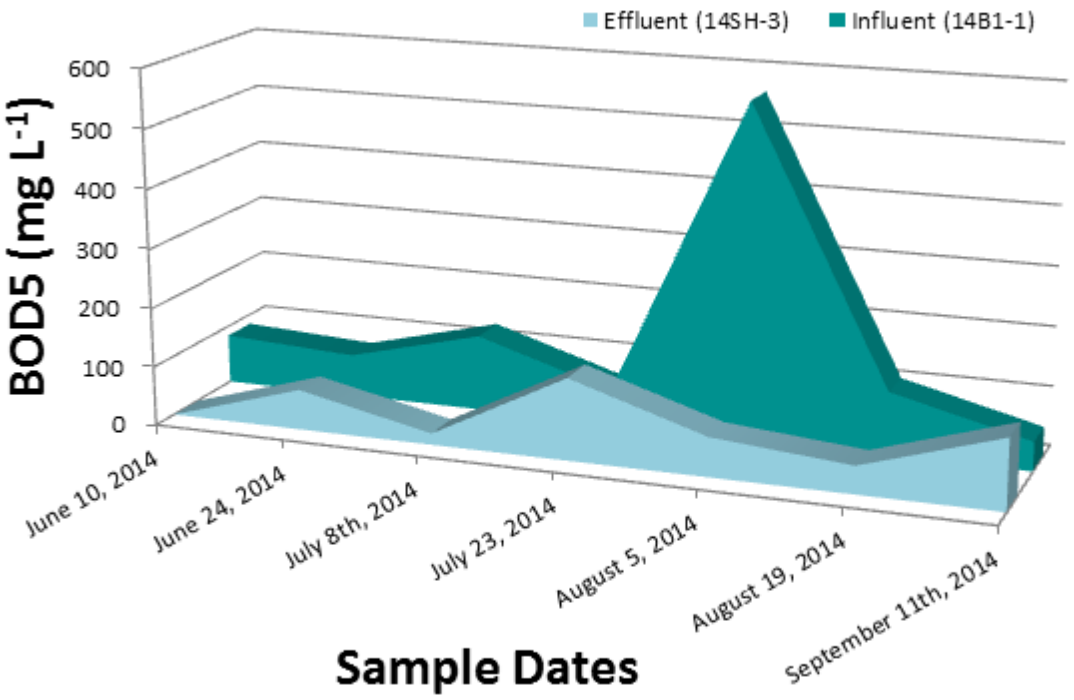

Figure 3-1: Weekly concentrations of the 5-day biochemical oxygen demand (BOD_5) within the influent and effluent sampled during the 2014 study period.

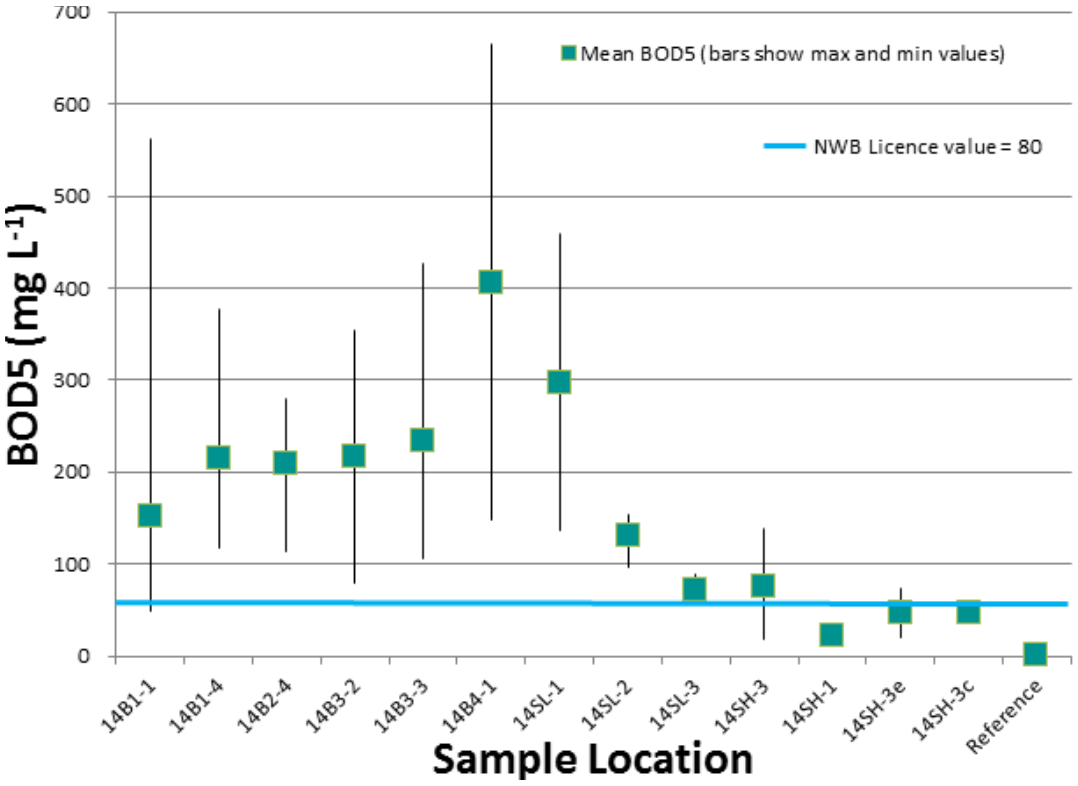

Figure 3-2: Mean concentrations of the 5-day biochemical oxygen demand (BOD_5) within wastewaters taken from sample sites within the Alert wetland during the 2014 study period. The blue horizontal line indicates the NWB compliance value of 80 mg BOD_5 per litre.

3.1.2 Total Suspended Solids

The concentration of TSS entering the wetland (influent) over the duration of the field season is generally lower in comparison to the TSS concentrations of the effluent leaving the wetland, particularly during mid-to-late July when most of the accumulated ice on the terraced wetland was rapidly melting. As shown in Figure 3-3, the concentration of TSS leaving the wetland diminishes significantly at the end of July 2014, suggesting that the high concentrations of solids were likely mobilized by the high volumes of melt water. A review of Figure 3-4 illustrates that the greatest concentration of TSS was observed in the lower portions of the wetland where the cumulative concentration of suspended solids would be anticipated to be the greatest. A closer look at the composition of the TSS, as outlined in Figure 3-5, reveals that the majority of the suspended load at the stations with high TSS concentrations is

composed of inorganic material (e.g., fine silts, clays). This trend is opposite to what is seen at the upstream end of the wetland where most of the TSS is composed of an organic fraction (e.g., volatile suspended solids) which is more likely reflective of the organic nature of the wastewater generated by the Canadian Forces Station. Figure 3-5 shows that the organic portion of the TSS decreases as the wastewater flows through the wetland and at the point of discharge into Parr Inlet; the organic fraction is 58 mg L^{-1}; a value below the NWB compliance target of 70 mg L^{-1}.

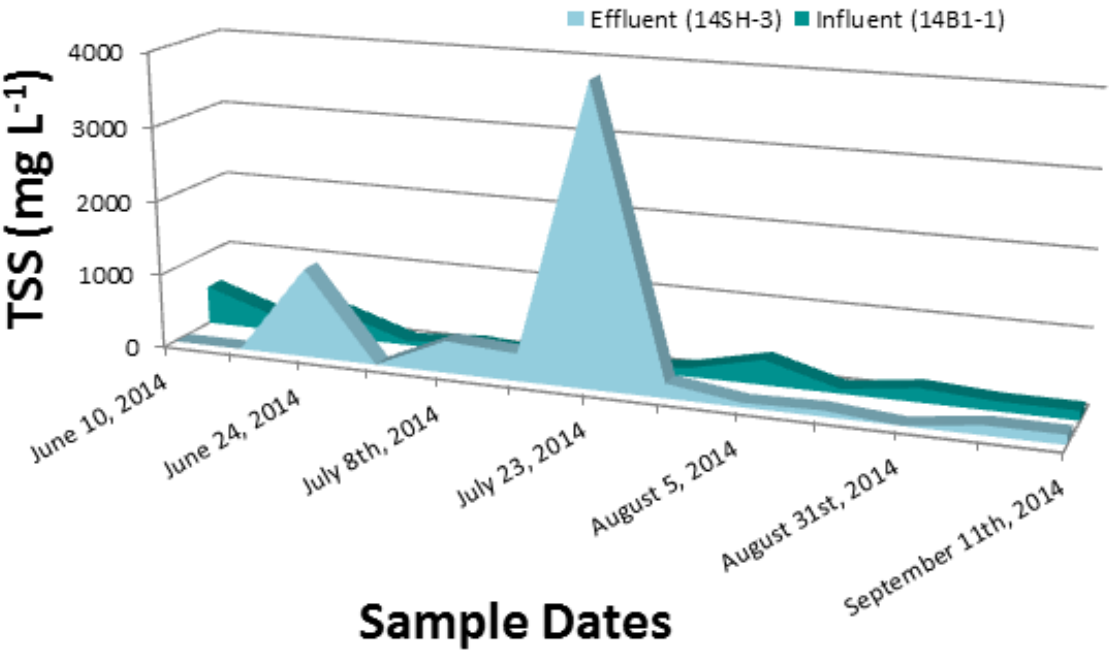

Figure 3-3: Weekly concentrations of the 5-day biochemical oxygen demand (BOD_5) within the influent and effluent sampled during the 2014 study period.

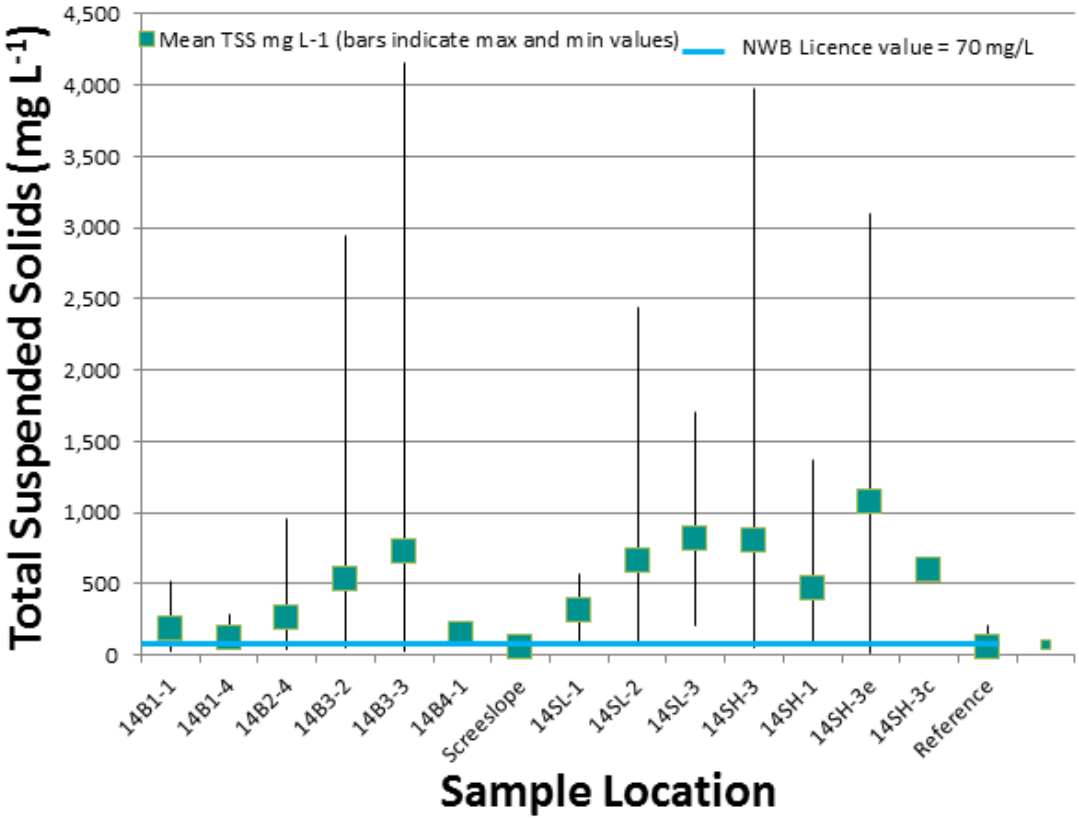

Figure 3-4: **Mean concentrations of total suspended solids (TSS) within wastewaters taken from sample sites within the Alert wetland during the 2014 study period. The blue horizontal line represents the NWB compliance value of 70 mg TSS per litre.**

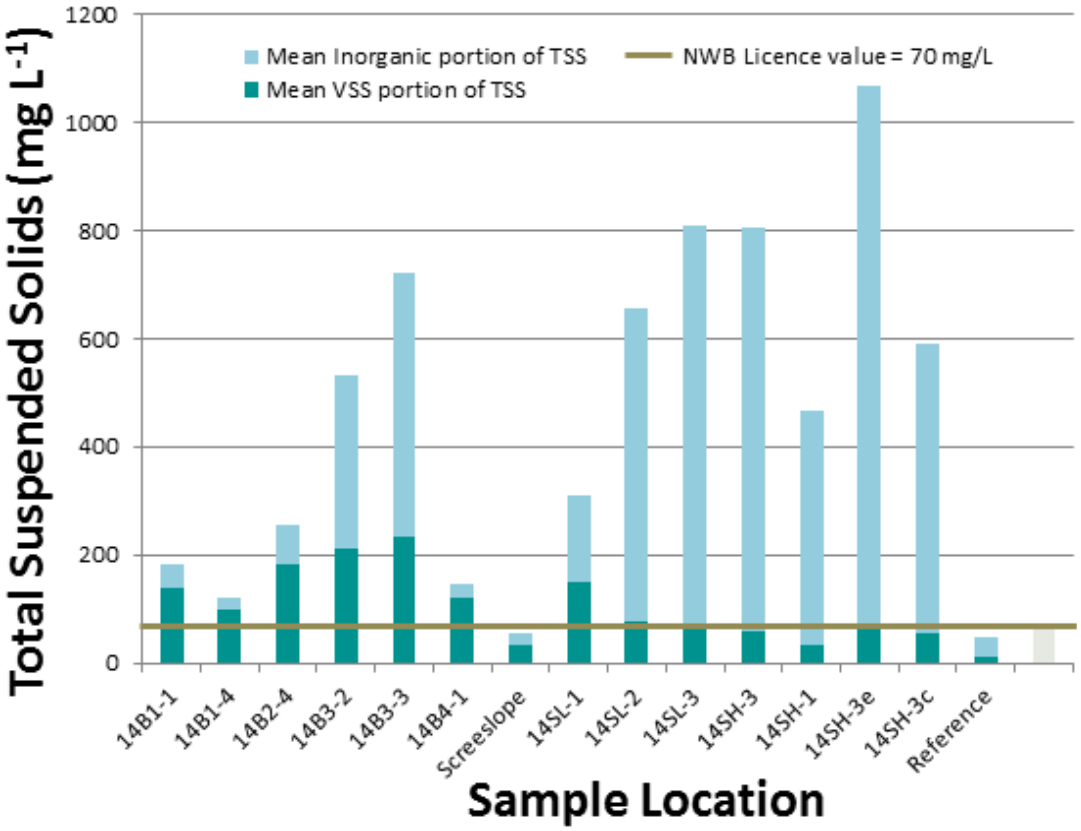

Figure 3-5: The proportion of total suspended solids composed of volatile suspended solids (VSS) and inorganic suspended solids within wastewater collected from sites within the Alert wetland during the 2014 study period. The tan coloured horizontal line represents the NWB compliance value of 70 mg TSS per litre.

3.1.3 Oil and Grease

The influent (14B1-1) entering the wetland and the effluent (14SH-3) exiting the wetland were monitored weekly for fats, oil and grease (FOG). The sample site 14SH-1 was monitored four times, to provide additional information on the removal of FOG. Figure 3-6 illustrates how the concentration of FOG in the influent entering the wetland and the effluent exiting the wetland varied weekly over the course of the study period. In most cases the general trends entering and exiting the wetland were similar except for a general lowering of FOG in the wastewater as it traveled through the wetland. The concentrations of FOG (Figure 3-7) leaving the wetland exhibited a

mean value of approximating 23 mg L^{-1}; a value above the NWB compliance value of 5 mg L^{-1}. The concentration of FOG exiting the wetland was not statistically lower ($p = 0.108$) than the concentration of FOG entering the wetland (e.g., 53 mg L^{-1}), despite the fact that summertime concentrations leaving the wetland were overall lower (e.g., 23 mg L^{-1}). Figure 3-7 indicates that the variability of FOG in the influent is high and likely reflective of the fact that most of the samples consisted of a single weekly grab sample, as opposed to a 24 hour composite sample. The concentration of FOG in the effluent of the wetland is lower and less variable, suggesting that moderate treatment of FOG is occurring despite the fact that the NWB licence limit was not achieved.

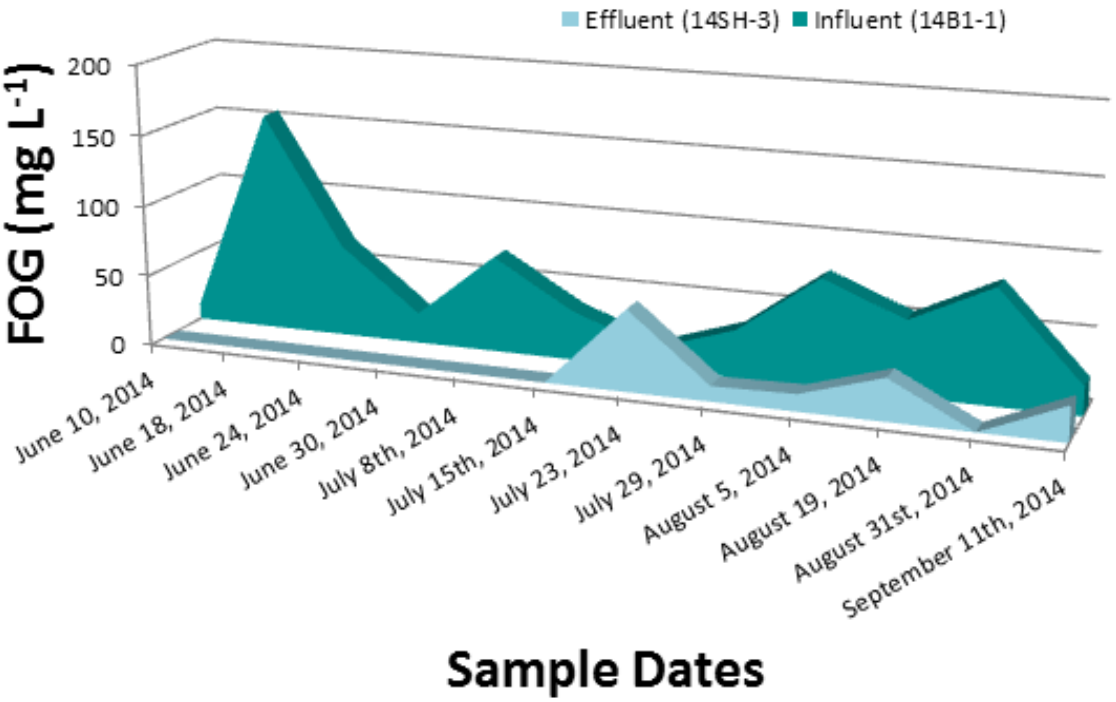

Figure 3-6: Weekly concentrations of fats, oils and grease (FOG) within the influent and effluent sampled during the 2014 study period.

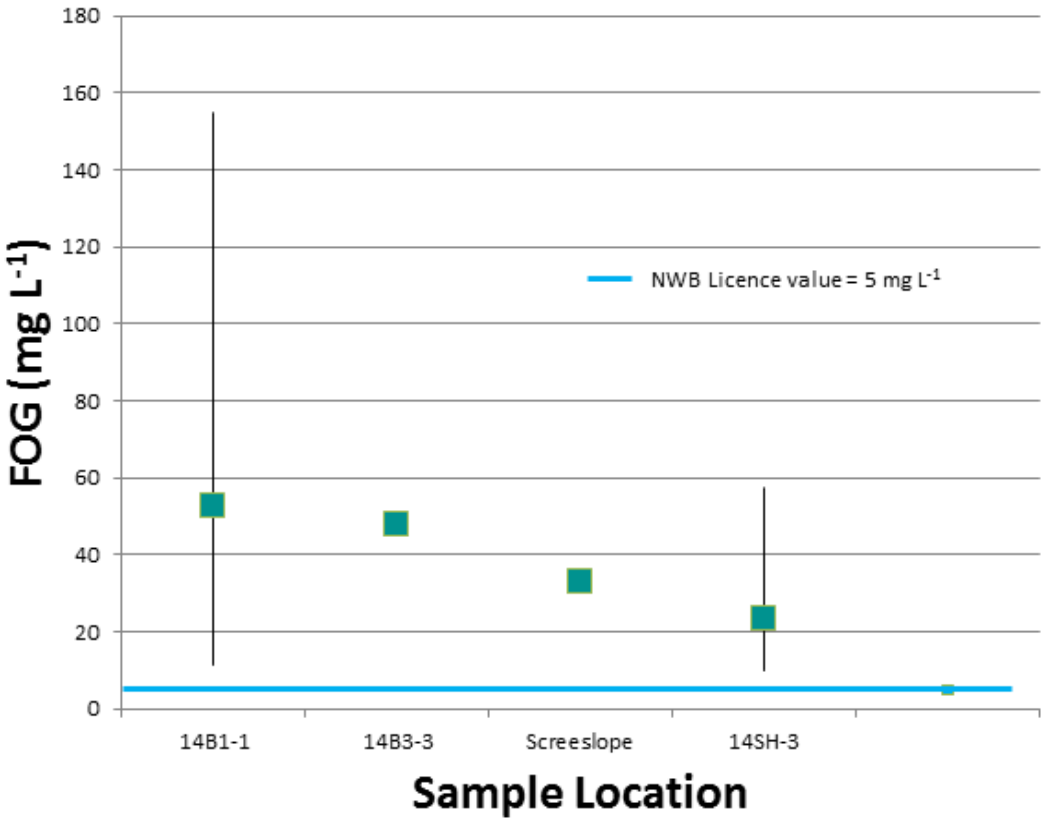

Figure 3-7: **Mean concentrations of fats, oils and grease (FOG) within wastewaters taken from sample sites within the Alert wetland during the 2014 study period. The blue horizontal line represents the NWB compliance value of 5 mg FOG per litre.**

3.1.4 pH

The pH of the wastewater entering the wetland (14B1-1) varied moderately (range: 7.1 – 8.9) with a mean value of 7.8, while the pH of the wastewater exiting the wetland (14SH-3) was somewhat less variable with a mean value of 7.8 (well within the NBW compliance range of 6 to 9 for pH (Figure 3-8)). The pH difference between the influent in and effluent out of the wetland was not significantly different (p = 0.850).

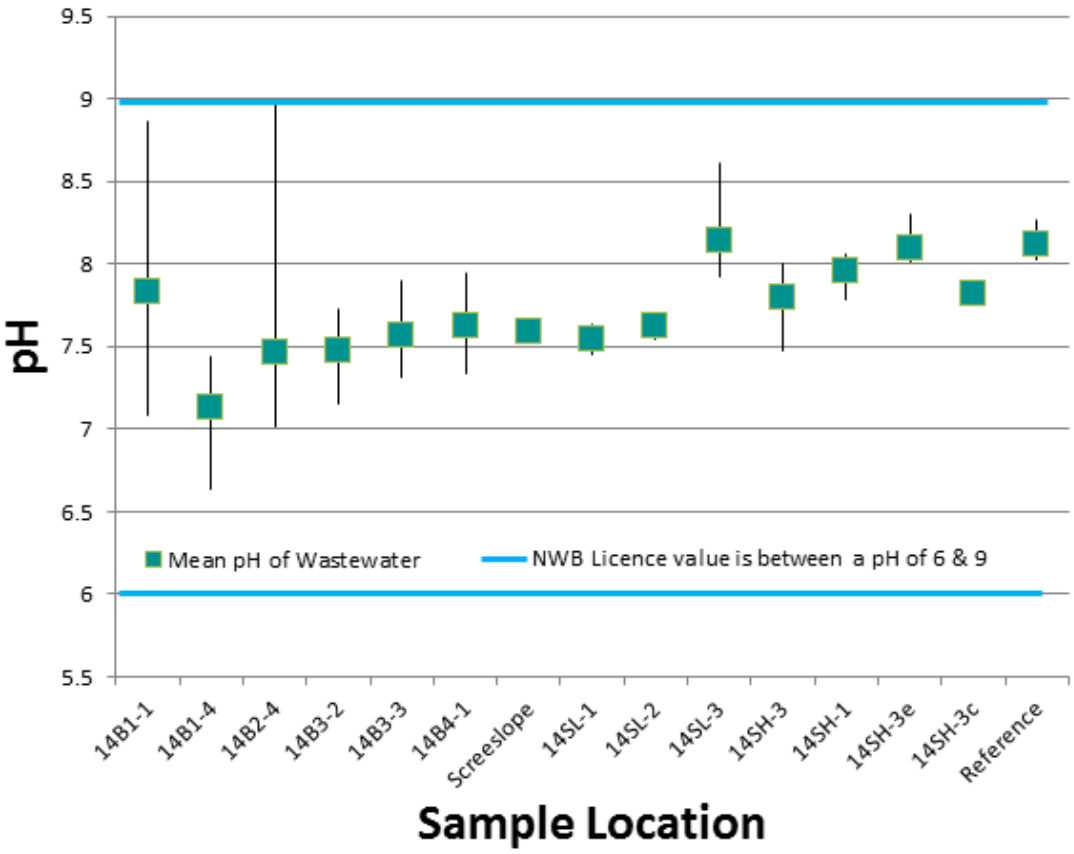

Figure 3-8: Mean pH values within wastewaters taken from sample sites within the Alert wetland during the 2014 study period. The two blue horizontal lines represent the NWB compliance value of for pH indicating that sample pH should be between a value of 6 and 9.

3.2 Additional Water Quality Parameters Measured for Interpretive Purposes

The following water quality parameters were not required by the NWB for compliant purposes. These parameters were monitored by the CAWT to provide additional information into the functioning and performance of the terraced wetland; therefore there is no treatment requirement stipulated by the NWB that must be achieved. The list of additional water quality parameters monitored during this study period includes:

Nitrogen Compounds
- Total Kjeldahl Nitrogen (TKN)
- Total Ammonia Nitrogen (NH_3-N)
- Total Nitrogen (the sum of organic nitrogen + NH_3-N + oxidized nitrogen (NO_2 / NO_3)

Phosphorus
- Total Phosphorus (TP) [non-filtered]
- Ortho-Phosphate (PO_4-P) [0.45 µm filtered]

Chemical oxygen demand and carbonaceous biochemical oxygen demand
- Chemical Oxygen Demand (COD)
- 5-day Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)

Microbial indicator organisms
- Total Coliform (TC)
- *Escherichia coli (E. coli)*

Dissolved trace elements
- Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Li, Mg, Mn, Hg, Mo, Ni, K, Se, Ag, Na, Sr, Tl, Ti, Sn, U, V, Zn

3.2.1 Total Kjeldahl Nitrogen

The weekly concentration of TKN entering the wetland (14B1-1) was relatively stable over the majority of the summer and then decline within the last weeks of the study period. The weekly concentrations exiting the wetland (14SH-3) were generally lower than the concentration of the influent, but did exhibit a slight increasing trend during this same period (Figure 3-9). The change in the mean TKN concentration as the wastewater traveled through the wetland is best illustrated in Figure 3-10 which shows

that the concentration of TKN varies between approximately 15 to 30 mg L^{-1} in the upper portion of the wetland (e.g., berms 1 to 4) and decreases to around 11 mg L^{-1} when it exits the wetland (14SH-3), however the difference between influent and effluent were not significant ($p = 0.301$).

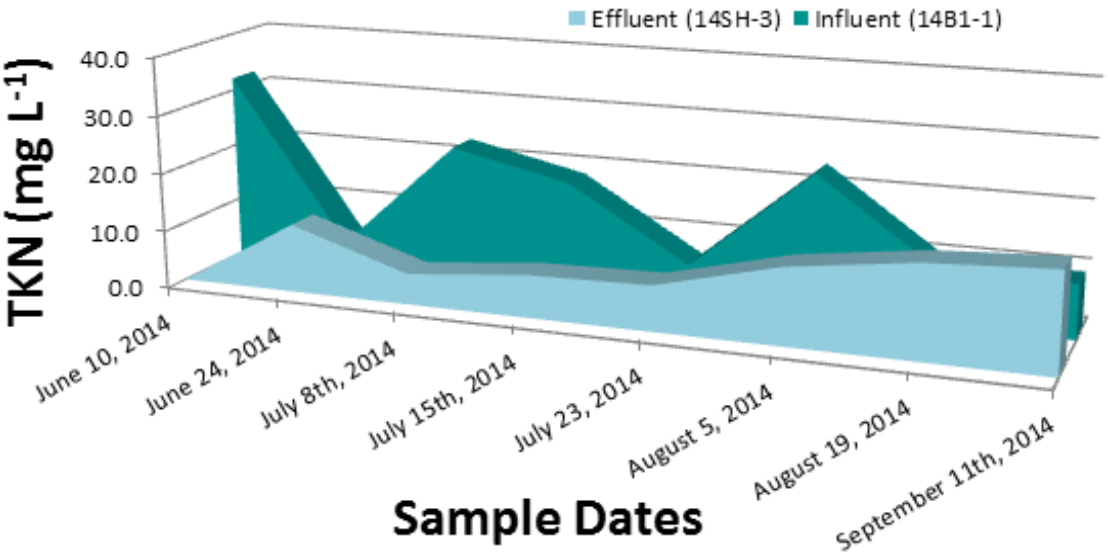

Figure 3-9: Weekly concentrations of total Kjeldahl nitrogen within the influent and effluent sampled during the 2014 study period.

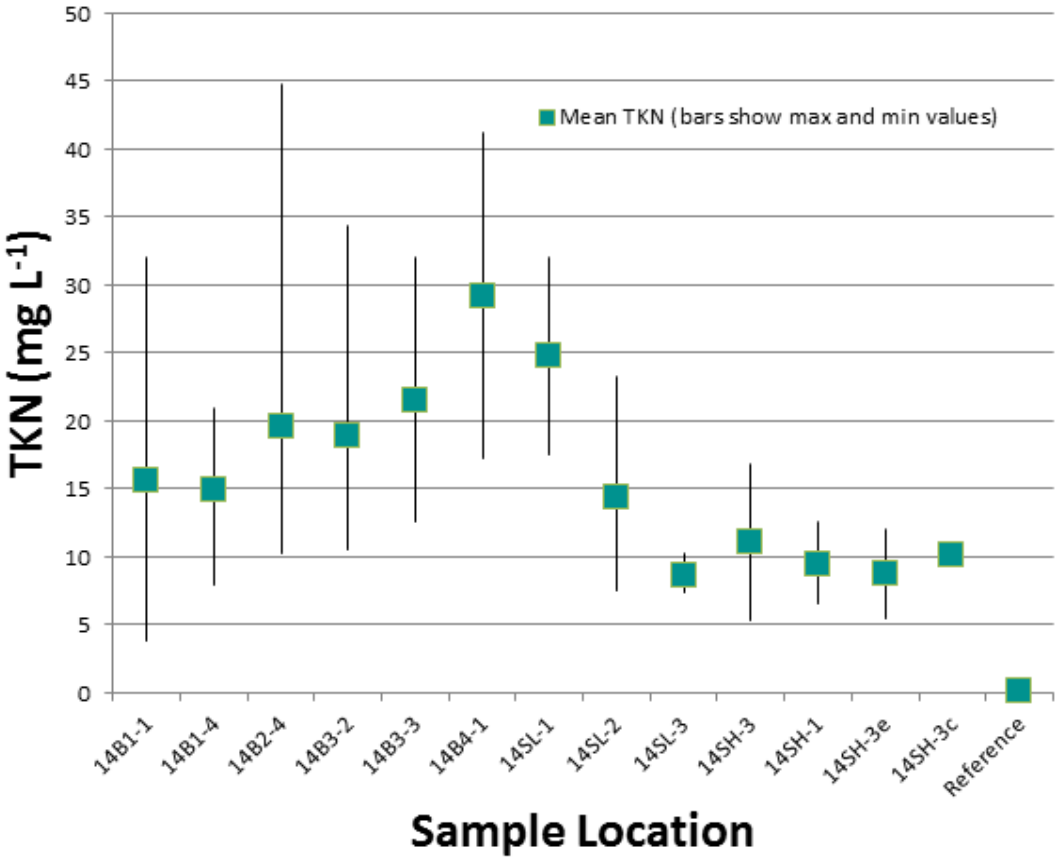

Figure 3-10: Mean concentration of total Kjeldahl nitrogen (TKN) within wastewaters taken from sample sites within the Alert wetland during the 2014 study period.

3.2.2 Total Ammonia Nitrogen (NH_3-N)

Ammonia can exist in both an un-ionized form (NH_3) and an ionized form (ammonium NH_{4+}). The proportion of these two forms is both pH and temperature dependant with higher percentages of NH_3 favoured with higher pH values. The un-ionized from (NH_3) is toxic to aquatic life forms and as such CCME has set a national performance standard (NPS) for the concentration NH_3 (measured as N) at 1.25 mg L^{-1} for southern treatment plants. A NPS guideline for northern communities is currently under review.

The ammonia concentrations expressed in this report are recorded as the concentration of total ammonia nitrogen expressed as NH_3-N, however, the nitrogen measure from the NH_3-N form does not accurately represent the toxic form of NH_3 found in the original environmental sample. The effluent sample in its natural state would contain a fraction of both the un-ionized form (NH_3) and the ionized form

(NH_{4+}). The effluent sample is analyzed under a basic environment which forces all of the NH_{4+} into the NH_3 form. Thus what is expressed in the value NH_3-N is actually the nitrogen from both the un-ionized and ionized forms; a better expression of this value is a term called "total ammonia nitrogen" or TAN for short. In order to approach the NPS of 1.25 mg L^{-1} of the toxic un-ionized form (NH_3), "total nitrogen ammonia" (TAN) concentration would need to approach 100 mg L^{-1} in an environment with a pH of 8 and a temperature of 5°C. Thus, the proportion of the TAN in the toxic un-ionized form of Alert wetland samples is expected to be well below the CCME standard of 1.25 mg L^{-1}.

The weekly TAN values for the influent (14B1-1) are variable and the concentration of TAN leaving the wetland (14SH-3) is relatively similar to the concentration entering the wetland (Figure 3-11). The general trends of highest values for TAN being found at the mid-section of the wetland is similar to what was observed for TKN (Figure 3-10) and likely represent organic matter being retained in this portion of the wetland. Overall, the net loss of TAN is not statistically significant ($p = 0.910$).

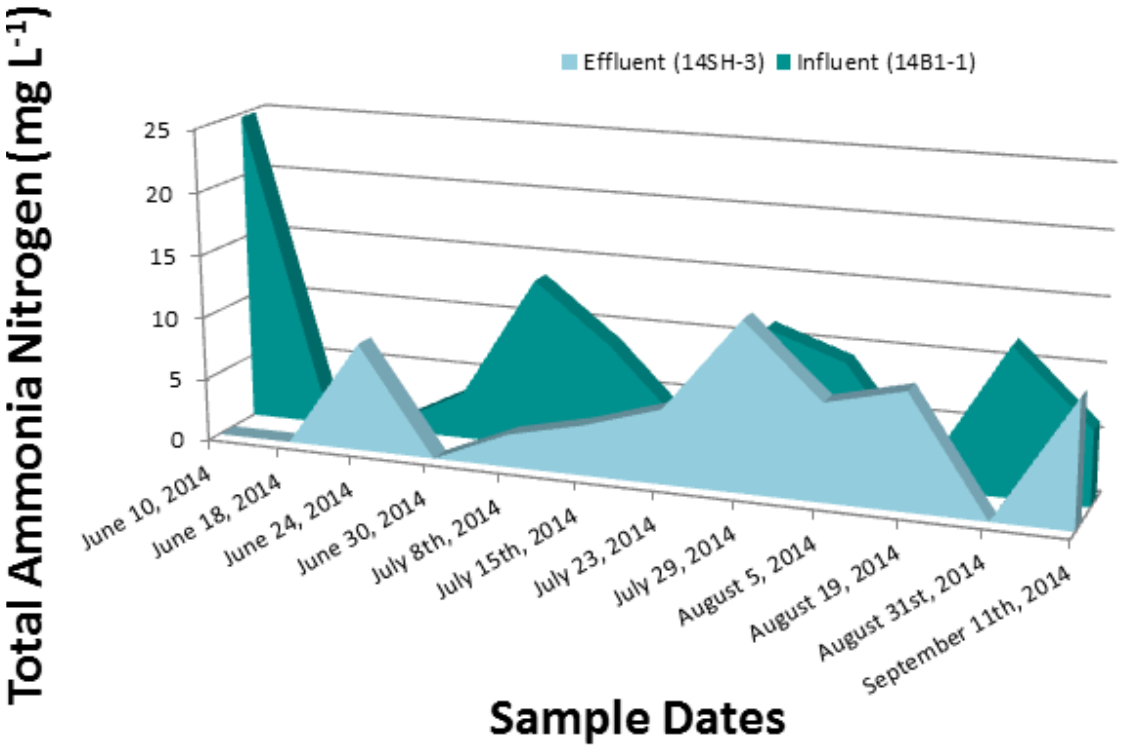

Figure 3-11: Weekly concentrations of total ammonia nitrogen (NH_3-N) within the influent and effluent sampled during the 2014 study period.

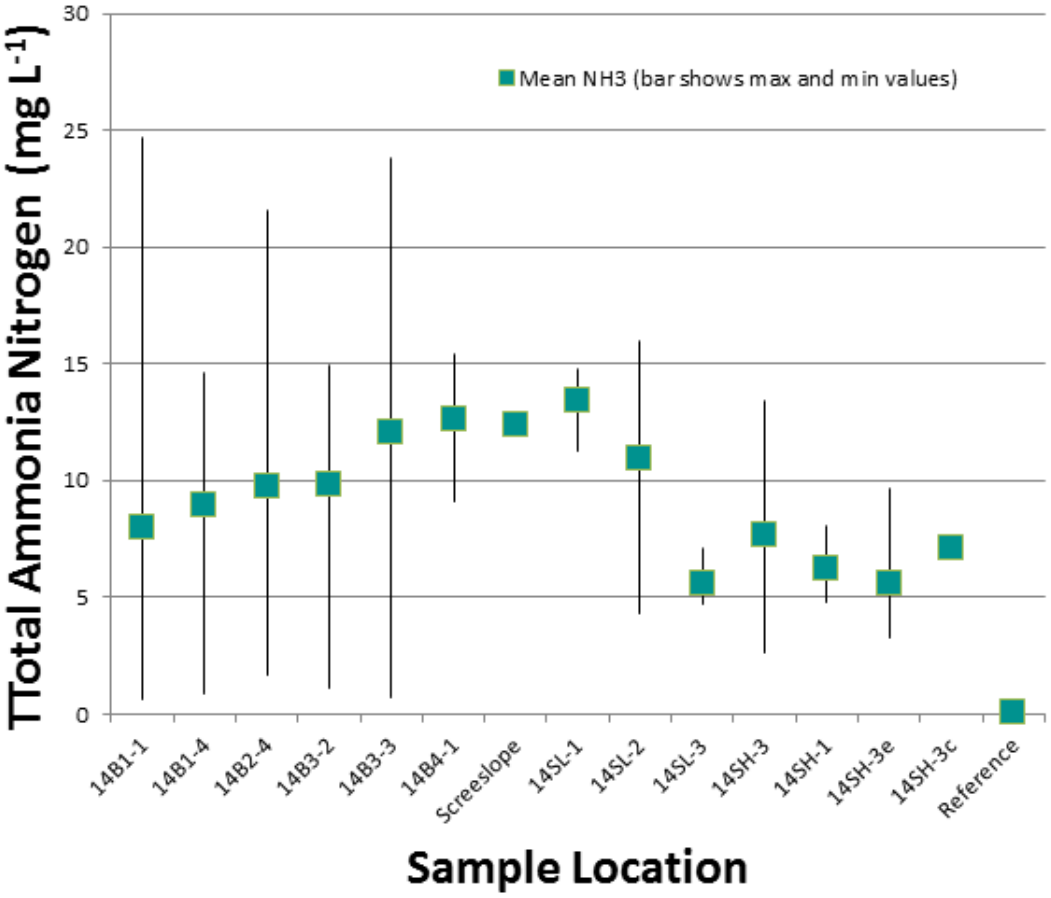

Figure 3-12: Mean concentrations of total ammonia nitrogen (NH_3-N) within wastewater collected at sample sites within the Alert wetland during the 2014 study period.

3.2.3 Total Nitrogen

Total nitrogen (TN) is the sum of organic nitrogen, ammonia (i.e., TAN), and oxidized nitrogen (e.g., NO_2-N + NO_3-N). Organic nitrogen was derived by subtracting NH_3-N from TKN. The averaged concentrations of total nitrogen at each sampling location are presented in Figure 3-13. As shown in this figure, the average concentration of total nitrogen decreases as the wastewater travels through the wetland from a high of approximately 15 mg L^{-1} (14B1-1) to near 11 mg L^{-1} at it leaves the wetland (14SH-3). A closer look at the changing composition of the total nitrogen values suggests that most of the TN loss may be attributed to an overall decline in the concentration of organic nitrogen which declines by approximately 50% from the start of the wetland to the

end of the wetland. Ammonia levels appeared to change relatively less (approximately 20%) as the wastewater traversed the wetland (Figures 3-12 and 3-13). Near the exit of the wetland (e.g., sites 14SH-1 and 14SH-3e) the presence of oxidized nitrogen was observed (Figure 3-13), however, the overall concentration of these compounds is minimal and is attributable primarily to NO_3-N, with very little NO_2-N present. The a lack of increase in ammonia and oxidized nitrogen suggests that most of the loss in organic nitrogen is likely due to particulate matter (high in organic nitrogen) being settled out or physically removed as the wastewater traverses the wetland. The high removal rate of volatile suspended solids as seen in Figure 3-5 provides support to this assumption.

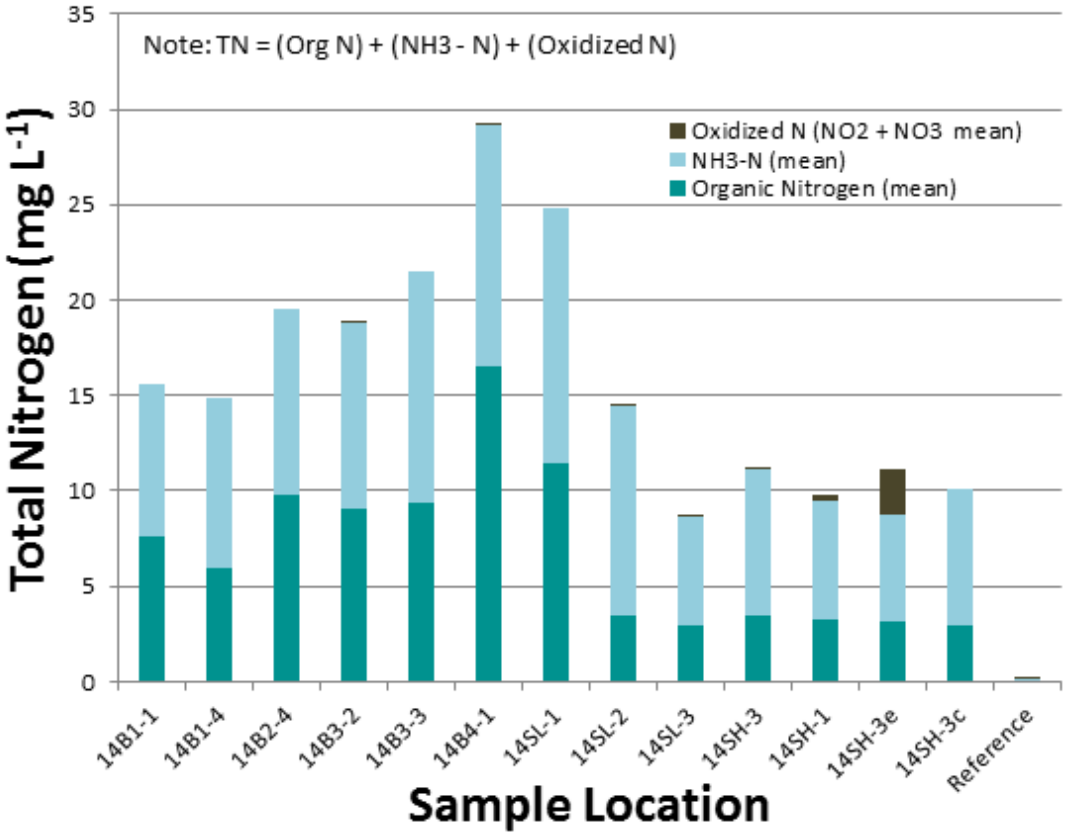

Figure 3-13: The mean concentrations of total nitrogen within wastewaters collected at sampling sites within the Alert wetland showing the proportion of organic nitrogen, ammonia nitrogen and oxidized nitrogen that contribute to the total nitrogen concentration during the 2014 study period.

3.2.4 Phosphorus

The weekly changes in the concentration of total phosphorus (TP) are illustrated in Figure 3-14. As evident in this figure, the overall concentration of total phosphorus entering the wetland (14B1-1) is variable and averages approximately 1.9 mg L^{-1}. The TP concentration exiting the wetland (14SH-3) is also variable and averages around 1.4 mg L^{-1}. A closer look at the values for TP (Figure 3-15) illustrates a trend seen with other parameters where the greatest concentrations are typically in the mid portion of the wetland, suggesting that particulate material is being trapped in these locations. The difference between the TP entering and exiting the wetland was not statistically significant ($p = 0.411$).

Total phosphorus includes both particle-bound and dissolved forms. While there are several dissolved forms of phosphorus, the greatest portion of dissolved phosphorus is often in the form of ortho-phosphate (PO_4-P). Figure 3-16 illustrates the proportion of total phosphorus that was measured in the dissolved form of PO_4-P and the non ortho-phosphate form which is most likely phosphorus that is particle-bound or

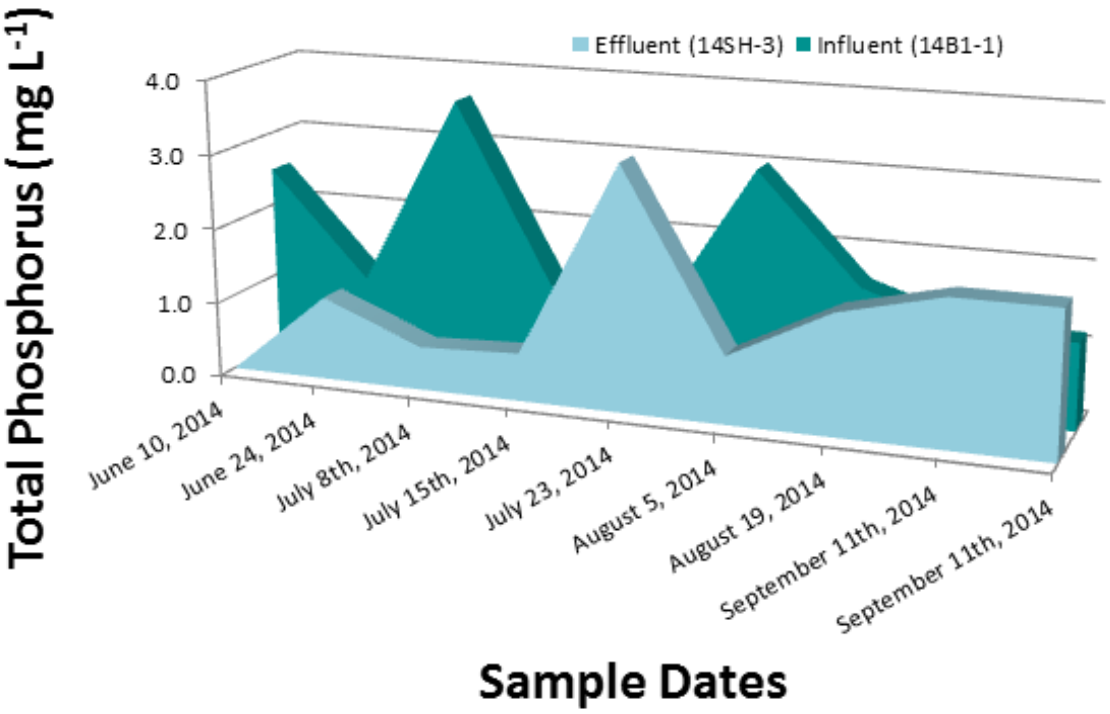

Figure 3-14: Weekly concentrations of total phosphorus (TP) within the influent and effluent sampled during the 2014 study period.

incorporated into particulate matter. As seen in Figure 3-16, the non-dissolved, non-PO_4-P is the dominate fraction of the total phosphorus concentration at all sampling stations. This presumably particulate fraction undergoes a relatively steady decline as the wastewater traverses the wetland. It is assumed, but not confirmed, that the removal mechanisms for the particulate fraction are likely influenced from physical removal of particulate matter while the dissolved fraction is likely through adsorption processes onto metal oxides naturally found within the wetland matrix. The difference between the mean PO_4-P of the effluent was not statistically different ($p = 0.057$) than the mean influent.

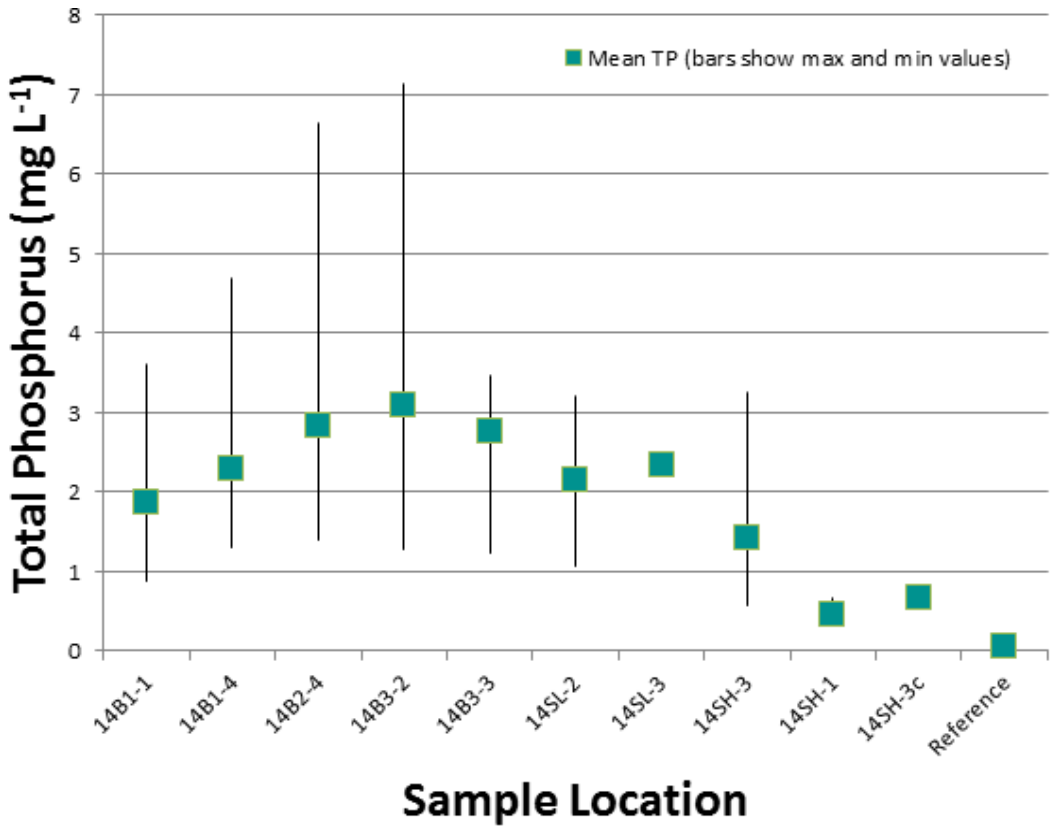

Figure 3-15: Mean concentrations of total phosphorus (TP) within wastewaters collected at sample sites within the Alert wetland during the 2014 study period.

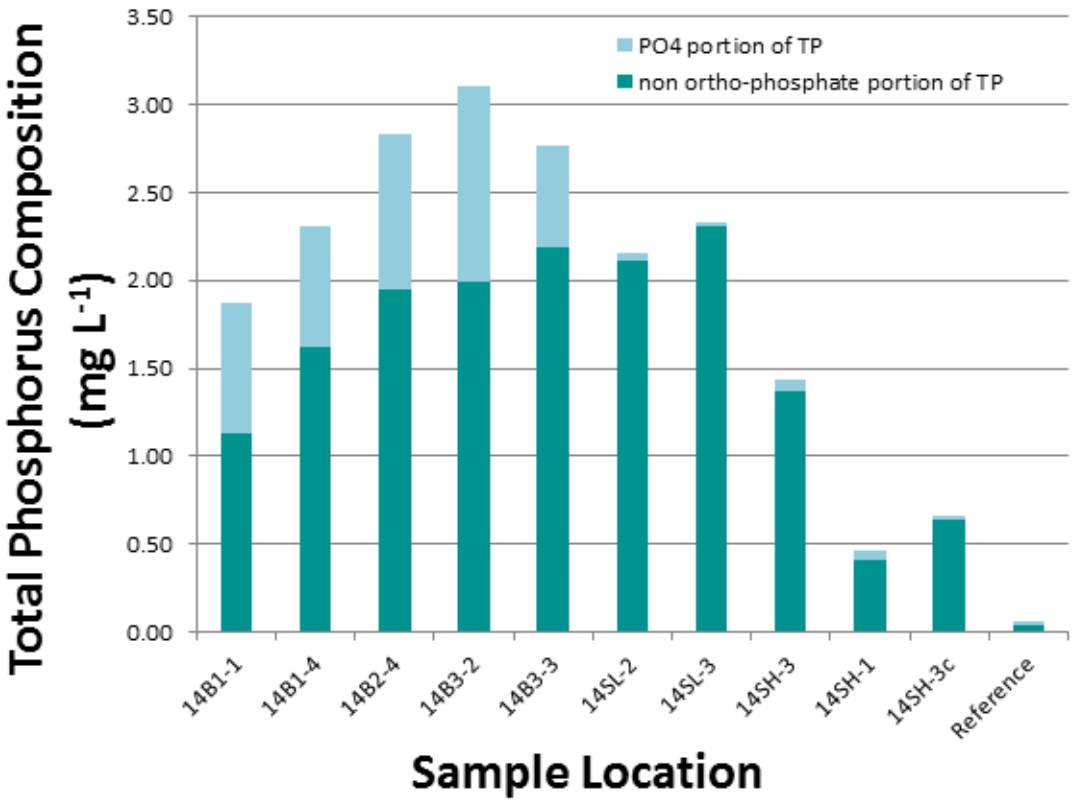

Figure 3-16: The mean concentrations of total phosphorus in wastewater at sampling sites within the Alert wetland showing the proportion of ortho-phosphate (PO_4-P) and non ortho-phosphate that contribute to the total phosphorus concentration during the 2014 study period.

3.2.5 Chemical oxygen demand and carbonaceous biochemical oxygen demand

The analysis of the carbonaceous biochemical oxygen demand is a five-day test. Water samples collected for $cBOD_5$ must be analyzed within 24 hours after collection. Laboratories certified for the analysis of $cBOD_5$ or BOD_5 do not exist in Nunavut and therefore samples must be flown south to larger centres such as Calgary, Winnipeg, or Ottawa. The biochemical oxygen demand is a measure of the microbially mediated oxidation of carbonaceous and nitrogenous compounds. In most cases, oxygen consumption from the oxidation of carbonaceous compounds exceeds the consumption from the oxidation of nitrogenous material. The oxygen demand from

only the carbonaceous compounds can be achieved through the analysis of $cBOD_5$, which in essence is a BOD_5 test with the addition of a chemical additive that suppresses the oxidation of nitrogenous compounds present in the sample.

The chemical oxygen demand is also an indirect measure of the oxidizable compounds within the wastewater. In this test however, oxidation is accomplished through the addition of a strong chemical oxidant and does not involve microbial oxidation. This test can be used to provide a more complete understanding of all oxidizable compounds within the wastewater, including those that are not readily oxidized microbially. Since this test does not involve microbially mediated processes, it can be accomplished within minutes, rather than days, and does not require the use of an incubator as do the BOD_5 and $cBOD_5$ tests, and thus can be routinely performed in lesser equipped laboratories.

In this study the relationship between COD and $cBOD_5$ was evaluated to determine if COD could be used as a surrogate for the biochemical oxygen demand test. Finding a consistent relationship may provide an indirect measure of BOD. If a relationship existed, then this might help with compliance testing at the Alert site and mitigate the challenges associated with finding a suitable location for the analysis of BOD. The NWB licence stipulates that BOD_5 be one of the treatment performance measurements, as do most other regulatory bodies.

A comparison of the COD results with the $cBOD_5$ values (Figure 3-17) generated from the same wastewater samples illustrates that there is a general lack of relationship between COD and $cBOD_5$, indicating that at the Alert wetland, COD would not be a reliable surrogate for the measurement of BOD_5.

It should be noted however that the mean $cBOD_5$ of the effluent was not statistically ($p = 0.188$) lower than the mean $cBOD_5$ of the influent.

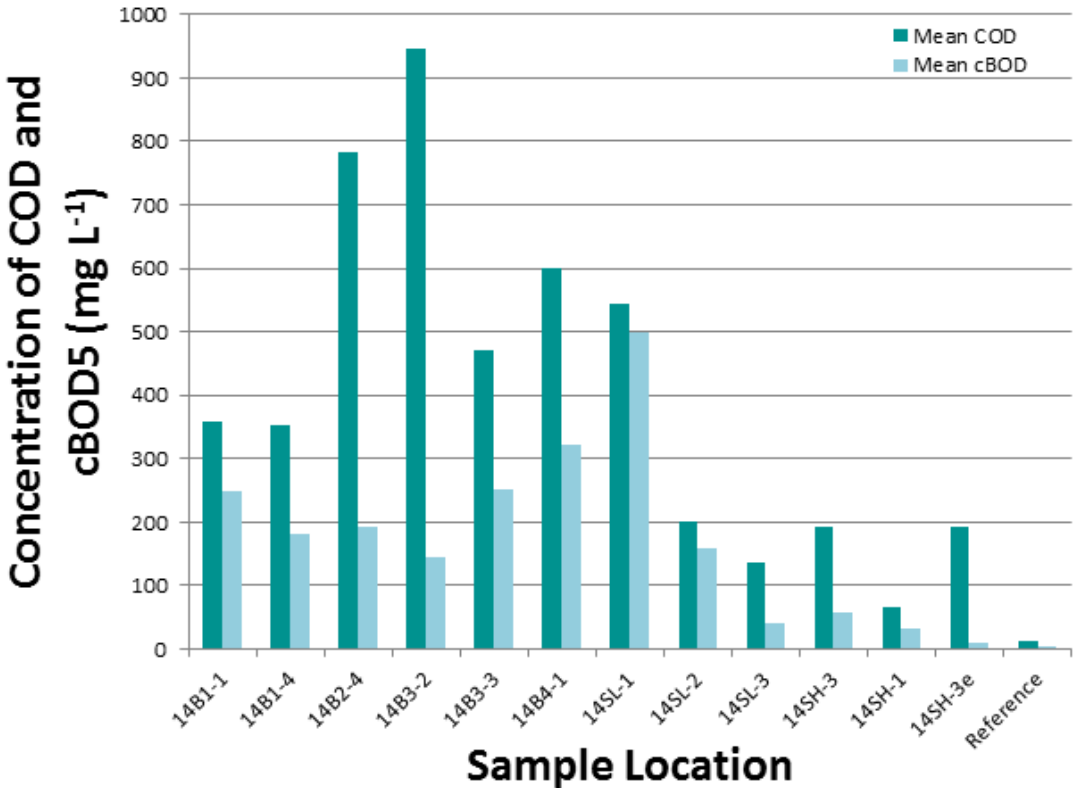

Figure 3-17: The concentration of COD compared to the concentration of $cBOD_5$, from wastewater collected at sites within the Alert wetland during the 2014 study period illustrating that the relationship is variable and not consistent.

3.2.6 Microbial

The density of microbial indicator organisms, expressed as the number of colony forming units per 100 mL of sample (cfu/100 mL), was monitored at the collection sites for both total coliforms and *E. coli*. Total coliforms (TC) are often used as an indicator of fecal contamination and although this indicator group can also contain genera which do not originate from fecal contamination, it has been used in this study as a general indicator of microbial contamination originating from the discharge of wastewater to the wetland. *E. coli* (EC) does originate from fecal contamination and it has been used as an indicator for the possible presence of human pathogens. In both cases, these microbial groups are used primarily to monitor the change in the density of microbial organisms within the wastewater as it travels through the wetland.

Figures 3-18 and 3-19 illustrate the changing densities of total coliforms and *E. coli*, respectively. Total coliform densities were typically ten times greater than the densities of *E. coli*. In both cases the densities at the sample locations vary widely throughout the study period. Microbial population densities entering the wetland were approximately $4x10^6$ for TC and $5x10^5$ for EC. These densities declined over distance, but this reduction was generally close to one log unit for both TC and EC. Final densities exiting the wetland were approximately $1x10^5$ for TC and $1x10^5$ for EC. The decline in cfu/100 mL was statistically significant ($p = 0.017$) for TC but not statistically significant ($p = 0.063$) for EC.

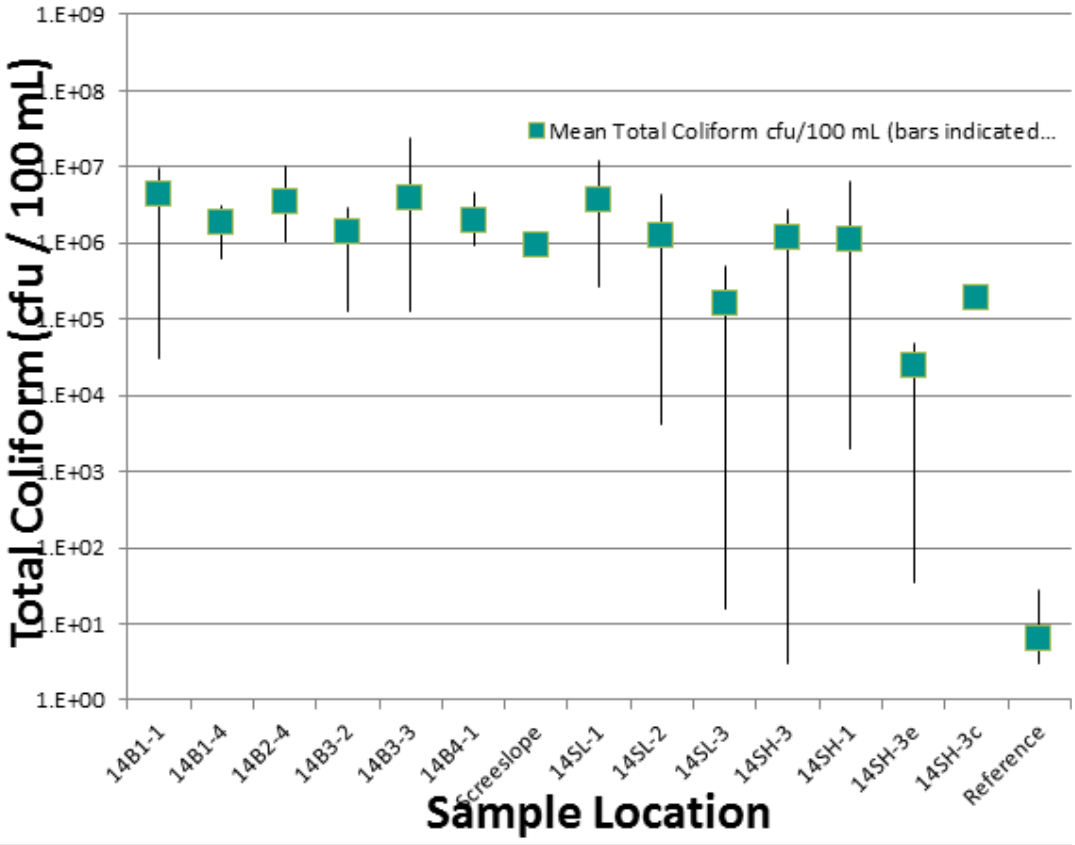

Figure 3-18: The mean concentration of total coliforms (expressed as colony forming units per 100 mL of wastewater) at sample sites within the Alert wetland during the 2014 study period.

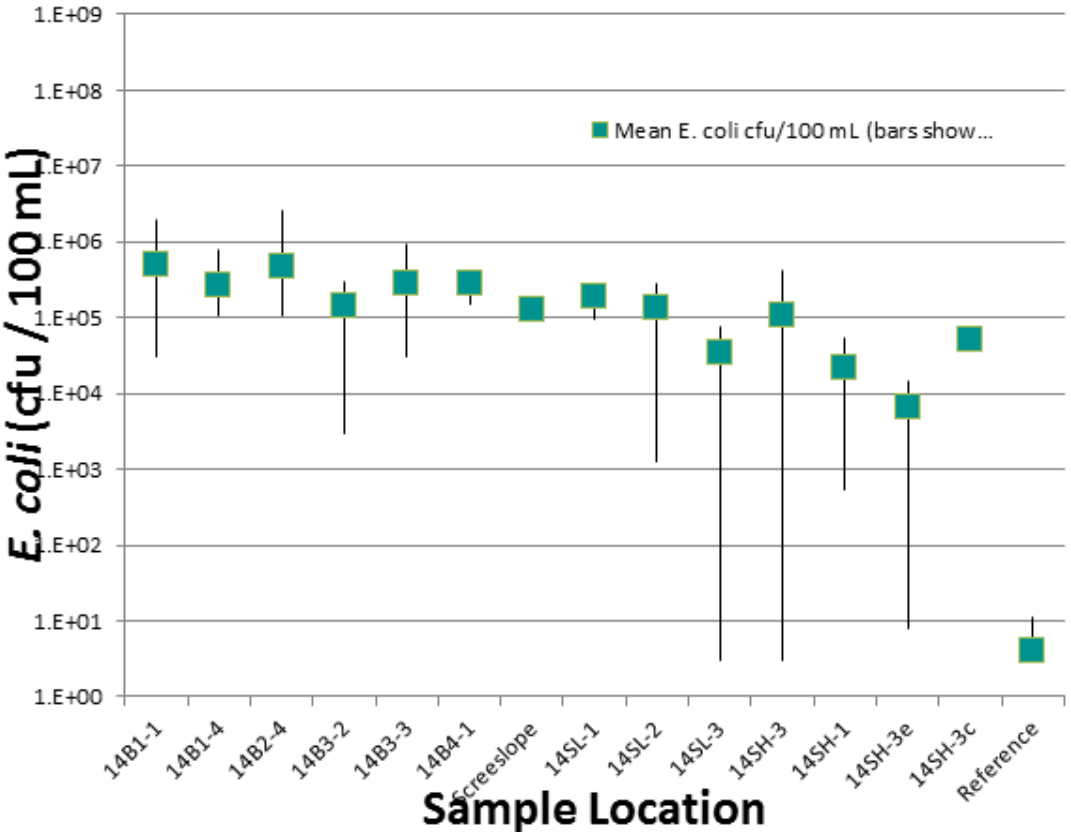

Figure 3-19: The mean concentrations of *Escherichia coli* (expressed as colony forming units per 100 mL of wastewater) at sample sites within the Alert wetland during the 2014 study period.

3.2.7 Dissolved trace elements

Calcium (Ca), magnesium (Mg), potassium (K), sodium (Na), aluminium (Al) and iron (Fe) were all found in low mg L^{-1} (ppm) concentrations, with all other elements in the range of µg L^{-1} (ppb). Of the six elements in the ppm range, Al and Fe are of greatest interest in terms of their potential impact upon biota, since the remaining four elements Ca, Mg, K and Na are more easily tolerated by organisms.

The concentration of both Al and Fe increase as the wastewater travels through the wetland. As shown in Figure 3-20, the concentration of Al entering the wetland was approximately 0.27 mg L^{-1} (e.g., 270 µg L^{-1}) and exited the wetland at approximately

6.9 mg L^{-1} (e.g., 6886 µg L^{-1}) with a maximum mean concentration of 18.5 mg L^{-1} (e.g., 18500 µg L^{-1}) at sample site 14SL-3. Environment Canada does not provide a water quality guideline for the protection of marine health but does indicate that within freshwater environments the water quality guideline for Al is set at 0.10 mg L^{-1}. The trend is similar for Fe (Figure 3-21) in that the average concentration of Fe entering the wetland was 0.35 mg L^{-1} and 14.0 mg L^{-1} exiting the wetland with the highest mean value of 36.9 mg L^{-1} at site 14SL-3. The increase in Al and Fe between the inflow and outflow of the wetland was not significantly different for Al ($p = 0.076$) due to low sample size and high variability, however, it was statistically significant for Fe ($p = 0.044$). Note, for the ease of graphing, the results shown in Figures 3-20 and 3-21 are expressed in units of µg L^{-1} or ppb. Likewise, there is no Environment Canada guideline for Fe within a marine environment; however, the value set for aquatic environments is 0.30 mg L^{-1}.

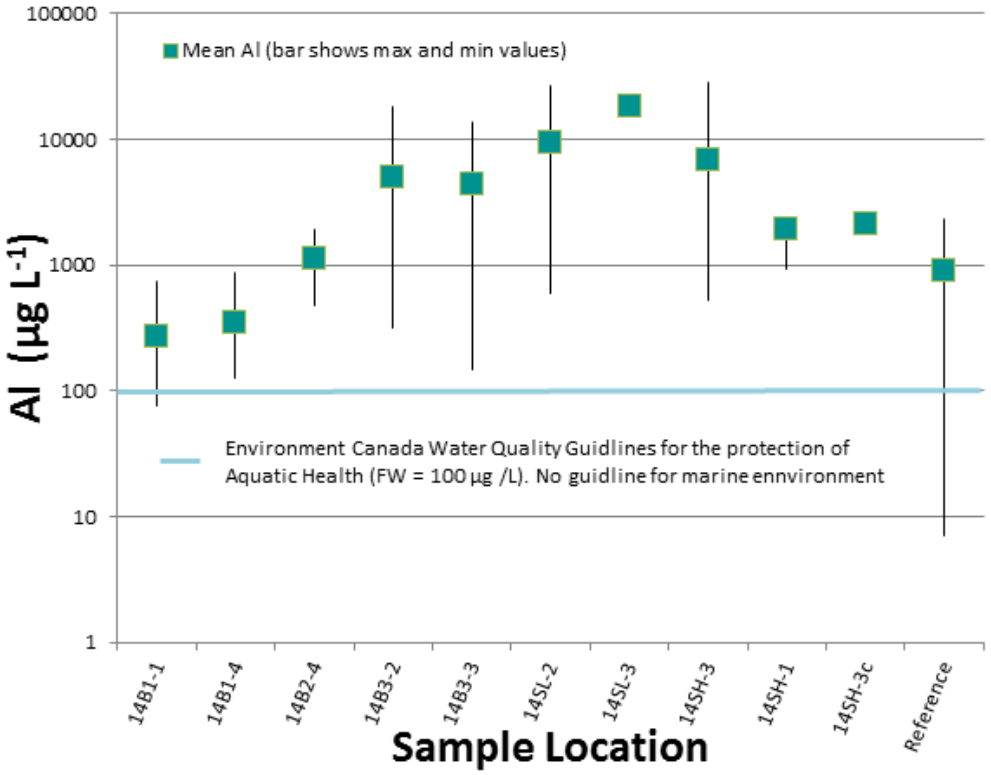

Figure 3-20: Mean concentrations (µg L^{-1}) of aluminium (Al) observed in wastewater collected at sample sites within the Alert wetland during the 2014 study period.

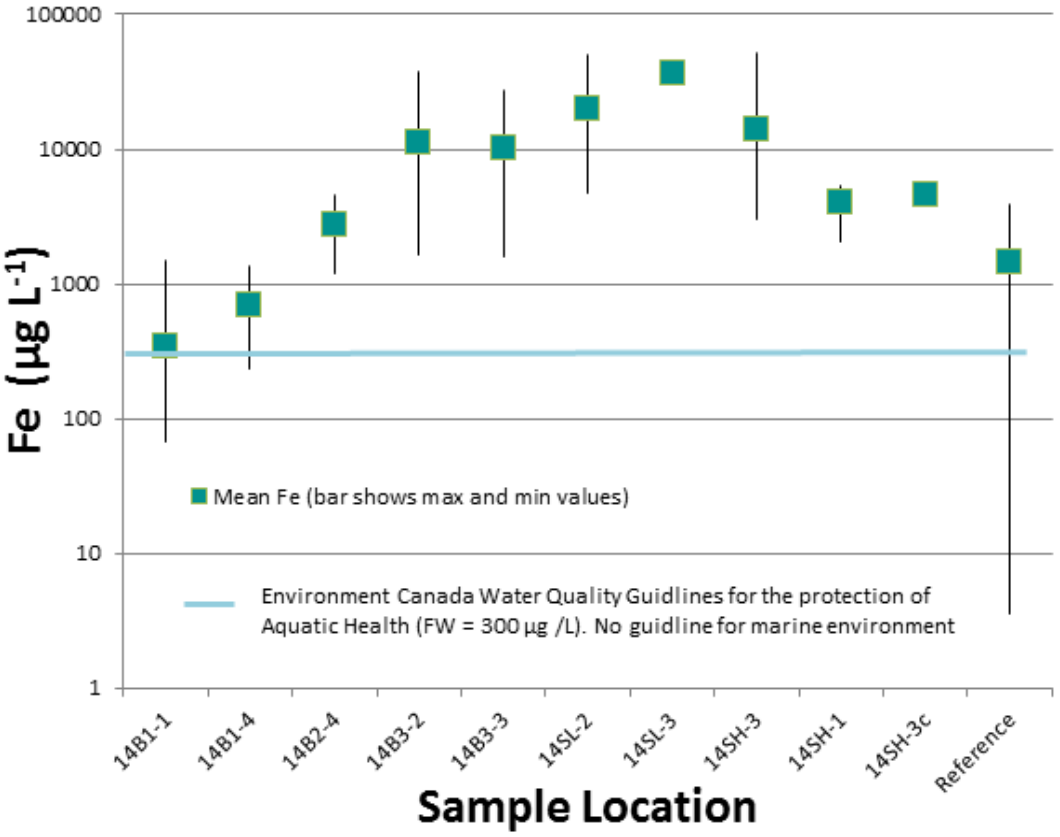

Figure 3-21: **Mean concentrations (µg L^{-1}) of iron (Fe) observed in wastewater collected at sample sites within the Alert wetland during the 2014 study period.**

4.0 DISCUSSION

4.1 General Overview

Overall, the wetland's performance in the treatment of NWB water licence compliance parameters was better in 2013 than in 2012, with the exception of TSS. With TSS, 2014's performance was slightly poorer than last year's (2013) but still better than 2012 (prior to the wetlands renovation at the end of the 2012 field season) (Table 4-1). It is speculated that the major wetland design modification that took place in late August of 2012 has influenced the mobilization of inorganic fines off of the disturbed sections, resulting in increased levels of TSS in the last two seasons, particularly during the periods of rapid snow and ice melt. As described in Section 3.1.2, most of the TSS is composed of an inorganic fraction, suggesting that the majority of the TSS was generated within the wetland and not related to the wastewater influent. Although unknown, it is suspected that the inorganic fraction of the TSS will decline in the following years as the disturbed soils become more stabilized.

The concentration of Oil and Grease was once again elevated above the compliance target; however, removal was generally improved in comparison to the 2012 field season. The overall patterns of Oil and Grease concentrations with effluent leaving the wetland appeared to mimic the patterns observed in the influent entering the wetland. The effluent patterns (response) were delayed by approximately one week (see Figure 3-6) suggesting that it takes approximately one week for the effluent to traverse the wetland.

Table 4-1: Water quality of the treated wastewater exiting the Alert wetland in the 2011, 2012, 2013 and 2014 site visits for the licenced compliance parameters stipulated by the Nunavut Water Board.

	NWB Licenced Value mg L^{-1}	2011 mg L^{-1} (range)	2012 mg L^{-1} (range)	2013 mg L^{-1} (range)	2014 mg L^{-1} (range)
BOD_5	80	15 (10 to 23)	112 (64 to 190)	39 (12 to 86)	76 (19 to 138)
TSS	70	241 (12 to 742)	124 (2 to 490)	590 (38 to 1860)	805 (58 to 3980)
Oil & Grease	5	3.7 (<1 to 7.4)	36 (13 to 72)	13 (<1 to 41)	23 (<10 to 57)
pH	6 to 9	8.2 (8.0 to 8.2)	7.5 (6.0 to 7.9)	7.5 (6.8 to 7.8)	7.8 (7.5 to 8.0)

The hydraulic retention time (HRT) of the wetland is unknown. The HRT provides an estimate of the volume of water that the wetland can hold at any one time and how quickly that defined volume of water changes over (i.e., is replaced). This measure includes the volume of water retained in the interstitial spaces of the substrate plus the

volume of surface water. Once the volume is defined, an estimate can be made of the HTR by dividing the water holding capacity of the wetland by the volume of water entering the wetland on a daily basis. For example, if the wetland could hold 600 m^3 and the daily volume entering the wetland was 200 m^3 d^{-1}, then the HRT would be 600 m^3 / 200 m^3 d^{-1} = 3 days.

The rocky nature of the wetland, changing preferential flow paths, and a changing porosity due to freezing of the substrate, make it difficult to estimate the water holding capacity of the wetland and in turn complicates the determination of HRT. Adding to this issue is the fact that much of the wastewater is retained in the upper portions of the wetland as ice during the winter months. The wastewater stored as ice undergoes a rapid melt during the early portions of summer, resulting in flow rates that would be much faster than the normal rate at which wastewater is generated. This melt of frozen wastewater in the early summer would inevitably lower the HRT significantly within a wetland that, in all likelihood, already has a short HRT. The CFS Alert produces on average 100 m^3 of wastewater per day. A significant portion of this volume accumulated in the wetland as ice during the frozen months. Most of this frozen wastewater is typically released over a period of 4 to 6 weeks resulting in an increased flow rate greater than the typical 100 m^3 per day generated by the facility.

It is assumed the overall improved treatment of BOD_5 during the 2013 field season was likely related to two factors. Firstly, the 2012 modifications probably improved the detention of the wastewater and significantly reduced the short-circuiting of the berms. A slower flow of the wastewater through the wetland (i.e., a higher hydraulic retention time) is consistent with an improved removal of BOD_5 since the microbial oxidation of organic matter is time dependent. A longer contact time between the organic matter and microorganisms would result in more material being microbially oxidized. Secondly, the overall strength of the wastewater entering the wetland in 2013 appeared to be slightly lower than observed in 2012 (see Section 4.2 below). Interestingly, the overall strength of the wastewater entering the wetland was slightly stronger in 2014 in comparison to 2013. Likewise, the concentrations of measured parameters leaving the wetland were corresponding higher than observed in the previous year.

The data, however, for VSS (Figure 3-5), organic nitrogen (Figure 3-13) and the particulate form of total phosphorus (Figure 3-16) all suggest that organic material originating from the wastewater was being effectively retained in the upper portions of the wetland. Thus it is difficult to determine if the primary factor lowering the concentration of BOD_5 is related to physical filtration (detention) of organic matter from the waste stream or if it is primarily via microbial oxidation. It is suspected the loss of BOD_5 is both physical and microbial, with physical likely being the greater influence based on the fact that there was little evidence of microbial oxidation of

nitrogen compounds.

A review of the TSS data (Figure 3-5) suggests that the suspended solids entering the wetland are composed primarily of organic matter, most likely garburated food waste and sanitary waste. The organic portion of the TSS (i.e., VSS) dominates the composition of suspended solids measured in the upper portion of the wetland. At and below site 14SL-2, the inorganic portion of TSS dominates and the prominence of VSS is less. This suggests the organic portion of the TSS (i.e., VSS) is retained in the upper portions of the wetland and it is this fraction that is likely a truer representation of the suspended solids attributable to the domestic waste of the CFS Alert. The majority of the inorganic portion of the suspended solids is probably generated within the wetland from the erosional forces of the wastewater as it flows through the wetland and in particular during the spring freshet. The average concentration of TSS at the last sample point (14SH-3) prior to Parr Inlet was 805 mg L^{-1}, of which 747 mg L^{-1} was composed of inorganic matter. The average concentration of the organic portion of the TSS was 58 mg L^{-1}, a value below the NWB compliance value of 70 mg L^{-1}. Therefore, of the 747 mg TSS L^{-1}, approximately 58 mg L^{-1} originated from the domestic wastewater, with the remainder likely being generated within the wetland.

The pH of the wastewater entering the wetland was not significantly different than the pH of the wastewater leaving the wetland. There was some variability in the average pH values in the upper portion of the wetland (e.g., berm 1 and 2) but these variations dampen and the final pH exiting the wetland was 8.1, which is a value well within the compliance limits set out by the NWB.

A review of the nitrogen data supports the suggestion that a large fraction of the organic portion of the total suspended solids (i.e., VSS) is being retained within berm 1 to berm 4. A review of the organic nitrogen fraction (see Figure 3-13) indicates a greater concentration within these detention berms (1-4) suggesting that organic matter high represented as organic nitrogen is being detained within these berms.

The ammonia concentrations in the wastewater (Figure 3-12) vary little over the course of the wetland; ranging from a summer time average of 8.0 mg L^{-1} at the inflow to the wetland (14B1-1) to 5.6 mg L^{-1} at the outflow (13SH-3) of the wetland. Ammonia levels do increase between the influent (14B1-1; TAN = 8.0 mg L^{-1}) to around berm 4 (14B4-1; TAN = 13.4 mg L^{-1}) suggesting that there is some conversion of organic nitrogen to ammonia (e.g., ammonification) occurring. The overall level of total nitrogen (e.g., Organic Nitrogen + TAN + Oxidized Nitrogen) also declines after berm 4 with some evidence of nitrification occurring (e.g., oxidized nitrogen species), suggestive of some microbial activity occurring in these sites. The suggestion of microbial activity is stronger than what was observed in 2013, however, most of the loss of total nitrogen still appears to be related to the detention of organic nitrogen within the berms (Figure 3-13).

In terms of phosphorus, it appears there are two dynamics occurring at the Alert wetland. First, the dissolved fraction of phosphorus (e.g., PO_4-P) declines as the wastewater travels through the berms. This loss is most likely related to adsorption of the dissolved phosphorus onto metal oxides of the soil particles or trapped organic material. However, the particulate associated phosphorus appears to be increasing in concentration as the wastewater passes through the berm portion of the wetland and onto the slope region (e.g., 14SL-2 and 14SL-3); once again suggesting that soil particles are migrating from higher elevations in the wetland.

The density of total coliforms was approximately ten times more abundant that *E. coli*. This is to be expected since *E. coli* is a subset of total coliforms. The decline in total coliforms was significant ($p = 0.017$) between the influent and effluent of the wetland; however, the decline in *E. coli* was not significant ($p = 0.063$). In both microbial groups the loss in the number of colony forming units was only around one log unit (i.e., ten times). This reduction value is lower than what has typically been observed by the CAWT in other northern wetlands where the log unit removal can be closer to 2 to 3 log units. However, the other northern wetlands investigated by the CAWT were tundra wetlands and different from the terraced wetland at CSF Alert. Filtration and entrapment is one of the main mechanisms for the removal of microorganisms from wastewater and it is anticipated this process would be more effective in vegetative wetlands where dense root masses exist.

Aluminium and iron, and to a lesser extent magnesium, were the three trace elements that were elevated to mg L^{-1} concentrations in the wastewater. The concentrations of Al (influent 0.272 mg L^{-1}; effluent 6.89 mg L^{-1}) and Fe (influent 0.345 mg L^{-1}; effluent 14.0 mg L^{-1}) in wastewaters, however, increase as the wastewater traverses the wetland, suggesting that these elements are being leached out of the wetland soils. In both cases, Al and Fe leaving the wetland are elevated above the Environment Canada water quality guidelines for the protection of aquatic health. Guidelines for marine environments such as those at Alert, have not been determined and are not available.

The rising levels of Al and Fe further into the wetland do raise the question as to where the elements are originating. One possibility is that these elements could be originating from the wetland itself. Legacy landfill material and soil contamination is a distinct possibility – barrels, legacy metal garbage and other materials have been uncovered during construction phases and site 14SL-2 is located at an erosional breach of berm 4 which appears to be located near one of the old legacy landfill sites.

4.2 Comparison of Wetland's Performance in 2014 with Performance in 2013

Table 4-2 summarizes the mean summertime water quality parameters monitored from both the wastewater entering the wetland (influent) and exiting the wetland (effluent), during the summers of 2011, 2012, 2013 and 2014. The effluent leaving the wetland in 2014 suggests treatment was slightly poorer in 2014 in comparison to 2013, but still better than what was observed in 2012.

A comparison of the water quality parameters of the raw wastewater flowing into the wetland (influent) reveals that strength of the 2014 influent was slightly stronger than the strength of the 2013 influent, particularly in terms of BOD_5, $cBOD_5$ and VSS. At this stage it is difficult to determine if the apparent difference in wastewater strength is real or not or if it is just an artifact of sampling and more indicative of the non-homogenous nature of raw effluent. In 2012, the influent sample (12B1-1) was a 24 hour composite sample that utilized an automated composite sampler to collect a subsample once every hour over a 24 hour period. The influent samples collected during 2012 may better represent an "averaged" daily concentration, whereas, the 2013 and 2014 influent samples represent one grab sample within a 24 hour period. In addition, the intake hose for the composite sampler in 2012 was positioned within a pool of the slash pad. If organic matter concentrated in this pool, then the 2012 influent samples may be expected to be somewhat elevated in comparison to grab samples. The difference in wastewater strength between the sample years may not be as great as it would first appear and it may be more of a function of the sample collection method and the inherent heterogeneous nature of raw wastewater samples.

There are many factors in addition to the strength of the raw wastewater that can influence the performance of a treatment wetland. One of the main factors is the August 2012 modification and the impact this likely had on increasing the hydraulic retention time (HRT). It also appears that the 2012 modification has increased the efficiency of the wetland (in 2013 and 2014) to retain organic material; despite the fact that the transport of suspended solids via erosional forces was increased. The microbial oxidation and transformation of organic material may have been temporarily disrupted from the 2012 modifications since the nitrogen data suggests very little microbial oxidation was occurring in 2013 but may have slightly increased in 2014; perhaps from a maturing of the microbial community. It will be interesting to see in future years if both the loss of transport of TSS slows and microbial activity increases as soils become more stable and biofilms develop. During the last weeks of the 2014 field season the wetland was once again physically altered in an attempt to redirect the wastewater flow away from the breach in berm 4 (i.e., close to 14SL-2) with the hope of redirecting it closer to the originally intended path near 14SL-3. This attempt

appeared to be successful in redirecting the flow path, however, approximately one week later the modification was reversed by physically altering the shape of the land which resulted in the flow once again being directed towards the original breach in berm 4 near 14SL-2. The physical modifications in the last weeks of the 2014 field season were not directed by the CAWT and it is not fully known why the changes were made and then reversed.

The wetland is still young and because of this, the historical record of its performance is correspondingly short. At this stage there is not enough information to understand the natural variability of the wetland's performance and so it is difficult to determine if the differences seen in performance between 2011, 2012, 2013 and 2014 are within the natural range of variability or if they are related to operational parameters resulting yearly damage from ice and melt waters. In all likelihood it is probably a combination of the two, however, at this stage it is difficult to identify the dominant factor.

Table 4-2: Comparison of influent and effluent values for 2011, 2012, 2013 and 2014 field seasons.

Parameter		2011		2012		2013		2014	
		Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
BOD_5	mg L^{-1}	471	15	734	111	133	39	151	76
$cBOD_5$	mg L^{-1}	251	22	371	88	142	22	227	58
TSS	mg L^{-1}	49	241	337	124	114	590	183	805
VSS	mg L^{-1}	36	39	309	52	99	48	138	58
pH		7.0	8.2	7.0	7.5	7.2	7.5	7.8	7.8
FOG	mg L^{-1}	4.1	3.7	58	37	50	14	53	23
COD	mg L^{-1}	223	74	479	262	248	120	358	191
TN	mg L^{-1}	---	---	19.1	10.4	17.8	10.9	15.6	11.2
TKN	mg L^{-1}	14.0	6.5	19.1	10.4	17.5	10.8	15.6	11.1
TAN	mg L^{-1}	12.7	3.6	11.5	7.4	8.9	9.4	8.0	7.7
NO_2	mg L^{-1}	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
NO_3	mg L^{-1}	0.11	1.99	0.10	0.50	<0.05	0.17	<0.05	0.09
TP	mg L^{-1}	1.20	0.64	4.00	1.50	2.97	1.12	1.87	1.43
PO_4	mg L^{-1}	0.15	0.00	2.50	0.26	1.42	0.37	0.74	0.07
TC	cfu/100mL	2.40E+05	4.50E+04	4.00E+07	3.90E+06	1.28E+07	4.61E+05	4.44E+06	1.18E+05
EC	cfu/100mL	3.30E+04	1.40E+05	3.00E+06	2.90E+05	1.02E+06	3.48E+04	5.08E+05	1.11E+05

4.3 Recommendations

The modifications made to the wetland in 2012 appear to have improved the overall performance of the CFS Alert wetland. The initial modification late in 2014 appeared to have had some success in diverting the wastewater flow away from the erosional breach in berm 4. However, subsequent modifications made a week later seem to have undermined these corrective measures. It may be to DND's advantage to discuss future modifications of the wetland with the CAWT, not for their approval, but more from the insight they may have gained during the course of their investigations that could help in the decision process.

Wetland performance may also be improved by establishing a vegetative cover in key areas. The introduction of plants (most likely a locally available species of sedge (*Carex* spp.) or grass (*Poa* spp.) would improve soil stability, enhance the entrapment of suspended solids, and provide root mass to support microbial populations necessary for biological treatment. The production of a vegetative cover would likely take several years (perhaps five years) of repeated plantings before the cover was dense enough to be effective. Some initial scoping attempts have been made by transplanting locally available plants in previous years. It appears that many of the transplants do not survive; however, enough do take root to suggest that with a concerted effort it may be possible to vegetate portions of the wetland. More investigation would be needed to better determine how much of the wetland may be suitable for vegetation.

The recommendations are as follows:

1. Monitor the performance of the wetland in the summer of 2015 in order to better understand the natural variability inherent in the wetland and to monitor performance and assess how modifications to flow paths impact overall treatment.
2. Survey the wetland in the spring of 2015 to assess how many of the plants transplanted in 2010 and 2011 survived and to assess which areas of the wetland may be suitable for future plantings. Based on these results it could be determined what portions of the wetland could be planted, the approximate cost for planting and an estimate of the cost for planting in terms of man-hours and supplies. Perhaps one of the best locations to start plantings is in areas where organic matter is being retained (e.g., screeslope).
3. Conduct a tracer study early in the season and again late in the season to better determine the rate at which the wastewater is travelling through the wetland. This will help to better assess the wastewater detention ability of the wetland and to better assess seasonal variability. A tracer test can be accomplished with the input of a known mass of potassium bromide and a composite sampler that samples hourly at the end of the wetland (this would require battery power).

5.0 SUMMARY

Collectively, these results suggest that one of the prime mechanisms of treatment operating in the wetland is the removal of organic matter from the wastewater through: i) detention of water velocities and physical filtration/ entrapment of particulate matter. This was evident by higher concentrations in the upper portions of the wetlands (particularly in berm 1 and 2) of:

- the organic fraction of suspended solids (e.g., VSS);
- the particulate fraction of nitrogen (e.g., organic nitrogen and total phosphorus).

The data also suggest that little microbial oxidation of carbonaceous or nitrogenous compounds were occurring in the wetland, with some data suggesting that microbial activity maybe starting to increase slightly as biofilms mature.

Lastly, aluminium and iron are elevated above other trace elements of concern in both the wastewater and soils. It is difficult to tell from the data whether the elevated levels are a result of metal accumulation originating from the wastewater or if the elevated levels are a result of these elements leaching from the wetland strata; the latter is suspected.

The modifications made to the wetland in late August 2012 generally improved the overall functioning of the wetland by enhancing: filtration and trapping of organic material from the wastewater, detention of flow rates as evident by better defined flow paths, the armoring of erosion-prone areas, and the installation of scree slopes to enhance the growth of biofilms.

6.0 REFERENCES

Canadian Council of Ministers of the Environment. 2014. Canada-wide strategy for the management of municipal wastewater effluent – 2014 progress report. ISBN: 978-1-77202-005-2 PDF. Winnipeg, Manitoba, Ontario. 18 pp.

7.0 APPENDICES

The raw data has been appended in the order listed below:

Sample locations (2014)	
BOD_5	B
$cBOD_5$	Cd
TSS	Ca
FOG	Cr
pH	Co
Temp	Cu
DO	Fe
COND	Pb
DOC	Li
COD	Mg
NH_3-N	Mn
NO_2	Hg
NO_3	Mo
TKN	Ni
TP	K
PO_4-P	Se
VSS	Na
TC	Sr
EC	Tl
Al	Sn
Sb	Ti
As	U
Ba	V
Be	Zn

Sample Identification	Sample Location		Sample Description
	UTM Easting	*UTM Northing*	
14B1-1	509855.35	9160584.19	Influent. Located 1m south of outfall pipe to allow for mixing.
14B1-4	509866.50	9160618.76	After radiator, north end of berm 1. Beginning of scree slope running to 14B2-4
14B2-4	509866.50	9160618.76	Located in centre of Berm 2 breach at confluence of flowpaths. Beginning of scree slope running to 14B3-2
14B3-2	509912.41	9160610.82	Meeting point of scree slope and Berm 3, confluence of flowpaths into single channel.
14B3-3	509973.57	9160639.03	Directly above Berm 3 scree slope and Berm 3 breach, final point of confluence before streams permanently diverge.
14B4-1	510024.66	9160587.48	Located directly below Berm 3 breach where flow meets Berm 4.
14SL-1	510038.64	9160559.27	Located halfway between 14B4-1 and 14SL-2.
14SL-2	510043.19	9160518.73	Sample point in Berm 4 breach, running over several exposed fuel drums from old landfill.
14SL-3	510082.75	9160535.88	Early season sampling location, initial point of discharge from ice sheet fed by scree slope below Berm 3. Dry as of late July.
Screeslope	510078.98	9160606.97	Sample point located at bottom of scree slope below Berm 3, where scree slope meets Berm 5. Established following wetland modifications in early September.
14SH-1	510125.00	9160492.98	Alert Inlet discharge point, fed from Screeslope through SL-3 and silt fence. Northernmost sampling point on shoreline, intermittent flow throughout season.
14SH-2	510151.16	9160498.12	Alert Inlet discharge point.
14SH-3	510073.66	9160490.02	Alert Inlet discharge point. Highly consistent discharge location from early though late season. Fed from stream running through SL-2. Stream initially ran through thick ice coverage, entire flowpath to this point clear of ice by early August.
14SH-3b	510095.47	9160478.22	Alert Inlet discharge point, fed from SL-2. Consistent but low volume discharge.
14SH-3c	510152.50	9160504.29	Alert Inlet discharge point, fed from Screeslope through SL-3 and silt fence. Flow ceased in mid-July.
14SH-3d	510101.54	9160489.87	Alert Inlet discharge point, fed from Screeslope through SL-3 and silt fence. Initially high volume, flow diminished to trace by end of season.
14SH-3e	510109.84	9160491.76	Alert Inlet discharge point, fed from Screeslope through SL-3 and silt fence. Continued moderate flow through end of season.
14SH-3f	510133.78	9160494.09	Alert Inlet discharge point, fed from Screeslope through SL-3 and silt fence. Next northernmost sampling point after 14SH-1. Moderate flow.
Reference	508567.80	9156045.30	Reference stream sampling point, located at Downs Bridge, approx. 5km south of Alert Station.

Legend

14	for 2014
B1	Berm 1
B2	Berm 2
B3	Berm 3
B4	Berm 4
B5	Berm 5
SH	Shoreline
PL	Powerline
SF	Silt fence
SCREE	Screeslope/trickel filter

Biochemical Oxygen Demand (BOD5) (mg/L)

Peterborough Detection Limits: *2.3* *mg/L*

1.15 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	39	--	--	--	82	--	--	--	--	--
June 18, 2014	--	--	--	--	--	--	--	--	--	--
June 24, 2014	78	--	--	--	--	--	--	--	--	--
June 30, 2014	--	--	--	--	--	--	--	--	--	--
July 8th, 2014	105	--	--	--	--	--	--	--	--	--
July 15th, 2014	--	--	--	--	--	--	--	--	--	--
July 23, 2014	17	--	--	--	--	--	--	--	--	--
July 29, 2014	--	--	--	--	--	--	--	--	--	--
August 5, 2014	386	--	--	--	--	--	--	--	--	--
August 13, 2014	--	--	--	--	--	--	--	--	--	--
August 19, 2014	87	--	--	--	--	--	--	--	--	--
August 31st, 2014	--	--	--	--	--	--	--	--	--	--
September 11th, 2014	49	--	--	--	--	--	--	--	--	--
Average	109				82					
Min	17				82					
Max	386				82					

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	--	--	--	--	--	--	--	--	--
June 18, 2014	--	--	--	--	--	--	--	--	--
June 24, 2014	10	--	--	--	--	--	--	--	--
June 30, 2014	--	--	--	--	--	--	--	--	--
July 8th, 2014	8	--	--	--	--	--	--	--	--
July 15th, 2014	--	--	--	--	--	--	--	--	--
July 23, 2014	--	--	103	--	--	--	--	--	--
July 29, 2014	--	--	--	--	--	--	--	--	--
August 5, 2014	--	--	48	--	--	--	--	--	--
August 13, 2014	--	--	--	--	--	--	--	--	--
August 19, 2014	--	--	15	--	--	--	--	--	--
August 31st, 2014	--	--	--	--	--	--	--	--	--
September 11th, 2014	--	--	119	--	--	--	--	--	--
	1.414213562		48.2795678						
Average	9		71						
Min	8		15						
Max	10		119						

Biochemical Oxygen Demand (BOD5) (mg/L)

CAWT Detection Limits: *1.0* *mg/L*
0.50 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	128	377	280	--	154	--	--	--	--	--
June 18, 2014	--	--	--	--	--	--	--	--	--	--
June 24, 2014	65	124	--	355	301	--	--	--	--	--
June 30, 2014	--	--	--	--	--	--	--	--	--	--
July 8th, 2014	152	118	113	80	106	--	--	--	89	--
July 15th, 2014	--	--	--	--	--	--	--	--	--	--
July 23, 2014	101	258	134	132	132	--	--	153	57	--
July 29, 2014	--	--	--	--	--	--	--	--	--	--
August 5, 2014	739	227	277	289	426	148	136	140	--	--
August 13, 2014	--	--	--	--	--	--	--	--	--	--
August 19, 2014	125	187	240	227	322	664	458	97	--	--
August 31st, 2014	--	--	--	--	--	--	--	--	--	--
September 11th, 2014	--	--	--	--	--	--	--	--	--	--
sd										
Average	218	215	209	216	240	406	297	130	73	
Min	65	118	113	80	106	148	136	97	57	
Max	739	377	280	355	426	664	458	153	89	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	--	--	--	--	--	--	--	--	--
June 18, 2014	--	--	--	--	--	--	--	--	--
June 24, 2014	22	--	66	--	--	--	--	--	--
June 30, 2014	--	--	--	--	--	--	--	--	--
July 8th, 2014	18	--	19	--	48	--	--	--	2
July 15th, 2014	--	--	--	--	--	--	--	--	--
July 23, 2014	36	--	173	--	--	--	73	--	1
July 29, 2014	--	--	--	--	--	--	--	--	--
August 5, 2014	--	--	84	--	--	--	20	--	1
August 13, 2014	--	--	--	--	--	--	--	--	--
August 19, 2014	--	--	78	--	--	--	--	15	<1
August 31st, 2014	--	--	--	--	--	--	--	--	--
September 11th, 2014	--	--	--	--	--	--	--	--	--
	9.738154254		55.47808072				37.15069889		
Average	25		85		48		47	15	1
Min	18		19		48		20	15	<1
Max	36		173		48		73	15	2

Carbonaceous Biochemical Oxygen Demand (cBOD5) (mg/L)

Peterborough Detection Limits: *2.0* *mg/L*

1.00 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	–	–	–	–	–	–	–	–	–	–
June 18, 2014	187	–	–	–	–	–	–	–	–	–
June 24, 2014	–	–	–	–	–	–	–	–	–	–
June 30, 2014	60	–	–	–	–	–	–	–	–	–
July 8th, 2014	–	–	–	–	–	–	–	–	–	–
July 15th, 2014	157	–	–	–	–	–	–	–	–	–
July 23, 2014	–	–	–	–	–	–	–	–	–	–
July 29, 2014	188	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	–	–	–	–	–	–	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	–	–	–	–	–	–	–	–
August 31st, 2014	317	–	–	–	–	–	–	–	–	53
September 11th, 2014	–	–	–	–	–	–	–	–	–	–
Average	182									53
Min	60									53
Max	317									53

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	20	–	–	–	–	–	–	–	–
June 24, 2014	–	–	–	–	–	–	–	–	–
June 30, 2014	10	–	–	–	–	–	–	–	–
July 8th, 2014	–	–	–	–	–	–	–	–	–
July 15th, 2014	–	–	21	–	–	–	–	–	–
July 23, 2014	–	–	–	–	–	–	–	–	–
July 29, 2014	–	–	53	–	–	–	–	–	–
August 5, 2014	–	–	–	–	–	–	–	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	–	–	–	–	–	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	–	–	–	–	–	–	–
Average	15		37						
Min	10		21						
Max	20		53						

Carbonaceous Biochemical Oxygen Demand (cBOD5) (mg/L)

CAWT Detection Limits: *1.0* *mg/L*
0.50 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	–	–	–	–	–	–	–	–	–	–
June 18, 2014	499	297	414	85	53	–	–	–	–	–
June 24, 2014	–	–	–	–	–	–	–	–	–	–
June 30, 2014	69	84	173	142	533	–	–	–	52	–
July 8th, 2014	–	–	–	–	–	–	–	–	–	–
July 15th, 2014	196	156	197	156	277	–	–	36	31	–
July 23, 2014	–	–	–	–	–	–	–	–	–	–
July 29, 2014	221	166	85	164	230	286	485	84		
August 5, 2014	–	–	–	–	–	–	–	–	–	–
August 13, 2014	148	228	189	208	219	357	512	356	–	–
August 19, 2014	–	–	–	–	–	–	–	–	–	–
August 31st, 2014	793	158	105	120	190	–	–	–	–	99
September 11th, 2014	–	–	–	–	–	–	–	–	–	–
Average	321	181	194	146	251	321	499	159	41	99
Min	69	84	85	85	53	286	485	36	31	99
Max	793	297	414	208	533	357	512	356	52	99

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	22	45	–	–	–	–	–	–	–
June 24, 2014	–	–	–	–	–	–	–	–	–
June 30, 2014	23	–	–	41	–	–	–	–	–
July 8th, 2014	–	–	–	–	–	–	–	–	–
July 15th, 2014	56	–	29	–	–	96	–	–	1
July 23, 2014	–	–	–	–	–	–	–	–	–
July 29, 2014	–	–	67	–	–	–	13	–	<1
August 5, 2014	–	–	–	–	–	–	–	–	–
August 13, 2014	–	–	88	–	–	–	8	–	2
August 19, 2014	–	–	–	–	–	–	–	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	1
September 11th, 2014	–	–	–	–	–	–	–	–	–
Average	34	45	61	41		96	11		1
Min	22	45	29	41		96	8		<1
Max	56	45	88	41		96	13		2

Total Suspended Solids (TSS) (mg/L)

City of Peterborough Detection Limits: 2 mg/L
1 mg/L *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	518	170	64	–	250	–	–	–	–	–
June 18, 2014	212	288	312	120	146	–	–	–	–	–
June 24, 2014	361	107	–	2950	4160	–	–	–	–	–
June 30, 2014	56	82	310	340	1070	–	–	–	964	–
July 8th, 2014	132	70	72	766	1170	–	–	–	1700	–
July 15th, 2014	57	74	312	376	1120	–	–	312	210	–
July 23, 2014	25	77	104	164	179	–	–	2440	369	–
July 29, 2014	118	100	60	63	116	146	572	356	–	–
August 5, 2014	336	140	106	125	190	76	61	62	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	63	86	474	150	138	218	292	100	–	–
August 31st, 2014	190	76	40	48	95	–	–	–	–	54
September 11th, 2014	129	184	950	744	33	–	–	–	–	–
Average	183	121	255	531	722	147	308	654	811	54
Min	25	70	40	48	33	76	61	62	210	54
Max	518	288	950	2950	4160	218	572	2440	1700	54

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	1370	496	–	–	–	–	–	–	–
June 24, 2014	69	–	1200	–	–	–	–	–	–
June 30, 2014	536	–	–	798	–	–	–	–	–
July 8th, 2014	160	–	430	–	592	–	–	–	20
July 15th, 2014	204	–	366	–	–	748	–	–	214
July 23, 2014	465	–	3980	–	–	–	3100	–	96
July 29, 2014	–	–	195	–	–	–	90	–	4
August 5, 2014	–	–	58	–	–	–	10	–	<2
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	82	–	–	–	–	4	<2
August 31st, 2014	–	–	–	–	–	–	–	–	<2
September 11th, 2014	–	–	129	–	–	–	–	–	–
Average	467	496	805	798	592	748	1067	4	48
Min	69	496	58	798	592	748	10	4	<2
Max	1370	496	3980	798	592	748	3100	4	214

Fats, Oils and Grease (FOG) (mg/L)

City of Peterborough Detection Limits: *5.0* *mg/L*
2.50 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	11.2	–	–	–	48.0	–	–	–	–	–
June 18, 2014	155.0	–	–	–	–	–	–	–	–	–
June 24, 2014	65.2	–	–	–	–	–	–	–	–	–
June 30, 2014	21.6	–	–	–	–	–	–	–	–	–
July 8th, 2014	68.0	–	–	–	–	–	–	–	–	–
July 15th, 2014	34.8	–	–	–	–	–	–	–	–	–
July 23, 2014	14.8	–	–	–	–	–	–	–	–	–
July 29, 2014	33.6	–	–	–	–	–	–	–	–	–
August 5, 2014	75.5	–	–	–	–	–	–	–	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	52.8	–	–	–	–	–	–	–	–	–
August 31st, 2014	80.8	–	–	–	–	–	–	–	–	32.8
September 11th, 2014	20.4	–	–	–	–	–	–	–	–	–
Average	52.8				48.0					32.8
Min	11.2				48.0					32.8
Max	155.0				48.0					32.8

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	22.4	–	–	–	–	–	–	–	–
June 24, 2014	<10	–	–	–	–	–	–	–	–
June 30, 2014	10.8	–	–	–	–	–	–	–	–
July 8th, 2014	234.0	–	–	–	–	–	–	–	–
July 15th, 2014	–	–	<10	–	–	–	–	–	–
July 23, 2014	–	–	57.3	–	–	–	–	–	–
July 29, 2014	–	–	10.8	–	–	–	–	–	–
August 5, 2014	–	–	12.0	–	–	–	–	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	29.6	–	–	–	–	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	24.8	–	–	–	–	–	–
Average	68.1		23.3						
Min	<10		<10						
Max	234.0		57.3						

pH

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	7.95	7.05	7.02	–	7.31	–	–	–	–	–
June 18, 2014	7.40	7.08	7.29	7.73	7.74	–	–	–	–	–
June 24, 2014	7.53	7.32	–	7.15	7.33	–	–	–	–	–
June 30, 2014	7.54	7.40	7.30	7.33	7.53	–	–	–	7.98	–
July 8th, 2014	7.72	7.21	7.35	7.44	7.60	–	–	–	7.92	–
July 15th, 2014	8.81	7.37	7.26	7.46	7.33	–	–	7.64	8.07	–
July 23, 2014	7.96	7.12	7.69	7.72	7.80	–	–	7.63	8.61	–
July 29, 2014	8.04	7.44	7.53	7.71	7.85	7.95	7.64	7.54	–	–
August 5, 2014	7.08	7.13	7.28	7.42	7.40	7.52	7.56	7.60	–	–
August 13, 2014	8.03	6.64	7.45	7.52	7.55	7.67	7.51	7.71	–	–
August 19, 2014	8.87	7.12	7.11	7.22	7.31	7.34	7.45	7.62	–	–
August 31st, 2014	7.21	6.85	7.32	7.56	7.66	–	–	–	–	7.59
September 11th, 2014	7.68	6.92	8.97	7.48	7.90	–	–	–	–	–
Average	7.83	7.13	7.46	7.48	7.56	7.62	7.54	7.62	8.15	7.59
Min	7.08	6.64	7.02	7.15	7.31	7.34	7.45	7.54	7.92	7.59
Max	8.87	7.44	8.97	7.73	7.90	7.95	7.64	7.71	8.61	7.59

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	8.06	8.09	–	–	–	–	–	–	–
June 24, 2014	7.78	–	7.48	–	–	–	–	–	–
June 30, 2014	8.03	–	–	7.96	–	–	–	–	–
July 8th, 2014	7.93	–	7.85	–	7.82	–	–	–	8.05
July 15th, 2014	7.97	–	7.62	–	–	7.75	–	–	8.03
July 23, 2014	7.94	–	7.79	–	–	–	8.03	–	8.27
July 29, 2014	–	–	7.73	–	–	–	8.01	–	8.19
August 5, 2014	–	–	8.00	–	–	–	8.05	–	8.07
August 13, 2014	–	–	7.96	–	–	–	8.30	–	8.14
August 19, 2014	–	–	7.82	–	–	–	–	8.66	8.09
August 31st, 2014	–	–	–	–	–	–	–	–	8.13
September 11th, 2014	–	–	7.92	–	–	–	–	–	–
Average	7.95	8.09	7.80	7.96	7.82	7.75	8.10	8.66	8.12
Min	7.78	8.09	7.48	7.96	7.82	7.75	8.01	8.66	8.03
Max	8.06	8.09	8.00	7.96	7.82	7.75	8.30	8.66	8.27

Temperature (° C)

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	16.5	12.7	12.8	–	8.2	–	–	–	–	–
June 18, 2014	19.1	9.4	7.6	8.4	8.3	–	–	–	–	–
June 24, 2014	14.7	9.1	–	2.1	1.0	–	–	–	–	–
June 30, 2014	19.6	14.6	8.9	4.2	3.8	–	–	–	–	–
July 8, 2014	17.4	12.3	6.7	4.0	3.9	–	–	–	2.4	–
July 15, 2014	20.3	14.3	7.8	2.9	7.6	–	–	0.0	0.5	–
July 23, 2014	–	–	–	–	–	–	–	–	–	–
July 29, 2014	18.4	12.1	4.9	5.9	4.0	–	3.6	2.9	–	–
August 5, 2014	–	16.5	9.4	7.7	8.1	–	7.8	5.3	6.4	–
August 13, 2014	19.3	12.3	4.7	2.6	0.9	2.0	0.3	0.2	–	–
August 19, 2014	19.8	16.0	10.9	6.5	6.0	5.8	6.1	6.8	–	–
August 31st, 2014	19.5	17.3	9.3	6.3	6.6	–	–	–	–	3.1
September 11th, 2014	15.6	11.6	6.0	1.6	0.8	–	–	–	–	–
Average	18.4	13.2	8.1	4.7	4.9	3.9	4.5	3.0	3.1	3.1
Min	14.7	9.1	4.7	1.6	0.8	2.0	0.3	0.0	0.5	3.1
Max	20.3	17.3	12.8	8.4	8.3	5.8	7.8	6.8	6.4	3.1

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH3c	14SH-3d	14SH3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	6.2	6.1	–	–	–	–	–	–	–
June 24, 2014	0	–	0.0	–	–	–	–	–	–
June 30, 2014	0.0	–	–	0	–	–	–	–	–
July 8th, 2014	1.6	–	0.9	–	0.5	–	–	–	–
July 15th, 2014	2.9	–	0.0	–	–	4.2	–	–	1.0
July 23, 2014	–	–	–	–	–	–	–	–	–
July 29, 2014	2.0	–	0.9	–	–	–	3.4	–	1.0
August 5, 2014	–	–	7.4	–	–	–	7.1	–	6.4
August 13, 2014	–	–	0.0	–	–	–	0.0	–	2.4
August 19, 2014	–	–	6.9	–	–	–	–	3.8	2.9
August 31st, 2014	–	–	–	–	–	–	–	–	1.1
September 11th, 2014	–	–	0.0	–	–	–	–	–	–
Average	2.1	6.1	2.0	0.0	0.5	4.2	3.5	3.8	2.5
Min	0.0	6.1	0.0	0.0	0.5	4.2	0.0	3.8	1.0
Max	6.2	6.1	7.4	0.0	0.5	4.2	7.1	3.8	6.4

Dissolved Oxygen (DO) (mg/L)

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	7.12	6.99	6.95	–	8.99	–	–	–	–	–
June 18, 2014	6.91	7.93	8.74	11.69	12.24	–	–	–	–	–
June 24, 2014	9.28	8.98	–	9.91	10.66	–	–	–	–	–
June 30, 2014	7.57	7.72	7.34	10.61	8.69	–	–	–	12.99	–
July 8th, 2014	7.25	7.19	8.14	11.13	10.58	–	–	–	–	–
July 15th, 2014	6.66	6.24	6.61	8.68	7.75	–	–	12.82	12.31	–
July 23, 2014	7.89	6.77	8.89	8.93	9.03	–	–	10.97	11.06	–
July 29, 2014	11.52	9.36	9.42	9.96	10.74	–	10.29	11.10	–	–
August 5, 2014	6.59	5.79	7.11	8.18	7.96	7.71	8.03	9.37	–	–
August 13, 2014	7.61	6.07	8.83	9.96	10.30	10.63	9.82	11.50	–	–
August 19, 2014	7.99	6.11	6.57	7.81	7.84	8.93	8.53	10.09	–	–
August 31st, 2014	6.45	4.92	7.79	9.34	9.02	–	–	–	–	9.97
September 11th, 2014	8.37	6.97	7.03	10.04	10.92	–	–	–	–	–
Average	7.79	7.00	7.79	9.69	9.59	9.09	9.17	10.96	12.12	9.97
Min	6.45	4.92	6.57	7.81	7.75	7.71	8.03	9.37	11.06	9.97
Max	11.52	9.36	9.42	11.69	12.24	10.63	10.29	12.82	12.99	9.97

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	13.55	13.50	–	–	–	–	–	–	–
June 24, 2014	12.90	–	12.62	–	–	–	–	–	–
June 30, 2014	12.87	–	–	13.26	–	–	–	–	–
July 8th, 2014	12.08	–	12.46	–	12.18	–	–	–	–
July 15th, 2014	10.27	–	12.13	–	–	10.22	–	–	13.65
July 23, 2014	10.78	–	11.21	–	–	–	11.14	–	13.06
July 29, 2014	11.34	–	12.52	–	–	–	12.42	–	13.53
August 5, 2014	–	–	10.79	–	–	–	11.23	–	12.12
August 13, 2014	–	–	12.44	–	–	–	13.63	–	13.21
August 19, 2014	–	–	10.43	–	–	–	–	12.59	13.04
August 31st, 2014	–	–	–	–	–	–	–	–	13.80
September 11th, 2014	–	–	12.16	–	–	–	–	–	–
Average	11.97	13.50	11.86	13.26	12.18	10.22	12.11	12.59	13.20
Min	10.27	13.50	10.43	13.26	12.18	10.22	11.14	12.59	12.12
Max	13.55	13.50	12.62	13.26	12.18	10.22	13.63	12.59	13.80

Conductivity (µS)

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	515	832	481	–	546	–	–	–	–	–
June 18, 2014	508	417	565	484	408	–	–	–	–	–
June 24, 2014	460	494	–	401	449	–	–	–	–	–
June 30, 2014	608	353	456	425	440	–	–	–	478	–
July 8th, 2014	479	454	468	442	473	–	–	–	616	–
July 15th, 2014	687	400	579	609	588	–	–	357	405	–
July 23, 2014	302	834	592	663	683	–	–	608	385	–
July 29, 2014	501	426	575	641	711	934	734	856	–	–
August 5, 2014	469	396	468	652	703	699	738	795	–	–
August 13, 2014	552	409	462	636	731	625	561	545	–	–
August 19, 2014	319	303	365	488	569	740	670	593	–	–
August 31st, 2014	498	358	336	479	532	–	–	–	–	501
September 11th, 2014	278	304	781	684	550	–	–	–	–	–
Average	475	460	512	550	568	750	676	626	471	501
Min	278	303	336	401	408	625	561	357	385	501
Max	687	834	781	684	731	934	738	856	616	501

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	486	366	–	–	–	–	–	–	–
June 24, 2014	565	–	561	–	–	–	–	–	–
June 30, 2014	390	–	–	–	–	–	–	–	–
July 8th, 2014	530	–	379	–	537	–	–	–	101
July 15th, 2014	528	–	350	–	–	679	–	–	99
July 23, 2014	515	–	550	–	–	–	485	–	99.2
July 29, 2014	719	–	719	–	–	–	770	–	159
August 5, 2014	–	–	770	–	–	–	1222	–	135
August 13, 2014	–	–	529	–	–	–	1417	–	155
August 19, 2014	–	–	539	–	–	–	–	672	161
August 31st, 2014	–	–	–	–	–	–	–	–	169
September 11th, 2014	–	–	529	–	–	–	–	–	–
Average	533	366	547		537	679	974	672	135
Min	390	366	350		537	679	485	672	99
Max	719	366	770		537	679	1417	672	169

Dissolved Organic Carbon (DOC) (mg/L)

City of Peterborough Detection Limits: *1.0* *mg/L*

0.50 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	36.4	103	55.2	–	49.4	–	–	–	–	–
June 18, 2014	–	–	–	–		–	–	–	–	–
June 24, 2014	16.5	32.2	–	62.6	72.2	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	40.9	36.2	28.2	17.2	25.7	–	–	–	22.6	–
July 15th, 2014	44.7	31.1	32.0	35.6	39.2	–	–	–	–	–
July 23, 2014	13.3	82.3	24.4	33.4	32.0	–	–	24.5	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	150	66.5	79.0	88.6	131	–	–	50.1	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	36.1	37.9	44.4	55.2	95.4	–	–	39.8	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	10.9	37.2	215	308	40.6	–	–	–	–	–
Average	43.6	53.3	68.3	85.8	60.7			38.1	22.6	
Min	10.9	31.1	24.4	17.2	25.7			24.5	22.6	
Max	150	103	215	308	131			50	23	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	20.6	–	31.6	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	14.4	–	13.1	–	16.6	–	–	–	1.70
July 15th, 2014	24.5	–	9.60	–	–	–	–	–	<1.0
July 23, 2014	–	–	25.4	–	–	–	–	–	<1.0
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	24.5	–	–	–	–	–	<1.0
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	30.9	–	–	–	–	–	<1.0
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	70.1	–	–	–	–	–	–
Average	19.8		29.3		16.6				0.74
Min	14.4		9.60		16.6				<1.0
Max	24.5		70.1		16.6				1.7

Chemical Oxygen Demand (COD) (mg/L)

City of Peterborough Detection Limits: *10.0* *mg/L*
5.00 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	270	670	630	–	350	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	200	270	–	1180	760	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	320	210	180	140	190	–	–	–	210	–
July 15th, 2014	360	260	350	700	670	–	–	110	100	–
July 23, 2014	160	400	210	270	460	–	–	190	100	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	1180	350	510	460	690	280	230	250	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	180	210	400	380	470	920	860	250	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	190	460	3210	3500	180	–	–	–	–	–
Average	358	354	784	947	471	600	545	200	137	
Min	160	210	180	140	180	280	230	110	100	
Max	1180	670	3210	3500	760	920	860	250	210	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	60	–	210	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	40	–	100	–	120	–	–	–	<10
July 15th, 2014	100	–	90	–	–	220	–	–	30
July 23, 2014	60	–	280	–	–	–	460	–	<10
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	140	–	–	–	40	–	20
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	200	–	–	–	80	–	<10
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	320	–	–	–	–	–	–
Average	65		191		120	220	193		13
Min	40		90		120	220	40		<10
Max	100		320		120	220	460		30

Ammonia (NH_3) (mg/L)

City of Peterborough Detection Limits: *0.1* *mg/L*

0.05 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	24.7	13.7	14.2	–	23.8	–	–	–	–	–
June 18, 2014	2.5	0.9	1.7	1.1	0.7	–	–	–	–	–
June 24, 2014	0.6	4.3	–	9.1	9.6	–	–	–	–	–
June 30, 2014	3.7	6.8	7.4	4.7	7.9	–	–	–	5.8	–
July 8th, 2014	13.4	11.8	7.0	6.8	4.7	–	–	–	7.1	–
July 15th, 2014	8.7	12.4	13.3	12.3	13.5	–	–	4.3	4.8	–
July 23, 2014	2.6	14.6	7.6	10.2	9.5	–	–	9.7	4.7	–
July 29, 2014	11.3	11.5	8.3	10.5	10.5	13.4	14.8	16.0	–	–
August 5, 2014	9.2	9.0	7.0	10.3	10.1	9.1	11.3	9.4	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	1.4	4.0	11.6	13.1	14.8	15.4	14.1	15.4	–	–
August 31st, 2014	11.7	12.2	7.3	14.9	20.4	–	–	–	–	12.4
September 11th, 2014	5.9	5.9	21.6	14.7	19.1	–	–	–	–	–
Average	8.0	8.9	9.7	9.8	12.1	12.6	13.4	11.0	5.6	12.4
Min	0.6	0.9	1.7	1.1	0.7	9.1	11.3	4.3	4.7	12.4
Max	24.7	14.6	21.6	14.9	23.8	15.4	14.8	16.0	7.1	12.4

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	6.3	4.9	–	–	–	–	–	–	–
June 24, 2014	7.7	–	8.6	–	–	–	–	–	–
June 30, 2014	5.1	–	–	5.4	–	–	–	–	–
July 8th, 2014	5.2	–	2.6	–	7.1	–	–	–	<0.1
July 15th, 2014	8.1	–	4.0	–	–	10.4	–	–	<0.1
July 23, 2014	4.8	–	5.9	–	–	–	9.7	–	<0.1
July 29, 2014	–	–	13.4	–	–	–	3.3	–	<0.1
August 5, 2014	–	–	7.7	–	–	–	3.8	–	<0.1
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	9.2	–	–	–	–	5.7	<0.1
August 31st, 2014	–	–	–	–	–	–	–	–	0.1
September 11th, 2014	–	–	10.0	–	–	–	–	–	–
Average	6.2	4.9	7.7	5.4	7.1	10.4	5.6	5.7	0.1
Min	4.8	4.9	2.6	5.4	7.1	10.4	3.3	5.7	<0.1
Max	8.1	4.9	13.4	5.4	7.1	10.4	9.7	5.7	0.1

Nitrite (NO_2) (mg/L)

City of Peterborough Detection Limits: *0.05* *mg/L*
0.025 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.05	<0.05	<0.05	–	<0.05	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.05	<0.05	–	<0.05	<0.05	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.05	<0.05	<0.05	<0.05	<0.05	–	–	–	<0.05	–
July 15th, 2014	<0.05	<0.05	<0.05	<0.05	<0.05	–	–	<0.05	<0.05	–
July 23, 2014	<0.05	<0.05	<0.05	<0.05	<0.05	–	–	<0.05	<0.05	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	<0.05	<0.05	<0.05	<0.05	<0.05	0.10	0.06	<0.05	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.05	<0.05	0.11	0.22	<0.05	–	–	–	–	–
Average	<0.05	<0.05	<0.05	0.05	<0.05	0.06	<0.05	<0.05	<0.05	
Min	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Max	<0.05	<0.05	0.11	0.22	<0.05	0.10	0.06	<0.05	<0.05	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.05	–	<0.05	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.05	–	<0.05	–	<0.05	–	–	–	<0.05
July 15th, 2014	<0.05	–	<0.05	–	–	<0.05	–	–	<0.05
July 23, 2014	<0.05	–	0.06	–	–	–	<0.05	–	<0.05
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	<0.05	–	–	–	0.08	–	<0.05
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	<0.05	–	–	–	–	0.05	<0.05
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	<0.05	–	–	–	–	–	–
Average	<0.05		<0.05		<0.05	<0.05	0.05	0.05	<0.05
Min	<0.05		<0.05		<0.05	<0.05	<0.05	0.05	<0.05
Max	<0.05		0.06		<0.05	<0.05	0.08	0.05	<0.05

Nitrate (NO_3) (mg/L)

City of Peterborough Detection Limits: *0.05* *mg/L*

0.025 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.05	<0.05	<0.05	–	<0.05	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.05	<0.05	–	<0.05	<0.05	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.05	<0.05	<0.05	<0.05	<0.05	–	–	–	<0.05	–
July 15th, 2014	<0.05	<0.05	<0.05	<0.05	<0.05	–	–	0.19	0.06	–
July 23, 2014	<0.05	<0.05	<0.05	<0.05	<0.05	–	–	0.20	<0.05	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.05	<0.05	<0.05	<0.05	<0.05	–	–	–	–	–
Average	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	0.04	
Min	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Max	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.20	0.06	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.05	–	<0.05	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.58	–	<0.05	–	<0.05	–	–	–	0.08
July 15th, 2014	<0.05	–	0.21	–	–	<0.05	–	–	0.08
July 23, 2014	0.72	–	0.32	–	–	–	0.16	–	0.16
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	<0.05	–	–	–	4.46	–	0.11
August 13, 2014	–	–	<0.05	–	–	–	–	0.12	<0.05
August 19, 2014	–	–	–	–	–	–	–	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	<0.05	–	–	–	–	–	–
Average	0.34		0.09		<0.05	<0.05	2.31	0.12	0.09
Min	<0.05		<0.05		<0.05	<0.05	0.16	0.12	<0.05
Max	0.72		0.32		<0.05	<0.05	4.46	0.12	0.16

Total Kjeldahl Nitrogen (TKN) (mg/L)

City of Peterborough Detection Limits: *0.1* *mg/L*
0.05 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	32.1	20.9	21.8	–	32.1	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	3.8	7.9	–	14.7	15.3	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	22.8	16.2	10.3	10.5	12.6	–	–	–	10.3	–
July 15th, 2014	18.3	18.2	18.2	18.1	20.7	–	–	7.5	8.1	–
July 23, 2014	6.0	20.0	11.3	14.7	14.3	–	–	12.0	7.4	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	23.6	16.3	14.3	19.7	23.7	17.2	17.5	14.9	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	8.8	9.5	16.0	19.9	27.8	41.2	32.1	23.3	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	9.3	9.9	44.8	34.4	25.3	–	–	–	–	–
Average	15.6	14.9	19.5	18.9	21.5	29.2	24.8	14.4	8.6	
Min	3.8	7.9	10.3	10.5	12.6	17.2	17.5	7.5	7.4	
Max	32.1	20.9	44.8	34.4	32.1	41.2	32.1	23.3	10.3	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	10.8	–	11.8	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	7.8	–	5.3	–	10.1	–	–	–	<0.1
July 15th, 2014	12.6	–	7.3	–	–	15.6	–	–	<0.1
July 23, 2014	6.6	–	7.8	–	–	–	12.1	–	<0.1
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	13.0	–	–	–	5.5	–	<0.1
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	15.8	–	–	–	–	7.2	<0.1
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	16.9	–	–	–	–	–	–
Average	9.5		11.1		10.1	15.6	8.8	7.2	<0.1
Min	6.6		5.3		10.1	15.6	5.5	7.2	<0.1
Max	12.6		16.9		10.1	15.6	12.1	7.2	<0.1

Total Phosphorus (TP) (mg/L)

City of Peterborough Detection Limits: *0.007* *mg/L*
0.0035 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	2.49	4.69	3.25	–	3.47	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	1.07	1.30	–	4.79	3.32	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	3.62	1.80	1.70	1.92	2.50	–	–	–	2.33	–
July 15th, 2014	1.14	1.68	2.67	1.74	3.43	–	–	–	–	–
July 23, 2014	0.87	3.03	1.39	1.27	1.23	–	–	3.22	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	3.01	2.46	2.18	2.35	3.45	–	–	1.08	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	1.59	1.92	1.98	2.51	2.77	–	–	2.17	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	1.15	1.56	6.65	7.14	1.93	–	–	–	–	–
Average	1.87	2.31	2.83	3.10	2.76			2.16	2.33	
Min	0.87	1.30	1.39	1.27	1.23			1.08	2.33	
Max	3.62	4.69	6.65	7.14	3.47			3.22	2.33	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	0.35	–	1.12	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.36	–	0.58	–	0.66	–	–	–	–
July 15th, 2014	0.68	–	0.64	–	–	–	–	–	0.16
July 23, 2014	–	–	3.25	–	–	–	–	–	0.06
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	0.90	–	–	–	–	–	<0.01
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	1.60	–	–	–	–	–	<0.01
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	1.93	–	–	–	–	–	–
Average	0.46		1.43		0.66				0.06
Min	0.35		0.58		0.66				<0.01
Max	0.68		3.25		0.66				0.16

Dissolved Phosphate as Phosphorus (PO_4) (mg/L)

City of Peterborough Detection Limits: *0.02* *mg/L*
0.01 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	1.08	1.87	1.18	–	0.84	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	0.49	0.13	–	1.22	1.29	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	1.71	0.94	0.14	0.05	0.20	–	–	–	<0.02	–
July 15th, 2014	0.31	0.78	0.90	0.20	0.46	–	–	<0.02	0.02	–
July 23, 2014	0.05	0.92	0.04	<0.02	<0.02	–	–	<0.02	<0.02	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	2.21	0.45	0.52	0.55	0.84	0.12	0.06	0.05	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	0.05	0.31	0.70	2.06	0.40	1.09	0.83	0.10	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.02	0.04	2.72	3.68	0.55	–	–	–	–	–
Average	0.74	0.68	0.89	1.11	0.57	0.61	0.45	0.04	<0.02	
Min	0.05	0.04	0.04	<0.02	<0.02	0.12	0.06	<0.02	<0.02	
Max	2.21	1.87	2.72	3.68	1.29	1.09	0.83	0.10	0.02	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	0.11	–	<0.02	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.03	–	<0.02	–	<0.02	–	–	–	<0.02
July 15th, 2014	0.06	–	0.31	–	–	0.04	–	–	<0.02
July 23, 2014	<0.02	–	<0.02	–	–	–	<0.02	–	<0.02
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	0.04	–	–	–	<0.02	–	<0.02
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	<0.02	–	–	–	0.41	–	<0.02
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	0.08	–	–	–	–	–	–
Average	0.05		0.07		<0.02	0.04	0.14		<0.02
Min	<0.02		<0.02		<0.02	0.04	<0.02		<0.02
Max	0.11		0.31		<0.02	0.04	0.41		<0.02

Volatile Suspended Solids (VSS) (mg/L)

City of Peterborough Detection Limits: *10* *mg/L*

5 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	310	94	59	–	226	–	–	–	–	–
June 18, 2014	190	226	166	40	34	–	–	–	–	–
June 24, 2014	146	85	–	872	1200	–	–	–	–	–
June 30, 2014	35	76	128	108	326	–	–	–	64	–
July 8th, 2014	126	64	46	84	144	–	–	–	134	–
July 15th, 2014	48	63	180	90	364	–	–	40	28	–
July 23, 2014	23	64	65	86	55	–	–	170	33	–
July 29, 2014	96	82	50	47	90	101	200	88	–	–
August 5, 2014	318	130	90	84	128	50	35	36	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	59	84	314	130	120	206	212	46	–	–
August 31st, 2014	185	70	36	43	79	–	–	–	–	34
September 11th, 2014	124	166	855	726	28	–	–	–	–	–
Average	138	100	181	210	233	119	149	76	65	34
Min	23	63	36	40	28	50	35	36	28	34
Max	318	226	855	872	1200	206	212	170	134	34

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	82	42	–	–	–	–	–	–	–
June 24, 2014	12	–	82	–	–	–	–	–	–
June 30, 2014	46	–	–	44	–	–	–	–	–
July 8th, 2014	12	–	26	–	54	–	–	–	<10
July 15th, 2014	30	–	36	–	–	86	–	–	13
July 23, 2014	23	–	148	–	–	–	182	–	<10
July 29, 2014	–	–	40	–	–	–	14	–	<10
August 5, 2014	–	–	32	–	–	–	<10	–	<10
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	38	–	–	–	–	<10	<10
August 31st, 2014	–	–	–	–	–	–	–	–	<10
September 11th, 2014	–	–	59	–	–	–	–	–	–
Average	34	42	58	44	54	86	67	<10	<10
Min	12	42	26	44	54	86	<10	<10	<10
Max	82	42	148	44	54	86	182	<10	13

Total Coliforms (TC) (cfu/100 mL)

Peterborough Detection Limits: *0.0* *cfu/100 mL*
0.00 *cfu/100 mL* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	NDOGT	--	--	--	13700000	--	--	--	--	--
June 18, 2014	--	--	--	--	--	--	--	--	--	--
June 24, 2014	36000	--	--	--	--	--	--	--	--	--
June 30, 2014	--	--	--	--	--	--	--	--	--	--
July 8th, 2014	16000000	--	--	--	--	--	--	--	--	--
July 15th, 2014	--	--	--	--	--	--	--	--	--	--
July 23, 2014	17500000	--	--	--	--	--	--	--	--	--
July 29, 2014	--	--	--	--	--	--	--	--	--	--
August 5, 2014	NDOGT	--	--	--	--	--	--	--	--	--
August 13, 2014	--	--	--	--	--	--	--	--	--	--
August 19, 2014	8434000	--	--	--	--	--	--	--	--	--
August 31st, 2014	--	--	--	--	--	--	--	--	--	--
September 11th, 2014	7200000	--	--	--	--	--	--	--	--	--

Average	9834000				13700000					
Min	36000				13700000					
Max	17500000				13700000					

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	--	--	--	--	--	--	--	--	--
June 18, 2014	--	--	--	--	--	--	--	--	--
June 24, 2014	126 00000	--	--	--	--	--	--	--	--
June 30, 2014	--	--	--	--	--	--	--	--	--
July 8th, 2014	4000A R>	--	--	--	--	--	--	--	--
July 15th, 2014	--	--	--	--	--	--	--	--	--
July 23, 2014	--	--	2402000	--	--	--	--	--	--
July 29, 2014	--	--	--	--	--	--	--	--	--
August 5, 2014	--	--	1900000	--	--	--	--	--	--
August 13, 2014	--	--	--	--	--	--	--	--	--
August 19, 2014	--	--	4232000	--	--	--	--	--	--
August 31st, 2014	--	--	--	--	--	--	--	--	--
September 11th, 2014	--	--	2200000	--	--	--	--	--	--

Average	126 00000		2683500						
Min	4000A R>		1900000						
Max	126 00000		4232000						

Total Coliforms (TC) (cfu/100 mL)

CAWT Detection Limits: *3.0* *cfu/100 mL*

1.50 *cfu/100 mL* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	2800000	2400000	7400000	--	3640000	--	--	--	--	--
June 18, 2014	1940000	1940000	1060000	130000	130000	--	--	--	--	--
June 24, 2014	460000	620000	--	2630000	2470000	--	--	--	--	--
June 30, 2014	<30000	1410000	6540000	2060000	24240000	--	--	--	147500	--
July 8th, 2014	2000000	1230000	1060000	360000	490000	--	--	--	490000	--
July 15th, 2014	1300000	1560000	2470000	1560000	2190000	--	--	4300	619	--
July 23, 2014	1100000	2000000	1510000	550000	550000	--	--	347000	16	--
July 29, 2014	1320000	1770000	1410000	910000	1750000	1127500	1397500	1696000	--	--
August 5, 2014	9380000	1610000	1360000	805000	1360000	940000	260000	245000	--	--
August 13, 2014	2800000	3070000	2710000	2935000	1660000	4510000	12120000	4240000	--	--
August 19, 2014	460000	1770000	10380000	1710000	1190000	1270000	980000	790000	--	--
August 31st, 2014	7940000	2550000	1660000	1710000	2980000	--	--	--	--	940000
September 11th, 2014	--	--	--	--	--	--	--	--	--	--
Average	2863636	1827500	3414545	1396364	3554167	1961875	3689375	1220383	159534	940000
Min	460000	620000	1060000	130000	130000	940000	260000	4300	16	940000
Max	9380000	3070000	10380000	2935000	24240000	4510000	12120000	4240000	490000	940000

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	--	--	--	--	--	--	--	--	--
June 18, 2014	59000	3000	--	--	--	--	--	--	--
June 24, 2014	93800	--	209000	--	--	--	--	--	--
June 30, 2014	38800	--	--	73000	--	--	--	--	--
July 8th, 2014	98	--	<3	--	187500	--	--	--	28
July 15th, 2014	70500	--	2500	--	--	685000	--	--	3
July 23, 2014	13600	--	279500	--	--	--	48900	--	3
July 29, 2014	--	--	685000	--	--	--	48900	--	<3
August 5, 2014	--	--	255000	--	--	--	271	--	<3
August 13, 2014	--	--	2740000	--	--	--	36	--	<3
August 19, 2014	--	--	582500	--	--	--	--	2200	<3
August 31st, 2014	--	--	--	--	--	--	--	--	5
September 11th, 2014	--	--	--	--	--	--	--	--	--
Average	45966	3000	594188	73000	187500	685000	24527	2200	6
Min	98	3000	<3	73000	187500	685000	36	2200	<3
Max	93800	3000	2740000	73000	187500	685000	48900	2200	28

E. coli (EC) (cfu/100 mL)

Peterborough Detection Limits: *0.0* *cfu/100 mL*
0.00 *cfu/100 mL* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	NDOGT	--	--	--	1000000	--	--	--	--	--
June 18, 2014	--	--	--	--	--	--	--	--	--	--
June 24, 2014	2000	--	--	--	--	--	--	--	--	--
June 30, 2014	--	--	--	--	--	--	--	--	--	--
July 8th, 2014	3300000	--	--	--	--	--	--	--	--	--
July 15th, 2014	--	--	--	--	--	--	--	--	--	--
July 23, 2014	100000	--	--	--	--	--	--	--	--	--
July 29, 2014	--	--	--	--	--	--	--	--	--	--
August 5, 2014	1000000	--	--	--	--	--	--	--	--	--
August 13, 2014	--	--	--	--	--	--	--	--	--	--
August 19, 2014	34000	--	--	--	--	--	--	--	--	--
August 31st, 2014	--	--	--	--	--	--	--	--	--	--
September 11th, 2014	400000	--	--	--	--	--	--	--	--	--
Average	806000				1000000					
Min	2000				1000000					
Max	3300000				1000000					

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	--	--	--	--	--	--	--	--	--
June 18, 2014	--	--	--	--	--	--	--	--	--
June 24, 2014	100000	--	--	--	--	--	--	--	--
June 30, 2014	--	--	--	--	--	--	--	--	--
July 8th, 2014	<1000	--	--	--	--	--	--	--	--
July 15th, 2014	--	--	--	--	--	--	--	--	--
July 23, 2014	--	--	2000	--	--	--	--	--	--
July 29, 2014	--	--	--	--	--	--	--	--	--
August 5, 2014	--	--	200000	--	--	--	--	--	--
August 13, 2014	--	--	--	--	--	--	--	--	--
August 19, 2014	--	--	132000	--	--	--	--	--	--
August 31st, 2014	--	--	--	--	--	--	--	--	--
September 11th, 2014	--	--	100000	--	--	--	--	--	--
Average	50250		108500						
Min	<1000		2000						
Max	100000		200000						

E. coli (EC) (cfu/100 mL)

CAWT Detection Limits: *3.0* *cfu/100 mL*

1.50 *cfu/100 mL* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	330000	430000	1100000	--	920000	--	--	--	--	--
June 18, 2014	130000	190000	130000	<3000	30000	--	--	--	--	--
June 24, 2014	190000	110000	--	190000	250000	--	--	--	--	--
June 30, 2014	<30000	220000	300000	130000	460000	--	--	--	75000	--
July 8th, 2014	550000	190000	110000	30000	50000	--	--	--	65000	--
July 15th, 2014	320000	110000	220000	190000	220000	--	--	1300	83	--
July 23, 2014	50000	110000	110000	50000	110000	--	--	27500	3	--
July 29, 2014	630000	130000	190000	95000	180000	147500	172500	141000	--	--
August 5, 2014	550000	520000	130000	140000	190000	295000	95000	82500	--	--
August 13, 2014	130000	790000	250000	295000	280000	430000	275000	285000	--	--
August 19, 2014	160000	190000	2630000	300000	250000	250000	220000	280000	--	--
August 31st, 2014	1460000	160000	160000	190000	390000	--	--	--	--	130000
September 11th, 2014	--	--	--	--	--	--	--	--	--	--
Average	392917	262500	484545	146500	277500	280625	190625	136217	35022	130000
Min	50000	110000	110000	<3000	30000	147500	95000	1300	3	130000
Max	1460000	790000	2630000	300000	920000	430000	275000	285000	75000	130000

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	--	--	--	--	--	--	--	--	--
June 18, 2014	16000	<3000	--	--	--	--	--	--	--
June 24, 2014	8700	--	41500	--	--	--	--	--	--
June 30, 2014	45000	--	--	19600	--	--	--	--	--
July 8th, 2014	49	--	<3	--	51000	--	--	--	11
July 15th, 2014	12500	--	740	--	--	36000	--	--	<3
July 23, 2014	5200	--	19500	--	--	--	14600	--	<3
July 29, 2014	--	--	144500	--	--	--	11900	--	<3
August 5, 2014	--	--	72000	--	--	--	72	--	<3
August 13, 2014	--	--	412000	--	--	--	8	--	<3
August 19, 2014	--	--	115000	--	--	--	--	1300	<3
August 31st, 2014	--	--	--	--	--	--	--	--	<3
September 11th, 2014	--	--	--	--	--	--	--	--	--
Average	14575	#DIV/0!	115034	19600	51000	36000	6645	1300	3
Min	49	0	740	19600	51000	36000	8	1300	2
Max	45000	0	412000	19600	51000	36000	14600	1300	11

Aluminum (Al) (mg/L)

City of Peterborough Detection Limits: *0.0007* *mg/L*
0.00035 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	0.1220	0.3100	1.7900	–	0.9750	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	0.7370	0.4780	–	18.5000	9.1000	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.2110	0.2130	0.5200	10.3000	13.8000	–	–	–	18.5000	–
July 15th, 2014	0.3520	0.2110	1.9300	3.3700	7.6300	–	–	–	–	–
July 23, 2014	0.2750	0.8650	0.8320	0.9890	1.5200	–	–	26.8000	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	0.2210	0.2870	0.5350	1.2600	1.4600	–	–	0.6000	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	0.1840	0.1260	0.4720	0.3580	0.3390	–	–	1.1100	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	0.0756	0.3260	1.8500	0.3180	0.1470	–	–	–	–	–
Average	0.2722	0.3520	1.1327	5.0136	4.3714			9.5033	18.5000	
Min	0.0756	0.1260	0.4720	0.3180	0.1470			0.6000	18.5000	
Max	0.7370	0.8650	1.9300	18.5000	13.8000			26.8000	18.5000	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	0.9400	–	7.7800	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	2.4300	–	5.5000	–	2.1300	–	–	–	–
July 15th, 2014	2.4200	–	4.3200	–	–	–	–	–	2.3300
July 23, 2014	–	–	28.2000	–	–	–	–	–	1.2800
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	0.5230	–	–	–	–	–	0.0147
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	0.8300	–	–	–	–	–	0.0071
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	1.0500	–	–	–	–	–	–
Average	1.9300		6.8861		2.1300				0.9080
Min	0.9400		0.5230		2.1300				0.0071
Max	2.4300		28.2000		2.1300				2.3300

Antimony (Sb) (mg/L)

City of Peterborough Detection Limits: *0.0032* *mg/L*

0.0016 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.0062	<0.0062	<0.0062	–	<0.0062	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.0063	<0.0063	–	<0.0063	<0.0063	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.0063	0.0074	<0.0063	<0.0063	<0.0063	–	–	–	<0.0063	–
July 15th, 2014	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	–	–	–	–	–
July 23, 2014	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	–	–	<0.0062	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	<0.0062	<0.0062	<0.0062	<0.0062	0.0073	–	–	<0.0062	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	–	–	<0.0062	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062	–	–	–	–	–
Average	<0.0062	0.0036	<0.0062	<0.0062	0.0036			<0.0062	<0.0063	
Min	<0.0062	<0.0062	<0.0062	<0.0062	<0.0062			<0.0062	<0.0063	
Max	<0.0063	0.0074	<0.0063	<0.0063	0.0073			<0.0062	<0.0063	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.0063	–	<0.0063	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.0063	–	<0.0063	–	<0.0063	–	–	–	–
July 15th, 2014	<0.0062	–	<0.0062	–	–	–	–	–	<0.0062
July 23, 2014	–	–	<0.0062	–	–	–	–	–	<0.0062
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	0.0092	–	–	–	–	–	<0.0062
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	<0.0062	–	–	–	–	–	<0.0062
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	<0.0062	–	–	–	–	–	–
Average	<0.0062		0.0040		<0.0063				<0.0062
Min	<0.0062		<0.0062		<0.0063				<0.0062
Max	<0.0063		0.0092		<0.0063				<0.0062

Arsenic (As) (mg/L)

City of Peterborough Detection Limits: *0.008* *mg/L*
0.004 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.008	0.009	0.009	–	<0.008	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	0.023	<0.008	–	0.016	<0.008	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.011	<0.008	<0.008	0.010	0.036	–	–	–	0.032	–
July 15th, 2014	<0.008	<0.008	<0.008	0.011	0.010	–	–	–	–	–
July 23, 2014	<0.008	<0.008	<0.008	<0.008	<0.008	–	–	<0.008	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	<0.008	<0.008	0.009	<0.008	0.012	–	–	<0.008	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	<0.008	<0.008	<0.008	<0.015	<0.008	–	–	<0.015	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.008	<0.008	<0.008	<0.008	0.009	–	–	–	–	–
Average	0.007	0.005	0.005	0.008	0.010			<0.008	0.032	
Min	<0.008	<0.008	<0.008	<0.008	<0.008			<0.008	0.032	
Max	0.023	0.009	0.009	0.016	0.036			<0.008	0.032	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	0.013	–	0.013	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.008	–	0.017	–	<0.008	–	–	–	–
July 15th, 2014	<0.008	–	<0.008	–	–	–	–	–	<0.008
July 23, 2014	–	–	<0.008	–	–	–	–	–	<0.008
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	0.009	–	–	–	–	–	<0.008
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	<0.008	–	–	–	–	–	<0.008
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	<0.008	–	–	–	–	–	–
Average	<0.008		0.008		<0.008				<0.008
Min	<0.008		<0.008		<0.008				<0.008
Max	0.013		0.017		<0.008				<0.008

Barium (Ba) (mg/L)

City of Peterborough Detection Limits: *0.0002* *mg/L*
0.0001 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	0.0048	0.0849	0.0843	–	0.0986	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	0.0058	0.0077	–	0.0404	0.0243	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.0059	0.0108	0.0103	0.0223	0.0271	–	–	–	0.0339	–
July 15th, 2014	0.0067	0.0092	0.0934	0.0954	0.0962	–	–	–	–	–
July 23, 2014	0.0032	0.0165	0.0103	0.0119	0.0141	–	–	0.0507	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	0.0064	0.0074	0.0193	0.0214	0.0141	–	–	0.0159	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	0.0036	0.0048	0.0065	0.0094	0.0089	–	–	0.0109	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	0.0040	0.0048	0.0088	0.0096	0.0076	–	–	–	–	–
Average	0.0051	0.0183	0.0333	0.0301	0.0366			0.0258	0.0339	
Min	0.0032	0.0048	0.0065	0.0094	0.0076			0.0109	0.0339	
Max	0.0067	0.0849	0.0934	0.0954	0.0986			0.0507	0.0339	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	0.0128	–	0.0233	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.0110	–	0.0146	–	0.0134	–	–	–	–
July 15th, 2014	0.0799	–	0.0676	–	–	–	–	–	0.0976
July 23, 2014	–	–	0.0515	–	–	–	–	–	0.0096
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	0.0160	–	–	–	–	–	0.0019
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	0.0088	–	–	–	–	–	0.0018
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	0.0113	–	–	–	–	–	–
Average	0.0346		0.0276		0.0134				0.0277
Min	0.0110		0.0088		0.0134				0.0018
Max	0.0799		0.0676		0.0134				0.0976

Beryllium (Be) (mg/L)

City of Peterborough Detection Limits: *0.0002* *mg/L*
0.0001 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.0002	<0.0002	<0.0002	–	<0.0002	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.0002	<0.0002	–	0.0005	0.0003	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.0002	<0.0002	<0.0002	0.0002	0.0003	–	–	–	0.0004	–
July 15th, 2014	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	–	–	–	–	–
July 23, 2014	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	–	–	0.0009	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	–	–	<0.0002	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	–	–	<0.0002	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	–	–	–	–	–
Average	<0.0002	<0.0002	<0.0002	0.0002	0.0002			0.0004	0.0004	
Min	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002			<0.0002	0.0004	
Max	<0.0002	0.0000	0.0004	0.0005	0.0003			0.0009	0.0004	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.0002	–	<0.0002	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.0002	–	<0.0002	–	<0.0002	–	–	–	–
July 15th, 2014	<0.0002	–	<0.0002	–	–	–	–	–	<0.0002
July 23, 2014	–	–	0.0009	–	–	–	–	–	<0.0002
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	<0.0002	–	–	–	–	–	<0.0002
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	<0.0002	–	–	–	–	–	<0.0002
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	<0.0002	–	–	–	–	–	–
Average	<0.0002		0.0002		<0.0002				<0.0002
Min	<0.0002		<0.0002		<0.0002				<0.0002
Max	<0.0002		0.0009		<0.0002				<0.0002

Boron (B) (mg/L)

City of Peterborough Detection Limits: *0.001* *mg/L*
0.0005 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	0.020	0.052	0.047	–	0.044	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	0.018	0.018	–	0.044	0.050	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.006	0.008	0.010	0.030	0.034	–	–	–	0.066	–
July 15th, 2014	0.019	0.018	0.042	0.050	0.071	–	–	–	–	–
July 23, 2014	0.018	0.057	0.148	0.099	0.107	–	–	0.106	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	0.019	0.014	0.040	0.086	0.087	–	–	0.135	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	0.010	0.011	0.010	0.024	0.024	–	–	0.038	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	0.017	0.012	0.016	0.038	0.030	–	–	–	–	–
Average	0.016	0.024	0.045	0.053	0.056			0.093	0.066	
Min	0.006	0.008	0.010	0.024	0.024			0.038	0.066	
Max	0.020	0.057	0.148	0.099	0.107			0.135	0.066	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	0.053	–	0.060	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.041	–	0.026	–	0.051	–	–	–	–
July 15th, 2014	0.069	–	0.056	–	–	–	–	–	0.024
July 23, 2014	–	–	0.102	–	–	–	–	–	<0.001
July 29, 2014	–	–	–	–	–	–	–	–	0.001
August 5, 2014	–	–	0.134	–	–	–	–	–	–
August 13, 2014	–	–	–	–	–	–	–	–	<0.001
August 19, 2014	–	–	0.038	–	–	–	–	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	0.036	–	–	–	–	–	–
Average	0.054		0.065		0.051				0.007
Min	0.041		0.026		0.051				<0.001
Max	0.069		0.134		0.051				0.024

Cadmium (Cd) (mg/L)

City of Peterborough Detection Limits: *0.0003* *mg/L*
0.00015 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.0003	<0.0003	0.0005	–	<0.0003	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.0003	0.0016	–	0.0038	0.0008	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.0003	<0.0003	<0.0003	0.0021	0.0022	–	–	–	0.0023	–
July 15th, 2014	<0.0003	<0.0003	<0.0003	0.0005	0.0009	–	–	–	–	–
July 23, 2014	<0.0003	0.0003	<0.0003	0.0006	<0.0003	–	–	0.0060	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	<0.0003	0.0004	0.0004	0.0004	0.0006	–	–	0.0005	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003	–	–	<0.0003	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.0003	0.0003	<0.0003	<0.0003	<0.0003	–	–	–	–	–
Average	<0.0003	0.0004	0.0002	0.0011	0.0006			0.0022	0.0023	
Min	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003			<0.0003	0.0023	
Max	<0.0003	0.0016	0.0005	0.0038	0.0022			0.0060	0.0023	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.0003	–	0.0016	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.0003	–	0.0006	–	<0.0003	–	–	–	–
July 15th, 2014	<0.0003	–	0.0003	–	–	–	–	–	<0.0003
July 23, 2014	–	–	0.0051	–	–	–	–	–	<0.0003
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	0.0005	–	–	–	–	–	<0.0003
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	<0.0003	–	–	–	–	–	<0.0003
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	0.0004	–	–	–	–	–	–
Average	<0.0003		0.0012		<0.0003				<0.0003
Min	<0.0003		<0.0003		<0.0003				<0.0003
Max	<0.0003		0.0051		<0.0003				<0.0003

Calcium (Ca) (mg/L)

City of Peterborough Detection Limits: *0.004* *mg/L*
0.002 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	39.1	47.7	58.5	–	56.4	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	44.5	37.0	–	183.0	107.0	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	40.6	42.6	47.4	107.0	127.0	–	–	–	179.0	–
July 15th, 2014	33.6	40.1	58.9	76.7	115.0	–	–	–	–	–
July 23, 2014	36.8	48.4	47.0	57.8	63.2	–	–	316.0	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	37.3	38.3	42.6	44.9	54.9	–	–	61.3	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	34.1	35.3	40.4	45.7	44.1	–	–	51.5	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	34.3	36.5	47.9	50.4	47.8	–	–	–	–	–
Average	37.5	40.7	49.0	80.8	76.9			142.9	179.0	
Min	33.6	35.3	40.4	44.9	44.1			51.5	179.0	
Max	44.5	48.4	58.9	183.0	127.0			316.0	179.0	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	52.5	–	104.0	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	51.7	–	72.7	–	59.0	–	–	–	–
July 15th, 2014	61.2	–	60.9	–	–	–	–	–	32.9
July 23, 2014	–	–	308.0	–	–	–	–	–	30.3
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	61.3	–	–	–	–	–	22.9
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	48.8	–	–	–	–	–	25.7
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	54.2	–	–	–	–	–	–
Average	55.1		101.4		59.0				28.0
Min	51.7		48.8		59.0				22.9
Max	61.2		308.0		59.0				32.9

Chromium (Cr) (mg/L)

City of Peterborough Detection Limits: *0.0008* *mg/L*
0.0004 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.0008	0.0013	0.0026	–	0.0014	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	0.0024	<0.0008	–	0.0351	0.0178	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.0008	<0.0008	0.0010	0.0163	0.0246	–	–	–	0.0330	–
July 15th, 2014	0.0032	<0.0008	0.0052	0.0056	0.0128	–	–	–	–	–
July 23, 2014	0.0015	0.0021	0.0019	0.0025	0.0037	–	–	0.0444	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	0.0010	<0.0008	0.0015	0.0024	0.0022	–	–	0.0014	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	0.0012	<0.0008	0.0013	<0.0008	<0.0008	–	–	0.0023	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.0008	0.0011	0.0039	<0.0008	<0.0008	–	–	–	–	–
Average	0.0013	0.0008	0.0025	0.0092	0.0079			0.0160	0.0330	
Min	<0.0008	<0.0008	0.0010	<0.0008	<0.0008			0.0014	0.0330	
Max	0.0032	0.0021	0.0052	0.0351	0.0246			0.0444	0.0330	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	0.0026	–	0.0153	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.0041	–	0.0093	–	0.0042	–	–	–	–
July 15th, 2014	0.0043	–	0.0081	–	–	–	–	–	0.0040
July 23, 2014	–	–	0.0474	–	–	–	–	–	0.0029
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	<0.0008	–	–	–	–	–	<0.0008
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	0.0012	–	–	–	–	–	<0.0008
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	0.0021	–	–	–	–	–	–
Average	0.0037		0.0120		0.0042				0.0019
Min	0.0026		<0.0008		0.0042				<0.0008
Max	0.0043		0.0474		0.0042				0.0040

Cobalt (Co) (mg/L)

City of Peterborough Detection Limits: *0.0007* *mg/L*

0.00035 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.0007	0.0031	0.0046	–	0.0099	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	0.0020	0.0042	–	0.0228	0.0171	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.0007	0.0043	0.0058	0.0164	0.0209	–	–	–	0.0407	–
July 15th, 2014	<0.0007	0.0028	0.0064	0.0152	0.0189	–	–	–	–	–
July 23, 2014	0.0010	0.0122	0.0095	0.0304	0.0354	–	–	0.0507	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	<0.0007	0.0014	0.0031	0.0155	0.0169	–	–	0.0227	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	<0.0007	<0.0007	0.0010	0.0076	0.0092	–	–	0.0139	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.0007	<0.0007	0.0015	0.0111	0.0140	–	–	–	–	–
Average	0.0007	0.0036	0.0046	0.0170	0.0178			0.0291	0.0407	
Min	<0.0007	<0.0007	0.0010	0.0076	0.0092			0.0139	0.0407	
Max	0.0020	0.0122	0.0095	0.0304	0.0354			0.0507	0.0407	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	0.0329	–	0.0288	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.0201	–	0.0134	–	0.0231	–	–	–	–
July 15th, 2014	0.0220	–	0.0140	–	–	–	–	–	0.0020
July 23, 2014	–	–	0.0543	–	–	–	–	–	0.0014
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	0.0225	–	–	–	–	–	<0.0007
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	0.0149	–	–	–	–	–	<0.0007
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	0.0160	–	–	–	–	–	–
Average	0.0250		0.0234		0.0231				0.0011
Min	0.0201		0.0134		0.0231				<0.0007
Max	0.0329		0.0543		0.0231				0.0020

Copper (Cu) (mg/L)

City of Peterborough Detection Limits: *0.0004* *mg/L*
0.0002 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	0.1150	0.1780	0.2090	–	0.1220	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	0.1160	0.1150	–	0.3890	0.2710	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.2510	0.1730	0.1370	0.1030	0.1300	–	–	–	0.1280	–
July 15th, 2014	0.1360	0.1140	0.2030	0.1040	0.2350	–	–	–	–	–
July 23, 2014	0.0899	0.1760	0.1040	0.0941	0.1020	–	–	0.1750	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	0.2210	0.3090	0.1270	0.1030	0.1350	–	–	0.0850	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	0.1410	0.1620	0.2210	0.3050	0.1150	–	–	0.1210	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	0.0851	0.1010	0.3940	0.1760	0.1190	–	–	–	–	–
Average	0.1444	0.1660	0.1993	0.1823	0.1536			0.1270		
Min	0.0851	0.1010	0.1040	0.0941	0.1020			0.0850		
Max	0.2510	0.3090	0.3940	0.3890	0.2710			0.1750		

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	0.0307	–	0.0564	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.0339	–	0.0362	–	0.0443	–	–	–	–
July 15th, 2014	0.0386	–	0.0402	–	–	–	–	–	0.0062
July 23, 2014	–	–	0.1650	–	–	–	–	–	0.0043
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	0.0731	–	–	–	–	–	<0.0004
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	0.1060	–	–	–	–	–	<0.0004
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	0.0818	–	–	–	–	–	–
Average	0.0344		0.0827		0.0443				0.0027
Min	0.0307		0.0362		0.0443				<0.0004
Max	0.0386		0.1650		0.0443				0.0062

Iron (Fe) (mg/L)

City of Peterborough Detection Limits: *0.0004* *mg/L*
0.0002 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	0.1230	0.7730	4.0000	–	3.4400	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	1.5200	1.0200	–	38.2000	19.2000	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.2770	0.7330	2.1600	20.2000	27.3000	–	–	–	36.9000	–
July 15th, 2014	0.3170	0.5080	4.5400	7.6100	16.7000	–	–	–	–	–
July 23, 2014	0.1620	1.3500	2.4000	4.0100	5.0400	–	–	50.4000	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	0.2000	0.4680	1.7900	3.6700	4.5900	–	–	4.7000	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	0.0685	0.2310	1.1900	2.1500	2.4400	–	–	4.7600	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	0.0917	0.5210	3.0000	1.6300	1.6100	–	–	–	–	–
Average	0.3449	0.7005	2.7257	11.0671	10.0400			19.9533	36.9000	
Min	0.0685	0.2310	1.1900	1.6300	1.6100			4.7000	36.9000	
Max	1.5200	1.3500	4.5400	38.2000	27.3000			50.4000	36.9000	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	2.0900	–	16.0000	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	4.5900	–	10.2000	–	4.5500	–	–	–	–
July 15th, 2014	5.3600	–	8.2200	–	–	–	–	–	3.9300
July 23, 2014	–	–	52.3000	–	–	–	–	–	1.9100
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	4.0800	–	–	–	–	–	0.0089
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	4.2500	–	–	–	–	–	0.0036
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	3.0700	–	–	–	–	–	–
Average	4.0133		14.0171		4.5500				1.4631
Min	2.0900		3.0700		4.5500				0.0036
Max	5.3600		52.3000		4.5500				3.9300

Lead (Pb) (mg/L)

City of Peterborough Detection Limits: *0.0033* *mg/L*

0.0017 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	0.0067	0.0081	0.0080	–	0.0049	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	0.0184	0.0618	–	0.0653	0.0414	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.0061	<0.0033	0.0086	<0.0033	0.0087	–	–	–	0.0085	–
July 15th, 2014	0.0069	<0.0033	0.0127	0.0114	0.0208	–	–	–	–	–
July 23, 2014	<0.0033	0.0131	0.0069	0.0060	0.0077	–	–	0.0529	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	0.0087	0.0055	0.0059	<0.0033	0.0089	–	–	0.0130	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	0.0075	<0.0033	0.0096	0.0129	0.0068	–	–	0.0123	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.0033	<0.0033	0.0150	0.0048	<0.0033	–	–	–	–	–
Average	0.0072	0.0119	0.0095	0.0148	0.0126			0.0261	0.0085	
Min	<0.0033	<0.0033	0.0059	<0.0033	<0.0033			0.0123	0.0085	
Max	0.0184	0.0618	0.0150	0.0653	0.0414			0.0529	0.0085	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	0.0389	–	0.0552	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.0083	–	–	–	0.0067	–	–	–	<0.0033
July 15th, 2014	0.0036	–	0.0041	–	–	–	–	–	0.0039
July 23, 2014	–	–	0.0636	–	–	–	–	–	<0.0033
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	0.0055	–	–	–	–	–	<0.0033
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	0.0112	–	–	–	–	–	<0.0033
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	0.0097	–	–	–	–	–	–
Average	0.0169		0.0249		0.0067				0.0021
Min	0.0036		0.0041		0.0067				<0.0033
Max	0.0389		0.0636		0.0067				0.0039

Lithium (Li) (mg/L)

City of Peterborough Detection Limits: *0.0014* *mg/L*

0.0007 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.0014	<0.0014	<0.0014	–	<0.0014	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.0014	<0.0014	–	<0.025	<0.005	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.0014	<0.0014	<0.0014	<0.011	<0.0014	–	–	–	<0.027	–
July 15th, 2014	<0.0014	<0.0014	<0.0014	<0.0014	0.0150	–	–	–	–	–
July 23, 2014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	–	–	<0.06	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	–	–	<0.0014	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	–	–	<0.0014	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	–	–	–	–	–
Average	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014			<0.0014	<0.027	
Min	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014			<0.0014	<0.027	
Max	<0.0014	<0.0014	<0.0014	<0.0014	0.0150			<0.0014	<0.027	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.0014	–	<0.003	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.0014	–	<0.0025	–	<0.0014	–	–	–	–
July 15th, 2014	<0.0014	–	<0.0014	–	–	–	–	–	<0.0014
July 23, 2014	–	–	0.0546	–	–	–	–	–	<0.0014
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	<0.0014	–	–	–	–	–	<0.0014
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	<0.0014	–	–	–	–	–	<0.0014
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	<0.0014	–	–	–	–	–	–
Average	<0.0014		0.0086		<0.0014				<0.0014
Min	<0.0014		<0.0014		<0.0014				<0.0014
Max	<0.0014		0.0546		<0.0014				<0.0014

Magnesium (Mg) (mg/L)

City of Peterborough Detection Limits: *0.0003* *mg/L*
0.00015 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	5.7300	6.6700	9.2900	–	9.1300	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	6.8800	5.8900	–	32.2000	19.0000	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	6.3300	6.2000	7.1500	19.9000	24.8000	–	–	–	34.7000	–
July 15th, 2014	5.5800	5.6800	8.5100	12.7000	19.7000	–	–	–	–	–
July 23, 2014	5.9700	7.5400	14.2000	11.8000	13.0000	–	–	48.2000	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	5.2700	5.3900	7.4500	9.7400	10.7000	–	–	15.4000	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	4.7500	5.2800	5.8100	6.9100	6.8300	–	–	8.7400	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	4.9500	4.9600	6.5100	7.5000	6.4900	–	–	–	–	–
Average	5.6825	5.9513	8.4171	14.3929	13.7063			24.1133	34.7000	
Min	4.7500	4.9600	5.8100	6.9100	6.4900			8.7400	34.7000	
Max	6.8800	7.5400	14.2000	32.2000	24.8000			48.2000	34.7000	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	10.6000	–	19.9000	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	12.2000	–	15.3000	–	12.9000	–	–	–	–
July 15th, 2014	11.9000	–	12.0000	–	–	–	–	–	4.8000
July 23, 2014	–	–	48.2000	–	–	–	–	–	3.3200
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	15.2000	–	–	–	–	–	3.1200
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	8.3800	–	–	–	–	–	4.1300
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	8.7600	–	–	–	–	–	–
Average	11.5667		18.2486		12.9000				3.8425
Min	10.6000		8.3800		12.9000				3.1200
Max	12.2000		48.2000		12.9000				4.8000

Manganese (Mn) (mg/L)

City of Peterborough Detection Limits: *0.001* *mg/L*
0.0005 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	0.007	0.094	0.173	–	0.260	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	0.043	0.070	–	0.841	0.548	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.015	0.123	0.179	0.524	0.630	–	–	–	1.120	–
July 15th, 2014	0.009	0.069	0.178	0.331	0.510	–	–	–	–	–
July 23, 2014	0.009	0.287	0.195	0.394	0.455	–	–	1.580	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	0.014	0.022	0.098	0.256	0.265	–	–	0.537	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	0.007	0.014	0.039	0.112	0.130	–	–	0.311	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	0.006	0.020	0.090	0.121	0.121	–	–	–	–	–
Average	0.014	0.087	0.136	0.368	0.367			0.809	1.120	
Min	0.006	0.014	0.039	0.112	0.121			0.311	1.120	
Max	0.043	0.287	0.195	0.841	0.630			1.580	1.120	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	0.739	–	0.828	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.402	–	0.354	–	0.446	–	–	–	–
July 15th, 2014	0.440	–	0.328	–	–	–	–	–	0.112
July 23, 2014	–	–	1.580	–	–	–	–	–	0.076
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	0.522	–	–	–	–	–	<0.001
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	0.346	–	–	–	–	–	<0.001
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	0.178	–	–	–	–	–	–
Average	0.527		0.591		0.446				0.047
Min	0.402		0.178		0.446				<0.001
Max	0.739		1.580		0.446				0.112

Mercury (Hg) (mg/L)

City of Peterborough Detection Limits: *0.10* *ug/L*
0.05 *ug/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.1	<0.1	<0.1	–	<0.1	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.1	<0.1	–	<0.1	<0.1	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.1	<0.1	<0.1	<0.1	<0.1	–	–	–	<0.1	–
July 15th, 2014	<0.1	<0.1	<0.1	<0.1	<0.1	–	–	–	–	–
July 23, 2014	<0.1	<0.1	<0.1	<0.1	<0.1	–	–	<0.1	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	<0.1	<0.1	<0.1	<0.1	<0.1	–	–	<0.1	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	<0.1	<0.1	<0.1	<0.1	<0.1	–	–	<0.1	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.1	<0.1	<0.1	<0.1	<0.1	–	–	–	–	–
Average	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	<0.1	
Min	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	<0.1	
Max	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	<0.1	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.1	–	<0.1	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.1	–	<0.1	–	<0.1	–	–	–	–
July 15th, 2014	<0.1	–	<0.1	–	–	–	–	–	<0.1
July 23, 2014	–	–	<0.1	–	–	–	–	–	<0.1
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	<0.1	–	–	–	–	–	<0.1
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	<0.1	–	–	–	–	–	<0.1
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	<0.1	–	–	–	–	–	–
Average	<0.1		<0.1		<0.1				<0.1
Min	<0.1		<0.1		<0.1				<0.1
Max	<0.1		<0.1		<0.1				<0.1

Molybdenum (Mo) (mg/L)

City of Peterborough Detection Limits: *0.007* *mg/L*

0.0035 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.007	<0.007	<0.007	–	<0.007	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.007	<0.007	–	<0.007	<0.007	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.007	<0.007	<0.007	<0.007	<0.007	–	–	–	<0.007	–
July 15th, 2014	<0.007	<0.007	<0.007	<0.007	<0.007	–	–	–	–	–
July 23, 2014	<0.007	<0.007	<0.007	<0.007	<0.007	–	–	<0.007	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	<0.007	<0.007	<0.007	<0.007	<0.007	–	–	<0.007	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	<0.007	<0.007	<0.007	<0.007	<0.007	–	–	<0.007	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	0.010	<0.007	<0.007	<0.007	<0.007	–	–	–	–	–
Average	0.004	<0.007	<0.007	<0.007	<0.007			<0.007	<0.007	
Min	<0.007	<0.007	<0.007	<0.007	<0.007			<0.007	<0.007	
Max	0.010	<0.007	<0.007	<0.007	<0.007			<0.007	<0.007	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.007	–	<0.007	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.007	–	<0.007	–	<0.007	–	–	–	–
July 15th, 2014	<0.007	–	<0.007	–	–	–	–	–	<0.007
July 23, 2014	–	–	<0.007	–	–	–	–	–	<0.007
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	<0.007	–	–	–	–	–	<0.007
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	<0.007	–	–	–	–	–	<0.007
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	<0.007	–	–	–	–	–	–
Average	<0.007		<0.007		<0.007				<0.007
Min	<0.007		<0.007		<0.007				<0.007
Max	<0.007		<0.007		<0.007				<0.007

Nickel (Ni) (mg/L)

City of Peterborough Detection Limits: *0.0016* *mg/L*
0.0008 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.0016	0.0054	0.0113	–	0.0170	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.0016	<0.0016	–	0.0663	0.0382	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.0016	0.0057	0.0119	0.0551	0.0659	–	–	–	0.0999	–
July 15th, 2014	0.0025	0.0048	0.0169	0.0355	0.0522	–	–	–	–	–
July 23, 2014	<0.0016	0.0224	0.0202	0.0637	0.0782	–	–	0.1530	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	<0.0016	0.0021	0.0106	0.0521	0.0533	–	–	0.0670	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	<0.0016	<0.0016	0.0025	0.0262	0.0316	–	–	0.0427	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.0016	<0.0016	0.0074	0.0372	0.0416	–	–	–	–	–
Average	0.0010	0.0054	0.0115	0.0480	0.0473			0.0876	0.0999	
Min	<0.0016	<0.0016	0.0025	0.0262	0.0170			0.0427	0.0999	
Max	0.0025	0.0224	0.0202	0.0663	0.0782			0.1530	0.0999	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	0.0499	–	0.0462	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.0435	–	0.0336	–	0.0484	–	–	–	–
July 15th, 2014	0.0470	–	0.0323	–	–	–	–	–	0.0088
July 23, 2014	–	–	0.1570	–	–	–	–	–	<0.0016
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	0.0675	–	–	–	–	–	<0.0016
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	0.0437	–	–	–	–	–	<0.0016
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	0.0456	–	–	–	–	–	–
Average	0.0468		0.0608		0.0484				0.0028
Min	0.0435		0.0323		0.0484				<0.0016
Max	0.0499		0.1570		0.0484				0.0088

Potassium (K) (mg/L)

City of Peterborough Detection Limits: *0.002* *mg/L*
0.001 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	4.350	11.900	9.040	–	13.200	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	3.310	3.760	–	6.280	6.910	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	11.600	6.330	5.970	5.950	7.020	–	–	–	8.950	–
July 15th, 2014	4.900	5.460	7.670	7.430	8.330	–	–	–	–	–
July 23, 2014	3.720	6.230	7.690	7.670	8.090	–	–	8.230	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	7.280	7.240	9.910	13.300	17.000	–	–	10.400	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	3.050	5.420	8.960	10.900	12.500	–	–	11.900	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	3.160	3.130	10.600	23.900	11.300	–	–	–	–	–
Average	5.171	6.184	8.577	10.776	10.544			10.177	8.950	
Min	3.050	3.130	5.970	5.950	6.910			8.230	8.950	
Max	11.600	11.900	10.600	23.900	17.000			11.900	8.950	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	6.980	–	7.500	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	6.090	–	4.330	–	6.770	–	–	–	–
July 15th, 2014	6.810	–	4.190	–	–	–	–	–	0.789
July 23, 2014	–	–	7.970	–	–	–	–	–	0.470
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	10.000	–	–	–	–	–	0.124
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	9.590	–	–	–	–	–	0.134
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	9.180	–	–	–	–	–	–
Average	6.627		7.537		6.770				0.379
Min	6.090		4.190		6.770				0.124
Max	6.980		10.000		6.770				0.789

Selenium (Se) (mg/L)

City of Peterborough Detection Limits: *0.008* *mg/L*
0.004 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.008	<0.008	0.011	–	<0.008	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.02	0.018	–	<0.008	<0.008	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.017	0.011	0.015	<0.008	0.016	–	–	–	<0.008	–
July 15th, 2014	<0.008	<0.008	<0.008	0.017	0.011	–	–	–	–	–
July 23, 2014	<0.008	<0.008	<0.008	<0.008	<0.008	–	–	0.012	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	<0.008	0.015	<0.008	<0.008	0.011	–	–	<0.008	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	<0.008	<0.008	<0.008	<0.008	<0.008	–	–	<0.008	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.008	<0.008	<0.008	<0.008	<0.008	–	–	–	–	–
Average	<0.008	0.008	<0.008	<0.008	<0.008			<0.008	<0.008	
Min	<0.008	<0.008	<0.008	<0.008	<0.008			<0.008	<0.008	
Max	0.017	0.018	0.015	0.017	0.016			0.012	<0.008	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.008	–	<0.008	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.010	–	0.026	–	<0.008	–	–	–	–
July 15th, 2014	<0.008	–	<0.008	–	–	–	–	–	<0.008
July 23, 2014	–	–	0.022	–	–	–	–	–	<0.008
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	<0.008	–	–	–	–	–	<0.008
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	<0.008	–	–	–	–	–	<0.008
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	<0.008	–	–	–	–	–	–
Average	<0.008		0.010		<0.008				<0.008
Min	<0.008		<0.008		<0.008				<0.008
Max	0.010		0.026		<0.008				<0.008

Sodium (Na) (mg/L)

City of Peterborough Detection Limits: *0.0006* *mg/L*
0.0003 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	24.8000	88.5000	20.7000	–	32.8000	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	31.2000	45.4000	–	18.1000	24.4000	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	27.3000	28.8000	32.9000	31.4000	32.6000	–	–	–	52.6000	–
July 15th, 2014	43.6000	22.1000	60.4000	62.6000	43.6000	–	–	–	–	–
July 23, 2014	16.9000	124.0000	53.5000	61.8000	65.4000	–	–	50.1000	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	28.8000	21.7000	33.0000	48.7000	62.6000	–	–	66.7000	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	36.9000	13.3000	18.3000	31.7000	41.8000	–	–	52.5000	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	10.9000	17.7000	71.4000	56.1000	35.9000	–	–	–	–	–
Average	27.550	45.188	41.457	44.343	42.388			56.433	52.600	
Min	10.900	13.300	18.300	18.100	24.400			50.100	52.600	
Max	43.600	124.000	71.400	62.600	65.400			66.700	52.600	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	38.9000	–	39.3000	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	37.6000	–	26.5000	–	40.6000	–	–	–	–
July 15th, 2014	41.4000	–	24.2000	–	–	–	–	–	0.7830
July 23, 2014	–	–	40.7000	–	–	–	–	–	0.4110
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	66.0000	–	–	–	–	–	0.3230
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	47.8000	–	–	–	–	–	0.3930
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	38.5000	–	–	–	–	–	–
Average	39.300		40.429		40.600				0.478
Min	37.600		24.200		40.600				0.323
Max	41.400		66.000		40.600				0.783

Strontium (Sr) (mg/L)

City of Peterborough Detection Limits: *0.0002* *mg/L*
0.0001 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	0.0727	0.0955	0.1090	–	0.1150	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	0.0805	0.0729	–	0.2850	0.1810	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.0790	0.0849	0.0938	0.1850	0.2160	–	–	–	0.3200	–
July 15th, 2014	0.0659	0.0748	0.1070	0.1400	0.2000	–	–	–	–	–
July 23, 2014	0.0672	0.0948	0.1340	0.1260	0.1430	–	–	0.4890	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	0.0702	0.0715	0.0905	0.0121	0.1250	–	–	0.1760	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	0.0607	0.0663	0.0753	0.0962	0.0947	–	–	0.1100	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	0.0617	0.0635	0.0768	0.0953	0.0908	–	–	–	–	–
Average	0.0697	0.0780	0.0981	0.1342	0.1457			0.2583	0.3200	
Min	0.0607	0.0635	0.0753	0.0121	0.0908			0.1100	0.3200	
Max	0.0805	0.0955	0.1340	0.2850	0.2160			0.4890	0.3200	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	0.1350	–	0.2000	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.1220	–	0.1410	–	0.1350	–	–	–	–
July 15th, 2014	0.1260	–	0.1110	–	–	–	–	–	0.0532
July 23, 2014	–	–	0.4670	–	–	–	–	–	0.0451
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	0.1760	–	–	–	–	–	0.0391
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	0.1050	–	–	–	–	–	0.0462
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	0.1060	–	–	–	–	–	–
Average	0.1277		0.1866		0.1350				0.0459
Min	0.1220		0.1050		0.1350				0.0391
Max	0.1350		0.4670		0.1350				0.0532

Thallium (Tl) (mg/L)

City of Peterborough Detection Limits: *0.0063* *mg/L*

0.00315 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.0063	<0.0063	<0.0063	–	<0.0063	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.0063	<0.0063	–	<0.0063	<0.0063	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063	–	–	–	<0.0063	–
July 15th, 2014	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063	–	–	–	–	–
July 23, 2014	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063	–	–	<0.0063	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063	–	–	<0.0063	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063	–	–	<0.0063	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063	–	–	–	–	–
Average	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063			<0.0063	<0.0063	
Min	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063			<0.0063	<0.0063	
Max	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063			<0.0063	<0.0063	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.0063	–	<0.0063	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.0063	–	<0.0063	–	<0.0063	–	–	–	–
July 15th, 2014	<0.0063	–	<0.0063	–	–	–	–	–	<0.0063
July 23, 2014	–	–	<0.0063	–	–	–	–	–	<0.0063
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	<0.0063	–	–	–	–	–	<0.0063
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	<0.0063	–	–	–	–	–	<0.0063
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	<0.0063	–	–	–	–	–	–
Average	<0.0063		<0.0063		<0.0063				<0.0063
Min	<0.0063		<0.0063		<0.0063				<0.0063
Max	<0.0063		<0.0063		<0.0063				<0.0063

Tin (Sn) (mg/L)

City of Peterborough Detection Limits: *0.006* *mg/L*
0.003 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.006	<0.006	<0.006	–	<0.006	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	0.009	<0.006	–	0.012	0.014	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.006	<0.006	<0.006	<0.006	<0.006	–	–	–	<0.006	–
July 15th, 2014	<0.006	<0.006	<0.006	<0.006	<0.006	–	–	–	–	–
July 23, 2014	<0.006	<0.006	<0.006	<0.006	<0.006	–	–	<0.006	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	<0.006	<0.006	<0.006	<0.006	<0.006	–	–	<0.006	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	0.006	<0.006	<0.006	0.008	<0.006	–	–	<0.006	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.008	<0.007	<0.006	<0.006	<0.006	–	–	–	–	–
Average	<0.006	<0.006	<0.006	<0.006	<0.006			<0.006	<0.006	
Min	<0.006	<0.006	<0.006	<0.006	<0.006			<0.006	<0.006	
Max	0.009	<0.006	<0.006	0.012	0.014			<0.006	<0.006	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	0.008	–	0.016	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.006	–	<0.006	–	<0.006	–	–	–	–
July 15th, 2014	<0.006	–	<0.006	–	–	–	–	–	<0.006
July 23, 2014	–	–	<0.006	–	–	–	–	–	<0.006
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	<0.006	–	–	–	–	–	<0.006
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	<0.006	–	–	–	–	–	<0.006
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	<0.006	–	–	–	–	–	–
Average	0.006		0.010		<0.006				<0.006
Min	<0.006		<0.006		<0.006				<0.006
Max	<0.006		0.016		<0.006				<0.006

Titanium (Ti) (mg/L)

City of Peterborough Detection Limits: *0.0002* *mg/L*

0.0001 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	0.0033	0.0038	0.0072	--	0.0039	--	--	--	--	--
June 18, 2014	--	--	--	--	--	--	--	--	--	--
June 24, 2014	0.0051	0.0052	--	0.0554	0.0336	--	--	--	--	--
June 30, 2014	--	--	--	--	--	--	--	--	--	--
July 8th, 2014	0.0044	0.0049	0.0061	0.0396	0.0510	--	--	--	0.0610	--
July 15th, 2014	0.0139	0.0133	0.0068	0.0132	0.0521	--	--	--	--	--
July 23, 2014	0.0393	0.1530	0.0748	0.0598	0.0531	--	--	0.0786	--	--
July 29, 2014	--	--	--	--	--	--	--	--	--	--
August 5, 2014	0.0057	0.0077	0.0160	0.0126	0.0083	--	--	0.0039	--	--
August 13, 2014	--	--	--	--	--	--	--	--	--	--
August 19, 2014	0.0139	0.0111	0.0225	0.0154	0.0149	--	--	0.0267	--	--
August 31st, 2014	--	--	--	--	--	--	--	--	--	--
September 11th, 2014	0.0056	0.0042	0.0110	0.0055	0.0021	--	--	--	--	--
Average	0.0114	0.0254	0.0212	0.0288	0.0274			0.0364	0.0610	
Min	0.0033	0.0038	0.0061	0.0055	0.0021			0.0039	0.0610	
Max	0.0393	0.1530	0.0748	0.0598	0.0531			0.0786	0.0610	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	--	--	--	--	--	--	--	--	--
June 18, 2014	--	--	--	--	--	--	--	--	--
June 24, 2014	0.0058	--	0.0254	--	--	--	--	--	--
June 30, 2014	--	--	--	--	--	--	--	--	--
July 8th, 2014	0.0125	--	0.0292	--	0.0131	--	--	--	--
July 15th, 2014	0.0093	--	0.0171	--	--	--	--	--	0.0139
July 23, 2014	--	--	0.0842	--	--	--	--	--	0.0270
July 29, 2014	--	--	--	--	--	--	--	--	--
August 5, 2014	--	--	0.0062	--	--	--	--	--	<0.0002
August 13, 2014	--	--	--	--	--	--	--	--	--
August 19, 2014	--	--	0.0240	--	--	--	--	--	<0.0002
August 31st, 2014	--	--	--	--	--	--	--	--	--
September 11th, 2014	--	--	0.0058	--	--	--	--	--	--
Average	0.0092		0.0274		0.0131				0.0103
Min	0.0058		0.0058		0.0131				<0.0002
Max	0.0125		0.0842		0.0131				0.0270

Uranium (U) (mg/L)

City of Peterborough Detection Limits: *0.0250* *mg/L*
0.0125 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.05	<0.05	<0.05	–	<0.05	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.025	<0.025	–	<0.15	<0.09	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.025	<0.025	<0.025	<0.085	<0.11	–	–	–	<0.125	–
July 15th, 2014	<0.025	<0.025	<0.035	<0.045	<0.065	–	–	–	–	–
July 23, 2014	<0.025	<0.025	<0.025	<0.035	<0.035	–	–	<0.15	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	<0.025	<0.025	<0.025	<0.025	<0.035	–	–	<0.035	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	<0.025	<0.025	<0.025	<0.025	<0.025	–	–	<0.035	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.015	<0.015	<0.025	<0.025	<0.025	–	–	–	–	–
Average	<0.025	<0.025	<0.025	<0.025	<0.025			<0.035	<0.125	
Min	<0.015	<0.015	<0.025	<0.025	<0.025			<0.035	<0.125	
Max	<0.025	<0.025	<0.025	<0.15	<0.11			<0.15	<0.125	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.025	–	<0.08	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.035	–	<0.055	–	<0.035	–	–	–	–
July 15th, 2014	<0.035	–	<0.045	–	–	–	–	–	<0.025
July 23, 2014	–	–	<0.16	–	–	–	–	–	<0.015
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	<0.035	–	–	–	–	–	<0.025
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	<0.035	–	–	–	–	–	<0.025
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	<0.025	–	–	–	–	–	–
Average	<0.025		<0.025		<0.035				<0.025
Min	<0.025		<0.025		<0.035				<0.015
Max	<0.035		<0.055		<0.035				<0.025

Vanadium (V) (mg/L)

City of Peterborough Detection Limits: *0.0005* *mg/L*
0.00025 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	<0.0005	<0.0005	0.0016	–	0.0007	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.0005	<0.0005	–	0.0205	0.0093	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.0005	<0.0005	<0.0005	<0.015	<0.016	–	–	–	<0.021	–
July 15th, 2014	<0.0005	<0.0005	0.0012	0.0036	0.0083	–	–	–	–	–
July 23, 2014	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	–	–	0.0284	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	–	–	<0.0005	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	–	–	0.0009	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	<0.0005	<0.0005	0.0010	<0.0005	<0.0005	–	–	–	–	–
Average	<0.0005	<0.0005	0.0007	0.0037	0.0026			0.0099	<0.021	
Min	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005			<0.0005	<0.021	
Max	<0.0005	<0.0005	0.0016	0.0205	0.0093			0.0284	<0.021	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	<0.0005	–	0.0073	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	<0.0025	–	<0.007	–	<0.0025	–	–	–	–
July 15th, 2014	0.0018	–	0.0045	–	–	–	–	–	0.0019
July 23, 2014	–	–	0.0303	–	–	–	–	–	0.0009
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	<0.0005	–	–	–	–	–	<0.0005
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	<0.0005	–	–	–	–	–	<0.0005
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	0.0008	–	–	–	–	–	–
Average			0.0063		<0.0025				0.0009
Min	<0.0005		<0.0005		<0.0025				<0.0005
Max	0.0018		0.0303		<0.0025				0.0019

Zinc (Zn) (mg/L)

City of Peterborough Detection Limits: *0.0025* *mg/L*
0.00125 *mg/L* *used to calculate mean when values were listed as <*

Sample Description	14B1-1	14B1-4	14B2-4	14B3-2	14B3-3	14B4-1	14SL-1	14SL-2	14SL-3	Screeslope
Sample Date										
June 10, 2014	0.0763	0.0965	0.0946	–	0.0767	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–	–
June 24, 2014	0.0367	0.0379	–	0.1730	0.1100	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.0659	0.0458	0.0407	0.0801	0.1040	–	–	–	0.1200	–
July 15th, 2014	0.0633	0.0348	0.0813	0.0717	0.1080	–	–	–	–	–
July 23, 2014	0.0255	0.0910	0.0461	0.0569	0.0625	–	–	0.1700	–	–
July 29, 2014	–	–	–	–	–	–	–	–	–	–
August 5, 2014	0.1030	0.0690	0.0566	0.0598	0.0707	–	–	0.0596	–	–
August 13, 2014	–	–	–	–	–	–	–	–	–	–
August 19, 2014	0.0303	0.0533	0.0659	0.0869	0.0574	–	–	0.0611	–	–
August 31st, 2014	–	–	–	–	–	–	–	–	–	–
September 11th, 2014	0.0261	0.0369	0.1230	0.0773	0.0496	–	–	–	–	–
Average	0.0534	0.0582	0.0726	0.0865	0.0799			0.0970	0.1200	
Min	0.0255	0.0348	0.0407	0.0569	0.0496			0.0596	0.1200	
Max	0.1030	0.0965	0.1230	0.1730	0.1100			0.1700	0.1200	

Sample Description	14SH-1	14SH-2	14SH-3	14SH-3b	14SH-3c	14SH-3d	14SH-3e	14SH-3f	Reference
Sample Date									
June 10, 2014	–	–	–	–	–	–	–	–	–
June 18, 2014	–	–	–	–	–	–	–	–	–
June 24, 2014	0.0282	–	0.0615	–	–	–	–	–	–
June 30, 2014	–	–	–	–	–	–	–	–	–
July 8th, 2014	0.0276	–	0.0413	–	0.0431	–	–	–	–
July 15th, 2014	0.0458	–	0.0582	–	–	–	–	–	0.0446
July 23, 2014	–	–	0.1790	–	–	–	–	–	0.0142
July 29, 2014	–	–	–	–	–	–	–	–	–
August 5, 2014	–	–	0.0522	–	–	–	–	–	<0.0034
August 13, 2014	–	–	–	–	–	–	–	–	–
August 19, 2014	–	–	0.0662	–	–	–	–	–	0.0078
August 31st, 2014	–	–	–	–	–	–	–	–	–
September 11th, 2014	–	–	0.0522	–	–	–	–	–	–
Average	0.0339		0.0729		0.0431				0.0170
Min	0.0276		0.0413		0.0431				<0.0034
Max	0.0458		0.1790		0.0431				0.0446

Centre for Alternative Wastewater Treatment

Vision

The Centre for Alternative Wastewater Treatment (CAWT) at the School of Environmental and Natural Resource Sciences, Frost Campus, Fleming College is an internationally recognized research institute committed to excellence in research and education.

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