APPENDIX I-3

2012 AQUATICS BASELINE

RAINY RIVER RESOURCES LIMITED
RAINY RIVER GOLD PROJECT

2012 AQUATIC RESOURCES BASELINE REPORT

Submitted by:

AMEC Environment & Infrastructure
a Division of AMEC Americas Limited
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March 2013
TC111504

March 6, 2013
TC111504

Mr. Kyle Stanfield, P.Eng
Vice President, Environment & Sustainability
Rainy River Resources Ltd.
1111 Victoria Avenue East
Thunder Bay, ON
P7C 1B7

Dear Mr. Stanfield,

AMEC Environment & Infrastructure is pleased to submit the attached 2012 Aquatic Resources Baseline Investigation for the Rainy River Gold Project.

The 2012 Aquatic Resources Baseline Investigation adds to the baseline studies conducted previously from 2008 to 2011.

We greatly appreciate the opportunity to provide support for your Rainy River Gold Project. Should you have any questions regarding the study, please do not hesitate to contact us.

Yours Sincerely,

AMEC Environment & Infrastructure,
a division of AMEC Americas Limited



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ERRATUM

The following erratum has been prepared in response to comments received on the final 2012 Aquatic Resources Baseline Report from regulatory agencies.

Page i: Photo 8: Jones 2 test hole frozen, muck substrate, should read Jones 1.

Page 2, Section 1.3: the statement: "the creeks and streams that are present in the local area do not support commercial or recreational fishery" is replaced by: " *The RRGP is somewhat unique from an environmental perspective in that there are no lakes located within, or adjacent to, the main RRGP site. While limited bait fishing does occur within certain project area streams, the area does not support a significant commercial or recreational fishery. Additionally, the streams and creeks that are present often encounter zero flow during dry periods.*"

Page 42, Section 3.7.2: insert the following new line after "The pH at Loslo Creek sampling locations generally ranged from 6.84 to 7.87, however, the August 29, 2012 measurement at LOS-11 (5.45) fell outside the pH range specified in the PWQO for protection of aquatic life (6.5-8.5)": "*It is believed that this value is a result of field equipment error as analytical results of surface water quality from grab samples collected from the same location on the same date indicate a pH of 7.16 (Table 3-2).*"

Table 3-14: additional note required: *"Note: See Page 93, 4th paragraph for further context"*.

1.0 INTRODUCTION

Rainy River Resources Ltd. (RRR) has been exploring the Rainy River Gold Project (RRGP) situated on private lands in the Township of Chapple, approximately 65 kilometres (km) northwest of Fort Frances in northwestern Ontario (Figure 1-1). This 2012 Aquatic Resources Baseline Report was prepared by AMEC Environment & Infrastructure, a division of AMEC Americas Limited (AMEC), to describe current environmental conditions and supplement previous baseline investigations (Klohn Crippen Berger (KCB) 2011; AMEC 2012), for the ongoing development of the RRGP.

This baseline report focuses on the new information collected by AMEC during 2012, but where appropriate historic data have been included to provide a broader context and to indicate notable data trends.

1.1 General Setting

The RRGP is located in the Township of Chapple, District of Rainy River, in northwestern Ontario, approximately 40 km east of Lake of the Woods, 65 km northwest of Fort Frances and 420 km west of Thunder Bay (Figure 1-1). The Universal Transverse Mercator coordinates for the centroid of the proposed open pit are at 425660E, 5409700N (NAD 83 Zone 15). The RRGP site and surrounding lands are dominantly privately held, with RRR holding a very large private land package.

The RRGP is located within the Late Achaean Rainy River Greenstone Belt which forms part of the western Wabigoon sub province, located in the Superior Province of the Canadian Shield. The terrain in the general vicinity of the RRGP site transitions from upland, bedrock controlled pond areas to the northeast, to lower-lying, gently undulating terrain to the southwest. The Pinewood River system, which drains most of the Project site area, is associated with a broad floodplain. Lands more proximal to the RRGP site area are typically gently rolling to flat, with wetlands occurring in low lying contributing watersheds and rounded bedrock outcrops and subcrops occurring in upland areas.

The site area occurs within the western portion of the Great Lakes St. Lawrence Forest Region in the area between Lake Superior and Lake of the Woods; but is near to the Boreal Forest and Prairie regions and therefore exhibits some transitional characteristics. Wetlands are present due to the pervasive clay till substrates and subdued topography that characterize much of the area, combined with extensive beaver activity.

Land uses within the RRGP site area mainly reflect low-density rural and some local agricultural and forestry practices. The area is intersected by a well-developed network of both Provincial and Municipal access roads as well as private roads crossing privately-held lands.

1.2 General Methodology

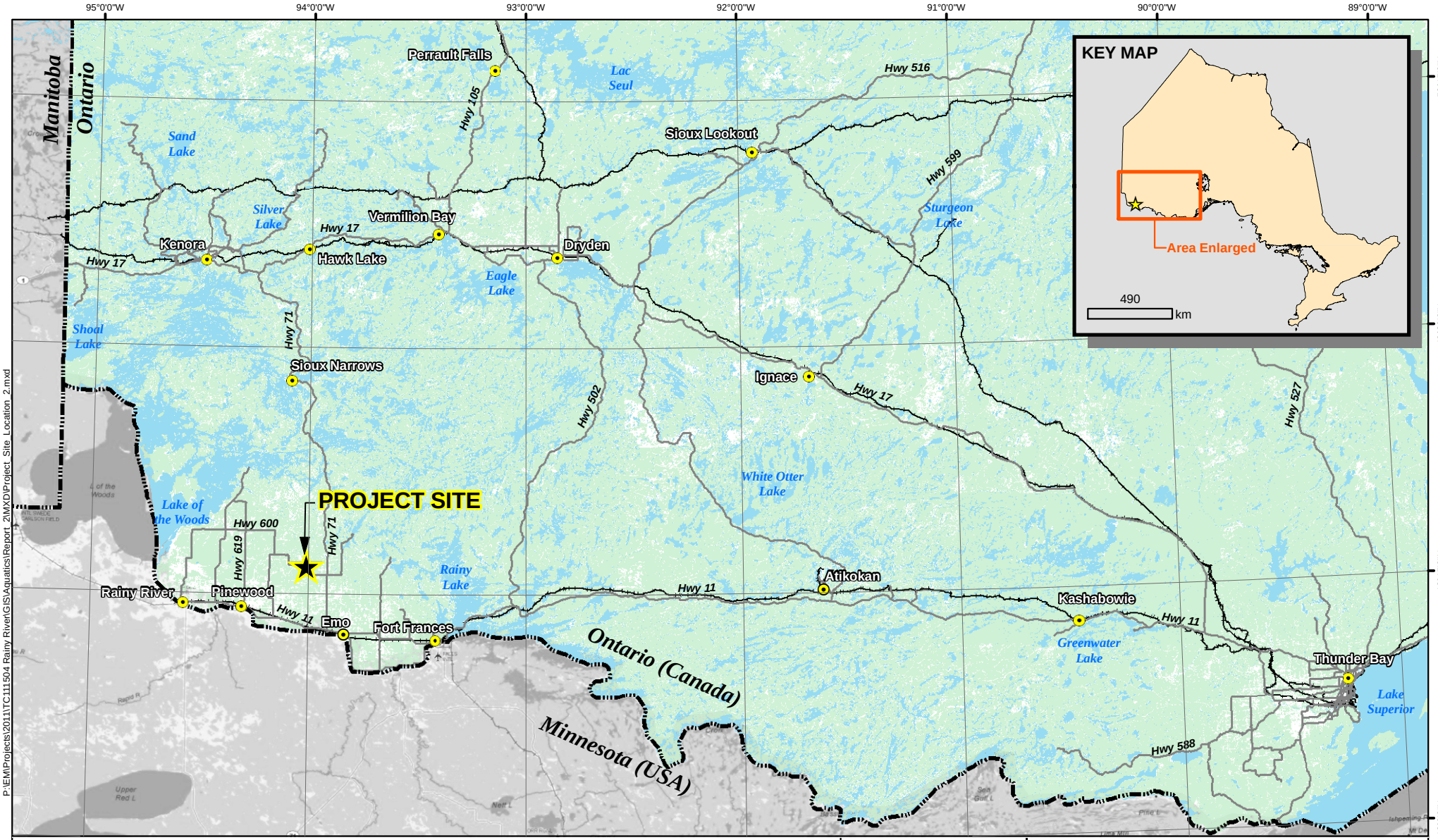
Baseline data were gathered with the assistance of RRR field staff, using the standard approaches of observation and sample collection, data analysis and discussions with people having specific knowledge of the area. Despite the generation of separate baseline reports, where appropriate, an ecosystem perspective has been used to integrate the data into functional relationships. It is recognized that the entire physical, chemical and biological system (i.e., the ecosystem) is interconnected. For example, surface water systems are connected to groundwater systems, which are in turn affected by climate, geology, soils and general aspects of the terrain. The expression of surface water systems, in terms of water flow, water quality and riverbed / creek bed materials, affects the presence and abundance of aquatic life and wildlife. In addition, the entire study team functioned as an integrated unit to ensure that all team members carried out their studies in a coordinated manner, so as to avoid inconsistencies and misinterpretations of the data.

1.3 Spatial Boundaries

The RRGP site area is positioned within the upper portion of the Pinewood River watershed (Figure 1-2). The RRGP is somewhat unique from an environmental perspective in that there are no lakes located within, or adjacent to, the main RRGP site. The creeks and streams that are present in the local area do not support a commercial or recreational fishery.

A number of the watercourses including Marr Creek appear to have been altered to act dominantly as agricultural drains. It should be also noted that the lower approximately 3.3 km reach of Loslo Creek and 2.3 km of Clark Creek leading to the outflow into the Pinewood River have been previously designated as Municipal drains under the *Drainage Act* (respectively, the Cowser Drain constructed in 1980 and the Teeple Drain constructed in 1994).

The RRGP area is situated within the vicinity of the following watersheds and subwatersheds: the Pinewood River, McCallum Creek (also referred to in previous reports as Jones Creek), Loslo Creek, Marr Creek, West Creek, Clark Creek, Tait Creek and Sturgeon Creek (Figure 1-2). Information provided in this report is specific to the following watercourses within these watersheds: Pinewood River, McCallum Creek, Unnamed Tributary 1, Tait Creek, Unnamed Tributary 2, Loslo Creek, Unnamed Tributary 5, West Creek Tributary 1, Clark Creek, Unnamed Tributary 8A and Sturgeon Creek (Figure 1-2). Note that creek names used in this report are local names used for ease of local recognition by stakeholders and are not geographically official names



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LEGEND

- Project Site
- Regional Communities
- Provincial / National Border
- Regional Road / Highway
- Railway

0 25 50 100 150 200 250 Kilometres

NOTES:
- Ontario base data extracted from Land Information Ontario (MNR) data warehouse.
- Base data outside of Ontario extracted from ESRI DeLorme World Basemap

Datum: NAD83
Projection: UTM Zone 15N

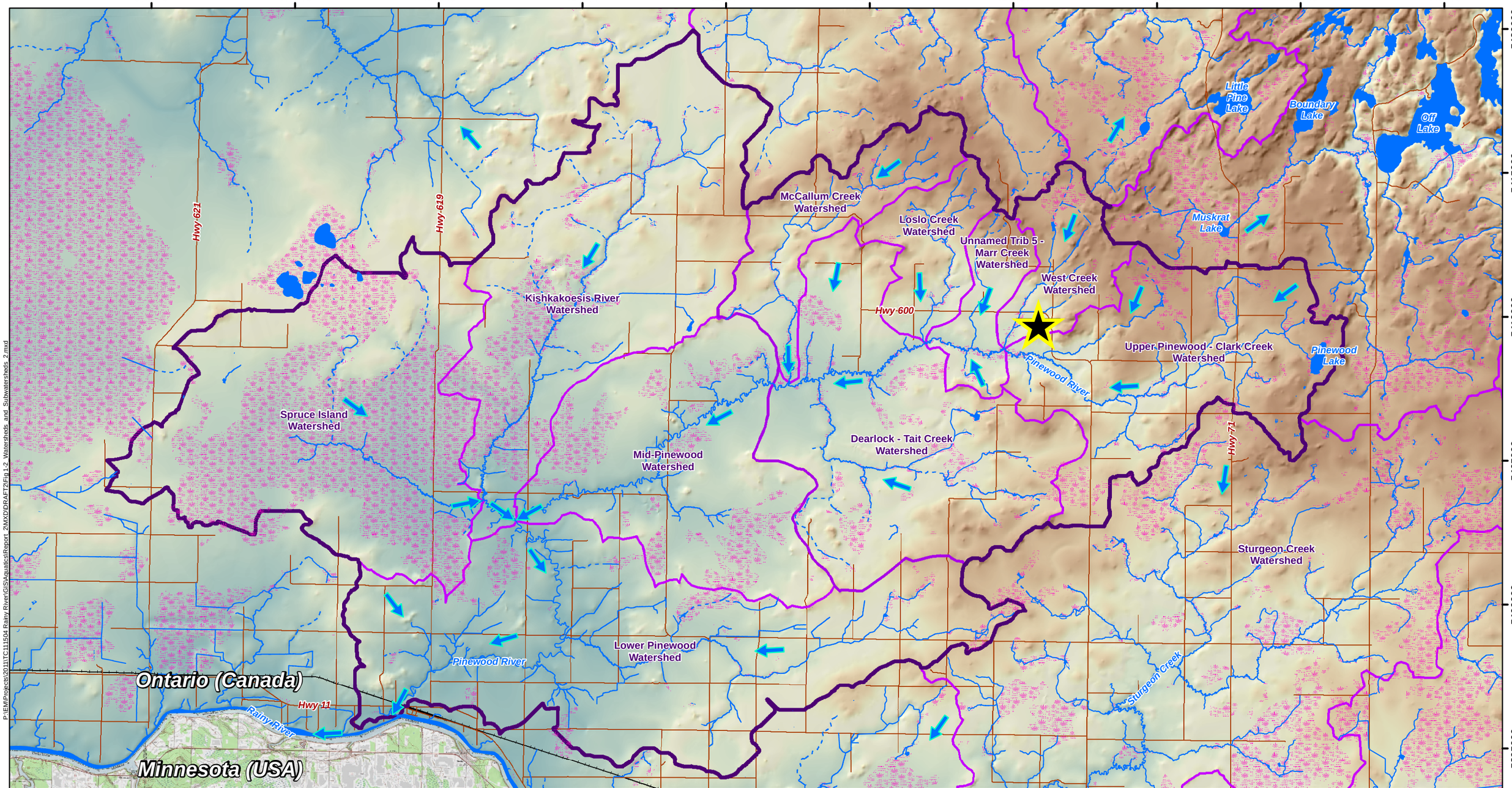
RAINY RIVER

amec

RAINY RIVER GOLD PROJECT

Project Location

PROJECT N°: TC111504	**FIGURE: 1-1**
SCALE: 1:1,800,000	DATE: March 2013



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LEGEND

- Project Site
- Regional Road / Highway
- Railway
- Waterbody
- Permanent Watercourse
- Intermittent Watercourse
- Low-Lying Area
- General Surface Flow Direction

Elevation Colour Ramp: High ground – Low ground

- Pinewood River Watershed (approx. 57,450 ha)
- Main Project Area Watershed (approx. 20,700 ha)
- Subwatershed Areas (Labelled on map)
  - -Unnamed Trib 5 - Marr Cr. approx. 1,230 ha
  - -Loslo Cr. approx. 1,620 ha
  - -West Cr. approx. 1,635 ha
  - -McCallum Cr. approx. 2,490 ha
  - -Upper Pinewood - Clark Cr. approx. 6,130 ha
  - -Mid-Pinewood approx. 6,530 ha
  - -Dearlock - Tait Cr. approx. 7,600 ha
  - -Kishkakoesis R. approx. 9,200 ha
  - -Spruce Is. approx. 9,580 ha
  - -Lower Pinewood approx. 11,435 ha
  - -Sturgeon Cr. approx. 21,477 ha

NOTES:
- Road data extracted from Land Information Ontario, Ontario Road Network, MNR
- Ontario base data extracted from Land Information Ontario (MNR) data warehouse.
- Base data outside of Ontario extracted from ESRI USGS Topographic maps
- Watershed delineations are approximate and are derived from MNR Ontario Digital Elevation Model and Quaternary Watershed boundaries

0 3.5 7 14 21 28 35 Kilometres

Datum: NAD83
Projection: UTM Zone 15N

N W E S

RAINYRIVER amec

RAINY RIVER GOLD PROJECT

Regional Topography, Watershed and Subwatershed Boundaries

PROJECT N^{O}: TC111504	**FIGURE: 1-2**
SCALE: 1:127,000	DATE: March 2013

2.0 METHODOLOGY

2.1 General Approach

Sampling locations were selected based on their proximity to the RRGP site, surface water patterns to adjacent water bodies and identified areas of ecological interest. Sites were also selected based on landowner permissions, accessibility and logistical feasibility. Field sampling during 2012 was conducted from July 11 to 19, 2012, August 28 to September 7, 2012 and from September 18 to 27, 2012.

2.2 Surface Water Quality

Periodic baseline surface water quality monitoring began at the RRGP in 2007 and was established as a monthly program in 2009. This initial program was augmented in the spring of 2010 to include a total of 14 monthly sampling locations that continue to be monitored at the time of this report. Results from this monitoring program are presented in Section 5 of this report and in KCB (2011).

As part of AMEC's aquatic baseline study, surface water samples were collected for chemical analysis from fourteen locations on the Pinewood River, two locations on McCallum Creek, one location on Tait Creek, one location on Unnamed Tributary 2, five locations on Loslo Creek, one location on Unnamed Tributary 5, one location on West Creek Tributary 1, one location on Clark Creek and two locations on Sturgeon Creek. These sampling locations are provided in Figures 2-1A, 2-1B and 2-1C. Water samples were not collected from Unnamed Tributary 1, due to lack of a defined channel, or Unnamed Tributary 8A, as it was dry at the time of field sampling. As a quality assurance / quality control (QA/QC) measure, a blind field duplicate sample was collected at sample location PIN-10A in order to assess the validity of the data received from the analytical laboratory.

Grab samples for water quality were collected approximately 10 centimetres (cm) below the water surface and sample containers were filled to remove all headspace. Samples were kept cool until they could be shipped to Maxxam Analytics laboratory in Mississauga, Ontario (possessing accreditation from the Standards Council of Canada) or ALS Environmental analytical laboratory in Thunder Bay, Ontario (possessing accreditation from the Canadian Association for Laboratory Accreditation). In-situ surface water field measurements of physico-chemical parameters (dissolved oxygen, conductivity, pH, temperature and total dissolved solids (TDS)) were also taken using portable analytical equipment. The additional physico-chemical data was collected to compliment site-specific biophysical microhabitat condition information, as reported in the context of habitat assessment information provided within this document.

The analytical results were compared to Ontario’s Provincial Water Quality Objectives (PWQO; MOEE 1999) for the protection of aquatic life and to the Canadian Environmental Quality Guidelines (CEQG) Canadian Water Quality Guidelines for the Protection of Aquatic Life

(CCME 1999). The PWQO are a set of criteria that are considered by the provincial government to protect all forms of aquatic life at all stages of their life cycles over an indefinite exposure period. PWQOs are based on lowest effect concentration with respect to aquatic toxicity, bioaccumulation and mutagenecity with an added safety factor. Interim PWQOs are draft values which have been established for some parameters where there is insufficient toxicological information to establish a PWQO. Interim PWQOs are presented in this report for reference purposes only.

CEQG criteria are nationally approved limits of substances and other attributes (e.g. pH, temperature) in the water column where no adverse toxic effects are expected to aquatic plants and animals. These guidelines are part of a management system developed to ensure that societal stresses do not lead to the degradation of Canadian fresh and marine waters.

2.3 Sediment Quality

Surficial sediment samples were collected using a Petite Ponar grab sampler at fourteen locations on the Pinewood River, two locations on McCallum Creek, one location on Tait Creek, one location on Unnamed Tributary 2, five locations on Loslo Creek, one location on Unnamed Tributary 5, two locations on West Creek Tributary 1, one location on Clark Creek and two locations on Sturgeon Creek. Sampling locations are presented in Figure 2-2A, 2-2B and 2-2C. Sediment samples were not collected from Unnamed Tributary 1, due to lack of a defined channel, or Unnamed Tributary 8A, as it was dry at the time of field sampling.

At each sampling location, three replicate sediment grabs were collected and homogenized to provide one pooled sample per location. Replicates were collected and pooled for the purpose of a more complete representation of substrates within the sampling location. Chemical analyses were conducted at ALS Environmental analytical laboratory in Thunder Bay, Ontario. Grain size analyses were conducted by AMEC's materials testing laboratory in Cambridge, Ontario which has been certified by the Canadian Council of Independent Laboratories as a Type C and Type D Advanced Aggregate Quality Testing Laboratory. Sediment grain size was analyzed for consideration and comparability to the benthic invertebrate community which sampled using the same collection technique (Petite Ponar). The occurrence of larger particle sizes (cobble and boulder) within representative reaches and sections of rivers and creeks was recorded through observation during habitat assessment. Details of habitat assessment are provided in Section 2.3.

The analytical results were compared to the Ontario Provincial Sediment Quality Guidelines (PSQG; MOE 2008) and the CEQG Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CCME 2001). The PSQG are guidelines which promote the protection of aquatic life and are based on sound scientific information. According to the PSQG document, three levels of effects are prescribed that reflect potential chronic and long term effects of contaminants on benthic invertebrates. The three levels are:

- No effect Level: fish and sediment-dwelling organisms are not affected by chemicals in the sediment; the sediment is considered clean;

- Lowest effect level (LEL): level of sediment contamination that can be tolerated by the majority of the sediment-dwelling benthic invertebrates; the sediment is considered to be clean to marginally contaminated; and

- Severe effect level (SEL): level of sediment contamination at which pronounced disturbance of the sediment-dwelling community can be expected; the sediment is considered heavily contaminated.

The CEQG criteria are established based on formal federal protocol to evaluate potential adverse biological effects in aquatic environments. They prescribe a level of contamination at which there are probable effects (Probable Effect Level, PEL).

2.4 Habitat Assessment

Habitat sampling was completed at sixteen locations on the Pinewood River, two locations on McCallum Creek, one location on Unnamed Tributary 1, one location on Tait Creek, one location on Unnamed Tributary 2, seven location on Loslo Creek, one location on Unnamed Tributary 5, two locations on West Creek, one location on Clark Creek, one location on Unnamed Tributary 8A and two locations on Sturgeon Creek. Habitat sampling locations are presented in Figures 2-3A, 2-3B and 2-3C.

Habitat inventories were conducted on linear channels and ponded water features within the RRGP study area. Habitat assessment was conducted on representative stations within the Project study area representing both channel and pond habitat types. Inventories were conducted to provide data specific to hydrogeomorphology and fish habitat availability. Comprehensive fish habitat descriptions were carried out at all sampling locations and included detailed recordings of general gradient and stability observations, channel profile and cross-section morphology, substrate composition, instream aquatic and riparian vegetation communities and cover opportunities. The Ministry of Transportation's (MTO) Fish and Fish Habitat sampling protocol was specifically used at sampling locations of potential stream crossings. The MTO protocol sampling parameters were recorded at the proposed or potential crossing locations, but were also designed to record surrounding upstream and downstream reaches from the point of the proposed crossing in order to encompass contingency areas of habitat potentially used for linear infrastructure construction.

Bathymetric mapping was undertaken on the lower Pinewood River in order to identify morphological and substrate features in areas of greater water depths. Using a Garmin GPSMAP 188 Sounder to record water depths, one continuous linear transect was completed, following the river's thalweg, from a point 300 metres (m) upstream of Highway 619 to a terminus of approximately 500 m downstream of the Highway 11 bridge crossing. Within this

section, high-resolution detailed bathymetry was collected at three locations and included transects collected in shore to shore fashion (perpendicular to the river) flow and spaced at approximately 20 m apart. The locations of bathymetric sampling are provided in Figure 2-3B with further detail provided in Section 3.0.

During field investigations topographic maps, orthophotographs, a handheld global positioning system and rangefinder were used to reference location, orientation and measure distances. Photographic records were collected from each sampling location.

Habitat assessment data collected at representative reaches and ponded areas within the Pinewood River and its tributaries were used to classify habitat types available and delineate their availability throughout the study area. Habitats types were classified using a number of criteria which included the following:

- Watercourse or water body: is the water feature linear and channelized (characterized by fluvial processes) or is it a ponded feature created by natural flow regimes or through beaver activity;

- Permanent (perennial), intermittent or ephemeral: as defined by the Ministry of Natural Resources (MNR) Lakes *& Rivers Improvement Act Technical Guidelines* (2004) and the MTO *Environmental Guide for Fish and Fish Habitat* (2002):

    - Permanent: a stream which flow continuously for nine of more consecutive months per year under average annual precipitation conditions. A permanent creek or stream must have a channel defined bed and banks of permanent nature.

    - Intermittent: river, creek or stream defined as one which flow for fewer than nine consecutive months per year when it receives a seasonal increase in surface water inputs. At low flow there may be dry segments alternating with flowing segments.

    - Ephemeral: a stream that flows for short periods of time in the spring or in response to runoff events, but not in sufficient duration to create a defined channel (e.g. field swale, gully, inundated hummock).

- Morphology: ranges in the gradient, bankfull widths and depths as well as the occurrence of riffle/run/flat/pool complexes in representative reaches were investigated;

- Land use / dominant riparian features: changes to habitat type were inferred based on the adjacent land use and riparian zone function with forested, graminoid / sedge floodplain and agricultural categories considered to provide different levels of riparian function from the perspective of thermal regulation, bank stability and filtration potential;

- Substrate composition: the percent occurrence within a reach or ponded area of representative particles size (i.e. silt/clay, sand, gravel, cobble, boulder, bedrock); and

- Instream and overhead cover: the availability of cover provided within the water column, as well as from shore, for fish species to carry out life functions including predator avoidance. The type of instream cover was also considered (i.e. vegetation, woody debris, rock etc.).

Representative habitat survey data in combination with detailed satellite imagery were used to delineate the expected occurrence of classified habitat types within watersheds located within the RRGP study area.

2.5 Benthic Invertebrate Community

The benthic invertebrate community was sampled at fourteen locations on the Pinewood River, two locations on McCallum Creek, one location on Tait Creek, one location on Unnamed Tributary 2, five locations on Loslo Creek, one location on Unnamed Tributary 5, two locations on West Creek Tributary 1, one location on Clark Creek and two locations on Sturgeon Creek. Benthic invertebrates were collected between August 28 and September 6, 2012 and September 19 and 25, 2012. Benthic sampling locations are presented in Figures 2-2A, 2-2B and 2-2C. All samples were collected using a Petite Ponar grab sampler, which sampled an approximate area of 0.02 square metres (m^2) per grab. Three replicate subsamples were collected and pooled (homogenized) at each replicate station to increase the representation of the benthic invertebrate community by reducing intra-sample variation inherent to benthic communities. All samples were preserved in 10% formalin.

Benthic invertebrate communities at each sample location were characterized using a series of descriptor indices including: total invertebrate density, Simpson's index of diversity, evenness and taxon richness. These indices were calculated and summarized using the guidelines for Environmental Effects Monitoring as stipulated by Environment Canada (2002). Percent Ephemeroptera, Plecoptera, Trichoptera (EPT; i.e., mayflies, stoneflies, caddisflies) and percent Chironomids were also used as descriptors of the benthic invertebrate communities sampled as they are recognized as useful indices for characterization and comparison of benthic invertebrate communities.

Total invertebrate density (TID) was calculated for each replicate station as the total number of individuals per square metre.

Simpson's Index of Diversity (I-D) is a descriptor of both the abundance patterns and taxonomic richness of the community. Simpson's Index of Diversity can range from 0 to 1 and reaches its greatest indication of diversity at a value of 1.

Simpson's Evenness (E) is similar to Simpson's Index of Diversity, but is a measure of how the abundance of individuals is distributed within the taxonomic groups inhabiting the sample location. Evenness ranges from 0 to 1 and reaches complete evenness at 1.

Taxon richness (Family Richness) is a count of the number of taxa found within an area. For this study richness was reported at the family level.

Percent EPT is the percentage of individual benthic invertebrates within a sample that belong to the orders Ephemeroptera, Plecoptera and Trichoptera. Increases in this metric may indicate improved water quality.

Percent Chironomids is the percentage of individual benthic invertebrates within a sample that belong to the family Chironomidae. Some genera of this family are more tolerant of pollution and their numbers tend to increase in degraded conditions.

2.6 Fisheries Resources

Fish community samples were collected between July 11 to 18, 2012, August 28 to September 6, 2012 and from September 18 to 26, under the MNR License to Collect Fish for Scientific Purposes No. 1068867. The following techniques were used to sample fish: gillnetting, minnow traps, seine netting, boat and backpack electroshocking, dip netting and angling effort. These techniques were deployed to provide a diverse range of passive and active methods to capturing both small-bodied and large bodied fish species in both pond and fluvial habitats. Sampling locations for each gear type are presented in Figures 2-4A, 2-4B and 2-4C.

In 2012 gillnets were primarily used in the lower reaches of the Pinewood River in areas with sufficient wetted widths and depths. Gillnets 15.2 m in length with a stretch mesh size ranging from 38.1 millimetres (mm) to 50.8 mm were set between 1 and 23 hours to capture large bodied fish species in selected habitats. Nets were typically set on the substrate between 1 and 4 m of depth. The gillnets were placed perpendicular to the channel flow for general community sampling. Gillnet Catch per Unit Effort (CPUE) is described in this report as the catch per 15 m standard gillnet set, calculated as:

CPUE = total catch / set period (hours)

Minnow traps were used for targeted passive effort for small-bodied fish. Traps were used at the majority of locations using a maximum of six baited minnow traps and set between 1 to 24 hours. Traps were generally set along creek banks or within 3 m of pond and river banks in depths between 0.5 to 1 m. The technique was used to target the forage fish community and coincided with dip netting effort. Minnow trap species specific CPUE is calculated as the number of fish per trap hour:

CPUE = total catch / number of traps set x sampling duration (hours)

Seine netting effort was conducted in areas of greater relative width and depth in both the Pinewood River and smaller tributaries, using a net 8 m in length with a depth of 1.5 m and ¼" mesh size. Each seine pull covered an average area of 110 m^2 providing presence / absence data as well as giving a quantitative estimate of abundance. CPUE is calculated as the number of fish per seine pull.

CPUE = total catch per seine pull

Backpack electroshocking was conducted by a provincially accredited crew leader using a Smith-Root Inc. Model LR-24 backpack electroshocker with a second crew member using a dip net. In general, the backpack electroshocker was set to 450 volts, 60 hertz with a 2% duty cycle. Habitats considered suitable for electroshocking ranged from: wadeable sections of creeks and rivers, to bank margins of deeper sections with variable substrates. All sites electroshocked were sampled using a sweeping motion concentrating on equal effort in different habitats.

Boat electroshocking was conducted in the lower reaches of the Pinewood River from September 18 to 24, 2012 using a 2.5 GGP Smith-Root Electrofisher, operated from a zodiac with one netter. A pulsing current was passed through the water at a voltage ranging from 50 to 1,000 volts. The electric current was expected to penetrate the water column up to 1.5 m. Fish were netted and placed live into a holding tank.

Electroshocking CPUE is presented as the total catch of individuals per electrosecond. As instances of this ratio may be considerably less than one, CPUE is presented as the total number of individuals captured per electrosecond multiplied by a factor of 1000.

CPUE = total catch / electroseconds x 1000

Dip netting was conducted at several locations as a means of investigating presence / absence and relative abundance of small-bodied species. Dip netting was typically conducted by slowly walking upstream along the margins so as to not disturb substrates in the path of observation. CPUE is calculated as the number of fish per dip.

CPUE = total catch / dips

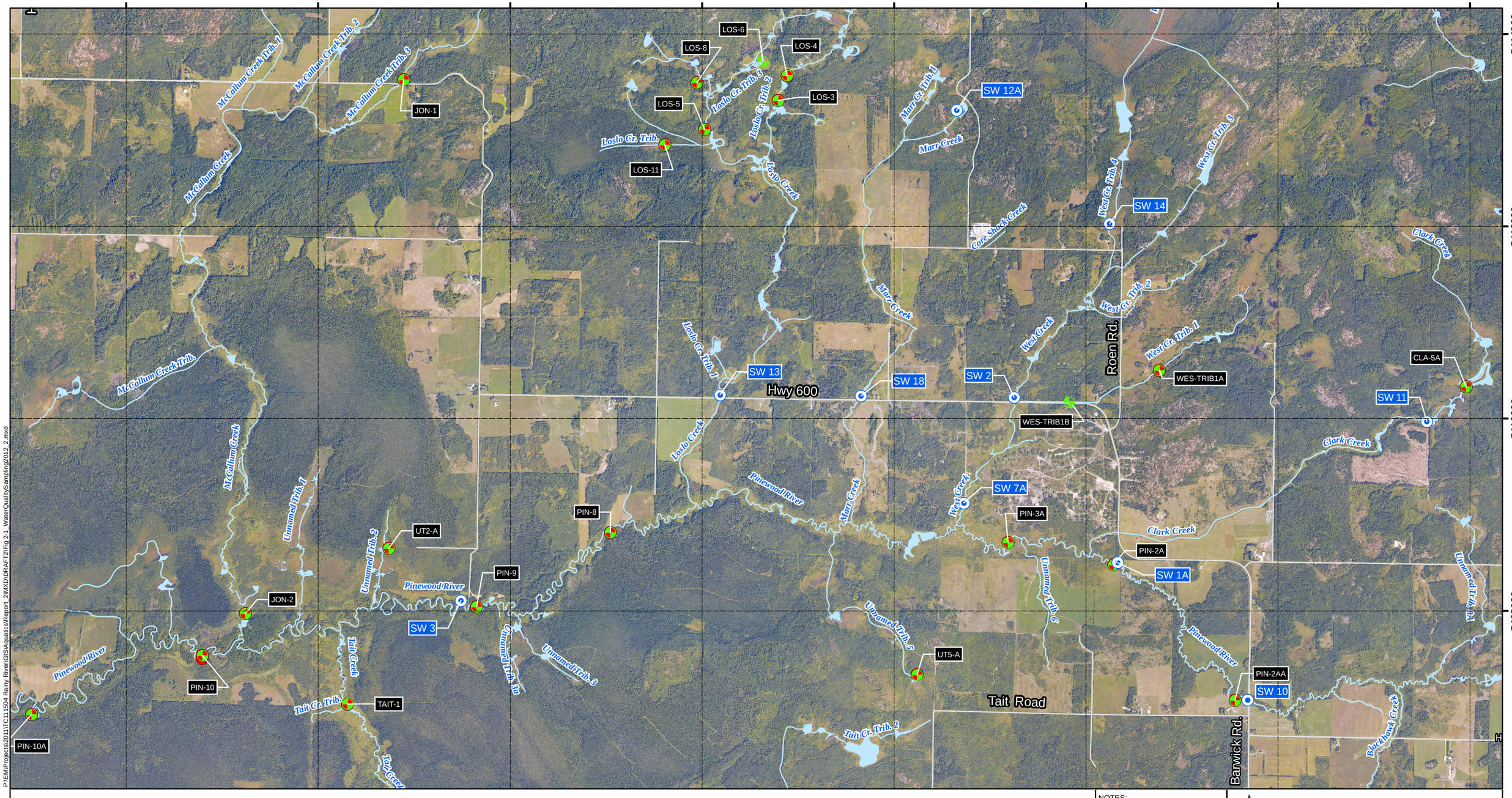
Angling was utilized in the fall of 2012 to capture adult fish in the Lower Pinewood River where conditions were not favourable to conventional sampling gear described above. Anglers used spinning rod equipment with spoons, spinners and jig heads. Each lure had a treble hook (three points) and jig heads had only one hook. Fishing effort was determined as the catch per rod per hour (rod hour). Angling effort took place in the thalweg and in a deep hole (5.1 m) in the reach at location PIN-17.

CPUE = total catch / total rod hours

2.7 Fish Biosample Collection

All fish captured were identified to species by qualified fisheries staff, were measured for length, weight and were scrutinized for any obvious parasites or lesions. Forage fish were returned unharmed to the location of capture except for a small number of individuals retained for species specific composite samples for analysis of total mercury and metals in forage fish. Adult Northern Pike (*Esox lucius*) and Walleye (*Sander vitreus)* captured during the field program were sacrificed, identified for sex and sampled for dorsal muscle tissue, liver tissue and calcified aging structures (scales, spines, cleithra, otoliths and fin rays as applicable to species). Calcified structure collection was consistent with the instruction of Collection Techniques for Fish Aging Structures, Northwest Region (MNR 2004). Calcified structures were analyzed for age by John Tost, North Shore Environmental Services.

Tissue samples were stored in individually labelled whorl packs and kept frozen for storage and during shipment for analysis of total mercury and metal body burdens by Maxxam Analytics laboratory in Mississauga, Ontario (possessing accreditation from the Standards Council of Canada).



P:\EM\Projects\2011\TC111504 Rainy River\GIS\Aquatics\Report 2\MXD\DRAFT2\Fig 2-1- WaterQualitySampling2012_2.mxd

LEGEND

- In-Situ Water Quality Sampling Location
- Grab Sample Location
- In-Situ Water Quality and Grab Sample Location
- RRR Monthly Surface Water Quality Stations
- Road
- Watercourse
- Waterbody

0 1.5 3 6 9 Kilometres

NOTES:
-Road and watercourse data extracted from Land Information Ontario (MNR).
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

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RAINY RIVER GOLD PROJECT

Water Quality Sampling Locations 2012

PROJECT N^{o}: TC111504	**FIGURE: 2-1A**
SCALE: 1:38,000	DATE: March 2013

398000 400000 402000 404000 406000 408000 410000 412000 414000 416000 418000

5406000 5404000 5402000 5400000 5398000 5396000

PIN-10 TAIT-1 Tait Ck Trib Tait Creek PIN-10A PIN-11 Pinewood River Tait Ck Trib 1

Kinkhaboo Creek Brown Road PIN-13 PIN-12 Kinkhaboo Creek PIN-14 Schram Road Highway 61 Graham Road Pinewood River Mosher Road

Bantry Creek

Morley Pattullo Road West Worthington Dilke Road BackBay-1 PW-23 PIN-15 Johnston Road Smith Road Elstad Road Morley Pattullo Road East

BackBay-2 BackBay-3 Pinewood River PIN-16 PIN-17 SW 15 Advent Road Weir Road

PIN-18 Morley Dilke Road

Cemetery Creek Rainy River

P:\EM\Projects\2011\TC111504 Rainy River\GIS\Aquatics\Report_2\MXD\DRAFT2\Fig 2-1_WaterQualitySampling2012_2.mxd

LEGEND

- In-Situ Water Quality Sampling Location
- Grab Sample Location
- In-Situ Water Quality and Grab Sample Location
- RRR Monthly Surface Water Quality Stations
- Road
- Watercourse
- Waterbody

0 2.5 5 10 15 Kilometres

NOTES:
-Road and watercourse data extracted from Land Information Ontario (MNR).
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

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Water Quality Sampling Locations 2012

PROJECT N^{o}: TC111504 | **FIGURE: 2-1B**

SCALE: 1:54,000 | DATE: March 2013

416000 418000 420000 422000 424000 426000 428000 430000 432000 434000 436000 438000 440000

5400000 5398000 5396000 5394000 5392000 5390000 5388000

Elstad Road
Morley Pattullo Road East
Weir Road
Ball Road
Sharp Road
Development Road
Woolsey Road
Barwick Road
Vanheyst Road
Taylor Road
STU-5
Mcculloch Road
STU-6
Steiner Road
Hele Road
Hayes Road
Cates Road
Mather Road
Off Lake Road
Hunsperger Road
Anderson Road
Shaw Road
Highway 11
Rainy River
Camelot Creek
Stellboy Creek
Mud Creek
Manitou Creek

P:\EM\Projects\2011\TC111504 Rainy River\GIS\Aquatics\Report - 2\MXD\DRAFT2\Fig 2-1_WaterQualitySampling2012_2.mxd

LEGEND

- In-Situ Water Quality Sampling Location
- Grab Sample Location
- In-Situ Water Quality and Grab Sample Location
- RRR Monthly Surface Water Quality Stations
- Road
- Watercourse
- Waterbody

0 2.5 5 10 15 Kilometres

NOTES:
-Road and watercourse data extracted from Land Information Ontario (MNR).
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

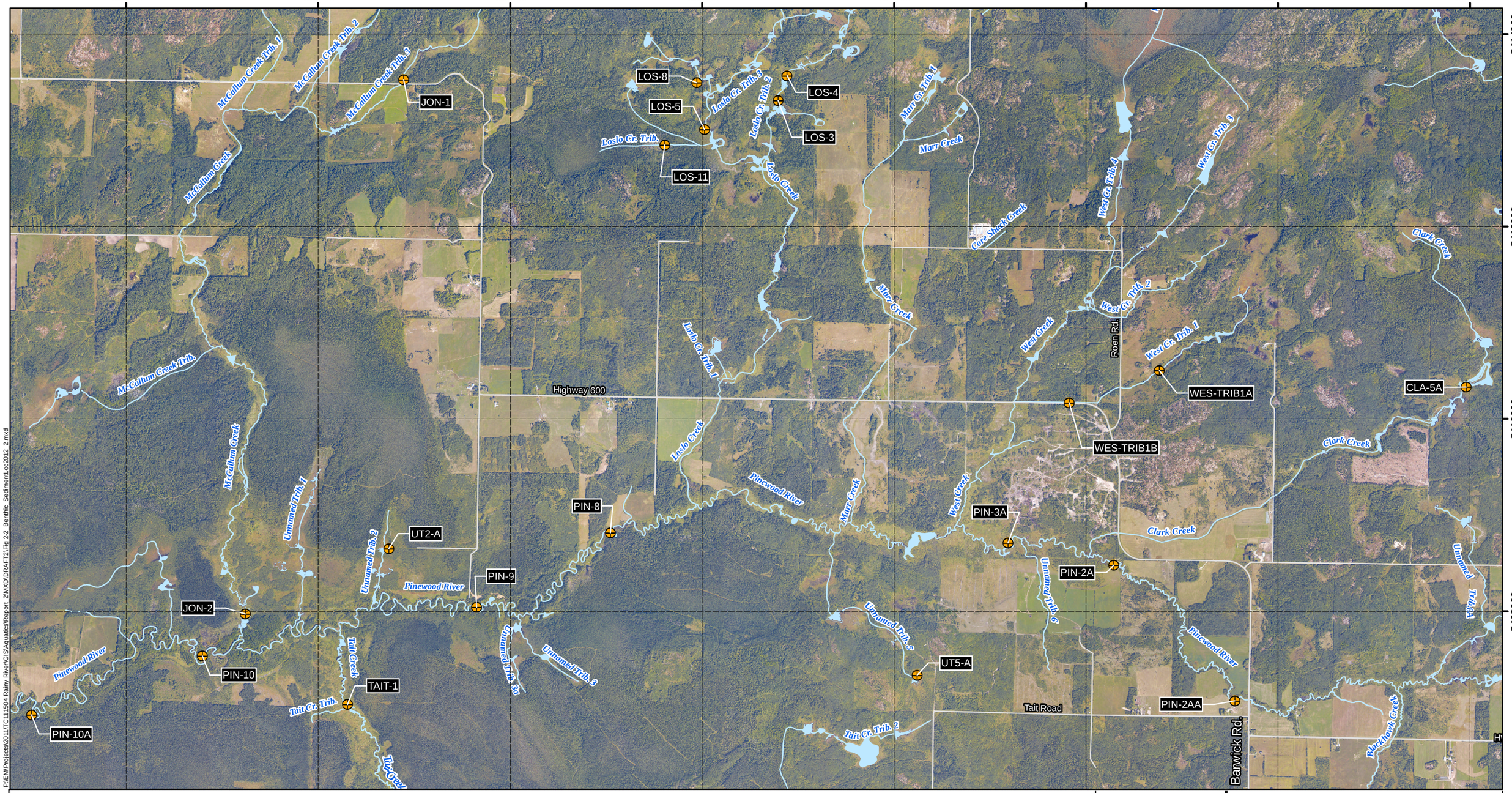
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RAINY RIVER GOLD PROJECT

Water Quality Sampling Locations 2012

PROJECT N^{o}: TC111504	**FIGURE: 2-1C**
SCALE: 1:60,000	DATE: March 2013



P:\EM\Projects\2011\TC111504 Rainy River\GIS\Aquatics\Report_2\MXD\DRAFT2\Fig 2-2 Benthic_SedimentLoc2012_2.mxd

LEGEND

- Benthic Invertebrate and Sediment Sampling Location
- Road
- Watercourse
- Waterbody

0 1.5 3 6 9 Kilometres

NOTES:
-Road and watercourse data extracted from Land Information Ontario (MNR).
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

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Benthic Invertebrate and Sediment Quality Sampling Locations 2012

PROJECT N^{o}: TC111504	**FIGURE: 2-2A**
SCALE: 1:38,000	DATE: March 2013

398000 400000 402000 404000 406000 408000 410000 412000 414000 416000 418000

5406000 5404000 5402000 5400000 5398000 5396000

PIN-10A
TAIT-1
PIN-11
PIN-12
PIN-14
PIN-15
PIN-16
PIN-17
PIN-18

Kishkakwesh Creek
Rinewood River
Tait Ck. Trib.
Tait Creek
Tait Ck. Trib. 1
Highway 619
Brown Road
Schram Road
Graham Road
Highway 617
Mosher Road
Morley Pattullo Road West
Morley Pattullo Road East
Elstad Road
Johnston Road
Smith Road
Advent Road
Weir Road
Sharp Road
Worthington Dilke Road
Morley Dilke Road
Highway 11
Pipewood River
Bunting Creek
Rainy River
Conchy Creek

P:\EM\Projects\2011\TC111504 Rainy River\GIS\Aquatics\Report_2\MXD\DRAFT2\Fig 2-2_Benthic_SedimentLoc2012_2.mxd

LEGEND

- Benthic Invertebrate and Sediment Sampling Location
- Road
- Watercourse
- Waterbody

NOTES:
-Road and watercourse data extracted from Land Information Ontario (MNR).
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

0 2.25 4.5 9 13.5 Kilometres

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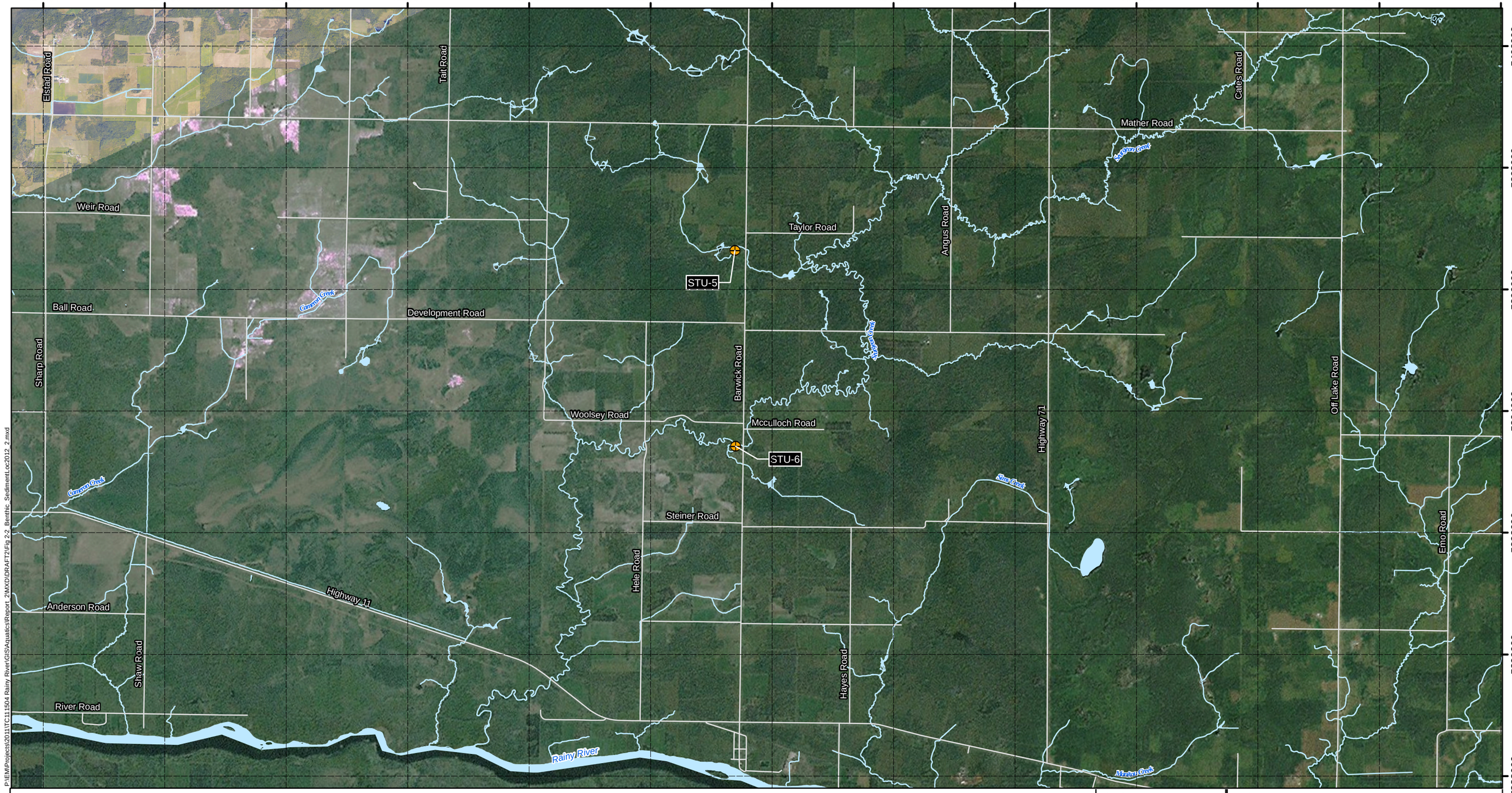
amec

RAINY RIVER GOLD PROJECT

Benthic Invertebrate and Sediment Quality Sampling Locations 2012

PROJECT N^{o}: TC111504 | **FIGURE: 2-2B**

SCALE: 1:54,000 | DATE: March 2013



LEGEND

- Benthic Invertebrate and Sediment Sampling Location
- Road
- Watercourse
- Waterbody

NOTES:
-Road and watercourse data extracted from Land Information Ontario (MNR).
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

0 2.5 5 10 15 Kilometres

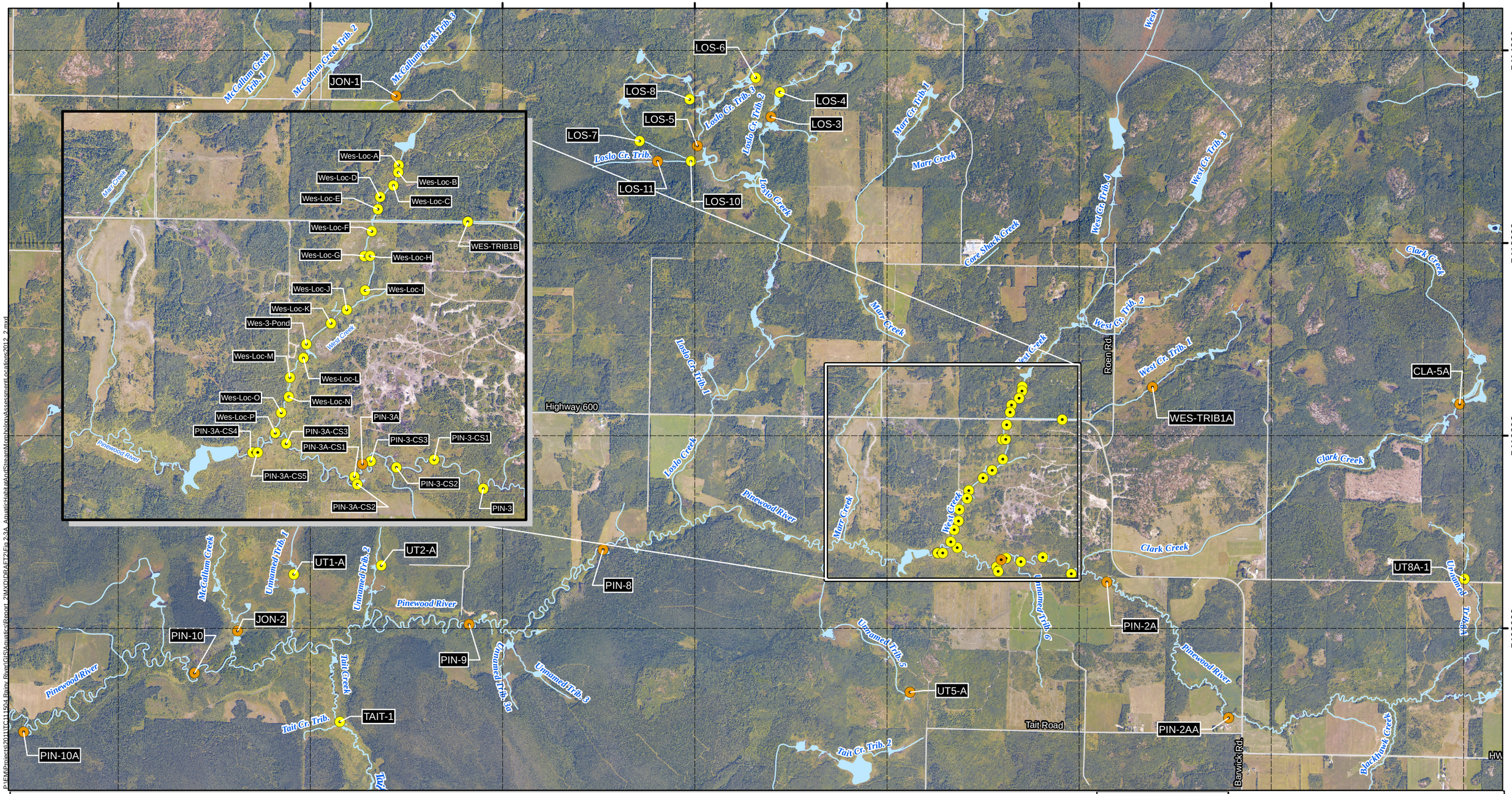
RAINY RIVER

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RAINY RIVER GOLD PROJECT

Benthic Invertebrate and Sediment Quality Sampling Locations 2012

PROJECT N^{o}: TC111504	**FIGURE: 2-2C**
SCALE: 1:60,000	DATE: March 2013



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LEGEND

- Bathymetric Survey Area
- Road
- Watercourse
- Waterbody

Habitat and Bathymetry Sampling Location

- Channel Cross-Section Morphological Assessment Location
- Comprehensive Habitat Assessment Location

NOTES:
-Road and watercourse data extracted from Land Information Ontario (MNR).
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

0 1.5 3 6 9 Kilometres

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Aquatic Habitat and Stream Morphology Assessment Locations 2012

PROJECT N^{o}: TC111504 | **FIGURE: 2-3A**

SCALE: 1:38,000 | DATE: March 2013

398000 400000 402000 404000 406000 408000 410000 412000 414000 416000 418000

5406000 5404000 5402000 5400000 5398000 5396000

HWY 619 HWY 617

Kishkakwesh Creek Rinewood River Tait Ck. Trib. Tait Creek Tait Ck. Trib. 1

Brown Rd. Schram Rd. Mosher Rd. Graham Rd. Morley Dilke Rd. Morley Pattullo Rd. W Smith Rd. Johnston Rd. Advent Rd. Weir Rd. Elstad Road

PIN-10A TAIT-1 PIN-11 PIN-12 PIN-13 PIN-14 PIN-15 PIN-16 PW-23 PIN-17 PIN-18

Worthington Dilke Rd. Bunting Creek Pipewood River Rainy River Comedy Creek

P:\EM\Projects\2011\TC111504 Rainy River\GIS\Aquatics\Report_2\MXD\DRAFT2\Fig 2-3_AquaticHabitatAndStreamMorphologyAssessmentLocations2012_2.mxd

LEGEND

- Bathymetric Survey Area
- Road
- Watercourse
- Waterbody

Habitat and Bathymetry Sampling Location

- Channel Cross-Section Morphological Assessment Location
- Comprehensive Habitat Assessment Location

NOTES:
-Road and watercourse data extracted from Land Information Ontario (MNR).
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

0 2.5 5 10 15 Kilometres

N W E S

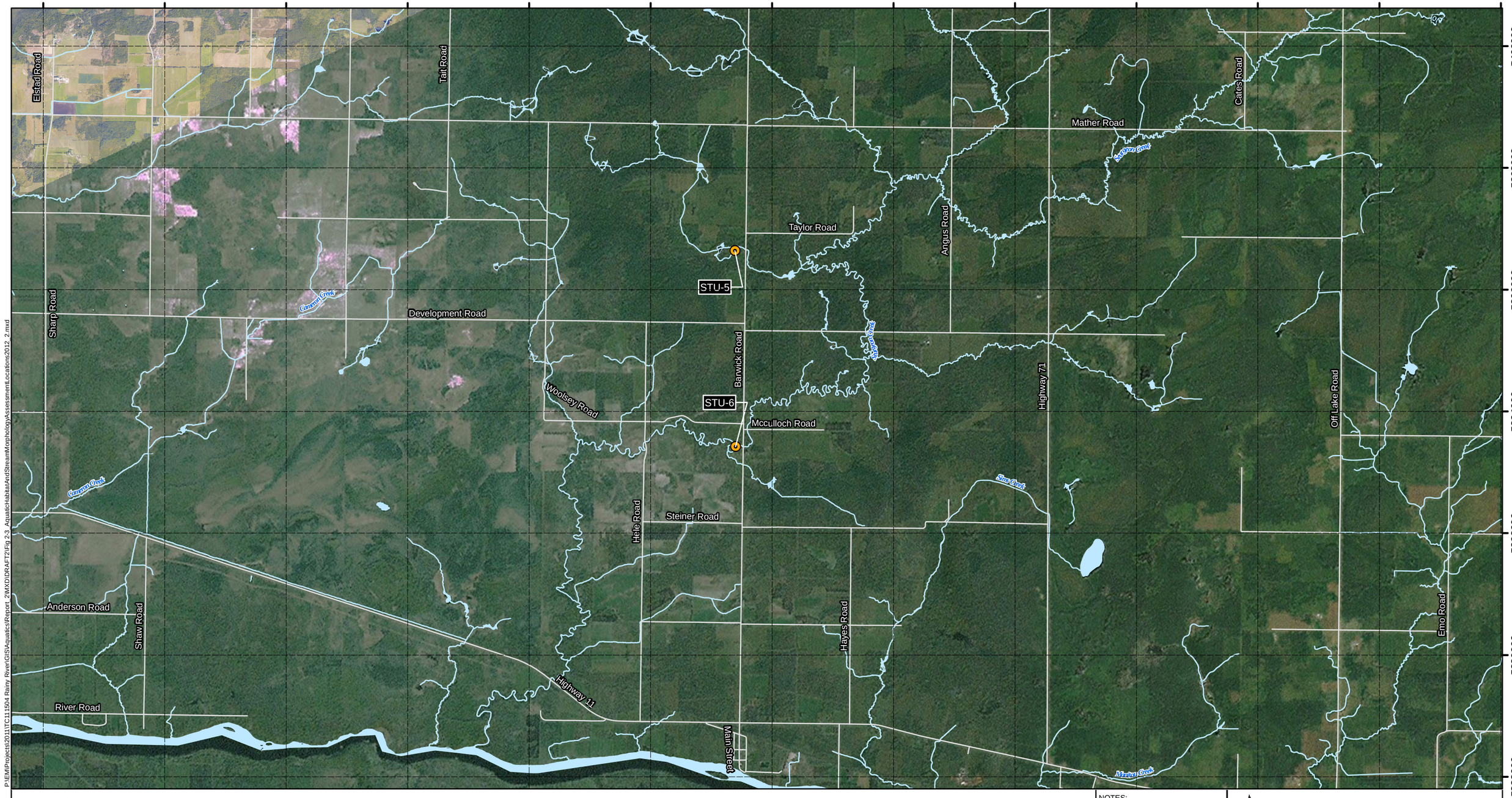
RAINY RIVER amec

RAINY RIVER GOLD PROJECT

Aquatic Habitat and Stream Morphology Assessment Locations 2012

PROJECT N°: TC111504 | **FIGURE: 2-3B**

SCALE: 1:54,000 | DATE: March 2013



P:\EM\Projects\2011\TC111504 Rainy River\GIS\Aquatics\Report 2\MXD\DRAFT2\Fig 2-3 AquaticHabitatAndStreamMorphologyAssessmentLocations2012_2.mxd

LEGEND

- Bathymetric Survey Area
- Road
- Watercourse
- Waterbody

Habitat and Bathymetry Sampling Location

- Channel Cross-Section Morphological Assessment Location
- Comprehensive Habitat Assessment Location

NOTES:
-Road and watercourse data extracted from Land Information Ontario (MNR).
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

0 2.5 5 10 15 Kilometres

N W E S

RAINY RIVER

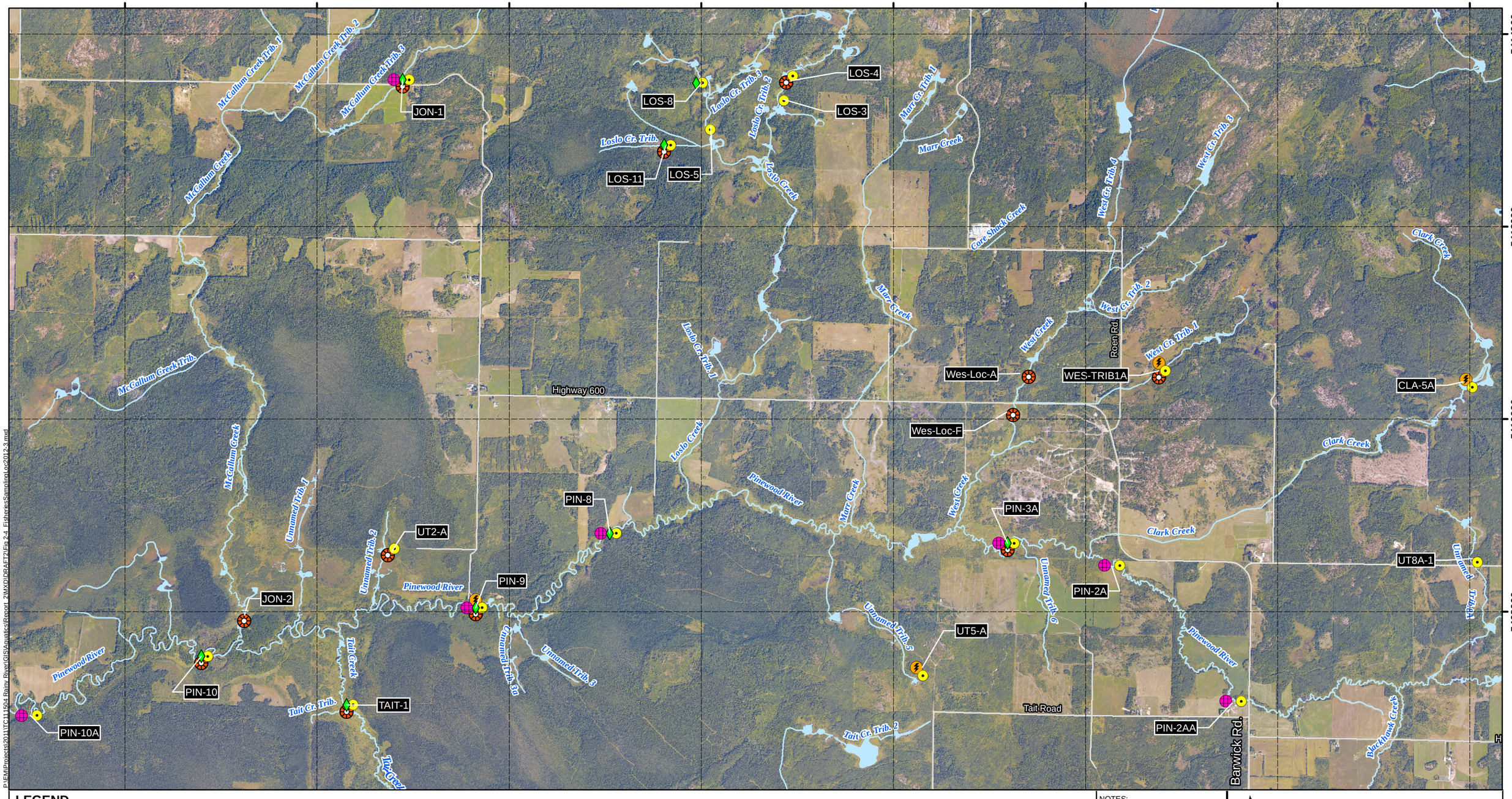
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RAINY RIVER GOLD PROJECT

Aquatic Habitat and Stream Morphology Assessment Locations 2012

PROJECT N^{o}: TC111504 | **FIGURE: 2-3C**

SCALE: 1:60,000 | DATE: March 2013



LEGEND

Gear Type

- Angling
- Seine Net
- Minnow Trap
- Gill Net
- Dip Net
- Backpack Electroshocking
- Boat Electroshocking

- Road
- Watercourse
- Waterbody

NOTES:
-Road and watercourse data extracted from Land Information Ontario (MNR).
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

0 1.5 3 6 9 Kilometres

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Fish Community Survey Locations 2012

PROJECT N^{o}: TC111504	**FIGURE: 2-4A**
SCALE: 1:38,000	DATE: March 2013

398000 400000 402000 404000 406000 408000 410000 412000 414000 416000 418000

5406000 5404000 5402000 5400000 5398000 5396000

PIN-10A
TAIT-1
PIN-11
PIN-12
PIN-14
PIN-15
PW-24
PW-23
PIN-16
PIN-17
PIN-18

Pinewood River
Kishkakosh Creek
Burling Creek
Tait Ck. Trib.
Tait Creek
Tait Ck. Trib 4
Comedy Creek
Rainy River

Highway 619
Brown Road
Schram Road
Highway 617
Graham Road
Mosher Road
Morley Pattullo Road West
Morley Pattullo Road East
Elstad Road
Johnston Road
Smith Road
Sharp Road
Advent Road
Weir Road
Morley Dilke Road
Worthington Dilke Road
Highway 11

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LEGEND

Gear Type

- Angling
- Seine Net
- Minnow Trap
- Gill Net
- Dip Net
- Backpack Electroshocking
- Boat Electroshocking

- Road
- Watercourse
- Waterbody

NOTES:
-Road and watercourse data extracted from Land Information Ontario (MNR).
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

0 2.5 5 10 15 Kilometres

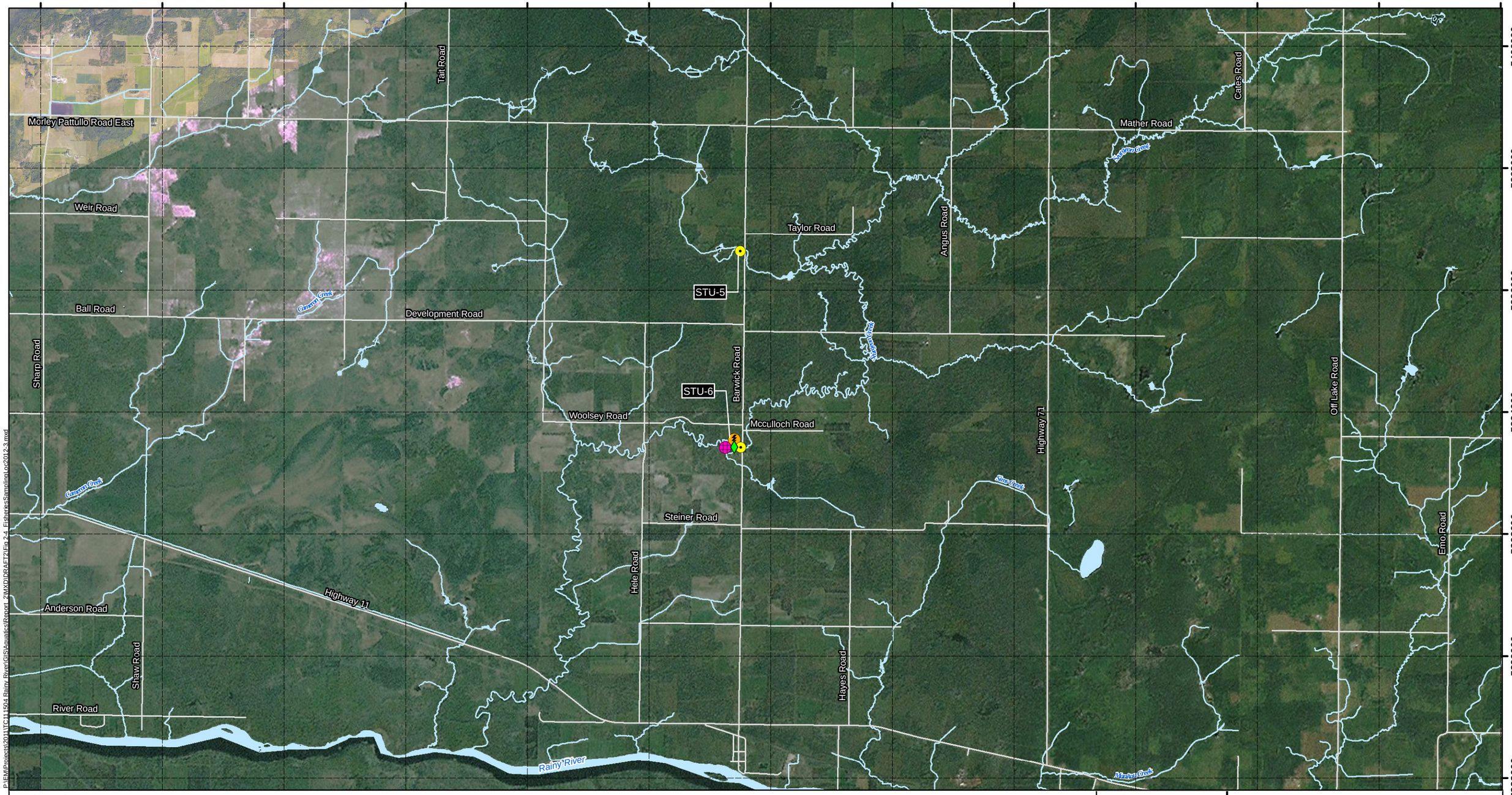
RAINY RIVER amec

RAINY RIVER GOLD PROJECT

Fish Community Survey Locations 2012

PROJECT N^{o}: TC111504 | **FIGURE: 2-4B**

SCALE: 1:54,000 | DATE: March 2013



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LEGEND

Gear Type

- Angling
- Seine Net
- Minnow Trap
- Gill Net
- Dip Net
- Backpack Electroshocking
- Boat Electroshocking
- Road
- Watercourse
- Waterbody

NOTES:
-Road and watercourse data extracted from Land Information Ontario (MNR).
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

0 2.5 5 10 15 Kilometres

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RAINY RIVER GOLD PROJECT

Fish Community Survey Locations 2012

PROJECT N^{O}: TC111504 | **FIGURE: 2-4C**

SCALE: 1:60,000 | DATE: March 2013

3.0 RESULTS

3.1 Habitat Type Classification

As described in Section 2.3, several habitat based criteria were used to classify lengths of watercourses (reaches) and ponded areas of watercourses within the study area into discrete categories or "habitat types". Table 3-1 provides a summary of both qualitative and quantitative criteria used to delineate habitat types. These habitat types are useful from a broad scale perspective to represent available aquatic habitat. The categorization of reaches and sections of the watersheds in the study area does not negate the importance of small-scale microhabitats on aquatic resources. The location and distribution of habitat types are presented in Figures 3-1A to 3-1K. A representative illustration of a channel cross section along with photographs is provided for each habitat type in Appendix A. Additional photographs of representative habitat sampling locations are shown in Appendix B. A site specific presentation of aquatic habitat data collected during 2012 field surveys is provided in Appendix C.

Overall, nine habitat types were classified and their presence was delineated throughout the study area. Based on the classification criteria, habitat types were most consistently associated with specific areas of the Pinewood River (either upper or lower as generally defined as upstream or downstream of PIN-13 for the purposes of this report) and its tributaries.

Habitat types 1 and 2 were most consistently associated with the upper Pinewood River. These two types primarily consisted of a relatively deep and wide channel mostly comprised of flat morphology with some pools. Generally these habitat types were characterized by relatively narrow flood prone widths and a variable composition of riparian vegetation. Although both habitat types 1 and 2 showed some similarity with regard to channel dimension, substrate and cover availability, Type 1 was characterized as having a narrower floodplain with moderate entrenchment and forested riparian vegetation extending close to the channel edge. Type 1 aquatic vegetation was dominated by Richardson's Pondweed *(Potamogeton richardsonii)* and Coontail *(Ceratophyllum demersum).*

Habitat type 2 was characterized by a slightly wider floodplain (maximum 50 m) dominated by sedge, Alder and Willow, with mixed forest available within the valley at a greater distance from the channel margins. Aquatic vegetation in Type 2 was dominated by Yellow Pond-lily *(Nuphar luteum),* Broad-leaved Arrowhead *(Sagittaria latifolia),* Tapegrass *(Vallisneria spirallis)* and Coontail. Substrate throughout both habitat types was relatively uniform and dominated by silt/muck, sand, clay and detritus mixed with some presence of larger substrate particles (gravel, boulder). Mixed forest species associated with both habitat types were Black Spruce *(Picea mariana)*, Tamarack *(Larix laricina),* Balsam Poplar *(Populus balsamifera),* American Elm *(Ulmus Americana)* and White Birch *(Betula papyrifera).*

Habitat types 3, 4 and 5 generally characterized the smaller tributaries to the Pinewood River including McCallum Creek, Unnamed Tributary 1, Tait Creek, Unnamed Tributary 2, Loslo

Creek, Unnamed Tributary 5, West Creek, Clark Creek, Unnamed Tributary 8A and a watershed not associated with the Pinewood River; Sturgeon Creek. Type 3 habitat characterized areas of braided diffuse channels with wide and dense grass/sedge dominated floodplains and was often observed in areas directly downstream of beaver dams. A low width to depth ratio was associated with creek reaches of this type.

Type 4 characterized relatively shallow and narrow single channel reaches and was typically observed in the headwater areas of creeks. Type 4 also included intermittent reaches of tributaries which were transitional to more defined creek channel morphology further downstream. This habitat type had no riffle/run complexes associated with it and was dominated by flat morphology. Woody debris and submerged aquatic vegetation provided a high percentage of in-stream cover for forage-fish species.

Habitat type 5 specifically classified natural ponded habitats, primarily beaver ponds, found abundantly scattered throughout the study area and associated with wide floodplains dominated by graminoid species. Beaver activity further decreases the flow rate throughout the study area watercourses and specifically in the tributaries of the Pinewood River. As such, Type 5 beaver ponds are directly associated with Types 3 habitat which characterizes the shallow and narrow braided/diffuse channels that are linked to the upstream and downstream reaches adjacent to the Type 5 beaver ponds. This association between Types 3 and 5 re-occurs in many locations across the study area. Substrate throughout Types 3, 4 and 5 remained relatively consistent, comprised of silt/muck, sand, clay and detritus mixed, with a higher degree of organics found in the Type 5 beaver ponds. Aquatic vegetation within these habitat types consisted primarily of Broad-leaf Arrowhead, Yellow Pond-lily, Coontail, Richardson's Pondweed and Duckweed *(Lemna minor).* All of these habitat types were associated with large floodplains, dominated by grass and sedge, with Alder and Willow interspersed throughout the flood prone width. Upper riparian areas were typically dominated by Black Spruce.

Habitat types 6 and 7 were characteristic of the lower Pinewood River from downstream of PIN-13 to the confluence with the Rainy River. As the Pinewood River approaches the Rainy River, the channel widths and depths are significantly increased in comparison to the upper reaches of the river. Type 6 and 7 characterize the majority of the lower Pinewood, consisting of larger bankfull widths and depths and a greater degree of entrenchment. These habitat types also had a considerable difference in available substrate from the upper Pinewood River habitat types, providing more areas having a greater proportion of cobble, gravel and boulder.

The criteria which separated these types were an increase in bankfull width and bankfull depth within habitat type 7 in comparison to type 6. Habitat type 7 included areas of the Pinewood River providing bankfull widths of up to 50 m and maximum bankfull depths of 4.5 m and likely provides the greatest potential for overwintering opportunities. Upper riparian zones of both habitat types were comprised of mixed forest containing Black Spruce, Tamarack, Balsam Poplar, White Birch and American Elm.

Types 8 and 9 were specific to specialized habitat areas found in the lower Pinewood River. Type 8 includes localized natural semi-offline back-bays connected at various locations to the lower Pinewood. These back-bays were shallow (0.15 to 0.85 m) and wide (up to 150 m) flooded depressions that exhibit signs of frequent inundations and varying water level fluctuations. These areas were dominated by grass and sedge riparian vegetation. They were typically connected to the Pinewood River by defined channels with narrow widths and shallow depths. These channels provide the only means of access to and from the mainstem Pinewood River outside of periods of increased water levels and inundation. Habitat type 8 had an abundance of aquatic vegetation including Horsetail (*Equisetum* spp.), Tapegrass, Water Milfoil, Broad-leaved Arrowhead, Yellow Pond-lily, Richardson's Pondweed and Duckweed. This habitat type was considered important from the context of spawning and nursery habitat for a number of species, but specifically for Northern Pike.

Habitat type 9 is specific to sections within the Pinewood River that may be considered high potential spawning habitat for species with a preference for larger particle sizes concentrated in an area of increased flow, such as Walleye. Specifically habitat type 9 consisted of sections of the Pinewood River which provided bars and outcroppings dominated by gravel, cobble, boulder and bedrock (e.g. PW-23; Photo 25, Appendix B). These substrates were also associated with expected riffle and run complex morphology during periods of higher flow.

3.2 Pinewood River System

3.2.1 Water Quality

Water quality samples were collected from fourteen locations along the Pinewood River in 2012 (PIN-2A, PIN-2AA, PIN-3A, PIN-8, PIN-9, PIN-10, PIN-10A, PIN-11, PIN-12, PIN-14, PIN-15, PIN-16, PIN-17 and PIN-18; Figure 2-1A and Figure 2-1B). Analytical results for general chemistry and metals are presented in Table 3-2 and field collected water quality parameters are provided in Table 3-3. Certificates of Analysis are provided in Appendix D.

General chemistry and total metal parameters were found to meet the provincial objective (PWQO) and federal guideline (CEQG) values with the following exceptions:

- Fluoride concentrations were above the CEQG (0.12 milligrams per litre (mg/L)) at two of fourteen sample locations (0.17 mg/L and 0.13 mg/L at PIN-3A and PIN-9, respectively). Fluoride concentrations in the remaining samples ranged from 0.04 micrograms per litre (µg/L) to 0.11 µg/L. There is no PWQO value for fluoride.

- The total aluminum concentration did not meet the CEQG (100 µg/L) at eight of the Pinewood River sample locations (PIN-9, PIN-10A, PIN-11, PIN-12, PIN-14, PIN-15, PIN-16, PIN-17). Concentrations at these locations ranged from 110 µg/L (PIN-10A) to 1,800 µg/L (PIN-14), with the remaining locations having concentrations between 6 µg/L and 95 µg/L. Samples with elevated total aluminum were also characterized by having

elevated levels of Total Suspended Solids. However, all Pinewood River samples met the interim PWQO value for aluminum (75 µg/L, as measured in a clay-free (i.e., filtered) sample) as dissolved aluminum concentrations ranged from not detectable to 57 µg/L.

- Arsenic exceeded the CEQG and interim PWQO (both 5 µg/L) at two Pinewood River sampling locations (6.3 µg/L and 5.1 µg/L at PIN-9 and PIN-10A, respectively), with the remaining locations having concentrations between 0.4 µg/L and 4.8 µg/L. All samples were well below the established PWQO of 100 µg/L.

- Cobalt was above the PWQO (0.9 µg/L) at the PIN-11, PIN-14 and PIN-15 sample locations (1.5 µg/L, 1.6 µg/L and 1.0 µg/L, respectively), with the remaining locations having concentrations ranging from non-detectable to 0.8 µg/L. There is no CEQG value for cobalt.

- Copper was present above the CEQG (calculated value = 3.7 µg/L) at the PIN-14 sample location (4.1 µg/L), but was below the PWQO and interim PWQO (5.0 µg/L for both). In the remaining samples, copper ranged from less than the detection limit to 2.6 µg/L.

- Iron concentrations were above the PWQO and CEQG (both 300 µg/L) at all but three of the sampling locations along the Pinewood River (non detectable, 260 µg/L and 103 µg/L at PIN-3A, PIN-8 and PIN-18, respectively). Concentrations for those samples which were above objective criteria ranged from 315 µg/L (PIN-17) to 2,270 µg/L (PIN-14).

- The interim PWQO for phosphorus is 30 µg/L. Detected concentrations ranged from 17.1 µg/L (PIN-18) to 161 µg/L (PIN-14) within the Pinewood River demonstrating that levels are elevated above the interim PWQO. Laboratory detection limits above the interim PWQO for phosphorus for PIN-2A, PIN-3A, PIN-8 and PIN-10A produced non-detect results for these samples. These results are further discussed in Section 4.0.

- Vanadium was present above the interim PWQO of 6.0 µg/L at the PIN-14 sample location (6.3 µg/L), with the remaining samples having vanadium concentrations ranging from non-detectable to 3.3 µg/L.

Over the duration of the sampling period, water temperatures ranged from 8.4 degrees Celsius (°C) to 29.0°C between all sites. The highest temperature (29.0°C) was recorded at sample stations PIN-2A and PIN-10A on July 11 and July 13, 2012, respectively and the lowest temperature (8.4°C) was recorded at station PIN-12 on September 25, 2012.

Dissolved oxygen (DO) concentrations measured in-situ at the Pinewood River sampling locations (Table 3-3) ranged from 1.89 mg/L (PIN-2AA on September 4, 2012) to 10.80 mg/L

(Back Bay-1 on September 22, 2012). The upstream areas typically were near or above the PWQO for DO for warm water biota (5 mg/L where temperature is approximately 10-15°C and 4 mg/L where temperature is approximately 20-25°C), with the exception of PIN-2AA (1.89 mg/L). Many of the measured DO values from PIN-10 downstream, as well as Back Bays 2 and 3, were less than the PWQO. Other physico-chemical parameters measured including pH, conductivity, total dissolved solids and temperature indicated no limitation to aquatic habitat.

3.2.2 Sediment Quality

Sediment samples were collected from fourteen locations along the Pinewood River (PIN-2A, PIN-2AA, PIN-3A, PIN-8, PIN-9, PIN-10, PIN-10A, PIN-11, PIN-12, PIN-14, PIN-15, PIN-16, PIN-17 and PIN-18; Figure 2-2A and Figure 2-2B). Results of chemical and physical analyses are presented in Table 3-4 and Table 3-5, respectively. Sediment chemistry Certificates of Analysis are provided in Appendix E. Sediment grain size Certificates of Analysis are provided in Appendix F.

Inorganic and metal parameters met both provincial PSQG and federal CEQG guideline values, with the following exceptions:

- Total Organic Carbon (TOC) was above the PSQG LEL (1%) at all Pinewood River sampling locations, except at PIN-2A (0.72%), .but was below the PSQG SEL (10%) at all locations. There is no CEQG PEL for TOC.

- Total Kjeldahl Nitrogen (TKN) was below the PSQG SEL (4,800 micrograms per gram (µg/g)) at all Pinewood River sampling stations, but was above the PSQG LEL (550 µg/g) at all but two locations (PIN-14 and PIN-16), with concentrations ranging from 350 µg/g to 2,580 µg/g at these locations. There is no CEQG PEL for TKN.

- Arsenic was below the PSQG SEL (33 µg/g) at all Pinewood River sampling locations, but was above the PSQG LEL (6 µg/g) at sampling location PIN-14 (6.97 µg/g). All samples were below the CEQG PEL value for arsenic (17 µg/g).

- Chromium was below the PSQG SEL (110 µg/g) at all Pinewood River sampling locations, but was equal to or above the PSQG LEL (26 µg/g) at eight locations (PIN-2A, PIN-3A, PIN-8, PIN-10A, PIN-11, PIN-12, PIN-14, PIN-15) with concentrations ranging from 26.0 µg/g to 41.7 µg/g at these locations. All samples were below the CEQG PEL value for chromium (90 µg/g).

- Copper was below the PSQG SEL (110 µg/g) at all Pinewood River sampling locations, but was above the PSQG LEL (16 µg/g) at four locations (PIN-10A, PIN-12, PIN-14, PIN-15) with concentrations ranging from 17.8 µg/g to 23.5 µg/g at these locations. All samples were below the CEQG PEL value for copper (197 µg/g).

- Iron was below the PSQG SEL (40,000 µg/g) at all Pinewood River sampling locations, but was above the PSQG LEL (20,000 µg/g) at two Pinewood River sampling locations PIN-10A and PIN-15 with concentrations of 25,000 µg/g and 23,000 µg/g, respectively. There is no CEQG PEL for iron.

- Manganese was below the PSQG SEL (1,100 µg/g) at all Pinewood River sampling locations, but was above the PSQG LEL (460 µg/g) at four Pinewood River sampling locations (PIN-10A, PIN-12, PIN-14, PIN-15) with concentrations ranging from 469 µg/g to 613 µg/g at these locations. There is no CEQG PEL for manganese.

- Nickel was well below the PSQG SEL (75 µg/g) at all Pinewood River sampling locations, but was above the PSQG LEL (16 µg/g) at all but two Pinewood River sampling locations, PIN-2AA (12.1 µg/g) and PIN-16 (11.6 µg/g). Nickel concentrations at the other locations ranged from 16.7 µg/g to 33.3 µg/g. There is no CEQG PEL for nickel.

Sediment particle size was variable amongst the Pinewood River sample locations. The majority of sample locations were dominated by varying mixtures of coarse sand, fine sand and silt. PIN-2AA, PIN-15, PIN-17 and PIN-18 also contained a significant portion of gravel (greater than 10%) and PIN-12 and PIN-14 contained pebble/cobble as well as gravel.

3.2.3 Habitat Type Availability

Pinewood River habitat assessment locations are shown on Figure 2-3 and habitat type delineations are shown in Figure 3-1. Habitat type classification criteria are presented in Table 3-1 and a summary of key habitat characteristics for each sampling location is presented Appendix C. Representative habitat type cross-section illustrations are provided in Appendix A and a photographic record of locations surveyed for habitat is provided in Appendix B.

The Pinewood River watershed covers an approximate area of 461 square kilometres (km^2), originating at the outlet of Pinewood Lake, flowing westward for approximately 50 km before draining into the Rainy River. The Pinewood River receives drainage from creeks within the study area including, McCallum Creek, Unnamed Tributary 1, Tait Creek, Unnamed Tributary 2, Loslo Creek, Unnamed Tributary 5, West Creek, Clark Creek and Unnamed Tributary 8A. The Pinewood River watershed lies in an area of gently rolling glaciofluvial and lacustrine sedimentary deposits, with intermittent areas of bedrock outcrop. Surrounding land use within the Pinewood River watershed is primarily agricultural with some reaches of the river characterized by forested riparian areas.

Surveys conducted in 2012 demonstrated that the Pinewood River exhibits a wide range of habitat types throughout its length. Habitat sampling locations assessed, accounting for 6 different habitat types (Types 1, 2, 6, 7, 8 and 9). Type 1 (PIN-2AA, PIN-3, PIN-10, PIN-10A, PIN-11, PIN12 and PIN-13) typified a large portion of the upper to mid sections of the Pinewood

River, providing a relatively deep and wide channel, with bankfull widths ranging from 5 to 10 m and bankfull depth ranging from 0.25 m to 0.75 m. Type 1 was restricted to the upper to mid sections of the Pinewood River (upstream of PIN-13) to its mainstem headwaters east of the study area. This habitat type was associated with forested riparian zones, silt dominated substrates and a moderate amount of in-stream cover. Type 2 (PIN-2A, PIN-8 and PIN-9) was similar to Type 1 and also restricted to the upper Pinewood River, but generally had larger bankfull widths and depths and graminoid dominated floodplains containing hummocks throughout its margins.

Type 6 (e.g. PIN-15 and PIN-16) categorized a large portion of the mid-lower Pinewood River, downstream of PIN-14 to the bedrock outcrop at PW-23. The delineation between Types 1 and 2 in the upper Pinewood and Type 6 in the lower Pinewood was largely due to the increase in bankfull widths and depths, but also a significant shift in substrate composition. Type 6 substrate was primarily clay-based with an abundance of gravel, cobble and boulder beds interspersed throughout, which not typical of habitat types 1 and 2 and the upper sections of the Pinewood River. Habitat type 7 (e.g. PIN-17 and PIN-18) largely typified the lower Pinewood River from PW-23 to approximately 300 m upstream from its confluence with the Rainy River. In a downstream direction toward the mouth of the Pinewood River, bankfull widths increased significantly, ranging from 20 to 60 m and bankfull depths ranged from 1.0 – 4.5 m. Substrate in Type 7 included an abundance of gravel/cobble beds as well as isolated bedrock outcrops.

Type 8 (BackBay-1, BackBay-2, BackBay-3) classifies the semi-online floodplain depressions that are adjacent to the lower Pinewood River. Connected by a defined, yet narrow channel, these low-lying back bays are subject to frequent inundation and water level fluctuations based on the Pinewood River water levels. Bankfull depths ranged from 0.15 to 0.85 m, bankfull widths ranged from 30 to 150 m and substrate in the back-bays was comprised of silt/muck and clay. The riparian and floodplain vegetation was dominated by graminoids. During periods of inundation, these back-bay areas likely provide ideal spawning and nursery habitat for Northern Pike.

Type 9 (PW-23 and PW-24) identifies isolated areas along the Pinewood River that provide specific critical habitat for fish including spawning and nursery areas. These areas included observed gravel and cobble shoals, which may provide Walleye spawning habitat during periods of high flows, as well as significant natural features such as the large bedrock outcrop at PW-23. This location may present an impediment to natural fish passage during extreme low flow periods, (Appendix A, Appendix B; Photo: 25). The surveyed reach at PW-23 contained a large pool downstream of the bedrock, containing gravel and cobble shoals. This shallow wide pool provides ideal spawning or staging habitat downstream of the higher velocities created by the bedrock outcrop at higher flow scenarios. A number of similar boulder and cobble habitat opportunities were observed at a few other isolated locations throughout the lower Pinewood River and are shown in Figure 3-1.

3.2.4 Benthic Invertebrate Community

Benthic invertebrate community sampling locations on the Pinewood River are shown in Figure 2-2A and Figure 2-2B. The results of benthic invertebrate sampling are presented in Tables 3-6 and 3-7, with taxonomic enumeration data presented in Appendix G.

TID, expressed as number of individuals per square meter, was variable between sample locations, generally ranging from 72 to 4,652 individuals/m^2 with a mean of 1,480 individuals/m^2. The greatest densities were observed at PIN-9, PIN-17 and PIN-18 (2,986, 4,652 and 3,116 individuals/m^2, respectively) and the lowest densities were observed at upstream locations PIN-2AA, PIN-2A, PIN-3A and PIN-8 which all had TID values less than 500 individuals/m^2.

Simpson's diversity values were variable and ranged from 0.10 (PIN-16) to 0.74 (PIN-8), while evenness ranged from 0.15 (PIN-17) to 0.76 (PIN-3A and PIN-8). Family richness ranged from 2 families (PIN-14) to 19 families (PIN-17).

EPT taxa were not present in upstream samples PIN-2AA, PIN-2A, PIN-3A and PIN-8, as well as further downstream stations PIN-10A and PIN-14, but were present in the remaining sample locations, ranging from 1% (PIN-16) to a maximum of 12.6% at PIN-18. EPT taxa present within the Pinewood River included mayfly families: Baetidae, Caenidae, Ephemeridae and Heptageniidae. Caddisfly families present included: Leptoceridae, Dipseudopsidae, Hydroptilidae and Leptoceridae.

Chironomids were present at all sample locations except PIN-3A, ranging from 2.9% (PIN-9) to 95% (PIN-16), with a mean value of 51% and generally increased their proportion within the sampled invertebrate community in a downstream trend. Chironomids were present in a greater proportion than EPT at all sample locations on the Pinewood River except PIN-9 (5.8% EPT and 2.9% Chironomids), which was dominated by Hydrobiidae (mud snails, 54%) and Hyalellidae (amphipods, 17%).

With respect to overall community dominance, Chironomidae was the family in greatest proportion at PIN-2AA as well as every sample location downstream of PIN-10, with Chironomids making up 51% to 95% of the benthic invertebrate community. PIN-8 and PIN-9 were dominated by Hydrobiidae (37%, 54%, respectively), PIN-3A was dominated by Sphaeriidae (bivalve molluscs 60%) and PIN-2A was dominated by Chaoboridae (phantom midges, 66%). Other taxa present in the Pinewood River, in order of relative abundance included Hydrobiidae, Chaoboridae, Sphaeriidae, Ceratopogonidae (biting midges) and Hyalellidae.

3.2.5 Fisheries Resources

Fish sampling results for the Pinewood River are presented in Tables 3-8 to 3-13 Results are presented as species specific CPUE based on gear type. A summary of presence / absence of fish species captured during the 2012 field survey as well as previous studies conducted from 2008 to 2012 (KCB 2011, AMEC 2012) is provided in Table 3-14. Sampling locations are shown in Figure 2-4A and Figure 2-4B. Fish biometrics and further sampling details are provided in Appendix H.

A total of 21 fish species were captured in the Pinewood River in 2012 including: Black Crappie (*Pomoxis nigromaculatus*), Blackchin Shiner (*Notropis hudsonius*), Brown Bullhead, (*Ameiurus nebulosus*), Brook Stickleback (*Culaea inconstans*), Central Mudminnow (*Umbra limi*), Common Shiner (*Luxilus cornutus*), Creek Chub (*Semotilus atromaculatus*), Emerald Shiner (*Notropis atherinoides*), Finescale Dace *(Phoxinus neogaeus*), Golden Shiner (*Notemogonis crysoleucas*), Johnny Darter (*Etheostoma nigrum*), Northern Pike (*Esox lucius*), Pearl Dace (*Margariscus margarita*), Pumpkinseed (*Lopomis gibbosus*), Rock Bass (*Ambloplites rupestris*), Sauger (*Sander canadensis*), Shorthead Redhorse (*Moxosstoma macrolepidotum*), Smallmouth Bass (*Micropterus dolomieu*), Spottail Shiner (*Notropis hudsonius*), Trout-perch (*Percopsis omiscomaycus*), Walleye (*Sander vitreus*), White Sucker (*Catostomus commersonii*) and Yellow Perch (*Perca flavescens*).

PIN-17 and PIN-15 were the sample locations of greatest catch abundance respectably. The species captured in the greatest abundance throughout the Pinewood River was Northern Pike (118 individuals). Large-bodied fish were captured more successfully in the lower reaches of the Pinewood River, downstream of PIN-13, where wetted widths and depths were significantly larger in comparison to the upper reaches. Northern Pike were captured throughout the Pinewood River in more upstream locations (PIN-2A and PIN-2AA) as well as downstream (PIN-14 and PIN-17). Species such as Black Crappie, Sauger, Shorthead Redhorse, Smallmouth Bass and Yellow Perch were only observed in these deeper and wider reaches of the lower Pinewood, downstream of PIN-13 (Table 3-8)

Forage fish as sampled by minnow traps, seine nets and electroshocking showed some differences in distribution from upstream to downstream sampling locations within the Pinewood River. Common Shiner, Brook Stickleback and Finescale Dace were the species of greatest abundance at sample locations within the upper reaches of Pinewood River within the study area. Common Shiner, Emerald Shiner and Golden Shiner were captured in the greatest abundance in the mid to lower reaches of the Pinewood River in 2012 (Tables 3-9 to 3-11).

3.3 McCallum Creek System

3.3.1 Water Quality

Water quality samples were collected from two locations along McCallum Creek in 2012 (JON-1 and JON-2; Figure 2-1A). Note that the naming of stations is consistent with the local name, Jones Creek, utilized in previous environmental baseline reporting. Analytical results for general chemistry and metals are presented in Table 3-2 and field collected water quality parameters are provided in Table 3-3. Certificates of Analysis are provided in Appendix D.

General chemistry and total metal parameters were found to meet the PWQO and CEQG values with the following exceptions:

- The total iron concentrations were above the PWQO and CEQG (both 300 µg/L) at both of the sampling locations along McCallum Creek (2,500 µg/L at JON-1, 2,200 µg/L at JON-2).

- Total phosphorus was present above the interim PWQO value (30 µg/L) at JON-2 (210 µg/L) and potentially above the PWQO at JON-1 (value was less than method detection limit of 100 µg/L).

Over the duration of the sampling period, water temperatures ranged from 15.7°C to 24.1°C at JON-1 (August 28, 2012 and July 11, 2012, respectively) and from 15.2°C to 25.8°C at JON-2 (September 3, 2012 and July 17, 2012).

DO concentrations measured in-situ at McCallum Creek sampling locations (Table 3-3) ranged from 1.85 mg/L (JON-1 on August 28, 2012) to 6.65 mg/L (JON-1 on July 12, 2012). DO measurements taken at McCallum Creek sampling locations in the summer (6.65 mg/L and 5.63 mg/L at JON-1 and JON-2, respectively) were within the PWQO for warm water biota (>5 mg/L where temperature is approximately 10-15°C and >4 mg/L where temperature is approximately 20-25°C), however, DO measurements taken in the late summer (1.85 mg/L and 2.66 mg/L at JON-1 and JON-2, respectively) were less than the PWQO. Other physico-chemical parameters measured including pH, conductivity, total dissolved solids and temperature indicated no limitation to aquatic habitat.

3.3.2 Sediment Quality

Sediment samples were collected from two locations along McCallum Creek (JON-1, JON-2; Figure 2-2A). Results of chemical and physical analyses are presented in Table 3-4 and Table 3-5, respectively. Sediment chemistry Certificates of Analysis are provided in Appendix E. Sediment grain size Certificates of Analysis are provided in Appendix F.

Inorganic and metal parameters were found to meet both the PSQG and CEQG guideline values, with the following exceptions:

- TOC was below the PSQG SEL (10%) in both McCallum Creek samples, but was above the PSQG LEL (1%) with concentrations of 1.17% at JON-1 and 2.46% at JON-2. There is no CEQG for TOC.

- TKN was below the PSQG SEL (4,800 µg/g) at both McCallum Creek sample locations, but did not meet the PSQG LEL (550 µg/g) with concentrations of 1,330 µg/g at JON-1 and 1,870 µg/g at JON-2. There is no CEQG for TKN.

- Chromium was below the PSQG SEL (110 µg/g) and CEQG (90 µg/g) at both McCallum Creek sample location, but was above the PSQG LEL (26 µg/g) with concentrations of 27.0 µg/g at JON-1 and 34.0 µg/g at JON-2.

- Copper was below the PSQG SEL (110 µg/g) and CEQG (197 µg/g) at both McCallum Creek sampling locations, but was above the PSQG LEL (16 µg/g) with concentrations of 21.5 µg/g at JON-1 and 18.3 µg/g at JON-2.

- Iron was below the PSQG SEL (40,000 µg/g) at both McCallum Creek sampling locations, but was above the PSQG LEL (20,000 µg/g) at JON-2 (25,700 µg/g). There is no CEQG for iron.

- Nickel was well below the PSQG SEL (75 µg/g) at both McCallum Creek sampling locations, but was above the PSQG LEL (16 µg/g) with concentrations of 19.5 µg/g and 25.3 µg/g in JON-1 and JON-2, respectively. There is no CEQG for nickel.

- Phosphorus was below the PSQG SEL (2,000 µg/g) at both McCallum Creek sampling locations, but was above the PSQG LEL (600 µg/g) at JON-2 (688 µg/g). There is no CEQG for phosphorus.

Sediment particle size was fairly consistent between the two McCallum Creek sample locations, generally consisting of coarse sand, fine sand and silt, with traces of clay and gravel.

3.3.3 Habitat Type Availability

McCallum Creek habitat assessment locations are shown on Figure 2-3 and habitat type delineations are shown in Figure 3-1. Habitat type criteria are presented in Table 3-1 and a summary of key habitat characteristics for each sampling location is presented in Appendix C. Habitat type profiles and associated representative photographs are provided in Appendix A and photographs of representative habitats associated with sample locations are provided in Appendix B.

McCallum Creek consisted of habitat types 3, 4 and 5. The low gradient and extensive beaver activity along much of McCallum Creek created a low flow system. Habitat type 5 identified at JON-2 was also identified through digital imagery analysis at McCallum Creek, specifically in upstream reaches. Braided/diffuse channels consistent with habitat type 3 occurred in isolated areas of McCallum Creek specifically in reaches adjacent to beaver ponds. Habitat type 4 (as at JON-1) represented the majority of McCallum Creek reaches providing a single narrow and shallow channel with dense graminoid riparian vegetation and limited in-stream aquatic vegetation. Substrates throughout McCallum Creek was relatively uniform, comprised primarily of silt/clay with organic/detritus.

3.3.4 Benthic Invertebrate Community

Benthic invertebrate community samples were collected from two locations on McCallum Creek (JON-1, JON-2; Figure 2-2A), with results of community analysis presented in Tables 3-6 and 3-7 and taxonomic enumeration data provided in Appendix G.

TID was 159 and 1,319 individuals/m^2 with family richness of 4 and 9 at JON-1 and JON-2, respectively. Simpson's diversity values were relatively high at McCallum Creek sample locations (0.61 and 0.78 at JON-1 and JON-2, respectively). Similarly community evenness was 0.64 at JON-1 and 0.51 at JON-2. EPT taxa were not identified in either sample from McCallum Creek and percent Chironomids ranged from 1% at JON-2 (1 of 91 individuals) to 55% at JON-1 (6 of 11 individuals). The community at JON-2 was dominated by the families Naididae (oligochaete worms), Tubificidae (oligochaete worms), Hyalellidae and Sphaeriidae. The community at JON-1 was dominated by Chironomids with Sphaerids and Tubificids. In general the more downstream location sampled (JON-2) showed a more diverse and robust benthic invertebrate community than upstream (JON-1).

3.3.5 Fisheries Resources

Fish sampling results for McCallum Creek are presented in Tables 3-8, 3-9, 3-10 and 3-12. Results are presented as species specific CPUE based on gear type. A summary of presence / absence of fish species captured during the 2012 field survey as well as previous studies conducted from 2008 to 2012 (KCB 2011, AMEC 2012) is provided in Table 3-14. Sampling locations are shown in Figure 2-4A. Fish biometrics, method of capture and other details related to fishing efforts are provided in Appendix H. .

Four fish species were captured at this location and included Brook Stickleback, Central Mudminnow, Finescale Dace and Pearl Dace. Central Mudminnow was captured in the greatest abundance with 21 of the 43 fish sampled. Dip netting was the most successful method of sampling with 21 of the 43 fish captured using this technique.

3.4 Unnamed Tributary 1 System

3.4.1 Water Quality

Water samples were not collected in the Unnamed Tributary 1 system during 2012 as a defined channel was not identified and the representative reach was dry.

3.4.2 Sediment Quality

Sediment samples were not collected in the Unnamed Tributary 1 system during 2012 as a defined channel was not identified and the representative reach was dry.

3.4.3 Habitat Type Availability

Unnamed Tributary 1 is a small tributary of the Pinewood River. The majority of its length is typified by alternating sections of beaver pond habitat (type 5) and type 3 (e.g. UT1-A) braided and diffuse channels. The entire tributary is associated with a large floodplain (>150 m) and dominated by graminoid/sedge species, with Alders (*Alnus* spp.) and Willows (*Salix* spp.) interspersed. As the tributary drains into the Pinewood River it becomes more channelized, briefly transitioning into a type 4 channelized habitat.

3.4.4 Benthic Invertebrate Community

Benthic invertebrate community samples were not collected in the Unnamed Tributary 1 system due to the channel being dry during the survey period.

3.4.5 Fisheries Resources

No fish sampling was conducted for Unnamed Tributary 1 due to the channel being dry during the survey period.

3.5 Tait Creek System

3.5.1 Water Quality

Water quality samples were collected from one location on Tait Creek (TAIT-1) (Figure 2-1A) in 2012. Analytical results for general chemistry and metals are presented in Table 3-2 and field collected water quality parameters are provided in Table 3-3. Certificates of Analysis are provided in Appendix D.

General chemistry and total metal parameters were found to meet the PWQO and CEQG values with the exception of iron and phosphorus as follows;

- The iron concentration at TAIT-1 (900 µg/L) was above the PWQO and CEQG (both 300 µg/L).

- Laboratory detection limits (500 µg/L) were well above the interim PWQO (30 µg/L) for phosphorus for TAIT-1. The sample produced a non-detect result (<500 µg/L) for this station. Results are further discussed in Section 4.0.

The water temperatures at location TAIT-1 was 27.5°C on July 14, 2012 and 21.3°C on September 3, 2012.

DO concentrations measured in-situ at the Tait Creek sampling station TAIT-1 ranged from 4.93 mg/L (September 3, 2012) to 6.85 mg/L (July 14, 2012). Physico-chemical parameters measured including pH, DO, conductivity, total dissolved solids and temperature indicated no limitation to aquatic habitat.

3.5.2 Sediment Quality

A sediment sample was collected at one location within Tait Creek (TAIT-1; Figure 2-2A). Results of chemical and physical analyses are presented in Table 3-4 and Table 3-5, respectively. Sediment chemistry Certificates of Analysis are provided in Appendix E. Sediment grain size Certificates of Analysis are provided in Appendix F.

Inorganic and metal parameters were found to meet both the PSQG and CEQG guideline values.

The sediment particle size distribution for sample location TAIT-1 was dominated by coarse sand, with some fine sand and silt and traces of gravel and clay.

3.5.3 Habitat Type Availability

The Tait Creek habitat assessment location is shown on Figure 2-3 and photographs of representative habitats associated with sample locations are provided in Appendix B.

Tait Creek is a tributary of Pinewood River that was characterized by a single well-defined channel at reaches visited during the 2012 field survey. The channel is associated with a relatively wide floodplain (approximately 300 m) densely dominated by graminoid species with some Alder and Willow. These reaches of Tait Creek (at TAIT-1) were classified as type 2 habitat which extends throughout the majority of Tait Creek (Figure 3-1). Beaver activity near the confluence of Tait Creek with the Pinewood River caused impounding and created type 5 habitat in lower Tait Creek reaches. Habitat type 4 dominated the upper reaches of Tait Creek, as well as some of its intermittent tributaries. Substrate throughout Tait Creek was relatively uniform, comprised primarily of silt/clay and detritus with localized pockets of coarse and fine sand.

3.5.4 Benthic Invertebrate Community

The single benthic invertebrate community sampling location on Tait Creek is shown in Figure 2-2A with results of sampling presented in Tables 3-6 and 3-7 and taxonomic enumeration data provided in Appendix G.

Simpson's diversity and evenness were low, with values of 0.17 and 0.20, respectively and a family richness of 6, yet TID was of a moderate level in comparison to other sampling locations at 1,623 individuals/m^2. Furthermore, 91% of individuals (102 of 112) in the sample collected at TAIT-1 were Chironomids. No EPT taxa were found in the sample collected from this location.

3.5.5 Fisheries Resources

Fish sampling results from Tait Creek are presented in Tables 3-9, 3-10 and 3-12. The sampling location is shown in Figure 2-4A.

Tait Creek was sampled using seine nets, dip nets and minnow traps. Twenty-one individuals of four species were captured; six Brassy Minnows, thirteen Brook Stickleback, one Central Mudminnow and one Northern Redbelly Dace.

3.6 Unnamed Tributary 2 System

3.6.1 Water Quality

Water quality samples were collected from one location within the Unnamed Tributary 2 system (UT2-A; Figure 2-1A). Analytical results for general chemistry and metals are presented in Table 3-2 and field collected water quality parameters are provided in Table 3-3. Certificates of Analysis are provided in Appendix D.

General chemistry and total metal parameters were found to meet the PWQO and CEQG values with the exception of phosphorus. Total phosphorus was not detected above the detection limit (500 µg/L), however, the laboratory detection limit was well above the interim PWQO value of 30 µg/L.

The water temperatures at location UT2-A was 32.1°C on July 14, 2012 and 12.9°C on September 6, 2012.

DO concentrations measured in-situ at Unnamed Tributary 2 sampling station UT2-A ranged from 4.93 mg/L (September 6, 2012) to 6.86 mg/L (July 14, 2012). The DO measurement taken at UT2-A in late summer was approximately equal to the PWQO for warm water biota (5 mg/L where temperature is approximately 10-15°C). Other physico-chemical parameters measured including pH, conductivity, total dissolved solids and temperature indicated no limitation to aquatic habitat.

3.6.2 Sediment Quality

A sediment sample was collected at one location within the Unnamed Tributary 2 system (UT2-A; Figure 2-2A). Results of chemical and physical analyses are presented in Table 3-4 and Table 3-5, respectively. Sediment chemistry Certificates of Analysis are provided in Appendix E. Sediment grain size Certificates of Analysis are provided in Appendix F.

Inorganic and metal parameters were found to meet both the PSQG and CEQG guideline values, with the following exceptions:

- TOC was below the PSQG SEL (10%) in sample UT2-A (3.42%), but did not meet the PSQG LEL (1%). There is no CEQG for TOC.
- TKN was below the PSQG SEL (4,800 µg/g) in sample UT2-A (1,280 µg/g), but did not meet the PSQG LEL (550 µg/g). There is no CEQG for TKN.
- Chromium was below the PSQG SEL (110 µg/g) and the CEQG (90 µg/g) in sample UT2-A (35.7 µg/g), but was above the PSQG LEL (26 µg/g).
- Nickel was well below the PSQG SEL (75 µg/g) at UT2-A (26.8 µg/g), but was above the PSQG LEL (16 µg/g). There is no CEQG for nickel.

The sediment particle size distribution at sample location UT2-A was dominated by silt (66%), with some fine sand and clay (14% each) and trace coarse sand and gravel (5% and 1%, respectively).

3.6.3 Habitat Type Availability

Unnamed Tributary 2 is a small tributary of the Pinewood River. Similar to Unnamed Tributary 1, the majority of its length is typified by alternating Type 5 beaver pond habitat and Type 3 (UT1-A) braided diffuse channels. The entire tributary is associated with a large floodplain (>150 m) and dominated by graminoid/sedge species, with some Alder and Willow. As the tributary drains into the Pinewood River it becomes more channelized, briefly transitioning into a Type 4 channelized habitat (Appendix B, Appendix C).

3.6.4 Benthic Invertebrate Community

The single benthic invertebrate community sampling location on Unnamed Tributary 2 is shown in Figure 2-2A with results of sampling presented in Tables 3-6 and 3-7 and taxonomic enumeration data provided in Appendix G.

Station UT2-A yielded a low TID (116 individuals/m^2). Only two families were represented in the sample; Planorbidae (ramshorn snails, 75%) and Sphaeriidae (25%). The Simpson's diversity

value was 0.38 and evenness was 0.80. The large evenness value is indicative of only two taxa with the number of individuals distributed relatively evenly. No individuals belonging to the EPT or Chironomidae families were collected from this site.

3.6.5 Fisheries Resources

Fish catch and abundance results for Unnamed Tributary 2 are presented in Tables 3-9 and 3-12. Sampling locations are shown in Figure 2-4A. Meristic data is provided in Appendix H. A summary of presence / absence of fish species captured during the 2012 field survey as well as previous studies (KCB 2011; AMEC 2012) is provided in Table 3-14.

No fish species were captured in the Unnamed Tributary 2 system despite dip netting and minnow trap efforts.

3.7 Loslo Creek System and Cowser Drain

3.7.1 Water Quality

Water quality samples were collected from five locations along Loslo Creek (LOS-3, LOS-4, LOS-5, LOS-8, LOS-11; Figure 2-1A). Analytical results for general chemistry and metals are presented in Table 3-2 and field collected water quality parameters are provided in Table 3-3. Certificates of Analysis are provided in Appendix D.

General chemistry and total metal parameters were found to meet the PWQO and CEQG values with the following exceptions:

- Fluoride concentrations were equal to or above the CEQG (0.12 mg/L) at sample locations LOS-3 and LOS-4 (0.12 mg/L and 0.13 mg/L, respectively). There is no PWQO value for fluoride.

- The total aluminum concentration did not meet the CEQG (100 µg/L) at LOS-4 and LOS-11 (170 µg/L and 523 µg/L, respectively). However, all Loslo Creek samples met the interim PWQO value for aluminum (75 µg/L, as measured in a clay-free (i.e., filtered) sample) as the dissolved aluminum concentrations ranged from not detectable to 14.6 µg/L).

- Cobalt was marginally above the PWQO (0.9 µg/L) at LOS-5 and LOS-11 (1.7 µg/L and 1.0 µg/L, respectively). There is no CEQG value for cobalt.

- Iron concentrations were above the PWQO and CEQG (both 300 µg/L) at all Loslo Creek sampling locations, ranging from 320 µg/L (LOS-3) to 2,900 µg/L (LOS-5).

- Loslo Creek samples generally had total phosphorus concentrations above the interim PWQO (30 µg/L). Detected concentrations ranged from 110 µg/L (LOS-8) to 370 µg/L (LOS-11). Laboratory detection limits were above the interim PWQO for samples collected at LOS-3 and LOS-4.

Water temperatures ranged from 19.1°C to 26.6°C at Loslo Creek sites (Table 3-3). The highest temperature (26.6°C) was recorded at sample station LOS-3 on July 18, 2012 and the lowest temperature (19.1°C) was recorded at station LOS-11 on August 29, 2012.

DO concentrations measured in-situ at Loslo Creek sampling locations ranged from 3.35 mg/L (LOS-5 on August 30, 2012) to 8.42 mg/L (LOS-3 on July 18, 2012). DO concentrations generally met the PWQO of 4 mg/L (where temperature is approximately 20 to 25°C) except at LOS-5 (3.35 mg/L) on August 30, 2012 and at LOS-4 (3.71 mg/L) and LOS-8 (3.46 mg/L) on August 31, 2012. The pH at Loslo Creek sampling locations generally ranged from 6.84 to 7.87, however, the August 29, 2012 measurement at LOS-11 (5.45) fell outside the pH range specified in the PWQO for protection of aquatic life (6.5-8.5). Other physico-chemical parameters measured including conductivity, total dissolved solids and temperature indicated no limitation to aquatic habitat.

3.7.2 Sediment Quality

Sediment samples were collected from five locations within Loslo Creek (LOS-3, LOS-4, LOS-5, LOS-8, LOS-11; Figure 2-2A). Results of chemical and physical analyses are presented in Table 3-4 and Table 3-5, respectively. Sediment chemistry Certificates of Analysis are provided in Appendix E. Sediment grain size Certificates of Analysis are provided in Appendix F.

Inorganic and metal parameters met both PSQG and CEQG guideline values, with the following exceptions:

- TOC was above the PSQG SEL (10%) at two of the Loslo Creek sampling stations (LOS-5 and LOS-11, 10.5% and 24.5%, respectively) and was above the PSQG LEL (1%) at LOS-3, LOS-4 and LOS-8 (TOC ranging from 1.18% to 5.70% at these locations). There is no CEQG for TOC.

- TKN exceeded the PSQG SEL (4,800 µg/g) at LOS-3, LOS-5 and LOS-11, (4,890 µg/g, 10,800 µg/g and 13,600 µg/g, respectively) and was above the PSQG LEL (550 µg/g) at LOS-4 and LOS-8 (1,300 µg/g to 2,980 µg/g, respectively). There is no CEQG for TKN.

- Chromium was below the PSQG SEL (110 µg/g) and CEQG (90 µg/g) at all Loslo creek sampling locations, but was above the PSQG LEL (26 µg/g) at LOS-3 and LOS-4 with concentrations of 33.0 µg/g and 34.3 µg/g, respectively.

- Copper was below the PSQG SEL (110 µg/g) and CEQG (197 µg/g) at all Loslo Creek sampling locations, but was above the PSQG LEL (16 µg/g) at LOS-3 and LOS-4 with concentrations of 19.5 µg/g and 17.3 µg/g, respectively.

- Iron was below the PSQG SEL (40,000 µg/g) at all Loslo Creek sampling locations, but was slightly above the PSQG LEL (20,000 µg/g) at LOS-4 (20,100 µg/g). There is no CEQG for iron.

- Manganese was below the PSQG SEL (1,100 µg/g) at all Loslo Creek sampling locations, but was above the PSQG LEL (460 µg/g) at LOS-3, LOS-5 and LOS-1 with concentrations of 594 µg/g, 848 µg/g and 717 µg/g, respectively. There is no CEQG for manganese.

- Nickel was well below the PSQG SEL (75 µg/g) at all Loslo Creek sampling locations, but was above the PSQG LEL (16 µg/g) at LOS-3, LOS-4 and LOS-5 with concentrations of 24.8 µg/g, 23.3 µg/g and 17.3 µg/g, respectively. There is no CEQG for nickel.

- Phosphorus was below the PSQG SEL (2,000 µg/g) at all Loslo Creek sampling locations, but was above the PSQG LEL (600 µg/g) at LOS-5 (632 µg/g). There is no CEQG for phosphorus.

Sediment particle size was fairly consistent amongst Loslo Creek sampling locations LOS-3, LOS-4, LOS-5 and LOS-8, consisting of a mixture of coarse and fine sand material with clay/silt and small percentages of gravel available at LOS-4 and LOS-8. The sample from LOS-11 contained a high proportion of organic content (53.7%) with other Loslo Creek samples having an organic content less than 20%.

3.7.3 Habitat Type Availability

Loslo Creek habitat assessment locations are shown on Figure 2-3 and habitat type delineations are shown in Figure 3-1. Habitat type classification criteria are presented in Table 3-1 and a summary of key habitat characteristics for each sampling location is presented in Appendix C. Representative habitat type cross-section illustrations are provided in Appendix A and a photographic record of locations surveyed for habitat is provided in Appendix B.

Loslo Creek originates from a large wetland complex extensively influenced by beaver activity and then flows south towards the Pinewood River through forested areas and agricultural fields. The low flow system is characterized by a wide flood prone area dominated by graminoid and sedge species. Type 5 (LOS-3, LOS-4 and LOS-8) habitat (ponds) is present throughout the majority of upper Loslo Creek with bankfull widths ranging between 10 – 50 m and bankfull depths between 0.25 – 2.00 m. Associated with the Type 5 habitat are inlet and outlet areas of

multiple braided/diffuse water features classified as Type 3 habitat (e.g. LOS-5). This habitat type extends through the transition areas between beaver ponds.

Habitat type 4, as represented by LOS-7 and LOS-11, is also abundant in many of the smaller upper tributaries of the Loslo Creek system. Specifically, sections of the west branches of Loslo Creek were observed to be intermittent with less defined channel morphology. Some reaches of these intermittent channels exist in dense Alder and Willow thickets with localized areas of terrestrial vegetation growing within the channel. Loslo Creek becomes more channelized and defined as it drains into the Pinewood River, flowing through narrower valleys and agricultural fields. Near the Pinewood River (the approximately lower 3,300 m), Loslo Creek has been channelized and altered to act as a Municipal drain. Substrates were variable and particle sizes increased in a downstream fashion from a more silt dominated matrix to one of mixed sand and silt. Silt with a higher degree of organics was more typical of type 5 pond habitats.

3.7.4 Benthic Invertebrate Community

Benthic invertebrate community sampling locations for Loslo Creek are shown in Figure 2-2A with results presented in Tables 3-6 and 3-7 and taxonomic enumeration data presented in Appendix G.

TID at Loslo Creek sampling locations was generally low and ranged from 72 to 1,217 individuals/m^2 with the minimum value observed for LOS-4 and the maximum at LOS-8. Family richness was variable and ranged from 2 (LOS-4) to 8 taxa (LOS-3). Loslo Creek Simpson's diversity values ranged between 0.48 and 0.74, with evenness ranging from 0.37 to 1.00. The evenness value of 1.0 at LOS-11 in 2012 is due to the occurrence of two individuals in each of only three families represented (Appendix G). Diversity was highest at LOS-8 and lowest at LOS-4.

EPT taxa were not identified in any of the Loslo Creek samples. Chironomids constituted 31% the LOS-8 sample and 54-60% of LOS-3, LOS-4 and LOS-5 samples. However, Chironomidae was not represented in the LOS-11 sample. Other taxa represented in benthic invertebrate community samples from the Loslo Creek system in 2012 included Tubificidae, Sphaeriidae, Naididae, Sisyridae (spongeflies) and Valvatidae.

3.7.5 Fisheries Resources

Species specific CPUE per gear type for Loslo Creek are presented in Tables 3-9, 3-10 and 3-12. Sampling locations are shown in Figure 2-4A. Fish meristic data are provided in Appendix H. A summary of presence / absence of fish species captured during the 2012 field survey as well as previous studies (KCB 2011, AMEC 2012) is provided in Table 3-14.

Five species were captured from the Loslo Creek system in 2012, including; Blackchin Shiner, Brook Stickleback, Central Mudminnow, Emerald Shiner and Finescale Dace. The sample

location with the greatest fish capture total was LOS-8 (85 individuals). The most productive method of capture was seine netting and the largest fish count by species was 57 Emerald Shiner from LOS-8. Minnow traps and dip netting also resulted in fish capture at sites LOS-3, LOS-4 and LOS-5 for a total catch of 97 fish.

3.8 Unnamed Tributary 5 System

3.8.1 Water Quality

A water quality sample was collected at UT5-A which was located in the Unnamed Tributary 5 system (Figure 2-1A). Analytical results for general chemistry and metals are presented in Table 3-2 and field collected water quality parameters are provided in Table 3-3. Certificates of Analysis are provided in Appendix D.

General chemistry and total metal parameters were found to meet the PWQO and CEQG values with the exception of iron. The iron concentration at UT5-A (450 µg/L) was above the PWQO and CEQG (both 300 µg/L). Total phosphorus was not detected above the laboratory minimum detection limit (100 µg/L), however, this detection limit is greater than the interim PWQO value of 30 µg/L.

The water temperature at UT5-A was 24.9°C on July 13, 2012 and 20.8°C on September 5, 2012.

DO concentrations measured in-situ at Unnamed Tributary 5 sampling location UT5-A was 2.68 mg/L on July 15, 2012 and 5.43 mg/L on September 5, 2012. The DO value measured during the July field trip was less than the PWQO for warm water biota (4 mg/L where temperature is approximately 20-25°C). Other physico-chemical parameters measured including pH, conductivity, total dissolved solids and temperature indicated no limitation to aquatic habitat.

3.8.2 Sediment Quality

A sediment sample was collected at one location within the Unnamed Tributary 5 system (UT5-A; Figure 2-2A). Results of chemical and physical analyses are presented in Table 3-4 and Table 3-5, respectively. Sediment chemistry Certificates of Analysis are provided in Appendix E. Sediment grain size Certificates of Analysis are provided in Appendix F.

Inorganic and metal parameters were found to meet both the PSQG and CEQG guideline values, with the following exceptions:

- TKN was below the PSQG SEL (4,800 µg/g) in sample UT5-A (620 µg/g), but did not meet the PSQG LEL (550 µg/g). There is no CEQG for TKN.

- Chromium was below the PSQG SEL (110 µg/g) and the CEQG (90 µg/g) in sample UT5-A (26.8 µg/g), but was above the PSQG LEL (26 µg/g).

- Nickel was well below the PSQG SEL (75 µg/g) at UT5-A (16.6 µg/g), yet was marginally above the PSQG LEL (16 µg/g). There is no CEQG for nickel.

The sediment at UT5-A consisted primarily of gravel and coarse sand, with some pebble/cobble, fine sand and silt and traces of clay.

3.8.3 Habitat Type Availability

Unnamed Tributary 5 is a small intermittent creek that originates to the south of Pinewood River within pastureland and drains into the river approximately 200 m downstream of Marr Creek. Beaver activity within Unnamed Tributary 5 created some type 5 habitat along its length which were fed and drained by reaches of Type 3 (as at UT5-A) braided/diffuse channels (Appendix B). Near its confluence with the Pinewood River the tributary becomes more channelized and reflects a type 4 classification.

3.8.4 Benthic Invertebrate Community

The single benthic invertebrate community sampling location on Unnamed Tributary 5 is shown in Figure 2-2A with results of sampling presented in Tables 3-6 and 3-7 and taxonomic enumeration data provided in Appendix G.

Simpson's diversity and evenness were moderate, with values of 0.54 and 0.44, respectively, with a family richness of 5. TID was 1,551 individuals/m^2, with 63% of the organisms in the sample being Chironomids. Other families present in the sample included Ceratopogonidae (24%), Naididae (7%), Tubificidae (5%) and Sphaeriidae (2%). EPT families were not represented in the sample from Unnamed Tributary 5 in 2012.

3.8.5 Fisheries Resources

Species-specific catch per unit effort by gear type for Unnamed Tributary 5 are presented in Tables 3-9 and 3-11. A summary of presence / absence of fish species captured during the 2012 field survey as well as previous studies (KCB 2011, AMEC 2012) is provided in Table 3-14.

The only species captured at Unnamed Tributary 5 was the Central Mudminnow (45 individuals). Minnow traps proved to be the most efficient in capturing this species in this tributary with 40 of the 45 individuals captured. Electroshocking also resulted in fish captures at Unnamed Tributary 5 with a total catch of five fish for 688 electroseconds of effort (CPUE = 7.27 fish per electrosecond*1000).

3.9 West Creek System

3.9.1 Water Quality

Water quality samples were collected from one location at West Creek Tributary 1 in 2012 (WES-TRIB1A; Figure 2-1A). Water quality samples were not collected at sample station WES-TRIB1B as the sample location was dry during the field trip for water sampling. Analytical results for general chemistry and metals are presented in Table 3-2 and field collected water quality parameters are provided in Table 3-3. Certificates of Analysis are provided in Appendix D.

General chemistry and total metal parameters were found to meet the PWQO and CEQG values with the exception of the following:

- Fluoride concentration at WES-TRIB1A (0.13 µg/L) was above the CEQG (0.12 mg/L).
- Iron concentration at WES-TRIB1A (930 µg/L) was above the PWQO and CEQG (both 300 µg/L).
- Total phosphorus was not detected above the laboratory minimum detection limit (100 µg/L), which was greater than the interim PWQO value of 30 µg/L.

The water temperature at location WES-TRIB1A was 28.3°C on July 11, 2012 and 21.3°C on September 12, 2012.

DO concentrations measured in-situ at West Creek Tributary 1A sampling location WES-TRIB1A were 1.57 mg/L on July 11, 2012 and 3.56 mg/L on September 1, 2012. Both of these values were less than the PWQO for warm water biota (4 mg/L where temperature is approximately 20-25°C). Other physico-chemical parameters measured including pH, conductivity, total dissolved solids and temperature indicated no limitation to aquatic habitat.

3.9.2 Sediment Quality

Sediment samples were collected at two locations within the West Creek Tributary 1 system (WES-TRIB1A, WES-TRIB1B; Figure 2-2A). Results of chemical and physical analyses are presented in Table 3-4 and Table 3-5, respectively. Sediment chemistry Certificates of Analysis are provided in Appendix E. Sediment grain size Certificates of Analysis are provided in Appendix F.

Inorganic and metal parameters were found to meet both the PSQG and CEQG guideline values, with the exception of TOC and TKN. TOC was below the PSQG SEL (10%) in both samples (1.66% at WES-TRIB1A and 4.69% at West-Trib-1B), but did not meet the PSQG LEL (1%). TKN was below the PSQG SEL (4,800 µg/g) in both samples (1,610 µg/g at WES-TRIB1A

and 590 µg/g at WES-TRIB1B), but did not meet the PSQG LEL (550 µg/g). There is no CEQG for TOC or TKN.

Sediment particle size was variable between the two West Creek Tributary 1 sample locations. WES-TRIB1A was dominated by fine sand and silt, with some coarse sand and trace clay, gravel and cobble, whereas WES-TRIB1B was dominated by gravel, with some pebble/cobble and coarse sand and very little fine sand and silt.

3.9.3 Habitat Type Availability

West Creek habitat assessment locations for 2012 are shown on Figure 2-3 and habitat type delineations for the West Creek System are shown in Figure 3-1. Habitat type criteria are presented in Table 3-1 and a summary of key habitat characteristics for each sampling location is presented in Appendix C. Habitat type profiles and associated representative photographs are provided in Appendix A and photographs of representative habitats associated with sample locations are provided in Appendix B.

West Creek drains approximately 1,635 hectares (ha) and has four sub-tributaries north of Roen Road which converge into a single main channel that eventually drains into the Pinewood River. As with other nearby creeks, a number of beaver dams impede flow, cause flooding of riparian areas and create a morphology made of primarily of pools and flats. Beaver activity in the upper sections of West Creek tributaries provided some type 5 habitat (e.g. WES-TRIB1A ponded area) with type 3 habitats conveying flow through transition zones between beaver ponds and downstream more channelized sections. Overall, the majority of West Creek tributaries are defined by habitat type 4 (as at representative reach WES-TRIB1B). This habitat is comprised of a single relatively shallow channel which was intermittent in localized sections. Bankfull widths ranged between 0.57 – to 2.30 m, with bankfull depths ranging from 0.14 to 0.45 m. A number of locations of the mainstem of West Creek were well defined with moderate entrenchment, but were dry during the site investigations of 2012. The channel becomes braided near the mouth of West Creek before draining into the Pinewood River. During periods of high flows in West Creek and the Pinewood River, which may be variable in annual occurrence, the flood prone area at the confluence of these watercourses is likely thoroughly inundated and would provide spawning and nursery habitat for Northern Pike and other spring spawning species that have an affinity for vegetation. Substrates were variable and particle sizes increased in a downstream fashion from a more silt dominated matrix to one of sand and silt mixed. Silts with a higher degree of organics was more typical of type 5 pond habitats.

3.9.4 Benthic Invertebrate Community

Benthic invertebrate community samples were collected from two locations on the West Creek Tributary 1 during the 2012 survey (WES-TRIB1A and WES-TRIB1B; Figure 2-2A), with results of community analyses presented in Tables 3-6 and 3-7 and taxonomic enumeration data provided in Appendix G.

TID was relatively high at 3,841 and 4,870 individuals/m^2 at WES-TRIB1A and WES-TRIB1B, respectively. However, family richness was dissimilar at these locations (8 at WES-TRIB1A and 18 at WES-TRIB1B). WES-TRIB1A and WES-TRIB1B had Simpson's diversity values of 0.42 and 0.70 and evenness values of 0.21 and 0.19, respectively. EPT taxa were not represented in the WES-TRIB1A sample, but were present at an abundance of 0.3% in WES-TRIB1B.

West-Trib-1A was dominated by Chironomids (75% by proportion), whereas WES-TRIB1B had a proportion of only 0.3% Chironomids. WES-TRIB1B was dominated by the families Tubificidae and Sphaeriidae.

3.9.5 Fisheries Resources

Fish sampling results from West Creek Tributary 1 are presented in Tables 3-9, 3-11 and 3-12, with the sampling location shown in Figure 2-4A.

Four species of fish were captured at West Creek Tributary 1 including; Brook Stickleback, Central Mudminnow, Finescale Dace and Pearl Dace. Dip netting was the most successful method of capture for small-bodied fish with a total of 14 fish, compared to 5 fish captured in minnow traps. The species present in the greatest abundance was the Finescale Dace (14 individuals) followed by the Pearl Dace (three individuals). Baitfish capture was relatively low at this location despite the use of a number of gear types and a significant amount of fishing effort.

3.10 Clark Creek System and Teeple Drain

3.10.1 Water Quality

Water quality samples were collected from one location within Clark Creek (CLA-5A) in 2012 (Figure 2-1A). Analytical results for general chemistry and metals are presented in Table 3-2 and field collected water quality parameters are provided in Table 3-3. Certificates of Analysis are provided in Appendix D.

General chemistry and total metal parameters were found to meet the PWQO and CEQG values. Total phosphorus was not detected above the laboratory minimum detection limit (500 µg/L), however, the detection limit is an order of magnitude above the interim PWQO value of 30 µg/L.

The water temperature at location CLA-5A was 26.2°C on July 13, 2012 and 17.3°C on September 1, 2012.

DO concentrations measured in-situ at CLA-5A was 8.44 mg/L on July 13, 2012 and 6.53 mg/L on September 1, 2012. Physico-chemical parameters measured including pH, DO, conductivity, total dissolved solids and temperature indicated no limitation to aquatic habitat.

3.10.2 Sediment Quality

A sediment sample was collected at one location within Clark Creek during the 2012 field survey (CLA-5A; Figure 2-2A). Results of chemical and physical analyses are presented in Table 3-4 and Table 3-5, respectively. Sediment chemistry Certificates of Analysis are provided in Appendix E. Sediment grain size Certificates of Analysis are provided in Appendix F.

Inorganic and metal parameters were found to meet both the PSQG and CEQG guideline values, with the exception of TOC and TKN. TOC was below the PSQG SEL (10%) in sample CLA-5A (4.13%), but did not meet the PSQG LEL (1%). TKN was below the PSQG SEL (4,800 µg/g) in sample CLA-5A (2,540 µg/g), but did not meet the PSQG LEL (550 µg/g). There is no CEQG for TOC or TKN.

Sediment particle size distribution at the Clark Creek sample location was dominated by coarse sand (52%), with some silt, fine sand and gravel and traces of clay.

3.10.3 Habitat Type Availability

Clark Creek habitat assessment locations for 2012 are shown on Figure 2-3 and habitat type delineations for Clark Creek are shown in Figure 3-1. Habitat type criteria are presented in Table 3-1 and a summary of key habitat characteristics for each sampling location is presented in Appendix C. Habitat type profiles and associated representative photographs are provided in Appendix A and photographs of representative habitats associated with sample locations are provided in Appendix B.

Clark Creek originates east of Clark Road, flowing southwest through pasture lands, passing by a municipal landfill before draining into the Pinewood River approximately 500 m west of Highway 600. Beaver activity throughout the majority of Clark Creek has created a number of large ponds that impede the flow of the creek. Alternating Type 5 (CLA-5A) and Type 3 habitats typify the majority of Clark Creek. Beaver pond bankfull widths ranged from 20 to 50 m and bankfull depths ranged from 0.5 to 1.8 m. Clark Creek is situated in a large graminoid and sedge floodplain (>150 m), with some Willow and Alder. Through its lower reaches, Clark Creek flows through agricultural lands where it becomes more channelized and specifically near its confluence with the Pinewood River, Floodprone widths are also reduced through these sections. Substrates within the creek primarily consist of sand with silt and some gravel and clay. Type 5 habitats in this creek are characterized by an increase in the percentage of silt/muck and organics compared to the more fluvial and channelized sections.

3.10.4 Benthic Invertebrate Community

The single benthic invertebrate community sampling location on Clark Creek for 2012 is shown in Figure 2-2A with results of sampling presented in Tables 3-6 and 3-7 and taxonomic enumeration data provided in Appendix G.

Station CLA-5A yielded a low TID (174 organisms/m^2). Three families were represented in the sample and included: Planorbidae (50%), Chironimidae (33%) and Valvatidae (valve snails, 17%). The Simpson's diversity value was 0.61 and evenness was 0.86. No individuals belonging to EPT families were collected from this location in 2012.

3.10.5 Fisheries Resources

Fish sampling results for Clark Creek are presented in Tables 3-9 and 3-11. Results are presented as species specific CPUE based on gear type. Sampling locations are shown in Figure 2-4A. Fish biometrics, method of capture and other details related to fishing efforts are provided in Appendix H. A summary of presence / absence of fish species captured during the 2012 field survey as well as previous studies (KCB 2011, AMEC 2012) is provided in Table 3-14.

Three fish species were captured at this location and included; Brassy Minnow, Brook Stickleback and Central Mudminnow. Minnow traps were the most successful method of sampling with the majority of fish captured using this technique. Electroshocking was also conducted and resulted in the capture of Brook Stickleback. Backpack electroshocking and minnow traps were primarily used in a large beaver pond near the headwaters of Clark Creek.

3.11 Unnamed Tributary 8A System

3.11.1 Water Quality

Water samples were not collected in the Unnamed Tributary 8A system as it was found to be dry at the time of the field visit.

3.11.2 Sediment Quality

Sediment samples were not collected in the Unnamed Tributary 8A system as it was dry at the time of the field visit.

3.11.3 Habitat Type Availability

Unnamed Tributary 8A is a small intermittent channel that provides seasonal surface flow conveyance in a southerly direction through forested valleys and agricultural fields before draining into the Pinewood River. The creek was completely dry during the 2012 field investigation, with pockets of terrestrial grasses growing within the channel. The creek bed was well defined with entrenchment and a hard-packed clay substrate. Beaver activity in the headwaters of the tributary combined with low water volumes affected connectivity of the creek to the Pinewood River during 2012.

3.11.4 Benthic Invertebrate Community

Benthic invertebrates were not collected at Unnamed Tributary 8A in 2012 as it was dry at the time of the field visit.

3.11.5 Fisheries Resources

Although the channelized reaches of Unnamed Tributary 8A were almost completely dry during the 2012 investigation, a single small intermittent pool downstream of the culvert at Teeple Road remained wetted (Figure 2-4A). The pool was sampled using minnow traps (Table 3-9).

In total, 125 stranded individuals of five species were captured within the isolated pool including; 78 Brook Stickleback, 31 Central Mudminnow, one Creek Chub, 14 Finescale Dace and one Pearl Dace.

3.12 Sturgeon Creek System

3.12.1 Water Quality

Water quality samples were collected from two locations along Sturgeon Creek (STU-5 and STU-6; Figure 2-1C) during the 2012 field survey. Analytical results for general chemistry and metals are presented in Table 3-2 and field collected water quality parameters are provided in Table 3-3. Certificates of Analysis are provided in Appendix D.

General chemistry and total metal parameters were found to meet the PWQO and CEQG values with the following exceptions:

- The fluoride concentration measured at STU-5 (0.14 mg/L) was above the CEQG (0.12 mg/L). There is no PWQO value for fluoride.
- The total aluminum concentration at STU-6 (1,110 µg/L) did not meet the CEQG (100 µg/L). However, both Sturgeon Creek samples met the interim PWQO value for aluminum (75 µg/L, as measured in a clay-free (i.e., filtered) sample) as the dissolved aluminum concentrations were not detectable (STU-5) and 16.4 µg/L (STU-6).
- Arsenic exceeded the CEQG and interim PWQO (both 5 µg/L) at STU-6 (6.1 µg/L). Both samples were well below the established PWQO of 100 µg/L.
- Cobalt was above the PWQO (0.9 µg/L) at the STU-6 sample location (1.6 µg/L). There is no CEQG value for cobalt.

- Iron concentrations were above the PWQO and CEQG (both 300 µg/L) at both Sturgeon Creek sampling locations, with concentrations of 1,870 µg/L and 2,110 µg/L at STU-5 and STU-6, respectively.

- Both Sturgeon Creek samples had total phosphorus concentrations (105 µg/L and 218 µg/L in STU-5 and STU-6, respectively) above the interim PWQO value (30 µg/L).

Water temperature measured in Sturgeon Creek was 15.9°C at STU-5 and 16.1°C at STU-6 on September 5, 2012.

DO concentrations measured in-situ at Sturgeon Creek on September 6, 2012 was 4.68 mg/L and 1.11 mg/L at STU-5 and STU-6, respectively. These concentrations were below the PWQO for warm water biota (5 mg/L where temperature is approximately 10-15°C. Other physico-chemical parameters measured including pH, conductivity, total dissolved solids and temperature indicated no limitation to aquatic habitat.

3.12.2 Sediment Quality

Sediment samples were collected from two locations within Sturgeon Creek (STU-5 and STU-6; Figure 2-2C). Results of chemical and physical analyses are presented in Table 3-4 and Table 3-5, respectively. Sediment chemistry Certificates of Analysis are provided in Appendix E. Sediment grain size Certificates of Analysis are provided in Appendix F.

Inorganic and metal parameters met both provincial PSQG and federal CEQG guideline values, with the following exceptions:

- TOC was below the PSQG SEL (10%) at both Sturgeon Creek sampling stations (3.35% at STU-5, 0.53% at STU-6), but was above the PSQG LEL (1%) at STU-5. There is no CEQG for TOC.

- TKN was below the PSQG SEL (4,800 µg/g) at both Sturgeon Creek sample locations, but was above the PSQG LEL (550 µg/g) at both locations (3,010 µg/g at STU-5, 620 µg/g at STU-6). There is no CEQG for TKN.

- Chromium was below the PSQG SEL (110 µg/g) and CEQG (90 µg/g) at both Sturgeon Creek sampling locations, but was above the PSQG LEL (26 µg/g) at STU-5 (29.5 µg/g).

- Nickel was well below the PSQG SEL (75 µg/g) at both Sturgeon Creek sampling locations, but was above the PSQG LEL (16 µg/g) at both locations (19.4 µg/g at STU-5, 18.5 µg/g at STU-6). There is no CEQG for nickel.

The sediment particle size distribution was dominated by coarse sand, fine sand and silt with traces of clay at both Sturgeon Creek sample locations. The STU-5 sample also contained of a proportion of gravel.

3.12.3 Habitat Type Availability

Sturgeon Creek habitat assessment locations for 2012 are shown on Figure 2-3 and habitat type delineations are shown in Figure 3-1 based on field investigation and digital imagery. Habitat type profiles and associated representative photographs are provided in Appendix A and Appendix B, respectively.

Sturgeon Creek is the only watercourse within the study area that is not a tributary of the Pinewood River, but rather is a direct tributary to the Rainy River. The Sturgeon Creek watershed is located to the east of the RRGP area and flows in a southerly direction adjacent to and is crossed numerous times by both Barwick Road and Highway 71 (Figure 2-1). The Sturgeon Creek watershed is large and drains approximately 21,477 ha. Adjacent to Barwick Road the creek and its tributaries flow through densely forested valleys. The majority of the main channel of Sturgeon Creek is typified by type 1 habitat (as at STU-6) with average bankfull widths of 9.3 m and bankfull depths of 1.05 m. The creek did not have a detectable flow during field investigations in 2012 and water was present in stagnant intermittent pools. Substrate within the main channel was a mix of clay and silt with pockets of gravel and cobble throughout. The smaller tributaries of Sturgeon Creek were classified as type 4 habitat (e.g. STU-5) habitat with singular narrow and shallow channels with small reaches of standing water available in 2012, indicating an intermittent nature in seasons of reduced surface flow inputs.

3.12.4 Benthic Invertebrate Community

The benthic invertebrate community was sampled at two locations on Sturgeon Creek in 2012 (STU-5 and STU-6; Figure 2-2C). Results of community analyses are presented in Tables 3-6 and 3-7 and taxonomic enumeration data provided in Appendix G.

Both Sturgeon Creek samples contained a very low number of benthic invertebrates (2 and 3 individuals for STU-5 and STU-6, respectively) and therefore had very low total invertebrate densities of 29 and 43 individuals/m^2. The STU-5 sample consisted of 100% Chironomids (two individuals), whereas the STU-6 sample consisted of 33% Naididae, 33% Chironomids and 33% Sphaeriidae (one per family). As such, Simpson's diversity values for STU-5 and STU-6 were 0 and 0.7, respectively, with evenness values of 1.0.

3.12.5 Fisheries Resources

Fish sampling results from Sturgeon Creek are presented in Tables 3-8 to 3-11. Results are presented as species specific CPUE based on gear type. Sampling locations are shown in Figure 2-4C. Fish biometrics and further sampling details are provided in Appendix H. A summary of presence / absence of fish species captured during the 2012 field survey as well as previous studies (KCB 2011, AMEC 2012) is provided in Table 3-14. Fishing efforts were ample and included minnow trapping, seine netting and electrofishing, however, only two species were captured (Brook Stickleback and Central Mudminnow) and only at STU-5.

3.13 Fish Body Burdens

A total of 70 Northern Pike and 15 Walleye from the Pinewood River were sampled for dorsal muscle tissue metal concentrations, with 42 and 13, of these specimens also being respectively sampled for liver tissue metal concentrations. Thirty-one species-specific, whole small-body composite fish samples were collected from the Pinewood River and its tributaries and analyzed for metal content. The small-bodied fish species included: Brassy Minnow, Common Shiner, Emerald Shiner, Pearl Dace, Northern Redbelly Dace, Central Mudminnow, Creek Chub and Yellow Perch. Capture and effort data pertaining to these samples are provided in previous sections and in Appendix H (specifically H-3, H-4 and H-5).

Small-bodied composite samples involved a minimum of three individuals and a maximum of 48 individuals, composited to create wet batch weights ranging from 35.7 to 337.5 g (Appendix H-5). Metal concentrations for parameters of interest are shown in Figures 3-3 to 3-5. Other parameters not represented in figure format are included in Appendix H-5. These include parameters with values consistently below detection limits, or for which there is little risk to fish health. Mercury concentrations in composite samples for all species was generally low, being less than or equal to 0.20 µg/g. Pearl Dace and Creek Chub captured in the Pinewood River at PIN-2AA exhibited the highest observed concentrations of mercury.

Cadmium was found to be present in whole fish composite samples at a maximum of 0.06 µg/g at Clark Creek in Brassy Minnows. Nine of the sample locations analyzed had mean cadmium whole body tissue concentrations equal to or less than 0.02 µg/g and three samples had concentrations below the 0.01 µg/g detection limit for this parameter (Figure 3-3).

Copper was present at or above the 0.5 µg/g detection limit in all composite samples, with mean values for each sampled watercourse ranging from 0.50 (Common Shiner from Blackhawk Creek) to 2.2 µg/g (Northern Redbelly Dace from West Creek).

Manganese concentrations ranged from below detection limits to a maximum of 0.06 µg/g. Five of the samples had concentrations of 0.01 µg/g, only slightly above detection and samples from Loslo Creek (Finescale Dace) and Blackhawk Creek (Common Shiner) exhibited non-detectable concentrations for this parameter.

Mean selenium concentrations in whole body composite samples ranged from 0.20 µg/g to 0.50 µg/g, with one station, Loslo Creek, showing non-detectable concentrations for Finescale Dace (Figure 3-5).

Mean zinc concentrations in whole body fish composite samples ranged from 18 µg/g (Yellow Perch from the Pinewood River) to 108 µg/g (Central Mudminnow from Unnamed Tributary 5). Nine of the mean values reported in Figure 3-5 were less than or equal to 40 µg/g.

Northern Pike sampled from the Pinewood River ranged in size from 185 mm to 570 mm (total length) with a mean of 378 mm and were well distributed between the two end points. The minimum age of individuals sampled was <1 year, indicating individuals having emerged during the spring of 2012 (i.e. Young-of-the-Year). The maximum age of the Northern Pike sampled was 5 years. The majority of fish sampled were 1 year (30%), 2 years (27%) and 3 years (18%). Total mercury body burdens in Northern Pike dorsal muscle tissue ranged from 0.11 µg/g to 0.67 µg/g with a mean of 0.34 µg/g (Table 3-15). The relationship between total mercury concentration in muscle tissue and total length of Northern Pike was statistically significant (Regression; $P < 0.001$), showing an increasing trend in mercury body burden with increasing size (Figure 3-6).

Cobalt was present in dorsal muscle tissue of Northern Pike from the Pinewood River at concentrations ranging from less than detectable to 0.008 µg/g. Manganese was present at non-detectable levels to a maximum of 4.7 µg/g (average = 0.86 µg/g). Selenium concentrations ranged from non-detectable to 0.30 (average = 0.21 µg/g). The mean zinc concentrations in Northern Pike dorsal muscle tissues was 5.0 µg/g (range = 3.0 to 12.0 µg/g; Table 3-15).

Other parameters of interest including arsenic, cadmium, chromium, copper, lead and nickel were generally not present in concentrations above reportable detection limits (Table 3-15).

Mercury was present in Northern Pike liver tissue with a mean concentration of 0.15 µg/g (range = 0.06 to 0.30 µg/g). Cadmium was found at levels slightly above detection limits (0.01 µg/g) with a mean of 0.05 µg/g. Generally, copper, selenium and zinc were present in Northern Pike liver tissue at higher concentrations than shown for the same parameter in muscle tissue. Copper was present in Northern Pike livers at concentrations ranging from 6.1 to 38 µg/g (average = 15.5 µg/g). Selenium was present at a mean concentration of 1.44 µg/g (range = 0.8 to 2.5 µg/g). Zinc concentrations ranged from 19 to 72 µg/g (average = 38.20 µg/g). Arsenic, chromium, lead and nickel concentrations in Northern Pike livers were generally present at levels below detection limits (Appendix H-4).

Walleye sampled from the Pinewood River ranged in size from 223 mm to 688 mm (total length) with a mean of 383 mm. The minimum age of individuals sampled was 1 year and the maximum age was 15 years. The majority of fish sampled were 1 year (40%) and 3 years (25%). Total mercury body burdens in Walleye dorsal muscle tissue ranged from 0.08 µg/g to 1.8 µg/g with a mean of 0.40 µg/g (Table 3-15). The relationship between total mercury concentration in muscle tissue and total length was statistically significant (Regression; $P < 0.001$), showing an increasing trend in mercury body burden with increases size (Figure 3-6).

Other parameters of interest including arsenic, cadmium, chromium, cobalt, copper, lead and nickel were generally not present in concentrations above reportable detection limits (Table 3-15).

418000 419000 420000 421000 422000 423000 424000 425000 426000

5417000 5416000 5415000 5414000 5413000

McCallum Cr.
McCallum Cr. Trib. 9
McCallum Cr. Trib. 3
McCallum Cr. Trib. 2
McCallum Cr. Trib. 1
McCallum Cr. Trib. 3
McCallum Cr. Trib. 3
McCallum Cr. Trib. 3
McCallum Cr.
Loslo Cr.
Loslo Cr. Trib. 3
Loslo Cr.
RICHARDSON RD
Loslo Cr. Trib. 3
Loslo Cr. Trib. 3
Loslo Cr. Trib. 2
West Cr.
Unnamed Trib 5 - Marr Cr.
Marr Cr. Trib. 1
Marr Creek
Marr Creek
JON-1
HWY 600
McCallum Cr.
Dearlock - Tait Cr.
LOS-6
LOS-4
LOS-3
LOS-8
LOS-5
LOS-7
Loslo Cr. Trib.
LOS-11
LOS-10
Loslo Cr.
Dearlock - Tait Cr.

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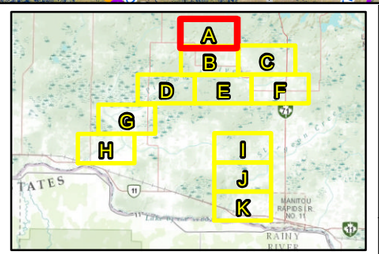
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- Subwatershed Areas (Labelled on map)

Habitat Assessment

- Channel Cross-Section Morphological Assessment Location
- Comprehensive Habitat Assessment Location
- Cross-Section Only

Habitat Types

1 2 3 4 5 6 7 8 9



NOTES:
-Road and watercourse data extracted from LIO.
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

0 1 2 4 6 Kilometres

RAINY RIVER

amec

RAINY RIVER GOLD PROJECT

Habitat Type Classification Delineations

PROJECT N^{O}: TC111504 | **FIGURE: 3-1A**

SCALE: 1:22,000 | DATE: March 2013

418000 419000 420000 421000 422000 423000 424000 425000 426000

5413000 5412000 5411000 5410000 5409000

LOS-7 LOS-5 LOS-11 LOS-10 PIN-8 UT2-A

Loslo Cr. Trib. Loslo Cr. Trib. 2 Loslo Creek Loslo Cr. Trib. 1 Loslo Creek

Marr Creek Marr Creek Marr Creek Marr Creek Marr Creek

Unnamed Trib 5 - Marr Cr. Loslo Cr.

Unnamed Trib 5 - Marr Cr. West Cr.

Dearlock - Tait Cr. Dearlock - Tait Cr. Loslo Cr. Maccallum Cr.

Pinewood River

HWY 600

Wes-Loc-A Wes-Loc-B Wes-Loc-C Wes-Loc-D Wes-Loc-E Wes-Loc-F Wes-Loc-H Wes-Loc-G Wes-Loc-I Wes-Loc-J Wes-Loc-K Wes-Loc-L Wes-3-Pond Wes-Loc-M Wes-Loc-N Wes-Loc-O Wes-Loc-P PIN-3A-CS5 PIN-3A-CS3 PIN-3A PIN-3A-CS1 PIN-3-CS3 PIN-3-CS1 PIN-3-CS2

West Creek West Cr. Trib West Cr. WES-TRIB1B West Cr. Upper Pinewood - Clark Cr. West Creek

Pinewood River

Unnamed Trib. 1 Unnamed Trib. 2

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Road

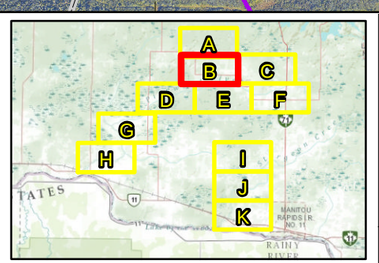
Subwatershed Areas (Labelled on map)

Habitat Assessment

- Channel Cross-Section Morphological Assessment Location
- Comprehensive Habitat Assessment Location
- Cross-Section Only

Habitat Types

1 2 3 4 5 6 7 8 9



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-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

N W E S

0 1 2 4 6 Kilometres

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RAINY RIVER GOLD PROJECT

Habitat Type Classification Delineations

PROJECT N°: TC111504 | **FIGURE: 3-1B**

SCALE: 1:22,000 | DATE: March 2013

426000 427000 428000 429000 430000 431000 432000 433000 434000

5413000 5412000 5411000 5410000 5409000

Muskrat Lake
West Cr.
Unnamed Trib 5 - Marr Cr.
West Cr.
West Cr. Trib. 3
West Cr. Trib. 3
West Cr. Trib. 2
Upper Pinewood - Clark Cr.
Clark Creek
Gallinger Ck. Trib. 2
HWY 71
WES-TRIB1A
CLA-5A
West Cr. Trib. 1
WES-TRIB1B
Clark Creek
Clark Creek
Gallinger Ck. Trib.
Gallinger Ck. Trib. 1
Gallinger Ck.
West Cr.
Upper Pinewood - Clark Cr.
HWY 600
PIN-3-CS1
Pinewood River
Clark Creek
Westra Cr.

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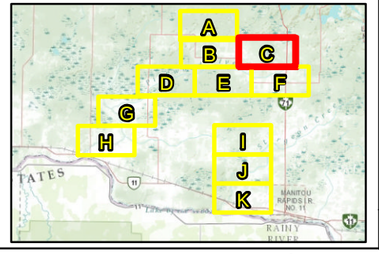
- Road
- Subwatershed Areas (Labelled on map)

Habitat Assessment

- Channel Cross-Section Morphological Assessment Location
- Comprehensive Habitat Assessment Location
- Cross-Section Only

Habitat Types

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9



NOTES:
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-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

0 1 2 4 6 Kilometres

N W E S

RAINY RIVER

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RAINY RIVER GOLD PROJECT

Habitat Type Classification Delineations

PROJECT N^{o}: TC111504	**FIGURE: 3-1C**
SCALE: 1:22,000	DATE: March 2013

412000 413000 414000 415000 416000 417000 418000 419000 420000

5409000 5408000 5407000 5406000 5405000

Kishkakoesis R.
Mid-Pinewood
HWY 617
PIN-11
PIN-10A
PIN-10
JCN-2
McCallum Creek
Mid-Pinewood
McCallum Cr.
McCallum Cr.
Dearlock - Tait Cr.
Unnamed Trib. 1
UT1-A
UT2-A
Unnamed Trib. 2
Pinewood River
PIN-9
TAIT-1
Tait Cr Trib.
Mid-Pinewood
Dearlock - Tait Cr.
Tait Cr Trib.
Tait Creek
Tait Ck Trib. 1
Pinewood River

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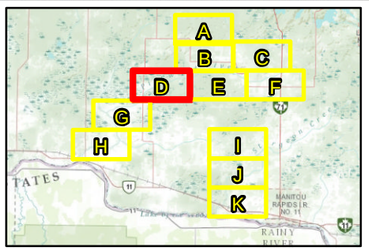
- Road
- Subwatershed Areas (Labelled on map)

Habitat Assessment

- Channel Cross-Section Morphological Assessment Location
- Comprehensive Habitat Assessment Location
- Cross-Section Only

Habitat Types

1 2 3 4 5 6 7 8 9



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-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

0 1 2 4 6 Kilometres

RAINY RIVER

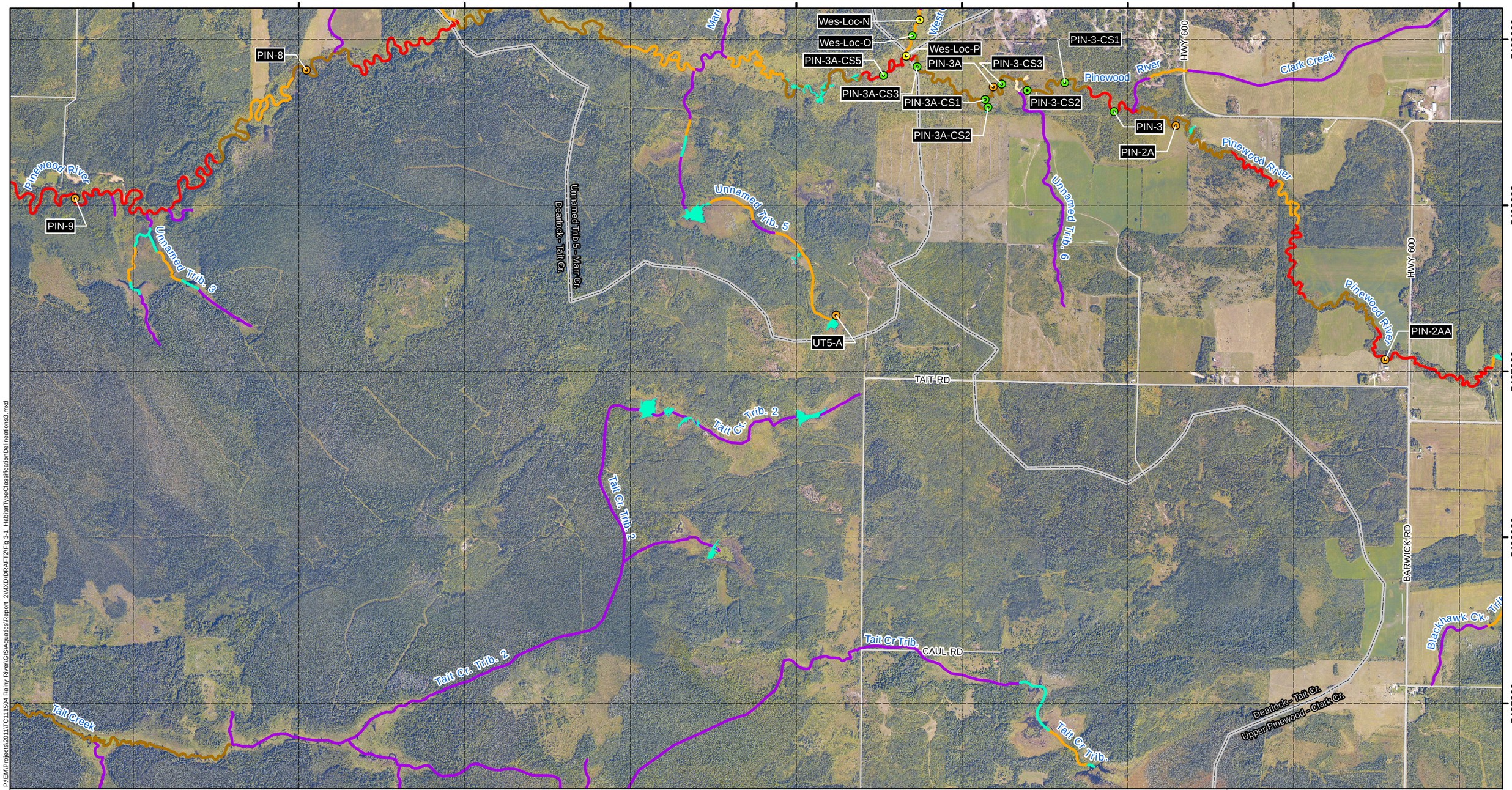
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RAINY RIVER GOLD PROJECT

Habitat Type Classification Delineations

PROJECT N^{o}: TC111504 | **FIGURE: 3-1D**

SCALE: 1:22,000 | DATE: March 2013



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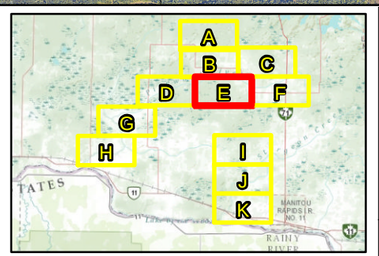
- Road
- Subwatershed Areas (Labelled on map)

Habitat Assessment

- Channel Cross-Section Morphological Assessment Location
- Comprehensive Habitat Assessment Location
- Cross-Section Only

Habitat Types

1, 2, 3, 4, 5, 6, 7, 8, 9



NOTES:
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-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

0 1 2 4 6 Kilometres

RAINY RIVER

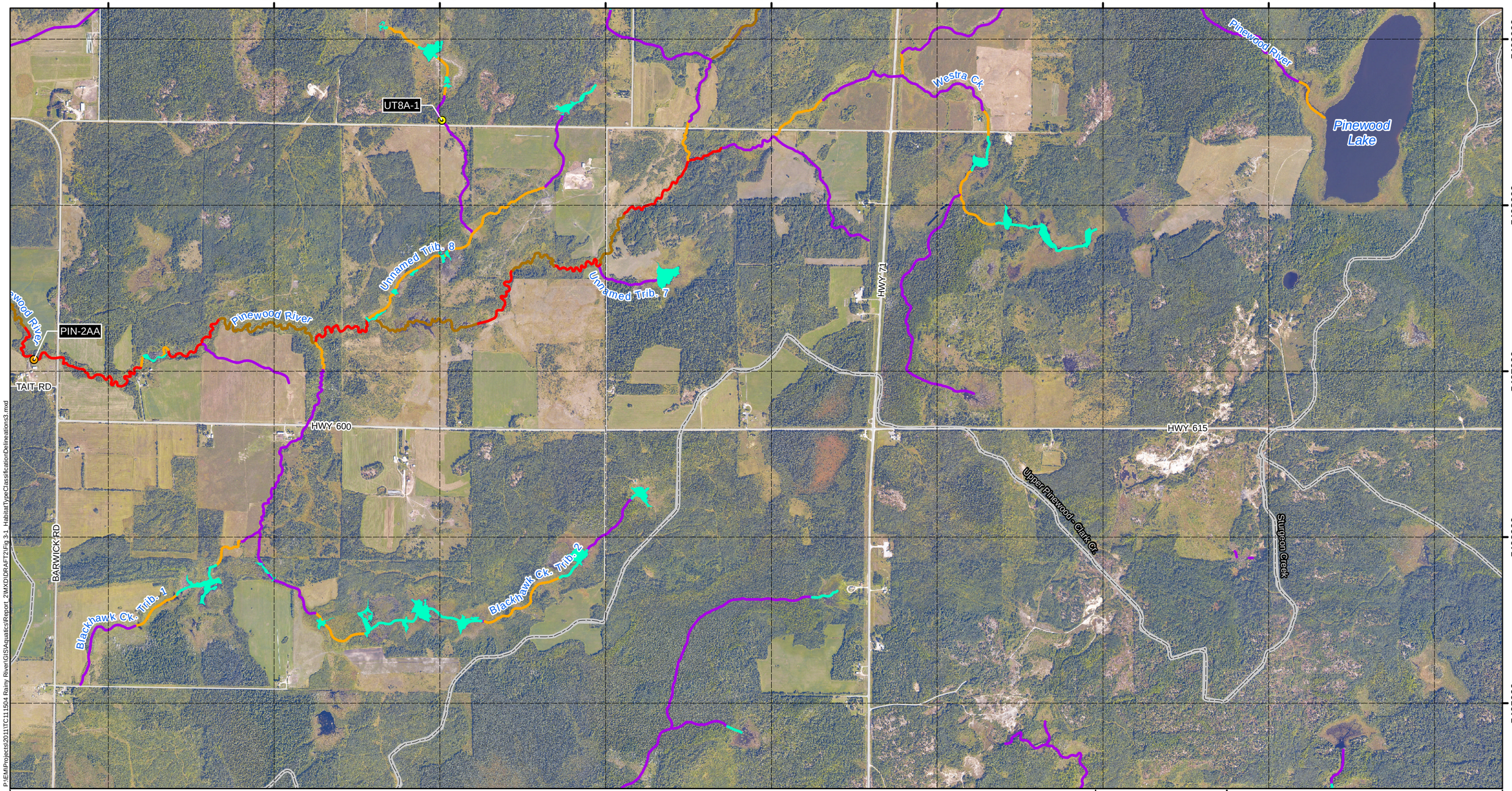
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RAINY RIVER GOLD PROJECT

Habitat Type Classification Delineations

PROJECT N°: TC111504 | **FIGURE: 3-1E**

SCALE: 1:22,000 | DATE: March 2013



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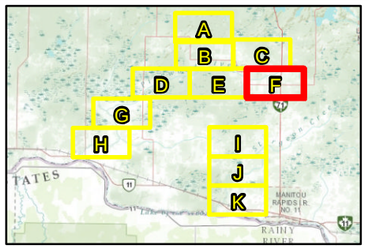
- Road
- Subwatershed Areas (Labelled on map)

Habitat Assessment

- Channel Cross-Section Morphological Assessment Location
- Comprehensive Habitat Assessment Location
- Cross-Section Only

Habitat Types

1, 2, 3, 4, 5, 6, 7, 8, 9



NOTES:
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-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

0 1 2 4 6 Kilometres

RAINY RIVER

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RAINY RIVER GOLD PROJECT

Habitat Type Classification Delineations

PROJECT N^{O}: TC111504 | **FIGURE: 3-1F**

SCALE: 1:22,000 | DATE: March 2013

406000 407000 408000 409000 410000 411000 412000 413000 414000

5404000 5403000 5402000 5401000

BROWN RD
MOSHER RD
GRAHAM RD
SCHRAM RD
HWY 617
Kishkakoesis R.
Mid-Pinewood
Kishkakoesis Creek
Spruce Is.
Kishkakoesis R.
Spruce Is.
Lower Pinewood
Mid-Pinewood
Lower Pinewood
Pinewood River
PIN-12
PIN-13
PIN-14

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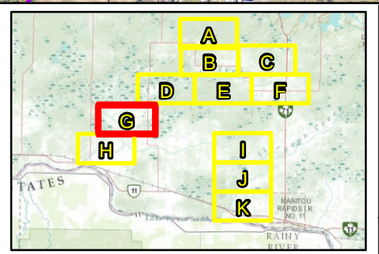
- Road
- Subwatershed Areas (Labelled on map)

Habitat Assessment

- Channel Cross-Section Morphological Assessment Location
- Comprehensive Habitat Assessment Location
- Cross-Section Only

Habitat Types

1 2 3 4 5 6 7 8 9



NOTES:
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-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

0 1 2 4 6 Kilometres

RAINY RIVER

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RAINY RIVER GOLD PROJECT

Habitat Type Classification Delineations

PROJECT N^{o}: TC111504 | **FIGURE: 3-1G**

SCALE: 1:22,000 | DATE: March 2013

403000 404000 405000 406000 407000 408000 409000 410000 411000

5400000 5399000 5398000 5397000 5396000

Lower Pinewood
Spruce Is
MOSHER RD
GRAHAM RD
SCHRAM RD
PIN-15
MORLEY PATTULLO RD W
HWY 619
PW-23
PIN-16
JOHNSTON RD
SMITH RD
PIN-17
Pinewood River
MORLEY DILKE RD
ADVENT RD
PIN-18
Lower Pinewood
HWY 11
FRONT ST
Rainy R.
Lower Pinewood

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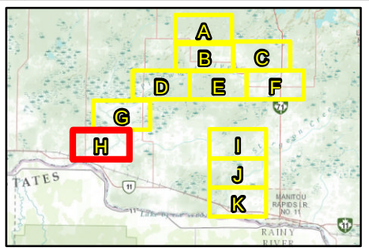
- Road
- Subwatershed Areas (Labelled on map)

Habitat Assessment

- Channel Cross-Section Morphological Assessment Location
- Comprehensive Habitat Assessment Location
- Cross-Section Only

Habitat Types

1 2 3 4 5 6 7 8 9



NOTES:
-Road and watercourse data extracted from LIO.
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

0 1 2 4 6 Kilometres

RAINY RIVER

amec

RAINY RIVER GOLD PROJECT

Habitat Type Classification Delineations

PROJECT N°: TC111504 | **FIGURE: 3-1H**

SCALE: 1:22,000 | DATE: March 2013

423000 424000 425000 426000 427000 428000 429000 430000 431000

5400000 5399000 5398000 5397000

TAIT RD
BARWICK RD
VANHEYST RD
ANGUS RD
MATHER RD
TAYLOR RD
Lower Pinewood
Sturgeon Creek
STU-5

P:\EM\Projects\2011\TC111504 Rainy River\GIS\Aquatics\Report_2\MXD\DRAFT2\Fig 3-1_HabitatTypeClassification3.mxd

LEGEND

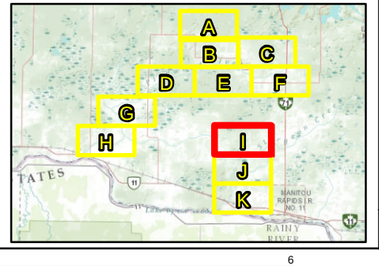
- Road
- Subwatershed Areas (Labelled on map)

Habitat Assessment

- Channel Cross-Section Morphological Assessment Location
- Comprehensive Habitat Assessment Location
- Cross-Section Only

Habitat Types

1 2 3 4 5 6 7 8 9



NOTES:
-Road and watercourse data extracted from LIO.
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

Datum: NAD83
Projection: UTM Zone 15N

0 1 2 4 6 Kilometres

N W E S

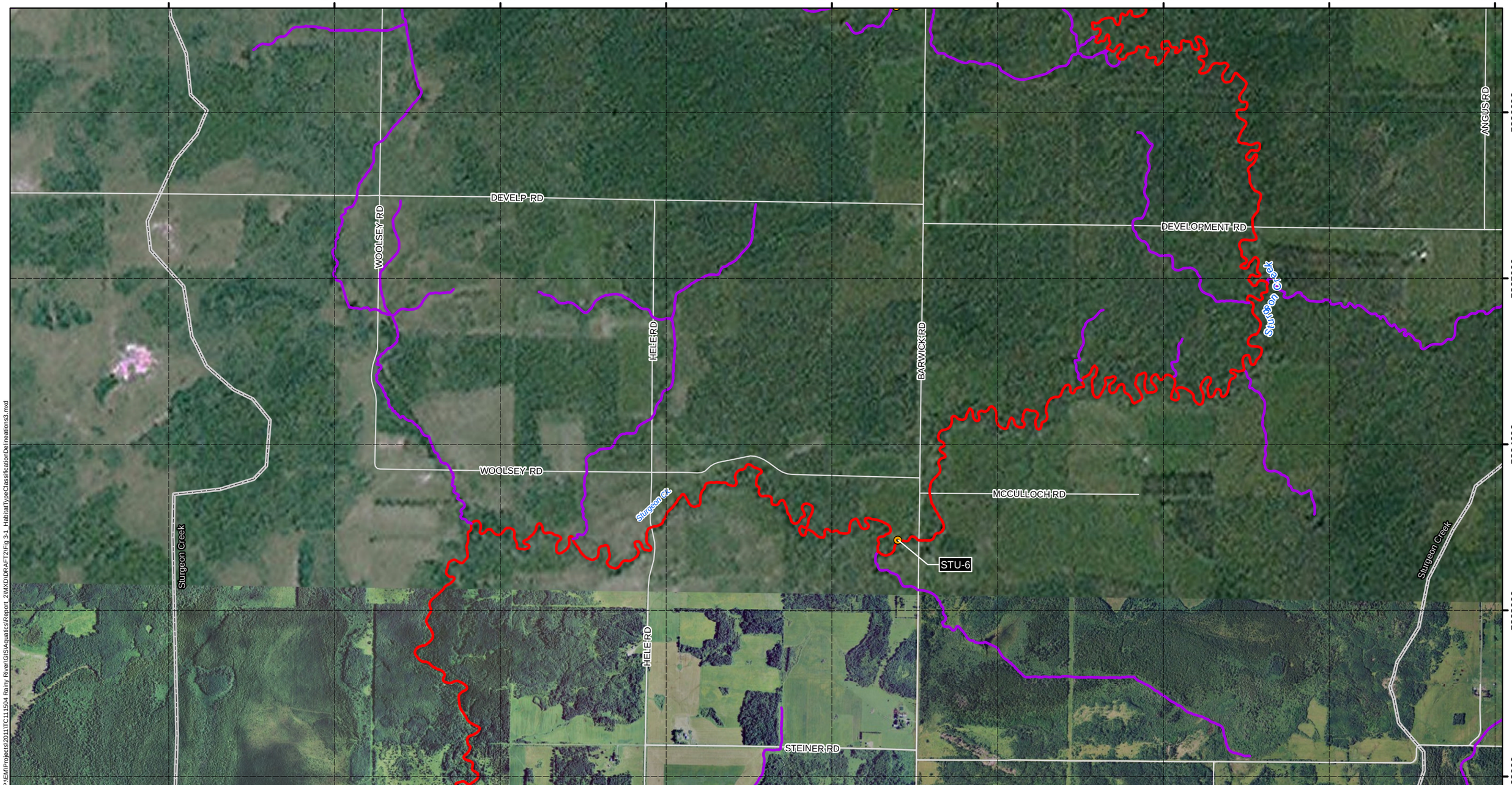
RAINY RIVER amec

RAINY RIVER GOLD PROJECT

Habitat Type Classification Delineations

PROJECT N°: TC111504 | **FIGURE: 3-1I**

SCALE: 1:22,000 | DATE: March 2013



LEGEND

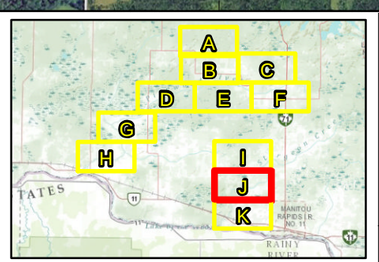
- Road
- Subwatershed Areas (Labelled on map)

Habitat Assessment

- Channel Cross-Section Morphological Assessment Location
- Comprehensive Habitat Assessment Location
- Cross-Section Only

Habitat Types

1, 2, 3, 4, 5, 6, 7, 8, 9



NOTES:
-Road and watercourse data extracted from LIO.
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

RAINY RIVER GOLD PROJECT

Habitat Type Classification Delineations

Datum: NAD83
Projection: UTM Zone 15N

0 1 2 4 6 Kilometres

PROJECT N^{O}: TC111504 | **FIGURE: 3-1J**

SCALE: 1:22,000 | DATE: March 2013

423000 424000 425000 426000 427000 428000 429000 430000 431000

5392000 5391000 5390000 5389000 5388000

STEINER RD
HELE RD
BARWICK RD
HAYES RD
Sturgeon Creek
Sturgeon Cr.
HWY 11
ROBERTSON AVE
AGNES ST
MAIN ST
QUEEN ST
Rainy River

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LEGEND

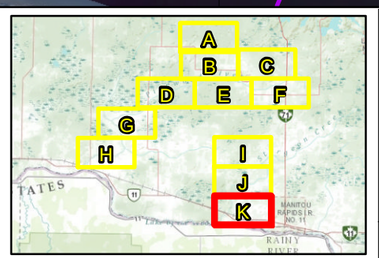
- Road
- Subwatershed Areas (Labelled on map)

Habitat Assessment

- Channel Cross-Section Morphological Assessment Location
- Comprehensive Habitat Assessment Location
- Cross-Section Only

Habitat Types

1 2 3 4 5 6 7 8 9



NOTES:
-Road and watercourse data extracted from LIO.
-Main background imagery collected in 2011 late summer, and provided by Rainy River Resources.
-Other background imagery provided by ESRI World Image service.

RAINY RIVER

amec

RAINY RIVER GOLD PROJECT

Habitat Type Classification Delineations

Datum: NAD83
Projection: UTM Zone 15N

N W E S

PROJECT N°: TC111504 | **FIGURE: 3-1K**

SCALE: 1:22,000 | DATE: March 2013

0 1 2 4 6 Kilometres

403000 403500 404000 404500 405000 405500

5397500

5397000

5396500

HWY 669

PIN-17

0.5 1 2 2 1 2 1 0.5 0.5

100 Metres

Pinewood River

HWY 619

1 2 3 4 5 3 2 1

100 Metres

HWY 11

CHURCH ST

AMY ST

DONALD ST

P:\EM\Projects\2011\TC111504 Rainy River\GIS\Aquatics\Report_2\MXD\DRAFT2\Fig 3-2A_Bathymetry_2.mxd

LEGEND

Comprehensive Habitat Assessment Location

Spot Depth Classifications along River Centerline Transects (metres)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0
- 3.0 - 3.5
- 3.5 - 4.0
- 4.0 - 4.5

Detailed Bathymetry Surfaces for Pinewood River

- Bathymetry Contours (0.5 metre intervals)
- Bathymetry Analysis Extent
- BathyGrid

Water Depth (metres) (Filled Contours)

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 4.5
- 4.5 - 5
- 5 - 5.5

0 0.25 0.5 1 1.5 Kilometres

NOTES:
-Road data extracted from LIO.
-Main background imagery collected in 2011 late summer, and provided by Rainy River.
-Background imagery provided by ESRI.

Datum: NAD83
Projection: UTM Zone 15N

N W E S

RAINY RIVER

amec

RAINY RIVER GOLD PROJECT

Pinewood River Bathymetry Analysis

PROJECT N°: TC111504 | **FIGURE: 3-2A**

SCALE: 1:8,000 | DATE: March 2013

403000 403250 403500 403750 404000

5396750 5396500 5396250

Pinewood River

HIGHWAY 11

GAUGHIST

AMY ST

Rainy River

FRONT ST

P:\EMP\Projects\2011\TC111504 Rainy River\GIS\Aquatics\Report_2\MXD\DRAFT2\Fig 3-2B_Bathymetry_2.mxd

LEGEND

Comprehensive Habitat Assessment Location

Spot Depth Classifications along River Centerline Transects (metres)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0
- 3.0 - 3.5
- 3.5 - 4.0
- 4.0 - 4.5

Detailed Bathymetry Surfaces for Pinewood River

- Bathymetry Contours (0.5 metre intervals)
- Bathymetry Analysis Extent

Water Depth (metres) (Filled Contours)

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- 3.5 - 4
- 4 - 4.5
- 4.5 - 5
- 5 - 5.5

0 50 100 200 300 Metres

NOTES:
-Road data extracted from LIO.
-Main background imagery collected in 2011 late summer, and provided by Rainy River.
-Background imagery provided by ESRI.

Datum: NAD83
Projection: UTM Zone 15N

N W E S

RAINYRIVER amec

RAINY RIVER GOLD PROJECT

Pinewood River Bathymetry Analysis

PROJECT N°: TC111504 | **FIGURE: 3-2B**

SCALE: 1:3,000 | DATE: March 2013

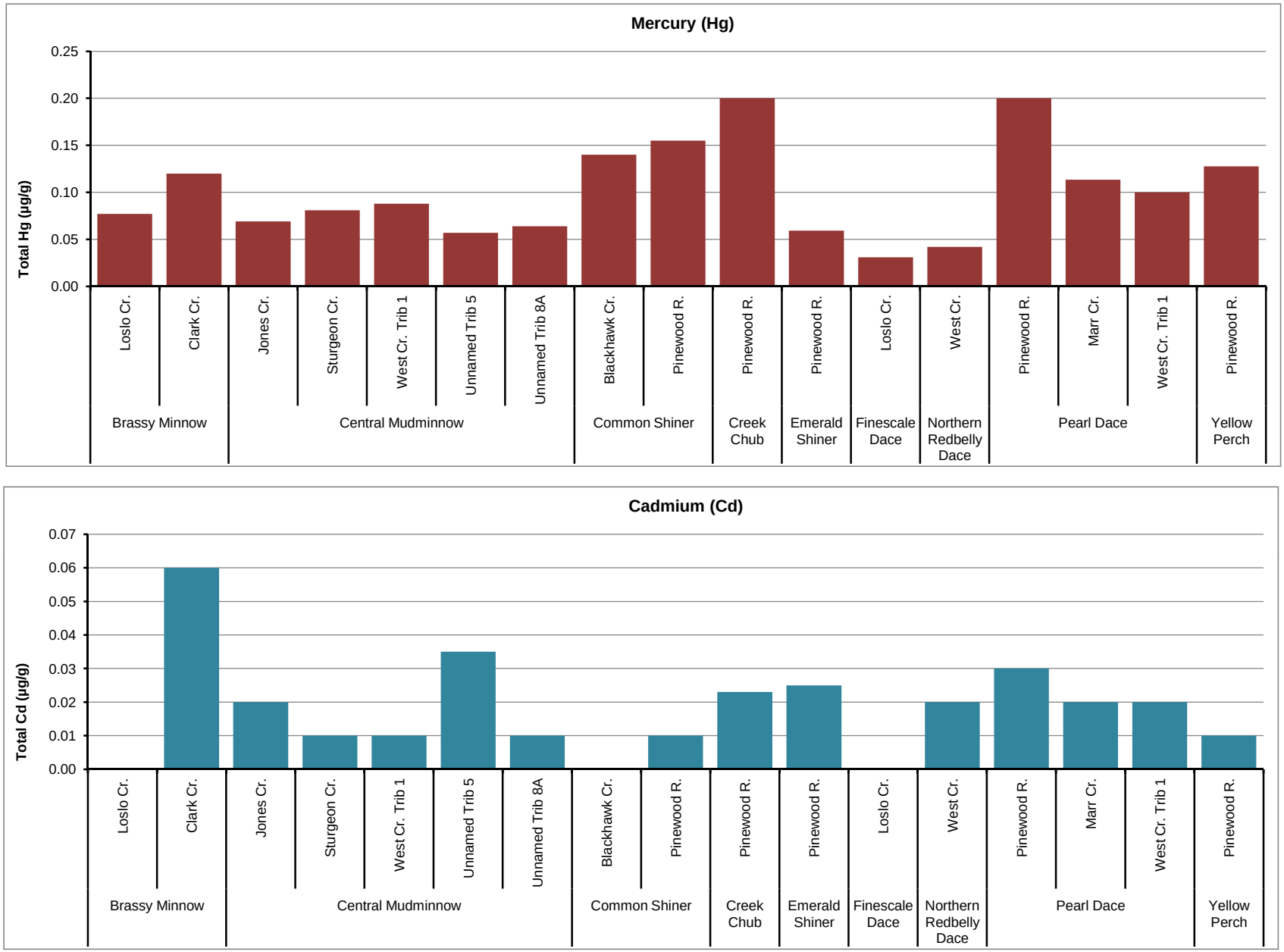


Figure 3-3: Total Mercury and Cadmium Concentrations in Composite Samples of Small Bodied Fish by Watercourse

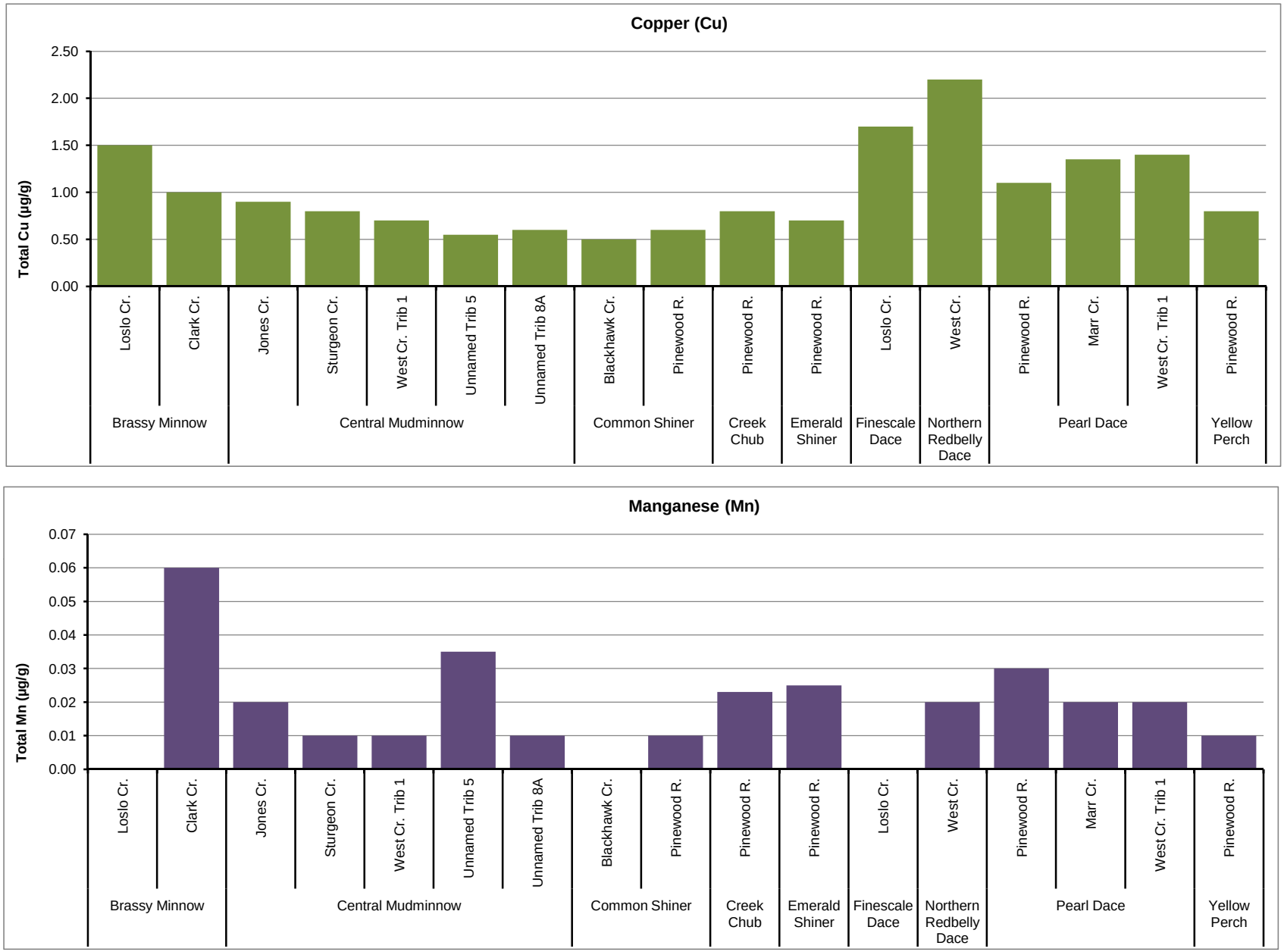


Figure 3-4: Total Copper and Manganese Concentrations in Composite Samples of Small Bodied Fish by Watercourse

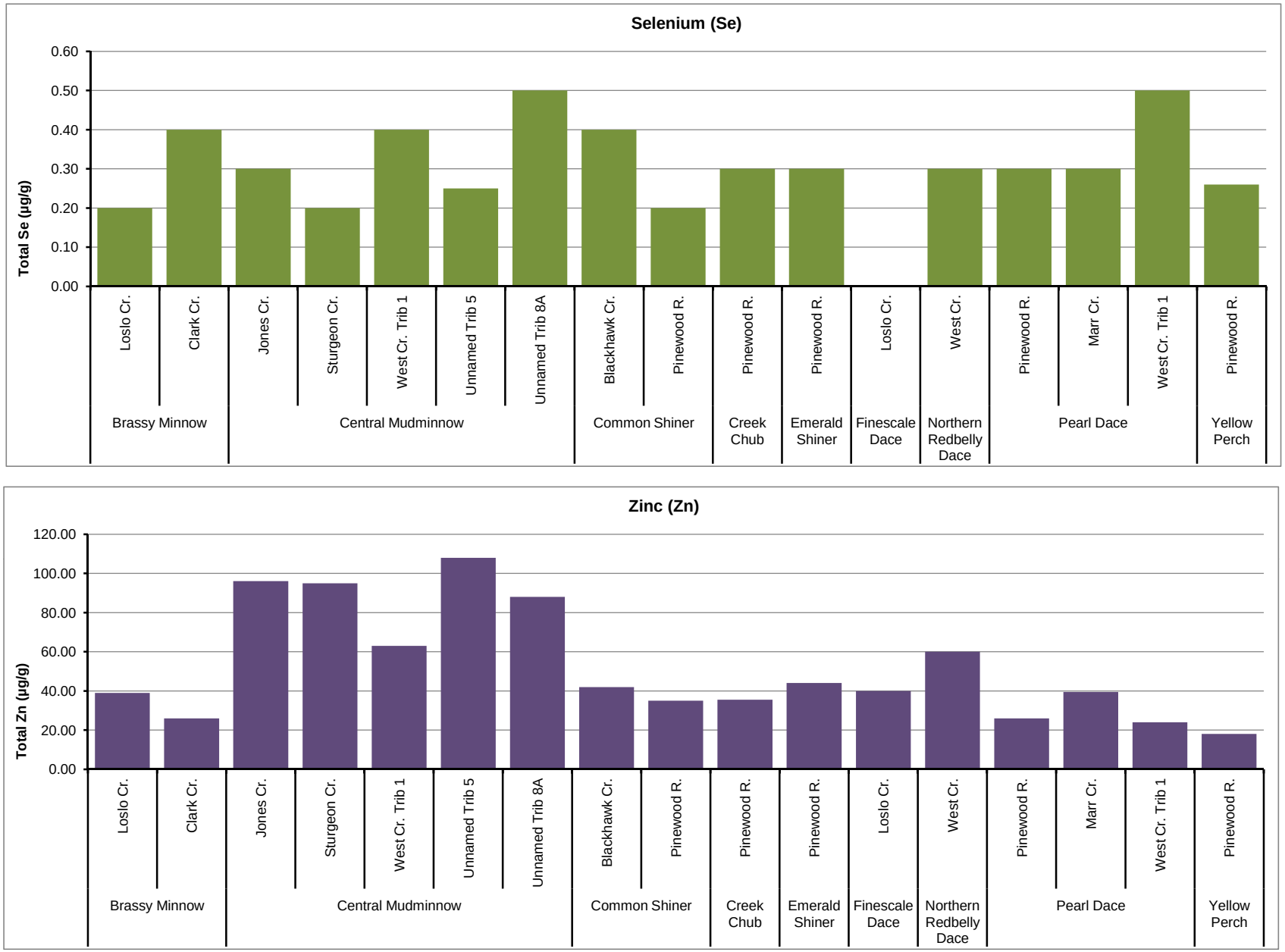
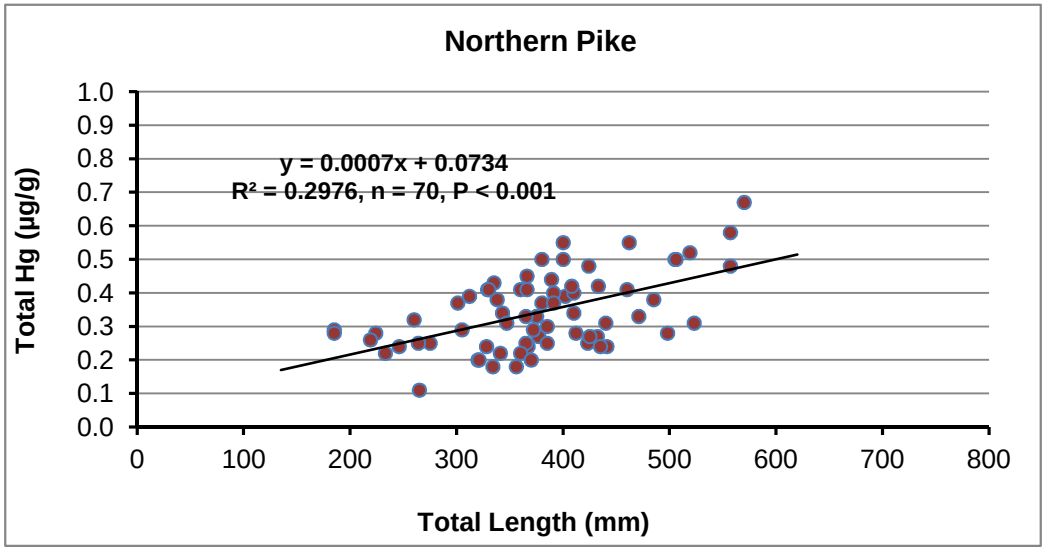


Figure 3-5: Total Selenium and Zinc Concentrations in Composite Samples of Small Bodied Fish by Watercourse



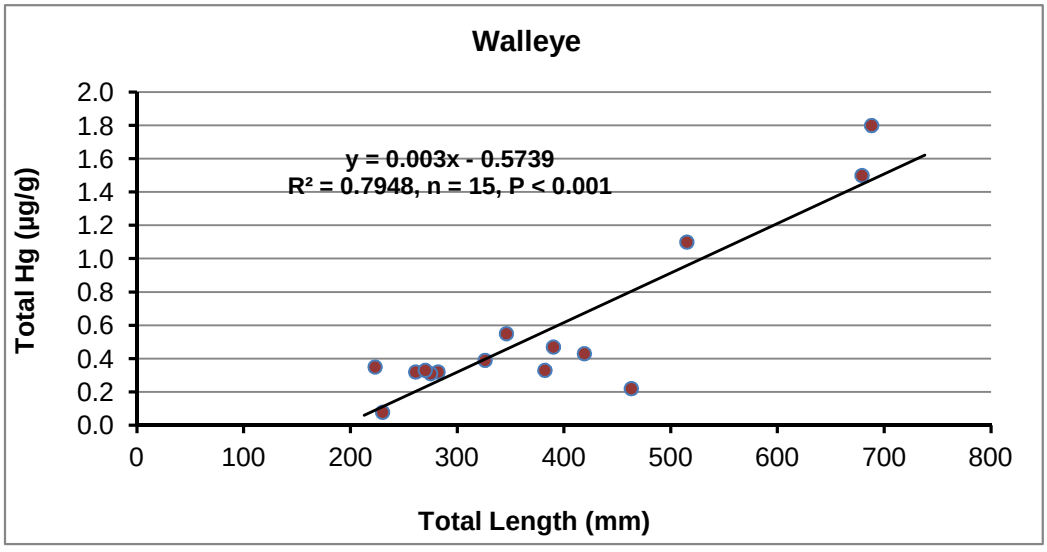


Figure 3-6: Mercury Body Burden Levels for Northern Pike and Walleye from the Pinewood River (2012)

TABLE 3-1
HABITAT TYPE CRITERIA

Typical Watershed Association	Habitat Type Classification	Watercourse vs. Waterbody Dominated	Permanent / Intermittent / Ephemeral	Characteristic Morphology Features					% Dominant Landuse / Riparian Features	Substrate Composition (% Ranges)	Instream Cover (% by Category)	Representative 2012 Habitat Sample Locations
				Habitat Attributes	Bankfull Width (m)	Average Depth (m)	Floodplain Width (m)	% Riffle, Run, Flat, Pool				
Upper Pinewood River	Habitat Type 1	Watercourse	Permanent	• Low gradient (0.05 - 1%) • Well defined and forested valley • Moderate entrenchment - banks 1:2 - 1:1 ratio • Narrower Floodplain • Moderately sinuous flow path	5 - 10	0.25 - 1.75	10 - 15	• Flats: > 80 • Pools: < 20 • Primarily flat morphology • Occasional pools in thalweg meanders	• Mixed Forest: 80 • Graminoid/Sedge Floodplain: 10 • Agricultural: 10	• Silt/Muck: 20 - 40 • Sand: 20 - 40 • Clay: 10 - 20 • Detritus: 5 - 10 • Gravel: 5 - 10 • Boulder: 2 - 5 • Loose organics, silt and detritus over firm silty clay. • Some sand/gravel beds interspersed throughout	• Woody Debris: 10 - 20 • Submerged Aquatic Veg: 5 - 10 • Emergent Aquatic Veg: 5 - 10 • Boulder/Cobble: <5 • Overhanging Veg: 5 - 10 • Moderate cover availability consisting of woody debris, bank vegetation and some aquatic vegetation	• PIN-2AA • PIN-9 • PIN-10 • PIN-10A • PIN-11 • PIN-12 • PIN-13 • STU-6
	Habitat Type 2	Watercourse	Permanent	• Low gradient (0.05 - 1%) • Low entrenchment - banks 1:5 - 1:2 ratio • Moderate past/present beaver activity • Hummocky	10 - 20	0.75 - 2.25	15 - 50	• Flats: >90 • Pools: < 10 • Pools and flats due to occasional beaver activity	• Graminoid/Sedge Floodplain: 60 • Agricultural: 30 • Mixed Forest: 10	• Silt/Muck: 20 - 40 • Sand: 20 - 40 • Clay: 10 - 20 • Detritus: 5 - 15 • Gravel: 5 - 10 • Boulder: 2 - 5 • Loose organics, silt and detritus over firm silty clay.	• Woody Debris: 20 - 30 • Submerged Aquatic Veg: 10 - 15 • Emergent Aquatic Veg: 10 - 20 • Boulder/Cobble: <5 • Overhanging Veg: 20 - 30 • High cover availability consisting of woody debris, bank vegetation and some undercut banks	• PIN-2A • PIN-3A • PIN-8 • PIN-11 • Tait-1
Upper Reaches of Pinewood River Tributaries	Habitat Type 3	Watercourse	Permanent	• Braided/Diffuse channel • Low entrenchment - banks 1:10 - 1:5 ratio • Low gradient (0.05 - 1%) • Poorly defined flow pattern. • Multiple channels • Past/present beaver activity	2 - 5	0.25 - 1.75	50 - 150	• Flats: >90 • Pools: < 5 • Runs: < 5 • Braided/diffuse channels • Deep narrow channels • Low width/depth ratio	• Graminoid/Sedge Floodplain: 80 • Mixed Forest: 20 • Beaver influenced/Floodplain • Alder/Willow thickets interspersed	• Silt/Muck: 15 - 25 • Sand: 20 - 40 • Clay: 15 - 25 • Detritus: 10 - 20 • Loose organics, silt and detritus over firm silty clay.	• Woody Debris: < 5 • Submerged Aquatic Veg: 5 - 10 • Emergent Aquatic Veg: 5 - 10 • Overhanging Veg: 30 - 50 • High cover availability consisting of woody debris, bank vegetation, aquatic vegetation.	• LOS-5 • UT2-A • UT5-A
	Habitat Type 4	Watercourse	Intermittent; leading to permanent	• Intermittent watercourse; leading to more permanent channel • Defined flow path consisting of one channel. • Low gradient (0.05 - 1%) • Moderate entrenchment- banks 1:2 - 1:1 ratio	1 - 8	0.75 - 2.5	50 - 100	• Flats: > 60 • Pools: > 40 • Primarily flats	• Graminoid/Sedge Floodplain: 50 • Agricultural: 40 • Mixed Forest: 10	• Detritus: 20 - 40 • Silt/Muck: 20 - 40 • Sand: 25 - 50 • Clay: 5 - 10 • Loose organics, silt and detritus over firm silty clay.	• Woody Debris: 20 - 30 • Submerged Aquatic Veg: 10 - 15 • Emergent Aquatic Veg: 10 - 20 • Boulder/Cobble: <5 • Overhanging Veg: 40 - 50 • High cover availability consisting of woody debris, bank vegetation.	• LOS-3 • LOS-6 • LOS-7 • LOS-11 • WES-TRIB1A • WES-TRIB1B • JON-1 • UT1-A • U8A-1 • STU-5
	Habitat Type 5	Water Body	Permanent	• Beaver Pond • Wide floodplain • Extensive beaver activity • Regulated flow • Low entrenchment - banks 1:10 - 1:5 ratio • Low gradient (0.05 - 1%)	10 - 50	0.25 - 2.00	150 >	• Pools: 100 • Pond habitat	• Graminoid/Sedge Floodplain: 80 • Mixed Forest: 20 • Beaver influenced/Floodplain • Alder/Willow thickets interspersed	• Sand: 20 - 30 • Silt/Muck: 20 - 40 • Clay: 10 -20 • Detritus: 10 - 20 • Loose organics, silt and detritus over firm silty clay.	• Woody Debris: 30 - 50 • Submerged Aquatic Veg: 10 - 15 • Emergent Aquatic Veg: 10 - 20 • Boulder/Cobble: <5 • Overhanging Veg: 10 -20 • Moderate cover availability consisting of woody debris, bank vegetation and some aquatic vegetation	• LOS-4 • LOS-8 • JON-2 • CLA-5A • UT2-A
Mid to Lower Pinewood River	Habitat Type 6	Watercourse	Permanent	• Moderate gradient (1 - 5%) • Steep entrenchment - banks 1:1 - 2:1 ratio • Undercut and bank erosion present	10 -25	0.5 - 2.0	25 - 50	• Flats: >60 • Pools: >30 • Runs: < 10 • Primarily flat morphology • Occasional pools in thalweg meander	• Mixed Forest: 80 • Graminoid/Sedge Floodplain: 10 • Agricultural: 10	• Silt/Muck: 30 - 50 • Sand: 15 - 25 • Gravel: 20 -30 • Cobble: 20 - 30 • Boulder: 30 - 40 • Clay: 5 - 10 • Silt bottom, with gravel, cobble and boulders mixed throughout.	• Woody Debris: 20 -40 • Submerged Aquatic Veg: 5 - 10 • Emergent Aquatic Veg: 5 - 10 • Boulder/Cobble: 50 - 70 • Overhanging Veg: 10 -20 • High percent cover consisting of woody debris, bank vegetation, some aquatic vegetation, as well as cobble and boulder beds throughout	• PIN-15 • PIN-16
	Habitat Type 7	Watercourse	Permanent	• Moderate gradient (1 - 5%) • Moderate entrenchment - banks 1:2 - 1:1 ratio • Wide Floodplain • Deep holes (>4 m) interspersed • Low Flow	20 - 60	1.0 - 4.5	40 - 100	Flats: >70 Pools: <25 Runs: < 5 • Primarily flat morphology • Occasional pools in thalweg meander	• Mixed Forest: 90 • Graminoid/Sedge Floodplain: 10	• Clay: 20 - 30 • Silt/Muck: 20 - 30 • Gravel: 40 -50 • Sand: 20 - 40 • Cobble: 40 - 50 • Boulder: 20 - 30 • Clay/silt bottom, with gravel, cobble and boulders mixed throughout.	• Woody Debris: 20 -40 • Submerged Aquatic Veg: 5 - 10 • Emergent Aquatic Veg: 5 - 10 • Boulder/Cobble: 40 - 60 • Overhanging Veg: 5 - 10 • High percent cover consisting of woody debris, bank vegetation, some aquatic vegetation, as well as cobble and boulder beds throughout	• PIN-17 • PIN-18
	Habitat Type 8	Water Body	Permanent	• Intermittent Back Bay area • Large online floodprone depressions. • Low Gradient (0.05 - 1%) • Low entrenchment - banks 1:10 - 1:5 ratio • Wide Floodplain • Frequent Inundation and water level fluctuations • Graminoid/sedge dominated floodplain. • Single narrow channel connection to Pinewood River.	30 - 150	0.15 - 0.85	50 - 200	• Pools: 100 • Intermittent pond habitat	• Mixed Forest: 40 • Graminoid/Sedge Floodplain: 30 • Agricultural: 30	• Silt/Muck: 40 -60 • Sand: 20 - 30 • Clay: 10 - 20 • Detritus: 10 - 20 • Silt and detritus over firm silty clay.	• Woody Debris: < 5 • Submerged Aquatic Veg: 20 - 30 • Emergent Aquatic Veg: 40 - 60 • Boulder/Cobble: <5 • Overhanging Veg: 30 - 50	• BackBay-1 • BackBay-2 • BackBay-3
	Habitat Type 9	Watercourse	Permanent	• Potentially critical spawning/staging habitat • Boulder/Cobble/Gravel beds • Exposed bedrock • Riffle/Run Morphology during periods of high flow. • Proximity to back-eddies and slack water areas • Point bars	10 - 25	0.25 - 1.25	25 - 50	• Flats: >40 • Pools: <20 • Runs: < 20 • Riffles: < 20 • Primarily flat morphology • Riffle/Runs during periods of high flow.	• Mixed Forest: 90 • Graminoid/Sedge Floodplain: 10	• Cobble: 40 -60 • Gravel: 40 - 60 • Boulder: 30 - 40 • Sand: 10 - 30 • Silt: 10 -20 • Boulder/Cobble/gravel beds • Exposed bedrock • Underlying clay/silt layer	•Woody Debris: 5 - 15 • Submerged Aquatic: < 5 • Emergent Aquatic Veg: < 5 • Boulder/Cobble: 70 - 90 • Overhanging Veg: < 5 • Large boulders, cobble beds providing ample cover as well as ideal spawing substrate.	• PIN-14 • PW-23

TABLE 3-2
SUMMARY OF SURFACE WATER ANALYTICAL RESULTS

Parameter			Watercourse		Pinewood River														McCallum Creek		Tait Creek	Unnamed Trib. 2	Loslo Creek					Unnamed Trib. 5	West Creek	Clark Creek	Sturgeon Creek	
				Sample Location	PIN-2AA	PIN-2A	PIN-3A	PIN-8	PIN-9	PIN-10	PIN-10A	PIN-11	PIN-12	PIN-14	PIN-15	PIN-16	PIN-17	PIN-18	JON-1	JON-2	TAIT-1	UT2-A	LOS-3	LOS-4	LOS-5	LOS-8	LOS-11	UT5-A	WES-TRIB1A	CLA-5A	STU-5	STU-6
				Sample Date	4-Sep-12	11-Jul-12	14-Jul-12	12-Jul-12	11-Jul-12	17-Jul-12	13-Jul-12	21-Sep-12	25-Sep-12	21-Sep-12	20-Sep-12	24-Sep-12	19-Sep-12	19-Sep-12	11-Jul-12	17-Jul-12	14-Jul-12	14-Jul-12	18-Jul-12	18-Jul-12	16-Jul-12	16-Jul-12	29-Aug-12	13-Jul-12	11-Jul-12	13-Jul-12	6-Sep-12	5-Sep-12
	Units	RDL	PWQO	CEQG																												
Physical Tests																																
Colour, True	TCU	1.0	-	-	58.8	-	-	-	-	-	-	65.1	106	63.7	63.3	68.2	33.9	29.7	-	-	-	-	-	-	-	-	181	-	-	-	52.6	89.6
Conductivity	uS/cm	1 / 3 ^	-	-	414	400	430	440	400	370	400	458	325	368	364	347	182	107	430	390	290	210	380	440	350	310	238	320	400	150	576	416
Hardness as $CaCO_3$	mg/L	0.5	-	-	211	200	210	230	220	200	210	219	167	168	175	182	81.8	33.0	240	220	160	110	220	260	200	170	129	170	220	89	278	187
pH	pH units	0.10	6.5-8.5	6.5-9.0	8.14	8.14	7.82	7.84	8.34	7.97	7.86	7.78	7.74	8.04	7.88	8.01	7.89	7.61	7.47	7.75	7.55	8.26	8.11	7.80	7.57	7.83	7.16	7.52	7.97	7.87	8.30	8.06
Total Suspended Solids	mg/L	1 / 2 ^	-	-	17.4	4	3	<	10	5	4	35.7	14.0	56.6	38.6	9.1	7.4	5.7	16	26	4	8	3	13	11	5	72.6	3	8	2	15.6	92.6
Total Dissolved Solids	mg/L	10	-	-	294	-	-	-	-	-	-	312	270	271	255	239	109	70	-	-	-	-	-	-	-	-	236	-	-	-	364	304
Turbidity	NTU	0.10	x[A]	-	7.0	-	-	-	-	-	-	28.5	30.4	65.0	53.8	12.8	9.68	4.47	-	-	-	-	-	-	-	-	35.0	-	-	-	20.6	84.4
Anions & Nutrients																																
Acidity		2.0	-	-	6.4	-	-	-	-	-	-	10.2	5.4	5.0	5.4	4.4	2.4	3.4	-	-	-	-	-	-	-	-	13.6	-	-	-	6.2	5.4
Alkalinity, Total as $CaCO_3$	mg/L	5.0	x[B]	-	220	-	-	-	-	-	-	224	157	179	175	163	76.2	33.5	-	-	-	-	-	-	-	-	121	-	-	-	313	176
Ammonia, Total (as N)	mg/L	0.01 / 0.02 ^	-	xM	<	0.08	0.09	0.08	0.10	0.06	0.09	<	<	0.02	0.04	0.02	<	0.06	0.10	0.08	0.09	0.11	0.05	0.04	0.08	0.05	0.12	0.08	0.08	0.11	<	0.05
Ammonia, Unionized (calculated*)	mg/L	-	20	19	0.1	4.7	0.4	4.9	8.2	1.0	2.9	0.1	0.2	0.1	0.9	0.2	0.1	0.8	0.5	1.6	7.8	10.4	2.2	0.8	0.5	1.3	0.01	0.2	4.8	8.6	0.3	0.6
Chloride (Cl-)	mg/L	0.10	-	120	4.6	-	-	-	-	-	-	6.4	2.9	5.0	3.6	3.3	2.7	3.2	-	-	-	-	-	-	-	-	2.0	-	-	-	11.9	30.6
Flouride (F-)	mg/L	0.030 / 0.1 ^	-	0.12	0.10	0.11	**0.17**	0.11	**0.13**	0.11	0.11	0.06	0.08	0.07	0.07	0.08	0.06	0.04	<	0.10	<	<	**0.12**	**0.13**	<	0.10	0.04	<	**0.13**	<	**0.14**	0.09
Nitrate - Nitrogen	mg/L	0.030 / 0.1 ^	-	3.0	<	<	<	<	<	<	<	<	<	<	<	0.037	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Nitrite - Nitrogen	mg/L	0.020 / 0.01^	-	0.06	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Nitrate + Nitrite	mg/L	0.030 / 0.1 ^	-	-	<	<	<	<	<	<	<	<	<	<	<	0.037	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Total Kjeldahl Nitrogen	mg/L	0.050	-	-	1.58	-	-	-	-	-	-	1.52	1.32	1.83	1.32	1.18	0.847	0.631	-	-	-	-	-	-	-	-	4.06	-	-	-	1.40	1.60
Dissolved Phosphorus (P)	µg/L	5 / 100 / 500 ^	-	-	31.3	<	<	<	<	130.0	<	36.8	35.9	23.5	20.2	44.2	14.1	6.8	<	<	<	<	<	<	130.0	110.0	91.9	<	<	<	17.3	44.2
Total Phosphorus (P)	µg/L	5 / 100 / 500 ^	30[I]	-	**109**	<100	<500	<100	**100**	**120**	<500	**167**	**108**	**161**	**85.3**	**81.6**	**41.8**	17.1	<100	**210**	<500	<500	<100	<100	**360**	**110**	**370**	<500	<100	<500	**105**	**218**
Orthophosphate, Dissolved (as P)	mg/L	0.0050	-	-	0.0076	-	-	-	-	-	-	0.0201	<	<	<	19.1	0.0088	<	-	-	-	-	-	-	-	-	0.0997	-	-	-	<	0.0142
Silica, Reactive (as SiO_2)	mg/L	1.0	-	-	11.1	-	-	-	-	-	-	7.7	8.6	1.3	8.1	6.0	3.5	3.6	-	-	-	-	-	-	-	-	15.7	-	-	-	11.5	11.6
Sulphate (SO_4)	mg/L	0.30	-	-	1.51	-	-	-	-	-	-	1.63	1.84	4.43	4.94	4.74	6.66	9.39	-	-	-	-	-	-	-	-	<	-	-	-	0.76	1.84
Sulphide	mg/L	0.020	-	-	<	-	-	-	-	-	-	<	<	<	<	<	<	<	-	-	-	-	-	-	-	-	0.127	-	-	-	<	<
Cyanides																																
Cyanide, Total (CN)	mg/L	0.0020 / 0.005 ^	-	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Cyanide, Weak Acid Diss	mg/L	0.0020	5	-	<	-	-	-	-	-	-	<	<	<	<	<	<	<	-	-	-	-	-	-	-	-	<	-	-	-	<	<
Organic Carbon																																
Dissolved Organic Carbon	mg/L	0.2 / 1.0 ^	-	-	20.0	27	27	24	29	30	30	27.8	20.6	26.8	20.2	21.4	9.7	8.3	28	38	39	37	16	18	30	21	26.8	23	11	42	16.7	19.9
Total Organic Carbon	mg/L	1.0	-	-	22.3	-	-	-	-	-	-	29.8	23.2	27.8	22.0	21.2	10.7	8.0	-	-	-	-	-	-	-	-	34.2	-	-	-	16.7	21.0
Aggregate Organics																																
Biochemical Oxygen Demand	mg/L	2.0	-	-	<	-	-	-	-	-	-	6.9	2.0	2.2	2.0	<	<	<	-	-	-	-	-	-	-	-	9.2	-	-	-	3.2	2.3
Chemical Oxygen Demand	mg/L	3.0	-	-	78.0	-	-	-	-	-	-	97.5	79.7	82.9	70.0	72.0	33.4	24.3	-	-	-	-	-	-	-	-	156	-	-	-	61.8	82.0
Animal/Veg Oil & Grease	mg/L	1.0	-	-	<	-	-	-	-	-	-	<	<	<	<	<	<	<	-	-	-	-	-	-	-	-	<	-	-	-	<	<
Mineral Oil & Grease	mg/L	1.0	-	-	<	-	-	-	-	-	-	<	<	<	<	<	<	<	-	-	-	-	-	-	-	-	<	-	-	-	<	<
Total Oil & Grease	mg/L	2.0	x[C]	-	<	-	-	-	-	-	-	<	<	<	<	<	<	<	-	-	-	-	-	-	-	-	<	-	-	-	<	<
Dissolved Metals																																
Dissolved Aluminum (Al)	µg/L	1 / 3 ^	75[D]	-	<	2.3	1.8	1.6	57	9.5	7.5	3.6	40.6	7.2	14.4	17.5	28.5	13.1	3.7	2.2	7.7	13	1.7	<	4.5	1.7	14.6	5.2	1.1	18	<	16.4
Dissolved Antimony (Sb)	µg/L	0.1 / 0.6 ^	-	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	0.16
Dissolved Arsenic (As)	µg/L	0.1 / 0.2 ^	-	-	1.7	1.7	2.1	1.4	5.9	3.5	3.8	2.4	2.6	1.4	2.2	2.3	1.1	0.5	1.6	2.2	1.7	1.4	2.1	1.9	1.6	1.1	1.6	1.0	1.5	1.2	1.0	4.5
Dissolved Barium (Ba)	µg/L	0.3 / 10 / 50 ^	-	-	18	<	<	<	<	12	<	18	22	27	28	22	13	9	<	17	<	<	<	18	12	14	25	<	<	<	11	34
Dissolved Beryllium (Be)	µg/L	0.06 / 1 ^	-	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Dissolved Bismuth (B)	µg/L	0.2	-	-	<	-	-	-	-	-	-	<	<	<	<	<	<	<	-	-	-	-	-	-	-	-	<	-	-	-	<	<
Dissolved Boron (B)	µg/L	2 / 20 / 100 ^	-	-	24	<	260	<	<	<	<	20	23	18	31	27	14	9	<	<	<	<	<	21	<	<	<	11	<	<	<	27	4
Dissolved Cadmium (Cd)	µg/L	0.01 / 0.0050 ^	-	-	<	<	0.007	0.020	0.006	<	0.013	<	<	<	0.011	0.018	<	<	0.010	<	0.009	0.006	<	<	<	0.005	<	0.005	0.011	0.006	<	<
Dissolved Calcium (Ca)	µg/L	100 / 300 / 1500 ^	-	-	52,900	48,000	49,000	54,000	50,000	49,000	51,000	50,600	41,500	38,700	41,800	45,500	19,600	8,680	61,000	54,000	38,000	21,000	46,000	64,000	49,000	42,000	28,600	43,000	45,000	20,000	58,300	48,900
Dissolved Chromium (Cr)	µg/L	0.5 / 1 ^	-	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Dissolved Cobalt (Co)	µg/L	0.05 / 0.3 ^	-	-	0.05	<	<	<	<	<	<	<	0.12	0.06	0.15	0.20	<	<	<	<	<	<	<	<	0.53	<	0.48	<	<	<	0.61	0.35
Dissolved Copper (Cu)	µg/L	0.2 / 0.7 ^	-	-	<	<	2.3	0.4	1.4	0.5	0.6	<	1.3	<	<	1.5	<	<	0.7	<	<	<	<	<	<	<	<	<	<	0.5	0.3	<	1.2
Dissolved Iron (Fe)	µg/L	10 / 60 / 300 ^	-	-	<	<	<	<	<	61	<	192	153	<	16	134	35	10	<	260	<	<	77	110	500	68	223	<	<	<	<	45
Dissolved Lead (Pb)	µg/L	0.1 / 0.2 ^	-	-	<	<	<	<	<	<	<	<	0.12	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Dissolved Lithium (Li)	µg/L	1 / 20 / 100 ^	-	-	9.5	<	<	<	<	<	<	6.8	7.3	6.6	7.7	7.6	2.4	1.8	<	<	<	<	<	<	<	<	6.9	<	<	<	33.4	10.5
Dissolved Magnesium (Mg)	µg/L	20 / 200 / 1,000 ^	-	-	19,100	21,000	22,000	23,000	23,000	20,000	20,000	22,400	15,400	17,300	17,200	16,600	7,970	2,740	22,000	21,000	16,000	14,000	27,000	24,000	18,000	16,000	13,900	14,000	25,000	9,600	32,100	15,700
Dissolved Manganese (Mn)	µg/L	0.5 / 4 / 20 ^	-	-	5	<	<	39	<	<	320	28	4	8	82	45	1	<	<	<	25	<	<	62	<	<	649	<	<	<	764	188
Dissolved Mercury (Hg)	µg/L	0.01	0.2[E]	-	<	-	-	-	-	-	-	<	<	<	<	<	<	<	-	-	-	-	-	-	-	-	<	-	-	-	<	<
Dissolved Molybdenum (Mo)	µg/L	0.2	-	-	0.4	0.4	0.5	<	1.2	0.9	0.7	0.3	0.5	0.8	1.3	0.8	0.3	<	0.7	<	<	<	0.3	<	<	<	<	<	0.7	0.3	0.5	1.2
Dissolved Nickel (Ni)	µg/L	0.5 / 1 ^	-	-	1.1	1.2	1.2	<	2.9	2.5	1.9	1.5	2.5	2.0	3.7	2.6	<	<	2.3	0.9	0.8	<	1.2	1.3	1.0	0.7	<	0.8	<	1.0	<	3.4
Dissolved Potassium (K)	µg/L	50 / 300 / 1,500 ^	-	-	1,940	<	<	<	<	<	<	3,520	2,870	2,300	2,750	2,400	1,280	886	<	1,100	<	<	<	970	630	430	982	<	<	<	3,740	3,080
Dissolved Selenium (Se)	µg/L	0.2 / 0.5 ^	-	-	0.5	<	0.2	0.2	0.3	<	<	<	<	<	<	<	<	<	0.2	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Dissolved Silicon (Si)	µg/L	100 / 500	-	-	-	1,800	4,200	2,200	3,300	2,200	3,200	-	-	-	-	-	-	-	9,700	6,800	8,600	5,300	2,600	3,800	8,300	3,800	-	2,600	4,100	720	-	-
Dissolved Silver (Ag)	µg/L	0.05 / 0.1	-	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Dissolved Sodium (Na)	µg/L	60 / 500 / 2,500 ^	-	-	4,780	7,500	1,400	5,900	5,800	3,400	5,800	4,530	3,240	3,440	4,520	4,890	4,190	5,650	2,500	2,500	3,700	4,400	2,100	1,900	2,100	1,600	2,540	<	3,000	3,100	14,100	13,400
Dissolved Strontium (Sr)	µg/L	0.3 / 20 / 100 ^	-	-	155	120	120	120	110	89	<	97	85	84	82	94	40	22	120	97	<	<	98	120	75	89	61	<	<	<	221	96
Dissolved Sulphur (S)	µg/L	200 / 1000	-	-	-	1,400	2,000	1,100	1,500	1,200	1,500	-	-	-	-	-	-	-	<	900	2,200	3,000	400	360	690	580	-	<	<	1,500	-	-
Dissolved Tellurium (Te)	µg/L	0.07	-	-	<	-	-	-	-	-	-	<	<	<	<	<	<	<	-	-	-	-	-	-	-	-	<	-	-	-	<	<
Dissolved Thallium (Tl)	µg/L	0.03 / 0.2 ^	-	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Dissolved Tin (Sn)	µg/L	0.1 / 1 ^	-	-	<	<	<	<	<	<	<	<	<	<	<	<	0.2	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Dissolved Titanium (Ti)	µg/L	0.5 / 1 ^	-	-	<	<	<	<	7.4	<	<	<	5.5	1.3	2.4	2.0	1.3	<	<	<	<	<	<	<	<	<	<	0.7	<	<	<	<	2.6
Dissolved Tungsten (W)	µg/L	0.10	-	-	<	-	-	-	-	-	-	<	<	<	<	<	<	<	-	-	-	-	-	-	-	-	<	-	-	-	<	<
Dissolved Uranium (U)	µg/L	0.01 / 0.1 ^	-	-	0.3	0.4	0.6	0.2	1.0	0.8	0.5	0.3	0.5	0.7	0.7	0.5	0.2	0.1	0.3	0.1	<	0.1	0.6	0.7	0.2	0.4	0.1	0.2	0.2	0.1	0.7	0.7
Dissolved Vanadium (V)	µg/L	0.2 / 1 ^	-	-	<	<	<	<	2.1	<	<	0.3	0.6	0.6	0.6	0.6	0.6	0.3	<	<	<	<	<	<	<	<	<	<	<	<	<	<	0.9
Dissolved Zinc (Zn)	µg/L	2 / 3 ^	-	-	4.5	<	4.9	<	<	<	4.0	<	<	<	<	2.4	<	<	<	<	7.7	4.5	<	<	<	<	<	<	4.4	<	6.6	3.2	<
Dissolved Zirconium (Zr)	µg/L	0.1	-	-	0.1	-	-	-	-	-	-	0.3	0.7	0.4	0.5	0.6	0.2	<	-	-	-	-	-	-	-	-	0.2	-	-	-	<	0.5

TABLE 3-2
SUMMARY OF SURFACE WATER ANALYTICAL RESULTS

Parameter			Watercourse	Pinewood River															McCallum Creek		Tait Creek	Unnamed Trib. 2	Loslo Creek					Unnamed Trib. 5	West Creek	Clark Creek	Sturgeon Creek	
			Sample Location	PIN-2AA	PIN-2A	PIN-3A	PIN-8	PIN-9	PIN-10	PIN-10A	PIN-11	PIN-12	PIN-14	PIN-15	PIN-16	PIN-17	PIN-18		JON-1	JON-2	TAIT-1	UT2-A	LOS-3	LOS-4	LOS-5	LOS-8	LOS-11	UT5-A	WES-TRIB1A	CLA-5A	STU-5	STU-6
			Sample Date	4-Sep-12	11-Jul-12	14-Jul-12	12-Jul-12	11-Jul-12	17-Jul-12	13-Jul-12	21-Sep-12	25-Sep-12	21-Sep-12	20-Sep-12	24-Sep-12	19-Sep-12	19-Sep-12		11-Jul-12	17-Jul-12	14-Jul-12	14-Jul-12	18-Jul-12	18-Jul-12	16-Jul-12	16-Jul-12	29-Aug-12	13-Jul-12	11-Jul-12	13-Jul-12	6-Sep-12	5-Sep-12
	Units	RDL	PWQO	CEQG																												
Total Metals																																
Total Aluminum (Al)	µg/L	1 / 3 ^	-	100[N]	72	91	13	6	**460**	79	**110**	**428**	**745**	**1,800**	**997**	**224**	**219**	95	100	46	29	64	20	**170**	16	24	**523**	58	16	53	21	**1,110**
Total Antimony (Sb)	µg/L	0.1 / 0.6 ^	20[I]	-	<	<	<	<	<	<	<	<	<	0.1	<	<	<	<	<	<	<	<	<	<	0.7	<	<	<	<	<	<	0.1
Total Arsenic (As)	µg/L	0.1 / 0.2 ^	100 (5[I])[F]	5	1.9	1.9	2.5	1.4	***6.3***	4.0	***5.1***	4.3	4.8	2.5	2.7	3.2	1.1	0.4	3.8	3.0	2.4	1.9	2.3	3.0	2.2	1.2	1.5	1.3	2.2	1.4	1.2	***6.1***
Total Barium (Ba)	µg/L	0.3 / 10 / 50 ^	-	-	18	21	<	19	11	15	<	29	29	40	31	24	12	7	30	25	<	<	<	22	27	16	31	<	28	<	14	5
Total Beryllium (Be)	µg/L	0.06 / 1 ^	11 / 1,100[G]	-	<	<	<	<	<	<	<	<	<	0.12	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	0.12
Total Bismuth	µg/L	0.2	-	-	<	-	-	-	-	-	-	<	<	<	<	<	<	<	-	-	-	-	-	-	-	-	<	-	-	-	<	<
Total Boron (B)	µg/L	2 / 20 / 100 ^	200[I]	1,500	26	24	190	<	22	<	<	18	22	19	33	25	11	6	<	<	<	<	20	<	<	<	17	<	<	<	29	6
Total Cadmium (Cd)	µg/L	0.005 / 0.01 ^	0.2 (0.1 / 0.5[I])[H]	0.013-0.080[O]	<	<	0.02	<	<	0.01	0.01	0.01	0.02	0.04	0.02	0.05	<	<	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	<	0.01	<	0.02	<	0.03
Total Calcium (Ca)	µg/L	100 / 300 / 1,500 ^	-	-	56,400	48,000	50,000	51,000	50,000	50,000	51,000	48,100	38,400	40,200	36,500	42,600	17,300	7,530	61,000	55,000	39,000	21,000	41,000	59,000	50,000	43,000	38,100	43,000	46,000	19,000	43,300	41,100
Total Chromium (Cr)	µg/L	0.5 / 1 ^	1 / 8.9[I]	1 / 8.9[H]	<	<	<	<	1.1	<	<	0.9	1.3	3.1	1.6	<	<	<	<	<	<	<	<	<	<	<	1.3	<	<	<	0.6	2.1
Total Cobalt (Co)	µg/L	0.05 / 0.3 ^	0.9	-	0.4	<	<	0.3	0.5	<	0.4	**1.5**	0.8	**1.6**	**1.0**	0.4	0.2	0.1	2.3	0.9	0.8	<	<	0.6	**1.7**	<	**1.0**	<	0.3	<	0.6	**1.6**
Total Copper (Cu)	µg/L	0.2 / 0.7 ^	5 (5[I])[J]	2-4[P]	<	0.7	0.5	0.3	2.1	0.8	0.9	1.6	2.4	**4.1**	2.6	2.0	1.3	0.9	0.5	0.3	0.6	0.4	<	0.3	0.3	0.5	1.5	0.4	0.3	0.6	<	2.8
Total Iron (Fe)	µg/L	10 / 60 / 300 ^	300	300	**859**	**320**	<	260	**600**	**400**	**540**	**1,990**	**1,720**	**2,270**	**1,180**	**669**	**315**	103	**2,500**	**2,200**	**900**	<	**320**	**670**	**2,900**	**450**	**1,290**	**450**	**930**	<	**1,870**	**2,110**
Total Lead (Pb)	µg/L	0.1 / 0.2 ^	5-25 (1-5[I])[K]	1-7[Q]	0.1	<	<	<	0.4	<	<	0.3	1.1	1.5	0.7	0.3	0.2	<	<	<	<	<	<	<	<	<	0.6	<	<	<	<	1.8
Total Lithium (Li)	µg/L	1 / 20 / 200 ^	-	-	7.8	<	<	<	<	<	<	6.9	7.0	9.5	8.9	6.9	2.9	1.3	<	<	<	<	<	<	<	<	10.8	<	<	<	37.0	10.1
Total Magnesium (Mg)	µg/L	20 / 200 / 1,000 ^	-	-	19,100	20,000	22,000	22,000	22,000	21,000	20,000	19,300	14,500	16,700	18,500	15,500	6,560	2,960	22,000	22,000	16,000	14,000	25,000	23,000	19,000	16,000	19,400	14,000	25,000	92,000	27,600	16,400
Total Manganese (Mn)	µg/L	0.5 / 4 / 20 ^	-	-	601	59	170	190	210	200	520	1780	329	304	341	225	34.5	12.2	1200	760	820	36	130	720	1700	110	1100	96	210	33	807	968
Total Mercury (Hg)	µg/L	0.01	-	0.026	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Total Molybdenum (Mo)	µg/L	0.2	40[I]	73	0.4	0.4	0.6	0.2	1.2	0.9	0.8	0.3	0.6	0.8	1.1	0.9	0.3	<	0.7	<	<	0.3	0.3	0.4	0.3	<	<	<	0.7	0.3	0.4	0.9
Total Nickel (Ni)	µg/L	0.5 / 1 ^	25	25-150[R]	1.0	1.9	1.4	0.8	4.5	2.8	2.5	2.2	3.5	4.9	4.4	3.0	1.5	<	2.6	1.2	1.1	<	1.3	1.7	1.5	0.9	1.4	0.8	1.0	1.2	<	4.9
Total Potassium (K)	µg/L	50 / 300 / 1,500 ^	-	-	1,620	1,900	<	1,200	800	<	<	3,460	2,960	2,800	2,750	2,370	1,190	815	660	1,100	<	<	<	960	750	500	2,310	<	730	<	4,210	2,850
Total Selenium (Se)	µg/L	0.2 / 0.5 ^	100	1	<	<	0.28	<	0.29	0.28	0.32	<	<	<	<	<	<	<	0.26	<	0.24	<	<	<	0.22	<	<	<	<	<	0.24	<	<
Total Silicon (Si)	µg/L	100 / 500 ^	-	-	-	2,000	3,600	2,100	4,400	2,600	3,300	-	-	-	-	-	-	-	10,000	7,100	8,500	5,400	2,500	4,100	8,800	4,000	<	2,600	4,300	540	-	-
Total Silver (Ag)	µg/L	0.05 / 0.1 ^	0.1	0.1	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	-	<	<	<	<	<
Total Sodium (Na)	µg/L	60 / 500 / 2,500 ^	-	-	5,770	6,800	12,000	5,500	5,200	3,600	4,300	4,370	3,260	3,470	4,090	4,930	3,890	5,210	2,200	2,500	3,100	4,400	1,900	1,900	2,200	1,600	5,070	<	2,600	<	16,900	12,000
Total Strontium (Sr)	µg/L	0.3 / 20 / 100 ^	-	-	166	110	120	110	100	93	100	85.5	77.9	80.2	68.2	85.7	32.7	27.6	120	99	<	<	90	110	79	91	67.0	<	71	<	250	85
Total Sulphur (S)	µg/L	200 / 1,000 ^	-		-	1,200	1,600	960	1,500	1,400	1,300	-	-	-	-	-	-	-	540	1,000	2,700	3,000	350	360	740	610	-	<	380	1,200	-	-
Total Tellurium (Te)	µg/L	0.07	-		<	-	-	-	-	-	-	<	<	<	<	<	<	<	-	-	-	-	-	-	-	-	<	-	-	-	<	<
Total Thallium (Tl)	µg/L	0.03 / 0.2 ^	0.3[I]	0.8	<	<	<	<	<	<	<	<	<	0.032	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Total Tin (Sn)	µg/L	0.1 / 1 ^	-	-	<	<	<	<	<	<	<	<	0.11	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Total Titanium (Ti)	µg/L	0.5 / 1 ^	-	-	2.5	3.0	1.3	<	32.0	3.3	4.2	16.3	25.2	52.2	30.7	7.0	6.3	2.5	2.6	2.8	1.6	2.3	<	4.4	<	1.2	16.4	3.0	<	1.6	1.4	33.3
Total Tungsten (W)	µg/L	0.1	30[I]		<	-	-	-	-	-	-	<	<	<	<	<	<	<	-	-	-	-	-	-	-	-	<	-	-	-	<	<
Total Uranium (U)	µg/L	0.01 / 0.1 ^	5[I]	15	0.2	0.4	0.7	0.2	1.1	0.9	0.5	0.3	0.5	0.7	0.5	0.5	0.2	0.1	0.3	0.1	<	0.1	0.6	0.8	0.2	0.5	0.1	0.2	0.2	0.1	0.5	0.7
Total Vanadium (V)	µg/L	0.2 / 1 ^	6[I]	-	0.3	<	<	<	3.2	<	1.1	1.6	3.1	**6.3**	3.3	1.5	1.1	0.4	<	<	<	<	1.0	1.6	<	<	1.1	<	<	<	<	4.2
Total Zinc (Zn)	µg/L	2 / 3 ^	30 (20)[L]	30	12.9	5.6	<	4.9	6.7	<	4.0	7.4	5.9	8.6	4.7	3.9	<	<	5.4	5.2	5.7	4.3	18.0	9.3	3.2	3.4	13.8	3.3	5.1	13.0	14.1	8.7
Total Zirconium (Zr)	µg/L	0.01	4[I]		0.2	-	-	-	-	-	-	0.5	1.0	1.3	0.9	0.7	0.2	0.1	-	-	-	-	-	-	-	-	0.4	-	-	-	0.1	1.3

Notes:

PWQO Provincial Water Quality Objectives, taken from "Policies, Guidelines, Provincial Water Quality Objectives (PWQO) of the Ministry of Environment and Energy," July, 1994; Table 2; Table of PWQOs and Interim PWQOs ("IPWQO"). IPWQOs denoted by superscript "I".
CCME Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines (CEQG) from the Summary Table: "Canadian Water Quality Guidelines for the Protection of Aquatic Life" Summary Table Accessed Online @ http://st-ts.ccme.ca/, October 2012.
RDL indicates Reportable Detection Limit.
^ indicates multiple RDLs applied by analytica lab(s).
RDL indicates RDL greater than PWQO.
< means not detected above the RDL.
- indicates parameter not analyzed.
100 indicates exceedence of an interim PWQO
100 indicates exceedence of the PWQO.
100 indicates exceedence of the CEQG.
100 indicates exceedence of both the PWQO and CEQG.
100 indicates RDL greater than PWQO.
i indicates value is an Interim PWQO.
* Unionized Ammonia calculated using field-measured pH and water temperature and lab-measured Total Ammonia.
A PWQO states: Suspended matter should not be added to surface water in concentrations that will change the naturla Secchi disc reading by more than 10%.
B PWQO states: Alkalinity should not be decreased by more than 25% of the natural concentration.
C PWQO states: Oil or petrochemicals should not be present in concentrations that: can be detected by visible film, sheen or discolouration of the surface; can be detected by odour; can cause tainiting of edible aquatic organisms; can form deposits on shorelines and bottom sediments that are detectable by sight or odour, or are deleterious to resident aquatic organisms.
D PWQO is for total aluminum measured in a clay-free sample where pH is 6.5 to 9.0.
E PWQO for mercury is for filtered samples.
F PWQO for arsenic is 100 µg/L; IPWQO is 5 µg/L
G PWQO for beryllium is 11 µg/L where hardness is <75 mg/L, 1,100 µg/L where hardness is >75 mg/L.
H PWQO for cadmium is 0.2 µg/L; PPWQO is 0.1 µg/L where hardness is 0-100 mg/L and 0.5 µg/L where hardness is >100 mg/L.
I PWQO/CEQG for hexavalent chromium is 1 µg/L, PWQO/CCME for trivalent chromium is 8.9 µg/L; total chromium reported.
J PWQO for copper is 5 µg/L; IPWQO is 5 µg/L where hardness is >20 mg/L.
K PWQO for lead is 5 µg/L where alkalinity is <20 mg/L, 10 µg/L where alkalinity is 20-40 mg/L, 20 µg/L where alkalinity is 40-80 mg/L and 25 µg/L where alkalinity is <20 mg/L where alkalinity is >80 mg/L; IPWQO is 1 µg/L where harness is <30 mg/L, 3 µg/L where hardness is 30-80 mg/L and 5 µg/L where hardness is >80 mg/L.
L PWQO for zinc is 30 µg/L; IPWQO is 20 µg/L.
M CEQG for ammonia is varies based on pH and temperature.
N CEQG for aluminum where pH is ≥6.5.
O CEQG for cadmium = $10^{0.86[\log 10(\text{hardness})]-3.2}$ µg/L.
P CEQG for copper = $e^{0.8545[\ln(\text{hardness})]-1.465}$ * 0.2µg/L; Minimum of 2 µg/L.
Q CEQG for lead = $e^{1.273[\ln(\text{hardness})]-4.705}$; Minimum of 1 µg/L.
R CEQG for nickel = $e^{0.76[\ln(\text{hardness})]+1.06\ \mu g/L}$; Minimum of 25 µg/L.

TABLE 3-3
IN SITU WATER QUALITY MEASUREMENTS

Watercourse	Sample Location	Date	Temperature (°C)	Conductivity (µS/cm)	Total Dissolved Solids (ppm)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	pH
Pinewood River	PIN-2AA	4-Sep-12	17.1	381	182	32.3	1.89	7.34
	PIN-2A	11-Jul-12	29.0	410	208	-	-	7.92
		30-Aug-12	22.8	356	199	43.1	3.56	7.17
	PIN-3A	14-Jul-12	24.8	428	213	-	-	6.94
		4-Sep-12	22.3	431	229	56.4	5.21	7.62
	PIN-8	12-Jul-12	27.5	437	229	71.3	6.36	7.98
	PIN-9	11-Jul-12	28.1	456	215	-	-	8.10
		12-Jul-12	23.6	363	485	59.1	6.36	6.85
		28-Aug-12	23.7	368	186	73.3	6.54	7.22
	PIN-10	17-Jul-12	21.9	384	196	53.9	5.21	7.56
		3-Sep-12	18.2	325	163	19.6	2.38	7.82
	PIN-10A	13-Jul-12	29.0	403	209	36.4	4.65	7.65
		5-Sep-12	19.6	371	192	53.5	4.42	7.56
	PIN-11	21-Sep-12	10.5	361	188	39.5	3.46	7.39
	PIN-12	25-Sep-12	8.4	267	136	38.7	4.09	7.67
	PIN-13	25-Sep-12	9.8	457	227	36.6	3.39	7.80
	PIN-14	21-Sep-12	10.4	330	165	40.1	4.45	7.54
	PIN-15	20-Sep-12	12.6	306	154	48.1	3.56	7.98
	PIN-16	24-Sep-12	10.4	293	147	74.1	7.13	7.72
	PIN-17	19-Sep-12	14.4	152	75	74.5	3.56	7.38
	PIN-18	19-Sep-12	14.1	90	46	86.6	8.93	7.72
	BACK BAY-1	22-Sep-12	13.5	191	96	90.5	10.80	7.57
	BACK BAY-2	22-Sep-12	15.5	162	81	56.2	4.53	7.42
	BACK BAY-3	23-Sep-12	12.8	146	73	36.3	3.59	8.05
	PW-23	18-Sep-12	14.9	285	142	83.5	8.65	8.15
McCallum Creek	JON-1	11-Jul-12	24.1	529	283	-	-	6.98
		12-Jul-12	19.5	305	238	65.6	6.65	6.84
		28-Aug-12	15.7	499	228	18.4	1.85	8.22
	JON-2	17-Jul-12	25.8	406	210	57.1	5.63	7.54
		3-Sep-12	15.2	499	246	24.1	2.66	6.95
Tait Creek	TAIT-1	14-Jul-12	27.5	368	-	69.1	6.85	8.15
		3-Sep-12	21.3	256	130	39.4	4.93	6.94
Unnamed Trib. 2	UT2-A	14-Jul-12	32.1	216	109	71.1	6.86	8.05
		6-Sep-12	12.9	215	107	46.4	4.93	7.89
Loslo Creek	LOS-3	18-Jul-12	26.6	368	190	97.1	8.42	7.87
		31-Aug-12	22.7	432	212	53.6	5.63	7.63
	LOS-4	18-Jul-12	25.1	443	226	58.9	5.63	7.56
		31-Aug-12	21.5	372	186	43.7	3.71	6.84
	LOS-5	16-Jul-12	22.6	338	180	53.6	5.68	7.08
		30-Aug-12	20.5	256	331	23.1	3.35	6.89
	LOS-6	18-Jul-12	25.6	346	173	82.8	6.31	7.36
	LOS-8	16-Jul-12	26.2	319	166	59.1	4.59	7.62
		30-Aug-12	20.1	287	188	21.4	3.46	7.05
	LOS-11	29-Aug-12	19.1	212	105	29.7	4.38	5.45
Unnamed Trib. 5	UT5-A	13-Jul-12	24.9	320	159	-	-	6.60
		15-Jul-12	22.5	324	162	28.9	2.68	6.85
		5-Sep-12	20.8	341	175	54.9	5.43	7.65
West Creek	WES-TRIB1A	11-Jul-12	28.3	467	234	-	1.57	7.95
		1-Sep-12	21.3	333	189	24.5	3.56	7.56
	WES-TRIB1B	28-Aug-12	15.4	424	215	40.4	3.71	7.36
Clark Creek	CLA-5A	13-Jul-12	26.2	149	75	113.5	8.44	8.14
		1-Sep-12	17.3	235	117	28.4	6.53	7.29
Sturgeon Creek	STU-5	6-Sep-12	15.9	515	260	63.2	4.68	7.65
	STU-6	5-Sep-12	16.1	432	225	9.7	1.11	7.61

Notes: - indicates value not recorded

TABLE 3-4
SUMMARY OF SEDIMENT ANALYTICAL RESULTS

Parameter	Watercourse					Pinewood River															McCallum Creek		Tait Creek	Unnamed Trib. 2	Loslo Creek					Unnamed Trib. 5	West Creek		Clark Creek	Sturgeon Creek	
	Sample Location					PIN-2AA	PIN-2A	PIN-3A	PIN-8	PIN-9	PIN-10	PIN-10A	PIN-11	PIN-12	PIN-14	PIN-15	PIN-16	PIN-17	PIN-18	JON-1	JON-2	TAIT-1	UT2-A	LOS-3	LOS-4	LOS-5	LOS-8	LOS-11	UT5-A	WES-TRIB1A	WES-TRIB1B	CLA-5A	STU-5	STU-6
	Sample Date					4-Sep-12	30-Aug-12	4-Sep-12	7-Sep-12	28-Aug-12	3-Sep-12	5-Sep-12	21-Sep-12	25-Sep-12	21-Sep-12	20-Sep-12	24-Sep-12	19-Sep-12	19-Sep-12	28-Aug-12	3-Sep-12	4-Sep-12	6-Sep-12	31-Aug-12	31-Aug-12	30-Aug-12	30-Aug-12	29-Aug-12	5-Sep-12	1-Sep-12	28-Aug-12	1-Sep-12	6-Sep-12	5-Sep-12
	Units	RDL	PSQG LEL	PSQG SEL	CEQG PEL																													
Physical Tests																																		
Loss on Ignition @ 550 C	%	1	-	-	-	4	11	5	7	7	8	5	5	5	5	3	2	5	5	6	10	6	6	17	13	43	3	66	5	7	4	10	8	3
Moisture	%	0.25	-	-	-	26.6	59.8	38.3	36.6	42.0	38.2	36.6	33.8	40.6	26.5	39.8	50.6	34.5	52.3	32.1	36.0	34.1	32.0	57.2	50.4	79.6	36.3	85.3	33.9	36.4	28.9	36.9	38.3	27.0
pH (1:2 soil:water)	pH	0.10	-	-	-	8.16	7.25	7.55	8.03	7.79	7.73	8.23	7.99	8.14	8.08	8.15	8.08	7.83	7.85	7.31	7.11	7.53	7.23	6.91	7.48	6.65	8.02	6.98	7.88	8.06	8.09	7.47	7.12	8.33
Leachable Anions & Nutrients																																		
Total Kjeldahl Nitrogen	µg/g	200	550	4,800	-	**1,540**	**1,630**	**1,720**	**2,580**	**1,060**	**1,350**	**1,030**	**1,120**	**550**	350	**670**	510	**950**	**1,530**	**1,330**	**1,870**	320	**1,280**	**4,890**	**2,980**	**10,800**	**1,300**	**13,600**	**620**	**1,610**	**590**	**2,540**	**3,010**	**620**
Organic / Inorganic Carbon																																		
Fraction Organic Carbon	-	0.0010	-	-	-	0.0118	0.0072	0.0135	0.0200	0.0101	0.0131	0.0109	0.0153	0.0153	0.0139	0.0169	0.0103	0.0151	0.0177	0.0117	0.0246	0.0059	0.0342	0.0570	0.0333	0.105	0.0118	0.245	0.0079	0.0166	0.0469	0.0413	0.0335	0.0053
Total Organic Carbon	%	0.10	1	10	-	**1.18**	0.72	**1.35**	**2.00**	**1.01**	**1.31**	**1.09**	**1.53**	**1.53**	**1.39**	**1.69**	**1.03**	**1.51**	**1.77**	**1.17**	**2.46**	0.59	**3.42**	**5.70**	**3.33**	**10.5**	**1.18**	**24.5**	0.79	**1.66**	**4.69**	**4.13**	**3.35**	0.53
Metals																																		
Aluminum (Al)	µg/g	50	-	-	-	8,390	15,200	11,500	15,700	11,600	11,500	18,300	11,600	14,100	15,400	17,600	6,550	11,400	10,300	14,100	16,000	7,420	18,900	17,100	19,400	13,000	14,100	3,320	14,900	7,420	5,050	6,070	13,700	9,070
Antimony (Sb)	µg/g	0.10	-	-	-	<	0.10	<	0.13	0.12	0.10	0.16	<	0.29	0.39	0.23	<	0.15	0.15	0.11	0.14	<	<	0.18	0.12	0.13	<	<	0.10	<	<	0.11	<	0.13
Arsenic (As)	µg/g	0.050	6	33	17	1.86	2.54	2.23	3.62	2.82	2.07	4.14	3.06	5.63	**6.97**	5.06	2.70	2.77	2.85	2.72	5.03	1.32	5.23	4.23	3.18	2.44	1.25	1.58	1.24	2.88	2.64	3.58	2.16	3.05
Barium (Ba)	µg/g	0.50	-	-	-	49.1	80.1	70.0	92.3	69.9	66.1	107	72.5	91.2	91.5	112	40.5	68.1	68.9	88.2	109	35.5	113	106	106	99.5	66.6	56.4	69.4	69.2	30.0	52.4	78.2	62.5
Beryllium (Be)	µg/g	0.20	-	-	-	0.32	0.57	0.50	0.68	0.42	0.49	0.75	0.35	0.67	0.77	0.68	0.29	0.47	0.45	0.61	0.65	0.26	0.69	0.83	0.80	0.48	0.56	<	0.47	0.36	<	0.48	0.47	0.38
Bismuth (Bi)	µg/g	0.20	-	-	-	<	<	<	<	<	<	0.21	<	<	0.21	0.20	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Boron (B)	µg/g	10	-	-	-	<	<	<	12	<	<	13	<	17	24	18	<	12	<	<	10	<	<	12	<	<	<	<	10	<	<	<	<	<
Cadmium (Cd)	µg/g	0.050	0.6	10	3.5	0.105	0.233	0.189	0.258	0.163	0.156	0.152	0.144	0.328	0.268	0.187	0.095	0.183	0.150	0.555	0.184	0.053	0.078	0.276	0.256	0.512	<	0.329	0.057	0.149	0.054	0.272	0.298	0.134
Calcium (Ca)	µg/g	50	-	-	-	9,060	9,310	4,750	15,400	18,000	13,400	25,000	10,800	51,800	64,100	44,900	38,400	33,300	31,800	4,710	10,800	6,570	4,980	8,910	7,360	10,200	4,260	18,300	5,610	21,800	16,400	9,910	5,890	19,900
Chromium (Cr)	µg/g	0.50	26	110	90	18.1	**28.7**	**26.6**	**32.5**	23.7	24.8	**41.7**	**26.0**	**28.9**	**30.9**	**38.5**	14.6	24.8	24.5	**27.0**	**34.0**	15.6	**35.7**	**33.0**	**34.3**	23.3	25.6	5.40	**26.8**	15.8	19.5	15.7	**29.5**	20.8
Cobalt (Co)	µg/g	0.10	-	-	-	5.62	8.16	7.51	9.39	8.62	8.03	13.9	9.33	9.08	9.30	11.7	5.86	7.86	8.60	6.41	12.9	4.60	14.5	8.79	9.79	6.90	5.22	2.75	5.50	5.84	5.42	4.26	7.07	9.41
Copper (Cu)	µg/g	0.50	16	110	197	8.33	12.0	11.5	14.4	10.6	12.0	**18.4**	11.0	**17.8**	**19.0**	**23.5**	6.84	12.1	12.8	**21.5**	**18.3**	5.57	13.5	**19.5**	**17.3**	14.1	11.9	5.34	9.67	10.8	15.5	9.96	14.5	9.84
Iron (Fe)	µg/g	50	20,000	40,000	-	10,500	16,800	14,100	18,800	14,000	15,200	**25,000**	15,600	17,500	18,700	**23,000**	9,830	14,500	15,500	15,700	**25,700**	9,240	16,500	19,900	**20,100**	13,500	14,100	4,090	13,100	12,500	12,800	6,990	14,800	13,000
Lead (Pb)	µg/g	0.50	31	250	91.3	5.34	8.06	7.30	9.11	6.89	6.31	10.2	6.00	9.15	9.01	10.6	4.92	7.71	7.87	7.26	8.87	3.89	13.3	8.80	10.3	8.47	6.97	5.25	6.33	6.43	1.47	4.63	7.58	7.32
Lithium (Li)	µg/g	5.0	-	-	-	9.9	16.3	13.3	18.6	12.3	14.3	25.8	11.6	18.6	23.8	23.3	9.8	14.1	13.7	13.7	19.1	8.9	22.2	18.2	19.9	13.5	16.0	<5.0	18.5	7.6	6.3	8.7	15.0	11.6
Magnesium (Mg)	µg/g	20	-	-	-	5,670	7,500	4,520	10,700	11,800	9,750	17,900	9,900	20,900	23,700	24,600	20,200	21,600	19,600	4,180	9,060	4,940	5,530	6,010	6,140	4,610	4,470	4,530	4,780	8,900	9,380	5,160	4,720	10,100
Manganese (Mn)	µg/g	1.0	460	1,100	-	185	273	200	402	275	276	**613**	283	**501**	**469**	**595**	241	262	386	387	**878**	167	175	**594**	443	**848**	116	**717**	109	255	406	72	284	327
Mercury (Hg)	µg/g	0.0050	0.2	2	0.486	0.0192	0.0367	0.0354	0.0365	0.0239	0.0245	0.0276	0.0229	0.0279	0.0303	0.0296	0.0132	0.0359	0.0302	0.0354	0.0299	0.0150	0.0078	0.0542	0.0373	0.0916	0.0186	0.0944	0.0198	0.0282	0.0072	0.0270	0.0345	0.0202
Molybdenum (Mo)	µg/g	0.50	-	-	-	<	<	<	<	<	<	<	<	1.22	1.70	<	<	<	<	<	<	<	<	<	<	0.53	<	0.70	<	<	<	0.69	<	<
Nickel (Ni)	µg/g	0.50	16	75	-	12.1	**17.8**	**16.7**	**23.3**	**16.7**	**18.4**	**33.3**	**19.5**	**26.0**	**27.3**	**31.4**	11.6	**18.8**	**19.9**	**19.5**	**25.3**	10.6	**26.8**	**24.8**	**23.3**	**17.3**	15.1	5.35	**16.6**	15.9	12.1	12.5	**19.4**	**18.5**
Phosphorus (P)	µg/g	50	600	2,000	-	377	570	435	484	464	466	498	388	448	457	476	283	458	426	406	**688**	249	170	578	427	**632**	359	428	325	456	351	339	407	339
Potassium (K)	µg/g	100	-	-	-	1,270	1,930	1,400	1,810	1,580	1,700	3,500	1,820	3,200	3,810	3,440	1,170	2,010	1,900	1,410	2,170	970	2,390	2,140	2,110	1,410	1,650	390	1,960	1,160	520	480	1,450	1,510
Selenium (Se)	µg/g	0.20	-	-	-	0.21	0.35	0.42	0.30	0.27	0.25	0.25	0.23	0.57	0.62	0.25	<	0.27	0.20	0.47	0.32	<	0.58	1.28	0.64	1.10	<	1.13	<	<	<	0.61	0.43	0.23
Silver (Ag)	µg/g	0.10	-	-	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Sodium (Na)	µg/g	100	-	-	-	<	130	<	140	120	130	270	140	180	290	270	110	140	140	<	160	<	180	100	<	<	<	<	<	<	<	<	<	<	130
Strontium (Sr)	µg/g	0.50	-	-	-	16.8	27.6	20.8	29.2	23.7	22.5	34.1	17.8	54.7	69.8	45.9	22.2	27.6	26.5	19.3	25.4	13.5	27.5	32.1	28.3	31.5	19.4	41.0	18.3	20.0	14.4	14.0	22.1	22.4
Thallium (Tl)	µg/g	0.050	-	-	-	0.092	0.182	0.127	0.177	0.139	0.138	0.253	0.120	0.228	0.231	0.252	0.095	0.166	0.164	0.134	0.182	0.075	0.256	0.219	0.182	0.155	0.148	0.056	0.156	0.145	<	0.088	0.139	0.117
Tin (Sn)	µg/g	2.0	-	-	-	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Titanium (Ti)	µg/g	1.0	-	-	-	211	256	167	258	290	280	446	260	200	246	492	219	314	220	178	318	216	573	164	170	183	271	70	329	202	288	138	192	221
Uranium (U)	µg/g	0.050	-	-	-	0.640	1.45	1.53	1.51	1.28	1.02	1.25	0.733	1.65	1.99	1.21	0.530	1.04	0.887	1.05	1.25	0.509	2.92	6.58	4.00	4.88	1.03	2.53	1.08	0.627	0.189	2.08	2.32	0.813
Vanadium (V)	µg/g	0.20	-	-	-	25.4	42.8	33.3	47.5	36.2	35.4	54.0	35.2	51.5	59.6	58.6	22.0	37.6	32.6	42.5	48.2	21.7	52.5	54.0	53.6	33.1	35.0	9.76	34.1	24.7	17.6	41.8	35.0	31.3
Zinc (Zn)	µg/g	1.0	120	820	315	35.0	65.6	56.4	56.1	46.2	51.7	70.1	49.9	55.3	57.8	63.2	29.6	48.4	49.2	73.6	66.6	27.3	60.8	57.9	65.5	66.5	36.2	35.2	34.4	32.8	35.8	28.5	76.9	39.1

Notes:

PSQG Provincial Sediment Quality Guidelines (PSQG), taken from "Guidelines for Identifying, Assessing and Managing Contaminated Sediments in Ontario: An integrated approach", Ontario Ministry of the Environment, May 2008; the Protection and Management of Aquatic Sediment Quality in Ontario", Queen's Printer for Ontario, 1993; Table 1: Provincial Sediment Quality Guidelines for Metals and Nutrients.
LEL - indicates Lowest Effect Level
SEL - indicates Severe Effect Level

CEQG Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines (CEQG) from the Summary Table: "Canadian Sediment Quality Guidelines for the Protection of Aquatic Life" Summary Table accessed online at http://st-ts.ccme.ca/, October 2012.
PEL - Probable Effects Level

RDL indicates Reportable Detection Limit.

< means not detected above the RDL.

100 indicates exceedence of the PSQG LEL.

100 indicates exceedence of the PSQG SEL.

100 indicates exceedence of CEQG PEL.

TABLE 3-5
SEDIMENT GRAIN SIZE DISTRIBUTION RESULTS

Watercourse		Pinewood River													
Sample Location		PIN-2AA	PIN-2A	PIN-3A	PIN-8	PIN-9	PIN-10	PIN-10A	PIN-11	PIN-12	PIN-14	PIN-15	PIN-16	PIN-17	PIN-18
Sample Date		4-Sep-12	30-Aug-12	4-Sep-12	7-Sep-12	28-Aug-12	3-Sep-12	5-Sep-12	21-Sep-12	25-Sep-12	21-Sep-12	20-Sep-12	24-Sep-12	19-Sep-12	19-Sep-12
Parameter	**Units**														
Pebble/Cobble (>16.0 mm)	%	4	0	0	0	0	0	0	0	12	11	0	0	1	0
Gravel (2.0 mm - 16.0 mm)	%	17	0	0	0	3	0	0	7	11	37	12	1	12	13
Coarse Sand (0.2 mm - 2.0 mm)	%	23	33	38	25	13	17	12	29	18	15	21	7	13	23
Fine Sand (0.062 mm - 0.2 mm)	%	27	26	10	34	34	39	11	19	18	4	20	47	22	20
Silt (0.0039 mm - 0.062 mm)	%	23	33	40	37	43	32	42	30	26	17	35	36	46	38
Clay (<0.0039 mm)	%	6	8	12	4	7	12	35	15	15	16	12	9	6	6
Organic Content	%	4.0	8.2	8.0	9.8	6.2	7.1	5.6	9.1	3.1	2.6	6.2	0.0	2.0	3.6

Watercourse		McCallum Creek		Tait Creek	Unnamed Trib. 2	Loslo Creek					Unnamed Trib. 5	West Creek		Clark Creek	Sturgeon Creek	
Sample Location		JON-1	JON-2	TAIT-1	UT2-A	LOS-3	LOS-4	LOS-5	LOS-8	LOS-11	UT5-A	WES-TRIB1A	WES-TRIB1B	CLA-5A	STU-5	STU-6
Sample Date		28-Aug-12	3-Sep-12	4-Sep-12	6-Sep-12	31-Aug-12	31-Aug-12	30-Aug-12	30-Aug-12	29-Aug-12	5-Sep-12	1-Sep-12	28-Aug-12	1-Sep-12	6-Sep-12	5-Sep-12
Parameter	**Units**															
Pebble/Cobble (>16.0 mm)	%	0	0	0	0	0	0	0	0	-**	12	3	19	0	7	0
Gravel (2.0 mm - 16.0 mm)	%	4	7	2	1	0	7	0	7	-**	30	5	69	10	13	0
Coarse Sand (0.2 mm - 2.0 mm)	%	37	32	63	5	41	45	28	28	-**	27	18	9	52	30	34
Fine Sand (0.062 mm - 0.2 mm)	%	32	25	16	14	23	23	34	28	-**	15	41	2	14	26	34
Silt (0.0039 mm - 0.062 mm)	%	19	27	15	66	31	21	28	31	-**	13	32	1	20	20	24
Clay (<0.0039 mm)	%	8	9	4	14	5	4	10	6	-**	3	1	0	4	4	8
Organic Content	%	7.3	6.9	2.9	8.4	15.1	12.6	53.7	4.2	-**	2.9	4.1	0.7	-	6.4	4.4

Notes: Composition estimated from Grain Size Distribution curves.

** Sample LOS-11 contained a high proportion of organic content; insufficient sample volume remaining for hydrometer test after combustion.

TABLE 3-6
SUMMARY OF BENTHIC INVERTEBRATE COMMUNITY INDICES
DESCRIPTORS BY LOCATION

Water-course	Sample Location	Count	TID (#/m^2)	Family Richness	Simpson's Diversity (1-D)	Evenness	EPT (%)	Chironomids (%)
Pinewood River	PIN-2AA	10	145	3	0.34	0.51	0	80.0
	PIN-2A	32	464	3	0.47	0.63	0	31.3
	PIN-3A	5	72	3	0.56	0.76	0	0
	PIN-8	19	275	5	0.74	0.76	0	10.5
	PIN-9	206	2986	15	0.66	0.20	5.8	2.9
	PIN-10	109	1580	15	0.68	0.21	1.8	51.4
	PIN-10A	43	623	6	0.63	0.45	0	53.5
	PIN-11	92	1333	10	0.46	0.19	1.1	71.7
	PIN-12	36	522	4	0.16	0.30	2.8	91.7
	PIN-14	110	1594	2	0.31	0.72	0	80.9
	PIN-15	40	580	8	0.72	0.45	12.5	42.5
	PIN-16	100	1449	4	0.10	0.28	1.0	95.0
	PIN-17	321	4652	19	0.65	0.15	2.8	49.2
	PIN-18	215	3116	12	0.70	0.27	12.6	52.1
	Mean	**102**	**1480**	**8**	**0.53**	**0.41**	**3.1**	**48.7**
	Min	**5**	**72**	**2**	**0.10**	**0.15**	**0**	**0**
	Max	**321**	**4652**	**19**	**0.74**	**0.76**	**12.6**	**95.0**
	SD	**93.4**	**1353**	**5.55**	**0.22**	**0.23**	**4.5**	**31.4**
	SE	**53.9**	**781**	**3.20**	**0.12**	**0.13**	**2.6**	**18.2**
McCallum Creek	JON-1	11	159	4	0.61	0.64	0	54.5
	JON-2	91	1319	9	0.78	0.51	0	1.1
	Mean	**51**	**739**	**7**	**0.70**	**0.58**	**0**	**27.8**
	Min	**11**	**159**	**4**	**0.61**	**0.51**	**0**	**1.1**
	Max	**91**	**1319**	**9**	**0.78**	**0.64**	**0**	**54.5**
	SD	**56.6**	**820**	**3.54**	**0.12**	**0.09**	**0**	**37.8**
	SE	**32.7**	**473**	**2.04**	**0.07**	**0.05**	**0**	**21.8**
Tait Creek	TAIT-1	112	1623	6	0.17	0.20	0	91.1
Unnamed Trib. 2	UT2-A	8	116	2	0.38	0.80	0	0

TABLE 3-6
SUMMARY OF BENTHIC INVERTEBRATE COMMUNITY INDICES
DESCRIPTORS BY LOCATION

Water-course	Sample Location	Count	TID (#/m^2)	Family Richness	Simpson's Diversity (1-D)	Evenness	EPT (%)	Chironomids (%)
Loslo Creek	LOS-3	53	768	8	0.66	0.37	0	54.7
	LOS-4	5	72	2	0.48	0.96	0	60.0
	LOS-5	22	319	5	0.64	0.56	0	54.5
	LOS-8	84	1217	6	0.74	0.64	0	31.0
	LOS-11	6	87	3	0.67	1.00	0	0
	Mean	**34**	**493**	**5**	**0.64**	**0.71**	**0**	**40.0**
	Min	**5**	**72**	**2**	**0.48**	**0.37**	**0**	**0**
	Max	**84**	**1217**	**8**	**0.74**	**1.00**	**0**	**60.0**
	SD	**34.0**	**493**	**2.39**	**0.10**	**0.27**	**0**	**25.0**
	SE	**19.6**	**285**	**1.38**	**0.06**	**0.16**	**0**	**14.5**
Unnamed Trib. 5	UT5-A	107	1551	5	0.54	0.44	0	62.6
West Creek	WES-TRIB1A	265	3841	8	0.42	0.21	0	74.7
	WES-TRIB1B	336	4870	18	0.70	0.19	0.3	0.3
	Mean	**301**	**4355**	**13**	**0.56**	**0.20**	**0.1**	**37.5**
	Min	**265**	**3841**	**8**	**0.42**	**0.19**	**0**	**0.3**
	Max	**336**	**4870**	**18**	**0.70**	**0.21**	**0.3**	**74.7**
	SD	**50.2**	**728**	**7.07**	**0.20**	**0.02**	**0.2**	**52.6**
	SE	**29.0**	**420**	**4.08**	**0.12**	**0.01**	**0.1**	**30.4**
Clark Creek	CLA-5A	12	174	3	0.61	0.86	0	33.3
Sturgeon Creek	STU-5	2	29	1	0.00	1.00	0	100
	STU-6	3	43	3	0.67	1.00	0	33.3
	Mean	**3**	**36**	**2**	**0.33**	**1.00**	**0**	**66.7**
	Min	**2**	**29**	**1**	**0.00**	**1.00**	**0**	**33.3**
	Max	**3**	**43**	**3**	**0.67**	**1.00**	**0**	**33.3**
	SD	**0.7**	**10**	**1.41**	**—**	**—**	**0**	**47.1**
	SE	**0.4**	**6**	**0.82**	**—**	**—**	**0**	**27.2**

TABLE 3-7
BENTHIC INVERTEBRATE FAMILY PROPORTIONS BY LOCATION

Benthic Invertebrate Taxa	Watercourse	Pinewood River														McCallum Creek		Tait Creek	Unnamed Trib. 2	Loslo Creek					Unnamed Trib. 5	West Creek		Clark Creek	Sturgeon Creek	
	Sample Location	PIN-2AA	PIN-2A	PIN-3A	PIN-8	PIN-9	PIN-10	PIN-10A	PIN-11	PIN-12	PIN-14	PIN-15	PIN-16	PIN-17	PIN-18	JON-1	JON-2	TAIT-1	UT2-A	LOS-3	LOS-4	LOS-5	LOS-8	LOS-11	UT5-A	WES-TRIB1A	WES-TRIB1B	CLA-5A	STU-5	STU-6
	Sample Date	4-Sep-12	30-Aug-12	4-Sep-12	7-Sep-12	28-Aug-12	3-Sep-12	5-Sep-12	21-Sep-12	25-Sep-12	21-Sep-12	20-Sep-12	24-Sep-12	19-Sep-12	9-Sep-12	28-Aug-12	3-Sep-12	3-Sep-12	6-Sep-12	31-Aug-12	31-Aug-12	30-Aug-12	30-Aug-12	29-Aug-12	5-Sep-12	1-Sep-12	28-Aug-12	1-Sep-12	6-Sep-12	5-Sep-12
ANNELIDA:HIRUDINEA:	ERPOBDELLIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.38	0.89	0	0	0
	GLOSSIPHONIIDAE:	0	0	0	5.26	0	0	0	0	0	0	0	0	0.31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HAEMOPIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANNELIDA:OLIGOCHAETA	ENCHYTRAEIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.49	0	0	0
	LUMBRICIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	LIMBRICULIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.60	0	0	0
	NAIDIDAE:	0	0	0	0	0	21.10	25.58	1.09	0	0	0	0	0	0	0	32.97	0	0	5.66	0	18.18	30.95	0	6.54	0.75	0	0	0	33.33
	TUBIFICIDAE:	0	3.13	0	26.32	0.97	4.59	2.33	10.87	0	0	2.50	1.00	1.25	3.72	9.09	23.08	3.57	0	7.55	40.00	0	0	0	4.67	12.45	32.74	0	0	0
ACARINA:	ARRENURIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HYDROBATIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.38	0	0	0
	KRENDOWSKIIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.30	0	0	0
	LEBERTIIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.98	0	0	0
	LIMNS\ESIIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.38	0	0	0	0
	SPERCHONTIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.38	0	0	0	0
	UNIONICOLIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRUSTACEA:AMPHIPODA:	HYALELLIDAE:	0	0	0	0	17.48	2.75	0	1.09	0	0	0	0	0	0	0	17.58	0	0	0	0	0	0	0	0	0	0	0	0	0
INSECTA:		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COLEOPTERA:	CHRYSOMELIDAE:	0	0	0	0	0.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	DYTISCIDAE:	0	0	0	0	0.97	0	0	0	0	0	0	0	0.31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ELMIDAE:	10.00	0	20.00	0	0	0.92	0	2.17	0	0	2.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.19	0	0	0
	HALIPLIDAE:	0	0	0	0	0	0	2.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
INSECTA:		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DIPTERA:	CERATOPOGONIDAE:	0	0	0	0	0	3.67	13.95	0	0	0	2.50	0	5.61	6.05	0	0	0.89	0	15.09	0	0	9.52	0	24.30	1.89	0.89	0	0	0
	CHAOBORIDAE:	0	65.63	0	0	0	0	0	0	0	19.09	27.50	3.00	1.56	1.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CHIRONOMIDAE:	80.00	31.25	0	10.53	2.91	51.38	53.49	71.74	91.67	80.91	42.50	95.00	49.22	52.09	54.55	1.10	91.07	0	54.72	60.00	54.55	30.95	0	62.62	74.72	0.30	33.33	100.00	33.33
	EMPIDIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	STRATIOMYIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.30	0	0	0
	TABANIDAE:	0	0	0	0	0.97	3.67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.09	0	0	0	0	0	0	0	0
	TIPULIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.89	0	0	0	0	0	33.33	0	0	0.30	0	0	0
EPHEMEROPTERA:	BAETIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0.31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CAENIDAE:	0	0	0	0	0	1.83	0	0	0	0	0	0	1.25	7.44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EPHEMERELLIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	EPHEMERIDAE:	0	0	0	0	0.97	0	0	1.09	2.78	0	12.50	1.00	0.31	1.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HEPTAGENIIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0.47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	LEPTOPHLEBIIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HEMIPTERA:	CORIXIDAE:	0	0	0	0	0	0	0	1.09	0	0	0	0	0.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PLEIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0.31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEPIDOPTERA:	CRAMBIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MEGALOPTERA:	SIALIDAE:	0	0	0	0	0	0	0	0	0	0	2.50	0	1.25	5.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NEUROPTERA:	SISYRIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33.33	0	0	0	0	0	0	0
ODONATA:	AESHNIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	COENAGRIONIDAE:	0	0	0	0	1.94	0.92	0	0	0	0	0	0	0	0	0	1.10	0	0	0	0	0	2.38	0	0	0	0	0	0	0	0
	CORDULIIDAE:	0	0	0	0	0.97	0	0	0	2.78	0	0	0	0	0	0	0	0	0	1.89	0	0	0	0	0	0	0.30	0	0	0	0
	GOMPHIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	LIBELLULIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TRICHOPTERA:	DIPSEUDOPSIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0.31	3.26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HYDROPSYCHIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HYDROPTILIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0.31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	LEPIDOSTOMATIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	LEPTOCERIDAE:	0	0	0	0	4.85	0	0	0	0	0	0	0	0.31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	LIMNEPHILIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.30	0	0	0	0
	PHILOPOTAMIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PHRYGANAEIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	POLYCENTROPODIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOLLUSCA:BIVALVIA:	SPHAERIIDAE:	0	0	60.00	21.05	1.94	3.67	2.33	8.70	0	0	7.50	0	31.15	6.51	27.27	14.29	0.89	25.00	7.55	0	0	23.81	0	1.87	9.06	42.56	0	0	33.33
	UNIONIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOLLUSCA:GASTROPODA:	ANCYLIDAE:	0	0	0	0	0.97	0.92	0	0	2.78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HYDROBIIDAE:	0	0	20.00	36.84	54.37	1.83	0	1.09	0	0	0	0	4.98	11.63	0	4.40	2.68	0	0	0	0	0	0	0	0	0	0	0	0	0
	LYMNAEIDAE:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.09	0	0	0	0	0	0	0	0	0
	PHYSIDAE:	10.00	0	0	0	7.77	0.92	0	0	0	0	0	0	0.31	0	0	3.30	0	0	1.89	0	0	0	0	0	0	0.60	0	0	0	0
	PLANORBIDAE:	0	0	0	0	1.94	0.92	0	1.09	0	0	0	0	0.31	0	9.09	2.20	0	75.00	5.66	0	0	0	33.33	0	0	3.87	50.00	0	0	0
	VALVATIDAE:	0	0	0	0	0	0.92	0	0	0	0	0	0	0	0.93	0	0	0	0	0	0	9.09	2.38	0	0	0	8.04	16.67	0	0	0
	TOTAL NUMBERS	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

TABLE 3-8
SPECIES SPECIFIC CATCH PER UNIT EFFORT FOR GILLNETS

Watercourse Name	Sample Location ID	Date	Set Length (hrs)	Area Sampled (m^2)	Mesh(s) Size (Inches)	Total Effort (Hrs*Area Sampled)	Species Specific CPUE (Fish per Net/Hour)												Total CPUE	Total Catch
							Black Crappie	Brown Bullhead	Central Mudminnow	Creek Chub	Golden Shiner	Northern Pike	Rock Bass	Sauger	Shorthead Redhorse	Walleye	White Sucker	Yellow Perch		
Pinewood River	PIN-2AA-GN1	04/09/12	18.58	90	1.5	1672.51	0	0	0	0.16	0	0	0	0	0	0	0.65	0	0.81	15
	PIN-2AA-GN2	04/09/12	18.58	90	2.0	1672.51	0	0	0	0.16	0	0	0	0	0	0	0.05	0	0.22	4
	PIN-2A-GN1	12/07/12	22.92	90	2.0	2062.44	0	0.04	0	0	0	0.17	0	0	0	0	0.04	0	0.26	6
	PIN-2A-GN2	12/07/12	22.58	90	4.0	2032.47	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PIN-2A-GN3	12/07/12	15.25	90	3.0	1372.50	0	0.46	0	0	0	0.59	0	0	0	0	0.20	0	1.25	19
	PIN-3A-GN1	14/07/12	6.00	90	2.0	540.00	0	0	0	0	0	0.50	0	0	0	0	0	0	0.50	3
	PIN-3A-GN2	14/07/12	21.50	90	1.5	1935.00	0	0.37	0	0	0	0.14	0	0	0	0	0.05	0	0.56	12
	PIN-3A-GN3	14/07/12	22.25	90	3.5	2002.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PIN-3A-GN4	14/07/12	16.16	90	2.0	1454.40	0	0.31	0	0	0	0.12	0	0	0	0	0.19	0	0.62	10
	PIN-8-GN1	14/07/12	21.58	90	1.5	1942.20	0	0	0	0	0	0.19	0	0	0	0	0	0	0.19	4
	PIN-8-GN2	14/07/12	20.92	90	2.5	1882.80	0	0	0	0	0	0.67	0	0	0	0	0	0	0.67	14
	PIN-8-GN3	14/07/12	20.16	90	3.0	1814.40	0	0.05	0	0	0	0.05	0	0	0	0	0	0	0.10	2
	PIN-9-GN1	12/07/12	18.92	90	1.5	1702.80	0	0	0	0	0	0	0	0	0	0	0.05	0	0.05	1
	PIN-9-GN2	12/07/12	19.08	90	2.5	1717.20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PIN-10A-GN1	14/07/12	16.80	90	N/R	1512.00	0	0	0	0	0	0	0	0	0	0	0.12	0	0.12	2
	PIN-10A-GN2	14/07/12	17.08	90	N/R	1537.47	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PIN-10A-GN3	14/07/12	16.42	90	N/R	1477.44	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PIN-11-GN1	15/09/12	20.25	90	N/R	1822.50	0	0	0	0	0	0.20	0	0	0	0	0.15	0	0.35	7
	PIN-12-GN1	26/09/12	23.00	90	3.5	2070.00	0	0	0	0	0	0.26	0	0	0	0	0.04	0	0.30	7
	PIN-12-GN2	26/09/12	23.00	90	1.0	2070.00	0	0	0	0	0	0.17	0	0	0	0	0	0	0.17	4
	PIN-12-GN3	26/09/12	23.00	90	2.0	2070.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PIN-12-GN4	26/09/12	23.17	90	2.5	2084.94	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PIN-14-GN1	22/09/12	23.00	90	N/R	2070.00	0	0	0	0	0	0.09	0	0	0	0	0	0	0.09	2
	PIN-14-GN2	22/09/12	22.92	90	N/R	2062.44	0	0	0	0	0	0.09	0	0	0.04	0	0.13	0	0.26	6
	PIN-14-GN3	22/09/12	22.83	90	N/R	2054.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PIN-17-GN1	23/09/12	22.08	90	2.0	1987.47	0	0	0	0	0.05	1.18	0.14	0.05	0.09	0.68	0	0	2.17	50
	PIN-17-GN2	23/09/12	21.58	90	3, 2	1942.47	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PIN-18-GN1	23/09/12	22.92	90	3.0	2062.49	0.09	0	0	0	0	0.44	0.09	0	0	0.22	0	0.04	0.87	20
	PIN-18-GN2	23/09/12	22.83	90	2.0	2054.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PIN-18-GN3	23/09/12	22.75	90	N/R	2047.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
McCallum Creek	JON-1-GN1	12/07/12	19.50	90	1.5	1755.00	0	0	0.05	0	0	0	0	0	0	0	0	0	0.05	1
	JON-1-GN2	12/07/12	19.58	90	2.0	1762.20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	JON-1-GN3	12/07/12	19.83	90	3.0	1784.70	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sturgeon Creek	STU-6-GN1	05/09/12	17.08	90	N/R	1537.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	STU-6-GN2	05/09/12	17.08	90	N/R	1537.47	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total CPUE							0.09	1.23	0.05	0.32	0.05	4.85	0.22	0.05	0.13	0.90	1.67	0.04	9.60	-
Total Catch							2	22	1	6	1	96	5	1	3	20	31	1	-	189

TABLE 3-9
SPECIES SPECIFIC CATCH PER UNIT EFFORT FOR MINNOW TRAPS

Watercourse Name	Sample Location ID	Date	Set Length (hrs)	Number of Traps Set	Total Effort (hrs*Num. traps)	Species Specific CPUE (Fish per Trap/Hour)							Total CPUE	Total Catch
						Brassy Minnow	Brook Stickleback	Central Mudminnow	Common Shiner	Creek Chub	Finescale Dace	Pearl Dace		
Pinewood River	PIN-2AA	09/04/12	20.33	5	101.65	0	0	0	0.79	1.03	0	0.20	2.02	41
	PIN-2A	12/07/12	23.25	4	93.00	0	0.09	0	0	0	0	0	0.09	4
	PIN-3A	15/07/12	22.30	4	89.20	0	0	0.02	0	0	0	0	0.02	2
	PIN-8	13/07/12	21.62	4	86.49	0	0	0	0	0	0	0	0	0
	PIN-9	12/07/12	19.54	4	78.16	0	0	0	0	0	0	0	0	0
	PIN-10	17/07/12	15.92	4	63.67	0	0	0	0	0	0	0	0	0
	PIN-10A	14/07/12	16.58	4	66.33	0	0	0	0	0	0	0	0	0
	PIN-12	26/09/12	23.10	4	92.42	0	0	0	0	0	0	0	0	0
	PIN-14	22/09/12	22.72	3	68.16	0	0	0	0	0	0	0	0	0
McCallum Creek	JON-1	12/07/12	20.21	3	60.63	0	0	0.91	0	0	0	0	0.91	20
Tait Creek	TAIT-1	14/07/12	0.71	4	2.83	0	0	0	0	0	0	0	0	0
Unnamed Trib. 2	UT2-A	14/07/12	0.42	3	1.13	0	0	0	0	0	0	0	0	0
Loslo Creek	LOS-3	18/07/12	1.66	6	9.98	0	0	0	0	0	1.14	0	1.14	4
	LOS-4	31/08/12	1.00	4	4.00	0	0.50	0.25	0	0	0	0	0.75	3
	LOS-5	16/07/12	2.42	6	14.50	0	0	0.20	0	0	0	0	0.20	1
	LOS-8	30/08/12	1.37	4	5.50	0	0	0	0	0	0	0	0	0
	LOS-11	29/08/12	1.50	4	6.00	0	0	0	0	0	0	0	0	0
Unnamed Trib. 5	UT5-A	15/07/12	43.88	3	131.63	0	0	0.62	0	0	0	0	0.62	40
West Creek Trib. 1	WESTRIB1-A	12/07/12	19.50	5	97.50	0	0	0.01	0	0	0.01	0.03	0.05	5
Clark Creek	CLA-5A	13/07/12	0.87	3	2.60	16.12	5.73	2.41	0	0	0	0	24.26	21
Unnamed Trib. 8A	U8A-1	12/07/12	16.00	2	32.00	0	2.44	0.97	0	0.03	0.44	0.03	3.91	125
Sturgeon Creek	STU-5	06/09/12	26.33	4	105.32	0	0.02	0.13	0	0	0	0	0.15	16
	STU-6	05/09/12	17.75	4	71.00	0	0	0	0	0	0	0	0	0
Total CPUE						16.12	8.77	5.52	0.79	1.06	1.59	0.26	34.11	-
Total Catch						14	91	112	16	22	19	8	-	282

TABLE 3-10
SPECIES SPECIFIC CATCH PER UNIT EFFORT FOR SEINE NETS

Watercourse Name	Sample Location ID	Date	# Of Seine Pulls	Area Sampled (m^2)	Total Effort (Area Sampled * # of Seine Pulls)	Species Specific CPUE (Fish per Number of Seines Pulled)								Total CPUE	Total Catch
						Blackchin Shiner	Brassy Minnow	Brook Stickleback	Central Mudminnow	Common Shiner	Emerald Shiner	Finescale Dace	Johnny Darter		
Pinewood River	PIN-3A	15/07/12	2	3.2725	6.545	0	0	10.00	0	0	0	25.00	0	35.00	70
	PIN-9	11/07/12	3	3.2725	9.8175	0	0	0	0	0	0	0	0	0	0
	PIN-10	17/07/12	4	3.2725	13.09	0	0	0	0	0	0	0	0	0	0
	PIN-14	21/09/12	3	3.2725	9.8175	0	0	0	0	0.67	0	0	1.67	2.33	7
McCallum Creek	JON-1	11/07/12	2	3.2725	6.545	0	0	0.50	0	0	0	0	0	0.50	1
Tait Creek	TAIT-1	14/07/12	2	3.2725	6.545	0	1.00	4.50	0	0	0	0	0	5.50	11
Loslo Creek	LOS-8	30/08/12	5	3.2725	16.3625	1.20	0	2.60	1.80	0	11.40	0	0	17.00	85
	LOS-11	29/08/12	4	3.2725	13.09	0	0	0	0	0	0	0	0	0	0
Sturgeon Creek	STU-6	05/09/12	2	3.2725	6.545	0	0	0	0	0	0	0	0	0	0
Total CPUE						1.20	1.00	17.60	1.80	0.67	11.40	25.00	1.67	60.33	-
Total Catch						6	2	43	9	2	57	50	5	-	174

TABLE 3-11
SPECIES SPECIFIC CATCH PER UNIT EFFORT FOR BACKPACK AND BOAT ELECTROSHOCKING

Watercourse Name	Sample Location ID	Date	Effort (electrosec.)	Species Specific CPUE [(Fish per ElectroSecond)*1000]																					Total CPUE	Total Catch
				Blackchin Shiner	Brook Stickleback	Central Mudminnow	Common Shiner	Emerald Shiner	Fathead Minnow	Finescale dace	Golden Shiner	Johnny Darter	Northern Pike	Northern Redbelly Dace	Pearl Dace	Pumpkinseed	Rock Bass	Sauger	Shorthead Redhorse	Smallmouth Bass	Spottail Shiner	Trout-perch	Walleye	White Sucker	Yellow Perch		
Pinewood River	PIN-9	12/07/12	564	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PIN-11	21/09/12	633	0	0	3.16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.16	2
	PIN-14	21/09/12	580	0	0	0	0	0	0	0	0	0	3.45	0	0	0	0	0	0	0	0	1.72	0	0	0	5.17	3
	PIN-15	20/09/12	1942	0	0	0	35.02	1.03	0	0	0	0	4.12	0	0	0	2.57	0	1.03	0	0	15.96	2.57	5.66	0	67.97	132
	PIN-16	24/09/12	1596	0	0	0	0	0	0	0	1.25	0	3.13	0	0	0	0	0	0	0	0	1.25	2.51	0.63	5.01	13.78	22
	PIN-17	19/09/12	1164	0	0	0	0	29.21	0	0	1.72	0.86	0.86	0	0	6.87	9.45	0	0	0	0.86	0	0	0	29.21	79.04	92
	PIN-18	19/09/12	1189	0.84	0	0	0	6.73	0	0	43.73	0	0	0	0	11.77	0	0	0	0	0	0	0	0	9.25	72.33	86
	PW-23	18/09/12	532	0	0	0	0	56.39	0	0	0	0	9.40	0	0	3.76	3.76	1.88	0	3.76	1.88	0	7.52	0	28.20	116.54	62
	PW-24	18/09/12	30	0	0	0	0	37.59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.88	39.47	21
Unnamed Trib.5	UT5-A	15/07/12	688	0	0	7.27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.27	5
West Creek Trib.1	WES-TRIB1A	11/07/12	480	0	22.92	27.08	0	0	4.17	60.42	0	0	0	8.33	75.00	0	0	0	0	0	0	0	0	0	0	197.92	95
Clark Creek	CLA-5A	13/07/12	698	0	0	4.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.30	3
Sturgeon Creek	STU-6	05/09/12	458	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total CPUE				0.84	22.92	41.81	35.02	130.95	4.17	60.42	46.71	0.86	20.96	8.33	75.00	22.41	15.78	1.88	1.03	3.76	2.74	18.94	12.60	6.29	73.55	606.95	-
Total Catch				1	11	23	68	94	2	29	56	1	21	4	36	24	18	1	2	2	2	34	13	12	69	-	523

TABLE 3-12
SPECIES SPECIFIC CATCH PER UNIT EFFORT FOR DIP NETTING

Watercourse Name	Sample Location ID	Date	Effort (Dips)	Species Specific CPUE (Fish per Dip)								Total CPUE	Total Catch
				Brassy Minnow	Brook Stickleback	Central Mudminnow	Emerald Shiner	Finescale Dace	Northern Redbelly Dace	Johnny Darter	Pearl Dace		
Pinewood River	PIN-3A	14/07/12	1	0	0	0	0	6.00	0	0	0	6.00	6
	PIN-9	12/07/12	1	0	0	0	12.00	0	0	0	0	12.00	12
	PIN-10	17/07/12	20	0	0	0	0	0	0	0	0.15	0.15	3
	PIN-15	20/09/12	21	0	0	0	0.48	0	0	0.05	0	0.52	11
McCallum Creek	JON-1	11/07/12	20	0	0	0	0	0	0	0	0	0	0
	JON-2	17/07/12	40	0	0	0	0	0.03	0	0	0.50	0.53	21
Tait Creek	TAIT-1	14/07/12	25	0.16	0.16	0.04	0	0	0.04	0	0	0.40	10
Unnamed Trib. 2	UT2-A	14/07/12	30	0	0	0	0	0	0	0	0	0	0
Loslo Creek	LOS-4	31/08/12	15	0	0.13	0.13	0	0	0	0	0	0.27	4
	LOS-11	29/08/12	20	0	0	0	0	0	0	0	0	0	0
West Creek	WES-LOC-A	12/07/11	5	0	4.00	0	0	4.00	0	0	4.00	12.00	60
	WES-LOC-F	12/07/11	3	0	2.00	0	0	0.67	0	0	0	2.67	8
West Creek Trib. 1	WES-TRIB1A	11/07/12	10	0	0.10	0	0	1.30	0	0	0	1.40	14
Total CPUE				0.16	6.39	0.17	12.48	11.99	0.04	0.05	4.65	35.93	-
Total Catch				4	33	3	22	42	1	1	43	-	149

TABLE 3-13
SPECIES SPECIFIC CATCH PER UNIT EFFORT FOR ANGLING

Watercourse Name	Sample Location ID	Date	Rods (#)	Effort (hours)	Effort (Total Rod Hours)	Species Specific CPUE (Fish per Rod)	Total CPUE	Total Catch
						Northern Pike		
Pinewood River	PIN-17	26/09/12	2	1.00	2.0	1.50	1.50	3
	PIN-17	26/09/12	2	0.75	1.5	0	0	0
Total CPUE						1.50	1.50	-
Total Catch						3	-	3

TABLE 3-14
SPECIES DISTRIBUTION ACROSS STUDY AREA BETWEEN 1997 AND 2012

Family	Common Name	Scientific Name	Pinewood River	McCallum Creek	Tait Creek	Loslo Creek	Unnamed Trib. 5	Marr Creek	Core Shack Creek	West Creek	Unnamed Trib. 6	Clark Creek	Blackhawk Creek	Unnamed Trib. 8A	Sturgeon Creek	Muskrat Lake, Unnam. Creek
Catostomidae	Shorthead Redhorse	*Moxostoma macrolepidotum*	X													
	White Sucker	*Catostomus commersonii*	X			X				X		X	X			
Centrarchidae	Black Crappie	*Pomoxis nigromaculatus*	X													
	Pumpkinseed	*Lepomis gibbosus*	X													
	Rock Bass	*Ambloplites rupestris*	X													
	Smallmouth Bass	*Micropterus dolomieu*	X													
Cyprinidae	Blackchin Shiner	*Notropis heterodon*	X			X				X						
	Blacknose Dace	*Rhinichthys atratulus*	X									X				
	Brassy Minnow	*Hybognathus hankinsoni*	X		X	X	X	X		X	X	X	X			X
	Common Shiner	*Luxilus cornutus*	X					X		X		X	X			
	Creek Chub	*Semotilus atromaculatus*	X		X	X		X		X		X	X	X		
	Emerald Shiner	*Notropis atherinoides*	X			X		X		X		X				
	Fathead Minnow	*Pimephales promelas*						X		X		X	X			X
	Finescale Dace	*Phoxinus neogaeus*	X	X		X		X		X		X	X	X		
	Golden Shiner	*Notemigonus crysoleucas*	X									X				
	Hornyhead Chub	*Nocomis biguttatus*	X													
	Lake Chub	*Couesius plumbeus*	X			X		X		X		X				
	Mimic Shiner	*Notropis volucellus*	X													
	Northern Pearl Dace	*Margariscus margarita*	X	X	X			X		X		X	X	X		
	Northern Redbelly Dace	*Phoxinus eos*	X		X	X		X		X		X	X			
	Spottail Shiner	*Notropis hudsonius*	X			X		X		X		X				
Esocidae	Northern Pike	*Esox lucius*	X													
Gasterosteidae	Brook Stickleback	*Culaea inconstans*	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ictaluridae	Brown Bullhead	*Ameiurus nebulosus*	X													
Percidae	Blackside Darter	*Percina maculata*	X							X		X				
	Iowa Darter	*Etheostoma exile*								X						
	Johnny Darter	*Etheostoma nigrum*	X													
	Log Perch	*Percina caprodes*	X													
	Sauger	*Sander canadensis*	X													
	Walleye	*Sander vitreus*	X													
	Yellow Perch	*Perca flavescens*	X													
Percopsidae	Trout-perch	*Percopsis omiscomaycus*	X													
Umbridae	Central Mudminnow	*Umbra limi*	X	X	X	X	X	X		X		X	X	X	X	X

TABLE 3-15: PINEWOOD RIVER NORTHERN PIKE AND WALLEYE LENGTH, WEIGHT, AGE AND TISSUE BODY BURDEN LEVELS

Species	Tissue Type	Descriptive Statistic	Total Length (mm)	Weight (g)	Age (years)	Mercury (Hg) (µg/g)	Arsenic (As) (µg/g)	Cadmium (Cd) (µg/g)	Chromium (Cr) (µg/g)	Cobalt (Co) (µg/g)	Copper (Cu) (µg/g)	Lead (Pb) (µg/g)	Manganese (Mn) (µg/g)	Nickel (Ni) (µg/g)	Selenium (Se) (µg/g)	Zinc (Zn) (µg/g)
Northern Pike	Dorsal Muscle	Sample Size (n)	70.0	70.0	67	70	70	70	70	70	70	70	70	70	70	70
		Minimum	185.0	11.0	0	0.11	<0.01	<0.01	<0.3	<0.005	<0.5	<0.03	<0.03	<0.05	<0.2	3.00
		Maximum	570.0	970.0	5	0.67	<0.01	<0.01	<0.3	0.008	0.9	0.03	4.70	3.7	0.30	12.00
		Mean	377.8	267.6	2	0.34	—	—	—	0.006	—	—	0.86	—	0.21	5.00
		Median	376.0	215.0	2	0.33	—	—	—	0.006	—	—	0.70	—	0.20	4.00
		SD	85.5	230.6	1.26	0.11	—	—	—	0.001	—	—	0.76	—	0.03	1.75
		SE	10.2	27.6	0.15	0.013	—	—	—	0.0001	—	—	0.09	—	0.004	0.21
	Liver	Sample Size (n)	42.0	42.0	—	42	42	42	42	42	42	42	42	42	42	42
		Minimum	185.0	19.0	—	0.06	<0.1	0.01	<0.3	0.02	6.10	<0.03	0.50	<0.05	0.80	19.00
		Maximum	570.0	970.0	—	0.30	0.20	0.19	<0.3	0.08	38.00	0.09	3.00	<0.05	2.50	72.00
		Mean	407.6	302.3	—	0.15	—	0.05	—	0.04	15.46	—	1.40	—	1.44	38.20
		Median	391.0	260.0	—	0.15	—	0.03	—	0.03	13.00	—	1.40	—	1.40	35.00
		SD	72.1	247.3	—	0.05	—	0.04	—	0.01	8.46	—	0.45	—	0.32	11.05
		SE	11.1	38.2	—	0.008	—	0.006	—	0.002	1.31	—	0.07	—	0.05	1.70
Walleye	Dorsal Muscle	Sample Size (n)	15.0	15.0	15	15	15	15	15	15	15	15	15	15	15	15
		Minimum	223.0	79.3	1	0.08	<0.1	<0.1	<0.3	<0.005	<0.5	<0.03	<0.3	<0.05	<0.2	3.00
		Maximum	688.0	3640.0	15	1.80	0.1	<0.1	<0.3	<0.005	1.1	<0.03	0.40	<0.05	0.30	5.00
		Mean	383.3	794.6	4	0.40	—	—	—	—	—	—	0.35	—	0.23	3.53
		Median	346.0	350.0	3	0.34	—	—	—	—	—	—	0.35	—	0.20	3.00
		SD	148.6	1066.0	4.86484	0.26	—	—	—	—	—	—	0.07	—	0.05	0.64
		SE	38.4	275.2	1.26	0.07	—	—	—	—	—	—	0.02	—	0.01	0.17
	Liver	Sample Size (n)	13.0	13.0	—	10	13	13	13	13	13	13	13	13	13	13
		Minimum	261.0	140.0	—	0.08	0.30	0.03	<0.3	0.03	1.20	<0.03	0.90	<0.05	0.60	16.00
		Maximum	688.0	3640.0	—	1.10	2.40	0.20	<0.3	0.30	3.00	<0.03	2.50	0.05	1.10	22.00
		Mean	421.0	948.5	—	0.33	1.00	0.11	—	0.13	1.98	—	1.95	—	0.79	19.23
		Median	390.0	510.0	—	0.19	0.90	0.13	—	0.10	2.00	—	2.00	—	0.80	20.00
		SD	139.2	1091.9	—	0.32	0.60	0.06	—	0.09	0.49	—	0.45	—	0.16	2.20
		SE	38.6	302.8	—	0.10	0.17	0.02	—	0.02	0.13	—	0.12	—	13.00	0.00

4.0 DISCUSSION

Water quality typically met the majority of provincial and federal objectives and guidelines; however, aluminum, iron and phosphorus were consistently present at elevated concentrations and did not meet water quality objectives in numerous samples. There were isolated locations where fluoride, arsenic, cobalt, copper and vanadium were present above objective/guideline values. Although total aluminum was higher than the CEQG in numerous samples, dissolved aluminum met the PWQO in all samples. The majority of samples throughout the study area had iron concentrations exceeding the objectives.

The interim PWQO for phosphorus states that excessive plant growth in rivers and streams should be eliminated at total phosphorus concentrations below 30 µg/L. Only one sample from the Pinewood River had a phosphorus concentration below the PWQO. Fifteen samples had phosphorus levels above this value (41.8 to 370 µg/L). An additional twelve samples had minimum laboratory detection limits of 100 µg/L and 500 µg/L based on dilution and therefore confirmation of phosphorus concentrations above PWQO was not possible. However, elevated phosphorus levels were typical of results provided by previous water quality surveys conducted by AMEC as part of baseline studies in 2011. Furthermore, results of water quality surveys conducted by RRR on a monthly basis throughout 2012 as provided in Appendix I indicate that total phosphorus concentrations were at or above the PWQO during the summer (June to August) at a majority of the water quality sampling locations within the Pinewood River and its tributaries. Increased phosphorus levels are typical of historic and long-term agricultural use of mineral fertilizers. Elevated phosphorus, aluminum and iron levels are indicative of the baseline condition observed during the 2011 and 2012 field studies.

At the majority of sampling locations, the sediment was dominated by sand and silt, with relatively little gravel or clay. However, the sediment at PIN-14 and WES-TRIB1B was dominated by coarser grained particles (gravel with some pebble/cobble). Substrates at Wes-TRIB1B are likely influenced by the adjacent roadways (Roen Road and Highway 600) which may increase the amount of larger gravel particles in the stream bank as a result of road surface wear. Organic content generally ranged from 0 to 10%, but was higher at most of the Loslo Creek sample locations, including LOS-5 (53.7%) and LOS-11 (majority of sample). This may be expected as the upper reaches of Loslo Creek are characterized by reduced channelization, reduced gradients and ponding.

TKN is a method/measure of the total organic nitrogen in the sediment which is in the form of ammonia and ammonium. TKN was consistently elevated at watercourse sampling locations despite low or non-detectable levels of ammonia, nitrate and nitrite in water quality samples. Elevated levels of nitrogen and ammonia are consistent with agricultural drainages, fertilization and the presence of organic waste. Similarly TOC in sediment was elevated at the majority of sampling locations. Loslo Creek showed the highest levels of TOC and TKN.

These results are believed to indicate past land use history and reflect current baseline conditions / land uses for the site and surroundings.

The benthic invertebrate community, as sampled in 2012, generally showed moderate to high diversity and evenness values, however, the TID was rather low at a number of locations in 2012. As sampling techniques and effort were not variable between locations, the low number of organisms at particular sample locations may be indicative of sampling within a microhabitat dominated by a hard clay substrate. Areas of low benthic invertebrate density in 2012 may be indicative of areas under some level of stress due to drought conditions as observed during the summer and fall of 2012. Other areas sampled within the Pinewood River and its tributaries demonstrated robust communities of benthic invertebrates, which provide a food base for many forage fish species in this environment.

Habitat type classification and delineation assisted in providing an overall general inventory of aquatic habitat within the vicinity of the RRGP study area. Habitat types were based on criteria that reflect stream morphology, landuse, riparian function, substrate and cover available for fish species to carry out life history phases. Classifications were provided at a resolution to allow for future inventory of possible impacts to aquatic systems, yet were not intended to identify all microhabitats available with respect to species-specific preferences. However, habitat type classification was undertaken with an understanding of local fish species and habitat preferences.

Fish community sampling conducted in 2012 supplemented information collected from 1997 to 2011. Fish community sampling efforts were previously conducted by the MNR and Rainy River First Nation in the lower Pinewood River and by KCB during 2008, 2009 and 2010 within the vicinity of the RRGP area. Species added to the overall species list included those that were present in the lower sections of the Pinewood River including Rock Bass, Largemouth Bass, Walleye and Yellow Perch. Despite conditions of reduced flow and increased water temperatures during the 2012 field survey, capture methods were successful throughout the Pinewood River and its tributaries. However, stranding of some forage and baitfish species was observed within reaches of some tributaries. The inclusion of the 2012 fish community data to the long term presence/absence dataset provides increased resolution and completeness. Species presence was directly attributable to habitat types as described herein and areas of potential spawning for keystone species (Northern Pike and Walleye) were identified throughout the Pinewood River watershed and specifically in the mainstem Pinewood River.

The tributaries of the Pinewood River support coolwater and warmwater fish communities and habitats. These habitats are consistently affected by beaver activity and water temperatures are influenced in many locations where watercourses have been manipulated or are directly accessible by livestock as a watering source. In these areas riparian vegetation has been reduced in density and complexity thereby compromising riparian function in comparison to areas of the watershed that have riparian forest or wetland species associations.

Sampling in the vicinity of the RRGP area during 2012 did not provide evidence of any aquatic species at risk either under federal (*Species at Risk Act*) or provincial (*Endangered Species Act*) legislation.

Metal concentrations in fish flesh (muscle and liver) and whole fish samples as presented herein are provided to indicate background levels for potential future monitoring studies. It should be noted that fish body burdens may show geographic and temporal variation despite potential sources of input.

Mercury levels in Northern Pike and Walleye edible muscle tissues were variable between species and individuals yet the majority of samples (75%) of both species had a mercury concentration above the lowest threshold for safe human consumption set out by the Ministry of the Environment (MOE) of 0.26 ppm (equal to 0.26 µg/g) for women of child-bearing age or children under 15 (MOE 2011). Eleven percent (11%) of the total number of Northern Pike and Walleye sampled had mercury concentrations above 0.52 ppm and therefore above the upper threshold recommended for total restriction for women of child-bearing age or children under 15 and above the Health Canada advisory of 0.5 ppm (Health Canada 2012). The three largest and oldest Walleye (aged 9 and 15 years) had mercury body burdens above the lower threshold for the general population of 0.61 ppm (MOE 2011). One of the 15 year old Walleye did approach the total restriction advisory of 1.84 ppm with a value of 1.8 µg/g. These individuals were captured in lower sections of the Pinewood River in closer proximity to the Rainy River and indicate relatively elevated mercury levels in longer lived individuals in the population.

Mercury concentrations of the small-bodied fish composite samples were less than or equal to 0.20 µg/g (or ppm) and therefore below the lowest thresholds for safe human consumption set out by both the MOE (0.26 ppm for women of child-bearing age or children under 15; MOE 2009) and Health Canada (0.5 ppm; Health Canada 2011).

Cadmium levels in Northern Pike and Walleye in edible muscle tissues were below detection yet liver tissue for both species was detected at maximum concentrations of 0.2 µg/g. These values are well below 10 ppm fresh weight of liver which may be viewed as evidence of probable cadmium contamination (Eisler 1985).

Cadmium is currently not included in consumption restrictions in Ontario. Mason et al. (2000) found cadmium concentrations in cyprinids (Blacknose Dace [*Rhinichthys atratulus*]) between 0.085 and 0.1 µg/g in a western Maryland, United States stream described as remote from point source inputs, forested and without significant human presence with the dominant source of metals as atmospheric deposition. Cadmium concentrations in small-bodied fish from the Pinewood River drainage were less than or equal to 0.06 µg/g likely indicating little influence by cadmium on fish health.

Copper concentrations in Northern Pike and Walleye were generally low with a maximum value of 1.1 µg/g. Concentrations in liver for Walleye was low at a maximum of 3.0 µg/g. The range in

liver copper concentration for Northern Pike 6.0 to 38.5 µg/g, the upper limit of this range being greater than that previously presented by Harrison and Klaverkamp (1990) of 7.6 to 28.5 ug/g for Northern Pike sampled from several lakes near mining operations in Flin Flon, Manitoba.

5.0 ADDITIONAL WATER QUALITY DATA

The environmental data presented earlier in this report are in response to the findings of a gap analysis with respect to current Project site considerations. The report focuses on the new information collected by AMEC, but where appropriate historic data have been included to provide a broader context. In parallel with this stand-alone aquatics investigation, RRR has continued to conduct the comprehensive monthly water quality sampling program established in early 2010.

Surface water samples were collected for chemical analysis from the RRGP site area, starting in 2007 and as part of the ongoing monthly surface water sampling program. An overview of these sampling locations is provided in Appendix I along with the original data. A summary of the results from 2012 (up to and including November) is provided herein in Appendix I. Data from sampling programs in 2011 and prior to 2011 are summarized in AMEC (2012) and KCB (2011), respectively.

All parameters were compared to the PWQO and CEQG. With the exception of parameters discussed below, all sampling results met PWQO and CEGQ standards.

Fluoride

Since there is no PWQO for fluoride, only the CEQG of 0.12 mg/L was used for comparison purposes. There were four samples taken from SW13, which is located at Loslo Creek above Highway 600, for which fluoride concentrations were marginally above the CEQG (maximum value = 0.13 mg/L).

Aluminum

Only one sample taken at SW12A (Marr Creek 3.8 km above Highway 600) had dissolved (clay-free) aluminum concentration above the PWQO value of 0.075 mg/L in 2012.

Unlike the provincial standard for aluminum, which is based on clay-free samples, the CEQG standard of 0.1 mg/L, for waters with a pH value above 6.5, is for unfiltered (total) aluminum concentration. Approximately 63 percent of the 146 samples collected in 2012 exceeded this threshold because of association with total suspended solids (TSS). Aluminum, as discussed above, is a primary component of clay minerals and suspended solids containing clay fractions are expected to contain elevated aluminum concentrations in the natural state; hence the provincial caveat for clay-free samples.

Arsenic

Arsenic concentrations were compared to the PWQO of 0.1 mg/L and the CEQG of 0.005 mg/L. Two samples exceeded the CEQG criteria. SW18 (Marr Creek at Highway 600) as sampled in

July 2012 had an arsenic concentration of 0.0074 mg/L. SW10 (Pinewood River at Highway 600) as sampled in February 2012 had a value of 0.013 mg/L and was correlated with an elevated TSS concentration of 1,340 mg/L. These may be related to sediment disturbance when sampling below ice.

Cadmium

All total cadmium concentrations met the PWQO and CEQG criteria of 0.0002 mg/L and 0.000015 mg/L, respectively, with the exception of one sample that had a total cadmium concentration of 0.00074 mg/L (February 2012, SW10), however this elevated concentration had a corresponding TSS concentration of 1,340 mg/L. There were 39 samples (n=160) for which cadmium concentrations marginally exceeded the calculated CEQG value, which is based on hardness of the particular sample.

All cadmium concentrations met the PWQO value of 0.0002 mg/L with the exception of the single sample exhibiting the very high TSS reading of 1,340 mg/L, where the cadmium value was 0.00074 mg/L. The CEQG value for cadmium is more stringent than the PWQO value and is also hardness-based. Twelve of the 146 samples collected in 2012 exceeded the federal hardness-based CEQG value and an additional 29 samples had detection limits that were higher than the calculated hardness-based CEQG value and therefore could not be assessed. The CEQG hardness-based values for cadmium are extremely low, such that it is not uncommon for these values to be exceeded under baseline conditions in northern Ontario.

Cobalt

There is no CEQG guideline for cobalt and therefore analyses were only compared to the PWQO of 0.0009 mg/L. There were 26 individual monthly samples from a several locations that exceeded the PWQO for total cobalt. A large proportion of the samples exceeding PWQO for this parameter (81%) were collected in the winter (December through March) and summer months (July through September). The fact that the vast majority of the samples which exceeded the PWQO value of 0.0009 mg/L were winter or summer samples suggests influence by freezing and evaporative processes for these samples.

Copper

Copper values were compared to the PWQO and CEQG criteria of 0.005 mg/L and 0.002 mg/L, respectively. Copper concentration exceeded both CEQG and PWQO criteria in two samples (from SW10 and SW12A (Marr Creek 3.8 km above Highway 600) as indicated by the maximum value by location. A total of 13 samples (from the total of 146 sampling events) had a copper concentration above the CEGQ only.

Iron

Approximately 75 percent of the 2012 baseline sample iron values exceeded the PWQO and CEQG value of 0.3 mg/L. Iron commonly exceeds PWQO and CEQG values in the background condition, as iron is a common crustal mineral and hence there is frequently a strong association between total iron concentrations and the concentration of TSS. The other factor affecting iron concentrations is the seasonal concentration of dissolved metals due to ice formation in winter and evaporation in summer, as discussed above. A review of the 2012 dissolved iron data revealed that there were 15 instances where dissolved iron exceeded the PWQO / CEQG value of 0.3 mg/L. Ten of the 15 instances occurred in winter and five instances occurred in summer (July through September).

Lead

Lead was compared to the PWQO (as based on the level of alkalinity) and the CEQG (as calculated based on hardness). The maximum calculated lead concentration exceeded the CEQG at three locations in 2012 (SW2 (West Creek above Highway 600), SW12A, SW16 (Rainy River approximately 40 km upstream of confluence with Pinewood River). Lead exceeded the CEQG and the PWQO for one sample at SW10.

Nickel

All total nickel analyses met both PWQO and CEQG criteria of 0.25 mg/L with the exception of one sample for which the total nickel concentration was 0.051 mg/L. However, this elevated nickel concentration was likely due to an elevated TSS concentration of 1,340 mg/L. This may be related to sediment disturbance when sampling below ice.

Phosphorus

The average total phosphorus concentration for the regular monthly, collective 14 RRGP water quality monitoring stations for 2012 was 0.085 mg/L, which is nearly three times the interim PWQO value of 0.03 mg/L for this parameter. A total of 62% of the samples in 2012 exceeded the PWQO threshold value. There is no CEQG value for phosphorus. The most likely source of excess phosphorus in the system is agricultural activity and particularly cattle excrement. Three water quality stations showed a lesser level of phosphorus enrichment: Stations SW4 (Unnamed Creek draining Muskrat Lake), SW14 (upper West Creek) and SW17 (Rainy River 12 km downstream of the Pinewood River). Stations SW4 and SW14 are located in sections of watercourses that do not drain areas of agricultural land.

Selenium

All total selenium analyses met the PWQO and CEQG criteria of 0.1 mg/L and 0.001 mg/L, respectively, with the exception of one sample (February, SW10) that exceeded the CEQG

guideline. However, this elevated selenium concentration corresponded to an elevated TSS concentration of 1,340 mg/L.

Zinc

All total zinc analyses met the PWQO and CEQG criteria of 0.03 mg/L with the exception of one sample from SW10 with a value of 0.20 mg/L as sampled on February 15, 2012. Occasional exceedances of zinc are not uncommon for background conditions. Samples collected in winter with use of ice augers, sometimes show elevated zinc concentrations because of galvanized shims used on the auger. The much higher concentration of zinc in the sample collected from SW10 in February of 2010 is a function of the abnormally high level of total suspended solids associated with this sample (1,340 mg/L), which reflects substrate disturbance during sampling. Elevated zinc concentrations can also occur where samples are collected in association with galvanized culverts, especially during low flow conditions in winter.

TABLE 5-1
SUMMARY OF 2012 SURFACE WATER ANALYTICAL RESULTS

		pH	Conductivity	Hardness as $CaCO_3$	Dissolved Organic Carbon	TSS	Total Ammonia-N	Fluoride	Nitrate	Nitrite	Cyanide-Total	Aluminum-Dissolved	Aluminum-Total	Antimony-Total	Arsenic-Total	Boron-Total	Cadmium-Total	Chromium-Total	Cobalt-Total	Copper-Total	Iron-Total	Lead-Total	Mercury-Total	Molybdenum-Total	Nickel-Total	Phosphorus-Total	Selenium-Total	Thallium-Total	Uranium-Total	Vanadium-Total	Zinc-Total
PWQO		6.5-8.5	-	-	-	-	-	-	-	-	0.005[A]	0.075[I,B]	-	0.02[i]	0.1(0.005[i])	0.2[i]	0.0002	0.001 / 0.0089	0.0009	0.005 (0.005[i])[I]	0.3	0.020 / 0.025 (0.003 / 0.005[i])[H]	0.0002	0.04[i]	0.025	0.03[i]	0.1	0.0003[i]	0.005[i]	0.006[i]	0.03(0.02[i])
CEQG		6.5-9.0	-	-	-	-	-	0.12	3	0.06	0.005[A]		0.1[C]	-	0.005	1.5	0.000015-0.000088[D]	0.001 / 0.0089	-	0.002 - 0.00622	0.3	0.00102 - 0.0134	0.000026	0.073[i]	0.025[J]	-	0.001	0.0008	0.015	-	0.03
RDL		0.10	3.0	5.0	1.0	2.0	0.020	0.030	0.030	0.020	0.0020	0.0050	0.0050	0.00010 / 0.00060 / 0.0050	0.0010	0.050	0.000010 / 0.000017 / 0.000090[D,*]	0.00050 / 0.0010	0.00050	0.00070 / 0.0010	0.020	0.00010 / 0.0010	0.000010 / 0.0010	0.00020 / 0.0010	0.0020	0.0050	0.00050 / 0.0010	0.000030 / 0.00030	0.0050	0.0010	0.0020 / 0.0030
		pH units	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
SW1A	Min	7.38	188.0	79.0	11.1	4.9	0.020	0.030	0.030	0.020	0.0020	0.0041	0.051	0.00010	0.00068	0.013	0.000010	0.00050	0.00023	0.00093	**0.266**	0.00019	0.000010	0.00030	0.0013	0.0279	0.00050	0.000030	0.00041	0.00081	0.0030
	Max	7.96	524.0	300.0	27.3	39.5	0.13	0.107	0.795	0.020	0.0020	0.015	**0.521**	**0.0050**	0.0028	0.050	0.000090	0.00120	0.00054	0.0015	**0.942**	0.0010	0.00010	0.0010	0.0079	**0.119**	0.0010	0.00030	0.0050	0.0018	0.02
	Median	7.90	383.0	209.0	18.9	11.7	0.020	0.073	0.030	0.020	0.0020	0.0050	**0.241**	0.00060	0.0015	0.050	0.000017	0.00100	0.00050	0.0010	**0.545**	0.0010	0.000010	0.0010	0.0020	**0.061**	0.00100	0.00030	0.0050	0.0011	0.0032
	St Dev.	0.20	94.0	59.1	4.2	12.0	0.037	0.027	0.230	0	0	0.0035	0.160	0.0014	0.00071	0.016	0.000023	0.00024	0.000086	0.00019	0.223	0.00037	0.000027	0.00029	0.0018	0.0301	0.00026	0.00014	0.0022	0.00030	0.0060
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.92	426.5	223.5	22.0	21.7	0.049	0.092	0.037	0.020	0.0020	0.0077	**0.355**	0.00060	0.0020	0.050	0.000019	0.0010	0.00050	0.0012	**0.693**	0.0010	0.000010	0.0010	0.0022	**0.082**	0.0010	0.00030	0.0050	0.0013	0.0038
SW2	Min	7.53	146.0	72.1	10.2	2.0	0.020	0.030	0.030	0.02	0.0020	0.0050	0.059	0.00010	0.00053	0.0077	0.000010	0.00050	0.00015	0.0010	0.174	0.00012	0.000010	0.00031	0.0012	0.0128	0.00049	0.000030	0.00030	0.00089	0.0022
	Max	8.17	389.0	223.0	22.2	142.0	0.088	0.076	0.383	0.02	0.0020	0.021	**0.610**	0.0050	0.0017	0.050	0.000090	0.0014	0.0010	0.0029	**1.03**	0.0012	0.00010	0.0010	0.0029	**0.126**	0.0010	0.00030	0.0050	0.0032	0.0083
	Median	8.03	292.0	165.0	17.1	5.4	0.023	0.055	0.030	0.02	0.0020	0.0071	**0.131**	0.0006	0.0011	0.050	0.000018	0.0010	0.00050	0.0013	**0.321**	0.0010	0.000010	0.0010	0.0020	**0.042**	0.00075	0.00030	0.0050	0.0011	0.0030
	St Dev.	0.25	89.8	55.6	3.6	48.1	0.025	0.017	0.125	0.00	0	0.0057	0.177	0.0017	0.00038	0.0215	0.000026	0.00032	0.00023	0.0006	0.333	0.00040	0.000032	0.00035	0.0005	0.038	0.00027	0.00014	0.0024	0.00076	0.0019
	N	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	75th %	8.10	331.3	196.8	18.8	11.8	0.035	0.074	0.030	0.02	0.0020	0.011	**0.166**	0.0006	0.0013	0.050	0.000024	0.0010	0.00050	0.0016	**0.502**	0.0010	0.000010	0.0010	0.0021	**0.057**	0.0010	0.00030	0.0050	0.0013	0.0031
SW3	Min	7.27	181.0	83.0	10.8	8.1	0.020	0.030	0.030	0.020	0.0020	0.0030	0.082	0.00010	0.00074	0.012	0.000011	0.0005	0.00022	0.00070	0.290	0.00014	0.000010	0.00041	0.0015	0.0292	0.00040	0.000030	0.00042	0.00071	0.0030
	Max	8.22	780.0	450.0	27.1	45.2	0.47	0.106	0.381	0.020	0.0020	0.025	**1.02**	0.0050	**0.0074**	0.050	0.000090	0.0042	0.0047	**0.0027**	**3.72**	0.0010	0.00010	0.0015	0.0049	**0.183**	0.0010	0.00030	0.0050	0.0047	0.0099
	Median	7.95	356.0	195.0	20.1	13.5	0.020	0.085	0.030	0.020	0.0020	0.0088	**0.382**	0.00060	0.0023	0.050	0.000024	0.0010	0.00050	0.0014	**0.741**	0.0010	0.000010	0.0010	0.0024	**0.069**	0.00100	0.00030	0.0050	0.0019	0.0037
	St Dev.	0.36	159.7	98.4	4.7	12.1	0.13	0.023	0.105	0	0	0.0062	0.276	0.0014	0.0019	0.016	0.000026	0.0011	0.0016	0.00061	1.00	0.00036	0.000027	0.00032	0.0011	0.050	0.00027	0.00014	0.0021	0.0011	0.0022
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	8.12	396.5	209.5	23.7	20.4	0.036	0.098	0.031	0.020	0.0020	0.012	**0.520**	0.00060	0.0034	0.050	0.000032	0.0011	0.00091	**0.0019**	**1.15**	0.0010	0.000010	0.0010	0.0036	**0.128**	0.0010	0.00030	0.0050	0.0021	0.0062
SW4	Min	6.64	109.0	34.9	8.3	3.1	0.020	0.030	0.030	0.020	0.0020	0.0056	0.018	0.00010	0.00030	0.0051	0.000010	0.00050	0.000085	0.00070	0.170	0.00010	0.000010	0.00020	0.0010	0.0123	0.00040	0.000030	0.000012	0.00020	0.0024
	Max	7.32	168.0	78.1	24.6	12.0	0.20	0.038	0.058	0.020	0.0020	0.028	**0.244**	0.0050	0.0010	0.050	*0.000090*	0.0026	0.00050	0.0010	**0.464**	0.0010	0.00010	0.0010	0.0020	**0.030**	0.0010	0.00030	0.0050	0.0010	0.0061
	Median	7.07	138.0	57.0	15.3	4.9	0.026	0.030	0.030	0.020	0.0020	0.009	0.060	0.00060	0.0010	0.050	0.000017	0.00100	0.00050	0.0010	**0.337**	0.0010	0.000010	0.0010	0.0020	0.0197	0.00100	0.00030	0.0050	0.0010	0.0030
	St Dev.	0.21	19.4	12.5	4.8	2.6	0.058	0.004	0.010	0	0	0.0061	0.070	0.0014	0.00028	0.021	0.000023	0.00061	0.00017	0.00015	0.103	0.00044	0.000027	0.00040	0.00050	0.00487	0.00027	0.000132	0.0025	0.00039	0.0010
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.27	152.5	68.5	18.9	6.5	0.067	0.037	0.035	0.020	0.0020	0.010	**0.100**	0.00060	0.0010	0.050	0.000021	0.0010	0.00050	0.0010	**0.391**	0.0010	0.000010	0.0010	0.0020	0.0212	0.0010	0.00030	0.0050	0.0010	0.0032
SW7A	Min	7.58	239.0	113.0	12.1	2.0	0.020	0.030	0.030	0.020	0.0020	0.0050	0.030	0.00010	0.00082	0.012	0.000015	0.00050	0.00031	0.00099	0.096	0.00017	0.000010	0.00086	0.0017	0.0196	0.00050	0.000030	0.00070	0.00082	0.0030
	Max	8.29	829.0	462.0	22.1	60.5	1.36	0.100	0.262	0.020	0.0020	0.030	**0.710**	0.0050	0.0022	0.050	0.000090	0.0017	0.0012	0.0022	**1.54**	0.0010	0.00010	0.0018	0.0034	**0.139**	0.0010	0.00030	0.0050	0.0029	0.0059
	Median	8.10	422.0	230.5	15.4	13.2	0.032	0.085	0.030	0.020	0.0020	0.0066	**0.156**	0.00060	0.0012	0.050	0.000018	0.0010	0.00050	0.0014	**0.503**	0.0010	0.000010	0.0012	0.0020	**0.062**	0.00076	0.00030	0.0050	0.0011	0.0037
	St Dev.	0.23	177.0	106.2	3.5	20.5	0.46	0.024	0.081	0	0	0.0085	0.236	0.0017	0.00054	0.017	0.000026	0.00036	0.00025	0.00042	0.495	0.00036	0.000032	0.00036	0.00052	0.043	0.00026	0.00014	0.00190	0.00067	0.00113
	N	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	75th %	8.11	469.8	253.0	16.9	24.9	0.12	0.094	0.034	0.020	0.0020	0.010	**0.355**	0.00060	0.0017	0.050	0.000022	0.0010	0.00054	0.00151	**0.731**	0.0010	0.000010	0.0016	0.0021	**0.107**	0.0010	0.00030	0.0050	0.0015	0.0045
SW10	Min	7.29	167.0	71.1	12.7	2.8	0.020	0.030	0.030	0.020	0.0020	0.0036	0.029	0.00010	0.00064	0.013	0.000010	0.00050	0.00019	0.0010	0.287	0.00014	0.000010	0.00035	0.0013	0.0243	0.00040	0.000030	0.00032	0.00095	0.0025
	Max	7.98	494.0	270.0	33.2	1340.0	0.22	0.111	0.606	0.020	0.0020	0.020	**32.3**	0.0050	**0.013**	0.050	**0.00074**	0.062	0.022	**0.036**	**42.3**	**0.023**	0.000100	0.0011	0.051	**1.400**	**0.0028**	0.00039	0.0050	**0.072**	**0.20**
	Median	7.84	352.0	190.0	22.6	9.7	0.027	0.070	0.030	0.020	0.0020	0.0050	**0.145**	0.00060	0.0016	0.050	0.000017	0.0010	0.00050	0.0010	**0.670**	0.0010	0.000010	0.0010	0.0020	**0.084**	0.0010	0.00030	0.0050	0.0010	0.0065
	St Dev.	0.22	95.8	57.0	5.2	400.4	0.060	0.028	0.172	0.0	0	0.0054	9.7	0.0014	0.0035	0.015	0.00022	0.018	0.0063	0.011	12.5	0.0068	0.000027	0.00027	0.015	0.400	0.00066	0.00013	0.0020	0.021	0.059
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.96	427.5	212.0	23.1	22.6	0.054	0.095	0.043	0.020	0.0020	0.0088	**0.423**	0.00060	0.0026	0.050	0.000026	0.0010	0.00065	0.0012	**1.100**	0.0010	0.000010	0.0010	0.0026	**0.099**	0.0010	0.00030	0.0050	0.0016	0.011
SW11	Min	6.84	83.0	61.5	10.7	2.4	0.020	0.030	0.030	0.020	0.0020	0.0066	0.023	0.00010	0.00043	0.0070	0.000010	0.00050	0.00018	0.00070	0.265	0.00010	0.000010	0.00020	0.0010	0.0152	0.00040	0.000030	0.000066	0.00042	0.0024
	Max	7.67	364.0	208.0	53.2	65.8	1.060	0.075	0.072	0.020	0.0020	0.038	**0.914**	0.0050	0.0023	0.050	0.000090	0.0018	0.0045	0.0013	**11.0**	0.0010	0.000100	0.0010	0.0027	**0.693**	0.0010	0.00030	0.0050	0.0025	0.013
	Median	7.35	211.0	118.0	22.7	11.4	0.039	0.049	0.030	0.020	0.0020	0.009	**0.168**	0.00060	0.0011	0.050	0.000017	0.0010	0.0010	0.0010	**1.61**	0.0010	0.000010	0.0010	0.0020	**0.062**	0.00100	0.00030	0.0050	0.0010	0.0040
	St Dev.	0.28	84.2	50.8	11.1	21.0	0.31	0.015	0.016	0	0	0.009	0.291	0.0014	0.00065	0.021	0.000023	0.00039	0.0015	0.00018	3.69	0.00040	0.000027	0.00040	0.00048	0.195	0.00027	0.00014	0.0024	0.00055	0.0030
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.47	277.5	162.5	28.6	18.8	0.079	0.058	0.034	0.020	0.0020	0.018	**0.292**	0.00060	0.0019	0.050	0.000019	0.0010	0.0018	0.0010	**2.60**	0.0010	0.000010	0.0010	0.0020	**0.086**	0.0010	0.00030	0.0050	0.0013	0.0052
SW12A	Min	6.54	57.1	23.1	9.9	2.0	0.020	0.030	0.030	0.020	0.0020	0.0094	0.073	0.00010	0.00058	0.0054	0.000010	0.00050	0.00018	0.0012	**0.317**	0.00011	0.000010	0.00020	0.0010	0.0186	0.00040	0.000030	0.000094	0.00075	0.0024
	Max	7.49	238.0	123.0	37.6	108.0	0.74	0.047	0.097	0.020	0.0020	0.31	**1.85**	0.0050	0.0026	0.050	0.000090	0.0027	0.0041	**0.0055**	**8.09**	0.0011	0.00010	0.0010	0.0041	**0.205**	0.001	0.00030	0.0050	0.0041	0.017
	Median	6.94	113.0	56.3	16.1	10.8	0.020	0.030	0.030	0.020	0.0020	0.029	**0.346**	0.00060	0.0013	0.050	0.000017	0.0010	0.00064	0.0022	**0.96**	0.0010	0.000010	0.0010	0.0020	**0.028**	0.0010	0.00030	0.0050	0.0013	0.0037
	St Dev.	0.35	57.4	31.5	8.2	32.4	0.24	0.006	0.023	0	0	0.090	0.558	0.0014	0.00067	0.021	0.000023	0.00063	0.0013	0.0013	2.58	0.00029	0.00003	0.00040	0.00079	0.060	0.00031	0.00014	0.0025	0.0012	0.0045
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.24	151.0	82.0	21.3	35.1	0.036	0.038	0.030	0.020	0.0020	0.050	**0.770**	0.00060	0.0017	0.050	0.000034	0.0012	0.00078	**0.0030**	**1.14**	0.0010	0.000010	0.0010	0.0022	**0.055**	0.0010	0.00030	0.0050	0.0026	0.0069
SW13	Min	7.35	172.0	83.3	10.7	2.4	0.020	0.030	0.030	0.020	0.0020	0.0030	0.021	0.00010	0.00046	0.011	0.000010	0.00050	0.000062	0.00070	0.037	0.00010	0.000010	0.00025	0.0010	0.0113	0.00050	0.000030	0.00031	0.00051	0.0020
	Max	8.31	662.0	409.0	37.2	39.0	0.71	**0.133**	0.260	0.020	0.0020	0.010	**0.336**	0.00500	0.0039	0.050	0.000090	0.0011	0.0048	0.0015	**4.77**	0.0010	0.00010	0.0010	0.0037	**0.253**	0.0010	0.00030	0.0050	0.0014	0.0068
	Median	7.84	353.0	194.0	16.4	14.0	0.020	0.075	0.030	0.020	0.0020	0.0050	**0.115**	0.00060	0.0012	0.050	0.000017	0.00100	0.00050	0.0011	**0.350**	0.0010	0.000010	0.0010	0.0022	**0.031**	0.0010	0.00030	0.0050	0.0011	0.0030
	St Dev.	0.34	137.0	93.6	7.2	12.7	0.21	0.038	0.090	0	0	0.0019	0.104	0.0014	0.0010	0.019	0.000022	0.00026	0.0014	0.00026	1.42	0.00039	0.000027	0.00034	0.00092	0.071	0.00025	0.00014	0.0022	0.00027	0.0014
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	8.08	474.5	275.0	20.4	25.6	0.09	0.106	0.099	0.020	0.0020	0.0056	**0.207**	0.00060	0.0021	0.050	0.000017	0.0010	0.00050	0.0012	**0.545**	0.0010	0.000010	0.0010	0.0031	**0.063**	0.0010	0.00030	0.0050	0.0013	0.0044

TABLE 5-1
SUMMARY OF 2012 SURFACE WATER ANALYTICAL RESULTS

		pH	Conductivity	Hardness as $CaCO_3$	Dissolved Organic Carbon	TSS	Total Ammonia-N	Fluoride	Nitrate	Nitrite	Cyanide-Total	Aluminum-Dissolved	Aluminum-Total	Antimony-Total	Arsenic-Total	Boron-Total	Cadmium-Total	Chromium-Total	Cobalt-Total	Copper-Total	Iron-Total	Lead-Total	Mercury-Total	Molybdenum-Total	Nickel-Total	Phosphorus-Total	Selenium-Total	Thallium-Total	Uranium-Total	Vanadium-Total	Zinc-Total
PWQO		6.5-8.5	-	-	-	-	-	-	-	-	0.005[A]	0.075[i,B]	-	0.02[i]	0.1(0.005[i])	0.2[i]	0.0002	0.001 / 0.0089	0.0009	0.005 (0.005[i])[F]	0.3	0.020 / 0.025 (0.003 / 0.005[i])[H]	0.0002	0.04[i]	0.025	0.03[i]	0.1	0.0003[i]	0.005[i]	0.006[i]	0.03(0.02[i])
CEQG		6.5-9.0	-	-	-	-	-	0.12	3	0.06	0.005[A]		0.1[C]	-	0.005	1.5	0.000015-0.000088[D]	0.001 / 0.0089	-	0.002 - 0.00622	0.3	0.00102 - 0.0134	0.000026	0.073[i]	0.025[J]	-	0.001	0.0008	0.015	-	0.03
RDL		0.10	3.0	5.0	1.0	2.0	0.020	0.030	0.030	0.020	0.0020	0.0050	0.0050	0.00010 / 0.00060 / 0.0050	0.0010	0.050	0.000010 / 0.000017 / 0.000090[D*]	0.00050 / 0.0010	0.00050	0.00070 / 0.0010	0.020	0.00010 / 0.0010	0.000010 / 0.0010	0.00020 / 0.0010	0.0020	0.0050	0.00050 / 0.0010	0.000030 / 0.00030	0.0050	0.0010	0.0020 / 0.0030
		pH units	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
SW14	**Min**	6.99	102.0	48.2	11.7	2.0	0.020	0.030	0.030	0.020	0.0020	0.0060	0.026	0.00010	0.00033	0.0043	0.000010	0.00050	0.000073	0.00070	0.111	0.00010	0.000010	0.00020	0.0010	0.0068	0.00040	0.000030	0.00004	0.00020	0.0020
	Max	8.11	297.0	169.0	31.7	21.8	1.23	0.052	0.282	0.020	0.0020	0.029	**0.602**	0.0050	0.0013	0.050	0.000090	0.0011	0.0018	0.0012	**1.60**	0.0010	0.00010	0.0010	0.0020	**0.052**	0.0010	0.00030	0.00500	0.0016	0.0084
	Median	7.60	197.0	114.0	21.3	9.9	0.025	0.042	0.030	0.020	0.0020	0.014	0.080	0.00060	0.0010	0.050	0.000017	0.00100	0.00050	0.0010	**0.304**	0.0010	0.000010	0.0010	0.0020	0.0246	0.00100	0.00030	0.00500	0.0010	0.0030
	St Dev.	0.41	62.4	39.9	5.6	6.3	0.37	0.009	0.076	0	0	0.0069	0.174	0.0014	0.00029	0.023	0.000023	0.00026	0.00043	0.00016	0.461	0.00043	0.000027	0.00040	0.00050	0.0143	0.00027	0.00014	0.00249	0.00041	0.0021
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.89	242.5	146.0	24.8	13.0	0.10	0.047	0.030	0.020	0.0020	0.017	**0.104**	0.00060	0.0010	0.050	0.000022	0.0010	0.00050	0.0010	**0.624**	0.0010	0.000010	0.0010	0.0020	**0.034**	0.0010	0.00030	0.00500	0.0010	0.0038
SW15	**Min**	7.38	140.0	60.6	9.7	2.0	0.020	0.030	0.030	0.020	0.0020	0.0080	0.078	0.00010	0.00056	0.0096	0.000013	0.00050	0.000072	0.0014	0.146	0.00014	0.000010	0.00021	0.0010	0.0229	0.00040	0.000030	0.00016	0.00020	0.0030
	Max	8.04	338.0	167.0	27.5	55.9	0.12	0.076	0.523	0.020	0.0020	0.067	**1.29**	0.0050	0.0023	0.050	0.000090	0.0025	0.0011	0.0036	**1.73**	0.0010	0.00010	0.0010	0.0052	**0.134**	0.001	0.00030	0.0050	0.0036	0.0338
	Median	7.77	176.0	85.1	12.6	16.3	0.020	0.048	0.030	0.020	0.0020	0.016	**0.323**	0.00060	0.0013	0.050	0.000017	0.0010	0.00050	0.0018	**0.517**	0.0010	0.000010	0.0010	0.0020	**0.074**	0.0010	0.00030	0.0050	0.0019	0.0041
	St Dev.	0.22	57.3	32.8	6.8	17.8	0.029	0.014	0.165	0	0	0.019	0.410	0.0014	0.00059	0.019	0.000022	0.00064	0.00030	0.00074	0.581	0.00031	0.000027	0.00034	0.00122	0.038	0.00027	0.00014	0.0023	0.0011	0.0090
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.95	193.0	95.4	21.5	31.3	0.023	0.058	0.064	0.020	0.0020	0.032	**0.812**	0.00060	0.0020	0.050	0.000029	0.0016	0.00082	**0.0025**	**1.28**	0.0010	0.000010	0.0010	0.0027	**0.105**	0.0010	0.00030	0.0050	0.0032	0.0059
SW16	**Min**	7.27	73.1	26.1	7.4	2.0	0.020	0.030	0.030	0.020	0.0020	0.0083	0.044	0.00010	0.00039	0.0065	0.000010	0.00050	0.000050	0.0010	0.064	0.00010	0.000010	0.00020	0.0010	0.0170	0.00040	0.000030	0.000057	0.00020	0.0023
	Max	7.66	131.0	49.9	12.9	159.0	0.053	0.043	0.430	0.044	0.0057	0.020	**2.65**	0.0050	0.0014	0.050	0.000090	0.0048	0.0018	**0.0049**	**3.28**	**0.0026**	0.00010	0.0010	0.0054	**0.142**	0.0010	0.00030	0.0050	**0.0082**	0.017
	Median	7.47	84.4	31.9	8.4	10.6	0.021	0.033	0.037	0.020	0.0020	0.017	**0.140**	0.00060	0.0010	0.050	0.000017	0.0010	0.00050	0.0015	0.207	0.0010	0.000010	0.0010	0.0020	0.0214	0.00100	0.00030	0.0050	0.0010	0.0036
	St Dev.	0.12	15.7	6.2	1.6	45.2	0.013	0.005	0.124	0.007	0.0011	0.0040	0.755	0.0014	0.00033	0.021	0.000026	0.0012	0.00047	0.0011	0.933	0.00071	0.000027	0.00039	0.0012	0.038	0.00026	0.00014	0.0025	0.0022	0.0045
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.55	92.0	33.3	9.3	29.3	0.030	0.039	0.089	0.020	0.0020	0.018	**0.280**	0.00060	0.0010	0.050	0.000023	0.0010	0.00050	0.0016	**0.309**	0.0010	0.000010	0.0010	0.0020	**0.039**	0.0010	0.00030	0.0050	0.0012	0.0041
SW17	**Min**	7.30	75.1	31.0	6.6	2.0	0.020	0.030	0.030	0.020	0.0020	0.011	0.052	0.00010	0.00042	0.0074	0.000010	0.00050	0.000050	0.0010	0.083	0.00010	0.000010	0.00020	0.0010	0.0183	0.00040	0.000030	0.000088	0.00020	0.0030
	Max	7.69	136.0	52.4	13.0	63.5	0.065	0.049	0.170	0.020	0.0020	0.031	**0.900**	0.0050	0.0010	0.050	0.00015	0.0020	0.00055	0.0022	**1.110**	0.0010	0.00010	0.0010	0.0020	**0.062**	0.0010	0.00030	0.0050	0.0026	0.016
	Median	7.54	102.0	38.0	9.6	8.5	0.020	0.039	0.030	0.020	0.0020	0.015	**0.107**	0.00060	0.0010	0.050	0.000017	0.00100	0.00050	0.0014	0.204	0.0010	0.000010	0.0010	0.0020	0.0276	0.00100	0.00030	0.0050	0.0010	0.0034
	St Dev.	0.12	17.1	6.0	1.8	17.7	0.014	0.006	0.050	0	0	0.0073	0.246	0.0014	0.00026	0.021	0.000044	0.00042	0.00019	0.00033	0.311	0.00041	0.000027	0.00038	0.00049	0.0149	0.00027	0.00014	0.0025	0.00060	0.0038
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.59	108.0	42.2	10.3	21.2	0.021	0.041	0.089	0.020	0.0020	0.023	**0.246**	0.00060	0.0010	0.050	0.000024	0.0010	0.00050	0.0015	**0.386**	0.0010	0.000010	0.0010	0.0020	0.0361	0.0010	0.00030	0.0050	0.0010	0.0048
SW18	**Min**	7.27	167.0	17.4	12.7	2.9	0.020	0.030	0.030	0.020	0.0020	0.0050	0.019	0.00010	0.00051	0.013	0.000010	0.00050	0.000075	0.00070	0.078	0.00010	0.000010	0.00049	0.0010	0.0133	0.00040	0.000030	0.00015	0.00065	0.0021
	Max	8.20	1030.0	653.0	27.1	225.0	3.81	0.123	0.301	0.020	0.0020	0.030	**1.47**	0.0050	**0.0054**	0.050	0.000090	0.0028	0.0054	0.0023	**56.6**	0.0010	0.00010	0.0010	0.0054	**1.230**	0.0010	0.00030	0.0050	0.0046	0.012
	Median	7.65	435.0	245.0	18.4	7.0	0.020	0.076	0.030	0.020	0.0020	0.005	0.041	0.00060	0.0016	0.050	0.000017	0.0010	0.00050	0.0010	**0.791**	0.0010	0.000010	0.0010	0.0024	**0.083**	0.00100	0.00030	0.0050	0.0010	0.0030
	St Dev.	0.34	235.4	172.3	4.4	73.5	1.14	0.033	0.082	0	0	0.010	0.526	0.0014	0.0015	0.016	0.000023	0.00083	0.0016	0.00054	18.9	0.00040	0.000027	0.00020	0.0012	0.411	0.00027	0.00014	0.0024	0.0013	0.0032
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	8.11	479.5	277.0	20.6	70.0	0.050	0.087	0.030	0.020	0.0020	0.013	**0.290**	0.00060	0.0025	0.050	0.000021	0.0010	0.0014	0.0012	**2.90**	0.0010	0.000010	0.0010	0.0029	**0.178**	0.0010	0.00030	0.0050	0.0017	0.0049

Notes:

PWQO	Provincial Water Quality Objectives, taken from "Policies, Guidelines, Provincial Water Quality Objectives ("PWQO") of the Ministry of Environment and Energy," July, 1994; Table 2; Table of PWQOs and Interim PWQOs ("IPWQO"). IPWQOs denoted by supe
CEQG	Canadian Environmental Quality Guidelines ("CEQG") from the Canadian Council of Ministers of the Environment, Summary Table: "Canadian Water Quality Guidelines for the Protection of Aquatic Life" Summary Table Accessed Online @ http://st-ts.ccme.ca
100	indicates exceedance of an interim PWQO.
100	indicates exceedance of the PWQO.
100	indicates exceedance of the CEQG.
100	indicates exceedance of both the PWQO and CEQG.
Others	RDL - Reportable Detection Limit; Min - minimum; Max - maximum; St Dev. - Standard Deviation; N - number of samples; 75th % - 75th percentile
	RDL values are provided by the laboratory Certificates of Analysis.
100	RDL value is above the PWQO or CCME guideline value
i	indicates values is an Interim PWQO.
A	PWQO / CEQG for free cyanide is 0.005 mg/L.
B	PWQO is for total aluminum measured in a clay-free sample; analyzed samples are not clay-free.
C	CEQG for aluminum where pH is ≥6.5.
D	CEQG for cadmium = 10^0.86[log10(hardness)]-3.2 µg/L.
D*	A few RDL values for cadmium are greater than the calculated CEQG value based on hardness of the particular sample.
E	PWQO / CEQG for hexavalent chromium is 1 µg/L, PWQO/CEQG for trivalent chromium is 8.9 µg/L; total chromium reported.
F	PWQO for copper is 5 µg/L; IPWQO is 5 µg/L where hardness is >20 mg/L.
G	CEQG for copper = e0.8545[ln(hardness)]-1.465 * 0.2µg/L; Minimum of 2 µg/L.
H	PWQO for lead is 20 µg/L where alkalinity is 40-80 mg/L and 25 µg/L where alkalinity is >80 mg/L; IPWQO is 3 µg/L where alkalinity is 30-80 mg/L and 5 µg/L where alkalinity is >80 mg/L.
I	CEQG for lead = e1.273[ln(hardness)]-4.705; Minimum of 1 µg/L.
J	CEQG for nickel is a minimum of 25 µg/L regardless of water hardness.

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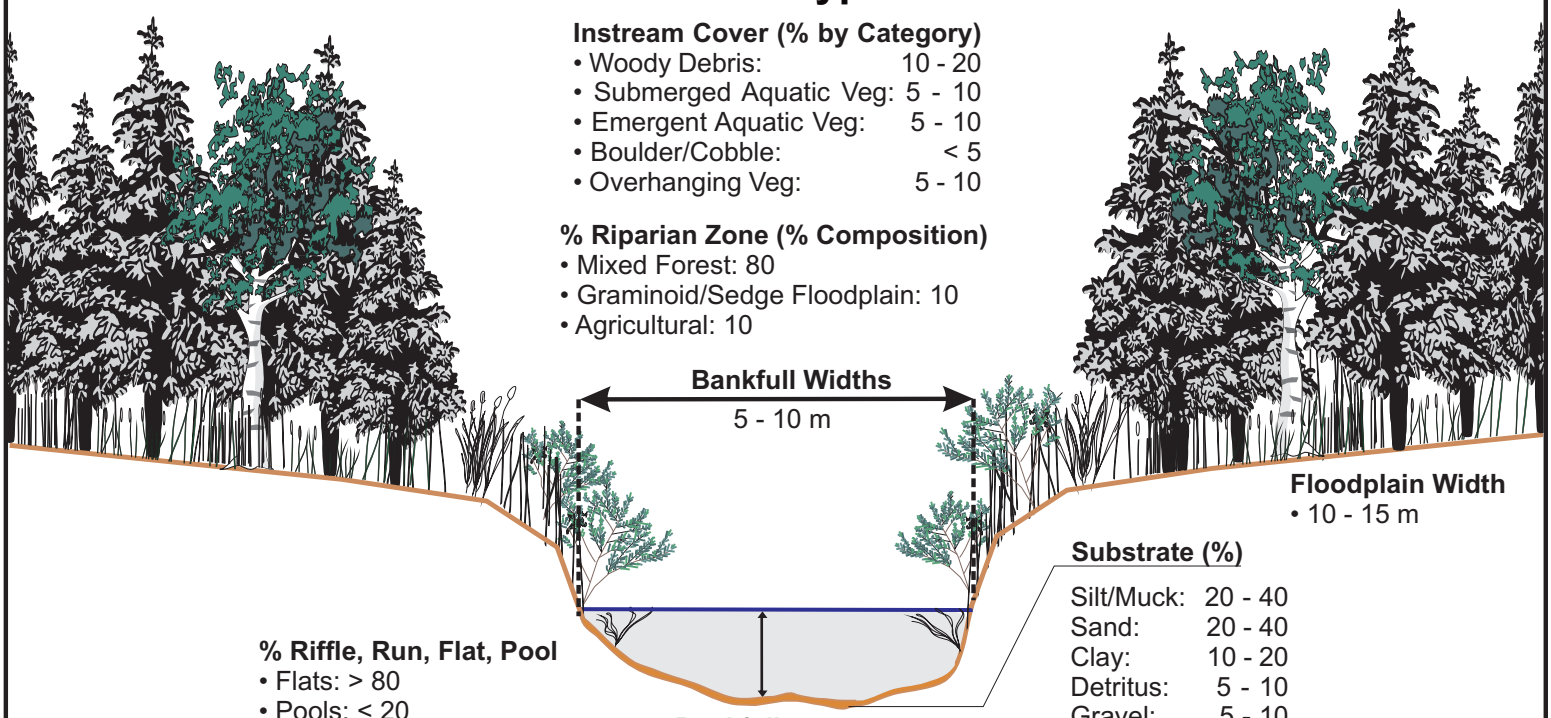
APPENDIX A

HABITAT TYPE PROFILES

Habitat Type 1

Instream Cover (% by Category)
- Woody Debris: 10 - 20
- Submerged Aquatic Veg: 5 - 10
- Emergent Aquatic Veg: 5 - 10
- Boulder/Cobble: < 5
- Overhanging Veg: 5 - 10

% Riparian Zone (% Composition)
- Mixed Forest: 80
- Graminoid/Sedge Floodplain: 10
- Agricultural: 10





Pinewood River: PIN-10A - Facing Downstream



Pinewood River: PIN-10A - Facing Upstream



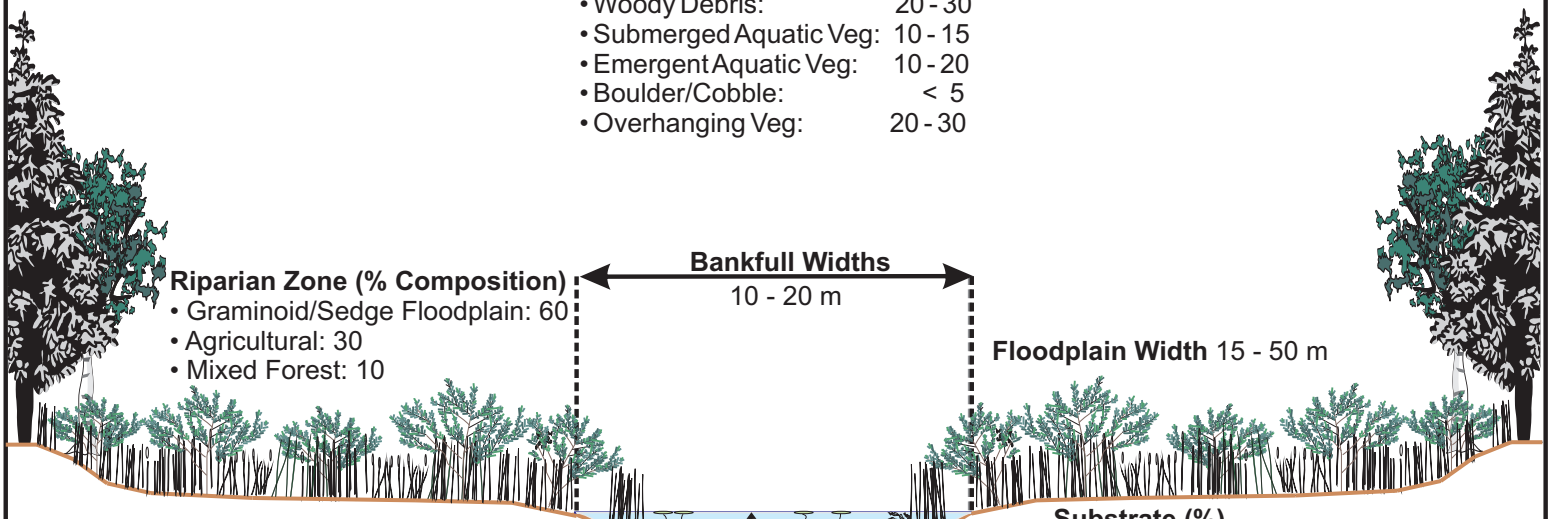
Pinewood River: PIN-9 - Facing Downstream



Pinewood River: PIN-9 - Facing Downstream

Habitat Type 2

Instream Cover (% by Category)
- Woody Debris: 20 - 30
- Submerged Aquatic Veg: 10 - 15
- Emergent Aquatic Veg: 10 - 20
- Boulder/Cobble: < 5
- Overhanging Veg: 20 - 30



Riparian Zone (% Composition)
- Graminoid/Sedge Floodplain: 60
- Agricultural: 30
- Mixed Forest: 10

Bankfull Widths
10 - 20 m

Floodplain Width 15 - 50 m

% Riffle, Run, Flat, Pool
- Flats: > 90
- Pools: < 10

Bankfull Depths 0.75 - 2.25m

Substrate (%)

Silt/Muck:	20 - 40
Sand:	20 - 40
Clay:	10 - 20
Detritus:	5 - 15
Gravel:	5 -10
Boulder:	2 - 5



Pinewood River: PIN-2A - Facing Upstream



Pinewood River: PIN-2A - Facing Downstream



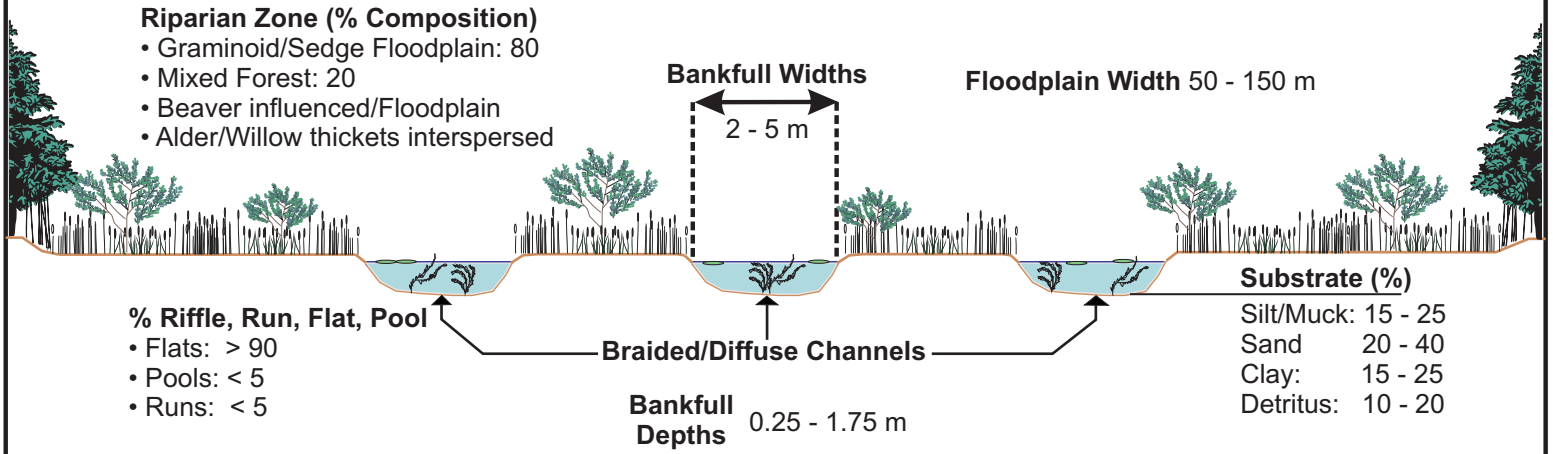
Pinewood River: PIN-8 - Facing Downstream



Pinewood River: PIN-8 - Facing Upstream

Habitat Type 3

Instream Cover (% by Category)
- Woody Debris: < 5
- Submerged Aquatic Veg: 5 - 10
- Emergent Aquatic Veg: 5 - 10
- Overhanging Veg: 30 - 50





Clark Creek: CLA-5A - Vegetated Floodplain



Clark Creek: CLA-5 - Facing Upstream



Loslo Creek: LOS-8 - Beaver Pond Outlet Channel

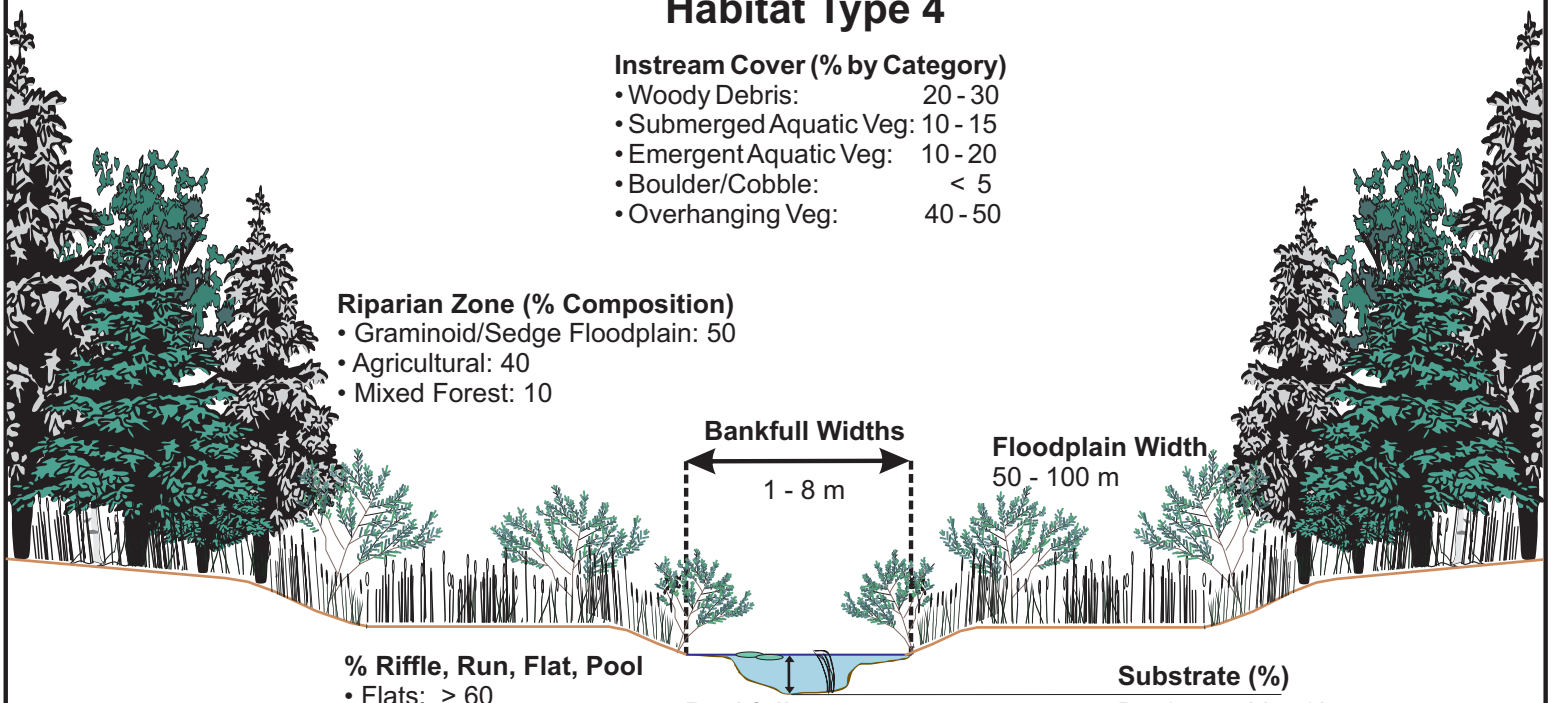


Loslo Creek: LOS-8 - Vegetated Floodplain

Habitat Type 4

Instream Cover (% by Category)
- Woody Debris: 20 - 30
- Submerged Aquatic Veg: 10 - 15
- Emergent Aquatic Veg: 10 - 20
- Boulder/Cobble: < 5
- Overhanging Veg: 40 - 50

Riparian Zone (% Composition)
- Graminoid/Sedge Floodplain: 50
- Agricultural: 40
- Mixed Forest: 10



% Riffle, Run, Flat, Pool
- Flats: > 60
- Pools: > 40

Bankfull Depths 0.75 - 2.5 m

Substrate (%)

Detritus:	20 - 40
Silt/muck:	20 - 40
Sand:	25 - 50
Clay:	5 - 10



Jones Creek: JON-1 - Facing Upstream



Loslo Creek: LOS-1 - Dry Intermittent Channel



Loslo Creek: LOS-10 - Saturated Intermittent Channel

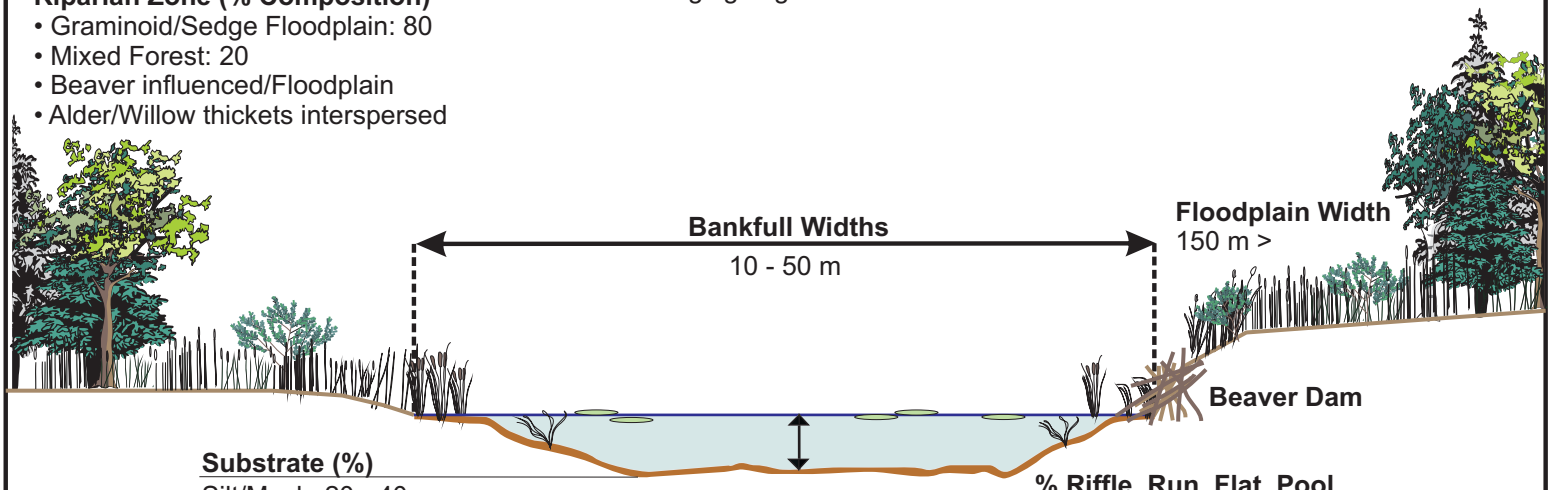


Loslo Creek: LOS-11- Beaver Pond Outlet Channel

Habitat Type 5

Instream Cover (% by Category)
- Woody Debris: 30 - 50
- Submerged Aquatic Veg: 10 - 15
- Emergent Aquatic Veg: 10 - 20
- Boulder/Cobble: < 5
- Overhanging Veg: 10 -20

Riparian Zone (% Composition)
- Graminoid/Sedge Floodplain: 80
- Mixed Forest: 20
- Beaver influenced/Floodplain
- Alder/Willow thickets interspersed



Substrate (%)
Silt/Muck: 20 - 40
Sand: 20 - 30
Clay: 10 - 20
Detritus: 10 - 20

Bankfull Depths 0.25 - 2.0 m

% Riffle, Run, Flat, Pool
- Pools: 100
- Pond habitat



Clark Creek: CLA-5A - Beaver Pond



Clark Creek: CLA-5A - Beaver Pond



Clark Creek: CLA-5A - Beaver Pond

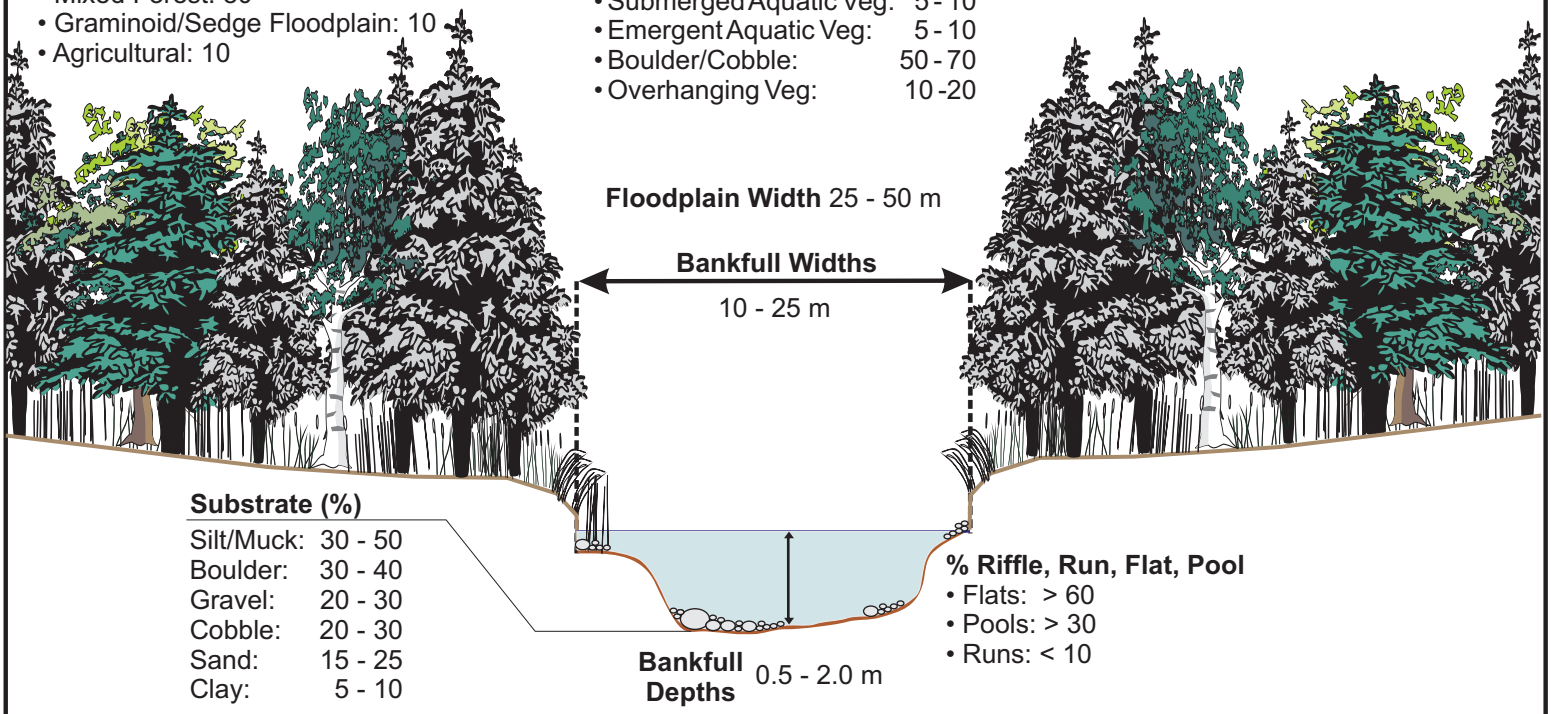


Clark Creek: CLA-5A - Beaver Pond

Habitat Type 6

Riparian Zone (% Composition)
- Mixed Forest: 80
- Graminoid/Sedge Floodplain: 10
- Agricultural: 10

Instream Cover (% by Category)
- Woody Debris: 20 -40
- Submerged Aquatic Veg: 5 - 10
- Emergent Aquatic Veg: 5 - 10
- Boulder/Cobble: 50 - 70
- Overhanging Veg: 10 -20



Substrate (%)

Silt/Muck:	30 - 50
Boulder:	30 - 40
Gravel:	20 - 30
Cobble:	20 - 30
Sand:	15 - 25
Clay:	5 - 10

Bankfull Depths 0.5 - 2.0 m

% Riffle, Run, Flat, Pool
- Flats: > 60
- Pools: > 30
- Runs: < 10



Pinewood River: PIN-15 - Facing Upstream



Pinewood River: PIN-15 - Facing Downstream



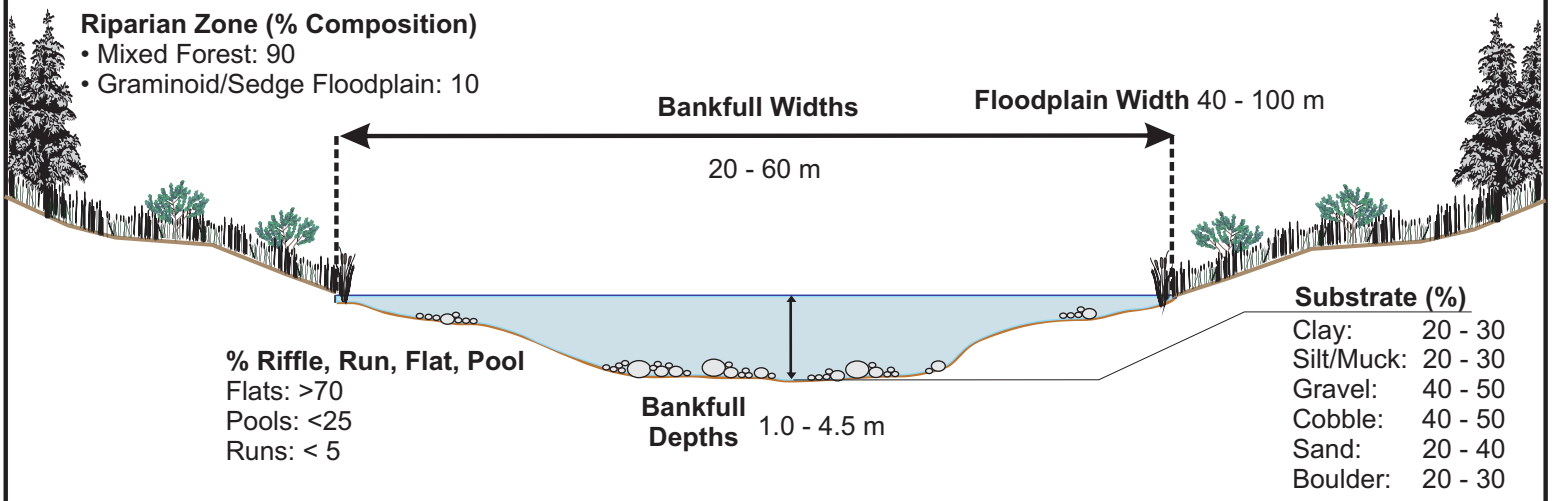
Pinewood River: Upstream of PIN-15



Pinewood River: PIN-12 - Facing Downstream

Habitat Type 7

Instream Cover (% by Category)
- Woody Debris: 20 -40
- Submerged Aquatic Veg: 5 - 10
- Emergent Aquatic Veg: 5 - 10
- Boulder/Cobble: 40 - 60
- Overhanging Veg: 5 - 10





Lower Pinewood River: PIN-18 Facing Upstream



Lower Pinewood River: Upstream of PIN-18



Lower Pinewood River: PIN-17 Facing Upstream

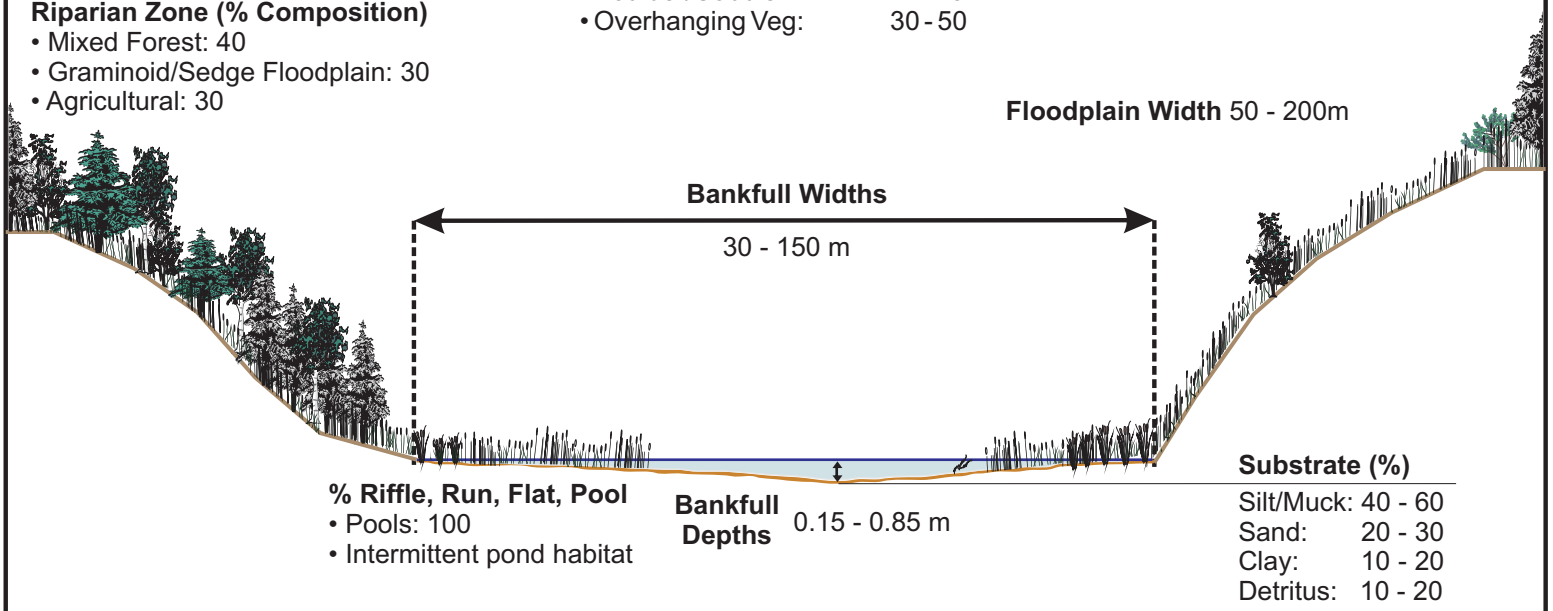


Lower Pinewood River: PIN-17 Facing Upstream

Habitat Type 8

Instream Cover (% by Category)
- Woody Debris: < 5
- Submerged Aquatic Veg: 20 - 30
- Emergent Aquatic Veg: 40 - 60
- Boulder/Cobble: < 5
- Overhanging Veg: 30 - 50

Riparian Zone (% Composition)
- Mixed Forest: 40
- Graminoid/Sedge Floodplain: 30
- Agricultural: 30



% Riffle, Run, Flat, Pool
- Pools: 100
- Intermittent pond habitat

Bankfull Depths 0.15 - 0.85 m

Substrate (%)
Silt/Muck: 40 - 60
Sand: 20 - 30
Clay: 10 - 20
Detritus: 10 - 20


Lower Pinewood River: Back Bay 3


Lower Pinewood River: Back Bay 3


Lower Pinewood River: Back Bay 3

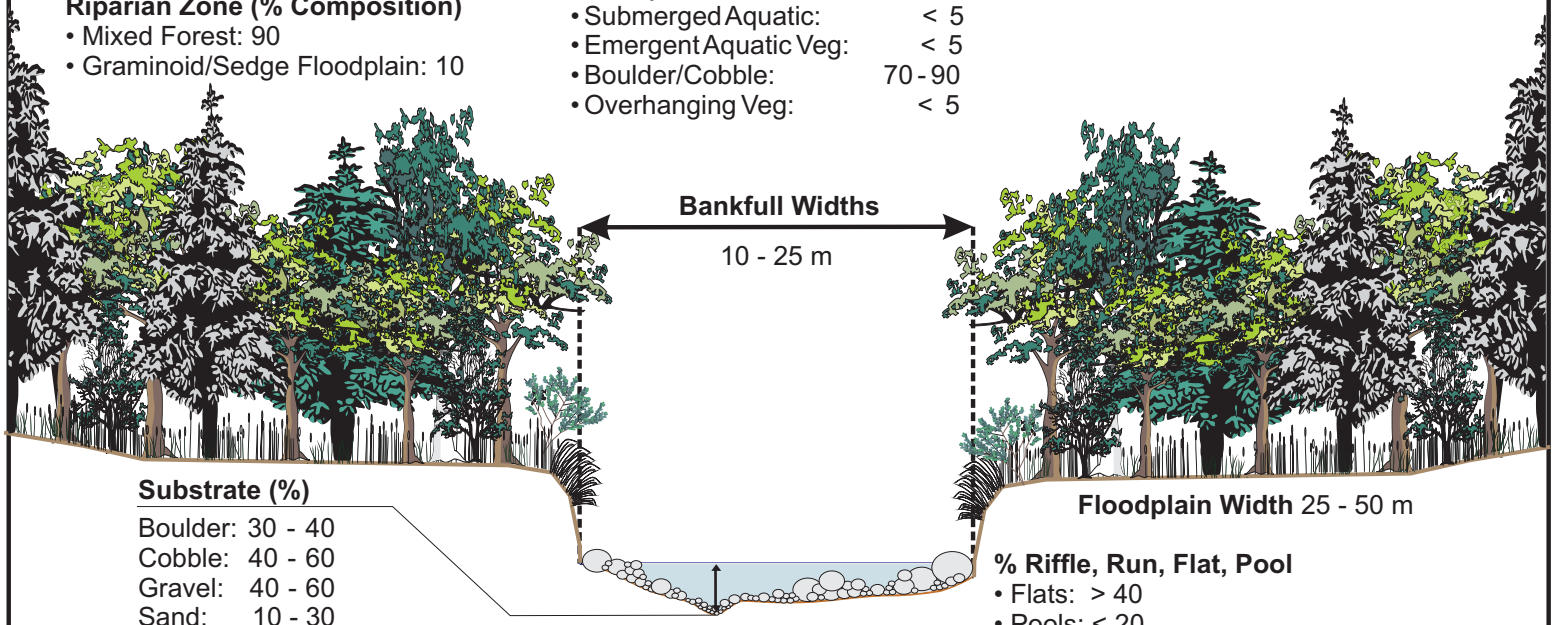

Lower Pinewood River: Back Bay 2

Habitat Type 9

Riparian Zone (% Composition)
- Mixed Forest: 90
- Graminoid/Sedge Floodplain: 10

Instream Cover (% by Category)

•Woody Debris:	5 - 15
• Submerged Aquatic:	< 5
• Emergent Aquatic Veg:	< 5
• Boulder/Cobble:	70 - 90
• Overhanging Veg:	< 5



Substrate (%)

Boulder:	30 - 40
Cobble:	40 - 60
Gravel:	40 - 60
Sand:	10 - 30
Silt:	10 - 20

Bankfull Depths 0.25 - 1.25 m

Floodplain Width 25 - 50 m

% Riffle, Run, Flat, Pool
- Flats: > 40
- Pools: < 20
- Runs: < 20
- Riffles: < 20



Lower Pinewood River: PW-24 - Facing downstream



Lower Pinewood River: PW-24 - Cobble Shoal

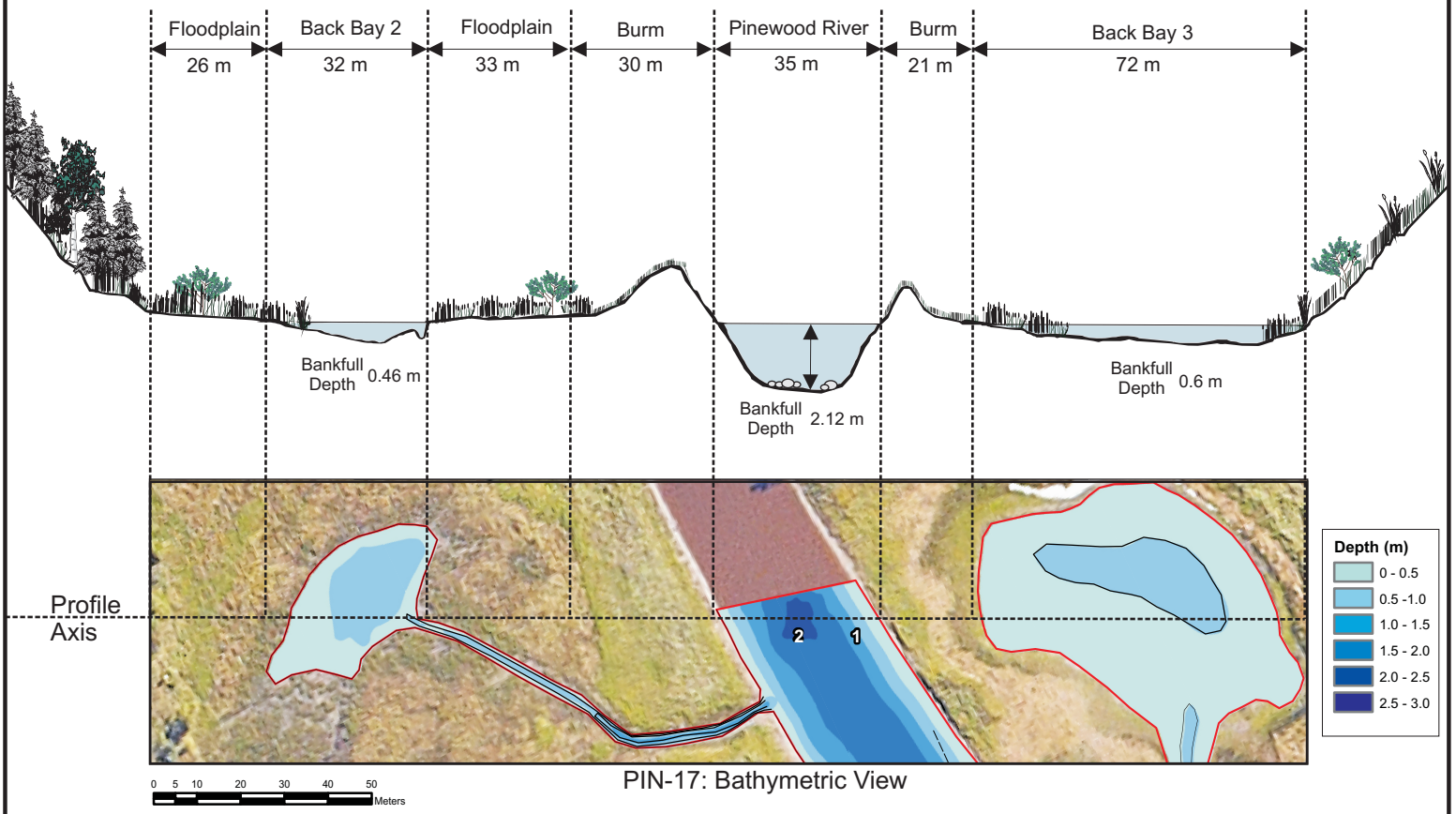


Lower Pinewood River: Downstream of PIN-14



Lower Pinewood River: PW-23 - Bedrock Outcrop

Lower Pinewood River and Back Bay Combined Profile (PIN-17)



PIN-17: Bathymetric View



Back Bay 2: Facing Northwest



Back Bay 3: Facing Southwest



Back Bay 2: Facing Northeast



Back Bay 3: Facing Southeast

APPENDIX B

PHOTOGRAPHIC RECORD



Photo 1: Facing east upstream at PIN-2AA on upper Pinewood River. Typical Type 1 habitat.



Photo 2: Facing southeast upstream at PIN-2A on upper Pinewood River. Bankfull conditions.



Photo 3: Facing southwest at PIN-3A on Pinewood River. Dense riparian vegetation and hummocks.



Photo 4: Bankfull conditions at PIN-8 due to beaver dam on Pinewood River.



Photo 5: Pinewood River, facing upstream at PIN-9. Low water conditions, steep entrenchment and dense aquatic vegetation.



Photo 6: Pinewood River, facing downstream at PIN-10. Typical Type 1 habitat.



Photo 7: Pinewood River, facing downstream at PIN-10A. Steep entrenchment, abundant wooding debris and aquatic vegetation. Type 1 Habitat.



Photo 8: Pinewood River, facing upstream at PIN-11. Low water conditions due to dense log jam upstream.



Photo 9: Pinewood River, dense log jam at PIN-11 restricts flow downstream and presents significant fish passage barrier.



Photo 10: Pinewood River, pool downstream of PIN-11 in river meander, showing steep entrenchment and low flow conditions.



Photo 11: Pinewood River, bankfull conditions due to beaver dam downstream at PIN-12. Erosion and undercut banks present.



Photo 12: Pinewood River, exposed gravel/cobble/boulder substrate during low flow conditions at PIN-13.



Photo 13: Beaver Dam at PIN-14 restricting flow to lower Pinewood River.



Photo 14: Bankfull conditions at Pin-15, upstream of beaver dam. Typical Type 6 habitat.



Photo 15: Exposed gravel cobble beds at PIN-16. Type 6 Habitat.



Photo 16: Facing upstream at PIN-17, lower Pinewood River. Typical Type 7 habitat.



Photo 17: Downstream of PIN-17. AMEC field staff conducting boat electroshocking.



Photo 18: Downstream of PIN-18, wide bankfull widths and depth near mouth to Rainy River.



Photo 19: Facing northeast, upstream at PIN-18, upstream of mouth to Rainy River.



Photo 20: Mouth to Rainy River, downstream of PIN-18.



Photo 21: Mouth of the Pinewood on the Rainy River. Pinewood on right, draining into Rainy River.



Photo 22: Shallow semi-online pond at BackBay-1. Looking north the pond is fed from narrow channel from Pinewood River.



Photo 23: Dense graminoid/sedge riparian vegetation at BackBay-2.



Photo 24: Shallow semi-online pond at BackBay-3. Adjacent to agricultural field.



Photo 25: Lower Pinewood River. Bedrock outcrop at PW-23. Significant fish passage barrier. Potential spawning habitat during high flows. Type 9 habitat.



Photo 26: Facing downstream. Exposed bedrock in lower Pinewood River at PW-24.



Photo 27: Upper McCallum Creek. Dense graminoid riparian vegetation at JON-1. Typical type 4 Habitat.



Photo 28: Beaver Pond at JON-2. Lower McCallum Creek. Typical transition from Type 3 to Type 5 habitat.



Photo 29: Location of potential pipeline crossing at Unnamed Tributary 1. No defined channel observed at UT1-A.



Photo 30: Tait Creek. Facing northwest, downstream at Tait-1.



Photo 31: Upper headwaters of Loslo Creek. Large wetland/beaver pond complex at LOS-3.



Photo 32: Facing north at upper Loslo Creek. Active beaver pond at LOS-4. Beaver observed in pond.



Photo 33: Typical Type 4 habitat at LOS-5. Single channel draining into beaver pond.



Photo 34: No channel observed at LOS-7. Type 4 intermittent habitat.



Photo 35: Facing north at upper Loslo creek. Beaver pond and associated tributaries at LOS-8.



Photo 36: Dense lemna in outflow channel of beaver pond at LOS-11. Channel with intermittent connectivity to main channel Loslo Creek.



Photo 37: Facing west. Beaver Pond in upper Loslo Creek at LOS-11.



Photo 38: Facing northwest from UT5-A. Braided/Diffuse channels at Unnamed Tributary 5. Type 3 habitat.



Photo 39: Beaver pond in headwaters of Unnamed Tributary 5. Braided/diffuse channels drain the system.



Photo 40: West Creek. Inundated Type 4 habitat at Wes-A.



Photo 41: West Creek. Dry intermittent defined channel at WES-B in West Creek. Type 4 Habitat.



Photo 42: West Creek. Dry intermittent defined channel ay WES-C.



Photo 43: West Creek. Dry intermittent channel at WES-D.



Photo 44: West Creek. Dry intermittent defined channel at WES-E.



Photo 45: West Creek. Isolated pools within defined channel at WES-F. Dense overhanging riparian vegetation.



Photo 46: West Creek. No defined channel at WES-G. Cattail marsh indicates frequent inundation.



Photo 47: West Creek. Saturated substrate and Isolated pools at WES-H. Defined channel with dense riparian graminoid vegetation.



Photo 48: Dry defined channel at WES-I. Some terrestrial vegetation found within channel.



Photo 49: West Creek. Dry intermittent defined channel at WES-J.



Photo 50: West Creek. Dry intermittent channel at WES-K. Site was known to be wet in 2011 (AMEC,2011)



Photo 51: West Creek. Dry intermittent defined channel, downstream from beaver dam at WES-L.



Photo 52: Lower West Creek. Intermittent wetted channel at WES-M.



Photo 53: West Creek. Saturated defined channel at WES-N. Type 4 habitat.



Photo 54: Lower West Creek. Dry intermittent channel at WES-O. Downstream from abandoned beaver dam.



Photo 55: West Creek. Facing upstream near the mouth of West Creek into the Pinewood River. Dry intermittent channel at WES-P.



Photo 56: Facing downstream on the Pinewood at the confluence with West Creek.



Photo 57: Facing north, upstream at the confluence of West Creek on the Pinewood River at WES-Location2.



Photo 58: Bankfull conditions upstream of large beaver dam on Clark Creek at CLA-5A. Type 5 habitat.



Photo 59: Large abandoned beaver lodge in headwaters of Clark Creek. CLA-5A, Type 5 Habitat.



Photo 60: Isolated pool in Unnamed Tributary 8 within cattle field. South of crossing at Teeple Road at UT8-A. Remainder of channel completely dry.



Photo 61: Tributary of Sturgeon Creek at STU-5. Downstream of crossing of Barwick Road. Upstream reaches beyond road were dry.



Photo 62: Sturgeon Creek. Abundant woody debris and aquatic vegetation at STU-6.



Photo 63: Facing west, bankfull conditions on Sturgeon Creek downstream of STU-6.

APPENDIX C

AQUATIC HABITAT DATA

APPENDIX C
TABLE C-1
KEY HABITAT CHARACTERISTICS OF CREEKS AND RIVERS

Watercourse Name	Sample Location ID	Watercourse Type	Location Cordinates (Zone 15)		Habitat Sheet (Y/N)	Wet/Dry	Section Length (m)	Current Velocity (m/s)	Channel Morphology (% composition)	Channel Features (m)	Other Channel Features (%)	Mean Wetted Width (m)	Mean Wetted Depth (m)	Mean Bankfull Width (m)	Mean Bankfull Depth (m)	Floodplain Width (m)	Left Upstream Bank Stability	Right Upstream Bank Stability	Substrate Composition (%)[1]	In stream Cover (% of surface area)	Aquatic Vegetation Type (based on overall 100% distribution)		Overhead Coverage (% stream shaded)	Migratory Obstructions / Potential Critical Habitat	Summer Water Chemistry Parameters	Surrounding Land Use	Sources of Pollution	Upwellings
			Easting	Northern																	Emergent	Submergent						
	PIN-2A	Permanent: Stream	426290	5408480	Y	Wet	80	<0.01	Flats: 100	Gradient: Low Meander Length: 75 Meander Amplitude:35 Entrenchment: 1/1	Undercut Banks: 0 Beaver Dams/# Observed: 0 Eroding Banks: 0 Woody Structure: 5 Organic Debris: 10	10.00	1.10	10.60	1.60	100	Stable	Stable	Si/Mu:20 Cl:75 Detritus: 5	Bottom Branch Debris: 10 Logs: 5	10 (Graminoid)	20 (Pondweed, Yellow Pondlilly, Coontail)	Canopy: 15 Ground Vegetation: 15 Supralittoral: Balsam Poplar 25, Tamarack 25, Willow 50. Eulittoral: Willow 75, Graminoid 25.	Beaver Dam	WT: 29.0°C pH: 7.92 Con: 410 µS/cm TDS: 208 ppm	Agriculture	Agriculture	None Observed
	PIN-3A	Permanent: Stream	425188	5408712	Y	Wet	90	<0.01	Flats: 100	Gradient: Low Meander Length: 60 Meander Amplitude: 40 Entrenchment: 0.19/0.26	Undercut Banks: 15 Beaver Dams/# Observed: 0 Eroding Banks: 0 Woody Structure: 0 Organic Debris: 15	5.20	1.20	5.90	2.75	300	Highly Stable	Highly Stable	Si/Mu: 70 Cl: 25 D: 5	Undercut Banks: 5	5 (Water Parsnip, Arrowleaf, Bullrush)	50 (Coontail, Richardson's Pondweed, Water Lily, Slenderleaf Pondweed, Broad leaf, Valecenaria)	Ground Vegetation: 15 Ground Vegetation: 15 Supralittoral: Tamarack 40, White Ash 20, Black Spruce 20 Eulittoral: Graminoid 80, Ericaceous 5, Willow 10, Alder 5.	None	WT: 24.8°C pH: 6.94 Con: 428 µS/cm TDS: 213 ppm	Agriculture, Forest	Agricultural Runoff	None Observed
	PIN-10	Permanent: Stream	416794	5407537	Y	Wet	200	<0.01	Flats: 100	Gradient: Low Meander Length: 100 Meander Amplitude: 50 Entrenchment: 0.8/0.26	Undercut Banks: 5 Beaver Dams: 1 Eroding Banks: 15 Woody Structure: 15 Organic Debris: 10	10.00	1.30	14.90	2.10	50	Moderately Stable	Moderately Stable	Si/Mu: 70 Clay: 20 D: 10	Overhanging Branches: 15 Bottom Branches: 10 Undercut Banks: 5 Logs: 15	30 (Arrowhead, Tapegrass, BurrReed)	40 (Broadleaf Pondweed, Coontail, Richardson's Pondweed)	Canopy: 10 Ground Vegetation: 10 Supralittoral: White Ash 60 Balsam Poplar 30, American Elm 10 Eulittoral: Graminoid 35, Ericaceous 35, Willow 25, Alder 5	Beaver Dam 200m upstream	WT: 21.9°C pH: 7.56 Con: 384 µS/cm TDS: 196 ppm DO: 53.9% 5.29 mg/L	Forest	None	None Observed
	PIN-10A	Permanent: Stream	415015	5406923	Y	Wet	50	<0.01	Flats: 70 Pools: 30	Gradient: Low Meander Length: 60 Meander Amplitude: 13 Entrenchment: 2/1	Undercut Banks: 10 Beaver Dams/# Observed: 0 Eroding Banks: 10 Woody Structure: 15 Organic Debris: 5	8.00	1.50	9.00	3.00	30	Slightly Unstable	Slightly Unstable	Si/Mu: 25 Cl: 70 Detritus: 5	Overhanging Branches: 5 Bottom Branch Debris: 10 Undercut Banks: 10 Logs: 5	15 (Arrowhead, Graminoid)	5 (Coontail)	Canopy: 40 Ground Vegetation: 15 Supralittoral: White Spruce 15, European Larch 10, White Birch 5, Willow 10. Eulittoral: Willow 15, Dogwood 5, Ericaceous 5, Alder 5.	None	WT: 29.0°C pH: 7.62 Con: 403 µS/cm TDS: 209 ppm DO: 4.65 mg/L 36.4%	Agriculture	Agriculture	None Observed
	PIN-11	Permanent River	412960	5412960	Y	Wet	80	<0.01	Flats: 100	Gradient: Low Meander Length: 50 Meander Amplitude: 15 Entrenchment: 2/1	Undercut Banks: 10 Beaver Dams/# Observed: 0 Eroding Banks: 20 Woody Structure: 10 Organic Debris: 5	7.90	0.49	12.30	1.64	55	Unstable	Unstable	Cl: 50 Co: 25 Si/Mu: 10 Gr: 5 Sa: 5 Bo: 5	Overhanging Branches: 15 Bottom Branch Debris: 20 Undercut Banks: 5 Logs: 5	15 (Arrowhead)	None	Canopy: 25 Ground Vegetation: Supralittoral 15 (Balsam Poplar 35, Black Spruce 5) Eulittoral 60 (Graminoid 20, Dogwood 10, Ericaceous 5, Alder 5, Manitoba Maple 10)	Low Flow Conditions / Isolated Pools. Significant log jam upstream of site, completely blocking fish passage	WT: 10.5°C pH: 7.39 Con: 361 µS/cm TDS: 188 ppm DO: 3.46 mg/L 39.5%	Agriculture	Agriculture	None Observed
Pinewood River	PIN-12	Permanent River	409768	5403759	Y	Wet	180	<0.01	Flats: 100	Gradient: Low Meander Length: 80 Meander Amplitude: 20 Entrenchment: 1/1	Undercut Banks: 10 Beaver Dams/# Observed: 2 Eroding Banks: 25 Woody Structure: 10 Organic Debris: 5	11.45	0.82	11.65	1.92	150	Unstable	Unstable	Cl: 30 Co: 5 Si/Mu: 25 Gr: 25 Sa: 10 Bo: 5	Overhanging Branches: 10 Bottom Branch Debris: 10 Undercut Banks: 5 Logs: 1/40m	5 (Graminoid)	None	Canopy: 20 Ground Vegetation: Supralittoral 55 (White Spruce 5, Tamarack 15, Balsam Poplar 10, White Birch 10, Alder 10) Eulittoral 40 (Alder 20, Graminoid 10, Dogwood 5, Ericaceous 5)	Beaver Dam downstream from site	WT: 8.4°C pH: 7.67 Con: 267 µS/cm TDS: 136 ppm DO: 4.09 mg/L 38.7%	Agriculture	Agriculture: Horses observed walking through river.	None Observed
	PIN-13	Permanent River	408124	5403174	Y	Wet	130	<0.01	Flats: 100	Gradient: Low Meander Length: 66 Meander Amplitude: 15 Entrenchment: 1/1	Undercut Banks: 10 Beaver Dams/# Observed: 1 Eroding Banks: 50 Woody Structure: 5 Organic Debris: 5	6.10	0.58	9.10	1.68	60	Slightly Unstable	Stable	Cl: 45 Co: 10 Si/Mu: 25 Gr: 5 Sa: 5 Bo: 10	Overhanging Branches: 10 Bottom Branch Debris: 5 Undercut Banks: 15 Logs: 1/50m	5 (Graminoid)	None	Canopy: 15 Ground Vegetation: Supralittoral 50 (White Spruce 5, Tamarack 10, Balsam Poplar 15, White Birch 5, Alder 15) Eulittoral 35 (Alder 15, Graminoid 5, Ericaceous 15)	Isolated pools and log jams located downstream.	WT: 9.8°C pH: 7.88 Con: 457 µS/cm TDS: 227 ppm DO: 3.39 mg/L 36.6%	Agriculture	Cattle Field	None Observed
	PIN-14	Permanent River	408074	5402501	Y	Wet	200	<0.01	Flats: 100	Gradient: Low Meander Length: 65 Meander Amplitude: 15 Entrenchment: Rise 0.85 / Run 0.25	Undercut Banks: 60 Beaver Dams/# Observed: 1 Eroding Banks: 50 Woody Structure: 50 Organic Debris: 40	12.00	0.82	13.00	1.84	45	Unstable	Unstable	Cl: 30 Co: 30 Si/Mu: 5 Gr: 10 Sa: 5 Bo: 20	Overhanging Branches: 10 Bottom Branch Debris: 30 Undercut Banks: 30 Logs: 20/50m	5 (Arrowhead)	5 (Coontail)	Canopy: 10 Ground Vegetation: Supralittoral 50 (Black Spruce 60, Tamarack 30, Balsam Poplar 10) Eulittoral (Willow 30, Alder 20, Graminoid 20, Ericaceous 30)	Large Beaver Dam directly below bridge. Isolated pools downstream. Significant water level change at dam	WT: 10.4°C pH: 7.54 Con: 330 µS/cm TDS: 165 ppm DO: 4.45 mg/L 40.1%	Agriculture	Cattle Field	None Observed
	PIN-15	Permanent River	409370	5398951	Y	Wet	200	<0.01	Flats: 100	Gradient: Low Meander Length: 200 Meander Amplitude: 75 Entrenchment: Rise 1.2 / Run 0.5	Undercut Banks: 50 Beaver Dams/# Observed: 1 Eroding Banks: 70 Woody Structure: 40 Organic Debris: 40	10.35	0.95	11.15	3.01	26	Unstable	Unstable	Cl: 30 Co: 30 Si/Mu: 5 Gr: 10 Sa: 5 Bo: 20	Overhanging Branches: 20 Bottom Branch Debris: 20 Undercut Banks: 50 Logs: 1/10m	20 (Sedges, Grasses, Arrowhead)	10 (Coontail, Richardson's Pondweed)	Canopy: 10 Ground Vegetation: Supralittoral 60 (Black Spruce 30, Balsam Poplar 20, American Elm 10) Eulittoral: 45 (Graminoid 20, Ericaceous 10, Dogwood 5, Willow 5, Alder 5)	Beaver Dam downstream from site	WT: 12.6°C pH: 7.98 Con: 306 µS/cm TDS: 154 ppm DO: 3.56 mg/L 48.1%	Agriculture	Agriculture	None Observed
	PIN-16	Permanent River	408138	5397842	Y	Wet	125	<0.01	Flats: 100	Gradient: Low Meander Length: 75 Meander Amplitude: 20 Entrenchment: Rise 1/1	Undercut Banks: 10 Beaver Dams/# Observed: 0 Eroding Banks: 20 Woody Structure: 5 Organic Debris: 5	16.12	3.62	18.62	4.45	100	Highly Unstable	Highly Unstable	Cl: 65 Co: 5 Si/Mu: 15 Gr: 5 Sa: 15 Bo: 5	Overhanging Branches: 5 Bottom Branch Debris: 5 Undercut Banks: 20 Logs: 1/40m	None	None	Canopy: 15 Ground Vegetation: Supralittoral: White Birch 15, Balsam Poplar 10, White Spruce 10 Eulittoral: Graminoid 50, Dogwood 5, Willow 5	Large natural bedrock dam going across channel downstream from site. Blocks flow during low flow periods. Significant barrier.	WT: 10.4°C pH: 7.72 Con: 293 µS/cm TDS: 147 ppm DO: 7.13 mg/L 74.1%	Agriculture	Agriculture	None Observed

APPENDIX C
TABLE C-1
KEY HABITAT CHARACTERISTICS OF CREEKS AND RIVERS

Watercourse Name	Sample Location ID	Watercourse Type	Location Cordinates (Zone 15)		Habitat Sheet (Y/N)	Wet/Dry	Section Length (m)	Current Velocity (m/s)	Channel Morphology (% composition)	Channel Features (m)	Other Channel Features (%)	Mean Wetted Width (m)	Mean Wetted Depth (m)	Mean Bankfull Width (m)	Mean Bankfull Depth (m)	Floodplain Width (m)	Left Upstream Bank Stability	Right Upstream Bank Stability	Substrate Composition (%)[1]	In stream Cover (% of surface area)	Aquatic Vegetation Type (based on overall 100% distribution)		Overhead Coverage (% stream shaded)	Migratory Obstructions / Potential Critical Habitat	Summer Water Chemistry Parameters	Surrounding Land Use	Sources of Pollution	Upwellings
			Easting	Northern																	Emergent	Submergent						
Pinewood River	PIN-17	Permanent River	404778	5397670	Y	Wet	200	<0.01	Flats: 100	Gradient: Low Meander Length: 100 Meander Amplitude: 100 Entrenchment: Rise 1/1	Undercut Banks: 0 Beaver Dams/# Observed: 0 Eroding Banks: 10 Woody Structure: 20 Organic Debris: 30	31.00	3.90	42.00	2.56	100	Slightly Unstable	Stable	Cl: 80 Si/Mu: 20	Overhanging Branches: 5 Bottom Branch Debris: 20 Undercut Banks: 0 Logs: 1/20m	5 (Arrowhead, Graminoid)	20 (Coontail, Tapegrass)	Canopy: 5 Ground Vegetation: Supralittoral: Balsam Poplar 20, Black Spruce 10, Tamarack 10 Eulittoral: Graminoid 50, Willow 5, Ericaceous 5	None	WT: 14.4°C pH: 7.38 Con: 152 µS/cm TDS: 75 ppm DO: 3.56 mg/L 74.5%	Agriculture	Agriculture	None Observed
	PIN-18	Permanent River	403576	5396459	Y	Wet	200	<0.01	Flats: 100	Gradient: Low Meander Length: 40 Meander Amplitude: 15 Entrenchment: Rise 2/1	Undercut Banks: 0 Beaver Dams/# Observed: 0 Eroding Banks: 10 Woody Structure: 5 Organic Debris: 5	30.63	3.05	41.30	4.23	80	Stable	Stable	Cl: 25 Co: 20 Si/Mu: 10 Gr: 20 Sa: 20 Bo: 5	Overhanging Branches: 5 Bottom Branch Debris: 5 Undercut Banks: 5 Logs: 10	5 (Graminoid)	None	Canopy: 5 Ground Vegetation: Supralittoral: Balsam Poplar 5, Black Spruce 5, Tamarack 10 Eulittoral: Graminoid 10, Willow 5, Alder 5, Dogwood 5, Ericaceous 10	None	WT: 14.1°C pH: 7.72 Con: 90 µS/cm TDS: 46 ppm DO: 8.93 mg/L 86.6%	Agriculture	Agriculture	None Observed
	BackBay-1	Intermittent	406208	5398177	Y	Wet	157	<0.01	Flats: 100	Gradient: Low Meander Length: NA Meander Amplitude: NA Entrenchment: 1/1	Undercut Banks: 0 Beaver Dams/# Observed: 0 Eroding Banks: 0 Woody Structure: 5 Organic Debris: 10	29.00	0.15	45.00	0.30	147	Stable	Stable	Cl: 60 Si/Mu: 40	Overhanging Branches: 5 Bottom Branch Debris: 5 Undercut Banks: 0 Logs: 1/25m	10 (Horsetail, Arrowhead, Sedges, Graminoid)	10 (Coontail, Algae)	Canopy: 5 Ground Vegetation: Supralittoral: Black Spruce 10, Balsam Poplar 10, White Birch 10, White Cedar 5, Tamarack 5, Red Oak 5, Alder 5. Eulittoral: Graminoid 20, Ericaceous 20, Dogwood 5, Willow 5, Manitoba Maple 5.	Back bay is inundated during periods of high flow.	WT: 13.5°C pH: 7.57 Con: 191 µS/cm TDS: 96 ppm DO: 10.8 mg/L 90.5%	Agriculture	Agriculture	None Observed
	BackBay-2	Intermittent	404923	5397799	Y	Wet	80	<0.01	Flats: 100	Gradient: Low Meander Length: NA Meander Amplitude: NA Entrenchment: 1/1	Undercut Banks: 0 Beaver Dams/# Observed: 0 Eroding Banks: 0 Woody Structure: 0 Organic Debris: 10	45.00	0.46	70.00	0.54	102	Stable	Stable	Cl: 50 Si/Mu: 40 D: 10	Overhanging Branches: 0 Bottom Branch Debris: 0 Undercut Banks: 5 Logs: 1/5m	10 (Horsetail, Graminoid)	5 (Milfoil)	Canopy: 15 Ground Vegetation: Supralittoral: White Birch 20, Black Spruce 5, Tamarack 5, Balsam Poplar 10. Eulittoral: Graminoid 25, Dogwood 5, Willow 5	Back bay is inundated during periods of high flow.	WT: 15.5°C pH: 7.42 Con: 162 µS/cm TDS: 81 ppm DO: 4.53 mg/L 56.2%	Agriculture	Agriculture	None Observed
	BackBay-3	Intermittent	404810	5397663	Y	Wet	50	<0.01	Flats: 100	Gradient: Low Meander Length: NA Meander Amplitude: NA Entrenchment: 1/1	Undercut Banks: 5 Beaver Dams/# Observed: 0 Eroding Banks: 0 Woody Structure: 5 Organic Debris: 5	90.00	0.60	110.00	0.65	90	Stable	Stable	Cl: 10 Si/Mu: 80 D: 10	Overhanging Branches: 0 Bottom Branch Debris: 0 Undercut Banks: 0 Logs: 0	5 (Horsetail, Arrowhead)	15 (Gramnoid, Milfoil)	Canopy: 5 Ground Vegetation: Supralittoral: Balsam Poplar 10, White Birch 10, Tamarack 5, Alder 5. Eulittoral: Graminoid 100	Back bay is inundated during periods of high flow.	WT: 12.8°C pH: 8.05 Con: 146 µS/cm TDS: 73 ppm DO: 3.59 mg/L 36.3%	Agriculture	Agriculture	None Observed
	PW-23	Permanent: River	407607	5397971	Y	Wet	150	<0.01	Flats: 100	Gradient: Low Meander Length: 100 Meander Amplitude: 40 Entrenchment: 1/1	Undercut Banks: 5 Beaver Dams/# Observed: 0 Eroding Banks: 20 Woody Structure: 5 Organic Debris: 5	60.40	1.61	62.90	2.29	70	Slightly Unstable	Slightly Unstable	Cl: 25 Gr: 20 Co: 15 Br: 15 Si/Mu: 10 Bo: 10 Sa: 5	Overhanging Branches: 0 Bottom Branch Debris: 5 Undercut Banks: 5 Logs: 1/25m	5 (Graminoid)	None	Canopy: 5 Ground Vegetation: Supralittoral: Willow 20, White Birch 20, Balsam Poplar 15, Black Spruce 5. Eulittoral: Graminoid 20, Ericaceous 10, Alder 5, Willow 5,	Large natural bedrock dam going across channel downstream from site. Blocks flow during low flow periods. Significant barrier.	WT: 14.9°C pH: 8.15 Con: 285 µS/cm TDS: 142 ppm DO: 8.65 mg/L 83.5%	Agriculture	Agriculture	None Observed
McCallum Creek	JON-2	Permanent: Stream	417241	5407972	Y	Wet	50	<0.01	Beaver Pond: 100	Gradient: Low Meander Length: 50 Meander Amplitude: 4.5 Entrenchment: Flooded Banks	Undercut Banks: 5 Beaver Dams: 1 Woody Structure: 15 Organic Debris: 40	7.50	1.50	8.00	1.80	250	Highly Stable	Highly Stable	D: 70 Si/Mu: 30	Undercut Banks: 5 Logs: 4	15 (Bullrush, Water Plantain, Arrowhead, Tapegrass)	75 (Coontail, Slenderleaf Pondweed, Lemna, Broadleaf Pondweed)	Canopy: 0 Ground Vegetation: 5 Supralittoral: Black Spruce 40, Balsam Poplar 20, Tamarack 10 Eulittoral: Graminoid 55, Alder 25, Willow 15, Ericaceous 5.	Beaver Dam	WT: 25.8°C pH: 7.54 Con: 406 µS/cm TDS: 210 ppm DO: 57.1% 5.63 mg/L	Forest	None	None Observed
Unnamed Trib. 1	UT1-A	No Channel	417827	5408560	N	Dry	50	NA	NA	Gradient: Low	Beaver Dams: 2	NA	NA	NA	NA	200	NA	NA	NA	NA	100 (Cattails, Willow, Alders, Graminoid)	NA	Ground Vegetation: Cattails 50, Graminoid 50 Supralittoral: Black Spruce 70, Tamarack 30 Eulittoral: Alder 10, Willow 10	Beaver Dams, Low Flow Conditions.	NA	Forest	None	None Observed
Tait Creek	TAIT-1	Permanent: Stream	418306	5407031	Y	Wet	100	<0.01	Flats: 80 Pools: 20	Gradient: Low Meander Length: 100 Meander Amplitude: 50	Undercut Banks: 5 Organic Debris: 20	4.50	1.85	15.00	3.20	300	Stable	Stable	Si/Mu: 60 D: 30 Cl: 10	Undercut Banks: 5	30 (Graminoid)	20 (Floating Pond Lily, Tapegrass, Coontail, Richardson's Pondweed)	Canopy: 10 Ground Vegetation: 50 Supralittoral: Black Spruce 90, Tamarack 10 Eulittoral: Alder 70, Ericaceous 20, Dogwood 10	None	WT: 27.5°C pH: 8.15 Con: 368 µS/cm	Forest	None	None Observed
Unnamed Trib. 2	UT2-A	Permanent: Stream	418735	5408652	Y	Wet	120	<0.01	Pools: 65 Beaver Ponds: 25 Riffles: 10	Gradient: Low Meander Length: 150 Meander Amplitude: 45 Entrenchment: 1/1	Beaver Dams/# Observed: 2 Woody Structure: 15 Organic Debris: 40	40	1.50	50	1.60	60	Stable	Stable	Si/Mu: 75 D: 20 Cl: 5	Overhanging Branches: 5 Bottom Branch Debris: 45 Undercut Banks: 0 Logs: 1	10 (Cattails, Sedge)	40 (Coontail)	Canopy: 10 Ground Vegetation: 10 Supralittoral: Black Spruce 40, Tamarack 40, White Birch 20 Eulittoral: Alder 50, Willow 30, Ericaceous 10, Graminoid 10	Beaver Dam	WT: 32.1°C pH: 8.05 Con: 216 µS/cm TDS: 109 ppm DO: 71.1% 6.86 mg/L	Forest	None	None Observed

APPENDIX C
TABLE C-1
KEY HABITAT CHARACTERISTICS OF CREEKS AND RIVERS

Watercourse Name	Sample Location ID	Watercourse Type	Location Cordinates (Zone 15)		Habitat Sheet (Y/N)	Wet/Dry	Section Length (m)	Current Velocity (m/s)	Channel Morphology (% composition)	Channel Features (m)	Other Channel Features (%)	Mean Wetted Width (m)	Mean Wetted Depth (m)	Mean Bankfull Width (m)	Mean Bankfull Depth (m)	Floodplain Width (m)	Left Upstream Bank Stability	Right Upstream Bank Stability	Substrate Composition (%)[1]	In stream Cover (% of surface area)	Aquatic Vegetation Type (based on overall 100% distribution)		Overhead Coverage (% stream shaded)	Migratory Obstructions / Potential Critical Habitat	Summer Water Chemistry Parameters	Surrounding Land Use	Sources of Pollution	Upwellings
			Easting	Northern																	Emergent	Submergent						
Loslo Creek	LOS-3	Permanent: Stream	422793	5413310	Y	Wet	200	<0.01	Beaver Pond: 100	Gradient: Moderate Entrenchment: 0.45/0.32	Beaver Dams: 4 Woody Structure: 15 Organic Debris: 40	4.50	0.90	5.20	1.40	100.0	Highly Stable	Highly Stable	D: 40 Si/Mu: 30 Cl: 30	Logs: 5	15 (Bullrush, Marshy Spikerush, Tapegrass, Arrowhead, Cattail)	60 (Lemna, Coontail, Yellow Pond Lilly, Broadleaf Pond Lilly, Slenderleaf Pondweed)	Canopy: 0 Ground Vegetation: 20 Supralittoral: Black Spruce 60, Balsam Poplar 25, Tamarack 10 Eulittoral: Graminoid 50, Alder 25, Ericaceous 15, Willow 10	Several Beaver Dams	WT: 26.6°C pH: 7.87 Con: 368 µS/cm TDS: 190 ppm DO: 97.1% 8.42 mg/L	Forest	None	None Observed
	LOS-4	Permanent: Beaver Pond	423010	5413640	N	Wet	50	<0.01	Beaver Pond: 100	Gradient: Low	Beaver Dams: 1 Woody Structure: 10	30.00	1.50	50.00	2.00	100.0	Stable	Stable	D: 70 Si/Mu: 30	Logs: 10	15 (Spikerush, Bullrush, Cattails, Arrowhead)	15 (Yellow Pond Lilly, Broadleaf Lilly)	Canopy: 10 Ground Vegetation: 20 Supralittoral: Black Spruce, Balsam Poplar, White Birch, American Elm Eulittoral: Graminoid 70, Ericaceous 20, Alder 10	Beaver Dams	WT: 25.1°C pH: 7.56 Con: 443 µS/cm TDS: 226 ppm DO: 5.63 mg/L DO: 58.9 %	Forest	None	None Observed
	LOS-5	Permanent: Stream	422025	5413009	Y	Wet	20	<0.01	Flats: 100	Gradient: Low Meander Length: 9 Meander Amplitude: 1.5 Entrenchment: 0.12/0.10	Undercut Banks: 15 Beaver Dams/# Observed: 1 Eroding Banks: 0 Woody Structure: 10 Organic Debris: 40	1.38	0.73	1.52	1.57	45.0	Highly Stable	Highly Stable	D: 60 Si/Mu: 40	Undercut Banks: 15 Logs: 2	10 (Marsh Spike Rush, Bullrush, Cattail, Water Plantain, Arrowhead)	30 (Floating Pondlilly, Lemna)	Canopy: 0 Ground Vegetation: 15 Supralittoral: Black Spruce 60, Balsam Poplar 25, White Birch 10 Eulittoral: Graminoid 65, Willow 15, Alder 15, Ericaceous 5.	Beaver Dam downstream from site	WT: 22.6°C pH: 7.08 Con: 338 µS/cm TDS: 180 ppm DO: 53.6% 5.68 mg/L	Forest	None	None Observed
	LOS-6	Permanent: Beaver Pond	422633	5413715	N	Wet	70	<0.01	Flats: 100	Gradient: Low	Undercut Banks: 15	2.00	1.50	NR	NR	70.0	Stable	Stable	D: 80 Si/Cl: 20	Undercut Banks: 15 Logs: 3	10 (Spikerush, Bullrush)	30 (Yellow Pond Lilly, Coontail)	Canopy: 10 Ground Vegetation: 20 Supralittoral: Black Spruce 80, Balsam Poplar 20 Eulittoral: Graminoid 70, Ericaceous 20, Alder 10	Beaver Dam downstream from site	WT: 25.6°C pH: 7.36 Con: 346 µS/cm TDS: 173 ppm DO: 82.8% DO: 5.68 mg/L	Forest	None	None Observed
	LOS-7	No Channel	421424	5413060	N	Dry	NR	NA	NA	No Channel; Middle of Forest	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Black Spruce Tamarack American Elm Balsam Poplar White Birch Sphagnum Moss	NA	NA	NA	NA	Forest, Historical Logging	None	None Observed
	LOS-8	Permanent: Beaver Pond	421732	5413676	N	Wet	60	<0.01	Pools: 100	Gradient: Low	Beaver Dams/# Observed: 2 Woody Structure: 15 Organic Debris: 40	2	1.5	NR	NR	200	Stable	Stable	D: 80 Si/Cl: 20	Bottom Branch Debris: 30	10 (Marsh Spike Rush, Bullrush, Cattail, Water Plantain, Arrowhead)	30 (Floating Pondlilly, Lemna)	Ground Vegetation: Willow 10, Alder 10, Cattails 30, Sedges 50. Supralittoral: Black Spruce 80, Tamarack 20.	Beaver Dam downstream from site	WT: 26.2°C pH: 7.62 Con: 319 µS/cm TDS: 166 ppm DO: 59.1% DO: 4.59 mg/L	Forest, Historical Logging	None	None Observed
	LOS-11	Permanent Stream	421612	5412848	Y	Wet	100	<0.01	Flats: 100	Gradient: Low Meander Length: 150 Meander Amplitude: 45 Entrenchment: 1/1	Undercut Banks: 30 Beaver Dams/# Observed: 10 Eroding Banks: 0 Woody Structure: 50 Organic Debris: 70	1.4	0.79	3.09	1.1	80	Stable	Stable	D: 60 Si/Mu: 20 Cl: 20	Overhanging Branches: 50 Bottom Branch Debris: 20 Undercut Banks: 30 Logs: 1/10m	10 (Graminoid, Arrowhead)	20 (Lemna)	Canopy: 20 Ground Vegetation: Supralitoral: Black Spruce 50, Tamarack 20, Balsam Poplar 15, White Birch 20 Eulittoral: Alder 25, Dogwood 25, Ericaceous 25, Graminoid 25.	Several beaver dams along length of creek. Creek dries up before reaching Loslo Creek.	WT: 19.1°C pH: 5.45 Con: 212 µS/cm TDS: 105 ppm DO: 29.7% DO: 4.38 mg/L	Forest, Historical Logging	None	None Observed
Unnamed Trib. 5	UT5-A	Permanent: Stream	424240	5407337	Y	Wet	22	<0.01	Flats: 100	Gradient: Low Meander Length: 22 Meander Amplitude: 3	Undercut Banks: 35 Beaver Dams/# Observed: 1 Eroding Banks: 0 Woody Structure: 10 Organic Debris: 20	1.15	0.67	2	2.40	25	Highly Stable	Highly Stable	Si/Mu: 55 D: 30 Cl: 10 Sa: 5	Overhanging Branches: 5 Bottom Branch Debris: 10 Undercut Banks: 30	5 (Arrowhead, Bullrush)	35 (Coontail, Broadleaf Pondweed, Narrowleaf Pondweed)	Canopy: 5 Ground Vegetation: 70 Supralittoral: Tamarack 60, White Birch 20, Black Spruce 10, American Elm 10. Eulittoral: Alder 25, Willow 15, Graminoid 50, Ericaceous 10	Beaver Dam downstream from site	WT: 24.9°C pH: 6.60 Con: 320 µS/cm TDS: 159 ppm	Forested, Road	Road Runoff	None Observed
West Creek	WES-TRIB1A	Permanent: Stream	426764	5410503	Y	Wet	50	<0.01	Flats: 80 Pools: 20	Gradient: Low Meander Length:50 Meander Amplitude:7 Entrenchment: 0.7/0.36	Undercut Banks: 0 Beaver Dams/# Observed: 2 Eroding Banks: 0 Woody Structure: 0 Organic Debris: 25	2.30	0.45	2.98	1.15	60	Highly Stable	Highly Stable	Gr: 30 Si/Mu: 30 Cl: 40	Overhanging Branches: 1 Bottom Branch Debris: 2 Logs: 30	2%	15 (Narrowleaf Pondweed, Lemna, Algae)	Canopy: 20 Ground Vegetation: 30 Supralittoral: American Elm 65, Ash 30, Black Spruce 5. Eulittoral: Graminoid 80 (Arrowhead, bullrush) Ericaceous 10 (Goldenrod, King of Meadow), Willow 5, Alder 5.	Beaver Dam	WT: 28.3°C pH: 7.95 Con: 467 µS/cm TDS: 234 ppm DO: 1.57 mg/L	Agriculture	Agriculture	None Observed
	WES-TRIB1B	Intermittinet: Stream	425824	5410168	N	Dry	50	NA	NA	Gradient: Low	Woody Structure: 20 Organic Debris: 20	0.57	0.14	0.57	3.50	NR	Stable	Stable	Gr: 70 Sa: 20 Si: 10	Overhanging Branches: 10	100 (Graminoid, Cattails)	NA	Canopy: 20 Ground Vegetation: 30	Low Flow Conditions	NA	Agriculture	None	None Observed
Unnamed Trib. 8A	U8A-1	Dry Channel	430012	5408513	N	Dry	50	NA	NA	Gradient: Low Meander Length: 12.5	Woody Structure: 80 Organic Debris: 20	0.46	0.36	1	0.42	NR	Stable	Stable	C: 40 Gr: 40 B: 10 Sa: 5 Org: 5	NR	NA	NA	Ground Vegetation: 70 (Ostrich Fern, Dogwood, Wild Rose, Meadow Rose, Ash, Willow, Maple, Alder	Dry Channel	NA	Forest	None	None Observed

APPENDIX C
TABLE C-1
KEY HABITAT CHARACTERISTICS OF CREEKS AND RIVERS

Pinewood River											
PIN-2AA											
Station	Upstream					**Station**	Downstream				
Coordinates	15U 427703 5407092					**Coordinates**	15U 427703 5407092				
Watercourse Type	Permanent					**Watercourse Type**	Permanent				
Velocity (m/s)	<0.01					**Velocity (m/s)**	0				
Section Length (m)	150					**Section Length (m)**	200				
Surrounding Land Use	Agricultural					**Surrounding Land Use**	Agricultural				
Morphology						**Morphology**					
	Flat	**Pool**	**Riffle**	**Flat**	**Other**		**Flat**	**Pool**	**Riffle**	**Flat**	**Other**
Percentage of Area (%)	100					**Percentage of Area (%)**	100				
Mean Depth Wetted (m)	2.8					**Mean Depth Wetted (m)**	2.9				
Mean Width Wetted (m)	12.7					**Mean Width Wetted (m)**	12.5				
Mean Width Bankfull (m)	13.1					**Mean Width Bankfull (m)**	13.1				
Mean Depth Bankfull (m)	2.95					**Mean Depth Bankfull (m)**	2.9				
Substrate (%)	Clay: 75 Sand: 20 Detritus: 5					**Substrate (%)**	Clay: 70 Sand: 20 Detritus: 10				
Left Bank Stability	Stable					**Left Bank Stability**	Stable				
Right Bank Stability	Stable					**Right Bank Stability**	Stable				
McCallum Creek						**Habitat**					
Undercut Banks (%)	**Woody Debris (%)**		**Organic**	**Vascular Macrophytes (%)**		**Undercut Banks (%)**	**Woody Debris (%)**		**Organic Debris**	**Vascular Macrophytes (%)**	
	Instream	**Overhanging**	**Debris (%)**	**Instream**	**Overhanging**		**Instream**	**Overhanging**	**(%)**	**Instream**	**Overhanging**
10	0	5	5	10	10	50	20		10	10	
Dominant Vegetation Type						**Dominant Vegetation Type**					
	Submergent	**Floating**		**Emergent**			**Submergent**	**Floating**		**Emergent**	
Percentage (%)				15		**Percentage (%)**	10	10		20	
Dominant Species				Graminoid		**Dominant Species**	Coontail	Yellow Pond Lilly		Arrowhead	
Notes						**Notes**					
• Deep channel, significant entrenchment • Good fish habitat						• Cattle field close to River • Potential pollution from field • Alder/Willow surrounding littoral zone • Graminoid and Ericaceous dominate banks (40-50%) • Deep wide channel • 2 large CSP's					

Pinewood River											
PIN-2A											
Station	Upstream					**Station**	Downstream				
Coordinates	15U 426290 5408480					**Coordinates**	15U 426270 5408513				
Watercourse Type	Permanent					**Watercourse Type**	Permanent				
Velocity (m/s)	0					**Velocity (m/s)**	0				
Section Length (m)	50					**Section Length (m)**	200				
Surrounding Land Use	Agricultural					**Surrounding Land Use**	Agricultural				
Morphology						**Morphology**					
	Flat	**Pool**	**Riffle**	**Flat**	**Other**		**Flat**	**Pool**	**Riffle**	**Flat**	**Other**
Percentage of Area (%)	100					**Percentage of Area (%)**	100				
Mean Depth Wetted (m)	2.5					**Mean Depth Wetted (m)**	2.68				
Mean Width Wetted (m)	15.8					**Mean Width Wetted (m)**	15.5				
Mean Width Bankfull (m)	20.6					**Mean Width Bankfull (m)**	25.5				
Mean Depth Bankfull (m)	3					**Mean Depth Bankfull (m)**	3.68				
Substrate (%)	Detritus: 80 Silt/Muck: 20%					**Substrate (%)**	Silt/Muck: 80 Clay: 20%				
Left Bank Stability	Stable					**Left Bank Stability**	Stable				
Right Bank Stability	Stable					**Right Bank Stability**	Stable				
Habitat						**Habitat**					
Undercut Banks (%)	**Woody Debris (%)**		**Organic**	**Vascular Macrophytes (%)**		**Undercut Banks (%)**	**Woody Debris (%)**		**Organic Debris**	**Vascular Macrophytes (%)**	
	Instream	**Overhanging**	**Debris (%)**	**Instream**	**Overhanging**		**Instream**	**Overhanging**	**(%)**	**Instream**	**Overhanging**
	20	20	20	20	20		20	10	20	20	20
Dominant Vegetation Type						**Dominant Vegetation Type**					
	Submergent	**Floating**		**Emergent**			**Submergent**	**Floating**		**Emergent**	
Percentage (%)	20	20		20		**Percentage (%)**	20	10		20	
Dominant Species	Richardson's Pondweed	Floating Pond Lily		Arrowhead		**Dominant Species**	Coontail	Floating Pond Lilly		Arrowhead	
Notes						**Notes**					
• Flooded Beaver pond • Water level near bankfull • No flow • Directly adjacent to agricultural field • Very sinuous, meanders radically.						• Flooded Beaver pond • Water level near bankfull • No flow • Directly adjacent to agricultural field • Very sinuous, meanders radically.					

APPENDIX C
TABLE C-1
KEY HABITAT CHARACTERISTICS OF CREEKS AND RIVERS

Pinewood River											
PIN-8											
Station	Upstream					**Station**	Downstream				
Coordinates	15U 421046 5408815					**Coordinates**	15U 421046 5408815				
Watercourse Type	Permanent					**Watercourse Type**	Permanent				
Velocity (m/s)	0					**Velocity (m/s)**	0				
Section Length (m)	50					**Section Length (m)**	200				
Surrounding Land Use	Agricultural					**Surrounding Land Use**	Agricultural				
Morphology						**Morphology**					
	Flat	**Pool**	**Riffle**	**Flat**	**Other**		**Flat**	**Pool**	**Riffle**	**Flat**	**Other**
Percentage of Area (%)	100					**Percentage of Area (%)**	100				
Mean Depth Wetted (m)	1.9					**Mean Depth Wetted (m)**	2.1				
Mean Width Wetted (m)	17					**Mean Width Wetted (m)**	18				
Mean Width Bankfull (m)	21					**Mean Width Bankfull (m)**	30				
Mean Depth Bankfull (m)	1.9					**Mean Depth Bankfull (m)**	3.5				
Substrate (%)	Detritus: 80 Silt/Muck: 20%					**Substrate (%)**	Detritus: 80 Silt/Muck: 20%				
Left Bank Stability	Slightly Unstable					**Left Bank Stability**	Stable				
Right Bank Stability	Slightly Unstable					**Right Bank Stability**	Stable				
Habitat						**Habitat**					
Undercut Banks (%)	**Woody Debris (%)**		**Organic Debris (%)**	**Vascular Macrophytes (%)**		**Undercut Banks (%)**	**Woody Debris (%)**		**Organic Debris (%)**	**Vascular Macrophytes (%)**	
	Instream	**Overhanging**		**Instream**	**Overhanging**		**Instream**	**Overhanging**		**Instream**	**Overhanging**
5	5	15	10	10	5		10	10	20	20	20
Dominant Vegetation Type						**Dominant Vegetation Type**					
	Submergent	**Floating**		**Emergent**			**Submergent**	**Floating**		**Emergent**	
Percentage (%)	15	15		10		**Percentage (%)**	50	20		20	
Dominant Species	Richardson's Pondweed	Broadleaved Pondweed		Arrowhead		**Dominant Species**	Richardson's Pondweed	Floating Pond Lilly		Arrowhead	
Notes						**Notes**					
• Beaver activity • Bankful conditions • Lots of cover • Abundance of instream woody debris • No Flow						• Flooded Beaver pond • Large Beaver dam and several Beaver lodges located at downstream extent of site. • Deep wide channel • Abundance of dense aquatic vegetation. • Surrounded by Black Spruce and Alder thickets. • No flow					

Pinewood River											
PIN-9											
Station	Upstream					**Station**	Downstream				
Coordinates	15U 419651 5408041					**Coordinates**	15U 419651 5408041				
Watercourse Type	Permanent					**Watercourse Type**	Permanent				
Velocity (m/s)	0					**Velocity (m/s)**	0				
Section Length (m)	100					**Section Length (m)**	200				
Surrounding Land Use	Agricultural					**Surrounding Land Use**	Agricultural				
Morphology						**Morphology**					
	Flat	**Pool**	**Riffle**	**Flat**	**Other**		**Flat**	**Pool**	**Riffle**	**Flat**	**Other**
Percentage of Area (%)	50	50				**Percentage of Area (%)**	100				
Mean Depth Wetted (m)	0.42	0.2				**Mean Depth Wetted (m)**	0.35				
Mean Width Wetted (m)	5.2	1.5				**Mean Width Wetted (m)**	8.5				
Mean Width Bankfull (m)	8	4.1				**Mean Width Bankfull (m)**	12.5				
Mean Depth Bankfull (m)	2.42	1.3				**Mean Depth Bankfull (m)**	1.91				
Substrate (%)	Clay: 75 Sand: 25%	Clay: 80 Sand: 20				**Substrate (%)**	Silt/Muck: 80 Clay: 20%				
Left Bank Stability	Unstable					**Left Bank Stability**	Slightly Unstable				
Right Bank Stability	Moderately Unstable					**Right Bank Stability**	Slightly Unstable				
Habitat						**Habitat**					
Undercut Banks (%)	**Woody Debris (%)**		**Organic Debris (%)**	**Vascular Macrophytes (%)**		**Undercut Banks (%)**	**Woody Debris (%)**		**Organic Debris (%)**	**Vascular Macrophytes (%)**	
	Instream	**Overhanging**		**Instream**	**Overhanging**		**Instream**	**Overhanging**		**Instream**	**Overhanging**
10	10	15	5	10	10	5	10	15	20	20	20
Dominant Vegetation Type						**Dominant Vegetation Type**					
	Submergent	**Floating**		**Emergent**			**Submergent**	**Floating**		**Emergent**	
Percentage (%)				25		**Percentage (%)**	20	10		20	
Dominant Species				Arrowhead		**Dominant Species**	Coontail	Floating Pond Lilly		Arrowhead	
Notes						**Notes**					
• Area is intermittent pools and flats • No flow • Likely fish habitat						• Extremely low flow • Standing water • High turbidity • Eroded banks along both sides • Low volume of water compared to bankfull conditions					

APPENDIX C
TABLE C-1
KEY HABITAT CHARACTERISTICS OF CREEKS AND RIVERS

McCallum (Jones) Creek

JON-1

Station	Upstream					**Station**	Downstream				
Coordinates	15U 418916 5413563					**Coordinates**	15U 418890 5413527				
Watercourse Type	Permanent					**Watercourse Type**	Permanent				
Velocity (m/s)	0					**Velocity (m/s)**	0				
Section Length (m)	50					**Section Length (m)**	80				
Surrounding Land Use	Agricultural					**Surrounding Land Use**	Agricultural				
Morphology						**Morphology**					
	Flat	**Pool**	**Riffle**	**Flat**	**Other**		**Flat**	**Pool**	**Riffle**	**Flat**	**Other**
Percentage of Area (%)	100					**Percentage of Area (%)**	100				
Mean Depth Wetted (m)	0.91					**Mean Depth Wetted (m)**	0.8				
Mean Width Wetted (m)	2.56					**Mean Width Wetted (m)**	2				
Mean Width Bankfull (m)	8.5					**Mean Width Bankfull (m)**	3.5				
Mean Depth Bankfull (m)	1.45					**Mean Depth Bankfull (m)**	1.4				
Substrate (%)	Silt/Muck: 80 Detritus: 20%					**Substrate (%)**	Silt/Muck: 80 Detritus: 20%				
Left Bank Stability	Stable					**Left Bank Stability**	Moderately Unstable				
Right Bank Stability	Stable					**Right Bank Stability**	Moderatley Unstable				
Habitat						**Habitat**					
Undercut Banks (%)	**Woody Debris (%)**		**Organic Debris (%)**	**Vascular Macrophytes (%)**		**Undercut Banks (%)**	**Woody Debris (%)**		**Organic Debris (%)**	**Vascular Macrophytes (%)**	
	Instream	**Overhanging**		**Instream**	**Overhanging**		**Instream**	**Overhanging**		**Instream**	**Overhanging**
	10	20	30	30	10	10	30	10	5	5	5
Dominant Vegetation Type						**Dominant Vegetation Type**					
	Submergent	**Floating**		**Emergent**			**Submergent**	**Floating**		**Emergent**	
Percentage (%)	20	10		25		**Percentage (%)**	10			15	
Dominant Species	Coontail	Tapegrass		Arrowhead		**Dominant Species**	Coontail			Arrowhead	
Notes						**Notes**					
• Beaver Dam located directly at JON-1 had blocked all water flow. • Low flow marsh habitat. • Large floodplain approximatley 50m wide. • Deep narrow channel continuing through grassland. • Channel flows out of Alder thicket upstream of Route 600. • Jones Creek crosses Route 600 Via 3 large Corrugated Steel Pipe culverts, all 1.5m in diameter. • Supralittoral zone dominated by Black Spruce.						• Beaver Dam located directly at JON-1 had blocked all water flow. • Lots of meandering sequences • Deep narrow channel continuing through grassland. • Channel flows out of Alder thicket upstream of Route 600. • Jones Creek crosses Route 600 Via 3 large Corrugated Steel Pipe culverts, all 1.5m in diameter. • Supralittoral zone dominated by Black Spruce.					

Clark Creek

CLA-5A

Station	Upstream					**Station**	Downstream				
Coordinates	15U 429961 5410330					**Coordinates**	15U 429961 5410330				
Watercourse Type	Permanent					**Watercourse Type**	Permanent				
Velocity (m/s)	0					**Velocity (m/s)**	0				
Section Length (m)	50					**Section Length (m)**	200				
Surrounding Land Use	Black Spruce Forest					**Surrounding Land Use**	Black Spruce Forest				
Morphology						**Morphology**					
	Flat	**Pool**	**Riffle**	**Flat**	**Other**		**Flat**	**Pool**	**Riffle**	**Flat**	**Other**
Percentage of Area (%)	100					**Percentage of Area (%)**	100				
Mean Depth Wetted (m)	1					**Mean Depth Wetted (m)**	1.05				
Mean Width Wetted (m)	1.81					**Mean Width Wetted (m)**	50				
Mean Width Bankfull (m)	2					**Mean Width Bankfull (m)**	100				
Mean Depth Bankfull (m)	1.1					**Mean Depth Bankfull (m)**	2.55				
Substrate (%)	Detritus: 75 Silt/Muck: 25%					**Substrate (%)**	Detritus: 80 Silt/Muckl: 20%				
Left Bank Stability	Unstable					**Left Bank Stability**	Stable				
Right Bank Stability	Moderately Unstable					**Right Bank Stability**	Stable				
Habitat						**Habitat**					
Undercut Banks (%)	**Woody Debris (%)**		**Organic Debris (%)**	**Vascular Macrophytes (%)**		**Undercut Banks (%)**	**Woody Debris (%)**		**Organic Debris (%)**	**Vascular Macrophytes (%)**	
	Instream	**Overhanging**		**Instream**	**Overhanging**		**Instream**	**Overhanging**		**Instream**	**Overhanging**
5	15		20	10			10	10	20	20	20
Dominant Vegetation Type						**Dominant Vegetation Type**					
	Submergent	**Floating**		**Emergent**			**Submergent**	**Floating**		**Emergent**	
Percentage (%)	15	15		20		**Percentage (%)**	20	20		20	
Dominant Species	Coontail	Yellow Pondlilly		Cattails		**Dominant Species**	Coontail	Floating Pond Lilly		Cattails, Arrowhead	
Notes						**Notes**					
• Channelized area between upstream marsh habitat and large Beaver pond. • No flow • Substrate completely muck and detritus						• Extremely large Beaver pond, with very large dam and abandoned lodge • Water level within Beaver pond has dropped, exposing lower mud layer of dam as well as the entrance and exits of the abandoned lodge. • Found 5 dead and floating Central Mudminnow. • Pond is shallow with alot of aquatic vegetation. • Pond surrounded by Cattails, Black Spruce, Alder thickets. • Floodplain is large, turning into low-lying marsh habitat.					

APPENDIX C
TABLE C-1
KEY HABITAT CHARACTERISTICS OF CREEKS AND RIVERS

Sturgeon Creek

STU-5

Station	Upstream					**Station**	Downstream				
Coordinates	15U 427556 5396411					**Coordinates**	15U 427572 5396413				
Watercourse Type	Permanent					**Watercourse Type**	Permanent				
Velocity (m/s)	<0.01					**Velocity (m/s)**	<0.01				
Section Length (m)	20					**Section Length (m)**	200				
Surrounding Land Use	Agricultural					**Surrounding Land Use**	Agricultural				
Morphology						**Morphology**					
	Flat	**Pool**	**Riffle**	**Flat**	**Other**		**Flat**	**Pool**	**Riffle**	**Flat**	**Other**
Percentage of Area (%)	100					**Percentage of Area (%)**	100				
Mean Depth Wetted (m)	0.48					**Mean Depth Wetted (m)**	0.48				
Mean Width Wetted (m)	2.1					**Mean Width Wetted (m)**	3				
Mean Width Bankfull (m)	3.1					**Mean Width Bankfull (m)**	3.1				
Mean Depth Bankfull (m)	0.79					**Mean Depth Bankfull (m)**	0.79				
Substrate (%)	Clay: 75 Sand: 20 Silt/Muck: 5					**Substrate (%)**	Clay: 70 Sand: 20 Silt/Muck: 10				
Left Bank Stability	Slightly Unstable					**Left Bank Stability**	Slightly Unstable				
Right Bank Stability	Slightly Unstable					**Right Bank Stability**	Slightly Unstable				
Habitat						**Habitat**					
Undercut Banks (%)	**Woody Debris (%)**		**Organic Debris (%)**	**Vascular Macrophytes (%)**		**Undercut Banks (%)**	**Woody Debris (%)**		**Organic Debris (%)**	**Vascular Macrophytes (%)**	
	Instream	**Overhanging**		**Instream**	**Overhanging**		**Instream**	**Overhanging**		**Instream**	**Overhanging**
5	0	5	25	10	25	5	5	5	10	10	10
Dominant Vegetation Type						**Dominant Vegetation Type**					
	Submergent	**Floating**		**Emergent**			**Submergent**	**Floating**		**Emergent**	
Percentage (%)		20		10		**Percentage (%)**	10	10		10	
Dominant Species		Lemna		Graminoid		**Dominant Species**	Coontail	Lemna, Tapegrass		Arrowhead	
Notes						**Notes**					
• Wetted part of creek only 20m. • Cattle pasture						• No Flow • Creek goes dry on upstream side of road • Cattle graze directly in and around creek. • Caught Central Mudminnow and Brook Stickleback • Banks dominated by Sedges (20%), Grasses (30%), Alder (20%), Willow (10%) • Grasses growing directly in channel • Banks show signs of erosion					

Sturgeon Creek

STU-6

Station	Upstream					**Station**	Downstream				
Coordinates	15U 427529 5393444					**Coordinates**	15U 427529 5393444				
Watercourse Type	Permanent					**Watercourse Type**	Permanent				
Velocity (m/s)	<0.01					**Velocity (m/s)**	<0.01				
Section Length (m)	125					**Section Length (m)**	200				
Surrounding Land Use	Agricultural					**Surrounding Land Use**	Agricultural				
Morphology						**Morphology**					
	Flat	**Pool**	**Riffle**	**Flat**	**Other**		**Flat**	**Pool**	**Riffle**	**Flat**	**Other**
Percentage of Area (%)	100					**Percentage of Area (%)**	100				
Mean Depth Wetted (m)	0.51					**Mean Depth Wetted (m)**	0.6				
Mean Width Wetted (m)	9.3					**Mean Width Wetted (m)**	9.3				
Mean Width Bankfull (m)	9.4					**Mean Width Bankfull (m)**	9.4				
Mean Depth Bankfull (m)	1.05					**Mean Depth Bankfull (m)**	1.05				
Substrate (%)	Clay: 70 Sand: 15 Gravel: 10 Silt: 5					**Substrate (%)**	Clay: 60 Sand: 30 Gravel: 10				
Left Bank Stability	Slightly Unstable					**Left Bank Stability**	Slightly Unstable				
Right Bank Stability	Slightly Unstable					**Right Bank Stability**	Slightly Unstable				
Habitat						**Habitat**					
Undercut Banks (%)	**Woody Debris (%)**		**Organic Debris (%)**	**Vascular Macrophytes (%)**		**Undercut Banks (%)**	**Woody Debris (%)**		**Organic Debris (%)**	**Vascular Macrophytes (%)**	
	Instream	**Overhanging**		**Instream**	**Overhanging**		**Instream**	**Overhanging**		**Instream**	**Overhanging**
10	5	5	5	5	5	20	10	10	10	10	10
Dominant Vegetation Type						**Dominant Vegetation Type**					
	Submergent	**Floating**		**Emergent**			**Submergent**	**Floating**		**Emergent**	
Percentage (%)		15		5		**Percentage (%)**	10	20		10	
Dominant Species		Lemna		Sedge		**Dominant Species**	Coontail	Lemna, Yellow Pond Lilly		Arrowhead	
Notes						**Notes**					
• No flow • Undercut banks 0.9m • Silt curtains present						• Some gravel and cobble beds throughout reach. • No flow and poor water quality, anoxic. • Both banks have extensive erosion and undercut banks. • Deep entrenchment and steep vegtated banks. • Limited aquatic vegetation, bank vegetation dominated dominated by Graminoid (30%), Ericaceous (30%), Alder (10%), Willow (10%), Black Spruce (10%), Balsam Poplar (10%).					

APPENDIX D

WATER QUALITY DATA AND CERTIFICATES OF ANALYSIS

Your Project #: MB2A7733
Site Location: TC111405
Your C.O.C. #: 363006-02-01, 363006-0201, 363006-03-01

Attention: SUB CONTRACTOR
MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Report Date: 2012/07/25

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B263334
Received: 2012/07/20, 08:40

Sample Matrix: Water
Samples Received: 11

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Cadmium - low level CCME - Dissolved	6	N/A	2012/07/23	AB SOP-00043	EPA 200.8
Cadmium - low level CCME - Dissolved	5	N/A	2012/07/25	AB SOP-00043	EPA 200.8
Cadmium - low level CCME (Total)	6	2012/07/20	2012/07/23	AB SOP-00043	EPA 200.8
Cadmium - low level CCME (Total)	5	2012/07/20	2012/07/24	AB SOP-00043	EPA 200.8
Hardness	11	N/A	2012/07/21	AB WI-00065	SM 2340B
Elements by ICP - Dissolved	11	N/A	2012/07/20	AB SOP-00042	EPA 200.7
Elements by ICP - Total	5	2012/07/20	2012/07/20	AB SOP-00042	EPA 200.7
Elements by ICP - Total	5	2012/07/21	2012/07/23	AB SOP-00042	EPA 200.7
Elements by ICP - Total	1	2012/07/25	2012/07/25	AB SOP-00042	EPA 200.7
Elements by ICPMS - Dissolved	6	N/A	2012/07/20	AB SOP-00043	EPA 200.8
Elements by ICPMS - Dissolved	5	N/A	2012/07/23	AB SOP-00043	EPA 200.8
Elements by ICPMS - Total	6	2012/07/20	2012/07/21	AB SOP-00043	EPA 200.8
Elements by ICPMS - Total	5	2012/07/21	2012/07/23	AB SOP-00043	EPA 200.8

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

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

Carmen Mackay, Project Manager Assistant
Email: CMacKay@maxxam.ca
Phone# (403) 291-3077

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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: 1

Maxxam Job #: B263334
Report Date: 2012/07/25

MAXXAM ANALYTICS
Client Project #: MB2A7733
Site Location: TC111405

HARDNESS (WATER)

Maxxam ID		DZ2859	DZ2860	DZ2861	DZ2862		
Sampling Date		2012/07/14 17:00	2012/07/13 14:20	2012/07/13 17:15	2012/07/14 13:45		
COC Number		363006-02-01	363006-02-01	363006-02-01	363006-02-01		
	UNITS	**PIN-3A (OE4721-03R)**	**CLA-5A (OE4722-03R)**	**PIN-10A (OE4723-03R)**	**TAIT-1 (OE4724-03R)**	**RDL**	**QC Batch**
Calculated Parameters							
Hardness (CaCO3)	mg/L	210	89	210	160	0.50	6022318

RDL = Reportable Detection Limit

Maxxam ID		DZ2863	DZ2864	DZ2865	DZ2866		
Sampling Date		2012/07/13 17:00	2012/07/14 17:30	2012/07/12 12:40	2012/07/11 13:35		
COC Number		363006-02-01	363006-02-01	363006-02-01	363006-02-01		
	UNITS	**UT5-A (OE04725-03R)**	**UT2-A (OE4726-03R)**	**PIN-8 (OE4727-03R)**	**WES-TRIB1A (OE4728-03R)**	**RDL**	**QC Batch**
Calculated Parameters							
Hardness (CaCO3)	mg/L	170	110	230	220	0.50	6022318

RDL = Reportable Detection Limit

Maxxam ID		DZ2867	DZ2868	DZ2869		
Sampling Date		2012/07/11 12:35	2012/07/11 15:10	2012/07/11 11:45		
COC Number		363006-02-01	363006-0201	363006-03-01		
	UNITS	**JON-1 (OE4729-03R-03R)**	**PIN-9 (OE4730-03R)**	**PIN-2A (OE4731-03R)**	**RDL**	**QC Batch**
Calculated Parameters						
Hardness (CaCO3)	mg/L	240	220	200	0.50	6022318

RDL = Reportable Detection Limit

Maxxam Job #: B263334
Report Date: 2012/07/25

MAXXAM ANALYTICS
Client Project #: MB2A7733
Site Location: TC111405

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		DZ2859	DZ2860	DZ2861	DZ2862		
Sampling Date		2012/07/14 17:00	2012/07/13 14:20	2012/07/13 17:15	2012/07/14 13:45		
COC Number		363006-02-01	363006-02-01	363006-02-01	363006-02-01		
	UNITS	**PIN-3A (OE4721-03R)**	**CLA-5A (OE4722-03R)**	**PIN-10A (OE4723-03R)**	**TAIT-1 (OE4724-03R)**	**RDL**	**QC Batch**
Low Level Elements							
Dissolved Cadmium (Cd)	ug/L	0.0067	0.0061	0.013	0.0086	0.0050	6022709
Elements							
Dissolved Aluminum (Al)	mg/L	0.0018	0.018	0.0075	0.0077	0.0010	6023591
Dissolved Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	<0.00060	0.00060	6023591
Dissolved Arsenic (As)	mg/L	0.0021	0.0012	0.0038	0.0017	0.00020	6023591
Dissolved Barium (Ba)	mg/L	<0.050	<0.050	<0.050	<0.050	0.050	6023580
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6023591
Dissolved Boron (B)	mg/L	0.26 (1)	<0.10	<0.10 (2)	<0.10	0.10	6023580
Dissolved Calcium (Ca)	mg/L	49	20	51	38	1.5	6023580
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6023591
Dissolved Cobalt (Co)	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	0.00030	6023591
Dissolved Copper (Cu)	mg/L	0.00023	0.00029	0.00060	<0.00020	0.00020	6023591
Dissolved Iron (Fe)	mg/L	<0.30	<0.30	<0.30	<0.30	0.30	6023580
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	6023591
Dissolved Lithium (Li)	mg/L	<0.10	<0.10	<0.10	<0.10	0.10	6023580
Dissolved Magnesium (Mg)	mg/L	22	9.6	20	16	1.0	6023580
Dissolved Manganese (Mn)	mg/L	<0.020	<0.020	0.32	0.025	0.020	6023580
Dissolved Molybdenum (Mo)	mg/L	0.00048	0.00027	0.00066	<0.00020	0.00020	6023591
Dissolved Nickel (Ni)	mg/L	0.0012	0.0010	0.0019	0.00080	0.00050	6023591
Dissolved Phosphorus (P)	mg/L	<0.50	<0.50	<0.50	<0.50	0.50	6023580
Dissolved Potassium (K)	mg/L	<1.5 (2)	<1.5	<1.5 (2)	<1.5	1.5	6023580
Dissolved Selenium (Se)	mg/L	0.00023	<0.00020	<0.00020	<0.00020	0.00020	6023591
Dissolved Silicon (Si)	mg/L	4.2 (3)	0.72	3.2	8.6 (3)	0.50	6023580
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	6023591
Dissolved Sodium (Na)	mg/L	14 (3)	3.1	5.8 (1)	3.7 (1)	2.5	6023580
Dissolved Strontium (Sr)	mg/L	0.12 (3)	<0.10	<0.10	<0.10 (2)	0.10	6023580
Dissolved Sulphur (S)	mg/L	2.0 (3)	1.5	1.5 (3)	2.2	1.0	6023580
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	6023591
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6023591
Dissolved Titanium (Ti)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6023591

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Reanalysis yields similar results.
(2) Dissolved greater than total. Results are within limits of uncertainty(MU).
(3) Dissolved greater than total. Results within acceptable limits of precision.

Maxxam Job #: B263334
Report Date: 2012/07/25

MAXXAM ANALYTICS
Client Project #: MB2A7733
Site Location: TC111405

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		DZ2859	DZ2860	DZ2861	DZ2862		
Sampling Date		2012/07/14 17:00	2012/07/13 14:20	2012/07/13 17:15	2012/07/14 13:45		
COC Number		363006-02-01	363006-02-01	363006-02-01	363006-02-01		
	UNITS	**PIN-3A (OE4721-03R)**	**CLA-5A (OE4722-03R)**	**PIN-10A (OE4723-03R)**	**TAIT-1 (OE4724-03R)**	**RDL**	**QC Batch**
Dissolved Uranium (U)	mg/L	0.00062	0.00011	0.00046	<0.00010	0.00010	6023591
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6023591
Dissolved Zinc (Zn)	mg/L	0.0049 (1)	0.0066	0.0040	0.0077 (1)	0.0030	6023591

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Results are within limits of uncertainty(MU).

Maxxam Job #: B263334
Report Date: 2012/07/25

MAXXAM ANALYTICS
Client Project #: MB2A7733
Site Location: TC111405

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		DZ2863	DZ2864		DZ2865	DZ2866		
Sampling Date		2012/07/13 17:00	2012/07/14 17:30		2012/07/12 12:40	2012/07/11 13:35		
COC Number		363006-02-01	363006-02-01		363006-02-01	363006-02-01		
	UNITS	**UT5-A (OE04725-03R)**	**UT2-A (OE4726-03R)**	**QC Batch**	**PIN-8 (OE4727-03R)**	**WES-TRIB1A (OE4728-03R)**	**RDL**	**QC Batch**
Low Level Elements								
Dissolved Cadmium (Cd)	ug/L	0.0050	0.0064	6022709	0.020	0.011	0.0050	6022709
Elements								
Dissolved Aluminum (Al)	mg/L	0.0052	0.013	6023591	0.0016	0.0011	0.0010	6025749
Dissolved Antimony (Sb)	mg/L	<0.00060	<0.00060	6023591	<0.00060	<0.00060	0.00060	6025749
Dissolved Arsenic (As)	mg/L	0.0010	0.0014	6023591	0.0014	0.0015	0.00020	6025749
Dissolved Barium (Ba)	mg/L	<0.050	<0.050	6023580	<0.050	<0.050	0.050	6023580
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	6023591	<0.0010	<0.0010	0.0010	6025749
Dissolved Boron (B)	mg/L	<0.10	<0.10	6023580	<0.10	<0.10	0.10	6023580
Dissolved Calcium (Ca)	mg/L	43 (1)	21	6023580	54	45	1.5	6023580
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	6023591	<0.0010	<0.0010	0.0010	6025749
Dissolved Cobalt (Co)	mg/L	<0.00030	<0.00030	6023591	<0.00030	<0.00030	0.00030	6025749
Dissolved Copper (Cu)	mg/L	<0.00020	<0.00020	6023591	0.00039 (2)	0.00048 (2)	0.00020	6025749
Dissolved Iron (Fe)	mg/L	<0.30	<0.30	6023580	<0.30	<0.30	0.30	6023580
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	6023591	<0.00020	<0.00020	0.00020	6025749
Dissolved Lithium (Li)	mg/L	<0.10	<0.10	6023580	<0.10	<0.10	0.10	6023580
Dissolved Magnesium (Mg)	mg/L	14	14	6023580	23	25	1.0	6023580
Dissolved Manganese (Mn)	mg/L	<0.020	<0.020	6023580	0.039	<0.020	0.020	6023580
Dissolved Molybdenum (Mo)	mg/L	<0.00020	<0.00020	6023591	<0.00020	0.00069	0.00020	6025749
Dissolved Nickel (Ni)	mg/L	0.00083 (2)	<0.00050	6023591	<0.00050	<0.00050	0.00050	6025749
Dissolved Phosphorus (P)	mg/L	<0.50	<0.50	6023580	<0.50	<0.50	0.50	6023580
Dissolved Potassium (K)	mg/L	<1.5 (2)	<1.5 (2)	6023580	<1.5	<1.5	1.5	6023580
Dissolved Selenium (Se)	mg/L	<0.00020	<0.00020	6023591	0.00022 (2)	<0.00020	0.00020	6025749
Dissolved Silicon (Si)	mg/L	2.6	5.3	6023580	2.2	4.1	0.50	6023580
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	6023591	<0.00010	<0.00010	0.00010	6025749
Dissolved Sodium (Na)	mg/L	<2.5 (2)	4.4 (1)	6023580	5.9	3.0	2.5	6023580
Dissolved Strontium (Sr)	mg/L	<0.10 (2)	<0.10 (2)	6023580	0.12	<0.10	0.10	6023580
Dissolved Sulphur (S)	mg/L	<1.0 (2)	3.0 (1)	6023580	1.1	<1.0	1.0	6023580
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	6023591	<0.00020	<0.00020	0.00020	6025749
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	6023591	<0.0010	<0.0010	0.0010	6025749
Dissolved Titanium (Ti)	mg/L	<0.0010	<0.0010	6023591	<0.0010	<0.0010	0.0010	6025749

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Results within acceptable limits of precision.
(2) Dissolved greater than total. Results are within limits of uncertainty(MU).

Maxxam Job #: B263334
Report Date: 2012/07/25

MAXXAM ANALYTICS
Client Project #: MB2A7733
Site Location: TC111405

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		DZ2863	DZ2864		DZ2865	DZ2866		
Sampling Date		2012/07/13 17:00	2012/07/14 17:30		2012/07/12 12:40	2012/07/11 13:35		
COC Number		363006-02-01	363006-02-01		363006-02-01	363006-02-01		
	UNITS	**UT5-A (OE04725-03R)**	**UT2-A (OE4726-03R)**	**QC Batch**	**PIN-8 (OE4727-03R)**	**WES-TRIB1A (OE4728-03R)**	**RDL**	**QC Batch**
Dissolved Uranium (U)	mg/L	0.00019	0.00011	6023591	0.00022	0.00019	0.00010	6025749
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	6023591	<0.0010	<0.0010	0.0010	6025749
Dissolved Zinc (Zn)	mg/L	0.0044 (1)	0.0045 (1)	6023591	<0.0030	<0.0030	0.0030	6025749

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Results are within limits of uncertainty(MU).

Maxxam Job #: B263334
Report Date: 2012/07/25

MAXXAM ANALYTICS
Client Project #: MB2A7733
Site Location: TC111405

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		DZ2867	DZ2868	DZ2869		
Sampling Date		2012/07/11 12:35	2012/07/11 15:10	2012/07/11 11:45		
COC Number		363006-02-01	363006-0201	363006-03-01		
	UNITS	**JON-1 (OE4729-03R-03R)**	**PIN-9 (OE4730-03R)**	**PIN-2A (OE4731-03R)**	**RDL**	**QC Batch**
Low Level Elements						
Dissolved Cadmium (Cd)	ug/L	0.0099	0.0055	<0.0050	0.0050	6022709
Elements						
Dissolved Aluminum (Al)	mg/L	0.0037	0.057	0.0023	0.0010	6025749
Dissolved Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	0.00060	6025749
Dissolved Arsenic (As)	mg/L	0.0016	0.0059	0.0017	0.00020	6025749
Dissolved Barium (Ba)	mg/L	<0.050	<0.050	<0.050	0.050	6023580
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	6025749
Dissolved Boron (B)	mg/L	<0.10	<0.10	<0.10	0.10	6023580
Dissolved Calcium (Ca)	mg/L	61	50	48	1.5	6023580
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	6025749
Dissolved Cobalt (Co)	mg/L	<0.00030	<0.00030	<0.00030	0.00030	6025749
Dissolved Copper (Cu)	mg/L	0.00072 (1)	0.0014	<0.00020	0.00020	6025749
Dissolved Iron (Fe)	mg/L	<0.30	<0.30	<0.30	0.30	6023580
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	6025749
Dissolved Lithium (Li)	mg/L	<0.10	<0.10	<0.10	0.10	6023580
Dissolved Magnesium (Mg)	mg/L	22	23	21	1.0	6023580
Dissolved Manganese (Mn)	mg/L	<0.020	<0.020	<0.020	0.020	6023580
Dissolved Molybdenum (Mo)	mg/L	0.00070	0.0012	0.00041	0.00020	6025749
Dissolved Nickel (Ni)	mg/L	0.0023	0.0029	0.0012	0.00050	6025749
Dissolved Phosphorus (P)	mg/L	<0.50	<0.50	<0.50	0.50	6023580
Dissolved Potassium (K)	mg/L	<1.5	<1.5	<1.5	1.5	6023580
Dissolved Selenium (Se)	mg/L	0.00021	0.00026	<0.00020	0.00020	6025749
Dissolved Silicon (Si)	mg/L	9.7	3.3	1.8	0.50	6023580
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	6025749
Dissolved Sodium (Na)	mg/L	2.5	5.8	7.5	2.5	6023580
Dissolved Strontium (Sr)	mg/L	0.12	0.11	0.12	0.10	6023580
Dissolved Sulphur (S)	mg/L	<1.0	1.5	1.4	1.0	6023580
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	6025749
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	6025749
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0074	<0.0010	0.0010	6025749
Dissolved Uranium (U)	mg/L	0.00031	0.0010	0.00042	0.00010	6025749

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Results are within limits of uncertainty(MU).

Maxxam Job #: B263334
Report Date: 2012/07/25

MAXXAM ANALYTICS
Client Project #: MB2A7733
Site Location: TC111405

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		DZ2867	DZ2868	DZ2869		
Sampling Date		2012/07/11 12:35	2012/07/11 15:10	2012/07/11 11:45		
COC Number		363006-02-01	363006-0201	363006-03-01		
	UNITS	**JON-1 (OE4729-03R-03R)**	**PIN-9 (OE4730-03R)**	**PIN-2A (OE4731-03R)**	**RDL**	**QC Batch**
Dissolved Vanadium (V)	mg/L	<0.0010	0.0021	<0.0010	0.0010	6025749
Dissolved Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	0.0030	6025749

RDL = Reportable Detection Limit

Maxxam Job #: B263334
Report Date: 2012/07/25

MAXXAM ANALYTICS
Client Project #: MB2A7733
Site Location: TC111405

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		DZ2859	DZ2860	DZ2861	DZ2862		
Sampling Date		2012/07/14 17:00	2012/07/13 14:20	2012/07/13 17:15	2012/07/14 13:45		
COC Number		363006-02-01	363006-02-01	363006-02-01	363006-02-01		
	UNITS	**PIN-3A (OE4721-03R)**	**CLA-5A (OE4722-03R)**	**PIN-10A (OE4723-03R)**	**TAIT-1 (OE4724-03R)**	**RDL**	**QC Batch**
Low Level Elements							
Total Cadmium (Cd)	ug/L	0.016	0.019	0.012	0.015	0.0050	6022710
Elements							
Total Aluminum (Al)	mg/L	0.013	0.053	0.11	0.029	0.0010	6023590
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	<0.00060	0.00060	6023590
Total Arsenic (As)	mg/L	0.0025	0.0014	0.0051	0.0024	0.00020	6023590
Total Barium (Ba)	mg/L	<0.050	N/A	<0.050	<0.050	0.050	6023663
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6023590
Total Boron (B)	mg/L	0.19	N/A	<0.10	<0.10	0.10	6023663
Total Calcium (Ca)	mg/L	50	N/A	51	39	1.5	6023663
Total Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6023590
Total Cobalt (Co)	mg/L	<0.00030	<0.00030	0.00044	0.00080	0.00030	6023590
Total Copper (Cu)	mg/L	0.00046	0.00060	0.00087	0.00056	0.00020	6023590
Total Iron (Fe)	mg/L	<0.30	N/A	0.54	0.90	0.30	6023663
Total Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	6023590
Total Lithium (Li)	mg/L	<0.10	N/A	<0.10	<0.10	0.10	6023663
Total Magnesium (Mg)	mg/L	22	N/A	20	16	1.0	6023663
Total Manganese (Mn)	mg/L	0.17	N/A	0.52	0.82	0.020	6023663
Total Molybdenum (Mo)	mg/L	0.00056	0.00033	0.00080	<0.00020	0.00020	6023590
Total Nickel (Ni)	mg/L	0.0014	0.0012	0.0025	0.0011	0.00050	6023590
Total Phosphorus (P)	mg/L	<0.50	N/A	<0.50	<0.50	0.50	6023663
Total Potassium (K)	mg/L	<1.5	N/A	<1.5	<1.5	1.5	6023663
Total Selenium (Se)	mg/L	0.00028	0.00024	0.00032	0.00024	0.00020	6023590
Total Silicon (Si)	mg/L	3.6	N/A	3.3	8.5	0.50	6023663
Total Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	6023590
Total Sodium (Na)	mg/L	12	N/A	4.3	3.1	2.5	6023663
Total Strontium (Sr)	mg/L	0.12	N/A	0.10	<0.10	0.10	6023663
Total Sulphur (S)	mg/L	1.6	N/A	1.3	2.7	1.0	6023663
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	6023590
Total Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6023590
Total Titanium (Ti)	mg/L	0.0013	0.0016	0.0042	0.0016	0.0010	6023590
Total Uranium (U)	mg/L	0.00070	0.00013	0.00053	<0.00010	0.00010	6023590

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B263334
Report Date: 2012/07/25

MAXXAM ANALYTICS
Client Project #: MB2A7733
Site Location: TC111405

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		DZ2859	DZ2860	DZ2861	DZ2862		
Sampling Date		2012/07/14 17:00	2012/07/13 14:20	2012/07/13 17:15	2012/07/14 13:45		
COC Number		363006-02-01	363006-02-01	363006-02-01	363006-02-01		
	UNITS	**PIN-3A (OE4721-03R)**	**CLA-5A (OE4722-03R)**	**PIN-10A (OE4723-03R)**	**TAIT-1 (OE4724-03R)**	**RDL**	**QC Batch**
Total Vanadium (V)	mg/L	<0.0010	<0.0010	0.0011	<0.0010	0.0010	6023590
Total Zinc (Zn)	mg/L	<0.0030	0.013	0.0040	0.0057	0.0030	6023590

RDL = Reportable Detection Limit

Maxxam Job #: B263334
Report Date: 2012/07/25

MAXXAM ANALYTICS
Client Project #: MB2A7733
Site Location: TC111405

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		DZ2863	DZ2864			DZ2865		
Sampling Date		2012/07/13 17:00	2012/07/14 17:30			2012/07/12 12:40		
COC Number		363006-02-01	363006-02-01			363006-02-01		
	UNITS	**UT5-A (OE04725-03R)**	**UT2-A (OE4726-03R)**	**RDL**	**QC Batch**	**PIN-8 (OE4727-03R)**	**RDL**	**QC Batch**
Low Level Elements								
Total Cadmium (Cd)	ug/L	0.011	0.016	0.0050	6022710	<0.0050	0.0050	6022710
Elements								
Total Aluminum (Al)	mg/L	0.058	0.064	0.0010	6023590	0.0061	0.0010	6025747
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	0.00060	6023590	<0.00060	0.00060	6025747
Total Arsenic (As)	mg/L	0.0013	0.0019	0.00020	6023590	0.0014	0.00020	6025747
Total Barium (Ba)	mg/L	<0.050	<0.050	0.050	6023663	0.019	0.010	6025409
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	0.0010	6023590	<0.0010	0.0010	6025747
Total Boron (B)	mg/L	<0.10	<0.10	0.10	6023663	<0.020	0.020	6025409
Total Calcium (Ca)	mg/L	43	21	1.5	6023663	51	0.30	6025409
Total Chromium (Cr)	mg/L	<0.0010	<0.0010	0.0010	6023590	<0.0010	0.0010	6025747
Total Cobalt (Co)	mg/L	<0.00030	<0.00030	0.00030	6023590	0.00030	0.00030	6025747
Total Copper (Cu)	mg/L	0.00038	0.00037	0.00020	6023590	0.00026	0.00020	6025747
Total Iron (Fe)	mg/L	0.45	<0.30	0.30	6023663	0.26	0.060	6025409
Total Lead (Pb)	mg/L	<0.00020	<0.00020	0.00020	6023590	<0.00020	0.00020	6025747
Total Lithium (Li)	mg/L	<0.10	<0.10	0.10	6023663	<0.020	0.020	6025409
Total Magnesium (Mg)	mg/L	14	14	1.0	6023663	22	0.20	6025409
Total Manganese (Mn)	mg/L	0.096	0.036	0.020	6023663	0.19	0.0040	6025409
Total Molybdenum (Mo)	mg/L	<0.00020	0.00030	0.00020	6023590	0.00020	0.00020	6025747
Total Nickel (Ni)	mg/L	0.00081	<0.00050	0.00050	6023590	0.00080	0.00050	6025747
Total Phosphorus (P)	mg/L	<0.50	<0.50	0.50	6023663	<0.10	0.10	6025409
Total Potassium (K)	mg/L	<1.5	<1.5	1.5	6023663	1.2	0.30	6025409
Total Selenium (Se)	mg/L	<0.00020	<0.00020	0.00020	6023590	<0.00020	0.00020	6025747
Total Silicon (Si)	mg/L	2.6	5.4	0.50	6023663	2.1	0.10	6025409
Total Silver (Ag)	mg/L	<0.00010	<0.00010	0.00010	6023590	<0.00010	0.00010	6025747
Total Sodium (Na)	mg/L	<2.5	4.4	2.5	6023663	5.5	0.50	6025409
Total Strontium (Sr)	mg/L	<0.10	<0.10	0.10	6023663	0.11	0.020	6025409
Total Sulphur (S)	mg/L	<1.0	3.0	1.0	6023663	0.96	0.20	6025409
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	0.00020	6023590	<0.00020	0.00020	6025747
Total Tin (Sn)	mg/L	<0.0010	<0.0010	0.0010	6023590	<0.0010	0.0010	6025747
Total Titanium (Ti)	mg/L	0.0030	0.0023	0.0010	6023590	<0.0010	0.0010	6025747
Total Uranium (U)	mg/L	0.00020	0.00014	0.00010	6023590	0.00024	0.00010	6025747
Total Vanadium (V)	mg/L	<0.0010	<0.0010	0.0010	6023590	<0.0010	0.0010	6025747

RDL = Reportable Detection Limit

Maxxam Job #: B263334
Report Date: 2012/07/25

MAXXAM ANALYTICS
Client Project #: MB2A7733
Site Location: TC111405

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		DZ2863	DZ2864			DZ2865		
Sampling Date		2012/07/13 17:00	2012/07/14 17:30			2012/07/12 12:40		
COC Number		363006-02-01	363006-02-01			363006-02-01		
	UNITS	**UT5-A (OE04725-03R)**	**UT2-A (OE4726-03R)**	**RDL**	**QC Batch**	**PIN-8 (OE4727-03R)**	**RDL**	**QC Batch**
Total Zinc (Zn)	mg/L	0.0033	0.0043	0.0030	6023590	0.0049	0.0030	6025747

RDL = Reportable Detection Limit

Maxxam Job #: B263334
Report Date: 2012/07/25

MAXXAM ANALYTICS
Client Project #: MB2A7733
Site Location: TC111405

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		DZ2866	DZ2867	DZ2868	DZ2869		
Sampling Date		2012/07/11 13:35	2012/07/11 12:35	2012/07/11 15:10	2012/07/11 11:45		
COC Number		363006-02-01	363006-02-01	363006-0201	363006-03-01		
	UNITS	**WES-TRIB1A (OE4728-03R)**	**JON-1 (OE4729-03R-03R)**	**PIN-9 (OE4730-03R)**	**PIN-2A (OE4731-03R)**	**RDL**	**QC Batch**
Low Level Elements							
Total Cadmium (Cd)	ug/L	<0.0050	0.010	<0.0050	<0.0050	0.0050	6022710
Elements							
Total Aluminum (Al)	mg/L	0.016	0.10	0.46	0.091	0.0010	6025747
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	<0.00060	0.00060	6025747
Total Arsenic (As)	mg/L	0.0022	0.0038	0.0063	0.0019	0.00020	6025747
Total Barium (Ba)	mg/L	0.028	0.030	0.011	0.021	0.010	6025409
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6025747
Total Boron (B)	mg/L	<0.020	<0.020	0.022	0.024	0.020	6025409
Total Calcium (Ca)	mg/L	46	61	50	48	0.30	6025409
Total Chromium (Cr)	mg/L	<0.0010	<0.0010	0.0011	<0.0010	0.0010	6025747
Total Cobalt (Co)	mg/L	0.00031	0.0023	0.00052	<0.00030	0.00030	6025747
Total Copper (Cu)	mg/L	0.00033	0.00045	0.0021	0.00072	0.00020	6025747
Total Iron (Fe)	mg/L	0.93	2.5	0.60	0.32	0.060	6025409
Total Lead (Pb)	mg/L	<0.00020	<0.00020	0.00037	<0.00020	0.00020	6025747
Total Lithium (Li)	mg/L	<0.020	<0.020	<0.020	<0.020	0.020	6025409
Total Magnesium (Mg)	mg/L	25	22	22	20	0.20	6025409
Total Manganese (Mn)	mg/L	0.21	1.2	0.21	0.059	0.0040	6025409
Total Molybdenum (Mo)	mg/L	0.00065	0.00072	0.0012	0.00039	0.00020	6025747
Total Nickel (Ni)	mg/L	0.00097	0.0026	0.0045	0.0019	0.00050	6025747
Total Phosphorus (P)	mg/L	<0.10	<0.10	0.10	<0.10	0.10	6025409
Total Potassium (K)	mg/L	0.73	0.66	0.80	1.9	0.30	6025409
Total Selenium (Se)	mg/L	<0.00020	0.00026	0.00029	<0.00020	0.00020	6025747
Total Silicon (Si)	mg/L	4.3	10	4.4	2.0	0.10	6025409
Total Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	6025747
Total Sodium (Na)	mg/L	2.6	2.2	5.2	6.8	0.50	6025409
Total Strontium (Sr)	mg/L	0.071	0.12	0.10	0.11	0.020	6025409
Total Sulphur (S)	mg/L	0.38	0.54	1.5	1.2	0.20	6025409
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	6025747
Total Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6025747
Total Titanium (Ti)	mg/L	<0.0010	0.0026	0.032	0.0030	0.0010	6025747
Total Uranium (U)	mg/L	0.00019	0.00032	0.0011	0.00041	0.00010	6025747
Total Vanadium (V)	mg/L	<0.0010	<0.0010	0.0032	<0.0010	0.0010	6025747

RDL = Reportable Detection Limit

Maxxam Job #: B263334
Report Date: 2012/07/25

MAXXAM ANALYTICS
Client Project #: MB2A7733
Site Location: TC111405

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		DZ2866	DZ2867	DZ2868	DZ2869		
Sampling Date		2012/07/11 13:35	2012/07/11 12:35	2012/07/11 15:10	2012/07/11 11:45		
COC Number		363006-02-01	363006-02-01	363006-0201	363006-03-01		
	UNITS	**WES-TRIB1A (OE4728-03R)**	**JON-1 (OE4729-03R-03R)**	**PIN-9 (OE4730-03R)**	**PIN-2A (OE4731-03R)**	**RDL**	**QC Batch**
Total Zinc (Zn)	mg/L	0.0051	0.0054	0.0067	0.0056	0.0030	6025747

RDL = Reportable Detection Limit

Maxxam Job #: B263334
Report Date: 2012/07/25

MAXXAM ANALYTICS
Client Project #: MB2A7733
Site Location: TC111405

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		DZ2860		
Sampling Date		2012/07/13 14:20		
COC Number		363006-02-01		
	UNITS	**CLA-5A (OE4722-03R)**	**RDL**	**QC Batch**
Elements				
Total Aluminum (Al)	mg/L	<0.20	0.20	6032358
Total Barium (Ba)	mg/L	<0.050	0.050	6032358
Total Boron (B)	mg/L	<0.10	0.10	6032358
Total Calcium (Ca)	mg/L	19	1.5	6032358
Total Chromium (Cr)	mg/L	<0.050	0.050	6032358
Total Iron (Fe)	mg/L	<0.30	0.30	6032358
Total Lithium (Li)	mg/L	<0.10	0.10	6032358
Total Magnesium (Mg)	mg/L	9.2	1.0	6032358
Total Manganese (Mn)	mg/L	0.033	0.020	6032358
Total Phosphorus (P)	mg/L	<0.50	0.50	6032358
Total Potassium (K)	mg/L	<1.5	1.5	6032358
Total Silicon (Si)	mg/L	0.54	0.50	6032358
Total Sodium (Na)	mg/L	<2.5	2.5	6032358
Total Strontium (Sr)	mg/L	<0.10	0.10	6032358
Total Sulphur (S)	mg/L	1.2	1.0	6032358

RDL = Reportable Detection Limit

Maxxam Job #: B263334
Report Date: 2012/07/25

MAXXAM ANALYTICS
Client Project #: MB2A7733
Site Location: TC111405

Package 1	-0.4°C

Each temperature is the average of up to three cooler temperatures taken at receipt

General Comments

Sample DZ2861-01: Dissolved greater than total for Cd. Results are within limits of uncertainty(MU).

REGULATED METALS (CCME/AT1) - DISSOLVED Comments

Sample DZ2859-01 Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

Sample DZ2860-01 Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

Sample DZ2861-01 Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

Sample DZ2862-01 Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

Sample DZ2863-01 Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

Sample DZ2864-01 Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

Sample DZ2865-01 Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

Sample DZ2866-01 Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

Sample DZ2867-01 Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

Sample DZ2868-01 Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

Sample DZ2869-01 Elements by ICP - Dissolved: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

REGULATED METALS (CCME/AT1) - TOTAL Comments

Sample DZ2859-01 Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

Sample DZ2861-01 Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

Sample DZ2862-01 Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

Sample DZ2863-01 Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

Sample DZ2864-01 Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER) Comments

Sample DZ2860-01 Elements by ICP - Total: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly

Results relate only to the items tested.

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB2A7733
P.O. #:
Site Location: TC111405

Quality Assurance Report

Maxxam Job Number: CB263334

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6023580	PL	Matrix Spike	Dissolved Barium (Ba)	2012/07/20		101	%	80 - 120
			Dissolved Boron (B)	2012/07/20		NC	%	80 - 120
			Dissolved Calcium (Ca)	2012/07/20		114	%	80 - 120
			Dissolved Iron (Fe)	2012/07/20		106	%	80 - 120
			Dissolved Lithium (Li)	2012/07/20		97	%	80 - 120
			Dissolved Magnesium (Mg)	2012/07/20		104	%	80 - 120
			Dissolved Manganese (Mn)	2012/07/20		106	%	80 - 120
			Dissolved Phosphorus (P)	2012/07/20		108	%	80 - 120
			Dissolved Potassium (K)	2012/07/20		102	%	80 - 120
			Dissolved Silicon (Si)	2012/07/20		NC	%	80 - 120
			Dissolved Sodium (Na)	2012/07/20		NC	%	80 - 120
			Dissolved Strontium (Sr)	2012/07/20		99	%	80 - 120
		Spiked Blank	Dissolved Barium (Ba)	2012/07/20		88	%	80 - 120
			Dissolved Boron (B)	2012/07/20		88	%	80 - 120
			Dissolved Calcium (Ca)	2012/07/20		100	%	80 - 120
			Dissolved Iron (Fe)	2012/07/20		92	%	80 - 120
			Dissolved Lithium (Li)	2012/07/20		86	%	80 - 120
			Dissolved Magnesium (Mg)	2012/07/20		91	%	80 - 120
			Dissolved Manganese (Mn)	2012/07/20		92	%	80 - 120
			Dissolved Phosphorus (P)	2012/07/20		94	%	80 - 120
			Dissolved Potassium (K)	2012/07/20		90	%	80 - 120
			Dissolved Silicon (Si)	2012/07/20		87	%	80 - 120
			Dissolved Sodium (Na)	2012/07/20		85	%	80 - 120
			Dissolved Strontium (Sr)	2012/07/20		87	%	80 - 120
		Method Blank	Dissolved Barium (Ba)	2012/07/20	<0.010		mg/L	
			Dissolved Boron (B)	2012/07/20	<0.020		mg/L	
			Dissolved Calcium (Ca)	2012/07/20	<0.30		mg/L	
			Dissolved Iron (Fe)	2012/07/20	<0.060		mg/L	
			Dissolved Lithium (Li)	2012/07/20	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2012/07/20	<0.20		mg/L	
			Dissolved Manganese (Mn)	2012/07/20	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2012/07/20	<0.10		mg/L	
			Dissolved Potassium (K)	2012/07/20	<0.30		mg/L	
			Dissolved Silicon (Si)	2012/07/20	<0.10		mg/L	
			Dissolved Sodium (Na)	2012/07/20	<0.50		mg/L	
			Dissolved Strontium (Sr)	2012/07/20	<0.020		mg/L	
			Dissolved Sulphur (S)	2012/07/20	<0.20		mg/L	
		RPD	Dissolved Calcium (Ca)	2012/07/20	NC		%	20
			Dissolved Iron (Fe)	2012/07/20	NC		%	20
			Dissolved Magnesium (Mg)	2012/07/20	NC		%	20
			Dissolved Manganese (Mn)	2012/07/20	NC		%	20
			Dissolved Potassium (K)	2012/07/20	7.3		%	20
			Dissolved Sodium (Na)	2012/07/20	2.6		%	20
6023590	TDB	Matrix Spike	Total Aluminum (Al)	2012/07/21		96	%	80 - 120
			Total Antimony (Sb)	2012/07/21		106	%	80 - 120
			Total Arsenic (As)	2012/07/21		100	%	80 - 120
			Total Beryllium (Be)	2012/07/21		101	%	80 - 120
			Total Chromium (Cr)	2012/07/21		98	%	80 - 120
			Total Cobalt (Co)	2012/07/21		100	%	80 - 120
			Total Copper (Cu)	2012/07/21		98	%	80 - 120
			Total Lead (Pb)	2012/07/21		99	%	80 - 120
			Total Molybdenum (Mo)	2012/07/21		102	%	80 - 120
			Total Nickel (Ni)	2012/07/21		98	%	80 - 120
			Total Selenium (Se)	2012/07/21		106	%	80 - 120
			Total Silver (Ag)	2012/07/21		103	%	80 - 120

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB2A7733
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Quality Assurance Report (Continued)

Maxxam Job Number: CB263334

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6023590	TDB	Matrix Spike	Total Thallium (Tl)	2012/07/21		95	%	80 - 120
			Total Tin (Sn)	2012/07/21		106	%	80 - 120
			Total Titanium (Ti)	2012/07/21		93	%	80 - 120
			Total Uranium (U)	2012/07/21		96	%	80 - 120
			Total Vanadium (V)	2012/07/21		99	%	80 - 120
			Total Zinc (Zn)	2012/07/21		88	%	80 - 120
		Spiked Blank	Total Aluminum (Al)	2012/07/20		102	%	80 - 120
			Total Antimony (Sb)	2012/07/20		110	%	80 - 120
			Total Arsenic (As)	2012/07/20		104	%	80 - 120
			Total Beryllium (Be)	2012/07/20		101	%	80 - 120
			Total Chromium (Cr)	2012/07/20		100	%	80 - 120
			Total Cobalt (Co)	2012/07/20		104	%	80 - 120
			Total Copper (Cu)	2012/07/20		102	%	80 - 120
			Total Lead (Pb)	2012/07/20		102	%	80 - 120
			Total Molybdenum (Mo)	2012/07/20		105	%	80 - 120
			Total Nickel (Ni)	2012/07/20		102	%	80 - 120
			Total Selenium (Se)	2012/07/20		108	%	80 - 120
			Total Silver (Ag)	2012/07/20		105	%	80 - 120
			Total Thallium (Tl)	2012/07/20		97	%	80 - 120
			Total Tin (Sn)	2012/07/20		109	%	80 - 120
			Total Titanium (Ti)	2012/07/20		101	%	80 - 120
			Total Uranium (U)	2012/07/20		98	%	80 - 120
			Total Vanadium (V)	2012/07/20		104	%	80 - 120
			Total Zinc (Zn)	2012/07/20		104	%	80 - 120
		Method Blank	Total Aluminum (Al)	2012/07/20	0.0012, RDL=0.0010		mg/L	
			Total Antimony (Sb)	2012/07/20	<0.00060		mg/L	
			Total Arsenic (As)	2012/07/20	<0.00020		mg/L	
			Total Beryllium (Be)	2012/07/20	<0.0010		mg/L	
			Total Chromium (Cr)	2012/07/20	<0.0010		mg/L	
			Total Cobalt (Co)	2012/07/20	<0.00030		mg/L	
			Total Copper (Cu)	2012/07/20	<0.00020		mg/L	
			Total Lead (Pb)	2012/07/20	<0.00020		mg/L	
			Total Molybdenum (Mo)	2012/07/20	<0.00020		mg/L	
			Total Nickel (Ni)	2012/07/20	<0.00050		mg/L	
			Total Selenium (Se)	2012/07/20	<0.00020		mg/L	
			Total Silver (Ag)	2012/07/20	<0.00010		mg/L	
			Total Thallium (Tl)	2012/07/20	<0.00020		mg/L	
			Total Tin (Sn)	2012/07/20	<0.0010		mg/L	
			Total Titanium (Ti)	2012/07/20	<0.0010		mg/L	
			Total Uranium (U)	2012/07/20	<0.00010		mg/L	
			Total Vanadium (V)	2012/07/20	<0.0010		mg/L	
			Total Zinc (Zn)	2012/07/20	<0.0030		mg/L	
		RPD	Total Aluminum (Al)	2012/07/21	NC		%	20
			Total Antimony (Sb)	2012/07/21	NC		%	20
			Total Arsenic (As)	2012/07/21	NC		%	20
			Total Beryllium (Be)	2012/07/21	NC		%	20
			Total Chromium (Cr)	2012/07/21	NC		%	20
			Total Cobalt (Co)	2012/07/21	NC		%	20
			Total Copper (Cu)	2012/07/21	NC		%	20
			Total Lead (Pb)	2012/07/21	NC		%	20
			Total Molybdenum (Mo)	2012/07/21	NC		%	20
			Total Nickel (Ni)	2012/07/21	NC		%	20
			Total Selenium (Se)	2012/07/21	NC		%	20
			Total Silver (Ag)	2012/07/21	NC		%	20
			Total Thallium (Tl)	2012/07/21	NC		%	20

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
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Quality Assurance Report (Continued)

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QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6023590	TDB	RPD	Total Tin (Sn)	2012/07/21	NC		%	20
			Total Titanium (Ti)	2012/07/21	NC		%	20
			Total Uranium (U)	2012/07/21	NC		%	20
			Total Vanadium (V)	2012/07/21	NC		%	20
			Total Zinc (Zn)	2012/07/21	NC		%	20
6023591	TDB	Matrix Spike	Dissolved Aluminum (Al)	2012/07/20		82	%	80 - 120
			Dissolved Antimony (Sb)	2012/07/20		84	%	80 - 120
			Dissolved Arsenic (As)	2012/07/20		88	%	80 - 120
			Dissolved Beryllium (Be)	2012/07/20		87	%	80 - 120
			Dissolved Chromium (Cr)	2012/07/20		83	%	80 - 120
			Dissolved Cobalt (Co)	2012/07/20		90	%	80 - 120
			Dissolved Copper (Cu)	2012/07/20		88	%	80 - 120
			Dissolved Lead (Pb)	2012/07/20		80	%	80 - 120
			Dissolved Molybdenum (Mo)	2012/07/20		92	%	80 - 120
			Dissolved Nickel (Ni)	2012/07/20		80	%	80 - 120
			Dissolved Selenium (Se)	2012/07/20		95	%	80 - 120
			Dissolved Silver (Ag)	2012/07/20		88	%	80 - 120
			Dissolved Thallium (Tl)	2012/07/20		81	%	80 - 120
			Dissolved Tin (Sn)	2012/07/20		88	%	80 - 120
			Dissolved Titanium (Ti)	2012/07/20		81	%	80 - 120
			Dissolved Uranium (U)	2012/07/20		81	%	80 - 120
			Dissolved Vanadium (V)	2012/07/20		88	%	80 - 120
			Dissolved Zinc (Zn)	2012/07/20		89	%	80 - 120
		Spiked Blank	Dissolved Aluminum (Al)	2012/07/20		98	%	80 - 120
			Dissolved Antimony (Sb)	2012/07/20		101	%	80 - 120
			Dissolved Arsenic (As)	2012/07/20		99	%	80 - 120
			Dissolved Beryllium (Be)	2012/07/20		97	%	80 - 120
			Dissolved Chromium (Cr)	2012/07/20		97	%	80 - 120
			Dissolved Cobalt (Co)	2012/07/20		97	%	80 - 120
			Dissolved Copper (Cu)	2012/07/20		98	%	80 - 120
			Dissolved Lead (Pb)	2012/07/20		95	%	80 - 120
			Dissolved Molybdenum (Mo)	2012/07/20		98	%	80 - 120
			Dissolved Nickel (Ni)	2012/07/20		97	%	80 - 120
			Dissolved Selenium (Se)	2012/07/20		102	%	80 - 120
			Dissolved Silver (Ag)	2012/07/20		100	%	80 - 120
			Dissolved Thallium (Tl)	2012/07/20		95	%	80 - 120
			Dissolved Tin (Sn)	2012/07/20		104	%	80 - 120
			Dissolved Titanium (Ti)	2012/07/20		95	%	80 - 120
			Dissolved Uranium (U)	2012/07/20		93	%	80 - 120
			Dissolved Vanadium (V)	2012/07/20		99	%	80 - 120
			Dissolved Zinc (Zn)	2012/07/20		97	%	80 - 120
		Method Blank	Dissolved Aluminum (Al)	2012/07/20	<0.0010		mg/L	
			Dissolved Antimony (Sb)	2012/07/20	<0.00060		mg/L	
			Dissolved Arsenic (As)	2012/07/20	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2012/07/20	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2012/07/20	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2012/07/20	<0.00030		mg/L	
			Dissolved Copper (Cu)	2012/07/20	<0.00020		mg/L	
			Dissolved Lead (Pb)	2012/07/20	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2012/07/20	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2012/07/20	<0.00050		mg/L	
			Dissolved Selenium (Se)	2012/07/20	<0.00020		mg/L	
			Dissolved Silver (Ag)	2012/07/20	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2012/07/20	<0.00020		mg/L	
			Dissolved Tin (Sn)	2012/07/20	<0.0010		mg/L	

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Quality Assurance Report (Continued)

Maxxam Job Number: CB263334

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6023591	TDB	Method Blank	Dissolved Titanium (Ti)	2012/07/20	<0.0010		mg/L	
			Dissolved Uranium (U)	2012/07/20	<0.00010		mg/L	
			Dissolved Vanadium (V)	2012/07/20	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2012/07/20	<0.0030		mg/L	
		RPD	Dissolved Aluminum (Al)	2012/07/20	NC		%	20
			Dissolved Antimony (Sb)	2012/07/20	NC		%	20
			Dissolved Arsenic (As)	2012/07/20	3.1		%	20
			Dissolved Beryllium (Be)	2012/07/20	NC		%	20
			Dissolved Chromium (Cr)	2012/07/20	NC		%	20
			Dissolved Cobalt (Co)	2012/07/20	NC		%	20
			Dissolved Copper (Cu)	2012/07/20	3.3		%	20
			Dissolved Lead (Pb)	2012/07/20	NC		%	20
			Dissolved Molybdenum (Mo)	2012/07/20	1.3		%	20
			Dissolved Nickel (Ni)	2012/07/20	3.6		%	20
			Dissolved Selenium (Se)	2012/07/20	NC		%	20
			Dissolved Silver (Ag)	2012/07/20	NC		%	20
			Dissolved Thallium (Tl)	2012/07/20	NC		%	20
			Dissolved Tin (Sn)	2012/07/20	NC		%	20
			Dissolved Titanium (Ti)	2012/07/20	NC		%	20
			Dissolved Uranium (U)	2012/07/20	1.0		%	20
			Dissolved Vanadium (V)	2012/07/20	NC		%	20
			Dissolved Zinc (Zn)	2012/07/20	NC		%	20
6023663	PL	Matrix Spike	Total Barium (Ba)	2012/07/20		106	%	80 - 120
			Total Boron (B)	2012/07/20		113	%	80 - 120
			Total Calcium (Ca)	2012/07/20		109	%	80 - 120
			Total Iron (Fe)	2012/07/20		115	%	80 - 120
			Total Lithium (Li)	2012/07/20		109	%	80 - 120
			Total Magnesium (Mg)	2012/07/20		104	%	80 - 120
			Total Manganese (Mn)	2012/07/20		105	%	80 - 120
			Total Phosphorus (P)	2012/07/20		107	%	80 - 120
			Total Potassium (K)	2012/07/20		107	%	80 - 120
			Total Silicon (Si)	2012/07/20		117	%	80 - 120
			Total Sodium (Na)	2012/07/20		107	%	80 - 120
			Total Strontium (Sr)	2012/07/20		108	%	80 - 120
		Spiked Blank	Total Barium (Ba)	2012/07/20		107	%	80 - 120
			Total Boron (B)	2012/07/20		114	%	80 - 120
			Total Calcium (Ca)	2012/07/20		110	%	80 - 120
			Total Iron (Fe)	2012/07/20		116	%	80 - 120
			Total Lithium (Li)	2012/07/20		109	%	80 - 120
			Total Magnesium (Mg)	2012/07/20		105	%	80 - 120
			Total Manganese (Mn)	2012/07/20		105	%	80 - 120
			Total Phosphorus (P)	2012/07/20		108	%	80 - 120
			Total Potassium (K)	2012/07/20		108	%	80 - 120
			Total Silicon (Si)	2012/07/20		117	%	80 - 120
			Total Sodium (Na)	2012/07/20		108	%	80 - 120
			Total Strontium (Sr)	2012/07/20		109	%	80 - 120
		Method Blank	Total Barium (Ba)	2012/07/20	<0.010		mg/L	
			Total Boron (B)	2012/07/20	<0.020		mg/L	
			Total Calcium (Ca)	2012/07/20	<0.30		mg/L	
			Total Iron (Fe)	2012/07/20	<0.060		mg/L	
			Total Lithium (Li)	2012/07/20	<0.020		mg/L	
			Total Magnesium (Mg)	2012/07/20	<0.20		mg/L	
			Total Manganese (Mn)	2012/07/20	<0.0040		mg/L	
			Total Phosphorus (P)	2012/07/20	<0.10		mg/L	
			Total Potassium (K)	2012/07/20	<0.30		mg/L	

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Attention: SUB CONTRACTOR
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QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6023663	PL	Method Blank	Total Silicon (Si)	2012/07/20	<0.10		mg/L	
			Total Sodium (Na)	2012/07/20	<0.50		mg/L	
			Total Strontium (Sr)	2012/07/20	<0.020		mg/L	
			Total Sulphur (S)	2012/07/20	<0.20		mg/L	
		RPD	Total Barium (Ba)	2012/07/20	NC		%	20
			Total Boron (B)	2012/07/20	NC		%	20
			Total Calcium (Ca)	2012/07/20	NC		%	20
			Total Iron (Fe)	2012/07/20	NC		%	20
			Total Lithium (Li)	2012/07/20	NC		%	20
			Total Magnesium (Mg)	2012/07/20	NC		%	20
			Total Manganese (Mn)	2012/07/20	NC		%	20
			Total Phosphorus (P)	2012/07/20	NC		%	20
			Total Potassium (K)	2012/07/20	NC		%	20
			Total Silicon (Si)	2012/07/20	NC		%	20
			Total Sodium (Na)	2012/07/20	NC		%	20
			Total Strontium (Sr)	2012/07/20	NC		%	20
			Total Sulphur (S)	2012/07/20	NC		%	20
6025409	MAP	Matrix Spike	Total Barium (Ba)	2012/07/23		91	%	80 - 120
			Total Boron (B)	2012/07/23		97	%	80 - 120
			Total Calcium (Ca)	2012/07/23		NC	%	80 - 120
			Total Iron (Fe)	2012/07/23		95	%	80 - 120
			Total Lithium (Li)	2012/07/23		94	%	80 - 120
			Total Magnesium (Mg)	2012/07/23		NC	%	80 - 120
			Total Manganese (Mn)	2012/07/23		90	%	80 - 120
			Total Phosphorus (P)	2012/07/23		98	%	80 - 120
			Total Potassium (K)	2012/07/23		96	%	80 - 120
			Total Silicon (Si)	2012/07/23		NC	%	80 - 120
			Total Sodium (Na)	2012/07/23		NC	%	80 - 120
			Total Strontium (Sr)	2012/07/23		93	%	80 - 120
		Spiked Blank	Total Barium (Ba)	2012/07/23		93	%	80 - 120
			Total Boron (B)	2012/07/23		99	%	80 - 120
			Total Calcium (Ca)	2012/07/23		100	%	80 - 120
			Total Iron (Fe)	2012/07/23		99	%	80 - 120
			Total Lithium (Li)	2012/07/23		94	%	80 - 120
			Total Magnesium (Mg)	2012/07/23		95	%	80 - 120
			Total Manganese (Mn)	2012/07/23		93	%	80 - 120
			Total Phosphorus (P)	2012/07/23		98	%	80 - 120
			Total Potassium (K)	2012/07/23		96	%	80 - 120
			Total Silicon (Si)	2012/07/23		107	%	80 - 120
			Total Sodium (Na)	2012/07/23		95	%	80 - 120
			Total Strontium (Sr)	2012/07/23		95	%	80 - 120
		Method Blank	Total Barium (Ba)	2012/07/23	<0.010		mg/L	
			Total Boron (B)	2012/07/23	<0.020		mg/L	
			Total Calcium (Ca)	2012/07/23	<0.30		mg/L	
			Total Iron (Fe)	2012/07/23	<0.060		mg/L	
			Total Lithium (Li)	2012/07/23	<0.020		mg/L	
			Total Magnesium (Mg)	2012/07/23	<0.20		mg/L	
			Total Manganese (Mn)	2012/07/23	<0.0040		mg/L	
			Total Phosphorus (P)	2012/07/23	<0.10		mg/L	
			Total Potassium (K)	2012/07/23	<0.30		mg/L	
			Total Silicon (Si)	2012/07/23	<0.10		mg/L	
			Total Sodium (Na)	2012/07/23	<0.50		mg/L	
			Total Strontium (Sr)	2012/07/23	<0.020		mg/L	
			Total Sulphur (S)	2012/07/23	<0.20		mg/L	
		RPD	Total Barium (Ba)	2012/07/23	NC		%	20

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
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Quality Assurance Report (Continued)

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QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6025409	MAP	RPD	Total Boron (B)	2012/07/23	NC		%	20
			Total Calcium (Ca)	2012/07/23	0.7		%	20
			Total Iron (Fe)	2012/07/23	NC		%	20
			Total Lithium (Li)	2012/07/23	NC		%	20
			Total Magnesium (Mg)	2012/07/23	0.8		%	20
			Total Manganese (Mn)	2012/07/23	NC		%	20
			Total Phosphorus (P)	2012/07/23	NC		%	20
			Total Potassium (K)	2012/07/23	1.2		%	20
			Total Silicon (Si)	2012/07/23	0.5		%	20
			Total Sodium (Na)	2012/07/23	1.5		%	20
			Total Strontium (Sr)	2012/07/23	0.9		%	20
			Total Sulphur (S)	2012/07/23	0.3		%	20
6025747	TDB	Matrix Spike	Total Aluminum (Al)	2012/07/23		NC	%	80 - 120
			Total Antimony (Sb)	2012/07/23		94	%	80 - 120
			Total Arsenic (As)	2012/07/23		91	%	80 - 120
			Total Beryllium (Be)	2012/07/23		104	%	80 - 120
			Total Chromium (Cr)	2012/07/23		88	%	80 - 120
			Total Cobalt (Co)	2012/07/23		88	%	80 - 120
			Total Copper (Cu)	2012/07/23		NC	%	80 - 120
			Total Lead (Pb)	2012/07/23		90	%	80 - 120
			Total Molybdenum (Mo)	2012/07/23		100	%	80 - 120
			Total Nickel (Ni)	2012/07/23		87	%	80 - 120
			Total Selenium (Se)	2012/07/23		88	%	80 - 120
			Total Silver (Ag)	2012/07/23		95	%	80 - 120
			Total Thallium (Tl)	2012/07/23		84	%	80 - 120
			Total Tin (Sn)	2012/07/23		99	%	80 - 120
			Total Titanium (Ti)	2012/07/23		90	%	80 - 120
			Total Uranium (U)	2012/07/23		86	%	80 - 120
			Total Vanadium (V)	2012/07/23		92	%	80 - 120
			Total Zinc (Zn)	2012/07/23		NC	%	80 - 120
		Spiked Blank	Total Aluminum (Al)	2012/07/23		109	%	80 - 120
			Total Antimony (Sb)	2012/07/23		110	%	80 - 120
			Total Arsenic (As)	2012/07/23		102	%	80 - 120
			Total Beryllium (Be)	2012/07/23		100	%	80 - 120
			Total Chromium (Cr)	2012/07/23		98	%	80 - 120
			Total Cobalt (Co)	2012/07/23		101	%	80 - 120
			Total Copper (Cu)	2012/07/23		101	%	80 - 120
			Total Lead (Pb)	2012/07/23		102	%	80 - 120
			Total Molybdenum (Mo)	2012/07/23		104	%	80 - 120
			Total Nickel (Ni)	2012/07/23		101	%	80 - 120
			Total Selenium (Se)	2012/07/23		95	%	80 - 120
			Total Silver (Ag)	2012/07/23		105	%	80 - 120
			Total Thallium (Tl)	2012/07/23		93	%	80 - 120
			Total Tin (Sn)	2012/07/23		107	%	80 - 120
			Total Titanium (Ti)	2012/07/23		91	%	80 - 120
			Total Uranium (U)	2012/07/23		96	%	80 - 120
			Total Vanadium (V)	2012/07/23		101	%	80 - 120
			Total Zinc (Zn)	2012/07/23		112	%	80 - 120
		Method Blank	Total Aluminum (Al)	2012/07/23	0.0012, RDL=0.0010		mg/L	
			Total Antimony (Sb)	2012/07/23	<0.00060		mg/L	
			Total Arsenic (As)	2012/07/23	<0.00020		mg/L	
			Total Beryllium (Be)	2012/07/23	<0.0010		mg/L	
			Total Chromium (Cr)	2012/07/23	<0.0010		mg/L	
			Total Cobalt (Co)	2012/07/23	<0.00030		mg/L	
			Total Copper (Cu)	2012/07/23	<0.00020		mg/L	

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB2A7733
P.O. #:
Site Location: TC111405

Quality Assurance Report (Continued)

Maxxam Job Number: CB263334

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6025747	TDB	Method Blank	Total Lead (Pb)	2012/07/23	<0.00020		mg/L	
			Total Molybdenum (Mo)	2012/07/23	<0.00020		mg/L	
			Total Nickel (Ni)	2012/07/23	<0.00050		mg/L	
			Total Selenium (Se)	2012/07/23	<0.00020		mg/L	
			Total Silver (Ag)	2012/07/23	<0.00010		mg/L	
			Total Thallium (Tl)	2012/07/23	<0.00020		mg/L	
			Total Tin (Sn)	2012/07/23	<0.0010		mg/L	
			Total Titanium (Ti)	2012/07/23	<0.0010		mg/L	
			Total Uranium (U)	2012/07/23	<0.00010		mg/L	
			Total Vanadium (V)	2012/07/23	<0.0010		mg/L	
			Total Zinc (Zn)	2012/07/23	<0.0030		mg/L	
		RPD	Total Aluminum (Al)	2012/07/23	2.0		%	20
			Total Antimony (Sb)	2012/07/23	NC		%	20
			Total Arsenic (As)	2012/07/23	NC		%	20
			Total Beryllium (Be)	2012/07/23	NC		%	20
			Total Chromium (Cr)	2012/07/23	NC		%	20
			Total Cobalt (Co)	2012/07/23	NC		%	20
			Total Copper (Cu)	2012/07/23	1.1		%	20
			Total Lead (Pb)	2012/07/23	NC		%	20
			Total Molybdenum (Mo)	2012/07/23	NC		%	20
			Total Nickel (Ni)	2012/07/23	NC		%	20
			Total Selenium (Se)	2012/07/23	1.3		%	20
			Total Silver (Ag)	2012/07/23	NC		%	20
			Total Thallium (Tl)	2012/07/23	NC		%	20
			Total Tin (Sn)	2012/07/23	NC		%	20
			Total Titanium (Ti)	2012/07/23	NC		%	20
			Total Uranium (U)	2012/07/23	2.3		%	20
			Total Vanadium (V)	2012/07/23	NC		%	20
			Total Zinc (Zn)	2012/07/23	1.8		%	20
6025749	PW3	Matrix Spike	Dissolved Aluminum (Al)	2012/07/23		87	%	80 - 120
			Dissolved Antimony (Sb)	2012/07/23		84	%	80 - 120
			Dissolved Arsenic (As)	2012/07/23		95	%	80 - 120
			Dissolved Beryllium (Be)	2012/07/23		99	%	80 - 120
			Dissolved Chromium (Cr)	2012/07/23		91	%	80 - 120
			Dissolved Cobalt (Co)	2012/07/23		91	%	80 - 120
			Dissolved Copper (Cu)	2012/07/23		92	%	80 - 120
			Dissolved Lead (Pb)	2012/07/23		90	%	80 - 120
			Dissolved Molybdenum (Mo)	2012/07/23		100	%	80 - 120
			Dissolved Nickel (Ni)	2012/07/23		96	%	80 - 120
			Dissolved Selenium (Se)	2012/07/23		88	%	80 - 120
			Dissolved Silver (Ag)	2012/07/23		93	%	80 - 120
			Dissolved Thallium (Tl)	2012/07/23		86	%	80 - 120
			Dissolved Tin (Sn)	2012/07/23		92	%	80 - 120
			Dissolved Titanium (Ti)	2012/07/23		93	%	80 - 120
			Dissolved Uranium (U)	2012/07/23		88	%	80 - 120
			Dissolved Vanadium (V)	2012/07/23		97	%	80 - 120
			Dissolved Zinc (Zn)	2012/07/23		84	%	80 - 120
		Spiked Blank	Dissolved Aluminum (Al)	2012/07/23		92	%	80 - 120
			Dissolved Antimony (Sb)	2012/07/23		84	%	80 - 120
			Dissolved Arsenic (As)	2012/07/23		95	%	80 - 120
			Dissolved Beryllium (Be)	2012/07/23		92	%	80 - 120
			Dissolved Chromium (Cr)	2012/07/23		91	%	80 - 120
			Dissolved Cobalt (Co)	2012/07/23		91	%	80 - 120
			Dissolved Copper (Cu)	2012/07/23		94	%	80 - 120
			Dissolved Lead (Pb)	2012/07/23		94	%	80 - 120

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB2A7733
P.O. #:
Site Location: TC111405

Quality Assurance Report (Continued)

Maxxam Job Number: CB263334

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6025749	PW3	Spiked Blank	Dissolved Molybdenum (Mo)	2012/07/23		92	%	80 - 120
			Dissolved Nickel (Ni)	2012/07/23		92	%	80 - 120
			Dissolved Selenium (Se)	2012/07/23		94	%	80 - 120
			Dissolved Silver (Ag)	2012/07/23		96	%	80 - 120
			Dissolved Thallium (Tl)	2012/07/23		89	%	80 - 120
			Dissolved Tin (Sn)	2012/07/23		96	%	80 - 120
			Dissolved Titanium (Ti)	2012/07/23		90	%	80 - 120
			Dissolved Uranium (U)	2012/07/23		87	%	80 - 120
			Dissolved Vanadium (V)	2012/07/23		94	%	80 - 120
			Dissolved Zinc (Zn)	2012/07/23		93	%	80 - 120
		Method Blank	Dissolved Aluminum (Al)	2012/07/23	<0.0010		mg/L	
			Dissolved Antimony (Sb)	2012/07/23	<0.00060		mg/L	
			Dissolved Arsenic (As)	2012/07/23	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2012/07/23	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2012/07/23	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2012/07/23	<0.00030		mg/L	
			Dissolved Copper (Cu)	2012/07/23	<0.00020		mg/L	
			Dissolved Lead (Pb)	2012/07/23	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2012/07/23	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2012/07/23	<0.00050		mg/L	
			Dissolved Selenium (Se)	2012/07/23	<0.00020		mg/L	
			Dissolved Silver (Ag)	2012/07/23	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2012/07/23	<0.00020		mg/L	
			Dissolved Tin (Sn)	2012/07/23	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2012/07/23	<0.0010		mg/L	
			Dissolved Uranium (U)	2012/07/23	<0.00010		mg/L	
			Dissolved Vanadium (V)	2012/07/23	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2012/07/23	<0.0030		mg/L	
		RPD	Dissolved Aluminum (Al)	2012/07/23	1.5		%	20
			Dissolved Antimony (Sb)	2012/07/23	NC		%	20
			Dissolved Arsenic (As)	2012/07/23	0		%	20
			Dissolved Beryllium (Be)	2012/07/23	NC		%	20
			Dissolved Chromium (Cr)	2012/07/23	NC		%	20
			Dissolved Cobalt (Co)	2012/07/23	NC		%	20
			Dissolved Copper (Cu)	2012/07/23	9.2		%	20
			Dissolved Lead (Pb)	2012/07/23	NC		%	20
			Dissolved Molybdenum (Mo)	2012/07/23	2.5		%	20
			Dissolved Nickel (Ni)	2012/07/23	NC		%	20
			Dissolved Selenium (Se)	2012/07/23	NC		%	20
			Dissolved Silver (Ag)	2012/07/23	NC		%	20
			Dissolved Thallium (Tl)	2012/07/23	NC		%	20
			Dissolved Tin (Sn)	2012/07/23	NC		%	20
			Dissolved Titanium (Ti)	2012/07/23	NC		%	20
			Dissolved Uranium (U)	2012/07/23	3.7		%	20
			Dissolved Vanadium (V)	2012/07/23	NC		%	20
			Dissolved Zinc (Zn)	2012/07/23	NC		%	20
6032358	PL	Matrix Spike	Total Aluminum (Al)	2012/07/24		103	%	80 - 120
			Total Barium (Ba)	2012/07/24		NC	%	80 - 120
			Total Boron (B)	2012/07/24		NC	%	80 - 120
			Total Calcium (Ca)	2012/07/24		NC	%	80 - 120
			Total Chromium (Cr)	2012/07/24		89	%	80 - 120
			Total Iron (Fe)	2012/07/24		NC	%	80 - 120
			Total Lithium (Li)	2012/07/24		NC	%	80 - 120
			Total Magnesium (Mg)	2012/07/24		NC	%	80 - 120
			Total Manganese (Mn)	2012/07/24		90	%	80 - 120

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB2A7733
P.O. #:
Site Location: TC111405

Quality Assurance Report (Continued)

Maxxam Job Number: CB263334

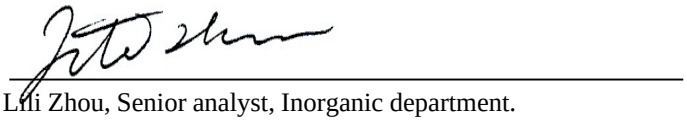
QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6032358	PL	Matrix Spike	Total Phosphorus (P)	2012/07/24		98	%	80 - 120
			Total Potassium (K)	2012/07/24		NC	%	80 - 120
			Total Silicon (Si)	2012/07/24		100	%	80 - 120
			Total Sodium (Na)	2012/07/24		NC	%	80 - 120
			Total Strontium (Sr)	2012/07/24		NC	%	80 - 120
		Spiked Blank	Total Aluminum (Al)	2012/07/24		107	%	80 - 120
			Total Barium (Ba)	2012/07/24		89	%	80 - 120
			Total Boron (B)	2012/07/24		99	%	80 - 120
			Total Calcium (Ca)	2012/07/24		104	%	80 - 120
			Total Chromium (Cr)	2012/07/24		93	%	80 - 120
			Total Iron (Fe)	2012/07/24		101	%	80 - 120
			Total Lithium (Li)	2012/07/24		91	%	80 - 120
			Total Magnesium (Mg)	2012/07/24		94	%	80 - 120
			Total Manganese (Mn)	2012/07/24		97	%	80 - 120
			Total Phosphorus (P)	2012/07/24		97	%	80 - 120
			Total Potassium (K)	2012/07/24		92	%	80 - 120
			Total Silicon (Si)	2012/07/24		107	%	80 - 120
			Total Sodium (Na)	2012/07/24		93	%	80 - 120
			Total Strontium (Sr)	2012/07/24		93	%	80 - 120
		Method Blank	Total Aluminum (Al)	2012/07/24	<0.040		mg/L	
			Total Barium (Ba)	2012/07/24	<0.010		mg/L	
			Total Boron (B)	2012/07/24	<0.020		mg/L	
			Total Calcium (Ca)	2012/07/24	<0.30		mg/L	
			Total Chromium (Cr)	2012/07/24	<0.010		mg/L	
			Total Iron (Fe)	2012/07/24	<0.060		mg/L	
			Total Lithium (Li)	2012/07/24	<0.020		mg/L	
			Total Magnesium (Mg)	2012/07/24	<0.20		mg/L	
			Total Manganese (Mn)	2012/07/24	<0.0040		mg/L	
			Total Phosphorus (P)	2012/07/24	<0.10		mg/L	
			Total Potassium (K)	2012/07/24	<0.30		mg/L	
			Total Silicon (Si)	2012/07/24	<0.10		mg/L	
			Total Sodium (Na)	2012/07/24	<0.50		mg/L	
			Total Strontium (Sr)	2012/07/24	<0.020		mg/L	
			Total Sulphur (S)	2012/07/24	<0.20		mg/L	
		RPD	Total Iron (Fe)	2012/07/24	NC		%	20
			Total Manganese (Mn)	2012/07/24	5.5		%	20
			Total Sodium (Na)	2012/07/24	8.7		%	20

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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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.
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 #: B263334

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



Lili Zhou, Senior analyst, Inorganic department.

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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.

Your Project #: TC111504
Site Location: RAINY RIVER RES. PROJ.
Your C.O.C. #: 36300602, 363006-02-01

Attention: Jason Dietrich
AMEC Environment & Infrastructure
160 Traders Blvd
Mississauga, ON
CANADA L4Z3K7

Report Date: 2012/07/26

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B2A7733
Received: 2012/07/18, 10:01

Sample Matrix: Water
Samples Received: 11

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Conductivity	11	N/A	2012/07/19	CAM SOP-00448	SM 2510
Total Cyanide	11	2012/07/18	2012/07/19	CAM SOP-00457	Ontario MOE CN-E3015
Dissolved Organic Carbon (DOC)	11	N/A	2012/07/19	CAM SOP-00446	SM 5310 B
Fluoride	11	2012/07/18	2012/07/19	CAM SOP-00448	APHA 4500FC
Mercury (low level)	11	2012/07/20	2012/07/20	CAM SOP-00453	EPA 7470
Ammonia-N (low level)	11	N/A	2012/07/24	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (1)	11	N/A	2012/07/19	CAM SOP-00440	SM 4500 NO3I/NO2B
pH	11	N/A	2012/07/19	CAM SOP-00448	SM 4500H+ B
Low Level Total Suspended Solids	11	N/A	2012/07/19	CAM SOP-00428	SM 2540D

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

../2

Maxxam Job #: B2A7733
Report Date: 2012/07/26

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER RES. PROJ.

Encryption Key

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

Gina Baybayan,
Email: GBAYBAYAN@maxxam.ca
Phone# (905) 817-5766

==========

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 #: B2A7733
Report Date: 2012/07/26

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER RES. PROJ.

RESULTS OF ANALYSES OF WATER

Maxxam ID			OE4721	OE4721	OE4722		OE4723	OE4724	OE4725		
Sampling Date			2012/07/14 17:00	2012/07/14 17:00	2012/07/13 14:20		2012/07/13 17:15	2012/07/14 13:45	2012/07/13 17:00		
	Units	**Criteria A**	**PIN-3A**	**PIN-3A Lab-Dup**	**CLA-5A**	**QC Batch**	**PIN-10A**	**TAIT-1**	**UT5-A**	**RDL**	**QC Batch**
Inorganics											
Total Ammonia-N	mg/L		0.09		0.11	2913393	0.09	0.09	0.08	0.01	2913393
Conductivity	umho/cm		430		150	2912731	400	290	320	1.0	2912711
Fluoride (F-)	mg/L		0.17		<0.10	2912732	0.11	<0.10	<0.10	0.10	2912713
Dissolved Organic Carbon	mg/L		27		42	2912914	30	39	23	0.20	2912914
pH	pH	**6.5:8.5**	7.82		7.87	2912733	7.86	7.55	7.52		2912714
Total Suspended Solids	mg/L		3	3	2	2912798	4	4	3	1	2912798
Total Cyanide (CN)	mg/L		<0.0050		<0.0050	2912720	<0.0050	<0.0050	<0.0050	0.0050	2912720
Nitrite (N)	mg/L		<0.010		<0.010	2912631	<0.010	<0.010	<0.010	0.010	2912631
Nitrate (N)	mg/L		<0.10		<0.10	2912631	<0.10	<0.10	<0.10	0.10	2912631
Nitrate + Nitrite	mg/L		<0.10		<0.10	2912631	<0.10	<0.10	<0.10	0.10	2912631

Maxxam ID			OE4726		OE4727		OE4728		
Sampling Date			2012/07/14 17:30		2012/07/12 12:40		2012/07/11 13:35		
	Units	**Criteria A**	**UT2-A**	**QC Batch**	**PIN-8**	**QC Batch**	**WES-TRIB1A**	**RDL**	**QC Batch**
Inorganics									
Total Ammonia-N	mg/L		0.11	2913393	0.08	2913393	0.08	0.01	2913393
Conductivity	umho/cm		210	2912731	440	2912711	400	1.0	2912731
Fluoride (F-)	mg/L		<0.10	2912732	0.11	2912713	0.13	0.10	2912732
Dissolved Organic Carbon	mg/L		37	2912914	24	2912914	11	0.20	2912914
pH	pH	**6.5:8.5**	8.26	2912733	7.84	2912714	7.97		2912733
Total Suspended Solids	mg/L		8	2912798	<1	2912798	8	1	2912798
Total Cyanide (CN)	mg/L		<0.0050	2912720	<0.0050	2912720	<0.0050	0.0050	2912720
Nitrite (N)	mg/L		<0.010	2912631	<0.010	2912631	<0.010	0.010	2912631
Nitrate (N)	mg/L		<0.10	2912631	<0.10	2912631	<0.10	0.10	2912631
Nitrate + Nitrite	mg/L		<0.10	2912631	<0.10	2912631	<0.10	0.10	2912631

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria A: ONTARIO PROVINCIAL WATER QUALITY OBJECTIVES
Ref. to MOEE Water Management document dated Feb.1999

Maxxam Job #: B2A7733
Report Date: 2012/07/26

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER RES. PROJ.

RESULTS OF ANALYSES OF WATER

Maxxam ID			OE4729		OE4730	OE4731	OE4731		
Sampling Date			2012/07/11 12:35		2012/07/11 15:10	2012/07/11 17:45	2012/07/11 17:45		
	Units	**Criteria A**	**JON-1**	**QC Batch**	**PIN-9**	**PIN-2A**	**PIN-2A Lab-Dup**	**RDL**	**QC Batch**
Inorganics									
Total Ammonia-N	mg/L		0.10	2913393	0.10	0.08		0.01	2913393
Conductivity	umho/cm		430	2912731	400	400		1.0	2912711
Fluoride (F-)	mg/L		<0.10	2912732	0.13	0.11		0.10	2912713
Dissolved Organic Carbon	mg/L		28	2912914	29	27		0.20	2912914
pH	pH	**6.5:8.5**	7.47	2912733	8.34	8.14			2912714
Total Suspended Solids	mg/L		16	2912798	10	4		1	2912798
Total Cyanide (CN)	mg/L		<0.0050	2912720	<0.0050	<0.0050		0.0050	2912720
Nitrite (N)	mg/L		<0.010	2912631	<0.010	<0.010	<0.010	0.010	2912631
Nitrate (N)	mg/L		<0.10	2912631	<0.10	<0.10	<0.10	0.10	2912631
Nitrate + Nitrite	mg/L		<0.10	2912631	<0.10	<0.10	<0.10	0.10	2912631

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID			OE4721	OE4722	OE4723	OE4724		OE4725		OE4726		
Sampling Date			2012/07/14 17:00	2012/07/13 14:20	2012/07/13 17:15	2012/07/14 13:45		2012/07/13 17:00		2012/07/14 17:30		
	Units	**Criteria A**	**PIN-3A**	**CLA-5A**	**PIN-10A**	**TAIT-1**	**QC Batch**	**UT5-A**	**QC Batch**	**UT2-A**	**RDL**	**QC Batch**
Metals												
Mercury (Hg)	ug/L	**0.2**	<0.01	<0.01	<0.01	<0.01	2914063	<0.01	2914062	<0.01	0.01	2914063

Maxxam ID			OE4727	OE4728	OE4729	OE4730	OE4731		
Sampling Date			2012/07/12 12:40	2012/07/11 13:35	2012/07/11 12:35	2012/07/11 15:10	2012/07/11 17:45		
	Units	**Criteria A**	**PIN-8**	**WES-TRIB1A**	**JON-1**	**PIN-9**	**PIN-2A**	**RDL**	**QC Batch**
Metals									
Mercury (Hg)	ug/L	**0.2**	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	2914063

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria A: ONTARIO PROVINCIAL WATER QUALITY OBJECTIVES
Ref. to MOEE Water Management document dated Feb.1999

Maxxam Job #: B2A7733
Report Date: 2012/07/26

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER RES. PROJ.

Test Summary

Maxxam ID OE4721 **Collected** 2012/07/14
Sample ID PIN-3A **Shipped**
Matrix Water **Received** 2012/07/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2912731	N/A	2012/07/19	Surinder Rai
Total Cyanide	TECH/CN	2912720	2012/07/18	2012/07/19	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2912914	N/A	2012/07/19	Charles Opoku-Ware
Fluoride	F	2912732	2012/07/18	2012/07/19	Surinder Rai
Mercury (low level)	CVAA	2914063	2012/07/20	2012/07/20	Lawrence Cheung
Ammonia-N (low level)	LACH/NH4	2913393	N/A	2012/07/24	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2912631	N/A	2012/07/19	Chris Li
pH	PH	2912733	N/A	2012/07/19	Surinder Rai
Low Level Total Suspended Solids	SLDS	2912798	N/A	2012/07/19	Subhashchandra Patel

Maxxam ID OE4721 Dup **Collected** 2012/07/14
Sample ID PIN-3A **Shipped**
Matrix Water **Received** 2012/07/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Low Level Total Suspended Solids	SLDS	2912798	N/A	2012/07/19	Subhashchandra Patel

Maxxam ID OE4722 **Collected** 2012/07/13
Sample ID CLA-5A **Shipped**
Matrix Water **Received** 2012/07/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2912731	N/A	2012/07/19	Surinder Rai
Total Cyanide	TECH/CN	2912720	2012/07/18	2012/07/19	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2912914	N/A	2012/07/19	Charles Opoku-Ware
Fluoride	F	2912732	2012/07/18	2012/07/19	Surinder Rai
Mercury (low level)	CVAA	2914063	2012/07/20	2012/07/20	Lawrence Cheung
Ammonia-N (low level)	LACH/NH4	2913393	N/A	2012/07/24	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2912631	N/A	2012/07/19	Chris Li
pH	PH	2912733	N/A	2012/07/19	Surinder Rai
Low Level Total Suspended Solids	SLDS	2912798	N/A	2012/07/19	Subhashchandra Patel

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Maxxam Job #: B2A7733
Report Date: 2012/07/26

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER RES. PROJ.

Test Summary

Maxxam ID OE4723 **Collected** 2012/07/13
Sample ID PIN-10A **Shipped**
Matrix Water **Received** 2012/07/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2912711	N/A	2012/07/19	Surinder Rai
Total Cyanide	TECH/CN	2912720	2012/07/18	2012/07/19	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2912914	N/A	2012/07/19	Charles Opoku-Ware
Fluoride	F	2912713	2012/07/18	2012/07/19	Surinder Rai
Mercury (low level)	CVAA	2914063	2012/07/20	2012/07/20	Lawrence Cheung
Ammonia-N (low level)	LACH/NH4	2913393	N/A	2012/07/24	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2912631	N/A	2012/07/19	Chris Li
pH	PH	2912714	N/A	2012/07/19	Surinder Rai
Low Level Total Suspended Solids	SLDS	2912798	N/A	2012/07/19	Subhashchandra Patel

Maxxam ID OE4724 **Collected** 2012/07/14
Sample ID TAIT-1 **Shipped**
Matrix Water **Received** 2012/07/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2912711	N/A	2012/07/19	Surinder Rai
Total Cyanide	TECH/CN	2912720	2012/07/18	2012/07/19	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2912914	N/A	2012/07/19	Charles Opoku-Ware
Fluoride	F	2912713	2012/07/18	2012/07/19	Surinder Rai
Mercury (low level)	CVAA	2914063	2012/07/20	2012/07/20	Lawrence Cheung
Ammonia-N (low level)	LACH/NH4	2913393	N/A	2012/07/24	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2912631	N/A	2012/07/19	Chris Li
pH	PH	2912714	N/A	2012/07/19	Surinder Rai
Low Level Total Suspended Solids	SLDS	2912798	N/A	2012/07/19	Subhashchandra Patel

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Test Summary

Maxxam ID OE4725 **Collected** 2012/07/13
Sample ID UT5-A **Shipped**
Matrix Water **Received** 2012/07/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2912711	N/A	2012/07/19	Surinder Rai
Total Cyanide	TECH/CN	2912720	2012/07/18	2012/07/19	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2912914	N/A	2012/07/19	Charles Opoku-Ware
Fluoride	F	2912713	2012/07/18	2012/07/19	Surinder Rai
Mercury (low level)	CVAA	2914062	2012/07/20	2012/07/20	Lawrence Cheung
Ammonia-N (low level)	LACH/NH4	2913393	N/A	2012/07/24	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2912631	N/A	2012/07/19	Chris Li
pH	PH	2912714	N/A	2012/07/19	Surinder Rai
Low Level Total Suspended Solids	SLDS	2912798	N/A	2012/07/19	Subhashchandra Patel

Maxxam ID OE4726 **Collected** 2012/07/14
Sample ID UT2-A **Shipped**
Matrix Water **Received** 2012/07/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2912731	N/A	2012/07/19	Surinder Rai
Total Cyanide	TECH/CN	2912720	2012/07/18	2012/07/19	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2912914	N/A	2012/07/19	Charles Opoku-Ware
Fluoride	F	2912732	2012/07/18	2012/07/19	Surinder Rai
Mercury (low level)	CVAA	2914063	2012/07/20	2012/07/20	Lawrence Cheung
Ammonia-N (low level)	LACH/NH4	2913393	N/A	2012/07/24	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2912631	N/A	2012/07/19	Chris Li
pH	PH	2912733	N/A	2012/07/19	Surinder Rai
Low Level Total Suspended Solids	SLDS	2912798	N/A	2012/07/19	Subhashchandra Patel

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Client Project #: TC111504
Site Location: RAINY RIVER RES. PROJ.

Test Summary

Maxxam ID OE4727 **Collected** 2012/07/12
Sample ID PIN-8 **Shipped**
Matrix Water **Received** 2012/07/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2912711	N/A	2012/07/19	Surinder Rai
Total Cyanide	TECH/CN	2912720	2012/07/18	2012/07/19	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2912914	N/A	2012/07/19	Charles Opoku-Ware
Fluoride	F	2912713	2012/07/18	2012/07/19	Surinder Rai
Mercury (low level)	CVAA	2914063	2012/07/20	2012/07/20	Lawrence Cheung
Ammonia-N (low level)	LACH/NH4	2913393	N/A	2012/07/24	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2912631	N/A	2012/07/19	Chris Li
pH	PH	2912714	N/A	2012/07/19	Surinder Rai
Low Level Total Suspended Solids	SLDS	2912798	N/A	2012/07/19	Subhashchandra Patel

Maxxam ID OE4728 **Collected** 2012/07/11
Sample ID WES-TRIB1A **Shipped**
Matrix Water **Received** 2012/07/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2912731	N/A	2012/07/19	Surinder Rai
Total Cyanide	TECH/CN	2912720	2012/07/18	2012/07/19	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2912914	N/A	2012/07/19	Charles Opoku-Ware
Fluoride	F	2912732	2012/07/18	2012/07/19	Surinder Rai
Mercury (low level)	CVAA	2914063	2012/07/20	2012/07/20	Lawrence Cheung
Ammonia-N (low level)	LACH/NH4	2913393	N/A	2012/07/24	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2912631	N/A	2012/07/19	Chris Li
pH	PH	2912733	N/A	2012/07/19	Surinder Rai
Low Level Total Suspended Solids	SLDS	2912798	N/A	2012/07/19	Subhashchandra Patel

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Maxxam Job #: B2A7733
Report Date: 2012/07/26

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER RES. PROJ.

Test Summary

Maxxam ID OE4729 **Collected** 2012/07/11
Sample ID JON-1 **Shipped**
Matrix Water **Received** 2012/07/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2912731	N/A	2012/07/19	Surinder Rai
Total Cyanide	TECH/CN	2912720	2012/07/18	2012/07/19	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2912914	N/A	2012/07/19	Charles Opoku-Ware
Fluoride	F	2912732	2012/07/18	2012/07/19	Surinder Rai
Mercury (low level)	CVAA	2914063	2012/07/20	2012/07/20	Lawrence Cheung
Ammonia-N (low level)	LACH/NH4	2913393	N/A	2012/07/24	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2912631	N/A	2012/07/19	Chris Li
pH	PH	2912733	N/A	2012/07/19	Surinder Rai
Low Level Total Suspended Solids	SLDS	2912798	N/A	2012/07/19	Subhashchandra Patel

Maxxam ID OE4730 **Collected** 2012/07/11
Sample ID PIN-9 **Shipped**
Matrix Water **Received** 2012/07/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2912711	N/A	2012/07/19	Surinder Rai
Total Cyanide	TECH/CN	2912720	2012/07/18	2012/07/19	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2912914	N/A	2012/07/19	Charles Opoku-Ware
Fluoride	F	2912713	2012/07/18	2012/07/19	Surinder Rai
Mercury (low level)	CVAA	2914063	2012/07/20	2012/07/20	Lawrence Cheung
Ammonia-N (low level)	LACH/NH4	2913393	N/A	2012/07/24	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2912631	N/A	2012/07/19	Chris Li
pH	PH	2912714	N/A	2012/07/19	Surinder Rai
Low Level Total Suspended Solids	SLDS	2912798	N/A	2012/07/19	Subhashchandra Patel

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Maxxam Job #: B2A7733
Report Date: 2012/07/26

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER RES. PROJ.

Test Summary

Maxxam ID OE4731 **Collected** 2012/07/11
Sample ID PIN-2A **Shipped**
Matrix Water **Received** 2012/07/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2912711	N/A	2012/07/19	Surinder Rai
Total Cyanide	TECH/CN	2912720	2012/07/18	2012/07/19	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2912914	N/A	2012/07/19	Charles Opoku-Ware
Fluoride	F	2912713	2012/07/18	2012/07/19	Surinder Rai
Mercury (low level)	CVAA	2914063	2012/07/20	2012/07/20	Lawrence Cheung
Ammonia-N (low level)	LACH/NH4	2913393	N/A	2012/07/24	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2912631	N/A	2012/07/19	Chris Li
pH	PH	2912714	N/A	2012/07/19	Surinder Rai
Low Level Total Suspended Solids	SLDS	2912798	N/A	2012/07/19	Subhashchandra Patel

Maxxam ID OE4731 Dup **Collected** 2012/07/11
Sample ID PIN-2A **Shipped**
Matrix Water **Received** 2012/07/18

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2912631	N/A	2012/07/19	Chris Li

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Maxxam Job #: B2A7733
Report Date: 2012/07/26

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER RES. PROJ.

Package 1	12.3°C
Package 2	11.7°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

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Maxxam Job #: B2A7733
Report Date: 2012/07/26

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER RES. PROJ.

QUALITY ASSURANCE REPORT

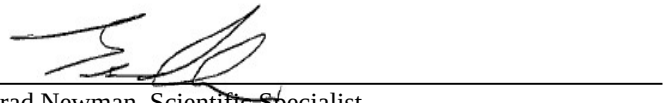
			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2912631	Nitrite (N)	2012/07/19	101(1)	80 - 120	100	85 - 115	<0.010	mg/L	NC(2)	25		
2912631	Nitrate (N)	2012/07/19	91(1)	80 - 120	98	85 - 115	<0.10	mg/L	NC(2)	25		
2912711	Conductivity	2012/07/19					<1.0	umho/cm	0.3	25	104	85 - 115
2912713	Fluoride (F-)	2012/07/19	103	80 - 120	99	80 - 120	<0.10	mg/L	NC	20		
2912720	Total Cyanide (CN)	2012/07/19	92	80 - 120	103	80 - 120	<0.0050	mg/L	NC	20		
2912731	Conductivity	2012/07/19					<1.0	umho/cm	0	25	104	85 - 115
2912732	Fluoride (F-)	2012/07/19	102	80 - 120	99	80 - 120	<0.10	mg/L	NC	20		
2912798	Total Suspended Solids	2012/07/19					<1	mg/L	NC(3)	25	100	85 - 115
2912914	Dissolved Organic Carbon	2012/07/19	94	80 - 120	96	80 - 120	<0.20	mg/L	0.5	20		
2913393	Total Ammonia-N	2012/07/24	99	80 - 120	103	80 - 120	<0.01	mg/L	13.8	20		
2914062	Mercury (Hg)	2012/07/20	106	80 - 120	109	80 - 120	<0.01	ug/L	NC	20		
2914063	Mercury (Hg)	2012/07/20	104	80 - 120	107	80 - 120	<0.01	ug/L	NC	20		

N/A = Not Applicable
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.
QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
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) - Matrix Spike Parent ID [OE4731-01]
(2) - Duplicate Parent ID [OE4731-01]
(3) - Duplicate Parent ID [OE4721-02]

Validation Signature Page

Maxxam Job #: B2A7733

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



Brad Newman, Scientific Specialist

==========

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.

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CHAIN OF CUSTODY RECORD

IMPERIAL

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#19056 AMEC Environment & Infrastructure	Company Name:	#12864 AMEC Environment & Infrastructure	Quotation #:	B24455	MAXXAM JOB #:	BOTTLE ORDER #: 363006
Contact Name:	Donna Verbakel	Contact Name:	Jason Dietrich	P.O. #:			
Address:	900 Maple Grove Rd Unit 10 Cambridge ON N3H 4R7	Address:	900 Maple Grove Road, Unit 10 Cambridge ON N3H 4R7	Project #:	TC111504	CHAIN OF CUSTODY #: C#363006-02-01	PROJECT MANAGER: Gina Baybayan
Phone:	(519)650-7100 Fax: (519)653-6554	Phone:	(519)650-7100 x7133 Fax: (519)569-1731	Project Name:	Rainy River Res. Proj.		
Email:	donna.verbakel@amec.com; Karin.Schmidt@amec.	Email:	Jason.Dietrich@amec.com	Site #:			
				Sampled By:	J. Dietrich		

Regulation 153 (2011): ☐ Table 1 ☐ Table 2 ☐ Table 3 ☐ Table ___ ☐ Res/Park ☐ Ind/Comm ☐ Agri/Other ☐ Medium/Fine ☐ Coarse ☐ For RSC

Other Regulations: ☒ CCME ☐ Reg. 558 ☐ MISA ☒ PWQO ☐ Other ☐ Sanitary Sewer Bylaw ☐ Storm Sewer Bylaw Municipality ___

SPECIAL INSTRUCTIONS

Include Criteria on Certificate of Analysis (Y/N)? Y

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y / N)	Metals Field Filtered ? (Y / N)	Conductivity, T. Cyanide, DOC	Fluoride, Hardness, Ammonia	Mercury, NO2, NO3, pH	TSS	Total Metals	Dissolved Metals	# of Bottles
1		PIN-3A	July,14	17:00	Water			X	X	X	X	X	X	9
2		CLA-5A	July,13	14:20	Water			X	X	X	X	X	X	9
3		PIN-10A	July,13	17:15	Water			X	X	X	X	X	X	9
4		Tait-1	July 14	13:45	Water			X	X	X	X	X	X	9
5		UT5-A	July 13	17:00	Water			X	X	X	X	X	X	9
6		UT2-A	July 14	17:30	Water			X	X	X	X	X	X	9
7		PIN-8	July 12	12:40	Water			X	X	X	X	X	X	9
8		Wes-Trib 1A	July 11	13:35	Water			X	X	X	X	X	X	9
9		Jon-1	July 11	12:35	Water			X	X	X	X	X	X	9
10		PIN-9	July 11	15:10	Water			X	X	X	X	X	X	9

18-Jul-12 10:01
Gina Baybayan
B2A7733
FW ENV-690

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time;	# Jars Used and Not Submitted
Levi Snook	12/07/16	9:00am	MAGDALENA COP	2012/07/18	10:01	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	13, 12, 12°C 11, 11, 13°C on ice	Present		✓
		Intact		

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

White: Maxxam Yellow: Client

Maxxam

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5779 www.maxxam.ca

CHAIN OF CUSTODY RECORD

IMMEDIATE

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#19056 AMEC Environment & Infrastructure	Company Name:	#12864 AMEC Environment & Infrastructure	Quotation #:	B24455	MAXXAM JOB #:	BOTTLE ORDER #: 363006
Contact Name:	Donna Verbakel	Contact Name:	Jason Dietrich	P.O. #:			
Address:	900 Maple Grove Rd Unit 10 Cambridge ON N3H 4R7	Address:	900 Maple Grove Road, Unit 10 Cambridge ON N3H 4R7	Project #:	TC111705		
				Project Name:	Rainy River Proj.	CHAIN OF CUSTODY #:	PROJECT MANAGER:
Phone:	(519)650-7100 Fax: (519)653-6554	Phone:	(519)650-7100 x7133 Fax: (519)569-1731	Site #:		C#363006-09-01	Gina Baybayan
Email:	donna.verbakel@amec.com; Karin.Schmidt@amec.	Email:	Jason.Dietrich@amec.com	Sampled By:			

Regulation 153 (2011)

- [ ] Table 1 [ ] Res/Park [ ] Medium/Fine
- [ ] Table 2 [ ] Ind/Comm [ ] Coarse
- [ ] Table 3 [ ] Agri/Other
- [ ] Table ___ [ ] For RSC

Other Regulations

- [X] CCME [ ] Sanitary Sewer Bylaw
- [ ] Reg. 558 [ ] Storm Sewer Bylaw
- [ ] MISA Municipality ___
- [X] PWQO
- [ ] Other ___

SPECIAL INSTRUCTIONS

Include Criteria on Certificate of Analysis (Y/N)? Y

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: [X]
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)

Date Required: ___ Time Required: ___ [ ]

Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Conductivity, T. Cyanide, DOC	Fluoride, Hardness, Ammonia	Mercury, NO2, NO3, pH	TSS	Total metals	Dissolved Metals					# of Bottles	Comments
1		PIN-2A	July 11	13:45	Water			X	X	X	X	X	X					9	
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
Levi Snook	12/07/16	9:00am	MAGDALENA OOP	2012/07/18	10:01	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	13, 12, 12°C	Present		
	11, 11, 13°C on ice	Intact		

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

White: Maxxam Yellow: Client

Your Project #: MB2A9419
Site Location: TC111504

Attention: SUB CONTRACTOR
MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Report Date: 2012/07/31

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B265418
Received: 2012/07/26, 8:40

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Cadmium - low level CCME - Dissolved	5	N/A	2012/07/30	AB SOP-00043	EPA 200.8
Cadmium - low level CCME (Total)	5	2012/07/26	2012/07/30	AB SOP-00043	EPA 200.8
Hardness	5	N/A	2012/07/30	AB WI-00065	SM 2340B
Elements by ICP - Dissolved	5	N/A	2012/07/27	AB SOP-00042	EPA 200.7
Elements by ICP - Total	5	2012/07/27	2012/07/27	AB SOP-00042	EPA 200.7
Elements by ICPMS - Dissolved	5	N/A	2012/07/28	AB SOP-00043	EPA 200.8
Elements by ICPMS - Total	5	2012/07/27	2012/07/28	AB SOP-00043	EPA 200.8

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

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

Carmen Mackay, Project Manager Assistant
Email: CMacKay@maxxam.ca
Phone# (403) 291-3077

==========

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: 1

Maxxam Job #: B265418
Report Date: 2012/07/31

MAXXAM ANALYTICS
Client Project #: MB2A9419
Site Location: TC111504
Sampler Initials: D

HARDNESS (WATER)

Maxxam ID		EA5717	EA5727	EA5728	EA5729		
Sampling Date		2012/07/12 12:15	2012/07/16 13:15	2012/07/16 14:30	2012/07/17 11:00		
	UNITS	**JON-2 (OF2862)**	**LOS-8 (OF2863)**	**LOS-5 (OF2864)**	**PIN-10 (OF2865)**	**RDL**	**QC Batch**
Calculated Parameters							
Hardness (CaCO3)	mg/L	220	170	200	200	0.50	6036245

RDL = Reportable Detection Limit

Maxxam ID		EA5730		
Sampling Date		2012/07/17 11:00		
	UNITS	**DUP-1 (OF2866)**	**RDL**	**QC Batch**
Calculated Parameters				
Hardness (CaCO3)	mg/L	210	0.50	6036245

RDL = Reportable Detection Limit

Maxxam Job #: B265418
Report Date: 2012/07/31

MAXXAM ANALYTICS
Client Project #: MB2A9419
Site Location: TC111504
Sampler Initials: D

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		EA5717	EA5727	EA5728	EA5729		
Sampling Date		2012/07/12 12:15	2012/07/16 13:15	2012/07/16 14:30	2012/07/17 11:00		
	UNITS	**JON-2 (OF2862)**	**LOS-8 (OF2863)**	**LOS-5 (OF2864)**	**PIN-10 (OF2865)**	**RDL**	**QC Batch**
Low Level Elements							
Dissolved Cadmium (Cd)	ug/L	<0.0050	0.0051	<0.0050	<0.0050	0.0050	6036242
Elements							
Dissolved Aluminum (Al)	mg/L	0.0022	0.0017	0.0045	0.0095	0.0010	6040633
Dissolved Antimony (Sb)	mg/L	<0.00060	<0.00060	<0.00060	<0.00060	0.00060	6040633
Dissolved Arsenic (As)	mg/L	0.0022	0.0011	0.0016	0.0035	0.00020	6040633
Dissolved Barium (Ba)	mg/L	0.017	0.014	0.012	0.012	0.010	6039916
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6040633
Dissolved Boron (B)	mg/L	<0.020	<0.020	<0.020	<0.020	0.020	6039916
Dissolved Calcium (Ca)	mg/L	54	42	49	49	0.30	6039916
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6040633
Dissolved Cobalt (Co)	mg/L	<0.00030	<0.00030	0.00053	<0.00030	0.00030	6040633
Dissolved Copper (Cu)	mg/L	<0.00020	<0.00020	<0.00020	0.00053	0.00020	6040633
Dissolved Iron (Fe)	mg/L	0.26	0.068	0.50	0.061	0.060	6039916
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	6040633
Dissolved Lithium (Li)	mg/L	<0.020	<0.020	<0.020	<0.020	0.020	6039916
Dissolved Magnesium (Mg)	mg/L	21	16	18	20	0.20	6039916
Dissolved Manganese (Mn)	mg/L	<0.0040	<0.0040	<0.0040	<0.0040	0.0040	6039916
Dissolved Molybdenum (Mo)	mg/L	<0.00020	<0.00020	<0.00020	0.00086	0.00020	6040633
Dissolved Nickel (Ni)	mg/L	0.00093	0.00070	0.0010	0.0025	0.00050	6040633
Dissolved Phosphorus (P)	mg/L	<0.10	0.11	0.13	0.13 (1)	0.10	6039916
Dissolved Potassium (K)	mg/L	1.1	0.43	0.63	<0.30	0.30	6039916
Dissolved Selenium (Se)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	6040633
Dissolved Silicon (Si)	mg/L	6.8	3.8	8.3	2.2	0.10	6039916
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	6040633
Dissolved Sodium (Na)	mg/L	2.5	1.6	2.1	3.4	0.50	6039916
Dissolved Strontium (Sr)	mg/L	0.097	0.089	0.075	0.089	0.020	6039916
Dissolved Sulphur (S)	mg/L	0.90	0.58	0.69	1.2	0.20	6039916
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	6040633
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6040633
Dissolved Titanium (Ti)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6040633
Dissolved Uranium (U)	mg/L	0.00013 (1)	0.00042	0.00022	0.00077	0.00010	6040633
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6040633

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Results are within limits of uncertainty(MU).

Maxxam Job #: B265418
Report Date: 2012/07/31

MAXXAM ANALYTICS
Client Project #: MB2A9419
Site Location: TC111504
Sampler Initials: D

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		EA5717	EA5727	EA5728	EA5729		
Sampling Date		2012/07/12 12:15	2012/07/16 13:15	2012/07/16 14:30	2012/07/17 11:00		
	UNITS	**JON-2 (OF2862)**	**LOS-8 (OF2863)**	**LOS-5 (OF2864)**	**PIN-10 (OF2865)**	**RDL**	**QC Batch**
Dissolved Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	0.0030	6040633

RDL = Reportable Detection Limit

Maxxam Job #: B265418
Report Date: 2012/07/31

MAXXAM ANALYTICS
Client Project #: MB2A9419
Site Location: TC111504
Sampler Initials: D

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		EA5730		
Sampling Date		2012/07/17 11:00		
	UNITS	**DUP-1 (OF2866)**	**RDL**	**QC Batch**
Low Level Elements				
Dissolved Cadmium (Cd)	ug/L	0.0088	0.0050	6036242
Elements				
Dissolved Aluminum (Al)	mg/L	0.0026	0.0010	6040633
Dissolved Antimony (Sb)	mg/L	<0.00060	0.00060	6040633
Dissolved Arsenic (As)	mg/L	0.0033	0.00020	6040633
Dissolved Barium (Ba)	mg/L	0.013	0.010	6039916
Dissolved Beryllium (Be)	mg/L	<0.0010	0.0010	6040633
Dissolved Boron (B)	mg/L	<0.020	0.020	6039916
Dissolved Calcium (Ca)	mg/L	50	0.30	6039916
Dissolved Chromium (Cr)	mg/L	<0.0010	0.0010	6040633
Dissolved Cobalt (Co)	mg/L	<0.00030	0.00030	6040633
Dissolved Copper (Cu)	mg/L	0.00074	0.00020	6040633
Dissolved Iron (Fe)	mg/L	0.077	0.060	6039916
Dissolved Lead (Pb)	mg/L	<0.00020	0.00020	6040633
Dissolved Lithium (Li)	mg/L	<0.020	0.020	6039916
Dissolved Magnesium (Mg)	mg/L	21	0.20	6039916
Dissolved Manganese (Mn)	mg/L	<0.0040	0.0040	6039916
Dissolved Molybdenum (Mo)	mg/L	0.00089 (1)	0.00020	6040633
Dissolved Nickel (Ni)	mg/L	0.0027 (2)	0.00050	6040633
Dissolved Phosphorus (P)	mg/L	<0.10	0.10	6039916
Dissolved Potassium (K)	mg/L	<0.30	0.30	6039916
Dissolved Selenium (Se)	mg/L	<0.00020	0.00020	6040633
Dissolved Silicon (Si)	mg/L	2.3	0.10	6039916
Dissolved Silver (Ag)	mg/L	<0.00010	0.00010	6040633
Dissolved Sodium (Na)	mg/L	3.5	0.50	6039916
Dissolved Strontium (Sr)	mg/L	0.091	0.020	6039916
Dissolved Sulphur (S)	mg/L	1.2	0.20	6039916
Dissolved Thallium (Tl)	mg/L	<0.00020	0.00020	6040633
Dissolved Tin (Sn)	mg/L	<0.0010	0.0010	6040633
Dissolved Titanium (Ti)	mg/L	<0.0010	0.0010	6040633

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Results are within limits of uncertainty(MU).
(2) Dissolved greater than total. Results within acceptable limits of precision.

Maxxam Job #: B265418
Report Date: 2012/07/31

MAXXAM ANALYTICS
Client Project #: MB2A9419
Site Location: TC111504
Sampler Initials: D

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		EA5730		
Sampling Date		2012/07/17 11:00		
	UNITS	**DUP-1 (OF2866)**	**RDL**	**QC Batch**
Dissolved Uranium (U)	mg/L	0.00080 (1)	0.00010	6040633
Dissolved Vanadium (V)	mg/L	<0.0010	0.0010	6040633
Dissolved Zinc (Zn)	mg/L	<0.0030	0.0030	6040633

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Results within acceptable limits of precision.

Maxxam Job #: B265418
Report Date: 2012/07/31

MAXXAM ANALYTICS
Client Project #: MB2A9419
Site Location: TC111504
Sampler Initials: D

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		EA5717	EA5727	EA5728	EA5729		
Sampling Date		2012/07/12 12:15	2012/07/16 13:15	2012/07/16 14:30	2012/07/17 11:00		
	UNITS	**JON-2 (OF2862)**	**LOS-8 (OF2863)**	**LOS-5 (OF2864)**	**PIN-10 (OF2865)**	**RDL**	**QC Batch**
Low Level Elements							
Total Cadmium (Cd)	ug/L	0.0081	0.0059	0.012	0.0074	0.0050	6036243
Elements							
Total Aluminum (Al)	mg/L	0.046	0.024	0.016	0.079	0.0010	6040630
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	0.00070	<0.00060	0.00060	6040630
Total Arsenic (As)	mg/L	0.0030	0.0012	0.0022	0.0040	0.00020	6040630
Total Barium (Ba)	mg/L	0.025	0.016	0.027	0.015	0.010	6039907
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6040630
Total Boron (B)	mg/L	<0.020	<0.020	<0.020	<0.020	0.020	6039907
Total Calcium (Ca)	mg/L	55	43	50	50	0.30	6039907
Total Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6040630
Total Cobalt (Co)	mg/L	0.00088	<0.00030	0.0017	<0.00030	0.00030	6040630
Total Copper (Cu)	mg/L	0.00033	0.00045	0.00032	0.00084	0.00020	6040630
Total Iron (Fe)	mg/L	2.2	0.45	2.9	0.40	0.060	6039907
Total Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	6040630
Total Lithium (Li)	mg/L	<0.020	<0.020	<0.020	<0.020	0.020	6039907
Total Magnesium (Mg)	mg/L	22	16	19	21	0.20	6039907
Total Manganese (Mn)	mg/L	0.76	0.11	1.7	0.20	0.0040	6039907
Total Molybdenum (Mo)	mg/L	<0.00020	<0.00020	0.00026	0.00090	0.00020	6040630
Total Nickel (Ni)	mg/L	0.0012	0.00092	0.0015	0.0028	0.00050	6040630
Total Phosphorus (P)	mg/L	0.21	0.11	0.36	0.12	0.10	6039907
Total Potassium (K)	mg/L	1.1	0.50	0.75	<0.30	0.30	6039907
Total Selenium (Se)	mg/L	<0.00020	<0.00020	0.00022	0.00028	0.00020	6040630
Total Silicon (Si)	mg/L	7.1	4.0	8.8	2.6	0.10	6039907
Total Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	6040630
Total Sodium (Na)	mg/L	2.5	1.6	2.2	3.6	0.50	6039907
Total Strontium (Sr)	mg/L	0.099	0.091	0.079	0.093	0.020	6039907
Total Sulphur (S)	mg/L	1.0	0.61	0.74	1.4	0.20	6039907
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	0.00020	6040630
Total Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6040630
Total Titanium (Ti)	mg/L	0.0028	0.0012	<0.0010	0.0033	0.0010	6040630
Total Uranium (U)	mg/L	0.00012	0.00046	0.00023	0.00087	0.00010	6040630
Total Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	6040630
Total Zinc (Zn)	mg/L	0.0052	0.0034	0.0032	<0.0030	0.0030	6040630

RDL = Reportable Detection Limit

Maxxam Job #: B265418
Report Date: 2012/07/31

MAXXAM ANALYTICS
Client Project #: MB2A9419
Site Location: TC111504
Sampler Initials: D

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		EA5730		
Sampling Date		2012/07/17 11:00		
	UNITS	**DUP-1 (OF2866)**	**RDL**	**QC Batch**
Low Level Elements				
Total Cadmium (Cd)	ug/L	0.0080	0.0050	6036243
Elements				
Total Aluminum (Al)	mg/L	0.080	0.0010	6040630
Total Antimony (Sb)	mg/L	<0.00060	0.00060	6040630
Total Arsenic (As)	mg/L	0.0036	0.00020	6040630
Total Barium (Ba)	mg/L	0.015	0.010	6039907
Total Beryllium (Be)	mg/L	<0.0010	0.0010	6040630
Total Boron (B)	mg/L	<0.020	0.020	6039907
Total Calcium (Ca)	mg/L	50	0.30	6039907
Total Chromium (Cr)	mg/L	<0.0010	0.0010	6040630
Total Cobalt (Co)	mg/L	<0.00030	0.00030	6040630
Total Copper (Cu)	mg/L	0.00095	0.00020	6040630
Total Iron (Fe)	mg/L	0.42	0.060	6039907
Total Lead (Pb)	mg/L	<0.00020	0.00020	6040630
Total Lithium (Li)	mg/L	<0.020	0.020	6039907
Total Magnesium (Mg)	mg/L	21	0.20	6039907
Total Manganese (Mn)	mg/L	0.17	0.0040	6039907
Total Molybdenum (Mo)	mg/L	0.00084	0.00020	6040630
Total Nickel (Ni)	mg/L	0.0026	0.00050	6040630
Total Phosphorus (P)	mg/L	0.10	0.10	6039907
Total Potassium (K)	mg/L	<0.30	0.30	6039907
Total Selenium (Se)	mg/L	0.00026	0.00020	6040630
Total Silicon (Si)	mg/L	2.6	0.10	6039907
Total Silver (Ag)	mg/L	<0.00010	0.00010	6040630
Total Sodium (Na)	mg/L	3.6	0.50	6039907
Total Strontium (Sr)	mg/L	0.092	0.020	6039907
Total Sulphur (S)	mg/L	1.3	0.20	6039907
Total Thallium (Tl)	mg/L	<0.00020	0.00020	6040630
Total Tin (Sn)	mg/L	<0.0010	0.0010	6040630
Total Titanium (Ti)	mg/L	0.0037	0.0010	6040630
Total Uranium (U)	mg/L	0.00077	0.00010	6040630
Total Vanadium (V)	mg/L	<0.0010	0.0010	6040630
Total Zinc (Zn)	mg/L	<0.0030	0.0030	6040630

RDL = Reportable Detection Limit

Maxxam Job #: B265418
Report Date: 2012/07/31

MAXXAM ANALYTICS
Client Project #: MB2A9419
Site Location: TC111504
Sampler Initials: D

Package 1	-0.7°C

Each temperature is the average of up to three cooler temperatures taken at receipt

General Comments

Sample EA5730-01: Dissolved greater than total for Cd. Results are within limits of uncertainty(MU).

Results relate only to the items tested.

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB2A9419
P.O. #:
Site Location: TC111504

Quality Assurance Report

Maxxam Job Number: CB265418

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6039907	PL	Matrix Spike	Total Barium (Ba)	2012/07/27		97	%	80 - 120
			Total Boron (B)	2012/07/27		103	%	80 - 120
			Total Calcium (Ca)	2012/07/27		NC	%	80 - 120
			Total Iron (Fe)	2012/07/27		109	%	80 - 120
			Total Lithium (Li)	2012/07/27		105	%	80 - 120
			Total Magnesium (Mg)	2012/07/27		NC	%	80 - 120
			Total Manganese (Mn)	2012/07/27		99	%	80 - 120
			Total Phosphorus (P)	2012/07/27		100	%	80 - 120
			Total Potassium (K)	2012/07/27		105	%	80 - 120
			Total Silicon (Si)	2012/07/27		NC	%	80 - 120
			Total Sodium (Na)	2012/07/27		95	%	80 - 120
			Total Strontium (Sr)	2012/07/27		99	%	80 - 120
		Spiked Blank	Total Barium (Ba)	2012/07/27		99	%	80 - 120
			Total Boron (B)	2012/07/27		104	%	80 - 120
			Total Calcium (Ca)	2012/07/27		106	%	80 - 120
			Total Iron (Fe)	2012/07/27		107	%	80 - 120
			Total Lithium (Li)	2012/07/27		106	%	80 - 120
			Total Magnesium (Mg)	2012/07/27		98	%	80 - 120
			Total Manganese (Mn)	2012/07/27		100	%	80 - 120
			Total Phosphorus (P)	2012/07/27		100	%	80 - 120
			Total Potassium (K)	2012/07/27		103	%	80 - 120
			Total Silicon (Si)	2012/07/27		109	%	80 - 120
			Total Sodium (Na)	2012/07/27		99	%	80 - 120
			Total Strontium (Sr)	2012/07/27		101	%	80 - 120
		Method Blank	Total Barium (Ba)	2012/07/27	<0.010		mg/L	
			Total Boron (B)	2012/07/27	<0.020		mg/L	
			Total Calcium (Ca)	2012/07/27	<0.30		mg/L	
			Total Iron (Fe)	2012/07/27	<0.060		mg/L	
			Total Lithium (Li)	2012/07/27	<0.020		mg/L	
			Total Magnesium (Mg)	2012/07/27	<0.20		mg/L	
			Total Manganese (Mn)	2012/07/27	<0.0040		mg/L	
			Total Phosphorus (P)	2012/07/27	<0.10		mg/L	
			Total Potassium (K)	2012/07/27	<0.30		mg/L	
			Total Silicon (Si)	2012/07/27	<0.10		mg/L	
			Total Sodium (Na)	2012/07/27	<0.50		mg/L	
			Total Strontium (Sr)	2012/07/27	<0.020		mg/L	
			Total Sulphur (S)	2012/07/27	<0.20		mg/L	
		RPD	Total Iron (Fe)	2012/07/27	0.2		%	20
			Total Manganese (Mn)	2012/07/27	1.8		%	20
6039916	PL	Matrix Spike	Dissolved Barium (Ba)	2012/07/27		97	%	80 - 120
			Dissolved Boron (B)	2012/07/27		95	%	80 - 120
			Dissolved Calcium (Ca)	2012/07/27		NC	%	80 - 120
			Dissolved Iron (Fe)	2012/07/27		99	%	80 - 120
			Dissolved Lithium (Li)	2012/07/27		100	%	80 - 120
			Dissolved Magnesium (Mg)	2012/07/27		92	%	80 - 120
			Dissolved Manganese (Mn)	2012/07/27		98	%	80 - 120
			Dissolved Phosphorus (P)	2012/07/27		101	%	80 - 120
			Dissolved Potassium (K)	2012/07/27		99	%	80 - 120
			Dissolved Silicon (Si)	2012/07/27		NC	%	80 - 120
			Dissolved Sodium (Na)	2012/07/27		91	%	80 - 120
			Dissolved Strontium (Sr)	2012/07/27		95	%	80 - 120
		Spiked Blank	Dissolved Barium (Ba)	2012/07/27		98	%	80 - 120
			Dissolved Boron (B)	2012/07/27		97	%	80 - 120
			Dissolved Calcium (Ca)	2012/07/27		105	%	80 - 120
			Dissolved Iron (Fe)	2012/07/27		102	%	80 - 120

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB2A9419
P.O. #:
Site Location: TC111504

Quality Assurance Report (Continued)

Maxxam Job Number: CB265418

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6039916	PL	Spiked Blank	Dissolved Lithium (Li)	2012/07/27		101	%	80 - 120
			Dissolved Magnesium (Mg)	2012/07/27		96	%	80 - 120
			Dissolved Manganese (Mn)	2012/07/27		98	%	80 - 120
			Dissolved Phosphorus (P)	2012/07/27		100	%	80 - 120
			Dissolved Potassium (K)	2012/07/27		102	%	80 - 120
			Dissolved Silicon (Si)	2012/07/27		89	%	80 - 120
			Dissolved Sodium (Na)	2012/07/27		93	%	80 - 120
			Dissolved Strontium (Sr)	2012/07/27		96	%	80 - 120
		Method Blank	Dissolved Barium (Ba)	2012/07/27	<0.010		mg/L	
			Dissolved Boron (B)	2012/07/27	<0.020		mg/L	
			Dissolved Calcium (Ca)	2012/07/27	<0.30		mg/L	
			Dissolved Iron (Fe)	2012/07/27	<0.060		mg/L	
			Dissolved Lithium (Li)	2012/07/27	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2012/07/27	<0.20		mg/L	
			Dissolved Manganese (Mn)	2012/07/27	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2012/07/27	<0.10		mg/L	
			Dissolved Potassium (K)	2012/07/27	<0.30		mg/L	
			Dissolved Silicon (Si)	2012/07/27	<0.10		mg/L	
			Dissolved Sodium (Na)	2012/07/27	<0.50		mg/L	
			Dissolved Strontium (Sr)	2012/07/27	<0.020		mg/L	
			Dissolved Sulphur (S)	2012/07/27	<0.20		mg/L	
		RPD	Dissolved Calcium (Ca)	2012/07/27	1.1		%	20
			Dissolved Iron (Fe)	2012/07/27	NC		%	20
			Dissolved Magnesium (Mg)	2012/07/27	1.1		%	20
			Dissolved Manganese (Mn)	2012/07/27	NC		%	20
			Dissolved Potassium (K)	2012/07/27	0.9		%	20
			Dissolved Sodium (Na)	2012/07/27	2.0		%	20
6040630	PW3	Matrix Spike	Total Aluminum (Al)	2012/07/29		NC	%	80 - 120
			Total Antimony (Sb)	2012/07/29		102	%	80 - 120
			Total Arsenic (As)	2012/07/29		97	%	80 - 120
			Total Beryllium (Be)	2012/07/29		101	%	80 - 120
			Total Chromium (Cr)	2012/07/29		95	%	80 - 120
			Total Cobalt (Co)	2012/07/29		98	%	80 - 120
			Total Copper (Cu)	2012/07/29		97	%	80 - 120
			Total Lead (Pb)	2012/07/29		97	%	80 - 120
			Total Molybdenum (Mo)	2012/07/29		101	%	80 - 120
			Total Nickel (Ni)	2012/07/29		104	%	80 - 120
			Total Selenium (Se)	2012/07/29		92	%	80 - 120
			Total Silver (Ag)	2012/07/29		101	%	80 - 120
			Total Thallium (Tl)	2012/07/29		94	%	80 - 120
			Total Tin (Sn)	2012/07/29		99	%	80 - 120
			Total Titanium (Ti)	2012/07/29		91	%	80 - 120
			Total Uranium (U)	2012/07/29		95	%	80 - 120
			Total Vanadium (V)	2012/07/29		98	%	80 - 120
			Total Zinc (Zn)	2012/07/29		NC	%	80 - 120
		Spiked Blank	Total Aluminum (Al)	2012/07/30		111	%	80 - 120
			Total Antimony (Sb)	2012/07/30		110	%	80 - 120
			Total Arsenic (As)	2012/07/30		108	%	80 - 120
			Total Beryllium (Be)	2012/07/30		106	%	80 - 120
			Total Chromium (Cr)	2012/07/30		108	%	80 - 120
			Total Cobalt (Co)	2012/07/30		107	%	80 - 120
			Total Copper (Cu)	2012/07/30		108	%	80 - 120
			Total Lead (Pb)	2012/07/30		104	%	80 - 120
			Total Molybdenum (Mo)	2012/07/30		111	%	80 - 120
			Total Nickel (Ni)	2012/07/30		107	%	80 - 120

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB2A9419
P.O. #:
Site Location: TC111504

Quality Assurance Report (Continued)

Maxxam Job Number: CB265418

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6040630	PW3	Spiked Blank	Total Selenium (Se)	2012/07/30		97	%	80 - 120
			Total Silver (Ag)	2012/07/30		111	%	80 - 120
			Total Thallium (Tl)	2012/07/30		100	%	80 - 120
			Total Tin (Sn)	2012/07/30		115	%	80 - 120
			Total Titanium (Ti)	2012/07/30		102	%	80 - 120
			Total Uranium (U)	2012/07/30		106	%	80 - 120
			Total Vanadium (V)	2012/07/30		108	%	80 - 120
			Total Zinc (Zn)	2012/07/30		114	%	80 - 120
		Method Blank	Total Aluminum (Al)	2012/07/28	0.0013, RDL=0.0010		mg/L	
			Total Antimony (Sb)	2012/07/28	<0.00060		mg/L	
			Total Arsenic (As)	2012/07/28	<0.00020		mg/L	
			Total Beryllium (Be)	2012/07/28	<0.0010		mg/L	
			Total Chromium (Cr)	2012/07/28	<0.0010		mg/L	
			Total Cobalt (Co)	2012/07/28	<0.00030		mg/L	
			Total Copper (Cu)	2012/07/28	<0.00020		mg/L	
			Total Lead (Pb)	2012/07/28	<0.00020		mg/L	
			Total Molybdenum (Mo)	2012/07/28	<0.00020		mg/L	
			Total Nickel (Ni)	2012/07/28	<0.00050		mg/L	
			Total Selenium (Se)	2012/07/28	<0.00020		mg/L	
			Total Silver (Ag)	2012/07/28	<0.00010		mg/L	
			Total Thallium (Tl)	2012/07/28	<0.00020		mg/L	
			Total Tin (Sn)	2012/07/28	<0.0010		mg/L	
			Total Titanium (Ti)	2012/07/28	<0.0010		mg/L	
			Total Uranium (U)	2012/07/28	<0.00010		mg/L	
			Total Vanadium (V)	2012/07/28	<0.0010		mg/L	
			Total Zinc (Zn)	2012/07/28	<0.0030		mg/L	
6040633	PW3	Matrix Spike	Dissolved Aluminum (Al)	2012/07/28		89	%	80 - 120
			Dissolved Antimony (Sb)	2012/07/28		105	%	80 - 120
			Dissolved Arsenic (As)	2012/07/28		101	%	80 - 120
			Dissolved Beryllium (Be)	2012/07/28		85	%	80 - 120
			Dissolved Chromium (Cr)	2012/07/28		94	%	80 - 120
			Dissolved Cobalt (Co)	2012/07/28		87	%	80 - 120
			Dissolved Copper (Cu)	2012/07/28		85	%	80 - 120
			Dissolved Lead (Pb)	2012/07/28		82	%	80 - 120
			Dissolved Molybdenum (Mo)	2012/07/28		106	%	80 - 120
			Dissolved Nickel (Ni)	2012/07/28		89	%	80 - 120
			Dissolved Selenium (Se)	2012/07/28		92	%	80 - 120
			Dissolved Silver (Ag)	2012/07/28		81	%	80 - 120
			Dissolved Thallium (Tl)	2012/07/28		80	%	80 - 120
			Dissolved Tin (Sn)	2012/07/28		98	%	80 - 120
			Dissolved Titanium (Ti)	2012/07/28		100	%	80 - 120
			Dissolved Uranium (U)	2012/07/28		92	%	80 - 120
			Dissolved Vanadium (V)	2012/07/28		102	%	80 - 120
			Dissolved Zinc (Zn)	2012/07/28		103	%	80 - 120
		Spiked Blank	Dissolved Aluminum (Al)	2012/07/28		90	%	80 - 120
			Dissolved Antimony (Sb)	2012/07/28		82	%	80 - 120
			Dissolved Arsenic (As)	2012/07/28		91	%	80 - 120
			Dissolved Beryllium (Be)	2012/07/28		87	%	80 - 120
			Dissolved Chromium (Cr)	2012/07/28		90	%	80 - 120
			Dissolved Cobalt (Co)	2012/07/28		90	%	80 - 120
			Dissolved Copper (Cu)	2012/07/28		91	%	80 - 120
			Dissolved Lead (Pb)	2012/07/28		90	%	80 - 120
			Dissolved Molybdenum (Mo)	2012/07/28		90	%	80 - 120
			Dissolved Nickel (Ni)	2012/07/28		92	%	80 - 120
			Dissolved Selenium (Se)	2012/07/28		86	%	80 - 120

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB2A9419
P.O. #:
Site Location: TC111504

Quality Assurance Report (Continued)

Maxxam Job Number: CB265418

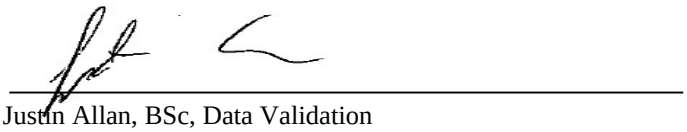
QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6040633	PW3	Spiked Blank	Dissolved Silver (Ag)	2012/07/28		94	%	80 - 120
			Dissolved Thallium (Tl)	2012/07/28		89	%	80 - 120
			Dissolved Tin (Sn)	2012/07/28		93	%	80 - 120
			Dissolved Titanium (Ti)	2012/07/28		91	%	80 - 120
			Dissolved Uranium (U)	2012/07/28		88	%	80 - 120
			Dissolved Vanadium (V)	2012/07/28		94	%	80 - 120
			Dissolved Zinc (Zn)	2012/07/28		92	%	80 - 120
		Method Blank	Dissolved Aluminum (Al)	2012/07/28	<0.0010		mg/L	
			Dissolved Antimony (Sb)	2012/07/28	<0.00060		mg/L	
			Dissolved Arsenic (As)	2012/07/28	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2012/07/28	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2012/07/28	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2012/07/28	<0.00030		mg/L	
			Dissolved Copper (Cu)	2012/07/28	<0.00020		mg/L	
			Dissolved Lead (Pb)	2012/07/28	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2012/07/28	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2012/07/28	<0.00050		mg/L	
			Dissolved Selenium (Se)	2012/07/28	<0.00020		mg/L	
			Dissolved Silver (Ag)	2012/07/28	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2012/07/28	<0.00020		mg/L	
			Dissolved Tin (Sn)	2012/07/28	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2012/07/28	<0.0010		mg/L	
			Dissolved Uranium (U)	2012/07/28	<0.00010		mg/L	
			Dissolved Vanadium (V)	2012/07/28	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2012/07/28	<0.0030		mg/L	
		RPD	Dissolved Aluminum (Al)	2012/07/28	NC		%	20
			Dissolved Antimony (Sb)	2012/07/28	NC		%	20
			Dissolved Arsenic (As)	2012/07/28	NC		%	20
			Dissolved Beryllium (Be)	2012/07/28	NC		%	20
			Dissolved Chromium (Cr)	2012/07/28	NC		%	20
			Dissolved Cobalt (Co)	2012/07/28	NC		%	20
			Dissolved Copper (Cu)	2012/07/28	NC		%	20
			Dissolved Lead (Pb)	2012/07/28	NC		%	20
			Dissolved Molybdenum (Mo)	2012/07/28	NC		%	20
			Dissolved Nickel (Ni)	2012/07/28	NC		%	20
			Dissolved Selenium (Se)	2012/07/28	NC		%	20
			Dissolved Silver (Ag)	2012/07/28	NC		%	20
			Dissolved Thallium (Tl)	2012/07/28	NC		%	20
			Dissolved Tin (Sn)	2012/07/28	NC		%	20
			Dissolved Titanium (Ti)	2012/07/28	NC		%	20
			Dissolved Uranium (U)	2012/07/28	NC		%	20
			Dissolved Vanadium (V)	2012/07/28	NC		%	20
			Dissolved Zinc (Zn)	2012/07/28	NC		%	20

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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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.
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 #: B265418

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



Justin Allan, BSc, Data Validation

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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.

Your Project #: TC111504
Site Location: RAINY RIVER PROJ.
Your C.O.C. #: 36300601, 363006-01-01

Attention: Jason Dietrich
AMEC Environment & Infrastructure
160 Traders Blvd
Mississauga, ON
CANADA L4Z3K7

Report Date: 2012/07/31

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B2A9419
Received: 2012/07/20, 09:50

Sample Matrix: Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Conductivity	5	N/A	2012/07/23	CAM SOP-00448	SM 2510
Total Cyanide	5	2012/07/21	2012/07/24	CAM SOP-00457	Ontario MOE CN-E3015
Dissolved Organic Carbon (DOC)	2	N/A	2012/07/23	CAM SOP-00446	SM 5310 B
Dissolved Organic Carbon (DOC)	3	N/A	2012/07/24	CAM SOP-00446	SM 5310 B
Fluoride	5	2012/07/21	2012/07/23	CAM SOP-00448	APHA 4500FC
Mercury (low level)	5	2012/07/24	2012/07/24	CAM SOP-00453	EPA 7470
Ammonia-N (low level)	5	N/A	2012/07/26	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (1)	5	N/A	2012/07/23	CAM SOP-00440	SM 4500 NO3I/NO2B
pH	5	N/A	2012/07/23	CAM SOP-00448	SM 4500H+ B
Low Level Total Suspended Solids	5	N/A	2012/07/23	CAM SOP-00428	SM 2540D

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

../2

Maxxam Job #: B2A9419
Report Date: 2012/07/31

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER PROJ.
Sampler Initials: JD

Encryption Key

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

Gina Baybayan,
Email: GBAYBAYAN@maxxam.ca
Phone# (905) 817-5766

==========

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 #: B2A9419
Report Date: 2012/07/31

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER PROJ.
Sampler Initials: JD

RESULTS OF ANALYSES OF WATER

Maxxam ID		OF2862		OF2863	OF2864		OF2865		OF2866		
Sampling Date		2012/07/12 12:15		2012/07/16 13:50	2012/07/16 14:30		2012/07/17 11:00		2012/07/17 11:00		
	Units	**JON-2**	**QC Batch**	**LOS-8**	**LOS-5**	**QC Batch**	**PIN-10**	**QC Batch**	**DUP-1**	**RDL**	**QC Batch**
Inorganics											
Total Ammonia-N	mg/L	0.08	2919282	0.05	0.08	2919282	0.06	2919282	0.06	0.01	2919282
Conductivity	umho/cm	390	2915733	310	350	2915733	370	2915733	370	1.0	2915733
Fluoride (F-)	mg/L	0.10	2915734	0.10	<0.10	2915734	0.11	2915734	0.11	0.10	2915734
Dissolved Organic Carbon	mg/L	38	2915699	21	30	2915477	30	2915699	30	0.20	2915699
pH	pH	7.75	2915735	7.83	7.57	2915735	7.97	2915735	8.00		2915735
Total Suspended Solids	mg/L	26	2915938	5	11	2915938	5	2915938	5	1	2915938
Total Cyanide (CN)	mg/L	<0.0050	2915712	<0.0050	<0.0050	2915712	<0.0050	2915712	<0.0050	0.0050	2915712
Nitrite (N)	mg/L	<0.010	2915633	<0.010	<0.010	2915496	<0.010	2915496	<0.010	0.010	2915633
Nitrate (N)	mg/L	<0.10	2915633	<0.10	<0.10	2915496	<0.10	2915496	<0.10	0.10	2915633
Nitrate + Nitrite	mg/L	<0.10	2915633	<0.10	<0.10	2915496	<0.10	2915496	<0.10	0.10	2915633

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		OF2862	OF2863	OF2863	OF2864	OF2865	OF2866		
Sampling Date		2012/07/12 12:15	2012/07/16 13:50	2012/07/16 13:50	2012/07/16 14:30	2012/07/17 11:00	2012/07/17 11:00		
	Units	**JON-2**	**LOS-8**	**LOS-8 Lab-Dup**	**LOS-5**	**PIN-10**	**DUP-1**	**RDL**	**QC Batch**
Metals									
Mercury (Hg)	ug/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	2916968

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B2A9419
Report Date: 2012/07/31

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER PROJ.
Sampler Initials: JD

Test Summary

Maxxam ID OF2862 **Collected** 2012/07/12
Sample ID JON-2 **Shipped**
Matrix Water **Received** 2012/07/20

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2915733	N/A	2012/07/23	Surinder Rai
Total Cyanide	TECH/CN	2915712	2012/07/21	2012/07/24	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2915699	N/A	2012/07/24	Charles Opoku-Ware
Fluoride	F	2915734	2012/07/21	2012/07/23	Surinder Rai
Mercury (low level)	CVAA	2916968	2012/07/24	2012/07/24	Magdalena Carlos
Ammonia-N (low level)	LACH/NH4	2919282	N/A	2012/07/26	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2915633	N/A	2012/07/23	Chris Li
pH	PH	2915735	N/A	2012/07/23	Surinder Rai
Low Level Total Suspended Solids	SLDS	2915938	N/A	2012/07/23	Subhashchandra Patel

Maxxam ID OF2863 **Collected** 2012/07/16
Sample ID LOS-8 **Shipped**
Matrix Water **Received** 2012/07/20

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2915733	N/A	2012/07/23	Surinder Rai
Total Cyanide	TECH/CN	2915712	2012/07/21	2012/07/24	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2915477	N/A	2012/07/23	Charles Opoku-Ware
Fluoride	F	2915734	2012/07/21	2012/07/23	Surinder Rai
Mercury (low level)	CVAA	2916968	2012/07/24	2012/07/24	Magdalena Carlos
Ammonia-N (low level)	LACH/NH4	2919282	N/A	2012/07/26	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2915496	N/A	2012/07/23	Chris Li
pH	PH	2915735	N/A	2012/07/23	Surinder Rai
Low Level Total Suspended Solids	SLDS	2915938	N/A	2012/07/23	Subhashchandra Patel

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Maxxam Job #: B2A9419
Report Date: 2012/07/31

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER PROJ.
Sampler Initials: JD

Test Summary

Maxxam ID OF2863 Dup
Sample ID LOS-8
Matrix Water

Collected 2012/07/16
Shipped
Received 2012/07/20

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Mercury (low level)	CVAA	2916968	2012/07/24	2012/07/24	Magdalena Carlos

Maxxam ID OF2864
Sample ID LOS-5
Matrix Water

Collected 2012/07/16
Shipped
Received 2012/07/20

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2915733	N/A	2012/07/23	Surinder Rai
Total Cyanide	TECH/CN	2915712	2012/07/21	2012/07/24	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2915477	N/A	2012/07/23	Charles Opoku-Ware
Fluoride	F	2915734	2012/07/21	2012/07/23	Surinder Rai
Mercury (low level)	CVAA	2916968	2012/07/24	2012/07/24	Magdalena Carlos
Ammonia-N (low level)	LACH/NH4	2919282	N/A	2012/07/26	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2915496	N/A	2012/07/23	Chris Li
pH	PH	2915735	N/A	2012/07/23	Surinder Rai
Low Level Total Suspended Solids	SLDS	2915938	N/A	2012/07/23	Subhashchandra Patel

Maxxam ID OF2865
Sample ID PIN-10
Matrix Water

Collected 2012/07/17
Shipped
Received 2012/07/20

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2915733	N/A	2012/07/23	Surinder Rai
Total Cyanide	TECH/CN	2915712	2012/07/21	2012/07/24	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2915699	N/A	2012/07/24	Charles Opoku-Ware
Fluoride	F	2915734	2012/07/21	2012/07/23	Surinder Rai
Mercury (low level)	CVAA	2916968	2012/07/24	2012/07/24	Magdalena Carlos
Ammonia-N (low level)	LACH/NH4	2919282	N/A	2012/07/26	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2915496	N/A	2012/07/23	Chris Li
pH	PH	2915735	N/A	2012/07/23	Surinder Rai
Low Level Total Suspended Solids	SLDS	2915938	N/A	2012/07/23	Subhashchandra Patel

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Maxxam Job #: B2A9419
Report Date: 2012/07/31

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER PROJ.
Sampler Initials: JD

Test Summary

Maxxam ID OF2866
Sample ID DUP-1
Matrix Water

Collected 2012/07/17
Shipped
Received 2012/07/20

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2915733	N/A	2012/07/23	Surinder Rai
Total Cyanide	TECH/CN	2915712	2012/07/21	2012/07/24	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2915699	N/A	2012/07/24	Charles Opoku-Ware
Fluoride	F	2915734	2012/07/21	2012/07/23	Surinder Rai
Mercury (low level)	CVAA	2916968	2012/07/24	2012/07/24	Magdalena Carlos
Ammonia-N (low level)	LACH/NH4	2919282	N/A	2012/07/26	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2915633	N/A	2012/07/23	Chris Li
pH	PH	2915735	N/A	2012/07/23	Surinder Rai
Low Level Total Suspended Solids	SLDS	2915938	N/A	2012/07/23	Subhashchandra Patel

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Maxxam Job #: B2A9419
Report Date: 2012/07/31

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER PROJ.
Sampler Initials: JD

Package 1	16.0°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B2A9419
Report Date: 2012/07/31

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER PROJ.
Sampler Initials: JD

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2915477	Dissolved Organic Carbon	2012/07/23	96	80 - 120	99	80 - 120	0.22, RDL=0.20	mg/L	NC	20		
2915496	Nitrite (N)	2012/07/23	94	80 - 120	97	85 - 115	<0.010	mg/L	NC	25		
2915496	Nitrate (N)	2012/07/23	NC	80 - 120	94	85 - 115	<0.10	mg/L	0.1	25		
2915633	Nitrite (N)	2012/07/23	101	80 - 120	102	85 - 115	<0.010	mg/L	NC	25		
2915633	Nitrate (N)	2012/07/23	100	80 - 120	99	85 - 115	<0.10	mg/L	NC	25		
2915699	Dissolved Organic Carbon	2012/07/24	101	80 - 120	104	80 - 120	<0.20	mg/L	2.3	20		
2915712	Total Cyanide (CN)	2012/07/24	99	80 - 120	102	80 - 120	<0.0050	mg/L	NC	20		
2915733	Conductivity	2012/07/23					<1.0	umho/cm	0	25	101	85 - 115
2915734	Fluoride (F-)	2012/07/23	92	80 - 120	97	80 - 120	<0.10	mg/L	2.4	20		
2915938	Total Suspended Solids	2012/07/23					<1	mg/L	NC	25	95	85 - 115
2916968	Mercury (Hg)	2012/07/24	104 (1)	80 - 120	98	80 - 120	<0.01	ug/L	NC (2)	20		
2919282	Total Ammonia-N	2012/07/26	96	80 - 120	102	80 - 120	<0.01	mg/L	NC	20		

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.
QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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.
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) - Matrix Spike Parent ID [OF2863-08]
(2) - Duplicate Parent ID [OF2863-08]

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Validation Signature Page

Maxxam Job #: B2A9419

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



Brad Newman, Scientific Specialist

==========

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Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5779 www.maxxam.ca

CHAIN OF CUSTODY RECO

20-Jul-12 09:50
Gina Baybayan
B2A9419
RDV ENV-588

of

ORDER #:

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:	
Company Name:	#19056 AMEC Environment & Infrastructure	Company Name:	#12864 AMEC Environment & Infrastructure	Quotation #:	B24455
Contact Name:	Donna Verbakel	Contact Name:	Jason Dietrich	P.O. #:	
Address:	900 Maple Grove Rd Unit 10 Cambridge ON N3H 4R7	Address:	900 Maple Grove Road, Unit 10 Cambridge ON N3H 4R7	Project #:	TC111504
				Project Name:	Rainy River Proj.
Phone:	(519)650-7100 Fax: (519)653-6554	Phone:	(519)650-7100 x7133 Fax: (519)569-1731	Site #:	
Email:	donna.verbakel@amec.com; Karin.Schmidt@amec.	Email:	Jason.Dietrich@amec.com	Sampled By:	J. Dietrich

CHAIN OF CUSTODY #: C#363006-01-01

PROJECT MANAGER: Gina Baybayan

Regulation 153 (2011)
☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other
☐ Table ___ ☐ For RSC

Other Regulations
☒ CCME ☐ Sanitary Sewer Bylaw
☐ Reg. 558 ☐ Storm Sewer Bylaw
☐ MISA Municipality ___
☒ PWQO
☐ Other ___

SPECIAL INSTRUCTIONS

Include Criteria on Certificate of Analysis (Y/N)? Y

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (Please be specific):

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____ ☐
Rush Confirmation Number: _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Conductivity, T. Cyanide, DOC	Fluoride, Hardness, Ammonia	Mercury, NO2, NO3, pH	TSS	Total Metals	Dissolved Metals	# of Bottles	Comments
1		JON-2	July 12	12:15	water			X	X	X	X	X	X	9	
2		LOS-8	July 16	13:50	water			X	X	X	X	X	X	9	
3		LOS-5	July 16	14:30	water			X	X	X	X	X	X	9	
4		PIN-10	July 17	11:00	water			X	X	X	X	X	X	9	
5		DUP-1	July 17	11:00	water			X	X	X	X	X	X	9	
6															
7															
8															
9															
10															

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
Richard Levi Snook	12/07/18	9:00am	~~DHut~~ DWAYNE FITZSAMES	2012/07/20	9:50	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	16 / 16 / 16°C	Present		
		Intact		

White: Maxxam Yellow: Client

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

Maxxam Analytics International Corporation o/a Maxxam Analytics

WARM ICE packs

Your Project #: MB2B1871
Site Location: TC111504

Attention: SUB CONTRACTOR
MAXXAM ANALYTICS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Report Date: 2012/07/31

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B265841
Received: 2012/07/27, 8:45

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Cadmium - low level CCME - Dissolved	2	N/A	2012/07/31	AB SOP-00043	EPA 200.8
Cadmium - low level CCME (Total)	2	2012/07/27	2012/07/31	AB SOP-00043	EPA 200.8
Hardness	2	N/A	2012/07/30	AB WI-00065	SM 2340B
Elements by ICP - Dissolved	2	N/A	2012/07/30	AB SOP-00042	EPA 200.7
Elements by ICP - Total	2	2012/07/29	2012/07/30	AB SOP-00042	EPA 200.7
Elements by ICPMS - Dissolved	1	N/A	2012/07/30	AB SOP-00043	EPA 200.8
Elements by ICPMS - Dissolved	1	N/A	2012/07/31	AB SOP-00043	EPA 200.8
Elements by ICPMS - Total	2	2012/07/29	2012/07/30	AB SOP-00043	EPA 200.8

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

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

Carmen Mackay, Project Manager Assistant
Email: CMacKay@maxxam.ca
Phone# (403) 291-3077

==========

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: 1

Maxxam Job #: B265841
Report Date: 2012/07/31

MAXXAM ANALYTICS
Client Project #: MB2B1871
Site Location: TC111504
Sampler Initials: D

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		EA7904	EA7904		EA7906		
Sampling Date		2012/07/18 13:30	2012/07/18 13:30		2012/07/18 13:00		
	UNITS	**LOS-3 (OG5738)**	**LOS-3 (OG5738) Lab-Dup**	**RDL**	**LOS-4 (OG5739)**	**RDL**	**QC Batch**
Low Level Elements							
Dissolved Cadmium (Cd)	ug/L	<0.0050	N/A	0.0050	<0.010	0.010	6039918
Elements							
Dissolved Aluminum (Al)	mg/L	0.0017	N/A	0.0010	<0.0020	0.0020	6044238
Dissolved Antimony (Sb)	mg/L	<0.00060	N/A	0.00060	<0.0012	0.0012	6044238
Dissolved Arsenic (As)	mg/L	0.0021	N/A	0.00020	0.0019	0.00040	6044238
Dissolved Barium (Ba)	mg/L	<0.010	<0.010	0.010	0.018	0.010	6043062
Dissolved Beryllium (Be)	mg/L	<0.0010	N/A	0.0010	<0.0020	0.0020	6044238
Dissolved Boron (B)	mg/L	0.021 (1)	0.022	0.020	<0.020	0.020	6043062
Dissolved Calcium (Ca)	mg/L	46 (2)	46	0.30	64 (2)	0.30	6043062
Dissolved Chromium (Cr)	mg/L	<0.0010	N/A	0.0010	<0.0020	0.0020	6044238
Dissolved Cobalt (Co)	mg/L	<0.00030	N/A	0.00030	<0.00060	0.00060	6044238
Dissolved Copper (Cu)	mg/L	<0.00020	N/A	0.00020	<0.00040	0.00040	6044238
Dissolved Iron (Fe)	mg/L	0.077	0.070	0.060	0.11	0.060	6043062
Dissolved Lead (Pb)	mg/L	<0.00020	N/A	0.00020	<0.00040	0.00040	6044238
Dissolved Lithium (Li)	mg/L	<0.020	<0.020	0.020	<0.020	0.020	6043062
Dissolved Magnesium (Mg)	mg/L	27 (2)	27	0.20	24 (2)	0.20	6043062
Dissolved Manganese (Mn)	mg/L	<0.0040	<0.0040	0.0040	0.062	0.0040	6043062
Dissolved Molybdenum (Mo)	mg/L	0.00032	N/A	0.00020	<0.00040	0.00040	6044238
Dissolved Nickel (Ni)	mg/L	0.0012	N/A	0.00050	0.0013	0.0010	6044238
Dissolved Phosphorus (P)	mg/L	<0.10	<0.10	0.10	<0.10	0.10	6043062
Dissolved Potassium (K)	mg/L	<0.30	<0.30	0.30	0.97 (1)	0.30	6043062
Dissolved Selenium (Se)	mg/L	<0.00020	N/A	0.00020	<0.00040	0.00040	6044238
Dissolved Silicon (Si)	mg/L	2.6 (2)	2.7	0.10	3.8	0.10	6043062
Dissolved Silver (Ag)	mg/L	<0.00010	N/A	0.00010	<0.00020	0.00020	6044238
Dissolved Sodium (Na)	mg/L	2.1 (1)	2.1	0.50	1.9	0.50	6043062
Dissolved Strontium (Sr)	mg/L	0.098 (1)	0.099	0.020	0.12 (2)	0.020	6043062
Dissolved Sulphur (S)	mg/L	0.40 (1)	0.40	0.20	0.36	0.20	6043062
Dissolved Thallium (Tl)	mg/L	<0.00020	N/A	0.00020	<0.00040	0.00040	6044238
Dissolved Tin (Sn)	mg/L	<0.0010	N/A	0.0010	<0.0020	0.0020	6044238
Dissolved Titanium (Ti)	mg/L	<0.0010	N/A	0.0010	<0.0020	0.0020	6044238

N/A = Not Applicable
RDL = Reportable Detection Limit
(1) Dissolved greater than total. Results are within limits of uncertainty(MU).
(2) Dissolved greater than total. Results within acceptable limits of precision.

Maxxam Job #: B265841
Report Date: 2012/07/31

MAXXAM ANALYTICS
Client Project #: MB2B1871
Site Location: TC111504
Sampler Initials: D

REGULATED METALS (CCME/AT1) - DISSOLVED

Maxxam ID		EA7904	EA7904		EA7906		
Sampling Date		2012/07/18 13:30	2012/07/18 13:30		2012/07/18 13:00		
	UNITS	**LOS-3 (OG5738)**	**LOS-3 (OG5738) Lab-Dup**	**RDL**	**LOS-4 (OG5739)**	**RDL**	**QC Batch**
Dissolved Uranium (U)	mg/L	0.00056	N/A	0.00010	0.00071	0.00020	6044238
Dissolved Vanadium (V)	mg/L	<0.0010	N/A	0.0010	<0.0020	0.0020	6044238
Dissolved Zinc (Zn)	mg/L	<0.0030	N/A	0.0030	<0.0060	0.0060	6044238

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: B265841
Report Date: 2012/07/31

MAXXAM ANALYTICS
Client Project #: MB2B1871
Site Location: TC111504
Sampler Initials: D

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		EA7904	EA7906		
Sampling Date		2012/07/18 13:30	2012/07/18 13:00		
	UNITS	**LOS-3 (OG5738)**	**LOS-4 (OG5739)**	**RDL**	**QC Batch**
Low Level Elements					
Total Cadmium (Cd)	ug/L	0.0062	0.0092	0.0050	6039919
Elements					
Total Aluminum (Al)	mg/L	0.020	0.17	0.0010	6044220
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	0.00060	6044220
Total Arsenic (As)	mg/L	0.0023	0.0030	0.00020	6044220
Total Barium (Ba)	mg/L	<0.010	0.022	0.010	6043055
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	0.0010	6044220
Total Boron (B)	mg/L	0.020	<0.020	0.020	6043055
Total Calcium (Ca)	mg/L	41	59	0.30	6043055
Total Chromium (Cr)	mg/L	<0.0010	<0.0010	0.0010	6044220
Total Cobalt (Co)	mg/L	<0.00030	0.00058	0.00030	6044220
Total Copper (Cu)	mg/L	<0.00020	0.00027	0.00020	6044220
Total Iron (Fe)	mg/L	0.32	0.67	0.060	6043055
Total Lead (Pb)	mg/L	<0.00020	<0.00020	0.00020	6044220
Total Lithium (Li)	mg/L	<0.020	<0.020	0.020	6043055
Total Magnesium (Mg)	mg/L	25	23	0.20	6043055
Total Manganese (Mn)	mg/L	0.13	0.72	0.0040	6043055
Total Molybdenum (Mo)	mg/L	0.00034	0.00035	0.00020	6044220
Total Nickel (Ni)	mg/L	0.0013	0.0017	0.00050	6044220
Total Phosphorus (P)	mg/L	<0.10	<0.10	0.10	6043055
Total Potassium (K)	mg/L	<0.30	0.96	0.30	6043055
Total Selenium (Se)	mg/L	<0.00020	<0.00020	0.00020	6044220
Total Silicon (Si)	mg/L	2.5	4.1	0.10	6043055
Total Silver (Ag)	mg/L	<0.00010	<0.00010	0.00010	6044220
Total Sodium (Na)	mg/L	1.9	1.9	0.50	6043055
Total Strontium (Sr)	mg/L	0.090	0.11	0.020	6043055
Total Sulphur (S)	mg/L	0.35	0.36	0.20	6043055
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	0.00020	6044220
Total Tin (Sn)	mg/L	<0.0010	<0.0010	0.0010	6044220
Total Titanium (Ti)	mg/L	<0.0010	0.0044	0.0010	6044220
Total Uranium (U)	mg/L	0.00063	0.00076	0.00010	6044220
Total Vanadium (V)	mg/L	0.0010	0.0016	0.0010	6044220
Total Zinc (Zn)	mg/L	0.018	0.0093	0.0030	6044220

RDL = Reportable Detection Limit

Maxxam Job #: B265841
Report Date: 2012/07/31

MAXXAM ANALYTICS
Client Project #: MB2B1871
Site Location: TC111504
Sampler Initials: D

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		EA7904	EA7906		
Sampling Date		2012/07/18 13:30	2012/07/18 13:00		
	UNITS	**LOS-3 (OG5738)**	**LOS-4 (OG5739)**	**RDL**	**QC Batch**
Calculated Parameters					
Hardness (CaCO3)	mg/L	220	260	0.50	6039921

RDL = Reportable Detection Limit

Maxxam Job #: B265841
Report Date: 2012/07/31

MAXXAM ANALYTICS
Client Project #: MB2B1871
Site Location: TC111504
Sampler Initials: D

Package 1	1.4°C

Each temperature is the average of up to three cooler temperatures taken at receipt

REGULATED METALS (CCME/AT1) - DISSOLVED Comments

Sample EA7906-01 Elements by ICPMS - Dissolved: Detection limits raised due to matrix interference.

Results relate only to the items tested.

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB2B1871
P.O. #:
Site Location: TC111504

Quality Assurance Report

Maxxam Job Number: CB265841

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6043055	MAP	Matrix Spike	Total Barium (Ba)	2012/07/30		91	%	80 - 120
			Total Boron (B)	2012/07/30		99	%	80 - 120
			Total Calcium (Ca)	2012/07/30		104	%	80 - 120
			Total Iron (Fe)	2012/07/30		96	%	80 - 120
			Total Lithium (Li)	2012/07/30		93	%	80 - 120
			Total Magnesium (Mg)	2012/07/30		97	%	80 - 120
			Total Manganese (Mn)	2012/07/30		94	%	80 - 120
			Total Phosphorus (P)	2012/07/30		100	%	80 - 120
			Total Potassium (K)	2012/07/30		96	%	80 - 120
			Total Silicon (Si)	2012/07/30		111	%	80 - 120
			Total Sodium (Na)	2012/07/30		NC	%	80 - 120
			Total Strontium (Sr)	2012/07/30		93	%	80 - 120
		Spiked Blank	Total Barium (Ba)	2012/07/30		95	%	80 - 120
			Total Boron (B)	2012/07/30		101	%	80 - 120
			Total Calcium (Ca)	2012/07/30		107	%	80 - 120
			Total Iron (Fe)	2012/07/30		101	%	80 - 120
			Total Lithium (Li)	2012/07/30		97	%	80 - 120
			Total Magnesium (Mg)	2012/07/30		101	%	80 - 120
			Total Manganese (Mn)	2012/07/30		97	%	80 - 120
			Total Phosphorus (P)	2012/07/30		103	%	80 - 120
			Total Potassium (K)	2012/07/30		99	%	80 - 120
			Total Silicon (Si)	2012/07/30		112	%	80 - 120
			Total Sodium (Na)	2012/07/30		98	%	80 - 120
			Total Strontium (Sr)	2012/07/30		98	%	80 - 120
		Method Blank	Total Barium (Ba)	2012/07/30	<0.010		mg/L	
			Total Boron (B)	2012/07/30	<0.020		mg/L	
			Total Calcium (Ca)	2012/07/30	<0.30		mg/L	
			Total Iron (Fe)	2012/07/30	<0.060		mg/L	
			Total Lithium (Li)	2012/07/30	<0.020		mg/L	
			Total Magnesium (Mg)	2012/07/30	<0.20		mg/L	
			Total Manganese (Mn)	2012/07/30	<0.0040		mg/L	
			Total Phosphorus (P)	2012/07/30	<0.10		mg/L	
			Total Potassium (K)	2012/07/30	<0.30		mg/L	
			Total Silicon (Si)	2012/07/30	<0.10		mg/L	
			Total Sodium (Na)	2012/07/30	<0.50		mg/L	
			Total Strontium (Sr)	2012/07/30	<0.020		mg/L	
			Total Sulphur (S)	2012/07/30	<0.20		mg/L	
		RPD	Total Barium (Ba)	2012/07/30	NC		%	20
			Total Boron (B)	2012/07/30	0.7		%	20
			Total Calcium (Ca)	2012/07/30	NC		%	20
			Total Iron (Fe)	2012/07/30	NC		%	20
			Total Lithium (Li)	2012/07/30	NC		%	20
			Total Magnesium (Mg)	2012/07/30	NC		%	20
			Total Manganese (Mn)	2012/07/30	NC		%	20
			Total Phosphorus (P)	2012/07/30	NC		%	20
			Total Potassium (K)	2012/07/30	NC		%	20
			Total Silicon (Si)	2012/07/30	2.5		%	20
			Total Sodium (Na)	2012/07/30	1.6		%	20
			Total Strontium (Sr)	2012/07/30	NC		%	20
			Total Sulphur (S)	2012/07/30	2.0		%	20
6043062	MAP	Matrix Spike [EA7904-01]	Dissolved Barium (Ba)	2012/07/30		102	%	80 - 120
			Dissolved Boron (B)	2012/07/30		99	%	80 - 120
			Dissolved Calcium (Ca)	2012/07/30		108	%	80 - 120
			Dissolved Iron (Fe)	2012/07/30		113	%	80 - 120

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB2B1871
P.O. #:
Site Location: TC111504

Quality Assurance Report (Continued)

Maxxam Job Number: CB265841

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6043062	MAP	Matrix Spike						
		[EA7904-01]	Dissolved Lithium (Li)	2012/07/30		101	%	80 - 120
			Dissolved Magnesium (Mg)	2012/07/30		103	%	80 - 120
			Dissolved Manganese (Mn)	2012/07/30		102	%	80 - 120
			Dissolved Phosphorus (P)	2012/07/30		107	%	80 - 120
			Dissolved Potassium (K)	2012/07/30		102	%	80 - 120
			Dissolved Silicon (Si)	2012/07/30		90	%	80 - 120
			Dissolved Sodium (Na)	2012/07/30		98	%	80 - 120
			Dissolved Strontium (Sr)	2012/07/30		100	%	80 - 120
		Spiked Blank	Dissolved Barium (Ba)	2012/07/30		88	%	80 - 120
			Dissolved Boron (B)	2012/07/30		88	%	80 - 120
			Dissolved Calcium (Ca)	2012/07/30		105	%	80 - 120
			Dissolved Iron (Fe)	2012/07/30		92	%	80 - 120
			Dissolved Lithium (Li)	2012/07/30		84	%	80 - 120
			Dissolved Magnesium (Mg)	2012/07/30		94	%	80 - 120
			Dissolved Manganese (Mn)	2012/07/30		93	%	80 - 120
			Dissolved Phosphorus (P)	2012/07/30		99	%	80 - 120
			Dissolved Potassium (K)	2012/07/30		88	%	80 - 120
			Dissolved Silicon (Si)	2012/07/30		80	%	80 - 120
			Dissolved Sodium (Na)	2012/07/30		85	%	80 - 120
			Dissolved Strontium (Sr)	2012/07/30		87	%	80 - 120
		Method Blank	Dissolved Barium (Ba)	2012/07/30	<0.010		mg/L	
			Dissolved Boron (B)	2012/07/30	<0.020		mg/L	
			Dissolved Calcium (Ca)	2012/07/30	<0.30		mg/L	
			Dissolved Iron (Fe)	2012/07/30	<0.060		mg/L	
			Dissolved Lithium (Li)	2012/07/30	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2012/07/30	<0.20		mg/L	
			Dissolved Manganese (Mn)	2012/07/30	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2012/07/30	<0.10		mg/L	
			Dissolved Potassium (K)	2012/07/30	<0.30		mg/L	
			Dissolved Silicon (Si)	2012/07/30	<0.10		mg/L	
			Dissolved Sodium (Na)	2012/07/30	<0.50		mg/L	
			Dissolved Strontium (Sr)	2012/07/30	<0.020		mg/L	
			Dissolved Sulphur (S)	2012/07/30	<0.20		mg/L	
		RPD [EA7904-01]	Dissolved Barium (Ba)	2012/07/30	NC		%	20
			Dissolved Boron (B)	2012/07/30	NC		%	20
			Dissolved Calcium (Ca)	2012/07/30	0.9		%	20
			Dissolved Iron (Fe)	2012/07/30	NC		%	20
			Dissolved Lithium (Li)	2012/07/30	NC		%	20
			Dissolved Magnesium (Mg)	2012/07/30	1.9		%	20
			Dissolved Manganese (Mn)	2012/07/30	NC		%	20
			Dissolved Phosphorus (P)	2012/07/30	NC		%	20
			Dissolved Potassium (K)	2012/07/30	NC		%	20
			Dissolved Silicon (Si)	2012/07/30	2.1		%	20
			Dissolved Sodium (Na)	2012/07/30	NC		%	20
			Dissolved Strontium (Sr)	2012/07/30	NC		%	20
			Dissolved Sulphur (S)	2012/07/30	NC		%	20
6044220	NR	Matrix Spike	Total Aluminum (Al)	2012/07/30		100	%	80 - 120
			Total Antimony (Sb)	2012/07/30		117	%	80 - 120
			Total Arsenic (As)	2012/07/30		99	%	80 - 120
			Total Beryllium (Be)	2012/07/30		95	%	80 - 120
			Total Chromium (Cr)	2012/07/30		94	%	80 - 120
			Total Cobalt (Co)	2012/07/30		96	%	80 - 120
			Total Copper (Cu)	2012/07/30		91	%	80 - 120
			Total Lead (Pb)	2012/07/30		96	%	80 - 120

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB2B1871
P.O. #:
Site Location: TC111504

Quality Assurance Report (Continued)

Maxxam Job Number: CB265841

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6044220	NR	Matrix Spike	Total Molybdenum (Mo)	2012/07/30		109	%	80 - 120
			Total Nickel (Ni)	2012/07/30		92	%	80 - 120
			Total Selenium (Se)	2012/07/30		86	%	80 - 120
			Total Silver (Ag)	2012/07/30		101	%	80 - 120
			Total Thallium (Tl)	2012/07/30		94	%	80 - 120
			Total Tin (Sn)	2012/07/30		111	%	80 - 120
			Total Titanium (Ti)	2012/07/30		98	%	80 - 120
			Total Uranium (U)	2012/07/30		100	%	80 - 120
			Total Vanadium (V)	2012/07/30		100	%	80 - 120
			Total Zinc (Zn)	2012/07/30		110	%	80 - 120
		Spiked Blank	Total Aluminum (Al)	2012/07/30		106	%	80 - 120
			Total Antimony (Sb)	2012/07/30		113	%	80 - 120
			Total Arsenic (As)	2012/07/30		99	%	80 - 120
			Total Beryllium (Be)	2012/07/30		94	%	80 - 120
			Total Chromium (Cr)	2012/07/30		96	%	80 - 120
			Total Cobalt (Co)	2012/07/30		97	%	80 - 120
			Total Copper (Cu)	2012/07/30		97	%	80 - 120
			Total Lead (Pb)	2012/07/30		99	%	80 - 120
			Total Molybdenum (Mo)	2012/07/30		103	%	80 - 120
			Total Nickel (Ni)	2012/07/30		96	%	80 - 120
			Total Selenium (Se)	2012/07/30		90	%	80 - 120
			Total Silver (Ag)	2012/07/30		105	%	80 - 120
			Total Thallium (Tl)	2012/07/30		93	%	80 - 120
			Total Tin (Sn)	2012/07/30		109	%	80 - 120
			Total Titanium (Ti)	2012/07/30		99	%	80 - 120
			Total Uranium (U)	2012/07/30		101	%	80 - 120
			Total Vanadium (V)	2012/07/30		99	%	80 - 120
			Total Zinc (Zn)	2012/07/30		115	%	80 - 120
		Method Blank	Total Aluminum (Al)	2012/07/30	0.0012, RDL=0.0010		mg/L	
			Total Antimony (Sb)	2012/07/30	<0.00060		mg/L	
			Total Arsenic (As)	2012/07/30	<0.00020		mg/L	
			Total Beryllium (Be)	2012/07/30	<0.0010		mg/L	
			Total Chromium (Cr)	2012/07/30	<0.0010		mg/L	
			Total Cobalt (Co)	2012/07/30	<0.00030		mg/L	
			Total Copper (Cu)	2012/07/30	0.00021, RDL=0.00020		mg/L	
			Total Lead (Pb)	2012/07/30	<0.00020		mg/L	
			Total Molybdenum (Mo)	2012/07/30	<0.00020		mg/L	
			Total Nickel (Ni)	2012/07/30	<0.00050		mg/L	
			Total Selenium (Se)	2012/07/30	<0.00020		mg/L	
			Total Silver (Ag)	2012/07/30	<0.00010		mg/L	
			Total Thallium (Tl)	2012/07/30	<0.00020		mg/L	
			Total Tin (Sn)	2012/07/30	<0.0010		mg/L	
			Total Titanium (Ti)	2012/07/30	<0.0010		mg/L	
			Total Uranium (U)	2012/07/30	<0.00010		mg/L	
			Total Vanadium (V)	2012/07/30	<0.0010		mg/L	
			Total Zinc (Zn)	2012/07/30	<0.0030		mg/L	
		RPD	Total Aluminum (Al)	2012/07/30	7.4		%	20
			Total Antimony (Sb)	2012/07/30	NC		%	20
			Total Arsenic (As)	2012/07/30	NC		%	20
			Total Beryllium (Be)	2012/07/30	NC		%	20
			Total Chromium (Cr)	2012/07/30	NC		%	20
			Total Cobalt (Co)	2012/07/30	NC		%	20
			Total Copper (Cu)	2012/07/30	NC		%	20
			Total Lead (Pb)	2012/07/30	NC		%	20
			Total Molybdenum (Mo)	2012/07/30	1.4		%	20

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB2B1871
P.O. #:
Site Location: TC111504

Quality Assurance Report (Continued)

Maxxam Job Number: CB265841

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6044220	NR	RPD	Total Nickel (Ni)	2012/07/30	NC		%	20
			Total Selenium (Se)	2012/07/30	NC		%	20
			Total Silver (Ag)	2012/07/30	NC		%	20
			Total Thallium (Tl)	2012/07/30	NC		%	20
			Total Tin (Sn)	2012/07/30	NC		%	20
			Total Titanium (Ti)	2012/07/30	NC		%	20
			Total Uranium (U)	2012/07/30	NC		%	20
			Total Vanadium (V)	2012/07/30	NC		%	20
			Total Zinc (Zn)	2012/07/30	NC		%	20
6044238	NR	Matrix Spike	Dissolved Aluminum (Al)	2012/07/30		NC	%	80 - 120
			Dissolved Arsenic (As)	2012/07/30		105	%	80 - 120
			Dissolved Beryllium (Be)	2012/07/30		99	%	80 - 120
			Dissolved Chromium (Cr)	2012/07/30		98	%	80 - 120
			Dissolved Cobalt (Co)	2012/07/30		95	%	80 - 120
			Dissolved Copper (Cu)	2012/07/30		88	%	80 - 120
			Dissolved Lead (Pb)	2012/07/30		93	%	80 - 120
			Dissolved Molybdenum (Mo)	2012/07/30		112	%	80 - 120
			Dissolved Nickel (Ni)	2012/07/30		95	%	80 - 120
			Dissolved Selenium (Se)	2012/07/30		103	%	80 - 120
			Dissolved Silver (Ag)	2012/07/30		103	%	80 - 120
			Dissolved Thallium (Tl)	2012/07/30		95	%	80 - 120
			Dissolved Tin (Sn)	2012/07/30		118	%	80 - 120
			Dissolved Titanium (Ti)	2012/07/30		105	%	80 - 120
			Dissolved Uranium (U)	2012/07/30		103	%	80 - 120
			Dissolved Vanadium (V)	2012/07/30		105	%	80 - 120
			Dissolved Zinc (Zn)	2012/07/30		NC	%	80 - 120
		Spiked Blank	Dissolved Aluminum (Al)	2012/07/30		105	%	80 - 120
			Dissolved Antimony (Sb)	2012/07/30		91	%	80 - 120
			Dissolved Arsenic (As)	2012/07/30		99	%	80 - 120
			Dissolved Beryllium (Be)	2012/07/30		95	%	80 - 120
			Dissolved Chromium (Cr)	2012/07/30		97	%	80 - 120
			Dissolved Cobalt (Co)	2012/07/30		96	%	80 - 120
			Dissolved Copper (Cu)	2012/07/30		98	%	80 - 120
			Dissolved Lead (Pb)	2012/07/30		97	%	80 - 120
			Dissolved Molybdenum (Mo)	2012/07/30		98	%	80 - 120
			Dissolved Nickel (Ni)	2012/07/30		98	%	80 - 120
			Dissolved Selenium (Se)	2012/07/30		96	%	80 - 120
			Dissolved Silver (Ag)	2012/07/30		105	%	80 - 120
			Dissolved Thallium (Tl)	2012/07/30		96	%	80 - 120
			Dissolved Tin (Sn)	2012/07/30		102	%	80 - 120
			Dissolved Titanium (Ti)	2012/07/30		97	%	80 - 120
			Dissolved Uranium (U)	2012/07/30		101	%	80 - 120
			Dissolved Vanadium (V)	2012/07/30		100	%	80 - 120
			Dissolved Zinc (Zn)	2012/07/30		101	%	80 - 120
		Method Blank	Dissolved Aluminum (Al)	2012/07/30	<0.0010		mg/L	
			Dissolved Antimony (Sb)	2012/07/30	<0.00060		mg/L	
			Dissolved Arsenic (As)	2012/07/30	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2012/07/30	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2012/07/30	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2012/07/30	<0.00030		mg/L	
			Dissolved Copper (Cu)	2012/07/30	<0.00020		mg/L	
			Dissolved Lead (Pb)	2012/07/30	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2012/07/30	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2012/07/30	<0.00050		mg/L	
			Dissolved Selenium (Se)	2012/07/30	<0.00020		mg/L	

MAXXAM ANALYTICS
Attention: SUB CONTRACTOR
Client Project #: MB2B1871
P.O. #:
Site Location: TC111504

Quality Assurance Report (Continued)

Maxxam Job Number: CB265841

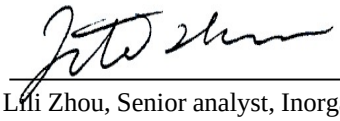
QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	UNITS	QC Limits
6044238	NR	Method Blank	Dissolved Silver (Ag)	2012/07/30	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2012/07/30	<0.00020		mg/L	
			Dissolved Tin (Sn)	2012/07/30	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2012/07/30	<0.0010		mg/L	
			Dissolved Uranium (U)	2012/07/30	<0.00010		mg/L	
			Dissolved Vanadium (V)	2012/07/30	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2012/07/30	<0.0030		mg/L	
		RPD	Dissolved Aluminum (Al)	2012/07/30	NC		%	20
			Dissolved Antimony (Sb)	2012/07/30	NC		%	20
			Dissolved Arsenic (As)	2012/07/30	NC		%	20
			Dissolved Beryllium (Be)	2012/07/30	NC		%	20
			Dissolved Chromium (Cr)	2012/07/30	NC		%	20
			Dissolved Cobalt (Co)	2012/07/30	NC		%	20
			Dissolved Copper (Cu)	2012/07/30	NC		%	20
			Dissolved Lead (Pb)	2012/07/30	NC		%	20
			Dissolved Molybdenum (Mo)	2012/07/30	NC		%	20
			Dissolved Nickel (Ni)	2012/07/30	NC		%	20
			Dissolved Selenium (Se)	2012/07/30	NC		%	20
			Dissolved Silver (Ag)	2012/07/30	NC		%	20
			Dissolved Thallium (Tl)	2012/07/30	NC		%	20
			Dissolved Tin (Sn)	2012/07/30	NC		%	20
			Dissolved Titanium (Ti)	2012/07/30	NC		%	20
			Dissolved Uranium (U)	2012/07/30	1.1		%	20
			Dissolved Vanadium (V)	2012/07/30	NC		%	20
			Dissolved Zinc (Zn)	2012/07/30	NC		%	20

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 to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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.
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 #: B265841

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



Lili Zhou, Senior analyst, Inorganic department.

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Your Project #: TC111504
Site Location: RAINY RIVER PROJ
Your C.O.C. #: 36300601, 363006-01-01

Attention: Jason Dietrich
AMEC Environment & Infrastructure
160 Traders Blvd
Mississauga, ON
CANADA L4Z3K7

Report Date: 2012/08/02

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B2B1871
Received: 2012/07/25, 08:55

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Conductivity	2	N/A	2012/07/26	CAM SOP-00448	SM 2510
Total Cyanide	2	2012/07/25	2012/07/26	CAM SOP-00457	Ontario MOE CN-E3015
Dissolved Organic Carbon (DOC)	2	N/A	2012/07/26	CAM SOP-00446	SM 5310 B
Fluoride	2	2012/07/25	2012/07/26	CAM SOP-00448	APHA 4500FC
Mercury (low level)	2	2012/07/30	2012/07/30	CAM SOP-00453	EPA 7470
Ammonia-N (low level)	2	N/A	2012/07/26	CAM SOP-00441	US GS I-2522-90
Nitrate (NO3) and Nitrite (NO2) in Water (1)	2	N/A	2012/07/26	CAM SOP-00440	SM 4500 NO3I/NO2B
pH	2	N/A	2012/07/26	CAM SOP-00448	SM 4500H+ B
Low Level Total Suspended Solids	2	N/A	2012/07/26	CAM SOP-00428	SM 2540D

Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
* Results relate only to the items tested.

(1) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

../2

Maxxam Job #: B2B1871
Report Date: 2012/08/02

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER PROJ

Encryption Key

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

Gina Baybayan,
Email: GBAYBAYAN@maxxam.ca
Phone# (905) 817-5766

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Total cover pages: 2

Maxxam Job #: B2B1871
Report Date: 2012/08/02

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER PROJ

RESULTS OF ANALYSES OF WATER

Maxxam ID			OG5738	OG5738	OG5739	OG5739		
Sampling Date			2012/07/18 13:30	2012/07/18 13:30	2012/07/18 13:00	2012/07/18 13:00		
	Units	**Criteria A**	**LOS-3**	**LOS-3 Lab-Dup**	**LOS-4**	**LOS-4 Lab-Dup**	**RDL**	**QC Batch**
Inorganics								
Total Ammonia-N	mg/L		0.05		0.04		0.01	2919282
Conductivity	umho/cm		380	380	440		1.0	2919548
Fluoride (F-)	mg/L		0.12	0.12	0.13		0.10	2919549
Dissolved Organic Carbon	mg/L		16		18	18	0.20	2919538
pH	pH	**6.5:8.5**	8.11	8.11	7.80			2919550
Total Suspended Solids	mg/L		3		13		1	2919591
Total Cyanide (CN)	mg/L		<0.0050		<0.0050		0.0050	2919557
Nitrite (N)	mg/L		<0.010		<0.010		0.010	2919363
Nitrate (N)	mg/L		<0.10		<0.10		0.10	2919363
Nitrate + Nitrite	mg/L		<0.10		<0.10		0.10	2919363

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID			OG5738	OG5739		
Sampling Date			2012/07/18 13:30	2012/07/18 13:00		
	Units	**Criteria A**	**LOS-3**	**LOS-4**	**RDL**	**QC Batch**
Metals						
Mercury (Hg)	ug/L	**0.2**	<0.01	<0.01	0.01	2923047

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria A: ONTARIO PROVINCIAL WATER QUALITY OBJECTIVES
Ref. to MOEE Water Management document dated Feb.1999

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B2B1871
Report Date: 2012/08/02

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER PROJ

Test Summary

Maxxam ID OG5738 **Collected** 2012/07/18
Sample ID LOS-3 **Shipped**
Matrix Water **Received** 2012/07/25

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2919548	N/A	2012/07/26	Surinder Rai
Total Cyanide	TECH/CN	2919557	2012/07/25	2012/07/26	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2919538	N/A	2012/07/26	Charles Opoku-Ware
Fluoride	F	2919549	2012/07/25	2012/07/26	Surinder Rai
Mercury (low level)	CVAA	2923047	2012/07/30	2012/07/30	Lawrence Cheung
Ammonia-N (low level)	LACH/NH4	2919282	N/A	2012/07/26	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2919363	N/A	2012/07/26	Chris Li
pH	PH	2919550	N/A	2012/07/26	Surinder Rai
Low Level Total Suspended Solids	SLDS	2919591	N/A	2012/07/26	Iqbal Hasan

Maxxam ID OG5738 Dup **Collected** 2012/07/18
Sample ID LOS-3 **Shipped**
Matrix Water **Received** 2012/07/25

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2919548	N/A	2012/07/26	Surinder Rai
Fluoride	F	2919549	2012/07/25	2012/07/26	Surinder Rai
pH	PH	2919550	N/A	2012/07/26	Surinder Rai

Maxxam ID OG5739 **Collected** 2012/07/18
Sample ID LOS-4 **Shipped**
Matrix Water **Received** 2012/07/25

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Conductivity	COND	2919548	N/A	2012/07/26	Surinder Rai
Total Cyanide	TECH/CN	2919557	2012/07/25	2012/07/26	Louise Harding
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2919538	N/A	2012/07/26	Charles Opoku-Ware
Fluoride	F	2919549	2012/07/25	2012/07/26	Surinder Rai
Mercury (low level)	CVAA	2923047	2012/07/30	2012/07/30	Lawrence Cheung
Ammonia-N (low level)	LACH/NH4	2919282	N/A	2012/07/26	Anastasia Hamanov
Nitrate (NO3) and Nitrite (NO2) in Water	LACH	2919363	N/A	2012/07/26	Chris Li
pH	PH	2919550	N/A	2012/07/26	Surinder Rai

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Maxxam Job #: B2B1871
Report Date: 2012/08/02

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER PROJ

Test Summary

Low Level Total Suspended Solids	SLDS	2919591	N/A	2012/07/26	Iqbal Hasan

Maxxam ID OG5739 Dup
Sample ID LOS-4
Matrix Water

Collected 2012/07/18
Shipped
Received 2012/07/25

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dissolved Organic Carbon (DOC)	TOCV/NDIR	2919538	N/A	2012/07/26	Charles Opoku-Ware

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Maxxam Job #: B2B1871
Report Date: 2012/08/02

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER PROJ

Package 1	19.7°C

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Samples received at a temperature above 10 C. Analysis performed with client's consent.

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Maxxam Job #: B2B1871
Report Date: 2012/08/02

AMEC Environment & Infrastructure
Client Project #: TC111504
Site Location: RAINY RIVER PROJ

QUALITY ASSURANCE REPORT

			Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2919282	Total Ammonia-N	2012/07/26	96	80 - 120	102	80 - 120	<0.01	mg/L	NC	20		
2919363	Nitrite (N)	2012/07/26	105	80 - 120	102	85 - 115	<0.010	mg/L	NC	25		
2919363	Nitrate (N)	2012/07/26	92	80 - 120	108	85 - 115	<0.10	mg/L	NC	25		
2919538	Dissolved Organic Carbon	2012/07/26	NC(1)	80 - 120	92	80 - 120	<0.20	mg/L	0.3(2)	20		
2919548	Conductivity	2012/07/26					<1.0	umho/cm	0.3(3)	25	103	85 - 115
2919549	Fluoride (F-)	2012/07/26	111(4)	80 - 120	103	80 - 120	<0.10	mg/L	NC(3)	20		
2919557	Total Cyanide (CN)	2012/07/26	98	80 - 120	101	80 - 120	<0.0050	mg/L	NC	20		
2919591	Total Suspended Solids	2012/07/26					<1	mg/L	NC	25	93	85 - 115
2923047	Mercury (Hg)	2012/07/30	104	80 - 120	102	80 - 120	<0.01	ug/L	NC	20		

N/A = Not Applicable
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.
QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
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.
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) - Matrix Spike Parent ID [OG5739-06]
(2) - Duplicate Parent ID [OG5739-06]
(3) - Duplicate Parent ID [OG5738-01]
(4) - Matrix Spike Parent ID [OG5738-01]

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Validation Signature Page

Maxxam Job #: B2B1871

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

Cristina Carriere, Scientific Services

==========

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25-Jul-12 08:55
Gina Baybayan
B2B1871
M_P ENV-848

Maxxam Analytics International Corporation o/a Maxxam Analytics

CHAIN OF CUSTODY

6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5779 www.maxxam.ca

IMMEDIATE TEST

Page of

Only:

BOTTLE ORDER #: 363006

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:	
Company Name:	#19056 AMEC Environment & Infrastructure	Company Name:	#12864 AMEC Environment & Infrastructure	Quotation #:	B24455
Contact Name:	Donna Verbakel	Contact Name:	Jason Dietrich	P.O. #:	
Address:	900 Maple Grove Rd Unit 10 Cambridge ON N3H 4R7	Address:	900 Maple Grove Road, Unit 10 Cambridge ON N3H 4R7	Project #:	TC111504
Phone:	(519)650-7100 Fax: (519)653-6554	Phone:	(519)650-7100 x7133 Fax: (519)569-1731	Project Name:	Rainy River Proj.
Email:	donna.verbakel@amec.com; Karin.Schmidt@amec.	Email:	Jason.Dietrich@amec.com	Site #:	
				Sampled By:	J. Dietrich

CHAIN OF CUSTODY #: C#363006-01-01

PROJECT MANAGER: Gina Baybayan

Regulation 153 (2011)

- [ ] Table 1 [ ] Res/Park [ ] Medium/Fine
- [ ] Table 2 [ ] Ind/Comm [ ] Coarse
- [ ] Table 3 [ ] Agri/Other
- [ ] Table ___ [ ] For RSC

Other Regulations

- [X] CCME [ ] Sanitary Sewer Bylaw
- [ ] Reg. 558 [ ] Storm Sewer Bylaw
- [ ] MISA Municipality _____
- [X] PWQO
- [ ] Other _____

SPECIAL INSTRUCTIONS

Include Criteria on Certificate of Analysis (Y/N)? Y

Note: For MOE regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: [X]
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)

Date Required: _____ Time Required: _____ [ ]

Rush Confirmation Number: _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Conductivity, T. Cyanide, DOC	Fluoride, Hardness, Ammonia	Mercury, NO2, NO3, pH	TSS	Total Metals	Dissolved metals	# of Bottles	Comments
1		LOS-3	July 18 2012	13:30	water			X	X	X	X	X	X		
2		LOS-4	July 18 2012	13:00	water			X	X	X	X	X	X		
3															
4															
5															
6															
7															
8															
9															
10															

RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
	2012/07/23	08:00	DHAYNOFIIZSAMES	2012/07/25	8:55	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
	20/20/19°	Present		
		Intact		

White: Maxxam Yellow: Client

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

warm ice packs

AMEC
ATTN: Jason Dietrich
900 Maple Grove Rd. Unit 10
Cambridge ON N3H 4R7

Date Received: 05-SEP-12
Report Date: 14-SEP-12 14:43 (MT)
Version: FINAL

Client Phone: 519-650-7153

Certificate of Analysis

Lab Work Order #: L1204882

Project P.O. #: NOT SUBMITTED
Job Reference: TC111504
C of C Numbers:
Legal Site Desc:

Karen Rutledge
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1204882-1				
	Description	WATER				
	Sampled Date	29-AUG-12				
	Sampled Time	12:30				
	Client ID	LOS-11				
Grouping	**Analyte**					
WATER						
Physical Tests	Color, True (T.C.U.)	181				
	Conductivity (EC) (uS/cm)	238				
	Hardness (as CaCO3) (mg/L)	129				
	pH (pH)	7.16				
	Total Suspended Solids (mg/L)	72.6				
	Total Dissolved Solids (mg/L)	236				
	Turbidity (NTU)	35.0				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	13.6				
	Alkalinity, Bicarbonate (as CaCO3) (mg/L CaCO3)	121				
	Alkalinity, Carbonate (as CaCO3) (mg/L CaCO3)	<5.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L CaCO3)	<5.0				
	Alkalinity, Total (as CaCO3) (mg/L CaCO3)	121				
	Ammonia, Total (as N) (mg/L)	0.122				
	Chloride (Cl) (mg/L)	2.00				
	Fluoride (F) (mg/L)	0.040				
	Nitrate and Nitrite as N (mg/L)	<0.030				
	Nitrate (as N) (mg/L)	<0.030				
	Nitrite (as N) (mg/L)	<0.020				
	Total Kjeldahl Nitrogen (mg/L)	4.06				
	Orthophosphate-Dissolved (as P) (mg/L)	0.0997				
	Phosphorus (P)-Total Dissolved (mg/L)	0.0919				
	Phosphorus (P)-Total (mg/L)	0.370				
	Silica, Reactive (as SiO2) (mg/L)	15.7				
	Sulfate (SO4) (mg/L)	<0.30				
	Sulphide (mg/L)	0.127				
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0020				
	Cyanide, Total (mg/L)	<0.0020				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	26.8				
	Total Organic Carbon (mg/L)	34.2				
Total Metals	Aluminum (Al)-Total (mg/L)	0.523				
	Antimony (Sb)-Total (mg/L)	<0.00010				
	Arsenic (As)-Total (mg/L)	0.00150				
	Barium (Ba)-Total (mg/L)	0.0311				
	Beryllium (Be)-Total (mg/L)	<0.000060				
	Bismuth (Bi)-Total (mg/L)	<0.00020				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1204882-1				
	Description	WATER				
	Sampled Date	29-AUG-12				
	Sampled Time	12:30				
	Client ID	LOS-11				
Grouping	**Analyte**					
WATER						
Total Metals	Boron (B)-Total (mg/L)	0.0168				
	Cadmium (Cd)-Total (mg/L)	<0.000010				
	Calcium (Ca)-Total (mg/L)	38.1				
	Chromium (Cr)-Total (mg/L)	0.00128				
	Cobalt (Co)-Total (mg/L)	0.000976				
	Copper (Cu)-Total (mg/L)	0.00150				
	Iron (Fe)-Total (mg/L)	1.29				
	Lead (Pb)-Total (mg/L)	0.00055				
	Lithium (Li)-Total (mg/L)	0.0108				
	Magnesium (Mg)-Total (mg/L)	19.4				
	Manganese (Mn)-Total (mg/L)	1.10				
	Mercury (Hg)-Total (mg/L)	<0.000010				
	Molybdenum (Mo)-Total (mg/L)	<0.00020				
	Nickel (Ni)-Total (mg/L)	0.0014				
	Potassium (K)-Total (mg/L)	2.31				
	Selenium (Se)-Total (mg/L)	<0.00050				
	Silver (Ag)-Total (mg/L)	<0.000050				
	Sodium (Na)-Total (mg/L)	5.07				
	Strontium (Sr)-Total (mg/L)	0.0670				
	Tellurium (Te)-Total (mg/L)	<0.000070				
	Thallium (Tl)-Total (mg/L)	<0.000030				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	0.0164				
	Tungsten (W)-Total (mg/L)	<0.00010				
	Uranium (U)-Total (mg/L)	0.000111				
	Vanadium (V)-Total (mg/L)	0.00113				
	Zinc (Zn)-Total (mg/L)	0.0138				
	Zirconium (Zr)-Total (mg/L)	0.00040				
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0146				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	0.00158				
	Barium (Ba)-Dissolved (mg/L)	0.0247				
	Beryllium (Be)-Dissolved (mg/L)	<0.000060				
	Bismuth (Bi)-Dissolved (mg/L)	<0.00020				
	Boron (B)-Dissolved (mg/L)	0.0107				
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010				
	Calcium (Ca)-Dissolved (mg/L)	28.6				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1204882-1
	Description	WATER
	Sampled Date	29-AUG-12
	Sampled Time	12:30
	Client ID	LOS-11
Grouping	**Analyte**	
WATER		
Dissolved Metals	Chromium (Cr)-Dissolved (mg/L)	<0.00050
	Cobalt (Co)-Dissolved (mg/L)	0.000478
	Copper (Cu)-Dissolved (mg/L)	<0.00070
	Iron (Fe)-Dissolved (mg/L)	0.223
	Lead (Pb)-Dissolved (mg/L)	<0.00010
	Lithium (Li)-Dissolved (mg/L)	0.0069
	Magnesium (Mg)-Dissolved (mg/L)	13.9
	Manganese (Mn)-Dissolved (mg/L)	0.649
	Mercury (Hg)-Dissolved (mg/L)	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	<0.00020
	Nickel (Ni)-Dissolved (mg/L)	<0.0010
	Potassium (K)-Dissolved (mg/L)	0.982
	Selenium (Se)-Dissolved (mg/L)	<0.00050
	Silver (Ag)-Dissolved (mg/L)	<0.000050
	Sodium (Na)-Dissolved (mg/L)	2.54
	Strontium (Sr)-Dissolved (mg/L)	0.0609
	Tellurium (Te)-Dissolved (mg/L)	<0.000070
	Thallium (Tl)-Dissolved (mg/L)	<0.000030
	Tin (Sn)-Dissolved (mg/L)	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	0.00074
	Tungsten (W)-Dissolved (mg/L)	<0.00010
	Uranium (U)-Dissolved (mg/L)	0.000054
	Vanadium (V)-Dissolved (mg/L)	<0.00020
	Zinc (Zn)-Dissolved (mg/L)	<0.0020
	Zirconium (Zr)-Dissolved (mg/L)	0.00015
Aggregate Organics	Biochemical Oxygen Demand (mg/L)	9.2
	Chemical Oxygen Demand (mg/L)	156
	Oil and Grease, Total (mg/L)	<2.0
	Animal/Veg Oil & Grease (mg/L)	<1.0
	Mineral Oil and Grease (mg/L)	<1.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
SFPL	Sample was Filtered and Preserved at the laboratory - DOC, Dissolved metals,Dissolved mercury, Dissolved phosphorous

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Dissolved Organic Carbon	G	L1204882-1
Comments:	Matrix interference suspected. vg		
Matrix Spike	Phosphorus (P)-Total Dissolved	MS-B	L1204882-1
Matrix Spike	Ammonia, Total (as N)	MS-B	L1204882-1
Matrix Spike	Silica, Reactive (as SiO2)	MS-B	L1204882-1
Matrix Spike	Total Kjeldahl Nitrogen	MS-B	L1204882-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
G	QC result did not meet ALS DQO. Refer to narrative comments for further information.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-TB	Water	Acidity (as CaCO3)	APHA 2310 B-POTENTIOMETRIC TITRATION
Aqueous matrices are analyzed by potentiometry. Acidity reported includes acidity caused by hydrolyzable metals present in the sample.			
ALK-TOT-CAP-TB	Water	Alkalinity, Total (as CaCO3)	APHA 2320 B-Auto-Pot. Titration
BIC-TB	Water	Bicarbonate (HCO3)	APHA 2320 B-POTENTIOMETRIC TITRATION
BOD-TB	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
C-DIS-ORG-TB	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
C-TOT-ORG-TB	Water	Total Organic Carbon (TOC)	APHA 5310 B-Instrumental
CL-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)
Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.			
CN-TOT-WT	Water	Cyanide, Total	APHA 4500CN C E-STRONG ACID DIST COLORIM
Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex. When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference			
CN-WAD-WT	Water	Cyanide, Weak Acid Diss	APHA 4500CN I-Weak acid Dist Colorimet
Weak acid dissociable cyanide (WAD) is determined by undergoing a distillation procedure. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.			
CO3-TB	Water	Carbonate (CO3)	APHA 2320 B-Potentiometric Titration
COD-TB	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry
COLOUR-TB	Water	Colour, True	CPPA H.5P Spectrophotometry
EC-CAP-TB	Water	Conductivity (EC)	APHA 2510 B-ELECTRODE
ETL-N2N3-TB	Water	Calculate from NO2 + NO3	Calculation
F-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)
Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.			
HARDNESS-CALC-TB	Water	Hardness (as CaCO3)	CALCULATION
HG-D-CVAF-TB	Water	Dissolved Mercury in Water by CVAFS	EPA 245.7
HG-T-CVAF-TB	Water	Total Mercury in Water by CVAFS	EPA 245.7
MET-D-L-MS-TB	Water	Dissolved Metals by ICPMS	APHA 3030B/EPA 6020A
This analysis involves filtration (APHA 3030B) and analysis by inductively coupled plasma - mass spectrometry (EPA Method 6020A).			
MET-T-L-MS-TB	Water	Total Metals in Water by ICPMS (Low)	APHA 3120 B-ICPMS
N-TOTKJ-TB	Water	Total Kjeldahl Nitrogen by Colourimetry	APHA 4500-Norg B (modified)

Reference Information

Total Kjeldahl Nitrogen in aqueous matrices is analyzed using an autoanalyzer with colourimetric detection.

NH3-COL-TB	Water	Ammonia by Discrete Analyzer	APHA 4500-NH3 G. (modified)

Ammonia in aqueous matrices is analyzed using discrete analyzer with colourimetric detection.

NO2-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

NO3-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

OGG-SPEC-WT	Water	Speciated Oil and Grease-Gravimetric	APHA 5520 B

Sample is extracted with hexane, sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.

OH-TB	Water	Hydroxide	APHA 2320 B-Potentiometric Titration
P-T-COL-TB	Water	Total Phosphorus by Discrete Analyzer	APHA 4500-P B, F, G (modified)

Phosphorus in aqueous matrices is analyzed using discrete Analyzer with colourimetric detection.

P-TD-COL-TB	Water	Total Dissolved Phosphorus in Water	APHA 4500-P B, F, G (modified)

Phosphorus in aqueous matrices is analyzed using discrete Analyzer with colourimetric detection.

PH-CAP-TB	Water	pH	APHA 4500-H-ELECTRODE
PO4-DO-COL-TB	Water	Dissolved Orthophosphate	APHA 4500-P B, F, G (modified)

Phosphorus in aqueous matrices is analyzed using discrete Analyzer with colourimetric detection.

SIO2-COL-WP	Water	Reactive Silica by colour	APHA 4500 SIO2

This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 "Silica". Molybdate Reactive Silica is determined by analysis of the sample using the heteropoly blue colourimetric method.

SO4-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

SOLIDS-TDS-TB	Water	Total Dissolved Solids	APHA 2540 C (modified)

Aqueous matrices are analyzed using gravimetry and evaporation

SOLIDS-TOTSUS-TB	Water	Total Suspended Solids	APHA 2540 D (modified)

Aqueous matrices are analyzed using gravimetry

SULPHIDE-WT	Water	Sulphide	APHA 4500S2D
TURBIDITY-TB	Water	Turbidity	APHA 2130 B-Nephelometer

Aqueous matrices are analyzed using nephelometry with the light scatter measured at a 90” angle.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

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ALS Environmen

L1204882-COFC

tario P7B 5N3 Canada PHONE +1 807 623 6463 FAX +1 807 623 7598
Campbell Brothers Limited Company www.alsglobal.com

L1204882 Page __ of __

Company:	AMEC	Regulatory Information	Both questions below must answered for water samples
Contact:	Jason Dietrich	☐ O. Reg 153 (O. Reg 511 Amend) Table:_____	Are any samples taken from a regulated DW System? ☐ Yes ☐ No
Address:	900 Maple Grove Rd, Unit 10	Record of Site Condition ☐ Yes ☐ No	If yes, an authorized DW COC must be used.
	Cambridge, ON, N3H 4R7	PWQO ☒ MISA ☐ MMER ☐ CCME ☒	Is the water sampled intended for human consumption? ☐ Yes ☐ No
Phone:	(519) 650-7133 Fax:	Guideline Required:	
Email:	jason.dietrich@amec.com	TCLP Regulation 558 ☐ Other:	Analysis Request
Project:	TC111504 PO:	Service Requested	Please indicate below Filtered, Preserved or both (F, P, F/P)
Quote #	Q36013	☒ Regular TAT (7 Days)	
Invoice To:	Same as Report: ☒ Yes ☐ No	☐ Priority TAT 50% Surcharge (3-5 Days)	
Company:		☐ Emergency TAT 100% Surcharge (1-2 Days)	
Contact:		Specify Date Required:	
Address:		All TAT quoted material is in business days which exclude statutory holidays and weekends. Samples received past 3:00pm or Saturday/Sunday begin the next day.	
Email:			
Account Manager	Karen	Sampler: Levi Snook	

Sample #	Sample Identification (This description will appear on the report)	Date	Time	Sample Type	Acidity, Alkalinity, Bic, Bod	DOC, TOC, Cl, Cn-T, Cn-W, CO3	COD, Colour, Conductivity, F	Hardness, Hg-D, Hg-T, Met-D	Met-T, TKN, NH3, NO2, NO3	OGG, OH, T@, TDP, pH, PO4 SiO2	SO4, TDS, TSS, Sulphide	Turbidity					Number of Containers
1	LOS-11	Aug 29, 2012	12:30	Water	X	X	X	X	X	X	X	X					14

Special Instructions / Comments

also please email SRC to abisson@rainyriverresources.com

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by: Levi Snook	Date & Time Sept, 4, 2012 4:00pm	Received by: KM	Date & Time Sept. 5/12	Temp 9.3	Cooling Initiated ☐ Yes ☐ No	Verified by: KM	Date & Time Sept. 5/12 12:30	Observations: Yes / No? If Yes add SIF

**Failure to complete all portions of this form may delay analysis. **TAT may vary dependant on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs. Any known or suspected hazards relating to a sample must be noted on the chain of custody in the comments section. By use of the form the user acknowledges and agrees with the Terms and Conditions as specified on the back page.

See SIF

AMEC
ATTN: JASON DIETRICH
900 MAPLE GROVE RD, UNIT 10
CAMBRIDGE ON N3H 4R7

Date Received: 08-SEP-12
Report Date: 20-SEP-12 15:00 (MT)
Version: FINAL

Client Phone: 519-650-7133

Certificate of Analysis

Lab Work Order #: L1206249

Project P.O. #: NOT SUBMITTED
Job Reference: TC111504
C of C Numbers:
Legal Site Desc:

Tricia Sampson
Account Manager Supervisor

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1206249-1	L1206249-2	L1206249-3		
	Description	WATER	WATER	WATER		
	Sampled Date	04-SEP-12	06-SEP-12	05-SEP-12		
	Sampled Time	10:30	14:30	09:30		
	Client ID	PIN-2AA	STU-5	STU-6		
Grouping	**Analyte**					
WATER						
Physical Tests	Color, True (T.C.U.)	58.8	52.6	89.6		
	Conductivity (EC) (uS/cm)	414	576	416		
	Hardness (as CaCO3) (mg/L)	211	278	187		
	pH (pH)	8.14	8.30	8.06		
	Total Suspended Solids (mg/L)	17.4	15.6	92.6		
	Total Dissolved Solids (mg/L)	294	364	304		
	Turbidity (NTU)	7.00	20.6	84.4		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	6.4	6.2	5.4		
	Alkalinity, Bicarbonate (as CaCO3) (mg/L CaCO3)	220	313	176		
	Alkalinity, Carbonate (as CaCO3) (mg/L CaCO3)	<5.0	<5.0	<5.0		
	Alkalinity, Hydroxide (as CaCO3) (mg/L CaCO3)	<5.0	<5.0	<5.0		
	Alkalinity, Total (as CaCO3) (mg/L CaCO3)	220	313	176		
	Ammonia, Total (as N) (mg/L)	<0.020	<0.020	0.047		
	Chloride (Cl) (mg/L)	4.64	11.9	30.6		
	Fluoride (F) (mg/L)	0.104	0.142	0.088		
	Nitrate and Nitrite as N (mg/L)	<0.030	<0.030	<0.030		
	Nitrate (as N) (mg/L)	<0.030	<0.030	<0.030		
	Nitrite (as N) (mg/L)	<0.020	<0.020	<0.020		
	Total Kjeldahl Nitrogen (mg/L)	1.58	1.40	1.60		
	Orthophosphate-Dissolved (as P) (mg/L)	0.0076	<0.0050	0.0142		
	Phosphorus (P)-Total Dissolved (mg/L)	0.0313	0.0173	0.0442		
	Phosphorus (P)-Total (mg/L)	0.109	0.105	0.218		
	Silica, Reactive (as SiO2) (mg/L)	11.1	11.5	11.6		
	Sulfate (SO4) (mg/L)	1.51	0.76	1.84		
	Sulphide (mg/L)	<0.020	<0.020	<0.020		
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0020	<0.0020	<0.0020		
	Cyanide, Total (mg/L)	<0.0020	<0.0020	<0.0020		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	20.0	16.7	19.9		
	Total Organic Carbon (mg/L)	22.3	16.7	21.0		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0721	0.0214	1.11		
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	0.00013		
	Arsenic (As)-Total (mg/L)	0.00194	0.00121	0.00611		
	Barium (Ba)-Total (mg/L)	0.0176	0.0144	0.0491		
	Beryllium (Be)-Total (mg/L)	<0.000060	<0.000060	0.000115		
	Bismuth (Bi)-Total (mg/L)	<0.00020	<0.00020	<0.00020		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1206249-1	L1206249-2	L1206249-3		
	Description	WATER	WATER	WATER		
	Sampled Date	04-SEP-12	06-SEP-12	05-SEP-12		
	Sampled Time	10:30	14:30	09:30		
	Client ID	PIN-2AA	STU-5	STU-6		
Grouping	**Analyte**					
WATER						
Total Metals	Boron (B)-Total (mg/L)	0.0256	0.0291	0.0062		
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	0.000032		
	Calcium (Ca)-Total (mg/L)	56.4	43.3	41.1		
	Chromium (Cr)-Total (mg/L)	<0.00050	0.00062	0.00212		
	Cobalt (Co)-Total (mg/L)	0.000356	0.000563	0.00161		
	Copper (Cu)-Total (mg/L)	<0.00070	<0.00070	0.00277		
	Iron (Fe)-Total (mg/L)	0.859	1.87	2.11		
	Lead (Pb)-Total (mg/L)	0.00011	<0.00010	0.00176		
	Lithium (Li)-Total (mg/L)	0.0078	0.0370	0.0101		
	Magnesium (Mg)-Total (mg/L)	19.1	27.6	16.4		
	Manganese (Mn)-Total (mg/L)	0.601	0.807	0.968		
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Total (mg/L)	0.00036	0.00036	0.00087		
	Nickel (Ni)-Total (mg/L)	0.0010	<0.0010	0.0049		
	Potassium (K)-Total (mg/L)	1.62	4.21	2.85		
	Selenium (Se)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Silver (Ag)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Sodium (Na)-Total (mg/L)	5.77	16.9	12.0		
	Strontium (Sr)-Total (mg/L)	0.166	0.250	0.0850		
	Tellurium (Te)-Total (mg/L)	<0.000070	<0.000070	<0.000070		
	Thallium (Tl)-Total (mg/L)	<0.000030	<0.000030	<0.000030		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	0.00253	0.00142	0.0333		
	Tungsten (W)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Uranium (U)-Total (mg/L)	0.000240	0.000452	0.000657		
	Vanadium (V)-Total (mg/L)	0.00032	<0.00020	0.00417		
	Zinc (Zn)-Total (mg/L)	0.0129	0.0141	0.0087		
	Zirconium (Zr)-Total (mg/L)	0.00015	0.00012	0.00127		
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	0.0164		
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	0.00016		
	Arsenic (As)-Dissolved (mg/L)	0.00171	0.00104 RRV	0.00448		
	Barium (Ba)-Dissolved (mg/L)	0.0179	0.0110 RRV	0.0337		
	Beryllium (Be)-Dissolved (mg/L)	<0.000060	<0.000060	<0.000060		
	Bismuth (Bi)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		
	Boron (B)-Dissolved (mg/L)	0.0241 DTC	0.0266 RRV	0.0038		
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Calcium (Ca)-Dissolved (mg/L)	52.9 DTC	58.3 RRV	48.9		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1206249-1	L1206249-2	L1206249-3		
	Description	WATER	WATER	WATER		
	Sampled Date	04-SEP-12	06-SEP-12	05-SEP-12		
	Sampled Time	10:30	14:30	09:30		
	Client ID	PIN-2AA	STU-5	STU-6		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Cobalt (Co)-Dissolved (mg/L)	0.000054	0.000612	0.000347		
	Copper (Cu)-Dissolved (mg/L)	<0.00070	<0.00070	0.00121		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	0.045		
	Lead (Pb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Lithium (Li)-Dissolved (mg/L)	0.0095	0.0334 RRV	0.0105		
	Magnesium (Mg)-Dissolved (mg/L)	19.1	32.1	15.7		
	Manganese (Mn)-Dissolved (mg/L)	0.00529	0.764	0.188		
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Dissolved (mg/L)	0.00044	0.00046	0.00121		
	Nickel (Ni)-Dissolved (mg/L)	0.0011	<0.0010	0.0034		
	Potassium (K)-Dissolved (mg/L)	1.94	3.74 RRV	3.08		
	Selenium (Se)-Dissolved (mg/L)	0.00050	<0.00050	<0.00050		
	Silver (Ag)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Sodium (Na)-Dissolved (mg/L)	4.78	14.1 RRV	13.4		
	Strontium (Sr)-Dissolved (mg/L)	0.155 RRV	0.221 RRV	0.0960		
	Tellurium (Te)-Dissolved (mg/L)	<0.000070	<0.000070	<0.000070		
	Thallium (Tl)-Dissolved (mg/L)	<0.000030	<0.000030	<0.000030		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.00050	<0.00050	0.00257		
	Tungsten (W)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Uranium (U)-Dissolved (mg/L)	0.000290	0.000674 RRV	0.000699		
	Vanadium (V)-Dissolved (mg/L)	<0.00020	<0.00020	0.00092		
	Zinc (Zn)-Dissolved (mg/L)	0.0045	0.0032	<0.0020		
	Zirconium (Zr)-Dissolved (mg/L)	0.00013	<0.00010	0.00045		
Aggregate Organics	Biochemical Oxygen Demand (mg/L)	<2.0	3.2	2.3		
	Chemical Oxygen Demand (mg/L)	78.0	61.8	82.0		
	Oil and Grease, Total (mg/L)	<2.0	<2.0	<2.0		
	Animal/Veg Oil & Grease (mg/L)	<1.0	<1.0	<1.0		
	Mineral Oil and Grease (mg/L)	<1.0	<1.0	<1.0		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
SFPL	Sample was Filtered and Preserved at the laboratory - DOC, S-Phosh, Dis. met., Dis. HG.

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Silica, Reactive (as SiO2)	DLA	L1206249-1, -2, -3
Matrix Spike	Chloride (Cl)	MS-B	L1206249-1, -2, -3
Matrix Spike	Total Organic Carbon	MS-B	L1206249-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-TB	Water	Acidity (as CaCO3)	APHA 2310 B-POTENTIOMETRIC TITRATION
Aqueous matrices are analyzed by potentiometry. Acidity reported includes acidity caused by hydrolyzable metals present in the sample.			
ALK-TOT-CAP-TB	Water	Alkalinity, Total (as CaCO3)	APHA 2320 B-Auto-Pot. Titration
BIC-TB	Water	Bicarbonate (HCO3)	APHA 2320 B-POTENTIOMETRIC TITRATION
BOD-TB	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
C-DIS-ORG-TB	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
C-TOT-ORG-TB	Water	Total Organic Carbon (TOC)	APHA 5310 B-Instrumental
CL-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)
Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.			
CN-TOT-WT	Water	Cyanide, Total	APHA 4500CN C E-STRONG ACID DIST COLORIM
Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.			
When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference			
CN-WAD-WT	Water	Cyanide, Weak Acid Diss	APHA 4500CN I-Weak acid Dist Colorimet
Weak acid dissociable cyanide (WAD) is determined by undergoing a distillation procedure. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.			
CO3-TB	Water	Carbonate (CO3)	APHA 2320 B-Potentiometric Titration
COD-TB	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry
COLOUR-TB	Water	Colour, True	CPPA H.5P Spectrophotometry
EC-CAP-TB	Water	Conductivity (EC)	APHA 2510 B-ELECTRODE
ETL-N2N3-TB	Water	Calculate from NO2 + NO3	Calculation
F-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)
Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.			
HARDNESS-CALC-TB	Water	Hardness (as CaCO3)	CALCULATION
HG-D-CVAF-TB	Water	Dissolved Mercury in Water by CVAFS	EPA 245.7
HG-T-CVAF-TB	Water	Total Mercury in Water by CVAFS	EPA 245.7
MET-D-L-MS-TB	Water	Dissolved Metals by ICPMS	APHA 3030B/EPA 6020A
This analysis involves filtration (APHA 3030B) and analysis by inductively coupled plasma - mass spectrometry (EPA Method 6020A).			
MET-T-L-MS-TB	Water	Total Metals in Water by ICPMS (Low)	APHA 3120 B-ICPMS
N-TOTKJ-TB	Water	Total Kjeldahl Nitrogen by Colourimetry	APHA 4500-Norg B (modified)

Reference Information

Total Kjeldahl Nitrogen in aqueous matrices is analyzed using an autoanalyzer with colourimetric detection.

NH3-COL-TB	Water	Ammonia by Discrete Analyzer	APHA 4500-NH3 G. (modified)

Ammonia in aqueous matrices is analyzed using discrete analyzer with colourimetric detection.

NO2-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

NO3-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

OGG-SPEC-WT	Water	Speciated Oil and Grease-Gravimetric	APHA 5520 B

Sample is extracted with hexane, sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.

OH-TB	Water	Hydroxide	APHA 2320 B-Potentiometric Titration
P-T-COL-TB	Water	Total Phosphorus by Discrete Analyzer	APHA 4500-P B, F, G (modified)

Phosphorus in aqueous matrices is analyzed using discrete Analyzer with colourimetric detection.

P-TD-COL-TB	Water	Total Dissolved Phosphorus in Water	APHA 4500-P B, F, G (modified)

Phosphorus in aqueous matrices is analyzed using discrete Analyzer with colourimetric detection.

PH-CAP-TB	Water	pH	APHA 4500-H-ELECTRODE
PO4-DO-COL-TB	Water	Dissolved Orthophosphate	APHA 4500-P B, F, G (modified)

Phosphorus in aqueous matrices is analyzed using discrete Analyzer with colourimetric detection.

SIO2-COL-WP	Water	Reactive Silica by colour	APHA 4500 SIO2

This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 "Silica". Molybdate Reactive Silica is determined by analysis of the sample using the heteropoly blue colourimetric method.

SO4-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

SOLIDS-TDS-TB	Water	Total Dissolved Solids	APHA 2540 C (modified)

Aqueous matrices are analyzed using gravimetry and evaporation

SOLIDS-TOTSUS-TB	Water	Total Suspended Solids	APHA 2540 D (modified)

Aqueous matrices are analyzed using gravimetry

SULPHIDE-WT	Water	Sulphide	APHA 4500S2D
TURBIDITY-TB	Water	Turbidity	APHA 2130 B-Nephelometer

Aqueous matrices are analyzed using nephelometry with the light scatter measured at a 90” angle.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Ontario P7B 5N3 Canada PHONE +1 807 623 6463 FAX +1 807 623 7598
A Campbell Brothers Limited Company www.alsglobal.com

L1206249-COFC

L1206249 04872 Page 1 of 1

Company:	AMEC	Regulatory Information	Both questions below must answered for water samples
Contact:	Jason Dietrich	☐ O. Reg 153 (O. Reg 511 Amend) Table:____	Are any samples taken from a regulated DW System? ☐Yes ☐No
Address:	900 Maple Grove Rd, Unit 10	Record of Site Condition ☐Yes ☐No	If yes, an authorized DW COC must be used.
	Cambridge, ON, N3H 4R7	PWQO ☒ MISA ☐ MMER ☐ CCME ☒	Is the water sampled intended for human consumption? ☐Yes ☐No
Phone:	(519)650-7733 Fax:	Guideline Required:	
Email:	Jason.dietrich@amec.com	TCLP Regulation 558 ☐ Other:	
Project:	TC111504 PO:	Service Requested	Analysis Request
Quote #	Q36013	☒ Regular TAT (7 Days)	Please indicate below Filtered, Preserved or both (F, P, F/P)
Invoice To:	Same as Report: ☒Yes ☐No	☐ Priority TAT 50% Surcharge (3-5 Days)	
Company:		☐ Emergency TAT 100% Surcharge (1-2 Days)	
Contact:		Specify Date Required:	
Address:		All TAT quoted material is in business days which exclude statutory holidays and weekends. Samples received past 3:00pm or Saturday/Sunday begin the next day.	
Email:			
Account Manager	Karen	Sampler: Levi Snook	

Sample #	Sample Identification (This description will appear on the report)	Date	Time	Sample Type	Acidity, Alkalinity, BC BOD	DOC, TOC, Cl, CN-T, CN-W CO3	COD, Colour, Conductivity, E	Hardness, Hg-D: Hg-T, MBTO	MBT-T, TKN, NH3, NO2, NO3	OGG, OH, TP, TDP, PH, PAH SiO2	SO4, TDS, TSS, Sulphide	Turbidity					Number of Containers
1	PIN-2AA	Sept 4, 12	10:30	Water	X	X	X	X	X	X	X	X					14
2	STU-5	Sept 6, 12	14:30	Water	X	X	X	X	X	X	X	X					14
3	STU-6	Sept 5, 12	9:30	Water	X	X	X	X	X	X	X	X					14

Special Instructions / Comments

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by: Levi Snook	Date & Time Sept 8, 12 11:00am	Received by:	Date & Time 08-SEP-12 10:45	Temp 4.9	Cooling Initiated ☐Yes ☐No	Verified by:	Date & Time 08-SEP-12 10:45	Observations: Yes / No ? If Yes add SIF

**Failure to complete all portions of this form may delay analysis. **TAT may vary dependant on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs. Any known or suspected hazards relating to a sample must be noted on the chain of custody in the comments section. By use of the form the user acknowledges and agrees with the Terms and Conditions as specified on the back page.

AMEC
ATTN: Jason Dietrich
900 Maple GRove Rd. Unit 10
Cambridge ON N3H 4R7

Date Received: 25-SEP-12
Report Date: 10-OCT-12 17:44 (MT)
Version: FINAL

Client Phone: 519-650-7100

Certificate of Analysis

Lab Work Order #: L1214169

Project P.O. #: NOT SUBMITTED
Job Reference: TC111504
C of C Numbers:
Legal Site Desc:

Karen Rutledge
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1214169-1	L1214169-2	L1214169-3	L1214169-4	L1214169-5
	Description	water	water	water	water	water
	Sampled Date	19-SEP-12	19-SEP-12	20-SEP-12	21-SEP-12	21-SEP-12
	Sampled Time	11:45	14:30	14:30	14:00	11:15
	Client ID	PIN-17	PIN-18	PIN-15	PIN-11	PIN-14
Grouping	**Analyte**					
WATER						
Physical Tests	Color, True (T.C.U.)	33.9	29.7	63.3	65.1	63.7
	Conductivity (EC) (uS/cm)	182	107	364	458	368
	Hardness (as CaCO3) (mg/L)	81.8	33.0	175	219	168
	pH (pH)	7.89	7.61	7.88	7.78	8.04
	Total Suspended Solids (mg/L)	7.4	5.7	38.6	35.7	56.6
	Total Dissolved Solids (mg/L)	109	70	255	312	271
	Turbidity (NTU)	9.68	4.47	53.8	28.5	65.0
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	2.4	3.4	5.4	10.2	5.0
	Alkalinity, Bicarbonate (as CaCO3) (mg/L CaCO3)	76.2	33.5	175	224	179
	Alkalinity, Carbonate (as CaCO3) (mg/L CaCO3)	<5.0	<5.0	<5.0	<5.0	<5.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L CaCO3)	<5.0	<5.0	<5.0	<5.0	<5.0
	Alkalinity, Total (as CaCO3) (mg/L CaCO3)	76.2	33.5	175	224	179
	Ammonia, Total (as N) (mg/L)	<0.020	0.063	0.040	<0.020	0.020
	Chloride (Cl) (mg/L)	2.71	3.24	3.60	6.43	5.01
	Fluoride (F) (mg/L)	0.055	0.041	0.070	0.058	0.068
	Nitrate and Nitrite as N (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
	Nitrate (as N) (mg/L)	<0.030	<0.030	<0.030	<0.030	<0.030
	Nitrite (as N) (mg/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Total Kjeldahl Nitrogen (mg/L)	0.847	0.631	1.32	1.52	1.83
	Orthophosphate-Dissolved (as P) (mg/L)	0.0088	<0.0050	<0.0050	0.0201	<0.0050
	Phosphorus (P)-Total Dissolved (mg/L)	0.0141	0.0068	0.0202	0.0368	0.0235
	Phosphorus (P)-Total (mg/L)	0.0418	0.0171	0.0853	0.167	0.161
	Silica, Reactive (as SiO2) (mg/L)	3.5	3.6	8.1	7.7	1.3
	TDS (Calculated) (mg/L)	88.1	50.7	181	224	179
	Sulfate (SO4) (mg/L)	6.66	9.39	4.94	1.63	4.43
	Sulphide (mg/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Anion Sum (me/L)	1.46	0.84	3.07	3.89	3.17
	Cation Sum (me/L)	1.85	0.93	3.88	4.66	3.56
	Cation - Anion Balance (%)	11.6 BL:INT	5.4	11.6 BL:INT	9.0	5.9
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Cyanide, Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	9.7	8.3	20.2	27.8	26.8
	Total Organic Carbon (mg/L)	10.7	8.0	22.0	29.8	27.8
Total Metals	Aluminum (Al)-Total (mg/L)	0.219	0.0949	0.997	0.428	1.80
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00011

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1214169-1	L1214169-2	L1214169-3	L1214169-4	L1214169-5
	Description	water	water	water	water	water
	Sampled Date	19-SEP-12	19-SEP-12	20-SEP-12	21-SEP-12	21-SEP-12
	Sampled Time	11:45	14:30	14:30	14:00	11:15
	Client ID	PIN-17	PIN-18	PIN-15	PIN-11	PIN-14
Grouping	**Analyte**					
WATER						
Total Metals	Arsenic (As)-Total (mg/L)	0.00106	0.00038	0.00272	0.00433	0.00252
	Barium (Ba)-Total (mg/L)	0.0122	0.00747	0.0314	0.0285	0.0400
	Beryllium (Be)-Total (mg/L)	<0.000060	<0.000060	<0.000060	<0.000060	0.000121
	Bismuth (Bi)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Boron (B)-Total (mg/L)	0.0105	0.0064	0.0326	0.0184	0.0189
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	0.000020	0.000014	0.000037
	Calcium (Ca)-Total (mg/L)	17.3	7.53	36.5	48.1	40.2
	Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	0.00161	0.00089	0.00309
	Cobalt (Co)-Total (mg/L)	0.000154	0.000062	0.000984	0.00151	0.00162
	Copper (Cu)-Total (mg/L)	0.00132	0.00088	0.00261	0.00158	0.00409
	Iron (Fe)-Total (mg/L)	0.315	0.103	1.18	1.99	2.27
	Lead (Pb)-Total (mg/L)	0.00019	<0.00010	0.00074	0.00033	0.00153
	Lithium (Li)-Total (mg/L)	0.0029	0.0013	0.0089	0.0069	0.0095
	Magnesium (Mg)-Total (mg/L)	6.56	2.96	18.5	19.3	16.7
	Manganese (Mn)-Total (mg/L)	0.0345	0.0122	0.341	1.78	0.304
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.00028	<0.00020	0.00110	0.00034	0.00076
	Nickel (Ni)-Total (mg/L)	0.0015	<0.0010	0.0044	0.0022	0.0049
	Potassium (K)-Total (mg/L)	1.19	0.815	2.75	3.46	2.80
	Selenium (Se)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Silver (Ag)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Sodium (Na)-Total (mg/L)	3.89	5.21	4.09	4.37	3.47
	Strontium (Sr)-Total (mg/L)	0.0327	0.0276	0.0682	0.0855	0.0802
	Tellurium (Te)-Total (mg/L)	<0.000070	<0.000070	<0.000070	<0.000070	<0.000070
	Thallium (Tl)-Total (mg/L)	<0.000030	<0.000030	<0.000030	<0.000030	0.000032
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	0.00627	0.00248	0.0307	0.0163	0.0522
	Tungsten (W)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Uranium (U)-Total (mg/L)	0.000228	0.000056	0.000549	0.000267	0.000736
	Vanadium (V)-Total (mg/L)	0.00106	0.00044	0.00326	0.00161	0.00630
	Zinc (Zn)-Total (mg/L)	<0.0020	<0.0020	0.0047	0.0074	0.0086
	Zirconium (Zr)-Total (mg/L)	0.00024	0.00012	0.00090	0.00051	0.00133
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0285	0.0131	0.0144	0.0036	0.0072
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00110	0.00048	0.00220	0.00239	0.00141
	Barium (Ba)-Dissolved (mg/L)	0.0130	0.00874	0.0282	0.0178	0.0274
	Beryllium (Be)-Dissolved (mg/L)	<0.000060	<0.000060	<0.000060	<0.000060	<0.000060

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1214169-1	L1214169-2	L1214169-3	L1214169-4	L1214169-5
	Description	water	water	water	water	water
	Sampled Date	19-SEP-12	19-SEP-12	20-SEP-12	21-SEP-12	21-SEP-12
	Sampled Time	11:45	14:30	14:30	14:00	11:15
	Client ID	PIN-17	PIN-18	PIN-15	PIN-11	PIN-14
Grouping	**Analyte**					
WATER						
Dissolved Metals	Bismuth (Bi)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Boron (B)-Dissolved (mg/L)	0.0143	0.0091	0.0310 RRV	0.0201	0.0177
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	0.000011	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	19.6	8.68	41.8	50.6	38.7
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)-Dissolved (mg/L)	<0.000050	<0.000050	0.000154	<0.000050	0.000062
	Copper (Cu)-Dissolved (mg/L)	<0.00070	<0.00070	<0.00070	<0.00070	<0.00070
	Iron (Fe)-Dissolved (mg/L)	0.035	0.010	0.016	0.192	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Lithium (Li)-Dissolved (mg/L)	0.0024	0.0018	0.0077	0.0068	0.0066
	Magnesium (Mg)-Dissolved (mg/L)	7.97	2.74 RRV	17.2 RRV	22.4	17.3
	Manganese (Mn)-Dissolved (mg/L)	0.00054	<0.00050	0.0817	0.0279	0.00809
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.00028	<0.00020	0.00127	0.00031	0.00079
	Nickel (Ni)-Dissolved (mg/L)	<0.0010	<0.0010	0.0037	0.0015	0.0020
	Potassium (K)-Dissolved (mg/L)	1.28	0.886	2.75	3.52	2.30
	Selenium (Se)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Silver (Ag)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Sodium (Na)-Dissolved (mg/L)	4.19	5.65	4.52	4.53	3.44
	Strontium (Sr)-Dissolved (mg/L)	0.0397	0.0223 RRV	0.0824	0.0968	0.0839
	Tellurium (Te)-Dissolved (mg/L)	<0.000070	<0.000070	<0.000070	<0.000070	<0.000070
	Thallium (Tl)-Dissolved (mg/L)	<0.000030	<0.000030	<0.000030	<0.000030	<0.000030
	Tin (Sn)-Dissolved (mg/L)	0.00024	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	0.00125	<0.00050	0.00237	<0.00050	0.00125
	Tungsten (W)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Uranium (U)-Dissolved (mg/L)	0.000202 RRV	0.000063	0.000662	0.000309	0.000706
	Vanadium (V)-Dissolved (mg/L)	0.00061	0.00033	0.00063	0.00025	0.00057
	Zinc (Zn)-Dissolved (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Zirconium (Zr)-Dissolved (mg/L)	0.00020	<0.00010	0.00051	0.00025	0.00035
Aggregate Organics	Biochemical Oxygen Demand (mg/L)	<2.0	<2.0	2.0	6.9	2.2
	Chemical Oxygen Demand (mg/L)	33.4	24.3	70.0	97.5	82.9
	Oil and Grease, Total (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
	Animal/Veg Oil & Grease (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Mineral Oil and Grease (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Lead (Pb)-Dissolved	A	L1214169-1, -2, -3, -4, -5
Duplicate	Silica, Reactive (as SiO2)	DLA	L1214169-5
Duplicate	Silica, Reactive (as SiO2)	DLA	L1214169-5
Matrix Spike	Sulphide	MS-B	L1214169-1, -2, -3, -4, -5
Matrix Spike	Ammonia, Total (as N)	MS-B	L1214169-1, -2, -3, -4, -5
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1214169-1, -2, -3, -4, -5
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1214169-1, -2, -3, -4, -5
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1214169-1, -2, -3, -4, -5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1214169-1, -2, -3, -4, -5

Qualifiers for Individual Parameters Listed:

Qualifier	Description
A	Method Blank exceeds ALS DQO. Refer to narrative comments for further information.
BL:INT	Balance Reviewed: Interference Or Non-Measured Component
DLA	Detection Limit Adjusted For required dilution
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-TB	Water	Acidity (as CaCO3)	APHA 2310 B-POTENTIOMETRIC TITRATION
Aqueous matrices are analyzed by potentiometry. Acidity reported includes acidity caused by hydrolyzable metals present in the sample.			
ALK-TOT-CAP-TB	Water	Alkalinity, Total (as CaCO3)	APHA 2320 B-Auto-Pot. Titration
BIC-TB	Water	Bicarbonate (HCO3)	APHA 2320 B-POTENTIOMETRIC TITRATION
BOD-TB	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
C-DIS-ORG-TB	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
C-TOT-ORG-TB	Water	Total Organic Carbon (TOC)	APHA 5310 B-Instrumental
CL-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)
Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.			
CN-TOT-WT	Water	Cyanide, Total	APHA 4500CN C E-STRONG ACID DIST COLORIM
Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.			
When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference			
CN-WAD-WT	Water	Cyanide, Weak Acid Diss	APHA 4500CN I-Weak acid Dist Colorimet
Weak acid dissociable cyanide (WAD) is determined by undergoing a distillation procedure. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.			
CO3-TB	Water	Carbonate (CO3)	APHA 2320 B-Potentiometric Titration
COD-TB	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry
COLOUR-TB	Water	Colour, True	CPPA H.5P Spectrophotometry
EC-CAP-TB	Water	Conductivity (EC)	APHA 2510 B-ELECTRODE
ETL-N2N3-TB	Water	Calculate from NO2 + NO3	Calculation
F-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)
Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.			
HARDNESS-CALC-TB	Water	Hardness (as CaCO3)	CALCULATION
HG-D-CVAF-TB	Water	Dissolved Mercury in Water by CVAFS	EPA 245.7
HG-T-CVAF-TB	Water	Total Mercury in Water by CVAFS	EPA 245.7
IONBALANCE-OP12-TB	Water	Ion Balance Calculation	APHA 1030 E - CALCULATION
MET-D-L-MS-TB	Water	Dissolved Metals by ICPMS	APHA 3030B/EPA 6020A

Reference Information

This analysis involves filtration (APHA 3030B) and analysis by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-T-L-MS-TB	Water	Total Metals in Water by ICPMS (Low)	APHA 3120 B-ICPMS
N-TOTKJ-TB	Water	Total Kjeldahl Nitrogen by Colourimetry	APHA 4500-Norg B (modified)

Total Kjeldahl Nitrogen in aqueous matrices is analyzed using an autoanalyzer with colourimetric detection.

NH3-COL-TB	Water	Ammonia by Discrete Analyzer	APHA 4500-NH3 G. (modified)

Ammonia in aqueous matrices is analyzed using discrete analyzer with colourimetric detection.

NO2-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

NO3-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

OGG-SPEC-WT	Water	Speciated Oil and Grease-Gravimetric	APHA 5520 B

Sample is extracted with hexane, sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.

OH-TB	Water	Hydroxide	APHA 2320 B-Potentiometric Titration
P-T-COL-TB	Water	Total Phosphorus by Discrete Analyzer	APHA 4500-P B, F, G (modified)

Phosphorus in aqueous matrices is analyzed using discrete Analyzer with colourimetric detection.

P-TD-COL-TB	Water	Total Dissolved Phosphorus in Water	APHA 4500-P B, F, G (modified)

Phosphorus in aqueous matrices is analyzed using discrete Analyzer with colourimetric detection.

PH-CAP-TB	Water	pH	APHA 4500-H-ELECTRODE
PO4-DO-COL-TB	Water	Dissolved Orthophosphate	APHA 4500-P B, F, G (modified)

Phosphorus in aqueous matrices is analyzed using discrete Analyzer with colourimetric detection.

SIO2-COL-WP	Water	Reactive Silica by colour	APHA 4500 SIO2

This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 "Silica". Molybdate Reactive Silica is determined by analysis of the sample using the heteropoly blue colourimetric method.

SO4-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

SOLIDS-TDS-TB	Water	Total Dissolved Solids	APHA 2540 C (modified)

Aqueous matrices are analyzed using gravimetry and evaporation

SOLIDS-TOTSUS-TB	Water	Total Suspended Solids	APHA 2540 D (modified)

Aqueous matrices are analyzed using gravimetry

SULPHIDE-WT	Water	Sulphide	APHA 4500S2D
TURBIDITY-TB	Water	Turbidity	APHA 2130 B-Nephelometer

Aqueous matrices are analyzed using nephelometry with the light scatter measured at a 90" angle.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

L1214169-COFC

B 5N3 Canada PHONE +1 807 623 6463 FAX +1 807 623 7598
ell Brothers Limited Company www.alsglobal.com

L1214169

Page ___ of ___

Company:	AMEC	ulatory Information	Both questions below must answered for water samples
Contact:	Jason Dietrich	. Reg 511 Amend) Table:___	Are any samples taken from a regulated DW System? ☐ Yes ☒ No
Address:	900 Maple Grove Rd, Unit 10	Record of Site Condition ☐ Yes ☐ No	If yes, an authorized DW COC must be used.
	Cambridge ON, N3H 4R7	PWQO ☒ MISA ☐ MMER ☐ CCME ☒	Is the water sampled intended for human consumption? ☐ Yes ☐ No
Phone:	519-650-7100 ext 7132 Fax:	Guideline Required:	
Email:	Jason.dietric@amec.com	TCLP Regulation 558 ☐ Other:	Analysis Request
Project:	TC111504 PO:	Service Requested	Please indicate below Filtered, Preserved or both (F, P, F/P)
Quote #	[redacted] Q36013	☒ Regular TAT (7 Days)	
Invoice To:	Same as Report: ☑ Yes ☐ No	☐ Priority TAT 50% Surcharge (3-5 Days)	
Company:		☐ Emergency TAT 100% Surcharge (1-2 Days)	
Contact:		Specify Date Required:	
Address:		All TAT quoted material is in business days which exclude statutory holidays and weekends. Samples received past 3:00pm or Saturday/Sunday begin the next day.	
Email:			
Account Manager	Karen	Sampler: LEVI SNOOK	

Sample #	Sample Identification (This description will appear on the report)	Date	Time	Sample Type	Acidity-TB, Alk-TOT-CAP-TB, BiCTB, [redacted] BOD-TB, C-DIS-OEG-TB	C-TOT-ORG-TB, Cl-IC-TB, Col-TOT-wt, [redacted] Colour-TB, EC-CAP-TB	ETL-W2N3-TB, F-IC-TB, HARDness-CALC-TB, HG-D-CVAF-TB, HG-T-CVAF-TB	ION-Balance-OT-IC-TB, MET-D-L-MS-TB, MET-T-L-MS-TB, N-Tot-TB, NH3-COL-TB	NOE-IC-TB, NO3-IC-TB, OGG-SPEC-wt, OH-TB, P-T-COL-TB, P-TOT-CO-TB	pH-CAP-TB, PO4-DO-CO-TB	SiO2-L-CO-wt, SOLIDS-TOTSUS-TB, Solids-TOTDIS-TB, Turbidity-TB	Number of Containers
1	PIN-17	Sept 19, 2012	11:45	Water	X	X	X	X	X	X	X	14
2	PIN-18	Sept 19, 2012	14:30	Water	X	X	X	X	X	X	X	14
3	PIN-15	Sept 20, 2012	14:30	Water	X	X	X	X	X	X	X	14
4	PIN-11	Sept 21, 2012	14:00	Water	X	X	X	X	X	X	X	14
5	PIN-14	Sept 21, 2012	11:15	Water	X	X	X	X	X	X	X	14

Special Instructions / Comments

Field Filter and Preserve in lab.

- Could not locate [redacted] chain of custody that came with bottles, so filled out parameters as outlined in Adf.
- Please follow parameters [redacted] the same as samples from Q36013 that were dropped off Sept 8, 2012.
- Should be the same analysis for parameters as written here, as ones [redacted] previously taken.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by: Levi Snook	Date & Time Sept 24, 2012 10:00am	Received by: AB	Date & Time 25-Sept-1130	Temp 8-6	Cooling Initiated ☐ Yes ☐ No	Verified by: [redacted]	Date & Time 25-SEP-12 11:50	Observations: Yes / No ? If Yes add SIF

Failure to complete all portions of this form may delay analysis. **TAT may vary dependant on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs. Any known or suspected hazards relating to a sample must be noted on the chain of custody in the comments section. By use of the form the user acknowledges and agrees with the Terms and Conditions as specified on the back page.

AMEC
ATTN: Jason Dietrich
900 Maple Grove Road
Unit 10
Cambridge Ont N3M 4R7

Date Received: 29-SEP-12
Report Date: 15-OCT-12 14:56 (MT)
Version: FINAL

Client Phone: 519-650-7100

Certificate of Analysis

Lab Work Order #: L1217055

Project P.O. #: NOT SUBMITTED
Job Reference: TC111504
C of C Numbers:
Legal Site Desc:

Tricia Sampson
Account Manager Supervisor

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1217055-1	L1217055-2			
	Description	WATER	WATER			
	Sampled Date	25-SEP-12	24-SEP-12			
	Sampled Time	12:30	14:15			
	Client ID	PIN-12	PIN-16			
Grouping	**Analyte**					
WATER						
Physical Tests	Color, True (T.C.U.)	106	68.2			
	Conductivity (EC) (uS/cm)	325	347			
	Hardness (as CaCO3) (mg/L)	167	182			
	pH (pH)	7.74	8.01			
	Total Suspended Solids (mg/L)	14.0	9.1			
	Total Dissolved Solids (mg/L)	270	239			
	Turbidity (NTU)	30.4	12.8			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	5.4	4.4			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L CaCO3)	157	163			
	Alkalinity, Carbonate (as CaCO3) (mg/L CaCO3)	<5.0	<5.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L CaCO3)	<5.0	<5.0			
	Alkalinity, Total (as CaCO3) (mg/L CaCO3)	157	163			
	Ammonia, Total (as N) (mg/L)	<0.020	0.023			
	Chloride (Cl) (mg/L)	2.88	3.25			
	Fluoride (F) (mg/L)	0.076	0.077			
	Nitrate and Nitrite as N (mg/L)	<0.030	0.037			
	Nitrate (as N) (mg/L)	<0.030	0.037			
	Nitrite (as N) (mg/L)	<0.020	<0.020			
	Total Kjeldahl Nitrogen (mg/L)	1.32	1.18			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0050	0.0191			
	Phosphorus (P)-Total Dissolved (mg/L)	0.0359	0.0442			
	Phosphorus (P)-Total (mg/L)	0.108	0.0816			
	Silica, Reactive (as SiO2) (mg/L)	8.6	6.0			
	TDS (Calculated) (mg/L)	158	171			
	Sulfate (SO4) (mg/L)	1.84	4.74			
	Sulphide (mg/L)	<0.020	<0.020			
	Anion Sum (me/L)	2.69	2.86			
	Cation Sum (me/L)	3.33	3.68			
	Cation - Anion Balance (%)	10.5 BL:INT	12.4 BL:INT			
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0020	<0.0020			
	Cyanide, Total (mg/L)	<0.0020	<0.0020			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	20.6	21.4			
	Total Organic Carbon (mg/L)	23.2	21.2			
Total Metals	Aluminum (Al)-Total (mg/L)	0.745	0.224			
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1217055-1	L1217055-2			
	Description	WATER	WATER			
	Sampled Date	25-SEP-12	24-SEP-12			
	Sampled Time	12:30	14:15			
	Client ID	PIN-12	PIN-16			
Grouping	**Analyte**					
WATER						
Total Metals	Arsenic (As)-Total (mg/L)	0.00476	0.00315			
	Barium (Ba)-Total (mg/L)	0.0286	0.0243			
	Beryllium (Be)-Total (mg/L)	<0.000060	<0.000060			
	Bismuth (Bi)-Total (mg/L)	<0.00020	<0.00020			
	Boron (B)-Total (mg/L)	0.0216	0.0250			
	Cadmium (Cd)-Total (mg/L)	0.000018	0.000053			
	Calcium (Ca)-Total (mg/L)	38.4	42.6			
	Chromium (Cr)-Total (mg/L)	0.00129	<0.00050			
	Cobalt (Co)-Total (mg/L)	0.000785	0.000449			
	Copper (Cu)-Total (mg/L)	0.00235	0.00197			
	Iron (Fe)-Total (mg/L)	1.72	0.669			
	Lead (Pb)-Total (mg/L)	0.00113	0.00033			
	Lithium (Li)-Total (mg/L)	0.0070	0.0069			
	Magnesium (Mg)-Total (mg/L)	14.5	15.5			
	Manganese (Mn)-Total (mg/L)	0.329	0.225			
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Total (mg/L)	0.00056	0.00085			
	Nickel (Ni)-Total (mg/L)	0.0035	0.0030			
	Potassium (K)-Total (mg/L)	2.96	2.37			
	Selenium (Se)-Total (mg/L)	<0.00050	<0.00050			
	Silver (Ag)-Total (mg/L)	<0.000050	<0.000050			
	Sodium (Na)-Total (mg/L)	3.26	4.93			
	Strontium (Sr)-Total (mg/L)	0.0779	0.0857			
	Tellurium (Te)-Total (mg/L)	<0.000070	<0.000070			
	Thallium (Tl)-Total (mg/L)	<0.000030	<0.000030			
	Tin (Sn)-Total (mg/L)	0.00011	<0.00010			
	Titanium (Ti)-Total (mg/L)	0.0252	0.00698			
	Tungsten (W)-Total (mg/L)	<0.00010	<0.00010			
	Uranium (U)-Total (mg/L)	0.000496	0.000536			
	Vanadium (V)-Total (mg/L)	0.00305	0.00152			
	Zinc (Zn)-Total (mg/L)	0.0059	0.0039			
	Zirconium (Zr)-Total (mg/L)	0.00100	0.00066			
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0406	0.0175			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	0.00260	0.00230			
	Barium (Ba)-Dissolved (mg/L)	0.0215	0.0217			
	Beryllium (Be)-Dissolved (mg/L)	<0.000060	<0.000060			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1217055-1	L1217055-2			
	Description	WATER	WATER			
	Sampled Date	25-SEP-12	24-SEP-12			
	Sampled Time	12:30	14:15			
	Client ID	PIN-12	PIN-16			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Bismuth (Bi)-Dissolved (mg/L)	<0.00020	<0.00020			
	Boron (B)-Dissolved (mg/L)	0.0232	0.0272			
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	0.000018			
	Calcium (Ca)-Dissolved (mg/L)	41.5	45.5			
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.00050			
	Cobalt (Co)-Dissolved (mg/L)	0.000123	0.000202			
	Copper (Cu)-Dissolved (mg/L)	0.00128	0.00154			
	Iron (Fe)-Dissolved (mg/L)	0.153	0.134			
	Lead (Pb)-Dissolved (mg/L)	0.00012	<0.00010			
	Lithium (Li)-Dissolved (mg/L)	0.0073	0.0076			
	Magnesium (Mg)-Dissolved (mg/L)	15.4	16.6			
	Manganese (Mn)-Dissolved (mg/L)	0.00445	0.0454			
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Dissolved (mg/L)	0.00048	0.00079			
	Nickel (Ni)-Dissolved (mg/L)	0.0025	0.0026			
	Potassium (K)-Dissolved (mg/L)	2.87	2.40			
	Selenium (Se)-Dissolved (mg/L)	<0.00050	<0.00050			
	Silver (Ag)-Dissolved (mg/L)	<0.000050	<0.000050			
	Sodium (Na)-Dissolved (mg/L)	3.24	4.89			
	Strontium (Sr)-Dissolved (mg/L)	0.0854	0.0942			
	Tellurium (Te)-Dissolved (mg/L)	<0.000070	<0.000070			
	Thallium (Tl)-Dissolved (mg/L)	<0.000030	<0.000030			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	0.00552	0.00204			
	Tungsten (W)-Dissolved (mg/L)	<0.00010	<0.00010			
	Uranium (U)-Dissolved (mg/L)	0.000469	0.000546			
	Vanadium (V)-Dissolved (mg/L)	0.00055	0.00063			
	Zinc (Zn)-Dissolved (mg/L)	<0.0020	0.0024			
	Zirconium (Zr)-Dissolved (mg/L)	0.00068	0.00064			
Aggregate Organics	Biochemical Oxygen Demand (mg/L)	2.0	<2.0			
	Chemical Oxygen Demand (mg/L)	79.7	72.0			
	Oil and Grease, Total (mg/L)	<2.0	<2.0			
	Animal/Veg Oil & Grease (mg/L)	<1.0	<1.0			
	Mineral Oil and Grease (mg/L)	<1.0	<1.0			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
SFPL	Sample was Filtered and Preserved at the laboratory - Dissolved metals, mercury, phosphorus and DOC

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Silica, Reactive (as SiO2)	DLA	L1217055-1, -2
Duplicate	Silica, Reactive (as SiO2)	DLA	L1217055-1, -2
Matrix Spike	Ammonia, Total (as N)	MS-B	L1217055-1, -2
Matrix Spike	Sulphide	MS-B	L1217055-1
Matrix Spike	Chemical Oxygen Demand	MS-B	L1217055-1, -2
Matrix Spike	Dissolved Organic Carbon	MS-B	L1217055-1, -2
Matrix Spike	Phosphorus (P)-Total	MS-B	L1217055-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
BL:INT	Balance Reviewed: Interference Or Non-Measured Component
DLA	Detection Limit Adjusted For required dilution
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-TB	Water	Acidity (as CaCO3)	APHA 2310 B-POTENTIOMETRIC TITRATION
Aqueous matrices are analyzed by potentiometry. Acidity reported includes acidity caused by hydrolyzable metals present in the sample.			
ALK-TOT-CAP-TB	Water	Alkalinity, Total (as CaCO3)	APHA 2320 B-Auto-Pot. Titration
BIC-TB	Water	Bicarbonate (HCO3)	APHA 2320 B-POTENTIOMETRIC TITRATION
BOD-TB	Water	Biochemical Oxygen Demand (BOD)	APHA 5210 B-5 day Incub.-O2 electrode
C-DIS-ORG-TB	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental
C-TOT-ORG-TB	Water	Total Organic Carbon (TOC)	APHA 5310 B-Instrumental
CL-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)
Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.			
CN-TOT-WT	Water	Cyanide, Total	APHA 4500CN C E-STRONG ACID DIST COLORIM
Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex. When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference			
CN-WAD-WT	Water	Cyanide, Weak Acid Diss	APHA 4500CN I-Weak acid Dist Colorimet
Weak acid dissociable cyanide (WAD) is determined by undergoing a distillation procedure. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.			
CO3-TB	Water	Carbonate (CO3)	APHA 2320 B-Potentiometric Titration
COD-TB	Water	Chemical Oxygen Demand	APHA 5220 D-Micro Colorimetry
COLOUR-TB	Water	Colour, True	CPPA H.5P Spectrophotometry
EC-CAP-TB	Water	Conductivity (EC)	APHA 2510 B-ELECTRODE
ETL-N2N3-TB	Water	Calculate from NO2 + NO3	Calculation
F-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)
Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.			
HARDNESS-CALC-TB	Water	Hardness (as CaCO3)	CALCULATION
HG-D-CVAF-TB	Water	Dissolved Mercury in Water by CVAFS	EPA 245.7
HG-T-CVAF-TB	Water	Total Mercury in Water by CVAFS	EPA 245.7
IONBALANCE-OP12-TB	Water	Ion Balance Calculation	APHA 1030 E - CALCULATION
MET-D-L-MS-TB	Water	Dissolved Metals by ICPMS	APHA 3030B/EPA 6020A

Reference Information

This analysis involves filtration (APHA 3030B) and analysis by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-T-L-MS-TB	Water	Total Metals in Water by ICPMS (Low)	APHA 3120 B-ICPMS
N-TOTKJ-TB	Water	Total Kjeldahl Nitrogen by Colourimetry	APHA 4500-Norg B (modified)

Total Kjeldahl Nitrogen in aqueous matrices is analyzed using an autoanalyzer with colourimetric detection.

NH3-COL-TB	Water	Ammonia by Discrete Analyzer	APHA 4500-NH3 G. (modified)

Ammonia in aqueous matrices is analyzed using discrete analyzer with colourimetric detection.

NO2-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

NO3-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

OGG-SPEC-WT	Water	Speciated Oil and Grease-Gravimetric	APHA 5520 B

Sample is extracted with hexane, sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.

OH-TB	Water	Hydroxide	APHA 2320 B-Potentiometric Titration
P-T-COL-TB	Water	Total Phosphorus by Discrete Analyzer	APHA 4500-P B, F, G (modified)

Phosphorus in aqueous matrices is analyzed using discrete Analyzer with colourimetric detection.

P-TD-COL-TB	Water	Total Dissolved Phosphorus in Water	APHA 4500-P B, F, G (modified)

Phosphorus in aqueous matrices is analyzed using discrete Analyzer with colourimetric detection.

PH-CAP-TB	Water	pH	APHA 4500-H-ELECTRODE
PO4-DO-COL-TB	Water	Dissolved Orthophosphate	APHA 4500-P B, F, G (modified)

Phosphorus in aqueous matrices is analyzed using discrete Analyzer with colourimetric detection.

SIO2-COL-WP	Water	Reactive Silica by colour	APHA 4500 SIO2

This analysis is carried out using procedures adapted from APHA Method 4500-SiO2 "Silica". Molybdate Reactive Silica is determined by analysis of the sample using the heteropoly blue colourimetric method.

SO4-IC-TB	Water	Anions by Ion Chromatography	EPA 300.1 (modified)

Anions in aqueous matrices are analyzed using ion chromatography with conductivity and/or UV absorbance detectors.

SOLIDS-TDS-TB	Water	Total Dissolved Solids	APHA 2540 C (modified)

Aqueous matrices are analyzed using gravimetry and evaporation

SOLIDS-TOTSUS-TB	Water	Total Suspended Solids	APHA 2540 D (modified)

Aqueous matrices are analyzed using gravimetry

SULPHIDE-WT	Water	Sulphide	APHA 4500S2D
TURBIDITY-TB	Water	Turbidity	APHA 2130 B-Nephelometer

Aqueous matrices are analyzed using nephelometry with the light scatter measured at a 90" angle.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

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ALS CANADA LIMIT

L1217055-COFC

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obal.com

L1217055 Page __ of __

Company:	AMEC		
Contact:	Jason Dietrich		
Address:	900 Maple Grove Rds Unit 10		
	Cambridge ON, N3H 4R7		
Phone:	519-650-7100	Fax:	
Email:	jason.dietrich@amec.com		
Project:	TC111504	PO:	
Quote #	[redacted] Q36013		
Invoice To:		Same as Report: ☑ Yes ☐ No	
Company:			
Contact:			
Address:			
Email:			
Account Manager	Karen	Sampler: Levi Snook	

Record of Site Condition ☐ Yes ☐ No
PWQO ☒ MISA ☐ MMER ☐ CCME ☒
Guideline Required:
TCLP Regulation 558 ☐ Other:

Service Requested
☒ Regular TAT (7 Days)
☐ Priority TAT 50% Surcharge (3-5 Days)
☐ Emergency TAT 100% Surcharge (1-2 Days)
Specify Date Required:

All TAT quoted material is in business days which exclude statutory holidays and weekends. Samples received past 3:00pm or Saturday/Sunday begin the next day.

Both questions below must answered for water samples
Are any samples taken from a regulated DW System? ☐ Yes ☒ No
If yes, an authorized DW COC must be used.
Is the water sampled intended for human consumption? ☐ Yes ☒ No

Analysis Request
Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date	Time	Sample Type	Acidity-TB, Alk-TOT-CAP-TB, [redacted] BIC-TB, BOD-TB	C-DIS-ORG-TB, C-TOT-ORG-TB, CL-IC-TB, CN-TOT-WT	CO-WAD-WT, COLOUR-TB	EC-CAP-TB, ETL-N2N3-TB, F-IC-TB	HARDNESS-CALC-TB, [redacted] HG-D-CVAF-TB	HC-T-CUAF-TB, IONBALANCE-OPT-TB, MET-D-L-MS-TB	MET-T-L-MS-TB, NTOTU-TB, [redacted] NH3-COL-TB, NOX-IC-TB	NOB-IC-TB, OG-SPEC-WT, PHTB, P-T-COL-TB, P-TD-COL-TB	PH-CAP-TB, POH-DO-COL-TB, SIO2-L-COL-WB, SO4-IC-TB	SOLIDS-TBS-TB, SOLIDS-TOTALS-TB	SULPHIDE-WT, TURBIDITY-TB	[redacted]			Number of Containers
1	PIW-12	Sept 25, 12	12:30	Water	X	X	X	X	X	X	X	X	X	X					14
2	PIW-16	Sept 24, 12	14:15	Water	X	X	X	X	X	X	X	X	X	X					14

Special Instructions / Comments

Field Filter and Preserve in lab.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by: Levi Snook	Date & Time Sept 29, 12 9:30am	Received by:	Date & Time 29-SEP-12 945	Temp 5.2	Cooling Initiated ☐ Yes ☐ No	Verified by:	Date & Time Oct 1/12 Noon	Observations: Yes / No ? If Yes add SIF

**Failure to complete all portions of this form may delay analysis. **TAT may vary dependant on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs. Any known or suspected hazards relating to a sample must be noted on the chain of custody in the comments section. By use of the form the user acknowledges and agrees with the Terms and Conditions as specified on the back page.

APPENDIX E

SEDIMENT QUALITY DATA AND CERTIFICATES OF ANALYSIS

AMEC
ATTN: Jason Dietrich
900 Maple Grove Rd., Unit 10
Cambridge ON N3H 4R7

Date Received: 05-SEP-12
Report Date: 21-SEP-12 07:18 (MT)
Version: FINAL REV. 2

Client Phone: 519-650-7133

Certificate of Analysis

Lab Work Order #: L1204572

Project P.O. #: NOT SUBMITTED
Job Reference: TC111504
C of C Numbers:
Legal Site Desc:

Comments:

21-SEP-12: Updated pH ration for L1204572-11. TS

Tricia Sampson
Account Manager Supervisor

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1204572-1	L1204572-2	L1204572-3	L1204572-4	L1204572-5
Description	SOIL	SOIL	SOIL	SOIL	SOIL
Sampled Date	03-SEP-12	01-SEP-12	01-SEP-12	31-AUG-12	31-AUG-12
Sampled Time	10:15	10:45	13:20	13:45	12:35
Client ID	PIN-10	CLA-5A	WES-TRIB1A	LOS-3	LOS-4
Grouping / **Analyte**					
SOIL					
Physical Tests Loss on Ignition @ 550 C (%)	8	10	7	17	13
Moisture (%)	38.2	36.9	36.4	57.2	50.4
pH (1:2 soil:water) (pH)	7.73	7.47	8.06	6.91	7.48
Leachable Anions & Nutrients Total Kjeldahl Nitrogen (mg/kg)	1350	2540	1610	4890	2980
Organic / Inorganic Carbon Fraction Organic Carbon	0.0131	0.0413	0.0166	0.0570	0.0333
Total Organic Carbon (%)	1.31	4.13	1.66	5.70	3.33
Metals Aluminum (Al) (mg/kg)	11500	6070	7420	17100	19400
Antimony (Sb) (mg/kg)	0.10	0.11	<0.10	0.18	0.12
Arsenic (As) (mg/kg)	2.07	3.58	2.88	4.23	3.18
Barium (Ba) (mg/kg)	66.1	52.4	69.2	106	106
Beryllium (Be) (mg/kg)	0.49	0.48	0.36	0.83	0.80
Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B) (mg/kg)	<10	<10	<10	12	<10
Cadmium (Cd) (mg/kg)	0.156	0.272	0.149	0.276	0.256
Calcium (Ca) (mg/kg)	13400	9910	21800	8910	7360
Chromium (Cr) (mg/kg)	24.8	15.7	15.8	33.0	34.3
Cobalt (Co) (mg/kg)	8.03	4.26	5.84	8.79	9.79
Copper (Cu) (mg/kg)	12.0	9.96	10.8	19.5	17.3
Iron (Fe) (mg/kg)	15200	6990	12500	19900	20100
Lead (Pb) (mg/kg)	6.31	4.63	6.43	8.80	10.3
Lithium (Li) (mg/kg)	14.3	8.7	7.6	18.2	19.9
Magnesium (Mg) (mg/kg)	9750	5160	8900	6010	6140
Manganese (Mn) (mg/kg)	276	71.9	255	594	443
Mercury (Hg) (mg/kg)	0.0245	0.0270	0.0282	0.0542	0.0373
Molybdenum (Mo) (mg/kg)	<0.50	0.69	<0.50	<0.50	<0.50
Nickel (Ni) (mg/kg)	18.4	12.5	15.9	24.8	23.3
Phosphorus (P) (mg/kg)	466	339	456	578	427
Potassium (K) (mg/kg)	1700	480	1160	2140	2110
Selenium (Se) (mg/kg)	0.25	0.61	<0.20	1.28	0.64
Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium (Na) (mg/kg)	130	<100	<100	100	<100
Strontium (Sr) (mg/kg)	22.5	14.0	20.0	32.1	28.3
Thallium (Tl) (mg/kg)	0.138	0.088	0.145	0.219	0.182
Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti) (mg/kg)	280	138	202	164	170
Uranium (U) (mg/kg)	1.02	2.08	0.627	6.58	4.00

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1204572-6 SOIL 03-SEP-12 11:10 JON-2	L1204572-7 SOIL 04-SEP-12 12:55 TAIT-1	L1204572-8 SOIL 30-AUG-12 11:25 LOS-8	L1204572-9 SOIL 30-AUG-12 12:55 LOS-5	L1204572-10 SOIL 30-AUG-12 16:05 PIN-2A
SOIL						
Physical Tests	Loss on Ignition @ 550 C (%)	10	6	3	43	11
	Moisture (%)	36.0	34.1	36.3	79.6	59.8
	pH (1:2 soil:water) (pH)	7.11	7.53	8.02	6.65	7.25
Leachable Anions & Nutrients	Total Kjeldahl Nitrogen (mg/kg)	1870	320	1300	10800	1630
Organic / Inorganic Carbon	Fraction Organic Carbon	0.0246	0.0059	0.0118	0.105	0.0072
	Total Organic Carbon (%)	2.46	0.59	1.18	10.5	0.72
Metals	Aluminum (Al) (mg/kg)	16000	7420	14100	13000	15200
	Antimony (Sb) (mg/kg)	0.14	<0.10	<0.10	0.13	0.10
	Arsenic (As) (mg/kg)	5.03	1.32	1.25	2.44	2.54
	Barium (Ba) (mg/kg)	109	35.5	66.6	99.5	80.1
	Beryllium (Be) (mg/kg)	0.65	0.26	0.56	0.48	0.57
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	10	<10	<10	<10	<10
	Cadmium (Cd) (mg/kg)	0.184	0.053	<0.050	0.512	0.233
	Calcium (Ca) (mg/kg)	10800	6570	4260	10200	9310
	Chromium (Cr) (mg/kg)	34.0	15.6	25.6	23.3	28.7
	Cobalt (Co) (mg/kg)	12.9	4.60	5.22	6.90	8.16
	Copper (Cu) (mg/kg)	18.3	5.57	11.9	14.1	12.0
	Iron (Fe) (mg/kg)	25700	9240	14100	13500	16800
	Lead (Pb) (mg/kg)	8.87	3.89	6.97	8.47	8.06
	Lithium (Li) (mg/kg)	19.1	8.9	16.0	13.5	16.3
	Magnesium (Mg) (mg/kg)	9060	4940	4470	4610	7500
	Manganese (Mn) (mg/kg)	878	167	116	848	273
	Mercury (Hg) (mg/kg)	0.0299	0.0150	0.0186	0.0916	0.0367
	Molybdenum (Mo) (mg/kg)	<0.50	<0.50	<0.50	0.53	<0.50
	Nickel (Ni) (mg/kg)	25.3	10.6	15.1	17.3	17.8
	Phosphorus (P) (mg/kg)	688	249	359	632	570
	Potassium (K) (mg/kg)	2170	970	1650	1410	1930
	Selenium (Se) (mg/kg)	0.32	<0.20	<0.20	1.10	0.35
	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Sodium (Na) (mg/kg)	160	<100	<100	<100	130
	Strontium (Sr) (mg/kg)	25.4	13.5	19.4	31.5	27.6
	Thallium (Tl) (mg/kg)	0.182	0.075	0.148	0.155	0.182
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	318	216	271	183	256
	Uranium (U) (mg/kg)	1.25	0.509	1.03	4.88	1.45

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1204572-11
	Description	SOIL
	Sampled Date	29-AUG-12
	Sampled Time	12:30
	Client ID	LOS-11
Grouping	**Analyte**	
SOIL		
Physical Tests	Loss on Ignition @ 550 C (%)	66
	Moisture (%)	85.3
	pH (1:2 soil:water) (pH)	6.98
Leachable Anions & Nutrients	Total Kjeldahl Nitrogen (mg/kg)	13600
Organic / Inorganic Carbon	Fraction Organic Carbon	0.245
	Total Organic Carbon (%)	24.5
Metals	Aluminum (Al) (mg/kg)	3320
	Antimony (Sb) (mg/kg)	<0.10
	Arsenic (As) (mg/kg)	1.58
	Barium (Ba) (mg/kg)	56.4
	Beryllium (Be) (mg/kg)	<0.20
	Bismuth (Bi) (mg/kg)	<0.20
	Boron (B) (mg/kg)	<10
	Cadmium (Cd) (mg/kg)	0.329
	Calcium (Ca) (mg/kg)	18300
	Chromium (Cr) (mg/kg)	5.40
	Cobalt (Co) (mg/kg)	2.75
	Copper (Cu) (mg/kg)	5.34
	Iron (Fe) (mg/kg)	4090
	Lead (Pb) (mg/kg)	5.25
	Lithium (Li) (mg/kg)	<5.0
	Magnesium (Mg) (mg/kg)	4530
	Manganese (Mn) (mg/kg)	717
	Mercury (Hg) (mg/kg)	0.0944
	Molybdenum (Mo) (mg/kg)	0.70
	Nickel (Ni) (mg/kg)	5.35
	Phosphorus (P) (mg/kg)	428
	Potassium (K) (mg/kg)	390
	Selenium (Se) (mg/kg)	1.13
	Silver (Ag) (mg/kg)	<0.10
	Sodium (Na) (mg/kg)	<100
	Strontium (Sr) (mg/kg)	41.0
	Thallium (Tl) (mg/kg)	0.056
	Tin (Sn) (mg/kg)	<2.0
	Titanium (Ti) (mg/kg)	69.9
	Uranium (U) (mg/kg)	2.53

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1204572-1	L1204572-2	L1204572-3	L1204572-4	L1204572-5
Description	SOIL	SOIL	SOIL	SOIL	SOIL
Sampled Date	03-SEP-12	01-SEP-12	01-SEP-12	31-AUG-12	31-AUG-12
Sampled Time	10:15	10:45	13:20	13:45	12:35
Client ID	PIN-10	CLA-5A	WES-TRIB1A	LOS-3	LOS-4
Grouping / **Analyte**					
SOIL					
Metals					
Vanadium (V) (mg/kg)	35.4	41.8	24.7	54.0	53.6
Zinc (Zn) (mg/kg)	51.7	28.5	32.8	57.9	65.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1204572-6	L1204572-7	L1204572-8	L1204572-9	L1204572-10
Description	SOIL	SOIL	SOIL	SOIL	SOIL
Sampled Date	03-SEP-12	04-SEP-12	30-AUG-12	30-AUG-12	30-AUG-12
Sampled Time	11:10	12:55	11:25	12:55	16:05
Client ID	JON-2	TAIT-1	LOS-8	LOS-5	PIN-2A
Grouping / **Analyte**					
SOIL					
Metals					
Vanadium (V) (mg/kg)	48.2	21.7	35.0	33.1	42.8
Zinc (Zn) (mg/kg)	66.6	27.3	36.2	66.5	65.6

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1204572-11				
	Description	SOIL				
	Sampled Date	29-AUG-12				
	Sampled Time	12:30				
	Client ID	LOS-11				
Grouping	**Analyte**					
SOIL						
Metals	Vanadium (V) (mg/kg)	9.76				
	Zinc (Zn) (mg/kg)	35.2				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Moisture	DUP-H	L1204572-11

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
B-200.2-CCMS-VA	Soil	Boron in Soil by CRC ICPMS	EPA 200.2/6020A

"This analysis is carried out using procedures from CSR Analytical Method: ""Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment."

HG-200.2-CVAF-VA	Soil	Mercury in Soil by CVAFS	EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 245.7).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

LOI-550-SK	Soil	Loss on Ignition @ 550 C	CSSS (1993) p.461-462

The sample is air dried at 40C overnight, then ground to < 2mm in particle size using a flail grinder. A portion of the dried and ground sample is dried at 105C overnight, then ignited at 550C for 16-20 hours. Loss on ignition at 550C is reported on a dry sample basis.

Carter, Martin. Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci.(1993) method 44.3.3

MET-200.2-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MOISTURE-VA	Soil	Moisture content	ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

TKN-WT	Soil	Total Kjeldahl Nitrogen	APHA 4500-N

A homogenized soil sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

Reference Information

TOC-WT	Soil	TOC & FOC in Solids	CARTER 21.2

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environme

L1204572-COFC

Ontario P7B 5N3 Canada PHONE +1 807 623 6463 FAX +1 807 623 7598
A Campbell Brothers Limited Company www.alsglobal.com

L1204572 04868

Page ___ of ___

Company:	AMEC
Contact:	Jason Dietrich
Address:	900 Maple Grove Rd, Unit 10 Cambridge, ON, N3H 4R7
Phone:	(519)650-7133 Fax:
Email:	jason.dietrich@amec.com
Project:	TC111504 PO:
Quote #	Q36010
Invoice To:	Same as Report: ☒ Yes ☐ No
Company:	
Contact:	
Address:	
Email:	
Account Manager	Karen
Sampler:	Levi Snook

Regulatory Information

- ☐ O. Reg 153 (O. Reg 511 Amend) Table:____
- Record of Site Condition ☐ Yes ☐ No
- PWQO ☐ MISA ☐ MMER ☐ CCME ☒
- Guideline Required: PSQG
- TCLP Regulation 558 ☐ Other:

Service Requested

- ☒ Regular TAT (7 Days)
- ☐ Priority TAT 50% Surcharge (3-5 Days)
- ☐ Emergency TAT 100% Surcharge (1-2 Days)
- Specify Date Required:

All TAT quoted material is in business days which exclude statutory holidays and weekends. Samples received past 3:00pm or Saturday/Sunday begin the next day.

Both questions below must answered for water samples

Are any samples taken from a regulated DW System? ☐ Yes ☐ No

If yes, an authorized DW COC must be used.

Is the water sampled intended for human consumption? ☐ Yes ☐ No

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date	Time	Sample Type	B-200.2-CCMS-VA	L01-550-SK	MET-CCME+FUL-VA	MOISTURE-VA	PREP-200.2-VA	TKN-WT	TOC-WT	Number of Containers
1	PIN-10	Sept 3, 2012	10:15am	Soil	X	X	X	X	X	X	X	3
2	CLA-5A	Sept 1, 2012	10:45am	Soil	X	X	X	X	X	X	X	3
3	WES-TRIBIA	Sept 1, 2012	13:20pm	Soil	X	X	X	X	X	X	X	3
4	LOS-3	Aug 31, 2012	13:45	Soil	X	X	X	X	X	X	X	3
5	LOS-4	Aug 31, 2012	12:35	Soil	X	X	X	X	X	X	X	3
6	JON-2	Sept 3, 2012	11:10am	Soil	X	X	X	X	X	X	X	3
7	TAIT-1	Sept 3, 2012	12:55pm	Soil	X	X	X	X	X	X	X	3
8	LOS-8	Aug 30, 2012	11:25am	Soil	X	X	X	X	X	X	X	3
9	LOS-5	Aug 30, 2012	12:55pm	Soil	X	X	X	X	X	X	X	3
10	PIN-2A	Aug 30, 2012	16:05	Soil	X	X	X	X	X	X	X	3
11	LOS-11	Aug 29, 2012	12:30pm	Soil	X	X	X	X	X	X	X	3

Special Instructions / Comments

Also please email SRC to abosson@rainyriverresources.com

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by: Levi Snook	Date & Time: Sept 4, 2012 4:00pm	Received by: KM	Date & Time: Sept 5/12 9:45	Temp: 10.8	Cooling Initiated ☐ Yes ☐ No	Verified by: KM	Date & Time: Sept 5/12 12:15	Observations: Yes / No? If Yes add SIF

**Failure to complete all portions of this form may delay analysis. **TAT may vary dependant on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs. Any known or suspected hazards relating to a sample must be noted on the chain of custody in the comments section. By use of the form the user acknowledges and agrees with the Terms and Conditions as specified on the back page.

Cooler #1 11.3, 10.2

AMEC
ATTN: Jason Dietrich
900 Maple Grove Rd. Unit 10
Cambridge ON N3H 4R7

Date Received: 05-SEP-12
Report Date: 18-SEP-12 07:58 (MT)
Version: FINAL

Client Phone: 519-650-7133

Certificate of Analysis

Lab Work Order #: L1204888

Project P.O. #: NOT SUBMITTED
Job Reference: TC111504
C of C Numbers:
Legal Site Desc:

Karen Rutledge
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1204888-1	L1204888-2	L1204888-3		
	Description	SOIL	SOIL	SOIL		
	Sampled Date	28-AUG-12	28-AUG-12	28-AUG-12		
	Sampled Time	12:53	14:15	11:30		
	Client ID	WES-TRIB1B	PIN-9	JON-1		
Grouping	**Analyte**					
SOIL						
Physical Tests	Loss on Ignition @ 550 C (%)	4	7	6		
	Moisture (%)	28.9	42.0	32.1		
	pH (1:2 soil:water) (pH)	8.09	7.79	7.31		
Leachable Anions & Nutrients	Total Kjeldahl Nitrogen (mg/kg)	590	1060	1330		
Organic / Inorganic Carbon	Fraction Organic Carbon	0.0469	0.0101	0.0117		
	Total Organic Carbon (%)	4.69	1.01	1.17		
Metals	Aluminum (Al) (mg/kg)	5050	11600	14100		
	Antimony (Sb) (mg/kg)	<0.10	0.12	0.11		
	Arsenic (As) (mg/kg)	2.64	2.82	2.72		
	Barium (Ba) (mg/kg)	30.0	69.9	88.2		
	Beryllium (Be) (mg/kg)	<0.20	0.42	0.61		
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20		
	Boron (B) (mg/kg)	<10	<10	<10		
	Cadmium (Cd) (mg/kg)	0.054	0.163	0.555		
	Calcium (Ca) (mg/kg)	16400	18000	4710		
	Chromium (Cr) (mg/kg)	19.5	23.7	27.0		
	Cobalt (Co) (mg/kg)	5.42	8.62	6.41		
	Copper (Cu) (mg/kg)	15.5	10.6	21.5		
	Iron (Fe) (mg/kg)	12800	14000	15700		
	Lead (Pb) (mg/kg)	1.47	6.89	7.26		
	Lithium (Li) (mg/kg)	6.3	12.3	13.7		
	Magnesium (Mg) (mg/kg)	9380	11800	4180		
	Manganese (Mn) (mg/kg)	406	275	387		
	Mercury (Hg) (mg/kg)	0.0072	0.0239	0.0354		
	Molybdenum (Mo) (mg/kg)	<0.50	<0.50	<0.50		
	Nickel (Ni) (mg/kg)	12.1	16.7	19.5		
	Phosphorus (P) (mg/kg)	351	464	406		
	Potassium (K) (mg/kg)	520	1580	1410		
	Selenium (Se) (mg/kg)	<0.20	0.27	0.47		
	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10		
	Sodium (Na) (mg/kg)	<100	120	<100		
	Strontium (Sr) (mg/kg)	14.4	23.7	19.3		
	Thallium (Tl) (mg/kg)	<0.050	0.139	0.134		
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0		
	Titanium (Ti) (mg/kg)	288	290	178		
	Uranium (U) (mg/kg)	0.189	1.28	1.05		

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1204888-1	L1204888-2	L1204888-3		
	Description	SOIL	SOIL	SOIL		
	Sampled Date	28-AUG-12	28-AUG-12	28-AUG-12		
	Sampled Time	12:53	14:15	11:30		
	Client ID	WES-TRIB1B	PIN-9	JON-1		
Grouping	**Analyte**					
SOIL						
Metals	Vanadium (V) (mg/kg)	17.6	36.2	42.5		
	Zinc (Zn) (mg/kg)	35.8	46.2	73.6		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
B-200.2-CCMS-VA	Soil	Boron in Soil by CRC ICPMS	EPA 200.2/6020A

"This analysis is carried out using procedures from CSR Analytical Method: ""Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment."

HG-200.2-CVAF-VA	Soil	Mercury in Soil by CVAFS	EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 245.7).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

LOI-550-SK	Soil	Loss on Ignition @ 550 C	CSSS (1993) p.461-462

The sample is air dried at 40C overnight, then ground to < 2mm in particle size using a flail grinder. A portion of the dried and ground sample is dried at 105C overnight, then ignited at 550C for 16-20 hours. Loss on ignition at 550C is reported on a dry sample basis.

Carter, Martin. Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci.(1993) method 44.3.3

MET-200.2-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MOISTURE-VA	Soil	Moisture content	ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

TKN-WT	Soil	Total Kjeldahl Nitrogen	APHA 4500-N

A homogenized soil sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TOC-WT	Soil	TOC & FOC in Solids	CARTER 21.2

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA

Reference Information

VA ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environme

y Ontario P7B 5N3 Canada PHONE +1 807 623 6463 FAX +1 807 623 7598
p A Campbell Brothers Limited Company www.alsglobal.com

L1204888 04869

Page ___ of ___

Company:	AME
Contact:	JASON DIETRICH
Address:	900 Maple Grove Rd, Unit 10 Cambridge, ON, N3H 4R7
Phone:	(519)650-7133 Fax:
Email:	jason.dietrich@ames.com
Project:	TC111504 PO:
Quote #	Q36010
Invoice To:	Same as Report: ☒ Yes ☐ No
Company:	
Contact:	
Address:	
Email:	
Account Manager	Kamen
Sampler:	Levi Snook

Regulatory Information

- ☐ O. Reg 153 (O. Reg 511 Amend) Table:____
- Record of Site Condition ☐ Yes ☐ No
- PWQO ☐ MISA ☐ MMER ☐ CCME ☒
- Guideline Required: PSOQ
- TCLP Regulation 558 ☐ Other:

Service Requested

- ☒ Regular TAT (7 Days)
- ☐ Priority TAT 50% Surcharge (3-5 Days)
- ☐ Emergency TAT 100% Surcharge (1-2 Days)
- Specify Date Required:

All TAT quoted material is in business days which exclude statutory holidays and weekends. Samples received past 3:00pm or Saturday/Sunday begin the next day.

Both questions below must answered for water samples

- Are any samples taken from a regulated DW System? ☐ Yes ☐ No
- If yes, an authorized DW COC must be used.
- Is the water sampled intended for human consumption? ☐ Yes ☐ No

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date	Time	Sample Type	B-200.2-CCMS-VA	LOI-SSD-SK	MET-CCME+FULL-VA	MOISTURE-VA	PREP-200.2-VA	TKN-WT	TOC-WT	Number of Containers
1	WES-TRIB1B	Aug 28, 2012	12:53	Soil	X	X	X	X	X	X	X	3
2	PIN-9	Aug 28, 2012	14:15	Soil	X	X	X	X	X	X	X	3
3	JON-1	Aug 28,	11:30	Soil	X	X	X	X	X	X	X	3

Special Instructions / Comments

also please email SRC to abisson@rainyriverresources.com

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by: Levi Snook	Date & Time Sept 4, 2012 4:00pm	Received by: KM	Date & Time Sept 5 12 9:45	Temp 9.3	Cooling Initiated ☐ Yes ☐ No	Verified by: KM	Date & Time Sept 5 12 12:30	Observations: Yes / No ? If Yes add SIF

Failure to complete all portions of this form may delay analysis. **TAT may vary dependant on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs. Any known or suspected hazards relating to a sample must be noted on the chain of custody in the comments section. By use of the form the user acknowledges and agrees with the Terms and Conditions as specified on the back page.

AMEC
ATTN: Jason Dietrich
900 Maple Grove Rd., Unit 10
Cambridge ON N3H 4R7

Date Received: 08-SEP-12
Report Date: 22-SEP-12 10:37 (MT)
Version: FINAL

Client Phone: 519-650-7133

Certificate of Analysis

Lab Work Order #: L1206253

Project P.O. #: NOT SUBMITTED
Job Reference: TC111504
C of C Numbers:
Legal Site Desc:

Karen Rutledge
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1206253-1	L1206253-2	L1206253-3	L1206253-4	L1206253-5
Description	SOIL	SOIL	SOIL	SOIL	SOIL
Sampled Date	06-SEP-12	05-SEP-12	07-SEP-12	05-SEP-12	05-SEP-12
Sampled Time	12:00	17:15	11:30	14:00	09:30
Client ID	UT2-A	UT5-A	PIN-8	PIN-10A	STU-6
Grouping / **Analyte**					
SOIL					
Physical Tests Loss on Ignition @ 550 C (%)	6	5	7	5	3
Moisture (%)	32.0	33.9	36.6	36.6	27.0
pH (1:2 soil:water) (pH)	7.23	7.88	8.03	8.23	8.33
Leachable Anions & Nutrients Total Kjeldahl Nitrogen (mg/kg)	1280	620	2580	1030	620
Organic / Inorganic Carbon Fraction Organic Carbon	0.0342	0.0079	0.0200	0.0109	0.0053
Total Organic Carbon (%)	3.42	0.79	2.00	1.09	0.53
Metals Aluminum (Al) (mg/kg)	18900	14900	15700	18300	9070
Antimony (Sb) (mg/kg)	<0.10	0.10	0.13	0.16	0.13
Arsenic (As) (mg/kg)	5.23	1.24	3.62	4.14	3.05
Barium (Ba) (mg/kg)	113	69.4	92.3	107	62.5
Beryllium (Be) (mg/kg)	0.69	0.47	0.68	0.75	0.38
Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	0.21	<0.20
Boron (B) (mg/kg)	<10	10	12	13	<10
Cadmium (Cd) (mg/kg)	0.078	0.057	0.258	0.152	0.134
Calcium (Ca) (mg/kg)	4980	5610	15400	25000	19900
Chromium (Cr) (mg/kg)	35.7	26.8	32.5	41.7	20.8
Cobalt (Co) (mg/kg)	14.5	5.50	9.39	13.9	9.41
Copper (Cu) (mg/kg)	13.5	9.67	14.4	18.4	9.84
Iron (Fe) (mg/kg)	16500	13100	18800	25000	13000
Lead (Pb) (mg/kg)	13.3	6.33	9.11	10.2	7.32
Lithium (Li) (mg/kg)	22.2	18.5	18.6	25.8	11.6
Magnesium (Mg) (mg/kg)	5530	4780	10700	17900	10100
Manganese (Mn) (mg/kg)	175	109	402	613	327
Mercury (Hg) (mg/kg)	0.0078	0.0198	0.0365	0.0276	0.0202
Molybdenum (Mo) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
Nickel (Ni) (mg/kg)	26.8	16.6	23.3	33.3	18.5
Phosphorus (P) (mg/kg)	170	325	484	498	339
Potassium (K) (mg/kg)	2390	1960	1810	3500	1510
Selenium (Se) (mg/kg)	0.58	<0.20	0.30	0.25	0.23
Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium (Na) (mg/kg)	180	<100	140	270	130
Strontium (Sr) (mg/kg)	27.5	18.3	29.2	34.1	22.4
Thallium (Tl) (mg/kg)	0.256	0.156	0.177	0.253	0.117
Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti) (mg/kg)	573	329	258	446	221
Uranium (U) (mg/kg)	2.92	1.08	1.51	1.25	0.813

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1206253-6	L1206253-7	L1206253-8		
Description	SOIL	SOIL	SOIL		
Sampled Date	04-SEP-12	04-SEP-12	06-SEP-12		
Sampled Time	13:50	10:30	14:30		
Client ID	PIN-3A	PIN-2AA	STU-5		
Grouping / **Analyte**					
SOIL					
Physical Tests Loss on Ignition @ 550 C (%)	5	4	8		
Moisture (%)	38.3	26.6	38.3		
pH (1:2 soil:water) (pH)	7.55	8.16	7.12		
Leachable Anions & Nutrients Total Kjeldahl Nitrogen (mg/kg)	1720	1540	3010		
Organic / Inorganic Carbon Fraction Organic Carbon	0.0135	0.0118	0.0335		
Total Organic Carbon (%)	1.35	1.18	3.35		
Metals Aluminum (Al) (mg/kg)	11500	8390	13700		
Antimony (Sb) (mg/kg)	<0.10	<0.10	<0.10		
Arsenic (As) (mg/kg)	2.23	1.86	2.16		
Barium (Ba) (mg/kg)	70.0	49.1	78.2		
Beryllium (Be) (mg/kg)	0.50	0.32	0.47		
Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20		
Boron (B) (mg/kg)	<10	<10	<10		
Cadmium (Cd) (mg/kg)	0.189	0.105	0.298		
Calcium (Ca) (mg/kg)	4750	9060	5890		
Chromium (Cr) (mg/kg)	26.6	18.1	29.5		
Cobalt (Co) (mg/kg)	7.51	5.62	7.07		
Copper (Cu) (mg/kg)	11.5	8.33	14.5		
Iron (Fe) (mg/kg)	14100	10500	14800		
Lead (Pb) (mg/kg)	7.30	5.34	7.58		
Lithium (Li) (mg/kg)	13.3	9.9	15.0		
Magnesium (Mg) (mg/kg)	4520	5670	4720		
Manganese (Mn) (mg/kg)	200	185	284		
Mercury (Hg) (mg/kg)	0.0354	0.0192	0.0345		
Molybdenum (Mo) (mg/kg)	<0.50	<0.50	<0.50		
Nickel (Ni) (mg/kg)	16.7	12.1	19.4		
Phosphorus (P) (mg/kg)	435	377	407		
Potassium (K) (mg/kg)	1400	1270	1450		
Selenium (Se) (mg/kg)	0.42	0.21	0.43		
Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10		
Sodium (Na) (mg/kg)	<100	<100	<100		
Strontium (Sr) (mg/kg)	20.8	16.8	22.1		
Thallium (Tl) (mg/kg)	0.127	0.092	0.139		
Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0		
Titanium (Ti) (mg/kg)	167	211	192		
Uranium (U) (mg/kg)	1.53	0.640	2.32		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1206253-1	L1206253-2	L1206253-3	L1206253-4	L1206253-5
	Description	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampled Date	06-SEP-12	05-SEP-12	07-SEP-12	05-SEP-12	05-SEP-12
	Sampled Time	12:00	17:15	11:30	14:00	09:30
	Client ID	UT2-A	UT5-A	PIN-8	PIN-10A	STU-6
Grouping	**Analyte**					
SOIL						
Metals	Vanadium (V) (mg/kg)	52.5	34.1	47.5	54.0	31.3
	Zinc (Zn) (mg/kg)	60.8	34.4	56.1	70.1	39.1

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1206253-6	L1206253-7	L1206253-8		
	Description	SOIL	SOIL	SOIL		
	Sampled Date	04-SEP-12	04-SEP-12	06-SEP-12		
	Sampled Time	13:50	10:30	14:30		
	Client ID	PIN-3A	PIN-2AA	STU-5		
Grouping	**Analyte**					
SOIL						
Metals	Vanadium (V) (mg/kg)	33.3	25.4	35.0		
	Zinc (Zn) (mg/kg)	56.4	35.0	76.9		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Antimony (Sb)	DUP-H	L1206253-3, -4, -5, -6, -7, -8
Duplicate	Mercury (Hg)	DUP-H,J	L1206253-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
DUP-H,J	Duplicate results outside ALS DQO, due to sample heterogeneity. Duplicate results and limits are expressed in terms of absolute difference.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
B-200.2-CCMS-VA	Soil	Boron in Soil by CRC ICPMS	EPA 200.2/6020A

"This analysis is carried out using procedures from CSR Analytical Method: ""Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment."

HG-200.2-CVAF-VA	Soil	Mercury in Soil by CVAFS	EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 245.7).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

LOI-550-SK	Soil	Loss on Ignition @ 550 C	CSSS (1993) p.461-462

The sample is air dried at 40C overnight, then ground to < 2mm in particle size using a flail grinder. A portion of the dried and ground sample is dried at 105C overnight, then ignited at 550C for 16-20 hours. Loss on ignition at 550C is reported on a dry sample basis.

Carter, Martin. Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci.(1993) method 44.3.3

MET-200.2-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MOISTURE-VA	Soil	Moisture content	ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

Reference Information

TKN-WT	Soil	Total Kjeldahl Nitrogen	APHA 4500-N

A homogenized soil sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TOC-WT	Soil	TOC & FOC in Solids	CARTER 21.2

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environme

L1206253-COFC

Ontario P7B 5N3 Canada PHONE +1 807 623 6463 FAX +1 807 623 7598
A Campbell Brothers Limited Company www.alsglobal.com

L1206253 04867

Page ___ of ___

Company:	AMEC	Regulatory Information	Both questions below must answered for water samples
Contact:	Jason Dietrich	O. Reg 153 (O. Reg 511 Amend) Table:____	Are any samples taken from a regulated DW System? ☐Yes ☐No
Address:	900 Maple Grove Rd, Unit 10 Cambridge, ON, N3H 4R7	Record of Site Condition ☐Yes ☐No	If yes, an authorized DW COC must be used.
		PWQO ☐ MISA ☐ MMER ☐ CCME ☒	Is the water sampled intended for human consumption? ☐Yes ☐No
Phone:	(519) 650-7133 Fax:	Guideline Required: PSOQ	
Email:	jason.dietrich@amec.com	TCLP Regulation 558 ☐ Other:	
Project:	TC111504 PO:	Service Requested	
Quote #	Q36010	☒Regular TAT (7 Days)	
Invoice To:	Same as Report: ☒Yes ☐No	☐Priority TAT 50% Surcharge (3-5 Days)	
Company:		☐Emergency TAT 100% Surcharge (1-2 Days)	
Contact:		Specify Date Required:	
Address:		All TAT quoted material is in business days which exclude statutory holidays and weekends. Samples received past 3:00pm or Saturday/Sunday begin the next day.	
Email:			
Account Manager	Karen	Sampler: Levi Snook	

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date	Time	Sample Type	B-200.2-CCMS-VA	LOI-SSO-SK	MET-CCME+FULL-VA	MOISTURE-VA	PREP-200.2-VA	TKN-WT	TOC-WT						Number of Containers
1	UT2-A	Sept 6/12	12:00	SOIL	X	X	X	X	X	X	X						3
2	UT5-A	Sept 5/12	17:15	SOIL	X	X	X	X	X	X	X						3
3	PIN-8	Sept 7/12	11:30	SOIL	X	X	X	X	X	X	X						3
4	PIN-10A	Sept 5/12	14:00	SOIL	X	X	X	X	X	X	X						3
5	STV-6	Sept 5/12	9:30	SOIL	X	X	X	X	X	X	X						3
6	PIN-3A	Sept 4/12	13:50	SOIL	X	X	X	X	X	X	X						3
7	PIN-2AA	Sept 4/12	10:30	SOIL	X	X	X	X	X	X	X						3
8	STV-5	Sept 6/12	14:30	SOIL	X	X	X	X	X	X	X						3
9																	
10																	
11																	

Special Instructions / Comments

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by: Levi Snook	Date & Time Sept 8, 2012 11:00am	Received by: LB	Date & Time 10:45 08-SEP-12	Temp 6.2	Cooling Initiated ☐Yes ☐No	Verified by: LB	Date & Time 10:45 08-SEP-12	Observations: Yes / No ? If Yes add SIF

Failure to complete all portions of this form may delay analysis. **TAT may vary dependant on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs. Any known or suspected hazards relating to a sample must be noted on the chain of custody in the comments section. By use of the form the user acknowledges and agrees with the Terms and Conditions as specified on the back page.



AMEC
ATTN: Jason Dietrich
900 Maple Grove Rd., Unit 10
Cambridge ON N3H 4R7

Date Received: 25-SEP-12
Report Date: 08-OCT-12 13:21 (MT)
Version: FINAL

Client Phone: 519-650-7100

Certificate of Analysis

Lab Work Order #: L1214177

Project P.O. #: NOT SUBMITTED
Job Reference: TC111504
C of C Numbers:
Legal Site Desc:

Tricia Sampson
Account Manager Supervisor

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1214177-1 soil 20-SEP-12 14:45 PIN-15	L1214177-2 soil 19-SEP-12 12:00 PIN-17	L1214177-3 soil 21-SEP-12 11:15 PIN-14	L1214177-4 soil 21-SEP-12 02:00 PIN-11	L1214177-5 soil 19-SEP-12 02:30 PIN-18
Sample ID / **Description** / **Sampled Date** / **Sampled Time** / **Client ID**						
SOIL						
Physical Tests	Loss on Ignition @ 550 C (%)	3	5	5	5	5
	Moisture (%)	39.8	34.5	26.5	33.8	52.3
	pH (1:2 soil:water) (pH)	8.15	7.83	8.08	7.99	7.85
Leachable Anions & Nutrients	Total Kjeldahl Nitrogen (mg/kg)	670	950	350	1120	1530
Organic / Inorganic Carbon	Fraction Organic Carbon	0.0169	0.0151	0.0139	0.0153	0.0177
	Total Organic Carbon (%)	1.69	1.51	1.39	1.53	1.77
Metals	Aluminum (Al) (mg/kg)	17600	11400	15400	11600	10300
	Antimony (Sb) (mg/kg)	0.23	0.15	0.39	<0.10	0.15
	Arsenic (As) (mg/kg)	5.06	2.77	6.97	3.06	2.85
	Barium (Ba) (mg/kg)	112	68.1	91.5	72.5	68.9
	Beryllium (Be) (mg/kg)	0.68	0.47	0.77	0.35	0.45
	Bismuth (Bi) (mg/kg)	0.20	<0.20	0.21	<0.20	<0.20
	Boron (B) (mg/kg)	18	12	24	<10	<10
	Cadmium (Cd) (mg/kg)	0.187	0.183	0.268	0.144	0.150
	Calcium (Ca) (mg/kg)	44900	33300	64100	10800	31800
	Chromium (Cr) (mg/kg)	38.5	24.8	30.9	26.0	24.5
	Cobalt (Co) (mg/kg)	11.7	7.86	9.30	9.33	8.60
	Copper (Cu) (mg/kg)	23.5	12.1	19.0	11.0	12.8
	Iron (Fe) (mg/kg)	23000	14500	18700	15600	15500
	Lead (Pb) (mg/kg)	10.6	7.71	9.01	6.00	7.87
	Lithium (Li) (mg/kg)	23.3	14.1	23.8	11.6	13.7
	Magnesium (Mg) (mg/kg)	24600	21600	23700	9900	19600
	Manganese (Mn) (mg/kg)	595	262	469	283	386
	Mercury (Hg) (mg/kg)	0.0296	0.0359	0.0303	0.0229	0.0302
	Molybdenum (Mo) (mg/kg)	<0.50	<0.50	1.70	<0.50	<0.50
	Nickel (Ni) (mg/kg)	31.4	18.8	27.3	19.5	19.9
	Phosphorus (P) (mg/kg)	476	458	457	388	426
	Potassium (K) (mg/kg)	3440	2010	3810	1820	1900
	Selenium (Se) (mg/kg)	0.25	0.27	0.62	0.23	0.20
	Silver (Ag) (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Sodium (Na) (mg/kg)	270	140	290	140	140
	Strontium (Sr) (mg/kg)	45.9	27.6	69.8	17.8	26.5
	Thallium (Tl) (mg/kg)	0.252	0.166	0.231	0.120	0.164
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	492	314	246	260	220
	Uranium (U) (mg/kg)	1.21	1.04	1.99	0.733	0.887

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1214177-1	L1214177-2	L1214177-3	L1214177-4	L1214177-5
	Description	soil	soil	soil	soil	soil
	Sampled Date	20-SEP-12	19-SEP-12	21-SEP-12	21-SEP-12	19-SEP-12
	Sampled Time	14:45	12:00	11:15	02:00	02:30
	Client ID	PIN-15	PIN-17	PIN-14	PIN-11	PIN-18
Grouping	**Analyte**					
SOIL						
Metals	Vanadium (V) (mg/kg)	58.6	37.6	59.6	35.2	32.6
	Zinc (Zn) (mg/kg)	63.2	48.4	57.8	49.9	49.2

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Antimony (Sb)	DUP-H	L1214177-1, -2, -5

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
B-200.2-CCMS-VA	Soil	Boron in Soil by CRC ICPMS	EPA 200.2/6020A

"This analysis is carried out using procedures from CSR Analytical Method: ""Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment."

HG-200.2-CVAF-VA	Soil	Mercury in Soil by CVAFS	EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 245.7).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

LOI-550-SK	Soil	Loss on Ignition @ 550 C	CSSS (1993) p.461-462

The sample is air dried at 40C overnight, then ground to < 2mm in particle size using a flail grinder. A portion of the dried and ground sample is dried at 105C overnight, then ignited at 550C for 16-20 hours. Loss on ignition at 550C is reported on a dry sample basis.

Carter, Martin. Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci.(1993) method 44.3.3

MET-200.2-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MOISTURE-VA	Soil	Moisture content	ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

TKN-WT	Soil	Total Kjeldahl Nitrogen	APHA 4500-N

A homogenized soil sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

Reference Information

TOC-WT	Soil	TOC & FOC in Solids	CARTER 21.2

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

L1214177-COFC

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ers Limited Company www.alsglobal.com

L1214177..

Page ___ of ___

Company:	AMEC		Report Information	Both questions below must answered for water samples	
Contact:	Jason Dietrich		☐ O. Reg 153 (O. Reg 511 Amend) Table:___	Are any samples taken from a regulated DW System?	☐ Yes ☐ No
Address:	900 Maple Grove Rd, Unit 10		Record of Site Condition ☐ Yes ☐ No	If yes, an authorized DW COC must be used.	
	Cambridge ON, N3H 4R7		PWQO ☐ MISA ☐ MMER ☐ CCME ☒	Is the water sampled intended for human consumption?	☐ Yes ☐ No
Phone:	519-650-7100 ext 7133	Fax:	Guideline Required: PSQG		
Email:	Jason.dietrich@amec.com		TCLP Regulation 558 ☐ Other:		
Project:	TC111504	PO:	Service Requested	Analysis Request	
Quote #	Q36010		☒ Regular TAT (7 Days)	Please indicate below Filtered, Preserved or both (F, P, F/P)	
Invoice To:		Same as Report: ☑ Yes ☐ No	☐ Priority TAT 50% Surcharge (3-5 Days)		
Company:			☐ Emergency TAT 100% Surcharge (1-2 Days)		
Contact:			Specify Date Required:		
Address:			All TAT quoted material is in business days which exclude statutory holidays and weekends. Samples received past 3:00pm or Saturday/Sunday begin the next day.		
Email:					
Account Manager	Karen	Sampler: Levi Snook			

Sample #	Sample Identification (This description will appear on the report)	Date	Time	Sample Type	B-200.2-CCMS-VA	LOI-550-SK	MET-CCME+FULL-VA	MOISTURE-VA	PREP-200.2-VA	TKN-WT	TOC-WT	Number of Containers
1	PIN-15	Sept 20, 2012	14:45	SOIL	X	✓	X	X	X	X	X	3
2	PIN-17	Sept 19, 2012	12:00	SOIL	X	X	X	X	X	X	X	3
3	PIN-14	Sept 21, 2012	11:15	SOIL	X	X	X	X	X	X	X	3
4	PIN-11	Sept 21, 2012	14:00	SOIL	X	X	X	X	X	X	X	3
5	PIN-18	Sept 19, 2012	14:30	SOIL	X	X	X	X	X	X	X	3

Special Instructions / Comments

Field Filter and Preserve in lab.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by: Levi Snook	Date & Time Sept 24, 2012 10:00 am	Received by:	Date & Time 25-Sept-12 1130	Temp 9.4	Cooling Initiated ☐ Yes ☐ No	Verified by: LB	Date & Time 25-SEP-12 11:30	Observations: Yes / No ? If Yes add SIF

**Failure to complete all portions of this form may delay analysis. **TAT may vary dependant on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs. Any known or suspected hazards relating to a sample must be noted on the chain of custody in the comments section. By use of the form the user acknowledges and agrees with the Terms and Conditions as specified on the back page.

AMEC
ATTN: Jason Dietrich
900 Maple Road Grove
Unit 10
Cambridge Ont N3H 4R7

Date Received: 29-SEP-12
Report Date: 11-OCT-12 16:25 (MT)
Version: FINAL

Client Phone: 519-650-7100

Certificate of Analysis

Lab Work Order #: L1217043

Project P.O. #: NOT SUBMITTED
Job Reference: TC111504
C of C Numbers:
Legal Site Desc:

Tricia Sampson
Account Manager Supervisor

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1217043-1	L1217043-2			
	Description	SOIL	SOIL			
	Sampled Date	25-SEP-12	24-SEP-12			
	Sampled Time	12:30	14:15			
	Client ID	PIN-12	PIN-16			
Grouping	**Analyte**					
SOIL						
Physical Tests	Loss on Ignition @ 550 C (%)	5	2			
	Moisture (%)	40.6	50.6			
	pH (1:2 soil:water) (pH)	8.14	8.08			
Leachable Anions & Nutrients	Total Kjeldahl Nitrogen (mg/kg)	550	510			
Organic / Inorganic Carbon	Fraction Organic Carbon	0.0153	0.0103			
	Total Organic Carbon (%)	1.53	1.03			
Metals	Aluminum (Al) (mg/kg)	14100	6550			
	Antimony (Sb) (mg/kg)	0.29	<0.10			
	Arsenic (As) (mg/kg)	5.63	2.70			
	Barium (Ba) (mg/kg)	91.2	40.5			
	Beryllium (Be) (mg/kg)	0.67	0.29			
	Bismuth (Bi) (mg/kg)	<0.20	<0.20			
	Boron (B) (mg/kg)	17	<10			
	Cadmium (Cd) (mg/kg)	0.328	0.095			
	Calcium (Ca) (mg/kg)	51800	38400			
	Chromium (Cr) (mg/kg)	28.9	14.6			
	Cobalt (Co) (mg/kg)	9.08	5.86			
	Copper (Cu) (mg/kg)	17.8	6.84			
	Iron (Fe) (mg/kg)	17500	9830			
	Lead (Pb) (mg/kg)	9.15	4.92			
	Lithium (Li) (mg/kg)	18.6	9.8			
	Magnesium (Mg) (mg/kg)	20900	20200			
	Manganese (Mn) (mg/kg)	501	241			
	Mercury (Hg) (mg/kg)	0.0279	0.0132			
	Molybdenum (Mo) (mg/kg)	1.22	<0.50			
	Nickel (Ni) (mg/kg)	26.0	11.6			
	Phosphorus (P) (mg/kg)	448	283			
	Potassium (K) (mg/kg)	3200	1170			
	Selenium (Se) (mg/kg)	0.57	<0.20			
	Silver (Ag) (mg/kg)	<0.10	<0.10			
	Sodium (Na) (mg/kg)	180	110			
	Strontium (Sr) (mg/kg)	54.7	22.2			
	Thallium (Tl) (mg/kg)	0.228	0.095			
	Tin (Sn) (mg/kg)	<2.0	<2.0			
	Titanium (Ti) (mg/kg)	200	219			
	Uranium (U) (mg/kg)	1.65	0.530			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1217043-1	L1217043-2			
	Description	SOIL	SOIL			
	Sampled Date	25-SEP-12	24-SEP-12			
	Sampled Time	12:30	14:15			
	Client ID	PIN-12	PIN-16			
Grouping	**Analyte**					
SOIL						
Metals	Vanadium (V) (mg/kg)	51.5	22.0			
	Zinc (Zn) (mg/kg)	55.3	29.6			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Molybdenum (Mo)	DUP-H	L1217043-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
B-200.2-CCMS-VA	Soil	Boron in Soil by CRC ICPMS	EPA 200.2/6020A

"This analysis is carried out using procedures from CSR Analytical Method: ""Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment."

HG-200.2-CVAF-VA	Soil	Mercury in Soil by CVAFS	EPA 200.2/245.7

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 245.7).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

LOI-550-SK	Soil	Loss on Ignition @ 550 C	CSSS (1993) p.461-462

The sample is air dried at 40C overnight, then ground to < 2mm in particle size using a flail grinder. A portion of the dried and ground sample is dried at 105C overnight, then ignited at 550C for 16-20 hours. Loss on ignition at 550C is reported on a dry sample basis.

Carter, Martin. Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci.(1993) method 44.3.3

MET-200.2-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MOISTURE-VA	Soil	Moisture content	ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

TKN-WT	Soil	Total Kjeldahl Nitrogen	APHA 4500-N

A homogenized soil sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

Reference Information

TOC-WT	Soil	TOC & FOC in Solids	CARTER 21.2

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

L1217043-COFC

ntario P7B 5N3 Canada PHONE +1 807 623 6463 FAX +1 807 623 7598
A Campbell Brothers Limited Company www.alsglobal.com

L1217043

Page __ of __

Company:	AMEC		
Contact:	Jason Dietrich		
Address:	900 Maple Grove Rd, Unit 10 Cambridge, ON, N3H 4R7		
Phone:	519-650-7100	Fax:	
Email:	jason.dietrich@amec.com		
Project:	TC111504	PO:	
Quote #	Q36010		
Invoice To:		Same as Report: ☑ Yes ☐ No	
Company:			
Contact:			
Address:			
Email:			
Account Manager	Karen	Sampler: Levi Snook	

Regulatory Information

- ☐ O. Reg 153 (O. Reg 511 Amend) Table: ___
- Record of Site Condition ☐ Yes ☐ No
- PWQO ☐ MISA ☐ MMER ☐ CCME ☒
- Guideline Required: PSQG
- TCLP Regulation 58 ☐ Other:

Service Requested

- ☒ Regular TAT (7 Days)
- ☐ Priority TAT 50% Surcharge (3-5 Days)
- ☐ Emergency TAT 100% Surcharge (1-2 Days)
- Specify Date Required:

All TAT quoted material is in business days which exclude statutory holidays and weekends. Samples received past 3:00pm or Saturday/Sunday begin the next day.

Both questions below must answered for water samples

Are any samples taken from a regulated DW System? ☐ Yes ☐ No

If yes, an authorized DW COC must be used.

Is the water sampled intended for human consumption? ☐ Yes ☐ No

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date	Time	Sample Type	B-200.2-CCMS-VA	LOI-550-SK	MET-CCME+FULL-VA	MOISTURE-VA	PREP-200.2-VA	TKN-WT	TOC-WT	Number of Containers
1	PIN-12	Sept 25, 12	12:30	Soil	X	X	X	X	X	X	X	3
2	PIN-16	Sept 24, 12	14:15	Soil	X	X	X	X	X	X	X	3

Special Instructions / Comments

Field Filter and Preserve in lab.

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)		
Released by: Levi Snook	Date & Time: Sept 24, 12 9:30am	Received by:	Date & Time: 29-SEP-12 09:45	Temp: 5.2	Cooling Initiated ☑ Yes ☐ No	Verified by:	Date & Time: Oct 1/12 11:55	Observations: Yes (No?) If Yes add SIF

**Failure to complete all portions of this form may delay analysis. **TAT may vary dependant on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs. Any known or suspected hazards relating to a sample must be noted on the chain of custody in the comments section. By use of the form the user acknowledges and agrees with the Terms and Conditions as specified on the back page.

APPENDIX F

SEDIMENT GRAIN SIZE DATA

AMEC Environment & Infrastructure
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900 Maple Grove Road, Unit 10
Cambridge Ontario
N3H 4R7

GRAIN SIZE DISTRIBUTION

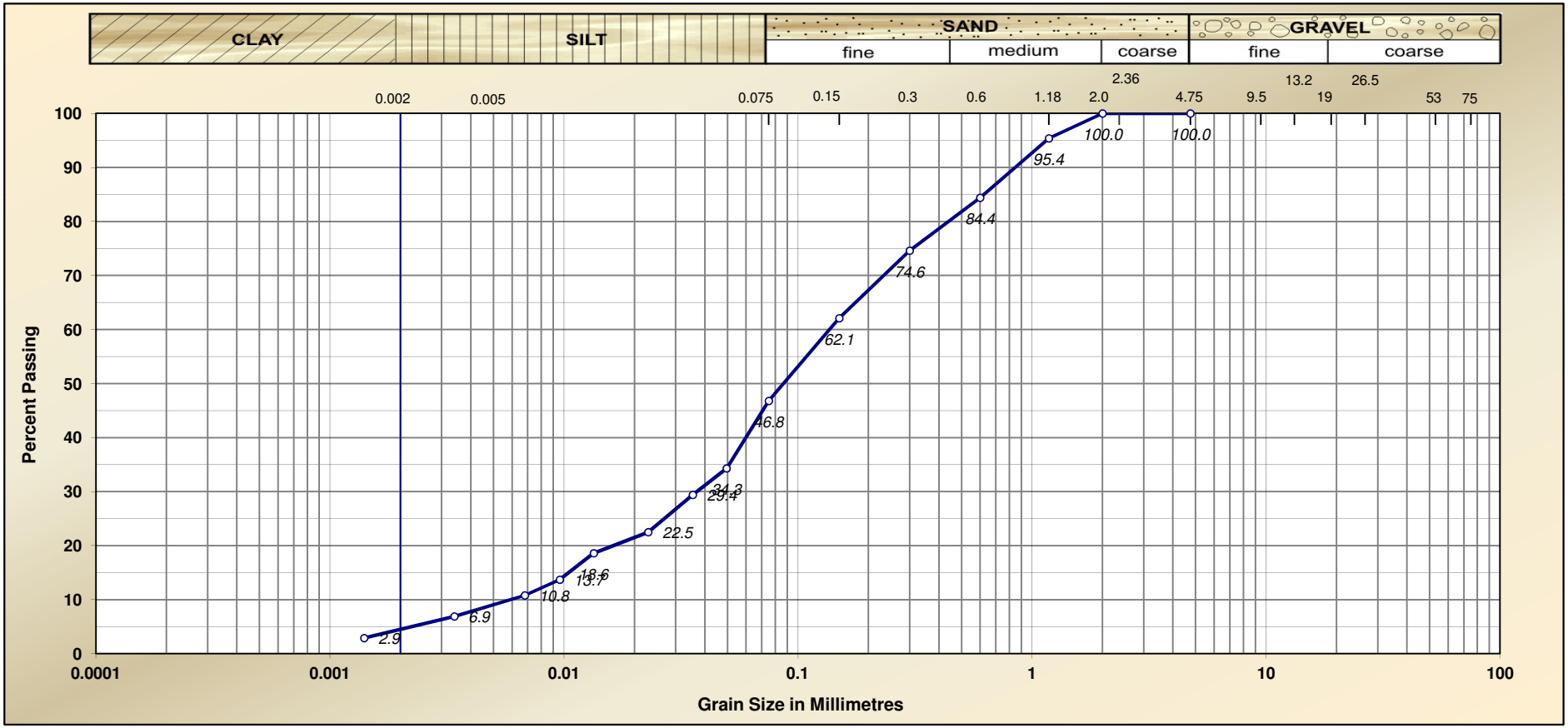
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: November 5, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Pinewood River PIN2A
SAMPLED BY:
LAB NO.: 12-241

DATE SAMPLED: August 30, 2012
SOIL CLASSIFICATION: SAND & SILT, trace clay
REMARKS: Organic Content= 8.2%



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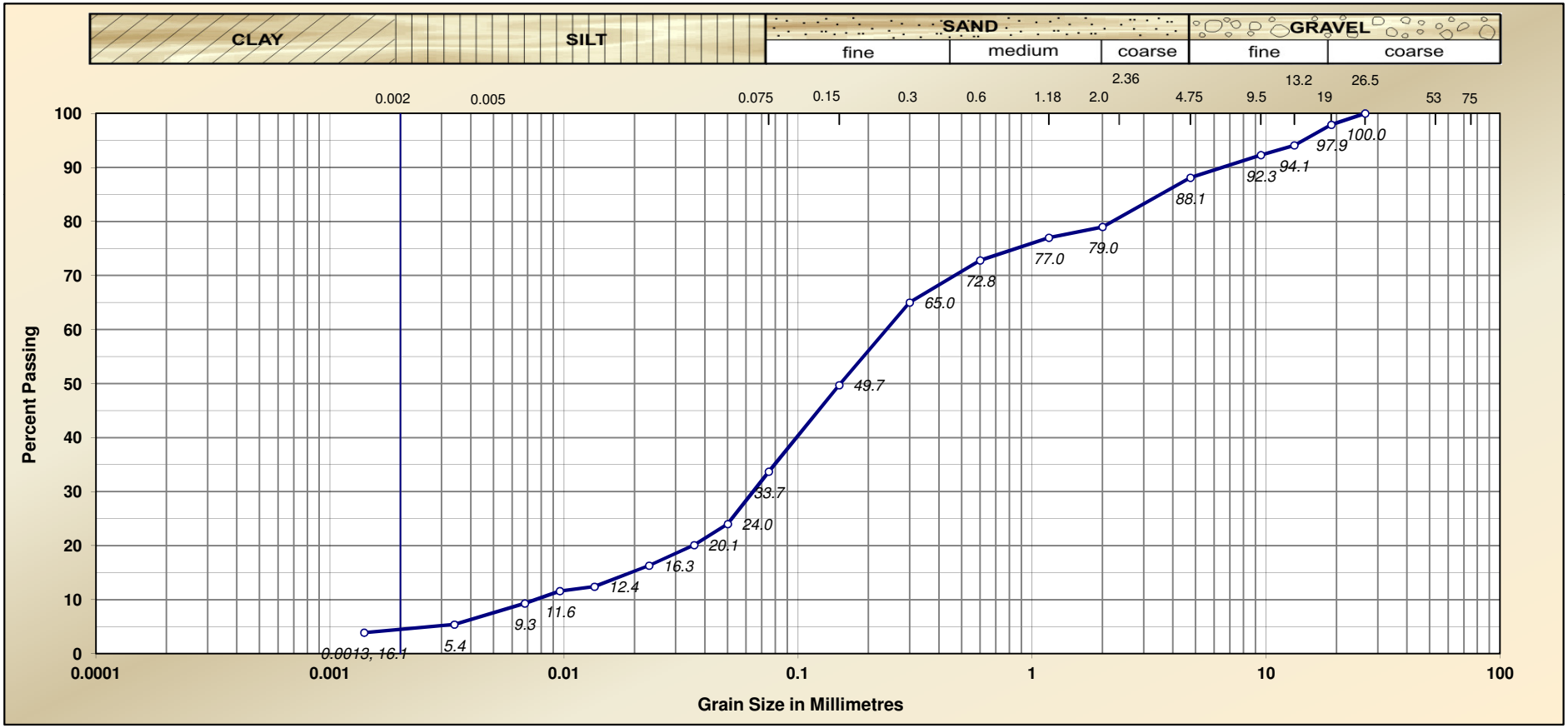
PROJECT NO.: TC111504.2012.12
PROJECT : RAINY RIVER 2012 AQUATICS
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 30, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Pinewood River - PIN2AA
SAMPLED BY:
LAB NO.: 12-242

DATE SAMPLED: September 4, 2012
SOIL CLASSIFICATION: SAND, some silt, some gravel, trace clay
REMARKS: Organic Content= 4.0%



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PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 23, 2012

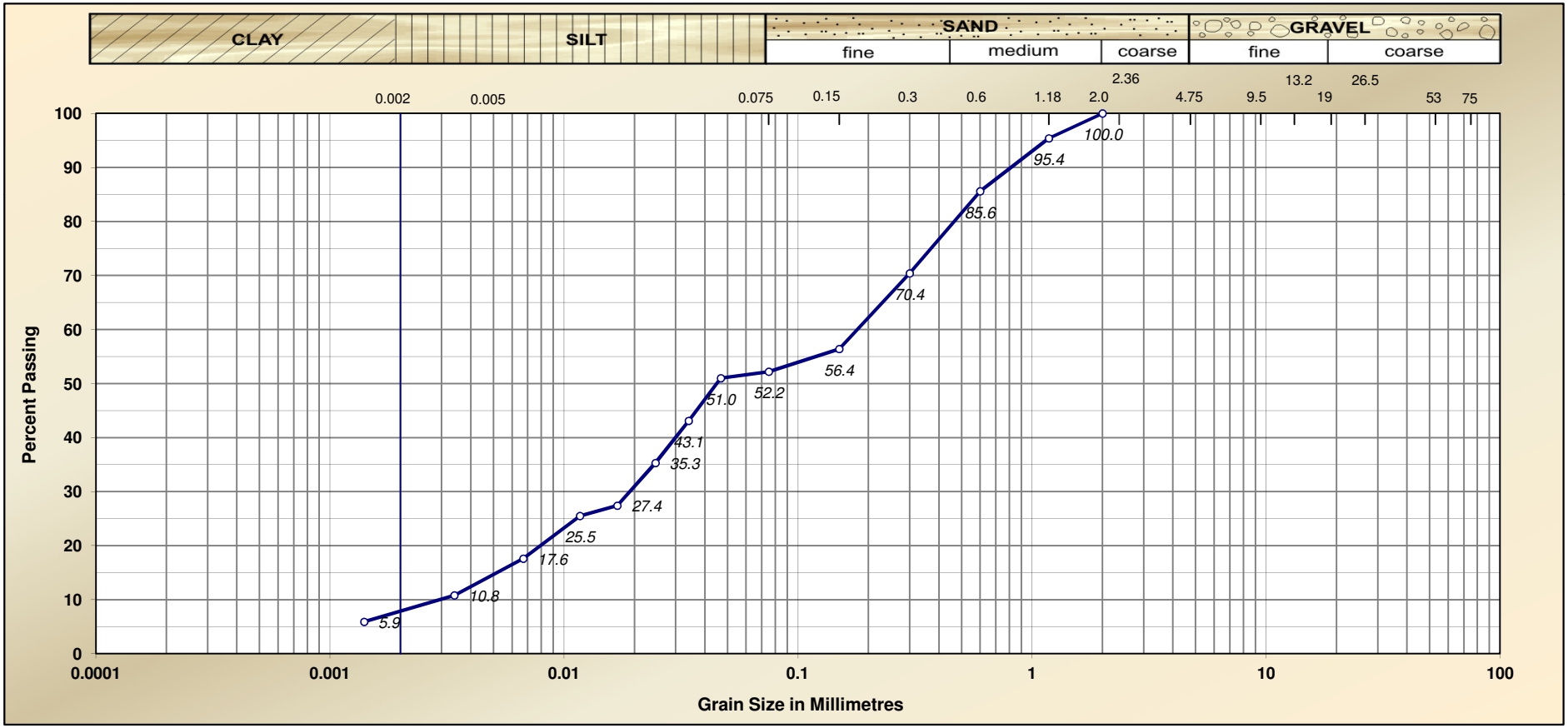
SAMPLE DATA

SAMPLE ID: PIN 3A
SAMPLE LOCATION.: Pinewood River - Pin 3A
SAMPLED BY:
LAB NO.: 12-254

SOIL CLASSIFICATION: Sand and Silt, trace clay

DATE SAMPLED: September 4, 2012

REMARKS: Organic Content= 8.0%



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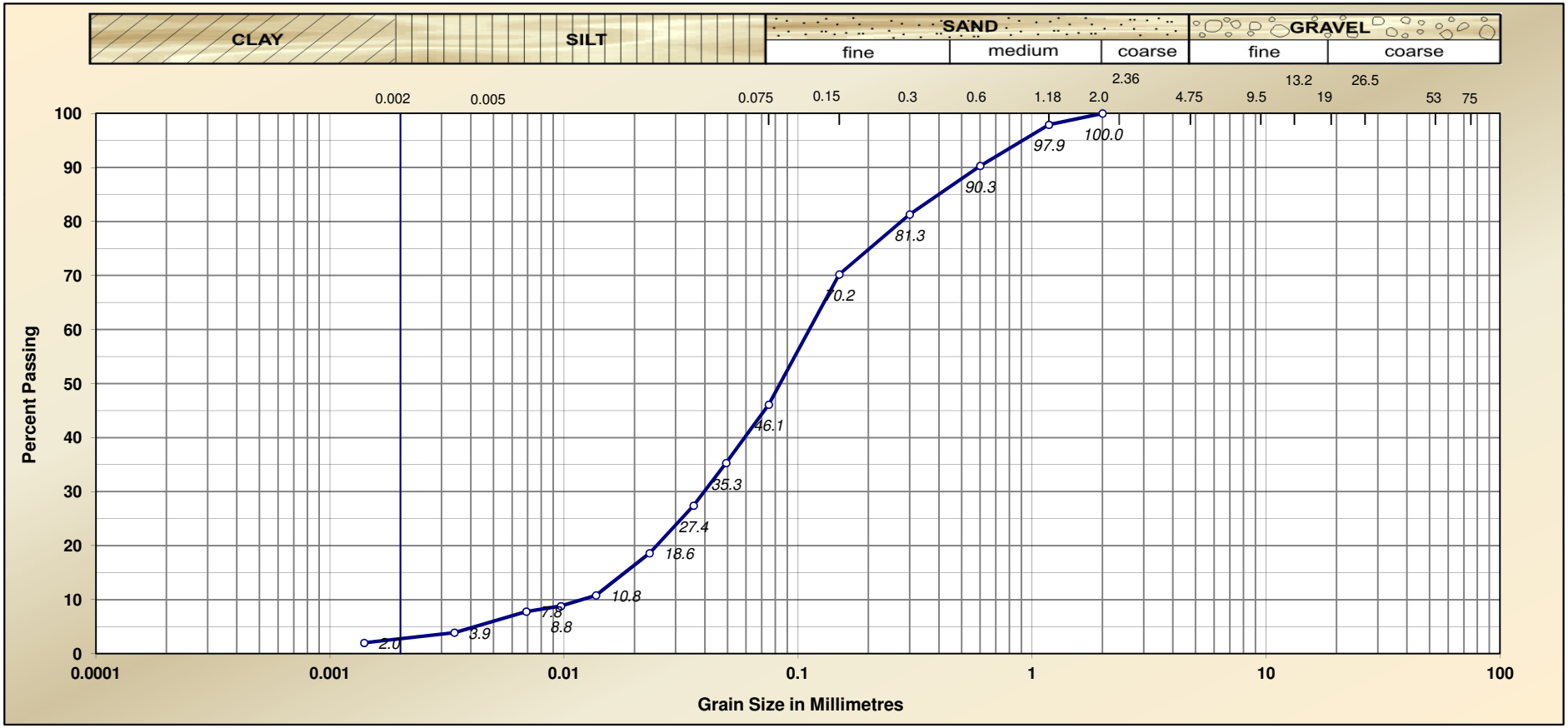
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: November 5, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Pinewod River PIN8
SAMPLED BY:
LAB NO.: 12-243

DATE SAMPLED: September 7, 2012
SOIL CLASSIFICATION: SAND & SILT, trace clay
REMARKS: Organic Content= 9.8%



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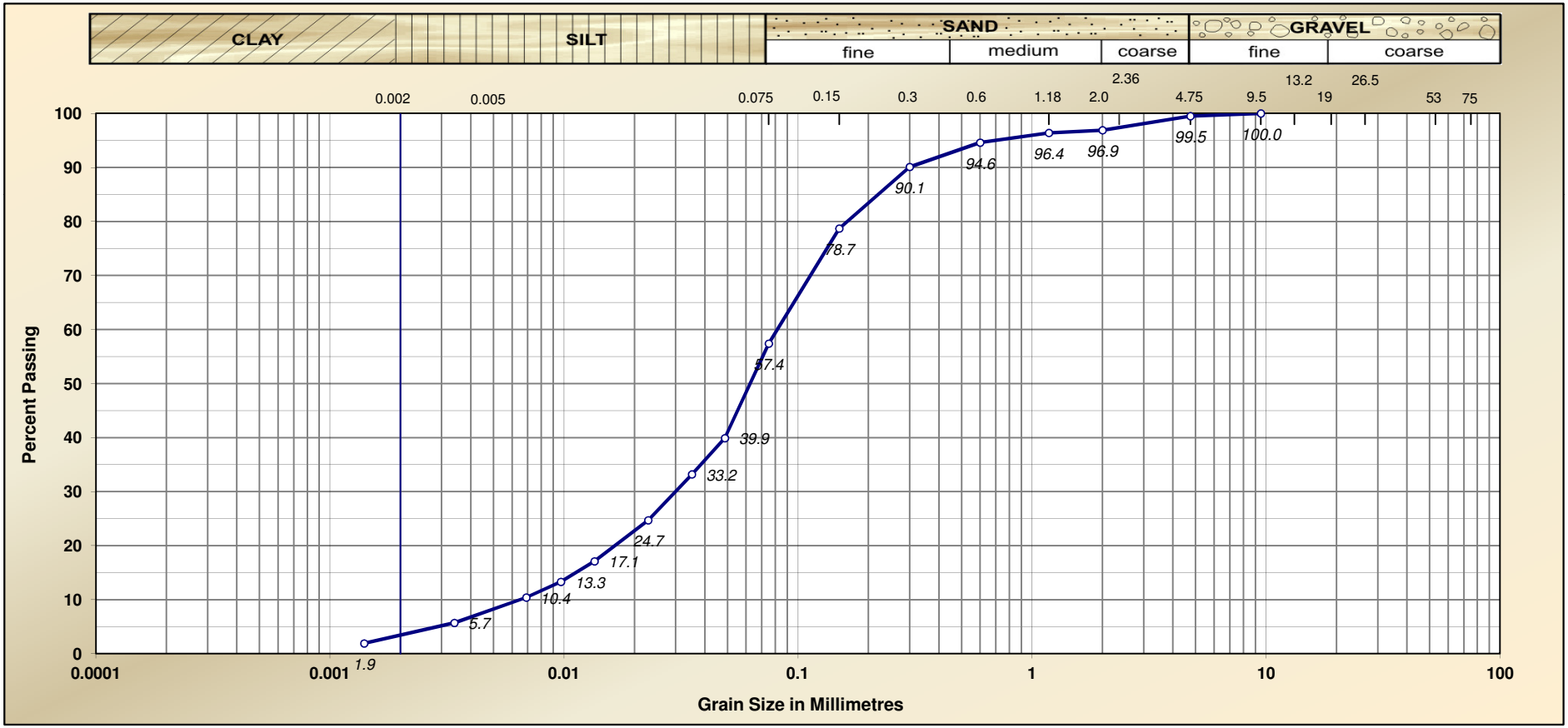
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: November 8, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Pinewood River PIN9
SAMPLED BY:
LAB NO.: 12-244

DATE SAMPLED: November 28, 2012
SOIL CLASSIFICATION: SAND & SILT, trace clay
REMARKS: Organic Content= 6.2%



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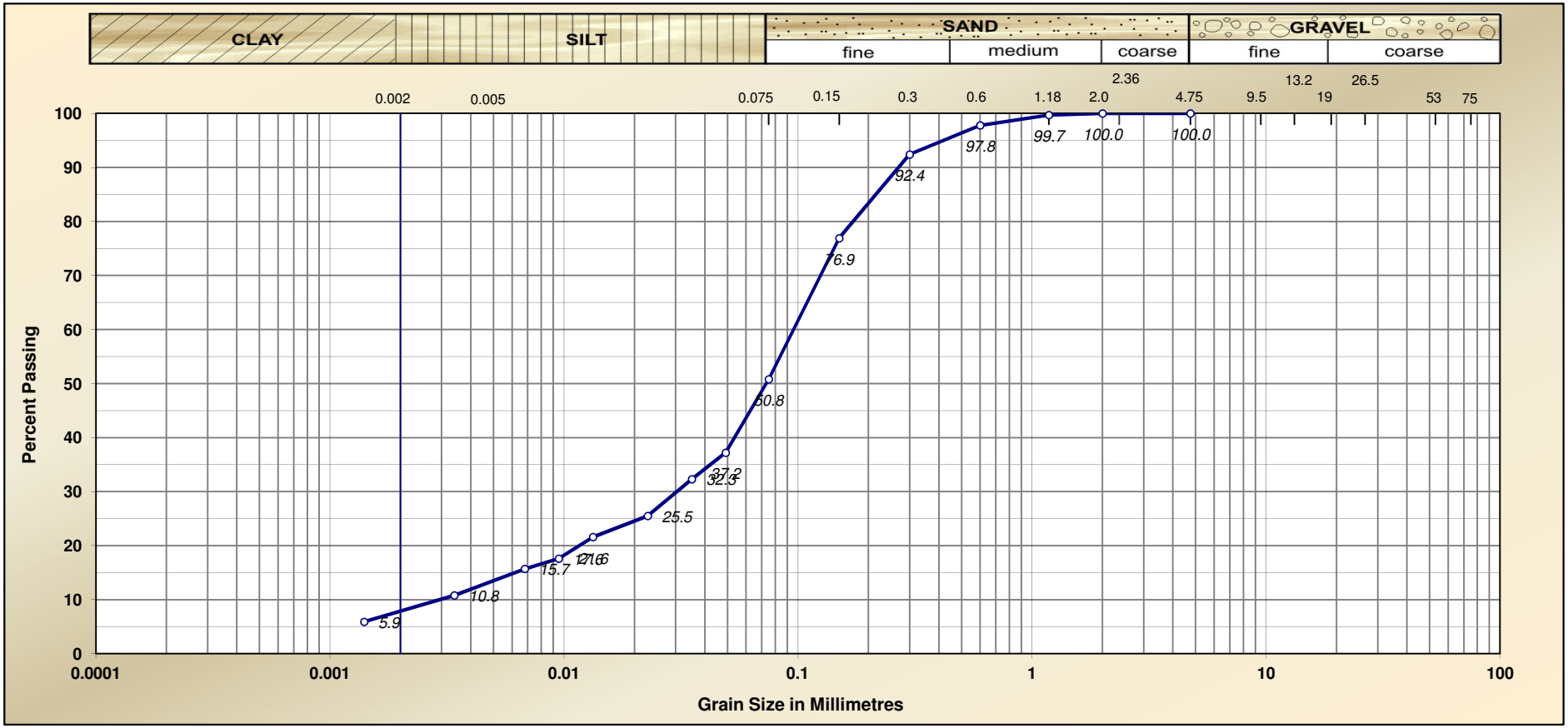
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 30, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Pinewood River - PIN10
SAMPLED BY:
LAB NO.: 12-245

DATE SAMPLED: September 3, 2012
SOIL CLASSIFICATION: SAND & SILT, trace clay
REMARKS: Organic Content= 7.1%



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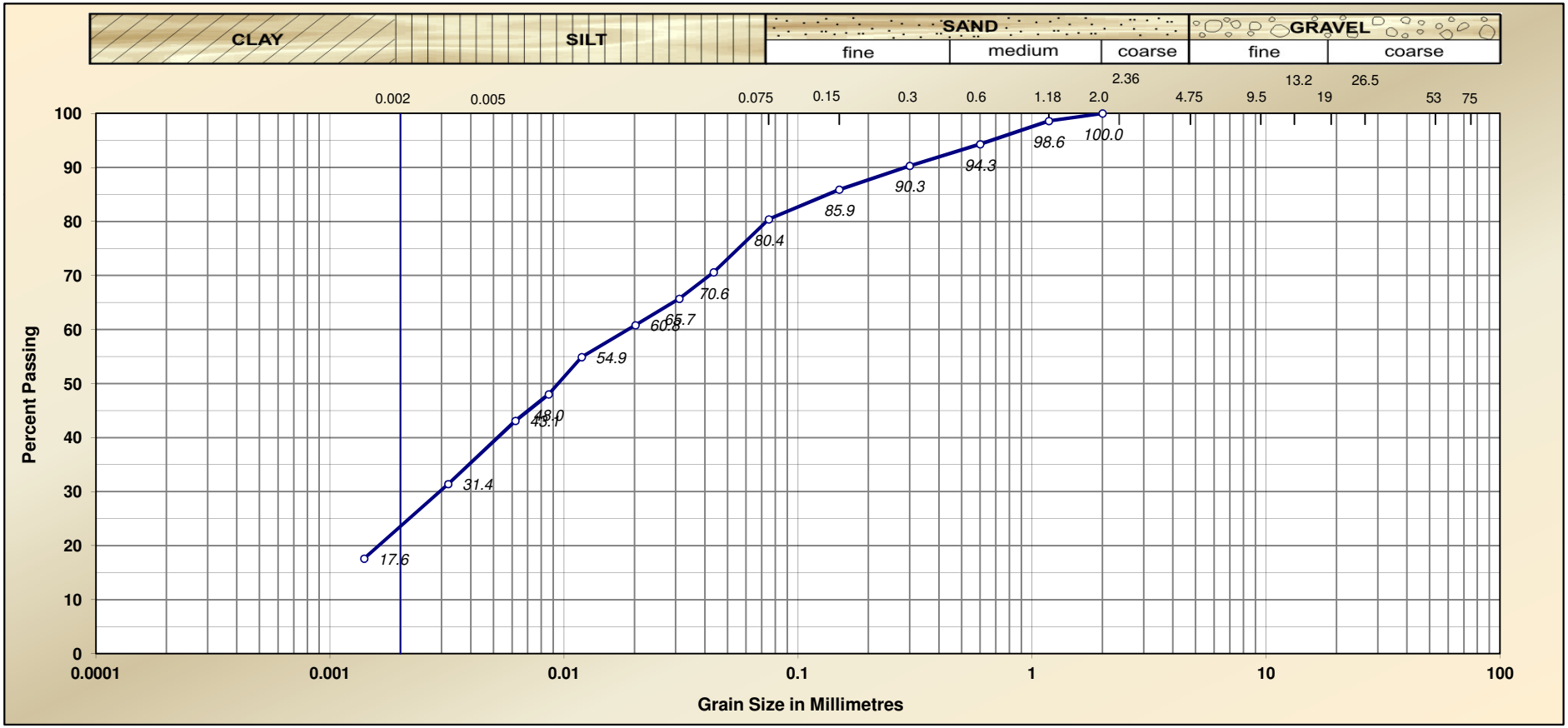
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 23, 2012

SAMPLE DATA

SAMPLE ID: PIN 10A
SAMPLE LOCATION.: Pinewood River - PIN 10A
SAMPLED BY:
LAB NO.: 12-246

DATE SAMPLED: September 3, 2012
SOIL CLASSIFICATION: Clayey SAND and SILT
REMARKS: Organic Content= 5.6%



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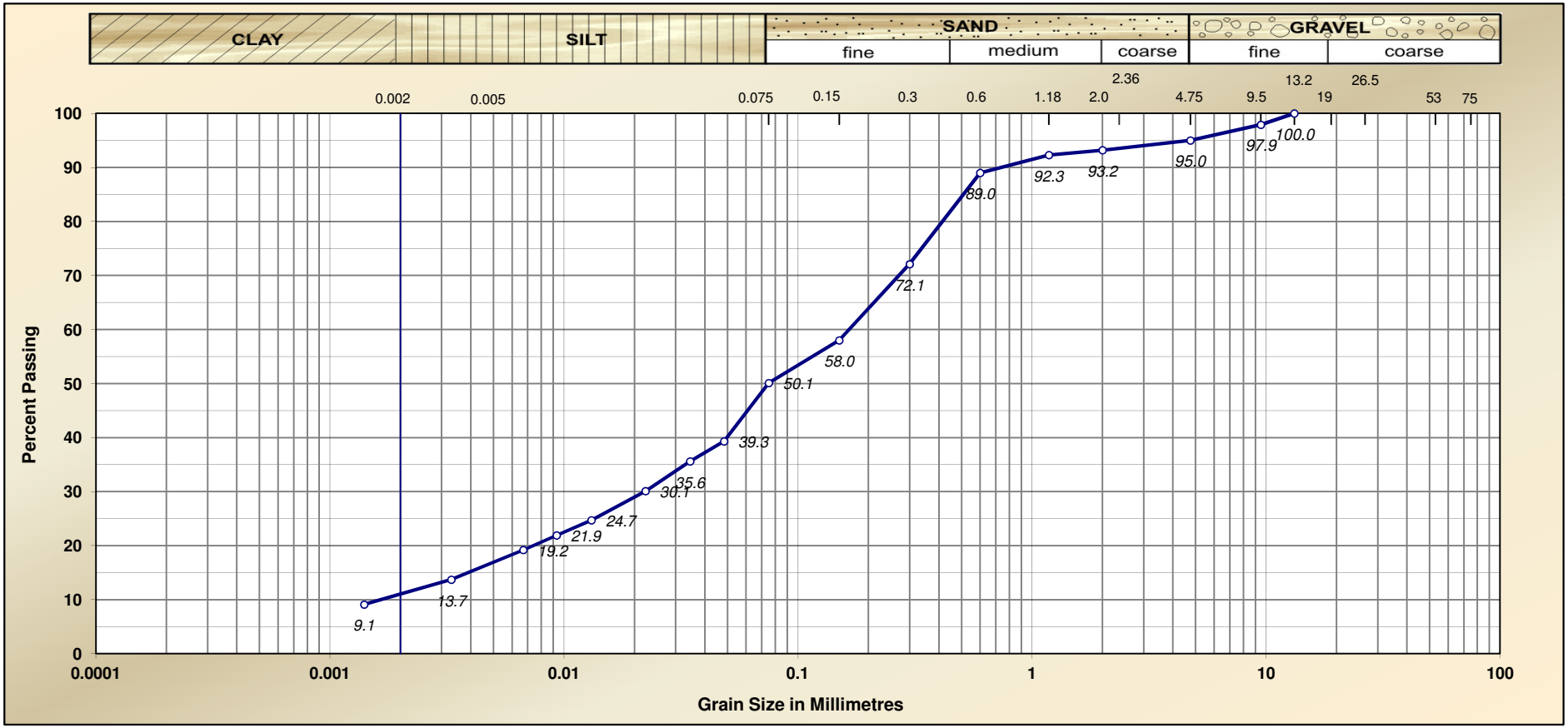
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 30, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Pinewood River - PIN11
SAMPLED BY:
LAB NO.: 12-247

DATE SAMPLED: September 21, 2012
SOIL CLASSIFICATION: Silty SAND, some clay, trace gravel
REMARKS: Organic Content= 9.1%



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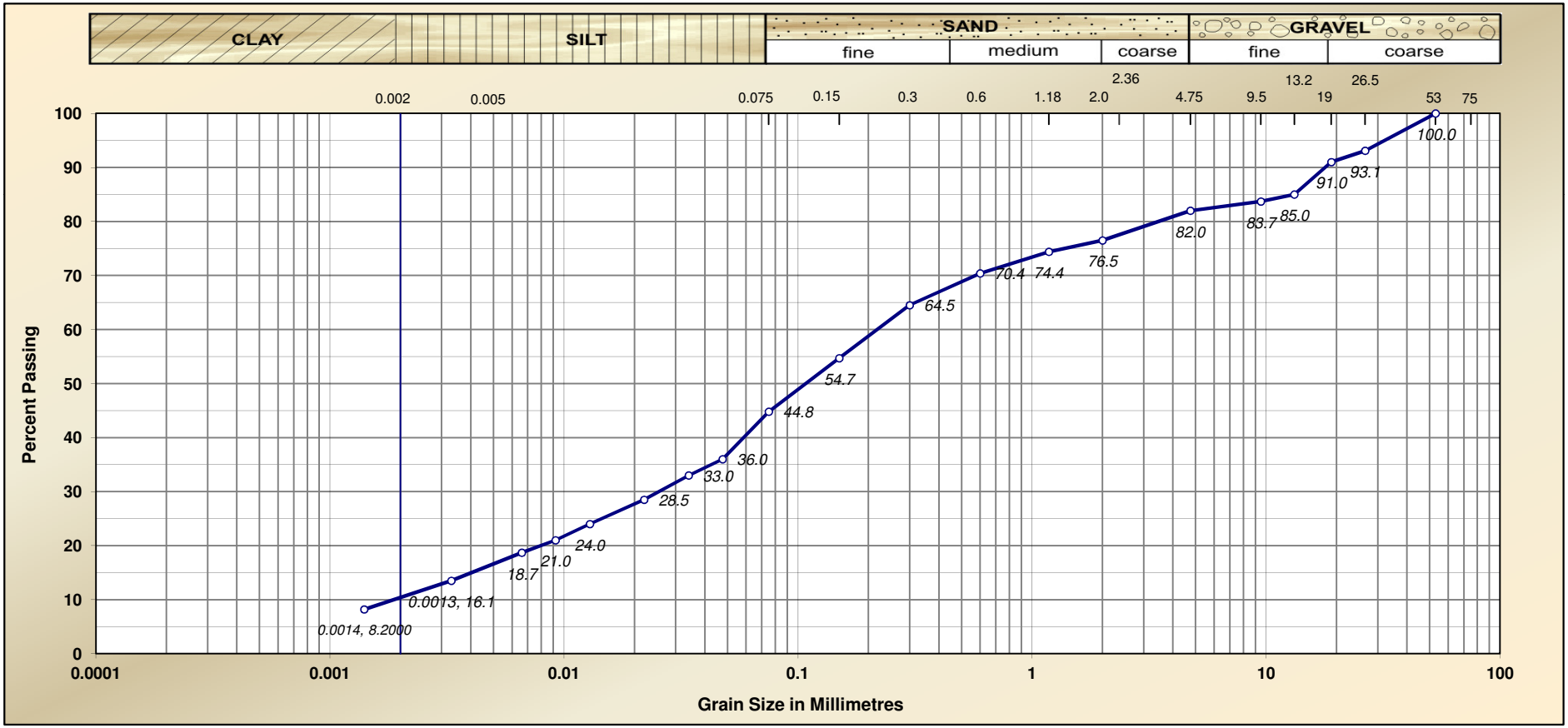
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay
CLIENT: Rainy River Resources

DATE: October 31, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Pinewood River -PIN12
SAMPLED BY:
LAB NO.: 12-248

DATE SAMPLED: September 21, 2012
SOIL CLASSIFICATION: Silty SAND, some gravel, some clay
REMARKS: Organic Content= 3.1%



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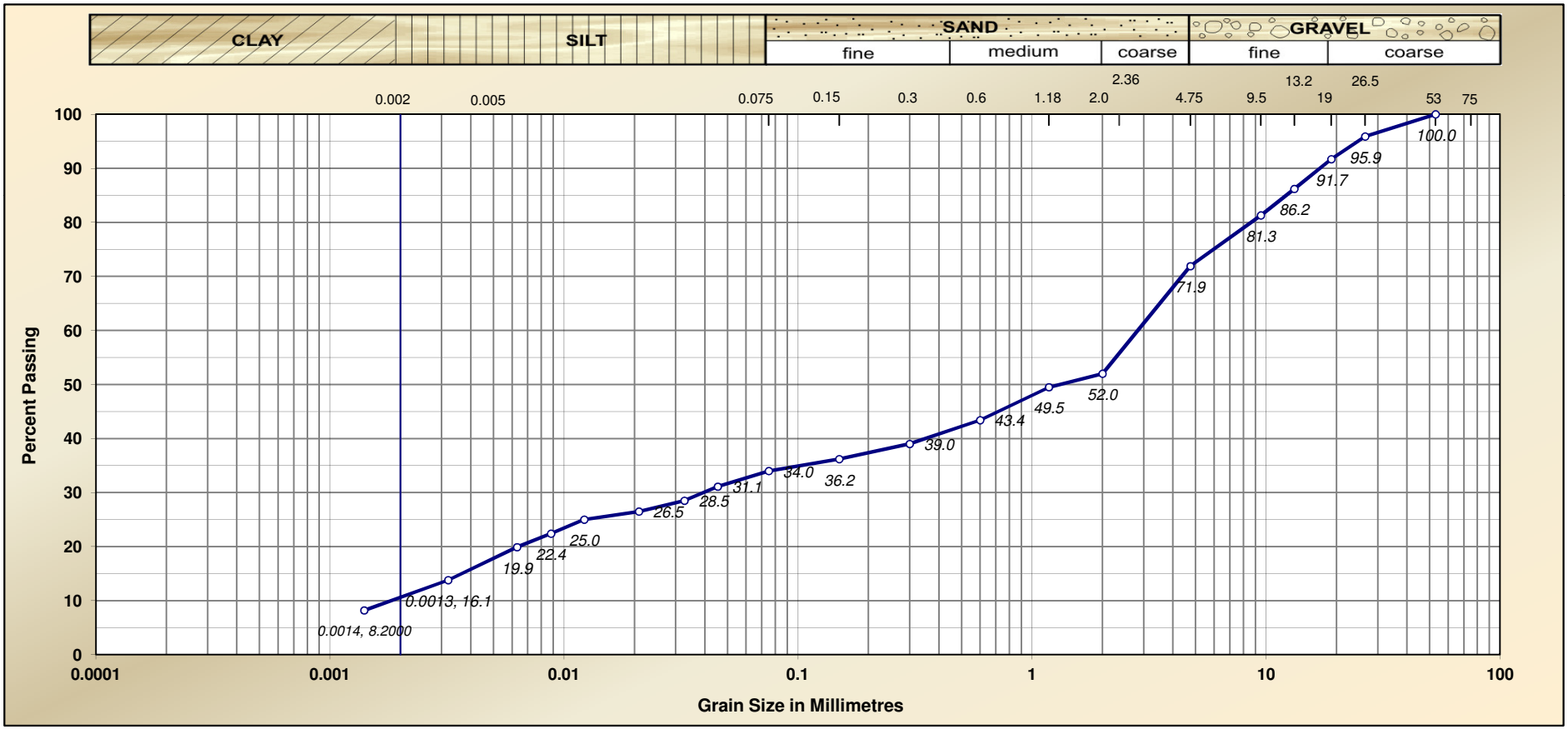
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 30, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Pinewood River - PIN14
SAMPLED BY:
LAB NO.: 12-249

DATE SAMPLED: September 21, 2012
SOIL CLASSIFICATION: Gravelly SAND, some silt, some clay
REMARKS: Organic Content= 2.6%



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PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 31, 2012

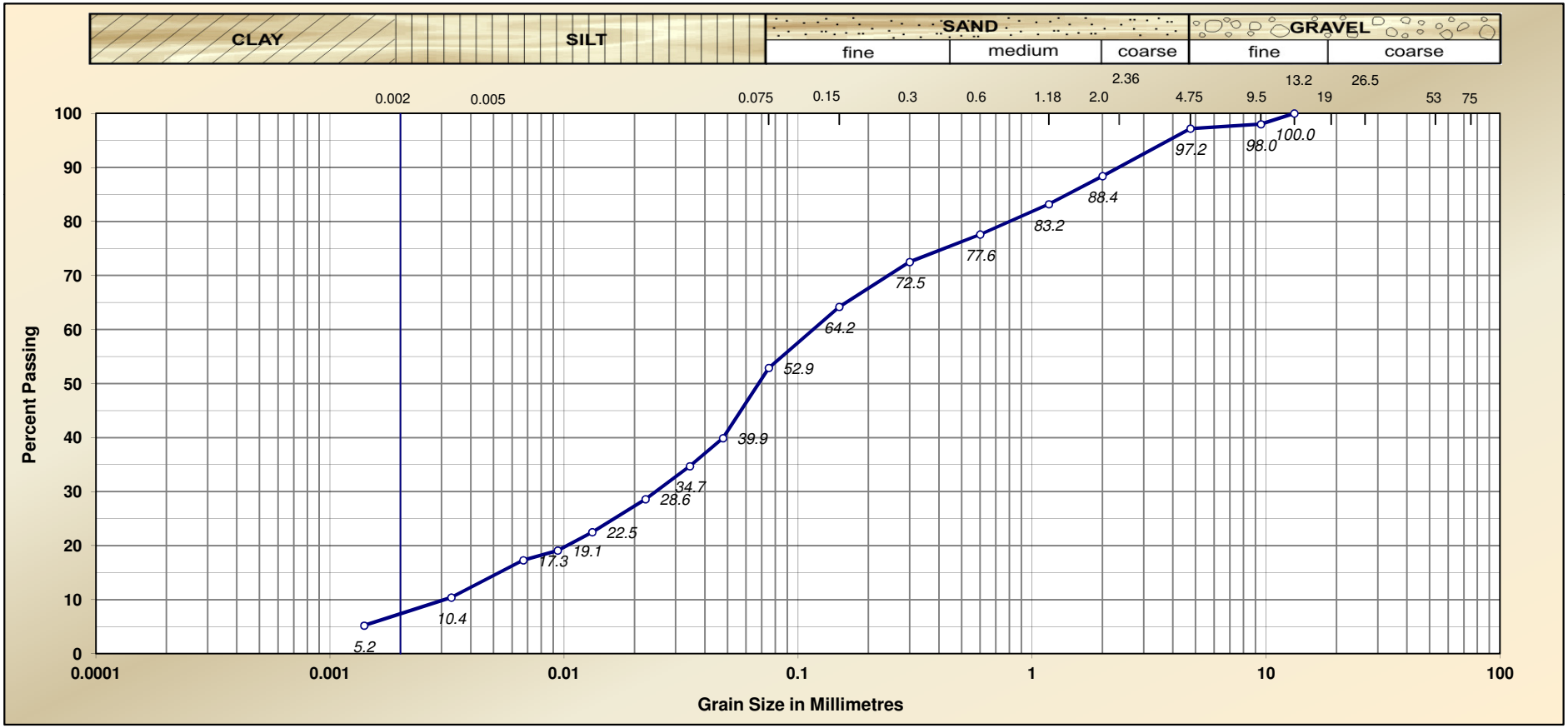
SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Pinewood River - PIN15
SAMPLED BY:
LAB NO.: 12-250

DATE SAMPLED: September 20, 2012

SOIL CLASSIFICATION: SAND & SILT, trace clay, trace gravel

REMARKS: Organic Content= 6.2% , a 40 mm coarse gravel removed for hydrometer



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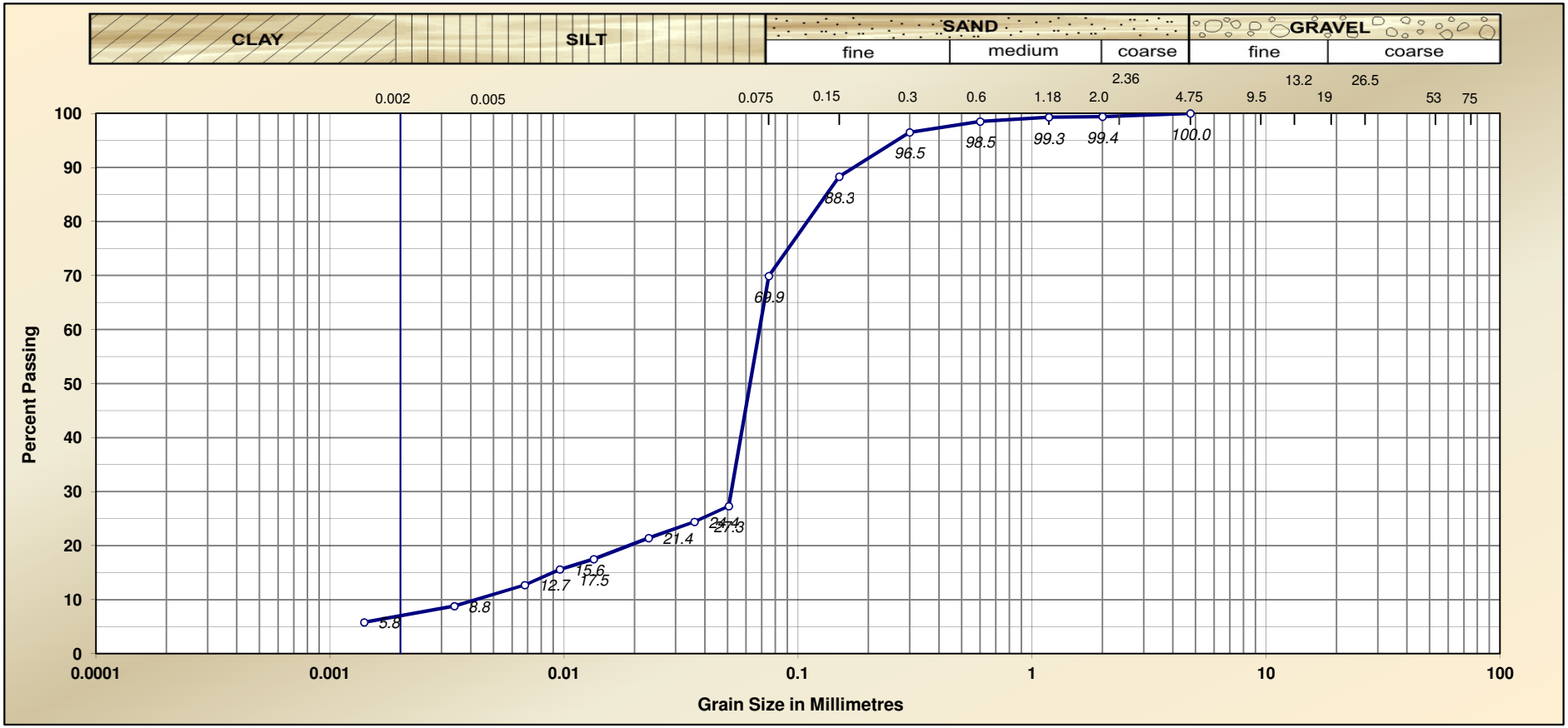
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 31, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Pinewood River -PIN16
SAMPLED BY:
LAB NO.: 12-251

DATE SAMPLED: September 24, 2012
SOIL CLASSIFICATION: SAND, some silt, trace clay
REMARKS: No Organic Content



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GRAIN SIZE DISTRIBUTION

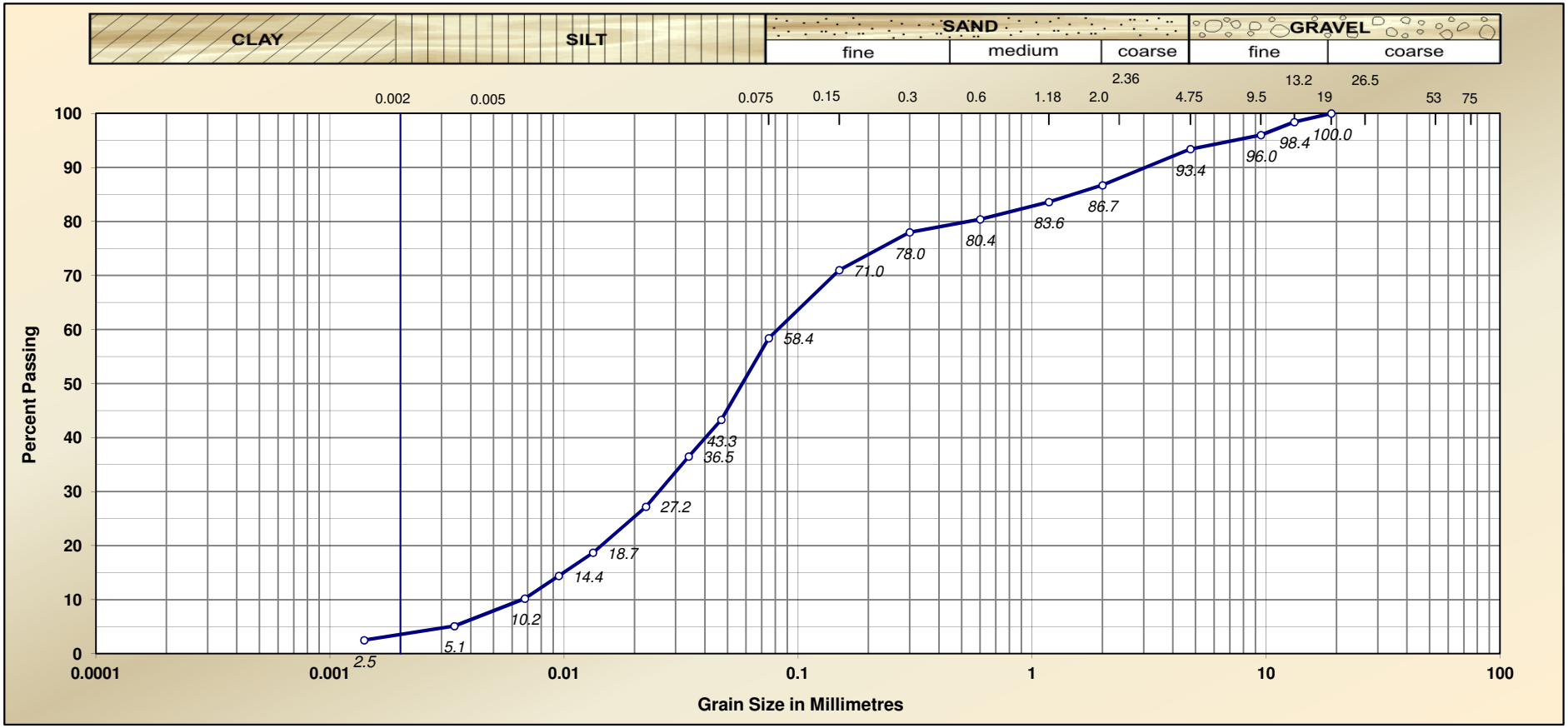
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 31, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Pinewood River - PIN17
SAMPLED BY:
LAB NO.: 12-252

DATE SAMPLED: September 19, 2012
SOIL CLASSIFICATION: Sandy SILT, trace gravel, trace clay
REMARKS: Organic Content= 2.0%



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900 Maple Grove Road, Unit 10
Cambridge Ontario
N3H 4R7

GRAIN SIZE DISTRIBUTION

PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 31, 2012

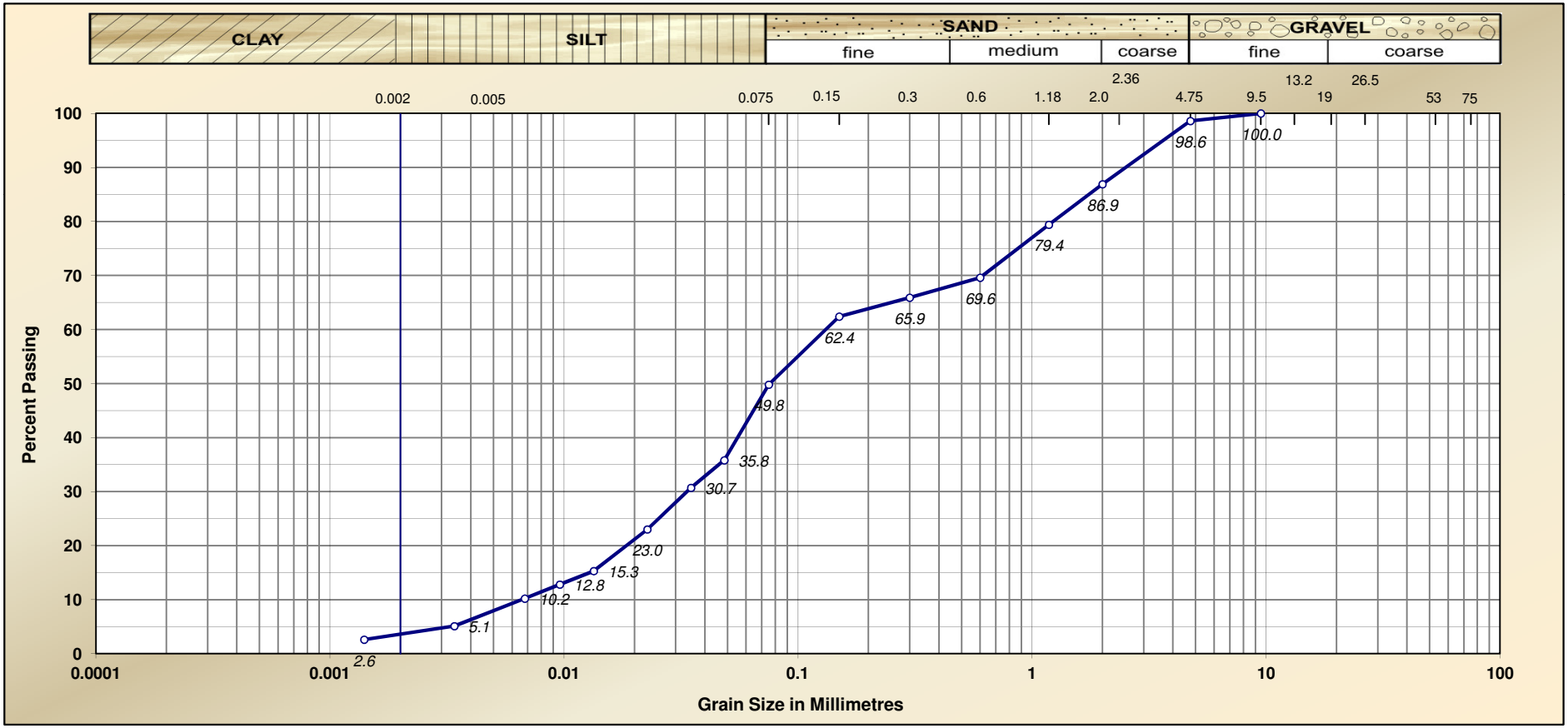
SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Pinewood River - PIN18
SAMPLED BY:
LAB NO.: 12-253

DATE SAMPLED: September 19, 2012

SOIL CLASSIFICATION: SAND & SILT, trace clay, trace gravel

REMARKS: Organic Content= 3.6%



CCIL CERTIFIED LABORATORY

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N3H 4R7

GRAIN SIZE DISTRIBUTION

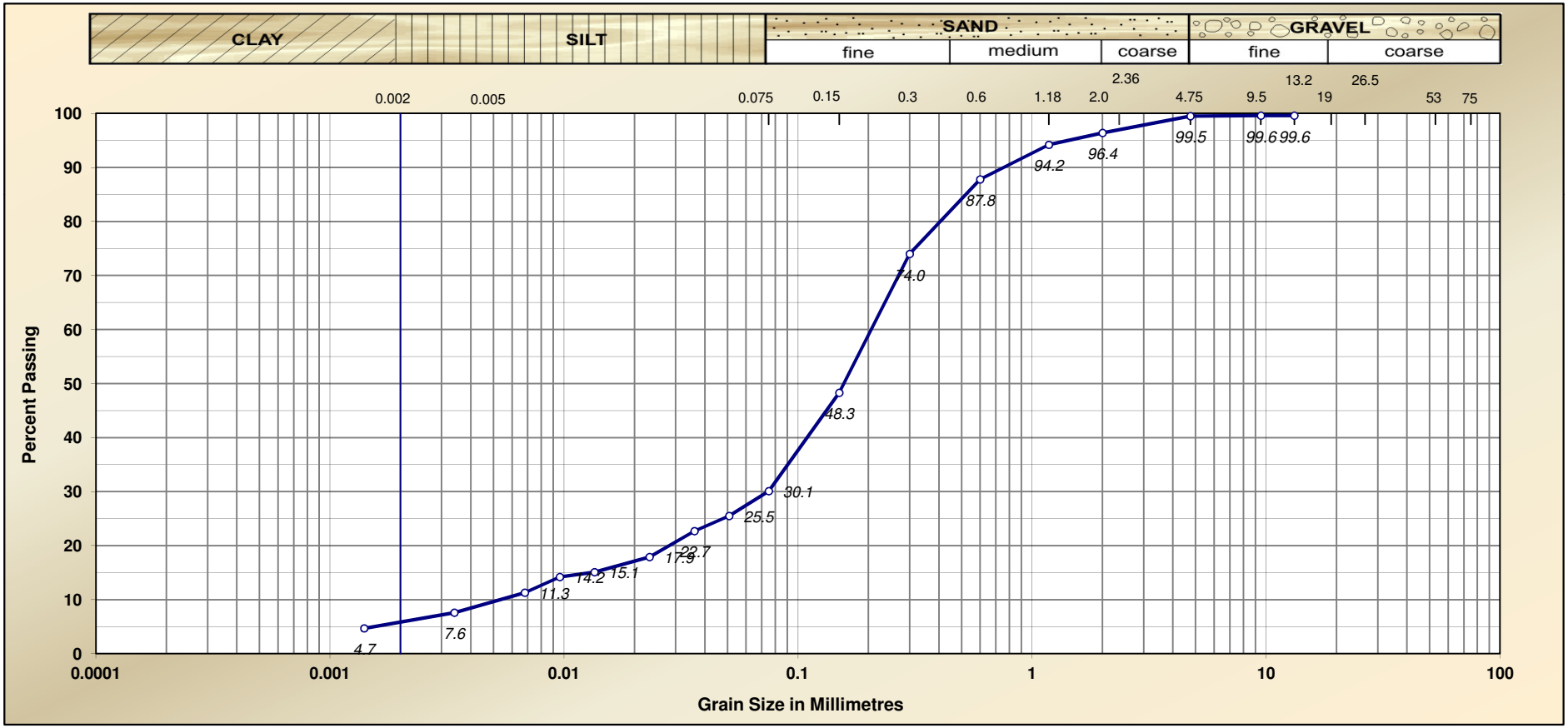
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 31, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Jones Creek - JON1
SAMPLED BY:
LAB NO.: 12-260

DATE SAMPLED: August 29, 2012
SOIL CLASSIFICATION: SAND, some silt, trace clay
REMARKS: Organic Content= 7.3%



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GRAIN SIZE DISTRIBUTION

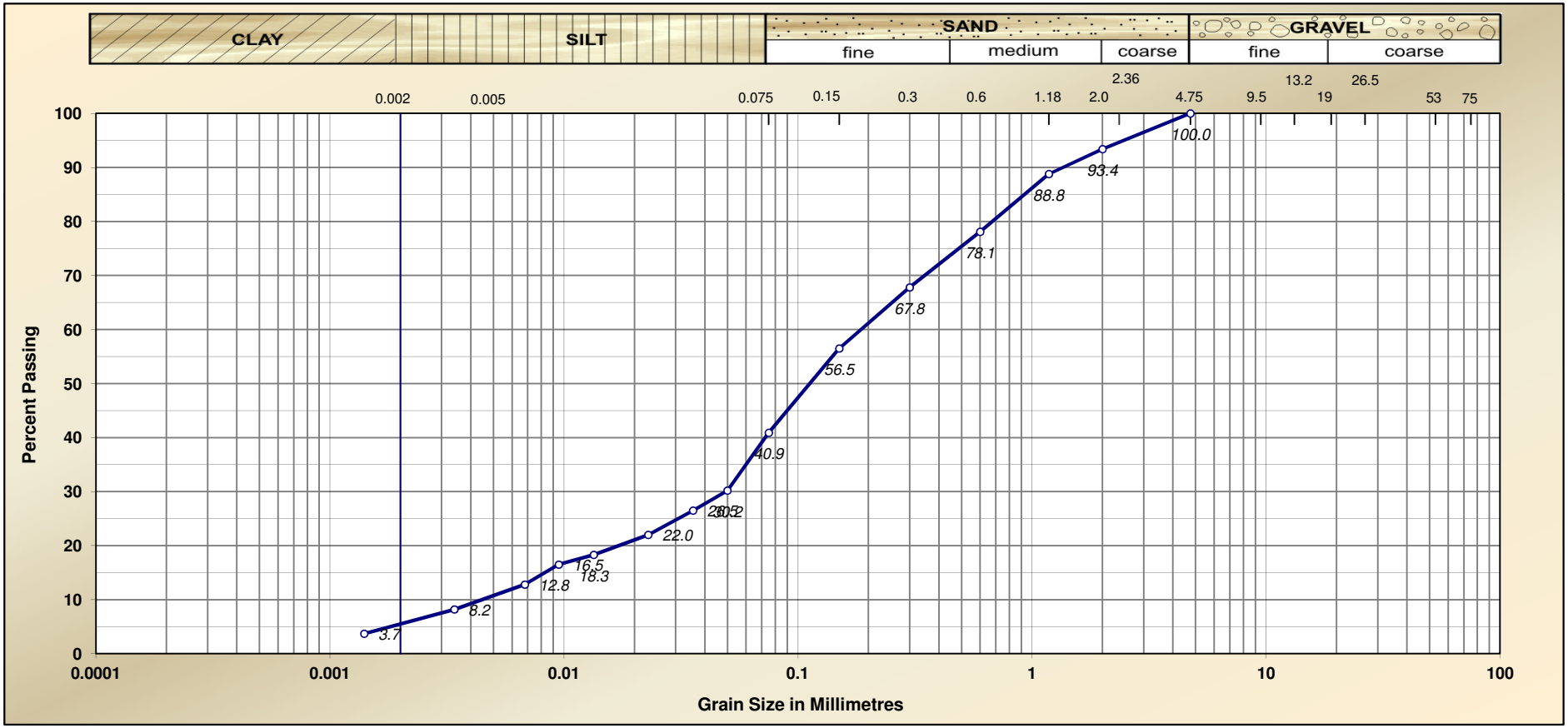
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 31, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Jones Creek - JON2
SAMPLED BY:
LAB NO.: 12-261

DATE SAMPLED: September 3, 2012
SOIL CLASSIFICATION: Silty SAND, trace clay
REMARKS: Organic Content= 6.9%



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GRAIN SIZE DISTRIBUTION

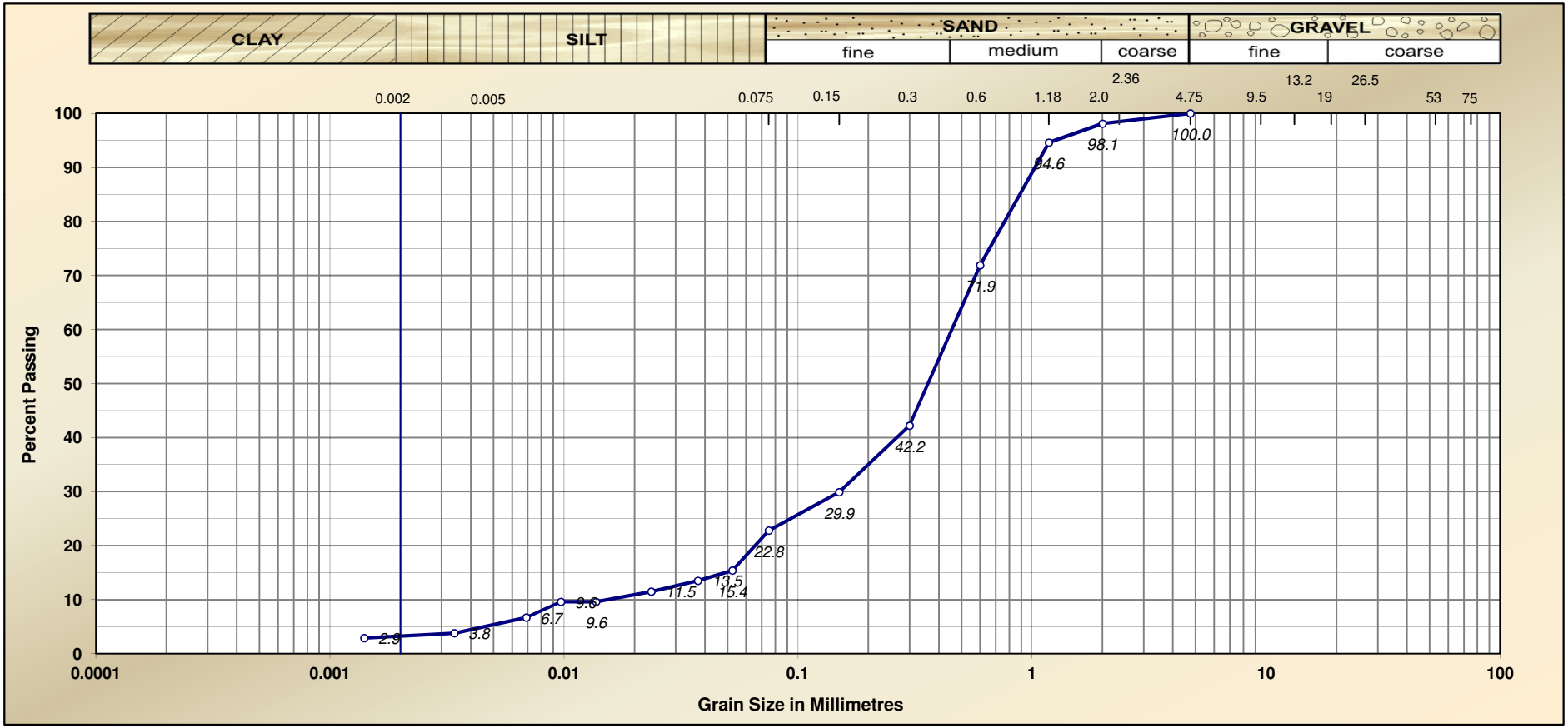
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 31, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Tait Creek - TAIT1
SAMPLED BY:
LAB NO.: 12-267

DATE SAMPLED: September 3, 2012
SOIL CLASSIFICATION: SAND, some silt, trace clay
REMARKS: Organic Content= 2.9%



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GRAIN SIZE DISTRIBUTION

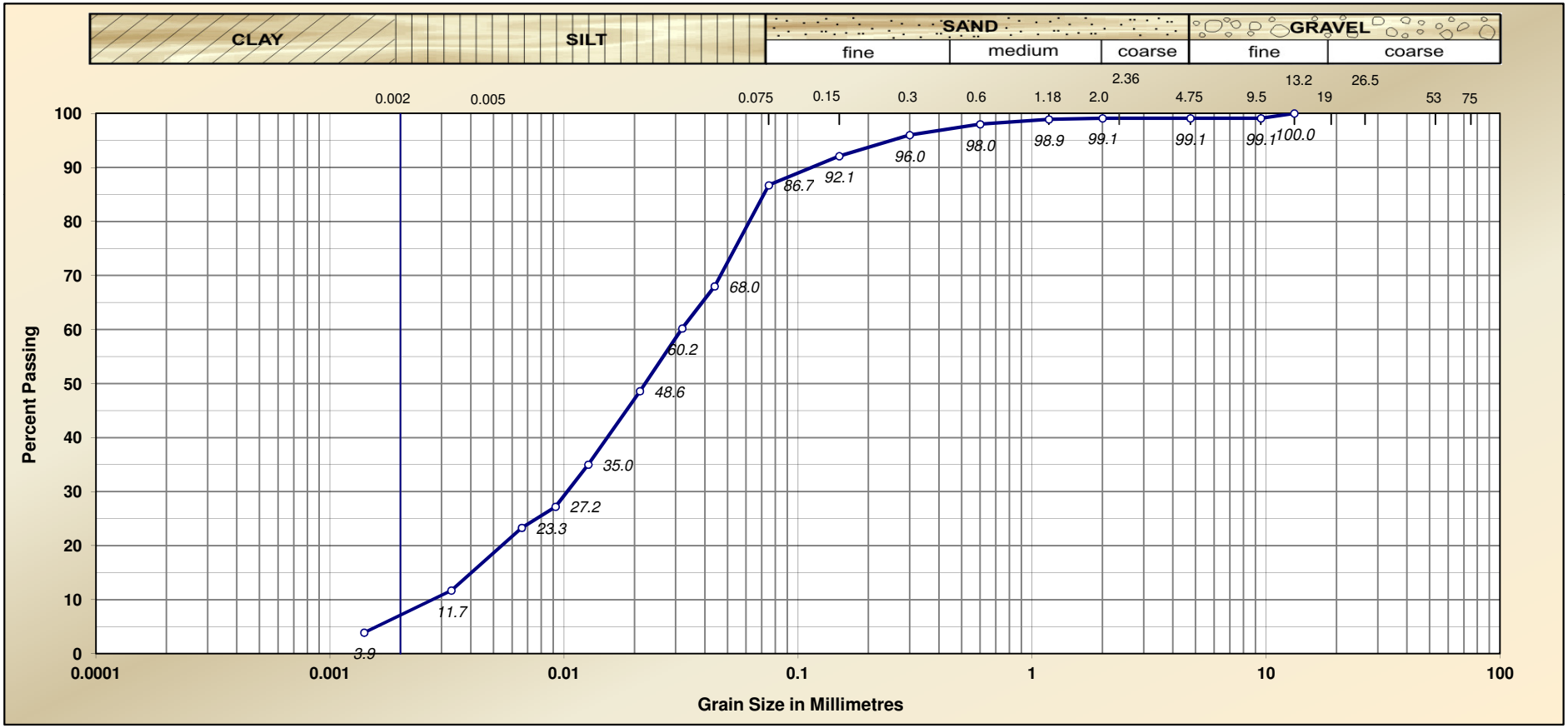
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatic Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 31, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Unnamed Tributary - UT2A
SAMPLED BY:
LAB NO.: 12-268

DATE SAMPLED: September 6, 2012
SOIL CLASSIFICATION: SILT, some sand, trace clay
REMARKS: Organic Content= 8.4%



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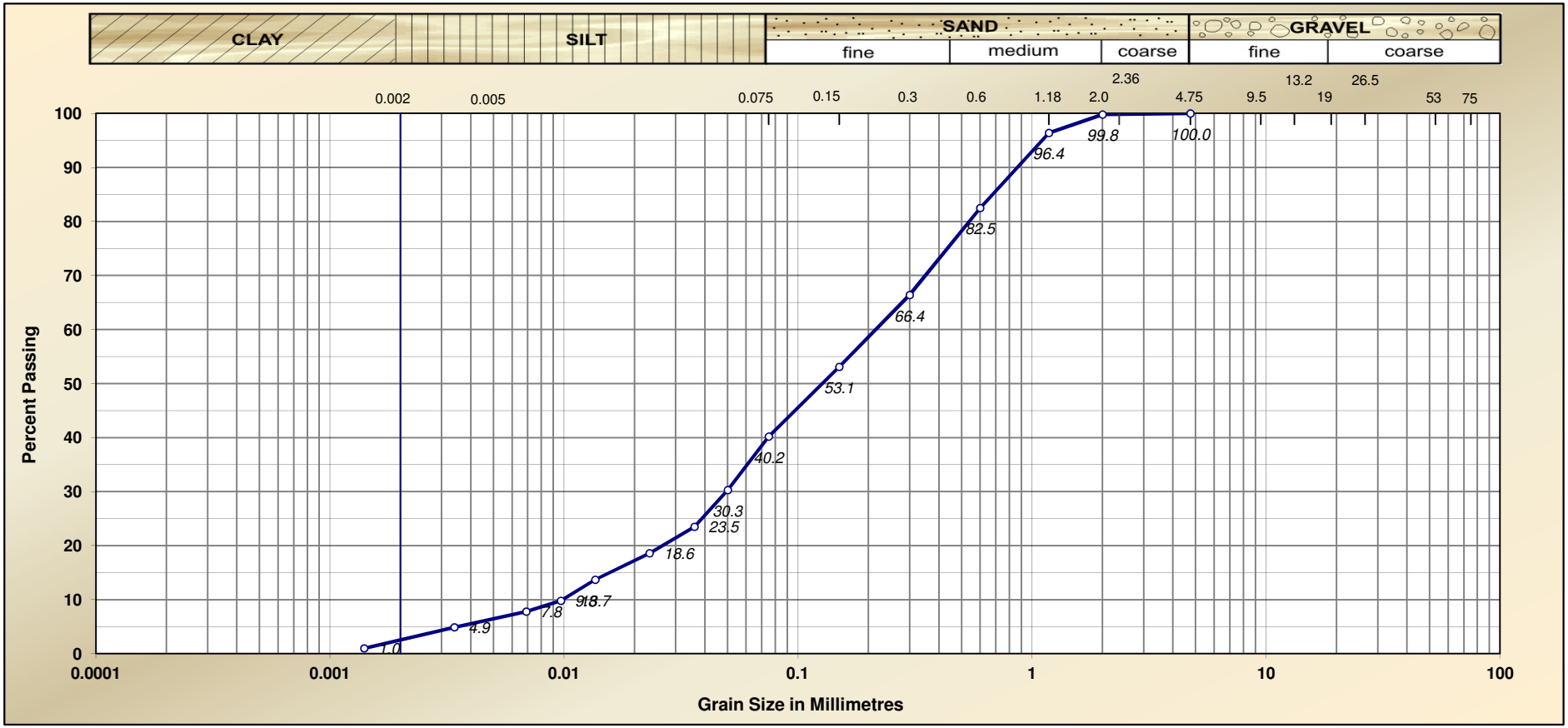
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 31, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Loslo Creek - LOS3
SAMPLED BY:
LAB NO.: 12-255

DATE SAMPLED: August 31, 2012
SOIL CLASSIFICATION: SILT & SAND, trace clay
REMARKS: Organic Content= 15.1%



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GRAIN SIZE DISTRIBUTION

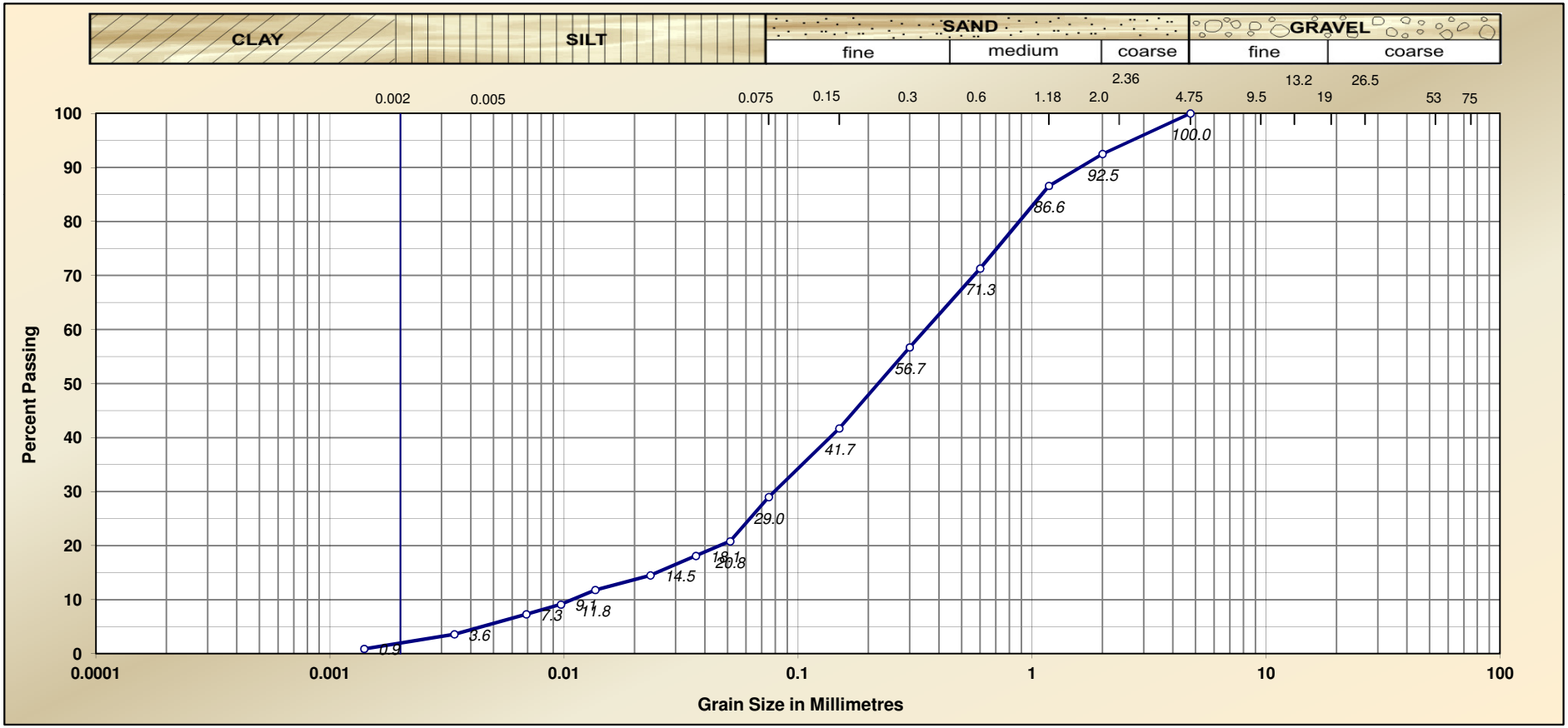
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: November 8, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Loslo Creek LOS4
SAMPLED BY:
LAB NO.: 12-256

DATE SAMPLED: August 31, 2012
SOIL CLASSIFICATION: SAND some silt
REMARKS: Organic Content= 12.6%



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GRAIN SIZE DISTRIBUTION

PROJECT NO.: TC111504-2012-12
PROJECT : Rainy River Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

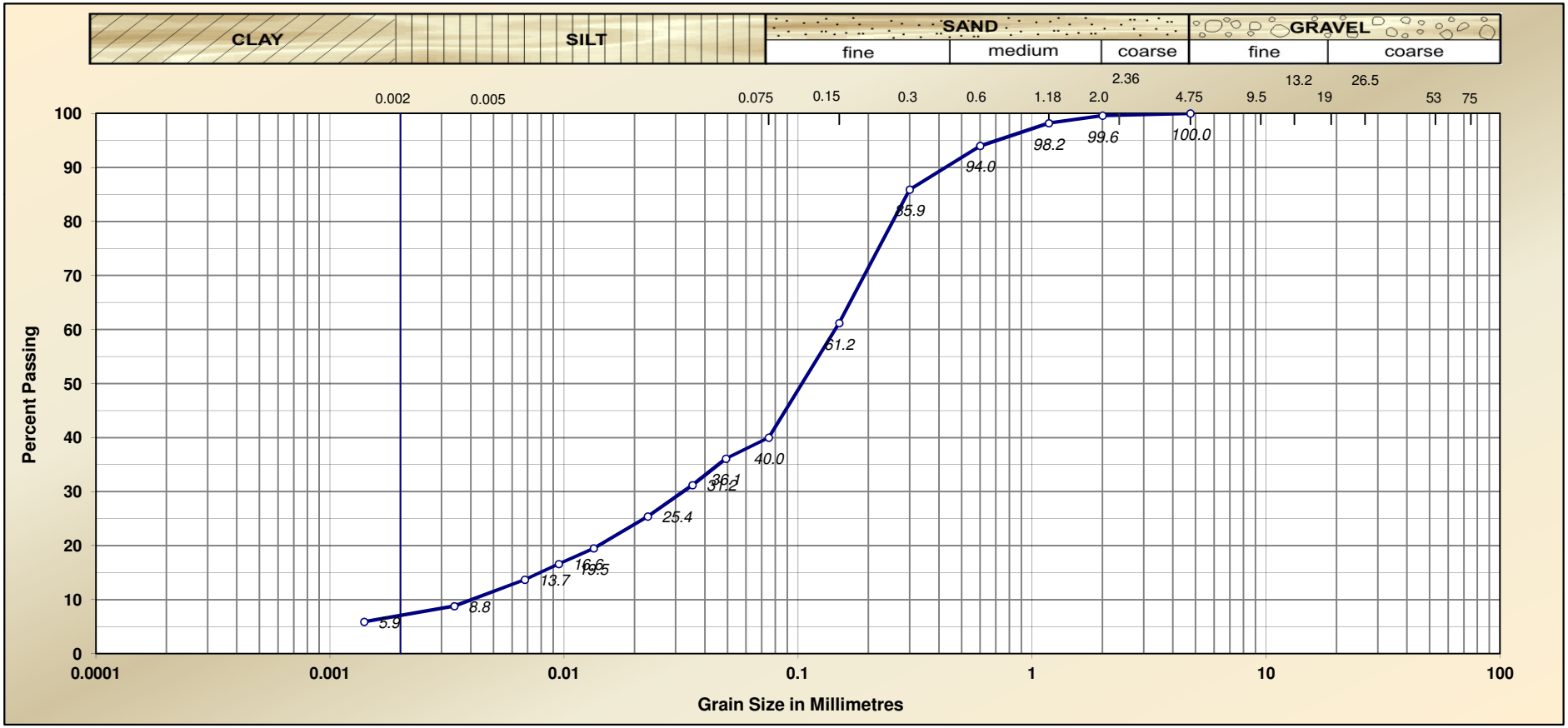
DATE: October 23, 2012

SAMPLE DATA

SAMPLE ID: LOS-5
SAMPLE LOCATION.: Loslo Creek - LOS-5
SAMPLED BY:
LAB NO.: 12-257

SOIL CLASSIFICATION: Silty SAND, trace clay

DATE SAMPLED: August 30, 2012
REMARKS: Organic Content= 53.7%



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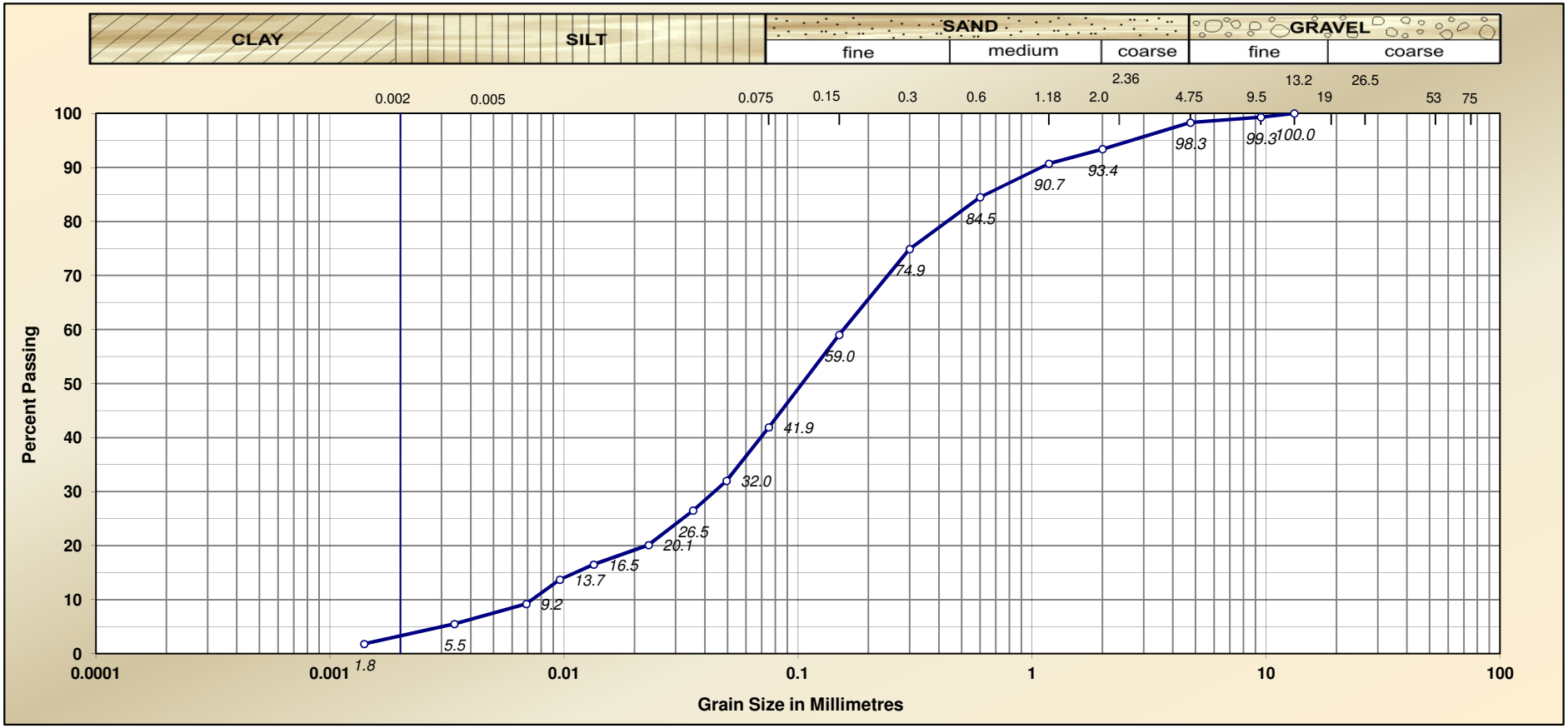
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 31, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Loslo Creek - LOS8
SAMPLED BY:
LAB NO.: 12-258

DATE SAMPLED: August 30, 2012
SOIL CLASSIFICATION: Silty SAND, trace clay, trace gravel
REMARKS: Organic Content= 4.2%



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GRAIN SIZE DISTRIBUTION

PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

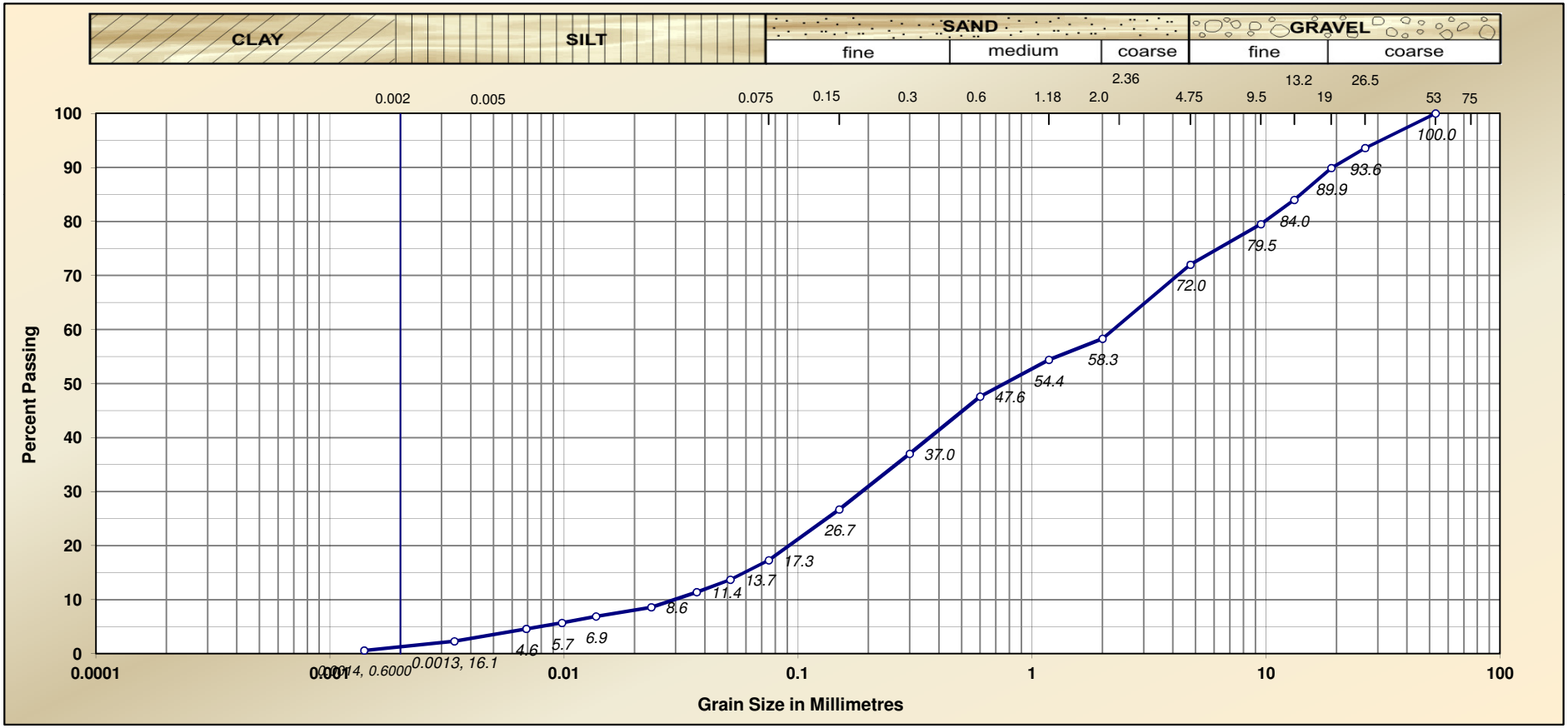
DATE: November 8, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Unnamed Tributary 5 UT5A
SAMPLED BY:
LAB NO.: 12-269

SOIL CLASSIFICATION: Gravelly SAND, some silt, trace clay

DATE SAMPLED: November 5, 2012
REMARKS: Organic Content= 2.9%



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GRAIN SIZE DISTRIBUTION

PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

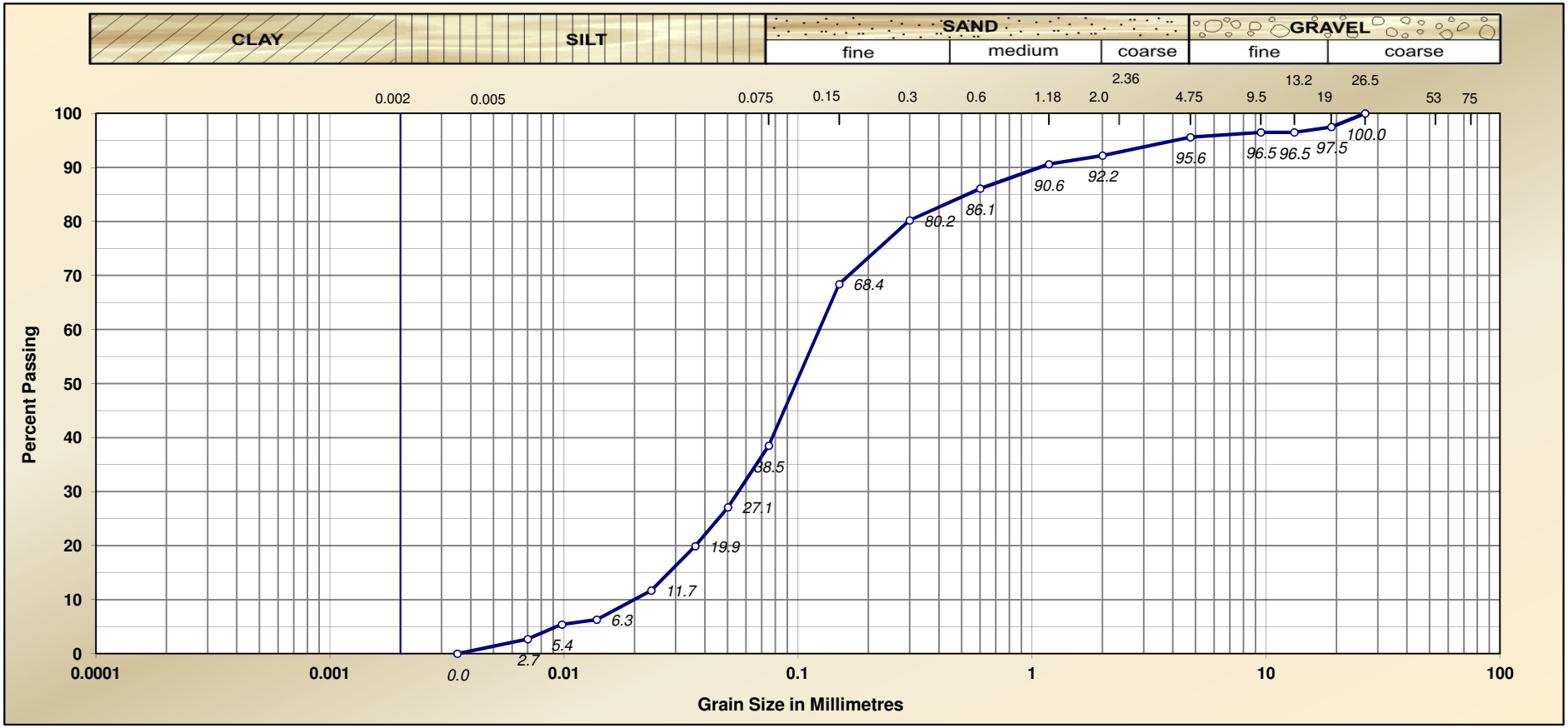
DATE: November 8, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: West Creek - WEST-TRIB-1A
SAMPLED BY:
LAB NO.: 12-262

SOIL CLASSIFICATION: Silty SAND, trace gravel

DATE SAMPLED: September 1, 2012
REMARKS: Organic Content= 4.1%



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GRAIN SIZE DISTRIBUTION

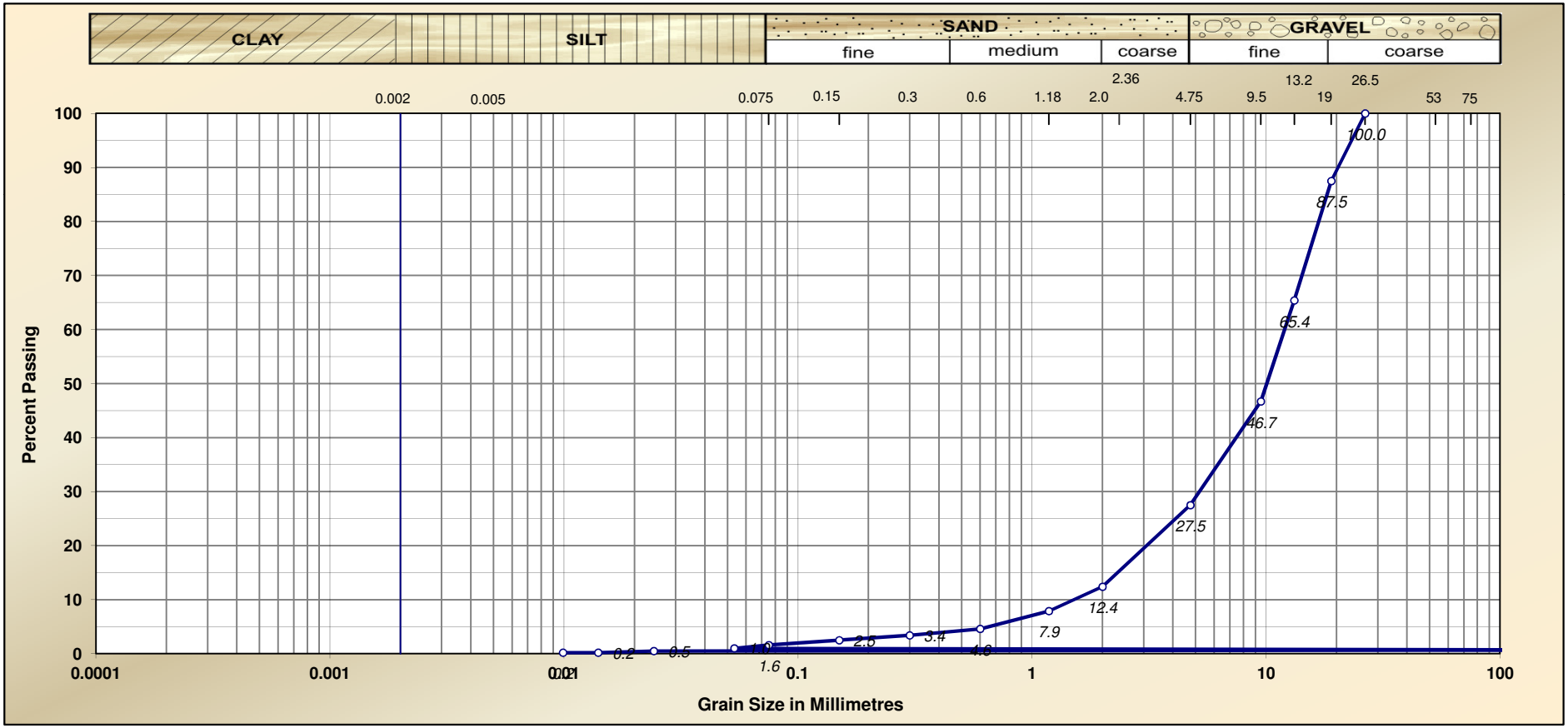
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: November 8, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: West Creek WEST-TRIB-1B
SAMPLED BY:
LAB NO.: 12-263

DATE SAMPLED: August 28, 2012
SOIL CLASSIFICATION: Sandy GRAVEL, trace silt
REMARKS: Organic Content= 0.7%



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GRAIN SIZE DISTRIBUTION

PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

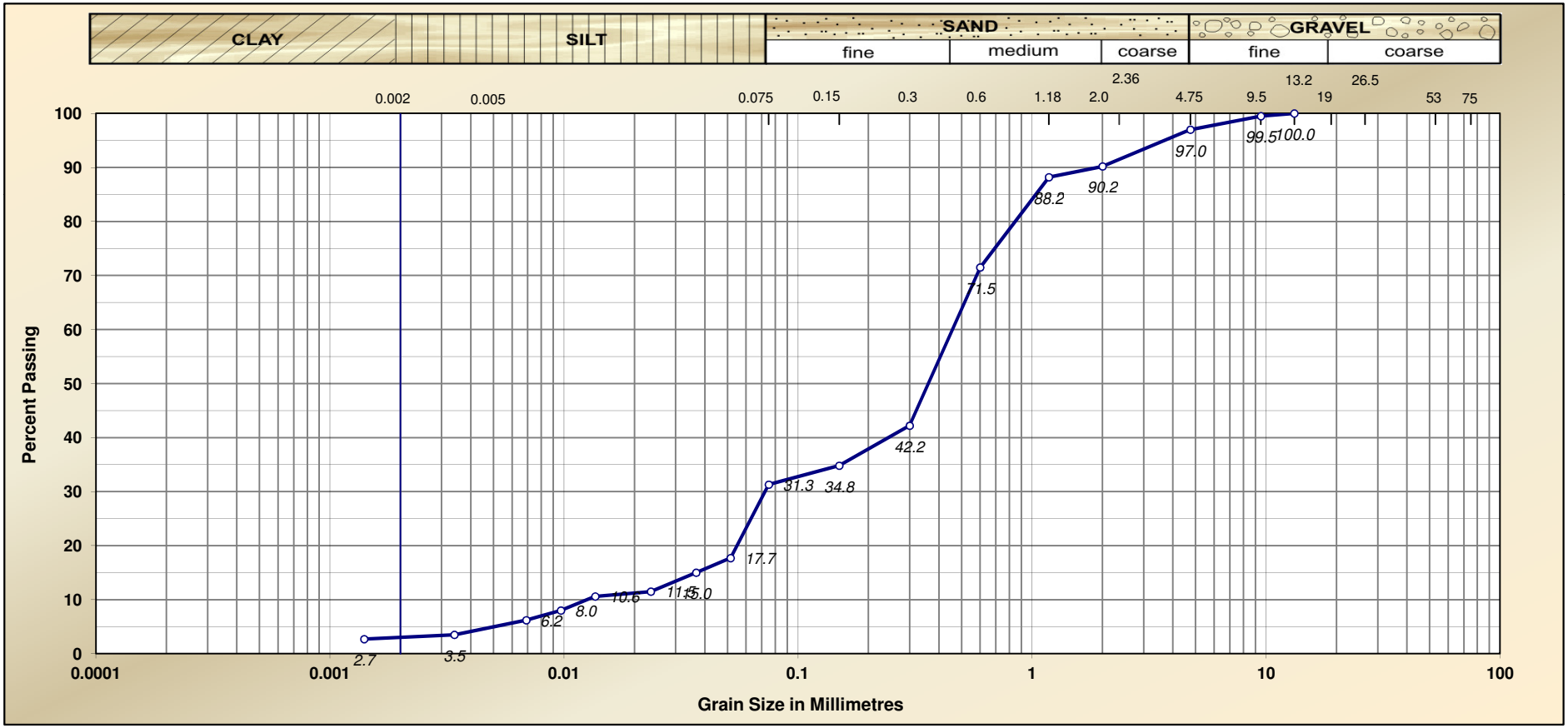
DATE: October 23, 2012

SAMPLE DATA

SAMPLE ID: CLA 5A
SAMPLE LOCATION.: Clark Creek CLA-5A
SAMPLED BY:
LAB NO.: 12-264

SOIL CLASSIFICATION: Silty SAND, trace clay, trace gravel

DATE SAMPLED: September 1, 2012
REMARKS:



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GRAIN SIZE DISTRIBUTION

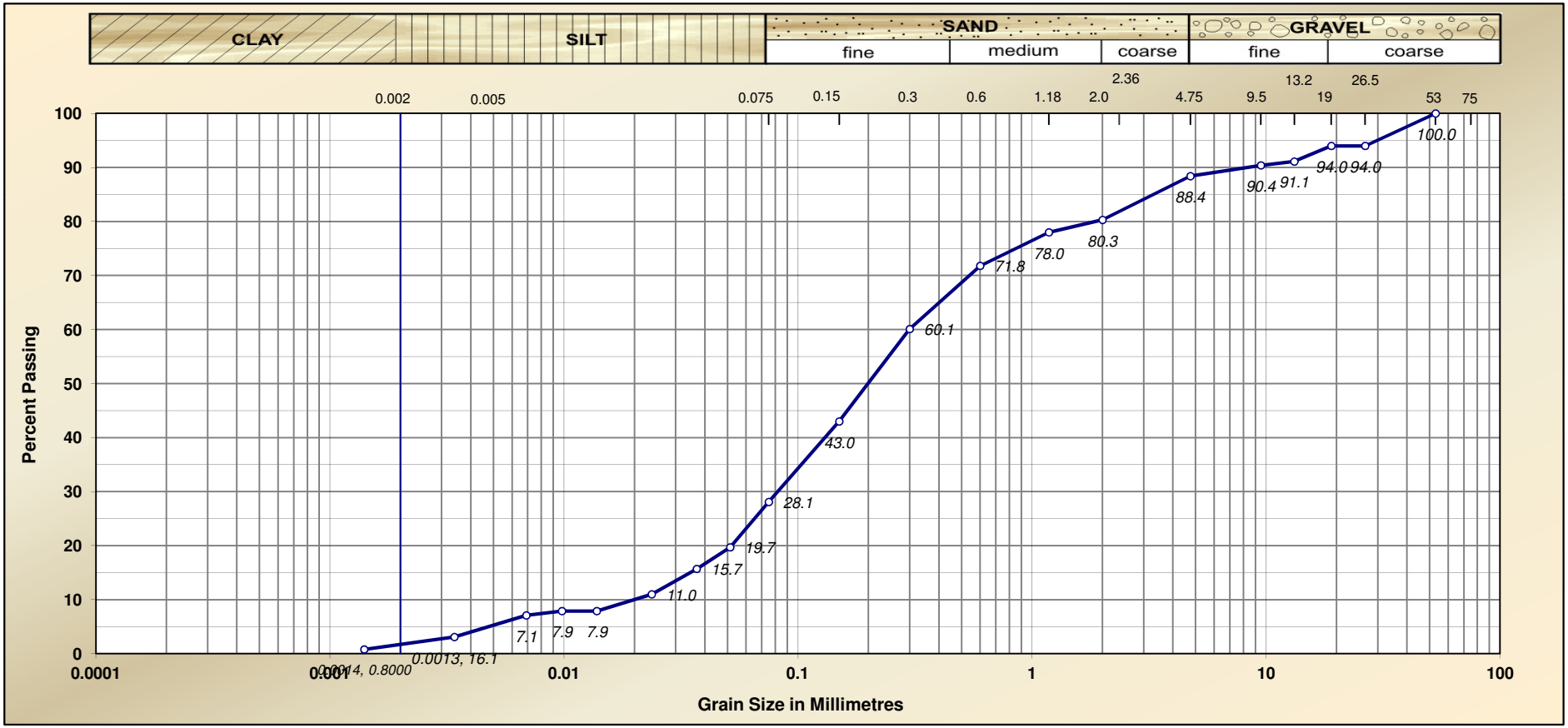
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: November 8, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Sturgeon Creek STU5
SAMPLED BY:
LAB NO.: 12-265

DATE SAMPLED: September 6, 2012
SOIL CLASSIFICATION: Silty SAND, some gravel
REMARKS: Organic Content= 6.4%



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GRAIN SIZE DISTRIBUTION

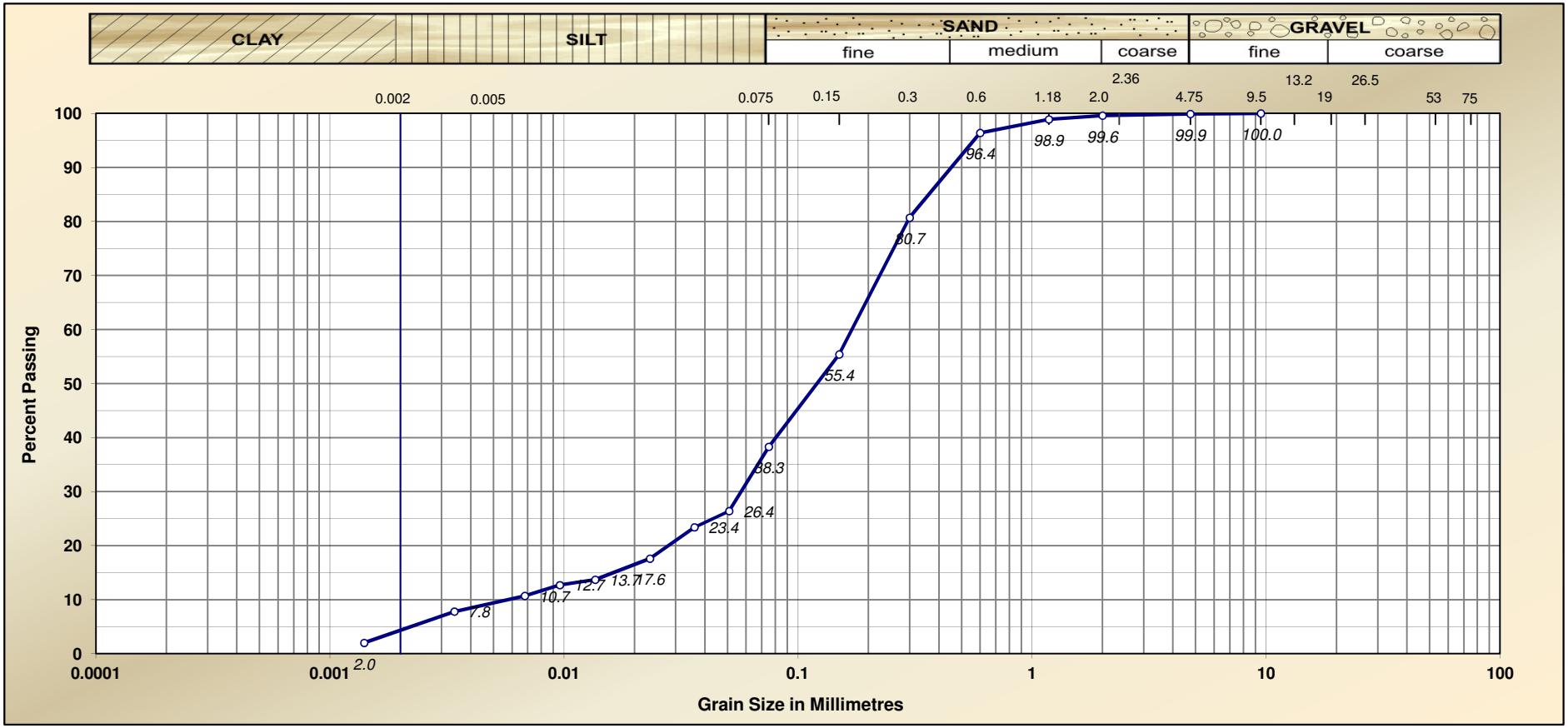
PROJECT NO.: TC111504.2012.12
PROJECT : Rainy River 2012 Aquatics Program
LOCATION: Thunder Bay, Ontario
CLIENT: Rainy River Resources

DATE: October 31, 2012

SAMPLE DATA

SAMPLE ID:
SAMPLE LOCATION.: Sturgeon Creek -STU6
SAMPLED BY:
LAB NO.: 12-266

DATE SAMPLED: September 5, 2012
SOIL CLASSIFICATION: Silty SAND, trace clay
REMARKS: Organic Content= 4.4%



CCIL CERTIFIED LABORATORY

ENCL. NO.

APPENDIX G

BENTHIC INVERTEBRATE COMMUNITY DATA

AMEC: Rainy River Resources, Pinewood River and tributaries (TC111504.2012.12): MMER , Aquatic Invertebrate Identifications 2012: CALCULATED TOTAL NUMBERS

Station	CLA-5A	LOS-3	PIN-10A	Wes T-1A	PIN-9	LOS-8	LOS-4	LOS-5	LOS-11	WES T-1B	STU-6	YT2-A	PIN-3A	JON-2	PIN-2A	JON-1	TAIT-1	UT5-A	PIN-2AA	PIN-8	PIN-10	STU-5	PIN-11	PIN-12	PIN-14	PIN-15	PIN-16	PIN-17	PIN-18
DATE	12.09.01	12.09.03	12.09.05	12.09.01	12.08.28	12.08.30	12.08.31	12.08.30	12.08.28	12.08.28	12.09.05	12.09.06	12.09.04	12.09.03	12.08.30	12.08.28	12.09.03	12.09.05	12.09.04	12.09.02	12.09.03	12.09.06	12.09.21	12.09.25	12.09.21	12.09.20	12.09.24	12.09.19	12.09.19
Original % Subsampled	50	100	100	100	50	50	100	50	50	100	100	50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
TAXA LIST																													
ANNELIDA:HIRUDINEA:																													
ERPOBDELLIDAE:																													
Erpobdella punctata																													
Nephelopsis obscura				1						3																			
GLOSSIPHONIIDAE:																													
Glossiphonia complanata																				1									
Helobdella stagnalis																													
Placobdella montifera																												1	
Placobdella ornata																													
HAEMOPIDAE:																													
Haemopis grandis																													
Haemopis poss. Terrestris																													
ANNELIDA:OLIGOCHAETA																													
ENCHYTRAEIDAE:										5																			
LUMBRICIDAE:																													
Eiseniella tetraedra																													
LIMBRICULIDAE:																													
Lumbriculus variegatus										2																			
NAIDIDAE:																													
Dero digitata		2	11	2		26		4			1			30				7			23		1						
Slavinia appendiculata		1																											
TUBIFICIDAE:																													
Immatures with hairs		4		13						2				10			1			2	5								
Immatures without hairs			1	20	2		2			108				11	1	1	3	5		3			9			1	1	4	8
Limnodrilus clarapedianus																													
Limnodrilus hoffmeisteri																							1						
ACARINA:																													
ARRENURIDAE:																													
Arrenurus																													
HYDROBATIDAE:																													
Hygrobates										8																			
KRENDOWSKIIDAE:																													
Kredowskia similis										1																			
LEBERTIIDAE:												.																	
Lebertia										10																			
LIMNS\ESIIDAE:																													
Limnesia				1																									
SPERCHONTIDAE:																													
Sperchon				1																									
UNIONICOLIDAE:																													
Neumania																													
Unionicola																													
CRUSTACEA:AMPHIPODA:																													
HYALELLIDAE:																													
Hyalella azteca					36									16							3		1						
INSECTA:																													
COLEOPTERA:																													
CHRYSOMELIDAE:																													
Donacia					2																								
DYTISCIDAE:																													
Agabus																													
Coptotomus longulus																												1	
Ilybius					2																								
ELMIDAE:																													
Dubiraphia										4			1						1		1		2			1			
Dubiraphia vittata																													
HALIPLIDAE:																													
Haliplus			1																										
INSECTA:																													
DIPTERA:																													
CERATOPOGONIDAE:		8	6	5		8				3							1	26			4					1		18	13
CHAOBORIDAE:																													
Chaoborus punctipennis															21										21	11	3	5	3
CHIRONOMIDAE:																													
CHIRONOMINAE:																													
Chironomus			12	5							1				9	5	8		1		3		48	31	85	10	69	5	
Cladopelma				1																	4								
Cladotanytarsus																												3	54

Station	CLA-5A	LOS-3	PIN-10A	Wes T-1A	PIN-9	LOS-8	LOS-4	LOS-5	LOS-11	WES T-1B	STU-6	YT2-A	PIN-3A	JON-2	PIN-2A	JON-1	TAIT-1	UT5-A	PIN-2AA	PIN-8	PIN-10	STU-5	PIN-11	PIN-12	PIN-14	PIN-15	PIN-16	PIN-17	PIN-18
DATE	12.09.01	12.09.03	12.09.05	12.09.01	12.08.28	12.08.30	12.08.31	12.08.30	12.08.28	12.08.28	12.09.05	12.09.06	12.09.04	12.09.03	12.08.30	12.08.28	12.09.03	12.09.05	12.09.04	12.09.02	12.09.03	12.09.06	12.09.21	12.09.25	12.09.21	12.09.20	12.09.24	12.09.19	12.09.19
Original % Subsampled	50	100	100	100	50	50	100	50	50	100	100	50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
TAXA LIST																													
Cyptochironomus			7																									8	3
Cryptotendipes																													
Dicrotendipes						2		2													9		8					54	14
Einfeldia natchitocheae	2	20		77		8	2								1		88	57	3	1	2						1		
Endochironomus																			4		7	1							
Glyptotendipes																							1						
Lauterbourniella																													
Microtendipes						10																							
Nolithauma																													
Parachironomus																	1												
Paratanytarsus																		1											
Paratendipes																													
Phaenopsectra																													
Polypedilum				95										1							1							1	
Pseudochironomus																													
Stictochironomus																													
Tanytarsus		5		1		2											2	1			3							2	1
Tribelos																											5	1	2
Zavreliella				3																									
ORTHOCLADIINAE:																													
Cricotopus					2												1												2
Epoicocladius																													
Metriocnemus										1																			
Nanocladius																													
Parakiefferiella																													
Parametriocnemus																													
Psectrocladius																													
TANYPODINAE:								2																					
Ablabesmyia	2				2																						1		2
Clinotanypus																												7	6
Helopelopia																													
Natarsia																							2			1			
Paramerina																													
Procladius		4	4	16	2	4	1	8								1	2	8		1	27	1	7	2	4	6	19	77	28
EMPIDIDAE:																													
Hemerodromia																													
STRATIOMYIDAE:																													
Allognosta										1																			
TABANIDAE:																													
Chrysops					2			2													4								
TIPULIDAE:																													
Psuedolimnophila																													
Rhabdomastix									2	1							1												
EPHEMEROPTERA:																													
BAETIDAE:																													
Acerpenna macdunnoughi																													
Baetis brunneicolor																													
Centroptilum																												1	
CAENIDAE:																													
Caenis youngi																					2							4	16
EPHEMERELLIDAE:																													
Eurylophella																													
EPHEMERIDAE:																													
Hexagenia limbata					2																		1	1		5	1	1	3
HEPTAGENIIDAE:																													
Stenacron interpunctatum																													1
Stenonema femoratum																													
LEPTOPHLEBIIDAE:																													
Leptophlebia																													
HEMIPTERA:																													
CORIXIDAE:																												2	
Hesperocorixa																							1						
Sigara																													
PLEIDAE:																													
Neoplea striola																												1	
LEPIDOPTERA:																													
CRAMBIDAE:																													
Acentria ephemerella																													
Paraponyx																													
MEGALOPTERA:																													
SIALIDAE:																													
Sialis																										1		4	11

Station	CLA-5A	LOS-3	PIN-10A	Wes T-1A	PIN-9	LOS-8	LOS-4	LOS-5	LOS-11	WES T-1B	STU-6	YT2-A	PIN-3A	JON-2	PIN-2A	JON-1	TAIT-1	UT5-A	PIN-2AA	PIN-8	PIN-10	STU-5	PIN-11	PIN-12	PIN-14	PIN-15	PIN-16	PIN-17	PIN-18
DATE	12.09.01	12.09.03	12.09.05	12.09.01	12.08.28	12.08.30	12.08.31	12.08.30	12.08.28	12.08.28	12.09.05	12.09.06	12.09.04	12.09.03	12.08.30	12.08.28	12.09.03	12.09.05	12.09.04	12.09.02	12.09.03	12.09.06	12.09.21	12.09.25	12.09.21	12.09.20	12.09.24	12.09.19	12.09.19
Original % Subsampled	50	100	100	100	50	50	100	50	50	100	100	50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
TAXA LIST																													
NEUROPTERA:																													
SISYRIDAE:																													
Sisyra									2																				
ODONATA:																													
AESHNIDAE:																													
Aeshna																													
COENAGRIONIDAE:																													
Enallagma					4	2															1								
Ischnura														1															
CORDULIIDAE:																													
Somatochlora		1								1														1					
Somatochlora walshii																													
Tetragoneuria canis					2																								
GOMPHIDAE:																													
Gomphus																													
LIBELLULIDAE:																													
Libellula																													
TRICHOPTERA:																													
DIPSEUDOPSIDAE:																													
Phylocentropus																												1	7
HYDROPSYCHIDAE:																													
Cheumatopsyche																													
Hydropsyche																													
HYDROPTILIDAE:																													
Hydroptila																												1	
Oxyethira																													
LEPIDOSTOMATIDAE:																													
Lepidostoma																													
LEPTOCERIDAE:																													
Oecetis																												1	
Triaenodes					10																								
LIMNEPHILIDAE:										1																			
PHILOPOTAMIDAE:																													
Dolophilodes																													
PHRYGANAEIDAE:																													
Banksiola																													
Phryganea																													
Ptilostomis																													
POLYCENTROPODIDAE:																													
Polycentropus																													
MOLLUSCA:BIVALVIA:																													
SPHAERIIDAE:																													
Musculium		2																										78	
Pisidium		2		20		12				143	1	2	1	13		2	1	2		4	3		3			1		10	1
Sphaerium rhomboideum						8										1													
Sphaerium simile				4	4								2								1								4
Sphaerium striatinum			1																				5			2		12	9
UNIONIDAE:																													
Pyganodon grandis																													
MOLLUSCA:GASTROPODA:																													
ANCYLIDAE:																													
Ferrissia paralella					2																1			1					
HYDROBIIDAE:																													
Amnicola limosa					112								1	4			3			7	2		1					3	5
Cincinnatia cincinnatiensis																												8	14
Probythinella lacustris																												5	6
LYMNAEIDAE:																													
Fossaria								2																					
PHYSIDAE:																													
Physella gyrina		1			16					2				3					1		1							1	
PLANORBIDAE:																													
Gyraulus circumstriatus	6	3			4					13		2		2		1					1							1	
Helisoma anceps									2			4											1						
VALVATIDAE:																													
Valvata lewisi	2					2		2		27																			
Valvata tricarinata																					1								2
TOTAL NUMBERS	12	53	43	265	206	84	5	22	6	336	3	8	5	91	32	11	112	107	10	19	109	2	92	36	110	40	100	321	215
TOTAL TAXA	4	12	8	16	17	11	3	7	3	19	3	3	4	10	4	6	12	8	5	7	23	2	16	5	3	11	8	31	24

APPENDIX H

FISH SAMPLING EFFORT, CAPTURES AND TISSUE ANALYSIS DATA

Waterbody Name	Date (dd/mm/yy)	Gear Used	Location Description	Sample Location ID	Species Name	Fish ID #	Fork Length (mm)	Total Length (mm)	Round Weight (g)	Age Structures	Tissue	Pres. For Analysis (Y/N)	Notes
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN1	PIN-2AA	White Sucker	1	-	201	81.100	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN1	PIN-2AA	White Sucker	2	174	181	54.800	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN1	PIN-2AA	White Sucker	3	168	176	50.400	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN1	PIN-2AA	White Sucker	4	171	176	53.100	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN1	PIN-2AA	White Sucker	5	167	180	51.100	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN1	PIN-2AA	Creek Chub	6	175	181	54.500	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN1	PIN-2AA	Creek Chub	7	169	180	47.200	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN1	PIN-2AA	White Sucker	8	158	170	47.300	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN1	PIN-2AA	White Sucker	9	171	178	54.500	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN1	PIN-2AA	White Sucker	10	166	173	48.100	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN1	PIN-2AA	White Sucker	11	167	175	57.300	N	N	N	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN1	PIN-2AA	Creek Chub	12	174	184	58.100	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN1	PIN-2AA	White Sucker	13	167	173	46.500	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN1	PIN-2AA	White Sucker	14	178	187	60.700	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN1	PIN-2AA	White Sucker	15	162	171	46.200	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN2	PIN-2AA	White Sucker	1	221	231	124.700	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN2	PIN-2AA	Creek Chub	2	203	225	104.500	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN2	PIN-2AA	Creek Chub	3	222	231	122.400	N	WF	Y	
Pinewood River	04/09/12	Gillnet	PIN-2AA-GN2	PIN-2AA	Creek Chub	4	222	235	110.600	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Creek Chub	1	148	153	32.300	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Creek Chub	2	144	149	30.600	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Creek Chub	3	127	133	23.000	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Creek Chub	4	136	144	27.200	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Pearl Dace	5	121	126	16.100	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Creek Chub	6	146	153	37.300	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Common Shiner	7	119	122	12.600	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Pearl Dace	8	111	115	15.400	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Common Shiner	9	81	86	6.200	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Common Shiner	10	81	85	4.500	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Common Shiner	11	80	85	5.600	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Creek Chub	12	112	116	6.100	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Common Shiner	13	79	84	5.200	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Creek Chub	14	98	110	10.300	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Common Shiner	15	85	91	6.100	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Common Shiner	16	89	95	6.800	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Common Shiner	17	81	85	4.400	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Common Shiner	18	76	80	4.400	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Pearl Dace	19	81	84	5.900	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Pearl Dace	20	101	106	10.100	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT1	PIN-2AA	Creek Chub	21	81	86	6.400	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Creek Chub	1	114	120	15.000	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Creek Chub	2	141	147	26.900	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Creek Chub	3	151	160	34.300	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Common Shiner	4	83	91	5.700	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Creek Chub	5	111	115	9.100	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Creek Chub	6	135	146	30.300	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Common Shiner	7	74	81	4.100	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Creek Chub	8	94	99	9.000	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Creek Chub	9	134	144	26.500	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Creek Chub	10	161	170	46.900	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Creek Chub	11	126	131	22.400	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Creek Chub	12	120	125	18.800	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Common Shiner	13	83	92	5.300	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Common Shiner	14	81	87	5.900	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Creek Chub	15	85	90	6.400	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Creek Chub	16	81	86	5.000	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Common Shiner	17	87	91	6.200	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Creek Chub	18	90	97	6.800	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Common Shiner	19	82	86	5.100	N	WF	Y	
Pinewood River	04/09/12	Minnow Trap	PIN-2AA-MT2	PIN-2AA	Common Shiner	20	86	93	5.700	N	WF	Y	
Pinewood River	12/07/12	Gillnet	PIN-2A-GN1	PIN-2A	Northern Pike	NP-10	491	520	94.000	N	N	N	Mortality
Pinewood River	12/07/12	Gillnet	PIN-2A-GN1	PIN-2A	Northern Pike	NP-11	576	610	146.000	N	N	N	Mortality
Pinewood River	12/07/12	Gillnet	PIN-2A-GN1	PIN-2A	Northern Pike	NP-12	460	485	76.000	N	N	N	Mortality
Pinewood River	12/07/12	Gillnet	PIN-2A-GN1	PIN-2A	Northern Pike	NP-13	501	531	96.000	N	N	N	Mortality
Pinewood River	12/07/12	Gillnet	PIN-2A-GN1	PIN-2A	White Sucker	WS	-	336	33.000	N	N	N	Mortality
Pinewood River	12/07/12	Gillnet	PIN-2A-GN1	PIN-2A	Brown Bullhead	BB	-	130	0.030	N	N	N	Mortality
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	Northern Pike	NP-1	521	557	114.000	SC, CL	DM, L	Y	Mortality
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	White Sucker	WS-1	-	235	12.350	N	N	N	Mortality
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	Northern Pike	NP-2	390	412	41.000	SC, CL	DM, L	Y	Mortality
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	Northern Pike	NP-3	406	432	49.000	SC, CL	DM, L	Y	Mortality
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	Brown Bullhead	BB-1	-	72	7.510	N	WF	Y	Mortality
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	Northern Pike	NP-4	522	557	107.000	SC, CL	DM, L	Y	Mortality
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	Northern Pike	NP-5	404	423	30.000	SC, CL	DM, L	Y	Mortality
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	White Sucker	WS-2	-	236	128.400	N	N	N	Mortality
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	Brown Bullhead	BB-2	-	170	70.600	N	N	N	Mortality
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	Brown Bullhead	BB-3	-	185	73.400	N	N	N	Mortality
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	Northern Pike	NP-6	345	366	28.000	N	N	N	

Waterbody Name	Date (dd/mm/yy)	Gear Used	Location Description	Sample Location ID	Species Name	Fish ID #	Fork Length (mm)	Total Length (mm)	Round Weight (g)	Age Structures	Tissue	Pres. For Analysis (Y/N)	Notes
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	Northern Pike	NP-7	364	383	37.000	N	N	N	
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	Northern Pike	NP-8	412	437	56.000	N	N	N	Parasites
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	Northern Pike	NP-9	400	424	52.000	N	N	N	Parasites
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	White Sucker	WS-3	-	218	-	N	N	N	
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	Brown Bullhead	BB-4	-	194	-	N	N	N	
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	Brown Bullhead	BB-5	-	156	-	N	N	N	
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	Brown Bullhead	BB-6	-	146	-	N	N	N	
Pinewood River	12/07/12	Gillnet	PIN-2A-GN3	PIN-2A	Brown Bullhead	BB-7	-	160	-	N	N	N	
Pinewood River	12/07/12	Minnow Trap	PIN-2A-MT2	PIN-2A	Brook Stickleback	BS-1	-	49	-	N	N	N	
Pinewood River	12/07/12	Minnow Trap	PIN-2A-MT2	PIN-2A	Brook Stickleback	BS-2	-	48	-	N	N	N	
Pinewood River	12/07/12	Minnow Trap	PIN-2A-MT2	PIN-2A	Brook Stickleback	BS-3	-	45	-	N	N	N	
Pinewood River	12/07/12	Minnow Trap	PIN-2A-MT2	PIN-2A	Brook Stickleback	BS-4	-	51	-	N	N	N	
Pinewood River	14/07/12	Gillnet	PIN-3A-GN1	PIN-3A	Northern Pike	1	300	320	230.000	SC, CL	DM, L	Y	Common Shiner in stomach/Liver weight 6.55g
Pinewood River	14/07/12	Gillnet	PIN-3A-GN1	PIN-3A	Northern Pike	2	356	377	390.000	SC, CL	DM, L	Y	Liver weight 9,168g
Pinewood River	14/07/12	Gillnet	PIN-3A-GN1	PIN-3A	Northern Pike	3	343	367	370.000	SC, CL	DM, L	Y	Liver weight 7.21g
Pinewood River	15/07/12	Gillnet	PIN-3A-GN2	PIN-3A	Brown Bullhead	1	-	125	50.000	N	N	N	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN2	PIN-3A	Brown Bullhead	2	-	131	60.000	N	N	N	Photo #1392
Pinewood River	15/07/12	Gillnet	PIN-3A-GN2	PIN-3A	Brown Bullhead	3	-	111	40.000	N	N	N	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN2	PIN-3A	Brown Bullhead	4	-	114	40.000	N	N	N	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN2	PIN-3A	Brown Bullhead	5	-	105	50.000	N	N	N	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN2	PIN-3A	Brown Bullhead	6	-	121	70.000	N	N	N	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN2	PIN-3A	Brown Bullhead	7	-	119	50.000	N	N	N	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN2	PIN-3A	Brown Bullhead	8	-	118	50.000	N	N	N	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN2	PIN-3A	White Sucker	9	163	169	60.000	N	WF	Y	Photo #1393
Pinewood River	15/07/12	Gillnet	PIN-3A-GN2	PIN-3A	Northern Pike	10	337	356	260.000	SC, CL	DM, L	Y	Photo #1394
Pinewood River	15/07/12	Gillnet	PIN-3A-GN2	PIN-3A	Northern Pike	11	323	341	150.000	SC, CL	DM, L	Y	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN2	PIN-3A	Northern Pike	12	339	360	140.000	SC, CL	DM, L	Y	Photo #1395-1405
Pinewood River	15/07/12	Gillnet	PIN-3A-GN4	PIN-3A	Northern Pike	1	341	365	180.000	SC, CL	DM, L	Y	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN4	PIN-3A	Northern Pike	2	338	360	150.000	SC, CL	DM, L	Y	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN4	PIN-3A	White Sucker	3	264	278	260.000	N	DM, L	Y	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN4	PIN-3A	White Sucker	4	219	232	150.000	N	WF	Y	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN4	PIN-3A	White Sucker	5	221	231	120.000	N	WF	Y	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN4	PIN-3A	Brown Bullhead	6	-	172	90.000	N	N	N	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN4	PIN-3A	Brown Bullhead	7	-	161	70.000	N	N	N	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN4	PIN-3A	Brown Bullhead	8	-	166	70.000	N	N	N	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN4	PIN-3A	Brown Bullhead	9	-	168	70.000	N	N	N	
Pinewood River	15/07/12	Gillnet	PIN-3A-GN4	PIN-3A	Brown Bullhead	10	-	161	60.000	N	N	N	
Pinewood River	15/07/12	Minnow Trap	PIN-3A-MT1	PIN-3A	Central Mudminnow	1	-	76	4.870	N	WF	Y	
Pinewood River	15/07/12	Minnow Trap	PIN-3A-MT1	PIN-3A	Central Mudminnow	2	-	59	2.160	N	WF	Y	
Pinewood River	13/07/12	Gillnet	PIN-8-GN1	PIN-8	Northern Pike	1	151	185	64.000	SC, CL	DM, L	Y	
Pinewood River	13/07/12	Gillnet	PIN-8-GN1	PIN-8	Northern Pike	2	358	370	21.000	SC, CL	DM, L	Y	
Pinewood River	13/07/12	Gillnet	PIN-8-GN1	PIN-8	Northern Pike	3	243	260	11.000	SC, CL	DM, L	Y	
Pinewood River	13/07/12	Gillnet	PIN-8-GN1	PIN-8	Northern Pike	4	319	328	19.000	SC, CL	DM, L	Y	
Pinewood River	13/07/12	Gillnet	PIN-8-GN2	PIN-8	Northern Pike	1	421	498	48.000	SC, CL	DM, L	Y	
Pinewood River	13/07/12	Gillnet	PIN-8-GN2	PIN-8	Northern Pike	2	395	425	52.000	SC, CL	DM, L	Y	
Pinewood River	13/07/12	Gillnet	PIN-8-GN2	PIN-8	Northern Pike	3	345	385	36.000	SC, CL	DM, L	Y	
Pinewood River	13/07/12	Gillnet	PIN-8-GN2	PIN-8	Northern Pike	4	356	385	41.000	SC, CL	DM, L	Y	
Pinewood River	13/07/12	Gillnet	PIN-8-GN2	PIN-8	Northern Pike	5	438	471	60.000	SC, CL	DM, L	Y	
Pinewood River	13/07/12	Gillnet	PIN-8-GN2	PIN-8	Northern Pike	6	415	441	48.000	SC, CL	DM, L	Y	
Pinewood River	13/07/12	Gillnet	PIN-8-GN2	PIN-8	Northern Pike	7	365	375	31.000	SC, CL	DM, L	Y	
Pinewood River	13/07/12	Gillnet	PIN-8-GN2	PIN-8	Northern Pike	8	338	360	28.000	N	N	N	
Pinewood River	13/07/12	Gillnet	PIN-8-GN2	PIN-8	Northern Pike	9	341	359	39.000	N	N	N	
Pinewood River	13/07/12	Gillnet	PIN-8-GN2	PIN-8	Northern Pike	10	385	410	47.000	N	N	N	
Pinewood River	13/07/12	Gillnet	PIN-8-GN2	PIN-8	Northern Pike	11	305	321	24.000	N	N	N	
Pinewood River	13/07/12	Gillnet	PIN-8-GN2	PIN-8	Northern Pike	12	395	420	46.000	N	N	N	
Pinewood River	13/07/12	Gillnet	PIN-8-GN2	PIN-8	Northern Pike	13	331	351	26.000	N	N	N	
Pinewood River	13/07/12	Gillnet	PIN-8-GN2	PIN-8	Northern Pike	14	309	328	22.000	N	N	N	
Pinewood River	13/07/12	Gillnet	PIN-8-GN3	PIN-8	Northern Pike	1	335	355	34.000	N	N	N	
Pinewood River	13/07/12	Gillnet	PIN-8-GN3	PIN-8	Brown Bullhead	2	-	270	21.000	N	N	N	
Pinewood River	13/07/12	Gillnet	PIN-9-GN1	PIN-9	White Sucker	WS-1	168	185	-	N	WF	Y	Ziploc bag
Pinewood River	14/07/12	Gillnet	PIN-10A-GN1	PIN-10	White Sucker	1	-	230	30.000	N	N	N	Only half a fish (eaten in net)
Pinewood River	14/07/12	Gillnet	PIN-10A-GN1	PIN-10	White Sucker	2	-	-	38.000	N	N	N	Only half a fish (eaten in net)
Pinewood River	21/09/12	Electrofisher	PIN-11-E1	PIN-11	Central Mudminnow	1	-	102	10.571	N	WF	Y	
Pinewood River	21/09/12	Electrofisher	PIN-11-E1	PIN-11	Central Mudminnow	2	-	52	1.499	N	WF	Y	
Pinewood River	21/09/12	Gillnet	PIN-11-GN1	PIN-11	Northern Pike	1	328	335	210.000	SC, CL	DM, L	Y	
Pinewood River	21/09/12	Gillnet	PIN-11-GN1	PIN-11	Northern Pike	2	329	338	180.000	SC, CL	DM, L	Y	
Pinewood River	21/09/12	Gillnet	PIN-11-GN1	PIN-11	Northern Pike	3	361	380	326.000	SC, CL	DM, L	Y	
Pinewood River	21/09/12	Gillnet	PIN-11-GN1	PIN-11	Northern Pike	4	139	148	16.185	N	WF	Y	Yoy
Pinewood River	21/09/12	Gillnet	PIN-11-GN1	PIN-11	White Sucker	5	240	250	190.000	N	WF	Y	
Pinewood River	21/09/12	Gillnet	PIN-11-GN1	PIN-11	White Sucker	6	238	249	180.000	N	WF	Y	
Pinewood River	21/09/12	Gillnet	PIN-11-GN1	PIN-11	White Sucker	7	226	236	160.000	N	WF	Y	
Pinewood River	26/09/12	Gillnet	PIN-12-GN1	PIN-12	White Sucker	1	368	395	530.000	N	N	N	Live release
Pinewood River	26/09/12	Gillnet	PIN-12-GN1	PIN-12	Northern Pike	2	453	471	460.000	N	N	N	Live release
Pinewood River	26/09/12	Gillnet	PIN-12-GN1	PIN-12	Northern Pike	3	405	433	470.000	SC, CL	DM, L	Y	
Pinewood River	26/09/12	Gillnet	PIN-12-GN1	PIN-12	Northern Pike	4	433	460	310.000	SC, CL	DM, L	Y	
Pinewood River	26/09/12	Gillnet	PIN-12-GN1	PIN-12	Northern Pike	5	345	380	350.000	SC, CL	DM, L	Y	
Pinewood River	26/09/12	Gillnet	PIN-12-GN1	PIN-12	Northern Pike	6	303	329	220.000	SC, CL	DM, L	Y	

Waterbody Name	Date (dd/mm/yy)	Gear Used	Location Description	Sample Location ID	Species Name	Fish ID #	Fork Length (mm)	Total Length (mm)	Round Weight (g)	Age Structures	Tissue	Pres. For Analysis (Y/N)	Notes
Pinewood River	26/09/12	Gillnet	PIN-12-GN1	PIN-12	Northern Pike	7	388	410	430.000	SC, CL	DM, L	Y	
Pinewood River	26/09/12	Gillnet	PIN-12-GN2	PIN-12	Northern Pike	8	245	268	120.000	N	DM, L	Y	
Pinewood River	26/09/12	Gillnet	PIN-12-GN2	PIN-12	Northern Pike	9	288	301	180.000	SC, CL	DM, L	Y	
Pinewood River	26/09/12	Gillnet	PIN-12-GN2	PIN-12	Northern Pike	10	343	366	160.000	SC, CL	DM, L	Y	
Pinewood River	26/09/12	Gillnet	PIN-12-GN2	PIN-12	Northern Pike	11	249	266	130.000	SC, CL	DM, L	Y	
Pinewood River	21/09/12	Electrofisher	PIN-14-E1	PIN-14	Northern Pike	1	144	150	18.121	N	WF	Y	Kept whole
Pinewood River	21/09/12	Electrofisher	PIN-14-E1	PIN-14	Northern Pike	2	171	180	28.857	N	WF	Y	Kept whole
Pinewood River	21/09/12	Electrofisher	PIN-14-E1	PIN-14	Trout-perch	3	80	86	5.581	N	WF	Y	
Pinewood River	21/09/12	Seine Net	PIN-14-SN1	PIN-14	Common Shiner	1	60	66	2.945	N	WF	Y	
Pinewood River	21/09/12	Seine Net	PIN-14-SN1	PIN-14	Common Shiner	2	67	72	2.066	N	WF	Y	
Pinewood River	21/09/12	Seine Net	PIN-14-SN1	PIN-14	Johnny Darter	3	-	42	0.663	N	WF	Y	
Pinewood River	21/09/12	Seine Net	PIN-14-SN1	PIN-14	Johnny Darter	4	-	46	0.796	N	WF	Y	
Pinewood River	21/09/12	Seine Net	PIN-14-SN1	PIN-14	Johnny Darter	5	-	45	0.636	N	WF	Y	
Pinewood River	21/09/12	Seine Net	PIN-14-SN1	PIN-14	Johnny Darter	6	-	40	0.624	N	WF	Y	
Pinewood River	21/09/12	Seine Net	PIN-14-SN1	PIN-14	Johnny Darter	7	-	42	0.667	N	WF	Y	
Pinewood River	22/09/12	Gillnet	PIN-14-GN1	PIN-14	Northern Pike	1	315	330	240.000	SC, CL	DM, L	Y	
Pinewood River	22/09/12	Gillnet	PIN-14-GN1	PIN-14	Northern Pike	2	386	410	430.000	SC, CL	DM, L	Y	
Pinewood River	22/09/12	Gillnet	PIN-14-GN2	PIN-14	Northern Pike	1	336	343	290.000	SC, CL	DM, L	Y	
Pinewood River	22/09/12	Gillnet	PIN-14-GN2	PIN-14	Northern Pike	2	341	365	290.000	SC, CL	DM, L	Y	
Pinewood River	22/09/12	Gillnet	PIN-14-GN2	PIN-14	White Sucker	3	392	433	1210.000	N	N	Y	
Pinewood River	22/09/12	Gillnet	PIN-14-GN2	PIN-14	White Sucker	4	415	445	1130.000	N	N	Y	
Pinewood River	22/09/12	Gillnet	PIN-14-GN2	PIN-14	White Sucker	5	361	388	890.000	N	N	Y	
Pinewood River	22/09/12	Gillnet	PIN-14-GN2	PIN-14	Shorthead Redhorse	6	346	378	600.000	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Northern Pike	1	324	347	310.000	SC, CL	DM, L	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Northern Pike	2	339	372	230.000	SC, CL	DM, L	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Northern Pike	3	215	233	62.000	SC, CL	DM, L	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Northern Pike	4	412	440	570.000	SC, CL	DM, L	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Northern Pike	5	231	246	105.000	SC, CL	DM, L	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Northern Pike	6	207	219	70.000	SC, CL	DM, L	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Northern Pike	7	258	275	125.000	SC, CL	DM, L	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Walleye	8	248	261	160.000	SC, DS	DM, L	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Walleye	9	268	275	140.000	SC, DS, O	DM, L	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Walleye	10	211	223	140.000	SC, DS, O	DM, L	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Walleye	11	268	282	190.000	SC, DS, O	**DM, L**	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Walleye	12	148	159	30.706	SC, DS	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Northern Pike	13	212	224	100.000	SC,CL	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	White Sucker	14	321	344	480.000	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	White Sucker	15	319	333	490.000	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	White Sucker	16	303	315	360.000	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	White Sucker	17	253	265	220.000	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	White Sucker	18	291	300	380.000	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	White Sucker	19	271	289	290.000	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	White Sucker	20	235	246	150.000	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	White Sucker	21	230	242	150.000	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	White Sucker	22	243	255	160.000	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	White Sucker	23	165	172	60.091	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	White Sucker	24	128	135	26.197	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Rock Bass	25	170	172	90.000	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Rock Bass	26	95	98	17.262	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Rock Bass	27	109	110	23.396	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Rock Bass	28	106	109	23.676	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Rock Bass	29	119	121	33.224	N	WF	Y	
Pinewood River	**20/09/12**	**Electrofisher**	**PIN-15-E1**	**PIN-15**	**Common Shiner**	**30**	**-**	**-**	**-**	**-**	**-**	**-**	**Deleted on sheet (kept number sequence)**
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	31	82	89	6.264	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	32	90	94	7.875	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	33	83	86	6.698	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	34	81	86	6.348	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	35	91	99	9.053	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	36	69	71	4.090	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	37	89	96	8.330	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	38	88	92	6.513	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	39	79	84	5.515	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	40	93	99	9.456	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	41	91	96	7.374	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	42	90	96	7.342	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	43	93	97	9.415	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	44	82	88	6.176	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	45	93	99	9.032	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	46	81	84	4.616	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	47	87	92	7.101	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	48	89	93	6.687	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	49	68	72	3.662	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	50	71	74	4.072	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	51	69	74	3.880	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	52	74	76	4.067	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	53	66	71	3.264	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	54	79	86	5.706	N	WF	Y	

Waterbody Name	Date (dd/mm/yy)	Gear Used	Location Description	Sample Location ID	Species Name	Fish ID #	Fork Length (mm)	Total Length (mm)	Round Weight (g)	Age Structures	Tissue	Pres. For Analysis (Y/N)	Notes
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	55	72	79	4.718	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	56	73	76	4.919	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	57	71	74	4.012	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	58	70	75	3.693	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	59	72	76	3.930	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	60	119	125	18.394	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	61	80	82	4.965	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	62	89	94	7.314	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	63	83	86	5.257	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	64	70	73	3.264	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	65	70	74	3.648	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	66	71	74	3.347	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	67	82	86	4.688	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	68	66	69	2.325	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	69	66	71	3.369	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	70	77	80	4.483	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	71	71	74	2.983	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	72	63	66	2.345	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	73	70	74	3.392	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	74	68	71	2.529	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	75	40	42	0.918	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	76	53	59	1.771	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Emerald Shiner	77	86	90	3.871	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Emerald Shiner	78	53	59	1.902	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	79	63	66	2.313	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Trout-perch	80	33	36	0.769	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	81	64	67	2.353	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	82	59	62	1.907	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Common Shiner	83	57	59	1.849	N	WF	Y	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Shorthead Redhorse	84	428	465	980.000	SC	N	N	
Pinewood River	20/09/12	Electrofisher	PIN-15-E1	PIN-15	Shorthead Redhorse	85	420	452	850.000	SC	N	N	
Pinewood River	20/09/12	Dip Net	PIN-15-DN1	PIN-15	Emerald Shiner	1	-	40	0.478	N	WF	Y	
Pinewood River	20/09/12	Dip Net	PIN-15-DN1	PIN-15	Emerald Shiner	2	-	42	0.550	N	WF	Y	
Pinewood River	20/09/12	Dip Net	PIN-15-DN1	PIN-15	Emerald Shiner	3	-	43	0.519	N	WF	Y	
Pinewood River	20/09/12	Dip Net	PIN-15-DN1	PIN-15	Emerald Shiner	4	-	44	0.636	N	WF	Y	
Pinewood River	20/09/12	Dip Net	PIN-15-DN1	PIN-15	Emerald Shiner	5	-	36	0.599	N	WF	Y	
Pinewood River	20/09/12	Dip Net	PIN-15-DN1	PIN-15	Emerald Shiner	6	-	35	0.241	N	WF	Y	
Pinewood River	20/09/12	Dip Net	PIN-15-DN1	PIN-15	Emerald Shiner	7	-	38	0.449	N	WF	Y	
Pinewood River	20/09/12	Dip Net	PIN-15-DN1	PIN-15	Emerald Shiner	8	-	37	0.440	N	WF	Y	
Pinewood River	20/09/12	Dip Net	PIN-15-DN1	PIN-15	Emerald Shiner	9	-	36	0.421	N	WF	Y	
Pinewood River	20/09/12	Dip Net	PIN-15-DN1	PIN-15	Johnny Darter	10	-	33	0.347	N	WF	Y	
Pinewood River	20/09/12	Dip Net	PIN-15-DN1	PIN-15	Emerald Shiner	11	-	35	0.420	N	WF	Y	
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Walleye	1	333	346	350.000	SC, DS, O	DM, L	Y	
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Walleye	2	196	205	87.585	N	WF	Y	
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Northern Pike	3	386	408	380.000	SC,CL	DM, L	Y	
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Northern Pike	4	344	366	310.000	SC, CL	DM, L	Y	
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Northern Pike	5	365	389	320.000	SC, CL	DM, L	Y	
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Northern Pike	6	211	225	57.032	N	WF	Y	Yoy
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Northern Pike	7	209	221	58.443	N	WF	Y	Yoy
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Walleye	8	168	180	44.209	N	WF	Y	Yoy
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Walleye	9	121	130	17.218	N	WF	Y	Yoy
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Yellow Perch	10	79	85	6.095	N	WF	Y	Yoy
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Golden Shiner	11	84	89	5.013	N	WF	Y	
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	White Sucker	12	79	83	5.071	N	WF	Y	
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Golden Shiner	13	99	110	7.851	N	WF	Y	
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Yellow Perch	14	75	80	5.271	N	WF	Y	Yoy
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Trout-perch	15	71	74	4.112	N	WF	Y	
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Trout-perch	16	75	82	4.578	N	WF	Y	
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Yellow Perch	17	63	70	3.041	N	WF	Y	Yoy
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Yellow Perch	18	61	64	2.813	N	WF	Y	Yoy
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Yellow Perch	19	55	59	2.717	N	WF	Y	Yoy
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Yellow Perch	20	51	56	2.618	N	WF	Y	Yoy
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Yellow Perch	21	58	63	2.815	N	WF	Y	Yoy
Pinewood River	24/09/12	Electrofisher	PIN-16-E1	PIN-16	Yellow Perch	22	411	456	460.000	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Northern Pike	1	246	265	120.000	SC, CL	DM, L	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	2	121	127	23.443	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	3	135	140	25.388	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	4	146	154	39.318	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	5	133	140	33.333	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	6	135	141	21.849	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	7	132	139	24.708	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	8	61	63	2.389	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	9	76	80	4.763	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	10	69	73	3.734	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	11	71	75	4.032	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	12	65	68	2.778	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	13	66	69	3.380	N	WF	Y	

Waterbody Name	Date (dd/mm/yy)	Gear Used	Location Description	Sample Location ID	Species Name	Fish ID #	Fork Length (mm)	Total Length (mm)	Round Weight (g)	Age Structures	Tissue	Pres. For Analysis (Y/N)	Notes
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	14	67	71	3.314	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	15	71	75	3.887	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	16	66	70	3.315	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	17	62	66	2.646	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	18	57	60	1.973	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	19	56	59	1.864	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	20	68	72	3.286	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	21	63	66	2.730	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	22	66	70	3.223	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	23	65	68	3.041	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	24	55	58	1.952	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	25	60	63	2.478	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	26	60	62	2.146	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Yellow Perch	27	53	57	1.693	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Rock Bass	28	110	115	23.520	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Rock Bass	29	54	57	3.058	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Rock Bass	30	52	55	2.767	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Rock Bass	31	50	52	2.103	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Rock Bass	32	50	52	2.730	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Rock Bass	33	52	54	2.558	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Rock Bass	34	51	54	2.808	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Rock Bass	35	48	50	2.315	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Rock Bass	36	51	54	2.724	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Rock Bass	37	52	54	2.491	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Rock Bass	38	51	53	2.824	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Pumpkinseed	39	50	52	2.324	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Pumpkinseed	40	52	55	2.570	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Pumpkinseed	41	54	57	2.969	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Pumpkinseed	42	51	54	2.332	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Pumpkinseed	43	50	52	2.110	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Pumpkinseed	44	40	42	1.021	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Pumpkinseed	45	40	43	1.134	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Pumpkinseed	46	35	37	1.794	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Golden Shiner	47	70	76	3.186	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Golden Shiner	48	60	66	1.945	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Spottail Shiner	49	61	67	2.187	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Johnny Darter	50	-	42	0.507	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	51	49	50	0.844	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	52	45	50	0.823	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	53	46	50	0.772	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	54	51	55	1.021	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	55	47	52	0.953	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	56	46	50	0.754	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	57	47	52	0.817	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	58	-	37	0.412	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	59	40	45	0.531	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	60	40	46	0.681	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	61	46	52	0.869	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	62	-	42	0.584	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	63	38	43	0.570	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	64	46	51	0.702	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	65	48	53	0.867	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	66	39	43	0.498	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	67	45	48	0.604	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	68	-	40	0.436	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	69	46	51	0.797	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-17-E1	PIN-17	Emerald Shiner	70	45	49	0.745	N	WF	Y	
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Notthern Pike	1	700	760	3750.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Notthern Pike	2	630	670	2200.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Notthern Pike	3	511	533	950.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Notthern Pike	4	493	510	640.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Notthern Pike	5	506	529	780.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Notthern Pike	6	705	748	3130.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Notthern Pike	7	481	500	850.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Notthern Pike	8	710	750	2640.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Shorthead Redhorse	9	445	481	950.000	N	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	10	455	480	610.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	11	555	580	980.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	12	456	481	870.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	13	408	430	450.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	14	540	570	900.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	15	479	503	670.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	16	479	505	720.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	17	445	470	460.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Walleye	18	655	688	2700.000	SC, DS, O	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Walleye	19	648	679	3640.000	SC, DS, O	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	20	483	505	750.000	SC	N	N	Live release

Waterbody Name	Date (dd/mm/yy)	Gear Used	Location Description	Sample Location ID	Species Name	Fish ID #	Fork Length (mm)	Total Length (mm)	Round Weight (g)	Age Structures	Tissue	Pres. For Analysis (Y/N)	Notes
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	21	378	410	320.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	22	385	412	340.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	23	331	345	160.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	24	341	355	220.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	25	336	351	170.000	N	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	26	507	551	810.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	27	409	438	420.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	28	419	448	390.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Northern Pike	29	333	360	150.000	SC	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Shorthead Redhorse	30	455	490	1130.000	N	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Walleye	31	574	592	1880.000	SC, DS	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Walleye	32	325	345	390.000	SC, DS	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Walleye	33	312	329	350.000	SC, DS	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Walleye	34	259	268	150.000	SC, DS	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Rock Bass	35	188	192	140.000	N	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Walleye	36	231	242	150.000	SC, DS	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Walleye	37	215	224	90.000	SC, DS	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Walleye	38	235	245	140.000	SC, DS	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Rock Bass	39	127	132	30.000	N	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Walleye	40	192	202	60.000	SC, DS	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Walleye	41	195	205	40.000	N	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Walleye	42	170	179	60.000	N	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Walleye	43	500	515	1630.000	SC, DS	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Walleye	44	428	447	830.000	SC, DS, O	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Walleye	45	368	382	550.000	SC, DS, O	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Yellow Perch	46	211	204	130.000	N	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Sauger	47	195	200	60.000	N	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Golden Shiner	48	138	145	28.877	N	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Rock Bass	49	145	150	55.600	N	N	N	Live release
Pinewood River	23/09/12	Gillnet	PIN-17-GN1	PIN-17	Yellow Perch	50	132	138	28.834	N	N	N	Live release
Pinewood River	26/09/12	Angling	PIN-17-A1	PIN-17	Northern Pike	NP-1	498	530	740.000	SC	N	N	Live release
Pinewood River	26/09/12	Angling	PIN-17-A1	PIN-17	Northern Pike	NP-2	515	550	920.000	SC	N	N	Live release
Pinewood River	26/09/12	Angling	PIN-17-A1	PIN-17	Northern Pike	NP-3	524	543	1150.000	SC	N	N	Live release
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Yellow Perch	1	63	66	2.591	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Yellow Perch	2	67	71	3.205	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Yellow Perch	3	65	71	3.277	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Yellow Perch	4	70	74	3.518	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Yellow Perch	5	72	76	3.744	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Yellow Perch	6	69	72	3.597	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Yellow Perch	7	64	67	2.774	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Yellow Perch	8	66	70	2.946	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Yellow Perch	9	60	63	2.132	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Yellow Perch	10	50	52	1.392	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Yellow Perch	11	55	59	1.296	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Pumpkinseed	12	56	60	3.342	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Pumpkinseed	13	53	62	2.335	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Pumpkinseed	14	41	44	1.396	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Pumpkinseed	15	42	45	1.419	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Pumpkinseed	16	52	56	2.552	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Pumpkinseed	17	45	47	1.410	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Pumpkinseed	18	54	57	2.912	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Pumpkinseed	19	51	53	2.565	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Pumpkinseed	20	42	45	1.485	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Pumpkinseed	21	49	51	1.893	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Pumpkinseed	22	42	45	1.396	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Pumpkinseed	23	41	44	1.169	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Pumpkinseed	24	37	39	0.780	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Pumpkinseed	25	35	37	0.892	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	26	-	60	1.787	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	27	68	74	2.667	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	28	70	77	2.884	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	29	60	67	2.151	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	30	55	60	1.418	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	31	57	62	1.382	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	32	57	64	1.509	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	33	55	61	1.420	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	34	56	61	1.400	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	35	56	61	1.540	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	36	57	62	1.405	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	37	45	51	1.554	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	38	51	56	1.185	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	39	55	60	1.409	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	40	56	60	1.299	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	41	52	57	1.174	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	42	51	57	1.024	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	43	50	55	0.877	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	44	47	51	0.907	N	WF	Y	

Waterbody Name	Date (dd/mm/yy)	Gear Used	Location Description	Sample Location ID	Species Name	Fish ID #	Fork Length (mm)	Total Length (mm)	Round Weight (g)	Age Structures	Tissue	Pres. For Analysis (Y/N)	Notes
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	45	47	52	0.862	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	46	-	50	0.758	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	47	47	51	0.752	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	48	50	54	0.763	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	49	45	51	0.771	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	50	45	51	0.724	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	51	41	45	0.524	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	52	44	48	0.186	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	53	-	50	0.721	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	54	41	45	0.586	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	55	46	51	0.785	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Golden Shiner	56	45	49	0.647	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Emerald Shiner	57	38	39	0.280	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Emerald Shiner	58	-	36	0.508	N	WF	Y	
Pinewood River	19/09/12	Electrofisher	PIN-18-E1	PIN-18	Blackchin Shiner	59	60	64	1.729	N	WF	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Walleye	1	439	463	1090.000	SC, DS, O	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Walleye	2	371	390	510.000	SC, DS, O	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Walleye	3	398	419	180.000	SC, DS, O	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Walleye	4	306	326	360.000	SC, DS, O	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Walleye	5	254	270	200.000	SC, DS, O	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Northern Pike	6	538	570	260.000	SC, CL	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Northern Pike	7	490	506	870.000	SC, CL	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Northern Pike	8	497	519	740.000	SC, CL	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Northern Pike	9	453	485	970.000	SC, CL	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Northern Pike	10	368	391	690.000	SC, CL	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Northern Pike	11	382	400	360.000	SC, CL	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Northern Pike	12	439	462	650.000	SC, CL	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Northern Pike	13	378	400	770.000	SC, CL	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Northern Pike	14	410	435	530.000	SC, CL	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Northern Pike	15	481	505	840.000	SC, CL	DM, L	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Black Crappie	16	-	230	210.000	N	WF	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Rock Bass	17	211	219	250.000	N	WF	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Black Crappie	18	-	186	100.000	N	WF	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Yellow Perch	19	175	180	90.000	N	WF	Y	
Pinewood River	23/09/12	Gillnet	PIN-18-GN1	PIN-18	Rock Bass	20	153	158	80.000	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Sauger	1	194	205	66.400	SC, DS, O	DM, L	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Yellow Perch	2	76	79	5.098	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Yellow Perch	3	72	76	4.850	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Yellow Perch	4	68	72	4.478	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Pumpkinseed	5	51	54	3.012	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	6	66	74	3.155	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	7	75	84	3.702	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	8	66	75	3.268	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	9	57	64	1.656	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	10	49	53	1.099	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	11	49	54	0.826	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Spottail Shiner	12	63	70	2.442	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	13	40	43	0.568	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	14	39	45	0.514	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	15	63	69	2.800	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	16	49	54	0.929	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	17	48	52	1.078	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	18	44	49	0.698	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	19	47	51	0.864	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	20	54	59	1.289	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	21	49	53	0.974	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	22	41	46	0.545	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	23	45	48	0.787	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	24	46	51	0.677	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	25	40	45	0.586	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	26	36	41	0.472	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	27	51	55	1.149	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	28	46	50	0.856	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	29	46	49	0.833	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	30	39	42	0.656	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	31	47	51	1.176	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Pumpkinseed	32	39	42	1.354	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	33	48	51	0.865	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	34	36	39	0.431	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	35	39	41	0.540	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	36	43	47	0.856	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Yellow Perch	37	59	63	2.192	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Emerald Shiner	38	46	50	1.086	N	N	N	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Northern Pike	39	517	523	450.000	SC, CL	DM, L	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Northern Pike	40	375	391	280.000	SC, CL	DM, L	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Northern Pike	41	291	305	90.000	SC, CL	DM, L	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Northern Pike	42	304	312	160.000	SC, CL	DM, L	Y	

Waterbody Name	Date (dd/mm/yy)	Gear Used	Location Description	Sample Location ID	Species Name	Fish ID #	Fork Length (mm)	Total Length (mm)	Round Weight (g)	Age Structures	Tissue	Pres. For Analysis (Y/N)	Notes
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Northern Pike	43	251	264	100.000	SC, CL	DM, L	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Walleye	44	215	230	79.290	SC, CL	DM, L	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Yellow Perch	45	111	115	17.356	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Walleye	46	158	164	32.433	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Walleye	47	164	166	33.700	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Yellow Perch	48	101	105	11.700	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Smallmouth Bass	49	119	125	30.120	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Yellow Perch	50	115	119	18.696	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Rock Bass	51	157	160	83.141	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Yellow Perch	52	107	110	17.001	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Yellow Perch	53	113	117	19.654	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Smallmouth Bass	54	110	114	20.285	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Yellow Perch	55	122	129	24.644	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Yellow Perch	56	114	119	24.288	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Yellow Perch	57	115	121	20.736	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Yellow Perch	58	111	115	18.298	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Walleye	59	128	134	15.855	N	WF	Y	Yoy
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Rock Bass	60	86	90	14.403	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Yellow Perch	61	118	124	24.414	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-23-E1	PW-23	Yellow Perch	62	68	72	3.805	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	1	80	87	4.681	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	2	87	96	5.271	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	3	74	81	3.944	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	4	85	91	4.643	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	5	83	90	4.266	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	6	75	83	3.655	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	7	87	92	4.875	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	8	86	92	5.350	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	9	85	91	5.654	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	10	69	75	3.545	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	11	78	85	3.863	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	12	84	95	5.460	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	13	74	82	3.666	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	14	81	86	4.093	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	15	82	90	4.268	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	16	76	85	3.856	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	17	84	93	4.972	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	18	77	85	3.643	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	19	78	87	4.176	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Emerald Shiner	20	91	96	5.178	N	WF	Y	
Pinewood River	18/09/12	Electrofisher	PW-24-E1	PW-24	Yellow Perch	21	63	65	2.603	N	WF	Y	
Jones Creek	11/07/12	Seine Net	JON-1-SN1	JON-1	Brook Stickleback	BS-1	61	63	-	N	WF	Y	
Jones Creek	11/07/12	Gillnet	JON-1-GN1	JON-1	Central Mudminnow	CM-1	-	82	-	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-2	-	85	6.415	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-3	-	74	6.951	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-4	-	118	17.950	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-5	-	89	8.991	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-6	-	95	8.713	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-7	-	61	6.158	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-8	-	96	9.724	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-9	-	70	4.210	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-10	-	80	5.349	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-11	-	76	5.553	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-12	-	96	9.951	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-13	-	53	1.731	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-14	-	85	8.415	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-15	-	59	1.872	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-16	-	73	6.861	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-17	-	68	6.113	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT1	JON-1	Central Mudminnow	CM-18	-	82	6.351	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT-2	JON-1	Central Mudminnow	CM-19	-	90	8.684	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT-2	JON-1	Central Mudminnow	CM-20	-	83	6.510	N	WF	Y	All specimens placed in ziploc bag and brought back
Jones Creek	11/07/12	Minnow Trap	JON-1-MT-2	JON-1	Central Mudminnow	CM-21	-	85	9.350	N	WF	Y	All specimens placed in ziploc bag and brought back
Tait Creek	14/07/12	Dip Net	TAIT-1-DN1	TAIT-1	Brassy Minnow	1	-	46	2.600	N	WF	Y	Batch WT 21.514g
Tait Creek	14/07/12	Dip Net	TAIT-1-DN1	TAIT-1	Brassy Minnow	2	-	40	1.900	N	WF	Y	Batch WT 21.514g
Tait Creek	14/07/12	Dip Net	TAIT-1-DN1	TAIT-1	Central Mudminnow	3	-	52	5.300	N	WF	Y	Batch WT 21.514g
Tait Creek	14/07/12	Dip Net	TAIT-1-DN1	TAIT-1	Nothern Redbellly Dace	4	-	51	3.600	N	WF	Y	** Tiny
Tait Creek	14/07/12	Dip Net	TAIT-1-DN1	TAIT-1	Brook Stickleback	5	-	26	0.400	N	WF	Y	Batch WT 21.514g
Tait Creek	14/07/12	Dip Net	TAIT-1-DN1	TAIT-1	Brook Stickleback	6	-	30	0.600	N	WF	Y	Batch WT 21.514g
Tait Creek	14/07/12	Dip Net	TAIT-1-DN1	TAIT-1	Brassy Minnow	7	-	38	1.400	N	WF	Y	Batch WT 21.514g
Tait Creek	14/07/12	Dip Net	TAIT-1-DN1	TAIT-1	Brook Stickleback	8	-	20	0.180	N	WF	Y	Batch WT 21.514g
Tait Creek	14/07/12	Dip Net	TAIT-1-DN1	TAIT-1	Brook Stickleback	9	-	26	0.400	N	WF	Y	Batch WT 21.514g
Tait Creek	14/07/12	Dip Net	TAIT-1-DN1	TAIT-1	Brassy Minnow	10	-	36	1.100	N	WF	Y	Batch WT 21.514g
Tait Creek	14/07/12	Seine Net	TAIT-1-SN1	TAIT-1	Brassy Minnow	11	-	36	1.100	N	WF	Y	Batch WT 21.514g
Tait Creek	14/07/12	Seine Net	TAIT-1-SN1	TAIT-1	Brook Stickleback	12	-	24	0.300	N	WF	Y	Batch WT 21.514g
Tait Creek	14/07/12	Seine Net	TAIT-1-SN1	TAIT-1	Brassy Minnow	13	-	13	0.030	N	WF	Y	** Tiny
Tait Creek	14/07/12	Seine Net	TAIT-1-SN1	TAIT-1	Brook Stickleback	14	-	29	0.600	N	WF	Y	Batch WT 21.514g

Waterbody Name	Date (dd/mm/yy)	Gear Used	Location Description	Sample Location ID	Species Name	Fish ID #	Fork Length (mm)	Total Length (mm)	Round Weight (g)	Age Structures	Tissue	Pres. For Analysis (Y/N)	Notes
Tait Creek	14/07/12	Seine Net	TAIT-1-SN1	TAIT-1	Brook Stickleback	15	-	29	0.600	N	WF	Y	Batch WT 21.514g
Tait Creek	14/07/12	Seine Net	TAIT-1-SN1	TAIT-1	Brook Stickleback	16	-	26	0.400	N	WF	Y	Batch WT 21.514g
Tait Creek	14/07/12	Seine Net	TAIT-1-SN1	TAIT-1	Brook Stickleback	17	-	26	0.400	N	WF	Y	Batch WT 21.514g
Tait Creek	14/07/12	Seine Net	TAIT-1-SN1	TAIT-1	Brook Stickleback	18	-	26	0.400	N	WF	Y	Batch WT 21.514g
Tait Creek	14/07/12	Seine Net	TAIT-1-SN1	TAIT-1	Brook Stickleback	19	-	11	0.004	N	WF	Y	** Tiny
Tait Creek	14/07/12	Seine Net	TAIT-1-SN1	TAIT-1	Brook Stickleback	20	-	29	0.100	N	WF	Y	Batch WT 21.514g
Tait Creek	14/07/12	Seine Net	TAIT-1-SN1	TAIT-1	Brook Stickleback	21	-	29	0.100	N	WF	Y	Batch WT 21.514g
Loslo Creek	18/07/12	Minnow Trap	LOS-3-MT1	LOS-3	Finescale Dace	FD-1	56	61	1.811	N	WF	Y	
Loslo Creek	18/07/12	Minnow Trap	LOS-3-MT1	LOS-3	Finescale Dace	FD-2	53	58	1.727	N	WF	Y	
Loslo Creek	18/07/12	Minnow Trap	LOS-3-MT1	LOS-3	Finescale Dace	FD-3	53	58	1.763	N	WF	Y	
Loslo Creek	18/07/12	Minnow Trap	LOS-3-MT1	LOS-3	Finescale Dace	FD-4	51	54	1.331	N	WF	Y	
Loslo Creek	16/07/12	Minnow Trap	LOS-5-MT1	LOS-5	Central Mudminnow	1	-	89	4.910	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Brook Stickleback	1	-	53	1.400	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Central Mudminnow	2	-	51	1.400	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	3	59	61	1.300	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	4	47	49	1.500	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	5	-	39	1.000	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	6	50	53	0.400	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Central Mudminnow	7	-	60	1.400	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Central Mudminnow	8	-	39	2.300	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	9	56	60	0.700	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Central Mudminnow	10	-	64	1.900	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	11	58	60	2.400	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Brook Stickleback	12	-	49	2.200	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	13	44	47	1.200	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	14	57	61	1.000	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	15	52	55	2.300	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Brook Stickleback	16	-	52	1.600	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Brook Stickleback	17	-	49	1.300	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	18	54	58	1.100	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	19	-	30	0.200	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	20	46	49	1.100	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	21	-	42	0.600	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	22	43	45	0.700	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	23	52	55	1.400	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	24	54	57	1.700	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	25	53	55	1.600	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Brook Stickleback	26	-	52	1.300	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	27	47	50	1.200	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	28	52	55	1.500	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Brook Stickleback	29	-	55	1.500	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	30	48	52	1.300	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	31	-	35	0.400	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Central Mudminnow	32	-	45	0.800	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Brook Stickleback	33	-	58	1.900	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	34	49	54	1.400	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Blackchin Shiner	35	47	50	1.200	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	36	48	52	1.300	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	37	-	28	0.100	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Central Mudminnow	38	-	45	0.500	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Brook Stickleback	39	-	54	1.500	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Brook Stickleback	40	-	51	1.400	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Brook Stickleback	41	-	50	1.100	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Central Mudminnow	42	-	62	2.800	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	43	57	61	2.200	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Brook Stickleback	44	-	58	1.500	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	45	43	47	0.800	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	46	52	56	1.600	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	47	52	56	1.500	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	48	48	51	1.200	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Brook Stickleback	49	-	52	1.600	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	50	-	40	0.400	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	51	44	46	0.900	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	52	-	29	0.100	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	53	47	50	1.000	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	54	50	54	1.500	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	55	-	40	0.500	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	56	-	29	0.100	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	57	-	39	0.100	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Blackchin Shiner	58	50	55	1.700	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	59	-	38	0.500	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Blackchin Shiner	60	44	48	1.000	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Brook Stickleback	61	-	43	0.800	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	62	-	25	0.100	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	63	-	27	0.100	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Blackchin Shiner	64	-	40	0.700	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	65	-	31	0.200	N	WF	Y	

Waterbody Name	Date (dd/mm/yy)	Gear Used	Location Description	Sample Location ID	Species Name	Fish ID #	Fork Length (mm)	Total Length (mm)	Round Weight (g)	Age Structures	Tissue	Pres. For Analysis (Y/N)	Notes
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	66	-	43	0.700	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Blackchin Shiner	67	-	43	0.700	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	68	-	43	0.700	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	69	-	26	0.100	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	70	-	38	0.500	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Central Mudminnow	71	-	33	0.600	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	72	-	38	0.300	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Blackchin Shiner	73	-	38	0.500	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Central Mudminnow	74	-	35	0.400	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	75	-	43	0.600	N	WF	Y	
Loslo Creek	30/08/12	Seine Net	LOS-8-SN1	LOS-8	Emerald Shiner	76	-	-	1.900	N	WF	Y	
Unnamed Trib 5	15/07/12	Electrofishing	UT5-A-E1	UT5-A	Central Mudminnow	1	-	89	7.620	N	WF	Y	
Unnamed Trib 5	15/07/12	Electrofishing	UT5-A-E1	UT5-A	Central Mudminnow	2	-	115	14.330	N	WF	Y	
Unnamed Trib 5	15/07/12	Electrofishing	UT5-A-E1	UT5-A	Central Mudminnow	3	-	64	2.890	N	WF	Y	
Unnamed Trib 5	15/07/12	Electrofishing	UT5-A-E1	UT5-A	Central Mudminnow	4	-	71	4.350	N	WF	Y	
Unnamed Trib 5	15/07/12	Electrofishing	UT5-A-E1	UT5-A	Central Mudminnow	5	-	71	3.870	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT1	UT5-A	Central Mudminnow	1	-	74	4.680	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT1	UT5-A	Central Mudminnow	2	-	78	5.720	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT1	UT5-A	Central Mudminnow	3	-	73	4.800	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT1	UT5-A	Central Mudminnow	4	-	79	4.030	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT1	UT5-A	Central Mudminnow	5	-	74	4.060	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT1	UT5-A	Central Mudminnow	6	-	98	11.670	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT1	UT5-A	Central Mudminnow	7	-	101	12.530	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT1	UT5-A	Central Mudminnow	8	-	65	3.650	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT1	UT5-A	Central Mudminnow	9	-	71	3.930	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT1	UT5-A	Central Mudminnow	10	-	64	2.670	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT1	UT5-A	Central Mudminnow	11	-	83	4.690	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT1	UT5-A	Central Mudminnow	12	-	77	5.700	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT1	UT5-A	Central Mudminnow	13	-	76	4.230	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT2	UT5-A	Central Mudminnow	14	-	71	3.450	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT2	UT5-A	Central Mudminnow	15	-	72	4.080	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT2	UT5-A	Central Mudminnow	16	-	125	21.790	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT2	UT5-A	Central Mudminnow	17	-	73	4.760	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT2	UT5-A	Central Mudminnow	18	-	79	5.830	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT2	UT5-A	Central Mudminnow	19	-	76	5.010	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT2	UT5-A	Central Mudminnow	20	-	63	1.820	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT2	UT5-A	Central Mudminnow	21	-	68	4.450	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT2	UT5-A	Central Mudminnow	22	-	77	4.780	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT2	UT5-A	Central Mudminnow	23	-	59	2.330	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT2	UT5-A	Central Mudminnow	24	-	76	4.600	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT2	UT5-A	Central Mudminnow	25	-	70	3.880	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT2	UT5-A	Central Mudminnow	26	-	80	5.830	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT3	UT5-A	Central Mudminnow	27	-	74	4.620	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT3	UT5-A	Central Mudminnow	28	-	75	4.310	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT3	UT5-A	Central Mudminnow	29	-	66	3.310	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT3	UT5-A	Central Mudminnow	30	-	76	4.620	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT3	UT5-A	Central Mudminnow	31	-	63	2.610	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT3	UT5-A	Central Mudminnow	32	-	70	4.080	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT3	UT5-A	Central Mudminnow	33	-	71	5.050	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT3	UT5-A	Central Mudminnow	34	-	72	4.310	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT3	UT5-A	Central Mudminnow	35	-	68	2.780	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT3	UT5-A	Central Mudminnow	36	-	71	4.520	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT3	UT5-A	Central Mudminnow	37	-	68	4.550	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT3	UT5-A	Central Mudminnow	38	-	83	6.440	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT3	UT5-A	Central Mudminnow	39	-	71	4.170	N	WF	Y	
Unnamed Trib 5	15/07/12	Minnow Trap	UT5-A-MT3	UT5-A	Central Mudminnow	40	-	55	1.470	N	WF	Y	
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Brook Stickleback	1	-	54	-	N	N	N	
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Brook Stickleback	2	-	57	-	N	N	N	
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Brook Stickleback	3	-	43	-	N	N	N	
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Northern Redbelly Dace	4	57	60	-	N	N	N	
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Northern Redbelly Dace	5	53	58	-	N	N	N	
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Brook Stickleback	6	-	52	-	N	N	N	
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Brook Stickleback	7	-	45	-	N	N	N	
West Creek Trib 1	**11/07/12**	**Electrofisher**	**WES-TRIB1A-E1**	**WES-TRIB1A**	**-**	**8**	**-**	**-**	**-**	**-**	**-**	**-**	**Deleted on sheet (kept number sequence)**
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Finescale Dace	9	41	43	-	N	N	N	214/183 Batch WT 96.502g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Brook Stickleback	10	-	20	-	N	N	N	
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Northern Redbelly Dace	11	41	44	-	N	N	N	
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Finescale Dace	12	61	66	-	N	N	N	214/183 Batch WT 96.502g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Finescale Dace	13	49	53	-	N	N	N	214/183 Batch WT 96.502g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Brook Stickleback	14	-	42	-	N	N	N	
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Northern Redbelly Dace	15	42	45	-	N	N	N	
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Brook Stickleback	16	-	37	-	N	N	N	
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Brook Stickleback	17	-	38	-	N	N	N	
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Brook Stickleback	18	-	53	-	N	N	N	
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Brook Stickleback	19	-	43	-	N	N	N	
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Fathead Minnow	20	68	72	-	N	N	N	
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Fathead Minnow	21	76	80	-	N	N	N	

Waterbody Name	Date (dd/mm/yy)	Gear Used	Location Description	Sample Location ID	Species Name	Fish ID #	Fork Length (mm)	Total Length (mm)	Round Weight (g)	Age Structures	Tissue	Pres. For Analysis (Y/N)	Notes
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Central Mudminnow	22	-	96	9.304	N	N	Y	141 Batch WT 34.243g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Central Mudminnow	23	-	90	7.304	N	WF	Y	141 Batch WT 34.243g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Central Mudminnow	24	-	57	1.976	N	WF	Y	141 Batch WT 34.243g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Central Mudminnow	25	-	58	2.083	N	WF	Y	141 Batch WT 34.243g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Central Mudminnow	26	-	55	1.778	N	WF	Y	141 Batch WT 34.243g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Central Mudminnow	27	-	60	2.162	N	WF	Y	141 Batch WT 34.243g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Central Mudminnow	28	-	50	1.230	N	WF	Y	141 Batch WT 34.243g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Central Mudminnow	29	-	51	1.428	N	WF	Y	141 Batch WT 34.243g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Central Mudminnow	30	-	53	1.428	N	WF	Y	141 Batch WT 34.243g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Central Mudminnow	31	-	51	1.263	N	WF	Y	141 Batch WT 34.243g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Central Mudminnow	32	-	47	1.146	N	WF	Y	141 Batch WT 34.243g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Central Mudminnow	33	-	52	1.503	N	WF	Y	141 Batch WT 34.243g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Central Mudminnow	34	-	57	1.654	N	WF	Y	141 Batch WT 34.243g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Pearl Dace	35	131	138	25.143	N	WF	Y	214/183 Batch WT 96.502g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Pearl Dace	36	124	134	24.148	N	WF	Y	214/183 Batch WT 96.502g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Pearl Dace	37	94	98	9.456	N	WF	Y	214/183 Batch WT 96.502g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Pearl Dace	38	116	128	14.930	N	WF	Y	214/183 Batch WT 96.502g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Finescale Dace	39	69	74	3.645	N	WF	Y	214/183 Batch WT 96.502g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Pearl Dace	40	80	85	5.480	N	WF	Y	214/183 Batch WT 96.502g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Pearl Dace	41	71	74	3.767	N	WF	Y	214/183 Batch WT 96.502g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Pearl Dace	42	63	38	2.576	N	WF	Y	214/183 Batch WT 96.502g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Pearl Dace	43	62	66	3.005	N	WF	Y	214/183 Batch WT 96.502g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Pearl Dace	44	48	51	1.313	N	WF	Y	214/183 Batch WT 96.502g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Pearl Dace	45	55	59	1.989	N	WF	Y	214/183 Batch WT 96.502g
West Creek Trib 1	11/07/12	Electrofisher	WES-TRIB1A-E1	WES-TRIB1A	Pearl Dace	46	44	46	1.050	N	WF	Y	214/183 Batch WT 96.502g
West Creek Trib 1	12/07/12	Minnow Trap	WES-TRIB1A-MT1	WES-TRIB1A	Pearl Dace	1	102	108	-	N	N	N	3/5 had fish in, relatively low abundance, varying depth & cover
West Creek Trib 1	12/07/12	Minnow Trap	WES-TRIB1A-MT1	WES-TRIB1A	Central Mudminnow	2	-	55	-	N	N	N	3/5 had fish in, relatively low abundance, varying depth & cover
West Creek Trib 1	12/07/12	Minnow Trap	WES-TRIB1A-MT1	WES-TRIB1A	Pearl Dace	3	82	87	-	N	N	N	3/5 had fish in, relatively low abundance, varying depth & cover
West Creek Trib 1	12/07/12	Minnow Trap	WES-TRIB1A-MT1	WES-TRIB1A	Finescale Dace	4	67	70	-	N	N	N	3/5 had fish in, relatively low abundance, varying depth & cover
West Creek Trib 1	12/07/12	Minnow Trap	WES-TRIB1A-MT1	WES-TRIB1A	Pearl Dace	5	120	128	-	N	N	N	3/5 had fish in, relatively low abundance, varying depth & cover
Clark Creek	13/09/12	Electrofisher	CLA-5A-E1	CLA-5A	Central Mudminnow	1	-	39	-	N	WF	Y	Found floating on surface
Clark Creek	13/09/12	Electrofisher	CLA-5A-E1	CLA-5A	Central Mudminnow	2	-	38	-	N	WF	Y	Found floating on surface
Clark Creek	13/09/12	Electrofisher	CLA-5A-E1	CLA-5A	Central Mudminnow	3	-	37	-	N	WF	Y	Found floating on surface
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT1	CLA-5A	Central Mudminnow	1	-	59	5.810	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT1	CLA-5A	Brook Stickleback	2	-	32	0.890	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT1	CLA-5A	Central Mudminnow	3	-	27	0.470	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT1	CLA-5A	Brassy Minnow	4	-	33	1.100	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT1	CLA-5A	Brassy Minnow	5	-	28	0.630	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT1	CLA-5A	Brassy Minnow	6	-	29	0.720	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT1	CLA-5A	Brassy Minnow	7	-	27	0.660	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT2	CLA-5A	Brassy Minnow	8	-	30	0.780	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT2	CLA-5A	Brassy Minnow	9	-	30	0.780	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT2	CLA-5A	Brassy Minnow	10	-	31	0.930	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT2	CLA-5A	Brassy Minnow	11	-	29	0.780	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT2	CLA-5A	Brassy Minnow	12	-	32	0.920	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT2	CLA-5A	Brook Stickleback	13	-	25	0.430	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT2	CLA-5A	Brook Stickleback	14	-	27	0.550	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT3	CLA-5A	Brassy Minnow	15	-	32	0.960	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT3	CLA-5A	Brassy Minnow	16	-	30	0.830	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT3	CLA-5A	Brassy Minnow	17	-	31	0.840	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT3	CLA-5A	Brassy Minnow	18	-	30	0.800	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT3	CLA-5A	Brassy Minnow	19	-	32	0.910	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT3	CLA-5A	Brook Stickleback	20	-	25	0.530	N	WF	Y	Batch WT 20.84g
Clark Creek	13/07/12	Minnow Trap	CLA-5A-MT3	CLA-5A	Brook Stickleback	21	-	25	0.520	N	WF	Y	Batch WT 20.84g
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	1	-	63	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	2	-	52	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	3	-	61	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Finescale Dace	4	57	60	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	5	-	61	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	6	-	58	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	7	-	55	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	8	-	58	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	9	-	66	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	10	-	63	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	11	-	54	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	12	-	56	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	13	-	55	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	14	-	54	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	15	-	55	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	16	-	59	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	17	-	57	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	18	-	57	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	19	-	63	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	20	-	52	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Finescale Dace	21	54	58	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	22	-	58	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	23	-	-	-	N	N	N	Stopped measuring and started dot tally

Waterbody Name	Date (dd/mm/yy)	Gear Used	Location Description	Sample Location ID	Species Name	Fish ID #	Fork Length (mm)	Total Length (mm)	Round Weight (g)	Age Structures	Tissue	Pres. For Analysis (Y/N)	Notes
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	24	-	-	-	N	N	N	Stopped measuring and started dot tally
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	25	-	-	-	N	N	N	Stopped measuring and started dot tally
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Brook Stickleback	26	-	-	-	N	N	N	Stopped measuring and started dot tally
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Pearl Dace	27	55	59	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Finescale Dace	28	52	56	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Finescale Dace	29	45	48	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Finescale Dace	30	56	60	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Finescale Dace	31	61	65	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Finescale Dace	32	65	70	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Finescale Dace	33	-	-	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Finescale Dace	34	54	58	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Finescale Dace	35	56	59	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Finescale Dace	36	64	68	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Finescale Dace	37	55	58	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Creek Chub	38	64	69	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Finescale Dace	39	64	68	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Finescale Dace	40	59	63	-	N	N	N	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	41	-	78	5.816	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	42	-	100	11.665	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	43	-	81	5.790	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	44	-	77	4.410	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	45	-	79	5.450	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	46	-	70	4.020	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	47	-	70	3.970	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	48	-	83	5.720	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	49	-	74	4.510	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	50	-	72	4.110	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	51	-	76	4.930	N	WF	Y	55.47g (Batch WT 137.85)
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	52	-	82	5.550	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	53	-	77	5.070	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	54	-	67	3.560	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	55	-	85	6.760	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	56	-	75	3.830	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	57	-	75	4.040	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	58	-	53	1.680	N	WF	Y	30.49g (Batch WT 137.85)
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	59	-	86	6.570	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	60	-	82	5.480	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	61	-	72	3.340	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	62	-	69	3.470	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	63	-	79	4.840	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	64	-	74	4.640	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	65	-	78	4.520	N	WF	Y	32.86g (Batch WT 137.85)
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	66	-	68	3.050	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	67	-	62	2.800	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	68	-	69	3.890	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	69	-	64	3.070	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	70	-	79	3.860	N	WF	Y	
Unnamed Trib 8A-1	12/07/12	Minnow Trap	On south side of Teeple Rd. with road ROW - (U8A-1-MT1)	U8A-1	Central Mudminnow	71	-	63	2.860	N	WF	Y	19.03g (Batch WT 137.85)
Sturgeon Creek	06/09/12	Minnow Trap	STU-5-MT1	STU-5	Central Mudminnow	1	-	97	9.900	N	WF	Y	
Sturgeon Creek	06/09/12	Minnow Trap	STU-5-MT1	STU-5	Central Mudminnow	2	-	87	7.200	N	WF	Y	
Sturgeon Creek	06/09/12	Minnow Trap	STU-5-MT1	STU-5	Central Mudminnow	3	-	95	9.500	N	WF	Y	
Sturgeon Creek	06/09/12	Minnow Trap	STU-5-MT1	STU-5	Central Mudminnow	4	-	92	6.900	N	WF	Y	
Sturgeon Creek	06/09/12	Minnow Trap	STU-5-MT1	STU-5	Central Mudminnow	5	-	56	1.400	N	WF	Y	
Sturgeon Creek	06/09/12	Minnow Trap	STU-5-MT1	STU-5	Central Mudminnow	6	-	78	5.000	N	WF	Y	
Sturgeon Creek	06/09/12	Minnow Trap	STU-5-MT1	STU-5	Central Mudminnow	7	-	66	3.900	N	WF	Y	
Sturgeon Creek	06/09/12	Minnow Trap	STU-5-MT1	STU-5	Central Mudminnow	8	-	61	2.800	N	WF	Y	
Sturgeon Creek	06/09/12	Minnow Trap	STU-5-MT1	STU-5	Brook Stickleback	9	-	48	1.600	N	WF	Y	
Sturgeon Creek	06/09/12	Minnow Trap	STU-5-MT1	STU-5	Central Mudminnow	10	-	74	2.600	N	WF	Y	
Sturgeon Creek	06/09/12	Minnow Trap	STU-5-MT1	STU-5	Central Mudminnow	11	-	77	4.400	N	WF	Y	
Sturgeon Creek	06/09/12	Minnow Trap	STU-5-MT1	STU-5	Central Mudminnow	12	-	93	7.900	N	WF	Y	
Sturgeon Creek	06/09/12	Minnow Trap	STU-5-MT1	STU-5	Central Mudminnow	13	-	96	8.600	N	WF	Y	
Sturgeon Creek	06/09/12	Minnow Trap	STU-5-MT1	STU-5	Central Mudminnow	14	-	71	3.300	N	WF	Y	
Sturgeon Creek	06/09/12	Minnow Trap	STU-5-MT1	STU-5	Brook Stickleback	15	-	46	0.600	N	WF	Y	
Sturgeon Creek	06/09/12	Minnow Trap	STU-5-MT1	STU-5	Central Mudminnow	16	-	51	1.300	N	WF	Y	

Age Structure:	Tissue:
SC=Scales (left)	DM=Dorsal Muscle Tissue
O=Otoliths	L=Liver
DS=Dorsal Spine	WF=Whole Fish
CL=Cleithrum	

APPENDIX H-2
FISH CAPTURE TALLY

Sampling Location Mapping I.D. 2012

Captured Fish By Species

Area	Sample ID	Black Crappie	Blackchin Shiner	Blacknose Dace	Blackside Darter	Brown Bullhead	Brassy Minnow	Brook Stickleback	Central Mudminnow	Common Shiner	Creek Chub	Darter Species	Emerald Shiner	Fathead Minnow	Finescale Dace	Golden Shiner	Johnny Darter	Northern Pike	Northern Redbelly Dace	Pearl Dace	Pumpkinseed	Rock Bass	Sauger	Shorthead Redhorse	Smallmouth Bass	Trout-perch	White Sucker	Yellow Perch		TOTAL
Upper Pinewood	PIN-2AA-GN1	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0		**15**
Upper Pinewood	PIN-2AA-GN2	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0		**4**
Upper Pinewood	PIN-2AA-MT1	0	0	0	0	0	0	0	0	9	8	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0		**21**
Upper Pinewood	PIN-2AA-MT2	0	0	0	0	0	0	0	0	7	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**20**
Upper Pinewood	PIN-2AA-MT3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Upper Pinewood	PIN-2AA-MT4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Upper Pinewood	PIN-2AA-MT5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Upper Pinewood	PIN-2A-GN1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	1	0		**6**
Upper Pinewood	PIN-2A-GN2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Upper Pinewood	PIN-2A-GN3	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	3	0		**19**
Upper Pinewood	PIN-2A-MT1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Upper Pinewood	PIN-2A-MT2	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**4**
Upper Pinewood	PIN-2A-MT3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Upper Pinewood	PIN-2A-MT4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Upper Pinewood	PIN-3A-SN1	0	0	0	0	0	0	20	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0		**70**
Upper Pinewood	PIN-3A-GN1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0		**3**
Upper Pinewood	PIN-3A-GN2	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0		**12**
Upper Pinewood	PIN-3A-GN3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Upper Pinewood	PIN-3A-GN4	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	3	0		**10**
Upper Pinewood	PIN-3A-DN1	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0		**6**
Upper Pinewood	PIN-3A-MT1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**2**
Upper Pinewood	PIN-3A-MT2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Upper Pinewood	PIN-3A-MT3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Upper Pinewood	PIN-3A-MT4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-8-GN1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0		**4**
Mid Pinewood	PIN-8-GN2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0		**14**
Mid Pinewood	PIN-8-GN3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0		**2**
Mid Pinewood	PIN-8-MT1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-8-MT2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-8-MT3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-8-MT4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-9-E1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-9-SN1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-9-GN1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0		**1**
Mid Pinewood	PIN-9-GN2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-9-DN1	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**12**
Mid Pinewood	PIN-9-MT1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-9-MT2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-9-MT3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-9-MT4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-10-SN1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-10-DN1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0		**3**
Mid Pinewood	PIN-10-MT1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-10-MT2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-10-MT3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-10-MT4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-10A-GN1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0		**2**
Mid Pinewood	PIN-10A-GN2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-10A-GN3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-10A-MT1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-10A-MT2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-10A-MT3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Mid Pinewood	PIN-10A-MT4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Lower Pinewood	PIN-11-E1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**2**
Lower Pinewood	PIN-11-GN1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	3	0		**7**
Lower Pinewood	PIN-12-GN1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	1	0		**7**
Lower Pinewood	PIN-12-GN2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0		**4**
Lower Pinewood	PIN-12-GN3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Lower Pinewood	PIN-12-GN4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Lower Pinewood	PIN-12-MT1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Lower Pinewood	PIN-12-MT2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Lower Pinewood	PIN-12-MT3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Lower Pinewood	PIN-12-MT4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Lower Pinewood	PIN-14-E1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0		**3**
Lower Pinewood	PIN-14-SN1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0		**7**
Lower Pinewood	PIN-14-GN1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0		**2**
Lower Pinewood	PIN-14-GN2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	3		**6**
Lower Pinewood	PIN-14-GN3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Lower Pinewood	PIN-14-MT1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Lower Pinewood	PIN-14-MT2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Lower Pinewood	PIN-14-MT3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Lower Pinewood	PIN-15-E1	0	0	0	0	0	0	0	0	68	0	0	2	0	0	0	0	8	0	0	0	5	0	2	0	31	11	0		**132**
Lower Pinewood	PIN-15-DN1	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	1	0	0	0	0	0	0	0	0	0	0		**11**
Lower Pinewood	PIN-16-E1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	5	0	0	0	0	0	0	0	2	1	8		**22**
Lower Pinewood	PIN-17-E1	0	0	0	0	0	0	0	0	0	0	0	34	0	0	2	1	1	0	0	8	11	0	0	0	0	0	34		**92**
Lower Pinewood	PIN-17-GN1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	26	0	0	0	3	1	2	0	0	0	2		**50**
Lower Pinewood	PIN-17-GN2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Lower Pinewood	PIN-17-A1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0		**3**
Lower Pinewood	PIN-17-A2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Lower Pinewood	PIN-18-E1	0	1	0	0	0	0	0	0	0	0	0	8	0	0	52	0	0	0	0	14	0	0	0	0	0	0	11		**86**
Lower Pinewood	PIN-18-GN1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	2	0	0	0	0	0	1		**20**
Lower Pinewood	PIN-18-GN2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Lower Pinewood	PIN-18-GN3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Lower Pinewood	PW-23-E1	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	5	0	0	2	2	1	0	2	0	0	15		**62**
Lower Pinewood	PW-24-E1	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		**21**
Jones Creek	JON-1-SN1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**1**
Jones Creek	JON-1-GN1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**1**
Jones Creek	JON-1-GN2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Jones Creek	JON-1-GN3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Jones Creek	JON-1-DN1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Jones Creek	JON-1-MT1	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**17**
Jones Creek	JON-1-MT2	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**3**
Jones Creek	JON-1-MT3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Jones Creek	JON-2-DN1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0		**20**
Jones Creek	JON-2-DN2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0		**1**

Tait Creek	**TAIT-1-SN1**	0	0	0	0	0	2	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**11**
Tait Creek	**TAIT-1-DN1**	0	0	0	0	0	4	4	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0		**10**
Tait Creek	**TAIT-1-MT1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Tait Creek	**TAIT-1-MT2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Tait Creek	**TAIT-1-MT3**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Tait Creek	**TAIT-1-MT4**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Unnamed Trib 2A	**UT2-A-DN1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Unnamed Trib 2A	**UT2A-MT1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Unnamed Trib 2A	**UT2A-MT2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Unnamed Trib 2A	**UT2A-MT3**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-3-MT1**	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0		**4**
Loslo Creek	**LOS-3-MT2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-3-MT3**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-3-MT4**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-3-MT5**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-3-MT6**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-4-DN1**	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**4**
Loslo Creek	**LOS-4-MT1**	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**3**
Loslo Creek	**LOS-5-MT1**	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**1**
Loslo Creek	**LOS-5-MT2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-5-MT3**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-5-MT4**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-5-MT5**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-5-MT6**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-8-SN1**	0	6	0	0	0	0	13	9	0	0	0	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**85**
Loslo Creek	**LOS-8-MT1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-8-MT2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-8-MT3**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-8-MT4**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-11-SN1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-11-DN1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-11-MT1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-11-MT2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-11-MT3**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Loslo Creek	**LOS-11-MT4**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Unnamed Trib 5A	**UT5-A-E1**	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**5**
Unnamed Trib 5A	**UT5-A-MT1**	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**13**
Unnamed Trib 5A	**UT5-A-MT2**	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**13**
Unnamed Trib 5A	**UT5-A-MT3**	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**14**
West Creek	**WES-A-DN1**	0	0	0	0	0	0	20	0	0	0	0	0	0	20	0	0	0	0	20	0	0	0	0	0	0	0	0		**60**
West Creek	**WES-F-DN1**	0	0	0	0	0	0	6	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0		**8**
West Creek	**WESTRIB1-A-E1**	0	0	0	0	0	0	11	13	0	0	0	0	2	29	0	0	0	4	36	0	0	0	0	0	0	0	0		**95**
West Creek	**WESTRIB1-A-DN1**	0	0	0	0	0	0	1	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0		**14**
West Creek	**WESTRIB1-A-MT1**	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0		**5**
Clark Creek	**CLA-5A-E1**	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**3**
Clark Creek	**CLA-5A-MT1**	0	0	0	0	0	4	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**7**
Clark Creek	**CLA-5A-MT2**	0	0	0	0	0	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**7**
Clark Creek	**CLA-5A-MT3**	0	0	0	0	0	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**7**
Unnamed Trib 8A	**U8A-1-MT1**	0	0	0	0	0	0	78	31	0	1	0	0	0	14	0	0	0	0	1	0	0	0	0	0	0	0	0		**125**
Sturgeon Creek	**STU-5-MT1**	0	0	0	0	0	0	2	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**16**
Sturgeon Creek	**STU-5-MT2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Sturgeon Creek	**STU-5-MT3**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Sturgeon Creek	**STU-5-MT4**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Sturgeon Creek	**STU-6-E1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Sturgeon Creek	**STU-6-SN1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Sturgeon Creek	**STU-6-GN1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Sturgeon Creek	**STU-6-GN2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Sturgeon Creek	**STU-6-MT1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Sturgeon Creek	**STU-6-MT2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Sturgeon Creek	**STU-6-MT3**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
Sturgeon Creek	**STU-6-MT4**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		**0**
TOTAL		**2**	**7**	**0**	**0**	**22**	**20**	**178**	**148**	**86**	**28**	**0**	**173**	**2**	**140**	**57**	**7**	**118**	**5**	**87**	**24**	**23**	**2**	**5**	**2**	**34**	**43**	**72**		**1320**

APPENDIX H-3
SIZE, AGE AND METAL CONCENTRATIONS OF FISH FROM THE PINEWOOD RIVER

| Species | Sample ID | Date of Capture / Sampling | Fork Length | Total Length | Body Weight | Tissue Weight | NCA | Edge Code | Confidence Rating | | Parameters | | |

APPENDIX H-3
SIZE, AGE AND METAL CONCENTRATIONS OF FISH FROM THE PINEWOOD RIVER

Species	Sample ID	Date of Capture / Sampling	Fork Length	Total Length	Body Weight	Tissue Weight	NCA	Edge Code	Confidence Rating		Parameters																																	
											Mercury (Hg)	Aluminum (Al)	Arsenic (As)	Antimony (Sb)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Magnesium (Mg)	Manganese (Mn)	Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Selenium (Se)	Silver (Ag)	Sodium (Na)	Strontium (Sr)	Thallium (Tl)	Tin (Sn)	Titanium (Ti)	Uranium (U)	Vanadium (V)	Zinc (Zn)
			(mm)	(mm)	(g)	(g)				Unit	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
										RDL	0.005	0.3	0.1	0.05	0.3	0.05	0.05	0.5	0.01	50	0.3	0.01	0.5	3	0.03	100	0.3	0.05	0.1	50	100	0.2	0.05	50	0.5	0.003	0.3	0.5	0.005	0.05	2
Walleye	PIN-15-E1-10-DM	20/09/12	211	223	140.0	16.7	1	++	7		0.35	0.8	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	540	<0.3	<0.005	<0.5	<3	<0.03	360	0.3	<0.05	<0.05	2200	4700	0.2	<0.05	290	<0.5	<0.003	<0.3	<0.5	0.006	<0.05	4
	PIN-15-E1-11-DM	20/09/12	268	282	190.0	34.6	1	++	7		0.32	0.4	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	110	<0.3	<0.005	<0.5	<3	<0.03	350	<0.3	<0.05	<0.05	2200	4500	0.2	<0.05	230	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	3
	PIN-15-E1-8-DM	20/09/12	248	261	160.0	33.6	1	++	7		0.32	1.2	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	570	<0.3	<0.005	<0.5	<3	<0.03	380	0.4	<0.05	<0.05	2400	4900	0.3	<0.05	280	<0.5	0.003	<0.3	<0.5	<0.005	<0.05	4
	PIN-15-E1-9-DM	20/09/12	268	275	140.0	33.3	1	++	7		0.31	1.4	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	190	<0.3	<0.005	<0.5	<3	<0.03	350	<0.3	<0.05	<0.05	2100	4900	0.2	<0.05	290	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	3
	PIN-16-E1-1-DM	24/09/12	333	346	350.0	51.0	3	++	7		0.55	0.5	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	200	<0.3	<0.005	<0.5	<3	<0.03	350	<0.3	<0.05	<0.05	2200	4400	0.3	<0.05	230	<0.5	0.003	<0.3	<0.5	<0.005	<0.05	3
	PIN-17-GN1-18-DM	23/09/12	655	688	2700.0	-	15	++	7		1.8	2.3	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	580	<0.3	<0.005	<0.5	4	<0.03	320	<0.3	<0.05	<0.05	2200	4400	0.2	<0.05	340	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	4
	PIN-17-GN1-19-DM	23/09/12	648	679	3640.0	-	15	++	7		1.5	1.2	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	98	<0.3	<0.005	<0.5	<3	<0.03	310	<0.3	<0.05	<0.05	2000	4500	0.2	<0.05	290	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	3
	PIN-17-GN1-43-DM	23/09/12	500	515	1630.0	118.0	9	++	6-7		1.1	0.9	0.1	<0.05	<0.3	<0.05	0.07	<0.5	<0.01	130	<0.3	<0.005	<0.5	5	<0.03	310	<0.3	<0.05	<0.05	2000	4500	<0.2	<0.05	360	<0.5	0.003	<0.3	<0.5	0.005	<0.05	3
	PIN-17-GN1-45-DM	23/09/12	368	382	550.0	56.5	3	++	7		0.33	0.6	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	540	<0.3	<0.005	<0.5	<3	<0.03	310	<0.3	<0.05	<0.05	2000	4300	<0.2	<0.05	260	<0.5	0.003	<0.3	<0.5	<0.005	<0.05	3
	PIN-18-GN1-1-DM	23/09/12	439	463	1090.0	116.2	6	++	7		0.22	0.5	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	200	<0.3	<0.005	1.1	<3	<0.03	320	<0.3	<0.05	<0.05	2100	4600	<0.2	<0.05	340	<0.5	0.003	<0.3	<0.5	<0.005	<0.05	5
	PIN-18-GN1-2-DM	23/09/12	371	390	510.0	80.1	3	++	7		0.47	0.8	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	160	<0.3	<0.005	<0.5	3	<0.03	340	<0.3	<0.05	<0.05	2100	4700	0.2	<0.05	250	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	4
	PIN-18-GN1-3-DM	23/09/12	398	419	180.0	93.2	3	++	7		0.43	0.4	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	110	<0.3	<0.005	<0.5	<3	<0.03	350	<0.3	<0.05	<0.05	2100	4900	<0.2	<0.05	380	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	3
	PIN-18-GN1-4-DM	23/09/12	306	326	360.0	38.9	2	++	7		0.39	0.5	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	430	<0.3	<0.005	<0.5	<3	<0.03	320	<0.3	<0.05	<0.05	2200	4600	<0.2	<0.05	250	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	3
	PIN-18-GN1-5-DM	23/09/12	254	270	200.0	31.2	1	++	7		0.33	0.7	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	180	<0.3	<0.005	<0.5	<3	<0.03	340	<0.3	<0.05	<0.05	2000	4700	<0.2	<0.05	370	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	4
	PW-23-E1-44-DM	18/09/12	215	230	79.3	16.8	1	++	7		0.078	0.6	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	280	<0.3	<0.005	<0.5	<3	<0.03	310	<0.3	<0.05	<0.05	1900	4700	<0.2	<0.05	290	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	4

APPENDIX H-4
METALS IN LIVER BY ICMPS
IN THE PINEWOOD RIVER - JULY AND SEPTEMBER 2012

Species	Sample ID	Date	Fork Length	Total Length	Body Weight	Liver Weight		Parameters																														
								Mercury (Hg)	Aluminum (Al)	Arsenic (As)	Antimony (Sb)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Magnesium (Mg)	Manganese (Mn)	Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Selenium (Se)	Silver (Ag)	Sodium (Na)	Strontium (Sr)	Thallium (Tl)	Tin (Sn)	Titanium (Ti)	Uranium (U)	Vanadium (V)	Zinc (Zn)
			(mm)	(mm)	(g)	(g)	Unit	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
							RDL	0.005	0.3	0.1	0.05	0.3	0.05	0.05	0.5	0.01	50	0.3	0.005	0.5	3	0.03	100	0.3	0.05	0.05	50	100	0.2	0.05	50	0.5	0.003	0.3	0.5	0.005	0.05	2
Northern Pike	PIN-11-GN1-2-L	21/09/12	329	338	180.0			NA	0.7	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.04	50	<0.3	0.049	19	110	<0.03	240	3.0	0.23	<0.05	3100	3000	1.5	0.08	840	<0.5	0.003	<0.3	<0.5	<0.005	0.26	65
	PIN-11-GN1-3-L	21/09/12	361	380	326.0			NA	0.3	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.01	60	<0.3	0.044	17	30	<0.03	240	1.7	0.20	<0.05	3300	3200	1.2	0.15	870	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	52
	PIN-12-GN1-3-L	26/09/12	405	433	470.0	8.961		0.24	0.3	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.02	<50	<0.3	0.028	8.9	21	<0.03	210	1.9	0.11	<0.05	2900	3400	1.5	<0.05	770	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	40
	PIN-12-GN1-4-L	26/09/12	433	460	310.0	10.648		0.20	0.4	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.03	53	<0.3	0.031	9.2	56	<0.03	210	1.0	0.11	<0.05	2900	3300	1.2	<0.05	860	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	31
	PIN-12-GN1-5-L	26/09/12	345	380	350.0	2.719		NA	0.7	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.05	63	<0.3	0.034	9.3	35	<0.03	240	2.5	0.14	<0.05	3200	3500	1.4	<0.05	700	<0.5	0.005	<0.3	<0.5	<0.005	<0.05	48
	PIN-12-GN1-6-L	26/09/12	303	329	220.0	3.202		NA	0.4	0.2	<0.05	<0.3	<0.05	<0.05	<0.5	0.02	<50	<0.3	0.040	8.7	47	<0.03	210	1.3	0.19	<0.05	2700	2900	1.2	0.07	760	<0.5	0.003	<0.3	<0.5	<0.005	<0.05	35
	PIN-12-GN2-7-L	26/09/12	388	410	430.0	3.210		NA	0.6	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.05	51	<0.3	0.038	18	34	<0.03	180	1.1	0.20	<0.05	2400	2600	2.0	0.06	780	<0.5	0.003	<0.3	<0.5	<0.005	0.11	51
	PIN-14-GN1-1-L	22/09/12	315	330	240.0	1.939		NA	0.7	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.05	74	<0.3	0.033	6.5	56	<0.03	200	1.7	0.20	<0.05	2500	3400	1.3	<0.05	940	<0.5	<0.003	<0.3	<0.5	<0.005	0.05	53
	PIN-14-GN1-2-L	22/09/12	386	410	430.0	5.000		0.15	0.6	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.07	56	<0.3	0.033	12	73	<0.03	160	1.3	0.17	<0.05	2000	2900	1.5	0.06	890	<0.5	<0.003	<0.3	<0.5	<0.005	0.07	33
	PIN-14-GN2-1-L	22/09/12	336	343	290.0	2.936		NA	0.3	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.02	62	<0.3	0.056	18	120	<0.03	220	1.9	0.19	<0.05	2900	3000	1.8	0.07	820	<0.5	0.003	<0.3	<0.5	<0.005	0.08	54
	PIN-14-GN2-2-L	22/09/12	341	365	290.0	2.567		NA	0.7	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.03	89	<0.3	0.073	26	170	<0.03	180	1.9	0.24	<0.05	2400	2500	1.9	0.15	1100	<0.5	0.003	<0.3	<0.5	<0.005	0.21	47
	PIN-15-E1-1-L	20/09/12	324	347	310.0	3.514		0.17	0.5	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.03	54	<0.3	0.035	8.1	22	<0.03	190	1.4	0.23	<0.05	2600	3200	1.5	<0.05	1100	<0.5	0.003	<0.3	<0.5	<0.005	<0.05	56
	PIN-15-E1-2-L	20/09/12	339	372	230.0	3.515		0.16	0.5	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.02	60	<0.3	0.030	10	22	<0.03	220	1.5	0.19	<0.05	2900	3500	1.6	<0.05	1200	<0.5	0.004	<0.3	<0.5	<0.005	<0.05	53
	PIN-15-E1-4-L	20/09/12	412	440	570.0	6.399		0.14	<0.3	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.04	<50	<0.3	0.040	16	170	<0.03	200	1.3	0.18	<0.05	2800	3300	2.0	<0.05	1100	<0.5	0.003	<0.3	<0.5	<0.005	<0.05	35
	PIN-16-E1-3-L	24/09/12	386	408	380.0	2.238		NA	1.1	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.10	<50	<0.3	0.038	16	28	<0.03	220	1.7	0.20	<0.05	3200	3500	1.7	<0.05	880	<0.5	0.005	<0.3	<0.5	<0.005	0.09	43
	PIN-16-E1-4-L	24/09/12	344	366	310.0	3.143		0.16	0.6	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.01	<50	<0.3	0.026	6.1	19	<0.03	160	1.4	0.17	<0.05	2400	3300	1.4	<0.05	940	<0.5	0.003	<0.3	<0.5	0.011	<0.05	29
	PIN-16-E1-5-L	24/09/12	365	389	320.0	3.093		0.18	0.9	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.10	<50	<0.3	0.036	12	50	<0.03	160	1.3	0.21	<0.05	2100	3200	1.7	<0.05	840	<0.5	0.004	<0.3	<0.5	0.006	0.10	29
	PIN-18-GN1-10-L	23/09/12	368	391	690.0	8.604		0.14	0.8	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.07	59	<0.3	0.082	36	240	<0.03	200	1.7	0.21	<0.05	3100	3300	1.6	0.16	930	<0.5	0.003	<0.3	<0.5	0.005	0.26	44
	PIN-18-GN1-11-L	23/09/12	382	400	360.0	5.301		0.17	1.3	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.03	54	<0.3	0.039	24	140	<0.03	170	1.4	0.21	<0.05	2300	2800	1.3	0.09	780	<0.5	0.004	<0.3	<0.5	<0.005	0.17	37
	PIN-18-GN1-12-L	23/09/12	439	462	650.0	10.996		0.18	0.6	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.03	<50	<0.3	0.036	21	21	<0.03	150	1.2	0.12	<0.05	2100	2700	1.1	0.06	870	<0.5	<0.003	<0.3	<0.5	<0.005	0.11	27
	PIN-18-GN1-13-L	23/09/12	378	400	770.0	11.109		0.16	1.1	<0.1	<0.05	<0.3	<0.05	0.09	<0.5	0.05	<50	<0.3	0.039	28	75	<0.03	170	1.6	0.16	<0.05	2400	2900	1.7	0.07	810	<0.5	0.006	<0.3	<0.5	0.010	0.25	34
	PIN-18-GN1-14-L	23/09/12	410	435	530.0	6.041		0.12	0.5	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.05	<50	<0.3	0.036	11	35	<0.03	170	1.2	0.19	<0.05	2400	2800	1.1	<0.05	910	<0.5	0.004	<0.3	<0.5	0.006	0.13	35
	PIN-18-GN1-15-L	23/09/12	481	505	840.0	6.919		0.24	2.2	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.13	<50	<0.3	0.065	38	44	<0.03	180	1.5	0.30	<0.05	2700	2900	1.8	0.24	830	<0.5	0.004	<0.3	<0.5	<0.005	0.46	49
	PIN-18-GN1-6-L	23/09/12	538	570	260.0	11.714		0.17	0.8	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.06	85	<0.3	0.064	26	160	<0.03	180	1.6	0.18	<0.05	2600	3000	1.5	0.11	960	<0.5	<0.003	<0.3	<0.5	<0.005	0.28	44
	PIN-18-GN1-7-L	23/09/12	490	506	870.0	9.453		0.21	1.1	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.06	61	<0.3	0.056	36	240	<0.03	160	0.9	0.18	<0.05	2200	2900	1.2	0.45	910	<0.5	<0.003	<0.3	<0.5	<0.005	0.26	46
	PIN-18-GN1-8-L	23/09/12	497	519	740.0	8.481		0.30	2.1	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.19	72	<0.3	0.058	38	37	<0.03	220	1.4	0.21	<0.05	3200	3300	2.5	0.21	880	<0.5	0.004	<0.3	<0.5	<0.005	0.42	72
	PIN-18-GN1-9-L	23/09/12	453	485	970.0	8.903		0.13	0.8	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.08	<50	<0.3	0.031	26	110	<0.03	170	1.2	0.29	<0.05	2400	2800	1.7	0.13	870	<0.5	0.004	<0.3	<0.5	<0.005	0.19	34
	PIN-2A-GN3-1-L	12/07/12	521	557	114.0	19.400		0.15	0.7	<0.1	<0.05	<0.3	<0.05	0.07	<0.5	<0.01	<50	<0.3	0.044	12	160	<0.03	130	1.2	0.13	<0.05	1600	2700	1.5	<0.05	830	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	30
	PIN-2A-GN3-3-L	12/07/12	406	432	49.0	5.500		0.21	0.4	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	52	<0.3	0.044	14	170	<0.03	180	1.5	0.25	<0.05	2600	2700	1.3	<0.05	850	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	47
	PIN-2A-GN3-4-L	12/07/12	522	557	107.0	17.600		0.17	0.3	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	74	<0.3	0.030	15	260	<0.03	120	0.7	0.14	<0.05	1500	2700	1.8	<0.05	740	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	24
	PIN-2A-GN3-5-L	12/07/12	404	423	30.0	6.300		0.16	0.6	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	85	<0.3	0.035	7.6	180	<0.03	140	1.2	0.17	<0.05	2000	2600	1.2	<0.05	900	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	38
	PIN-2A-GN3-NP2-L	12/07/12	390	412	41.0	5.100		0.16	0.6	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	140	<0.3	0.030	8.4	180	<0.03	140	1.5	0.15	<0.05	2000	2400	1.4	<0.05	740	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	22
	PIN-3A-GN1-1-L	14/07/12	300	320	230.0	6.550		0.10	0.7	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	85	<0.3	0.029	9.8	98	<0.03	130	1.2	0.17	<0.05	1900	2700	0.9	<0.05	780	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	40
	PIN-3A-GN1-2-L	14/07/12	356	377	390.0	9.168		0.088	<0.3	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	<50	<0.3	0.024	12	88	<0.03	120	1.6	0.17	<0.05	1900	2700	1.1	<0.05	860	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	36
	PIN-3A-GN1-3-L	14/07/12	343	367	370.0	7.210		0.11	1.9	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	<50	<0.3	0.029	8.0	190	<0.03	150	1.5	0.22	<0.05	2200	2600	1.2	<0.05	970	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	35
	PIN-3A-GN2-10-L	15/07/12	337	356	260.0	3.785		0.12	0.5	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	62	<0.3	0.018	8.0	70	<0.03	140	1.8	0.18	<0.05	2000	2200	0.8	<0.05	790	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	34
	PIN-3A-GN2-11-L	15/07/12	323	341	150.0	2.135		0.12	0.6	<0.1	<0.05	<0.3	<0.05	0.05	<0.5	<0.01	53	<0.3	0.027	7.8	75	<0.03	150	1.8	0.18	<0.05	2000	2600	1.0	<0.05	930	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	40
	PIN-3A-GN2-12-L	15/07/12	339	360	140.0	3.060		0.21	0.5	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	<50	<0.3	0.025	6.9	97	<0.03	130	1.9	0.13	<0.05	1700	2500	1.2	<0.05	770	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	24
	PIN-3A-GN4-1-L	15/07/12	341	365	180.0	3.255		0.12	0.4	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	51	<0.3	0.025	9.6	120	<0.03	150	1.3	0.18	<0.05	2200	2800	1.1	<0.05	900	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	38
	PIN-3A-GN4-2-L	15/07/12	338	360	150.0	3.312		0.14	0.3	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	56	<0.3	0.029	8.9	110	0.09	150	1.6	0.22	<0.05	2200	2800	1.2	<0.05	760	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	36
	PIN-8-GN1-1-L	13/07/12	151	185	64.0			0.063	0.5	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.02	<50	<0.3	0.023	17	200	<0.03	110	0.5	0.12	<0.05	1400	2400	1.7	0.07	680	<0.5	<0.003	<0.3	<0.5	<0.005	0.22	23
	PIN-8-GN1-2-L	13/07/12	358	370	21.0	0.200		0.17	0.7	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	<50	<0.3	0.021	9.9	200	<0.03	120	1.1	0.12	<0.05	1800	2200	1.1	<0.05	630	<0.5	<0.003	<0.3	<0.5	<0.005	0.08	30
	PIN-8-GN1-4-L	13/07/12	319	328	19.0	2.900		0.12	0.9	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	<50	<0.3	0.027	13	170	<0.03	140	0.9	0.16	<0.05	1900	2900	1.4	<0.05	600	<0.5	<0.003	<0.3	<0.5	<0.005	0.14	25
	PIN-8-GN2-1-L	13/07/12	421	498	48.0			0.083	0.6	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.01	<50	<0.3	0.023	10	190	<0.03	110	0.8	0.11	<0.05	1500	2300	1.4	<0.05	600	<0.5	<0.003	<0.3	<0.5	<0.005	0.13	19
	PIN-8-GN2-2-L	13/07/12	395	425	52.0	6.400		0.077	0.6	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.03	260	<0.3	0.030	15	210	<0.03	130	1.7	0.14	<0.05	1800	2100	1.4	0.08	640	<0.5	<0.003	<0.3	<0.5	<0.005	0.26	41
	PIN-8-GN2-3-L	13/07/12	345	385	36.0	5.100		0.082	0.3	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	<0.01	<50	<0.3	0.021	14	210	<0.03	120	0.8	0.14	<0.05	1600	2300	1.3	<0.05	750	<0.5	<0.003	<0.3	<0.5	<0.005	0.09	28
	PIN-8-GN2-4-L	13/07/12	356	385	41.0	5.400		0.11	0.7	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.03	<50	<0.3	0.026	13	200	<0.03	130	1.2	0.15	<0.05	1600	2400	1.5	0.05	710	<0.5	<0.003	<0.3	<0.5	<0.005	0.11	35
	PIN-8-GN2-5-L	13/07/12	438	471	60.0	5.800		0.14	1.0	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.04	130	<0.3	0.037	23	360	<0.03	120	0.7	0.15	<0.05	1700	2300	1.8	0.27	790	<0.5	<0.003	<0.3	<0.5	<0.005	0.49	33
	PIN-8-GN2-6-L	13/07/12	415	441	48.0	6.500		0.069	0.9	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.03	<50	<0.3	0.025	15	190	<0.03	120	1.1	0.12	<0.05	1600	2000	1.2	0.11	570	<0.5	<0.003	<0.3	<0.5	<0.005	0.18	32
	PIN-8-GN2-7-L	13/07/12	365	375	31.0	5.600		0.084	0.4	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.03	<50	<0.3	0.024	13	140	<0.03	130	0.8	0.13	<0.05	1900	2500	1.4	0.05	780	<0.5	<0.003	<0.3	<0.5	<0.005	<0.05	33
	PW-23-E1-39-L	18/09/12	517	523	450.0	5.186		0.14	0.6	<0.1	<0.05	<0.3	<0.05	0.06	<0.5	0.03	<50	<0.3	0.025	13	21	<0.03	150	1.6	0.15	<0.05	2200	3000	1.6	<0.05	840	<0.5	0.003	<0.3	<0.5	<0.005	<0.05	29
Walleye	PIN-15-E1-11-L	20/09/12	268	282	190.0			NA	1.4	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.05	480	<0.3	0.085	2.1	59	<0.03	220	2.3	0.21	<0.05	3300	3100	1.0	<0.05	1200	<0.5	0.010	<0.3	<0.5	<0.005	<0.05	21
	PIN-15-E1-8-L	20/09/12	248	261	160.0	2.252		NA	2.4	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.04	320	<0.3	0.12	2.4	74	<0.03	210	2.0	0.21	0.05	3200	3300	1.1	<0.05	1200	<0.5	0.015	<0.3	<0.5	<0.005	<0.05	21
	PIN-15-E1-9-L	20/09/12	268	275	140.0	2.219		NA	0.9	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.05	110	<0.3	0.10	2.0	57	<0.03	220	2.1	0.16	<0.05	3000	3100	0.9	<0.05	1200	<0.5	0.013	<0.3	<0.5	<0.005	<0.05	19
	PIN-16-E1-1-L	24/09/12	333	346	350.0	3.467		0.19	0.6	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.14	88	<0.3	0.21	2.2	73	<0.03	220	2.2	0.15	<0.05	3100	3000	0.8	<0.05	1300	<0.5	0.010	<0.3	<0.5	<0.005	<0.05	22
	PIN-17-GN1-18-L	23/09/12	655	688	2700.0			1.1	1.5	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.20	80	<0.3	0.042	1.5	51	<0.03	210	1.9	0.10	<0.05	2800	3300	0.8	<0.05	1300	<0.5	0.008	<0.3	<0.5	<0.005	0.08	17
	PIN-17-GN1-19-L	23/09/12	648	679	3640.0			0.67	1.5	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.11	74	<0.3	0.029	1.2	72	<0.03	190	2.1	0.07	<0.05	2700	3300	0.6	<0.05	1300	<0.5	0.009	<0.3	<0.5	<0.005	<0.05	16
	PIN-17-GN1-43-L	23/09/12	500	515	1630.0	21.081		0.32	1.3	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.13	78	<0.3	0.30	1.4	130	<0.03	160	0.9	0.09	<0.05	2300	2800	0.7	<0.05	1500	<0.5	0.008	<0.3	<0.5	<0.005	<0.05	16
	PIN-17-GN1-44-L	23/09/12	428	447	830.0	7.189		0.16	0.4	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.19	68	<0.3	0.10	2.3	77	<0.03	210	2.0	0.17	<0.05	2700	3100	0.8	<0.05	1400	<0.5	0.009	<0.3	<0.5	<0.005	<0.05	20
	PIN-17-GN1-45-L	23/09/12	368	382	550.0	4.941		0.18	0.8	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.11	770	<0.3	0.30	3.0	110	<0.03	230	1.8	0.15	<0.05	3100	2600	0.8	<0.05	1100	<0.5	0.010	<0.3	<0.5	<0.005	<0.05	21
	PIN-18-GN1-1-L	23/09/12	439	463	1090.0	20.994		0.078	0.3	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.14	120	<0.3	0.063	1.6	99	<0.03	190	2.5	0.10	<0.05	2700	3200	0.6	<0.05	1300	<0.5	0.010	<0.3	<0.5	<0.005	<0.05	20
	PIN-18-GN1-2-L	23/09/12	371	390	510.0	5.727		0.24	0.7	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.14	76	<0.3	0.15	2.0	88	<0.03	200	1.6	0.17	<0.05	2900	3000	0.9	<0.05	940	<0.5	0.011	<0.3	<0.5	<0.005	<0.05	20
	PIN-18-GN1-3-L	23/09/12	398	419	180.0	11.610		0.18	0.3	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.03	72	<0.3	0.096	1.8	92	<0.03	170	1.4	0.09	<0.05	2300	3200	0.6	<0.05	1100	<0.5	0.006	<0.3	<0.5	<0.005	<0.05	16
	PIN-18-GN1-4-L	23/09/12	306	326	360.0	4.211		0.14	0.9	<0.1	<0.05	<0.3	<0.05	<0.05	<0.5	0.13	120	<0.3	0.15	2.3	110	<0.03	190	2.5	0.14	<0.05	2700	2600	0.7	<0.05	1300	<0.5	0.010	<0.3	<0.5	<0.005	<0.05	21

NA - Not enough tissue weight to analyze for Mercury

RDL = Reportable Detection Limit

APPENDIX H-5
METALS IN COMPOSITE TISSUE'S BY ICMPS
IN THE PINEWOOD RIVER, LOSLO CREEK AND WEST CREEK - 2011 and 2012

Waterbody	Species	Sample ID	Date	Total Number of Fish in Composite	Composite Batch Weight	Parameters																																
						Mercury (Hg)	Aluminum (Al)	Arsenic (As)	Antimony (Sb)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Magnesium (Mg)	Manganese (Mn)	Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Selenium (Se)	Silver (Ag)	Sodium (Na)	Strontium (Sr)	Thallium (Tl)	Tin (Sn)	Titanium (Ti)	Uranium (U)	Vanadium (V)	Zinc (Zn)
				(#)	(g)	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
						0.005	0.3	0.1	0.05	0.3	0.05	0.05	0.5	0.01	50	0.3	0.005	0.5	3	0.03	100	0.3	0.05	0.05	50	100	0.2	0.05	50	0.5	0.003	0.3	0.5	0.005	0.05	2
Pinewood River	Common Shiner	PIN-15-E1-C2-CS	20/09/12	20	82.5	0.14	10	<0.1	<0.05	1.5	<0.05	<0.05	<0.5	<0.01	10000	<0.3	0.01	0.5	26	<0.03	430	12	<0.05	<0.1	5400	2400	0.4	<0.05	530	6.4	<0.003	<0.3	0.5	<0.005	<0.05	42
	Creek Chub	PIN-2AA-MT2-C2-CS	04/09/12	7	38.0	0.18	20	0.1	<0.05	3.3	<0.05	<0.05	<0.5	0.01	12000	<0.3	0.06	0.6	180	<0.03	460	82	<0.05	<0.1	5800	2400	0.4	<0.05	760	9.4	<0.003	<0.3	1.3	0.007	0.09	69
		PIN-2AA-GN2-C1-CC	04/09/12	3	337.5	0.29	<0.3	<0.1	<0.05	1.7	<0.05	<0.05	<0.5	<0.01	14000	<0.3	<0.01	0.8	19	<0.03	460	4	<0.05	<0.1	7200	2900	0.2	<0.05	900	12	<0.003	<0.3	<0.5	<0.005	<0.05	18
		PIN-2AA-MT2-C1-CC	04/09/12	13	257.4	0.2	2.2	<0.1	<0.05	3.3	<0.05	<0.05	<0.5	0.03	11000	<0.3	0.02	1	40	<0.03	430	10	<0.05	<0.05	5600	2700	0.3	<0.05	780	9.2	<0.003	<0.3	<0.5	<0.005	<0.05	32
		PIN-2AA-MT1-C4-CC	04/09/12	8	173.2	0.24	3.6	<0.1	<0.05	0.9	<0.05	<0.05	<0.5	0.04	8900	<0.3	0.01	0.9	33	<0.03	390	7	<0.05	<0.1	4900	2800	0.3	<0.05	870	7.9	<0.003	<0.3	<0.5	<0.005	<0.05	27
		PIN-2AA-GN1-C1-CC	04/09/12	3	159.8	0.34	0.7	<0.1	<0.05	1	<0.05	<0.05	<0.5	0.01	9800	<0.3	0.01	1	24	<0.03	400	7.9	<0.05	<0.1	5300	2800	0.3	<0.05	970	8.3	<0.003	<0.3	<0.5	<0.005	<0.05	25
	Yellow Perch	PIN-16-E1-C2-YP	24/09/12	7	485.4	0.17	23	<0.1	<0.05	2.1	<0.05	<0.05	<0.5	<0.01	11000	<0.3	0.03	<0.5	42	<0.03	430	19	<0.05	<0.1	6600	3300	0.3	<0.05	920	4.2	0.003	<0.3	1.1	<0.005	0.14	18
		PIN-17-E1-C1-YP	19/09/12	26	226.7	0.13	22	<0.1	<0.05	1.0	<0.05	<0.05	<0.5	<0.01	14000	<0.3	0.02	<0.5	42	<0.03	440	13	<0.05	<0.1	7700	3200	0.2	<0.05	930	6.6	0.003	<0.3	1.2	0.007	0.14	16
		PIN-18-E1-C1-YP	19/09/12	12	120.5	0.088	30	<0.1	<0.05	1.5	<0.05	<0.05	<0.5	0.01	14000	<0.3	0.04	0.6	52	0.04	490	11	<0.05	<0.1	8200	3500	0.2	<0.05	980	6.6	0.008	<0.3	1.4	<0.005	0.14	21
		PW-23-E1-C1-YP	18/09/12	11	200.6	0.14	25	<0.1	<0.05	0.8	<0.05	<0.05	<0.5	<0.01	10000	<0.3	0.03	<0.5	46	<0.03	380	11	<0.05	<0.1	5400	3500	0.3	<0.05	940	4.5	<0.003	<0.3	1.1	<0.005	0.18	15
		PW-23-E1-C5-YP	18/09/12	4		0.11	14	<0.1	<0.05	1.7	<0.05	<0.05	<0.5	<0.01	14000	<0.3	0.02	1.0	32	<0.03	470	39	<0.05	<0.1	8000	3200	0.3	<0.05	790	5.9	0.005	<0.3	0.6	<0.005	0.13	20
	Pearl Dace	PIN-2AA-MT1-C3-PD	04/09/12	4	47.5	0.20	6.1	<0.1	<0.05	1.9	<0.05	<0.05	<0.5	0.03	6700	<0.3	0.027	1.1	58	<0.03	340	15	<0.05	<0.05	4400	2100	0.3	<0.05	640	5.5	<0.003	<0.3	<0.5	0.008	0.06	26
	Emerald Shiner	PIN-17-E1-C3-ES	19/09/12	22	17.0	0.044	13	<0.1	<0.05	2.0	<0.05	<0.05	<0.5	<0.01	7300	<0.3	0.019	0.7	29	0.04	380	5.6	<0.05	<0.05	4600	2500	0.3	<0.05	430	6.6	<0.003	<0.3	0.7	<0.005	0.07	48
		PW-23-E1-C4-ES	18/09/12	20		0.080	4.5	<0.1	<0.05	1.7	<0.05	<0.05	<0.5	0.01	9400	<0.3	0.01	0.8	22	<0.03	400	4.3	<0.05	<0.1	5900	2800	0.3	<0.05	570	7.7	<0.003	<0.3	<0.5	0.006	<0.05	44
		PW-24-E1-C1-ES	18/09/12	16		0.054	5.4	0.1	<0.05	1.5	<0.05	<0.05	<0.5	0.04	6600	<0.3	0.009	0.6	20	<0.03	390	2.8	<0.05	<0.05	4800	3600	0.3	<0.05	800	5.1	<0.003	<0.3	<0.5	<0.005	<0.05	43
	Common Shiner	PIN-1-SN1-C1-CS	22/07/11	20	211.8	0.12	34	<0.1	<0.05	18	<0.05	<0.05	<0.5	<0.01	6700	<0.3	0.11	<0.5	54	<0.03	350	26	<0.05	<0.05	3900	2300	0.2	<0.05	620	4.6	<0.003	<0.3	1.4	0.008	0.1	33
		PIN-2-MT1-C1-CS	21/07/11	20	106.4	0.19	2.8	<0.1	<0.05	3	<0.05	<0.05	<0.5	0.01	11000	<0.3	0.01	0.6	25	<0.03	430	9.7	<0.05	<0.1	6000	3100	0.4	<0.05	1100	7.8	<0.003	<0.3	<0.5	0.006	<0.05	55
Unammed Trib. 5	Central Mudminnow	UT5-A-MT-C2-CM	15/07/12	14	74.7	0.056	6.4	<0.1	<0.05	3.6	<0.05	0.06	<0.5	0.01	9000	<0.3	0.05	0.5	45	<0.03	370	7.1	<0.05	<0.1	4600	1700	0.2	<0.05	500	6	<0.003	<0.3	<0.5	0.008	0.05	96
		UT5-A-E1-C1-CM	15/07/12	5	33.1	0.058	25	0.1	<0.05	2	<0.05	<0.05	<0.5	0.06	8800	<0.3	0.14	0.6	77	<0.03	410	7.2	<0.05	<0.1	4900	3000	0.3	<0.05	950	5.7	<0.003	<0.3	1	<0.005	0.1	120
Unnamed Trib. 8A	Central Mudminnow	U8A-1-MT1-C1-CM	11/07/12	31	143.3	0.064	7.3	<0.1	<0.05	1.8	<0.05	<0.05	<0.5	0.01	11000	<0.3	0.07	0.6	56	<0.03	410	6.6	<0.05	<0.1	5600	2900	0.5	<0.05	920	8.3	<0.003	<0.3	<0.5	0.006	<0.05	88
Marr Creek	Pearl Dace	MARR-3-SN1-C1-PD	20/07/11	9	56.3	0.067	7	<0.1	<0.05	2.2	<0.05	<0.05	<0.5	<0.01	8600	<0.3	0.04	1.3	50	<0.03	360	15	<0.05	<0.1	4200	2600	<0.2	<0.05	760	5.7	<0.003	<0.3	<0.5	<0.005	<0.05	32
		MARR-3-MT1-C2-PD	20/07/11	3	35.7	0.16	2.8	<0.1	<0.05	2	<0.05	<0.05	<0.5	0.02	9900	<0.3	0.03	1.4	48	<0.03	450	8	<0.05	<0.1	5300	2800	0.3	<0.05	880	6.7	<0.003	<0.3	<0.5	<0.005	<0.05	47
West Creek Trib. 1	Pearl Dace	WESTRIB-A-E1-C1-PD	11/07/12	12	96.5	0.10	18	<0.1	<0.05	2.2	<0.05	<0.05	<0.5	0.02	5800	<0.3	0.037	1.4	93	<0.03	340	5.7	<0.05	<0.05	3800	3200	0.5	<0.05	910	4.5	<0.003	<0.3	0.9	<0.005	0.09	24
	Central Mudminnow	WESTRIB-A-E1-C2-CM	11/07/12	13	34.3	0.088	4.3	0.2	<0.05	1.9	<0.05	<0.05	<0.5	0.01	9300	<0.3	0.07	0.7	54	<0.03	420	10	<0.05	<0.1	5100	3100	0.4	<0.05	870	4.5	<0.003	<0.3	<0.5	<0.005	0.05	63
Loslo Creek	Finescale Dace	LOS-8-SN1-C2-FD	30/08/12	48	45.0	0.031	17	<0.1	<0.05	3.7	<0.05	<0.05	<0.5	<0.01	13000	<0.3	0.03	1.7	54	0.03	460	13	0.05	<0.1	6700	2800	<0.2	<0.05	940	20	<0.003	<0.3	0.6	0.006	0.07	40
	Brassy Minnow	LOS-1-SN1-C1-BM	24/07/11	11	25.7	0.077	43	0.1	<0.05	14	<0.05	<0.05	<0.5	<0.01	11000	<0.3	0.09	1.5	140	0.03	470	25	0.05	<0.1	5700	2900	0.2	<0.05	720	43	<0.003	<0.3	1.4	0.012	0.15	39
Clark Creek	Brassy Minnow	CLA-2-MT1-C1-BM	23/07/11	10	205.2	0.12	12	<0.1	<0.05	0.9	<0.05	<0.05	<0.5	0.06	8100	<0.3	0.02	1	35	<0.03	350	3.8	<0.05	<0.1	5200	3200	0.4	<0.05	970	5.8	<0.003	<0.3	<0.5	0.009	0.05	26
Blackhawk Creek	Common Shiner	BLA-1-SN1-C1-CS	22/07/11	12	152.1	0.087	4	<0.1	<0.05	0.9	<0.05	<0.05	<0.5	<0.01	7800	<0.3	0.01	0.5	22	<0.03	340	9.7	<0.05	<0.1	4400	2500	0.2	<0.05	620	5.3	<0.003	<0.3	<0.5	<0.005	<0.05	35
Jones Creek	Central Mudminnow	JON-1-MT1-C1-CM	11/07/12	17	121.3	0.069	150	0.1	<0.05	2.4	<0.05	0.1	<0.5	0.02	12000	<0.3	0.21	0.9	210	0.11	450	24	<0.05	0.1	6900	2800	0.3	<0.05	850	8.6	0.006	<0.3	5.3	0.032	0.5	96
Sturgeon Creek	Central Mudminnow	STU-5-MT1-C2-CM	06/09/12	14	74.7	0.081	10	<0.1	<0.05	1.4	<0.05	<0.05	<0.5	0.01	8200	<0.3	0.12	0.8	82	<0.03	380	11	<0.05	<0.1	4700	2800	0.2	<0.05	910	6.3	<0.003	<0.3	0.7	<0.005	<0.05	95
West Creek	Northern Redbelly Dace	WES-2-Pond-MT1-C1-NRD	20/07/11	33	112.4	0.042	38	0.1	<0.05	12	<0.05	<0.05	<0.5	0.02	8400	<0.3	0.09	2.2	120	0.03	380	17	0.1	<0.1	4600	2800	0.3	<0.05	880	17	<0.003	<0.3	1.5	0.007	0.14	60

RDL = Reportable Detection Limit

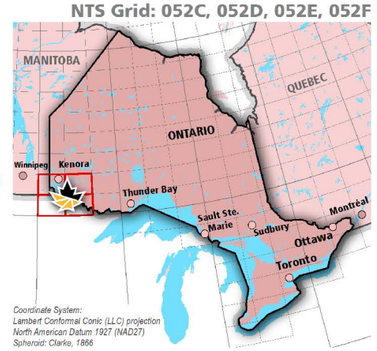
APPENDIX I

RRR WATER QUALITY DATA

RAINY RIVER PROJECT
Rainy River Resources Ltd.

SURFACE WATER SAMPLING LOCATIONS

NTS Grid: 052C, 052D, 052E, 052F



Coordinate System:
Lambert Conformal Conic (LLC) projection
North American Datum 1927 (NAD27)
Spheroid: Clarke, 1866

400000 410000 420000 430000 440000

5410000 5400000 5390000

ARBOR VITAE
CRANBERRY LAKE PROVINCIAL NATURE RESERVE
Pratt
Sutherland
Kishkakoesis River
NORTH BRANCH
Sifton
Richardson
Rock River East Branch
Mud Lake
Little Pine Lake
Boundary Lake
Tina Lake
Off Lake
Potts
Muskrat Lake
FINLAND
GAMELAND
Cranberry Lake
SUTHERLAND 2 ROAD
BLUE 7 ROAD
DEARLOCK
Pinewood River
SPRUCE ISLANDS PROVINCIAL PARK
Nelles
Blue
BLUE 4 ROAD
BLUE 3 ROAD
BLUE 2 ROAD
NEILSON ROAD
BROWN ROAD
Pattullo
Tait
Mather
Sturgeon Creek
Bunting Creek
Dilke
MORLEY PATTULLO ROAD WEST
MOSHER ROAD
MATHER ROAD
Chapple
Mather Creek
WOOD
SLEEMAN
Worthington
COLONIZATION ROAD
Sleeman Creek
Cemetery Creek
PINEWOOD
ADVENT ROAD
WEIR ROAD
FEHER ROAD
SHENSTON
TAYLOR ROAD
PENNEY ROAD
BALL ROAD
DEVELOPMENT ROAD
Morley
Shenston
Dobie
CAMERON ROAD
Cameron Creek
STRATTON
WOOLSEY ROAD
MCCULLOCH ROAD
STEINER ROAD
ANDERSON ROAD
MANDERS
Morley Additional
Roseberry
LONG SAULT 12
LONGSAULT RAPIDS
RIVER ROAD
HIGHWAY 11
BARWICK
Barwick
MANITOU RAPIDS 11
MANITOU RAPIDS
Manitou Creek
Everett Creek
Couchie Creek
EMO
Rainy River (rivière à la Pluie)
SW 1A
SW 2
SW 3
SW 4
SW 7A
SW 10
SW 11
SW 12 A
SW 13
SW 14
SW 15
SW 16
SW 17
SW 18
OFF LAKE CORNER
BLACK HAWK
TEEPLE ROAD
WESTRA ROAD
WHITE ROAD
KORPI ROAD
LAMPI ROAD
MAKI ROAD
ROEN ROAD
CLARK ROAD
GALLINGER ROAD
HEATWOLE ROAD
ATKINSON ROAD
MOULTON ROAD
HUNSPERGER ROAD
EMO ROAD
PINE RIVER ROAD
RICHARDSON ROAD
PHANTOM ROAD
BOUNDARY LAKE ROAD
MARR ROAD
SMITH ROAD
JOHNSTON ROAD
MORLEY DILKE ROAD
WORTHINGTON DILKE ROAD
GRAHAM ROAD
SCHRAM ROAD
ELSTAD ROAD
MORLEY CHAPPLE ROAD
OLSON ROAD
BOLEN ROAD NORTH
BARWICK ROAD
ANGUS ROAD
VANHEST ROAD
CATES ROAD
OFF LAKE ROAD
HAYES ROAD
HELE ROAD
HUZLAK ROAD
SHAW ROAD
BOUCHERVILLE ROAD
OTT ROAD
CAVE ROAD
SIMDWALL ROAD
CLEMENT CREEK
Sims Creek
Mathers Creek
Highway 621
Highway 619
Highway 617
Highway 600
Highway 615
Highway 71
Highway 602
MN 11

SURFACE WATER SAMPLING LOCATION

TRANSPORTATION & OTHER FEATURES
- HIGHWAY
- ARTERIAL ROAD
- LOCAL ROAD, STREET
- RESOURCE, RECREATION ROAD
- OTHER ROAD SEGMENT (MNR)
- DIGITIZED ROAD SEGMENT
- ELEVATION CONTOUR (5M INTERVAL)
- BUILDING LOCATION

HYDROLOGY FEATURES
- BEAVER DAM (ALTERED)
- LARGE WATERBODY
- WATERCOURSE
- VIRTUAL FLOW SEGMENT ALTERED
- WETLAND
- QUATERNARY WATERSHED BOUNDARY

326 Metres (m) a.s.l. 426

0 2 4 6 8
Kilometers

Coordinate System:
North American Datum (NAD) 1983
Universal Transverse Mercator (UTM) Zone 15N

Natural Resources Canada, ©2010
National Topographic Data Base

RAINY RIVER

F:\MAP DOCUMENTS\RAINY RIVER PROJECT\2011-08-31 HYDROLOGY, WATER SAMPLING (ALYSON)\SURFACE WATER SAMPLING LOCATIONS (DYNAMIC LABELS) 11X17_NEW.MXD

APPENDIX I
2012 SURFACE WATER ANALYTICAL RESULTS

		pH	Conductivity	Hardness as $CaCO_3$	Dissolved Organic Carbon	TSS	Total Ammonia-N	Fluoride	Nitrate	Nitrite	Cyanide-Total	Aluminum-Dissolved	Aluminum-Total	Antimony-Total	Arsenic-Total	Boron-Total	Cadmium-Total	Chromium-Total	Cobalt-Total	Copper-Total	Iron-Total	Lead-Total	Mercury-Total	Molybdenum-Total	Nickel-Total	Phosphorus-Total	Selenium-Total	Thallium-Total	Uranium-Total	Vanadium-Total	Zinc-Total
PWQO		6.5-8.5	-	-	-	-	-	-	-	-	0.005[A]	0.075[LB]	-	0.02[I]	0.1(0.005[I])	0.2[I]	0.0002	0.001 / 0.0089[E]	0.0009	0.005 (0.005[I])[F]	0.3	0.020 / 0.025 (0.003 / 0.005[I])[H]	0.0002	0.04[I]	0.025	0.03[I]	0.1	0.0003[I]	0.005[I]	0.006[I]	0.03(0.02[I])
CEQG		6.5-9.0	-	-	-	-	-	0.12	3	0.06	0.005[A]		0.1[C]	-	0.005	1.5	0.000015-0.000088[D]	0.001 / 0.0089[E]	-	0.002 - 0.00622[G]	0.3	0.00102 - 0.01343	0.000026	0.073[J]	0.025[J]	-	0.001	0.0008	0.015	-	0.03
RDL		0.10	3.0	5.0	1.0	2.0	0.020	0.030	0.030	0.020	0.0020	0.0050	0.0050	0.00010 / 0.00060 / 0.0050	0.0010	0.050	0.000010 / 0.000017 / 0.000090[D*]	0.00050 / 0.0010	0.00050	0.00070 / 0.0010	0.020	0.00010 / 0.0010	0.000010 / 0.0010	0.00020 / 0.0010	0.0020	0.0050	0.00050 / 0.0010	0.000030 / 0.00030	0.0050	0.0010	0.0020 / 0.0030
		pH units	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
SW1A	10-Jan-12	7.51	524.0	300.0	24.2	12.8	0.060	0.076	<0.030	<0.020	<0.0020	0.0053	**0.278**	<0.00010	0.0013	0.023	0.000013	<0.00050	0.00047	0.00093	**0.942**	0.00025	<0.000010	0.00035	0.0022	**0.063**	<0.00050	<0.000030	0.0014	0.00081	0.0032
	15-Feb-12	7.58	383.0	206.0	17.8	18.2	0.134	0.037	0.046	<0.020	<0.0020	0.0041	**0.410**	<0.00010	0.0010	0.024	0.000012	0.00068	0.00041	0.0010	**0.929**	0.00036	<0.000010	0.00030	0.0016	**0.066**	<0.00050	<0.000030	0.00057	0.0012	0.02
	20-Mar-12	7.38	188.0	79.0	11.1	25.1	0.085	<0.030	0.795	<0.020	<0.0020	0.010	**0.241**	<0.00010	0.0007	0.013	0.000021	0.00070	0.00050	0.0013	**0.595**	0.00029	<0.000010	0.00062	0.0013	**0.099**	<0.00050	<0.000030	0.00041	0.0013	0.0039
	19-Apr-12	7.75	245.0	116.0	18.9	8.3	<0.020	0.046	<0.030	<0.020	<0.0020	0.015	**0.215**	<0.00010	0.0009	0.014	0.000010	0.00064	0.00023	0.0015	**0.427**	0.00019	<0.000010	0.00049	0.0016	0.0279	<0.00050	<0.000030	0.00046	0.0011	0.0030
	23-May-12	7.95	331.0	172.0	21.0	11.0	<0.020	0.068	0.044	<0.020	<0.0020	0.0053	0.083	<0.00060	0.0018	<0.050	<0.000017	<0.0010	<0.00050	0.0011	**0.398**	<0.0010	<0.00010	<0.0010	0.0079	**0.056**	<0.0010	<0.00030	<0.0050	0.0011	0.0030
	21-Jun-12	7.68	358.0	183.0	17.6	11.7	0.037	0.073	<0.030	<0.020	<0.0020	<0.010	**0.345**	<0.0050	0.0027	<0.050	*<0.000090*	<0.00050	<0.00050	<0.0010	**0.554**	<0.0010	<0.000010	<0.0010	<0.0020	**0.109**	0.00056	<0.00030	<0.0050	0.0017	<0.0030
	24-Jul-12	7.90	418.0	227.0	27.3	6.5	<0.020	0.048	<0.030	<0.020	<0.0020	<0.0050	0.051	<0.00060	0.0028	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.402**	<0.0010	<0.000010	<0.0010	<0.0020	**0.061**	<0.0010	<0.00030	<0.0050	<0.0010	0.0031
	15-Aug-12	7.92	379.0	209.0	23.0	4.9	<0.020	0.097	<0.030	<0.020	<0.0020	<0.0050	0.063	<0.00060	0.0021	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.462**	<0.0010	<0.000010	<0.0010	<0.0020	**0.057**	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	17-Sep-12	7.90	435.0	231.0	19.9	35.0	<0.020	0.103	<0.030	<0.020	<0.0020	<0.0050	**0.365**	<0.00060	0.0015	<0.050	<0.000017	0.0012	<0.00050	<0.0010	**0.545**	<0.0010	<0.000010	<0.0010	0.0023	**0.039**	<0.0010	<0.00030	<0.0050	0.0012	0.0033
	22-Oct-12	7.96	418.0	220.0	18.7	39.5	<0.020	0.107	<0.030	<0.020	<0.0020	<0.0050	**0.521**	<0.00060	0.0017	<0.050	0.000020	<0.0010	0.00054	0.0013	**0.790**	<0.0010	<0.000010	<0.0010	0.0022	**0.119**	<0.0010	<0.00030	<0.0050	0.0018	0.0045
	14-Nov-12	7.91	444.0	213.0	18.0	5.7	<0.020	0.087	<0.030	<0.020	<0.0020	<0.0050	0.0757	<0.00060	0.0011	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.266**	<0.0010	<0.000010	<0.0010	<0.0020	**0.0363**	<0.0010	<0.00030	<0.0050	<0.0010	0.0036
	Min	7.38	188.0	79.0	11.1	4.9	0.020	0.030	0.030	0.020	0.0020	0.0041	0.051	0.00010	0.00068	0.013	0.000010	0.00050	0.00023	0.00093	**0.266**	0.00019	0.000010	0.00030	0.0013	0.0279	0.00050	0.000030	0.00041	0.00081	0.0030
	Max	7.96	524.0	300.0	27.3	39.5	0.13	0.107	0.795	0.020	0.0020	0.015	**0.521**	**0.0050**	0.0028	0.050	0.000090	0.00120	0.00054	0.0015	**0.942**	0.0010	0.00010	0.0010	0.0079	**0.119**	0.0010	0.00030	0.0050	0.0018	0.02
	Median	7.90	383.0	209.0	18.9	11.7	0.020	0.073	0.030	0.020	0.0020	0.0050	**0.241**	0.00060	0.0015	0.050	0.000017	0.00100	0.00050	0.0010	**0.545**	0.0010	0.000010	0.0010	0.0020	**0.061**	0.00100	0.00030	0.0050	0.0011	0.0032
	St Dev.	0.20	94.0	59.1	4.2	12.0	0.037	0.027	0.230	0	0	0.0035	0.160	0.0014	0.00071	0.016	0.000023	0.00024	0.000086	0.00019	0.223	0.00037	0.000027	0.00029	0.0018	0.0301	0.00026	0.00014	0.0022	0.00030	0.0060
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.92	426.5	223.5	22.0	21.7	0.049	0.092	0.037	0.020	0.0020	0.0077	**0.355**	0.00060	0.0020	0.050	0.000019	0.0010	0.00050	0.0012	**0.693**	0.0010	0.000010	0.0010	0.0022	**0.082**	0.0010	0.00030	0.0050	0.0013	0.0038
SW2	10-Jan-12	7.53	314.0	194.0	22.2	6.1	0.054	0.044	0.031	<0.020	<0.0020	0.0083	**0.215**	<0.00010	0.0012	0.009	0.000019	<0.00050	0.00038	0.0013	**0.935**	0.00028	<0.000010	0.00032	0.0019	**0.035**	<0.00050	<0.000030	0.00065	0.0012	0.0033
	20-Mar-12	7.61	146.0	72.1	10.2	142.0	0.088	<0.030	0.383	<0.020	<0.0020	0.015	**0.610**	<0.00010	0.0008	0.009	**0.000038**	0.0014	0.0010	**0.0029**	**1.03**	0.0012	<0.000010	0.00036	0.0023	**0.126**	<0.00050	<0.000030	0.00039	0.0032	0.0083
	19-Apr-12	7.82	170.0	89.1	18.6	4.6	<0.020	0.048	<0.030	<0.020	<0.0020	0.021	**0.124**	<0.00010	0.0005	0.008	<0.000010	<0.00050	0.00015	0.0011	**0.333**	0.00012	<0.000010	0.00031	0.0012	0.0128	<0.00050	<0.000030	0.00030	0.00089	0.0022
	23-May-12	8.17	311.0	179.0	15.5	25.4	0.029	0.074	<0.030	<0.020	<0.0020	0.0051	**0.137**	<0.00060	0.0012	<0.050	0.000019	<0.0010	<0.00050	0.0016	**0.309**	<0.0010	<0.00010	<0.0010	0.0029	**0.049**	<0.0010	<0.00030	<0.0050	0.0013	<0.0030
	21-Jun-12	8.01	273.0	151.0	19.4	4.1	<0.020	0.062	<0.030	<0.020	<0.0020	0.010	**0.150**	<0.0050	0.0017	<0.050	*<0.000090*	<0.00050	<0.00050	0.0011	**0.358**	<0.0010	<0.000010	<0.0010	<0.0020	0.0282	0.00049	<0.00030	<0.0050	0.0014	<0.0030
	15-Aug-12	8.04	389.0	223.0	17.6	4.0	0.025	0.076	<0.030	<0.020	<0.0020	<0.0050	0.059	<0.00060	0.0015	<0.050	<0.000017	<0.0010	<0.00050	0.0013	0.174	<0.0010	<0.000010	<0.0010	<0.0020	**0.048**	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	22-Oct-12	8.16	383.0	205.0	14.4	7.2	<0.020	0.074	<0.030	<0.020	<0.0020	<0.0050	**0.112**	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	0.0017	0.254	<0.0010	<0.000010	<0.0010	<0.0020	**0.081**	<0.0010	<0.00030	<0.0050	0.0010	<0.0030
	14-Nov-12	8.08	238.0	121.0	16.6	<2.0	<0.020	0.045	<0.030	<0.020	<0.0020	0.0058	<0.090	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	0.230	<0.0010	<0.000010	<0.0010	<0.0020	0.0134	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	Min	7.53	146.0	72.1	10.2	2.0	0.020	0.030	0.030	0.02	0.0020	0.0050	0.059	0.00010	0.00053	0.0077	0.000010	0.00050	0.00015	0.0010	0.174	0.00012	0.000010	0.00031	0.0012	0.0128	0.00049	0.000030	0.00030	0.00089	0.0022
	Max	8.17	389.0	223.0	22.2	142.0	0.088	0.076	0.383	0.02	0.0020	0.021	**0.610**	0.0050	0.0017	0.050	0.000090	0.0014	0.0010	0.0029	**1.03**	0.0012	0.00010	0.0010	0.0029	**0.126**	0.0010	0.00030	0.0050	0.0032	0.0083
	Median	8.03	292.0	165.0	17.1	5.4	0.023	0.055	0.030	0.02	0.0020	0.0071	**0.131**	0.0006	0.0011	0.050	0.000018	0.0010	0.00050	0.0013	**0.321**	0.0010	0.000010	0.0010	0.0020	**0.042**	0.00075	0.00030	0.0050	0.0011	0.0030
	St Dev.	0.25	89.8	55.6	3.6	48.1	0.025	0.017	0.125	0.00	0	0.0057	0.177	0.0017	0.00038	0.0215	0.000026	0.00032	0.00023	0.0006	0.333	0.00040	0.000032	0.00035	0.0005	0.038	0.00027	0.00014	0.0024	0.00076	0.0019
	N	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	75th %	8.10	331.3	196.8	18.8	11.8	0.035	0.074	0.030	0.02	0.0020	0.011	**0.166**	0.0006	0.0013	0.050	0.000024	0.0010	0.00050	0.0016	**0.502**	0.0010	0.000010	0.0010	0.0021	**0.057**	0.0010	0.00030	0.0050	0.0013	0.0031
SW3	10-Jan-12	7.27	567.0	322.0	25.4	26.0	0.069	0.093	<0.030	<0.020	<0.0020	0.0039	**0.584**	<0.00010	0.0037	0.020	0.000034	<0.00050	0.0047	0.0012	**3.72**	0.00054	<0.000010	0.00043	0.0038	**0.183**	<0.00050	<0.000030	0.0011	0.0021	0.0099
	15-Feb-12	7.67	780.0	450.0	27.1	11.6	0.467	0.103	<0.030	<0.020	<0.0020	<0.0030	0.082	<0.00010	0.0032	0.025	0.000011	<0.00050	0.0043	<0.00070	**1.76**	0.00014	<0.000010	0.00041	0.0034	**0.142**	<0.00050	<0.000030	0.0010	0.00071	0.0061
	20-Mar-12	7.40	181.0	83.0	10.8	35.9	0.047	<0.030	0.381	<0.020	<0.0020	0.010	**0.456**	<0.00010	0.0007	0.015	0.000024	0.0011	0.00057	0.0015	**0.843**	0.00040	<0.000010	0.00068	0.0016	**0.114**	<0.00050	<0.000030	0.00042	0.0019	0.0034
	19-Apr-12	7.30	250.0	115.0	17.7	14.5	<0.020	0.061	<0.030	<0.020	<0.0020	0.014	**0.176**	<0.00010	0.0009	0.012	0.000012	0.00054	0.00022	0.0014	**0.366**	0.00018	0.000012	0.00053	0.0015	0.0292	<0.00050	<0.000030	0.00062	0.0011	0.0030
	23-May-12	8.02	346.0	186.0	20.1	10.1	0.024	0.084	0.031	<0.020	<0.0020	0.009	**0.386**	<0.00060	0.0020	<0.050	0.000028	0.0042	<0.00050	0.0015	**0.741**	<0.0010	<0.00010	0.0015	0.0049	**0.063**	<0.0010	<0.00030	<0.0050	0.0019	0.0035
	21-Jun-12	7.86	352.0	186.0	21.9	13.5	<0.020	0.076	<0.030	<0.020	<0.0020	0.013	**0.208**	<0.0050	0.0023	<0.050	*<0.000090*	<0.00050	<0.00050	0.0013	**0.429**	<0.0010	<0.000010	<0.0010	<0.0020	**0.069**	<0.00040	<0.00030	<0.0050	0.0014	<0.0030
	24-Jul-12	8.21	356.0	204.0	25.6	45.2	<0.020	0.063	<0.030	<0.020	<0.0020	0.025	**1.02**	<0.00060	**0.0074**	<0.050	0.000030	0.0019	0.0010	0.0027	**1.460**	0.0010	<0.000010	<0.0010	0.0043	**0.144**	<0.0010	<0.00030	<0.0050	0.0047	0.0064
	15-Aug-12	8.22	343.0	195.0	21.8	12.4	<0.020	0.103	0.059	<0.020	<0.0020	0.0088	**0.382**	<0.00060	0.0033	<0.050	<0.000017	<0.0010	<0.00050	0.0022	**0.432**	<0.0010	<0.000010	<0.0010	0.0024	**0.074**	<0.0010	<0.00030	<0.0050	0.0020	0.0040
	17-Sep-12	8.21	364.0	212.0	18.2	10.3	<0.020	0.106	<0.030	<0.020	<0.0020	0.0082	**0.750**	<0.00060	0.0035	<0.050	**0.000073**	0.0011	0.00079	0.0024	**0.767**	<0.0010	<0.000010	<0.0010	0.0032	**0.050**	<0.0010	<0.00030	<0.0050	0.0026	0.0063
	22-Oct-12	7.95	374.0	194.0	16.8	8.1	<0.020	0.085	<0.030	<0.020	<0.0020	0.0066	**0.217**	<0.00060	0.0016	<0.050	<0.000017	<0.0010	<0.00050	0.0013	0.290	<0.0010	<0.000010	<0.0010	<0.0020	**0.047**	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	14-Nov-12	7.97	419.0	207.0	18.2	14.8	<0.020	0.092	<0.030	<0.020	<0.0020	<0.0050	**0.365**	<0.00060	0.0013	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.687**	<0.0010	<0.000010	<0.0010	0.0023	**0.0524**	<0.0010	<0.00030	<0.0050	0.0012	0.0037
	Min	7.27	181.0	83.0	10.8	8.1	0.020	0.030	0.030	0.020	0.0020	0.0030	0.082	0.00010	0.00074	0.012	0.000011	0.0005	0.00022	0.00070	0.290	0.00014	0.000010	0.00041	0.0015	0.0292	0.00040	0.000030	0.00042	0.00071	0.0030
	Max	8.22	780.0	450.0	27.1	45.2	0.47	0.106	0.381	0.020	0.0020	0.025	**1.02**	0.0050	**0.0074**	0.050	0.000090	0.0042	0.0047	**0.0027**	**3.72**	0.0010	0.00010	0.0015	0.0049	**0.183**	0.0010	0.00030	0.0050	0.0047	0.0099
	Median	7.95	356.0	195.0	20.1	13.5	0.020	0.085	0.030	0.020	0.0020	0.0088	**0.382**	0.00060	0.0023	0.050	0.000024	0.0010	0.00050	0.0014	**0.741**	0.0010	0.000010	0.0010	0.0024	**0.069**	0.00100	0.00030	0.0050	0.0019	0.0037
	St Dev.	0.36	159.7	98.4	4.7	12.1	0.13	0.023	0.105	0	0	0.0062	0.276	0.0014	0.0019	0.016	0.000026	0.0011	0.0016	0.00061	1.00	0.00036	0.000027	0.00032	0.0011	0.050	0.00027	0.00014	0.0021	0.0011	0.0022
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	8.12	396.5	209.5	23.7	20.4	0.036	0.098	0.031	0.020	0.0020	0.012	**0.520**	0.00060	0.0034	0.050	0.000032	0.0011	0.00091	**0.0019**	**1.15**	0.0010	0.000010	0.0010	0.0036	**0.128**	0.0010	0.00030	0.0050	0.0021	0.0062
SW4	10-Jan-12	6.88	138.0	68.6	21.8	5.8	0.113	0.038	0.051	<0.020	<0.0020	0.010	**0.123**	<0.00010	0.00055	0.009	<0.000010	<0.00050	0.00023	<0.00070	**0.375**	0.00013	<0.000010	<0.00020	<0.0010	0.0241	<0.00050	<0.000030	0.000027	<0.00020	0.0034
	15-Feb-12	6.96	168.0	78.1	24.6	4.5	0.199	0.034	0.058	<0.020	<0.0020	0.010	0.056	<0.00010	0.00063	0.011	<0.000010	<0.00050	0.00020	<0.00070	**0.337**	<0.00010	<0.000010	<0.00020	<0.0010	0.0217	<0.00050	<0.000030	0.000012	0.00022	0.0061
	20-Mar-12	6.64	109.0	34.9	8.3	5.7	0.093	<0.030	0.032	<0.020	<0.0020	0.0056	0.037	<0.00010	0.00030	0.0056	**0.000029**	<0.00050	0.00016	<0.00070	0.192	0.00012	<0.000010	<0.00020	<0.0010	0.0207	<0.00050	0.000062	0.000013	<0.00020	0.0024
	19-Apr-12	7.07	110.0	47.7	15.3	4.9	0.021	<0.030	<0.030	<0.020	<0.0020	0.010	0.060	<0.00010	0.00043	0.0051	**0.000025**	<0.00050	0.000085	<0.00070	0.170	0.00017	<0.000010	<0.00020	<0.0010	0.0123	<0.00050	<0.000030	0.000013	0.00028	0.0024
	23-May-12	7.32	124.0	55.2	16.1	3.1	0.040	<0.030	<0.030	<0.020	<0.0020	0.0089	0.021	<0.00060	<0.0010	<0.050	<0.000017	0.0026	<0.00050	<0.0010	0.199	<0.0010	<0.00010	<0.0010	<0.0020	0.0138	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	21-Jun-12	6.97	127.0	57.0	13.8	3.8	<0.020	<0.030	<0.030	<0.020	<0.0020	<0.010	0.064	<0.0050	<0.0010	<0.050	*<0.000090*	<0.00050	<0.00050	<0.0010	0.280	<0.0010	<0.000010	<0.0010	<0.0020	0.0176	<0.00040	<0.00030	<0.0050	<0.0010	<0.0030
	24-Jul-12	7.29	155.0	72.6	21.7	4.3	<0.020	<0.030	0.037	<0.020	<0.0020	0.0066	0.018	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.380**	<0.0010	<0.000010	<0.0010	<0.0020	0.0184	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	15-Aug-12	7.24	156.0	65.2	13.8	3.2	<0.020	0.037	<0.030	<0.020	<0.0020	0.028	0.040	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.415**	<0.0010	<0.000010	<0.0010	<0.0020	0.0173	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	17-Sep-12	7.17	150.0	68.4	13.0	7.1	<0.020	0.038	<0.030	<0.020	<0.0020	0.0072	0.078	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	0.226	<0.0010	<0.000010	<0.0010	<0.0020	0.0197	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	22-Oct-12	7.29	141.0	56.1	13.2	12.0	0.026	0.037	<0.030	<0.020	<0.0020	0.0094	**0.173**	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.401**	<0.0010	<0.000010	<0.0010	<0.0020	**0.030**	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	14-Nov-12	7.05	125.0	51.8	15.8	7.8	0.027	<0.030	<0.030	<0.020	<0.0020	<0.0086	0.244	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	0.001	**0.464**	<0.0010	<0.000010	<0.0010	<0.0020	0.0206	<0.0010	<0.00030	<0.0050	<0.0010	0.0034
	Min	6.64	109.0	34.9	8.3	3.1	0.020	0.030	0.030	0.020	0.0020	0.0056	0.018	0.00010	0.00030	0.0051	0.000010	0.00050	0.000085	0.00070	0.170	0.00010	0.000010	0.00020	0.0010	0.0123	0.00040	0.000030	0.000012	0.00020	0.0024
	Max	7.32	168.0	78.1	24.6	12.0	0.20	0.038	0.058	0.020	0.0020	0.028	**0.244**	0.0050	0.0010	0.050	*0.000090*	0.0026	0.00050	0.0010	**0.464**	0.0010	0.00010	0.0010	0.0020	**0.030**	0.0010	0.00030	0.0050	0.0010	0.0061
	Median	7.07	138.0	57.0	15.3	4.9	0.026	0.030	0.030	0.020	0.0020	0.009	0.060	0.00060	0.0010	0.050	0.000017	0.00100	0.00050	0.0010	**0.337**	0.0010	0.000010	0.0010	0.0020	0.0197	0.00100	0.00030	0.0050	0.0010	0.0030
	St Dev.	0.21	19.4	12.5	4.8	2.6	0.058	0.004	0.010	0	0	0.0061	0.070	0.0014	0.00028	0.021	0.000023	0.00061	0.00017	0.00015	0.103	0.00044	0.000027	0.00040	0.00050	0.00487	0.00027	0.000132	0.0025	0.00039	0.0010
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.27	152.5	68.5	18.9	6.5	0.067	0.037	0.035	0.020	0.0020	0.010	**0.100**	0.00060	0.0010	0.050	0.000021	0.0010	0.00050	0.0010	**0.391**	0.0010	0.000010	0.0010	0.0020	0.0212	0.0010	0.00030	0.0050	0.0010	0.0032

APPENDIX I
2012 SURFACE WATER ANALYTICAL RESULTS

		pH	Conductivity	Hardness as $CaCO_3$	Dissolved Organic Carbon	TSS	Total Ammonia-N	Fluoride	Nitrate	Nitrite	Cyanide-Total	Aluminum-Dissolved	Aluminum-Total	Antimony-Total	Arsenic-Total	Boron-Total	Cadmium-Total	Chromium-Total	Cobalt-Total	Copper-Total	Iron-Total	Lead-Total	Mercury-Total	Molybdenum-Total	Nickel-Total	Phosphorus-Total	Selenium-Total	Thallium-Total	Uranium-Total	Vanadium-Total	Zinc-Total
PWQO		6.5-8.5	-	-	-	-	-	-	-	-	0.005[A]	0.075[LB]	-	0.02[I]	0.1(0.005[I])	0.2[I]	0.0002	0.001 / 0.0089[E]	0.0009	0.005 (0.005[I])[F]	0.3	0.020 / 0.025 (0.003 / 0.005[I])[H]	0.0002	0.04[I]	0.025	0.03[I]	0.1	0.0003[I]	0.005[I]	0.006[I]	0.03(0.02[I])
CEQG		6.5-9.0	-	-	-	-	-	0.12	3	0.06	0.005[A]		0.1[C]	-	0.005	1.5	0.000015-0.000088[D]	0.001 / 0.0089[E]	-	0.002 - 0.00622[G]	0.3	0.00102 - 0.01343	0.000026	0.073[I]	0.025[J]	-	0.001	0.0008	0.015	-	0.03
RDL		0.10	3.0	5.0	1.0	2.0	0.020	0.030	0.030	0.020	0.0020	0.0050	0.0050	0.00010 / 0.00060 / 0.0050	0.0010	0.050	0.000010 / 0.000017 / 0.000090[D*]	0.00050 / 0.0010	0.00050	0.00070 / 0.0010	0.020	0.00010 / 0.0010	0.000010 / 0.0010	0.00020 / 0.0010	0.0020	0.0050	0.00050 / 0.0010	0.000030 / 0.00030	0.0050	0.0010	0.0020 / 0.0030
		pH units	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
SW7A	10-Jan-12	7.78	829.0	462.0	22.1	21.6	1.36	0.100	<0.030	<0.020	<0.0020	<0.030	**0.214**	<0.00010	0.0022	0.023	0.000018	<0.00050	0.0012	0.0010	**1.54**	0.00017	<0.000010	0.0018	0.0022	**0.139**	<0.00050	<0.000030	0.0041	0.00082	0.0043
	20-Mar-12	7.58	239.0	113.0	12.1	34.6	0.087	<0.030	0.262	<0.020	<0.0020	0.0081	**0.710**	<0.00010	0.00082	0.016	0.000031	0.0017	0.00065	0.0022	**1.12**	0.00057	<0.000010	0.0012	0.0020	**0.106**	<0.00050	0.000046	0.00070	0.0029	0.0051
	19-Apr-12	7.89	293.0	134.0	15.8	19.6	<0.020	0.065	<0.030	<0.020	<0.0020	0.010	**0.344**	<0.00010	0.00085	0.012	0.000015	0.00079	0.00031	0.0018	**0.593**	0.00029	<0.000010	0.00086	0.0017	0.0196	<0.00050	<0.000030	0.00093	0.0016	0.0043
	23-May-12	8.29	430.0	237.0	14.9	2.8	0.042	0.085	<0.030	<0.020	<0.0020	0.0050	0.053	<0.00060	0.0013	<0.050	<0.000017	<0.0010	<0.00050	0.0011	0.217	<0.0010	<0.00010	0.0018	0.0034	0.0250	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	21-Jun-12	8.12	414.0	224.0	18.8	2.2	0.021	0.085	<0.030	<0.020	<0.0020	<0.010	0.098	<0.0050	0.0016	<0.050	*<0.000090*	<0.00050	<0.00050	0.0014	0.245	<0.0010	<0.000010	0.0012	<0.0020	**0.051**	0.00052	<0.00030	<0.0050	0.0012	<0.0030
	15-Aug-12	8.10	461.0	256.0	12.9	2.0	0.216	0.095	0.044	<0.020	<0.0020	<0.0050	0.030	<0.00060	0.0021	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.412**	<0.0010	<0.000010	0.0016	<0.0020	**0.109**	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	22-Oct-12	8.09	496.0	252.0	12.1	6.8	<0.020	0.093	<0.030	<0.020	<0.0020	<0.0050	0.0454	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	0.0013	0.096	<0.0010	<0.000010	0.0011	<0.0020	**0.073**	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	14-Nov-12	8.1	397.0	197.0	16.2	60.5	<0.020	0.054	<0.030	<0.020	<0.0020	<0.0050	**0.387**	<0.00060	<0.0010	<0.050	0.000019	<0.0010	<0.00050	0.0014	**0.601**	<0.0010	<0.000010	<0.0010	<0.0020	**0.0441**	<0.0010	<0.00030	<0.0050	0.0014	0.0059
	Min	7.58	239.0	113.0	12.1	2.0	0.020	0.030	0.030	0.020	0.0020	0.0050	0.030	0.00010	0.00082	0.012	0.000015	0.00050	0.00031	0.00099	0.096	0.00017	0.000010	0.00086	0.0017	0.0196	0.00050	0.000030	0.00070	0.00082	0.0030
	Max	8.29	829.0	462.0	22.1	60.5	1.36	0.100	0.262	0.020	0.0020	0.030	**0.710**	0.0050	0.0022	0.050	0.000090	0.0017	0.0012	0.0022	**1.54**	0.0010	0.00010	0.0018	0.0034	**0.139**	0.0010	0.00030	0.0050	0.0029	0.0059
	Median	8.10	422.0	230.5	15.4	13.2	0.032	0.085	0.030	0.020	0.0020	0.0066	**0.156**	0.00060	0.0012	0.050	0.000018	0.0010	0.00050	0.0014	**0.503**	0.0010	0.000010	0.0012	0.0020	**0.062**	0.00076	0.00030	0.0050	0.0011	0.0037
	St Dev.	0.23	177.0	106.2	3.5	20.5	0.46	0.024	0.081	0	0	0.0085	0.236	0.0017	0.00054	0.017	0.000026	0.00036	0.00025	0.00042	0.495	0.00036	0.000032	0.00036	0.00052	0.043	0.00026	0.00014	0.00190	0.00067	0.00113
	N	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	75th %	8.11	469.8	253.0	16.9	24.9	0.12	0.094	0.034	0.020	0.0020	0.010	**0.355**	0.00060	0.0017	0.050	0.000022	0.0010	0.00054	0.00151	**0.731**	0.0010	0.000010	0.0016	0.0021	**0.107**	0.0010	0.00030	0.0050	0.0015	0.0045
SW10	10-Jan-12	7.55	442.0	239.0	23.9	29.8	0.060	0.064	<0.030	<0.020	<0.0020	0.0056	**0.778**	<0.00010	0.0016	0.026	0.000029	<0.00050	0.00116	0.0012	**1.91**	0.00060	<0.000010	0.00035	0.0027	**0.095**	<0.00050	<0.000030	0.0011	0.0024	0.0065
	15-Feb-12	7.61	344.0	185.0	17.2	1340.0	0.219	<0.030	0.056	<0.020	<0.0020	0.0036	**32.3**	<0.00010	**0.013**	0.048	**0.00074**	0.062	0.022	**0.036**	**42.3**	**0.023**	<0.000010	0.0011	0.051	**1.400**	**0.0028**	0.00039	0.0030	**0.072**	**0.20**
	20-Mar-12	7.29	167.0	71.1	12.7	23.9	0.098	<0.030	0.606	<0.020	<0.0020	0.017	**0.295**	<0.00010	0.00064	0.014	0.000023	0.00081	0.00055	0.0012	**0.675**	0.00030	<0.000010	0.00050	0.0013	**0.084**	<0.00050	0.000031	0.00032	0.0014	0.0038
	19-Apr-12	7.61	224.0	101.0	23.2	9.3	0.037	0.056	<0.030	<0.020	<0.0020	0.020	**0.145**	<0.00010	0.00086	0.013	<0.000010	0.00055	0.00019	0.0014	**0.361**	0.00014	<0.000010	0.00046	0.0015	0.0243	<0.00050	<0.000030	0.00039	0.00095	0.0025
	23-May-12	7.98	318.0	165.0	22.9	4.3	0.047	0.080	<0.030	<0.020	<0.0020	0.0075	0.069	<0.00060	0.0016	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	0.287	<0.0010	<0.00010	<0.0010	0.0030	**0.046**	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	21-Jun-12	7.86	363.0	188.0	22.6	2.8	0.027	0.065	<0.030	<0.020	<0.0020	<0.010	0.088	<0.0050	0.0025	<0.050	*<0.000090*	<0.00050	<0.00050	<0.0010	**0.338**	<0.0010	<0.000010	<0.0010	<0.0020	**0.082**	<0.00040	<0.00030	<0.0050	<0.0010	<0.0030
	24-Jul-12	7.97	349.0	200.0	33.2	5.6	<0.020	0.094	0.099	<0.020	<0.0020	<0.0050	0.048	<0.00060	0.0036	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.323**	<0.0010	<0.000010	<0.0010	0.0021	**0.103**	<0.0010	<0.00030	<0.0050	<0.0010	0.010
	15-Aug-12	7.97	352.0	199.0	23.0	10.6	0.021	0.096	<0.030	<0.020	<0.0020	<0.0050	0.029	<0.00060	0.0027	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.670**	<0.0010	<0.000010	<0.0010	<0.0020	**0.085**	<0.0010	<0.00030	<0.0050	<0.0010	0.013
	17-Sep-12	7.81	494.0	270.0	17.7	7.3	<0.020	0.110	<0.030	<0.020	<0.0020	0.0050	0.093	<0.00060	0.0018	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**1.04**	<0.0010	<0.000010	<0.0010	<0.0020	**0.072**	<0.0010	<0.00030	<0.0050	<0.0010	0.012
	22-Oct-12	7.95	439.0	224.0	18.4	9.7	<0.020	0.111	<0.030	<0.020	<0.0020	<0.0050	**0.215**	<0.00060	0.0011	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.519**	<0.0010	<0.000010	<0.0010	<0.0020	**0.121**	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	14-Nov-12	7.84	416.0	190.0	19.6	21.3	<0.020	0.07	<0.030	<0.020	<0.0020	<0.0050	**0.551**	<0.00060	0.0013	<0.050	<0.000017	<0.0012	0.00075	0.0013	**1.160**	<0.0010	<0.000010	<0.0010	0.0025	**0.044**	<0.0010	<0.00030	<0.0050	0.0018	0.0090
	Min	7.29	167.0	71.1	12.7	2.8	0.020	0.030	0.030	0.020	0.0020	0.0036	0.029	0.00010	0.00064	0.013	0.000010	0.00050	0.00019	0.0010	0.287	0.00014	0.000010	0.00035	0.0013	0.0243	0.00040	0.000030	0.00032	0.00095	0.0025
	Max	7.98	494.0	270.0	33.2	1340.0	0.22	0.111	0.606	0.020	0.0020	0.020	**32.3**	0.0050	**0.013**	0.050	**0.00074**	0.062	0.022	**0.036**	**42.3**	**0.023**	0.000100	0.0011	0.051	**1.400**	**0.0028**	0.00039	0.0050	**0.072**	**0.20**
	Median	7.84	352.0	190.0	22.6	9.7	0.027	0.070	0.030	0.020	0.0020	0.0050	**0.145**	0.00060	0.0016	0.050	0.000017	0.0010	0.00050	0.0010	**0.670**	0.0010	0.000010	0.0010	0.0020	**0.084**	0.0010	0.00030	0.0050	0.0010	0.0065
	St Dev.	0.22	95.8	57.0	5.2	400.4	0.060	0.028	0.172	0.0	0	0.0054	9.7	0.0014	0.0035	0.015	0.00022	0.018	0.0063	0.011	12.5	0.0068	0.000027	0.00027	0.015	0.400	0.00066	0.00013	0.0020	0.021	0.059
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.96	427.5	212.0	23.1	22.6	0.054	0.095	0.043	0.020	0.0020	0.0088	**0.423**	0.00060	0.0026	0.050	0.000026	0.0010	0.00065	0.0012	**1.100**	0.0010	0.000010	0.0010	0.0026	**0.099**	0.0010	0.00030	0.0050	0.0016	0.011
SW11	10-Jan-12	7.03	333.0	208.0	35.8	17.7	0.318	0.053	<0.030	<0.020	<0.0020	0.021	**0.168**	<0.00010	0.0022	0.0072	<0.000010	<0.00050	0.0042	<0.00070	**8.98**	0.00018	<0.000010	<0.00020	0.0017	**0.088**	<0.00050	<0.000030	0.00031	0.0012	0.0052
	15-Feb-12	6.84	364.0	208.0	53.2	52.4	1.06	<0.030	<0.030	<0.020	<0.0020	0.038	**0.914**	<0.00010	0.0023	0.0090	0.000034	0.0018	0.0045	0.0013	**11.0**	0.00065	<0.000010	<0.00020	0.0027	**0.693**	<0.00050	<0.000030	0.00019	0.0025	0.013
	20-Mar-12	6.88	83.0	67.5	10.7	15.6	0.110	<0.030	0.072	<0.020	<0.0020	0.0086	0.078	<0.00010	0.0004	0.0070	0.000012	<0.00050	0.00047	<0.00070	**0.570**	0.00013	<0.000010	0.00021	<0.0010	**0.055**	<0.00050	<0.000030	0.000066	0.00042	0.0024
	19-Apr-12	7.18	126.0	61.5	21.7	2.4	0.020	0.034	<0.030	<0.020	<0.0020	0.020	**0.100**	<0.00010	0.00047	0.0082	<0.000010	<0.00050	0.00018	<0.00070	0.265	<0.00010	0.000020	0.00021	<0.0010	0.0152	<0.00050	<0.000030	0.000069	0.00050	0.0025
	23-May-12	7.44	190.0	106.0	22.7	4.4	0.039	0.049	<0.030	<0.020	<0.0020	0.014	0.048	<0.00060	0.0011	<0.050	<0.000017	<0.0010	0.00082	<0.0010	**0.849**	<0.0010	<0.00010	<0.0010	<0.0020	**0.042**	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	21-Jun-12	7.11	197.0	107.0	25.4	8.4	0.033	0.044	<0.030	<0.020	<0.0020	0.015	**0.178**	<0.0050	0.0018	<0.050	*<0.000090*	<0.00050	0.0016	<0.0010	**1.99**	<0.0010	<0.000010	<0.0010	<0.0020	**0.083**	<0.00040	<0.00030	<0.0050	<0.0010	0.0040
	24-Jul-12	7.56	250.0	147.0	31.7	65.8	0.040	0.075	0.037	<0.020	<0.0020	0.0089	**0.375**	<0.00060	0.0020	<0.050	<0.000017	<0.0010	0.0020	<0.0010	**3.21**	<0.0010	<0.000010	<0.0010	<0.0020	**0.181**	<0.0010	<0.00030	<0.0050	0.0013	0.0056
	15-Aug-12	7.67	264.0	152.0	24.9	11.4	<0.020	0.058	<0.030	<0.020	<0.0020	0.0069	**0.209**	<0.00060	0.0015	<0.050	<0.000017	<0.0010	0.0014	<0.0010	**1.92**	<0.0010	<0.000010	<0.0010	<0.0020	**0.062**	<0.0010	<0.00030	<0.0050	<0.0010	0.0033
	17-Sep-12	7.35	291.0	173.0	20.8	19.9	0.021	0.058	<0.030	<0.020	<0.0020	0.0073	**0.687**	<0.00060	0.0010	<0.050	0.000020	0.0011	0.0010	<0.0010	**1.61**	<0.0010	<0.000010	<0.0010	<0.0020	**0.074**	<0.0010	<0.00030	<0.0050	0.0016	0.0051
	22-Oct-12	7.50	211.0	118.0	18.8	5.4	0.039	0.067	<0.030	<0.020	<0.0020	0.0066	0.023	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.323**	<0.0010	<0.000010	<0.0010	<0.0020	0.0206	<0.0010	<0.00030	<0.0050	<0.0010	0.0048
	14-Nov-12	7.44	189.0	96.1	21.4	3.1	0.047	0.048	<0.069	<0.020	<0.0020	<0.0078	0.0412	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.338**	<0.0010	<0.000010	<0.0010	<0.0020	0.0207	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	Min	6.84	83.0	61.5	10.7	2.4	0.020	0.030	0.030	0.020	0.0020	0.0066	0.023	0.00010	0.00043	0.0070	0.000010	0.00050	0.00018	0.00070	0.265	0.00010	0.000010	0.00020	0.0010	0.0152	0.00040	0.000030	0.000066	0.00042	0.0024
	Max	7.67	364.0	208.0	53.2	65.8	1.060	0.075	0.072	0.020	0.0020	0.038	**0.914**	0.0050	0.0023	0.050	0.000090	0.0018	0.0045	0.0013	**11.0**	0.0010	0.000100	0.0010	0.0027	**0.693**	0.0010	0.00030	0.0050	0.0025	0.013
	Median	7.35	211.0	118.0	22.7	11.4	0.039	0.049	0.030	0.020	0.0020	0.009	**0.168**	0.00060	0.0011	0.050	0.000017	0.0010	0.0010	0.0010	**1.61**	0.0010	0.000010	0.0010	0.0020	**0.062**	0.00100	0.00030	0.0050	0.0010	0.0040
	St Dev.	0.28	84.2	50.8	11.1	21.0	0.31	0.015	0.016	0	0	0.009	0.291	0.0014	0.00065	0.021	0.000023	0.00039	0.0015	0.00018	3.69	0.00040	0.000027	0.00040	0.00048	0.195	0.00027	0.00014	0.0024	0.00055	0.0030
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.47	277.5	162.5	28.6	18.8	0.079	0.058	0.034	0.020	0.0020	0.018	**0.292**	0.00060	0.0019	0.050	0.000019	0.0010	0.0018	0.0010	**2.60**	0.0010	0.000010	0.0010	0.0020	**0.086**	0.0010	0.00030	0.0050	0.0013	0.0052
SW12A	10-Jan-12	6.54	179.0	95.4	30.1	58.6	0.413	<0.030	<0.030	<0.020	<0.0020	0.037	**1.28**	<0.00010	0.0025	0.0084	0.000029	<0.00050	0.00330	**0.0027**	**5.90**	0.00070	<0.000010	<0.00020	0.0031	**0.135**	<0.00050	<0.000030	0.00017	0.0033	0.0094
	15-Feb-12	6.57	238.0	123.0	37.6	108.0	0.744	<0.030	0.030	<0.020	<0.0020	0.029	**1.85**	<0.00010	0.0026	0.011	**0.000042**	0.0027	0.0041	**0.0040**	**8.09**	0.0011	<0.000010	<0.00020	0.0041	**0.205**	<0.00050	<0.000030	0.00021	0.0041	0.017
	20-Mar-12	6.63	57.1	23.1	13.1	40.9	0.024	<0.030	<0.030	<0.020	<0.0020	0.14	**0.904**	<0.00010	0.00058	0.0054	0.000023	0.0017	0.00067	**0.0055**	**1.08**	0.00062	<0.000010	<0.00020	0.0019	**0.069**	<0.00050	<0.000030	0.000094	0.0030	0.0047
	19-Apr-12	6.94	70.9	32.2	14.7	8.6	0.021	<0.030	<0.030	<0.020	<0.0020	0.062	**0.194**	<0.00010	0.00068	0.0063	<0.000010	<0.00050	0.00018	0.0015	**0.367**	0.00011	<0.000010	<0.00020	<0.0010	0.0186	0.001	<0.000030	0.00011	0.00075	0.0024
	23-May-12	7.41	116.0	51.9	16.1	16.8	<0.020	0.038	<0.030	<0.020	<0.0020	0.028	**0.636**	<0.00060	0.0013	<0.050	<0.000017	0.0011	0.00078	**0.0026**	**1.20**	<0.0010	<0.000010	<0.0010	0.0023	**0.041**	<0.0010	<0.00030	<0.0050	0.0023	0.0042
	21-Jun-12	6.94	95.1	48.0	9.9	2.0	<0.020	<0.030	0.097	<0.020	<0.0020	0.031	**0.111**	<0.0050	0.0013	<0.050	*<0.000090*	<0.00050	<0.00050	**0.0022**	**0.868**	<0.0010	<0.000010	<0.0010	<0.0020	0.0200	<0.00040	<0.00030	<0.0050	<0.0010	<0.0030
	24-Jul-12	7.25	113.0	62.8	21.8	10.8	<0.020	0.038	<0.030	<0.020	<0.0020	0.029	**0.180**	<0.00060	0.0018	<0.050	<0.000017	<0.0010	0.00064	0.0013	**1.07**	<0.0010	<0.000010	<0.0010	<0.0020	**0.035**	<0.0010	<0.00030	<0.0050	<0.0010	0.0036
	15-Aug-12	7.23	108.0	56.3	17.5	29.2	<0.020	0.047	<0.030	<0.020	<0.0020	0.019	**0.340**	<0.00060	0.0015	<0.050	<0.000017	<0.0010	0.00058	0.0012	**0.959**	<0.0010	<0.000010	<0.0010	<0.0020	0.0217	<0.0010	<0.00030	<0.0050	0.0013	<0.0030
	17-Sep-12	7.23	123.0	68.6	14.5	9.9	0.048	0.045	<0.030	<0.020	<0.0020	0.0094	**0.346**	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	0.0016	**0.482**	<0.0010	<0.000010	<0.0010	<0.0020	0.0280	<0.0010	<0.00030	<0.0050	0.0014	<0.0030
	22-Oct-12	7.49	197.0	105.0	14.8	3.5	<0.020	0.038	<0.030	<0.020	<0.0020	0.024	0.073	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	0.0016	**0.317**	<0.0010	<0.000010	<0.0010	<0.0020	0.0260	<0.0010	<0.00030	<0.0050	<0.0010	0.0037
	14-Nov-12	6.69	69.2	39.4	20.8	3.3	<0.020	<0.030	<0.075	<0.020	<0.0020	0.314	**0.493**	<0.00060	<0.0010	<0.050	**0.000038**	<0.0012	0.00077	**0.0032**	**0.684**	<0.0010	<0.000010	<0.0010	<0.0020	0.0197	<0.0010	<0.00030	<0.0050	<0.0010	0.0090
	Min	6.54	57.1	23.1	9.9	2.0	0.020	0.030	0.030	0.020	0.0020	0.0094	0.073	0.00010	0.00058	0.0054	0.000010	0.00050	0.00018	0.0012	**0.317**	0.00011	0.000010	0.00020	0.0010	0.0186	0.00040	0.000030	0.000094	0.00075	0.0024
	Max	7.49	238.0	123.0	37.6	108.0	0.74	0.047	0.097	0.020	0.0020	0.31	**1.85**	0.0050	0.0026	0.050	0.000090	0.0027	0.0041	**0.0055**	**8.09**	0.0011	0.00010	0.0010	0.0041	**0.205**	0.001	0.00030	0.0050	0.0041	0.017
	Median	6.94	113.0	56.3	16.1	10.8	0.020	0.030	0.030	0.020	0.0020	0.029	**0.346**	0.00060	0.0013	0.050	0.000017	0.0010	0.00064	0.0022	**0.96**	0.0010	0.000010	0.0010	0.0020	**0.028**	0.0010	0.00030	0.0050	0.0013	0.0037
	St Dev.	0.35	57.4	31.5	8.2	32.4	0.24	0.006	0.023	0	0	0.090	0.558	0.0014	0.00067	0.021	0.000023	0.00063	0.0013	0.0013	2.58	0.00029	0.00003	0.00040	0.00079	0.060	0.00031	0.00014	0.0025	0.0012	0.0045
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.24	151.0	82.0	21.3	35.1	0.036	0.038	0.030	0.020	0.0020	0.050	**0.770**	0.00060	0.0017	0.050	0.000034	0.0012	0.00078	**0.0030**	**1.14**	0.0010	0.000010	0.0010	0.0022	**0.055**	0.0010	0.00030	0.0050	0.0026	0.0069

APPENDIX I
2012 SURFACE WATER ANALYTICAL RESULTS

		pH	Conductivity	Hardness as $CaCO_3$	Dissolved Organic Carbon	TSS	Total Ammonia-N	Fluoride	Nitrate	Nitrite	Cyanide-Total	Aluminum-Dissolved	Aluminum-Total	Antimony-Total	Arsenic-Total	Boron-Total	Cadmium-Total	Chromium-Total	Cobalt-Total	Copper-Total	Iron-Total	Lead-Total	Mercury-Total	Molybdenum-Total	Nickel-Total	Phosphorus-Total	Selenium-Total	Thallium-Total	Uranium-Total	Vanadium-Total	Zinc-Total
PWQO		6.5-8.5	-	-	-	-	-	-	-	-	0.005[A]	0.075[LB]	-	0.02[I]	0.1(0.005[I])	0.2[I]	0.0002	0.001 / 0.0089[E]	0.0009	0.005 (0.005[I])[F]	0.3	0.020 / 0.025 (0.003 / 0.005[I])[H]	0.0002	0.04[I]	0.025	0.03[I]	0.1	0.0003[I]	0.005[I]	0.006[I]	0.03(0.02[I])
CEQG		6.5-9.0	-	-	-	-	-	0.12	3	0.06	0.005[A]		0.1[C]	-	0.005	1.5	0.000015-0.000088[D]	0.001 / 0.0089[E]	-	0.002 - 0.00622[G]	0.3	0.00102 - 0.01343	0.000026	0.073[I]	0.025[J]	-	0.001	0.0008	0.015	-	0.03
RDL		0.10	3.0	5.0	1.0	2.0	0.020	0.030	0.030	0.020	0.0020	0.0050	0.0050	0.00010 / 0.00060 / 0.0050	0.0010	0.050	0.000010 / 0.000017 / 0.000090[D*]	0.00050 / 0.0010	0.00050	0.00070 / 0.0010	0.020	0.00010 / 0.0010	0.000010 / 0.0010	0.00020 / 0.0010	0.0020	0.0050	0.00050 / 0.0010	0.000030 / 0.00030	0.0050	0.0010	0.0020 / 0.0030
		pH units	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
SW13	10-Jan-12	7.41	485.0	271.0	22.7	14.0	0.207	0.060	<0.030	<0.020	<0.0020	<0.0030	**0.216**	<0.00010	0.0022	0.011	0.000017	<0.00050	0.00229	<0.00070	**2.29**	0.00027	<0.000010	0.00025	0.0022	**0.120**	<0.00050	<0.000030	0.0011	0.00076	0.0054
	15-Feb-12	7.45	662.0	409.0	37.2	30.5	0.714	<0.030	0.067	<0.020	<0.0020	<0.0030	**0.198**	<0.00010	0.0039	0.014	0.000017	<0.00050	0.0048	<0.00070	**4.77**	0.00032	<0.000010	0.00028	0.0037	**0.253**	<0.00050	<0.000030	0.0011	0.0013	0.0068
	20-Mar-12	7.35	172.0	83.3	10.7	22.6	0.128	<0.030	0.260	<0.020	<0.0020	0.0062	**0.285**	<0.00010	0.00064	0.011	0.000016	0.00068	0.00045	0.00092	**0.664**	0.00028	<0.000010	0.00035	0.0010	**0.079**	<0.00050	<0.000030	0.00031	0.0013	0.0026
	19-Apr-12	7.66	240.0	110.0	14.4	3.6	0.052	0.050	0.249	<0.020	<0.0020	0.0047	0.021	<0.00010	0.00046	0.011	<0.000010	<0.00050	0.00006	0.00088	0.059	<0.00010	<0.000010	0.00042	<0.0010	0.0113	0.0010	<0.000030	0.00036	0.00051	<0.0020
	23-May-12	7.99	315.0	175.0	18.6	7.3	<0.020	0.078	<0.030	<0.020	<0.0020	<0.0050	**0.100**	<0.00060	0.0012	<0.050	<0.000017	<0.0010	<0.00050	0.0013	0.222	<0.0010	<0.00010	<0.0010	0.0029	**0.031**	<0.0010	<0.00030	<0.0050	0.0011	<0.0030
	21-Jun-12	7.83	353.0	194.0	17.2	2.4	<0.020	0.075	0.131	<0.020	<0.0020	<0.010	0.079	<0.0050	0.0021	<0.050	*<0.000090*	<0.00050	0.00050	0.0011	**0.335**	<0.0010	<0.000010	<0.0010	<0.0020	**0.046**	0.00052	<0.00030	<0.0050	0.0011	<0.0030
	24-Jul-12	8.31	464.0	279.0	22.1	7.5	<0.020	**0.128**	<0.030	<0.020	<0.0020	<0.0050	**0.115**	<0.00060	0.0029	<0.050	<0.000017	<0.0010	<0.00050	0.0014	**0.422**	<0.0010	<0.000010	<0.0010	0.0033	**0.048**	<0.0010	<0.00030	<0.0050	0.0014	<0.0030
	15-Aug-12	8.28	435.0	264.0	15.4	39.0	<0.020	**0.132**	<0.030	<0.020	<0.0020	<0.0050	**0.148**	<0.00060	0.0019	<0.050	<0.000017	<0.0010	<0.00050	0.0011	**0.425**	<0.0010	<0.000010	<0.0010	0.0035	0.0272	<0.0010	<0.00030	<0.0050	0.0011	<0.0030
	17-Sep-12	8.17	498.0	298.0	14.6	28.5	<0.020	**0.133**	<0.030	<0.020	<0.0020	<0.0050	**0.336**	<0.00060	0.0011	<0.050	<0.000017	0.0011	<0.00050	0.0011	**0.315**	<0.0010	<0.000010	<0.0010	0.0027	0.0223	<0.0010	<0.00030	<0.0050	0.0013	0.0038
	22-Oct-12	7.95	336.0	192.0	16.4	14.1	0.020	0.084	<0.030	<0.020	<0.0020	0.0061	0.022	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	0.0015	0.037	<0.0010	<0.000010	<0.0010	<0.0020	0.0237	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	14-Nov-12	7.84	316.0	161.0	13.6	2.5	<0.020	0.074	<0.030	<0.020	<0.0020	<0.0050	0.0683	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.350**	<0.0010	<0.000010	<0.0010	<0.0020	0.0215	<0.0010	<0.00030	<0.0050	<0.0010	0.0049
	Min	7.35	172.0	83.3	10.7	2.4	0.020	0.030	0.030	0.020	0.0020	0.0030	0.021	0.00010	0.00046	0.011	0.000010	0.00050	0.000062	0.00070	0.037	0.00010	0.000010	0.00025	0.0010	0.0113	0.00050	0.000030	0.00031	0.00051	0.0020
	Max	8.31	662.0	409.0	37.2	39.0	0.71	**0.133**	0.260	0.020	0.0020	0.010	**0.336**	0.00500	0.0039	0.050	0.000090	0.0011	0.0048	0.0015	**4.77**	0.0010	0.00010	0.0010	0.0037	**0.253**	0.0010	0.00030	0.0050	0.0014	0.0068
	Median	7.84	353.0	194.0	16.4	14.0	0.020	0.075	0.030	0.020	0.0020	0.0050	**0.115**	0.00060	0.0012	0.050	0.000017	0.00100	0.00050	0.0011	**0.350**	0.0010	0.000010	0.0010	0.0022	**0.031**	0.0010	0.00030	0.0050	0.0011	0.0030
	St Dev.	0.34	137.0	93.6	7.2	12.7	0.21	0.038	0.090	0	0	0.0019	0.104	0.0014	0.0010	0.019	0.000022	0.00026	0.0014	0.00026	1.42	0.00039	0.000027	0.00034	0.00092	0.071	0.00025	0.00014	0.0022	0.00027	0.0014
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	8.08	474.5	275.0	20.4	25.6	0.09	0.106	0.099	0.020	0.0020	0.0056	**0.207**	0.00060	0.0021	0.050	0.000017	0.0010	0.00050	0.0012	**0.545**	0.0010	0.000010	0.0010	0.0031	**0.063**	0.0010	0.00030	0.0050	0.0013	0.0044
SW14	10-Jan-12	7.17	223.0	131.0	25.6	2.1	0.477	0.034	0.030	<0.020	<0.0020	0.020	0.090	<0.00010	0.00063	0.0043	0.000035	<0.00050	0.00068	<0.00070	**1.09**	0.00013	<0.000010	<0.00020	<0.0010	0.0199	<0.00050	<0.000030	0.000051	<0.00020	0.0039
	15-Feb-12	6.99	297.0	169.0	28.4	10.9	1.23	<0.030	<0.030	<0.020	<0.0020	0.016	**0.325**	<0.00010	0.00068	0.0050	0.000015	0.00060	0.0018	0.0010	**1.60**	0.00024	<0.000010	<0.00020	0.0010	**0.036**	<0.00050	<0.000030	0.000075	0.00066	0.0084
	20-Mar-12	7.00	102.0	48.2	11.7	9.3	0.162	<0.030	0.282	<0.020	<0.0020	0.014	**0.100**	<0.00010	0.00033	0.0063	0.000012	<0.00050	0.00019	<0.00070	0.260	0.00012	<0.000010	0.00021	<0.0010	**0.052**	<0.00050	<0.000030	0.000057	0.00041	<0.0020
	19-Apr-12	7.33	103.0	55.4	24.0	2.0	<0.020	<0.030	<0.030	<0.020	<0.0020	0.029	0.055	<0.00010	0.00049	0.0059	<0.000010	<0.00050	0.000073	<0.00070	0.184	<0.00010	<0.000010	<0.00020	<0.0010	0.0068	0.00055	<0.000030	0.000039	0.00028	0.0025
	23-May-12	7.79	168.0	97.6	22.4	4.4	0.026	0.042	<0.030	<0.020	<0.0020	0.015	0.066	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.304**	<0.0010	<0.00010	<0.0010	<0.0020	0.0295	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	21-Jun-12	7.60	183.0	101.0	20.9	21.8	0.021	0.042	<0.030	<0.020	<0.0020	0.017	**0.108**	<0.0050	<0.0010	<0.050	*<0.000090*	<0.00050	<0.00050	<0.0010	**0.464**	<0.0010	<0.000010	<0.0010	<0.0020	**0.046**	<0.00040	<0.00030	<0.0050	<0.0010	<0.0030
	24-Jul-12	8.11	239.0	148.0	31.7	4.9	0.029	0.052	<0.030	<0.020	<0.0020	0.0081	0.026	<0.00060	0.0013	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.365**	<0.0010	<0.000010	<0.0010	<0.0020	0.0183	<0.0010	<0.00030	<0.0050	<0.0010	0.0037
	15-Aug-12	8.07	246.0	144.0	19.9	17.5	<0.020	0.049	0.050	<0.020	<0.0020	0.0074	0.037	<0.00060	0.0011	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	0.245	<0.0010	<0.000010	<0.0010	<0.0020	**0.031**	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	17-Sep-12	7.98	256.0	149.0	16.9	12.2	0.025	0.045	<0.030	<0.020	<0.0020	0.0060	0.032	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	0.111	<0.0010	<0.000010	<0.0010	<0.0020	0.0131	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	22-Oct-12	7.80	197.0	114.0	16.9	13.8	<0.020	0.052	<0.030	<0.020	<0.0020	0.0075	**0.602**	<0.00060	<0.0010	<0.050	0.000026	0.0011	<0.00050	0.0012	**0.783**	<0.0010	<0.000010	<0.0010	<0.0020	0.0246	<0.0010	<0.00030	<0.0050	0.0016	0.0079
	14-Nov-12	7.41	156.0	80.4	21.3	9.9	<0.020	0.031	<0.030	<0.020	<0.0020	<0.0089	0.0797	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	<0.0010	**0.265**	<0.0010	<0.000010	<0.0010	<0.0020	0.0136	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	Min	6.99	102.0	48.2	11.7	2.0	0.020	0.030	0.030	0.020	0.0020	0.0060	0.026	0.00010	0.00033	0.0043	0.000010	0.00050	0.000073	0.00070	0.111	0.00010	0.000010	0.00020	0.0010	0.0068	0.00040	0.000030	0.00004	0.00020	0.0020
	Max	8.11	297.0	169.0	31.7	21.8	1.23	0.052	0.282	0.020	0.0020	0.029	**0.602**	0.0050	0.0013	0.050	0.000090	0.0011	0.0018	0.0012	**1.60**	0.0010	0.00010	0.0010	0.0020	**0.052**	0.0010	0.00030	0.00500	0.0016	0.0084
	Median	7.60	197.0	114.0	21.3	9.9	0.025	0.042	0.030	0.020	0.0020	0.014	0.080	0.00060	0.0010	0.050	0.000017	0.00100	0.00050	0.0010	**0.304**	0.0010	0.000010	0.0010	0.0020	0.0246	0.00100	0.00030	0.00500	0.0010	0.0030
	St Dev.	0.41	62.4	39.9	5.6	6.3	0.37	0.009	0.076	0	0	0.0069	0.174	0.0014	0.00029	0.023	0.000023	0.00026	0.00043	0.00016	0.461	0.00043	0.000027	0.00040	0.00050	0.0143	0.00027	0.00014	0.00249	0.00041	0.0021
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.89	242.5	146.0	24.8	13.0	0.10	0.047	0.030	0.020	0.0020	0.017	**0.104**	0.00060	0.0010	0.050	0.000022	0.0010	0.00050	0.0010	**0.624**	0.0010	0.000010	0.0010	0.0020	**0.034**	0.0010	0.00030	0.00500	0.0010	0.0038
SW15	10-Jan-12	7.38	140.0	60.6	10.7	2.0	0.020	0.040	<0.030	<0.020	<0.0020	0.016	0.078	<0.00010	0.00056	0.011	0.000013	<0.00050	0.000072	0.0015	0.146	0.00014	<0.000010	0.00022	<0.0010	0.0229	<0.00050	<0.000030	0.00016	<0.00020	0.0041
	15-Feb-12	7.41	172.0	71.7	14.3	55.9	0.023	<0.030	0.064	<0.020	<0.0020	0.010	**1.29**	<0.00010	0.00089	0.012	**0.000027**	0.0025	0.0011	**0.0028**	**1.73**	0.0010	<0.000010	0.00021	0.0031	**0.118**	<0.00050	<0.000030	0.00026	0.0036	0.0093
	20-Mar-12	7.65	170.0	79.2	12.4	44.7	0.115	<0.030	0.523	<0.020	<0.0020	0.0084	**0.808**	<0.00010	0.0010	0.014	**0.000030**	0.0018	0.00099	**0.0021**	**1.41**	0.00072	<0.000010	0.00080	0.0023	**0.134**	<0.00050	<0.000030	0.00053	0.0030	0.0043
	19-Apr-12	7.77	177.0	88.2	27.5	20.5	<0.020	0.036	0.064	<0.020	<0.0020	0.050	**0.458**	<0.00010	0.00093	0.010	0.000017	0.0011	0.00037	0.0018	**0.715**	0.00037	<0.000010	0.00038	0.0018	**0.038**	0.001	<0.000030	0.00049	0.0019	0.0041
	23-May-12	7.96	274.0	152.0	25.0	34.0	0.051	0.048	<0.030	<0.020	<0.0020	0.036	**0.815**	<0.00060	0.0019	<0.050	0.000031	0.0014	0.00081	**0.0036**	**1.15**	<0.0010	<0.00010	<0.0010	0.0043	**0.128**	<0.0010	<0.00030	<0.0050	0.0033	0.0058
	21-Jun-12	7.64	171.0	83.0	12.6	3.9	<0.020	0.038	<0.030	<0.020	<0.0020	0.027	**0.323**	<0.0050	0.0018	<0.050	*<0.000090*	<0.00050	<0.00050	**0.0022**	**0.441**	<0.0010	<0.000010	<0.0010	<0.0020	**0.048**	<0.00040	<0.00030	<0.0050	0.0015	0.0060
	24-Jul-12	7.77	169.0	85.1	17.9	16.3	<0.020	0.049	<0.030	<0.020	<0.0020	0.067	**0.304**	<0.00060	0.0023	<0.050	<0.000017	<0.0010	<0.00050	0.0017	**0.517**	<0.0010	<0.000010	<0.0010	0.0021	**0.079**	<0.0010	<0.00030	<0.0050	0.0019	<0.0030
	15-Aug-12	7.88	176.0	85.0	12.5	8.9	<0.020	0.057	<0.030	<0.020	<0.0020	0.022	**0.266**	<0.00060	0.0020	<0.050	<0.000017	<0.0010	<0.00050	0.0018	**0.386**	<0.0010	<0.000010	<0.0010	<0.0020	**0.074**	<0.0010	<0.00030	<0.0050	0.0015	0.0031
	17-Sep-12	7.97	185.0	92.7	10.2	6.8	<0.020	0.058	<0.030	<0.020	<0.0020	0.0080	**0.140**	<0.00060	0.0013	<0.050	<0.000017	<0.0010	<0.00050	0.0016	0.248	<0.0010	<0.000010	<0.0010	<0.0020	**0.061**	<0.0010	<0.00030	<0.0050	0.0011	<0.0030
	22-Oct-12	7.93	201.0	98.0	9.7	9.3	<0.020	0.059	<0.030	<0.020	<0.0020	0.013	**0.141**	<0.00060	<0.0010	<0.050	<0.000017	<0.0010	<0.00050	0.0014	0.264	<0.0010	<0.000010	<0.0010	<0.0020	**0.042**	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	14-Nov-12	8.04	338.0	167.0	26.5	28.5	0.022	0.076	<0.337	<0.020	<0.0020	<0.0140	**1.05**	<0.00060	0.0020	<0.050	0.000027	<0.0022	0.00082	0.0032	**1.580**	<0.0010	<0.000010	<0.0010	0.0052	**0.0918**	<0.0010	<0.00030	<0.0050	0.0035	0.0338
	Min	7.38	140.0	60.6	9.7	2.0	0.020	0.030	0.030	0.020	0.0020	0.0080	0.078	0.00010	0.00056	0.0096	0.000013	0.00050	0.000072	0.0014	0.146	0.00014	0.000010	0.00021	0.0010	0.0229	0.00040	0.000030	0.00016	0.00020	0.0030
	Max	8.04	338.0	167.0	27.5	55.9	0.12	0.076	0.523	0.020	0.0020	0.067	**1.29**	0.0050	0.0023	0.050	0.000090	0.0025	0.0011	0.0036	**1.73**	0.0010	0.00010	0.0010	0.0052	**0.134**	0.001	0.00030	0.0050	0.0036	0.0338
	Median	7.77	176.0	85.1	12.6	16.3	0.020	0.048	0.030	0.020	0.0020	0.016	**0.323**	0.00060	0.0013	0.050	0.000017	0.0010	0.00050	0.0018	**0.517**	0.0010	0.000010	0.0010	0.0020	**0.074**	0.0010	0.00030	0.0050	0.0019	0.0041
	St Dev.	0.22	57.3	32.8	6.8	17.8	0.029	0.014	0.165	0	0	0.019	0.410	0.0014	0.00059	0.019	0.000022	0.00064	0.00030	0.00074	0.581	0.00031	0.000027	0.00034	0.00122	0.038	0.00027	0.00014	0.0023	0.0011	0.0090
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.95	193.0	95.4	21.5	31.3	0.023	0.058	0.064	0.020	0.0020	0.032	**0.812**	0.00060	0.0020	0.050	0.000029	0.0016	0.00082	**0.0025**	**1.28**	0.0010	0.000010	0.0010	0.0027	**0.105**	0.0010	0.00030	0.0050	0.0032	0.0059
SW16	10-Jan-12	7.29	81.4	30.3	9.1	2.0	<0.020	0.031	0.030	<0.020	0.0057	0.018	0.066	<0.00010	0.00040	0.007	<0.000010	<0.00050	<0.000050	0.0011	0.085	<0.00010	<0.000010	<0.00020	<0.0010	0.0170	<0.00050	<0.000030	0.000081	<0.00020	0.0023
	15-Feb-12	7.27	84.1	28.8	12.9	10.6	0.023	<0.030	0.099	<0.020	<0.0020	0.013	0.044	<0.00010	0.00039	0.007	**0.000012**	<0.00050	0.000052	0.0016	0.064	0.00013	<0.000010	<0.00020	<0.0010	0.0185	<0.00050	<0.000030	0.000057	0.00030	0.011
	20-Mar-12	7.51	131.0	49.9	8.8	34.2	0.050	<0.030	0.430	<0.020	<0.0020	0.014	**0.414**	<0.00010	0.00062	0.012	**0.000028**	0.0011	0.00042	0.0016	**0.686**	0.00042	<0.000010	0.00035	0.0014	**0.075**	<0.00050	0.000032	0.00027	0.0016	0.0036
	19-Apr-12	7.40	90.7	30.7	9.5	8.8	0.021	0.032	0.079	<0.020	<0.0020	0.020	**0.128**	<0.00010	0.00039	0.007	<0.000010	<0.00050	0.000094	0.0012	0.207	0.00010	<0.000010	<0.00020	<0.0010	0.0174	0.00064	<0.000030	0.00010	0.00056	0.0044
	23-May-12	7.60	91.0	33.3	7.8	37.7	0.036	0.036	0.037	0.044	<0.0020	0.017	**0.195**	<0.00060	<0.0010	<0.050	*<0.000017*	<0.0010	<0.00050	0.0015	0.289	<0.0010	<0.00010	<0.0010	<0.0020	**0.038**	<0.0010	<0.00030	<0.0050	<0.0010	0.0031
	21-Jun-12	7.41	78.2	32.0	7.7	5.1	<0.020	0.041	0.219	<0.020	<0.0020	0.018	**0.124**	<0.0050	<0.0010	<0.050	<0.000090	<0.00050	<0.00050	0.0014	0.150	<0.0010	<0.000010	<0.0010	<0.0020	**0.041**	<0.00040	<0.00030	<0.0050	<0.0010	<0.0030
	24-Jul-12	7.55	73.1	29.2	10.2	24.3	<0.020	<0.030	<0.030	<0.020	<0.0020	0.019	**0.210**	<0.00060	<0.0010	<0.050	*<0.000017*	<0.0010	<0.00050	0.0016	0.288	<0.0010	<0.000010	<0.0010	<0.0020	0.0214	<0.0010	<0.00030	<0.0050	<0.0010	0.0037
	15-Aug-12	7.47	84.4	31.9	8.3	159.0	0.021	0.033	0.051	<0.020	<0.0020	0.017	**2.65**	<0.00060	0.0014	<0.050	**0.000068**	0.0048	0.0018	**0.0049**	**3.28**	**0.0026**	<0.000010	<0.0010	0.0054	**0.142**	<0.0010	<0.00030	<0.0050	**0.0082**	0.017
	17-Sep-12	7.66	99.8	34.7	8.4	12.7	<0.020	0.041	<0.030	<0.020	<0.0020	0.0083	**0.349**	<0.00060	<0.0010	<0.050	*<0.000017*	<0.0010	<0.00050	0.0016	**0.329**	<0.0010	<0.000010	<0.0010	<0.0020	0.0263	<0.0010	<0.00030	<0.0050	0.0013	0.0037
	22-Oct-12	7.55	93.0	33.3	7.4	8.5	<0.020	0.043	<0.030	<0.020	<0.0020	0.010	0.0748	<0.00060	<0.0010	<0.050	*<0.000017*	<0.0010	<0.00050	<0.0010	0.101	<0.0010	<0.000010	<0.0010	<0.0020	0.0213	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	14-Nov-12	7.38	79.5	26.1	8.2	2.9	0.053	0.037	<0.030	<0.020	<0.0020	<0.0106	**0.140**	<0.00060	<0.0010	<0.050	*<0.000017*	<0.0010	<0.00050	0.0014	0.182	<0.0010	<0.000010	<0.0010	<0.0020	0.0191	<0.0010	<0.00030	<0.0050	<0.0010	0.0035
	Min	7.27	73.1	26.1	7.4	2.0	0.020	0.030	0.030	0.020	0.0020	0.0083	0.044	0.00010	0.00039	0.0065	0.000010	0.00050	0.000050	0.0010	0.064	0.00010	0.000010	0.00020	0.0010	0.0170	0.00040	0.000030	0.000057	0.00020	0.0023
	Max	7.66	131.0	49.9	12.9	159.0	0.053	0.043	0.430	0.044	0.0057	0.020	**2.65**	0.0050	0.0014	0.050	0.000090	0.0048	0.0018	**0.0049**	**3.28**	**0.0026**	0.00010	0.0010	0.0054	**0.142**	0.0010	0.00030	0.0050	**0.0082**	0.017
	Median	7.47	84.4	31.9	8.4	10.6	0.021	0.033	0.037	0.020	0.0020	0.017	**0.140**	0.00060	0.0010	0.050	0.000017	0.0010	0.00050	0.0015	0.207	0.0010	0.000010	0.0010	0.0020	0.0214	0.00100	0.00030	0.0050	0.0010	0.0036
	St Dev.	0.12	15.7	6.2	1.6	45.2	0.013	0.005	0.124	0.007	0.0011	0.0040	0.755	0.0014	0.00033	0.021	0.000026	0.0012	0.00047	0.0011	0.933	0.00071	0.000027	0.00039	0.0012	0.038	0.00026	0.00014	0.0025	0.0022	0.0045
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.55	92.0	33.3	9.3	29.3	0.030	0.039	0.089	0.020	0.0020	0.018	**0.280**	0.00060	0.0010	0.050	0.000023	0.0010	0.00050	0.0016	**0.309**	0.0010	0.000010	0.0010	0.0020	**0.039**	0.0010	0.00030	0.0050	0.0012	0.0041

APPENDIX I
2012 SURFACE WATER ANALYTICAL RESULTS

		pH	Conductivity	Hardness as $CaCO_3$	Dissolved Organic Carbon	TSS	Total Ammonia-N	Fluoride	Nitrate	Nitrite	Cyanide-Total	Aluminum-Dissolved	Aluminum-Total	Antimony-Total	Arsenic-Total	Boron-Total	Cadmium-Total	Chromium-Total	Cobalt-Total	Copper-Total	Iron-Total	Lead-Total	Mercury-Total	Molybdenum-Total	Nickel-Total	Phosphorus-Total	Selenium-Total	Thallium-Total	Uranium-Total	Vanadium-Total	Zinc-Total
PWQO		6.5-8.5	-	-	-	-	-	-	-	-	0.005[A]	0.075[LB]	-	0.02[I]	0.1(0.005[I])	0.2[I]	0.0002	0.001 / 0.0089[E]	0.0009	0.005 (0.005)[F]	0.3	0.020 / 0.025 (0.003 / 0.005[I])[H]	0.0002	0.04[I]	0.025	0.03[I]	0.1	0.0003[I]	0.005[I]	0.006[I]	0.03(0.02[I])
CEQG		6.5-9.0	-	-	-	-	-	0.12	3	0.06	0.005[A]		0.1[C]	-	0.005	1.5	0.000015-0.000088[D]	0.001 / 0.0089[E]	-	0.002 - 0.00622[G]	0.3	0.00102 - 0.01343	0.000026	0.073[I]	0.025[J]	-	0.001	0.0008	0.015	-	0.03
RDL		0.10	3.0	5.0	1.0	2.0	0.020	0.030	0.030	0.020	0.0020	0.0050	0.0050	0.00010 / 0.00060 / 0.0050	0.0010	0.050	0.000010 / 0.000017 / 0.000090[D*]	0.00050 / 0.0010	0.00050	0.00070 / 0.0010	0.020	0.00010 / 0.0010	0.000010 / 0.0010	0.00020 / 0.0010	0.0020	0.0050	0.00050 / 0.0010	0.000030 / 0.00030	0.0050	0.0010	0.0020 / 0.0030
		pH units	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
SW17	10-Jan-12	7.30	105.0	42.3	10.0	2.0	<0.020	0.039	0.039	<0.020	<0.0020	0.015	0.059	<0.00010	0.00042	0.0074	<0.000010	<0.00050	<0.000050	0.0011	0.099	<0.00010	<0.000010	<0.00020	<0.0010	0.0196	<0.00050	<0.000030	0.000095	<0.00020	0.016
	15-Feb-12	7.38	112.0	41.4	11.4	2.0	<0.020	0.034	0.114	<0.020	<0.0020	0.014	0.052	<0.00010	0.00042	0.008	<0.000010	<0.00050	<0.000050	0.0013	0.089	<0.00010	<0.000010	<0.00020	<0.0010	0.0216	<0.00050	<0.000030	0.000088	0.00034	0.0030
	20-Mar-12	7.51	136.0	52.4	8.8	19.9	0.065	<0.030	0.170	<0.020	<0.0020	0.014	**0.236**	<0.00010	0.00056	0.011	0.00015	0.00084	0.00036	0.0015	**0.561**	0.00033	<0.000010	0.00041	0.0011	**0.062**	<0.00050	<0.000030	0.00023	0.0011	0.0031
	19-Apr-12	7.59	110.0	42.1	13.0	22.5	<0.020	0.034	0.064	<0.020	<0.0020	0.031	**0.288**	<0.00010	0.00058	0.0084	0.000018	0.00075	0.00023	0.0015	**0.456**	0.00028	<0.000010	0.00023	<0.0010	0.0278	<0.00050	<0.000030	0.00016	0.0011	0.0044
	23-May-12	7.69	106.0	43.3	9.7	2.5	<0.020	0.040	0.030	<0.020	<0.0020	0.015	**0.113**	<0.00060	<0.0010	<0.050	*<0.000017*	<0.0010	<0.00050	0.0014	0.204	<0.0010	<0.00010	<0.0010	<0.0020	0.0282	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	21-Jun-12	7.46	75.1	31.0	6.6	23.0	<0.020	0.033	0.030	<0.020	<0.0020	0.021	**0.255**	<0.0050	<0.0010	<0.050	*<0.000090*	<0.00050	<0.00050	0.0015	**0.316**	*<0.0010*	<0.000010	<0.0010	<0.0020	0.0276	<0.00040	<0.00030	<0.0050	<0.0010	0.0051
	24-Jul-12	7.59	79.6	32.4	10.6	8.5	<0.020	<0.030	<0.030	<0.020	<0.0020	0.016	**0.107**	<0.00060	<0.0010	<0.050	*<0.000017*	<0.0010	<0.00050	0.0014	0.213	*<0.0010*	<0.000010	<0.0010	<0.0020	0.0264	<0.0010	<0.00030	<0.0050	<0.0010	0.0034
	15-Aug-12	7.39	83.3	35.0	9.6	7.6	<0.020	0.043	0.128	<0.020	<0.0020	0.026	0.094	<0.00060	<0.0010	<0.050	*<0.000017*	<0.0010	<0.00050	0.0012	0.134	*<0.0010*	<0.000010	<0.0010	<0.0020	0.0252	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	17-Sep-12	7.58	102.0	38.0	8.3	16.8	<0.020	0.039	<0.030	<0.020	<0.0020	0.030	0.077	<0.00060	<0.0010	<0.050	*<0.000017*	<0.0010	<0.00050	0.0011	0.083	*<0.0010*	<0.000010	<0.0010	<0.0020	**0.056**	<0.0010	<0.00030	<0.0050	<0.0010	0.0036
	22-Oct-12	7.59	101.0	37.5	7.1	6.8	0.041	0.049	<0.030	<0.020	<0.0020	0.011	0.071	<0.00060	<0.0010	<0.050	*<0.000017*	<0.0010	<0.00050	<0.0010	0.089	*<0.0010*	<0.000010	<0.0010	<0.0020	0.0183	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	14-Nov-12	7.54	97.8	36.0	9.2	63.5	0.021	0.042	<0.030	<0.020	<0.0020	<0.0124	**0.9**	<0.00060	<0.0010	<0.050	**0.000029**	<0.0020	0.00055	**0.0022**	**1.110**	*<0.0010*	<0.000010	<0.0010	0.002	**0.0439**	<0.0010	<0.00030	<0.0050	0.0026	0.0068
	Min	7.30	75.1	31.0	6.6	2.0	0.020	0.030	0.030	0.020	0.0020	0.011	0.052	0.00010	0.00042	0.0074	0.000010	0.00050	0.000050	0.0010	0.083	0.00010	0.000010	0.00020	0.0010	0.0183	0.00040	0.000030	0.000088	0.00020	0.0030
	Max	7.69	136.0	52.4	13.0	63.5	0.065	0.049	0.170	0.020	0.0020	0.031	**0.900**	0.0050	0.0010	0.050	0.00015	0.0020	0.00055	0.0022	**1.110**	0.0010	0.00010	0.0010	0.0020	**0.062**	0.0010	0.00030	0.0050	0.0026	0.016
	Median	7.54	102.0	38.0	9.6	8.5	0.020	0.039	0.030	0.020	0.0020	0.015	**0.107**	0.00060	0.0010	0.050	0.000017	0.00100	0.00050	0.0014	0.204	0.0010	0.000010	0.0010	0.0020	0.0276	0.00100	0.00030	0.0050	0.0010	0.0034
	St Dev.	0.12	17.1	6.0	1.8	17.7	0.014	0.006	0.050	0	0	0.0073	0.246	0.0014	0.00026	0.021	0.000044	0.00042	0.00019	0.00033	0.311	0.00041	0.000027	0.00038	0.00049	0.0149	0.00027	0.00014	0.0025	0.00060	0.0038
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	7.59	108.0	42.2	10.3	21.2	0.021	0.041	0.089	0.020	0.0020	0.023	**0.246**	0.00060	0.0010	0.050	0.000024	0.0010	0.00050	0.0015	**0.386**	0.0010	0.000010	0.0010	0.0020	0.0361	0.0010	0.00030	0.0050	0.0010	0.0048
SW18	10-Jan-12	7.44	673.0	404.0	17.7	87.2	0.338	<0.030	0.030	<0.020	<0.0020	<0.030	**0.252**	<0.00010	0.0034	0.021	<0.000010	<0.00050	0.0031	<0.00070	**35.6**	0.00020	<0.000010	0.00049	0.0027	**0.921**	<0.00050	<0.000030	0.00027	0.0019	0.0045
	15-Feb-12	7.39	1030.0	653.0	25.6	225.0	3.81	<0.030	0.030	<0.020	<0.0020	<0.030	**1.47**	<0.00010	**0.0054**	0.028	0.000023	0.0027	0.0054	0.0023	**56.6**	0.00085	<0.000010	0.00071	0.0054	**1.230**	<0.00050	<0.000030	0.00048	0.0046	0.012
	20-Mar-12	7.27	167.0	72.3	14.6	3.2	<0.020	<0.030	0.301	<0.020	<0.0020	0.016	0.033	<0.00010	0.00051	0.018	0.000018	<0.00050	0.00010	0.0012	0.125	<0.00010	<0.000010	0.00073	<0.0010	**0.085**	<0.00050	<0.000030	0.00015	0.00075	0.0021
	19-Apr-12	7.44	218.0	109.0	19.4	3.3	<0.020	0.045	0.030	<0.020	<0.0020	0.010	0.025	<0.00010	0.00055	0.013	<0.000010	<0.00050	0.000075	0.0012	0.078	<0.00010	<0.000010	0.00054	0.0014	0.0133	<0.00050	<0.000030	0.00019	0.00065	0.0029
	23-May-12	8.07	305.0	17.4	21.8	4.6	<0.020	0.082	0.030	<0.020	<0.0020	0.0054	0.019	<0.00060	0.0012	<0.050	*<0.000017*	<0.0010	<0.00050	<0.0010	**0.412**	*<0.0010*	<0.000010	<0.0010	0.0030	**0.037**	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	21-Jun-12	7.63	361.0	198.0	15.3	2.9	0.023	0.087	0.030	<0.020	<0.0020	<0.010	0.023	<0.0050	0.0016	<0.050	*<0.000090*	<0.00050	0.0010	<0.0010	**0.791**	<0.0010	<0.000010	<0.0010	<0.0020	**0.081**	<0.00040	<0.00030	<0.0050	<0.0010	<0.0030
	24-Jul-12	8.14	435.0	253.0	27.1	142.0	0.026	0.071	<0.030	<0.020	<0.0020	<0.0050	**0.327**	<0.00060	0.0023	<0.050	*<0.000017*	<0.0010	0.00086	0.0012	**1.64**	<0.0010	<0.000010	<0.0010	0.0026	**0.250**	<0.0010	<0.00030	<0.0050	0.0015	0.0053
	15-Aug-12	8.20	440.0	260.0	18.4	6.0	0.073	0.116	0.030	<0.020	<0.0020	<0.0050	0.041	<0.00060	0.0017	<0.050	*<0.000017*	<0.0010	<0.00050	<0.0010	**0.821**	<0.0010	<0.000010	<0.0010	0.0024	**0.048**	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	17-Sep-12	8.14	429.0	245.0	17.5	52.8	<0.020	0.123	<0.030	<0.020	<0.0020	<0.0050	**1.26**	<0.00060	0.0027	<0.050	0.000035	0.0028	0.0018	0.0023	**4.15**	<0.0010	<0.000010	<0.0010	0.0041	**0.083**	<0.0010	<0.00030	<0.0050	0.0038	0.0096
	22-Oct-12	7.65	519.0	294.0	12.7	7.0	<0.020	0.087	<0.030	<0.020	<0.0020	<0.0050	0.020	<0.00060	<0.0010	<0.050	*<0.000017*	<0.0010	<0.00050	<0.0010	**0.511**	<0.0010	<0.000010	<0.0010	<0.0020	**0.064**	<0.0010	<0.00030	<0.0050	<0.0010	<0.0030
	14-Nov-12	7.81	439.0	227.0	18.6	16.8	<0.020	0.076	<0.030	<0.020	<0.0020	<0.0050	**0.12**	<0.00060	<0.0010	<0.050	*<0.000017*	<0.0010	<0.00050	0.001	**0.553**	<0.0010	<0.000010	<0.0010	0.0024	**0.105**	<0.0010	<0.00030	<0.0050	<0.0010	0.0043
	Min	7.27	167.0	17.4	12.7	2.9	0.020	0.030	0.030	0.020	0.0020	0.0050	0.019	0.00010	0.00051	0.013	0.000010	0.00050	0.000075	0.00070	0.078	0.00010	0.000010	0.00049	0.0010	0.0133	0.00040	0.000030	0.00015	0.00065	0.0021
	Max	8.20	1030.0	653.0	27.1	225.0	3.81	0.123	0.301	0.020	0.0020	0.030	**1.47**	0.0050	**0.0054**	0.050	0.000090	0.0028	0.0054	0.0023	**56.6**	0.0010	0.00010	0.0010	0.0054	**1.230**	0.0010	0.00030	0.0050	0.0046	0.012
	Median	7.65	435.0	245.0	18.4	7.0	0.020	0.076	0.030	0.020	0.0020	0.005	0.041	0.00060	0.0016	0.050	0.000017	0.0010	0.00050	0.0010	**0.791**	0.0010	0.000010	0.0010	0.0024	**0.083**	0.00100	0.00030	0.0050	0.0010	0.0030
	St Dev.	0.34	235.4	172.3	4.4	73.5	1.14	0.033	0.082	0	0	0.010	0.526	0.0014	0.0015	0.016	0.000023	0.00083	0.0016	0.00054	18.9	0.00040	0.000027	0.00020	0.0012	0.411	0.00027	0.00014	0.0024	0.0013	0.0032
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	75th %	8.11	479.5	277.0	20.6	70.0	0.050	0.087	0.030	0.020	0.0020	0.013	**0.290**	0.00060	0.0025	0.050	0.000021	0.0010	0.0014	0.0012	**2.90**	0.0010	0.000010	0.0010	0.0029	**0.178**	0.0010	0.00030	0.0050	0.0017	0.0049

Notes:

PWQO — Provincial Water Quality Objectives, taken from "Policies, Guidelines, Provincial Water Quality Objectives ("PWQO") of the Ministry of Environment and Energy," July, 1994; Table 2; Table of PWQOs and Interim PWQOs ("IPWQO"). IPWQOs denoted by superscript "i".

CEQG — Canadian Environmental Quality Guidelines ("CEQG") from the Canadian Council of Ministers of the Environment, Summary Table: "Canadian Water Quality Guidelines for the Protection of Aquatic Life" Summary Table Accessed Online @ http://st-ts.ccme.ca/, November 15, 2011.

100 — indicates exceedance of an interim PWQO.

100 — indicates exceedance of the PWQO.

100 — indicates exceedance of the CEQG.

100 — indicates exceedance of both the PWQO and CEQG.

Others — RDL - Reportable Detection Limit; Min - minimum; Max - maximum; St Dev. - Standard Deviation; N - number of samples; 75th % - 75th percentile

RDL values are provided by the laboratory Certificates of Analysis.

100 — RDL value is above the PWQO or CCME guideline value

i — indicates values is an Interim PWQO.

A — PWQO / CEQG for free cyanide is 0.005 mg/L.

B — PWQO is for total aluminum measured in a clay-free sample; analyzed samples are not clay-free.

C — CEQG for aluminum where pH is ≥6.5.

D — CEQG for cadmium = 10^0.86[log10(hardness)]-3.2 µg/L.

D* — A few RDL values for cadmium are greater than the calculated CEQG value based on hardness of the particular sample.

E — PWQO / CEQG for hexavalent chromium is 1 µg/L, PWQO/CEQG for trivalent chromium is 8.9 µg/L; total chromium reported.

F — PWQO for copper is 5 µg/L; IPWQO is 5 µg/L where hardness is >20 mg/L.

G — CEQG for copper = e0.8545[ln(hardness)]-1.465 * 0.2µg/L; Minimum of 2 µg/L.

H — PWQO for lead is 20 µg/L where alkalinity is 40-80 mg/L and 25 µg/L where alkalinity is >80 mg/L; IPWQO is 3 µg/L where alkalinity is 30-80 mg/L and 5 µg/L where alkalinity is >80 mg/L.

I — CEQG for lead = e1.273[ln(hardness)]-4.705; Minimum of 1 µg/L.

J — CEQG for nickel is a minimum of 25 µg/L regardless of water hardness.