

---

# 2013 CLINTON CREEK SURFACE WATER QUALITY AND HYDROLOGICAL MONITORING PROGRAM

## REPORT

### PREPARED FOR:

**Yukon Government**  
**Assessment and Abandoned Mines**  
PO Box 2703  
Whitehorse, YT Y1A 2C6

### Prepared By:



204-105 TITANIUM WAY  
WHITEHORSE, YUKON  
PROJECT NO. 13-156

March, 2014

---

*This Page Intentionally Left Blank*



# CLINTON CREEK SURFACE WATER QUALITY AND HYDROLOGICAL MONITORING PROGRAM - 2013

## Table of Contents

<b>1.</b>	<b>Introduction .....</b>	<b>1</b>
1.1	<b>Site Location and Hydrological Setting.....</b>	<b>1</b>
1.2	<b>2013 Monitoring Program Scope.....</b>	<b>1</b>
1.3	<b>2013 Program Sample Sites .....</b>	<b>3</b>
<b>2.</b>	<b>Methods .....</b>	<b>7</b>
2.1	<b>Surface Water Quality Sampling.....</b>	<b>7</b>
2.1.1	Field Data Collection .....	7
2.1.2	Sample Care and Shipping.....	8
2.1.3	Laboratory Analysis.....	8
2.1.4	QA/QC Program for Laboratory Analytical Sampling.....	8
2.2	<b>Stream Hydrological Monitoring.....</b>	<b>9</b>
2.2.1	Field Data Collection .....	9
2.2.2	QA/QC Program for Hydrology Field Measurements .....	10
2.2.3	Data Analysis.....	10
<b>3.</b>	<b>Results.....</b>	<b>11</b>
3.1	<b>Surface Water Quality Sampling.....</b>	<b>11</b>
3.1.1	Field <i>In-Situ</i> Water Quality Results.....	11
3.1.2	Laboratory Analytical Water Quality Results.....	12
3.1.3	Water Quality Monitoring QA/QC Review .....	20
3.2	<b>Stream Hydrological Monitoring Results .....</b>	<b>26</b>
3.2.1	Site R1 .....	27
3.2.2	Site R2 .....	27
3.2.3	Site R3 .....	27
3.2.4	Site R4 .....	27
3.2.5	Site R6 .....	27
3.2.6	Site E1 .....	27
3.2.7	Site E2.....	27
3.2.8	Site E3.....	28
3.2.9	Site E4.....	28
3.2.10	Site E7.....	28
3.2.11	Site E8.....	28
3.2.12	Site PL.....	28
3.2.13	Site SL.....	28
3.2.14	Site GWCC-1 .....	28
3.2.15	Site GWCC-2.....	28
3.2.16	Site GWCC-3.....	28
3.2.17	Site GWCC-4.....	28
3.2.18	Site GWCC-5.....	29
<b>4.</b>	<b>Summary of Water Quality Monitoring Results .....</b>	<b>30</b>
4.1	<b>Summary of Water Quality Exceedances.....</b>	<b>30</b>



4.1.1	QA/QC Discussion .....	32
5.	Recommendations .....	33
6.	Closure.....	34
7.	References .....	35

## List of Figures

Figure 1.1:	Overview of Clinton Creek Site Location.....	2
Figure 1.2:	Clinton Creek Site Area Sampling Locations .....	5
Figure 1.3:	Forty Mile River Area Sampling Locations.....	6

## List of Tables

Table 1.1:	Sample Site Descriptions and Locations.....	4
Table 2.1:	Analytical Sampling Bottle Set Summary .....	7
Table 3.1:	Water Quality Field Parameter Results. ....	11
Table 3.2:	Laboratory Analytical Results Summary for Non-Metal Parameters .....	17
Table 3.3:	Laboratory Analytical Results Summary for Total Metal Parameters.....	18
Table 3.4:	Laboratory Analytical Results Summary for Dissolved Metal Parameters.....	19
Table 3.5:	Comparison of Duplicate and Blank Results for Non-Metal Parameters.....	21
Table 3.6:	Comparison of Duplicate and Blank Results for Total Metals .....	23
Table 3.7:	Comparison of Duplicate and Blank Results for Dissolved Metals.....	25
Table 3.8:	Summary of Hydrological Data Collected During the Monitoring Program.....	26
Table 4.1:	Summary of Exceedances of CCME-PAL Guideline Levels Organized According to Parameter .....	30

## List of Appendices

- Appendix 1 – Site Photos
- Appendix 2 – Water Quality Analytical Laboratory Reports
- Appendix 3 – Hydrological Monitoring Data and Calculations
- Appendix 4 – Sampling Field Notes

## I. INTRODUCTION

Ecological Logistics and Research Ltd. (ELR) was retained by Yukon Government (YG), Assessment and Abandoned Mines (AAM) to conduct a water quality and hydrological monitoring program at the Clinton Creek Mine site in September 2013.

The Clinton Creek Mine Site (herein referred to as the Site) is a former asbestos mine, owned and operated by Cassiar Asbestos Corporation Limited for 10 years (1967 to 1978) until all of the economically-valuable asbestos in the area was mined (YG 2013). Approximately 16 million tons of serpentinite rock containing 940,000 tonnes of white asbestos (known as chrysotile) was removed from three pits at the mine site. From 1978 to 1992, the company attempted to implement an abandonment plan and completed a few remedial activities at the Site. Over the following years, various weather events destabilized creek channels and caused erosion on site which increased the potential for flooding. In 2002, the federal government worked on stabilizing the Site under emergency provisions of the *Yukon Waters Act* (YG 2007). Upon devolution in 2003, YG assumed responsibility for the care, maintenance and closure of the Site. The purpose of the 2013 sampling program was to monitor the current status of water quality at the Site.

### I.1 SITE LOCATION AND HYDROLOGICAL SETTING

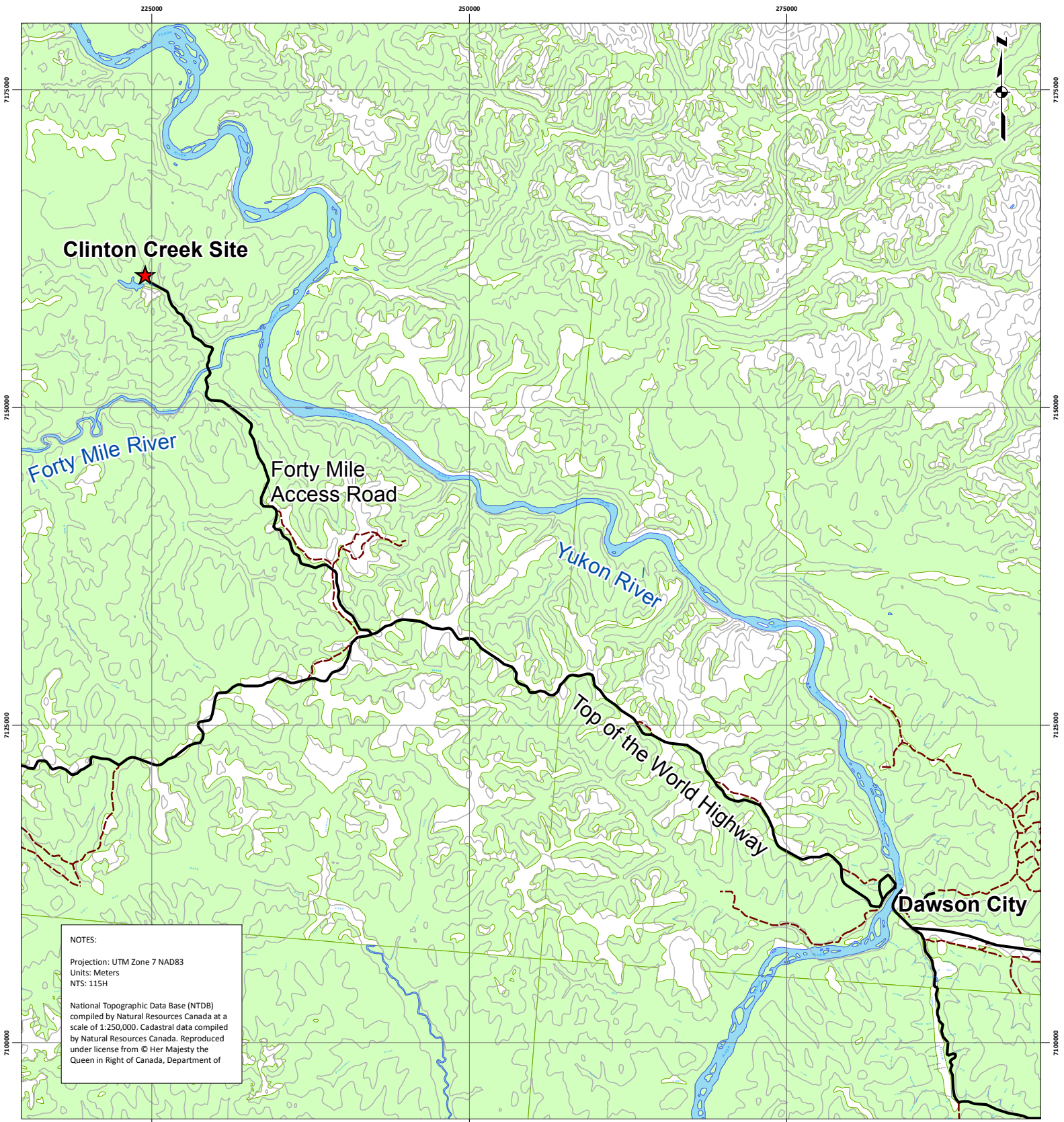
The Site is located approximately 75 km northwest of Dawson City (100 km by road), in the traditional territory of the Tr'ondëk Hwëch'in First Nation (**Figure I.1**). The Site within the Klondike Plateau Ecoregion of the Boreal Cordillera Ecozone (Smith et al. 1994), near the northern extent of the Klondike Plateau, at the edge of the Tintina Trench.

The Site falls within the drainage of the Forty Mile River, a tributary to the Yukon River. Clinton Creek flows to the Site from the west then continues to flow southeast for approximately 8 km before flowing into the Forty Mile River. Tailings slumping into the valley have dammed Clinton Creek, forming Hudgeon Lake (**Figure I.2**). Four tributaries contribute to Clinton Creek at or near the Site: Easter Creek flows into Hudgeon Lake; Porcupine Creek and Wolverine Creek flow through the Site to Clinton Creek from the south and north, respectively; and Eagle Creek flows into Clinton Creek from the north, downstream from the Site. Slumping tailings have backed up Wolverine Creek creating two ponds (**Figure I.2**). Past mining activities have formed two pit lakes: Porcupine Pit Lake and Snowshoe Pit Lake.

### I.2 2013 MONITORING PROGRAM SCOPE

The 2013 monitoring program was focused on recording current water quality and hydrological conditions at the Site during the fall of 2013, according to the document *Scope of Work: Clinton Creek Surface Water Quality and Hydrology Monitoring (September 2013)* provided to ELR by AAM. The scope of work included:

- Conducting surface water quality sampling at 18 designated sample sites, including the collection of field parameters and samples for laboratory analytical analysis.
- Measuring stream discharge at sample sites where flowing water was present.
- Shipping analytical samples to an accredited laboratory for analysis according to analytical requirements established by AAM.



NOTES:  
 Projection: UTM Zone 7 NAD83  
 Units: Meters  
 NTS: 115H  
 National Topographic Data Base (NTDB)  
 compiled by Natural Resources Canada at a  
 scale of 1:250,000. Cadastral data compiled  
 by Natural Resources Canada. Reproduced  
 under license from © Her Majesty the  
 Queen in Right of Canada, Department of



Ecological Logistics  
& Research Ltd.

Client: **Yukon**  
 Energy, Mines and Resources  
 Assessment and Abandoned Mines

**Legend**

-  Clinton Creek Site
-  Road
-  Limited-use road
-  Wetlands
-  Waterbodies
-  Vegetation



Scale: 1:400,000



## 2013 Clinton Creek Monitoring Program

Figure 1.1  
Project Area Overview

Date: March 12, 2014	Drawn by: CJ
ELR Project #: 13-156	Rev. #: 1

*This Page Intentionally Left Blank*

- Analyzing and summarizing data from the field and laboratory program.
- Preparing a report that outlines the sampling program, including and raw data. This report summarizes the monitoring activities and methods used to conduct the sampling program, describes sample sites, summarizing data including quality assurance/quality control (QA/QC) data for the program, and provides a summary of the overall success of the field program.

### **I.3 2013 PROGRAM SAMPLE SITES**

A total of 18 sites were sampled during the sampling program, including five reference surface water sites, eight exposed surface water sites, and five exposed groundwater seepage sites. Reference sites included watercourses upstream from the Site that were not considered to be influenced by the Site. Exposed sites included watercourses and water bodies under the influence of Site infrastructure (e.g. waste rock or tailings), and those downstream of the Site that are considered to be part of the receiving environment.

A summary of the sample sites including field-verified UTM locations, a description of the sites, and a summary of the sampling conducted at each site is provided in **Table 1.1** below. The locations of sample sites are shown in **Figures 1.2** and **1.3**.



**Table 1.1: Sample Site Descriptions and Locations.**

Site Type	Water Type	Site Code	Sampling Conducted	Site Description	Location (UTM)	
<b>Reference</b>	<b>Surface Water</b>	R1	Water Quality, Hydrology	Clinton Creek upstream of Hudgeon Lake	7W 510697 7147528	
		R2	Water Quality, Hydrology	Easter Creek upstream of Hudgeon Lake	7W 512021 7148023	
		R3	Water Quality, Hydrology	Wolverine Creek, upstream of tailings	7W 513956 7148689	
		R4	Water Quality, Hydrology	Eagle Creek, upstream of culvert	7W 515979 7145336	
		R6	Water Quality	Forty Mile River, upstream of Clinton Creek	7W 519483 7141726	
<b>Exposed</b>		PL	Water Quality	Porcupine Pit Lake from shore	7W 513290 7146350	
		SL	Water Quality	Snowshoe Pit Lake from shore	7W 513833 7146711	
		E1	Water Quality, Hydrology	Clinton Creek downstream of gabions	7W 513470 7147216	
		E2	Water Quality, Hydrology	Clinton Creek, downstream of Porcupine Creek but upstream of Wolverine Creek	7W 514149 7147074	
		E3	Water Quality, Hydrology	Wolverine Creek, upstream of culvert	7W 514178 7147186	
		E4	Water Quality, Hydrology	Clinton Creek downstream of Wolverine Creek but upstream of Eagle Creek	7W 515949 7145288	
		E7	Water Quality, Hydrology	Clinton Creek near mouth	7W 519419 7142051	
		E8	Water Quality	Forty Mile River downstream of Clinton Creek	7W 519456 7142789	
		<b>Groundwater Seep</b>	GWCC – 1	Water Quality	Toe of the Waste Rock dump flowing into ponded area at Porcupine Creek	7W 513902 7146954
			GWCC – 2	Water Quality	Toe of the Waste Rock dump flowing into ponded area approx. 10 m northwest of GWCC-1	7W 513899 7146966
	GWCC – 3		Water Quality	Toe of the Waste Rock dump flowing into side channel, approx. 10 m northwest of GWCC-2	7W 513880 7147038	
	GWCC – 4		Water Quality	Toe of the Waste Rock dump flowing into side channel, approx. 10 m northwest of GWCC-3	7W 513869 7147044	
	GWCC – 5		Water Quality, Hydrology	Groundwater flows in old Clinton Creek channel	7W 513988 7147122	

# 2013 Clinton Creek Surface Water Quality and Hydrological Monitoring Program



Client:



## Legend

### Sampling Conducted

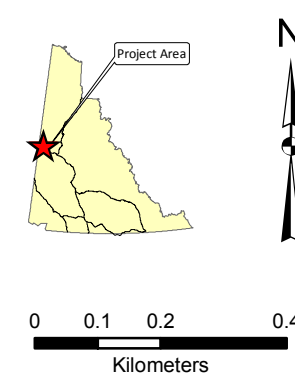
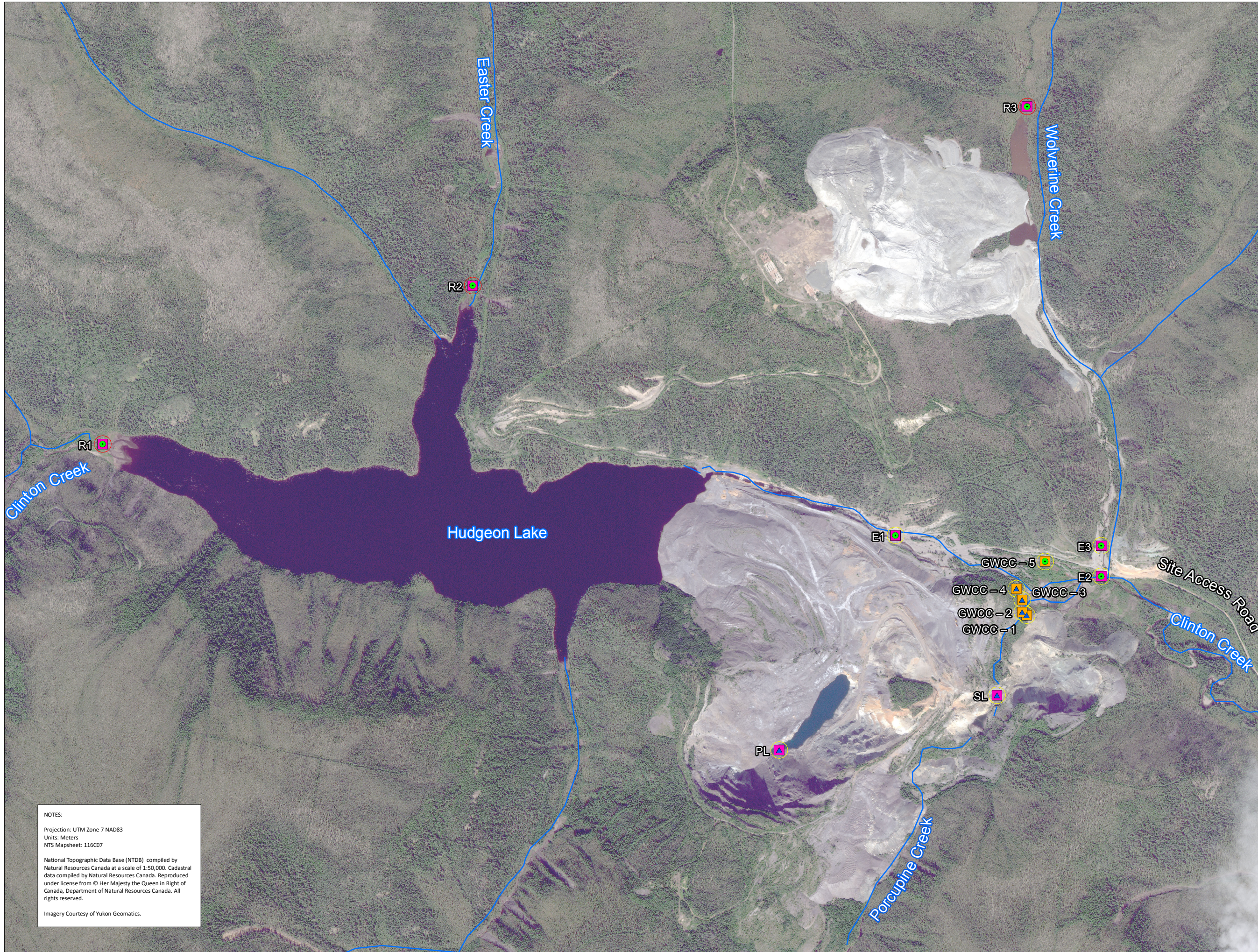
- ▲ Water Quality
- Water Quality & Hydrology

### Water Type

- Surface Water
- Ground Water Seepage

### Site Type

- Exposed
- Reference



NOTES:  
 Projection: UTM Zone 7 NAD83  
 Units: Meters  
 NTS Mapsheet: 116C07  
 National Topographic Data Base (NTDB) compiled by Natural Resources Canada at a scale of 1:50,000. Cadastral data compiled by Natural Resources Canada. Reproduced under license from © Her Majesty the Queen in Right of Canada, Department of Natural Resources Canada. All rights reserved.  
 Imagery Courtesy of Yukon Geomatics.

**FIGURE 1.2**  
 Sampling Locations  
 Site Area

Date: March 12, 2014	Scale: 1:12,000
ELR Project #: 13-156	Rev. #: 2

*This Page Intentionally Left Blank*

# 2013 Clinton Creek Surface Water Quality and Hydrological Monitoring Program



## Legend

### Sampling Conducted

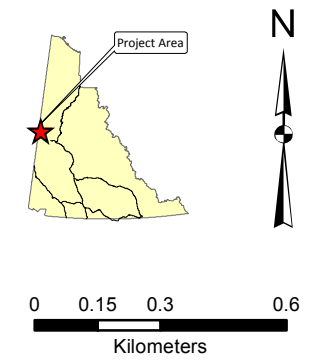
- ▲ Water Quality
- Water Quality & Hydrology

### Water Type

- Surface Water
- Ground Water Seepage

### Site Type

- Exposed
- Reference



NOTES:  
 Projection: UTM Zone 7 NAD83  
 Units: Meters  
 NTS Mapsheet: 116C07  
 National Topographic Data Base (NTDB) compiled by Natural Resources Canada at a scale of 1:50,000. Cadastral data compiled by Natural Resources Canada. Reproduced under license from © Her Majesty the Queen in Right of Canada, Department of Natural Resources Canada. All rights reserved.  
 Imagery Courtesy of Yukon Geomatics.

**FIGURE 1.3**  
 Sampling Locations  
 Forty Mile River Area

*This Page Intentionally Left Blank*

## 2. METHODS

Two ELR staff completed the surface water quality and hydrological field program from September 16 to 19, 2013. Specific methods for each are summarized in the following sections.

### 2.1 SURFACE WATER QUALITY SAMPLING

#### 2.1.1 Field Data Collection

Surface water quality sampling was conducted in accordance with *Standard Methods for the Examination of Water and Wastewater* (Rice et al., 2012). Field *in-situ* water quality parameters were measured and laboratory analytical samples were collected at each site, as described below.

Upon arriving at each site, the following field *in-situ* water quality data were collected using a YSI Professional Plus Water Quality Multimeter:

- Water temperature (°C);
- pH (pH units);
- Conductivity and Specific Conductivity (µs/cm); and,
- Dissolved oxygen (mg/L).

Following the collection of field *in-situ* parameters at each site, samples for laboratory analytical analysis were collected. Samples were collected directly into 120 mL and 1 L laboratory-supplied containers, and were field filtered and/or preserved according to laboratory instructions. The analytical set for the 2013 monitoring program included six bottles for each site, as detailed in below in **Table 2.1** (using Site R1 as an example). Nitric acid (HNO<sub>3</sub>) was used as a preservative for metals (dissolved and total), while sulphuric acid (S<sub>2</sub>SO<sub>4</sub>) was used as a preservative for certain nutrient parameters and dissolved organic carbon (DOC).

**Table 2.1: Analytical Sampling Bottle Set Summary**

Site Name (Example)	Bottle Number	Bottle Size	Bottle Type	Parameter Analyzed	Sample Treatment	Preservative Added
R1	1 of 6	120 ml	Plastic	Low Level Dissolved Metals and Hardness	Field Filtered and Preserved	HNO <sub>3</sub>
R1	2 of 6	120 ml	Plastic	Low Level Total Metals and Hardness	Preserved	HNO <sub>3</sub>
R1	3 of 6	120 ml	Plastic	Nitrate, Nitrite and Sulphate	Preserved	None
R1	4 of 6	120 ml	Plastic	Nitrogen (Total), Ammonia-N and Total Phosphorous	Preserved	H <sub>2</sub> SO <sub>4</sub>
R1	5 of 6	1L	Plastic	Total Suspended Solids (TSS)	-	None
R1	6 of 6	120 ml	Plastic	Dissolved Organic Carbon (DOC)	Field Filtered and Preserved	H <sub>2</sub> SO <sub>4</sub>

At each sampling site, UTM coordinates were recorded using a Garmin Map 62s handheld GPS. The general condition and a description of each site was recorded, including any identification features noted or conditions observed that may have influenced water quality results. Photos were taken at each site to illustrate the site record sampling conditions. Photos were taken facing upstream, facing downstream, and facing across the site location.

### **2.1.2 Sample Care and Shipping**

Sample sets were placed into coolers immediately following water collection and were kept cool with ice. Samples were shipped via air under chain of custody and using custody seals to Maxxam Analytics in Burnaby, British Columbia for analysis.

### **2.1.3 Laboratory Analysis**

All surface water quality samples collected during the program were received by the analytical laboratory within 72 hours of sampling, and all primary analyses were conducted within laboratory hold time limits (although several follow-up or repeat analyses were required beyond regular hold times, as described in Section 3.1.4).

The analytical laboratory analyses for the surface water quality monitoring program employed a variety of laboratory analytical methods to determine the various water quality parameters required under this monitoring program. Specific methods were selected to ensure that reportable detection limits (RDL) were below Canadian Council of Ministers on the Environment (CCME) *Water Quality Guidelines for Protection of Aquatic Life* (CCME-PAL), where applicable (CCME 2014). In several cases, follow-up analyses had to be conducted by the laboratory where required sample dilutions (in the laboratory) increased detection limits for specific parameters above CCME-PAL guideline levels. These occurrences are discussed further in Section 3.1.3 with recommendations for future programs provided in Section 5 of this report.

### **2.1.4 QA/QC Program for Laboratory Analytical Sampling**

QA/QC methods were employed during the surface water quality monitoring program to confirm the precision of program with respect to sample contamination, sampling error or laboratory analysis error.

#### **2.1.4.1 Duplicate and Blank Samples**

As prescribed in the SOW, two blind duplicate samples, one field blank sample, and one travel blank sample were included in the program.

Blind duplicate samples were collected in the field at Sites EI and GWCC-5. The results of these duplicates were compared with the results for corresponding sample sites to determine whether errors in laboratory analysis may have occurred or whether field or laboratory contamination may have been present.

One field blank was prepared at Site EI, which involved filling a program bottle set with laboratory-supplied distilled water. All handling, filtering, and preserving was conducted in the same way as with other sample sites. The field blank was collected for the purpose of detecting contamination during the field sampling process.

One travel blank was prepared at the laboratory using distilled water. The travel blank was stored, handled, and transported in the same manner as the field samples in order to assess whether any contamination may have occurred during the transport or storage of samples.

Duplicate samples were compared with corresponding test samples to determine whether results varied significantly, thereby indicating potential contamination or error. This analysis used the calculation of relative percent difference (RPD), where an RPD value exceeding 20% is considered to indicate significant differences between corresponding samples. Where samples exceeded 20% RPD, the lab re-analyzed samples to determine potential sources of error.

RPD is calculated according to the following formula:

$$RPD = \frac{\text{Result 1} - \text{Result 2}}{[(\text{Result 1} + \text{Result 2})/2]} \times 100\%$$

#### 2.1.4.2 Field Sampling QA/QC

ELR employed the following methods during field sampling to help ensure the integrity of water quality data:

- Samplers used new nitrile gloves for sampling at each Site;
- All sample bottle sets were pre-labeled prior to sampling with location, analyte, and sample preservation method information. Field site data was confirmed in the field and date/time data was completed on bottle labels at the time of sampling;
- Detailed field data sheets and checklists were used to track sample collection at each site;
- Disposable syringes and disposable luer-lock 40 µm filters were used for field filtering of samples;
- Samples were preserved immediately upon collection, where required by the laboratory;
- Samples were kept cool with ice packs during transportation to the laboratory; and
- The field water quality multimeter was calibrated prior to field sampling, and checked against established standards to ensure correct operation.

## 2.2 STREAM HYDROLOGICAL MONITORING

### 2.2.1 Field Data Collection

ELR used a velocity-area method to measure discharge of surface water bodies during the monitoring program. Total discharge is calculated using the area and velocity from a series of point measurements taken across the stream at each sampling location.

During the monitoring program, ELR chose hydrological monitoring locations at each sample site that were well suited to flow and velocity measurements (i.e., a straight channel with relatively flat stream bed and little vegetation or rocks, and with few back-eddies that could hinder flow meter measurements). At each site, a cross section was established, and the active stream channel width was determined using a tape measure fixed to the top of bank on each side. The stream was then divided into a series of sections (referred to as panels), where individual velocity and depth measurements were



taken. At each point across the stream cross section, water depth was measured using a wading rod, and mean flow was measured using a Global Flow model, FPIII Flow Probe.

### **2.2.2 QA/QC Program for Hydrology Field Measurements**

Two sets of measurements were collected at each stream crossing location. The first crossing was used to establish the station locations and data, and the second crossing was used to collect a duplicate set of data for QA/QC purposes (to ensure station readings were accurate and that no significant variance between the two measurements sets occurred).

### **2.2.3 Data Analysis**

For each sampling point (panel) at a crossing location (sample site), stream discharge ( $Q$ ;  $m^3/s$ ) was calculated by multiplying the cross sectional area of the panel (width of panel  $\times$  mean depth;  $A$ ;  $m^2$ ) by the measured velocity ( $V$ ;  $m/s$ ), according to the following formula:

$$Q = AV$$

The total discharge for a sample site was then calculated by summing the discharge of all panels for each stream crossing location.

### 3. RESULTS

#### 3.1 SURFACE WATER QUALITY SAMPLING

##### 3.1.1 Field *In-Situ* Water Quality Results

Field *in-situ* water quality monitoring results are presented below in **Table 3.1**, with CCME-PAL exceedances shown in bold italic text. Photographs of monitoring sites are provided in Appendix I.

**Table 3.1: Water Quality Field Parameter Results.**

Site	Water Temperature (°C)	pH (pH units)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%Sat.)
<b>CCME-PAL Guideline Levels†</b>					
		<b>6.5-9.0</b>		<b>5.5‡</b>	
<b>Reference Sites</b>					
R1	0.6	8.04	345.2	13.36	98.2
R2	2.4	7.70	366.0	12.10	93.3
R3	1.3	7.84	412.0	14.30	107.3
R4	1.0	7.30	362.5	13.61	103.0
R6	4.7	8.01	128.4	13.08	106.3
<b>Exposed Sites</b>					
PL	8.4	8.00	19,809	7.07	71.7
SL	2.8	8.21	8,644	9.11	75.9
E1	7.3	7.86	3,561	10.38	98.0
E2	7.3	7.57	5,057	10.3	92.6
E3	3.3	7.53	4,332	11.45	93.0
E4	5.7	7.04	5,250	11.31	97.3
E7	5.2	7.67	481.7	12.11	98.9
E8	4.5	8.25	145.9	12.62	101.8
GWCC-1	3.7	7.48	15,386	<b>5.08</b>	45.1
GWCC-2	5.4	7.5	13,680	6.97	64.1
GWCC-3	7.7	7.61	10,308	<b>4.61</b>	43.5
GWCC-4	8.1	7.59	16,037	<b>4.63</b>	44.5
GWCC-5	6.7	7.83	6,690	<b>4.01</b>	36.3

Notes

† Bold italic text indicates an exceedance of the CCME-PAL guideline level.

‡ Guideline level represents a minimum recommended value.

Surface water temperatures ranged from 0.6°C to 8.4°C. pH levels were relatively consistent and ranged from 7.04 to 8.25, which were all within the CCME-PAL guideline range of 6.5-9.0.

Surface water conductivity varied significantly between sites (**Table 3.1**). Reference sites R1-R6 were the lowest of all sites with respect to conductivity, ranging from 128.4  $\mu\text{s}/\text{cm}$  (R6) to 412.0  $\mu\text{s}/\text{cm}$  (R3). Exposed stream sites had higher conductivity than their corresponding reference sites in all cases; exposed stream sites ranged in conductivity from 145.9  $\mu\text{s}/\text{cm}$  (E8) to 5,250  $\mu\text{s}/\text{cm}$  (E4). The conductivities at pit and groundwater seepage sites were significantly higher, ranging from 8,666  $\mu\text{s}/\text{cm}$  (SL) to 19,809  $\mu\text{s}/\text{cm}$  (PL).

Concentrations of dissolved oxygen ranged from 7.07 mg/L (PL) to 14.30 mg/L (R3) at surface water sites (both reference and exposed), all well above the CCME-PAL minimum of 5.5 mg/L. The level of dissolved oxygen measured at four of five groundwater seepage sites was below the CCME-PAL minimum of 5.5, likely due to these sites being groundwater discharge sites. Recorded values at sites GWCC-1, GWCC-3, GWCC-4 and GWCC-5 were 5.08 mg/L, 4.61 mg/L, 4.63 mg/L, and 4.01 mg/L, respectively. Low levels of dissolved oxygen are common in groundwater, and it is likely that that once exposed to air that dissolved oxygen levels would be elevated downstream of the seeps.

### 3.1.2 Laboratory Analytical Water Quality Results

Laboratory analytical results are summarized in **Tables 3.2 through 3.4**, below. General, physical, and nutrient (non-metal) results are summarized in **Table 3.2**, total metal results are summarized in **Table 3.3**, and dissolved metal results are summarized in **Table 3.4**. Results that exceed CCME-PAL guideline levels are shaded within those tables. Laboratory analytical results are described further below in comparison with CCME-PAL guideline levels according to site.

No laboratory analytical data were available for site GWCC-4. Samples were collected at this site alongside field parameters; however, the sample set was reported missing at the laboratory.

In some cases, dissolved metal concentrations exceeded total metal concentrations for specific parameters at the same site; however, none exceeded the 20% RPD. Such cases were therefore considered to be within acceptable analytical limits and these results were considered to be normal by the laboratory.

For sites where duplicate samples were collected, test and duplicate samples were compared relative to the lab QA/QC analysis threshold of 20% RPD. These QA/QC results are provided in **Table 3.5** and are described below.

#### 3.1.2.1 Reference Sites

##### Site R1

The concentrations of total iron and dissolved iron at Site R1 were 0.548 mg/L and 0.344 mg/L, respectively, both exceeding the CCME-PAL guideline of 0.3 mg/L.

The concentrations of total selenium and dissolved selenium at Site R1 were 0.00160 mg/L and 0.00154 mg/L, both exceeded the CCME-PAL guideline of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guideline levels at Site R1.

##### Site R2

No non-metal or metal parameters exceeded CCME-PAL guideline levels at Site R2.

**Site R3**

The concentration of TSS at Site R3 was 45.8 mg/L, which was moderately elevated when compared to other program results. The samplers could not identify the reason for elevated TSS at this site. There was no indication during sampling of the elevated TSS concentration (i.e., noticeable turbidity), and therefore ELR did not investigate further upstream during sampling to determine potential sources. Because this is a reference site, the source is most likely to be natural. Additionally, the concentration of TSS was greatly reduced further downstream at Site E3 (described below), suggesting that solids are settling out in the two ponds between sites R3 and E3.

ELR did note that the total concentration of several metals was elevated in relation to corresponding dissolved metal concentrations at Site R3, potentially due to the elevated TSS. This was most evident in the case of aluminum, iron, and zinc. This trend was reversed in the case of copper. Metals results are provided in detail below.

The concentration of total aluminum at Site R3 was 0.234 mg/L, exceeding the CCME-PAL guideline of 0.1 mg/L at pH levels over 6.5 (the pH measured at the site was 7.84).

The concentration of dissolved copper at Site R3 was 0.00479 mg/L, exceeding the water hardness-dependent CCME-PAL guideline of 0.004 mg/L calculated at a total water hardness of 365 mg/L.

The concentration of total iron at Site R3 was 0.999 mg/L, exceeding the CCME-PAL guideline of 0.3 mg/L.

The concentration of total zinc at Site R3 was 0.0297 mg/L, which was close to but did not exceed the CCME-PAL guideline of 0.030 mg/L.

No other reported parameters exceeded CCME-PAL guideline levels at Site R3.

**Site R4**

The concentrations of total and dissolved selenium at Site R4 were 0.00333 mg/L and 0.00339 mg/L, respectively, both exceeding the CCME-PAL guideline level of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guideline levels at Site R4.

**Site R6**

The concentration of total aluminum at Site R6 was 0.119 mg/L, exceeding the CCME-PAL guideline level of 0.1 mg/L when pH is greater than 6.5 (the pH measured at the site was 8.01).

The concentrations of total and dissolved copper at Site R6 were 0.00297 mg/L and 0.00278 mg/L, respectively, both exceeding the water hardness-dependent CCME-PAL guideline level of 0.00212 mg/L calculated at a total water hardness of 87.8 mg/L.

The concentration of total iron at Site R6 was 0.345 mg/L, exceeding the CCME-PAL guideline level of 0.3 mg/L.

No other reported parameters exceeded CCME-PAL guideline levels at Site R6.

### 3.1.2.2 Exposed Sites

#### Site E1

The concentration of dissolved copper at Site E1 was 0.0102 mg/L, exceeding the water hardness-dependent CCME-PAL guideline level of 0.004 mg/L calculated at a total water hardness of 245 mg/L.

The concentration of total selenium at Site E1 was 0.00106 mg/L, exceeding the CCME-PAL guideline level of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guideline levels at Site E1.

#### Site E2

The concentrations of total and dissolved iron at Site E2 were 0.384 mg/L and 0.306 mg/L, respectively, both exceeding the CCME-PAL guideline level of 0.3 mg/L.

The concentrations of total and dissolved selenium at Site E2 were 0.00135 mg/L and 0.00139 mg/L, respectively, both exceeding the CCME-PAL guideline level of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guideline levels at Site E2.

#### Site E3

The concentration of total iron at Site E3 was 0.418 mg/L, exceeding the CCME-PAL guideline level of 0.3 mg/L.

No other reported parameters exceeded CCME-PAL guideline levels at Site E3.

#### Site E4

The concentration of total iron at Site E4 was 0.413 mg/L, exceeding the CCME-PAL guideline level of 0.3 mg/L.

Total and dissolved selenium concentrations at Site E4 were 0.00126 mg/L and 0.00118 mg/L, respectively, exceeding the CCME-PAL guideline level of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guideline levels at Site E4.

#### Site E7

The concentrations of total and dissolved iron at Site E7 were 0.518 mg/L and 0.351 mg/L respectively, both exceeding the CCME-PAL guideline level of 0.3 mg/L.

The concentrations of total and dissolved selenium at Site E7 were 0.00108 mg/L and 0.00115 mg/L respectively, both exceeding the CCME-PAL guideline level of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guideline levels at Site E7.

#### Site E8

The concentration of total aluminum at Site E8 was 0.124 mg/L, exceeding the CCME-PAL guideline level of 0.1 mg/L when pH is greater than 6.5 (the pH measured at the site was 8.25).



The concentrations of total and dissolved copper at Site E8 were 0.00314 mg/L and 0.00275 mg/L respectively, exceeding the water hardness-dependent CCME-PAL guideline level of 0.00214 mg/L calculated at a total water hardness of 89.9 mg/L.

The concentration of total iron at Site E8 was 0.348 mg/L, exceeding the CCME-PAL guideline level of 0.3 mg/L.

No other reported parameters exceeded CCME-PAL guideline levels at Site E8.

#### **Site PL**

The concentrations of total and dissolved selenium at Site PL were 0.00576 mg/L and 0.00584 mg/L respectively, both exceeding the CCME-PAL guideline level of 0.001 mg/L.

The concentrations of total and dissolved arsenic at Site PL were 0.00724 mg/L and 0.00757 mg/L respectively, both exceeding the CCME-PAL guideline level of 0.005 mg/L.

The concentrations of total and dissolved boron at Site PL were 4.44 mg/L and 4.01 mg/L respectively, both exceeding the CCME-PAL guideline level of 1.5 mg/L.

No other reported parameters exceeded CCME-PAL guideline levels at Site PL.

#### **Site SL**

The concentrations of total and dissolved selenium at Site SL were 0.0203 mg/L and 0.0194 mg/L respectively, both exceeding the CCME-PAL guideline level of 0.001 mg/L.

The concentrations of total and dissolved arsenic at Site SL were 0.0165 mg/L and 0.0166 mg/L respectively, both exceeding the CCME-PAL guideline level of 0.005 mg/L.

No other reported parameters exceeded CCME-PAL guideline levels at Site SL.

#### **Site GWCC-1**

The concentrations of total and dissolved selenium at Site GWCC-1 were 0.00860 mg/L and 0.00739 mg/L respectively, both exceeding the CCME-PAL guideline level of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guideline levels at Site GWCC-1.

#### **Site GWCC-2**

The concentrations of total and dissolved selenium at Site GWCC-2 were 0.00394 mg/L and 0.00428 mg/L respectively, both exceeding the CCME-PAL guideline level of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guideline levels at Site GWCC-2.

#### **Site GWCC-3**

The concentrations of total and dissolved selenium at Site GWCC-3 were 0.00209 mg/L and 0.00212 mg/L respectively, both exceeding the CCME-PAL guideline level of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guideline levels at Site GWCC-3.



**Site GWCC-4**

No laboratory analytical data were available for Site GWCC-4.

**Site GWCC-5**

The concentrations of total and dissolved selenium at Site GWCC-5 were 0.00271 mg/L and 0.00263 mg/L respectively, both exceeding the CCME-PAL guideline level of 0.001 mg/L.

No other reported parameters exceeded CCME-PAL guideline levels at Site GWCC-5.

**Table 3.2 Laboratory Analytical Results Summary for Non-Metal Parameters**

Parameter	Units	CCME-PAL	Surface Water – Reference Sites					Surface Water – Exposed Sites								Groundwater – Exposed Sites			
			R1	R2	R3	R4	R6	E1	E2	E3	E4	E7	E8	PL	SL	GWCC – 1	GCWW – 2	GWCC – 3	GWCC – 5
Dissolved Organic Carbon (DOC)	mg/L		13.9	9.97	14.4	13.4	11.6	15.8	14.4	13.4	13.8	13.3	12.6	1.18	9.25	5.95	6.52	7.69	7.04
Total Hardness (calculated as CaCO <sub>3</sub> )	mg/L		327	316	365	308	87.8	245	357	344	381	378	89.9	1700	762	1470	1330	805	496
Dissolved Hardness (calculated as CaCO <sub>3</sub> )	mg/L		315	326	386	319	90.2	255	366	346	393	383	91.0	1730	811	1480	1370	829	499
Nitrite	mg/L	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0060	0.0051	0.0051	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Nitrate	mg/L	0.55	0.277	0.039	0.058	0.242	0.142	0.161	0.164	0.088	0.143	0.169	0.146	0.421	0.231	0.363	0.417	0.240	0.034
Nitrate + Nitrite	mg/L		0.277	0.039	0.058	0.221	0.128	0.186	0.177	0.100	0.145	0.158	0.143	0.421	0.231	0.363	0.417	0.240	0.034
Total Nitrogen (mg/L)	mg/L		0.829	0.385	0.653	0.788	14.3	0.833	0.854	0.655	0.584	1.78	0.930	0.423	1.39	0.541	0.611	0.454	0.340
Total Kjeldahl Nitrogen (TKN)	mg/L		0.552	0.347	0.595	0.566	14.1	0.647	0.677	0.555	0.439	1.62	0.788	<0.020	1.16	0.178	0.195	0.214	0.306
Ammonia	mg/L	Varies‡	0.045	0.029	0.041	0.032	0.059	0.031	0.036	0.027	0.034	0.041	0.030	0.027	0.018	0.011	0.024	0.012	0.016
Dissolved Sulphate	mg/L		201	171	274	150	37.2	147	246	229	248	245	39.0	1580	671	1330	1250	681	289
Total Phosphorous	mg/L		0.0174	0.0099	0.0365	0.0098	0.0189	0.0119	0.0114	0.0126	0.0088	0.0209	0.0107	<0.0050	0.0083	<0.0050	<0.0050	<0.0050	0.0264
Total Suspended Solids (TSS)	mg/L	Varies†	<4.0	<4.0	45.8	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	13.3	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	5.3

Notes:

CCME-PAL: Canadian Council of Ministers of the Environment, Water Quality Guidelines for the Protection of Aquatic Life (Freshwater).

Shaded text indicates results that exceeded the applicable CCME-PAL guideline level.

† CCME-PAL guideline for TSS exposure is a maximum increase of 25 mg/L for up to 24 hours, or a maximum increase of 5 mg/L lasting between 24 hours and 30 days.

‡ CCME-PAL guideline for Total Ammonia varies according to pH and water temperature.



*This Page Intentionally Left Blank*

**Table 3.3 Laboratory Analytical Results Summary for Total Metal Parameters**

Metal	Reported Unit	CCME-PAL	Surface Water - Reference Sites					Surface Water - Exposed Sites								Groundwater Seepage - Exposed Sites			
			R1	R2	R3	R4	R6	E1	E2	E3	E4	E7	E8	PL	SL	GWCC - 1	GWCC - 2	GWCC - 3	GWCC - 5
Magnesium	mg/L		36.1	41.9	47.3	35.6	7.84	29.0	47.6	48.5	52.3	52.3	8.40	367	84.4	247	226	125	55.4
Potassium	mg/L		0.609	0.807	0.789	0.541	0.897	0.655	0.859	0.737	0.925	0.964	0.873	3.83	1.53	3.10	2.33	1.67	1.01
Sodium	mg/L		2.92	3.12	3.68	4.00	3.86	2.61	3.66	4.01	4.43	4.39	3.90	22.5	2.36	17.4	10.2	5.12	3.96
Sulphur	mg/L		63.2	57.5	86.6	57.5	12.6	46.6	79.8	72.6	81.9	80.2	14.0	491	203	419	376	206	97.8
Calcium	mg/L		71.4	57.4	68.3	64.6	22.2	50.1	64.7	57.7	66.2	65.3	22.2	75.3	166	183	159	117	107
Aluminum	mg/L	0.1@pH>6.5	0.0735	0.0378	0.234	0.0475	0.119	0.0670	0.0536	0.0671	0.0419	0.0669	0.124	0.0062	0.0271	0.0032	0.0036	0.0036	0.00218
Chromium	mg/L		0.00043	0.00085	0.00169	0.00057	0.00048	0.00063	0.00069	0.00095	0.00068	0.00085	0.00043	<0.00050	0.00101	0.00122	0.00150	0.00078	0.00063
Cobalt	mg/L		0.000643	0.000240	0.000781	0.00121	0.000349	0.000398	0.000730	0.000332	0.000822	0.000996	0.000351	0.000393	0.000125	0.000070	0.000091	0.000059	0.000106
Copper	mg/L	.00212-.004†	0.00313	0.00170	0.00328	0.00263	0.00297	0.00312	0.00272	0.00225	0.00227	0.00312	0.00314	0.00042	0.00163	0.00363	0.00168	0.00308	0.000905
Mercury‡	mg/L	0.000026	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010‡	<0.000010‡	<0.000010‡	<0.000010‡	<0.000010‡	<0.000010
Iron	mg/L	0.3	0.548	0.270	0.999	0.191	0.345	0.298	0.384	0.418	0.413	0.518	0.348	0.0295	0.0231	0.0057	<0.0050	0.0071	0.0710
Lead	mg/L	0.0027-0.007†	0.000270	0.0000470	0.000511	0.0000750	0.0000940	0.000147	0.000128	0.000135	0.000110	0.000207	0.0000800	0.000034	0.000032	0.000098	0.000026	0.000070	0.0000130
Lithium	mg/L		0.00348	0.00627	0.00491	0.00376	0.00330	0.00320	0.00828	0.00475	0.0126	0.0121	0.00348	0.0863	0.0105	0.0782	0.0320	0.0104	0.0124
Manganese	mg/L		0.321	0.147	0.181	0.226	0.0233	0.146	0.157	0.101	0.185	0.310	0.0273	0.00824	0.00253	<0.00025	<0.00025	<0.00025	0.00609
Antimony	mg/L		0.000238	0.000514	0.000203	0.000428	0.000118	0.000294	0.000397	0.000766	0.000445	0.000408	0.000111	0.0185	0.00361	0.00143	0.00122	0.00089	0.000723
Molybdenum	mg/L		0.00144	0.000817	0.00137	0.00115	0.000463	0.00135	0.00163	0.00140	0.00170	0.00151	0.000419	0.00824	0.00241	0.00268	0.00253	0.00274	0.00149
Nickel	mg/L	0.08658-0.150†	0.00472	0.00404	0.00531	0.0135	0.00264	0.00507	0.0136	0.0108	0.0169	0.0169	0.00295	0.104	0.0172	0.0728	0.0554	0.0377	0.0150
Selenium	mg/L	0.001	0.00160	0.000860	0.000628	0.00333	0.000177	0.00106	0.00135	0.000726	0.00126	0.00108	0.000204	0.00576	0.0203	0.00860	0.00394	0.00209	0.00271
Silicon	mg/L		4.26	5.05	5.32	4.55	4.45	3.60	3.86	4.90	3.95	4.08	4.20	1.54	4.07	5.14	4.16	3.93	4.33
Silver	mg/L		0.0000080	<0.0000050	0.0000080	0.0000060	0.0000050	<0.0000050	<0.0000050	0.0000070	0.0000060	0.0000080	0.0000070	<0.000025	<0.000025	<0.000025	<0.000025	<0.000025	<0.0000050
Strontium	mg/L		0.344	0.351	0.395	0.389	0.134	0.279	0.414	0.341	0.469	0.443	0.137	0.676	0.886	1.86	1.22	0.704	0.729
Arsenic	mg/L	0.005	0.000804	0.000879	0.00103	0.00161	0.000581	0.000861	0.00112	0.00127	0.00114	0.00119	0.000556	0.00724	0.0165	0.00236	0.00176	0.00097	0.000764
Thallium	mg/L	0.0008	0.000060	0.0000030	0.0000030	0.0000050	0.0000020	0.0000080	0.0000190	0.0000030	0.0000160	0.0000120	0.0000020	0.000336	0.000019	0.000098	0.000078	0.000080	0.0000170
Tin	mg/L		0.00038	0.00029	0.00096	0.00032	0.00039	0.00048	0.00034	0.00031	0.00052	0.00022	0.00040	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	0.00022
Titanium	mg/L		0.00274	0.00122	0.00655	0.00095	0.00151	0.00225	0.00087	0.00129	0.00148	0.00149	0.00188	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.00050
Uranium	mg/L	0.015	0.00211	0.00429	0.00540	0.00478	0.000843	0.00202	0.00228	0.00333	0.00243	0.00240	0.000857	0.0115	0.00275	0.00698	0.00468	0.00244	0.00201
Vanadium	mg/L		0.00044	0.00037	0.00143	0.00036	0.00074	0.00046	0.00045	0.00073	0.00035	0.00055	0.00072	<0.0010	0.0011	<0.0010	0.0014	0.0010	<0.00020
Zinc	mg/L	0.030	0.00422	0.00246	<b>0.0297</b>	0.00448	0.00345	0.00348	0.00577	0.00173	0.00817	0.00453	0.00650	0.00212	0.00343	0.0101	0.00892	0.00595	0.00212
Barium	mg/L		0.0540	0.0515	0.0624	0.0610	0.0355	0.0626	0.0582	0.0548	0.0552	0.0640	0.0358	0.0108	0.0219	0.0189	0.0228	0.0290	0.0857
Zirconium	mg/L		0.00102	0.00054	0.00099	0.00141	0.00075	0.00106	0.00085	0.00078	0.00100	0.00148	0.00070	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00019
Beryllium	mg/L		0.000015	<0.000010	0.000029	<0.000010	0.000020	0.000015	0.000015	<0.000010	0.000012	0.000015	0.000020	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010
Bismuth	mg/L		<0.0000050	<0.0000050	0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000025	<0.000025	<0.000025	<0.000025	<0.000025	<0.0000050
Boron	mg/L	1.500	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.062	0.053	<0.050	<0.050	4.44	<0.25	0.30	<0.25	<0.25	<0.050
Cadmium	mg/L	0.00014-0.00037†	0.0000880	0.0000290	0.0000560	0.0000990	0.0000270	0.0000430	0.0000580	0.0000240	0.0000540	0.0000760	0.0000280	0.000080	0.000044	0.000199	0.000215	0.000141	0.000118

Notes:

CCME-PAL: Canadian Council of Ministers of the Environment, Water Quality Guidelines for the Protection of Aquatic Life (Freshwater).

Shaded text indicates results that exceeded the applicable CCME-PAL guideline level. Bold and italic text indicates results that were near to but not exceeding CCME-PAL guideline level.

† Indicates a CCME-PAL guideline level that is dependent on total water hardness, therefore the range applicable to study results is indicated.

‡ Mercury was analyzed using ICPMS, except for those marked which were analyzed using Cold Vapor Atomic Fluorescence (CVAF). This analysis was completed as the analytical laboratory reported metals interference that prevented ICPMS analysis.

*This Page Intentionally Left Blank*



**Table 3.4 Laboratory Analytical Results Summary for Dissolved Metal Parameters**

Metal	Reported Unit	CCME-PAL	Surface Water Reference Sites					Surface Water – Exposed Sites								Groundwater Seepage - Exposed Sites			
			R1	R2	R3	R4	R6	E1	E2	E3	E4	E7	E8	PL	SL	GWCC-1	GWCC-2	GWCC-3	GWCC-5
Magnesium	mg/L		34.9	43.9	49.2	35.4	7.94	29.4	47.5	47.6	53.0	52.2	8.38	371	88.3	245	226	126	55.1
Potassium	mg/L		0.597	0.812	0.791	0.544	0.916	0.670	0.891	0.715	0.955	1.01	0.924	3.84	1.53	3.16	2.47	1.67	0.992
Sodium	mg/L		3.00	3.20	3.84	3.90	3.85	2.55	3.55	3.92	4.40	4.20	3.75	22.2	2.41	16.6	9.92	5.04	3.78
Sulphur	mg/L		83.7	57.4	86.8	56.8	12.5	48.8	81.9	71.7	86.5	85.2	13.7	520	221	420	395	211	100
Calcium	mg/L		68.6	58.2	73.5	69.3	23.0	53.8	68.3	60.2	70.0	67.2	22.6	79.7	179	188	177	125	109
Aluminum	mg/L	0.1@pH>6.5	0.0283	0.0247	0.0370	0.0239	0.0786	0.0328	0.0271	0.0293	0.0193	0.0244	0.0776	<0.0025	0.0082	0.0026	<0.0025	0.0036	0.00233
Chromium	mg/L		0.00034	0.00056	0.00067	0.00049	0.00038	0.00052	0.00053	0.00093	0.00068	0.00081	0.00049	0.00104	0.00122	0.00172	0.00161	0.00110	0.00063
Cobalt	mg/L		0.000580	0.000203	0.000448	0.00116	0.000278	0.000360	0.000671	0.000267	0.000768	0.000820	0.000308	0.000375	0.000129	0.000076	0.000095	0.000057	0.0000930
Copper	mg/L	.00212-.004†	0.00290	0.00157	0.00479	0.00261	0.00278	0.0102	0.00257	0.00215	0.00230	0.00248	0.00275	0.00055	0.00124	0.00112	0.00135	0.00123	0.000885
Mercury‡	mg/L	0.000026	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010‡	<0.000010‡	<0.000010‡	<0.000010‡	<0.000010‡	<0.000010
Iron	mg/L	0.3	0.344	0.203	0.238	0.158	0.253	0.213	0.306	0.231	0.317	0.351	0.251	0.0176	0.0169	0.0052	<0.0050	0.0140	0.0367
Lead	mg/L	0.0027-0.007†	0.0000580	0.0000220	0.000111	0.0000470	0.0000290	0.0000640	0.0000880	0.0000620	0.0000560	0.0000860	0.0000490	<0.000025	<0.000025	<0.000025	<0.000025	<0.000025	0.0000060
Lithium	mg/L		0.00333	0.00609	0.00465	0.00382	0.00343	0.00346	0.00862	0.00491	0.0120	0.0118	0.00353	0.0888	0.0109	0.0795	0.0331	0.0099	0.0122
Manganese	mg/L		0.311	0.137	0.154	0.222	0.0196	0.137	0.153	0.0919	0.179	0.283	0.0237	0.00805	0.00305	0.00046	0.00043	0.00043	0.00562
Antimony	mg/L		0.000252	0.000496	0.000176	0.000441	0.000113	0.000329	0.000432	0.000787	0.000461	0.000381	0.000108	0.0190	0.00366	0.00167	0.00132	0.00099	0.000867
Molybdenum	mg/L		0.00149	0.000791	0.00132	0.00125	0.000461	0.00140	0.00176	0.00146	0.00171	0.00167	0.000486	0.00810	0.00241	0.00273	0.00289	0.00287	0.00155
Nickel	mg/L	0.08658-0.150†	0.00460	0.00327	0.00359	0.0132	0.00240	0.00471	0.0131	0.0103	0.0163	0.0159	0.00272	0.105	0.0168	0.0709	0.0538	0.0364	0.0145
Selenium	mg/L	0.001	0.00154	0.000738	0.000568	0.00339	0.000180	0.000989	0.00139	0.000859	0.00118	0.00115	0.000166	0.00584	0.0194	0.00739	0.00428	0.00212	0.00263
Silicon	mg/L		4.65	5.57	5.91	4.61	4.45	3.66	3.83	4.88	3.98	4.03	4.10	1.57	4.37	5.07	4.57	4.09	4.17
Silver	mg/L		<0.0000050	<0.0000050	<0.0000050	0.0000060	<0.0000050	0.0000060	<0.0000050	<0.0000050	<0.0000050	0.0000100	<0.0000050	<0.000025	<0.000025	<0.000025	<0.000025	<0.000025	<0.0000050
Strontium	mg/L		0.355	0.343	0.373	0.389	0.139	0.286	0.426	0.336	0.480	0.463	0.141	0.727	0.960	1.92	1.28	0.741	0.761
Arsenic	mg/L	0.005	0.000615	0.000812	0.000645	0.00149	0.000477	0.000775	0.00105	0.00113	0.00105	0.00106	0.000497	0.00757	0.0166	0.00243	0.00160	0.00102	0.000686
Thallium	mg/L	0.0008	0.0000040	0.0000030	<0.0000020	0.0000050	0.0000030	0.0000070	0.0000190	0.0000020	0.0000130	0.0000090	0.0000030	0.000382	0.000020	0.000100	0.000088	0.000089	0.0000170
Tin	mg/L		0.00047	0.00078	0.00114	0.00066	0.00034	0.00078	0.00033	0.00037	0.00035	0.00066	0.00060	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00077
Titanium	mg/L		0.00075	0.00062	0.00080	0.00086	0.00130	0.00067	0.00053	0.00052	<0.00050	0.00070	0.00133	0.0028	0.0027	<0.0025	<0.0025	<0.0025	<0.00050
Uranium	mg/L	0.015	0.00208	0.00400	0.00490	0.00459	0.000817	0.00194	0.00220	0.00331	0.00229	0.00225	0.000820	0.0115	0.00275	0.00642	0.00433	0.00231	0.00195
Vanadium	mg/L		0.00036	0.00047	0.00053	0.00032	0.00059	0.00037	0.00033	0.00054	0.00030	0.00037	0.00068	0.0010	<0.0010	0.0012	<0.0010	<0.0010	<0.00020
Zinc	mg/L	0.030	0.00330	0.00160	0.00710	0.00357	0.00218	0.00221	0.00414	0.00240	0.00150	0.00458	0.00428	0.00173	0.00091	0.00731	0.00664	0.00431	0.00223
Barium	mg/L		0.0499	0.0483	0.0425	0.0580	0.0344	0.0607	0.0560	0.0523	0.0544	0.0598	0.0352	0.0108	0.0223	0.0188	0.0229	0.0300	0.0665
Zirconium	mg/L		0.00090	0.00050	0.00074	0.00134	0.00076	0.00094	0.00079	0.00066	0.00099	0.00123	0.00076	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00026
Beryllium	mg/L		0.000012	<0.000010	0.000012	<0.000010	0.000021	0.000012	0.000013	0.000012	0.000013	0.000010	0.000020	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010
Bismuth	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000025	<0.000025	<0.000025	<0.000025	<0.000025	<0.0000050
Boron	mg/L	1.500	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.073	0.058	<0.050	<0.050	4.01	<0.25	0.34	<0.25	<0.25	<0.050
Cadmium	mg/L	0.00014-0.00037†	0.0000630	0.0000280	0.0000150	0.0000850	0.0000230	0.0000390	0.0000550	0.0000150	0.0000470	0.0000640	0.0000240	0.000083	0.000044	0.000229	0.000216	0.000137	0.0000880

Notes:

CCME-PAL: Canadian Council of Ministers of the Environment, Water Quality Guidelines for the Protection of Aquatic Life (Freshwater).

Shaded text indicates results that exceeded the applicable CCME-PAL guideline level.

† Indicates a CCME-PAL guideline level that is dependent on total water hardness, therefore the range applicable to study results is indicated.

‡ Mercury was analyzed using ICPMS, except for those marked which were analyzed using Cold Vapor Atomic Fluorescence (CVAF). This analysis was completed as the analytical laboratory reported metals interference that prevented ICPMS analysis.

*This Page Intentionally Left Blank*

### 3.1.3 Water Quality Monitoring QA/QC Review

Duplicate laboratory analytical samples were collected at Sites EI and GWCC-5, using the same methods for collection and treatment (application of preservative and/or filtration). Comparative results between duplicate and corresponding test samples are summarized in **Tables 3.5, 3.6, and 3.7**, below. Instances where the duplicate results and the test results exceeded the acceptable RPD limit of 20% are shaded within the tables, and discussed in the following sections. Field and travel blank sample results are provided for comparison.

#### 3.1.3.1 QA/QC for Non-Metal Parameters

##### *Site EI / Duplicate 1*

The RPD value for all corresponding pairs of results between Site EI and Dup-1 fell below the 20% QA/QC threshold, indicating that contamination, sampling error or laboratory error did not occur (**Table 3.5**).

##### *Site GWCC-5 / Duplicate 2*

Total nitrogen and Total Kjeldahl Nitrogen (TKN) concentrations between the results for Site GWCC-5 and Dup-2 exceeded the QA/QC 20% RPD threshold (**Table 3.5**). The total nitrogen and TKN concentrations for Site GWCC-5 were 0.340 mg/L and 0.306 mg/L, while the total nitrogen and TKN concentrations for Dup-2 were both 876 mg/L. Due to the significant differences between these results (greater than 3 orders of magnitude), the laboratory was asked to investigate and subsequently determined that contamination from the field sampling program had not occurred, but that the laboratory had swapped a sample bottle preserved with sulphuric acid for a bottle preserved with nitric acid resulting in the perceived elevated nitrogen levels. Accordingly, the laboratory was asked to re-analyze the sample but subsequent to this, the laboratory had misplaced the properly preserved sample bottle. The laboratory reanalyzed the Dup-2 sample using an unpreserved bottle after 30-days of shelf time. The reanalyzed result of 1.31 mg/L for both total nitrogen and TKN still exceeded the 20% RPD limit, but were deemed to be correct by the laboratory.

The RPD value for all other corresponding pairs of results between Site GWCC-5 and Dup-2 fell below the 20% QA/QC threshold indicating that contamination or sampling error did not occur (**Table 3.5**).

##### *Field Blank and Travel Blank*

The analytical results of the field blank and travel blank were below or near RDL values for all non-metal parameters (**Table 3.5**). Reported sulphate concentrations of 0.84 mg/L and 0.54 mg/L for the field blank and travel blank, respectively, slightly exceeded the RDL of 0.5 mg/L. Further, reported values for ammonia, total nitrogen, and TKN in the travel blank were 0.024 mg/L, 0.031 mg/L, and 0.031 mg/L, respectively, slightly exceeding the RDLs for these parameters of 0.0050 mg/L, 0.02 mg/L, and 0.02 mg/L, respectively. These results are not considered to be great enough to suggest a potential effect of the shipping or handling processes.

**Table 3.5: Comparison of Duplicate and Blank Results for Non-Metal Parameters**

Parameter	Units	Surface Water – Exposed		Seep – Exposed		Blanks	
		Site EI	Duplicate (Dup-1)	GWCC-5	Duplicate (Dup-2)	Field Blank	Travel Blank
Nitrite	mg/L	0.0060	0.0062	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Nitrate	mg/L	0.161	0.164	0.034	< 0.020	< 0.020	< 0.020
Nitrate + Nitrite	mg/L	0.186	0.185	0.034	< 0.020	< 0.020	< 0.020
Total Hardness	mg/L	245	241	496	482	< 0.50	< 0.50
Dissolved Hardness	mg/L	255	245	499	505	< 0.50	< 0.50
Dissolved Organic Carbon	mg/L	15.8	15.3	7.04	6.76	< 0.50	< 0.50
Dissolved Sulphate	mg/L	147	143	289	289	<b>0.84</b>	<b>0.54</b>
Ammonia	mg/L	0.031	0.039	0.016	0.026	< 0.0050	<b>0.024</b>
Total Nitrogen	mg/L	0.833	0.793	0.340	876 <sup>1</sup> / 1.31 <sup>2</sup>	< 0.020	<b>0.031</b>
Total TKN	mg/L	0.647	0.609	0.306	876 <sup>1</sup> / 1.31 <sup>2</sup>	< 0.020	<b>0.031</b>
Total Phosphorous	mg/L	0.0119	0.0123	0.0264	<.0050	< 0.0050	< 0.0050
TSS	mg/L	< 4.0	< 4.0	5.3	< 4.0	< 4.0	< 4.0

Notes:

Shaded cells indicate instances where duplicate and test sample results exceeded the 20% RPD threshold.

Bold text indicates results in the field or travel blank above RDL level.

1 - Original sample analyzed within 72 hour laboratory hold time in September 2013.

2 - Re-run sample analyzed in November 2013; unpreserved and shelved for more than 30 days.

### 3.1.3.2 QAI/QC for Total Metal Parameters

#### Site EI and Dup-1

Aluminum and zinc concentrations between the results for Site EI and Dup-1 exceeded the QA/QC 20% RPD threshold. While neither exceeded the respective CCME-PAL guideline (0.1 mg/L and 0.030 mg/L respectively), the differences in concentration between Site EI and Dup-1 did exceed the QA/QC threshold.

Aluminum concentrations in samples EI and Dup-1 were measured at 0.0670 mg/L and 0.0963 mg/L, respectively, resulting in an RPD of approximately 36%. Neither result exceeded the CCME-PAL guideline of 0.1 mg/L when pH is greater than 6.5. Low-level contamination of aluminum either at the sample site or in the lab is common due to its ubiquity.

Zinc concentrations in samples EI and Dup-1 were measured at 0.00348 mg/L and 0.00257 mg/L, respectively, resulting in an RPD of 30%. Neither result exceeded the CCME-PAL guideline of 0.030 mg/L. As with aluminum, low-level contamination of zinc either at the sample site or in the lab is common due to its ubiquity.

#### Site GWCC-5 and Dup-2

Eight metal parameters between the results for Site GWCC-5 and Dup-2 exceeded the QA/QC 20% RPD threshold: aluminum, chromium, cobalt, copper, iron, manganese, arsenic and tin. In no instances did the detected levels of these metals exceed the CCME-PAL guidelines.

Aluminum concentrations in sample GWCC-5 were 0.00218 mg/L, while the concentration in Dup-2 was 0.00334 mg/L, resulting in an RPD of 42%. Neither of these concentrations exceeded the CCME-PAL guideline level of 0.1 mg/L at pH greater than 6.5.



Chromium concentrations in sample GWCC-5 were 0.00063 mg/L, while the concentration in Dup-2 was measured to be 0.00086 µg/L, resulting in an RPD of 31%. No CCME-PAL guideline level currently exists for chromium.

Cobalt concentrations in sample GWCC-5 were 0.000106 mg/L, while the concentration in Dup-2 was measured to be 0.000150 mg/L, resulting in an RPD of 34%. No CCME-PAL guideline level currently exists for cobalt.

Copper concentrations in sample GWCC-5 were 0.000905 mg/L, while the concentration in DUP-2 was measured to be 0.00142 mg/L, resulting in an RPD of 44%. Neither sample exceeded the water hardness-dependent CCME-PAL guideline level of 0.0040 mg/L calculated at a total hardness of 496 mg/L.

Iron concentrations in sample GWCC-5 were 0.0710 mg/L, while the concentration in DUP-2 was measured to be 0.207 mg/L, resulting in an RPD of 98%. Neither sample exceeded the CCME-PAL guideline level of 0.3 mg/L for iron.

Manganese concentrations in sample GWCC-5 were 0.00609 mg/L, while the concentration in DUP-2 was measured to be 0.0105 mg/L, resulting in an RPD of 530%. No CCME-PAL guideline level currently exists for manganese.

Arsenic concentrations in sample GWCC-5 were 0.000764 mg/L, while the concentration in DUP-2 was measured to be 0.00101 mg/L, resulting in an RPD of 28%. Neither sample exceeded the CCME-PAL guideline level of 0.0050 mg/L for arsenic.

Tin concentrations in sample GWCC-5 were 0.00022 mg/L, while the concentration in DUP-2 was measured to be 0.00043 mg/L, resulting in an RPD of 65%. No CCME-PAL guideline level currently exists for tin.

The occurrence of RPD exceedances for eight total metal parameters may have been the result of several potential factors. According to the laboratory that analyzed the samples for this program, exceeding the RPD threshold of 20% is common at very low concentrations, and for those near RDL values. Despite the exceedance of RPD, the laboratory did not consider the reported differences to be significant. Alternately, the observed result could have been the result of contamination of the total metal sample that was not detected by the sampler. Finally, as the results compared were from a groundwater seep site (Site GWCC-5), it is possible that there was some temporal variation in the quality of water at the seep due to the low flow rate from the seep and limited opportunity for mixing.

### **Field Blank and Travel Blank**

The analytical results of the field blank and travel blank were below or near RDL values for all total metal parameters (**Table 3.6**). The reported copper concentration of 0.000102 mg/L in the field blank only slightly exceeded the RDL of 0.000050 mg/L. The reported lead concentration of 0.0000060 mg/L in the travel blank only slightly exceeded the RDL of 0.0000050 mg/L. Finally, the reported zinc concentrations of 0.00011 mg/L and 0.00038 mg/L in the field blank and travel blank, respectively, were near the RDL of 0.0001 mg/L. These results are not considered to be great enough to suggest a significant effect of the shipping or handling processes.





Table 3.6: Comparison of Duplicate and Blank Results for Total Metals

Metal	Units	Surface Water – Exposed		Seep – Exposed		Blanks	
		Site EI	Duplicate (Dup-1)	GWCC-5	Duplicate (Dup-2)	Field Blank (Site EI)	Travel Blank
Magnesium	mg/L	29.0	28.5	55.4	55.7	<0.050	<0.050
Potassium	mg/L	0.655	0.631	1.01	1.08	<0.050	<0.050
Sodium	mg/L	2.61	2.55	3.96	3.96	<0.050	<0.050
Sulphur	mg/L	46.6	46.8	97.8	99.0	<3.0	<3.0
Calcium	mg/L	50.1	49.3	107	101	<0.050	<0.050
Aluminum	mg/L	0.0670	0.0963	0.00218	0.00334	<0.00050	<0.00050
Chromium	mg/L	0.00063	0.00069	0.00063	0.00086	<0.00010	<0.00010
Cobalt	mg/L	0.000398	0.000410	0.000106	0.000150	<0.000050	<0.000050
Copper	mg/L	0.00312	0.00326	0.000905	0.00142	<b>0.000102</b>	<0.000050
Mercury	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Iron	mg/L	0.298	0.316	0.0710	0.207	<0.0010	<0.0010
Lead	mg/L	0.000147	0.000154	0.0000130	0.0000320	<0.000050	<b>0.000060</b>
Lithium	mg/L	0.00320	0.00341	0.0124	0.0123	<0.00050	<0.00050
Manganese	mg/L	0.146	0.144	0.00609	0.0105	<0.000050	<0.000050
Antimony	mg/L	0.000294	0.000321	0.000723	0.000592	<0.000020	<0.000020
Molybdenum	mg/L	0.00135	0.00134	0.00149	0.00138	<0.000050	<0.000050
Nickel	mg/L	0.00507	0.00506	0.0150	0.0156	<0.000020	<0.000020
Selenium	mg/L	0.00106	0.000965	0.00271	0.00274	<0.000040	<0.000040
Silicon	mg/L	3.60	3.37	4.33	3.93	<0.10	<0.10
Silver	mg/L	<0.0000050	0.0000070	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Strontium	mg/L	0.279	0.272	0.729	0.715	<0.000050	<0.000050
Arsenic	mg/L	0.000861	0.000854	0.000764	0.00101	<0.000020	<0.000020
Thallium	mg/L	0.0000080	0.0000080	0.0000170	0.0000180	<0.0000020	<0.0000020
Tin	mg/L	0.00048	0.00035	0.00022	0.00043	<0.00020	<0.00020
Titanium	mg/L	0.00225	0.00225	<0.00050	<0.00050	<0.00050	<0.00050
Uranium	mg/L	0.00202	0.00196	0.00201	0.00191	<0.0000020	<0.0000020
Vanadium	mg/L	0.00046	0.00058	<0.00020	<0.00020	<0.00020	<0.00020
Zinc	mg/L	0.00348	0.00257	0.00212	0.00272	<b>0.00011</b>	<b>0.00038</b>
Barium	mg/L	0.0626	0.0613	0.0857	0.100	<0.000020	<0.000020
Zirconium	mg/L	0.00106	0.00086	0.00019	0.00021	<0.00010	<0.00010
Beryllium	mg/L	0.000015	0.000014	<0.000010	<0.000010	<0.000010	<0.000010
Bismuth	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Boron	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Cadmium	mg/L	0.0000430	0.0000440	0.000118	0.000139	<0.0000050	<0.0000050

Notes:

Shaded cells indicate instances where duplicate and test sample results exceeded the 20% RPD threshold.

Bold text indicates results in the field or travel blank above RDL level.

### 3.1.3.3 QA/QC for Dissolved Metal Parameters

#### **Site E1 and Dup-1**

Copper and zinc concentrations between the results for Site E1 and Dup-1 exceeded the QA/QC 20% RPD threshold (**Table 3.7**)

The concentration of dissolved copper in E1 was measured to be 0.0102 mg/L, while the concentration in Dup-1 was measured to be 0.00324 mg/L, resulting in an RPD of 103%. The concentration of copper in sample E1 exceeded the water hardness-dependent CCME-PAL guideline level of 0.004 mg/L calculated at a total water hardness of 245 mg/L, while that in sample Dup-1 did not. This pair of samples was reanalyzed during the lab QA/QC process and the same results were achieved; therefore, the result for both samples were deemed to be accurate by the laboratory. Considering that only one other element was confirmed to have exceeded the RPD threshold, the difference may have been the result of isolated contamination in either the field or laboratory.

The concentration of dissolved zinc in E1 was measured to be 0.00221 mg/L, while the concentration in Dup-1 was measured to be 0.00152 mg/L, resulting in an RPD of 37%. Neither sample exceeded the CCME-PAL guideline level of 0.030 mg/L. At the low levels detected, contamination of zinc is common due to the ubiquity of this element. Atmospheric dust from sample sites or the lab can contribute to this discrepancy.

#### **GWCC-5 and Dup-2**

Tin and zinc concentrations between the results for Site GWCC-5 and Dup-2 exceeded the QA/QC 20% RPD threshold (**Table 3.7**). The RPD level could not be calculated for metals where concentrations were below lab detection limits. At levels less than five-times the residual detection limit set by the lab, accurately calculating a RPD is not possible.

The concentration of dissolved sulphur in GWCC-5 was measured to be 100 mg/L, while the concentration in Dup-2 was measured to be 1,940 mg/L, resulting in an RPD of 180%. An error was discovered during data review (the same error as with the TKN analysis previously discussed), where the lab had switched a sulphuric acid-preserved bottle for a nitric acid-preserved bottle, resulting in elevated sulphate levels. This sample was reanalyzed by the laboratory, and the correct concentration of sulphur was determined to be 108 mg/L, resulting in an RPD of 7.7%.

The concentration of dissolved zinc in GWCC-5 was measured to be 0.00223 mg/L, while the concentration in Dup-2 was measured to be 0.00060 mg/L, resulting in an RPD of 120%. Neither of these results exceeded the CCME-PAL guideline level of 0.005 mg/L.

#### **Field Blank and Travel Blank**

The analytical results of the field blank and travel blank were below or near RDL values for all nearly all dissolved metal parameters (**Table 3.7**). In the field blank, copper, lead, thallium, and barium were detected, all near RDL with the exception of copper (at four times RDL). The occurrence of copper in the field blank (collected at Site E1) suggests that the source of copper contamination may have been either an environmental source at Site E1, or a source of contamination in filtering equipment that could have been applied across multiple sites.



Table 3.7: Comparison of Duplicate and Blank Results for Dissolved Metals

Metal	Units	Surface Water – Exposed		Seep – Exposed		Blanks	
		Site EI	Duplicate (Dup-1)	GWCC-5	Site EI	Field Blank (Site EI)	Travel Blank
Magnesium	mg/L	29.4	28.3	55.1	58.1	<0.050	<0.050
Potassium	mg/L	0.670	0.667	0.992	1.05	<0.050	<0.050
Sodium	mg/L	2.55	2.49	3.78	4.22	<0.050	<0.050
Sulphur	mg/L	48.8	46.6	100	1940 / 108 <sup>2</sup>	<3.0	<3.0
Calcium	mg/L	53.8	51.6	109	107	<0.050	<b>0.053</b>
Aluminum	mg/L	0.0328	0.0338	0.00233	0.00187	<0.00050	<b>0.00070</b>
Chromium	mg/L	0.00052	0.00056	0.00063	0.00059	<0.00010	<0.00010
Cobalt	mg/L	0.000360	0.000343	0.0000930	0.0000930	<0.0000050	<0.0000050
Copper	mg/L	0.0102*	0.00324	0.000885	0.000753	<b>0.000212</b>	<b>0.000051</b>
Mercury	mg/L	<0.000010	<0.000010	<0.000010	-	<0.000010	<0.000010
Iron	mg/L	0.213	0.224	0.0367	0.0387	<0.0010	<0.0010
Lead	mg/L	0.0000640	0.0000780	0.0000060	0.0000050	<b>0.0000080</b>	<b>0.0000060</b>
Lithium	mg/L	0.00346	0.00339	0.0122	0.0113	<0.00050	<0.00050
Manganese	mg/L	0.137	0.133	0.00562	0.00581	<0.000050	<0.000050
Antimony	mg/L	0.000329	0.000324	0.000867	0.000866	<0.000020	<0.000020
Molybdenum	mg/L	0.00140	0.00135	0.00155	0.00143	<0.000050	<0.000050
Nickel	mg/L	0.00471	0.00464	0.0145	0.0149	<0.000020	<0.000020
Selenium	mg/L	0.000989	0.000985	0.00263	0.00258	<0.000040	<0.000040
Silicon	mg/L	3.66	3.44	4.17	5.27	<0.10	<0.10
Silver	mg/L	0.0000060	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Strontium	mg/L	0.286	0.289	0.761	0.724	<0.000050	<b>0.000061</b>
Arsenic	mg/L	0.000775	0.000800	0.000686	0.000655	<0.000020	<0.000020
Thallium	mg/L	0.0000070	0.0000070	0.0000170	0.0000130	<b>0.0000020</b>	<0.0000020
Tin	mg/L	0.00078	0.00062	0.00077	<0.00020	<0.00020	<0.00020
Titanium	mg/L	0.00067	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Uranium	mg/L	0.00194	0.00191	0.00195	0.00182	<0.0000020	<0.0000020
Vanadium	mg/L	0.00037	0.00037	<0.00020	<0.00020	<0.00020	<0.00020
Zinc	mg/L	0.00221	0.00152	0.00223	0.00060	<0.00010	<b>0.00034</b>
Barium	mg/L	0.0607	0.0610	0.0665	0.0640	<b>0.000020</b>	<b>0.000027</b>
Zirconium	mg/L	0.00094	0.00088	0.00026	0.00022	<0.00010	<0.00010
Beryllium	mg/L	0.000012	0.000012	<0.000010	<0.000010	<0.000010	<0.000010
Bismuth	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Boron	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Cadmium	mg/L	0.0000390	0.0000370	0.0000880	0.0000810	<0.0000050	<0.0000050

Notes:

Shaded cells indicate instances where duplicate and test sample results exceeded the 20% RPD threshold.

Bold text indicates results in the field or travel blank above RDL level.

\*Result exceeds the respective CCME-PAL guideline.

1 - Original sample analyzed within 72 hour laboratory hold time in September 2013.

2 - Re-run sample analyzed in November 2013; unpreserved and shelved for more than 30 days.

### 3.2 STREAM HYDROLOGICAL MONITORING RESULTS

Stream hydrological monitoring was conducted at 10 of the 18 sites visited during the monitoring program, based on where stream flows and defined channels were present, and where it was safe for staff to collect measurements. Accordingly, no hydrological monitoring was conducted at the two pit lake sites (Porcupine and Snowshoe Pit Lakes) or at groundwater sites GWCC-1, GWCC-2 and GWCC-3, due to a lack of defined channels and/or sufficient flows. Also, it was not safe for ELR staff to collect hydrological measurements in the Forty Mile River (Sites R6 and E8) due to the combined depth and flow of that river.

Hydrological measurements collected during the monitoring program are summarized in **Table 3.8**, below, while detailed data, calculations, and crossing profiles are attached in Appendix 3.

**Table 3.8: Summary of Hydrological Data Collected During the Monitoring Program**

Site	Location (UTM)	Wetted Width (m)	Mean Channel Depth (m)	Mean Velocity (m/s)	Mean Calculated Discharge (m <sup>3</sup> /s)
R1	7W 510697 7147528	5.35	0.22	0.225	0.3239
R2	7W 512021 7148023	2.90	0.15	0.135	0.0748
R3	7W 513956 7148689	2.70	0.06	0.200	0.0541
R4	7W 515979 7145336	1.55	0.12	0.280	0.0707
R6*	7W 519483 7141726	-	-	-	-
E1	7W 513470 7147216	5.00	0.23	0.375	0.6604
E2	7W 514149 7147074	4.90	0.18	0.410	0.5118
E3	7W 514178 7147186	2.00	0.18	0.145	0.0799
E4	7W 515949 7145288	5.50	0.20	0.560	0.6973
E7	7W 519419 7142051	7.55	0.17	0.450	0.8776
E8†	7W 519456 7142789	-	-	-	-
PL‡	7W 513290 7146350	-	-	-	-
SL‡	7W 513833 7146711	-	-	-	-
GWCC-1§	7W 513902 7146954	-	-	-	-
GWCC-2§	7W 5139899 7146966	-	-	-	-
GWCC-3§	7W 513880 7147038	-	-	-	-
GWCC-4**	7W 513869 7147044	-	-	-	1.808 × 10 <sup>-4</sup>
GWCC-5***	7W 513988 7147122	0.90	0.00	0.200	0.0162

Notes:

\*Site R6 = Forty Mile River upstream of Clinton Creek; discharge data could not be safely collected.

† Site E8 = Forty Mile River, downstream of Clinton Creek; discharge data could not be safely collected.

‡ Sites PL and SL were pit lakes, therefore no discharge data was collected.

§ Groundwater seepage site without defined channel. No measureable discharge.

\*\* No defined channel present, but ELR was able to collect discharge data at Site GWCC-5 using a timed volume flow measurement

\*\*\* No defined channel was present, but ELR was able to construct a channel 0.90 m wide and 0.09 m deep in which to collect discharge data.

### 3.2.1 Site R1

Fifteen stations were sampled at Site R1 (Clinton Creek upstream of Hudgeon Lake). The channel had a wetted width of 5.35 m and a mean depth of 0.22 m. Stream velocities ranged from 0.1 m/s to 0.4 m/s, with a mean velocity of 0.23 m/s. The calculated discharges for two crossings were 0.3385 m<sup>3</sup>/s and 0.3093 m<sup>3</sup>/s, resulting in a mean calculated discharge at Site R1 of 0.3239 m<sup>3</sup>/s.

### 3.2.2 Site R2

Sixteen stations were sampled at Site R2 (Easter Creek upstream of Hudgeon Lake). The channel had a wetted width of 2.90 m and a mean depth of 0.15 m. Stream velocities ranged from 0.1 m/s to 0.25 m/s, with a mean velocity of 0.135 m/s. The calculated discharges for two crossings were 0.0738 m<sup>3</sup>/s and 0.0757 m<sup>3</sup>/s, resulting in a mean calculated discharge at Site R2 of 0.0748 m<sup>3</sup>/s.

### 3.2.3 Site R3

Fourteen stations were sampled at Site R3 (Wolverine Creek, upstream of the tailings area). The channel had a wetted width of 2.70 m, with a mean depth of 0.06 m. Stream velocities ranged from 0.05 m/s to 0.40 m/s, with a mean velocity of 0.200 m/s. The calculated discharges for two crossings were 0.0519 m<sup>3</sup>/s and 0.0562 m<sup>3</sup>/s, resulting in a mean calculated discharge at Site R3 of 0.0541 m<sup>3</sup>/s.

### 3.2.4 Site R4

Eleven stations were sampled at Site R4 (Clinton Creek, upstream of Eagle Creek). The channel had a wetted width of 1.55 m, with a mean depth of 0.12 m. Stream velocities ranged from 0.02 m/s to 0.60 m/s, with a mean velocity of 0.280 m/s. The calculated discharges for two crossings were 0.0723 m<sup>3</sup>/s and 0.0691 m<sup>3</sup>/s, resulting in a mean calculated discharge at Site R4 of 0.0707 m<sup>3</sup>/s.

### 3.2.5 Site R6

Site R6 is at the Forty Mile River upstream of Clinton Creek. Due to the size and velocity of the river, neither channel width nor flow data could be safely collected.

### 3.2.6 Site E1

Eleven stations were sampled at Site E1 (Clinton Creek, upstream of Porcupine Creek but downstream of the Gabions). The channel had a wetted width of 5.0 m, with a mean depth of 0.23 m. Stream velocities ranged from 0.05 m/s to 0.90 m/s, with a mean velocity of 0.375 m/s. The calculated discharges for two crossings were 0.7184 m<sup>3</sup>/s and 0.6023 m<sup>3</sup>/s, resulting in a mean calculated discharge at Site E1 of 0.6604 m<sup>3</sup>/s.

### 3.2.7 Site E2

Eleven stations were sampled at Site E2 (Clinton Creek, downstream of Porcupine Creek but downstream of Wolverine Creek). The channel had a wetted width of 4.90 m, with a mean depth of 0.18 m. Stream velocities ranged from 0.15 m/s to 0.65 m/s, with a mean velocity of 0.410 m/s. The calculated discharges for two crossings were 0.5050 m<sup>3</sup>/s and 0.5186 m<sup>3</sup>/s, resulting in a mean calculated discharge at Site E2 of 0.5118 m<sup>3</sup>/s.

### 3.2.8 Site E3

Nine stations were sampled at Site E3 (Wolverine Creek upstream from Clinton Creek). The channel had a wetted width of 2.00 m, with a mean depth of 0.18 m. Stream velocities ranged from 0.05 m/s to 0.40 m/s, with a mean velocity of 0.145 m/s. The calculated discharges for two crossings were 0.0829 m<sup>3</sup>/s and 0.0769 m<sup>3</sup>/s, resulting in a mean calculated discharge at Site E3 of 0.0799 m<sup>3</sup>/s.

### 3.2.9 Site E4

A total of 12 stations were sampled at Site E4 (Clinton Creek upstream from Eagle Creek). The channel had a wetted width of 5.5 m, with a mean depth of 0.20 m. Stream velocities ranged from 0.40 m/s to 0.90 m/s, with a mean velocity of 0.560 m/s. The calculated discharges for two crossings were 0.7076 m<sup>3</sup>/s and 0.6870 m<sup>3</sup>/s, resulting in a mean calculated discharge at Site E4 of 0.6973 m<sup>3</sup>/s.

### 3.2.10 Site E7

A total of 12 stations were sampled at Site E7 (Clinton Creek upstream from the Forty Mile River). The channel had a wetted width of 7.55 m, with a mean depth of 0.17 m. Stream velocities ranged from 0.15 m/s to 0.75 m/s, with a mean velocity of 0.450 m/s. The calculated discharges for two crossings were 0.8838 m<sup>3</sup>/s and 0.8714 m<sup>3</sup>/s, resulting in a mean calculated discharge at Site E7 of 0.8776 m<sup>3</sup>/s.

### 3.2.11 Site E8

Site E8 is at the Forty Mile River downstream of Clinton Creek. Due to the size and velocity of the river, neither channel width nor flow data could be safely collected.

### 3.2.12 Site PL

Site PL is at the Porcupine Pit Lake; therefore, no channel or flow data could be collected.

### 3.2.13 Site SL

Site SL is at the Snowshoe Pit Lake; therefore, no channel or flow data could be collected.

### 3.2.14 Site GWCC-1

No defined channel was present at groundwater seepage Site GWCC-1 nor was flows sufficient to measure discharge.

### 3.2.15 Site GWCC-2

No defined channel was present at groundwater seepage Site GWCC-2 nor was flows sufficient to measure discharge.

### 3.2.16 Site GWCC-3

No defined channel was present at groundwater seepage Site GWCC-3 nor was flows sufficient to measure discharge.

### 3.2.17 Site GWCC-4

No defined channel was present at groundwater seepage Site GWCC-4; however, ELR was able to conduct a timed volume flow measurement at the seep. Five timed one-litre measurements were



collected, ranging in time from 5.25 seconds to 6.11 seconds. The resulting calculated discharges ranged from  $1.637 \times 10^{-4} \text{ m}^3/\text{s}$  and  $1.905 \times 10^{-4} \text{ m}^3/\text{s}$ , resulting in a mean calculated discharge at Site GWCC-4 of  $1.808 \times 10^{-4} \text{ m}^3/\text{s}$ .

### 3.2.18 Site GWCC-5

Surface flows at seepage Site GWCC-5 were minimal, and there was no defined channel. In order to collect discharge data, ELR created a channel of approximately 0.9 m across and 0.09 m deep to direct flows. Seven stations were sampled, all of which were measured to have velocity of 0.20 m/s. The resulting calculated discharge at Site GWCC-5 was  $0.0162 \text{ m}^3/\text{s}$ .

## 4. SUMMARY OF WATER QUALITY MONITORING RESULTS

### 4.1 SUMMARY OF WATER QUALITY EXCEEDANCES

A summary of the observed exceedances of CCME-PAL guideline levels are summarized according to parameter in **Table 4.1**, below.

**Table 4.1: Summary of Exceedances of CCME-PAL Guideline Levels Organized According to Parameter**

Parameter	Detected Level (Site)	CCME-PAL Guideline	Comments
Dissolved Oxygen	5.08 (GWCC-1)	Minimum of 5.5 mg/L	Low dissolved oxygen conditions were detected at groundwater seep sites, which can commonly have reduced dissolved oxygen. No implications for the site are assumed.
	4.61 (GWCC-3)		
	4.63 (GWCC-4)		
	4.01 (GWCC-4)		
Total Aluminum	0.234 mg/L at pH 7.84 (R3)	0.1 mg/L when pH > 6.5	All exceedances of total aluminum appear to originate from off-site sources. Sites R3 and R6 are reference sites on Wolverine Creek and the Forty Mile River, and Site E8 is an exposed site on the Forty Mile River. The exceedance at Site E8 is considered to originate from the Forty Mile River, not Clinton Creek.
	0.119 mg/L at pH 8.01 (R6)		
	0.124 mg/L at pH 8.25 (E8)		
Total Copper	.00297 mg/L at total hardness of 87.8 mg/L (R6)	.00212 mg/L	Total copper appears to be contributed primarily by an off-site source (R6 - Forty Mile River), which then persists at Site E8 (Forty Mile River d/s of Clinton Creek). Total copper is therefore not considered to be a concern in relation to the Site at this time.
	.00314 mg/L at total hardness of 89.9 mg/L (E8)	.00216 mg/L	
Dissolved Copper	.00479 mg/L at total hardness of 365 mg/L (R3)	.00400 mg/L	Dissolved copper appears to be contributed primarily by off-site sources (R6 - Forty Mile River, R3 - Wolverine Creek), one of which persists at Site E8 (Forty Mile River d/s of Clinton Creek). The source of elevated copper at Site E1 (Clinton Creek d/s of gabions and u/s of Porcupine Creek) cannot be deduced, but may originate in Hudgeon Lake. Therefore, dissolved copper is not considered to be a concern in relation to the Site at this time.
	.00278 mg/L at total hardness of 87.8 mg/L (R6)	.00212 mg/L	
	.00102 mg/L at total hardness of 245 mg/L (E1)	.00400 mg/L	
	.00275 mg/L at total hardness of 89.9 mg/L (E8)	.00216 mg/L	
Total Iron	0.548 mg/L (R1)	0.3 mg/L	Total iron is in at least some cases originating off-site (R3 - Wolverine Creek, R1 - Clinton Creek, R6 - Forty Mile River, and potentially Porcupine Creek), or potentially from tailings area. Observed concentrations are highest in reference sites (R1, R3), and concentrations at exposed sites are near CCME-PAL guideline level. Therefore, total iron is not considered to be a concern in relation to the site.
	0.999 mg/L (R3)		
	0.345 mg/L (R6)		
	0.384 mg/L (E2)		
	0.418 mg/L (E3)		
	0.413 mg/L (E4)		
	0.518 mg/L (E7)		
0.348 mg/L (E8)			
Dissolved Iron	0.344 mg/L (R1)	0.3 mg/L	Dissolved iron appears to be in one case originating off-site (R1 - Clinton Creek), and observed dissolved iron levels are close to CCME-PAL guideline level. Therefore, dissolved iron is not considered to be a current concern in relation to the site.
	0.306 mg/L (E2)		
	0.317 mg/L (E4)		
	0.351 mg/L (E7)		





Parameter	Detected Level (Site)	CCME-PAL Guideline	Comments
Total Selenium	0.00160 mg/L (R1) 0.00333 mg/L (R4) 0.00106 mg/L (E1) 0.00135 mg/L (E2) 0.00126 mg/L (E4) 0.00108 mg/L (E7) 0.00576 mg/L (PL) 0.0203 mg/L (SL) 0.00860 mg/L (GWCC-1) 0.00394 mg/L (GWCC-2) 0.00209 mg/L (GWCC-3) 2.71 mg/L (GWCC-5)	0.001 mg/L	Total selenium appears to be contributed by off-site sources (R1 - Clinton Creek and R4 - Eagle Creek), and from previous mine area (elevated in PL, SL, and GWCC-1, GWCC-2, GWCC-3, and GWCC-5). Selenium persists in all exposed sites on Clinton Creek downstream from the Site, although at levels only marginally above the CCME-PAL guideline level (total Selenium of 0.00126 and 0.00108 mg/L at Sites E4 and E7 compared to CCME-PAL of 0.001 mg/L). Selenium appears to be primarily in the dissolved form, as suggested by comparison of total and dissolved selenium results.
Dissolved Selenium	0.00154 mg/L (R1) 0.00339 mg/L (R4) 0.00139 mg/L (E2) 0.00118 mg/L (E4) 0.00115 mg/L (E7) 0.00584 mg/L (PL) 0.00194 mg/L (SL) 0.00739 mg/L (GWCC-1) 0.00428 mg/L (GWCC-2) 0.00212 mg/L (GWCC-3) 0.00263 mg/L (GWCC-5)	0.001 mg/L	Dissolved selenium appears to be contributed by off-site sources (R1 - Clinton Creek and R4 - Eagle Creek), and from previous mine area (elevated in PL, SL, and GWCC-1, GWCC-2, GWCC-3, and GWCC-5). Dissolved selenium persists in all exposed sites on Clinton Creek downstream from the Site, although at levels only marginally above the CCME-PAL guideline level (total Selenium of 0.00118 and 0.00115 mg/L at Sites E4 and E7 compared to CCME-PAL of 0.001 mg/L). Selenium appears to be primarily in the dissolved form, as suggested by comparison of total and dissolved selenium results.
Total Arsenic	0.00724 mg/L (PL) 0.0165 mg/L (SL)	0.005 mg/L	Exceedances of total arsenic are limited to the two pit lakes (PL and SL). Total arsenic is also slightly elevated but not exceeding the CCME-PAL guideline level in seeps GWCC-1 and GWCC-2. Total arsenic is not currently considered to be a concern for the receiving environment of the Site. Arsenic appears to be primarily in the dissolved form, as suggested by comparison of total and dissolved arsenic results.
Dissolved Arsenic	0.00757 mg/L (PL) 0.0166 mg/L (SL)	0.005 mg/L	Exceedances of dissolved arsenic are limited to the two pit lakes (PL and SL). Dissolved arsenic is also slightly elevated but not exceeding the CCME-PAL guideline level in seeps GWCC-1 and GWCC-2. Dissolved arsenic is not currently considered to be a concern for the receiving environment of the Site. Arsenic appears to be primarily in the dissolved form, as suggested by comparison of total and dissolved arsenic results.
Total Zinc	0.0297 mg/L (R3)	0.030 mg/L	No exceedances of total zinc were recorded, but this result was noted because the detected amount was very close to the CCME-PAL guideline level.
Total Boron	4.440 mg/L (PL)	1.500 mg/L	A single exceedance of total boron was detected in the Porcupine Pit Lake, but total boron was not detected at any stream sites. Therefore, total boron is not currently considered to be a concern for the receiving environment of the Site. Boron appears to be primarily in the dissolved form, as suggested by comparison of total and dissolved boron results.



Parameter	Detected Level (Site)	CCME-PAL Guideline	Comments
Dissolved Boron	4.010 mg/L (PL)	1.500 mg/L	A single exceedance of dissolved boron was detected in the Porcupine Pit Lake, but dissolved boron was not detected at any stream sites. Therefore, dissolved boron is not currently considered to be a concern for the receiving environment of the Site. Boron appears to be primarily in the dissolved form, as suggested by comparison of total and dissolved boron results.
TSS	45.8 mg/L (R3)	During clear flow, maximum increase of 25 mg/L from background for 24-h period. Maximum average increase of 5 mg/L from background levels for 30 d.	The recorded TSS concentration of 45.8 mg/L is not considered to be an exceedance of the CCME-PAL guideline level as Site R3 (Wolverine Creek) is considered to be a reference site. The elevated TSS concentration is considered to result from some upstream condition and is noted as it could influence total metal concentrations at the Site. This observation is provided for future reference only.

#### 4.1.1 QA/QC Discussion

Generally, the two blind field duplicate samples were successful in identifying potential sources of contamination and errors in either field sampling or laboratory analysis. Although several exceedances of the 20% RPD threshold were noted between sample and duplicate, these were generally at such low levels that they were not considered significant.

In two cases, significant differences were observed between the GWCC-5 test sample and the corresponding duplicate sample (Dup-2), resulting in re-analysis by the laboratory after identification of RPD exceedances by ELR. During this re-analysis, a lab error was realized, where bottles preserved with sulphuric acid and nitric acid had been reversed, thereby resulting in elevated sulphur and nitrogen levels in the Dup-2 sample results. Furthermore, the appropriately-preserved bottle had been misplaced by the lab and therefore the re-analysis could only be completed on an unpreserved bottle. Due to the timing of the discovery of this error, the unpreserved bottle had been shelved for more than 30-days (beyond the regular hold time for nutrient analysis of 72 hours). This was considered to be purely lab error that could have occurred with any duplicate or test sample. The actual GWCC-5 test sample data were considered to be correct for the site.

Field blank and travel blank samples were generally found to have parameter results below RDL levels, or near RDL levels for several parameters. In all but three cases of detections, concentrations in the travel blank were higher than those in the field blank, suggesting that any contamination was process-related and not the result of any field contamination. Only in the cases of total Copper (0.000102 mg/L and <0.000050 mg/L in field blank and travel blank, respectively), dissolved copper (0.000212 mg/L and 0.000051 mg/L in field blank and travel blank, respectively), dissolved lead (0.0000080 mg/L and 0.0000060 mg/L in field blank and travel blank, respectively) and dissolved thallium (0.0000020 mg/L and <0.0000020 mg/L in field blank and travel blank, respectively), were levels in the field blank higher compared to the travel blank. Accordingly, the field blank was considered to be indicative of acceptable field sampling practices. The elevated concentrations of both dissolved and total copper in the field blank may have been the result of some contamination during the field blank collection process, or potentially in the water used for the field blank sample.

## 5. RECOMMENDATIONS

ELR has prepared several recommendations based on the results of the 2013 Clinton Creek water quality and hydrological monitoring program. These recommendations relate to the consistent collection of data on site, and to better understanding the potential sources of contamination to the Site and its receiving waters.

- 1) The suitability of establishing a reference site at Porcupine Creek upstream from the mine area should be reviewed. The establishment of a site at this location may provide useful to isolate the potential influence of Porcupine Creek and the groundwater seeps on Clinton Creek. ELR did not confirm the suitability of Porcupine Creek as a reference site during the 2013 program (i.e., consistent flow or accessibility).
- 2) ELR recommends the installation of long-term markers at sample site locations to aid field crews with the location and identification of sites and to ensure consistency of sampling between sampling events (in particular groundwater seepage sites).
- 3) If flow data from the Forty Mile River is considered to be important to the overall monitoring program for the Site, a method for collecting hydrological data safely from this larger river site should be developed. This could potentially involve the installation of safety cables and the use of remote hydrometric data loggers (i.e., pressure transducer stations) to more safely collect data.

## 6. CLOSURE

Ecological Logistics & Research Ltd. is pleased to provide the Yukon Government, Assessment and Abandoned Mines this report that summarizes the 2013 water quality and hydrological monitoring program at the Clinton Creek Site. Please do not hesitate to contact us should you have any questions regarding this report.

Sincerely,

*Original Version Signed*

Alexandra de Jong Westman, M.Sc., R.P.Bio.,  
Biologist  
Ecological Logistics & Research Ltd.  
867.668.6386  
[alex@elr.ca](mailto:alex@elr.ca)

*Original Version Signed*

Chris Jastrebski, M.Sc., R.P.Bio.  
Lead Consultant/Biologist  
Ecological Logistics & Research Ltd.  
867.668.6386  
[chris@elr.ca](mailto:chris@elr.ca)

## 7. REFERENCES

- Canadian Council of Ministers of the Environment (CCME). 2014. Canadian Water Quality Guidelines for the Protection of Aquatic Life. Accessed online at <http://st-ts.ccme.ca/>, March 2014.
- Rice, E.W., Baird, R.B., Eaton, A.D., & Clesceri, L.S. 2012. Standard Methods for the Examination of Water and Wastewater, 22nd Edition. American Public Health Association. ISBN: 9780875530130
- Smith, C.A.S., Meikle, J.C. and Roots, C.F. (editors). 2004. *Ecoregions of the Yukon Territory - Biophysical Properties of Yukon Landscapes*. Agriculture and Agri-Food Canada, PARC Technical Bulletin 04-01, Summerland, British Columbia.
- Yukon government, Energy, Mines, and Resources (YG). 2013. Clinton Creek Site Description and Updates. Accessed online at: [http://www.emr.gov.yk.ca/aam/clinton\\_creek.html](http://www.emr.gov.yk.ca/aam/clinton_creek.html), October 2013.
- Yukon Government (YG). 2007. Acts and Regulations: Waters Act O.I.C 2003/58. Accessed online at: [http://www.gov.yk.ca/legislation/acts/waters\\_c.pdf](http://www.gov.yk.ca/legislation/acts/waters_c.pdf) October 2013.

*This Page Intentionally Left Blank*



## APPENDIX I – SITE PHOTOS

*This Page Intentionally Left Blank*





**Photo 1:** Site R1—Clinton Creek upstream of Hudgeon Lake (upstream).



**Photo 2:** Site R1—Clinton Creek upstream of Hudgeon Lake (downstream).



**Photo 3:** Site R2—Easter Creek upstream of Hudgeon Lake (downstream).



**Photo 4:** Site R2—Easter Creek upstream of Hudgeon Lake (upstream).



**Photo 5:** Site R3—Wolverine Creek upstream of the tailings (downstream).



**Photo 6:** Site R3—Wolverine Creek upstream of the tailings (crossing).



**Photo 7:** Site R4—Eagle Creek upstream of the culvert (downstream).



**Photo 8:** Site R4—Eagle Creek upstream of the culvert (upstream).



**Photo 9:** Site R6—Forty Mile River upstream of Clinton Creek (upstream).



**Photo 10:** Site R6—Forty Mile River downstream of Clinton Creek (downstream).



**Photo 11:** Site E1—Clinton Creek downstream of gabions and upstream of Porcupine Creek (upstream).



**Photo 12:** Site E1—Clinton Creek downstream of gabions and upstream of Porcupine Creek (downstream).



**Photo 13:** Site E2—Clinton Creek downstream of Porcupine Creek and Upstream of Wolverine Creek (upstream).



**Photo 14:** Site E2—Clinton Creek downstream of Porcupine Creek and upstream of Wolverine Creek (downstream).



**Photo 15:** Site E3—Wolverine Creek upstream of culvert (downstream).



**Photo 16:** Site E3—Wolverine Creek upstream of culvert (upstream).





**Photo 17:** Site E4 - Clinton Creek downstream of Wolverine Creek and upstream of Eagle Creek (downstream).



**Photo 18:** Site E4—Clinton Creek downstream of Wolverine Creek and upstream of Eagle Creek (upstream).



**Photo 19:** Site E4—Clinton Creek downstream of Wolverine Creek and upstream of Eagle Creek (crossing).



**Photo 20:** Site E7—Clinton Creek near mouth (upstream).



**Photo 21:** Site E7—Clinton Creek near mouth (upstream).



**Photo 22:** Site E7—Clinton Creek near mouth (crossing).



**Photo 23:** Site E8—Forty Mile River downstream of Clinton Creek (downstream).



**Photo 24:** Site E8—Forty Mile River downstream of Clinton Creek (upstream).



**Photo 25:** Site PL—Porcupine Pit Lake.



**Photo 26:** Site PL—Porcupine Pit Lake.



**Photo 27:** Site SL—Snowshoe Lake.



**Photo 28:** Site SL—Snowshoe Lake.



**Photo 29:** Site GWCC-1—Seepage from rock dump to ponded area of Porcupine Creek.



**Photo 30:** Site GWCC-1—Seepage from rock dump to ponded area of Porcupine Creek.



**Photo 31:** Site GWCC-2—Seepage from rock dump northwest of GWCC-1.



**Photo 32:** Site GWCC-2—Seepage from rock dump northwest of GWCC-1.





**Photo 33:** Site GWCC-3—Seepage from rock dump into side channel.



**Photo 34:** Site GWCC-3—Seepage from rock dump into side channel.



**Photo 35:** Site GWCC-4—Seepage from Rock dump into side channel.



**Photo 36:** Site GWCC-4—Seepage from Rock dump into side channel.



**Photo 37:** Site GWCC-5—Groundwater flow to old Clinton Creek channel.



**Photo 38:** Site GWCC-5—Groundwater flow to old Clinton Creek channel.

*This Page Intentionally Left Blank*



## **APPENDIX 2 – WATER QUALITY ANALYTICAL LABORATORY REPORTS**

*This Page Intentionally Left Blank*

Your Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Your C.O.C. #: 08378822, 08378821

**Attention: Chris Jastrebski**

Ecological Logistics & Research Ltd  
 #204 - 105 Titanium Way  
 Whitehorse, YT  
 CANADA Y1A 0E7

**Report Date: 2014/02/27**  
**Report #: R1523550**  
**Version: 5R**

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B386041**

**Received: 2013/09/21, 12:55**

Sample Matrix: Water  
 # Samples Received: 18

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
Carbon (DOC) - field filtered/preserved (1)	18	N/A	2013/09/23	BBY6SOP-00003	SM-5310C
Hardness Total (calculated as CaCO <sub>3</sub> )	18	N/A	2013/09/25	BBY7SOP-00002	EPA 6020A
Hardness (calculated as CaCO <sub>3</sub> )	18	N/A	2013/09/24	BBY7SOP-00002	EPA 6020A
Mercury (Dissolved) by CVAf	6	N/A	2013/10/30	BBY7SOP-00015	EPA 245.7
Mercury (Total) by CVAf	6	2013/10/29	2013/10/29	BBY7SOP-00015	EPA 245.7
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	18	N/A	2013/09/24	BBY7SOP-00002	EPA 6020A
Elements by ICPMS Low Level (dissolved)	17	N/A	2013/09/24	BBY7SOP-00002	EPA 6020A
Elements by ICPMS Low Level (dissolved)	1	N/A	2013/10/29	BBY7SOP-00002	EPA 6020A
Na, K, Ca, Mg, S by CRC ICPMS (total)	18	N/A	2013/09/25	BBY7SOP-00002	EPA 6020A
Elements by ICPMS Low Level (total)	18	N/A	2013/09/25	BBY7SOP-00002	EPA 6020A
Nitrogen (Total)	17	2013/09/24	2013/09/25	BBY6SOP-00016	SM-4500N C
Nitrogen (Total)	1	2013/11/05	2013/11/05	BBY6SOP-00016	SM-4500N C
Ammonia-N (Preserved)	1	N/A	2013/09/23	BBY6SOP-00009	SM-4500NH3G
Ammonia-N (Preserved)	15	N/A	2013/09/24	BBY6SOP-00009	SM-4500NH3G
Ammonia-N (Preserved)	2	N/A	2013/09/25	BBY6SOP-00009	SM-4500NH3G
Nitrate + Nitrite (N)	18	N/A	2013/09/21	BBY6SOP-00010	SM 4500NO3-I
Nitrite (N) by CFA	10	N/A	2013/09/21	BBY6SOP-00010	EPA 353.2
Nitrogen - Nitrate (as N)	10	N/A	2013/09/24	BBY6SOP-00010	SM 4500NO3-I
Filter and HNO <sub>3</sub> Preserve for Metals	18	N/A	2013/09/21	BBY6WI-00001	EPA 200.2
Sulphate by Automated Colourimetry	8	N/A	2013/09/24	BBY6SOP-00017	SM4500-SO42- E
Sulphate by Automated Colourimetry	1	N/A	2013/09/25	BBY6SOP-00017	SM4500-SO42- E
Sulphate by Automated Colourimetry	1	N/A	2013/10/01	BBY6SOP-00017	SM4500-SO42- E
TKN (Calc. TN, N/N) total	18	N/A	2013/09/26	BBY6SOP-00022	SM 4500N-C
Total Phosphorus	17	N/A	2013/09/24	BBY6SOP-00013	SM 4500 PE
Total Phosphorus	1	N/A	2013/09/27	BBY6SOP-00013	SM 4500 PE
Total Suspended Solids	18	N/A	2013/09/24	BBY6SOP-00034	SM - 2540 D

\* Results relate only to the items tested.

(1) DOC present in the sample should be considered as non-purgeable DOC.

Maxxam Job #: B386041  
Report Date: 2014/02/27

Ecological Logistics & Research Ltd  
Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
Site Location: CLINTON CREEK  
Sampler Initials: DD

-2-

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ken Pomeroy, Project Manager  
Email: KPomeroy@maxxam.ca  
Phone# (604) 638-5020

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2



Maxxam Job #: B386041  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**RESULTS OF CHEMICAL ANALYSES OF WATER**

Maxxam ID		HO9871		HO9872			HO9873		HO9874	HO9875	HO9876		
Sampling Date		2013/09/18 10:30		2013/09/17 17:15			2013/09/18 15:30		2013/09/18 13:00	2013/09/18 14:00	2013/09/18 11:30		
COC#		08378822		08378822			08378822		08378822	08378822	08378822		
	UNITS	R4	RDL	R6	RDL	QC Batch	E1	QC Batch	E2	E3	E4	RDL	QC Batch
<b>Calculated Parameters</b>													
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	N/A	ONSITE	FIELD	ONSITE	FIELD	FIELD	FIELD	N/A	ONSITE
Total Hardness (CaCO3)	mg/L	308	0.50	87.8	0.50	7184032	245	7184032	357	344	381	0.50	7184032
<b>Misc. Inorganics</b>													
Dissolved Hardness (CaCO3)	mg/L	319	0.50	90.2	0.50	7184082	255	7184082	366	346	393	0.50	7184082
Dissolved Organic Carbon (C)	mg/L	13.4	0.50	11.6	0.50	7185617	15.8	7185617	14.4	13.4	13.8	0.50	7185617
<b>Nutrients</b>													
Ammonia (N)	mg/L	0.032	0.0050	0.059	0.0050	7188142	0.031	7186672	0.036	0.027	0.034	0.0050	7188142
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.566	0.020	14.1	0.20	7184167	0.647	7184167	0.677	0.555	0.439	0.020	7184167
Nitrate plus Nitrite (N)	mg/L	0.221	0.020	0.128 <sup>(1)</sup>	0.020	7184456	0.186	7184456	0.177	0.100	0.145	0.020	7184456
Total Nitrogen (N)	mg/L	0.788	0.020	14.3	0.20	7189555	0.833	7189555	0.854	0.655	0.584	0.020	7189555
Total Phosphorus (P)	mg/L	0.0098	0.0050	0.0189	0.0050	7189402	0.0119	7189402	0.0114	0.0126	0.0088	0.0050	7189402
<b>Physical Properties</b>													
Total Suspended Solids	mg/L	<4.0	4.0	<4.0	4.0	7187883	<4.0	7187883	<4.0	<4.0	<4.0	4.0	7187883

N/A = Not Applicable

RDL = Reportable Detection Limit

(1) - Sample arrived to laboratory past recommended hold time.

Maxxam Job #: B386041  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**RESULTS OF CHEMICAL ANALYSES OF WATER**

Maxxam ID		HO9877		HO9878		HO9879	HO9880	HO9880	HO9881	HO9882		
Sampling Date		2013/09/17 18:00		2013/09/17 16:15		2013/09/19 11:00	2013/09/19 12:15	2013/09/19 12:15	2013/09/19 14:30	2013/09/19 14:15		
COC#		08378822		08378822		08378822	08378822	08378822	08378822	08378822		
	UNITS	E7	QC Batch	E8	QC Batch	PL	SL	SL Lab-Dup	GWCC-1	GWCC-2	RDL	QC Batch
<b>ANIONS</b>												
Nitrite (N)	mg/L					<0.0050	<0.0050		<0.0050	<0.0050	0.0050	7184457
<b>Calculated Parameters</b>												
Filter and HNO3 Preservation	N/A	FIELD	ONSITE	FIELD	ONSITE	FIELD	FIELD		FIELD	FIELD	N/A	ONSITE
Total Hardness (CaCO3)	mg/L	378	7184032	89.9	7184032	1700	762		1470	1330	0.50	7184032
Nitrate (N)	mg/L					0.421	0.231		0.363	0.417	0.020	7184034
<b>Misc. Inorganics</b>												
Dissolved Hardness (CaCO3)	mg/L	383	7184082	91.0	7184082	1730	811		1480	1370	0.50	7184082
Dissolved Organic Carbon (C)	mg/L	13.3	7185617	12.6	7185617	1.18	9.25		5.95	6.52	0.50	7185617
<b>Anions</b>												
Dissolved Sulphate (SO4)	mg/L					1580	671		1330	1250	5.0	7189554
<b>Nutrients</b>												
Ammonia (N)	mg/L	0.041	7188142	0.030	7188142	0.027	0.018		0.011	0.024	0.0050	7188142
Total Total Kjeldahl Nitrogen (Calc)	mg/L	1.62	7184167	0.788	7184167	<0.020	1.16		0.178	0.195	0.020	7184167
Nitrate plus Nitrite (N)	mg/L	0.158 <sup>(1)</sup>	7184456	0.143 <sup>(1)</sup>	7184456	0.421	0.231		0.363	0.417	0.020	7184456
Total Nitrogen (N)	mg/L	1.78	7189555	0.930	7189555	0.423	1.39		0.541	0.611	0.020	7189555
Total Phosphorus (P)	mg/L	0.0209	7189402	0.0107	7196377	<0.0050	0.0083		<0.0050	<0.0050	0.0050	7189402
<b>Physical Properties</b>												
Total Suspended Solids	mg/L	13.3	7187883	<4.0	7187883	<4.0	<4.0	<4.0	<4.0	<4.0	4.0	7187883

N/A = Not Applicable

RDL = Reportable Detection Limit

(1) - Sample arrived to laboratory past recommended hold time.

Maxxam Job #: B386041  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**RESULTS OF CHEMICAL ANALYSES OF WATER**

Maxxam ID		HO9883	HO9884	HO9884			HO9885			HO9886		
Sampling Date		2013/09/19 14:30	2013/09/19 14:45	2013/09/19 14:45			2013/09/18 15:30			2013/09/19 16:30		
COC#		08378821	08378821	08378821			08378821			08378821		
	UNITS	GWCC-3	GWCC-5	GWCC-5 Lab-Dup	RDL	QC Batch	DUP1	RDL	QC Batch	DUP2	RDL	QC Batch
<b>ANIONS</b>												
Nitrite (N)	mg/L	<0.0050	<0.0050		0.0050	7184457	0.0056	0.0050	7184457	<0.0050	0.0050	7184457
<b>Calculated Parameters</b>												
Filter and HNO3 Preservation	N/A	FIELD	FIELD		N/A	ONSITE	FIELD	N/A	ONSITE	FIELD	N/A	ONSITE
Total Hardness (CaCO3)	mg/L	805	496		0.50	7184032	241	0.50	7184032	482	0.50	7184032
Nitrate (N)	mg/L	0.240	0.034		0.020	7184034	0.179	0.020	7184034	<0.020	0.020	7184034
<b>Misc. Inorganics</b>												
Dissolved Hardness (CaCO3)	mg/L	829	499		0.50	7184082	245	0.50	7184082	545	0.50	7184082
Dissolved Organic Carbon (C)	mg/L	7.69	7.04		0.50	7185617	15.3	0.50	7185617	6.76	0.50	7185617
<b>Anions</b>												
Dissolved Sulphate (SO4)	mg/L	681	289		5.0	7189554	156	0.50	7191886	289	5.0	7189554
<b>Nutrients</b>												
Ammonia (N)	mg/L	0.012	0.016		0.0050	7188142	0.039	0.0050	7188142	0.026	0.0050	7188142
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.214	0.306		0.020	7184167	0.609	0.020	7184167	1.31	0.020	7184167
Nitrate plus Nitrite (N)	mg/L	0.240	0.034		0.020	7184456	0.185	0.020	7184456	<0.020	0.020	7184456
Total Nitrogen (N)	mg/L	0.454	0.340	0.340	0.020	7189555	0.793	0.020	7189555	1.31	0.020	7264394
Total Phosphorus (P)	mg/L	<0.0050	0.0264		0.0050	7189402	0.0123	0.0050	7189402	<0.0050	0.0050	7189402
<b>Physical Properties</b>												
Total Suspended Solids	mg/L	<4.0	5.3		4.0	7187883	<4.0	4.0	7187883	<4.0	4.0	7187883

N/A = Not Applicable

RDL = Reportable Detection Limit

Maxxam Job #: B386041  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**RESULTS OF CHEMICAL ANALYSES OF WATER**

Maxxam ID		HO9886			HO9887		HO9888	HO9888		
Sampling Date		2013/09/19 16:30			2013/09/19 16:30					
COC#		08378821			08378821		08378821	08378821		
	UNITS	DUP2 Lab-Dup	RDL	QC Batch	FB	QC Batch	TRAVEL BLANK	TRAVEL BLANK Lab-Dup	RDL	QC Batch
<b>ANIONS</b>										
Nitrite (N)	mg/L	<0.0050	0.0050	7184457	<0.0050	7184457	<0.0050		0.0050	7184457
<b>Calculated Parameters</b>										
Filter and HNO3 Preservation	N/A		N/A	ONSITE	FIELD	ONSITE	FIELD		N/A	ONSITE
Total Hardness (CaCO3)	mg/L		0.50	7184032	<0.50	7184032	<0.50		0.50	7184032
Nitrate (N)	mg/L		0.020	7184034	<0.020	7184034	<0.020		0.020	7184034
<b>Misc. Inorganics</b>										
Dissolved Hardness (CaCO3)	mg/L		0.50	7184082	<0.50	7184082	<0.50		0.50	7184082
Dissolved Organic Carbon (C)	mg/L		0.50	7185617	<0.50	7185617	<0.50	<0.50	0.50	7185617
<b>Anions</b>										
Dissolved Sulphate (SO4)	mg/L		5.0	7189554	0.84	7189554	0.54		0.50	7202052
<b>Nutrients</b>										
Ammonia (N)	mg/L		0.0050	7188142	<0.0050	7190550	0.024		0.0050	7190550
Total Total Kjeldahl Nitrogen (Calc)	mg/L		0.020	7184167	<0.020	7184167	0.031		0.020	7184167
Nitrate plus Nitrite (N)	mg/L	<0.020	0.020	7184456	<0.020	7184456	<0.020		0.020	7184456
Total Nitrogen (N)	mg/L		0.020	7264394	<0.020	7189555	0.031		0.020	7189555
Total Phosphorus (P)	mg/L		0.0050	7189402	<0.0050	7189402	<0.0050	<0.0050	0.0050	7189402
<b>Physical Properties</b>										
Total Suspended Solids	mg/L		4.0	7187883	<4.0	7187883	<4.0		4.0	7187883

**MERCURY BY COLD VAPOR (WATER)**

Maxxam ID		HO9879	HO9879	HO9880	HO9881	HO9882	HO9883	HO9886		
Sampling Date		2013/09/19 11:00	2013/09/19 11:00	2013/09/19 12:15	2013/09/19 14:30	2013/09/19 14:15	2013/09/19 14:30	2013/09/19 16:30		
COC#		08378822	08378822	08378822	08378822	08378822	08378821	08378821		
	UNITS	PL	PL Lab-Dup	SL	GWCC-1	GWCC-2	GWCC-3	DUP2	RDL	QC Batch
<b>Elements</b>										
Dissolved Mercury (Hg)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	7254463
Total Mercury (Hg)	mg/L	<0.000010		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	7253093

N/A = Not Applicable

RDL = Reportable Detection Limit

Maxxam Job #: B386041  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		HO9871		HO9872	HO9873	HO9874		HO9875		HO9876		
Sampling Date		2013/09/18 10:30		2013/09/17 17:15	2013/09/18 15:30	2013/09/18 13:00		2013/09/18 14:00		2013/09/18 11:30		
COIC#		08378822		08378822	08378822	08378822		08378822		08378822		
	UNITS	R4	QC Batch	R6	E1	E2	QC Batch	E3	QC Batch	E4	RDL	QC Batch
<b>Dissolved Metals by ICPMS</b>												
Dissolved Aluminum (Al)	mg/L	0.0239	7187055	0.0786	0.0328	0.0271	7187055	0.0293	7187055	0.0193	0.00050	7187055
Dissolved Antimony (Sb)	mg/L	0.000441	7187055	0.000113	0.000329	0.000432	7187055	0.000787	7187055	0.000461	0.000020	7187055
Dissolved Arsenic (As)	mg/L	0.00149	7187055	0.000477	0.000775	0.00105	7187055	0.00113	7187055	0.00105	0.000020	7187055
Dissolved Barium (Ba)	mg/L	0.0580	7187055	0.0344	0.0607	0.0560	7187055	0.0523	7187055	0.0544	0.000020	7187055
Dissolved Beryllium (Be)	mg/L	<0.000010	7187055	0.000021	0.000012	0.000013	7187055	0.000012	7187055	0.000013	0.000010	7187055
Dissolved Bismuth (Bi)	mg/L	<0.0000050	7187055	<0.0000050	<0.0000050	<0.0000050	7187055	<0.0000050	7187055	<0.0000050	0.0000050	7187055
Dissolved Boron (B)	mg/L	<0.050	7187055	<0.050	<0.050	<0.050	7187055	0.073	7187055	0.058	0.050	7187055
Dissolved Cadmium (Cd)	mg/L	0.0000850	7187055	0.0000230	0.0000390	0.0000550	7187055	0.0000150	7187055	0.0000470	0.0000050	7187055
Dissolved Chromium (Cr)	mg/L	0.00049	7187055	0.00038	0.00052	0.00053	7187055	0.00093	7187055	0.00068	0.00010	7187055
Dissolved Cobalt (Co)	mg/L	0.00116	7187055	0.000278	0.000360	0.000671	7187055	0.000267	7187055	0.000768	0.000050	7187055
Dissolved Copper (Cu)	mg/L	0.00261	7187055	0.00278	0.0102 <sup>(1)</sup>	0.00257	7187055	0.00215	7191722	0.00230	0.000050	7187055
Dissolved Iron (Fe)	mg/L	0.158	7187055	0.253	0.213	0.306	7187055	0.231	7187055	0.317	0.0010	7187055
Dissolved Lead (Pb)	mg/L	0.0000470	7187055	0.0000290	0.0000640	0.0000880	7187055	0.0000620	7191722	0.0000560	0.0000050	7187055
Dissolved Lithium (Li)	mg/L	0.00382	7187055	0.00343	0.00346	0.00862	7187055	0.00491	7187055	0.0120	0.00050	7187055
Dissolved Manganese (Mn)	mg/L	0.222	7187055	0.0196	0.137	0.153	7187055	0.0919	7187055	0.179	0.000050	7187055
Dissolved Mercury (Hg)	mg/L	<0.000010	7187055	<0.000010	<0.000010	<0.000010	7187055	<0.000010	7187055	<0.000010	0.000010	7187055
Dissolved Molybdenum (Mo)	mg/L	0.00125	7187055	0.000461	0.00140	0.00176	7187055	0.00146	7187055	0.00171	0.000050	7187055
Dissolved Nickel (Ni)	mg/L	0.0132	7187055	0.00240	0.00471	0.0131	7187055	0.0103	7187055	0.0163	0.000020	7187055
Dissolved Selenium (Se)	mg/L	0.00339	7187055	0.000180	0.000989	0.00139	7187055	0.000859	7191722	0.00118	0.000040	7187055
Dissolved Silicon (Si)	mg/L	4.61	7187055	4.45	3.66	3.83	7187055	4.88	7187055	3.98	0.10	7187055
Dissolved Silver (Ag)	mg/L	0.0000060	7187055	<0.0000050	0.0000060	<0.0000050	7187055	<0.0000050	7187055	<0.0000050	0.0000050	7187055
Dissolved Strontium (Sr)	mg/L	0.389	7187055	0.139	0.286	0.426	7187055	0.336	7187055	0.480	0.000050	7187055
Dissolved Thallium (Tl)	mg/L	0.0000050	7187055	0.0000030	0.0000070	0.0000190	7187055	0.0000020	7187055	0.0000130	0.0000020	7187055
Dissolved Tin (Sn)	mg/L	0.00066	7187055	0.00034	0.00078	0.00033	7187055	0.00037	7187055	0.00035	0.00020	7187055
Dissolved Titanium (Ti)	mg/L	0.00086	7187055	0.00130	0.00067	0.00053	7187055	0.00052	7187055	<0.00050	0.00050	7187055
Dissolved Uranium (U)	mg/L	0.00459	7187055	0.000817	0.00194	0.00220	7187055	0.00331	7187055	0.00229	0.0000020	7187055
Dissolved Vanadium (V)	mg/L	0.00032	7187055	0.00059	0.00037	0.00033	7187055	0.00054	7187055	0.00030	0.00020	7187055
Dissolved Zinc (Zn)	mg/L	0.00357	7191722	0.00218	0.00221	0.00414	7187055	0.00240 <sup>(1)</sup>	7191722	0.00150	0.00010	7187055
Dissolved Zirconium (Zr)	mg/L	0.00134	7187055	0.00076	0.00094	0.00079	7187055	0.00066	7187055	0.00099	0.00010	7187055
Dissolved Calcium (Ca)	mg/L	69.3	7184448	23.0	53.8	68.3	7184448	60.2	7184448	70.0	0.050	7184448
Dissolved Magnesium (Mg)	mg/L	35.4	7184448	7.94	29.4	47.5	7184448	47.6	7184448	53.0	0.050	7184448
Dissolved Potassium (K)	mg/L	0.544	7184448	0.916	0.670	0.891	7184448	0.715	7184448	0.955	0.050	7184448
Dissolved Sodium (Na)	mg/L	3.90	7184448	3.85	2.55	3.55	7184448	3.92	7184448	4.40	0.050	7184448
Dissolved Sulphur (S)	mg/L	56.8	7184448	12.5	48.8	81.9	7184448	71.7	7184448	86.5	3.0	7184448

RDL = Reportable Detection Limit

(1) - Dissolved greater than total. Reanalysis yields similar results.

Maxxam Job #: B386041  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		HO9871		HO9872	HO9873	HO9874		HO9875		HO9876		
Sampling Date		2013/09/18 10:30		2013/09/17 17:15	2013/09/18 15:30	2013/09/18 13:00		2013/09/18 14:00		2013/09/18 11:30		
COC#		08378822		08378822	08378822	08378822		08378822		08378822		
	UNITS	R4	QC Batch	R6	E1	E2	QC Batch	E3	QC Batch	E4	RDL	QC Batch
<b>Total Metals by ICPMS</b>												
Total Aluminum (Al)	mg/L	0.0475	7188822	0.119	0.0670	0.0536	7188822	0.0671	7188822	0.0419	0.00050	7188822
Total Antimony (Sb)	mg/L	0.000428	7188822	0.000118	0.000294	0.000397	7188822	0.000766	7188822	0.000445	0.00020	7188822
Total Arsenic (As)	mg/L	0.00161	7188822	0.000581	0.000861	0.00112	7188822	0.00127	7188822	0.00114	0.00020	7188822
Total Barium (Ba)	mg/L	0.0610	7188822	0.0355	0.0626	0.0582	7188822	0.0548	7188822	0.0552	0.00020	7188822
Total Beryllium (Be)	mg/L	<0.000010	7188822	0.000020	0.000015	0.000015	7188822	<0.000010	7188822	0.000012	0.000010	7188822
Total Bismuth (Bi)	mg/L	<0.0000050	7188822	<0.0000050	<0.0000050	<0.0000050	7188822	<0.0000050	7188822	<0.0000050	0.0000050	7188822
Total Boron (B)	mg/L	<0.050	7188822	<0.050	<0.050	<0.050	7188822	0.062	7188822	0.053	0.050	7188822
Total Cadmium (Cd)	mg/L	0.0000990	7188822	0.0000270	0.0000430	0.0000580	7188822	0.0000240	7188822	0.0000540	0.0000050	7188822
Total Chromium (Cr)	mg/L	0.00057	7188822	0.00048	0.00063	0.00069	7188822	0.00095	7188822	0.00068	0.00010	7188822
Total Cobalt (Co)	mg/L	0.00121	7188822	0.000349	0.000398	0.000730	7188822	0.000332	7188822	0.000822	0.0000050	7188822
Total Copper (Cu)	mg/L	0.00263	7188822	0.00297	0.00312	0.00272	7188822	0.00225	7188822	0.00227	0.000050	7188822
Total Iron (Fe)	mg/L	0.191	7188822	0.345	0.298	0.384	7188822	0.418	7188822	0.413	0.0010	7188822
Total Lead (Pb)	mg/L	0.0000750	7188822	0.0000940	0.000147	0.000128	7188822	0.000135	7188822	0.000110	0.0000050	7188822
Total Lithium (Li)	mg/L	0.00376	7188822	0.00330	0.00320	0.00828	7188822	0.00475	7188822	0.0126	0.00050	7188822
Total Manganese (Mn)	mg/L	0.226	7188822	0.0233	0.146	0.157	7188822	0.101	7188822	0.185	0.000050	7188822
Total Mercury (Hg)	mg/L	<0.000010	7188822	<0.000010	<0.000010	<0.000010	7188822	<0.000010	7188822	<0.000010	0.000010	7188822
Total Molybdenum (Mo)	mg/L	0.00115	7188822	0.000463	0.00135	0.00163	7188822	0.00140	7188822	0.00170	0.000050	7188822
Total Nickel (Ni)	mg/L	0.0135	7188822	0.00264	0.00507	0.0136	7188822	0.0108	7188822	0.0169	0.000020	7188822
Total Selenium (Se)	mg/L	0.00333	7188822	0.000177	0.00106	0.00135	7188822	0.000726	7188822	0.00126	0.000040	7188822
Total Silicon (Si)	mg/L	4.55	7188822	4.45	3.60	3.86	7188822	4.90	7188822	3.95	0.10	7188822
Total Silver (Ag)	mg/L	0.0000060	7188822	0.0000050	<0.0000050	<0.0000050	7188822	0.0000070	7188822	0.0000060	0.0000050	7188822
Total Strontium (Sr)	mg/L	0.389	7188822	0.134	0.279	0.414	7188822	0.341	7188822	0.469	0.000050	7188822
Total Thallium (Tl)	mg/L	0.0000050	7188822	0.0000020	0.0000080	0.0000190	7188822	0.0000030	7188822	0.0000160	0.0000020	7188822
Total Tin (Sn)	mg/L	0.00032	7188822	0.00039	0.00048	0.00034	7188822	0.00031	7188822	0.00052	0.00020	7188822
Total Titanium (Ti)	mg/L	0.00095	7188822	0.00151	0.00225	0.00087	7188822	0.00129	7188822	0.00148	0.00050	7188822
Total Uranium (U)	mg/L	0.00478	7188822	0.000843	0.00202	0.00228	7188822	0.00333	7188822	0.00243	0.0000020	7188822
Total Vanadium (V)	mg/L	0.00036	7188822	0.00074	0.00046	0.00045	7188822	0.00073	7188822	0.00035	0.00020	7188822
Total Zinc (Zn)	mg/L	0.00448	7188822	0.00345	0.00348	0.00577	7188822	0.00173	7188822	0.00817	0.00010	7188822
Total Zirconium (Zr)	mg/L	0.00141	7188822	0.00075	0.00106	0.00085	7188822	0.00078	7188822	0.00100	0.00010	7188822
Total Calcium (Ca)	mg/L	64.6	7184372	22.2	50.1	64.7	7184372	57.7	7184372	66.2	0.050	7184372
Total Magnesium (Mg)	mg/L	35.6	7184372	7.84	29.0	47.6	7184372	48.5	7184372	52.3	0.050	7184372
Total Potassium (K)	mg/L	0.541	7184372	0.897	0.655	0.859	7184372	0.737	7184372	0.925	0.050	7184372
Total Sodium (Na)	mg/L	4.00	7184372	3.86	2.61	3.66	7184372	4.01	7184372	4.43	0.050	7184372
Total Sulphur (S)	mg/L	57.5	7184372	12.6	46.6	79.8	7184372	72.6	7184372	81.9	3.0	7184372

RDL = Reportable Detection Limit

Maxxam Job #: B386041  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		HO9877	HO9878			HO9879		HO9880	HO9881	HO9882		
Sampling Date		2013/09/17 18:00	2013/09/17 16:15			2013/09/19 11:00		2013/09/19 12:15	2013/09/19 14:30	2013/09/19 14:15		
COC#		08378822	08378822			08378822		08378822	08378822	08378822		
	UNITS	E7	E8	RDL	QC Batch	PL	QC Batch	SL	GWCC-1	GWCC-2	RDL	QC Batch
<b>Dissolved Metals by ICPMS</b>												
Dissolved Aluminum (Al)	mg/L	0.0244	0.0776	0.00050	7187055	<0.0025	7191722	0.0082	0.0026	<0.0025	0.0025	7187055
Dissolved Antimony (Sb)	mg/L	0.000381	0.000108	0.000020	7187055	0.0190	7187055	0.00366	0.00167	0.00132	0.00010	7187055
Dissolved Arsenic (As)	mg/L	0.00106	0.000497	0.000020	7187055	0.00757	7187055	0.0166	0.00243	0.00160	0.00010	7187055
Dissolved Barium (Ba)	mg/L	0.0598	0.0352	0.000020	7187055	0.0108	7187055	0.0223	0.0188	0.0229	0.00010	7187055
Dissolved Beryllium (Be)	mg/L	0.000010	0.000020	0.000010	7187055	<0.000050	7187055	<0.000050	<0.000050	<0.000050	0.000050	7187055
Dissolved Bismuth (Bi)	mg/L	0.0000050	<0.0000050	0.0000050	7187055	<0.000025	7187055	<0.000025	<0.000025	<0.000025	0.000025	7187055
Dissolved Boron (B)	mg/L	<0.050	<0.050	0.050	7187055	4.01	7187055	<0.25	0.34	<0.25	0.25	7187055
Dissolved Cadmium (Cd)	mg/L	0.0000640	0.0000240	0.0000050	7187055	0.000083	7187055	0.000044	0.000229	0.000216	0.000025	7187055
Dissolved Chromium (Cr)	mg/L	0.00081	0.00049	0.00010	7187055	0.00104	7187055	0.00122	0.00172	0.00161	0.00050	7187055
Dissolved Cobalt (Co)	mg/L	0.000820	0.000308	0.0000050	7187055	0.000375	7187055	0.000129	0.000076	0.000095	0.000025	7187055
Dissolved Copper (Cu)	mg/L	0.00248	0.00275	0.0000050	7187055	0.00055	7187055	0.00124	0.00112	0.00135	0.00025	7187055
Dissolved Iron (Fe)	mg/L	0.351	0.251	0.0010	7187055	0.0176	7187055	0.0169	0.0052	<0.0050	0.0050	7187055
Dissolved Lead (Pb)	mg/L	0.0000860	0.0000490	0.0000050	7187055	<0.000025	7191722	<0.000025	<0.000025	<0.000025	0.000025	7191722
Dissolved Lithium (Li)	mg/L	0.0118	0.00353	0.00050	7187055	0.0888	7187055	0.0109	0.0795	0.0331	0.0025	7187055
Dissolved Manganese (Mn)	mg/L	0.283	0.0237	0.0000050	7187055	0.00805	7187055	0.00305	0.00046	0.00043	0.00025	7187055
Dissolved Mercury (Hg)	mg/L	<0.000010	<0.000010	0.000010	7187055							
Dissolved Molybdenum (Mo)	mg/L	0.00167	0.000486	0.0000050	7187055	0.00810	7187055	0.00241	0.00273	0.00289	0.00025	7187055
Dissolved Nickel (Ni)	mg/L	0.0159	0.00272	0.000020	7187055	0.105	7187055	0.0168	0.0709	0.0538	0.00010	7187055
Dissolved Selenium (Se)	mg/L	0.00115	0.000166	0.000040	7187055	0.00584	7187055	0.0194	0.00739	0.00428	0.00020	7187055
Dissolved Silicon (Si)	mg/L	4.03	4.10	0.10	7187055	1.57	7187055	4.37	5.07	4.57	0.50	7187055
Dissolved Silver (Ag)	mg/L	0.0000100	<0.0000050	0.0000050	7187055	<0.000025	7187055	<0.000025	<0.000025	<0.000025	0.000025	7187055
Dissolved Strontium (Sr)	mg/L	0.463	0.141	0.0000050	7187055	0.727	7187055	0.960	1.92	1.28	0.00025	7187055
Dissolved Thallium (Tl)	mg/L	0.0000090	0.0000030	0.0000020	7187055	0.000382	7187055	0.000020	0.000100	0.000088	0.000010	7187055
Dissolved Tin (Sn)	mg/L	0.00066	0.00060	0.00020	7187055	<0.0010	7187055	<0.0010	<0.0010	<0.0010	0.0010	7187055
Dissolved Titanium (Ti)	mg/L	0.00070	0.00133	0.00050	7187055	0.0028	7187055	0.0027	<0.0025	<0.0025	0.0025	7187055
Dissolved Uranium (U)	mg/L	0.00225	0.000820	0.0000020	7187055	0.0115	7187055	0.00275	0.00642	0.00433	0.000010	7187055
Dissolved Vanadium (V)	mg/L	0.00037	0.00068	0.00020	7187055	0.0010	7187055	<0.0010	0.0012	<0.0010	0.0010	7187055
Dissolved Zinc (Zn)	mg/L	0.00458	0.00428	0.00010	7187055	0.00173	7187055	0.00091	0.00731	0.00664	0.00050	7187055
Dissolved Zirconium (Zr)	mg/L	0.00123	0.00076	0.00010	7187055	<0.00050	7187055	<0.00050	<0.00050	<0.00050	0.00050	7187055
Dissolved Calcium (Ca)	mg/L	67.2	22.6	0.050	7184448	79.7	7184448	179	188	177	0.25	7184448
Dissolved Magnesium (Mg)	mg/L	52.2	8.38	0.050	7184448	371	7184448	88.3	245	226	0.25	7184448
Dissolved Potassium (K)	mg/L	1.01	0.924	0.050	7184448	3.84	7184448	1.53	3.16	2.47	0.25	7184448
Dissolved Sodium (Na)	mg/L	4.20	3.75	0.050	7184448	22.2	7184448	2.41	16.6	9.92	0.25	7184448
Dissolved Sulphur (S)	mg/L	85.2	13.7	3.0	7184448	520	7184448	221	420	395	15	7184448

RDL = Reportable Detection Limit

Maxxam Job #: B386041  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		HO9877	HO9878			HO9879		HO9880	HO9881	HO9882		
Sampling Date		2013/09/17 18:00	2013/09/17 16:15			2013/09/19 11:00		2013/09/19 12:15	2013/09/19 14:30	2013/09/19 14:15		
COC#		08378822	08378822			08378822		08378822	08378822	08378822		
	UNITS	E7	E8	RDL	QC Batch	PL	QC Batch	SL	GWCC-1	GWCC-2	RDL	QC Batch
<b>Total Metals by ICPMS</b>												
Total Aluminum (Al)	mg/L	0.0669	0.124	0.00050	7188822	0.0062	7188822	0.0271	0.0032	0.0036	0.0025	7188822
Total Antimony (Sb)	mg/L	0.000408	0.000111	0.000020	7188822	0.0185	7188822	0.00361	0.00143	0.00122	0.00010	7188822
Total Arsenic (As)	mg/L	0.00119	0.000556	0.000020	7188822	0.00724	7188822	0.0165	0.00236	0.00176	0.00010	7188822
Total Barium (Ba)	mg/L	0.0640	0.0358	0.000020	7188822	0.0108	7188822	0.0219	0.0189	0.0228	0.00010	7188822
Total Beryllium (Be)	mg/L	0.000015	0.000020	0.000010	7188822	<0.000050	7188822	<0.000050	<0.000050	<0.000050	0.000050	7188822
Total Bismuth (Bi)	mg/L	<0.0000050	<0.0000050	0.0000050	7188822	<0.000025	7188822	<0.000025	<0.000025	<0.000025	0.000025	7188822
Total Boron (B)	mg/L	<0.050	<0.050	0.050	7188822	4.44	7188822	<0.25	0.30	<0.25	0.25	7188822
Total Cadmium (Cd)	mg/L	0.0000760	0.0000280	0.0000050	7188822	0.000080	7188822	0.000044	0.000199	0.000215	0.000025	7188822
Total Chromium (Cr)	mg/L	0.00085	0.00043	0.00010	7188822	<0.00050	7188822	0.00101	0.00122	0.00150	0.00050	7188822
Total Cobalt (Co)	mg/L	0.000996	0.000351	0.0000050	7188822	0.000393	7188822	0.000125	0.000070	0.000091	0.000025	7188822
Total Copper (Cu)	mg/L	0.00312	0.00314	0.000050	7188822	0.00042	7188822	0.00163	0.00363	0.00168	0.00025	7188822
Total Iron (Fe)	mg/L	0.518	0.348	0.0010	7188822	0.0295	7188822	0.0231	0.0057	<0.0050	0.0050	7188822
Total Lead (Pb)	mg/L	0.000207	0.0000800	0.0000050	7188822	0.000034	7188822	0.000032	0.000098	0.000026	0.000025	7188822
Total Lithium (Li)	mg/L	0.0121	0.00348	0.00050	7188822	0.0863	7188822	0.0105	0.0782	0.0320	0.0025	7188822
Total Manganese (Mn)	mg/L	0.310	0.0273	0.000050	7188822	0.00824	7188822	0.00253	<0.00025	<0.00025	0.00025	7188822
Total Mercury (Hg)	mg/L	<0.000010	<0.000010	0.000010	7188822							
Total Molybdenum (Mo)	mg/L	0.00151	0.000419	0.000050	7188822	0.00824	7188822	0.00241	0.00268	0.00253	0.00025	7188822
Total Nickel (Ni)	mg/L	0.0169	0.00295	0.000020	7188822	0.104	7188822	0.0172	0.0728	0.0554	0.00010	7188822
Total Selenium (Se)	mg/L	0.00108	0.000204	0.000040	7188822	0.00576	7188822	0.0203	0.00860	0.00394	0.00020	7188822
Total Silicon (Si)	mg/L	4.08	4.20	0.10	7188822	1.54	7188822	4.07	5.14	4.16	0.50	7188822
Total Silver (Ag)	mg/L	0.0000080	0.0000070	0.0000050	7188822	<0.000025	7188822	<0.000025	<0.000025	<0.000025	0.000025	7188822
Total Strontium (Sr)	mg/L	0.443	0.137	0.000050	7188822	0.676	7188822	0.886	1.86	1.22	0.00025	7188822
Total Thallium (Tl)	mg/L	0.0000120	0.0000020	0.0000020	7188822	0.000336	7188822	0.000019	0.000098	0.000078	0.000010	7188822
Total Tin (Sn)	mg/L	0.00022	0.00040	0.00020	7188822	<0.0010	7188822	<0.0010	0.0010	<0.0010	0.0010	7188822
Total Titanium (Ti)	mg/L	0.00149	0.00188	0.00050	7188822	<0.0025	7188822	<0.0025	<0.0025	<0.0025	0.0025	7188822
Total Uranium (U)	mg/L	0.00240	0.000857	0.0000020	7188822	0.0115	7188822	0.00275	0.00698	0.00468	0.000010	7188822
Total Vanadium (V)	mg/L	0.00055	0.00072	0.00020	7188822	<0.0010	7188822	0.0011	<0.0010	0.0014	0.0010	7188822
Total Zinc (Zn)	mg/L	0.00453	0.00650	0.00010	7188822	0.00212	7188822	0.00343	0.0101	0.00892	0.00050	7188822
Total Zirconium (Zr)	mg/L	0.00148	0.00070	0.00010	7188822	<0.00050	7188822	<0.00050	<0.00050	<0.00050	0.00050	7188822
Total Calcium (Ca)	mg/L	65.3	22.2	0.050	7184372	75.3	7184372	166	183	159	0.25	7184372
Total Magnesium (Mg)	mg/L	52.3	8.40	0.050	7184372	367	7184372	84.4	247	226	0.25	7184372
Total Potassium (K)	mg/L	0.964	0.873	0.050	7184372	3.83	7184372	1.53	3.10	2.33	0.25	7184372
Total Sodium (Na)	mg/L	4.39	3.90	0.050	7184372	22.5	7184372	2.36	17.4	10.2	0.25	7184372
Total Sulphur (S)	mg/L	80.2	14.0	3.0	7184372	491	7184372	203	419	376	15	7184372

RDL = Reportable Detection Limit



Maxxam Job #: B386041  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		HO9883			HO9884		HO9885		
Sampling Date		2013/09/19 14:30			2013/09/19 14:45		2013/09/18 15:30		
COC#		08378821			08378821		08378821		
	UNITS	GWCC-3	RDL	QC Batch	GWCC-5	QC Batch	DUP1	RDL	QC Batch
<b>Dissolved Metals by ICPMS</b>									
Dissolved Aluminum (Al)	mg/L	0.0036	0.0025	7187055	0.00233	7187055	0.0338	0.00050	7187055
Dissolved Antimony (Sb)	mg/L	0.00099	0.00010	7187055	0.000867	7191722	0.000324	0.000020	7187055
Dissolved Arsenic (As)	mg/L	0.00102	0.00010	7187055	0.000686	7187055	0.000800	0.000020	7187055
Dissolved Barium (Ba)	mg/L	0.0300	0.00010	7187055	0.0665	7187055	0.0610	0.000020	7187055
Dissolved Beryllium (Be)	mg/L	<0.000050	0.000050	7187055	<0.000010	7187055	0.000012	0.000010	7187055
Dissolved Bismuth (Bi)	mg/L	<0.000025	0.000025	7187055	<0.0000050	7187055	<0.0000050	0.0000050	7187055
Dissolved Boron (B)	mg/L	<0.25	0.25	7187055	<0.050	7187055	<0.050	0.050	7187055
Dissolved Cadmium (Cd)	mg/L	0.000137	0.000025	7187055	0.0000880	7187055	0.0000370	0.0000050	7187055
Dissolved Chromium (Cr)	mg/L	0.00110	0.00050	7187055	0.00063	7187055	0.00056	0.00010	7187055
Dissolved Cobalt (Co)	mg/L	0.000057	0.000025	7187055	0.0000930	7187055	0.000343	0.0000050	7187055
Dissolved Copper (Cu)	mg/L	0.00123	0.00025	7187055	0.000885	7187055	0.00324	0.000050	7191722
Dissolved Iron (Fe)	mg/L	0.0140	0.0050	7187055	0.0367	7187055	0.224	0.0010	7187055
Dissolved Lead (Pb)	mg/L	<0.000025	0.000025	7191722	0.0000060	7191722	0.0000780	0.0000050	7187055
Dissolved Lithium (Li)	mg/L	0.0099	0.0025	7187055	0.0122	7187055	0.00339	0.00050	7187055
Dissolved Manganese (Mn)	mg/L	0.00043	0.00025	7187055	0.00562	7187055	0.133	0.000050	7187055
Dissolved Mercury (Hg)	mg/L				<0.000010	7187055	<0.000010	0.000010	7187055
Dissolved Molybdenum (Mo)	mg/L	0.00287	0.00025	7187055	0.00155	7187055	0.00135	0.000050	7187055
Dissolved Nickel (Ni)	mg/L	0.0364	0.00010	7187055	0.0145	7187055	0.00464	0.000020	7187055
Dissolved Selenium (Se)	mg/L	0.00212	0.00020	7187055	0.00263	7187055	0.000985	0.000040	7187055
Dissolved Silicon (Si)	mg/L	4.09	0.50	7187055	4.17	7187055	3.44	0.10	7187055
Dissolved Silver (Ag)	mg/L	<0.000025	0.000025	7187055	<0.0000050	7187055	<0.0000050	0.0000050	7187055
Dissolved Strontium (Sr)	mg/L	0.741	0.00025	7187055	0.761	7187055	0.289	0.000050	7187055
Dissolved Thallium (Tl)	mg/L	0.000089	0.000010	7187055	0.0000170	7187055	0.0000070	0.0000020	7187055
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	7187055	0.00077	7187055	0.00062	0.00020	7187055
Dissolved Titanium (Ti)	mg/L	<0.0025	0.0025	7187055	<0.00050	7187055	<0.00050	0.00050	7187055
Dissolved Uranium (U)	mg/L	0.00231	0.000010	7187055	0.00195	7187055	0.00191	0.0000020	7187055
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	7187055	<0.00020	7187055	0.00037	0.00020	7187055
Dissolved Zinc (Zn)	mg/L	0.00431	0.00050	7187055	0.00223	7187055	0.00152	0.00010	7187055
Dissolved Zirconium (Zr)	mg/L	<0.00050	0.00050	7187055	0.00026	7187055	0.00088	0.00010	7187055
Dissolved Calcium (Ca)	mg/L	125	0.25	7184448	109	7184448	51.6	0.050	7184448
Dissolved Magnesium (Mg)	mg/L	126	0.25	7184448	55.1	7184448	28.3	0.050	7184448
Dissolved Potassium (K)	mg/L	1.67	0.25	7184448	0.992	7184448	0.667	0.050	7184448
Dissolved Sodium (Na)	mg/L	5.04	0.25	7184448	3.78	7184448	2.49	0.050	7184448
Dissolved Sulphur (S)	mg/L	211	15	7184448	100	7184448	46.6	3.0	7184448

RDL = Reportable Detection Limit

Maxxam Job #: B386041  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		HO9883			HO9884		HO9885		
Sampling Date		2013/09/19 14:30			2013/09/19 14:45		2013/09/18 15:30		
COC#		08378821			08378821		08378821		
	UNITS	GWCC-3	RDL	QC Batch	GWCC-5	QC Batch	DUP1	RDL	QC Batch
<b>Total Metals by ICPMS</b>									
Total Aluminum (Al)	mg/L	0.0036	0.0025	7188822	0.00218	7188822	0.0963	0.00050	7188822
Total Antimony (Sb)	mg/L	0.00089	0.00010	7188822	0.000723	7188822	0.000321	0.000020	7188822
Total Arsenic (As)	mg/L	0.00097	0.00010	7188822	0.000764	7188822	0.000854	0.000020	7188822
Total Barium (Ba)	mg/L	0.0290	0.00010	7188822	0.0857	7188822	0.0613	0.000020	7188822
Total Beryllium (Be)	mg/L	<0.000050	0.000050	7188822	<0.000010	7188822	0.000014	0.000010	7188822
Total Bismuth (Bi)	mg/L	<0.000025	0.000025	7188822	<0.0000050	7188822	<0.0000050	0.0000050	7188822
Total Boron (B)	mg/L	<0.25	0.25	7188822	<0.050	7188822	<0.050	0.050	7188822
Total Cadmium (Cd)	mg/L	0.000141	0.000025	7188822	0.000118	7188822	0.0000440	0.0000050	7188822
Total Chromium (Cr)	mg/L	0.00078	0.00050	7188822	0.00063	7188822	0.00069	0.00010	7188822
Total Cobalt (Co)	mg/L	0.000059	0.000025	7188822	0.000106	7188822	0.000410	0.0000050	7188822
Total Copper (Cu)	mg/L	0.00308	0.00025	7188822	0.000905	7188822	0.00326	0.000050	7188822
Total Iron (Fe)	mg/L	0.0071	0.0050	7188822	0.0710	7188822	0.316	0.0010	7188822
Total Lead (Pb)	mg/L	0.000070	0.000025	7188822	0.0000130	7188822	0.000154	0.0000050	7188822
Total Lithium (Li)	mg/L	0.0104	0.0025	7188822	0.0124	7188822	0.00341	0.00050	7188822
Total Manganese (Mn)	mg/L	<0.00025	0.00025	7188822	0.00609	7188822	0.144	0.000050	7188822
Total Mercury (Hg)	mg/L				<0.000010	7188822	<0.000010	0.000010	7188822
Total Molybdenum (Mo)	mg/L	0.00274	0.00025	7188822	0.00149	7188822	0.00134	0.000050	7188822
Total Nickel (Ni)	mg/L	0.0377	0.00010	7188822	0.0150	7188822	0.00506	0.000020	7188822
Total Selenium (Se)	mg/L	0.00209	0.00020	7188822	0.00271	7188822	0.000965	0.000040	7188822
Total Silicon (Si)	mg/L	3.93	0.50	7188822	4.33	7188822	3.37	0.10	7188822
Total Silver (Ag)	mg/L	<0.000025	0.000025	7188822	<0.0000050	7188822	0.0000070	0.0000050	7188822
Total Strontium (Sr)	mg/L	0.704	0.00025	7188822	0.729	7188822	0.272	0.000050	7188822
Total Thallium (Tl)	mg/L	0.000080	0.000010	7188822	0.0000170	7188822	0.0000080	0.0000020	7188822
Total Tin (Sn)	mg/L	<0.0010	0.0010	7188822	0.00022	7188822	0.00035	0.00020	7188822
Total Titanium (Ti)	mg/L	<0.0025	0.0025	7188822	<0.00050	7188822	0.00225	0.00050	7188822
Total Uranium (U)	mg/L	0.00244	0.000010	7188822	0.00201	7188822	0.00196	0.0000020	7188822
Total Vanadium (V)	mg/L	0.0010	0.0010	7188822	<0.00020	7188822	0.00058	0.00020	7188822
Total Zinc (Zn)	mg/L	0.00595	0.00050	7188822	0.00212	7188822	0.00257	0.00010	7188822
Total Zirconium (Zr)	mg/L	<0.00050	0.00050	7188822	0.00019	7188822	0.00086	0.00010	7188822
Total Calcium (Ca)	mg/L	117	0.25	7184372	107	7184372	49.3	0.050	7184372
Total Magnesium (Mg)	mg/L	125	0.25	7184372	55.4	7184372	28.5	0.050	7184372
Total Potassium (K)	mg/L	1.67	0.25	7184372	1.01	7184372	0.631	0.050	7184372
Total Sodium (Na)	mg/L	5.12	0.25	7184372	3.96	7184372	2.55	0.050	7184372
Total Sulphur (S)	mg/L	206	15	7184372	97.8	7184372	46.8	3.0	7184372

RDL = Reportable Detection Limit

Maxxam Job #: B386041  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		HO9886		HO9887	HO9887		HO9888		
Sampling Date		2013/09/19 16:30		2013/09/19 16:30	2013/09/19 16:30				
COC#		08378821		08378821	08378821		08378821		
	UNITS	DUP2	QC Batch	FB	FB Lab-Dup	QC Batch	TRAVEL BLANK	RDL	QC Batch
<b>Dissolved Metals by ICPMS</b>									
Dissolved Aluminum (Al)	mg/L	0.00187	7252915	<0.00050	<0.00050	7187055	0.00070	0.00050	7187055
Dissolved Antimony (Sb)	mg/L	0.000866	7252915	<0.000020	<0.000020	7187055	<0.000020	0.000020	7187055
Dissolved Arsenic (As)	mg/L	0.000655	7252915	<0.000020	<0.000020	7187055	<0.000020	0.000020	7187055
Dissolved Barium (Ba)	mg/L	0.0640	7252915	0.000020	<0.000020	7187055	0.000027	0.000020	7187055
Dissolved Beryllium (Be)	mg/L	<0.000010	7252915	<0.000010	<0.000010	7187055	<0.000010	0.000010	7187055
Dissolved Bismuth (Bi)	mg/L	<0.0000050	7252915	<0.0000050	<0.0000050	7187055	<0.0000050	0.0000050	7187055
Dissolved Boron (B)	mg/L	<0.050	7252915	<0.050	<0.050	7187055	<0.050	0.050	7187055
Dissolved Cadmium (Cd)	mg/L	0.0000810	7252915	<0.0000050	<0.0000050	7187055	<0.0000050	0.0000050	7187055
Dissolved Chromium (Cr)	mg/L	0.00059	7252915	<0.00010	<0.00010	7187055	<0.00010	0.00010	7187055
Dissolved Cobalt (Co)	mg/L	0.0000930	7252915	<0.0000050	<0.0000050	7187055	<0.0000050	0.0000050	7187055
Dissolved Copper (Cu)	mg/L	0.000753	7252915	0.000212	0.000203	7187055	0.000051	0.000050	7187055
Dissolved Iron (Fe)	mg/L	0.0387	7252915	<0.0010	<0.0010	7187055	<0.0010	0.0010	7187055
Dissolved Lead (Pb)	mg/L	0.0000050	7252915	0.0000080	0.0000060	7187055	0.0000060	0.0000050	7187055
Dissolved Lithium (Li)	mg/L	0.0113	7252915	<0.00050	<0.00050	7187055	<0.00050	0.00050	7187055
Dissolved Manganese (Mn)	mg/L	0.00581	7252915	<0.000050	<0.000050	7187055	<0.000050	0.000050	7187055
Dissolved Mercury (Hg)	mg/L			<0.000010	<0.000010	7187055	<0.000010	0.000010	7187055
Dissolved Molybdenum (Mo)	mg/L	0.00143	7252915	<0.000050	<0.000050	7187055	<0.000050	0.000050	7187055
Dissolved Nickel (Ni)	mg/L	0.0149	7252915	<0.000020	<0.000020	7187055	<0.000020	0.000020	7187055
Dissolved Selenium (Se)	mg/L	0.00258	7252915	<0.000040	<0.000040	7187055	<0.000040	0.000040	7187055
Dissolved Silicon (Si)	mg/L	5.27	7252915	<0.10	<0.10	7187055	<0.10	0.10	7187055
Dissolved Silver (Ag)	mg/L	<0.0000050	7252915	<0.0000050	<0.0000050	7187055	<0.0000050	0.0000050	7187055
Dissolved Strontium (Sr)	mg/L	0.724	7252915	<0.000050	<0.000050	7187055	0.000061	0.000050	7187055
Dissolved Thallium (Tl)	mg/L	0.0000130	7252915	0.0000020	<0.0000020	7187055	<0.0000020	0.0000020	7187055
Dissolved Tin (Sn)	mg/L	<0.00020	7252915	<0.00020	<0.00020	7187055	<0.00020	0.00020	7187055
Dissolved Titanium (Ti)	mg/L	<0.00050	7252915	<0.00050	<0.00050	7187055	<0.00050	0.00050	7187055
Dissolved Uranium (U)	mg/L	0.00182	7252915	<0.0000020	<0.0000020	7187055	<0.0000020	0.0000020	7187055
Dissolved Vanadium (V)	mg/L	<0.00020	7252915	<0.00020	<0.00020	7187055	<0.00020	0.00020	7187055
Dissolved Zinc (Zn)	mg/L	0.00060	7252915	<0.00010	<0.00010	7187055	0.00034	0.00010	7191722
Dissolved Zirconium (Zr)	mg/L	0.00022	7252915	<0.00010	<0.00010	7187055	<0.00010	0.00010	7187055
Dissolved Calcium (Ca)	mg/L	120	7184448	<0.050		7184448	0.053	0.050	7184448
Dissolved Magnesium (Mg)	mg/L	59.7	7184448	<0.050		7184448	<0.050	0.050	7184448
Dissolved Potassium (K)	mg/L	1.03	7184448	<0.050		7184448	<0.050	0.050	7184448
Dissolved Sodium (Na)	mg/L	4.07	7184448	<0.050		7184448	<0.050	0.050	7184448
Dissolved Sulphur (S)	mg/L	108(1)	7184448	<3.0		7184448	<3.0	3.0	7184448

RDL = Reportable Detection Limit

(1) - Dissolved greater than total. Reanalysis yields similar results.

Maxxam Job #: B386041  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		HO9886		HO9887	HO9887		HO9888		
Sampling Date		2013/09/19 16:30		2013/09/19 16:30	2013/09/19 16:30				
COC#		08378821		08378821	08378821		08378821		
	UNITS	DUP2	QC Batch	FB	FB Lab-Dup	QC Batch	TRAVEL BLANK	RDL	QC Batch
<b>Total Metals by ICPMS</b>									
Total Aluminum (Al)	mg/L	0.00334	7188822	<0.00050	<0.00050	7188822	<0.00050	0.00050	7188822
Total Antimony (Sb)	mg/L	0.000592	7188822	<0.000020	<0.000020	7188822	<0.000020	0.000020	7188822
Total Arsenic (As)	mg/L	0.00101	7188822	<0.000020	<0.000020	7188822	<0.000020	0.000020	7188822
Total Barium (Ba)	mg/L	0.100	7188822	<0.000020	<0.000020	7188822	<0.000020	0.000020	7188822
Total Beryllium (Be)	mg/L	<0.000010	7188822	<0.000010	<0.000010	7188822	<0.000010	0.000010	7188822
Total Bismuth (Bi)	mg/L	<0.0000050	7188822	<0.0000050	<0.0000050	7188822	<0.0000050	0.0000050	7188822
Total Boron (B)	mg/L	<0.050	7188822	<0.050	<0.050	7188822	<0.050	0.050	7188822
Total Cadmium (Cd)	mg/L	0.000139	7188822	<0.0000050	<0.0000050	7188822	<0.0000050	0.0000050	7188822
Total Chromium (Cr)	mg/L	0.00086	7188822	<0.00010	<0.00010	7188822	<0.00010	0.00010	7188822
Total Cobalt (Co)	mg/L	0.000150	7188822	<0.0000050	<0.0000050	7188822	<0.0000050	0.0000050	7188822
Total Copper (Cu)	mg/L	0.00142	7188822	0.000102		7196748	<0.000050	0.000050	7188822
Total Iron (Fe)	mg/L	0.207	7188822	<0.0010	<0.0010	7188822	<0.0010	0.0010	7188822
Total Lead (Pb)	mg/L	0.0000320	7188822	<0.0000050	<0.0000050	7188822	0.0000060	0.0000050	7188822
Total Lithium (Li)	mg/L	0.0123	7188822	<0.00050	<0.00050	7188822	<0.00050	0.00050	7188822
Total Manganese (Mn)	mg/L	0.0105	7188822	<0.000050	<0.000050	7188822	<0.000050	0.000050	7188822
Total Mercury (Hg)	mg/L			<0.000010	<0.000010	7188822	<0.000010	0.000010	7188822
Total Molybdenum (Mo)	mg/L	0.00138	7188822	<0.000050	<0.000050	7188822	<0.000050	0.000050	7188822
Total Nickel (Ni)	mg/L	0.0156	7188822	<0.000020	<0.000020	7188822	<0.000020	0.000020	7188822
Total Selenium (Se)	mg/L	0.00274	7188822	<0.000040	<0.000040	7188822	<0.000040	0.000040	7188822
Total Silicon (Si)	mg/L	3.93	7188822	<0.10	<0.10	7188822	<0.10	0.10	7188822
Total Silver (Ag)	mg/L	<0.0000050	7188822	<0.0000050	<0.0000050	7188822	<0.0000050	0.0000050	7188822
Total Strontium (Sr)	mg/L	0.715	7188822	<0.000050	<0.000050	7188822	<0.000050	0.000050	7188822
Total Thallium (Tl)	mg/L	0.0000180	7188822	<0.0000020	<0.0000020	7188822	<0.0000020	0.0000020	7188822
Total Tin (Sn)	mg/L	0.00043	7188822	<0.00020	<0.00020	7188822	<0.00020	0.00020	7188822
Total Titanium (Ti)	mg/L	<0.00050	7188822	<0.00050	<0.00050	7188822	<0.00050	0.00050	7188822
Total Uranium (U)	mg/L	0.00191	7188822	<0.0000020	<0.0000020	7188822	<0.0000020	0.0000020	7188822
Total Vanadium (V)	mg/L	<0.00020	7188822	<0.00020	<0.00020	7188822	<0.00020	0.00020	7188822
Total Zinc (Zn)	mg/L	0.00272	7188822	0.00011	<0.00010	7188822	0.00038	0.00010	7188822
Total Zirconium (Zr)	mg/L	0.00021	7188822	<0.00010	<0.00010	7188822	<0.00010	0.00010	7188822
Total Calcium (Ca)	mg/L	101	7184372	<0.050		7184372	<0.050	0.050	7184372
Total Magnesium (Mg)	mg/L	55.7	7184372	<0.050		7184372	<0.050	0.050	7184372
Total Potassium (K)	mg/L	1.08	7184372	<0.050		7184372	<0.050	0.050	7184372
Total Sodium (Na)	mg/L	3.96	7184372	<0.050		7184372	<0.050	0.050	7184372
Total Sulphur (S)	mg/L	99.0	7184372	<3.0		7184372	<3.0	3.0	7184372

RDL = Reportable Detection Limit

**General Comments**

Revised Report (2013/10/11): Additional parameters have been included in the metals scan (KP5).

Revised Report (2013/11/01): Total Nitrogen added, sample HO9886-02, as per client request. (JM3)

Revised Report (Version: 4R): Report units for metals analysis have been changed to mg/L as per client request [GRR].

Sample HO9886-01: Revised Report (2013/11/05): Due to suspected laboratory error, sample was reanalyzed for Metals, Total N and TKN. Corrected values are included in this report (KP5).

Sample HO9871, Elements by ICPMS Low Level (dissolved): Test repeated.

Sample HO9875, Elements by ICPMS Low Level (dissolved): Test repeated.

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER) Comments**

Sample HO9879-04 Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.

Sample HO9879, Elements by ICPMS Low Level (dissolved): Test repeated.

Sample HO9880-04 Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.

Sample HO9880, Elements by ICPMS Low Level (dissolved): Test repeated.

Sample HO9881-04 Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.

Sample HO9881, Elements by ICPMS Low Level (dissolved): Test repeated.

Sample HO9882-04 Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.

Sample HO9882, Elements by ICPMS Low Level (dissolved): Test repeated.

Sample HO9883-04 Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.

Sample HO9883, Elements by ICPMS Low Level (dissolved): Test repeated.

Sample HO9884, Elements by ICPMS Low Level (dissolved): Test repeated.

Sample HO9885, Elements by ICPMS Low Level (dissolved): Test repeated.

Sample HO9888, Elements by ICPMS Low Level (dissolved): Test repeated.

Sample HO9879-04 Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.

Sample HO9880-04 Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.

Sample HO9881-04 Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.

Sample HO9882-04 Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.

Sample HO9883-04 Elements by ICPMS Low Level (dissolved): RDL raised due to sample matrix interference.

Maxxam Job #: B386041  
Report Date: 2014/02/27

Ecological Logistics & Research Ltd  
Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
Site Location: CLINTON CREEK  
Sampler Initials: DD

Sample HO9879-03 Elements by ICPMS Low Level (total): RDL raised due to sample matrix interference.

Sample HO9880-03 Elements by ICPMS Low Level (total): RDL raised due to sample matrix interference.

Sample HO9881-03 Elements by ICPMS Low Level (total): RDL raised due to sample matrix interference.

Sample HO9882-03 Elements by ICPMS Low Level (total): RDL raised due to sample matrix interference.

Sample HO9883-03 Elements by ICPMS Low Level (total): RDL raised due to sample matrix interference.

Sample HO9887, Elements by ICPMS Low Level (total): Test repeated.

Maxxam Job #: B386041  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7184456	Nitrate plus Nitrite (N)	2013/09/21	NC	80 - 120	104	80 - 120	<0.020	mg/L	NC	25
7184457	Nitrite (N)	2013/09/21	103	80 - 120	101	80 - 120	<0.0050	mg/L	NC	20
7185617	Dissolved Organic Carbon (C)	2013/09/23	NC	80 - 120	105	80 - 120	<0.50	mg/L	NC	20
7186672	Ammonia (N)	2013/09/23	100	80 - 120	98	80 - 120	<0.0050	mg/L	0.9	20
7187055	Dissolved Aluminum (Al)	2013/09/24	101	80 - 120	103	80 - 120	<0.00050	mg/L	NC	20
7187055	Dissolved Antimony (Sb)	2013/09/24	101	80 - 120	102	80 - 120	<0.000020	mg/L	NC	20
7187055	Dissolved Arsenic (As)	2013/09/24	101	80 - 120	99	80 - 120	<0.000020	mg/L	NC	20
7187055	Dissolved Barium (Ba)	2013/09/24	98	80 - 120	100	80 - 120	<0.000020	mg/L	NC	20
7187055	Dissolved Beryllium (Be)	2013/09/24	99	80 - 120	100	80 - 120	<0.000010	mg/L	NC	20
7187055	Dissolved Bismuth (Bi)	2013/09/24	100	80 - 120	95	80 - 120	<0.000050	mg/L	NC	20
7187055	Dissolved Cadmium (Cd)	2013/09/24	101	80 - 120	101	80 - 120	<0.000050	mg/L	NC	20
7187055	Dissolved Chromium (Cr)	2013/09/24	98	80 - 120	98	80 - 120	<0.00010	mg/L	NC	20
7187055	Dissolved Cobalt (Co)	2013/09/24	100	80 - 120	97	80 - 120	<0.000050	mg/L	NC	20
7187055	Dissolved Copper (Cu)	2013/09/24	98	80 - 120	96	80 - 120	<0.000050	mg/L	NC	20
7187055	Dissolved Iron (Fe)	2013/09/24	104	80 - 120	108	80 - 120	<0.0010	mg/L	NC	20
7187055	Dissolved Lead (Pb)	2013/09/24	99	80 - 120	100	80 - 120	<0.000050	mg/L	NC	20
7187055	Dissolved Lithium (Li)	2013/09/24	97	80 - 120	99	80 - 120	<0.00050	mg/L	NC	20
7187055	Dissolved Manganese (Mn)	2013/09/24	100	80 - 120	97	80 - 120	<0.000050	mg/L	NC	20
7187055	Dissolved Mercury (Hg)	2013/09/24	98	80 - 120	99	80 - 120	<0.000010	mg/L	NC	20
7187055	Dissolved Molybdenum (Mo)	2013/09/24	103	80 - 120	112	80 - 120	<0.000050	mg/L	NC	20
7187055	Dissolved Nickel (Ni)	2013/09/24	101	80 - 120	98	80 - 120	<0.000020	mg/L	NC	20
7187055	Dissolved Selenium (Se)	2013/09/24	105	80 - 120	106	80 - 120	<0.000040	mg/L	NC	20
7187055	Dissolved Silver (Ag)	2013/09/24	105	80 - 120	98	80 - 120	<0.000050	mg/L	NC	20
7187055	Dissolved Strontium (Sr)	2013/09/24	100	80 - 120	100	80 - 120	<0.000050	mg/L	NC	20
7187055	Dissolved Thallium (Tl)	2013/09/24	102	80 - 120	102	80 - 120	<0.000020	mg/L	NC	20
7187055	Dissolved Tin (Sn)	2013/09/24	99	80 - 120	101	80 - 120	<0.00020	mg/L	NC	20
7187055	Dissolved Titanium (Ti)	2013/09/24	118	80 - 120	98	80 - 120	<0.00050	mg/L	NC	20
7187055	Dissolved Uranium (U)	2013/09/24	96	80 - 120	97	80 - 120	<0.000020	mg/L	NC	20
7187055	Dissolved Vanadium (V)	2013/09/24	101	80 - 120	96	80 - 120	<0.00020	mg/L	NC	20
7187055	Dissolved Zinc (Zn)	2013/09/24	109	80 - 120	102	80 - 120	<0.00010	mg/L	NC	20
7187055	Dissolved Boron (B)	2013/09/24					<0.050	mg/L	NC	20
7187055	Dissolved Silicon (Si)	2013/09/24					<0.10	mg/L	NC	20
7187055	Dissolved Zirconium (Zr)	2013/09/24					<0.00010	mg/L	NC	20
7187883	Total Suspended Solids	2013/09/24	103	80 - 120	100	80 - 120	<4.0	mg/L	NC	20
7188142	Ammonia (N)	2013/09/24	99	80 - 120	99	80 - 120	<0.0050	mg/L	NC	20
7188822	Total Aluminum (Al)	2013/09/25	99	80 - 120	101	80 - 120	<0.00050	mg/L	NC	20
7188822	Total Antimony (Sb)	2013/09/25	99	80 - 120	95	80 - 120	<0.000020	mg/L	NC	20
7188822	Total Arsenic (As)	2013/09/25	102	80 - 120	100	80 - 120	<0.000020	mg/L	NC	20
7188822	Total Barium (Ba)	2013/09/25	94	80 - 120	96	80 - 120	<0.000020	mg/L	NC	20
7188822	Total Beryllium (Be)	2013/09/25	97	80 - 120	96	80 - 120	<0.000010	mg/L	NC	20

Maxxam Job #: B386041  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7188822	Total Bismuth (Bi)	2013/09/25	101	80 - 120	95	80 - 120	<0.000050	mg/L	NC	20
7188822	Total Cadmium (Cd)	2013/09/25	99	80 - 120	96	80 - 120	<0.000050	mg/L	NC	20
7188822	Total Chromium (Cr)	2013/09/25	99	80 - 120	97	80 - 120	<0.00010	mg/L	NC	20
7188822	Total Cobalt (Co)	2013/09/25	100	80 - 120	98	80 - 120	<0.000050	mg/L	NC	20
7188822	Total Copper (Cu)	2013/09/25	101	80 - 120	98	80 - 120	<0.000050	mg/L		
7188822	Total Iron (Fe)	2013/09/25	104	80 - 120	102	80 - 120	<0.0010	mg/L	NC	20
7188822	Total Lead (Pb)	2013/09/25	98	80 - 120	99	80 - 120	<0.000050	mg/L	NC	20
7188822	Total Lithium (Li)	2013/09/25	96	80 - 120	97	80 - 120	<0.00050	mg/L	NC	20
7188822	Total Manganese (Mn)	2013/09/25	99	80 - 120	97	80 - 120	<0.000050	mg/L	NC	20
7188822	Total Mercury (Hg)	2013/09/25	96	80 - 120	98	80 - 120	<0.000010	mg/L	NC	20
7188822	Total Molybdenum (Mo)	2013/09/25	99	80 - 120	91	80 - 120	<0.000050	mg/L	NC	20
7188822	Total Nickel (Ni)	2013/09/25	102	80 - 120	101	80 - 120	0.000025, RDL=0.000020	mg/L	NC	20
7188822	Total Selenium (Se)	2013/09/25	107	80 - 120	103	80 - 120	<0.000040	mg/L	NC	20
7188822	Total Silver (Ag)	2013/09/25	100	80 - 120	92	80 - 120	<0.0000050	mg/L	NC	20
7188822	Total Strontium (Sr)	2013/09/25	96	80 - 120	95	80 - 120	<0.000050	mg/L	NC	20
7188822	Total Thallium (Tl)	2013/09/25	99	80 - 120	101	80 - 120	<0.0000020	mg/L	NC	20
7188822	Total Tin (Sn)	2013/09/25	97	80 - 120	93	80 - 120	<0.00020	mg/L	NC	20
7188822	Total Titanium (Ti)	2013/09/25	116	80 - 120	100	80 - 120	<0.00050	mg/L	NC	20
7188822	Total Uranium (U)	2013/09/25	98	80 - 120	99	80 - 120	<0.0000020	mg/L	NC	20
7188822	Total Vanadium (V)	2013/09/25	101	80 - 120	98	80 - 120	<0.00020	mg/L	NC	20
7188822	Total Zinc (Zn)	2013/09/25	109	80 - 120	103	80 - 120	<0.00010	mg/L	NC	20
7188822	Total Boron (B)	2013/09/25					<0.050	mg/L	NC	20
7188822	Total Silicon (Si)	2013/09/25					<0.10	mg/L	NC	20
7188822	Total Zirconium (Zr)	2013/09/25					<0.00010	mg/L	NC	20
7189402	Total Phosphorus (P)	2013/09/24	84	80 - 120	97	80 - 120	<0.0050	mg/L	NC	20
7189554	Dissolved Sulphate (SO4)	2013/09/24	NC	80 - 120	101	80 - 120	<0.50	mg/L	0.9	20
7189555	Total Nitrogen (N)	2013/09/25	NC	80 - 120	90	80 - 120	<0.020	mg/L	0.1	20
7190550	Ammonia (N)	2013/09/25	NC	80 - 120	97	80 - 120	<0.0050	mg/L	NC	20
7191722	Dissolved Aluminum (Al)	2013/09/26			97	80 - 120	<0.00050	mg/L		
7191722	Dissolved Antimony (Sb)	2013/09/26			97	80 - 120	<0.000020	mg/L		
7191722	Dissolved Copper (Cu)	2013/09/26			97	80 - 120	<0.000050	mg/L		
7191722	Dissolved Lead (Pb)	2013/09/26			99	80 - 120	<0.0000050	mg/L		
7191722	Dissolved Selenium (Se)	2013/09/26			101	80 - 120	<0.000040	mg/L		
7191722	Dissolved Zinc (Zn)	2013/09/26			101	80 - 120	<0.00010	mg/L		
7191886	Dissolved Sulphate (SO4)	2013/09/25	NC	80 - 120	100	80 - 120	<0.50	mg/L	NC <sup>(1)</sup>	20
7196377	Total Phosphorus (P)	2013/09/27	NC	80 - 120	83	80 - 120	<0.0050	mg/L	0.6	20
7196748	Total Copper (Cu)	2013/09/30			98	80 - 120	<0.000050	mg/L		
7202052	Dissolved Sulphate (SO4)	2013/10/01			99	80 - 120	0.60, RDL=0.50	mg/L		
7252915	Dissolved Aluminum (Al)	2013/10/29			108	80 - 120	<0.00050	mg/L		
7252915	Dissolved Antimony (Sb)	2013/10/29			102	80 - 120	<0.000020	mg/L		



Maxxam Job #: B386041  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7252915	Dissolved Arsenic (As)	2013/10/29			100	80 - 120	<0.000020	mg/L		
7252915	Dissolved Barium (Ba)	2013/10/29			95	80 - 120	<0.000020	mg/L		
7252915	Dissolved Beryllium (Be)	2013/10/29			97	80 - 120	<0.000010	mg/L		
7252915	Dissolved Bismuth (Bi)	2013/10/29			96	80 - 120	<0.000050	mg/L		
7252915	Dissolved Cadmium (Cd)	2013/10/29			101	80 - 120	<0.000050	mg/L		
7252915	Dissolved Chromium (Cr)	2013/10/29			100	80 - 120	<0.00010	mg/L		
7252915	Dissolved Cobalt (Co)	2013/10/29			101	80 - 120	<0.000050	mg/L		
7252915	Dissolved Copper (Cu)	2013/10/29			97	80 - 120	<0.000050	mg/L		
7252915	Dissolved Iron (Fe)	2013/10/29			110	80 - 120	<0.0010	mg/L		
7252915	Dissolved Lead (Pb)	2013/10/29			101	80 - 120	<0.000050	mg/L		
7252915	Dissolved Lithium (Li)	2013/10/29			99	80 - 120	<0.00050	mg/L		
7252915	Dissolved Manganese (Mn)	2013/10/29			103	80 - 120	<0.000050	mg/L		
7252915	Dissolved Molybdenum (Mo)	2013/10/29			100	80 - 120	<0.000050	mg/L		
7252915	Dissolved Nickel (Ni)	2013/10/29			104	80 - 120	<0.000020	mg/L		
7252915	Dissolved Selenium (Se)	2013/10/29			98	80 - 120	<0.000040	mg/L		
7252915	Dissolved Silver (Ag)	2013/10/29			92	80 - 120	<0.000050	mg/L		
7252915	Dissolved Strontium (Sr)	2013/10/29			102	80 - 120	<0.000050	mg/L		
7252915	Dissolved Thallium (Tl)	2013/10/29			102	80 - 120	<0.000020	mg/L		
7252915	Dissolved Tin (Sn)	2013/10/29			95	80 - 120	<0.00020	mg/L		
7252915	Dissolved Titanium (Ti)	2013/10/29			105	80 - 120	<0.00050	mg/L		
7252915	Dissolved Uranium (U)	2013/10/29			100	80 - 120	<0.000020	mg/L		
7252915	Dissolved Vanadium (V)	2013/10/29			100	80 - 120	<0.00020	mg/L		
7252915	Dissolved Zinc (Zn)	2013/10/29			103	80 - 120	<0.00010	mg/L		
7252915	Dissolved Boron (B)	2013/10/29					<0.050	mg/L		
7252915	Dissolved Silicon (Si)	2013/10/29					<0.10	mg/L		
7252915	Dissolved Zirconium (Zr)	2013/10/29					<0.00010	mg/L		
7253093	Total Mercury (Hg)	2013/10/29	91	80 - 120	89	80 - 120	<0.000010	mg/L	NC	20
7254463	Dissolved Mercury (Hg)	2013/10/30	111	80 - 120	84	80 - 120	<0.000010	mg/L	NC	20
7264394	Total Nitrogen (N)	2013/11/05			90	80 - 120	<0.020	mg/L		

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

Maxxam Job #: B386041  
Report Date: 2014/02/27

Ecological Logistics & Research Ltd  
Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
Site Location: CLINTON CREEK  
Sampler Initials: DD


NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.  
(1) - RDL raised due to sample matrix interference.

## Validation Signature Page

**Maxxam Job #: B386041**

---

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



---

Andy Lu, Data Validation Coordinator

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Job #: **B386041**

COC #:  **08378821**

Page: 2 of 2

Invoice To: Require Report? Yes  No   
 Company Name: Ecological Logistics & Research Ltd.  
 Contact Name: Chris Jastrebski  
 Address: 204-105 Titanium Way, Whitehorse YT  
 PC: Y1A 0E7  
 Phone / Fax#: Ph: 867.668.6386 Fax: 867.668.6385  
 E-mail: [chris@elf.ca](mailto:chris@elf.ca)

Report To:  
 Company Name: Ecological Logistics & Research Ltd.  
 Contact Name: Chris Jastrebski  
 Address: 204-105 Titanium Way, Whitehorse YT  
 PC: Y1A 0E7  
 Phone / Fax#: Ph: 867.668.6386 Fax: 867.668.6385  
 E-mail: [water@elf.ca](mailto:water@elf.ca)

PO #:
Quotation #: B13-213.1-DV
Project #: 13-156
Proj. Name: September 2013 Clinton Creek Monitoring
Location: Clinton Creek
Sampled by: Dave Desmarais

REGULATORY REQUIREMENTS: SERVICE REQUESTED:  
 CSR  Regular Turn Around Time (TAT) (5 days for most tests)  
 CCME  RUSH (Please contact the lab)  
 BC Water Quality  1 Day  2 Day  3 Day  
 Other \_\_\_\_\_  
 DRINKING WATER Date Required: \_\_\_\_\_

SPECIAL INSTRUCTIONS:  
 Return Cooler  Ship Sample Bottles (please specify)

ANALYSIS REQUESTED												HOLD	Number of Containers	YES	NO	YES	NO
ICP low level	Dissolved Metals (DM)	IPC low level Total Metals	Nitrate	Nitrite	Sulphate	Total Phosphorous	Ammonia	Total Suspended Solids (TSS)	Dissolved Organic Carbon (DOC)	Total Kjeldahl Nitrogen	Total Hardness						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> </															

*This Page Intentionally Left Blank*

Your Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Your C.O.C. #: 08378570

**Attention: Chris Jastrebski**  
 Ecological Logistics & Research Ltd  
 #204 - 105 Titanium Way  
 Whitehorse, YT  
 CANADA Y1A 0E7

**Report Date: 2014/02/27**  
**Report #: R1523554**  
**Version: 3R**

**CERTIFICATE OF ANALYSIS – REVISED REPORT**

**MAXXAM JOB #: B384508**  
**Received: 2013/09/18, 09:05**

Sample Matrix: Water  
 # Samples Received: 12

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
Carbon (DOC) - field filtered/preserved (1)	3	N/A	2013/09/19	BBY6SOP-00003	SM-5310C
Hardness Total (calculated as CaCO3)	3	N/A	2013/09/20	BBY7SOP-00002	EPA 6020A
Hardness (calculated as CaCO3)	3	N/A	2013/09/20	BBY7SOP-00002	EPA 6020A
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	2	N/A	2013/09/20	BBY7SOP-00002	EPA 6020A
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	1	N/A	2013/09/25	BBY7SOP-00002	EPA 6020A
Elements by ICPMS Low Level (dissolved)	3	N/A	2013/09/19	BBY7SOP-00002	EPA 6020A
Na, K, Ca, Mg, S by CRC ICPMS (total)	3	N/A	2013/09/20	BBY7SOP-00002	EPA 6020A
Elements by ICPMS Low Level (total)	1	N/A	2013/09/19	BBY7SOP-00002	EPA 6020A
Elements by ICPMS Low Level (total)	2	N/A	2013/09/20	BBY7SOP-00002	EPA 6020A
Nitrogen (Total)	3	2013/09/23	2013/09/23	BBY6SOP-00016	SM-4500N C
Ammonia-N (Preserved)	3	N/A	2013/09/19	BBY6SOP-00009	SM-4500NH3G
Nitrate + Nitrite (N)	12	N/A	2013/09/18	BBY6SOP-00010	SM 4500NO3-I
Nitrite (N) by CFA	12	N/A	2013/09/18	BBY6SOP-00010	EPA 353.2
Nitrogen - Nitrate (as N)	12	N/A	2013/09/18	BBY6SOP-00010	SM 4500NO3-I
Filter and HNO3 Preserve for Metals	3	N/A	2013/09/18	BBY6WI-00001	EPA 200.2
Sulphate by Automated Colourimetry	9	N/A	2013/09/19	BBY6SOP-00017	SM4500-SO42- E
Sulphate by Automated Colourimetry	3	N/A	2013/09/20	BBY6SOP-00017	SM4500-SO42- E
TKN (Calc. TN, N/N) total	3	N/A	2013/09/24	BBY6SOP-00022	SM 4500N-C
Total Phosphorus	3	N/A	2013/09/20	BBY6SOP-00013	SM 4500 PE
Total Suspended Solids	3	N/A	2013/09/20	BBY6SOP-00034	SM - 2540 D

\* Results relate only to the items tested.

(1) DOC present in the sample should be considered as non-purgeable DOC.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ken Pomeroy, Project Manager  
 Email: KPomeroy@maxxam.ca  
 Phone# (604) 638-5020

=====

Maxxam Job #: B384508  
Report Date: 2014/02/27

Ecological Logistics & Research Ltd  
Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
Site Location: CLINTON CREEK  
Sampler Initials: DD

-2-

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2



Maxxam Job #: B384508  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**RESULTS OF CHEMICAL ANALYSES OF WATER**

Maxxam ID		HN9920	HN9920			HN9921	HN9921		HN9922		HN9923		
Sampling Date		2013/09/16 12:15	2013/09/16 12:15			2013/09/16 14:00	2013/09/16 14:00		2013/09/16 17:30		2013/09/15 14:00		
COC#		08378570	08378570			08378570	08378570		08378570		08378570		
	UNITS	R1	R1 Lab-Dup	RDL	QC Batch	R2	R2 Lab-Dup	RDL	R3	RDL	R4	RDL	QC Batch
<b>ANIONS</b>													
Nitrite (N)	mg/L	<0.0050		0.0050	7177805	<0.0050	<0.0050	0.0050	<0.0050	0.0050	<0.0050	0.0050	7177805
<b>Calculated Parameters</b>													
Filter and HNO3 Preservation	N/A	FIELD		N/A	ONSITE	FIELD		N/A	FIELD	N/A			ONSITE
Total Hardness (CaCO3)	mg/L	327		0.50	7175805	316		0.50	365	0.50			7175805
Nitrate (N)	mg/L	0.277		0.020	7175871	0.039		0.020	0.058	0.020	0.242	0.020	7175871
<b>Misc. Inorganics</b>													
Dissolved Hardness (CaCO3)	mg/L	315		0.50	7175867	326		0.50	386	0.50			7175867
Dissolved Organic Carbon (C)	mg/L	13.9		0.50	7178903	9.97		0.50	14.4	0.50			7178903
<b>Anions</b>													
Dissolved Sulphate (SO4)	mg/L	201		5.0	7183616	171		0.50	274	5.0	150	0.50	7180688
<b>Nutrients</b>													
Ammonia (N)	mg/L	0.045		0.0050	7178795	0.029		0.0050	0.041	0.0050			7178795
Total Total Kjeldahl Nitrogen (Calc)	mg/L	0.552		0.020	7176382	0.347		0.020	0.595	0.020			7176382
Nitrate plus Nitrite (N)	mg/L	0.277		0.020	7177336	0.039	0.040	0.020	0.058	0.020	0.242	0.020	7177336
Total Nitrogen (N)	mg/L	0.829		0.020	7186259	0.385		0.020	0.653	0.020			7186259
Total Phosphorus (P)	mg/L	0.0174	0.0175	0.0050	7183556	0.0099		0.0050	0.0365	0.0050			7183556
<b>Physical Properties</b>													
Total Suspended Solids	mg/L	<4.0		4.0	7181547	<4.0		4.0	45.8	4.0			7181547

N/A = Not Applicable

RDL = Reportable Detection Limit

Maxxam Job #: B384508  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**RESULTS OF CHEMICAL ANALYSES OF WATER**

Maxxam ID		HN9924		HN9925	HN9926	HN9926		HN9927		
Sampling Date		2013/09/15 16:00		2013/09/15 12:30	2013/09/15 12:30	2013/09/15 12:30		2013/09/15 13:00		
COC#		08378570		08378570	08378570	08378570		08378570		
	<b>UNITS</b>	<b>R6</b>	<b>QC Batch</b>	<b>E1</b>	<b>DUP 1</b>	<b>DUP 1 Lab-Dup</b>	<b>RDL</b>	<b>E2</b>	<b>RDL</b>	<b>QC Batch</b>
<b>ANIONS</b>										
Nitrite (N)	mg/L	<0.0050	7177805	0.0060	0.0062		0.0050	0.0051	0.0050	7177805
<b>Calculated Parameters</b>										
Nitrate (N)	mg/L	0.142	7175871	0.161	0.164		0.020	0.164	0.020	7175871
<b>Anions</b>										
Dissolved Sulphate (SO4)	mg/L	37.2	7183616	147	143	141	0.50	246	5.0	7180688
<b>Nutrients</b>										
Nitrate plus Nitrite (N)	mg/L	0.142	7177336	0.167	0.170		0.020	0.169	0.020	7177336

Maxxam ID		HN9928	HN9929	HN9930			HN9931			
Sampling Date		2013/09/15 13:15	2013/09/15 13:45	2013/09/15 15:15			2013/09/15 15:45			
COC#		08378570	08378570	08378570			08378570			
	<b>UNITS</b>	<b>E3</b>	<b>E4</b>	<b>E7</b>	<b>RDL</b>	<b>QC Batch</b>	<b>E8</b>	<b>RDL</b>	<b>QC Batch</b>	
<b>ANIONS</b>										
Nitrite (N)	mg/L	0.0051	<0.0050	<0.0050	0.0050	7177805	<0.0050	0.0050		7177805
<b>Calculated Parameters</b>										
Nitrate (N)	mg/L	0.088	0.143	0.169	0.020	7175871	0.146	0.020		7175871
<b>Anions</b>										
Dissolved Sulphate (SO4)	mg/L	229	248	245	5.0	7180688	39.0	0.50		7183616
<b>Nutrients</b>										
Nitrate plus Nitrite (N)	mg/L	0.093	0.143	0.169	0.020	7177336	0.146	0.020		7177336

RDL = Reportable Detection Limit

Maxxam Job #: B384508  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		HN9920		HN9921		HN9922		
Sampling Date		2013/09/16 12:15		2013/09/16 14:00		2013/09/16 17:30		
COC#		08378570		08378570		08378570		
	UNITS	R1	QC Batch	R2	QC Batch	R3	RDL	QC Batch
<b>Dissolved Metals by ICPMS</b>								
Dissolved Aluminum (Al)	mg/L	0.0283	7178607	0.0247	7178607	0.0370	0.00050	7178607
Dissolved Antimony (Sb)	mg/L	0.000252	7178607	0.000496	7178607	0.000176	0.00020	7178607
Dissolved Arsenic (As)	mg/L	0.000615	7178607	0.000812	7178607	0.000645	0.00020	7178607
Dissolved Barium (Ba)	mg/L	0.0499	7178607	0.0483	7178607	0.0425	0.00020	7178607
Dissolved Beryllium (Be)	mg/L	0.000012	7178607	<0.000010	7178607	0.000012	0.000010	7178607
Dissolved Bismuth (Bi)	mg/L	<0.0000050	7178607	<0.0000050	7178607	<0.0000050	0.0000050	7178607
Dissolved Boron (B)	mg/L	<0.050	7178607	<0.050	7178607	<0.050	0.050	7178607
Dissolved Cadmium (Cd)	mg/L	0.0000630	7178607	0.0000280	7178607	0.0000150	0.0000050	7178607
Dissolved Chromium (Cr)	mg/L	0.00034	7178607	0.00056	7178607	0.00067	0.00010	7178607
Dissolved Cobalt (Co)	mg/L	0.000580	7178607	0.000203	7178607	0.000448	0.0000050	7178607
Dissolved Copper (Cu)	mg/L	0.00290	7178607	0.00157	7178607	0.00479 <sup>(1)</sup>	0.000050	7189570
Dissolved Iron (Fe)	mg/L	0.344	7178607	0.203	7178607	0.238	0.0010	7178607
Dissolved Lead (Pb)	mg/L	0.0000580	7178607	0.0000220	7178607	0.000111	0.0000050	7178607
Dissolved Lithium (Li)	mg/L	0.00333	7178607	0.00609	7178607	0.00465	0.00050	7178607
Dissolved Manganese (Mn)	mg/L	0.311	7178607	0.137	7178607	0.154	0.000050	7178607
Dissolved Mercury (Hg)	mg/L	<0.000010	7178607	<0.000010	7178607	<0.000010	0.000010	7178607
Dissolved Molybdenum (Mo)	mg/L	0.00149	7178607	0.000791	7178607	0.00132	0.000050	7178607
Dissolved Nickel (Ni)	mg/L	0.00460	7178607	0.00327	7178607	0.00359	0.000020	7178607
Dissolved Selenium (Se)	mg/L	0.00154	7178607	0.000738	7178607	0.000568	0.000040	7178607
Dissolved Silicon (Si)	mg/L	4.65	7178607	5.57	7178607	5.91	0.10	7178607
Dissolved Silver (Ag)	mg/L	<0.0000050	7178607	<0.0000050	7178607	<0.0000050	0.0000050	7178607
Dissolved Strontium (Sr)	mg/L	0.355	7178607	0.343	7178607	0.373	0.000050	7178607
Dissolved Thallium (Tl)	mg/L	0.0000040	7178607	0.0000030	7178607	<0.0000020	0.0000020	7178607
Dissolved Tin (Sn)	mg/L	0.00047	7178607	0.00078	7178607	0.00114	0.00020	7178607
Dissolved Titanium (Ti)	mg/L	0.00075	7178607	0.00062	7178607	0.00080	0.00050	7178607
Dissolved Uranium (U)	mg/L	0.00208	7178607	0.00400	7178607	0.00490	0.0000020	7178607
Dissolved Vanadium (V)	mg/L	0.00036	7178607	0.00047	7178607	0.00053	0.00020	7178607
Dissolved Zinc (Zn)	mg/L	0.00330	7189570	0.00160	7178607	0.00710	0.00010	7178607
Dissolved Zirconium (Zr)	mg/L	0.00090	7178607	0.00050	7178607	0.00074	0.00010	7178607
Dissolved Calcium (Ca)	mg/L	68.6	7188391	58.2	7177229	73.5	0.050	7177229
Dissolved Magnesium (Mg)	mg/L	34.9	7188391	43.9	7177229	49.2	0.050	7177229
Dissolved Potassium (K)	mg/L	0.597	7188391	0.812	7177229	0.791	0.050	7177229
Dissolved Sodium (Na)	mg/L	3.00	7188391	3.20	7177229	3.84	0.050	7177229
Dissolved Sulphur (S)	mg/L	83.7 <sup>(1)</sup>	7188391	57.4	7177229	86.8	3.0	7177229

RDL = Reportable Detection Limit

(1) - Dissolved greater than total. Reanalysis yields similar results.

Maxxam Job #: B384508  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)**

Maxxam ID		HN9920		HN9921		HN9922		
Sampling Date		2013/09/16 12:15		2013/09/16 14:00		2013/09/16 17:30		
COC#		08378570		08378570		08378570		
	UNITS	R1	QC Batch	R2	QC Batch	R3	RDL	QC Batch
<b>Total Metals by ICPMS</b>								
Total Aluminum (Al)	mg/L	0.0735	7178599	0.0378	7178599	0.234	0.00050	7178599
Total Antimony (Sb)	mg/L	0.000238	7178599	0.000514	7178599	0.000203	0.000020	7178599
Total Arsenic (As)	mg/L	0.000804	7178599	0.000879	7178599	0.00103	0.000020	7178599
Total Barium (Ba)	mg/L	0.0540	7178599	0.0515	7178599	0.0624	0.000020	7178599
Total Beryllium (Be)	mg/L	0.000015	7178599	<0.000010	7178599	0.000029	0.000010	7178599
Total Bismuth (Bi)	mg/L	<0.0000050	7178599	<0.0000050	7178599	0.0000050	0.0000050	7178599
Total Boron (B)	mg/L	<0.050	7178599	<0.050	7178599	<0.050	0.050	7178599
Total Cadmium (Cd)	mg/L	0.0000880	7178599	0.0000290	7178599	0.0000560	0.0000050	7178599
Total Chromium (Cr)	mg/L	0.00043	7178599	0.00085	7178599	0.00169	0.00010	7178599
Total Cobalt (Co)	mg/L	0.000643	7178599	0.000240	7178599	0.000781	0.0000050	7178599
Total Copper (Cu)	mg/L	0.00313	7178599	0.00170	7178599	0.00328	0.000050	7178599
Total Iron (Fe)	mg/L	0.548	7178599	0.270	7178599	0.999	0.0010	7178599
Total Lead (Pb)	mg/L	0.000270	7178599	0.0000470	7178599	0.000511	0.0000050	7178599
Total Lithium (Li)	mg/L	0.00348	7178599	0.00627	7178599	0.00491	0.00050	7178599
Total Manganese (Mn)	mg/L	0.321	7178599	0.147	7178599	0.181	0.000050	7178599
Total Mercury (Hg)	mg/L	<0.000010	7178599	<0.000010	7178599	<0.000010	0.000010	7178599
Total Molybdenum (Mo)	mg/L	0.00144	7178599	0.000817	7178599	0.00137	0.000050	7178599
Total Nickel (Ni)	mg/L	0.00472	7178599	0.00404	7178599	0.00531	0.000020	7178599
Total Selenium (Se)	mg/L	0.00160	7178599	0.000860	7178599	0.000628	0.000040	7178599
Total Silicon (Si)	mg/L	4.26	7178599	5.05	7178599	5.32	0.10	7178599
Total Silver (Ag)	mg/L	0.0000080	7178599	<0.0000050	7178599	0.0000080	0.0000050	7178599
Total Strontium (Sr)	mg/L	0.344	7178599	0.351	7178599	0.395	0.000050	7178599
Total Thallium (Tl)	mg/L	0.0000060	7178599	0.0000030	7178599	0.0000030	0.0000020	7178599
Total Tin (Sn)	mg/L	0.00038	7178599	0.00029	7178599	0.00096	0.00020	7178599
Total Titanium (Ti)	mg/L	0.00274	7178599	0.00122	7178599	0.00655	0.00050	7178599
Total Uranium (U)	mg/L	0.00211	7178599	0.00429	7178599	0.00540	0.0000020	7178599
Total Vanadium (V)	mg/L	0.00044	7178599	0.00037	7178599	0.00143	0.00020	7178599
Total Zinc (Zn)	mg/L	0.00422	7178599	0.00246	7178599	0.0297	0.00010	7178599
Total Zirconium (Zr)	mg/L	0.00102	7178599	0.00054	7178599	0.00099	0.00010	7178599
Total Calcium (Ca)	mg/L	71.4	7175806	57.4	7175806	68.3	0.050	7175806
Total Magnesium (Mg)	mg/L	36.1	7175806	41.9	7175806	47.3	0.050	7175806
Total Potassium (K)	mg/L	0.609	7175806	0.807	7175806	0.789	0.050	7175806
Total Sodium (Na)	mg/L	2.92	7175806	3.12	7175806	3.68	0.050	7175806
Total Sulphur (S)	mg/L	63.2	7175806	57.5	7175806	86.6	3.0	7175806

RDL = Reportable Detection Limit

Maxxam Job #: B384508  
Report Date: 2014/02/27

Ecological Logistics & Research Ltd  
Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
Site Location: CLINTON CREEK  
Sampler Initials: DD

**General Comments**

Revised Report (Version: 3R): Reporting units for metals analysis have been changed to mg/L as per client request [GRR].

Revised Report (2013/10/11): Additional parameters have been included in the metals scan (KP5).

Sample HN9920, Elements by ICPMS Low Level (dissolved): Test repeated.

Sample HN9922, Elements by ICPMS Low Level (dissolved): Test repeated.

Maxxam Job #: B384508  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7177336	Nitrate plus Nitrite (N)	2013/09/18	106	80 - 120	108	80 - 120	<0.020	mg/L	NC	25
7177805	Nitrite (N)	2013/09/18	99	80 - 120	104	80 - 120	<0.0050	mg/L	NC	20
7178599	Total Aluminum (Al)	2013/09/19	NC	80 - 120	102	80 - 120	<0.00050	mg/L	1	20
7178599	Total Antimony (Sb)	2013/09/19	NC	80 - 120	99	80 - 120	<0.000020	mg/L	3.5	20
7178599	Total Arsenic (As)	2013/09/19	107	80 - 120	98	80 - 120	<0.000020	mg/L	1.8	20
7178599	Total Barium (Ba)	2013/09/19	NC	80 - 120	99	80 - 120	<0.000020	mg/L	0.7	20
7178599	Total Beryllium (Be)	2013/09/19	99	80 - 120	95	80 - 120	<0.000010	mg/L	NC	20
7178599	Total Bismuth (Bi)	2013/09/19	98	80 - 120	96	80 - 120	<0.0000050	mg/L	NC	20
7178599	Total Cadmium (Cd)	2013/09/19	104	80 - 120	99	80 - 120	<0.0000050	mg/L	NC	20
7178599	Total Chromium (Cr)	2013/09/19	100	80 - 120	98	80 - 120	<0.00010	mg/L	NC	20
7178599	Total Cobalt (Co)	2013/09/19	98	80 - 120	98	80 - 120	<0.0000050	mg/L	5.2	20
7178599	Total Copper (Cu)	2013/09/19	101	80 - 120	97	80 - 120	<0.000050	mg/L	0.7	20
7178599	Total Iron (Fe)	2013/09/19	107	80 - 120	109	80 - 120	<0.0010	mg/L	2.8	20
7178599	Total Lead (Pb)	2013/09/19	101	80 - 120	102	80 - 120	<0.0000050	mg/L	1	20
7178599	Total Lithium (Li)	2013/09/19	102	80 - 120	101	80 - 120	<0.00050	mg/L	3.0	20
7178599	Total Manganese (Mn)	2013/09/19	NC	80 - 120	99	80 - 120	<0.000050	mg/L	2.4	20
7178599	Total Mercury (Hg)	2013/09/19	97	80 - 120	101	80 - 120	<0.000010	mg/L		
7178599	Total Molybdenum (Mo)	2013/09/19	NC	80 - 120	97	80 - 120	<0.000050	mg/L	2.7	20
7178599	Total Nickel (Ni)	2013/09/19	NC	80 - 120	98	80 - 120	0.000022, RDL=0.000020	mg/L	1.6	20
7178599	Total Selenium (Se)	2013/09/19	114	80 - 120	107	80 - 120	<0.000040	mg/L	1.6	20
7178599	Total Silver (Ag)	2013/09/19	100	80 - 120	98	80 - 120	<0.0000050	mg/L	NC	20
7178599	Total Strontium (Sr)	2013/09/19	NC	80 - 120	101	80 - 120	<0.000050	mg/L	1.5	20
7178599	Total Thallium (Tl)	2013/09/19	106	80 - 120	105	80 - 120	<0.0000020	mg/L	2.7	20
7178599	Total Tin (Sn)	2013/09/19	100	80 - 120	98	80 - 120	<0.00020	mg/L	NC	20
7178599	Total Titanium (Ti)	2013/09/19	115	80 - 120	100	80 - 120	<0.00050	mg/L	NC	20
7178599	Total Uranium (U)	2013/09/19	104	80 - 120	102	80 - 120	<0.0000020	mg/L	4.3	20
7178599	Total Vanadium (V)	2013/09/19	103	80 - 120	100	80 - 120	<0.00020	mg/L	NC	20
7178599	Total Zinc (Zn)	2013/09/19	105	80 - 120	101	80 - 120	<0.00010	mg/L	4.2	20
7178599	Total Boron (B)	2013/09/19					<0.050	mg/L	NC	20
7178599	Total Silicon (Si)	2013/09/19					<0.10	mg/L	1.8	20
7178599	Total Zirconium (Zr)	2013/09/19					<0.00010	mg/L	NC	20
7178607	Dissolved Aluminum (Al)	2013/09/19	NC	80 - 120	98	80 - 120	<0.00050	mg/L	2.1	20
7178607	Dissolved Antimony (Sb)	2013/09/19	NC	80 - 120	101	80 - 120	<0.000020	mg/L	0.3	20
7178607	Dissolved Arsenic (As)	2013/09/19	103	80 - 120	100	80 - 120	<0.000020	mg/L	0.2	20
7178607	Dissolved Barium (Ba)	2013/09/19	NC	80 - 120	102	80 - 120	<0.000020	mg/L	2.6	20
7178607	Dissolved Beryllium (Be)	2013/09/19	100	80 - 120	100	80 - 120	<0.000010	mg/L	NC	20
7178607	Dissolved Bismuth (Bi)	2013/09/19	94	80 - 120	94	80 - 120	<0.0000050	mg/L	NC	20
7178607	Dissolved Cadmium (Cd)	2013/09/19	101	80 - 120	100	80 - 120	<0.0000050	mg/L	NC	20
7178607	Dissolved Chromium (Cr)	2013/09/19	98	80 - 120	98	80 - 120	<0.00010	mg/L	NC	20
7178607	Dissolved Cobalt (Co)	2013/09/19	94	80 - 120	98	80 - 120	<0.0000050	mg/L	3.0	20

Maxxam Job #: B384508  
 Report Date: 2014/02/27

 Ecological Logistics & Research Ltd  
 Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
 Site Location: CLINTON CREEK  
 Sampler Initials: DD

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7178607	Dissolved Copper (Cu)	2013/09/19	95	80 - 120	97	80 - 120	<0.000050	mg/L		
7178607	Dissolved Iron (Fe)	2013/09/19	104	80 - 120	112	80 - 120	<0.0010	mg/L	0.2	20
7178607	Dissolved Lead (Pb)	2013/09/19	98	80 - 120	101	80 - 120	<0.0000050	mg/L		
7178607	Dissolved Lithium (Li)	2013/09/19	101	80 - 120	100	80 - 120	<0.00050	mg/L	6.3	20
7178607	Dissolved Manganese (Mn)	2013/09/19	NC	80 - 120	98	80 - 120	<0.000050	mg/L	2.0	20
7178607	Dissolved Mercury (Hg)	2013/09/19	99	80 - 120	99	80 - 120	<0.000010	mg/L		
7178607	Dissolved Molybdenum (Mo)	2013/09/19	NC	80 - 120	107	80 - 120	<0.000050	mg/L	1.2	20
7178607	Dissolved Nickel (Ni)	2013/09/19	NC	80 - 120	97	80 - 120	<0.000020	mg/L	1	20
7178607	Dissolved Selenium (Se)	2013/09/19	116	80 - 120	106	80 - 120	<0.000040	mg/L	3.6	20
7178607	Dissolved Silver (Ag)	2013/09/19	99	80 - 120	98	80 - 120	<0.0000050	mg/L	NC	20
7178607	Dissolved Strontium (Sr)	2013/09/19	NC	80 - 120	101	80 - 120	<0.000050	mg/L	1.4	20
7178607	Dissolved Thallium (Tl)	2013/09/19	102	80 - 120	102	80 - 120	<0.0000020	mg/L	0.7	20
7178607	Dissolved Tin (Sn)	2013/09/19	103	80 - 120	98	80 - 120	<0.00020	mg/L	NC	20
7178607	Dissolved Titanium (Ti)	2013/09/19	106	80 - 120	97	80 - 120	<0.00050	mg/L	NC	20
7178607	Dissolved Uranium (U)	2013/09/19	102	80 - 120	101	80 - 120	<0.0000020	mg/L	3.9	20
7178607	Dissolved Vanadium (V)	2013/09/19	104	80 - 120	101	80 - 120	<0.00020	mg/L	NC	20
7178607	Dissolved Zinc (Zn)	2013/09/19	NC	80 - 120	104	80 - 120	<0.00010	mg/L		
7178607	Dissolved Boron (B)	2013/09/19					<0.050	mg/L	NC	20
7178607	Dissolved Silicon (Si)	2013/09/19					<0.10	mg/L	1	20
7178607	Dissolved Zirconium (Zr)	2013/09/19					<0.00010	mg/L	NC	20
7178795	Ammonia (N)	2013/09/19	NC	80 - 120	102	80 - 120	<0.0050	mg/L	NC	20
7178903	Dissolved Organic Carbon (C)	2013/09/19	101	80 - 120	106	80 - 120	<0.50	mg/L	1.1	20
7180688	Dissolved Sulphate (SO4)	2013/09/19	NC	80 - 120	105	80 - 120	<0.50	mg/L	1.3	20
7181547	Total Suspended Solids	2013/09/20	105	80 - 120	100	80 - 120	<4.0	mg/L	NC	20
7183556	Total Phosphorus (P)	2013/09/20			105	80 - 120	<0.0050	mg/L	NC	20
7183616	Dissolved Sulphate (SO4)	2013/09/20			103	80 - 120	0.51, RDL=0.50	mg/L	3.8	20
7186259	Total Nitrogen (N)	2013/09/23	95	80 - 120	92	80 - 120	<0.020	mg/L	NC	20
7189570	Dissolved Copper (Cu)	2013/09/25			92	80 - 120	<0.000050	mg/L		
7189570	Dissolved Zinc (Zn)	2013/09/25			103	80 - 120	<0.00010	mg/L		

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.

Maxxam Job #: B384508  
Report Date: 2014/02/27

Ecological Logistics & Research Ltd  
Client Project #: 13-156 SEPTEMBER 2013 CLINTON  
Site Location: CLINTON CREEK  
Sampler Initials: DD

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

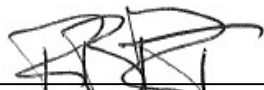


**Validation Signature Page**

**Maxxam Job #: B384508**

---

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



---

Rob Reinert, Data Validation Coordinator

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: **B384508**

COC #: **08378570**

Page: 1 of 1

Invoice To: Require Report?  Yes  No

Report To:

Company Name: Ecological Logistics & Research Ltd.  
 Contact Name: Chris Jastrebski  
 Address: 204-105 Titanium Way, Whitehorse YT  
 PC: Y1A 0E7  
 Phone / Fax#: Ph: 867.668.6386 Fax: 867.668.6385  
 E-mail: chris@elfr.ca

Company Name: Ecological Logistics & Research Ltd.  
 Contact Name: Chris Jastrebski  
 Address: 204-105 Titanium Way, Whitehorse YT  
 PC: Y1A 0E7  
 Phone / Fax#: Ph: 867.668.6386 Fax: 867.668.6385  
 E-mail: water@elfr.ca

PO #:
Quotation #: B13-213.1-DV
Project #: 13-156
Proj. Name: September 2013 Clinton Creek Monitoring
Location: Clinton Creek
Sampled by: Dave Desmarais

REGULATORY REQUIREMENTS: SERVICE REQUESTED:  
 CSR  Regular Turn Around Time (TAT) (5 days for most tests)  
 CCME  RUSH (Please contact the lab)  
 BC Water Quality  1 Day  2 Day  3 Day  
 Other \_\_\_\_\_  
 DRINKING WATER Date Required: \_\_\_\_\_

SPECIAL INSTRUCTIONS:  
 Return Cooler  Ship Sample Bottles (please specify)

ANALYSIS REQUESTED												HOLD	Number of Containers	YES	NO	YES	NO	
ICP low level Dissolved Metals (DM)	Field Filled?	Field Acidified?	IPC low level Total Metals	Field Acidified?	Nitrate	Nitrite	Sulphate	Total Phosphorous	Ammonia	Total Suspended Solids (TSS)	Dissolved Organic Carbon (DOC)							Total Kjeldahl Nitrogen
1	R1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
2	R2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
3	R3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
4	R4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
5	R6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
6	E1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
7	QWP1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
8	E2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
9	E3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
10	E4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
11	E7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
12	E8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					

Sample Identification	Lab Identification	Sample Type	Date/Time(24hr) Sampled
1	4119922		SEP-16 12:15
2	4119921		" " 14:00
3	4119922		" " 17:30
4	4119923		SEP 15 14:00
5	4119924	SEPTEMBER 15	" " 16:00
6	4119923		" " 12:30
7	4119926		" " 12:30
8	4119927		" " 13:00
9	4119928		" " 13:15
10	4119929		" " 13:45
11	4119930		" " 15:15
12	4119922		" " 15:45



B384508

Print name and sign		Print name and sign			Laboratory Use Only					
*Relinquished By:	Date (yy/mm/dd):	Time (24 hr):	Received by:	Date (yy/mm/dd):	Time (24 hr):	Time Sensitive	Temperature on Receipt (C):	Custody Seal	Yes	No
D Desmarais	2013/09/		[Signature]	2013/09/	09:05	<input type="checkbox"/>	A) 3 B) 5 C) 4	Present	<input checked="" type="checkbox"/>	<input type="checkbox"/>
							<input type="checkbox"/>	Just sampled & read on ice	<input checked="" type="checkbox"/>	<input type="checkbox"/>

IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORDS. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

*This Page Intentionally Left Blank*



## **APPENDIX 3 – HYDROLOGICAL MONITORING DATA AND CALCULATIONS**

*This Page Intentionally Left Blank*

## Stream Flow & Discharge Calculation

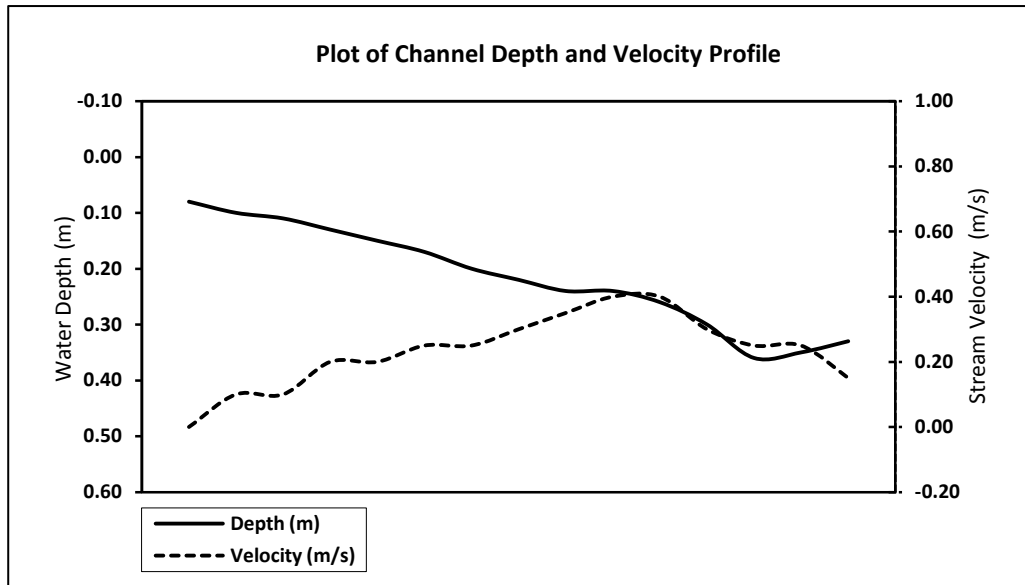
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Clinton Creek u/s Hudgeon Lake		
Station Name:	R1-1		
Date:	Sept. 16, 2013		
Time:	12:16		
Staff:	DD / AN		
UTM Coordinates:	07W 510697 7147528	Left Bank	8.65
Technique:	Wading, Using Global Flow Probe	Right Bank	3.3
Temp., Water/Air (°C)	0.6/ -7	Wetted Width	5.35



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	3.30	0.200	0.08	0.00	0.016	0.0000
1	3.70	0.350	0.10	0.10	0.035	0.0035
2	4.00	0.300	0.11	0.10	0.033	0.0033
3	4.30	0.300	0.13	0.20	0.039	0.0078
4	4.60	0.300	0.15	0.20	0.045	0.0090
5	4.90	0.250	0.17	0.25	0.043	0.0106
6	5.10	0.250	0.20	0.25	0.050	0.0125
7	5.40	0.300	0.22	0.30	0.066	0.0198
8	5.70	0.300	0.24	0.35	0.072	0.0252
9	6.00	0.400	0.24	0.40	0.096	0.0384
10	6.50	0.500	0.26	0.40	0.130	0.0520
11	7.00	0.500	0.30	0.30	0.150	0.0450
12	7.50	0.500	0.36	0.25	0.180	0.0450
13	8.00	0.575	0.35	0.25	0.201	0.0503
14	8.65	0.325	0.33	0.15	0.107	0.0161
15	8.65					

Mean Depth (m)	0.22
Mean Velocity (m/s)	0.23

Discharge (m <sup>3</sup> /s)	0.3385
-------------------------------	--------



## Stream Flow & Discharge Calculation

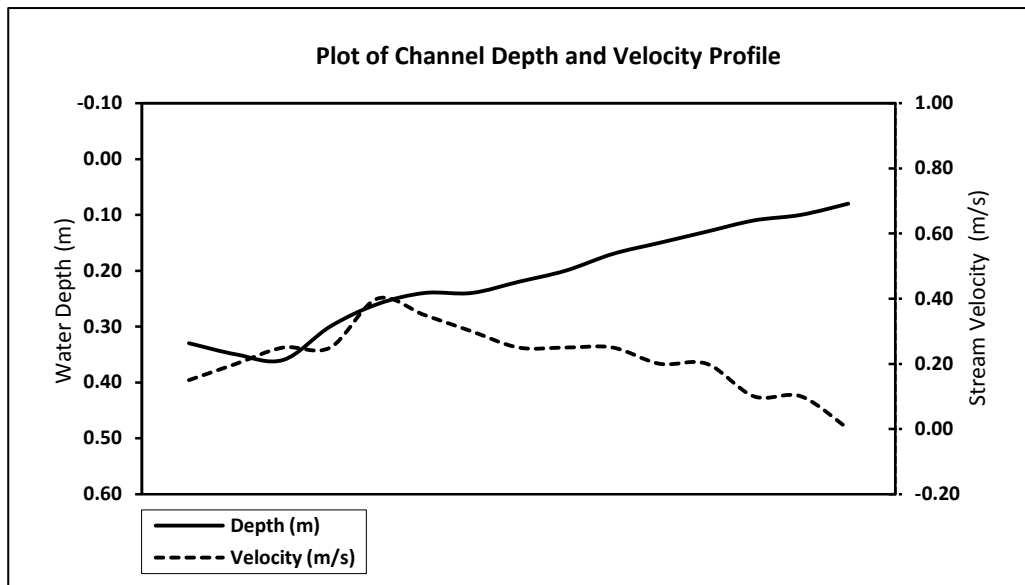
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Clinton Creek u/s Hudgeon Lake		
Station Name:	R1-2		
Date:	Sept. 16, 2013		
Time:	12:16		
Staff:	DD / AN		
UTM Coordinates:	07W 510697 7147528	Left Bank	8.65
Technique:	Wading, Using Global Flow Probe	Right Bank	3.3
Temp., Water/Air (°C)	0.6/ -7	Wetted Width	5.35



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	8.65	0.325	0.33	0.15	0.107	0.0161
1	8.00	0.575	0.35	0.20	0.201	0.0403
2	7.50	0.500	0.36	0.25	0.180	0.0450
3	7.00	0.500	0.30	0.25	0.150	0.0375
4	6.50	0.500	0.26	0.40	0.130	0.0520
5	6.00	0.400	0.24	0.35	0.096	0.0336
6	5.70	0.300	0.24	0.30	0.072	0.0216
7	5.40	0.300	0.22	0.25	0.066	0.0165
8	5.10	0.250	0.20	0.25	0.050	0.0125
9	4.90	0.250	0.17	0.25	0.043	0.0106
10	4.60	0.300	0.15	0.20	0.045	0.0090
11	4.30	0.300	0.13	0.20	0.039	0.0078
12	4.00	0.300	0.11	0.10	0.033	0.0033
13	3.70	0.350	0.10	0.10	0.035	0.0035
14	3.30	0.200	0.08	0.00	0.016	0.0000
15	3.30					

Mean Depth (m)	0.22
Mean Velocity (m/s)	0.22

Discharge (m <sup>3</sup> /s)	0.3093
-------------------------------	--------



## Stream Flow & Discharge Calculation

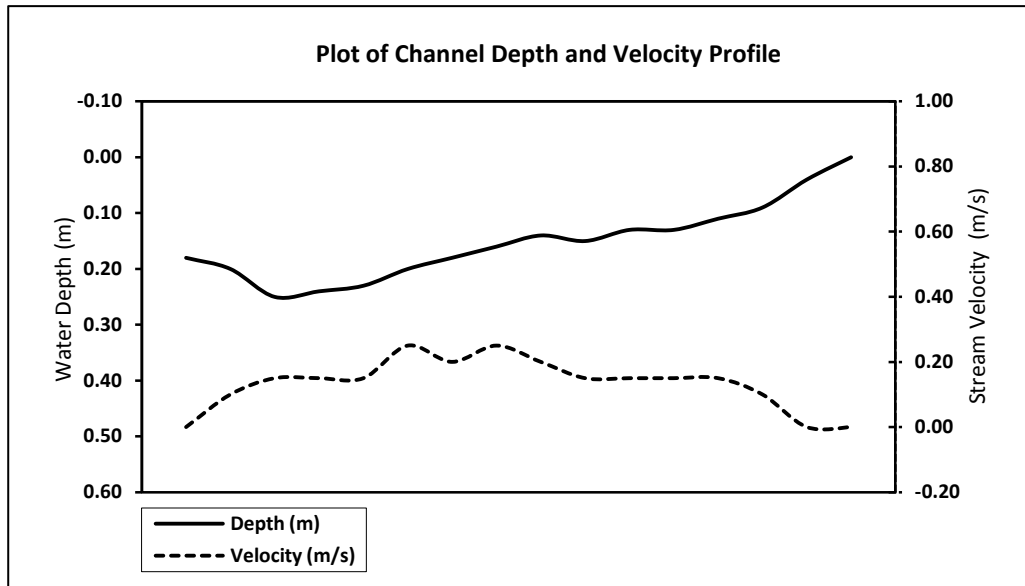
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Easter Creek u/s Hudgeon Lake		
Station Name:	R2-1		
Date:	Sept. 16, 2013		
Time:	14:15		
Staff:	DD / AN		
UTM Coordinates:	07W 512021 7148023	Left Bank	4.4
Technique:	Wading, Using Global Flow Probe	Right Bank	1.5
Temp., Water/Air (°C)	2.4 / -7	Wetted Width	2.9



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	4.40	0.100	0.18	0.00	0.018	0.0000
1	4.20	0.200	0.20	0.10	0.040	0.0040
2	4.00	0.200	0.25	0.15	0.050	0.0075
3	3.80	0.200	0.24	0.15	0.048	0.0072
4	3.60	0.200	0.23	0.15	0.046	0.0069
5	3.40	0.200	0.20	0.25	0.040	0.0100
6	3.20	0.200	0.18	0.20	0.036	0.0072
7	3.00	0.200	0.16	0.25	0.032	0.0080
8	2.80	0.200	0.14	0.20	0.028	0.0056
9	2.60	0.200	0.15	0.15	0.030	0.0045
10	2.40	0.200	0.13	0.15	0.026	0.0039
11	2.20	0.200	0.13	0.15	0.026	0.0039
12	2.00	0.200	0.11	0.15	0.022	0.0033
13	1.80	0.200	0.09	0.10	0.018	0.0018
14	1.60	0.150	0.04	0.00	0.006	0.0000
15	1.50	0.050	0.00	0.00	0.000	0.0000
16	1.50					

Mean Depth (m)	0.15
Mean Velocity (m/s)	0.13

Discharge (m <sup>3</sup> /s)	0.0738
-------------------------------	--------





## Stream Flow & Discharge Calculation

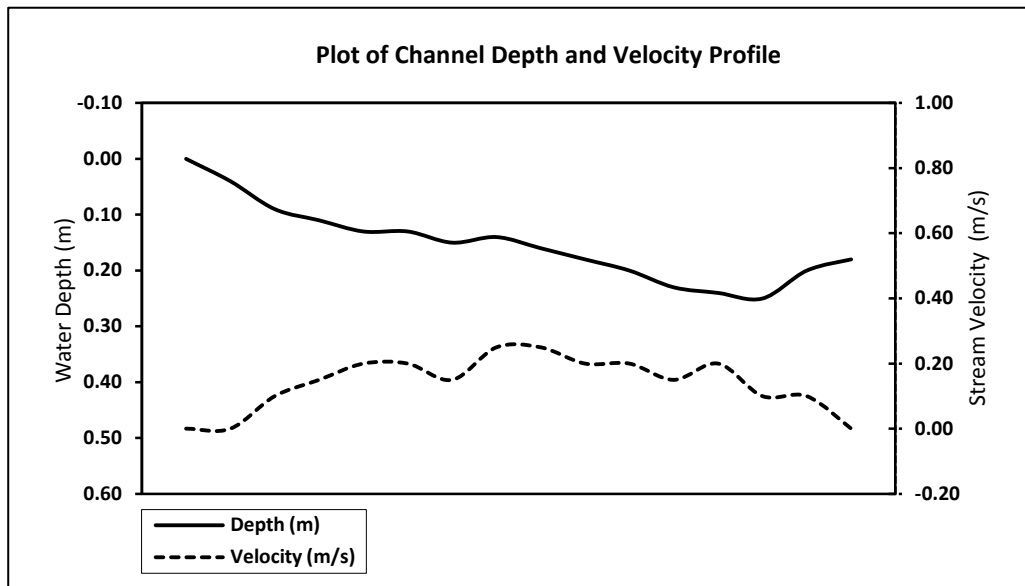
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Easter Creek u/s Hudgeon Lake		
Station Name:	R2-2		
Date:	Sept. 16, 2013		
Time:	14:15		
Staff:	DD / AN		
UTM Coordinates:	07W 512021 7148023	Left Bank	4.4
Technique:	Wading, Using Global Flow Probe	Right Bank	1.5
Temp., Water/Air (°C)	2.4/ -7	Wetted Width	2.9



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	1.50	0.050	0.00	0.00	0.000	0.0000
1	1.60	0.150	0.04	0.00	0.006	0.0000
2	1.80	0.200	0.09	0.10	0.018	0.0018
3	2.00	0.200	0.11	0.15	0.022	0.0033
4	2.20	0.200	0.13	0.20	0.026	0.0052
5	2.40	0.200	0.13	0.20	0.026	0.0052
6	2.60	0.200	0.15	0.15	0.030	0.0045
7	2.80	0.200	0.14	0.25	0.028	0.0070
8	3.00	0.200	0.16	0.25	0.032	0.0080
9	3.20	0.200	0.18	0.20	0.036	0.0072
10	3.40	0.200	0.20	0.20	0.040	0.0080
11	3.60	0.200	0.23	0.15	0.046	0.0069
12	3.80	0.200	0.24	0.20	0.048	0.0096
13	4.00	0.200	0.25	0.10	0.050	0.0050
14	4.20	0.200	0.20	0.10	0.040	0.0040
15	4.40	0.100	0.18	0.00	0.018	0.0000
16	4.40					

Mean Depth (m)	0.15
Mean Velocity (m/s)	0.14

Discharge (m <sup>3</sup> /s)	0.0757
-------------------------------	--------



## Stream Flow & Discharge Calculation

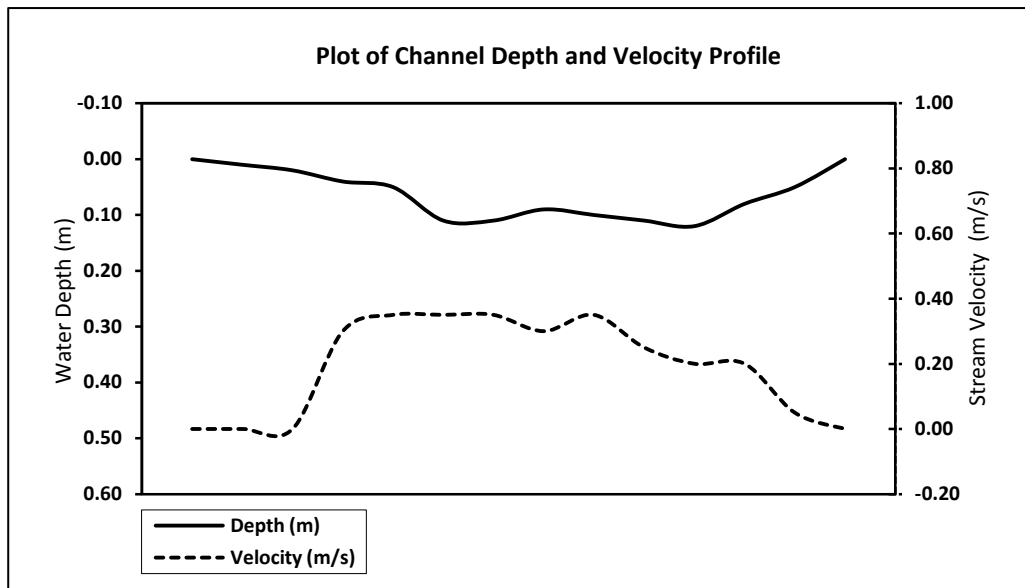
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Wolverine Creek u/s of tailings		
Station Name:	R3		
Date:	Sept. 16, 2013		
Time:	17:30		
Staff:	DD / AN		
UTM Coordinates:	07W 513956 7148689	Left Bank	0.7
Technique:	Wading, Using Global Flow Probe	Right Bank	3.4
Temp., Water/Air (°C)	1.3 / 8	Wetted Width	2.7



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	0.70	0.100	0.00	0.00	0.000	0.0000
1	0.90	0.200	0.01	0.00	0.002	0.0000
2	1.10	0.200	0.02	0.00	0.004	0.0000
3	1.30	0.250	0.04	0.30	0.010	0.0030
4	1.60	0.300	0.05	0.35	0.015	0.0053
5	1.90	0.250	0.11	0.35	0.028	0.0096
6	2.10	0.200	0.11	0.35	0.022	0.0077
7	2.30	0.200	0.09	0.30	0.018	0.0054
8	2.50	0.200	0.10	0.35	0.020	0.0070
9	2.70	0.200	0.11	0.25	0.022	0.0055
10	2.90	0.200	0.12	0.20	0.024	0.0048
11	3.10	0.200	0.08	0.20	0.016	0.0032
12	3.30	0.150	0.05	0.05	0.008	0.0004
13	3.40	0.050	0.00	0.00	0.000	0.0000
14	3.40					

Mean Depth (m)	0.06
Mean Velocity (m/s)	0.19

Discharge (m <sup>3</sup> /s)	0.0519
-------------------------------	--------



## Stream Flow & Discharge Calculation

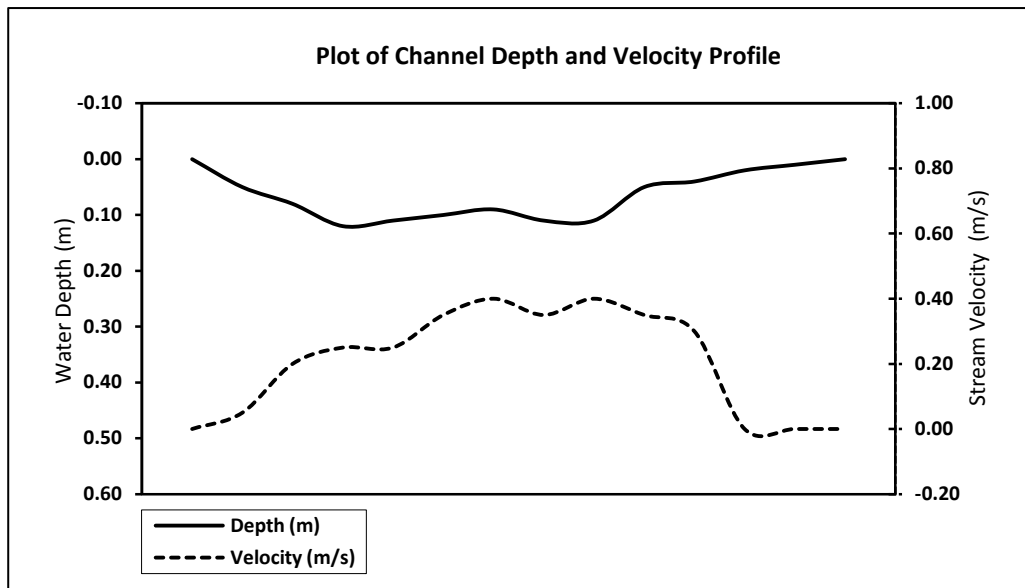
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Wolverine Creek u/s of tailings		
Station Name:	R3		
Date:	Sept. 16, 2013		
Time:	17:30		
Staff:	DD / AN		
UTM Coordinates:	07W 513956 7148689	Left Bank	0.7
Technique:	Wading, Using Global Flow Probe	Right Bank	3.4
Temp., Water/Air (°C)	1.3 / 8	Wetted Width	2.7



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	3.40	0.050	0.00	0.00	0.000	0.0000
1	3.30	0.150	0.05	0.05	0.008	0.0004
2	3.10	0.200	0.08	0.20	0.016	0.0032
3	2.90	0.200	0.12	0.25	0.024	0.0060
4	2.70	0.200	0.11	0.25	0.022	0.0055
5	2.50	0.200	0.10	0.35	0.020	0.0070
6	2.30	0.200	0.09	0.40	0.018	0.0072
7	2.10	0.200	0.11	0.35	0.022	0.0077
8	1.90	0.250	0.11	0.40	0.028	0.0110
9	1.60	0.300	0.05	0.35	0.015	0.0053
10	1.30	0.250	0.04	0.30	0.010	0.0030
11	1.10	0.200	0.02	0.00	0.004	0.0000
12	0.90	0.200	0.01	0.00	0.002	0.0000
13	0.70	0.100	0.00	0.00	0.000	0.0000
14	0.70					

Mean Depth (m)	0.06
Mean Velocity (m/s)	0.21

Discharge (m <sup>3</sup> /s)	0.0562
-------------------------------	--------



## Stream Flow & Discharge Calculation

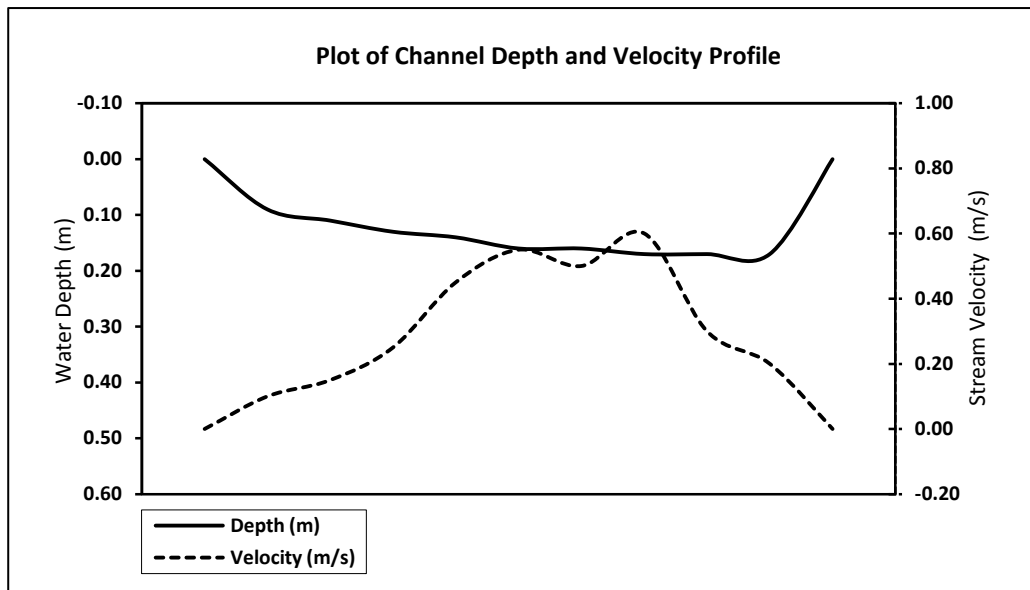
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Clinton Creek 30 m u/s from Eagle Ck.		
Station Name:	R4-1		
Date:	Sept. 18, 2013		
Time:	10:30		
Staff:	DD / AN		
UTM Coordinates:	07W 515979 7145336	Left Bank	2.30
Technique:	Wading, Using Global Flow Probe	Right Bank	0.75
Temp., Water/Air (°C)	1.0/ 2	Wetted Width	1.55



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	0.75	0.075	0.00	0.00	0.000	0.0000
1	0.90	0.150	0.09	0.10	0.014	0.0014
2	1.05	0.150	0.11	0.15	0.017	0.0025
3	1.20	0.150	0.13	0.25	0.020	0.0049
4	1.35	0.150	0.14	0.45	0.021	0.0095
5	1.50	0.150	0.16	0.55	0.024	0.0132
6	1.65	0.150	0.16	0.50	0.024	0.0120
7	1.80	0.150	0.17	0.60	0.026	0.0153
8	1.95	0.150	0.17	0.30	0.026	0.0077
9	2.10	0.175	0.17	0.20	0.030	0.0060
10	2.30	0.100	0.00	0.00	0.000	0.0000
11	2.30					

Mean Depth (m)	0.12
Mean Velocity (m/s)	0.28

Discharge (m <sup>3</sup> /s)	0.0723
-------------------------------	--------



## Stream Flow & Discharge Calculation

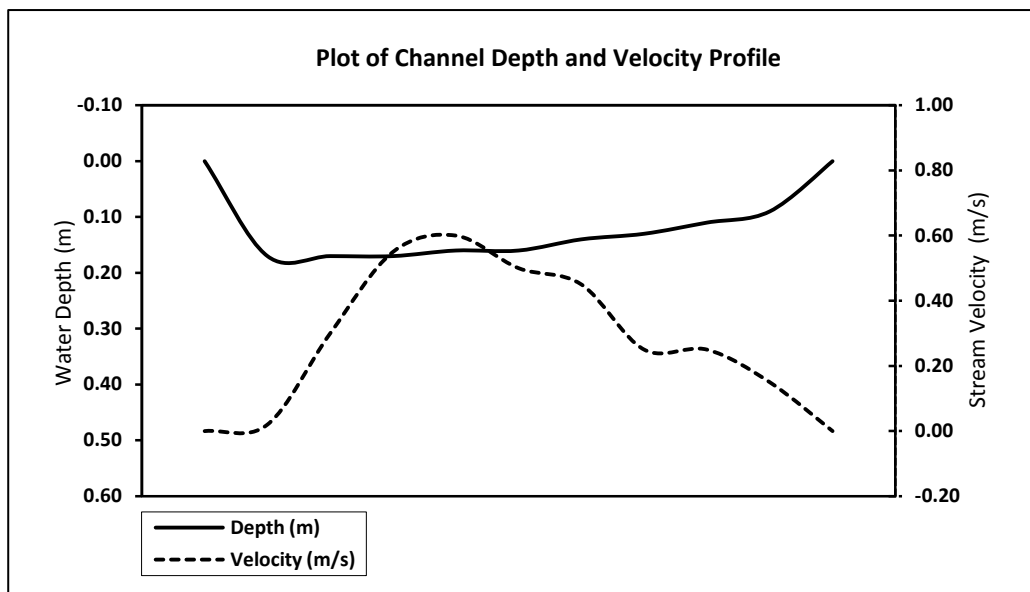
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Clinton Creek 30 m u/s from Eagle Ck.		
Station Name:	R4-2		
Date:	Sept. 18, 2013		
Time:	10:30		
Staff:	DD / AN		
UTM Coordinates:	07W 515979 7145336	Left Bank	2.30
Technique:	Wading, Using Global Flow Probe	Right Bank	0.75
Temp., Water/Air (°C)	1.0/ 2	Wetted Width	1.55



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	2.30	0.100	0.00	0.00	0.000	0.0000
1	2.10	0.175	0.17	0.02	0.030	0.0006
2	1.95	0.150	0.17	0.30	0.026	0.0077
3	1.80	0.150	0.17	0.55	0.026	0.0140
4	1.65	0.150	0.16	0.60	0.024	0.0144
5	1.50	0.150	0.16	0.50	0.024	0.0120
6	1.35	0.150	0.14	0.45	0.021	0.0095
7	1.20	0.150	0.13	0.25	0.020	0.0049
8	1.05	0.150	0.11	0.25	0.017	0.0041
9	0.90	0.150	0.09	0.15	0.014	0.0020
10	0.75	0.075	0.00	0.00	0.000	0.0000
11	0.75					

Mean Depth (m)	0.12
Mean Velocity (m/s)	0.28

Discharge (m <sup>3</sup> /s)	0.0691
-------------------------------	--------



## Stream Flow & Discharge Calculation

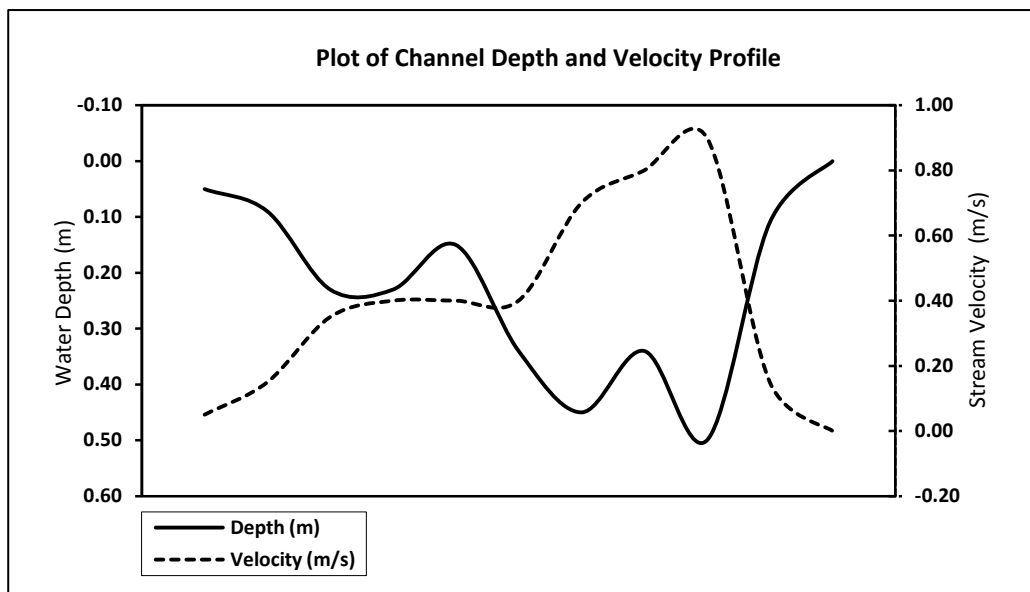
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Clinton Creek u/s Porcupine Ck d/s gabions		
Station Name:	E1-1		
Date:	Sept. 18, 2013		
Time:	15:30		
Staff:	DD / AN		
UTM Coordinates:	07W 513470 7147216	Left Bank	2.4
Technique:	Wading, Using Global Flow Probe	Right Bank	7.4
Temp., Water/Air (°C)	7.3/ 6	Wetted Width	5



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	2.40	0.300	0.05	0.05	0.015	0.0008
1	3.00	0.550	0.09	0.15	0.050	0.0074
2	3.50	0.500	0.23	0.35	0.115	0.0403
3	4.00	0.500	0.23	0.40	0.115	0.0460
4	4.50	0.500	0.15	0.40	0.075	0.0300
5	5.00	0.500	0.34	0.40	0.170	0.0680
6	5.50	0.500	0.45	0.70	0.225	0.1575
7	6.00	0.500	0.34	0.80	0.170	0.1360
8	6.50	0.500	0.50	0.90	0.250	0.2250
9	7.00	0.450	0.11	0.15	0.050	0.0074
10	7.40	0.200	0.00	0.00	0.000	0.0000
11	7.40					

Mean Depth (m)	0.23
Mean Velocity (m/s)	0.39

Discharge (m <sup>3</sup> /s)	0.7184
-------------------------------	--------



## Stream Flow & Discharge Calculation

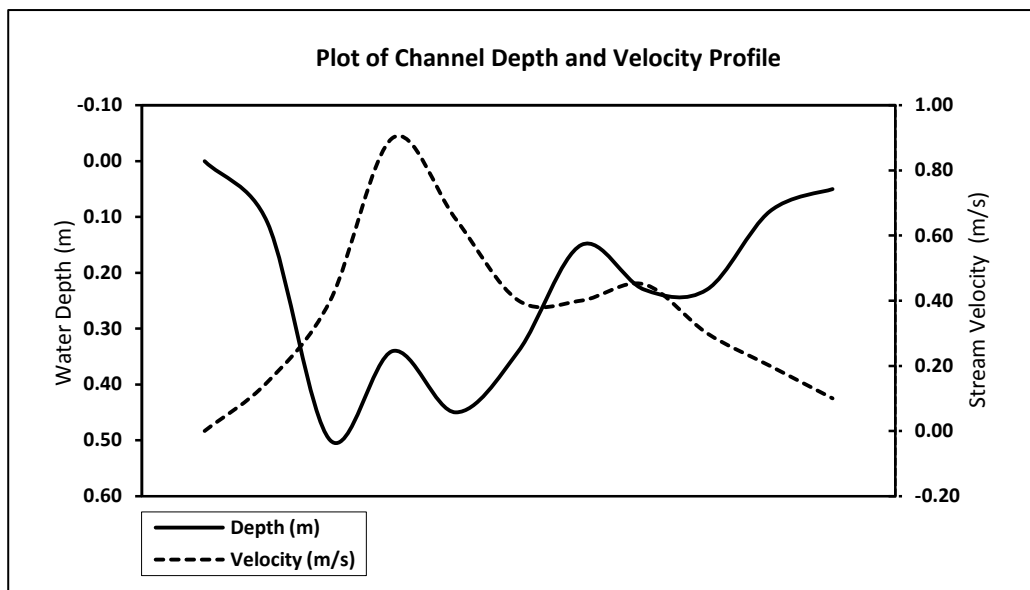
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Clinton Creek u/s Porcupine Ck d/s gabions		
Station Name:	E1-2		
Date:	Sept. 18, 2013		
Time:	15:30		
Staff:	DD / AN		
UTM Coordinates:	07W 513470 7147216	Left Bank	2.4
Technique:	Wading, Using Global Flow Probe	Right Bank	7.4
Temp., Water/Air (°C)	7.3/ 6	Wetted Width	5



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	7.40	0.200	0.00	0.00	0.000	0.0000
1	7.00	0.450	0.11	0.15	0.050	0.0074
2	6.50	0.500	0.50	0.40	0.250	0.1000
3	6.00	0.500	0.34	0.90	0.170	0.1530
4	5.50	0.500	0.45	0.65	0.225	0.1463
5	5.00	0.500	0.34	0.40	0.170	0.0680
6	4.50	0.500	0.15	0.40	0.075	0.0300
7	4.00	0.500	0.23	0.45	0.115	0.0518
8	3.50	0.500	0.23	0.30	0.115	0.0345
9	3.00	0.550	0.09	0.20	0.050	0.0099
10	2.40	0.300	0.05	0.10	0.015	0.0015
11	2.40					

Mean Depth (m)	0.23
Mean Velocity (m/s)	0.36

Discharge (m <sup>3</sup> /s)	0.6023
-------------------------------	--------



## Stream Flow & Discharge Calculation

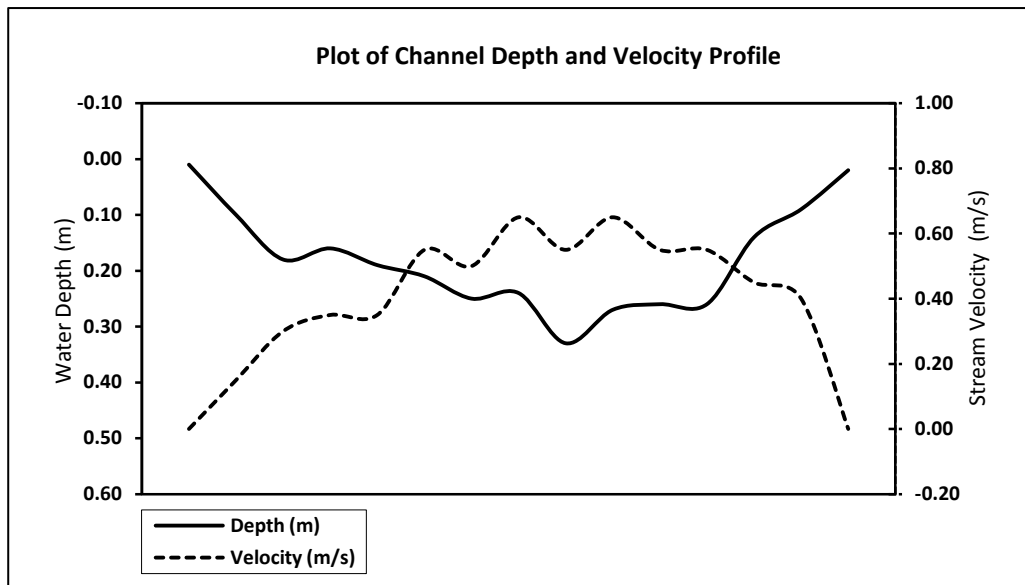
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Clinton Ck. d/s Porc. Ck. u/s Wolverine Ck.		
Station Name:	E2-1		
Date:	Sept. 18, 2013		
Time:	14:00		
Staff:	DD / AN		
UTM Coordinates:	07W 514149 7147074	Left Bank	1.6
Technique:	Wading, Using Global Flow Probe	Right Bank	6.5
Temp., Water/Air (°C)	7.3/ 6	Wetted Width	4.9



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	1.60	0.150	0.01	0.00	0.002	0.0000
1	1.90	0.300	0.10	0.15	0.030	0.0045
2	2.20	0.300	0.18	0.30	0.054	0.0162
3	2.50	0.300	0.16	0.35	0.048	0.0168
4	2.80	0.250	0.19	0.35	0.048	0.0166
5	3.00	0.300	0.21	0.55	0.063	0.0347
6	3.40	0.400	0.25	0.50	0.100	0.0500
7	3.80	0.450	0.24	0.65	0.108	0.0702
8	4.30	0.450	0.33	0.55	0.149	0.0817
9	4.70	0.400	0.27	0.65	0.108	0.0702
10	5.10	0.400	0.26	0.55	0.104	0.0572
11	5.50	0.400	0.26	0.55	0.104	0.0572
12	5.90	0.300	0.14	0.45	0.042	0.0189
13	6.10	0.300	0.09	0.40	0.027	0.0108
14	6.50	0.200	0.02	0.00	0.004	0.0000
15	6.50					

Mean Depth (m)	0.18
Mean Velocity (m/s)	0.40

Discharge (m <sup>3</sup> /s)	0.5050
-------------------------------	--------





## Stream Flow & Discharge Calculation

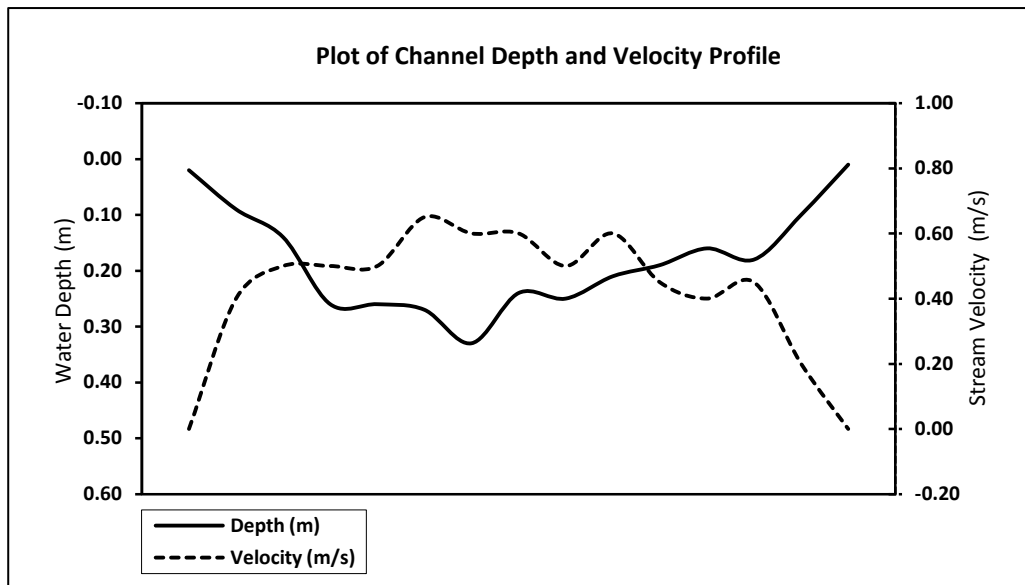
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Clinton Ck. d/s Porc. Ck. u/s Wolverine Ck.		
Station Name:	E2-2		
Date:	Sept. 18, 2013		
Time:	14:00		
Staff:	DD / AN		
UTM Coordinates:	07W 514149 7147074	Left Bank	1.6
Technique:	Wading, Using Global Flow Probe	Right Bank	6.5
Temp., Water/Air (°C)	7.3/ 6	Wetted Width	4.9



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	6.50	0.200	0.02	0.00	0.004	0.0000
1	6.10	0.300	0.09	0.40	0.027	0.0108
2	5.90	0.300	0.14	0.50	0.042	0.0210
3	5.50	0.400	0.26	0.50	0.104	0.0520
4	5.10	0.400	0.26	0.50	0.104	0.0520
5	4.70	0.400	0.27	0.65	0.108	0.0702
6	4.30	0.450	0.33	0.60	0.149	0.0891
7	3.80	0.450	0.24	0.60	0.108	0.0648
8	3.40	0.400	0.25	0.50	0.100	0.0500
9	3.00	0.300	0.21	0.60	0.063	0.0378
10	2.80	0.250	0.19	0.45	0.048	0.0214
11	2.50	0.300	0.16	0.40	0.048	0.0192
12	2.20	0.300	0.18	0.45	0.054	0.0243
13	1.90	0.300	0.10	0.20	0.030	0.0060
14	1.60	0.150	0.01	0.00	0.002	0.0000
15	1.60					

Mean Depth (m)	0.18
Mean Velocity (m/s)	0.42

Discharge (m <sup>3</sup> /s)	0.5186
-------------------------------	--------







## Stream Flow & Discharge Calculation

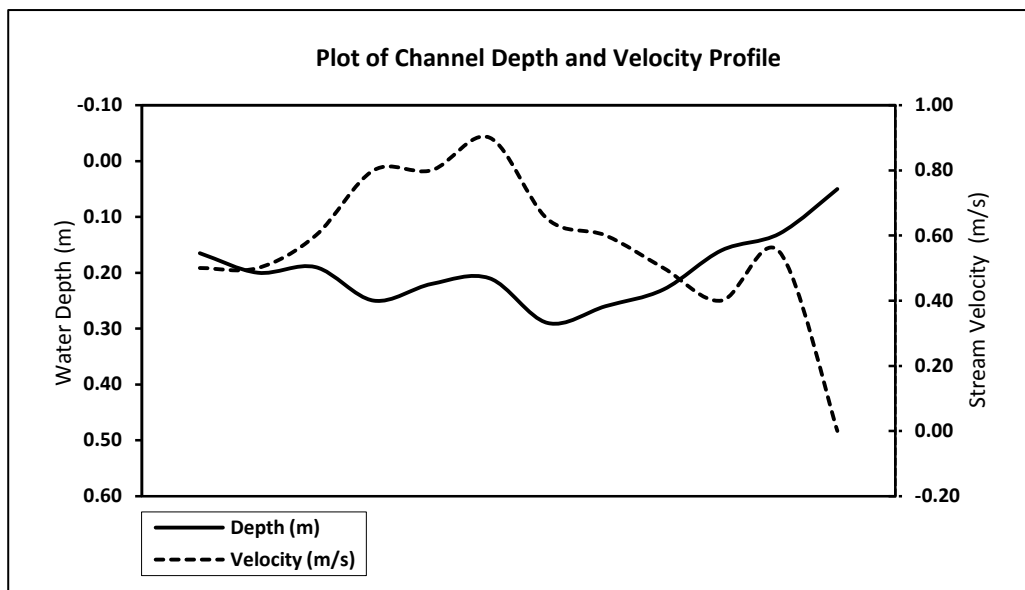
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Clinton Creek 30 m u/s from Eagle Ck.		
Station Name:	E4-1		
Date:	Sept. 18, 2013		
Time:	11:30		
Staff:	DD / AN		
UTM Coordinates:	07W 515949 7145288	Left Bank	0.5
Technique:	Wading, Using Global Flow Probe	Right Bank	6.0
Temp., Water/Air (°C)	5.7/ 2	Wetted Width	5.5



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	0.50	0.250	0.17	0.50	0.041	0.0206
1	1.00	0.500	0.20	0.50	0.100	0.0500
2	1.50	0.500	0.19	0.60	0.095	0.0570
3	2.00	0.500	0.25	0.80	0.125	0.1000
4	2.50	0.500	0.22	0.80	0.110	0.0880
5	3.00	0.500	0.21	0.90	0.105	0.0945
6	3.50	0.500	0.29	0.65	0.145	0.0943
7	4.00	0.500	0.26	0.60	0.130	0.0780
8	4.50	0.500	0.23	0.50	0.115	0.0575
9	5.00	0.500	0.16	0.40	0.080	0.0320
10	5.50	0.500	0.13	0.55	0.065	0.0358
11	6.00	0.250	0.05	0.00	0.013	0.0000
12	6.00					

Mean Depth (m)	0.20
Mean Velocity (m/s)	0.57

Discharge (m <sup>3</sup> /s)	0.7076
-------------------------------	--------



## Stream Flow & Discharge Calculation

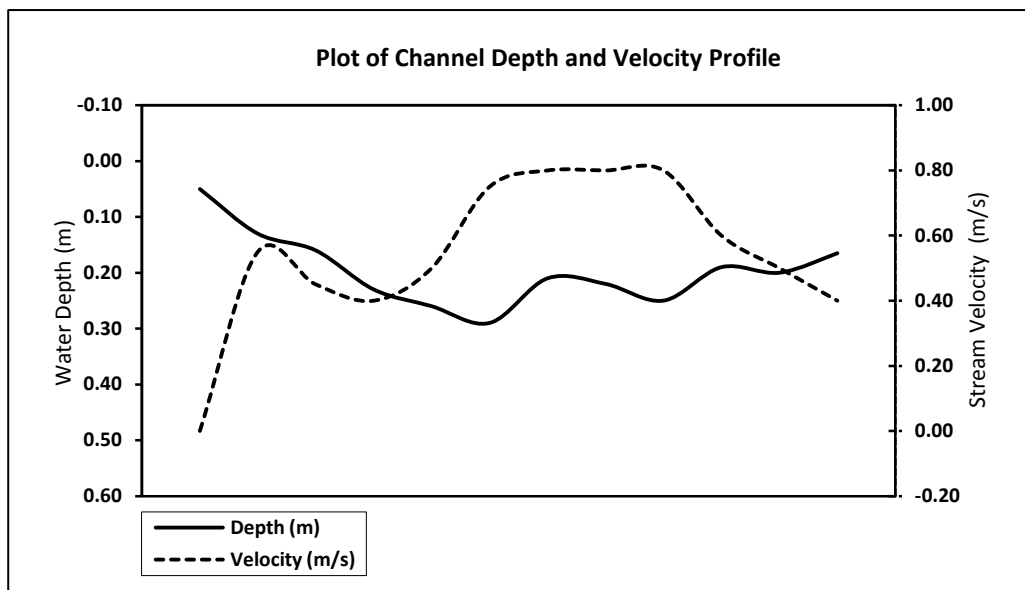
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Clinton Creek 30 m u/s from Eagle Ck.		
Station Name:	E4-2		
Date:	Sept. 18, 2013		
Time:	11:30		
Staff:	DD / AN		
UTM Coordinates:	07W 515949 7145288	Left Bank	0.5
Technique:	Wading, Using Global Flow Probe	Right Bank	6.0
Temp., Water/Air (°C)	5.7/ 2	Wetted Width	5.5



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	6.00	0.250	0.05	0.00	0.013	0.0000
1	5.50	0.500	0.13	0.55	0.065	0.0358
2	5.00	0.500	0.16	0.45	0.080	0.0360
3	4.50	0.500	0.23	0.40	0.115	0.0460
4	4.00	0.500	0.26	0.50	0.130	0.0650
5	3.50	0.500	0.29	0.75	0.145	0.1088
6	3.00	0.500	0.21	0.80	0.105	0.0840
7	2.50	0.500	0.22	0.80	0.110	0.0880
8	2.00	0.500	0.25	0.80	0.125	0.1000
9	1.50	0.500	0.19	0.60	0.095	0.0570
10	1.00	0.500	0.20	0.50	0.100	0.0500
11	0.50	0.250	0.17	0.40	0.041	0.0165
12	0.50					

Mean Depth (m)	0.20
Mean Velocity (m/s)	0.55

Discharge (m <sup>3</sup> /s)	0.6870
-------------------------------	--------



## Stream Flow & Discharge Calculation

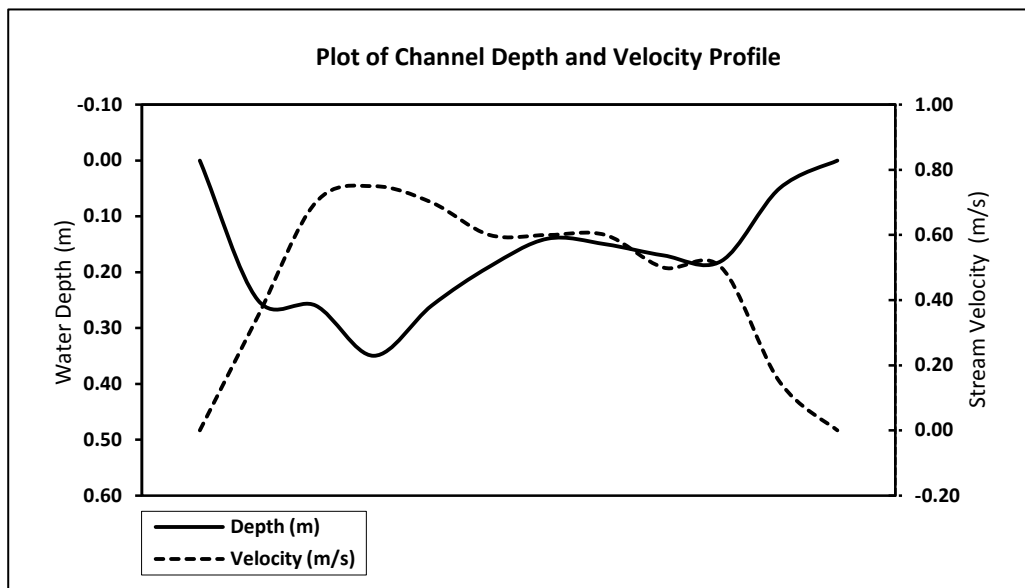
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Clinton Creek, u/s of Forty Mile River		
Station Name:	E7		
Date:	Sept. 17, 2013		
Time:	18:00		
Staff:	DD / AN		
UTM Coordinates:	07W 519419 7142051	Left Bank	1.15
Technique:	Wading, Using Global Flow Probe	Right Bank	8.7
Temp., Water/Air (°C)	5.2/5	Wetted Width	7.55



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	8.70	0.35	0.00	0.00	0.000	0.0000
1	8.00	0.73	0.25	0.35	0.181	0.0634
2	7.25	0.75	0.26	0.70	0.195	0.1365
3	6.50	0.75	0.35	0.75	0.263	0.1969
4	5.75	0.75	0.26	0.70	0.195	0.1365
5	5.00	0.75	0.19	0.60	0.143	0.0855
6	4.25	0.75	0.14	0.60	0.105	0.0630
7	3.50	0.75	0.15	0.60	0.113	0.0675
8	2.75	0.75	0.17	0.50	0.128	0.0638
9	2.00	0.75	0.18	0.50	0.135	0.0675
10	1.25	0.43	0.05	0.15	0.021	0.0032
11	1.15	0.05	0	0.00	0.000	0.0000
12	1.15					

Mean Depth (m)	0.17
Mean Velocity (m/s)	0.45

Discharge (m <sup>3</sup> /s)	0.8838
-------------------------------	--------



## Stream Flow & Discharge Calculation

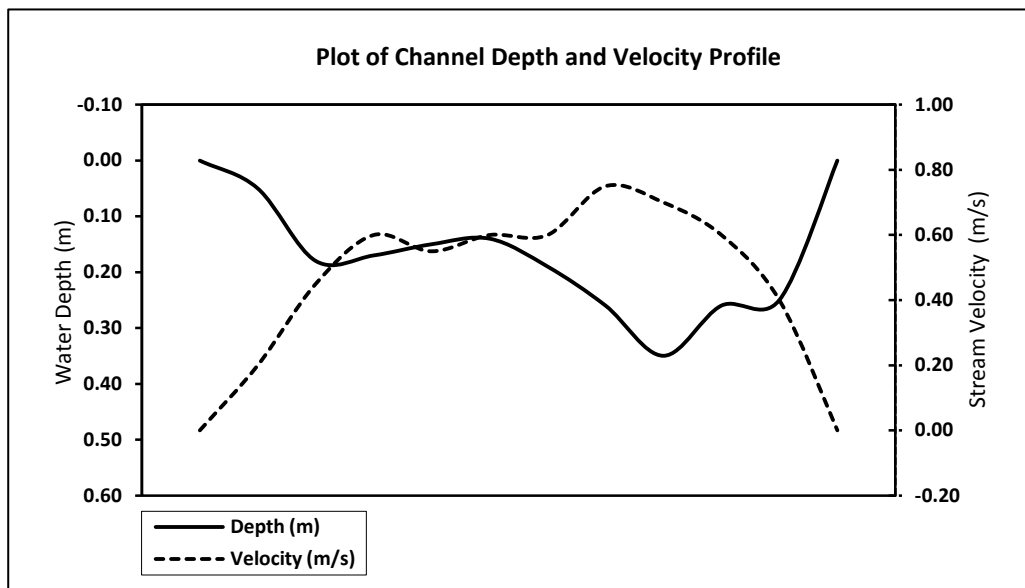
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Clinton Creek, u/s of Forty Mile River		
Station Name:	E7		
Date:	Sept. 17, 2013		
Time:	18:00		
Staff:	DD / AN		
UTM Coordinates:	07W 519419 7142051	Left Bank	1.15
Technique:	Wading, Using Global Flow Probe	Right Bank	8.7
Temp., Water/Air (°C)	5.2/5	Wetted Width	7.55



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	1.15	0.050	0.00	0.00	0.000	0.0000
1	1.25	0.425	0.05	0.2	0.021	0.0043
2	2.00	0.750	0.18	0.45	0.135	0.0608
3	2.75	0.750	0.17	0.6	0.128	0.0765
4	3.50	0.750	0.15	0.55	0.113	0.0619
5	4.25	0.750	0.14	0.6	0.105	0.0630
6	5.00	0.750	0.19	0.6	0.143	0.0855
7	5.75	0.750	0.26	0.75	0.195	0.1463
8	6.50	0.750	0.35	0.7	0.263	0.1838
9	7.25	0.750	0.26	0.6	0.195	0.1170
10	8.00	0.725	0.25	0.4	0.181	0.0725
11	8.70	0.350	0	0	0.000	0.0000
12	8.7					

Mean Depth (m)	0.17
Mean Velocity (m/s)	0.45

Discharge (m <sup>3</sup> /s)	0.8714
-------------------------------	--------



## Stream Flow & Discharge Calculation

<b>ELR Project No.</b>	13-156		
<b>Location:</b>	Clinton Creek Site		
<b>Stream Name:</b>	Unnamed Seep		
<b>Station Name:</b>	GWCC-4		
<b>Date:</b>	Sept. 19, 2013		
<b>Time:</b>	Not Specified		
<b>Staff:</b>	DD / AN		
<b>UTM Coordinates:</b>	07W 513869 7147044	Left Bank	N/A
<b>Technique:</b>	Timed Volume Flow Measurement	Right Bank	N/A
<b>Temp., Water/Air (°C)</b>	8.1/ 6	Wetted Width	N/A



Measure No.	Time (s)	Volume (L)	Discharge (L/s)	Discharge (m <sup>3</sup> /s)
1	6.11	1.0	0.1637	0.0001637
2	5.3	1.0	0.1887	0.0001887
3	5.75	1.0	0.1739	0.0001739
4	5.34	1.0	0.1873	0.0001873
5	5.25	1.0	0.1905	0.0001905

<b>Mean Discharge (m<sup>3</sup>/s)</b>	0.0001808
---	-----------



## Stream Flow & Discharge Calculation

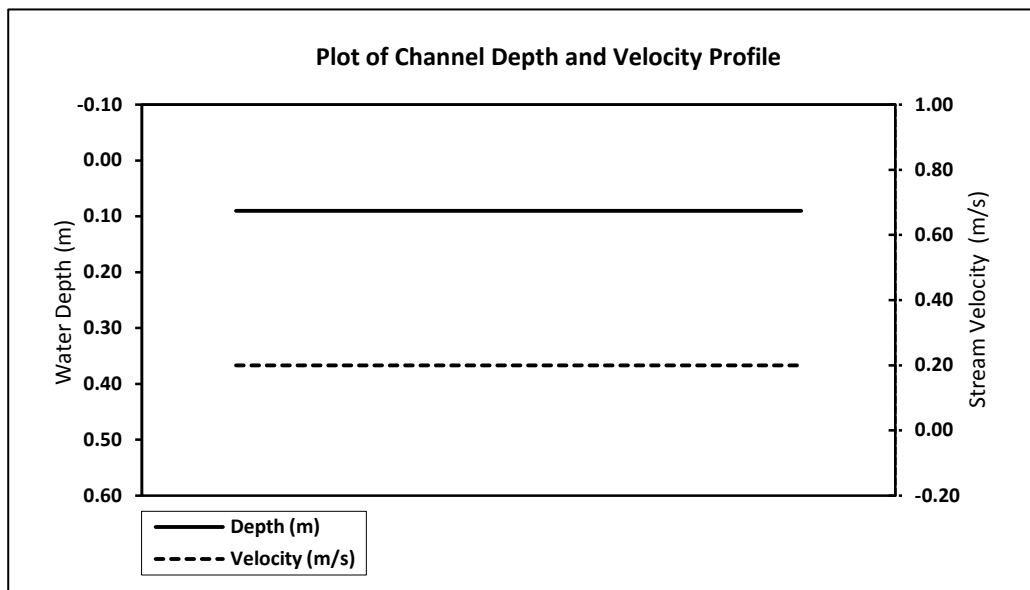
ELR Project No.	13-156		
Location:	Clinton Creek Site		
Stream Name:	Unnamed Seep		
Station Name:	GWCC-5		
Date:	Sept. 19, 2013		
Time:	16:30		
Staff:	DD / AN		
UTM Coordinates:	07W 513988 7147122	Left Bank	0.0
Technique:	Wading, Using Global Flow Probe	Right Bank	0.9
Temp., Water/Air (°C)	6.7 / 6	Wetted Width	0.9



Station No.	Distance (m)	Station Width (m)	Depth (m)	Velocity (m/s)	Panel Area (m <sup>2</sup> )	Panel Discharge (m <sup>3</sup> /s)
0	0.00	0.08	0.09	0.20	0.007	0.0014
1	0.15	0.15	0.09	0.20	0.014	0.0027
2	0.30	0.15	0.09	0.20	0.014	0.0027
3	0.45	0.15	0.09	0.20	0.014	0.0027
4	0.60	0.15	0.09	0.20	0.014	0.0027
5	0.75	0.15	0.09	0.20	0.014	0.0027
6	0.90	0.08	0.09	0.20	0.007	0.0014
7	0.90					

Mean Depth (m)	0.09
Mean Velocity (m/s)	0.20

Discharge (m <sup>3</sup> /s)	0.0162
-------------------------------	--------





## **APPENDIX 4 – SAMPLING FIELD NOTES**

*This Page Intentionally Left Blank*



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 19. 2013 @ 16:30

Sample location GNCC-5

Field Staff AS/DD

Weather Conditions Season: Winter Spring Summer Fall

Weather: Rain Snow Overcast Clear Windy

Air Temp. (°C): 6

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	✓	R ✓	N	includes Hardness
ICP low level Dissolved Metals	✓	R ✓	R ✓	includes Hardness
Total Suspended Soilds (TSS)	✓	N	N	
Dissolved Organic Carbon (DOC)	✓	R ✓	R ✓	
Nitrate/Nitrite/Sulphate	✓	N	N	
Total Nitrogen/Ammonia/Total Phosphorus	✓	R ✓	N	
Duplicate / Field blank Collected	<u>DUP2</u>	—	—	
<del>FRB</del> <u>DONE HERE</u>				

## In-Situ Measurements

Water Temp. (°C) 6.7

pH 7.83

Conductivity (µS/cm) 6690

SP. Conductivity (µS/cm) 10308

Dissolved O<sub>2</sub> (mg/L) 4.01

Dissolved O<sub>2</sub> (% Sat.) 36.3

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers 4 TAKEN

UTM Coordinates Zone: 07W E: 053988 N: 7147122

Waypoint name 022 Datum

Observations



# Hydrology Field Sheet

**ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring**

Date and Time (24hr) Sept. 19. 2013  
Hydrology Site W GWCC-5  
Field Staff AC/DD  
Left Bank (m) 0  
Right Bank (m) 0.90  
Wetted width (m) 0.90

Crossing No. 1

0.90m {

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1		0.09	0.20	Limited wetted width.
2		0.09	0.20	" Overly to Read
3				Velocity
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 19. 2013 @ 14:30

Sample location GWCC-1

Field Staff AS/DD

Weather Conditions Season: Winter Spring Summer Fall

Weather: Rain Snow Overcast Clear Windy

Air Temp. (°C): 6

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	✓	R ✓	<del>N</del>	includes Hardness
ICP low level Dissolved Metals	✓	R ✓	R ✓	includes Hardness
Total Suspended Soilds (TSS)	✓	N	N	
Dissolved Organic Carbon (DOC)	✓	R ✓	R ✓	
Nitrate/Nitrite/Sulphate	✓	<del>N</del>	N	
Total Nitrogen/Ammonia/Total Phosphorus	✓	R ✓	N	
Duplicate / Field blank Collected	N	-	-	

## In-Situ Measurements

Water Temp. (°C) 3.7

pH 5.748

Conductivity (µS/cm) 15386

SP Conductivity (µS/cm) 26894

Dissolved O<sub>2</sub> (mg/L) 5.08

Dissolved O<sub>2</sub> (% Sat.) 45.1

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers 4 TAKEN.

UTM Coordinates Zone: 07W E: 0513902 N: 7146954

Waypoint name S1 Datum

Observations



# Hydrology Field Sheet

**ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring**

Date and Time (24hr) \_\_\_\_\_

Hydrology Site \_\_\_\_\_

Field Staff \_\_\_\_\_

Left Bank (m) \_\_\_\_\_

Right Bank (m) \_\_\_\_\_

Wetted width (m) \_\_\_\_\_

Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) Sept. 18, 2013. 19th @ 14:15

Sample location GWCC-2

Field Staff AS/DO

Weather Conditions Season: Winter Spring Summer Fall

Weather: Rain Snow Overcast Clear Windy

Air Temp. (°C): 4°C

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	✓	R ✓	N	includes Hardness
ICP low level Dissolved Metals	✓	R ✓	R ✓	includes Hardness
Total Suspended Solids (TSS)	✓	N	N	
Dissolved Organic Carbon (DOC)	✓	R ✓	R ✓	
Nitrate/Nitrite/Sulphate	✓	N	N	
Total Nitrogen/Ammonia/Total Phosphorus	✓	R ✓	N	
Duplicate / Field blank Collected	N	-	-	

## In-Situ Measurements

Water Temp. (°C) 5.4

pH 7.5

Conductivity (µS/cm) 14350 13680

SP Conductivity (µS/cm) 22437

Dissolved O<sub>2</sub> (mg/L) 6.97

Dissolved O<sub>2</sub> (% Sat.) 64.1

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers 4 TAKEN.

UTM Coordinates Zone: 07 E: 0513899 N: 7146966

Waypoint name 018 Datum

Observations SR Act.





# Hydrology Field Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) Sept. 18<sup>th</sup> 2013 @ 11:00

Hydrology Site GWCC-2

Field Staff AS/DD

Left Bank (m) \_\_\_\_\_

Right Bank (m) \_\_\_\_\_

Wetted width (m) \_\_\_\_\_

Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT 18 2013 @ 11:15

Sample location # GWCC-4

Field Staff DO/AS

Weather Conditions Season: Winter Spring Summer Fall

Weather: Rain Snow Overcast Clear Windy

Air Temp. (°C): 4°C 6

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	✓	R ✓	N	includes Hardness
ICP low level Dissolved Metals	✓	R ✓	R ✓	includes Hardness
Total Suspended Solids (TSS)	✓	N	N	
Dissolved Organic Carbon (DOC)	✓	R ✓	R ✓	
Nitrate/Nitrite/Sulphate	✓	N	N	
Total Nitrogen/Ammonia/Total Phosphorus	✓	R ✓	N	
Duplicate / Field blank Collected	N	—	—	

## In-Situ Measurements

Water Temp. (°C) 8.1

pH 7.59

Conductivity (µS/cm) 1602 16637

SP Conductivity (µS/cm) ~~23780~~ 23780

Dissolved O<sub>2</sub> (mg/L) 4.63

Dissolved O<sub>2</sub> (% Sat.) 44.54

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers 4 TAKEN 0513869 7147044

UTM Coordinates Zone: 07W E: 188999 N: 747037

Waypoint name SWPZ 020 Datum

Observations



# Hydrology Field Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT 19 18 2013

Hydrology Site GWCC-4

Field Staff AS/DD

Left Bank (m) \_\_\_\_\_

Right Bank (m) \_\_\_\_\_

Wetted width (m) \_\_\_\_\_

VOL. FLOW

MEASUREMENT

Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2		TIME	VOLUME	
3		6.11	1L	
4		5.30	1L	LESS 1076
5		5.75	1L	
6		5.94		
7		5.25		
8				
9				
10				
11				
12				
13				
14				
15				
16				

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT 19 2013 @ 14:30

Sample location GWCC-3 VA

Field Staff AS/OD

Weather Conditions Season: Winter Spring Summer Fall

Weather: Rain Snow Overcast Clear Windy

Air Temp. (°C): 4.0 6.0

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	✓	R ✓	N	includes Hardness
ICP low level Dissolved Metals	✓	R ✓	R ✓	includes Hardness
Total Suspended Solids (TSS)	✓	N	N	
Dissolved Organic Carbon (DOC)	✓	R ✓	R ✓	
Nitrate/Nitrite/Sulphate	✓	N	N	
Total Nitrogen/Ammonia/Total Phosphorus	✓	R ✓	✓	
Duplicate / Field blank Collected	-NO	-	-	

## In-Situ Measurements

Water Temp. (°C) 7.7

pH 7.61

Conductivity (µS/cm) 10308

sp Conductivity (µS/cm) 15382

Dissolved O<sub>2</sub> (mg/L) 4.61

Dissolved O<sub>2</sub> (% Sat.) 43.5

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers 4 TAKEN 0513880 7147038

UTM Coordinates Zone: 09W E: 0513880 N: 7147038

Waypoint name VA 021 Datum

Observations



# Hydrology Field Sheet

**ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring**

Date and Time (24hr) SEPT. 13<sup>th</sup> 2013

Hydrology Site GWCC-3

Field Staff AS/DD

Left Bank (m) \_\_\_\_\_

Right Bank (m) \_\_\_\_\_

Wetted width (m) \_\_\_\_\_

Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 17, 2013 @ 18:00

Sample location ET CLINTON CREEK v/s 40 MILE RIVER - NEAR MOUTH

Field Staff AS/DD

Weather Conditions Season: Winter Spring Summer Fall

Weather: Rain Snow Overcast Clear Windy

Air Temp. (°C): 5 (APPROX)

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	Y	R Y	N	includes Hardness
ICP low level Dissolved Metals	Y	R Y	R Y	includes Hardness
Total Suspended Solids (TSS)	Y	N	N	
Dissolved Organic Carbon (DOC)	Y	R Y	R Y	
Nitrate/Nitrite/Sulphate	Y	N	N	
Total Nitrogen/Ammonia/Total Phosphorus	Y	R Y	N	
Duplicate / Field blank Collected	N	-	-	

## In-Situ Measurements

Water Temp. (°C) 5.2

pH 7.67

Conductivity (µS/cm) 481.7

*SP* Conductivity (µS/cm) ~~274.9~~ 774.9

Dissolved O<sub>2</sub> (mg/L) 12.11

Dissolved O<sub>2</sub> (% Sat.) 98.9

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers \_\_\_\_\_

UTM Coordinates Zone: 07 E: 0519419 N: 7142051

Waypoint name 011 Datum \_\_\_\_\_

Observations \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



# Hydrology Field Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) Sept. 17 @ 16 18:00

Hydrology Site E7

Field Staff AS/DD

Left Bank (m) 1.15m

Right Bank (m) 8.70m

Wetted width (m) 7.55m

8.70  
1.15  
7.55

Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	8.70	0	0	
2	8.00	0.25	0.35	
3	7.25	0.26	0.70	
4	6.50	0.35	0.75	
5	5.75	0.26	0.7	
6	5.00	0.19	0.6	
7	4.25	0.14	0.6	
8	3.50	0.15	0.6	
9	2.75	0.17	0.5	
10	2.00	0.18	0.5	
11	1.25	0.05	0.15	
12	1.15	0	0	
13				
14				
15				
16	<u>1.15m</u>			

7.  
0.5  
0.7  
0.9  
2.6

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5	1.15	0	0	
6	1.25	0.05	0.20	
7	2.00	0.18	0.45	
8	2.75	0.17	0.60	
9	3.50	0.15	0.55	
10	4.25	0.14	0.60	
11	5.00	0.19	0.60	
12	5.75	0.26	<del>0.85</del> 0.75	
13	6.50	0.35	0.70	
14	7.25	0.26	0.60	
15	8.00	0.25	0.40	
16	8.70	0	0	



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 17, 2013 @ 16:15

Sample location EB (40 MILE R. D/S FROM CLINTON CREEK)

Field Staff AS/DD

Weather Conditions Season: Winter Spring Summer Fall

Weather: Rain Snow Overcast Clear Windy

Air Temp. (°C): 8

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	Y	R Y	N	includes Hardness
ICP low level Dissolved Metals	Y	R Y	R Y	includes Hardness
Total Suspended Solids (TSS)	Y	-	N	
Dissolved Organic Carbon (DOC)	Y	R Y	R Y	
Nitrate/Nitrite/Sulphate	Y	-	N	
Total Nitrogen/Ammonia/Total Phosphorus	Y	R Y	N	
Duplicate / Field blank Collected	NO	-	-	

## In-Situ Measurements

Water Temp. (°C) 4.5

pH 8.25

Conductivity (µS/cm) 145.9

SP Conductivity (µS/cm) 237.6

Dissolved O<sub>2</sub> (mg/L) 12.62

Dissolved O<sub>2</sub> (% Sat.) 101.8

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers 34 TAKEN

UTM Coordinates Zone: 07 E: 0519456 N: 7142789

Waypoint name Datum

Observations ACCESS TO SITE VIA ROAD JUST ~~AT~~ OVER THE BRIDGE ROAD IS ON RIGHT HAND SIDE ~~AT~~ LEADS TO RIVER SITE. EB





# Hydrology Field Sheet

**ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring**

Date and Time (24hr) \_\_\_\_\_

Hydrology Site No Hydrology

Field Staff \_\_\_\_\_

Left Bank (m) \_\_\_\_\_

Right Bank (m) \_\_\_\_\_

Wetted width (m) \_\_\_\_\_

Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 17 @ 17:15

Sample location R6 40 MILE RIVER REF. SITE

Field Staff AS/DD

Weather Conditions Season: Winter Spring Summer Fall

Weather: Rain Snow Overcast Clear Windy

Air Temp. (°C): 7°C

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	Y	R Y	N	includes Hardness
ICP low level Dissolved Metals	Y	R Y	R Y	includes Hardness
Total Suspended Solids (TSS)	Y	N	N	
Dissolved Organic Carbon (DOC)	Y	R Y	R Y	
Nitrate/Nitrite/Sulphate	Y	N	N	
Total Nitrogen/Ammonia/Total Phosphorus	Y	R Y	Y	
Duplicate / Field blank Collected	N	-	-	

## In-Situ Measurements

Water Temp. (°C) 4.7

pH 8.01

Conductivity (µS/cm) 128.4

SP Conductivity (µS/cm) 209.9

Dissolved O<sub>2</sub> (mg/L) 13.08

Dissolved O<sub>2</sub> (% Sat.) 106.3

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers 3 TAKEN

UTM Coordinates Zone: 07 E: 0519483 N: 7141726

Waypoint name 013 Datum

Observations



# Hydrology Field Sheet

**ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring**

Date and Time (24hr) \_\_\_\_\_

Hydrology Site

~~EA~~ R6 NO HYDROLOGY

Field Staff

40 MILE RIVER SIDE.

Left Bank (m) \_\_\_\_\_

Right Bank (m) \_\_\_\_\_

Wetted width (m) \_\_\_\_\_

Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) Sept. 16 2013 @ 17:30

Sample location R3 (Wolverine Cr. N/S Tailings)

Field Staff AS/DD

Weather Conditions Season: Winter Spring Summer Fall

Weather: Rain Snow Overcast Clear Windy

Air Temp. (°C): 8°C Above

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	✓	R ✓		includes Hardness
ICP low level Dissolved Metals	✓	R ✓	R ✓	includes Hardness
Total Suspended Solids (TSS)	✓	—		
Dissolved Organic Carbon (DOC)	✓	R ✓	R ✓	
Nitrate/Nitrite/Sulphate	✓	✓		
Total Nitrogen/Ammonia/Total Phosphorus	✓	R ✓		
Duplicate / Field blank Collected	NO			

## In-Situ Measurements

Water Temp. (°C) 1.3

pH 7.84

Conductivity (µS/cm) 412.0

SP Conductivity (µS/cm) 758.9

Dissolved O<sub>2</sub> (mg/L) 14.30

Dissolved O<sub>2</sub> (% Sat.) 107.3 ? SEEMS OFF.

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers 4 taken

UTM Coordinates Zone: 07 E: 0513956 N: 7148689

Waypoint name 017 Datum

Observations \* LONG WALL OVER TAILING / SLOPE UNSURABLE ON GROUND SIDE



# Hydrology Field Sheet

**ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring**

Date and Time (24hr) SAME SEPT. 16 2013 @ 1730

Hydrology Site R3 (WOLVERINE CR. U/S TAILINGS)

Field Staff AS/DD

Left Bank (m) 0.70

Right Bank (m) 3.40

Wetted width (m) 2.70m

2  
3.40  
0.70  
-----  
2.70

Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	0.70	0	0	
2	0.90	0.01	0	
3	1.10	0.02	0	
4	1.30	0.04	0.3	
5	1.60	0.05	0.35	
6	1.90	0.11	0.35	
7	2.10	0.11	0.35	
8	2.30	0.09	0.30	
9	2.50	0.10	0.35	
10	2.70	0.11	0.25	
11	2.90	0.12	0.20	
12	3.10	0.08	<del>0.02</del> 0.20	
13	3.30	0.05	0.05	
14				
15				
16	3.40	0	0	

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	3.40			
2				
3	3.40	0	0	
4	3.20	0.05	0.05	
5	3.10	0.08	0.20	
6	2.90	0.12	0.25	
7	2.70	0.11	0.25	
8	2.50	0.10	0.35	
9	2.30	0.09	0.40	
10	2.10	0.11	0.35	
11	1.90	0.11	0.40	
12	1.70	0.05	0.35	
13	1.30	0.04	0.30	
14	1.10	0.02	0	
15	0.90	0.01	0	
16	0.70	0	0	



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) Sept 16/2013 14:00

Sample location R2 COASTER CREEK US HUNGEON LK

Field Staff AN, DD

Weather Conditions Season: Winter Spring Summer Fall

Weather: Rain Snow Overcast Clear Windy

Air Temp. (°C): N/A

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	✓	R Y	N	includes Hardness
ICP low level Dissolved Metals	✓	R Y	R Y	includes Hardness
Total Suspended Solids (TSS)	✓	N	N	
Dissolved Organic Carbon (DOC)	✓	R Y	R Y	
Nitrate/Nitrite/Sulphate	✓	N	N	
Total Nitrogen/Ammonia/Total Phosphorus	✓	R Y	N	
Duplicate / Field blank Collected	NO	-	-	

## In-Situ Measurements

Water Temp. (°C) 2.4

pH 7.70

Conductivity (µS/cm) 366.0

SP Conductivity (µS/cm) 642.2

Dissolved O<sub>2</sub> (mg/L) 12.10

Dissolved O<sub>2</sub> (% Sat.) 93.3

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers 4 TAKEN.

UTM Coordinates Zone: 07 E: 0512021 N: 7148023

Waypoint name 016. Datum

Observations



# Hydrology Field Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT 16, 2013 @ 14:15

Hydrology Site R2 (EASTER CR. U/S HUGGON CR.)

Field Staff D.D. / A.S.

Left Bank (m) 4.40

Right Bank (m) 1.50

Wetted width (m) 2.90

Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	4.40	0.18	0 N/F	
2	4.20	0.20	0.10	
3	4.00	0.25	0.15	
4	3.80	0.24	0.15	
5	3.60	0.23	0.15	
6	3.40	0.20	0.25	
7	3.20	0.18	0.20	
8	3.00	0.16	0.25	
9	2.80	0.14	0.20	
10	2.60	0.15	0.15	
11	2.40	0.13	0.15	
12	2.20	0.13	0.15	
13	2.00	0.11	0.15	
14	1.80	0.09	0.10	
15	1.60	0.04	N/F	
16	1.50	0	0	

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	1.50	0	0	
2	1.60	0.04	N/F	
3	1.80	0.09	0.10	
4	2.00	0.11	0.15	
5	2.20	0.13	0.20	
6	2.40	0.13	0.20	
7	2.60	0.15	0.15	
8	2.80	0.14	0.25	
9	3.00	0.16	0.25	
10	3.20	0.18	0.20	
11	3.40	0.20	0.20	
12	3.60	0.23	0.15	
13	3.80	0.24	0.20	
14	4.00	0.25	0.10	
15	4.20	0.20	0.10	
16	4.40	0.18	0.00 N/F	



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 16, 2023 @ 12:16

Sample location R1 (CLINTON CREEK @S HUDGSON LK)

Field Staff D.O. / A.S.

Weather Conditions Season: Winter Spring Summer Fall

Weather: Rain Snow Overcast Clear Windy LIGHT

Air Temp. (°C): -7

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	Y	R Y	N	includes Hardness
ICP low level Dissolved Metals	Y	R Y	R Y	includes Hardness
Total Suspended Solids (TSS)	Y	N	N	
Dissolved Organic Carbon (DOC)	Y	R Y	R Y	
Nitrate/Nitrite/Sulphate	Y	N	N	
Total Nitrogen/Ammonia/Total Phosphorus	Y	R Y	N	
Duplicate / Field blank Collected	N	-	-	

## In-Situ Measurements

Water Temp. (°C) 0.6

pH 8.04

Conductivity (µS/cm) 345.2

SP Conductivity (µS/cm) 647.0

Dissolved O<sub>2</sub> (mg/L) 13.36

Dissolved O<sub>2</sub> (% Sat.) 98.2

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers 4 PHOTOS.

UTM Coordinates Zone: 07 E: 0510697 N: 7147528

Waypoint name 015 Datum

Observations @ LAKE BEACH & WALK TO SITE  
" " MULTI-CHANNELS OF CREEK



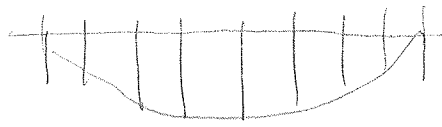


# Hydrology Field Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT 16 2013 @ 13:00  
 Hydrology Site R1 (CLINTON CREEK w/s MUDGEDON LAKE)  
 Field Staff AS/DD

Left Bank (m) 8.65  
 Right Bank (m) 3.30  
 Wetted width (m) 5.35



Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	3.30	0.08	0	
2	3.70	0.10	0.1	
3	4.00	<del>0.13</del> 0.11	<del>0.2</del> 0.1	
4	4.30	0.13	0.2	
5	4.60	0.15	0.2	
6	4.90	0.17	0.25	
7	5.10	0.20	0.25	
8	5.40	0.22	0.3	
9	5.70	0.24	0.35	
10	6.00	0.24	0.40	
11	6.50	0.26	0.40	
12	7.00	0.30	0.30	
13	7.50	0.36	0.25	
14	8.00	0.35	0.25	
15	<del>8.25</del>			
16	8.65	0.33	0.15	

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	8.65	0.33	0.15	
2	8.00	0.365	0.20	
3	7.50	0.36	0.25	
4	7.00	<del>0.26</del> 0.30	0.25	
5	6.50	0.26	0.40	
6	6.00	0.24	0.35	
7	5.70	0.24	0.30	
8	5.40	0.220	0.25	
9	5.10	0.20 <del>17</del>	0.25	
10	4.90	0.17 <del>15</del>	0.25	
11	4.60	0.15 <del>13</del>	0.20	
12	4.30	0.13 <del>11</del>	0.20	
13	4.00	0.11	0.1	
14	3.70	0.10	0.1	
15				
16	3.30	0.08	0	



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 18. 2013 @ 15:30  
 Sample location E1 (CLINTON CR. ups PORCUPINE CR & d/s GABIONS)  
 Field Staff AS/DD  
 Weather Conditions Season: Winter Spring Summer Fall  
 Weather: Rain Snow Overcast Clear Windy  
 Air Temp. (°C): 6

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	✓	R ✓	N	includes Hardness
ICP low level Dissolved Metals	✓	R ✓	R ✓	includes Hardness
Total Suspended Solids (TSS)	✓	N	N	
Dissolved Organic Carbon (DOC)	✓	R ✓	R ✓	
Nitrate/Nitrite/Sulphate	✓	N	N	
Total Nitrogen/Ammonia/Total Phosphorus	✓	R ✓	N	
Duplicate / Field blank Collected	DUP 1	✓	✓	
	FB	✓	✓	

## In-Situ Measurements

Water Temp. (°C) 7.3  
 pH 7.86  
 Conductivity (µS/cm) 3561  
 SP Conductivity (µS/cm) 5587  
 Dissolved O<sub>2</sub> (mg/L) 10.33  
 Dissolved O<sub>2</sub> (% Sat.) 98.0

Flow and discharge rates (see reverse side)

PHOTOS.

## Miscellaneous Information

Photo Numbers 3 \$ TAKEN.  
 UTM Coordinates Zone: OTW E: 05H 0513470 N: 7174 7147216  
 Waypoint name 004 Datum  
 Observations



# Hydrology Field Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 18. 20. 13

Hydrology Site E1

Field Staff AS/DD

Left Bank (m) 2.40

Right Bank (m) 7.40

Wetted width (m) 5.00

Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	2.40	0.05	0.05	
2	3.00	0.09	0.15	
3	3.50	0.23	0.35	
4	4.00	0.23	0.46	
5	4.50	0.15	0.40	
6	5.00	0.34	0.40	
7	5.50	0.45	0.70	
8	6.00	0.34	0.80	
9	<del>6.40</del> 6.50	0.50	0.90	
10	7.00	.11	0.15	
11	7.40	0	0	
12				
13				
14				
15				
16				

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	7.40	0	0	
2	7.00	0.11	0.15	
3	6.50	<del>0.40</del> 0.3	0.4	depth 0.50 wet
4	6.00	0.23 0.34	0.9 0.45	0.9
5	5.50	0.45	0.65	
6	5.00	0.34	0.4	
7	<del>4.50</del>	0.15	0.4	
8	4.00	0.23	0.45	
9	3.50	0.23	0.3	
10	3.00	0.09	0.2	
11	2.40	0.05	0.1	
12				
13				
14				
15				
16				



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 18 @ 2012 @ 14:00

Sample location E2 CLINTON CREEK d/s POLKUPINE CR & W/S WOLVERINE CR.

Field Staff DD/AS

Weather Conditions Season: Winter Spring Summer Fall  
Weather: Rain Snow Overcast Clear Windy

Air Temp. (°C): 6°C

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	✓	R ✓	N	includes Hardness
ICP low level Dissolved Metals	✓	R ✓	R ✓	includes Hardness
Total Suspended Solids (TSS)	✓	N	N	
Dissolved Organic Carbon (DOC)	✓	R ✓	R ✓	
Nitrate/Nitrite/Sulphate	✓	N	N	
Total Nitrogen/Ammonia/Total Phosphorus	✓	R ✓	N	
Duplicate / Field blank Collected	N	-	-	

## In-Situ Measurements

Water Temp. (°C) 7.3

pH 7.57

Conductivity (µS/cm) 5057

S Conductivity (µS/cm) 7550

Dissolved O<sub>2</sub> (mg/L) 10.30

Dissolved O<sub>2</sub> (% Sat.) 92.6

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers 4 TAKEN

UTM Coordinates Zone: 07 W E: 0514149 N: 7147074

Waypoint name 005 Datum

Observations



# Hydrology Field Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 18. 2013.

Hydrology Site E2

Field Staff DO/AS.

Left Bank (m) 1.6

Right Bank (m) 6.5

Wetted width (m) 5.4

Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	1.6	.01	0.0	
2	1.9	.10	.15	
3	2.20	.18	0.3	
4	2.5	.16	0.35	
5	2.8	.19	0.35	
6	3.0	.21	0.55	
7	3.4	.25	0.5	
8	3.8	.24	0.65	
9	4.3	.33	0.55	
10	4.7	.27	0.65	
11	5.1	.26	0.55	
12	5.5	.26	0.55	
13	5.9	.14	0.45	
14	6.1	.09	0.4	
15	6.5	.02	0.0	
16				

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	6.5	.02	0.0	
2	6.1	.09	0.4	
3	5.9	.14	0.5	
4	5.5	.26	0.5	
5	5.1	.26	0.5	
6	4.7	.27	0.65	
7	4.3	.33	0.6	
8	3.8	.24	0.6	
9	3.4	.25	0.5	
10	3.0	.21	0.6	
11	2.8	.19	0.45	
12	2.5	.16	0.4	
13	2.2	.18	0.45	
14	1.9	.10	0.2	
15	1.6	.01	0.0	
16				



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 18. 2013 @ 13:00

Sample location E3 WOLVERINE CR. N 1/2 FROM CLINTON

Field Staff DD/AS CRUER

Weather Conditions Season: Winter Spring Summer Fall

Weather: Rain Snow Overcast Clear Windy

Air Temp. (°C): 6°

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	✓	R ✓	N	includes Hardness
ICP low level Dissolved Metals	✓	R ✓	R ✓	includes Hardness
Total Suspended Solids (TSS)	✓	N	N	
Dissolved Organic Carbon (DOC)	✓	R ✓	R ✓	
Nitrate/Nitrite/Sulphate	✓	N	N	
Total Nitrogen/Ammonia/Total Phosphorus	✓	R ✓	N	
Duplicate / Field blank Collected	N	-	-	

## In-Situ Measurements

Water Temp. (°C) 3.3

pH 7.53

Conductivity (µS/cm) 4332

*SF* Conductivity (µS/cm) 7388

Dissolved O<sub>2</sub> (mg/L) 11.45

Dissolved O<sub>2</sub> (% Sat.) 93.0

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers 4 TAKEN.

UTM Coordinates Zone: 07 W E: 0514178 N: 7147186

Waypoint name 006 Datum

Observations



# Hydrology Field Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 18. 2013.

Hydrology Site E3

Field Staff AS/DD.

Left Bank (m) 0.75

Right Bank (m) 2.75

Wetted width (m) 2.00

Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	0.75	0.0	0.0	
2	1.00	.09	0.0	
3	1.25	.15	0.05	
4	1.50	.23	0.2	
5	1.75	.31	0.4	
6	2.00	.33	0.35	
7	2.25	.31	0.05	
8	2.50	.10	0.2	
9	2.75	.06	0.1	
10				
11				
12				
13				
14				
15				
16				

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	2.75	.06	0.1	
2	2.50	.10	0.15	
3	2.25	.31	0.2	
4	2.00	.33	0.2	
5	1.75	.31	0.3	
6	1.50	.23	0.2	
7	1.25	.15	0.15	
8	1.00	.09	0.0	
9	0.75	0.0	0.0	
10				
11				
12				
13				
14				
15				
16				



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 18. 2013. @ 11:30

Sample location E4 (CLINTON CREEK) 30 m U/S FROM EAGLE CR.

Field Staff DO/AS.

Weather Conditions Season: Winter Spring Summer Fall

Weather: Rain Snow Overcast Clear Windy

Air Temp. (°C): 2°

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	<u>Y</u>	R <u>Y</u>	<u>N</u>	includes Hardness
ICP low level Dissolved Metals	<u>Y</u>	R <u>Y</u>	R <u>Y</u>	includes Hardness
Total Suspended Solids (TSS)	<u>Y</u>	<u>N</u>	<u>N</u>	
Dissolved Organic Carbon (DOC)	<u>Y</u>	R <u>Y</u>	R <u>Y</u>	
Nitrate/Nitrite/Sulphate	<u>Y</u>	<u>N</u>	<u>N</u>	
Total Nitrogen/Ammonia/Total Phosphorus	<u>Y</u>	R <u>Y</u>	<u>N</u>	
Duplicate / Field blank Collected	<u>N</u>	<u>-</u>	<u>-</u>	

## In-Situ Measurements

Water Temp. (°C) 5.7

pH 7.04

Conductivity (µS/cm) 5250

SP Conductivity (µS/cm) 3296

Dissolved O<sub>2</sub> (mg/L) 4.31

Dissolved O<sub>2</sub> (% Sat.) 97.3

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers 4 TAKEN.

UTM Coordinates Zone: 07 W E: 0515949 N: 7145288

Waypoint name 007 Datum

Observations





# Hydrology Field Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 18. 2013 @

Hydrology Site E4 (CLINTON CREEK)

Field Staff AS/DD

Left Bank (m) 0.50

Right Bank (m) 6.00

Wetted width (m) 5.50

Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	0.5	.16.5	.5	
2	1.0	.20	.5	
3	1.5	.19	.6	
4	2.0	.25	.8	
5	2.5	.22	.8	
6	3.0	.21	.9	
7	3.5	.29	.65	
8	4.0	.26	.6	
9	4.5	.23	.5	
10	5.0	.16	.4	
11	5.5	.13	.55	
12	6.0	.05	0.0	
13				
14				
15				
16				

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	6.0	.05	0.0	
2	5.5	.13	0.55	
3	5.0	.16	0.45	
4	4.5	.23	0.4	
5	4.0	.26	0.5	
6	3.5	.29	0.75	
7	3.0	.21	0.8	
8	2.5	.22	0.8	
9	2.0	.25	0.8	
10	1.5	.19	0.6	
11	1.0	.20	0.5	
12	0.5	.165	0.4	
13				
14				
15				
16				



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 18. 2013 @ 10:30

Sample location RLL (EAGLE CREEK 20 m W/S CLINTON CR)

Field Staff DD/AS

Weather Conditions Season: Winter Spring Summer Fall

Weather: Rain Snow Overcast Clear Windy

Air Temp. (°C): 2

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	Y	R ✓	N	includes Hardness
ICP low level Dissolved Metals	Y	R ✓	R ✓	includes Hardness
Total Suspended Solids (TSS)	Y	N	N	
Dissolved Organic Carbon (DOC)	Y	R ✓	R ✓	
Nitrate/Nitrite/Sulphate	Y	N	N	
Total Nitrogen/Ammonia/Total Phosphorus	Y	R ✓	N	
Duplicate / Field blank Collected	N	+	-	

## In-Situ Measurements

Water Temp. (°C) 1

pH 7.30

Conductivity (µS/cm) 362.5

Conductivity (µS/cm) 668.0

Dissolved O<sub>2</sub> (mg/L) 13.61

Dissolved O<sub>2</sub> (% Sat.) 103.0

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers 4 TAKEN

UTM Coordinates Zone: 07W E: 0515979 N: 7145336

Waypoint name 008 Datum

Observations



# Hydrology Field Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 18. 2013. @ 10:30

Hydrology Site R4 (EAGLE CREEK)

Field Staff AS/OD.

Left Bank (m) 2.30m

Right Bank (m) 0.75m

Wetted width (m) 1.55

Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	0.75	0	0	
2	0.90	0.09	0.10	
3	1.05	0.11	0.15	
4	1.20	0.13	0.25	
5	1.35	0.14	0.45	
6	1.50	0.16	0.55	
7	1.65	0.16	0.50	
8	1.80	0.17	0.60	
9	1.95	0.17	0.30	
10	2.10	<del>0.17</del> 0.17	<del>0.20</del> 0.20	
11	2.30	0	0	
12				
13				
14				
15				
16				

1.12  
2.30  
0.75  
1.55

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1	2.30	0	0	
2	<del>1.95</del> 2.10	0.17	0.02	
3	1.95	0.17	0.30	
4	1.80	<del>0.17</del> 0.17	0.55	
5	1.65	0.16	0.60	
6	1.50	0.16	0.50	
7	1.35	0.14	0.45	
8	1.20	0.13	<del>0.55</del>	0.25
9	1.05	0.11	<del>0.30</del>	0.25
10	0.90	0.09	<del>0.20</del> 0.20	0.15
11	0.75	0	0	
12				
13				
14				
15				
16				



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 19 - 2013 @ 11:00

Sample location PL (PORCUPINE CREEK)

Field Staff DD/AS

Weather Conditions Season: Winter Spring Summer Fall

Weather: Rain Snow Overcast Clear Windy

Air Temp. (°C): 6°C

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	Y	R ✓	N	includes Hardness
ICP low level Dissolved Metals	Y	R ✓	R ✓	includes Hardness
Total Suspended Solids (TSS)	Y	N	N	
Dissolved Organic Carbon (DOC)	Y	R ✓	R ✓	
Nitrate/Nitrite/Sulphate	Y	N	N	
Total Nitrogen/Ammonia/Total Phosphorus	Y	R N	N	
Duplicate / Field blank Collected	N	-	-	

## In-Situ Measurements

Water Temp. (°C) 8.4

pH 8.00

Conductivity (µS/cm) 19809

*SP* Conductivity (µS/cm) 29009

Dissolved O<sub>2</sub> (mg/L) 7.07

Dissolved O<sub>2</sub> (% Sat.) 71.7

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers 2 TAKEN

UTM Coordinates Zone: E: N:

Waypoint name Datum

Observations



# Hydrology Field Sheet

**ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring**

Date and Time (24hr) SEPT. 19. 2013

Hydrology Site PL - PIT LAKE NO HYDROLOGY.

Field Staff DO/AS

Left Bank (m) \_\_\_\_\_

Right Bank (m) \_\_\_\_\_

Wetted width (m) \_\_\_\_\_

Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				



# Surface Water Sampling Field Parameter Sheet

ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring

Date and Time (24hr) SEPT. 19. 2013 @ 12:15

Sample location JL (SNOWSHOE LAKE)

Field Staff DD/AS

Weather Conditions Season: Winter Spring Summer Fall

Weather: Rain Snow Overcast Clear Windy

Air Temp. (°C): 6°C

## Surface Water Samples

Parameters	Collected (Y/N)	Preserved (Required) added (Y/N)	Field filtered (Required) (Y/N)	Comments
ICP low level Total Metals	✓	R ✓	N	includes Hardness
ICP low level Dissolved Metals	✓	R ✓	R ✓	includes Hardness
Total Suspended Solids (TSS)	✓	N	N	
Dissolved Organic Carbon (DOC)	✓	R ✓	R ✓	
Nitrate/Nitrite/Sulphate	✓	N	N	
Total Nitrogen/Ammonia/Total Phosphorus	✓	R ✓	N	
Duplicate / Field blank Collected	N	—	—	

## In-Situ Measurements

Water Temp. (°C) 2.8

pH 8.21

Conductivity (µS/cm) 8644

SP Conductivity (µS/cm) 14955

Dissolved O<sub>2</sub> (mg/L) 9.11

Dissolved O<sub>2</sub> (% Sat.) 75.9

Flow and discharge rates (see reverse side)

## Miscellaneous Information

Photo Numbers 2 TAKEN

UTM Coordinates Zone: E: N:

Waypoint name Datum

Observations WHILE SAMPLING ROCK SLIDE OCCURRED

ON SE SLOPE OF PIT WALL → SAFETY CONCERN



# Hydrology Field Sheet

**ELR PROJECT NUMBER: 13-156 Clinton Creek Surface Water Quality and Hydrology Monitoring**

Date and Time (24hr) SEPT. 19. 2013

Hydrology Site SL - NO HYDROLOGY

Field Staff \_\_\_\_\_

Left Bank (m) \_\_\_\_\_

Right Bank (m) \_\_\_\_\_

Wetted width (m) \_\_\_\_\_

Crossing No. 1

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Crossing No. 2

	Distance (m)	Depth (m)	Velocity (m/s)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				