CENTURY
IRON MINES CORP.

Joyce Lake Direct Shipping Iron Ore Project

Fish and Fish Habitat
Baseline Study
Additional Study

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November 2014

WSP

Joyce Lake Direct Shipping Iron Ore Project

Fish and Fish Habitat Baseline Study

Additional Study

Final Version

Approved by:

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EXECUTIVE SUMMARY

Reference to be cited:

WSP. 2014. Joyce Lake Direct Shipping Iron Ore Project. Fish and Fish Habitat Baseline Study. Additional Study. Report prepared for Labec Century Iron Ore. 83 p. and appendices.

Labec Century Iron Ore (Labec Century; the Proponent), a subsidiary of Century Iron Mines Corporation (TSX:FER), is proposing to develop an iron mine in western Labrador, approximately 20 kilometres northeast of the Town of Schefferville, Québec. The Joyce Lake Direct Shipping Iron Ore Project (the Project) lies on a peninsula of land in Attikamagen Lake and all of the Project's physical elements lie within Labrador. The mine will produce up to two million tonnes (Mt) of product per year. The ore will be transported to the existing rail line owned by Tshiuetin Rail Transportation Inc. for transportation to the Port of Sept-Îles.

The Project will require approval from the Government of Newfoundland and Labrador and is subject to environmental assessment (EA) under the *Newfoundland and Labrador Environmental Protection Act* (NL EPA) and associated Environmental Assessment Regulations. Under the CEAA, 2012 the Project is a Designated Project pursuant to Section 15(a) Regulations Designating Physical Activities and will require a federal EA.

The specific objectives of the 2013 Fish and Fish Habitat Baseline Study were to collect additional information to determine the fish species found within the Study Area and describe their habitat, including benthic invertebrate communities and sediment quality. The field campaign was conducted from August 21 to September 2, 2013.

Three fish species were captured in Joyce Lake: lake chub, longnose sucker and burbot. It appears that the pearl dace identified in 2012 were in fact lake chub. According to the Bradbury et al (2001) habitat classification method, there are 90,535 m² (24 % of the total lake area) of preferential habitat for lake chub, 27,727 m² (7 % of the total lake area) for longnose sucker and 140,896 m² (38 % of the total lake area) for burbot.

The bay where the waste rock effluent is proposed to be discharged is characterized by shallow waters, with a mean water depth of 2.1 m. There is no connecting stream that discharges into this bay. In the small cove where the effluent is proposed to be discharged two areas were covered by aquatic vegetation (440 m²). It is assumed that the same fish species found in Bay 2 and in Iron Arm in 2012 occur in this area of Attikamagen Lake.

In Iron Arm, flow velocities are very low and ranged from 0.01 to 0.09 m/s at 0.2h and from 0.02 to 0.08 m/s at 0.8h (near bottom). Three aquatic vegetation areas were found on the eastern shore of Iron Arm between the two proposed ice bridges. These are small patches of 20 to 40 m² of vegetation occurring in shallow water in small coves. Along the western shore, no aquatic vegetation was found. In deeper water, the substrate was mostly composed of reddish-brown silt and clay. The riparian vegetation is predominantly black spruce and larch with shrubs such as willows, alder, birch and ericaceous. Herbaceous species were also found along the east shore.

Lake H covers 96.3 ha and discharges towards unnamed lakes that connect to Petitsikapau Lake. The mean water depth is 0.83 m and the maximum water depth reaches 1.45 m. Fish sampling was conducted in Lake H using gillnets, fyke nets and minnow traps. A total of 35 fish were captured: northern pike, white sucker, burbot and mottled sculpin. Several patches of pond lily and bur-reed were found in the lake. These covered approximately 2,585 m². All habitats found in Lake H are littoral (within the photic zone). There are approximately 0.3 ha of fine substrate habitat with vegetation and 96.0 ha of fine substrate habitat without vegetation.

Pond I is a shallow waterbody where the maximum water depth is approximately 1.0 m. The pond covers an area of 5.8 ha and is part of a vast wetland complex. Fish sampling was conducted in Pond I using gillnets, fyke nets and minnow traps and no fish were captured. Pond I has no direct connection with any other waterbodies. Pond I was not considered to be a fish habitat.

Timmins Bay is an elongated waterbody adjacent to Joyce Lake. In the northern part of the bay, two deep pools were found, both approximately 23 m deep. Only the northernmost part of the bay is characterized by shallow water. The remainder of the bay is deep (mean depth of 7.1 m) and has relatively steep slopes. Four zones with aquatic vegetation were observed and covered approximately 6,550 m². It is assumed that the same fish species found in Attikamagen Lake and Iron Arm in 2012 occur in Timmins Bay since these are connected.

In Gilling River, fish sampling was conducted using gillnets, fyke nets and minnow traps. A total of 59 fish were captured, with lake chub, brook trout and white sucker being the predominant species. The other fish species that occur in this river are longnose sucker, northern pike, burbot, threespine stickleback and mottled sculpin. Three suitable spawning grounds were identified: two for northern pike in the aquatic vegetation in the lowermost part of the stream and one for sucker located in the uppermost section of the characterized river. Dense aquatic vegetation was found in the lowermost part of the characterized river and these vegetated areas cover approximately 84,000 m².

During the field campaign, 15 stream sections identified as stream crossings were characterized. As observed in 2012, no streams were found at CR06, CR09, CR19 and CR21 in 2013: these were non-existent or underground.

The proposed crossing location at AT-T01 was not accessible and only photographs were taken from the helicopter. From the helicopter only small channels were visible and small pockets of water were also visible. It is unlikely to find fish in the upper part of the stream, where the projected crossing is located, since the small channels seems to run underground over short distances in many areas.

CR07 crosses in an area where no streams were found in 2012 and 2013. The link between the stream identified CR07 and the pond located a few hundred metres south is completely underground and does not allow fish passage. Therefore, the proposed crossing is not considered to be a fish habitat.

In CR20, large patches of aquatic vegetation were found in the pond (pond lilies and bur-reed). The pond provide suitable habitat for juveniles of many fish species. Four species were captured: burbot, mottled sculpin, lake chub and white sucker.

The connection between CR10A and CR10 was determined to be underground and the underground section is judged to be inaccessible to fish. Seven brook trout were captured in the area of CR10A and many other small brook trout were observed. CR10 is, in general, quite homogenous with a flat type of habitat and a width ranging from 9 to 12 m. Three fish species were caught: mottled sculpin, brook trout and white sucker.

CR11 and CR14 are predominantly flat types of habitat. In both streams, only brook trout was captured. CR12 is predominantly a run type of habitat, with short segments with rapid and riffle types of habitat. Three fish species were captured: mottled sculpin, longnose sucker and brook trout.

CR15 and CR16 discharge into Mike Lake. CR15 is characterized by swift water and three species were captured: brook trout, longnose dace and lake chub. CR16 is predominantly a run/riffle type of habitat, with underground sections. Three species were captured: brook trout, lake trout and lake chub.

CR17A is a small stream that connects to the Gilling River. The stream is approximately 25 m long and is only 0.20 m wide. Beyond that, the stream probably flows underground in a narrow valley and only pockets of water were visible through mosses and herbs. At the proposed crossing location, pockets of water were visible, but no stream bed was found. The proposed crossing is not considered to be a fish habitat.

CR23 is quite homogenous with a flat type of habitat, a width ranging from 2.5 to 3.5 m. Only two fish were caught: burbot and longnose sucker.

PRODUCTION TEAM

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1 INTRODUCTION

Labec Century Iron Ore (Labec Century; the Proponent), a subsidiary of Century Iron Mines Corporation (TSX:FER), is proposing to develop an iron mine in western Labrador, approximately 20 kilometres (km) northeast of the Town of Schefferville, Québec. The Joyce Lake Direct Shipping Iron Ore (DSO) Project (the Project) lies on a peninsula of land in Attikamagen Lake and all physical elements of the Project lie within Labrador (Figure 1).

The mine will produce up to two million tonnes (Mt) of product per year. The ore will be transported to the existing rail owned by Tshiuetin Rail Transportation Inc., and further onto the Québec North Shore and Labrador Railway (QSN&L) for transportation to the Port of Sept-Îles.

The Project will require approval from the Government of Newfoundland and Labrador and is subject to environmental assessment (EA) under the Newfoundland and *Labrador Environmental Protection Act* (NLEPA) and associated Environmental Assessment Regulations. Under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) the Project is a Designated Project pursuant to Section 15(a) Regulations Designating Physical Activities and will require a federal EA.

1.1 Project Overview

The Joyce Lake mining prospect lies in an undeveloped area adjacent to the small Joyce Lake waterbody on a peninsula within Attikamagen Lake, in an area with a number of interconnecting large lakes. The prospect can be reached from the mainland by crossing a relatively narrow stretch of water, called Iron Arm. Currently, the prospect is accessed from Schefferville either directly by helicopter or by ground via an existing road to Iron Arm and then by helicopter to Joyce Lake.

The Project consists of mining a high grade deposit of hematite iron in western Labrador, approximately 20 km northeast of Schefferville, as shown in Figure 1. The physical works for the proposed Joyce Lake Project subject to assessment are located wholly in Labrador. The mine area lies within two map-staked licences (309 claims) covering 12,665 hectares (ha).

The physical elements of the Project include the Joyce Lake mining area, options for conveyance across Iron Arm (ice bridges and barge), a beneficiation plant on the mainland, a new haul road to connect to a new rail loop by Astray Lake, access roads, and an accommodation camp. Power for the Project will be provided by diesel generators using fuel stored mainly at the beneficiation plant, with smaller tanks at other locations where power is required. Other physical elements of the Project include stockpiles for overburden, waste rock, and ore (pre- and post-processing), water supply systems, settling ponds with water treatment, domestic waste water treatment, drainage ditches, explosives storage, a hazardous materials storage and management area, an accommodation camp, and ancillary buildings (e.g., offices, workshops, warehouse/storage areas, worker facilities, mobile equipment storage). All structures will be constructed so that they can be moved from the site and re-used elsewhere when no longer required for this Project.

Extraction of the resource will be by open pit and construction of this pit will require dewatering of Joyce Lake. The mining operation will consist of removing ore from the single open pit using drilling and blasting, a hydraulic excavator and haul trucks. Mining equipment and supplies will be brought to the mine site by barge over Attikamagen Lake during the ice free season and over an ice bridge in the winter. The pre-stripping of overburden at the open pit will start during the summer, with waste rock and low grade ore being stockpiled outside the pit limits.

Beneficiation in Phase I of the Project (from 2015 to 2018) will consist of a dry circuit with two crushing and two screening steps necessitating no water addition, allowing operation in cold weather. In Phase I, the beneficiation plant will be operated 250 days per year. Only high grade ore will be processed during Phase I generating two different products: lump ore and sinter feed. During Phase I, the plant will not produce any tailings.

For Phase II (from 2019 to 2021), a wet circuit will be added which will require the use of fresh water and may include an iron content upgrading process. For Phase II, the beneficiation plant will be operated approximately 200 days per year (during the warmer months). Processing details for Phase II have not yet been determined and are being studied in parallel with information obtained during exploration activities.

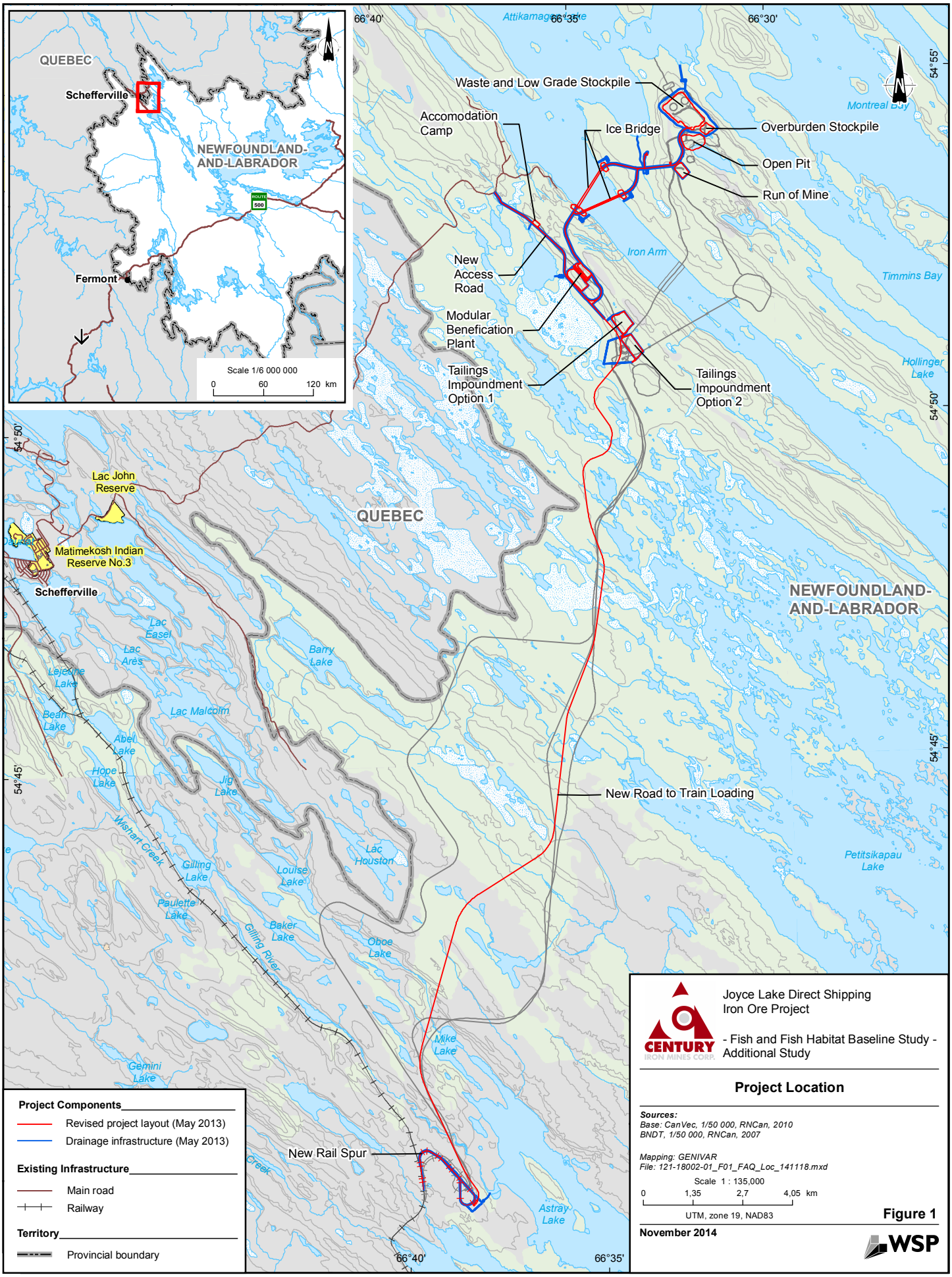
For both phases, the final product will be hauled by truck from the beneficiation plant to the rail yard, a distance of approximately 28 km along a new haul road. At the rail yard, the product will be loaded onto rail cars on a new 6 km rail loop that will connect to the existing Tshiuetin Rail. The product will be taken south to Sept-Îles, Québec, where it will be stockpiled on Port Authority land prior to shipping to market.

1.2 Organization of this Report

The remainder of this Fish and Fish Habitat Baseline Study outlines the scope, methodology, and results of the baseline program, and is presented in seven sections, as follows:

- Section 1: Introduction;
- Section 2: Rationale and Objectives;
- Section 3: Description of the Study Area;
- Section 4: Methods;
- Section 5: Results;
- Section 6: Summary and Closure;
- Section 7: References.

Additional supporting information and documentation is presented in the appendices.



Joyce Lake Direct Shipping Iron Ore Project

- Fish and Fish Habitat Baseline Study - Additional Study

Project Location

Sources:
Base: CanVec, 1/50 000, RNCan, 2010
BNDT, 1/50 000, RNCan, 2007

Mapping: GENIVAR
File: 121-18002-01_F01_FAQ_Loc_141118.mxd

Scale 1 : 135,000
0 1,35 2,7 4,05 km
UTM, zone 19, NAD83

Figure 1

November 2014

2 RATIONALE AND OBJECTIVES

Section 2(1) of the revised *Fisheries Act* defines fish habitat as “spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes”. The rationale for determining if the waterbodies found within the Study Area provide fish habitat is to evaluate whether the proposed Joyce Lake DSO Project will be considered an activity that contravenes Section 35(1) of the *Fisheries Act*. Section 35(1) states that: “no person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery” unless the undertaking or the activity was authorized by the Minister and is carried out in accordance with the conditions established. In addition, the information presented in this report will be used to assess the impacts of the Project on fish and fish habitat.

A field campaign was conducted in 2012 with the main objective to determine if waterbodies and streams identified within the Study Area provide habitat for fish species. Due to some changes in the Project, additional information was needed. Furthermore, some information collected in 2012 needed to be validated or completed. The specific objectives of the 2013 field campaign were to:

- determine if Joyce Lake is to be considered as a fish habitat and collect additional data on sediment quality and benthic invertebrate communities;
- provide a description of the main characteristics of Timmins Bay;
- describe fish population, fish habitat, sediment quality and benthic invertebrate communities in the areas of proposed effluent discharges;
- provide additional information on the shoreline description, presence of aquatic vegetation, sediment quality and benthic invertebrate communities of the ice bridge/barge landing areas;
- provide additional or complementary information at each proposed stream crossing and determine which fish species are present;
- provide a brief description of Guy’s River (Iron Arm outlet).

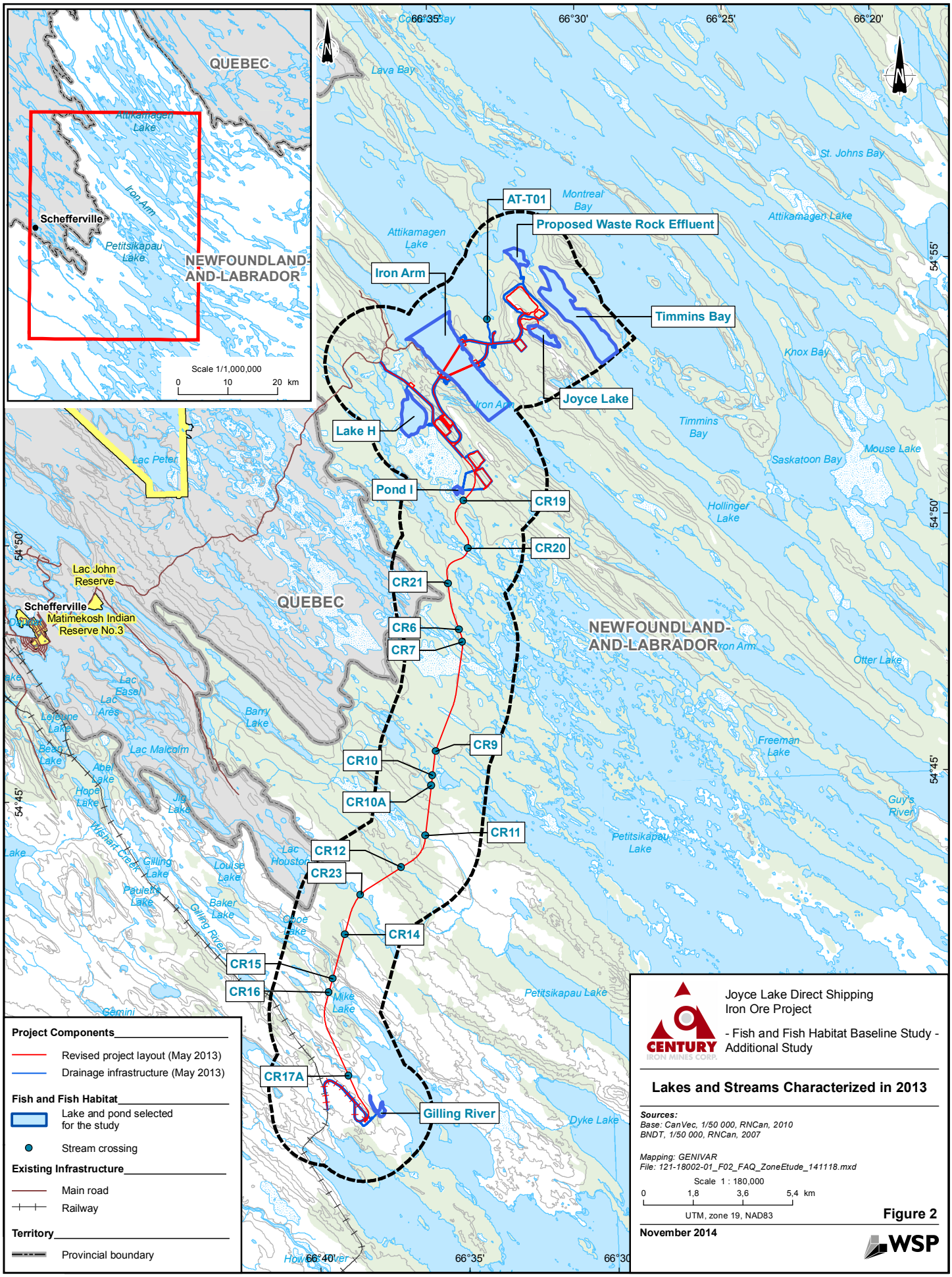
3 DESCRIPTION OF THE STUDY AREA

The lakes, ponds, and streams in this part of western Labrador form part of the Churchill River watershed. The Joyce Lake DSO Project lies on a peninsula of land in Attikamagen Lake, which drains south to Petitsikapau Lake via Iron Arm and Guy's River, then into Dyke Lake, the Ashuanipi River, and finally into the Smallwood Reservoir. The Smallwood Reservoir is the main source of water to the Churchill River. In the southern part of the Project Development Area, streams drain into Astray Lake which then drains to Dyke Lake. For the purposes of this study, the peninsula of land on which Joyce Lake is found, was named "Joyce Lake Peninsula".

The Study Area is the maximum area within which Project-related environmental effects can be predicted or measured with a reasonable degree of accuracy and confidence. It includes the project components and any adjacent areas where Project-related environmental effects may reasonably be expected to occur. The Fish and Fish Habitat Baseline Study Area includes the waterbodies and streams found on and around Joyce Lake Peninsula where the mining site is located (Figure 2). The streams found within the limits of a 2-km buffer surrounding the proposed infrastructure (initial and revised layouts) located on the mainland are also part of the Study Area. Table 1 lists the waterbodies and streams characterized during the 2013 field campaign.

Table 1: List of Waterbodies and Streams Characterized during the Field Campaign (see Figure 2 for locations)

Name	Coordinates	
	Latitude	Longitude
Waste rock effluent area in Attikamagen Lake	54° 55' 06.5"	-66° 32' 10.1"
Joyce Lake	54° 53’ 49.3’’	-66° 31’ 33.2’’
Timmins Bay	54° 54’ 24.9’’	-66° 30’ 49.1’’
Lake H (accommodation camp effluent)	54° 52' 47.8"	-66° 36' 09.0"
Pond I (tailings management facility effluent)	54° 50' 47.4"	-66° 34' 21.6"
Gilling River (rail yard effluent)	54° 38' 43.2"	-66° 37' 57.3"
Stream AT-T01	54° 54' 05.8"	-66° 33' 18.6"
Stream crossing at AT-T01	54° 53' 37.5"	-66° 33' 11.3"
Iron Arm (ice bridge/barge west shore)	54° 53' 07.9"	-66° 34' 56.8"
Iron Arm (ice bridge/barge north-east shore)	54° 53' 37.4"	-66° 34' 12.6"
Iron Arm (ice bridge/barge south-east shore)	54° 53' 15.7"	-66° 33' 50.9"
Guy’s River (Iron Arm outlet)	54° 44' 19.1"	-66° 19' 25.2"
Stream Crossing CR19	54° 50' 35.2"	-66° 34' 19.8"
Stream Crossing CR20	54° 49' 39.6"	-66° 34' 14.3"
Stream Crossing CR21	54° 48' 59.0"	-66° 34' 57.1"
Stream Crossing CR06	54° 48' 04.9"	-66° 34' 37.8"
Stream Crossing CR07	54° 47' 50.2"	-66° 34' 31.8"
Stream Crossing CR09	54° 45' 43.4"	-66° 35' 33.4"
Stream Crossing CR10	54° 45' 15.3"	-66° 35' 42.1"
Stream Crossing CR10A	54° 45' 03.5"	-66° 35' 45.2"
Stream Crossing CR11	54° 44' 04.9"	-66° 36' 00.2"
Stream Crossing CR12	54° 43' 28.9"	-66° 36' 51.3"
Stream Crossing CR23	54° 42’ 58.4’’	-66° 38’ 15.7’’
Stream Crossing CR14	54° 42' 12.7"	-66° 38' 50.1"
Stream Crossing CR15	54° 41' 21.5"	-66° 39' 17.7"
Stream Crossing CR16	54° 41' 05.9"	-66° 39' 26.1"
Stream Crossing CR17A	54° 39' 27.2"	-66° 38' 52.0"


QUEBEC
NEWFOUNDLAND-AND-LABRADOR
Schefferville
Attikamagen Lake
Iron Arm
Petitsikapau Lake
Scale 1/1,000,000
0 10 20 km
AT-T01
Proposed Waste Rock Effluent
Iron Arm
Timmins Bay
Joyce Lake
Lake H
Pond I
CR19
CR20
CR21
CR6
CR7
CR9
CR10
CR10A
CR11
CR12
CR23
CR14
CR15
CR16
CR17A
Gilling River
Lac John Reserve
Matimekosh Indian Reserve No.3
Lac Peter
Lac Ease
Lac Ares
Lac Malcolm
Barry Lake
Lac Houston
Louise Lake
Baker Lake
Gilling Lake
Paulette Lake
Hope Lake
Abel Lake
Jig Lake
Mike Lake
Dyke Lake
Freeman Lake
Otter Lake
Mouse Lake
Knox Bay
Saskatoon Bay
Hollinger Lake
St. Johns Bay
Montreal Bay
Lava Bay
66°35'
66°30'
66°25'
66°20'
54°55'
54°50'
54°45'
54°40'
Project Components
Revised project layout (May 2013)
Drainage infrastructure (May 2013)
Fish and Fish Habitat
Lake and pond selected for the study
Stream crossing
Existing Infrastructure
Main road
Railway
Territory
Provincial boundary
CENTURY IRON MINES CORP.
Joyce Lake Direct Shipping Iron Ore Project
- Fish and Fish Habitat Baseline Study - Additional Study
Lakes and Streams Characterized in 2013
Sources:
Base: CanVec, 1/50 000, RNCan, 2010
BNDT, 1/50 000, RNCan, 2007
Mapping: GENIVAR
File: 121-18002-01_F02_FAQ_ZoneEtude_141118.mxd
Scale 1 : 180,000
0 1,8 3,6 5,4 km
UTM, zone 19, NAD83
Figure 2
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4 METHODS

4.1 Pre-Survey Planning

In order to conduct fish sampling for scientific purposes in the Province of Newfoundland and Labrador, a licence is required from the Department of Fisheries and Oceans Canada. An Experimental Fisheries Licence was issued to conduct fish sampling in the waterbodies and streams within the Study Area (Licence No. NL-2053-13).

4.2 Field Methods

All field activities were conducted between August 21 and September 2, 2013. Table 2 summarizes activities that were conducted in each waterbody.

4.2.1 Fish Habitat

Since Joyce Lake will have to be dewatered, additional fish sampling was conducted to confirm fish species found in this lake. In addition, effluent discharge locations are available and therefore supplemental field work was conducted in these areas to characterize fish habitat.

Concerning stream crossings, the footprint of the road, linking the proposed processing plant to the existing road and to the train loading station, was preliminary at the time the 2012 field work was conducted. Several crossings have been relocated since then and therefore habitat characterization was required in 2013. Some stream crossings identified as being nonexistent in 2012 also needed to be confirmed.

Bathymetry and Flow Velocity

Bathymetric surveys were carried out in lakes and ponds to determine their morphometric characteristics. The bathymetry was implemented using a Garmin Map 521s depth sounder. The collected data provided information on waterbodies, such as mean and maximal depths and volume of water. In addition, the bathymetry is required for the classification of fish habitat based on the Bradbury et al. (2001) method.

In addition, in Iron Arm, flow velocity was measured in the area where the two ice bridges are proposed. Measurements were made along two transects following the general ice bridge alignments. Flow velocities were measured at 10 stations, near the surface (0.2h) and near the bottom (0.8h).

Table 2: Summary of Activities Conducted during the 2013 Field Campaign

Name	Bathymetric Survey	Water Physicochemistry (in situ)	Substrate and Aquatic Vegetation Mapping	Shoreline Description	Fish Sampling	Sediment and Benthos Collection[1]	Habitat Description	Electrofishing
Joyce Lake					X	S/B		
Timmins Bay	X			X		S/B		
Waste rock effluent area in Attikamagen Lake	X	X		X		S/B		
Lake H (accommodation camp effluent)	X	X	X	X	X	S/B		
Pond I (tailings management facility effluent)		X	X	X	X	S/B		
Gilling River (Rail Yard Effluent)		X		X	X	S/B		
Stream AT-T01		X					X	
Stream Crossing at AT-T01	*No stream found.*							
Iron Arm (Ice Bridge/Barge Area)		X		X		S/B		
Guy's River (Iron Arm Outlet)							X	
Stream Crossing CR19	*No stream found.*							
Stream Crossing CR20							X	X
Stream Crossing CR21	*Stream underground.*							
Stream Crossing CR06	*No stream found.*							
Stream Crossing CR07	*No stream found.*							
Stream Crossing CR09	*No stream found.*							
Stream Crossing CR10						B	X	X
Stream Crossing CR10A							X	X
Stream Crossing CR11							X	X
Stream Crossing CR12						B	X	X
Stream Crossing CR23						B	X	X
Stream Crossing CR14							X	X
Stream Crossing CR15						B	X	X
Stream Crossing CR16							X	X
Stream Crossing CR17A							X	X

[1] S: Sediment collection; B: Benthos collection.

Water Chemistry

At the deepest location within the waterbodies, water temperature, dissolved oxygen, conductivity, pH, and turbidity were measured approximately 0.5 m below the water surface using a YSI 556 multiparameter water quality meter. In addition, temperature and dissolved oxygen were measured each metre down to 14 m and then each 2 metres until the bottom was reached using the same multiparameter instrument. The Secchi depth was measured using a Secchi disc to determine the approximate depth of the photic zone.

Lacustrine Substrate and Aquatic Vegetation Mapping

In shallow water and when the water was very clear, substrate data were collected by looking over the shaded side of a boat. Below the photic zone, sediment was sampled using an Ekman grab to collect data on substrate type. The substrate was classified based on the nine categories proposed in Bradbury et al. (2001) as follows:

- littoral zone (located near the shores at a depth above the photic limit):
  - coarse substrate / no vegetation;
  - medium substrate / no vegetation;
  - fine substrate / no vegetation;
  - coarse substrate / vegetation;
  - medium substrate / vegetation;
  - fine substrate / vegetation;
- non-littoral zone (below the photic limit):
  - coarse / pelagic;
  - medium / pelagic;
  - fine / pelagic.

This method was applied in waterbodies where the presence of fish was confirmed. Coarse substrate includes bedrock and boulder, medium substrate is composed of rubble, cobble and/or gravel, and fine substrate includes sand, silt, clay and muck. Table 3 shows the substrate categories used and adapted from Grant and Lee (2004).

In addition, plant species were identified within the vegetation zones delineated. Maps of appropriate scale and a GPS (Garmin Map 78s) were used on the field to delineate substrate categories and vegetation.

Table 3: Substrate Categories

Categories	Code	Description
Bedrock	R	Exposed continuous solid rock
Boulder	B	Rocks ranging from 25 to >100 cm in diameter
Rubble	G	Rocks ranging from 14 to 25 cm in diameter
Cobble	C	Rocks ranging from 3 to 14 cm in diameter
Gravel	V	Small stones from 0.2 to 3 cm in diameter
Sand	S	Grains ranging from 0.006 to 2 mm in diameter
Silt/Clay/Mud	L	Very fine sediment particles, usually <0.006 mm in diameter
Muck/detritus	MO	Organic material from dead organisms

Note: Adapted from Grant and Lee (2004)

Lacustrine Shoreline Description

Shorelines were described in terms of substrate, gradient, and riparian vegetation, and divided into homogenous segments based on substrate composition. Segments were located using a Garmin GPS Map 78s (accuracy of 3 m). The percent coverage of each substrate class was estimated visually. In each segment, the shoreline gradient was qualified (low, moderate, steep) and the percent coverage of treed, shrubby and herbaceous vegetation found within a 15-m riparian zone was also estimated. Photographs were taken for each segment and for any relevant components observed.

Connecting streams (tributaries flowing in or flowing out of the lakes) were identified and characterized. The following information was also collected for at least the lowermost 100 m of each tributary: average depth, average width, surface velocity, habitat type, substrate composition, cover, riparian vegetation, stream bank stability, and any obstructions to fish passage. Habitat types are described in Table 4.

For both lakes and connecting streams and suitable spawning habitats were also identified and described (substrate, size, compaction, organic material, periphyton, etc.). Any other relevant information such as beaver dams, cabins, launching ramps, or the presence or signs of wildlife was noted. Photographs were taken for each segment and for all noteworthy features.

Fish Sampling and Electrofishing

Fish sampling was conducted in Joyce Lake, as well as in two unnamed ponds/lakes. These were identified as Lake H and Pond I for the present study. In addition, fish sampling was also conducted in the Gilling River (Figure 2). Fishing was carried out using gillnets, fyke nets and minnow traps. Gillnets were checked every two hours during the day and remained overnight only when the catches were not abundant. In Joyce Lake, fishing gear remained in the water for a total of 48 hours. Gear specifications are provided in Table 5 while gear locations and fishing effort are given in Appendix A.

Table 4: Description of Habitat Types Used to Characterize Streams

Habitat Type	Habitat Parameter	Description
Fast water	Mean water velocity: >0.5 m/s; stream gradient: >4 %	
Rapid	General description:	Considerable white water present
	Mean water velocity:	>0.5 m/s
	Mean water depth:	< 0.6 m
	Substrate:	Usually dominated by boulders and rubble with finer substrates possibly present in smaller amounts. Large boulders typically break the surface.
	Stream gradient:	Generally 4-7 %
Falls/Chute/ Cascade	General description:	The dominating feature is a rapid change in stream gradient with most water free-falling over a vertical drop or series of drops.
	Mean water velocity:	>0.5 m/s
	Mean water depth:	Variable and will depend on degree of constriction of stream banks.
	Substrate:	Dominated by bedrock and/or large boulders.
	Stream gradient:	>7 % and can be as high as 100 %
Run	General description:	Relatively swift flowing, laminar and non-turbulent.
	Mean water velocity:	> 0.5 m/s
	Mean water depth:	> 0.3 m
	Substrate:	Predominantly gravel, cobble and rubble with some boulders and sand in smaller amounts.
	Stream gradient:	Typically < 4 %
Moderate water	Mean water velocity: 0.2 to 0.5 m/s; stream gradient: > 1 and < 4 %	
Riffle	General description:	Relatively shallow and characterized by a turbulent surface with little or no white water.
	Mean water velocity:	0.2 to 0.5 m/s
	Mean water depth:	< 0.3 m
	Substrate:	Typically dominated by gravel and cobble with some finer substrates present, such as sand. A small amount of larger substrates may be present, which may break the surface.
	Stream gradient:	> 1 and < 4 %
Steady/Flat	General description:	Relatively slow flowing.
	Mean water velocity:	0.2 to 0.5 m/s
	Mean water depth:	> 0.2 m
	Substrate:	Predominantly sand and finer substrates with some gravel and cobble.
	Stream gradient:	<1 and < 4 %
Slow water	Mean water velocity: generally < 0.2 m/s; stream gradient: < 1 %	
Plunge/ trench/ debris/ pools	General description:	Generally caused by increased erosion near or around a larger, embedded object in the stream such as a rock or a log or created by upstream water impoundment.
	Mean water velocity:	<0.2 m/s
	Mean water depth:	> 0.5 m depending on stream size
	Substrate:	Highly variable
	Stream gradient:	Generally <1 %
Eddy	General description:	Relatively small pools caused by a combination of damming and scour.
	Mean water velocity:	Typically < 0.4 m/s, but can be variable.
	Mean water depth:	> 0.3 m. May vary depending on obstruction type, orientation, stream bed and bank material and flows experienced.
	Substrate:	Predominantly sand, silt and organics with some gravel in smaller amounts.
	Stream gradient:	Variable

Source: DFO NL (2012)

Table 5: Fishing Gear Specifications

Gear type	Code	Specifications
Gillnet	FE	Six 3.8-m long panels with mesh sizes: 25, 32, 38, 51, 64, 76 mm
Fyke net	VE	0.6 X 0.6 m opening; with wings and lead; 0.6 mm mesh size
Minnow trap	BO	41 cm long, 21 cm in diameter and 2.5 cm opening

Gillnets were set perpendicular to the shore and small mesh sizes were set nearshore and offshore in alternation. Fyke nets were also set perpendicular to the shore. Minnow traps were distributed in shallow water in habitat favourable to small species (aquatic vegetation, covered by overhead vegetation, near shelter such as boulders or fallen trees, etc.). These traps were baited with bread. The time was noted, and the water temperature and water depth were measured at each fishing station during installation. In Joyce Lake, two gillnets were set in the deepest area in the lake.

When the fishing gear was retrieved from the water, all dead fish were collected and placed in a bag identified to the station and carried to a temporary laboratory for measurement. Fish caught alive were identified, measured (total length), weighed and released. Dead fish were identified, measured (total length) and weighted. Sex and gonad development stage were also determined for brook trout, lake trout, round whitefish, longnose sucker, and white sucker. Abnormalities and parasites were noted when observed.

Electrofishing was conducted to determine the fish species found within the stream potentially crossed by the road. Index electrofishing stations covered 5 to 120 m² depending on the stream width, water depth and flow velocity. No blocknets were installed upstream or downstream, and only one sweep was conducted in each station. Each station was described: water temperature, station length and width, mean water depth, flow pattern, flow speed, vegetation cover and substrate composition. Station coordinates and fishing time were recorded. Fish captured were identified, measured (total length) and released.

Stream Habitat Description

Stream crossings were characterized over 200 m upstream and 250 m downstream from the intercept point. Stream crossings were divided into 50-m long segments. In each segment, the following information was collected: length, mean width, water depth, flow velocity, type of habitat (flow pattern), number of pools and dimensions, substrate composition, bank description (high water mark, riparian vegetation cover, sign of erosion), presence of aquatic vegetation and cover, fish barrier, shelter and suitable spawning habitats.

4.2.2 Sediment Quality

Sediment samples were collected in various areas that are most likely to be affected by the Project, such as Joyce Lake, areas receiving the proposed effluent

discharges, and the embankments along Iron Arm (ice bridge/barge landing areas). Sediment samples were collected from August 22 to September 2, 2013 and shipped to the analytical laboratory by airplane. Field methods, sample conservation and shipping were conducted according to Environment Canada's Metal Mining Technical Guidance (Environment Canada, 2012).

Sediment grab samples were collected using an Ekman grab. Sediment was placed in a large bowl to be homogenized and then placed in each laboratory jar and plastic bag (WhirlPak). The grab and all subsampling instruments were washed and rinsed at each station to avoid any cross-contamination.

Samples were identified with the project number, the sample ID, the date and the analysis to be performed. Samples were kept in a cooler below 4°C prior to shipment. One field duplicate sample was collected in the Gilling River (10 % of the samples) for quality assurance and quality control (QA/QC).

All analyses were conducted by EXOVA located in Québec City (Québec). EXOVA is accredited by the Standards Council of Canada (SCC) and by the *Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs*' (MDDEFP) *Centre d'expertise et d'analyse environnementale du Québec*.

Analytical parameters include: metal scan (ICP-MS), grain size distribution, ammoniacal nitrogen, chloride, conductivity, nitrate, nitrite, pH, sulphate, total organic carbon.

4.2.3 Benthic Invertebrate Community

Benthos samples were collected at the same stations as the sediment samples using the Ekman grab. In addition, 6 samples were collected in coarse substrate habitat using a D-net. A total of 23 benthic invertebrate samples were collected and analyzed.

Soft Substrate Habitat

Each sample was made of three grab subsamples collected approximately 1 m apart from each other. When the grab could not penetrate deeply into the sediment, additional subsamples were also collected. Sediment was sieved using a 500 microns mesh size and the remaining content was placed into a jar filled with ethanol 85 %. Samples were identified with the project number, the sample ID and the date. At each station the following information was collected: water depth (m), number of subsamples, relative volume of sediment in the grab (%), colour, odour, and texture of the sediment. In stations located in streams, sediment samples have been collected to determine total organic carbon content and grain size distribution. Samples were sent to Laboratoires SAB in Longueuil (Québec) for identification to the family level.

Coarse Substrate Habitat

Where the substrate was too coarse for the Ekman grab, a D-net (500 microns mesh size) was used to collect benthic invertebrates. This method was used in streams, but also in Iron Arm along the shoreline where coarse substrate is found.

Each station was 100 m long and made of 20 sampling plots scattered in various types of habitats. Each sampling plot was 30 cm wide and 50 cm long.

The D-net was placed downstream from the sampling plot, opening facing the current, and a second technician cleaned the substrate, within the plot, using his hands for 30 second. The organisms collected this way in each of the 20 sampling plots were placed in a jar, and the jar was then labelled with the project number, the station number and the date. Samples were preserved with ethanol 85 %. The water depth (m) was measured at each station. The substrate composition was determined and the presence of aquatic vegetation was noted. These samples were also sent to Laboratoires SAB for identification to the family level.

4.2.4 Data Analysis

All the data collected were tabulated in various tables and all raw data are appended to the report. The sediment analytical results have been compared to the Canadian Environmental Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME, 2013).

Lake Morphometry

The shoreline development index (D_L) and the volume development index (D_V) were calculated for each lake and pond. The equations for these two indices are as follows:

$$D_L = \frac{C}{2\sqrt{S * \pi}}$$

$$D_V = \frac{\bar{D}}{Dmax} * 3$$

where:

D_L : Shoreline development index

D_V : Volume development index

C : Circumference or perimeter (m)

S : Surface area (m²)

$\bar{D}$: Mean depth (m)

Dmax : Maximum depth (m)

Fish Population

The number of fish captured was determined for each species, fishing gear, and sampling station. In each waterbody, mean length was calculated for each species.

In addition, mean mass and mean Fulton's coefficient factor (K) were calculated on fish weighted:

$$K = \frac{M * 10^5}{L^3}$$

where:

K : Fulton's coefficient of condition

M : Fish fresh weight (g)

L : Fish total length (mm)

Catch per unit effort, expressed as the number of fish caught per unit effort (CPUE) and biomass of fish caught per unit effort (BPUE), and relative abundance are calculated for each lake.

Fish Habitat Classification

The classification and quantity of fish habitat in lakes was determined using DFO Guide for lacustrine habitat (Bradbury et al., 2001).

Benthic Invertebrate Community

Benthic invertebrate data have been tabulated then basic statistics have been calculated for each station such as density (org./m²), relative abundance, EPT/C index[1] and number of taxa.

4.3 Quality Assurance/Quality Control (QA/QC) Procedures

The Quality Assurance/Quality Control (QA/QC) Program includes planning, organization, communication, fieldwork, data analysis, reporting and the review of completed work. The QA/QC Program included the following elements:

- experienced professionals with a good understanding of the project and of its objectives;
- a kick-off meeting with the study team to present the project and the baseline study objectives;
- trained and experienced technical teams of at least two persons;
- use of standard methods, with equipment in good condition and appropriate for the work to be carry out;
- preparation of specific protocols including the type of sample required, measurements required, sampling methods, etc.;

[1] EPT/C index corresponds to the sum of Ephemeroptera (E), Plecoptera (P) and Trichoptera (T) in a given sample divided by the sum of the Chiroptera (C) in that sample. In general, a high index is indicative of a good quality habitat since EPT are considered to be more sensitive to environment degradation and pollution.

- use of field forms;
- use of recent and standard reference documents;
- control of data tabulation;
- conservation of original data and data analysis results (hard and soft copies);
- revision of all documents produced by qualified professionals.

5 RESULTS

5.1 Fish and Fish Habitat

5.1.1 Joyce Lake

Additional fish sampling was conducted in Joyce Lake from August 23 to 25, 2013 to confirm and validate fish species that occur in this waterbody. In 2012, only pearl dace had been caught in this lake.

During the 2013 field campaign, fish sampling was conducted in Joyce Lake using gillnets, fyke nets and minnow traps (Figure 3; Appendices A and B). Fishing gear was set overnight for a total of 48 hours. In order to determine if different fish species occurred in the deepest layer of water in this lake, two bottom gillnets were set in the large pool located in the northern part of the lake, where the water depth reach approximately 20 m (Figure 3).

Three fish species were captured: lake chub (88.8 % of fish captured), longnose sucker (10.6 %) and burbot (0.6 %; Table 6). It appears that the pearl dace identified in 2012 were in fact lake chub. A total of 1,398 fish were captured in 2013 and most of these were captured using fyke nets.

Fish captured in gillnets were all measured and weighed, and basic statistics are given in Table 6. Longnose sucker had a mean length of 184.6 mm and a mean mass of 68.9 g. The minimum and maximum length for longnose sucker captured in gillnets were 112 and 397 mm. Lake chub ranged from 77 to 162 mm and only seven specimens were captured in gillnets.

In fyke nets, lake chub accounted for a total biomass of 2,560 g (Table 7). Lake chub length ranged from 29 to 140 mm. Concerning longnose sucker, a total biomass of 2,687 g was captured in fyke nets and these fish measured between 51 and 257 mm. Burbot accounted for a biomass of 666 g and sizes ranged from 156 to 462 mm. A smaller number of fish was captured in minnow traps. Lake chub, longnose sucker and burbot accounted respectively for 679, 257 and 309 g.

According to the Bradbury et al (2001) habitat classification method, there are 90,535 m² (24 % of the total lake area) of preferential habitat for lake chub, 27,727 m² (7 % of the total lake area) for longnose sucker and 140,896 m² (38 % of the total lake area) for burbot. Despite the fact that the lake characteristics provide the greatest units of preferential habitat for burbot in Joyce Lake, this species was the least represented in captures made in 2013. Other factors not considered in the classification methodology must affect the burbot population in this waterbody.

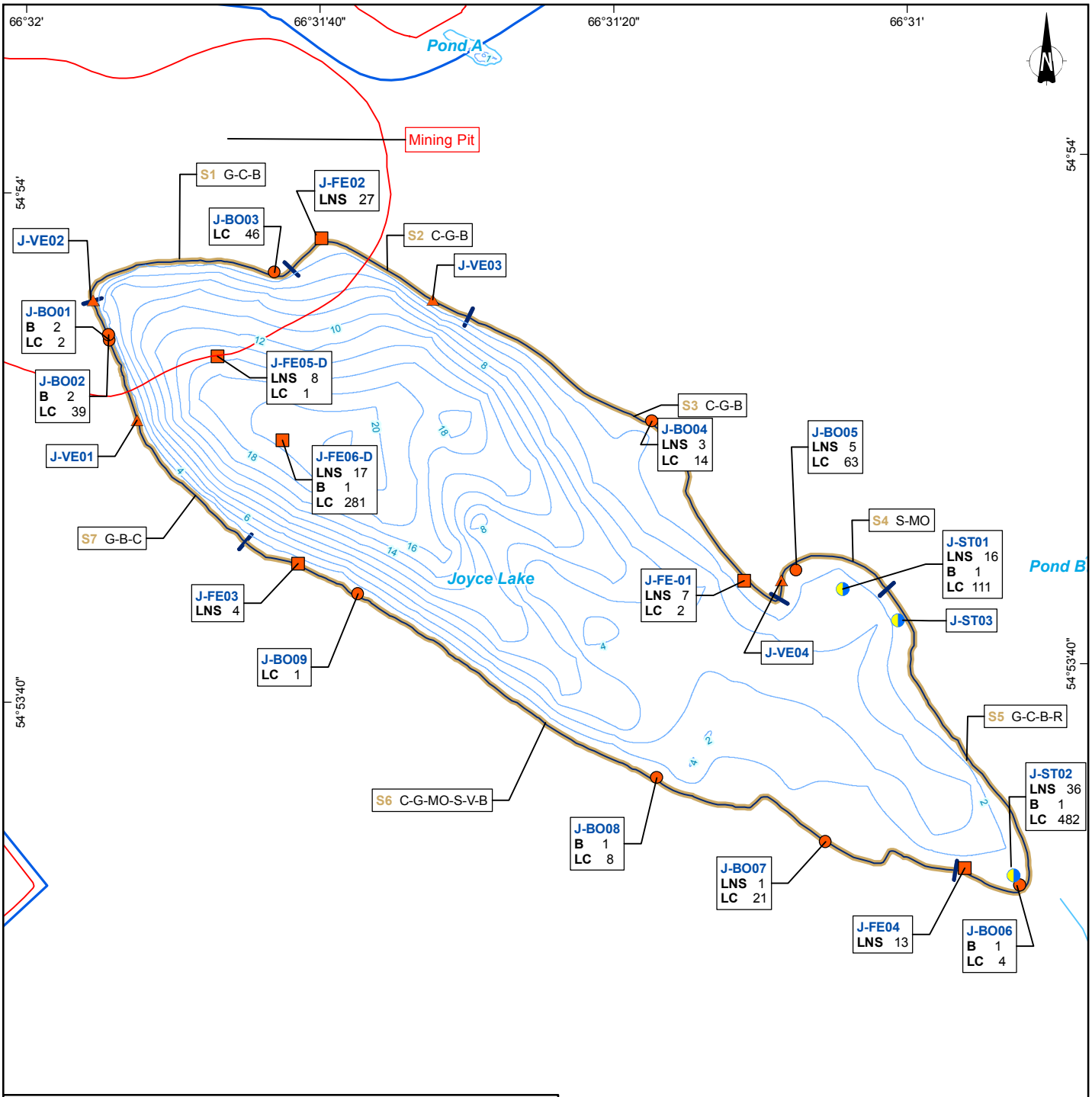
Fish species found in Joyce Lake are not part of any recreational or commercial fisheries and do not support such a fishery. Despite the fact that sucker and burbot may be fished by Naskapi from Kawawachikamach and Innu from Matimekush – Lac John in the Schefferville region, there is no known Aboriginal fishery occurring in Joyce Lake. Thus, Joyce Lake is not considered to be a fish habitat.

Table 6: Fish Sampling Effort and Basic Statistics of Fish Communities in Joyce Lake

Date: August 23, 24, 25						**Water Temperature:** 13 ºC
Fishing Gear	**Effort (gear-night)**	**Species[1]**	**Number**	**Biomass (g)**	**CPUE[2]**	**BPUE[3]**
Gillnet	12	LNS	70	4,824	5.8	402.0
		LC	4	98	0.3	8.2
		TOTAL	**74**	**4,922**	**6.2**	**410.2**
Fyke net	8	LNS	69	2,687	8.6	335.9
		LC	1,036	2,560	129.5	320
		B	4	666	0.5	83.3
		TOTAL	**1,109**	**5,913**	**138.6**	**739.1**
Minnow trap	18	LNS	10	257	0.5	14.2
		LC	199	679	11.1	37.7
		B	6	309	0.3	17.2
		TOTAL	**215**	**1,245**	**11.9**	**69.2**

	LNS	**LC**
Number of fish	70[4]	7
Mean length (mm; s. d.[5])	184.6 (55.6)	133.5 (38.5)
Minimum length (mm)	112	77
Maximum length (mm)	397	162
Mean weight (mm; s. d.[5])	68.9 (79.9)	24.4 (14.5)
Minimum weight (mm)	10.5	2.8
Maximum weight (mm)	428	33.4
Mean Fulton (s. d.[5])	0,818 (0.081)	0.830 (0.170)

[1] LNS: Longnose sucker; LC: Lake chub; B: Burbot
[2] CPUE : Capture per unit effort
[3] BPUE : Biomass (g) per unit effort
[4] Two fish were not weighted.
[5] Standard deviation



Project Components

Revised project layout (May 2013)

Drainage infrastructure (May 2013)

Habitat Characteristics

5 Isobathe (Equidistance: 1 m)

Sediment and benthic organisms collection

Fish Sampling

VE-01 (Gear type / Sequential number)

X	No fish
B	Burbot
LC	Lake chub
LNS	Longnose sucker

Fishing Gear

Minnow trap (BO)

Gill net (FE)

Fyke net (VE)

Segmentation

Shore segment

Type of habitat

S4 MO-C-S — Substrate / Segment number

Substrate

R	Bedrock
B	Boulder (250 to 1,000 mm)
G	Rubble (140 to 250 mm)
C	Cobble (30 to 140 mm)
V	Gravel (2 to 30 mm)
S	Sand (0.006 to 2 mm)
MO	Organic material

CENTURY IRON MINES CORP.

Joyce Lake Direct Shipping Iron Ore Project

- Fish and Fish Habitat Baseline Study - Additional Study

Joyce Lake - Sampling Stations

Sources:
Base: CanVec, 1/50 000, RNCan, 2010
Orthophoto: Mosaïque photo XEOS

Mapping and inventory: GENIVAR 2012
File: 121-18002-01_F03_FAQ_Joyce_Lake_141118.mxd

Scale 1:7 000

0 65 130 195 m

UTM, zone 19, NAD83

Figure 3

November 2014

WSP

Table 7: Data Collected on Fish Captured and Released in Joyce Lake

Station ID	Date	Lake Chub (LC)				Longnose sucker (LNS)				Burbot (B)			
		n[1]	Min TL (mm)[2]	Max TL (mm)[3]	Total Mass (g)	n[1]	Min TL (mm)[2]	Max TL (mm)[3]	Total Mass (g)	n[1]	Min TL (mm)[2]	Max TL (mm)[3]	Total Mass (g)
Fyke nets													
J-VE01	2013-08-24	141	37	114	341.0	9	112	217	307.0	0	---	---	---
J-VE01	2013-08-25	140	34	89	226.4	8	51	231	196.4	1	---	207	46.4
J-VE02	2013-08-24	45	43	140	190.4	0	---	---	---	0	---	---	---
J-VE02	2013-08-25	117	39	117	186.4	0	---	---	---	0	---	---	---
J-VE03	2013-08-24	78	37	97	251.4	13	87	193	590.4	1	---	156	31.4
J-VE03	2013-08-25	33	35	84	44.4	3	157	257	188.5	1	---	462	524.3
J-VE04	2013-08-24	333	29	121	865.0	26	84	209	850.0	0	---	---	---
J-VE04	2013-08-25	149	34	92	455.4	10	113	192	554.4	1	---	213	64.2
Total		**1036**			**2,560.4**	**69**			**2,686.7**	**4**			**666.3**
Minnow traps													
J-BO01	2013-08-24	2	64	86	8.5	0	---	---	---	1	---	212	61.7
J-BO01	2013-08-25	0	---	---	---	0	---	---	---	1	---	195	35.2
J-BO02	2013-08-24	32	61	89	108.0	0	---	---	---	0	---	---	---
J-BO02	2013-08-25	7	56	74	15.3	0	---	---	---	2	184	208	95.8
J-BO03	2013-08-24	3	61	73	7.6	0	---	---	---	1		205	57.0
J-BO03	2013-08-25	43	66	92	129.8	0	---	---	---	0	---	---	---
J-BO04	2013-08-24	5	74	82	20.1	3	141	166	95.2	0	---	---	---
J-BO04	2013-08-25	9	61	92	33.9	0	---	---	---	0	---	---	---
J-BO05	2013-08-24	44	61	92	155.6	5	98	174	114.5	0	---	---	---
J-BO05	2013-08-25	19	68	87	71.4	0	---	---	---	0	---	---	---
J-BO06	2013-08-24	1	64	---	2.4	0	---	---	---	0	---	---	---
J-BO06	2013-08-25	3	61	71	5.2	0	---	---	---	1	---	220	59.7
J-BO07	2013-08-24	3	86	88	15.2	1	134	---	20.4	0	---	---	---
J-BO07	2013-08-25	19	45	87	76.4	0	---	---	---	0	---	---	---
J-BO08	2013-08-24	2	74	76	7.3	0	---	---	---	0	---	---	---
J-BO08	2013-08-25	6	64	81	19.7	1	157	---	27.3	0	---	---	---
J-BO09	2013-08-25	1	77	---	2.1	0	---	---	---	0	---	---	---
Total		**199**			**678.5**	**10**			**257.4**	**6**			**309.4**

[1] n is the number of fish captured and released.
[2] Minimum total length in mm
[3] Maximum total length in mm

5.1.2 Waste Rock Effluent Area in Attikamagen Lake

The bay where the waste rock effluent is proposed to be discharged is characterized by shallow waters, with a mean water depth of 2.1 m and a maximum water depth of 5.7 m (Figure 4). It covers an area of 31 ha and the shoreline is 3.2 km long. During field work, dissolved oxygen was 9.09 mg/L, pH was 6.21 and conductivity was 30 µS/cm (Table 8). The water transparency reached the bottom of this shallow bay.

Table 8: Water Physicochemistry in the Waste Rock Effluent Discharge Area, Attikamagen Lake

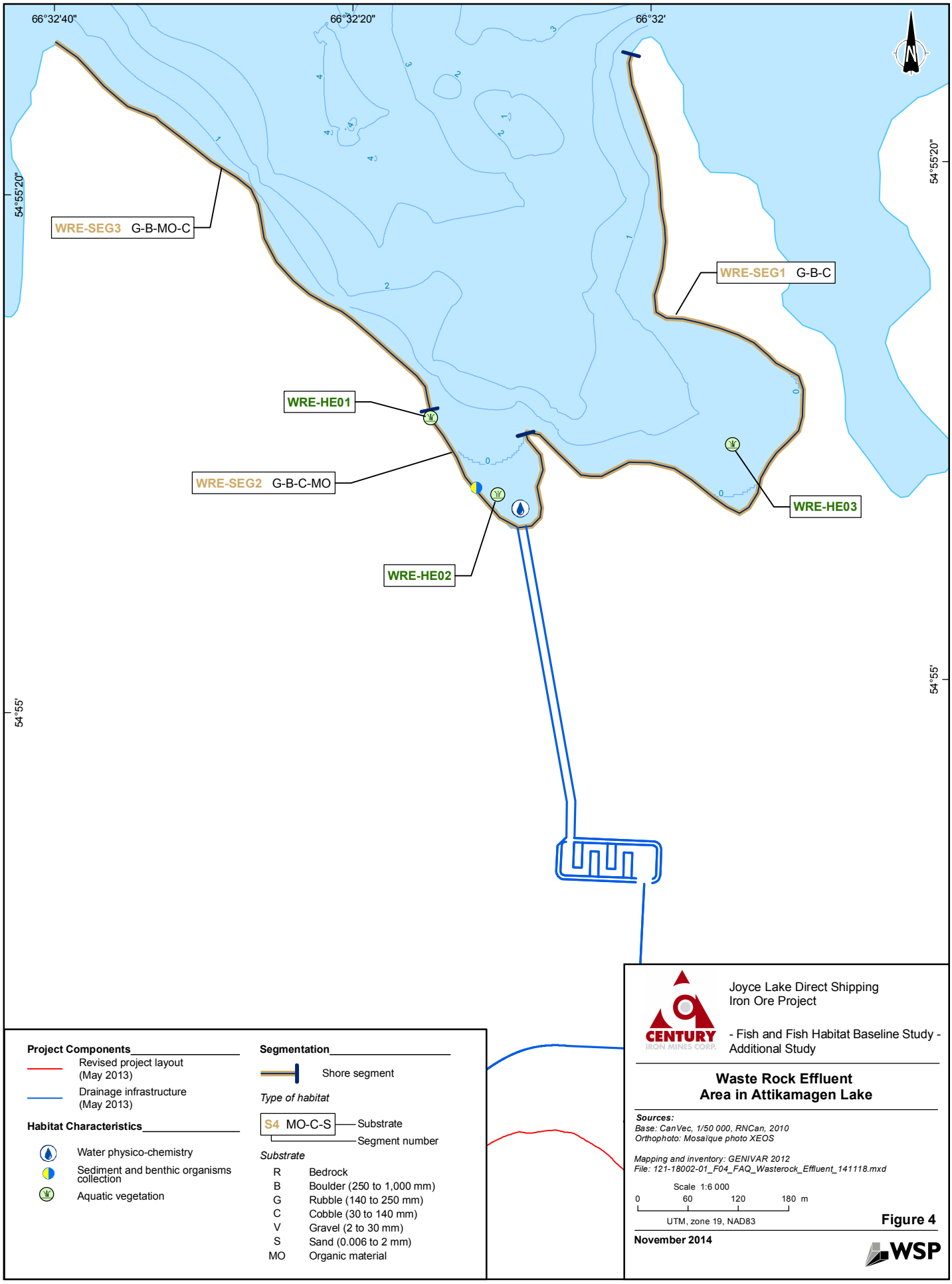
Date	Water Depth (m)	Water Temperature (°C)	Dissolved oxygen		Conductivity (µS/cm)	pH
			mg/L	%		
2013-08-31	0.5	12.04	9.09	90.6	30	6.21

There is no connecting stream that discharges into this bay (Figure 4). The shoreline substrate is mostly composed of cobble, boulder and rubble (Photo 1; Appendix C). Organic material was also found in segment WRE-SEG2 and WRE-SEG3. In the small cove where the effluent is proposed to be discharged, two areas were covered by aquatic vegetation (bur-reed [Photo 2] and bulrush; 440 m²). Aquatic vegetation was also found in the eastern cove of this bay (300 m²).

No fish sampling was conducted in this bay in 2013. It is assumed that the same fish species found in Bay 2 and in Iron Arm in 2012 occur in this area of Attikamagen Lake.

Photo 1: Shoreline general view in the waste rock effluent proposed area

Photo 2: Bur-reed found in the Attikamagen bay – WRE-SEG2


66°32'40"
66°32'20"
66°32'
54°55'20"
54°55'
WRE-SEG3 G-B-MO-C
WRE-SEG1 G-B-C
WRE-SEG2 G-B-C-MO
WRE-HE01
WRE-HE02
WRE-HE03
N
Project Components
Revised project layout (May 2013)
Drainage infrastructure (May 2013)
Habitat Characteristics
Water physico-chemistry
Sediment and benthic organisms collection
Aquatic vegetation
Segmentation
Shore segment
Type of habitat
S4 MO-C-S
Substrate
Segment number
Substrate
R Bedrock
B Boulder (250 to 1,000 mm)
G Rubble (140 to 250 mm)
C Cobble (30 to 140 mm)
V Gravel (2 to 30 mm)
S Sand (0.006 to 2 mm)
MO Organic material
CENTURY IRON MINES CORP.
Joyce Lake Direct Shipping Iron Ore Project
- Fish and Fish Habitat Baseline Study - Additional Study
Waste Rock Effluent Area in Attikamagen Lake
Sources:
Base: CanVec, 1/50 000, RNCan, 2010
Orthophoto: Mosaïque photo XEOS
Mapping and inventory: GENIVAR 2012
File: 121-18002-01_F04_FAQ_Wasterock_Effluent_141118.mxd
Scale 1:6 000
0 60 120 180 m
UTM, zone 19, NAD83
Figure 4
November 2014
WSP

5.1.3 Iron Arm and Guy's River

During field work, dissolved oxygen was 9.81 mg/L near the surface, pH was 6.44 and conductivity was 43 µS/cm (Table 9; Figure 5). There was no thermic stratification in the first 20 m of water but dissolved oxygen tended to increase near the bottom. No measurement could be made deeper since the multiparameter was limited by a 20-metre long cord. The water transparency reached 5.5 m.

Table 9: Water Physicochemistry in Iron Arm (Ice Bridge/Barge Area)

Waterbody ID	Date	Depth (m)	Temperature (°C)	Dissolved oxygen		Conductivity (µS/cm)	pH
				mg/L	%		
Iron Arm	2013-09-01	0.5	12.86	9.81	97.9	43	6.44
Iron Arm	2013-09-01	1	12.88	9.19	90.3	44	6.44
Iron Arm	2013-09-01	2	12.86	9.17	91.4	44	6.41
Iron Arm	2013-09-01	3	12.86	9.18	91.2	44	6.41
Iron Arm	2013-09-01	4	12.86	9.25	90.9	44	6.38
Iron Arm	2013-09-01	5	12.88	8.80	90.1	45	6.38
Iron Arm	2013-09-01	6	12.88	9.37	94.5	44	6.36
Iron Arm	2013-09-01	7	12.88	9.50	93.1	44	6.29
Iron Arm	2013-09-01	8	12.87	9.48	94.7	44	6.28
Iron Arm	2013-09-01	9	12.86	9.85	98.3	44	6.27
Iron Arm	2013-09-01	10	12.85	9.69	96.2	44	6.26
Iron Arm	2013-09-01	11	12.85	10.30	101.2	44	6.25
Iron Arm	2013-09-01	12	12.84	10.73	107.5	44	6.25
Iron Arm	2013-09-01	13	12.83	10.46	104.7	44	6.24
Iron Arm	2013-09-01	14	12.83	10.45	103.7	44	6.24
Iron Arm	2013-09-01	16	12.78	10.53	103.9	44	6.23
Iron Arm	2013-09-01	18	12.71	10.51	101.3	44	6.21
Iron Arm	2013-09-01	20	12.69	10.47	104.3	45	6.20

Flow velocity measurements were made at ten stations located in the area of the two ice bridges (Figure 5). Despite the fact that Iron Arm is Attikamagen Lake's outlet, flow velocity in Iron Arm remains very low and ranged from 0.01 to 0.09 m/s at 0.2h and from 0.02 to 0.08 m/s at 0.8h (near bottom; Table 10).

Table 10: Flow Velocities (m/s) Measured in Iron Arm

	Station ID									
	FV1	FV2	FV3	FV4	FV5	FV6	FV7	FV8	FV9	FV10
Surface (0.2h)	0.09	0.07	0.05	0.06	0.04	0.03	0.09	0.01	0.07	0.05
Bottom (0.8h)	0.03	0.02	0.04	0.06	0.07	0.06	0.08	0.04	0.04	0.04

Three aquatic vegetation areas were found on the eastern shore of Iron Arm between the two ice bridges (Figure 5; Appendix C). These are small patches of 20 to 40 m² of vegetation occurring in shallow water in small coves. Near the eastern shore, the substrate is coarse and mostly composed of rubble, cobble and boulder. Segment IA-SEG3, where the southern ice bridge is located, has a small amount of sand and gravel through cobble, boulder and rubble. Along the western shore, no aquatic vegetation was found and the substrate was composed of rubble, cobble, boulder, gravel and sand. In deeper water, the substrate was mostly composed of reddish-brown silt and clay (see Section 5.2 for grain size distribution). The riparian vegetation is predominantly black spruce and larch with shrubs such as willows, alder, birch and ericaceous. Herbaceous species were also found along the east shore.

Guy's River is Iron Arm outlet and is located approximately 22 km downstream from the ice bridge/barge area (Figure 2). This river discharges into Freeman Lake and represents a traditional fishing area. Photos 3 and 4 provide a general view of this river which is characterized by swift water and coarse substrate in the main channel.

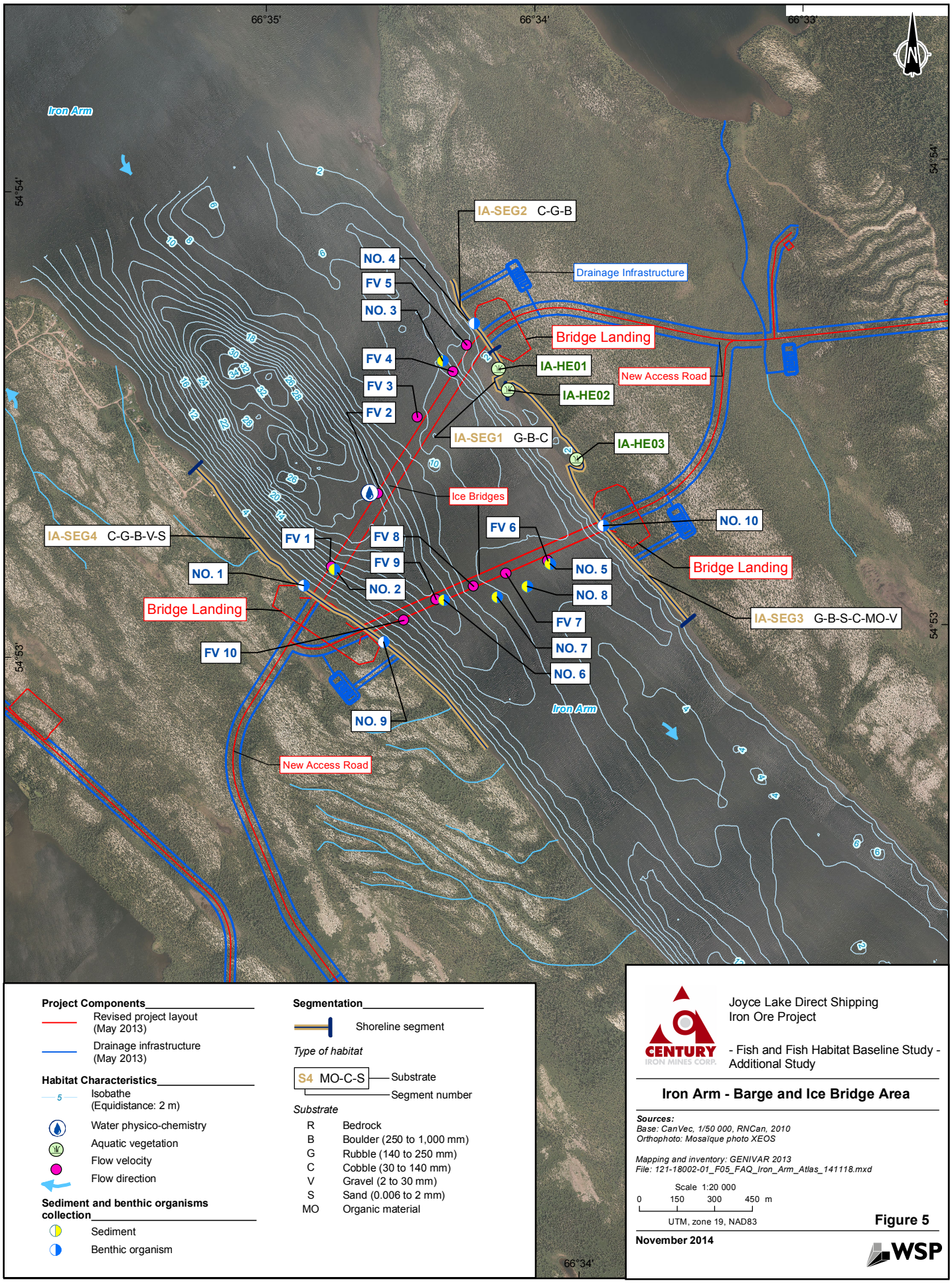
Photo 3: Upstream part of Guy's River

Photo 4: General view from Freeman Lake

5.1.4 Lake H

Morphometry and Water Physicochemistry

Lake H covers 96.3 ha and discharges towards unnamed lakes that connect to Petitsikapau Lake (Figure 2). The mean water depth is 0.83 m and the maximum water depth reaches 1.45 m (Figure 6; Table 11). The littoral development index is 1.41 which indicates a relatively regular shoreline with only a few bays. This type of lake is, in general, less favourable to biological productivity. However, the volume development index is 1.72, which is indicative of convex slopes that help maintain the nutrients available for biological productivity. The very low water depth in this lake may prevent fish to inhabit this lake during winter as water could freeze to the bottom. During field work, dissolved oxygen was 9.10 mg/L near the surface, pH was 6.57 and conductivity was 34 µS/cm (Table 11; Figure 6). The water transparency reached the bottom of the lake.



Project Components

- Revised project layout (May 2013)
- Drainage infrastructure (May 2013)

Habitat Characteristics

- 5 — Isobathe (Equidistance: 2 m)
- Water physico-chemistry
- Aquatic vegetation
- Flow velocity
- Flow direction

Sediment and benthic organisms collection

- Sediment
- Benthic organism

Segmentation

- Shoreline segment

Type of habitat

S4 MO-C-S — Substrate / Segment number

Substrate

R	Bedrock
B	Boulder (250 to 1,000 mm)
G	Rubble (140 to 250 mm)
C	Cobble (30 to 140 mm)
V	Gravel (2 to 30 mm)
S	Sand (0.006 to 2 mm)
MO	Organic material

CENTURY IRON MINES CORP.

Joyce Lake Direct Shipping
Iron Ore Project

- Fish and Fish Habitat Baseline Study - Additional Study

Iron Arm - Barge and Ice Bridge Area

Sources:
Base: CanVec, 1/50 000, RNCan, 2010
Orthophoto: Mosaïque photo XEOS

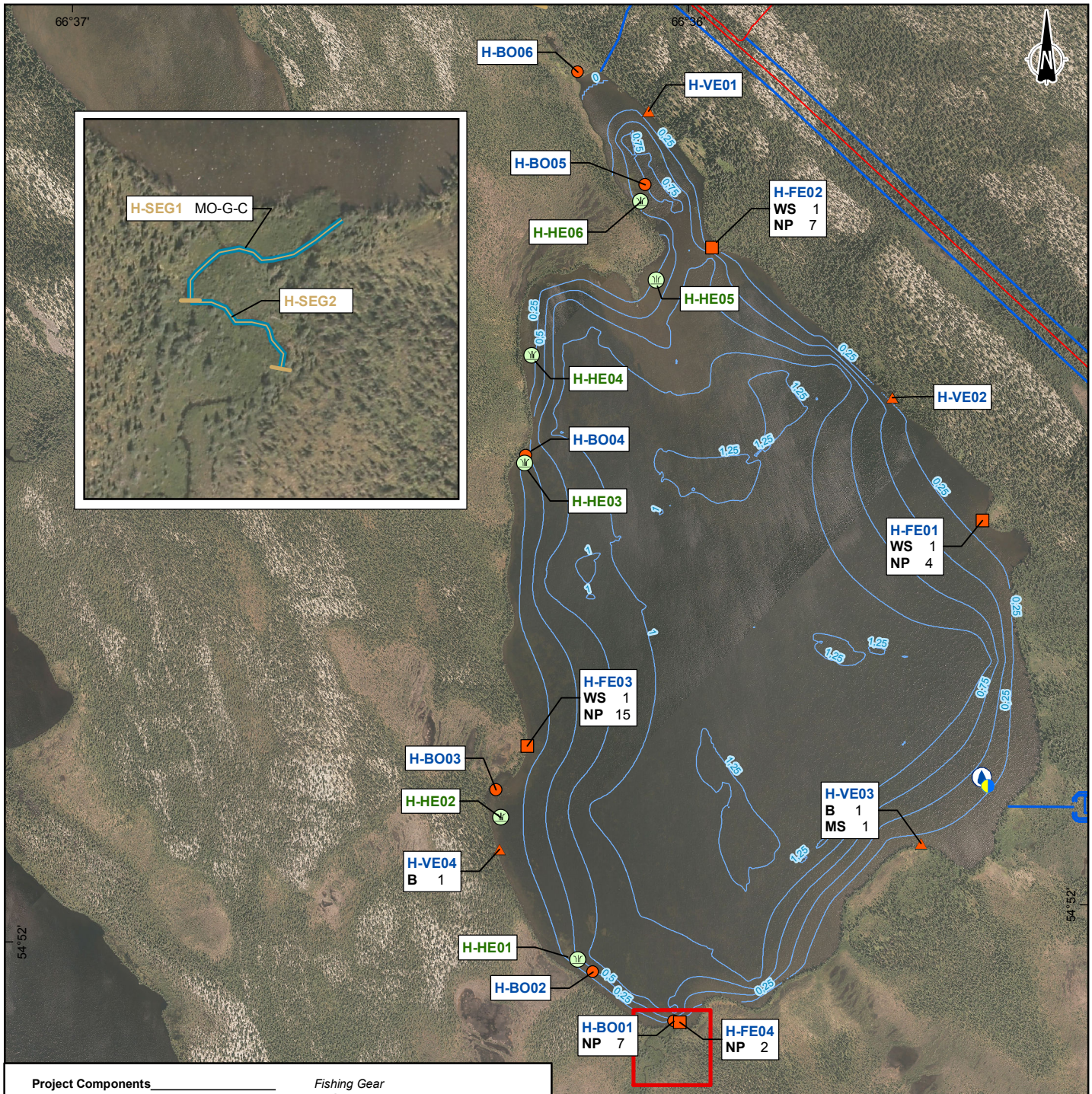
Mapping and inventory: GENIVAR 2013
File: 121-18002-01_F05_FAQ_Iron_Arm_Atlas_141118.mxd

Scale 1:20 000
0 150 300 450 m
UTM, zone 19, NAD83

Figure 5

November 2014

WSP



Project Components

- Revised project layout (May 2013)
- Drainage infrastructure (May 2013)

Habitat Characteristics

- 5 — Isobathe (Equidistance: 0.25 m)
- Water physico-chemistry
- Sediment and benthic organisms collection
- Aquatic vegetation
- Flow direction

Fish Sampling

VE-01 — Gear type; Sequential number

X	No fish
ND	Northern pike
MS	Mottled sculpin
WS	White sucker

Fishing Gear

- Minnow trap (BO)
- Gill net (FE)
- Fyke net (VE)

Segmentation

- Stream segment

Type of habitat

S4 MO-C-S — Substrate; Segment number

Substrate

R	Bedrock
B	Boulder (250 to 1,000 mm)
G	Rubble (140 to 250 mm)
C	Cobble (30 to 140 mm)
V	Gravel (2 to 30 mm)
S	Sand (0.006 to 2 mm)
MO	Organic material

CENTURY IRON MINES CORP.

Joyce Lake Direct Shipping
Iron Ore Project

- Fish and Fish Habitat Baseline Study - Additional Study

Lake H

Sources:
Base: CanVec, 1/50 000, RNCan, 2010
Orthophoto: Mosaïque photo XEOS

Mapping and Inventory: GENIVAR 2012
File: 121-18002-01_F06_FAQ_Lac_H_141118.mxd

Scale 1:10 000
0 100 200 300 m
UTM, zone 19, NAD83

Figure 6

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Table 11: Lake H Morphometric Characteristics

Morphometry		
Area (ha)	96.3	
Perimeter (m)	4,912	
Volume (m^3)	801,654	
Maximum depth (m)	1.45	
Mean depth (m)	0.83	
Maximum length (m)	1,551	
Littoral development index (D_L)	1.41	
Volume development index (D_V)	1.72	

Water Physicochemistry	
Date: August 22, 2013	Conductivity (µS/cm) : 34
Temperature (°C): 14.5	pH: 6.57
Dissolved oxygen (mg/L): 9.10	Water transparency (m): 1.45

Fish Population

On August 22-23, 2013, fish sampling was conducted in Lake H using gillnets, fyke nets and minnow traps (Figure 6; Appendices A and B). Fishing gear was set overnight. A total of 35 fish were captured: northern pike (82.9 % of all fish captured), white sucker (8.9 %), burbot (5.7 %) and mottled sculpin (2.9 %; Table 12). Northern pike had a mean length of 504.4 mm and a mean weight of 909.8 g. Both adult and juvenile sizes were captured with minimum and maximum lengths of 87 and 702 mm.

Several patches of pond lily and bur-reed were found in the lake. These covered approximately 2,585 m². All habitats found in Lake H are littoral (within the photic zone). There are approximately 0.3 ha of fine substrate habitat with vegetation and 96.0 ha of fine substrate habitat without vegetation. These habitats provide feeding and spawning areas mostly for northern pike during the ice free season.

Connecting Stream

The Lake H tributary was characterized in 2012 and identified as CR02. The outlet was characterized in 2013 over a distance of 100 m and the data collected are given in Appendix D. The outlet is a 2-metre wide stream with a mean water depth of 1.2 m. The type of habitat is flat and flow velocity was 0.1 m/s. The substrate is composed of organic material and aquatic vegetation covers approximately 5 % of the stream bed. The riparian vegetation is mostly composed of shrubs overhanging the water. This connecting stream may provide wintering habitat when the ice cover and the low dissolved oxygen content prevent fish from inhabiting Lake H.

Table 12: Fish Sampling Effort and Basic Statistics of Fish Communities in Lake H

Date: August 22, 23						**Water Temperature:** 15 ºC
Fishing Gear	**Effort (gear-night)**	**Species[1]**	**Number**	**Biomass (g)**	**CPUE[2]**	**BPUE[3]**
Gillnet	4	NP	28	25,475	7	6,369.8
		WS	3	171	0.8	42.8
		TOTAL	**31**	**25,646**	**7.8**	**6,411.5**
Fyke net	4	B	2	7.3	0.5	1.8
		MS	1	6.8	0.3	1.7
		TOTAL	**3**	**14.1**	**0.8**	**3.5**
Minnow trap	6	NP	1	7.6	0.2	1.3
		TOTAL	**1**	**7.6**	**0.2**	**1.3**

	WS	**NP**	**B**
Number of fish	3	29[4]	2
Mean length (mm; s. d.[5])	167.7 (43.2)	504.4 (156.7)	72.5 (12.0)
Minimum length (mm)	127	87	64
Maximum length (mm)	213	702	81
Mean weight (mm; s. d.[5])	57.0 (39.2)	909.8 (514.3)	-
Minimum weight (mm)	26	53.8	-
Maximum weight (mm)	101	1980.0	-
Mean Fulton (s. d.[5])	1.110 (0.139)	0.553 (0.062)	-

[1] WS: White sucker; NP: Northern pike; B: Burbot; MS: Mottled sculpin.
[2] CPUE : Capture per unit effort
[3] BPUE : Biomass (g) per unit effort
[4] One fish was not weighted.

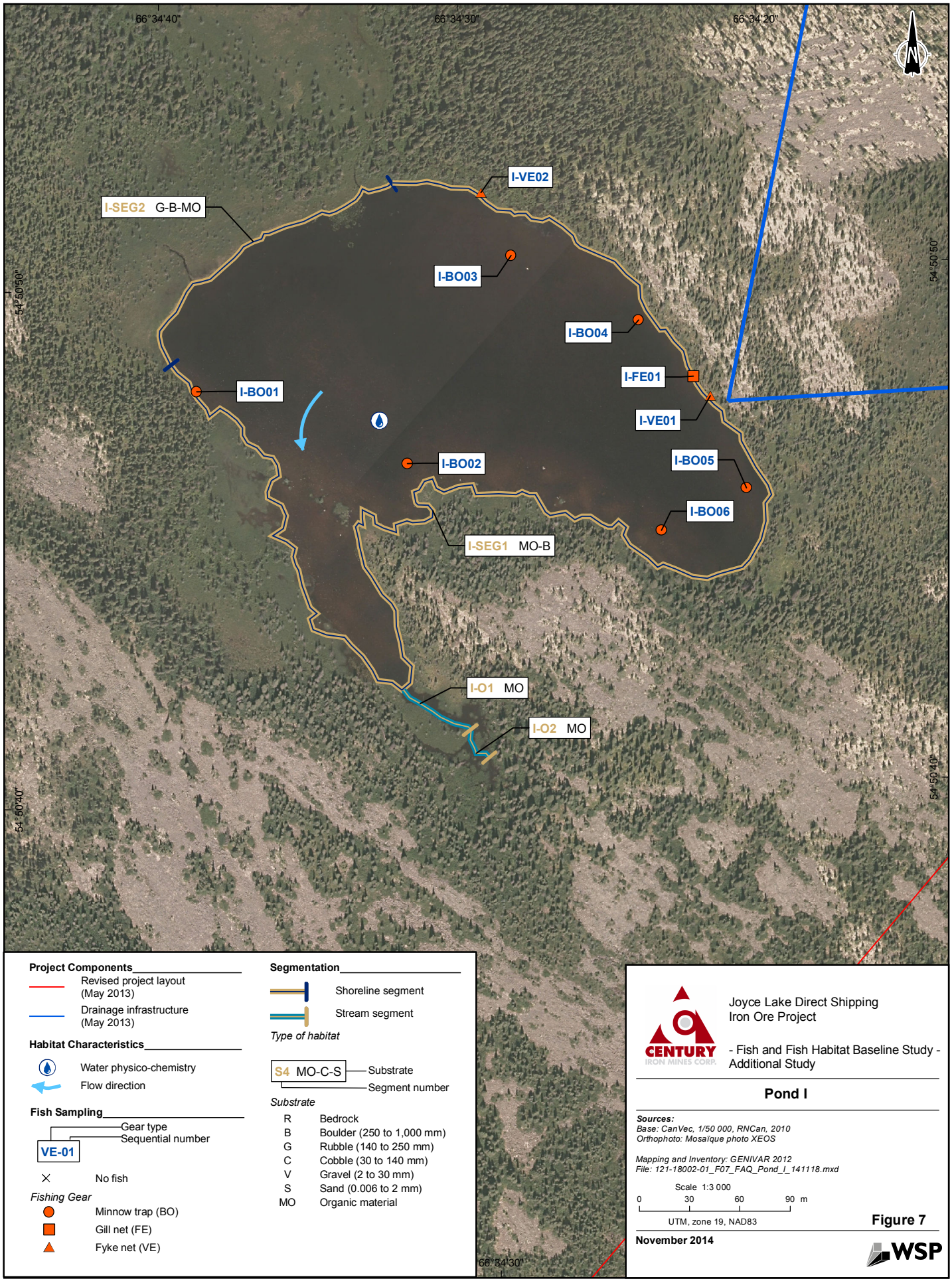
5.1.5 Pond I

Morphometry and Water Physicochemistry

Pond I is a shallow waterbody where the maximum water depth is approximately 1.0 m (Figure 7). Due to the low water depth, no bathymetric survey could be conducted in this pond. The pond covers an area of 5.8 ha and is part of a vast wetland complex. The littoral development index is 1.78, which indicates a low potential for biological productivity. During field work, dissolved oxygen was 7.89 mg/L, pH was 6.41 and conductivity was 29 µS/cm (Table 13). The water transparency reached the bottom of the lake, which was approximately 1 m deep.

Fish Population

On August 21-22, 2013, fish sampling was conducted in Pond I using gillnets, fyke nets and minnow traps (Figure 7; Appendices A and B). Fishing gear was set overnight and no fish were captured (Table 14).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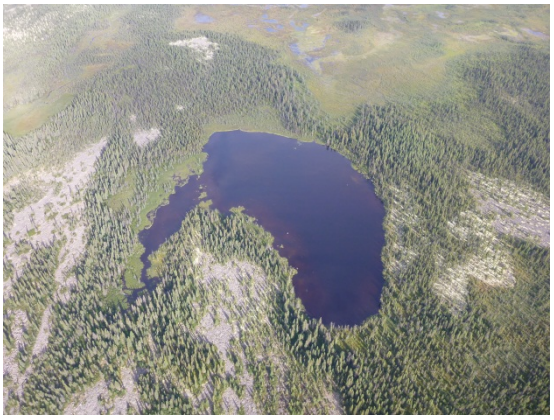
66°34'30"
66°34'20"
54°50'50"
54°50'40"
I-VE02
I-SEG2 G-B-MO
I-BO03
I-BO04
I-FE01
I-BO01
I-VE01
I-BO02
I-BO05
I-BO06
I-SEG1 MO-B
I-O1 MO
I-O2 MO
Project Components
Revised project layout (May 2013)
Drainage infrastructure (May 2013)
Habitat Characteristics
Water physico-chemistry
Flow direction
Fish Sampling
Gear type
Sequential number
VE-01
No fish
Fishing Gear
Minnow trap (BO)
Gill net (FE)
Fyke net (VE)
Segmentation
Shoreline segment
Stream segment
Type of habitat
S4 MO-C-S
Substrate
Segment number
Substrate
R Bedrock
B Boulder (250 to 1,000 mm)
G Rubble (140 to 250 mm)
C Cobble (30 to 140 mm)
V Gravel (2 to 30 mm)
S Sand (0.006 to 2 mm)
MO Organic material
CENTURY IRON MINES CORP.
Joyce Lake Direct Shipping Iron Ore Project
- Fish and Fish Habitat Baseline Study - Additional Study
Pond I
Sources:
Base: CanVec, 1/50 000, RNCan, 2010
Orthophoto: Mosaïque photo XEOS
Mapping and Inventory: GENIVAR 2012
File: 121-18002-01_F07_FAQ_Pond_I_141118.mxd
Scale 1:3 000
0 30 60 90 m
UTM, zone 19, NAD83
Figure 7
November 2014
WSP

Table 13: Morphometry and Water Physicochemical Characteristics in Pond I

Morphometry		
Area (ha)	5.8	
Perimeter (m)	1,521	
Volume (m³)	Not determined	
Maximum depth (m)	≈ 1.0	
Mean depth (m)	Not determined	
Maximum length (m)	382	
Littoral development index (D_L)	1.78	
Volume development index (D_V)	Not determined	

Water Physicochemistry	
Date: August 21, 2013	Conductivity (µS/cm) : 29
Temperature (°C): 14.8	pH: 6.41
Dissolved oxygen (mg/L): 7.89	Water transparency (m): 1.0

Table 14: Fish Sampling Effort in Pond I

Date: August 21, 22 **Water Temperature:** 15 ºC

Fishing Gear	Effort (gear-night)	Species[1]	Number	Biomass (g)	CPUE[2]	BPUE[3]
Gillnet	1	---	0	---	---	---
Fyke net	2	---	0	---	---	---
Minnow trap	6	---	0	---	---	---

[1] ---: No fish captured.
[2] CPUE : Capture per unit effort
[3] BPUE : Biomass per unit effort

Connecting Stream

There is only one stream connecting to Pond I (Figure 7). The outlet was characterized over a distance of 100 m. The channel is 4.5 m wide and the mean water depth is 0.3 m (Appendix D). The type of habitat is flat and the flow velocity was not detected by the current meter. The substrate is composed of organic material and aquatic vegetation covered 50 % of the stream bed. This stream runs towards the stream crossing identified as CR19. However, much effort was made in 2012 and 2013 to find CR19 and it appears that the Pond I outlet becomes underground approximately 150 m downstream. There is no direct connection with

other waterbodies. Therefore, Pond I is not accessible to fish and was not considered to be a fish habitat.

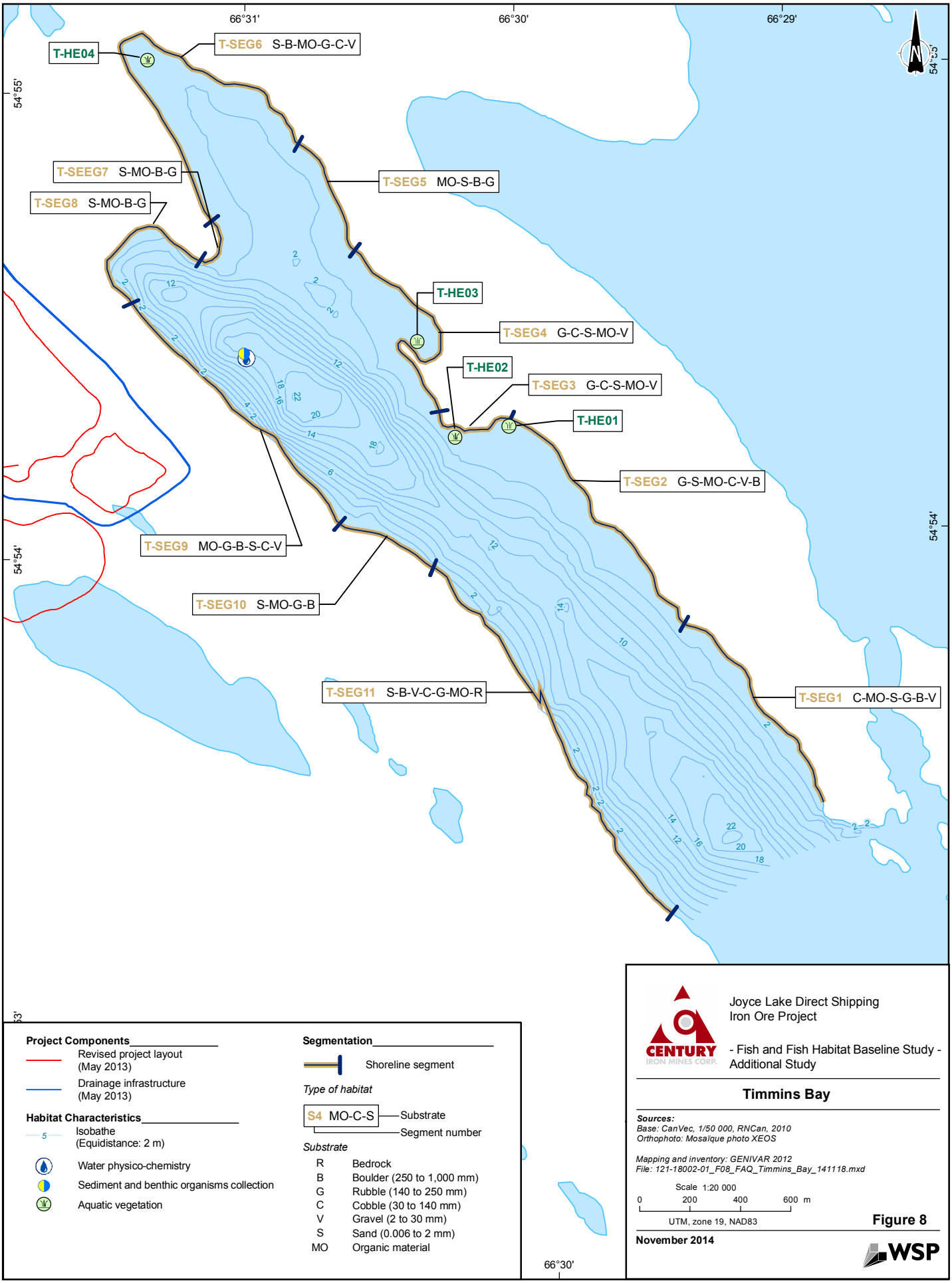
5.1.6 Timmins Bay

Only the northern part of Timmins Bay, which is adjacent to Joyce Lake, was characterized during the field campaign (Figure 8). This elongated bay is approximately 0.7 km wide and more than 10 km long. In the northern part of the bay, two deep pools were found, both approximately 23 m deep. Only the northernmost part of the bay is characterized by shallow water. The remainder of the bay is deep (mean depth of 7.1 m) and has relatively steep slopes. During field work, dissolved oxygen was 10.02 mg/L near the surface, pH was 6.20 and conductivity was 42 µS/cm (Table 15). There was no thermic stratification in the first 20 m of water. Dissolved oxygen reached its maximum at 4 m with 10.47 mg/kg, then slightly decreased in deeper water. No measurement could be made deeper since the multiparameter was limited by a 20-m long cord. The water transparency reached 5.5 m.

Table 15: Water Physicochemistry in Timmins Bay

Waterbody ID	Date	Depth (m)	Temperature (°C)	Dissolved oxygen		Conductivity (µS/cm)	pH
				mg/L	%		
Timmins Bay	2013-09-02	0.5	12.98	10.02	99.4	42	6.20
Timmins Bay	2013-09-02	1	12.98	9.86	99.4	42	6.18
Timmins Bay	2013-09-02	2	12.98	10.21	99.4	42	6.17
Timmins Bay	2013-09-02	3	12.96	10.23	101.1	42	6.17
Timmins Bay	2013-09-02	4	12.96	10.47	103.1	42	6.16
Timmins Bay	2013-09-02	5	12.95	10.41	99.4	42	6.16
Timmins Bay	2013-09-02	6	12.94	10.40	97.3	42	6.17
Timmins Bay	2013-09-02	7	12.93	9.87	97.3	42	6.15
Timmins Bay	2013-09-02	8	12.94	9.89	99.2	42	6.14
Timmins Bay	2013-09-02	9	12.94	9.88	98.6	42	6.13
Timmins Bay	2013-09-02	10	12.94	9.92	98.4	42	6.13
Timmins Bay	2013-09-02	11	12.92	9.93	98.3	42	6.13
Timmins Bay	2013-09-02	12	12.91	9.87	98.2	42	6.10
Timmins Bay	2013-09-02	13	12.91	9.86	98.1	42	6.10
Timmins Bay	2013-09-02	14	12.92	9.84	98.2	42	6.09
Timmins Bay	2013-09-02	16	12.93	9.82	94.6	42	6.08
Timmins Bay	2013-09-02	18	12.92	9.81	95.2	42	6.08
Timmins Bay	2013-09-02	20	12.92	9.82	94.4	42	6.04

Timmins Bay riparian vegetation is mostly treed with some shrubs and herbaceous. The shoreline substrate is mostly composed of sand and organic material with rubble, cobble, boulder and gravel. Four zones with aquatic vegetation were observed and covered approximately 6,550 m².


66°31'
66°30'
66°29'
54°55'
54°54'
54°53'
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T-SEG6 S-B-MO-G-C-V
T-SEEG7 S-MO-B-G
T-SEG8 S-MO-B-G
T-SEG5 MO-S-B-G
T-HE03
T-SEG4 G-C-S-MO-V
T-HE02
T-SEG3 G-C-S-MO-V
T-HE01
T-SEG2 G-S-MO-C-V-B
T-SEG9 MO-G-B-S-C-V
T-SEG10 S-MO-G-B
T-SEG11 S-B-V-C-G-MO-R
T-SEG1 C-MO-S-G-B-V
Project Components
Revised project layout (May 2013)
Drainage infrastructure (May 2013)
Habitat Characteristics
Isobathe (Equidistance: 2 m)
Water physico-chemistry
Sediment and benthic organisms collection
Aquatic vegetation
Segmentation
Shoreline segment
Type of habitat
S4 MO-C-S
Substrate
Segment number
Substrate
R Bedrock
B Boulder (250 to 1,000 mm)
G Rubble (140 to 250 mm)
C Cobble (30 to 140 mm)
V Gravel (2 to 30 mm)
S Sand (0.006 to 2 mm)
MO Organic material
CENTURY IRON MINES CORP.
Joyce Lake Direct Shipping Iron Ore Project
- Fish and Fish Habitat Baseline Study - Additional Study
Timmins Bay
Sources:
Base: CanVec, 1/50 000, RNCan, 2010
Orthophoto: Mosaïque photo XEOS
Mapping and inventory: GENIVAR 2012
File: 121-18002-01_F08_FAQ_Timmins_Bay_141118.mxd
Scale 1:20 000
0 200 400 600 m
UTM, zone 19, NAD83
Figure 8
November 2014
WSP

No fish sampling was conducted in this bay in 2013. It is assumed that the same fish species found in Attikamagen Lake and Iron Arm in 2012 occur in Timmins Bay since these are connected.

Gilling River

Gilling River was characterized in 2012 at the proposed stream crossing identified as CR17. The required additional information was mostly related to the fish species found in the river. Also, more information was collected regarding shoreline and aquatic vegetation in the area of the proposed rail yard effluent. The section of Gilling River under study is shallow with a maximum depth in some areas of approximately 1.0 m.

On August 26-27, 2013, fish sampling was conducted in the Gilling River using gillnets, fyke nets and minnow traps (Figure 9; Appendices A and B). Fishing gear was set overnight. A total of 59 fish were captured, with lake chub (22.0 %), brook trout (18.6 %) and white sucker (18.6 %) being the predominant species. The other fish species that occur in this river are longnose sucker (10.2 %), northern pike (10.2 %), burbot (10.2 %), threespine stickleback (8.5 %) and mottled sculpin (1.7 %).

The number of fish captured per unit effort is low with only five fish captured per gillnet-night, eight fish captured per fyke net-night and 0.4 fish captured per minnow trap-night (Table 16). However, a biomass of approximately 10 kg was captured using gillnets (2.7 kg/gillnet-night) which is relatively high as compared to the small number of fish caught. Northern pike and white sucker accounted for the highest biomass.

Northern pike had a mean length of 564.0 mm and a mean mass of 1,040.6 g (Table 16). All specimens captured were adult size (between 443 and 737 mm). The mean condition factor (Fulton) was relatively low with 0,555. White sucker presents a mean length of 274.0 mm with a minimum and maximum length of 73 and 503 mm which correspond to both adult and juvenile sizes. White sucker mean mass was 455.8 g. Brook trout has a mean length of 114.4 mm and a mean mass of 45.1 g. Specimens captured were both adult and juvenile sizes (between 54 and 198 mm).

Gilling River's substrate was mostly composed of organic material in segments G-SEG1 and G-SEG5 (both near the outlet), while sand was predominant in segments G-SEG-2 and G-SEG4 (narrow section of the river). Segment G-SEG3 was composed of cobble, rubble, sand, gravel, boulder and a little organic material. Three suitable spawning grounds were identified: two for northern pike in the aquatic vegetation near G-SEG1 and G-SEG5 (approx. 200 and 500 m²) and one for sucker approximately 500 m² located in the uppermost section of the river that was characterized (G-SEG3). Dense aquatic vegetation was found in the lowermost part of the characterized river and these vegetated areas cover approximately 84,000 m².

Table 16: Fish Sampling Effort and Basic Statistics of Fish Communities in Gilling River

Date: August 26, 27						**Water Temperature:** 11 ºC
Fishing Gear	**Effort (gear-night)**	**Species[1]**	**Number**	**Biomass (g)**	**CPUE[2]**	**BPUE[3]**
Gillnet	4	WS	8	4,063	2.0	1,015.8
		LNS	1	228	0.3	57.0
		BT	5	226	1.3	56.5
		NP	6	6,244	1.5	1,561.0
		TOTAL	**20**	**10,760**	**5.0**	**2,690.0**
Fyke net	4	WS	3	Not determined	0.8	Not determined
		LNS	4		1.0	
		BT	6		1.5	
		B	5		1.3	
		LC	12		3.0	
		TS	2		0.5	
		TOTAL	**32**	**---**	**8.0**	**---**
Minnow trap	9	LNS	1	1.4	0.1	0.2
		B	1	57.7	0.1	6.4
		MS	1	2.6	0.1	0.3
		LC	1	6.6	0.1	0.7
		TOTAL	**4**	**68.3**	**0.4**	**7.6**

	LSN	**WS**	**LC**	**NP**	**TSS**	**B**	**BT**
Number of fish	6	11	13[4]	6	5	6	11[5]
Mean length (mm; s. d.[5])	116.5 (93.6)	274.0 (149.0)	83.3 (16.7)	564.0 (98.3)	49.4 (8.1)	90.7 (71.4)	114.4 (58.2)
Minimum length (mm)	57	73	48	443	41	46	54
Maximum length (mm)	306	503	109	737	63	222	198
Mean weight (mm; s. d.[5])	-	455.8 (420.6)	3.1 (1.7)	1,040.6 (506.7)	-	-	45.1 (14.7)
Minimum weight (mm)	-	30.2	1.0	549.7	-	-	31.4
Maximum weight (mm)	-	1,179.1	6.6	1,998.9	-	-	64.1
Mean Fulton (s. d.[5])	-	0.989 (0.073)	0.511 (0.158)	0.555 (0.055)	-	-	0.842 (0.040)

[1] WS: White sucker; LNS: Longnose sucker; BT: Brook trout; NP: Northern pike; B: Burbot; LC: Lake chub; TS: Threespine stickleback; MS: Mottled sculpin.

[2] CPUE : Capture per unit effort

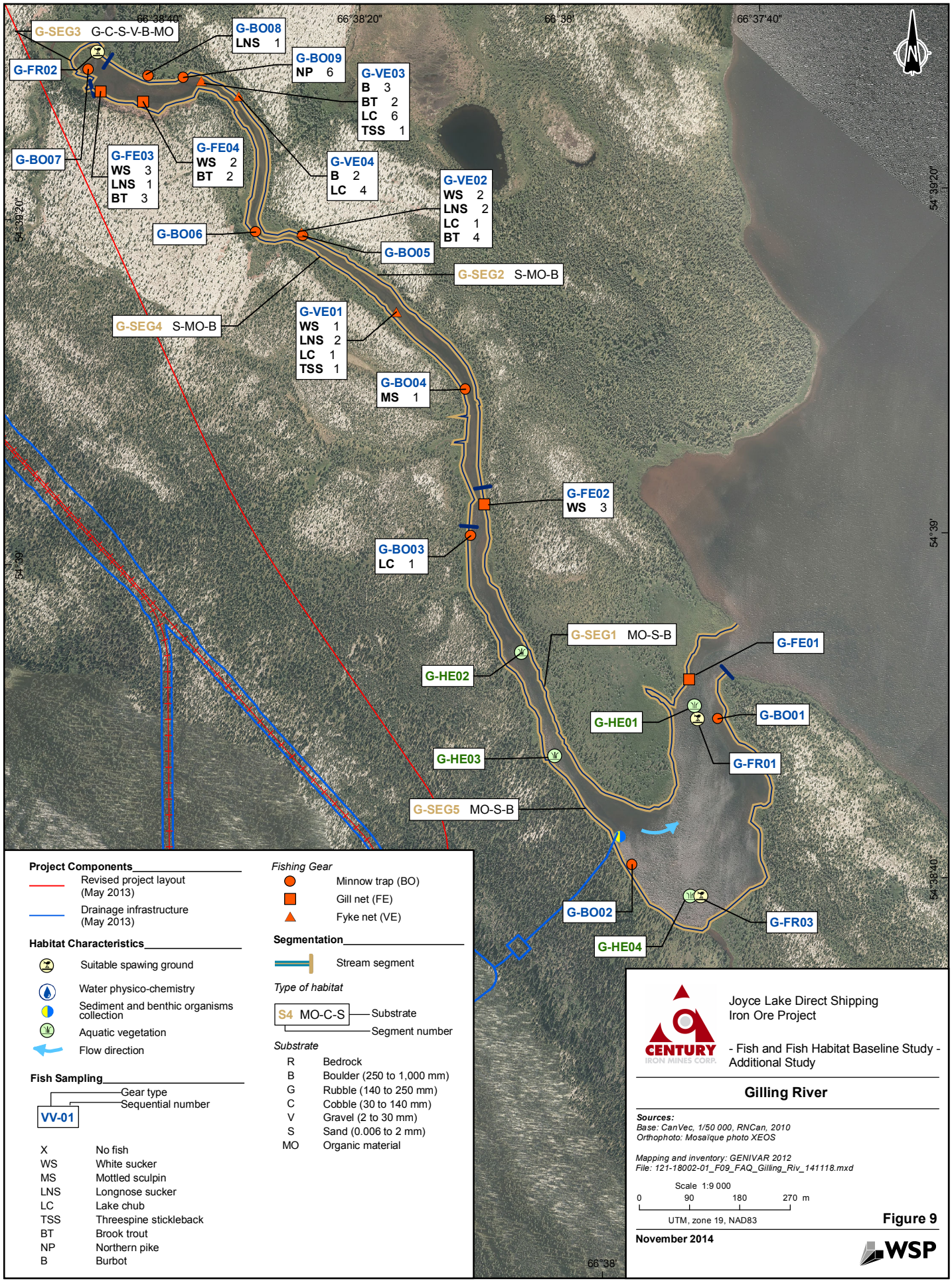
[3] BPUE : Biomass (g) per unit effort

[4] Four fish were not weighed.

[5] Fish caught in gillnet were weighed (n = 5).

5.1.7 Stream Crossings

During the 2012 survey, several stream crossings were identified as being nonexistent due to the absence of stream bed. In many cases, small pockets of water could be seen which suggested these streams may be intermittent.


66°38'40"
66°38'20"
66°38'
66°37'40"
54°39'20"
54°39'
54°38'40"
G-SEG3 G-C-S-V-B-MO
G-BO08 LNS 1
G-BO09 NP 6
G-VE03 B 3 BT 2 LC 6 TSS 1
G-FR02
G-BO07
G-FE03 WS 3 LNS 1 BT 3
G-FE04 WS 2 BT 2
G-VE04 B 2 LC 4
G-VE02 WS 2 LNS 2 LC 1 BT 4
G-BO06
G-BO05
G-SEG2 S-MO-B
G-SEG4 S-MO-B
G-VE01 WS 1 LNS 2 LC 1 TSS 1
G-BO04 MS 1
G-FE02 WS 3
G-BO03 LC 1
G-SEG1 MO-S-B
G-FE01
G-HE02
G-HE01
G-BO01
G-HE03
G-FR01
G-SEG5 MO-S-B
G-BO02
G-FR03
G-HE04
N
Project Components
Revised project layout (May 2013)
Drainage infrastructure (May 2013)
Habitat Characteristics
Suitable spawing ground
Water physico-chemistry
Sediment and benthic organisms collection
Aquatic vegetation
Flow direction
Fish Sampling
Gear type
Sequential number
VV-01
X No fish
WS White sucker
MS Mottled sculpin
LNS Longnose sucker
LC Lake chub
TSS Threespine stickleback
BT Brook trout
NP Northern pike
B Burbot
Fishing Gear
Minnow trap (BO)
Gill net (FE)
Fyke net (VE)
Segmentation
Stream segment
Type of habitat
S4 MO-C-S
Substrate
Segment number
Substrate
R Bedrock
B Boulder (250 to 1,000 mm)
G Rubble (140 to 250 mm)
C Cobble (30 to 140 mm)
V Gravel (2 to 30 mm)
S Sand (0.006 to 2 mm)
MO Organic material
CENTURY IRON MINES CORP.
Joyce Lake Direct Shipping Iron Ore Project
- Fish and Fish Habitat Baseline Study - Additional Study
Gilling River
Sources:
Base: CanVec, 1/50 000, RNCan, 2010
Orthophoto: Mosaïque photo XEOS
Mapping and inventory: GENIVAR 2012
File: 121-18002-01_F09_FAQ_Gilling_Riv_141118.mxd
Scale 1:9 000
0 90 180 270 m
UTM, zone 19, NAD83
Figure 9
November 2014
WSP

During the 2013 field campaign, these streams were visited again, at the proposed crossing location, to confirm there is no fish habitat. These stream crossings are identified AT-T01, CR06, CR07, CR09, CR19 and CR21. The remaining stream crossings characterized in 2013 were not visited in 2012 due to changes in the road alignment after the field campaign was conducted. These crossings are identified: CR10, CR11, CR12, CR14, CR23, CR15, CR16 and CR17A.

Crossing at AT-T01

AT-T01 is a stream identified in the 1:50,000 topographic map that discharges into Attikamagen Lake (Figure 2). In 2012, only small ponds in wetlands and pockets of water were found. The stream was determined to be an intermittent stream receiving water on rare occasions. During the 2013 field campaign, a stream was visible from Attikamagen Lake and up to approximately 350 m upstream (Photo 5). Beyond that point, the water was running through multiple small channels and, is some areas, the water seemed to flow underground.

The proposed crossing location was not accessible and only photographs were taken (Photo 6). From the helicopter only small channels were visible and small pockets of water were also visible. It is assumed that in minimum flow condition, part of this watercourse stream could be dry and inaccessible to fish. Therefore, it is unlikely that there are fish in the upper part of the stream, where the projected crossing is located. In addition, in the area of the crossing, the small channels run underground over short distances in many areas. The upper part of AT-T01 corresponds to a wetland and is not considered to be a fish habitat. No electrofishing was conducted in the lower part of the stream where a channel was present.

Photo 5: AT-T01, small stream visible approximately 350 m from Attikamagen Lake, then become intermittent upstream

Photo 6: AT-T01, general view where the crossing is projected; multiple small channels running through the vegetation

CR06

As observed in 2012, no streams were found at CR06 in 2013 (Figure 2, Photos 7 and 8). Shrubby vegetation (*Ledum groenlandicum, Myrica gale*) with black spruce, larch and lichens were found, but no stream bed was observed (Photo 8, Appendix D). Where small pockets of water were visible, mosses were present on the ground. The area identified as a potential crossing has no stream and is therefore not a fish habitat.

Photo 7: CR06, small pocket of water

Photo 8: CR06, general view

CR07

Considering the final road alignment, CR07 now crosses an area where there was no stream found in 2012. The 2013 field campaign aimed at determining if there is a link between the streams identified as CR07 and a pond located a few hundred metres south (Figure 2). The visit indicated that those two waterbodies do not connect together, at least not above the ground (Photos 9 and 10). There may exist an underground connection but it would not allow fish passage. Therefore, the proposed crossing is not considered to be a fish habitat.

CR09

As observed in 2012, there was no stream found at proposed crossing CR09 in 2013. If there is a stream there, it is probably intermittent and partially underground and does not connect upstream to any other watercourse or waterbody. It is considered that there is no fish habitat in this area. Only a wetland was found as well as some small pockets of water (Photos 11 and 12).

Photo 9: CR07, aerial view of the pond located downstream CR07

Photo 10: Upstream part of the pond, no water coming from CR07

Photo 11: CR09, aerial view of the area where the stream should be found; a wetland is present on the left side of the photo

Photo 12: CR09, no stream bed found through the open spruce-moss forest stand

CR19

CR19 is a small stream that discharges into Pond I (Figure 2) and was identified as a potential stream crossing. As observed in 2012, no stream could be found at the proposed crossing location and only pockets of water were observed during the 2013 visit. If there is a connection between the vast wetland and Pond I, it is most likely underground with water seeping or flowing through weathered rock (Photos 13 and 14). There is no fish habitat at the proposed crossing.

Photo 13: CR19, no stream bed found; weathered rock

Photo 14: Upper part where CR19 should be found; outlet disappear through the ground (weathered rock)

CR21

As observed in 2012, no streams were found at CR21, but a few pockets of water were observed. These seem to be part of some wetlands but not connected to each other. In 2013, water could be heard underground running through boulder covered by peat. CR21 is considered to be a hydric link between a wetland (north) and a waterbody (south), but considering it runs underground over a long distance, it is not considered to be a fish habitat. Photos 15 and 16 show the general characteristics of the environment found at the proposed crossing location.

Photo 15: CR21, no stream bed visible

Photo 16: CR21, water could be heard running through boulder, under peat and moss cover

CR20

Stream crossing CR20 was visited in 2013 to collect additional information on the pond located downstream from the proposed crossing location (Figure 2; Photos 17 and 18). The water is too shallow to navigate and therefore the information was collected from the helicopter at low altitude.

Photo 17: CR20, proposed crossing location (bottom of the photo) – View from upstream to downstream

Photo 18: CR20, general view of the fish habitat found downstream from the proposed crossing location

The substrate is predominantly organic material and large patches of aquatic vegetation were found in the pond (pond lilies and bur-reed). The pond provide suitable habitat for juveniles of many fish species. During the 2013 field campaign electrofishing was conducted at the proposed stream crossing location (Photos 19 and 20). Four species were captured: two burbot, five mottled sculpin, two lake chub and a single white sucker. The fishing effort and habitat characteristics at the station are provided in Tables 17 and 18.

Photo 19: Electrofishing station in CR20

Photo 20: Fish caught in CR20

CR10 and CR10A

Additional information was required for stream crossings CR10 and CR10A since the connection between CR10 and CR10A remained unclear. Also, the road alignment was relocated and therefore the information collected at CR10 in 2012 did not cover the final stream crossing location. Finally, electrofishing was required to determine fish species found in these habitats.

The connection between CR10A and CR10 was determined to be underground. The three ponds in the area of CR10A discharge towards CR10 through the ground (Photo 21), then, approximately 175 m before it reaches CR10, the water emerges from the ground and runs into CR10 via a small stream approximately 0.3 m wide (Photo 22). The underground section is judged to be inaccessible to fish. In the area of stream crossing CR10A, in the narrow stretch of water between two small ponds, only brook trout was caught using electrofishing (Photos 23 and 24). Seven fish were captured and many other small brook trout (approx. 50 to 100 mm) were observed.

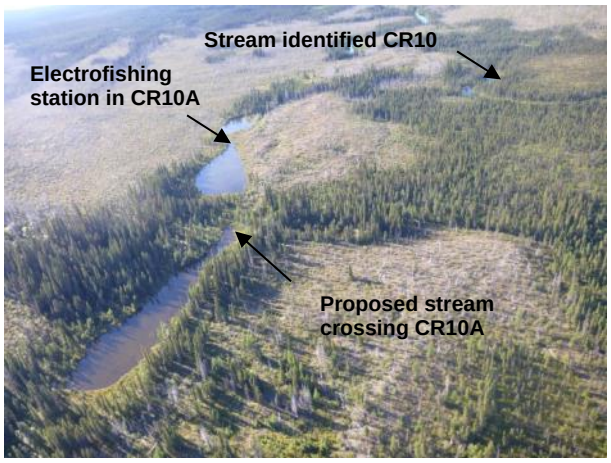


Photo 17: CR10A – General view

Photo 18: No fish passage between CR10A and CR10

Photo 19: CR10A – Electrofishing station located between the two ponds

Photo 20: Electrofishing station in CR10A

Table 17: Information on Electrofishing Effort and Number of Fish Caught at Proposed Stream Crossing Locations

Stream ID	Date	Water Temp. (°C)	Station Size			Fishing Time (sec)	Fish Caught[(a)]								Notes
			Length (m)	Width (m)	Area (m²)		LC	LNS	WS	BT	MS	B	LND	LT	
CR10	2013-08-28	13.0	30	3.0	90	622			1	1	6				Three fish lost; beavers still active at the dam.
CR10A	2013-08-28	13.5	20	4.0	80	268				7					One fish lost; very fine substrate and soft streambed. Several BT observed (>50 mm) that could not be caught due to the difficulty of walking in the mud.
CR11	2013-08-29	10.5	75	1.0	75	348				4					Two fish lost.
CR12	2013-08-29	8.4	40	2.5	100	403		1		5	1				
CR14	2013-08-30	12.8	60	1.5	70	347				4					Two fish lost.
CR15	2013-08-30	13.4	50	2.0	100	474	2			2			5		Three fish lost.
CR16	2013-08-30	10.9	100	0.8	80	428	1			1				1	
CR17A	2013-08-31	6.4	25	0.2	5	115									
CR20	2013-08-28	13.0	15	8.0	120	535	2		1		5	2			
CR23	2013-08-29	13.5	50	2.0	100	322		1				1			Very fine substrate and soft bottom. Electrofishing conducted along the shore in tall aquatic herbs.

(a) LC: Lake Chub, LNS: Longnose Sucker; WS: White Sucker; BT: Brook Trout; MS: Mottled Sculpin; B: Burbot; LND: Longnose Dace; LT: Lake Trout.

Table 18: Stream Characteristics in the Area of the Electrofishing Stations

Stream ID	Latitude (ddmmss.s)	Longitude (ddmmss.s)	Mean Water Depth (m)	Habitat Type	Vegetation % Cover	Substrate (%) [(a)]								Mean Flow Speed (m/s)
						MO	L	S	V	C	G	B	R	
CR10	N54 45 17.8	W66 35 29.9	0.9	Riffle	10	90		5				5		ND
CR10A	N54 45 09.0	W66 35 55.5	0.3	Flat	5	100								0.0
CR11	N54 44 26.8	W66 36 40.5	0.5	Flat	20	40			5	20	30	5		0.10
CR12	N54 43 29.0	W66 36 51.4	0.5	Run	15					10	30	60		0.70
CR14	N54 42 15.4	W66 38 54.9	0.2	Flat	50	60			10	20	5	5		ND
CR15	N54 41 35.6	W66 39 21.1	0.6	Run	15					5	25	70		0.65
CR16	N54 41 18.5	W66 39 36.3	0.3	Riffle(10%); Run(90%)	40			10	70	15	5			0.55
CR17A	N54 39 28.2	W66 38 50.5	0.1	Run	15	95		5						ND
CR20	N54 49 39.9	W66 34 15.1	0.4	Riffle	10				5	20	60	15		0.55
CR23	N54 42 58.9	W66 38 15.8	0.4	Flat	15	100								0.0

ND: Not determined.

(a) Substrate: MO: Organic Material; L: Silt and clay; S: Sand; V; Gravel; C; Cobble; G: Rubble; B : Boulder; R: Bedrock

CR10 was characterized over a distance of 200 m upstream and 250 m downstream from the proposed crossing (Photos 25 to 34; Appendix D). In general, this stream section is quite homogenous with a flat type of habitat, a width ranging from 9 to 12 m, a water depth ranging from 0.9 to 2.2 m, and a flow velocity of 0.1 m/s. The substrate is mostly composed of organic material. A beaver dam was found (under construction) in segment DS-SEG5 but fish passage was still possible.

In CR10, the electrofishing station was located downstream from the proposed crossing location (segment DS-SEG5; Appendix D), upstream from the beaver dam. The habitat type at this station is riffle and the mean water depth was 0.90 cm. Three fish species were caught: six mottled sculpin, one brook trout and one white sucker (Tables 17 and 18).

Photo 25: CR10 – DS-SEG5

Photo 26: CR10 – DS-SEG4

Photo 27: CR10 – DS-SEG3

Photo 28: CR10 – DS-SEG2

Photo 29: CR10 – DS-SEG1

Photo 30: CR10 – US-SEG1

Photo 31: CR10 – US-SEG2

Photo 32: CR10 – US-SEG3

Photo 33: CR10 – US-SEG4

Photo 34: CR10 – Bur-reed commonly occurring in the stream

CR11

CR11 was characterized over a distance of 200 m upstream and 250 m downstream from the proposed crossing (Photos 35 to 44; Appendix D). This stream section is predominantly a flat type of habitat, with short segment with run and riffle types of habitat. The stream width ranges from 1.2 to 2.4 m, the water depth ranged from 0.4 to 0.8 m, and a flow velocity was 0.3-0.4 m/s. The substrate is mostly composed of cobble and rubble with organic material.

Electrofishing was conducted on August 29, 2013 (Tables 17 and 18). The station was located upstream from the crossing due to the dense vegetation found in the area of the proposed crossing. There are no fish barriers between the two areas so the fish species are assumed to be the same. Four brook trout were caught and two other fish were lost.

Photo 35: CR11 – DS-SEG5

Photo 36: CR11 – DS-SEG4

Photo 37: CR11 – DS-SEG3

Photo 38: CR11 – DS-SEG2

Photo 39: CR11 – DS-SEG1

Photo 40: CR11 – US-SEG1

Photo 41: CR11 – US-SEG2

Photo 42: CR11 – US-SEG3

Photo 43: CR11 – US-SEG4

Photo 44: CR11 – Electrofishing station

CR12

CR12 was characterized over a distance of 200 m upstream and 250 m downstream from the proposed crossing (Photos 45 to 54; Appendix D). This stream section is predominantly a run type of habitat, with short segments with rapid and riffle types of habitat. The stream width ranges from 2.8 to 3.5 m, the water depth ranged from 0.4 to 0.6 m, and a flow velocity was 0.3 to 0.9 m/s. The substrate is mostly composed of boulder, with cobble and rubble. There was no aquatic vegetation.

Electrofishing was conducted on August 29, 2013 and the station was located within segments US-SEG1 and DS-SEG1 (Tables 17 and 18). Three fish species were captured: one mottled sculpin, one longnose sucker and five brook trout.

Photo 45: CR12 – DS-SEG5

Photo 46: CR12 – DS-SEG4

Photo 47: CR12 – DS-SEG3

Photo 48: CR12 – DS-SEG2

Photo 49: CR12 – DS-SEG1

Photo 50: CR12 – US-SEG1

Photo 51: CR12 – US-SEG2

Photo 52: CR12 – US-SEG3

Photo 53: CR12 – US-SEG4

Photo 54: Fish captured at CR12

CR14

CR14 was characterized over a distance of 200 m upstream and 250 m downstream from the proposed crossing (Photos 55 to 64; Appendix D). This stream section is predominantly a flat type of habitat, with a stream width ranging from 0.8 to 2.5 m, a water depth ranging from 0.2 to 0.8 m, and a flow velocity of 0.1 m/s. The substrate is mostly composed of organic material (60 to 95 %). Aquatic vegetation was found in all segments.

Electrofishing was conducted on August 30, 2013 and the station was located in the upper part of the section characterized (Tables 17 and 18). Only four brook trout were captured and two other individuals were observed.

Photo 55: CR14 – DS-SEG5

Photo 56: CR14 – DS-SEG4

Photo 57: CR14 – DS-SEG3

Photo 58: CR14 – DS-SEG2

Photo 59: CR14 – DS-SEG1

Photo 60: CR14 – US-SEG1

Photo 61: CR14 – US-SEG2

Photo 62: CR14 – US-SEG3

Photo 63: CR14 – US-SEG4

Photo 64: General view of CR14

CR15

CR15 is characterized by swift water that discharges into Mike Lake (Photos 65 to 74; Appendix D). This stream section is predominantly a rapid type of habitat, with a stream width ranging from 2.5 to 3.7 m, a water depth ranging from 0.2 to 0.7 m, and a flow velocity of 0.5 to 1.2 m/s. The characterized upper segment (US-SEG4) differs from the rest of the section by the presence of a pool type of habitat where the flow velocity was 0.4 m/s and the mean depth was 1.0 m. The substrate is mostly composed of rubble, cobble and boulder and no aquatic vegetation was found.

Electrofishing was conducted on August 30, 2013 and the station was located in the upper part of the section characterized (Tables 17 and 18). Three species were captured: two brook trout, five longnose dace and two lake chub. A brook trout (approximately 20 cm long) was observed in a pool during the field work.

Photo 65: CR15 – DS-SEG5

Photo 66: CR15 – DS-SEG4

Photo 67: CR15 – DS-SEG3

Photo 68: CR15 – DS-SEG2

Photo 69: CR15 – DS-SEG1

Photo 70: CR15 – US-SEG1

Photo 71: CR15 – US-SEG2

Photo 72: CR15 – US-SEG3

Photo 73: CR15 – US-SEG4

Photo 74: General view of CR15

CR16

CR16 is a small stream that discharges into Mike Lake (Photos 75 to 82; Appendix D). It was characterized 150 m downstream from the proposed crossing (until it became underground) and 200 m upstream. This stream is predominantly a run/riffle type of habitat, with a stream width ranging from 0.25 to 0.90 m, a water depth ranging from 0.4 to 0.8 m, and a flow velocity of 0.3 to 0.5 m/s. The substrate is mostly composed of gravel and rubble with some sand and cobbles. The underground section of the stream may prevent fish passage during minimum flow periods.

Electrofishing was conducted on August 30, 2013 and the station was located 430 m upstream from the proposed crossing (Tables 17 and 18). Three species were captured: one brook trout, one lake trout and one lake chub.

Photo 75: CR16 – DS-SEG3

Photo 76: CR16 – DS-SEG2

Photo 77: CR16 – DS-SEG1

Photo 78: CR16 – US-SEG1

Photo 79: CR16 – US-SEG2

Photo 80: CR16 – US-SEG3

Photo 81: CR16 – US-SEG4

Photo 82: Electrofishing station in CR16

CR17A

CR17A is a small stream that connects to the Gilling River. The stream is approximately 25 m long and is only 0.20 m wide (Photos 83 and 84). Beyond that, the stream probably flows underground in a narrow valley and only pockets of water were visible through mosses and herbs. At the proposed crossing location, pockets of water were visible, but no stream beds were found (Photos 85 and 86).

Electrofishing was conducted in the stream over a small area of 5 m² and no fish were caught (Tables 17 and 18). However, several species found in the Gilling River could occasionally use the first 25 m of this stream. The proposed crossing, which is located upstream, is not considered to be a fish habitat.

Photo 83: CR17A – General view of the stream

Photo 84: CR17A – Downstream part of the stream that connects to Gilling River

Photo 85: CR17A – Wetland found at the proposed crossing location

Photo 86: CR17A – Wetland found at the proposed crossing location

CR23

CR23 was characterized over a distance of 200 m upstream and 250 m downstream from the proposed crossing (Photos 87 and 88; Appendix D). In general, this stream section is quite homogenous with a flat type of habitat, a width ranging from 2.5 to 3.5 m, a water depth ranging from 1.5 to 2.0 m, and a slow flow velocity (< 0.1 m/s). The substrate is mostly composed of organic material.

Electrofishing was conducted in CR23 on August 29, 2013 (Tables 17 and 18). The station is found at the proposed crossing location. Fish sampling was made difficult due the high water level. Only two fish were caught: a burbot and a longnose sucker.

Photo 87: CR23 – General view of the stream – Upstream to downstream view

Photo 88: Electrofishing station in CR23

5.2 Sediment Quality

Sediment collected in Iron Arm was predominantly composed of silt and clay (>80 %), with a small proportion of approximately 10 % of fine sand (Table 19; Figure 5). The remainder was coarse sand, with gravel found only in sample No. 3. Sediment collected in Timmins Bay was quite similar but with a higher proportion of fine sand and less clay and colloids as compared to the Iron Arm samples (Table 19; Figure 4). The bay in Attikamagen Lake, where the waste rock effluent is proposed to be discharged, was heterogeneous and showed relatively equal proportions of gravel, coarse and fine sand, silt and clay. Sediment in Pond I was predominantly silt, with clay and fine sand, while sediment in Lake H was also predominantly silt, with coarse and fine sand (Table 19; Figure 7). Joyce Lake sediment showed the greatest difference as compared to the other samples since coarse sand and gravel were the two predominant grain types (Table 19; Figure 3). Finally, Gilling River sediment samples were mostly composed of coarse and fine sand (Table 19; Figure 9).

Sediment analytical results are presented in Table 20 and certificates of analysis are provided in Appendix E. Six of the analyzed metals are found in the Canadian Sediment Quality Guidelines (CSQG) for the Protection of Aquatic Life (CCME, 2013). These are arsenic, cadmium, chromium, copper, lead and zinc.

Arsenic is naturally present in concentrations above the Interim Sediment Quality Guideline (ISQG) in almost all stations sampled, excepted in Lake H where it was below the guideline (Table 20). In addition, arsenic was above the Probable Effect Level (PEL) in three samples: Timmins Bay (106 mg/kg), Iron Arm No. 6 (18.8 mg/kg) and Pond I (19.0 mg/kg). Considering the high concentration found in Timmins Bay No. 1, verifications were made with the laboratory to ensure there was no error. The analysis was conducted a second time and the result was 134 mg/kg (Appendix E). Since there is no industrial activity in this area, the arsenic concentration found is considered to be natural and probably associated with silt

and clay that were found in high proportions at this station. Cadmium was found to be above the ISQG in all samples collected in Iron Arm, in Timmins Bay, in the waste rock effluent area in Attikamagen Lake, in Lake H and in one sample collected in Joyce Lake. Pond I showed a concentration of cadmium above the PEL (5.0 mg/kg). Chromium also exceeded the ISQG in five samples collected in Iron Arm while all other results were below this guideline. Copper was found in concentrations above the ISQG in all samples collected in Iron Arm, in Timmins Bay, in the waste rock effluent area in Attikamagen Lake and in Lake H. Lead was below the CSQG in all samples. Finally, zinc was found to be above the ISQG in five samples collected in Iron Arm and in Timmins Bay. These results indicate that heavy metals naturally occur in high concentrations in the sediment within the Study Area.

Table 19: Sediment Grain Size Distribution

Sample ID	Grain Categories (%)				
	Gravel	Coarse Sand	Fine Sand	Silt	Clay and Colloids
Iron Arm No. 2	0.0	0.0	7.8	43.4	48.8
Iron Arm No. 3	16.0	9.2	5.2	35.7	33.9
Iron Arm No. 5	0.0	1.7	10.5	55.5	32.3
Iron Arm No. 6	0.0	2.5	10.0	52.8	34.7
Iron Arm No. 7	0.0	5.2	10.3	55.2	29.2
Iron Arm No. 8	0.0	0.7	9.2	59.6	30.4
Timmins Bay	0.0	7.5	22.8	50.3	19.5
Waste rock effluent	34.0	15.5	12.6	22.4	15.5
Pond I	0.0	10.0	17.3	48.6	24.2
Lake H	1.0	35.9	14.3	42.8	6.0
Joyce Lake No. 1	30.0	43.9	13.9	4.6	7.6
Joyce Lake No. 2	18.0	49.6	8.4	9.5	14.5
Joyce Lake No. 3	49.0	41.4	9.6	-	-
Gilling River No. 1	1.0	67.6	25.9	3.1	2.4
Gilling River No. 2 (duplicate of No. 1)	2.0	70.2	22.8	2.6	2.4

Note: Gravel >2 mm; Coarse sand <2 mm and >0.2 mm; Fine sand <0.2 mm and >0.06 mm; Silt <0.06 mm and >0.004 mm; Clay and colloids <0.004 m

In general, the other metals analyzed were found in lower concentrations in the Gilling River as compared to the other sampling stations. As observed in 2012, the Gilling River was characterized by high concentrations of manganese and iron. High concentrations of iron were also found in Timmins Bay and in Iron Arm sediment. Timmins Bay showed also the highest concentrations of barium, manganese, nickel and lead.

Total organic content was the highest in Lake H with 23.8 %, while in the other waterbodies the values ranged from 0.09 to 6.66 %. The conductivity was relatively similar in all samples (4 to 36 µS/cm). The pH was very low in Pond I, Lake H and Joyce Lake. In Gilling River and Timmins Bay, sediment pH was near neutral. In Iron

Arm and in the area downstream from the waste rock effluent, the pH was near 6.5. Chloride, sulphate, nitrite and nitrate were not detected in any samples (below the detection limits). Ammoniacal nitrogen was found in concentrations of between 32 and 91 mg/kg in some samples (5 samples) while it was not detected in the others (Table 20).

5.3 Benthic Invertebrate Community

The sampling station general characteristics are provided in Table 21. Most stations (17) were located in soft substrate and sampled using an Ekman grab. In coarse substrate (six stations), a D-net was used to collect benthic invertebrate. The sampled area varies from 0.07 to 3.0 m² depending on the stations. Total organic carbon (TOC) content was determined in soft substrate stations and ranged from 0.09 to 33.0 %. The lowest TOC values were found in the Gilling River, Joyce Lake, and in Iron Arm's Stations No.1 and No.2 (Table 21). The highest TOC contents were found in CR23, Lake H and Pond I.

The substrate in Iron Arm was mostly composed of silt and clay in grab-sampled stations. Where coarse substrate was found, it was mainly composed of cobble, rubble and boulder. In Timmins Bay, the substrate was predominantly silt, fine sand and clay. The proposed waste rock effluent area presents the most heterogeneous substrate composition with relatively similar proportions of gravel, sand, silt and clay. Sediment in Lake H and Pond I was predominantly composed of silt, and a large fraction of coarse sand was found in Lake H. Sampling stations in Joyce Lake showed the largest proportions of coarse sand and gravel of all sampled stations. In both CR10 and CR23, sand was the dominant substrate constituent. Finally, the stations in the Gilling River showed a substrate mostly composed of coarse sand.

The identification results and the relative abundance of each taxa identified is given in Table 22. A total of 62 taxa were identified among the 23 samples collected in the Study Area. The complete identification report is provided in Appendix F. Predominant taxa were the following:

- Iron Arm: Sphaeriidae (Bivalvia) and/or Chironomidae (Nematocera) were among the dominant taxa found in samples 2, 3, 5, 6, 7, 8; 9 and 10. Hygrobatidae (Acari) and Heptageniidae (Ephemeroptera) were predominant in sample 1. Samples 2 and 3 were quite similar, with Sphaeriidae as the predominant taxa, but only six specimens were found in each of these samples. Planorbidae (Gastropoda) and Hygrobatidae were the most abundant taxa in sample 4. A total of 32 taxa was identified in Iron Arm;
- Timmins Bay: Chironomidae (36.4 %) and Sphaeriidae (27.3 %);
- Waste Rock Effluent: Nematoda (27.1 %), Chironomidae (21.3 %) and Enchytraeidae (16.8 %);
- Lake H: Hyallelidae (Amphipoda; 36.4 %) and Chironomidae (15.9 %);
- Pond I: Chironomidae (73.0 %);
- Joyce Lake: only a few specimens were collected in this lake and these were Nematoda, Sphaeriidae, Enchytraeidae (Oligochaeta), Chironomidae and Dolichopodidae (Diptera);

Table 20: Sediment Analytical Results

Parameters	Units	Sample ID														CSQG[a]	
		Iron Arm No. 2	Iron Arm No. 3	Iron Arm No. 5	Iron Arm No. 6	Iron Arm No. 7	Iron Arm No. 8	Timmins Bay	Waste Rock Effluent	Pond I	Lake H	Joyce Lake No. 1	Joyce Lake No. 2	Joyce Lake No. 3	Gilling River No. 1	Gilling River No. 2 (duplicate of No. 1)	ISQG	PEL
General chemistry																		
Moisture	%	42.4	29.6	80.7	85.4	83.5	80.6	89.5	50.5	88.1	88.2	47.5	25.0	24.3	28.0	25.9		
Total organic carbon	%	1.16	0.37	5.36	4.47	4.97	4.95	6.66	1.47	16.4	23.8	1.90	0.30	0.43	0.20	0.09		
Conductivity	µS/cm	7	8	12	7	23	13	42	11	32	36	7	4	5	19	36		
pH	-	6.5	6.6	5.9	6.3	6.0	6.1	7.2	6.4	5.3	5.7	5.9	5.8	5.7	6.9	7.1		
Anions																		
Ammoniacal nitrogen	mg/kg	<5	<5	30	<5	47	32	34	<5	60	91	<5	<5	<5	<5	<5		
Chloride	mg/kg	<92	<64	<249	<321	<288	<243	<469	<93	<559	<535	<114	<83	<78	<93	<84		
Sulphate	mg/kg	<92	<64	<249	<321	<288	<243	<469	<93	<559	<535	<114	<83	<78	<93	<84		
Nitrites	Mg/kg	<1.8	<1.3	<5.0	<6.4	<5.8	<4.9	<9.4	<1.9	<11.2	<10.7	<2.3	<1.7	<1.6	<1.9	<1.7		
Nitrates	mg/kg	<1.8	<1.3	<5.0	<6.4	<5.8	<4.9	<9.4	<1.9	<11.2	<10.7	<2.3	<1.7	<1.6	<1.9	<1.7		
Cations																		
Calcium	mg/kg	1,500	1,240	1,580	2,060	1,710	1,640	1,860	1,560	2,140	3,930	433	391	384	300	247		
Potassium	mg/kg	1,990	1,500	1,390	1,330	1,940	1,680	927	1,120	547	981	1,020	1,130	1,260	419	435		
Sodium	mg/kg	89	63	78	70	102	90	67	67	58	142	<50	51	<50	<50	<50		
Metals																		
Aluminum	mg/kg	19,800	15,000	19,100	18,200	22,500	22,100	12,600	14,200	7,090	6,560	11,200	12,800	15,200	3,400	3,230		
Antimony	mg/kg	0.8	0.8	0.4	0.7	0.5	0.5	0.4	0.7	0.4	0.2	0.7	0.9	0.7	0.3	0.3		
Silver	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Arsenic	mg/kg	16.5	12.0	7.3	18.8	16.6	6.8	106	12.3	19.0	5.1	9.9	14.4	12.7	9.5	8.6	5.9	17.0
Barium	mg/kg	71	61	96	138	156	105	489	53	23	19	33	45	35	86	116		
Beryllium	mg/kg	0.8	0.8	1.1	0.9	1.3	1.2	0.5	0.7	0.3	0.3	0.6	0.6	0.6	0.8	0.7		
Bismuth	mg/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
Boron	mg/kg	3	3	3	2	3	3	2	3	2	5	3	4	2	3	2		
Cadmium	mg/kg	1.9	2.0	2.4	1.8	2.0	3.3	1.8	1.1	5.0	0.9	0.4	0.9	0.6	0.4	0.5	0.6	3.5
Chromium	mg/kg	51	32	43	38	46	47	22	32	7	13	23	26	29	9	8	37.3	90.0
Cobalt	mg/kg	19	15	12	16	19	10	13	17	5	4	9	16	9	13	13		
Copper	mg/kg	59	43	67	89	105	104	42	38	69	15	23	30	29	13	13	37.7	197.0
Tin	mg/kg	2	3	3	2	2	4	3	2	3	3	3	3	3	3	4		
Iron	mg/kg	75,700	67,900	18,000	91,400	88,600	46,000	136,000	64,100	13,800	13,700	62,400	76,200	69,900	90,900	92,900		
Lithium	mg/kg	21	19	18	15	19	21	9	16	2	6	12	13	15	5	5		
Magnesium	mg/kg	6,840	5,290	5,010	4,230	5,320	5,270	2,780	5,520	777	2,270	3,360	4,210	4,190	789	672		
Manganese	mg/kg	1,820	3,350	851	32,800	3,680	1,110	56,200	1,010	420	166	835	2,010	671	4,910	5,770		
Molybdenum	mg/kg	6.8	5.3	3.8	8.8	5.0	4.9	41.7	3.0	2.8	1.4	3.0	3.8	4.1	1.8	1.8		
Nickel	mg/kg	59	42	78	75	91	83	41	37	37	16	21	26	21	14	14		
Lead	mg/kg	14	13	13	26	18	15	21	13	8	12	8	11	8	4	4	35.0	91.3
Selenium	mg/kg	<0.5	<0.5	0.8	1.1	0.9	0.7	1.3	<0.5	1.2	1.0	<0.05	<0.05	<0.05	<0.05	<0.05		
Strontium	mg/kg	11	<10	11	16	11	11	30	<10	21	44	<10	<10	<10	<10	<10		
Thallium	mg/kg	<0.1	<0.1	<0.1	0.2	0.2	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.2	0.2		
Titanium	mg/kg	892	527	528	436	524	481	280	504	72	128	383	420	332	76	69		
Vanadium	mg/kg	67	54	52	44	57	55	33	55	8	16	48	52	63	27	26		
Zinc	mg/kg	126	106	262	192	242	277	171	101	317	97	62	71	60	27	26	123.0	315.0

[a] Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CCME, 2012b): ISQG: Interim Sediment Quality Guideline; PEL: Probable Effect Level

- CR10: Sphaeriidae (59.1 %);
- CR12: Ephemerellidae (Ephemeroptera; 46.0 %) and Chironomidae (16.4 %);
- CR15: Philopotamidae (Trichoptera; 33.9 %), Chloroperlidae (Plecoptera; 15.6 %) and Ephemerellidae (14.6 %);
- CR23: Chironomidae (91.4 %);
- Gilling River: Chironomidae (63.6 to 70.0 %), but only seven specimens in each sample.

Table 21: Benthic Invertebrate Sampling Station General Description

Sample ID	Sampler	Mean Depth (m)	Sampled Area (m²)	TOC (%)	Substrate (%)[a]				
					G	Cs	Fs	S	C
Iron Arm No. 1	D-net	0.5	3.0	n/a	*Predominantly cobble, rubble and boulder*				
Iron Arm No. 2	Ekman	22.0	0.09	1.16	0.0	0.0	7.8	43.4	48.8
Iron Arm No. 3	Ekman	12.0	0.18	0.37	16.0	9.2	5.2	35.7	33.9
Iron Arm No. 4	D-net	0.6	3.0	n/a	*Predominantly cobble, rubble and boulder*				
Iron Arm No. 5	Ekman	10.0	0.07	5.36	0.0	1.7	10.5	55.5	32.3
Iron Arm No. 6	Ekman	16.0	0.07	4.47	0.0	2.5	10.0	52.8	34.7
Iron Arm No. 7	Ekman	11.0	0.07	4.97	0.0	5.2	10.3	55.2	29.2
Iron Arm No. 8	Ekman	10.0	0.07	4.95	0.0	0.7	9.2	59.6	30.4
Iron Arm No. 9	D-net	0.7	3.0	n/a	*Predominantly cobble, rubble and boulder*				
Iron Arm No. 10	D-net	0.6	3.0	n/a	*Predominantly cobble, rubble and boulder*				
Timmins Bay	Ekman	25.0	0.07	6.66	0.0	7.5	22.8	50.3	19.5
Waste Rock Effluent	Ekman	0.8	0.20	1.47	34.0	15.5	12.6	22.4	15.5
Lake H	Ekman	0.9	0.07	23.8	1.0	35.9	14.3	42.8	6.0
Pond I	Ekman	0.8	0.07	16.4	0.0	10.0	17.3	48.6	24.2
Joyce Lake No. 1	Ekman	2.0	0.18	1.90	30.0	43.9	13.9	4.6	7.6
Joyce Lake No. 2	Ekman	1.7	0.14	0.30	18.0	49.6	8.4	9.5	14.5
Joyce Lake No. 3	Ekman	1.12	0.09	0.43	49.0	41.4	9.6	-	-
CR10	Ekman	0.9	0.07	1.12	0.0	30.3	46.6	16.1	7.0
CR12	D-net	0.6	3.0	n/a	*Predominantly boulder and cobble*				
CR15	D-net		3.0	n/a	*Predominantly cobble and boulder*				
CR23	Ekman	1.8	0.07	33.0	0.0	63.4	14.6	8.1	13.9
Gilling River No. 1	Ekman	0.7	0.07	0.20	1.0	67.6	25.9	3.1	2.4
Gilling River No. 2	Ekman	0.7	0.07	0.09	2.0	70.2	22.8	2.6	2.4

a G: Gravel >2 mm; Cs: Coarse sand <2 mm and >0.2 mm; Fs: Fine sand <0.2 mm and >0.06 mm; S; Silt <0.06 mm and >0.004 mm; C: Clay and colloids <0.004 m

n/a: Not applicable

Table 23 presents benthic invertebrate community basic statistics for each sample collected. The habitat characteristics described above have a great influence on these results since benthic invertebrates are highly sensitive to many factors, such as water depth, flow velocity, substrate composition, presence of vegetation, light, water quality and organic material. The results are therefore representative only of the type of habitat where they have been collected.

Table 22: Benthic Invertebrate Community General Description

Sample ID	Number of organisms	Total Density (n org./m²)	EPT/C Index	Richness (number of taxa)
Iron Arm No. 1	151	50	2.80	15
Iron Arm No. 2	7	78	n/a	2
Iron Arm No. 3	8	44	n/a	2
Iron Arm No. 4	453	151	1.76	25
Iron Arm No. 5	28	415	0	7
Iron Arm No. 6	15	222	1.00	7
Iron Arm No. 7	41	607	0	6
Iron Arm No. 8	34	504	0	7
Iron Arm No. 9	328	109	3.44	30
Iron Arm No. 10	122	41	1.73	28
Timmins Bay	11	163	0	6
Waste Rock Effluent	155	775	0.03	18
Lake H	44	652	0	12
Pond I	163	2,415	0	7
Joyce Lake No. 1	9	50	0	4
Joyce Lake No. 2	3	21	n/a	1
Joyce Lake No. 3	1	11	n/a	1
CR10	44	652	1.00	11
CR12	476	159	3.51	21
CR15	712	237	29.9	23
CR23	35	519	0.03	3
Gilling River No. 1	10	148	0.14	4
Gilling River No. 2	11	163	0.14	3

n/a: Not applicable

In general, benthic invertebrate densities were found to be very low, with values ranging from 11 to 2,415 organisms/m² (Table 23). The lowest densities were found in Iron Arm in Stations 1, 2, 3 and 10 and also in all three Joyce Lake stations. The highest density was found in Pond H. The EPT/C index which represents the sum of all Ephemeroptera, Plecoptera and Tricoptera divided by the sum of the Chironomidae indicates that, in most samples, EPTs were found in small numbers and in some cases these taxa were not found. EPTs are, in general, sensitive to habitat degradation and, in disturbed habitats, these taxa tend to be replaced by more tolerant benthic invertebrates such as Chironomidae. Only the sample

Table 23: Benthic Invertebrate Relative Abundance – Sample Collected in 2013

Taxon	CR 10		CR 12		CR 15		CR 23		WRE		Gilling R.				Iron Arm									
											01		02		01		02		03		04		05	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
PORIFERA																								
Demospongiae																								
Spongillidae	C														C						C		C	
NEMATODA	3	6.8	3	0.6					42	27.1					10	6.6					14	3.1		
MOLLUSCA																								
Gastropoda																								
Heterobranchia																								
Lymnaeidae									1	0.6											2	0.4		
Planorbidae					4	0.6									9	6.0					129	28.5		
Valvatidae					1	0.1									6	4.0			2	25.0			1	3.6
Bivalvia																								
Sphaeriidae	26	59.1			52	7.3			3	1.9	1	10.0					6	85.7	6	75.0			7	25.0
ANNELIDA																								
Oligochaeta																								
Enchytraeidae	3	6.8	20	4.2	10	1.4			26	16.8			3	27.3	13	8.6					8	1.8		
Naididae																								
Tubificidae	2	4.5					2	5.7	5	3.2												0.0	1	3.6
Lumbriculidae									4	2.6					5	3.3					3	0.7		
Hirudinea																								
Erpobdellidae															6	4.0					1	0.2		
Glossiphoniidae									1	0.6													1	3.6
ARTHROPODA																								
Chelicerata																								
Arachnida																								
Acari																								
Oribati					2	0.3																		
Prostigmata																								
Hygrobatidae			6	1.3											40	26.5					100	22.1		
Laversiidae			1	0.2																				
Lebertiidae	1	2.3	2	0.4	3	0.4									6	4.0					5	1.1		
Limnesiidae									1	0.6					3	2.0								
Sperchontidae			44	9.2																				
Torrenticolidae					2	0.3																		
Crustacea																								
Branchiopoda																								
Cladocera																								
Chydoridae																					16	3.5		
Daphniidae																								
Holopedidae																								
Ophryoxide									1	0.6											6	1.3		
Sididae																					1	0.2		
Copepoda																								
Cyclopoida																								
Cyclopidae benthiques																								
Ostracoda																								
Podocopida																								
Candonidae																					5	1.1		
Cyprididae																								
Malacostraca																								
Amphipoda																								
Gammaridae															14	9.3					47	10.4		
Hyalellidae									6	3.9					1	0.7								
Uniramia																								
Insecta																								
Odonata																								
Anisoptera																								
Aeshnidae																								
Corduliidae									1	0.6														
Ephemeroptera																								
Baetidae			6	1.3	1	0.1																		
Ephemerellidae			219	46.0	104	14.6															1	0.2		
Ephemeridae	2	4.5									1	10.0												
Heptageniidae			1	0.2	16	2.2									17	11.3					42	9.3		
Leptophlebiidae					19	2.7																		
Plecoptera																								
Capniidae																					2	0.4		
Chloroperlidae			1	0.2	111	15.6																		
Leuctridae			5	1.1																				
Nemouridae			35	7.4																				
Perlodidae					2	0.3																		
Taeniopterygidae													1	9.1										
Hemiptera																								
Corixidae																								
Trichoptera																								
Apataniidae																								
Glossosomatidae					3	0.5																		
Hydropsychidae			2	0.4	28	3.9																		
Hydroptilidae																					1	0.2		
Lepidostomatidae			1	0.2																				
Leptoceridae																								
Limnephilidae															11	7.3	1	14.3			13	2.9		
Philopotamidae					242	33.9	1	2.9																
Phryganeidae									1	0.6											13	2.9		
Rhyacophilidae			25	5.3	72	10.2																		
Coleoptera																								
Haliplidae									1	0.6											1	0.2		
Diptera																								
Nematocera																								
Ceratopogonidae	3	6.8	9	1.9	3	0.4			24	15.5														
Chironomidae (pupes)			6	1.3																	10	2.2	1	3.6
Chironomidae (larves)	2	4.5	78	16.4	20	2.8	32	91.4	33	21.3	7	70.0	7	63.6	10	6.6					31	6.8	17	60.7
Simuliidae (pupes)			2	0.4	1	0.1																		
Simuliidae (larves)			8	1.7						0.0														
Tipulidae	1	2.3			2	0.3			2		1	10.0									1	0.2		
Brachycera																								
Dolichopodidae																								
Empididae			2	0.4	1	0.1			1	0.6											1	0.2		
Muscidae					13	1.8																		
Tabanidae	1	2.3							2	1.3														
TOTAL:	44		476		712		35		155		10		11		151		7		8		453		28	

Table 22: Benthic Invertebrate Relative Abundance – Sample Collected in 2013 (cont'd)

Taxon	Iron Arm										Joyce L.						Lake H		Pond I		Timmins B.	
	06		07		08		9		10		01		02		03							
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
PORIFERA																						
Demospongiae																						
Spongillidae							C										C				C	
NEMATODA	2	13.3					10	3.0	12	9.8					1	100.0	3	6.8	1	0.6		
MOLLUSCA																						
Gastropoda																						
Heterobranchia																						
Lymnaeidae									4	3.3												
Planorbidae							10	3.0	3	2.5												
Valvatidae			1	2.4	1	2.9			1	0.8							4	9.1	6	3.7		
Bivalvia																						
Sphaeriidae	4	26.7	17	41.5	12	35.3	12	3.7	4	3.3	1	11.1					3	6.8	22	13.5	3	27.3
ANNELIDA																						
Oligochaeta																						
Enchytraeidae							15	4.6	10	8.2	5	55.6	3	100.0								
Naididae									3	2.5												
Tubificidae	3	20.0			2	5.9			2	1.6											1	9.1
Lumbriculidae							2	0.6	5	4.1							1	2.3	2	1.2		
Hirudinea																						
Erpobdellidae							4	1.2	1	0.8							2	4.5				
Glossiphoniidae							2	0.6									2	4.5				
ARTHROPODA																						
Chelicerata																						
Arachnida																						
Acari																						
Oribati																						
Prostigmata																						
Hygrobatidae			1	2.4			20	6.1	7	5.7												
Laversiidae																						
Lebertiidae	1	6.7			2	5.9	11	3.4	2	1.6												
Limnesiidae							1	0.3														
Sperchontidae																						
Torrenticolidae																						
Crustacea																						
Branchiopoda																						
Cladocera																						
Chydoridae							13	4.0	4	3.3												
Daphniidae					1	2.9																
Holopedidae			1	2.4	8	23.5																
Ophryoxide							9	2.7	4	3.3												
Sididae							2	0.6														
Copepoda																						
Cyclopoida																						
Cyclopidae benthiques							2	0.6	1	0.8												
Ostracoda																						
Podocopida																						
Candonidae							9	2.7													2	18.2
Cyprididae							2	0.6														
Malacostraca																						
Amphipoda																						
Gammaridae							8	2.4	14	11.5							3	6.8				
Hyalellidae			1	2.4			2	0.6	2	1.6							16	36.4				
Uniramia																						
Insecta																						
Odonata																						
Anisoptera																						
Aeshnidae																	1	2.3				
Corduliidae																						
Ephemeroptera																						
Baetidae							1	0.3														
Ephemerellidae							1	0.3	2	1.6												
Ephemeridae																						
Heptageniidae							62	18.9	4	3.3												
Leptophlebiidae							47	14.3	12	9.8												
Plecoptera																						
Capniidae	2	13.3					30	9.1	1	0.8												
Chloroperlidae																						
Leuctridae																						
Nemouridae																						
Perlodidae																						
Taeniopterygidae																						
Hemiptera																						
Corixidae																						
Trichoptera																						
Apataniidae							2	0.6	1	0.8												
Glossosomatidae																						
Hydropsychidae																						
Hydroptilidae									1	0.8												
Lepidostomatidae																						
Leptoceridae									1	0.8												
Limnephilidae							5	1.5	2	1.6												
Philopotamidae																						
Phryganeidae									2	1.6												
Rhyacophilidae																						
Coleoptera																						
Haliplidae							1	0.3														
Diptera																						
Nematocera																						
Ceratopogonidae	1	6.7					2	0.6									2	4.5	12	7.4		
Chironomidae (pupes)							6	1.8											1	0.6	1	9.1
Chironomidae (larves)	2	13.3	20	48.8	8	23.5	37	11.3	15	12.3	2	22.2					7	15.9	119	73.0	4	36.4
Simuliidae (pupes)																						
Simuliidae (larves)																						
Tipulidae									2	1.6												
Brachycera																						
Dolichopodidae											1	11.1										
Empididae																						
Muscidae																						
Tabanidae																						
TOTAL:	15		41		34		328		122		9		3		1		44		163		11	

collected in CR15 showed a high number of EPTs as compared to Chironimidae (EPT/C index of 29.9) which indicates generally good quality habitat.

The number of taxa was highly variable from station to station and ranged from 1 to 30 taxa (Table 23). Stations sampled in Iron Arm were also very different with samples showing very low numbers of taxa (2 to 7 taxa) in samples collected with the Ekman grab and others with high numbers (15 to 30 taxa) in stations sampled with a D-net. Therefore, the fine substrate in Iron Arm seems to support a very poor benthic invertebrate community as compared to coarse substrate. The other two stations where benthic invertebrates were collected using a D-net, Stations CR12 and CR15, also showed a high number of taxa, with respectively 21 and 23 taxa. Joyce Lake was by far the poorest area sampled, with 4, 1 and 1 taxa in each of the three samples collected.

6 SUMMARY AND CLOSURE

The specific objectives of the Fish and Fish Habitat Baseline Study were to collect complementary information to determine the fish species found within the Study Area and describe their habitat, including benthic invertebrate communities and sediment quality. The field campaign was conducted from August 21 to September 2, 2013.

- Three fish species were captured in Joyce Lake: lake chub, longnose sucker and burbot. It appears that the pearl dace identified in 2012 were in fact lake chub. According to the Bradbury et al (2001) habitat classification method, there are 90,535 m² (24 % of the total lake area) of preferential habitat for lake chub, 27,727 m² (7 % of the total lake area) for longnose sucker and 140,896 m² (38 % of the total lake area) for burbot.
- The bay where the waste rock effluent is proposed to be discharged is characterized by shallow waters, with a mean water depth of 2.1 m. There is no connecting stream that discharges into this bay. In the small cove where the effluent is proposed to be discharged, two areas were covered by aquatic vegetation (440 m²). It is assumed that the same fish species found in Bay 2 and in Iron Arm in 2012 occur in this area of Attikamagen Lake.
- In Iron Arm, flow velocities are very low and ranged from 0.01 to 0.09 m/s at 0.2h and from 0.02 to 0.08 m/s at 0.8h (near bottom). Three aquatic vegetation areas were found on the eastern shore of Iron Arm between the two ice bridges. These are small patches of 20 to 40 m² of vegetation occurring in shallow water in small coves. Along the western shore, no aquatic vegetation was found. In deeper water, the substrate was mostly composed of reddish-brown silt and clay. The riparian vegetation is predominantly black spruce and larch with shrubs such as willows, alder, birch and ericaceous. Herbaceous species were also found along the east shore.
- Lake H covers 96.3 ha and discharges towards unnamed lakes that connect to Petitsikapau Lake. The mean water depth is 0.83 m and the maximum water depth reaches 1.45 m. Fish sampling was conducted in Lake H using gillnets, fyke nets and minnow traps. A total of 35 fish were captured: northern pike, white sucker, burbot and mottled sculpin. Several patches of pond lily and bur-reed were found in the lake. These covered approximately 2,585 m². All habitats found in Lake H are littoral (within the photic zone). There are approximately 0.3 ha of fine substrate habitat with vegetation and 96.0 ha of fine substrate habitat without vegetation.
- Pond I is a shallow waterbody where the maximum water depth is approximately 1.0 m. The pond covers an area of 5.8 ha and is part of a vast wetland complex. Fish sampling was conducted in Pond I using gillnets, fyke nets and minnow traps and no fish were captured. Pond I has no direct connection with any other waterbody. Pond I was not considered to be a fish habitat.
- Timmins Bay is an elongated waterbody adjacent to Joyce Lake. In the northern part of the bay, two deep pools were found, both approximately 23 m deep. Only the northernmost part of the bay is characterized by shallow water. The remainder of the bay is deep (mean depth of 7.1 m) and has relatively steep

slopes. Four zones with aquatic vegetation were observed and covered approximately 6,550 m². It is assumed that the same fish species found in Attikamagen Lake and Iron Arm in 2012 occur in Timmins Bay since these are connected.

- In Gilling River fish sampling was conducted using gillnets, fyke nets and minnow traps. A total of 59 fish were captured, with lake chub, brook trout and white sucker being the predominant species. The other fish species that occur in this river are longnose sucker, northern pike, burbot, threespine stickleback and mottled sculpin. Three suitable spawning grounds were identified: two for northern pike in the aquatic vegetation in the lowermost part of the stream and one for sucker approximately located in the uppermost section of the river that was characterized. Dense aquatic vegetation was found in the lowermost part of the characterized river and these vegetated areas covers approximately 84,000 m².

Streams Crossings

During the field campaign, 15 stream sections identified as stream crossings were characterized.

- The proposed crossing location at AT-T01 was not accessible and only photographs were taken from the helicopter. From the helicopter only small channels were visible and small pockets of water were also visible. It is unlikely to find fish in the upper part of the stream, where the projected crossing is located, since the small channels seems to run underground over short distances in many areas.
- As observed in 2012, no streams were found at CR06, CR09, CR19 and CR21 in 2013: these were nonexistent or underground. There is no fish habitat at these crossing locations.
- CR07 crosses an area where no streams were found in 2012 and 2013. The link between the streams identified CR07 and the pond located a few hundred metres south is completely underground and does not allow fish passage. Therefore, the proposed crossing is not considered to be a fish habitat.
- In CR20 large patches of aquatic vegetation were found in the pond (pond lilies and bur-reed). The pond provides suitable habitat for juveniles of many fish species. Four species were captured: burbot, mottled sculpin, lake chub and white sucker.
- The connection between CR10A and CR10 was determined to be underground. And the underground section is judged to be inaccessible to fish. Seven brook trout were captured in the area of CR10A and many other small brook trout were observed. CR10 is, in general, quite homogenous with a flat type of habitat and a width ranging from 9 to 12 m. Three fish species were caught: mottled sculpin, brook trout and white sucker.
- CR11 is predominantly a flat type of habitat, with short segments with run and riffle types of habitat. Four brook trout were caught in this stream.

- CR12 is predominantly a run type of habitat, with short segments with rapid and riffle types of habitat. Three fish species were captured: mottled sculpin, longnose sucker and brook trout.
- CR14 is predominantly a flat type of habitat and brook trout were captured in this stream.
- CR15 is characterized by swift water that discharges into Mike Lake. Three species were captured: brook trout, longnose dace and lake chub.
- CR16 is a small stream that discharges into Mike Lake. This stream is predominantly a run/riffle type of habitat. Three species were captured: brook trout, lake trout and lake chub.
- CR17A is a small stream that connects to the Gilling River. The stream is approximately 25 m long and is only 0.20 m wide. Beyond that, the stream probably flows underground in a narrow valley and only pockets of water were visible through mosses and herbs. At the proposed crossing location, pockets of water were visible, but not stream bed was found. The proposed crossing is not considered to be a fish habitat.
- CR23 is quite homogenous with a flat type of habitat, a width ranging from 2.5 to 3.5 m. Only two fish were caught: burbot and longnose sucker.

Sediment Quality

The analytical results indicate that heavy metals occur naturally in high concentrations in the sediment within the Study Area:

- Arsenic is naturally present in concentrations above the Interim Sediment Quality Guideline (ISQG) in almost all stations sampled, excepted in Lake H where it was below the guideline. In addition, arsenic was above the Probable Effect Level (PEL) in three samples: Timmins Bay (106 mg/kg), Iron Arm No. 6 (18.8 mg/kg) and Pond I (19.0 mg/kg).
- Cadmium was found to be above the ISQG in all samples collected in Iron Arm, in Timmins Bay, in the waste rock effluent area in Attikamagen Lake, in Lake H and in one sample collected in Joyce Lake. Pond I showed a concentration of cadmium above the PEL (5.0 mg/kg).
- Chromium also exceeded the ISQG in five samples collected in Iron Arm, while all other results were below this guideline.
- Copper was found in concentrations above the ISQG in all samples collected in Iron Arm, in Timmins Bay, in the waste rock effluent area in Attikamagen Lake and in Lake H.
- Lead was below the CSQG in all samples.
- Finally, zinc was found to be above the ISQG in five samples collected in Iron Arm and in Timmins Bay.

Benthic Invertebrate

In general, benthic invertebrate densities were found to be very low in the Study Area, with values ranging from 11 to 2,415 organisms/m². The lowest densities were

found in the Iron Arm and Joyce Lake stations. The highest density was found in Pond H. The number of taxa was highly variable from station to station and ranged from 1 to 30 taxa. Stations sampled in Iron Arm were also very different with samples showing very low numbers of taxa (2 to 7 taxa) in samples collected with the Ekman grab and other samples with high numbers (15 to 30 taxa) in stations where a D-net was used. Therefore, the fine substrate in Iron Arm seems to support a very poor benthic invertebrate community as compare to coarse substrate. The other two stations where benthic invertebrate were collected using a D-net, Stations CR12 and CR15, showed also a high number of taxa, with respectively 21 and 23 taxa. Joyce Lake was by far the poorest area sampled, with 4, 1 and 1 taxa in each of the three samples collected.

7 REFERENCES

BRADBURY, C., A. S. POWER and M. M. ROBERGE. 2001. *Standard Methods Guide for the Classification/Quantification of Lacustrine Habitat in Newfoundland and Labrador*. Fisheries and Oceans, St. John's, NF. 60 p.

CANADIAN COUNCIL OF MINISTERS OF THE ENVIRONMENT (CCME). 2013. *Canadian sediment quality guidelines for the protection of aquatic life, Summary Table. Accessed online* in November 2013.

DEPARTMENT OF FISHERIES AND OCEANS (DFO NL). 2012. *Standard Methods Guide for the Classification and Quantification of Fish Habitat in Rivers of Newfoundland and Labrador for the Determination of Harmful Alteration, Disruption or Destruction of Fish Habitat*. Draft version, January 2012. 21 p. + Appendix.

ENVIRONMENT CANADA. 2012. *Metal Mining Technical Guidance for Environmental Effects Monitoring*.

GRANT, C. G. J. and E. M. LEE. 2004. *Life History Characteristics of Freshwater Fishes Occurring in Newfoundland and Labrador, with Major Emphasis on Riverine Habitat Requirements*. Can. Manuscr. Rep. Fish. Aquat. Sci. 2672: 262 p.

Appendix A: Information on Fishing Effort in Joyce Lake, Lake H, Pond I and Gilling River

Legend

Station ID

X-YY-00, where X is the location, YY is the type of fishing gear and 00 the station number

Location

G:	Gilling River
H:	Lake H
I:	Pond I
J:	Joyce Lake

Fishing Gear

BO:	Minnow trap
FE:	Gillnet
VE:	Fyke net

Appendix A. Information on Fishing Effort in Joyce Lake, Lake H, Pond I and Gilling River

Waterbody ID	Station ID	Latitude (ddmmss.s)	Longitude (ddmmss.s)	Date (set)	Hour (set)	Date (retrieve)	Hour (retrieve)	Max depth (m)	Temperature (°C)	Small mesh nearshore
Gilling River	G-BO01	N54 38 49.7	W66 37 46.9	2013-08-26	12:15	2013-08-27	11:28	0.4	11.0	-
Gilling River	G-BO02	N54 38 41.4	W66 37 56.0	2013-08-26	12:20	2013-08-27	11:26	0.6	11.0	-
Gilling River	G-BO03	N54 39 00.8	W66 38 11.0	2013-08-26	12:31	2013-08-27	11:19	0.3	11.0	-
Gilling River	G-BO04	N54 39 09.3	W66 38 11.0	2013-08-26	12:45	2013-08-27	10:58	0.5	11.0	-
Gilling River	G-BO05	N54 39 18.5	W66 38 26.8	2013-08-26	12:55	2013-08-27	10:36	0.4	11.0	-
Gilling River	G-BO06	N54 39 18.8	W66 38 31.5	2013-08-26	13:15	2013-08-27	10:33	0.4	11.0	-
Gilling River	G-BO07	N54 39 28.6	W66 38 47.7	2013-08-26	13:35	2013-08-27	10:10	0.7	11.0	-
Gilling River	G-BO08	N54 39 28.1	W66 38 41.7	2013-08-26	14:07	2013-08-27	10:04	0.6	11.0	-
Gilling River	G-BO09	N54 39 27.9	W66 38 38.2	2013-08-26	14:09	2013-08-27	10:00	0.3	11.0	-
Gilling River	G-FE01	N54 38 52.0	W66 37 49.6	2013-08-26	12:07	2013-08-27	11:50	0.8	11.0	N
Gilling River	G-FE02	N54 39 02.5	W66 38 09.5	2013-08-26	12:35	2013-08-27	11:17	0.9	11.0	Y
Gilling River	G-FE03	N54 39 27.3	W66 38 46.5	2013-08-26	13:30	2013-08-27	09:22	1.4	11.0	Y
Gilling River	G-FE04	N54 39 26.6	W66 38 42.3	2013-08-26	13:50	2013-08-27	09:58	0.8	11.0	N
Gilling River	G-VE01	N54 39 13.9	W66 38 17.7	2013-08-26	12:50	2013-08-27	10:53	0.7	11.0	-
Gilling River	G-VE02	N54 39 18.7	W66 38 26.9	2013-08-26	13:05	2013-08-27	10:37	0.9	11.0	-
Gilling River	G-VE03	N54 39 27.7	W66 38 36.4	2013-08-26	14:04	2013-08-27	10:25	0.9	11.0	-
Gilling River	G-VE04	N54 39 26.7	W66 38 32.7	2013-08-26	14:30	2013-08-27	10:16	1.0	11.0	-
Lake H	H-BO01	N54 51 54.3	W66 36 05.1	2013-08-22	12:56	2013-08-23	09:03	0.4	14.5	-
Lake H	H-BO02	N54 51 57.2	W66 36 12.8	2013-08-22	12:59	2013-08-23	08:58	0.2	14.5	-
Lake H	H-BO03	N54 52 07.6	W66 36 21.7	2013-08-22	13:04	2013-08-23	08:51	0.6	14.5	-
Lake H	H-BO04	N54 52 26.3	W66 36 17.6	2013-08-22	13:08	2013-08-23	08:40	0.5	14.5	-
Lake H	H-BO05	N54 52 41.3	W66 36 05.1	2013-08-22	13:12	2013-08-23	08:36	0.5	14.5	-
Lake H	H-BO06	N54 52 47.8	W66 36 11.3	2013-08-22	13:16	2013-08-23	08:30	0.2	14.5	-
Lake H	H-FE01	N54 52 21.8	W66 35 33.4	2013-08-22	12:23	2013-08-23	09:30	1.2	14.5	Y
Lake H	H-FE02	N54 52 37.7	W66 35 58.8	2013-08-22	12:32	2013-08-23	09:15	0.9	14.5	N
Lake H	H-FE03	N54 52 10.0	W66 36 18.4	2013-08-22	12:41	2013-08-23	09:40	1.2	14.5	Y
Lake H	H-FE04	N54 51 54.2	W66 36 04.5	2013-08-22	12:54	2013-08-23	10:05	0.8	14.5	N
Lake H	H-VE01	N54 52 45.4	W66 36 04.5	2013-08-22	13:08	2013-08-23	10:20	0.5	14.5	-
Lake H	H-VE02	N54 52 28.9	W66 35 41.7	2013-08-22	13:41	2013-08-23	10:28	0.7	14.5	-
Lake H	H-VE03	N54 52 03.8	W66 35 40.5	2013-08-22	14:07	2013-08-23	10:35	1.2	14.5	-
Lake H	H-VE04	N54 52 04.3	W66 36 21.5	2013-08-22	14:22	2013-08-23	10:50	0.8	14.5	-
Pond I	I-BO01	N54 50 48.0	W66 34 39.5	2013-08-21	09:20	2013-08-22	09:35	0.3	14.7	-
Pond I	I-BO02	N54 50 46.4	W66 34 32.5	2013-08-21	09:28	2013-08-22	09:40	0.4	14.7	-
Pond I	I-BO03	N54 50 50.4	W66 34 28.8	2013-08-21	09:40	2013-08-22	09:45	0.4	14.7	-
Pond I	I-BO04	N54 50 49.0	W66 34 24.6	2013-08-21	09:45	2013-08-22	09:50	0.3	14.7	-
Pond I	I-BO05	N54 50 45.7	W66 34 21.2	2013-08-21	09:50	2013-08-22	10:00	0.5	14.7	-
Pond I	I-BO06	N54 50 45.0	W66 34 24.1	2013-08-21	09:55	2013-08-22	10:10	0.3	14.7	-
Pond I	I-FE01	N54 50 47.9	W66 34 22.8	2013-08-21	10:45	2013-08-22	08:55	0.8	14.7	Y
Pond I	I-VE01	N54 50 47.5	W66 34 22.3	2013-08-21	10:10	2013-08-22	09:15	0.4	14.7	-

Appendix A. Information on Fishing Effort in Joyce Lake, Lake H, Pond I and Gilling River

Waterbody ID	Station ID	Latitude (ddmmss.s)	Longitude (ddmmss.s)	Date (set)	Hour (set)	Date (retrieve)	Hour (retrieve)	Max depth (m)	Temperature (°C)	Small mesh nearshore
Pond I	I-VE02	N54 50 51.6	W66 34 29.7	2013-08-21	10:20	2013-08-22	09:25	0.4	14.7	-
Joyce Lake	J-BO01	N54 53 54.1	W66 31 55.4	2013-08-23	16:07	2013-08-24	11:34	1.0	12.8	-
Joyce Lake	J-BO01	N54 53 54.1	W66 31 55.4	2013-08-24	12:10	2013-08-25	09:58	1.0	12.5	-
Joyce Lake	J-BO02	N54 53 54.3	W66 31 55.5	2013-08-23	16:08	2013-08-24	11:36	0.9	12.8	-
Joyce Lake	J-BO02	N54 53 54.3	W66 31 55.5	2013-08-24	12:12	2013-08-25	10:00	0.9	12.5	-
Joyce Lake	J-BO03	N54 53 56.5	W66 31 44.0	2013-08-23	16:12	2013-08-24	12:18	0.4	12.8	-
Joyce Lake	J-BO03	N54 53 56.5	W66 31 44.0	2013-08-24	12:25	2013-08-25	10:06	0.4	12.5	-
Joyce Lake	J-BO04	N54 53 50.1	W66 31 18.7	2013-08-23	16:14	2013-08-24	12:33	0.9	12.8	-
Joyce Lake	J-BO04	N54 53 50.1	W66 31 18.7	2013-08-24	12:36	2013-08-25	10:20	0.9	12.5	-
Joyce Lake	J-BO05	N54 53 44.5	W66 31 10.0	2013-08-23	16:19	2013-08-24	12:39	0.7	12.8	-
Joyce Lake	J-BO05	N54 53 44.5	W66 31 10.0	2013-08-24	12:47	2013-08-25	10:25	0.7	12.5	-
Joyce Lake	J-BO06	N54 53 30.9	W66 30 54.0	2013-08-23	16:26	2013-08-24	12:54	0.6	12.8	-
Joyce Lake	J-BO06	N54 53 30.9	W66 30 54.0	2013-08-24	12:59	2013-08-25	10:31	0.6	12.5	-
Joyce Lake	J-BO07	N54 53 33.4	W66 31 07.8	2013-08-23	16:29	2013-08-24	13:13	0.8	12.8	-
Joyce Lake	J-BO07	N54 53 33.4	W66 31 07.8	2013-08-24	13:18	2013-08-25	10:40	0.8	12.5	-
Joyce Lake	J-BO08	N54 53 36.1	W66 31 19.2	2013-08-23	16:23	2013-08-24	13:20	0.6	12.8	-
Joyce Lake	J-BO08	N54 53 36.1	W66 31 19.2	2013-08-24	13:24	2013-08-25	10:45	0.6	12.5	-
Joyce Lake	J-BO09	N54 53 43.8	W66 31 39.1	2013-08-23	16:37	2013-08-24	13:26	0.5	12.8	-
Joyce Lake	J-BO09	N54 53 43.8	W66 31 39.1	2013-08-24	13:36	2013-08-25	10:50	0.5	12.5	-
Joyce Lake	J-FE01	N54 53 43.8	W66 31 12.8	2013-08-23	14:35	2013-08-24	10:18	2.0	12.8	N
Joyce Lake	J-FE01	N54 53 43.8	W66 31 12.8	2013-08-24	10:18	2013-08-25	08:34	2.0	12.5	N
Joyce Lake	J-FE02	N54 53 57.8	W66 31 40.8	2013-08-23	14:49	2013-08-24	10:27	3.0	12.8	Y
Joyce Lake	J-FE02	N54 53 57.8	W66 31 40.8	2013-08-24	10:27	2013-08-25	08:50	3.0	12.5	Y
Joyce Lake	J-FE03	N54 53 45.0	W66 31 43.1	2013-08-23	15:05	2013-08-24	10:39	4.5	12.8	N
Joyce Lake	J-FE03	N54 53 45.0	W66 31 43.1	2013-08-24	10:39	2013-08-25	09:08	4.5	12.5	N
Joyce Lake	J-FE04	N54 53 32.1	W66 30 58.4	2013-08-23	15:20	2013-08-24	10:54	4.5	12.8	Y
Joyce Lake	J-FE04	N54 53 32.1	W66 30 58.4	2013-08-24	10:54	2013-08-25	09:17	4.5	12.5	Y
Joyce Lake	J-FE05	N54 53 53.3	W66 31 48.1	2013-08-23	15:39	2013-08-24	11:05	18.2	12.8	Deep water
Joyce Lake	J-FE05	N54 53 53.3	W66 31 48.1	2013-08-24	11:05	2013-08-25	09:26	18.2	12.5	Deep water
Joyce Lake	J-FE06	N54 53 49.9	W66 31 43.9	2013-08-23	15:51	2013-08-24	11:15	20.0	12.8	Deep water
Joyce Lake	J-FE06	N54 53 49.9	W66 31 43.9	2013-08-24	11:15	2013-08-25	09:43	20.0	12.5	Deep water
Joyce Lake	J-VE01	N54 53 50.9	W66 31 53.7	2013-08-23	16:42	2013-08-24	13:39	1.2	12.8	-
Joyce Lake	J-VE01	N54 53 50.9	W66 31 53.7	2013-08-24	13:31	2013-08-25	10:59	1.2	12.5	-
Joyce Lake	J-VE02	N54 53 55.7	W66 31 56.5	2013-08-23	16:52	2013-08-24	13;43	1.5	12.8	-
Joyce Lake	J-VE02	N54 53 55.7	W66 31 56.5	2013-08-24	13:46	2013-08-25	11:13	1.5	12.5	-
Joyce Lake	J-VE03	N54 53 55.2	W66 31 33.3	2013-08-23	17:06	2013-08-24	13:57	1.4	12.8	-
Joyce Lake	J-VE03	N54 53 55.2	W66 31 33.3	2013-08-24	14:00	2013-08-25	11:25	1.4	12.5	-
Joyce Lake	J-VE04	N54 53 43.7	W66 31 10.3	2013-08-23	17:16	2013-08-24	14:10	1.5	12.8	-
Joyce Lake	J-VE04	N54 53 43.7	W66 31 10.3	2013-08-24	14:27	2013-08-25	11:40	1.5	12.5	-

Appendix B:
Information Collected on Fish Caught in Lakes

Legend

Station ID

X-YY-00, where X is the waterbody identification, YY is the type of fishing gear and 00 the station number

Fishing Gear

BO:	Minnow trap
FE:	Gillnet
VE:	Fyke net

Fish Species

LT:	Lake trout
WS:	White sucker
LNS:	Longnose sucker
LC:	Lake chub
BT:	Brook trout
B:	Burbot
MS:	Mottled sculpin
TSS:	Threespine stickleback
LND:	Longnose dace

Sex

M:	Male
F:	Female
X:	Juvenile

Stage of Gonad Development (Nikolsky,1963)

1:	Immaturity
2:	Resting Stage
3:	Maturation
4:	Maturity
5:	Reproduction
6:	Spent

Appendix B. Information Collected on Fish Caught in Lakes and Streams

Fish ID	Waterbody/Stream	Station ID	Date (retrieve)	Species	Length (total; mm)	Weight (g)	Sex	Gonad development	Notes
1	Lake H	H-FE02	2013-08-23	ESLU	500	686	M	3	
2	Lake H	H-FE02	2013-08-23	ESLU	340	199	M	2	
3	Lake H	H-FE02	2013-08-23	ESLU	520	825	M	3	
4	Lake H	H-FE02	2013-08-23	ESLU	565	687	M	2	
5	Lake H	H-FE02	2013-08-23	ESLU	592	1254	M	3	
6	Lake H	H-FE02	2013-08-23	ESLU	267	125	X	1	
7	Lake H	H-FE02	2013-08-23	ESLU	405	363	M	2	
8	Lake H	H-FE02	2013-08-23	CACO	213	101	X	1	
9	Lake H	H-FE01	2013-08-23	ESLU	525	801	M	3	
10	Lake H	H-FE01	2013-08-23	ESLU	545	961	F	3	
11	Lake H	H-FE01	2013-08-23	ESLU	660	1526	M	3	
12	Lake H	H-FE01	2013-08-23	ESLU	630	1191	X	1	
13	Lake H	H-FE01	2013-08-23	CACO	127	26	X	1	
14	Lake H	H-FE04	2013-08-23	ESLU	702	1980	F	3	
15	Lake H	H-FE04	2013-08-23	ESLU	655	1682	F	3	
16	Lake H	H-FE03	2013-08-23	ESLU	610	1403	M	3	
17	Lake H	H-FE03	2013-08-23	ESLU	583	996	M	3	
18	Lake H	H-FE03	2013-08-23	ESLU	560	1029	M	3	
19	Lake H	H-FE03	2013-08-23	ESLU	562	1040	M	3	
20	Lake H	H-FE03	2013-08-23	ESLU	221	53.8	X	1	
21	Lake H	H-FE03	2013-08-23	ESLU	655	1212	X	1	
22	Lake H	H-FE03	2013-08-23	ESLU	540	715	M	3	
23	Lake H	H-FE03	2013-08-23	ESLU	600	1202	M	2	
24	Lake H	H-FE03	2013-08-23	ESLU	558	984	M	2	
25	Lake H	H-FE03	2013-08-23	ESLU	530	909	M	2	
26	Lake H	H-FE03	2013-08-23	ESLU	245	83	X	1	
27	Lake H	H-FE03	2013-08-23	ESLU	246	87	X	1	
28	Lake H	H-FE03	2013-08-23	ESLU	512	791	F	3	
29	Lake H	H-FE03	2013-08-23	ESLU	537	963	M	2	
30	Lake H	H-FE03	2013-08-23	ESLU	675	1727	F	3	
31	Lake H	H-FE03	2013-08-23	CACO	163	44.0	X	1	
32	Lake H	H-BO01	2013-08-23	ESLU	87				Released
33	Lake H	H-VE04	2013-08-23	LOLO	64				Released
34	Lake H	H-VE03	2013-08-23	LOLO	81				Released
35	Lake H	H-VE03	2013-08-23	COBA	86				Released
36	Joyce Lake	J-FE01	2013-08-24	CACA	292	231.2	F	3	
37	Joyce Lake	J-FE01	2013-08-24	CACA	121	14.7			
38	Joyce Lake	J-FE01	2013-08-24	CACA	181	47.2	M	2	
39	Joyce Lake	J-FE01	2013-08-24	CACA	126	17.5	X	1	
40	Joyce Lake	J-FE01	2013-08-24	COPL	152	32.1	F	3	
41	Joyce Lake	J-FE01	2013-08-24	COPL	143	29.4	F	3	
42	Joyce Lake	J-FE02	2013-08-24	CACA	193	58.5	M	2	
43	Joyce Lake	J-FE02	2013-08-24	CACA	179	43.9	X	1	
44	Joyce Lake	J-FE02	2013-08-24	CACA	184	50.2	M	2	
45	Joyce Lake	J-FE02	2013-08-24	CACA	181	41.5	F	2	
46	Joyce Lake	J-FE02	2013-08-24	CACA	183	46.9	M	2	
47	Joyce Lake	J-FE02	2013-08-24	CACA	141	22.6			
48	Joyce Lake	J-FE02	2013-08-24	CACA	141	21.9			

Appendix B. Information Collected on Fish Caught in Lakes and Streams

Fish ID	Waterbody/Stream	Station ID	Date (retrieve)	Species	Length (total; mm)	Weight (g)	Sex	Gonad development	Notes
49	Joyce Lake	J-FE02	2013-08-24	CACA	186	55.4			
50	Joyce Lake	J-FE02	2013-08-24	CACA	147	26.0			
51	Joyce Lake	J-FE02	2013-08-24	CACA	112	11.3			
52	Joyce Lake	J-FE02	2013-08-24	CACA	132	16.8			
53	Joyce Lake	J-FE02	2013-08-24	CACA	126	14.2			
54	Joyce Lake	J-FE02	2013-08-24	CACA	146	22.9			
55	Joyce Lake	J-FE02	2013-08-24	CACA	119	14.5			
56	Joyce Lake	J-FE02	2013-08-24	CACA	147	23.1			
57	Joyce Lake	J-FE02	2013-08-24	CACA	121	13.6			
58	Joyce Lake	J-FE02	2013-08-24	CACA	127	14.8			
59	Joyce Lake	J-FE02	2013-08-24	CACA	113	13.6			
60	Joyce Lake	J-FE03	2013-08-24	CACA	397	428.0			
61	Joyce Lake	J-FE03	2013-08-24	CACA	175	42.9			
62	Joyce Lake	J-FE03	2013-08-24	CACA	208	65.4			
63	Joyce Lake	J-FE04	2013-08-24	CACA	296	246.8			
64	Joyce Lake	J-FE04	2013-08-24	CACA	229	104.6			
65	Joyce Lake	J-FE04	2013-08-24	CACA	203	62.4			
66	Joyce Lake	J-FE04	2013-08-24	CACA	184	47.6			
67	Joyce Lake	J-FE04	2013-08-24	CACA	168	33.8			
68	Joyce Lake	J-FE04	2013-08-24	CACA	114	10.5			
69	Joyce Lake	J-FE04	2013-08-24	CACA	149	24.2			
70	Joyce Lake	J-FE04	2013-08-24	CACA	123	12.4			
71	Joyce Lake	J-FE04	2013-08-24	CACA	237	104.1			
72	Joyce Lake	J-FE04	2013-08-24	COPL	162	33.4			
73	Joyce Lake	J-FE05	2013-08-24	CACA	224				
74	Joyce Lake	J-FE05	2013-08-24	CACA	186	51.6			
75	Joyce Lake	J-FE05	2013-08-24	CACA	129				
76	Joyce Lake	J-FE05	2013-08-24	CACA	213	82.3			
77	Joyce Lake	J-FE05	2013-08-24	CACA	219	88.2			
78	Joyce Lake	J-FE05	2013-08-24	COPL	77	2.8			
79	Joyce Lake	J-FE06	2013-08-24	CACA	176	45.6			
80	Joyce Lake	J-FE06	2013-08-24	CACA	132	19.5			
81	Joyce Lake	J-FE06	2013-08-24	CACA	191	56.5			
95	Joyce Lake	J-FE01	2013-08-25	CACA	192	58.4			
96	Joyce Lake	J-FE01	2013-08-25	CACA	251	156.2			
97	Joyce Lake	J-FE01	2013-08-25	CACA	314	286.3			
98	Joyce Lake	J-FE02	2013-08-25	CACA	331	378.1			
99	Joyce Lake	J-FE02	2013-08-25	CACA	203	70.4			
100	Joyce Lake	J-FE02	2013-08-25	CACA	172	41.5			
101	Joyce Lake	J-FE02	2013-08-25	CACA	196	68.6			
102	Joyce Lake	J-FE02	2013-08-25	CACA	146	26.4			
103	Joyce Lake	J-FE02	2013-08-25	CACA	178	47.7			
104	Joyce Lake	J-FE02	2013-08-25	CACA	140	22.9			
105	Joyce Lake	J-FE02	2013-08-25	CACA	139	21.4			
106	Joyce Lake	J-FE02	2013-08-25	CACA	153	27.8			
107	Joyce Lake	J-FE03	2013-08-25	CACA	241	114.3			
108	Joyce Lake	J-FE04	2013-08-25	CACA	145	24.6			
109	Joyce Lake	J-FE04	2013-08-25	CACA	182	52.1			

Appendix B. Information Collected on Fish Caught in Lakes and Streams

Fish ID	Waterbody/Stream	Station ID	Date (retrieve)	Species	Length (total; mm)	Weight (g)	Sex	Gonad development	Notes
110	Joyce Lake	J-FE04	2013-08-25	CACA	114	15.3			
111	Joyce Lake	J-FE04	2013-08-25	CACA	199	63.7			
112	Joyce Lake	J-FE05	2013-08-25	CACA	216	85.3			
113	Joyce Lake	J-FE05	2013-08-25	CACA	185	49.2			
114	Joyce Lake	J-FE05	2013-08-25	CACA	192	51.1			
115	Joyce Lake	J-FE06	2013-08-25	CACA	183	50.5			
116	Joyce Lake	J-FE06	2013-08-25	CACA	276	174.6			
117	Joyce Lake	J-FE06	2013-08-25	CACA	206	71.7			
118	Joyce Lake	J-FE06	2013-08-25	CACA	208	69.4			
119	Joyce Lake	J-FE06	2013-08-25	CACA	238	113.9			
120	Joyce Lake	J-FE06	2013-08-25	CACA	225	97.3			
121	Joyce Lake	J-FE06	2013-08-25	CACA	174	54.8			
122	Joyce Lake	J-FE06	2013-08-25	CACA	171	42.6			
136	Gilling River	G-FE01	2013-08-27	ESLU	515	810.0	M	2	
137	Gilling River	G-FE01	2013-08-27	ESLU	546	930.3	F	2	
138	Gilling River	G-FE01	2013-08-27	ESLU	550	817.5	X	1	
139	Gilling River	G-FE01	2013-08-27	ESLU	443	549.7	X	1	
140	Gilling River	G-FE01	2013-08-27	ESLU	593	1137.4	F	3	
141	Gilling River	G-FE01	2013-08-27	ESLU	737	1998.9	F	3	
142	Gilling River	G-FE02	2013-08-27	CACO	439	948.2	M	3	
143	Gilling River	G-FE02	2013-08-27	CACO	258	169.8	X	1	
144	Gilling River	G-FE02	2013-08-27	CACO	503	1179.1	F	3	
145	Gilling River	G-FE03	2013-08-27	CACO	417	687.5	X	1	
146	Gilling River	G-FE03	2013-08-27	CACO	390	601.2	X	1	
147	Gilling River	G-FE03	2013-08-27	CACO	219	99.7	X	1	
148	Gilling River	G-FE03	2013-08-27	CACA	306	228.1	X	1	
149	Gilling River	G-FE03	2013-08-27	SAFO	154	32.1	X	1	
150	Gilling River	G-FE03	2013-08-27	SAFO	198	64.1	X	1	
151	Gilling River	G-FE03	2013-08-27	SAFO	186	56.6	X	1	
152	Gilling River	G-FE04	2013-08-27	CACO	317	347.1	X	1	
153	Gilling River	G-FE04	2013-08-27	CACO	149	30.2	X	1	
154	Gilling River	G-FE04	2013-08-27	SAFO	155	31.4	X	1	
155	Gilling River	G-FE04	2013-08-27	SAFO	174	41.3	X	1	
156	Gilling River	G-BO08	2013-08-27	CACA	57	1.4			Released
157	Gilling River	G-BO07	2013-08-27	LOLO	222	57.7			
158	Gilling River	G-VE04	2013-08-27	COPL	61	1.2			Released
159	Gilling River	G-VE04	2013-08-27	COPL	48	1.0			
160	Gilling River	G-VE04	2013-08-27	COPL	81	2.6			No head
161	Gilling River	G-VE04	2013-08-27	COPL	86	2.8			
162	Gilling River	G-VE04	2013-08-27	LOLO	47	-			
163	Gilling River	G-VE04	2013-08-27	LOLO	46	-			
164	Gilling River	G-VE03	2013-08-27	GAAC	63	-			
165	Gilling River	G-VE03	2013-08-27	COPL	90	3.5			
166	Gilling River	G-VE03	2013-08-27	COPL	86	3.1			
167	Gilling River	G-VE03	2013-08-27	COPL	69	-			
168	Gilling River	G-VE03	2013-08-27	COPL	89	2.9			
169	Gilling River	G-VE03	2013-08-27	COPL	84	-			
170	Gilling River	G-VE03	2013-08-27	COPL	106	4.1			

Appendix B. Information Collected on Fish Caught in Lakes and Streams

Fish ID	Waterbody/Stream	Station ID	Date (retrieve)	Species	Length (total; mm)	Weight (g)	Sex	Gonad development	Notes
171	Gilling River	G-VE03	2013-08-27	LOLO	47	-			
172	Gilling River	G-VE03	2013-08-27	LOLO	56	-			
173	Gilling River	G-VE03	2013-08-27	LOLO	126	7.5			
174	Gilling River	G-VE03	2013-08-27	SAFO	67	-			
175	Gilling River	G-VE03	2013-08-27	SAFO	75	-			
176	Gilling River	G-BO03	2013-08-27	COPL	109	6.6			
177	Gilling River	G-BO04	2013-08-27	COBA	81	2.6			
178	Gilling River	G-VE01	2013-08-27	CACO	88	-			
179	Gilling River	G-VE01	2013-08-27	CACA	87	-			
180	Gilling River	G-VE01	2013-08-27	CACA	74	-			
181	Gilling River	G-VE01	2013-08-27	GAAC	41	-			
182	Gilling River	G-VE01	2013-08-27	GAAC	48	-			
183	Gilling River	G-VE01	2013-08-27	GAAC	47	-			
184	Gilling River	G-VE01	2013-08-27	GAAC	48	-			
185	Gilling River	G-VE01	2013-08-27	COPL	80	-			
186	Gilling River	G-VE02	2013-08-27	CACO	161	39.6			
187	Gilling River	G-VE02	2013-08-27	CACO	73	-			
188	Gilling River	G-VE02	2013-08-27	CACA	85	-			
189	Gilling River	G-VE02	2013-08-27	CACA	90	-			
190	Gilling River	G-VE02	2013-08-27	COPL	94	-			
191	Gilling River	G-VE02	2013-08-27	SAFO	75	-			
192	Gilling River	G-VE02	2013-08-27	SAFO	64	-			
193	Gilling River	G-VE02	2013-08-27	SAFO	54	-			
194	Gilling River	G-VE02	2013-08-27	SAFO	56	-			

Appendix C:
Lake Shoreline Characteristics

Legend

Substrate

L:	Silt and Clay
S:	Sand
V:	Gravel
C:	Cobble
G:	Rubble
B:	Boulder
R:	Bedrock
MO:	Organic Material/Muck

Appendix C. Shoreline Characteristics

Lake and Segment ID				Substrate								Aquatic Vegetation			Shoreline				Notes
Waterbody	Segment ID	Date	Length (m)	Composition (%) [2]								Vegetation zone	Type of vegetation [1]	Dimensions of the zone (m)	Slope	Vegetation percent coverage			
				L	S	V	C	G	B	R	MO					Arborescent	Shruby	Herbaceous	
Attikamagen Lake	WRE-SEG1	2013-08-31					20	40	40						Low	30	60	10	
Attikamagen Lake	WRE-SEG2	2013-08-31					20	30	30		20	WRE-HE01	100Sub.	10x4	Low	30	55	15	
Attikamagen Lake	WRE-SEG2	2013-08-31										WRE-HE02	5Flot.;95Emerg.	200x2					
Attikamagen Lake	WRE-SEG3	2013-08-31					15	35	30		20	WRE-HE03	10Flot.;90Emerg.	150x2	Low	40	50	10	
Iron Arm	IA-SEG1	2013-07-01					15	45	40						Low	55	35	10	
Iron Arm	IA-SEG2	2013-07-01					45	40	15			IA-HE01	100Emerg.	10x2	Low	30	55	15	
Iron Arm	IA-SEG2	2013-07-01										IA-HE02	30Sub.;70Emerg.	12x2					
Iron Arm	IA-SEG3	2013-07-01			15	5	15	30	25		10	IA-HE03	25Sub.;75Emerg.	20x2	Low	45	40	15	
Iron Arm	IA-SEG4	2013-07-01			5	10	30	30	25						Low	>5	25		
Lake H	H-SEG1	2013-08-22					5	15			80	H- HE01		30X5	Low	50	30	20	Sightings: three scoters; Aquatic vegetation composed of burreed and pond lilies.
Lake H	H-SEG1	2013-08-22										H- HE02		15X5					
Lake H	H-SEG1	2013-08-22										H- HE03		10X2					
Lake H	H-SEG1	2013-08-22										H- HE04		20X3					
Lake H	H-SEG1	2013-08-22										H- HE05		35X8					
Lake H	H-SEG1	2013-08-22										H- HE06		100X20					
Pond I	I-SEG1	2013-08-21							10		90	I-HE01			Low				The aquatic vegetation covers the entire surface of the pond; Sightings: two beavers and two ducks.
Pond I	I-SEG2	2013-08-21						40	40		20				Low				
Timmins Bay	T-SEG1	2013-09-02			25	15	15	10	20	5	10				Low	60	25	15	
Timmins Bay	T-SEG2	2013-09-02			50			10	10		30				Low	60	30	10	
Timmins Bay	T-SEG3	2013-09-02			15	5	10	25	20		25	T-HE01	100Emerg.	15x5	Low	50	30	20	
Timmins Bay	T-SEG3	2013-09-02										T-HE02	100Emerg.	5x5					
Timmins Bay	T-SEG4	2013-09-02			40			10	20		30	T-HE03	90Emerg.;10Sub.	150x100	Low	50	30	20	
Timmins Bay	T-SEG5	2013-09-02			35			10	25		30				Low	55	35	15	
Timmins Bay	T-SEG6	2013-09-02			50			5	15		30	T-HE04	80Sub.;20Emerg.	200x25	Low	65	35	0	
Timmins Bay	T-SEG7	2013-09-02			25	5	10	15	25		20				Low	60	30	10	
Timmins Bay	T-SEG8	2013-09-02			35			5	10		50				Low	55	30	15	
Timmins Bay	T-SEG9	2013-09-02			15	5	30	35			15				Low	75	15	10	Sightings: merganser and brood
Timmins Bay	T-SEG10	2013-09-02			20	5	10	40	5		20				Low	80	15	5	
Timmins Bay	T-SEG11	2013-09-02			20	5	25	15	10		25				Low	80	20	0	
Gilling River	G-SEG1	2013-08-27			10				5		85	G-HE01	80Sub.;20Emerg.	500x200	Low	10	60	30	NP suitable spawning ground (FR01)
Gilling River	G-SEG1	2013-08-27										G-HE02	90Sub.;10Emerg.	400x80					
Gilling River	G-SEG2	2013-08-28			95				2		3				Low	25	60	15	
Gilling River	G-SEG3	2013-08-28			20	15	20	30	10		5				Moderate	30	40	30	WS suitable spawning ground (FR02)
Gilling River	G-SEG4	2013-08-29			95				2		3				Low	20	50	30	
Gilling River	G-SEG5	2013-08-29			10				5		85	G-HE03	80Sub.;20Emerg.	500x200	Low	25	60	15	NP suitable spawning ground (FR03)
Gilling River	G-SEG5	2013-08-29										G-HE04	90Sub.;10Emerg.	400x80					

(1) Emerg.: Emergent vegetation; Sub.: Submergent vegetation

(2) Substrate: L: Silt and clay; S: Sand; V; Gravel; C; Cobble; G: Rubble; B : Boulder; R: Bedrock

Appendix D: Connecting Streams and Stream Crossing Characteristics

Legend

Type of Riparian Vegetation

Md:	Mature deciduous
Mc:	Mature softwood
Arb:	Shrubby
Er:	Ericaceous
Her:	Herbaceous
To:	Peatland

Substrate

L:	Silt and Clay
S:	Sand
V:	Gravel
C:	Cobble
G:	Rubble
B:	Boulder
R:	Bedrock
MO:	Organic Material/Muck

Aquatic Vegetation

E:	Emergent
S:	Submergent

Appendix D. Stream Characteristics at Proposed Crossing Sites

General Characteristics											Shoreline			Stream bed													
Stream ID	Upstream/ Downstream the Crossing[4]	Segment ID	Date	Length (m)	Mean width (m)	Water depth (m)	Type of habitat (%)	Flow velocity (m/s)			High water line	Riparian vegetation		Substrate (%)[2]								Substrate compaction	Aquatic vegetation[3]	Fish barrier	Suitable Spawning Habitat	Notes
													Type of vegetation[1]													
								Left	Center	Right	Height (m)	Stream cover (%)	Left	Right	L	S	V	C	G	B	R	MO			Type		
Lake H	NA	SEG1	2013-08-23	50	2	1.2	100Flat	0.1	0.1	0.1	0.0	40 Overhead; 10 Submerged	10Mc;40Arb;10Er;30Her;10To	10Mc;50Arb;5Er;30Her;5To								100	Low	5Sub.	No	No	
Lake H	NA	SEG2	2013-08-23	50	2	1.2	100Flat	0.1	0.1	0.1	0.0	40 Overhead; 10 Submerged	5Mc;50Arb;5Er;30Her;10To	5Mc;50Arb;5Er;30Her;10To								100	Low	5Sub.	No	No	
Pond I	NA	SEG1	2013-08-21	50	4.5	0.3	100Flat	0	0	0	0.1	20 Overhead	5Mc;70Er;20Her;5To	5Mc;70Er;20Her;5To								100	Low	50Emerg.+Sub.	No	No	
Pond I	NA	SEG2	2013-08-21	50	4.5	0.3	100Flat	0	0	0	0.1	20 Overhead	5Mc;70Er;20Her;5To	5Mc;70Er;20Her;5To								100	Low	50Emerg.+Sub.	No	No	
CR14	US	SEG4	2013-08-30	50	0.8	0.2	20Run; 80Flat	0.1	0.2	0.1	0.3	5 Canopy; 10 Overhanging	25Mc;15Arb;20Er;Her40	25Mc;15Arb;20Er;Her41		5	5	10	15	5		60	Moderate	25Sub.	No	No	
CR14	US	SEG3	2013-08-30	50	1,0	0.2	100Flat	0.1	0.1	0.1	0.2	5 Overhanging	15Mc;20Arb;20Er;45Her	15Mc;20Arb;20Er;45Her						5		95	Moderate	30Sub.	No	No	
CR14	US	SEG2	2013-08-30	50	1.3	0.3	100Flat	0.1	0.1	0.1	0.2	5 Overhanging	5Mc;10Arb;20Er;65Her	5Mc;10Arb;20Er;65Her					5	5		90	Moderate	40Sub.	No	No	
CR14	US	SEG1	2013-08-30	50	2,0	0.4	100Flat	0.1	0.1	0.4	0.2	5 Overhanging	5Mc;15Arb;20Er;60Herb	5Mc;15Arb;20Er;60Herb					5	10		85	Moderate	40Sub.	No	No	
CR14	DS	SEG1	2013-08-30	50	1.5	0.7	100Flat	0.1	0.1	0.1	0.2	5 Overhead	5Mc;5Arb;30Er.;30Her	5Mc;5Arb;30Er.;30Her					10	10		80	Moderate	40Sub.	No	No	Sightings: fish not identified
CR14	DS	SEG2	2013-08-30	50	1.9	0.6	100Flat	0.1	0.1	0.1	0.2	5 Overhanging	10Arb;20Er;60Her	10Arb;20Er;60Her				5	5	10		80	Moderate	50Sub.	No	No	
CR14	DS	SEG3	2013-08-30	50	2.2	0.7	100Flat	0.1	0.1	0.1	0.2	5 Overhanging	15Arb;25Er;60Her	15Arb;25Er;60Her					10	10		80	Moderate	50Sub.	No	No	
CR14	DS	SEG4	2013-08-30	50	2.5	0.8	100Flat	0.1	0.1	0.1	0.2	5 Overhanging	10Arb;20Er;70her	10Arb;20Er;70her					5	5		90	Moderate	50Sub.	No	No	Sightings: two brook trout
CR14	DS	SEG5	2013-08-30	50	2.5	0.7	100Flat	0.1	0.1	0.1	0.2	5 Overhanging	5Mc;5Arb;20Er;70Her	5Mc;5Arb;20Er;70Her					5	5		90	Moderate	50Sub.	No	No	
CR23	US	SEG4	2013-08-29	50	2	1.5	50Flat; 50Pool	0.0	0.0	0.0	0.4	10 Canopy; 15 Overhead	Md;30Mc;10Arb;20Er;30Her; 5To	Md;30Mc;10Arb;20Er;30Her; 5To				5	15	20		60	Moderate	10Emerg.+sub.	No	No	
CR23	US	SEG3	2013-08-29	50	3.5	2,00	100Flat	0.0	0.0	0.0	0.4	15 Overhead	10Md;20Mc;5Arb;20Er;30Her;5To	10Md;20Mc;5Arb;20Er;30Her;5To								100	Low	5Emerg.	No	No	
CR23	US	SEG2	2013-08-29	50	3.5	2,00	100Flat	0.0	0.0	0.0	0.4	15 Overhead	5Arb;20Er;60Her;15To	5Arb;20Er;60Her;15To						5		95	Low	5Emerg.	No	No	
CR23	US	SEG1	2013-08-29	50	3.5	2,00	100Flat	0.0	0.0	0.0	0.4	15 Overhead	5Arb;20Er;60Her;15To	5Arb;20Er;60Her;15To								100	Low	5Emerg.	No	No	
CR23	DS	SEG1	2013-08-29	50	3.5	2,00	100Flat	0.0	0.0	0.0	0.4	15 Overhead	5Arb;20Er;60Her;15To	5Arb;20Er;60Her;15To								100	Low	5Emerg.	No	No	
CR23	DS	SEG2	2013-08-29	50	3.5	2,00	100Flat	0.0	0.0	0.0	0.4	15 Overhead	5Arb;20Er;60Her;15To	5Arb;20Er;60Her;15To						5		95	Low	5Emerg.	No	No	
CR23	DS	SEG3	2013-08-29	50	3.5	2,00	100Flat	0.0	0.0	0.0	0.4	15 Overhead	5Arb;20Er;60Her;15To	5Arb;20Er;60Her;15To								100	Low	10Emerg.	No	No	
CR23	DS	SEG4	2013-08-29	50	3.5	2,00	100Flat	0.0	0.0	0.0	0.4	10 Overhanging; 15 Overhead	5Arb;20Er;60Her;15To	5Arb;20Er;60Her;15To						10		90	Low	5Emerg.	No	No	
CR23	DS	SEG5	2013-08-29	50	3	2,00	100Flat	0.0	0.0	0.0	0.4	10 Overhanging; 15 Overhead	10Mc;5Arb;40Er;30Her;15To	10Mc;5Arb;40Er;30Her;15To						5		95	Low	No	No	No	
CR12	US	SEG4	2013-08-29	50	2.8	0.5	40Rapid; 30Run; 30Riffle	0.3	0.6	0.3	0.4	5 Canopy; 10 Overhanging; 10 Overhead	10Mc;20Arb;20Er;50Her	10Mc;20Arb;20Er;50Her				5	15	80			High	No	No	No	

Appendix D. Stream Characteristics at Proposed Crossing Sites

General Characteristics											Shoreline			Stream bed													Suitable Spawning Habitat	Notes
Stream ID	Upstream/ Downstream the Crossing[4]	Segment ID	Date	Length (m)	Mean width (m)	Water depth (m)	Type of habitat (%)	Flow velocity (m/s)			High water line	Riparian vegetation		Substrate (%)[2]								Substrate compaction	Aquatic vegetation[3]	Fish barrier			
												Stream cover (%)	Type of vegetation[1]														
								Left	Center	Right	Height (m)		Left	Right	L	S	V	C	G	B	R	MO			Type		
CR12	US	SEG3	2013-08-29	50	3.5	0.4	80Run; 20Riffle	0.5	0.6	0.5	0.4	5 Canopy; 10 Overhanging; 10 Overhead	10Mc;20Arb;20Er;50Her	10Mc;20Arb;20Er;50Her				5	10	85			High	No	No	No	
CR12	US	SEG2	2013-08-29	50	3	0.5	90Run; 10Riffle	0.3	0.5	0.4	0.4	5 Canopy; 10 Overhanging; 10 Overhead	10Mc;20Arb;20Er;50Her	10Mc;20Arb;20Er;50Her				10	20	70			High	No	No	No	
CR12	US	SEG1	2013-08-29	50	2.8	0.6	10Rapid; 70Run; 20Flat	0.3	0.6	0.4	0.4	5 Canopy; 10 Overhanging; 10 Overhead	10Mc;20Arb;20Er;50Her	10Mc;20Arb;20Er;50Her				10	20	70			High	No	No	No	
CR12	DS	SEG1	2013-08-29	50	2.5	0.5	80Run; 20Riffle	0.3	0.8	0.4	0.4	5 Canopy; 10 Overhanging; 10 Overhead	20Mc;20Arb;20Er;40Her	20Mc;20Arb;20Er;40Her				5	15	80			High	No	No	No	
CR12	DS	SEG2	2013-08-29	50	2.8	0.4	40Rapid; 40Run; 20Riffle	0.4	0.8	0.4	0.4	5 Canopy; 10 Overhanging; 10 Overhead	20Mc;10Arb;10Er;60Her	20Mc;10Arb;10Er;60Her				10	20	70			High	No	No	No	
CR12	DS	SEG3	2013-08-29	50	2.8	0.6	75Run; 20Riffle; 5Pool	0.4	0.9	0.3	0.4	5 Canopy; 10 Overhanging; 10 Overhead	20Mc;10Arb;10Er;60Her	20Mc;10Arb;10Er;60Her				20	20	60			High	No	No	No	
CR12	DS	SEG4	2013-08-29	50	3	0.6	75Run; 25Riffle	0.4	0.9	0.5	0.4	5 Canopy; 10 Overhanging; 10 Overhead	20Mc;10Arb;10Er;55Her;5To	20Mc;10Arb;10Er;55Her;5To				5	15	80			High	No	No	No	
CR12	DS	SEG5	2013-08-29	50	2.8	0.6	10Rapid; 80Run; 10Riffle	0.4	0.6	0.4	0.4	5 Canopy; 10 Overhanging; 10 Overhead	20Mc;10Arb;10Er;55Her;5To	20Mc;10Arb;10Er;55Her;5To				10	20	70			High	No	No	No	
CR11	US	SEG4	2013-08-29	50	1.2	0.5	10Run; 20Riffle; 70Flat	0.4	0.4	0.4	0.4	30 Overhanging; 40 Overhead; 5 Submerged	10Arb;80Er;10Her	10Arb;80Er;10Her		5	10	30	25	5		25	High	10Sub.	No	No	
CR11	US	SEG3	2013-08-29	50	1.7	0.4	20Run; 20Riffle; 60Flat	0.4	0.5	0.4	0.4	40 Overhanging; 30 Overhead; 10 Submerged	5Arb;80Er;10Her;5To	5Arb;80Er;10Her;5To		5	10	30	25	5		25	High	10Sub.	No	No	
CR11	US	SEG2	2013-08-29	50	2.2	0.6	100Flat	0.3	0.3	0.3	0.4	40 Overhanging; 30 Overhead; 10 Submerged	20Arb;70Er;5Her;5To	20Arb;70Er;5Her;5To		10	5	35	20	10		20	High	5Sub.	No	No	
CR11	US	SEG1	2013-08-29	50	2	0.5	100Flat	0.3	0.3	0.3	0.4	40 Overhanging; 30 Overhead	20Arb;70Er;5Her;5To	20Arb;70Er;5Her;5To		5	5	30	20	10		30	High	10Sub.	No	No	
CR11	DS	SEG1	2013-08-29	50	2	0.45	5Run; 5Riffle; 90Flat	0.4	0.4	0.4	0.4	40 Overhanging; 30 Overhead; 10 Submerged	15Arb;80Er;5Her	15Arb;80Er;5Her		10	5	30	30	5		20	High	10Sub.	No	No	
CR11	DS	SEG2	2013-08-29	50	2.1	0.8	100Flat	0.3	0.3	0.3	0.4	30 Overhanging; 25 Overhead; 10 Submerged	20Arb;70Er;10Her	20Arb;70Er;10Her		5		20	20	5		50	Moderate	15Sub.	No	No	

Appendix D. Stream Characteristics at Proposed Crossing Sites

General Characteristics											Shoreline			Stream bed													
Stream ID	Upstream/ Downstream the Crossing[4]	Segment ID	Date	Length (m)	Mean width (m)	Water depth (m)	Type of habitat (%)	Flow velocity (m/s)			High water line	Riparian vegetation		Substrate (%)[2]								Substrate compaction	Aquatic vegetation[3]	Fish barrier	Suitable Spawning Habitat	Notes
												Stream cover (%)	Type of vegetation[1]													
								Left	Center	Right	Height (m)		Left	Right	L	S	V	C	G	B	R	MO			Type		
CR11	DS	SEG3	2013-08-29	50	2.4	0.8	100Flat	0.3	0.3	0.3	0.4	25 Overhanging; 25 Overhead; 15 Submerged	25Arb;70Er;5 Her	25Arb;70Er;5 Her					10	20		70	Moderate	15Sub.	No	No	
CR11	DS	SEG4	2013-08-29	50	1.8	0.7	100Flat	0.3	0.3	0.3	0.4	40 Overhanging; 20 Overhead; 10 Submerged	10Arb;90Er	10Arb;90Er		5		25	10			60	Moderate	10Sub.	No	No	
CR11	DS	SEG5	2013-08-29	50	1.8	0.7	100Flat	0.3	0.3	0.3	0.4	30 Overhanging; 20 Overhead; 10 Submerged	10Mc;20Arb;60Er;10Her	10Mc;20Arb;60Er;10Her		10		20	20			50	Moderate	10Sub.	No	No	
CR10	US	SEG4	2013-08-28	50	10	2.2	100Flat	0.1	0.1	0.1	0.3	No cover	10Mc;10Arb;60Er;20Her	10Mc;10Arb;60Er;20Her						5		95	Moderate	25Sub.	No	No	
CR10	US	SEG3	2013-08-28	50	9	1,00	100Flat	0.1	0.1	0.1	0.3	No cover	10Md;20Mc;10Arb;40Er;20Her	10Md;20Mc;10Arb;40Er;20Her				2	3	5		90	Moderate	40Sub.	No	No	
CR10	US	SEG2	2013-08-28	50	9	0.9	100Flat	0.1	0.1	0.1	0.3	10 Overhead; 30 Submerged	20Md;20Mc;10Arb;20Er;30Her	20Md;20Mc;10Arb;20Er;30Her			5	30	10	15		40	Moderate	50Sub.	No	No	
CR10	US	SEG1	2013-08-28	50	9	1.2	100Flat	0.1	0.1	0.1	0.3	10 Overhead; 30 Submerged	20Md;20Mc;10Arb;20Er;30Her	20Md;20Mc;10Arb;20Er;30Her		5				5		90	Low	30Sub.	No	No	
CR10	DS	SEG1	2013-08-28	50	9	1.1	100Flat	0.1	0.1	0.1	0.3	5 Overhanging; 10 Overhead; 15 Submerged	10Md;10Mc;20Arb;40Er;20Her	10Md;10Mc;20Arb;40Er;20Her					5	5		90	Moderate	40Sub.	No	No	
CR10	DS	SEG2	2013-08-28	50	10	1,00	100Flat	0.1	0.1	0.1	0.3	5 Overhanging; 20 Overhead; 15 Submerged	10Md;10Mc;20Arb;40Er;20Her	10Md;10Mc;20Arb;40Er;20Her						10		90	Moderate	45Sub.	No	No	
CR10	DS	SEG3	2013-08-28	50	10	0.9	100Flat	0.1	0.1	0.1	0.3	10 Overhanging; 10 Overhead; 10 Submerged	10Md;20Mc;25Arb;20Er;25Her	10Md;20Mc;25Arb;20Er;25Her		5			5	20		70	Moderate	25Sub.	No	No	
CR10	DS	SEG4	2013-08-28	50	10	1,00	100Flat	0.1	0.1	0.1	0.3	5 Overhanging; 5 Overhead; 25 Submerged	5Md;5Mc;5Arb;60Er;25Her	5Md;5Mc;5Arb;60Er;25Her						5		95	Low	30Sub.	No	No	
CR10	DS	SEG5	2013-08-28	50	12	1.3	20Riffle; 80Flat	0.2	0.2	0.2	0.3	5 Overhanging; 5 Overhead; 20 Submerged	5Mc;5Arb;70Er;20Her	5Mc;5Arb;70Er;20Her				2	3	5		90	Moderate	20Sub.	Beaver Dam (H=1.4m; L=8m)	No	
CR15	US	SEG4	2013-08-30	50	4.3	1,00	10Rapid; 40Run; 50 Pool	0.4	0.4	0.4	0.15	5 Overhead	15Arb;45Er;35 Her	15Arb;45Er;35 Her			5	35	35	25			High	No	No	No	Sightings: brook trout (app. 20 cm)
CR15	US	SEG3	2013-08-30	50	3.7	0.3	40Rapid; 50Run; 10Chute/cascade	0.7	0.7	0.7	0.2	5 Overhead	15Arb;45Er;35 Her	15Arb;45Er;35 Her				20	50	30			High	No	No	No	
CR15	US	SEG2	2013-08-30	50	3.5	0.3	75Rapid; 20Run; 5Cascade	0.7	0.7	0.7	0.3	10 Overhead	15Arb;45Er;35 Her	15Arb;45Er;35 Her				20	40	40			High	No	No	No	
CR15	US	SEG1	2013-08-30	50	3	0.4	90Rapid; 10Cascade	0.8	0.9	0.8	0.4	5 Overhead	5Mc;50Er;45Her	5Mc;50Er;45Her				10	50	40			High	No	No	No	
CR15	DS	SEG1	2013-08-30	50	2.5	0.5	80Rapid; 20Run	0.8	0.7	0.8	0.3	5 Canopy; 5 Overhanging; 5 Overhead	5Mc;5Arb;70Er;20Her	5Mc;5Arb;70Er;20Her			5	15	70	10			High	No	No	No	
CR15	DS	SEG2	2013-08-30	50	2.7	0.4	90Rapid; 10Run	0.5	0.5	0.5	0.5	15 Canopy; 10 Overhanging; 5 Overhead	35Mc;25Arb;20Er;20Her	35Mc;25Arb;20Er;20Her			10	30	50	10			High	No	No	No	

Appendix D. Stream Characteristics at Proposed Crossing Sites

General Characteristics											Shoreline				Stream bed													
Stream ID	Upstream/ Downstream the Crossing[4]	Segment ID	Date	Length (m)	Mean width (m)	Water depth (m)	Type of habitat (%)	Flow velocity (m/s)			High water line	Riparian vegetation			Substrate (%)[2]								Substrate compaction	Aquatic vegetation[3]	Fish barrier	Suitable Spawning Habitat	Notes
												Stream cover (%)	Type of vegetation[1]														
								Left	Center	Right	Height (m)		Left	Right	L	S	V	C	G	B	R	MO			Type		
CR15	DS	SEG3	2013-08-30	50	2.7	0.45	80Rapid; 10Cascade; 10Riffle	0.8	1.2	0.8	0.3	15 Canopy; 10 Overhanging; 15 Overhead	40Mc;25Arb;20Er;15Her	40Mc;25Arb;20Er;15Her				30	50	20			High	No	No	No	
CR15	DS	SEG4	2013-08-30	50	2.7	0.3	80Rapid; 10Run; 10Chute/cascade	0.8	0.8	0.8	0.2	10 Canopy; 10 Overhanging; 5 Overhead	40Mc;30Arb;15Er;15Her	40Mc;30Arb;15Er;15Her			5	30	45	20			High	No	No	No	
CR15	DS	SEG5	2013-08-30	50	2.9	0.7	50Rapid; 40Run; 10Cascade	0.6	0.6	0.6	0.3	5 Canopy; 10 Overhanging; 5 Overhead	25Mc;30Arb;25Er;20Her	25Mc;30Arb;25Er;20Her			5	45	30	20			High	No	No	No	
CR16	US	SEG4	2013-08-30	50	0.4	0.6	30Run; 30Riffle; 40Flat	0.4	0.5	0.4	0.3	5 Canopy; 5 Overhanging; 10 Overhead	30Mc;30Arb;15Er;25Her	30Mc;30Arb;15Er;25Her		10	25	55	5	5			High	No	No	No	
CR16	US	SEG3	2013-08-30	50	0.8	0.5	30Run; 30Riffle; 40Flat	0.4	0.4	0.4	0.3	20 Canopy; 10 Overhanging; 5 Overhead	30Mc;30Arb;20Er;20Her	30Mc;30Arb;20Er;20Her		5	20	60	10	5			High	No	No	No	
CR16	US	SEG2	2013-08-30	50	0.9	0.6	60Run; 20Riffle; 20Flat	0.4	0.4	0.4	0.3	15 Canopy; 5 Overhanging; 5 Overhead	20Mc;20Arb;15Er;45Her	20Mc;20Arb;15Er;45Her		10	30	50	5	5			High	No	No	No	
CR16	US	SEG1	2013-08-30	50	0.5	0.8	50Run; 40Riffle; 10Flat	0.4	0.5	0.4	0.3	10 Canopy; 5 Overhanging; 5 Overhead	20Mc;10Arb;20Er;50Her	20Mc;10Arb;20Er;50Her		10	20	60	5	5			High	No	No	No	
CR16	DS	SEG1	2013-08-30	50	0.5	0.4	60Run; 40Riffle	0.4	0.4	0.4	0.3	10 Canopy; 10 Overhanging; 5 Overhead	20Mc;20Arb;15Er;50Her;5To	20Mc;20Arb;15Er;50Her;5To		5	15	35	40	5			High	5Emerg.	No	No	
CR16	DS	SEG2	2013-08-30	50	0.8	0.6	30Run; 30Riffle; 40Flat	0.3	0.3	0.3	0.3	10 Canopy; 10 Overhanging; 5 Overhead	30Mc;25Arb;15Er;30Her	30Mc;25Arb;15Er;30Her		5	20	50	20	5			High	No	No	No	
CR16	DS	SEG3	2013-08-30	50	0.25	0.6	80Run; 15Riffle; 5Flat	0.3	0.4	0.3	0.2	5 Canopy; 10 Overhanging; 5 Overhead	10Mc;10Arb;10Er;70Her	10Mc;10Arb;10Er;70Her		10	20	50	10	5		5	High	No	Underground; accessible to fish during flood	No	
CR17A	US	SEG1	2013-08-31																								
CR17A	DS	SEG1	2013-08-31	25	0.2	0.02	50Run; 50Flat	0.1	0.1	0.1	0.5	5 Overhead	10Mc;80Er;10Her	10Mc;80Er;10Her		5						95	Moderate	5Emerg.	Underground	No	
CR-09			2013-08-28	Dry, with a few pockets of water. Presents characteristics of a wetland, not a stream.																							
CR-07			2013-08-28	The stream does not connect with the pond downstrean CR07.																							
CR-06			2013-08-28	Dry, with a few pockets of water. Small peatlands.																							
CR-21			2013-08-28	Stream completely underground. The water running could be heard from underground in some areas. A few small pockets of water visible through rock and peat.																							
CR-20			2013-08-28	Fish habitat: Shallow pond with aquatic vagetation found in many areas.																							
CR-19			2013-08-28	Pond I outlet disappears into the ground. Presents characteristics of a wetland, not a stream. A few pockets of water scattered here and there.																							
AT-T01			2013-08-29	At the crossing point, the water runs through peat and vegetation in many small arms. Presents charatecristics of a wetland, not a stream. The small arms group together approximately 300 to 400 m berore discharging into Attikamagen Lake. This downstream part of the stream is a																							

[1] Type of riparian vegetation: Md: Mature deciduous; Mc: Mature softwood; Arb: Shruby; Er: Ericaceae; Her: Herbaceous; To: Peatland

2 Substrate: L: Silt and clay; S: Sand; V; Gravel; C; Cobble; G: Rubble; B : Boulder; R: Bedrock

[3] Emerg.: Emergent vegetation; Sub.: Submergent vegetation

[4] US: Upstream; DS: Downstream; NA: Not applicable.

Appendix E: Certificates of Analysis

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Certificat d'analyses

Numéro de demande d'analyse: **13-558008**

Demande d'analyse reçue le: 2013-08-28

Date d'émission du certificat: 2013-09-25

Numéro de version du certificat: 1

☑ Certificat d'analyse officiel

☐ Certificat d'analyse préliminaire

Requérant

GENIVAR inc.

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Télécopieur : (418) 296-2889

Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

Commentaires

Chlorures, nitrites, nitrates et sulfates: Échantillons dilués car effet de matrice (limite de détection augmentée).

Cette version remplace et annule toute version antérieure, le cas échéant.

NA : Information non-fournie et/ou non-applicable

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Certificat d'analyses

Client: **GENIVAR inc.**

Numéro de demande: 13-558008

Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

		Échantillon(s)			
	No Labo.	**2427328**	**2427333**	**2427334**	**2427335**
	Votre Référence	Étang I	Lac H	Lac Joyce Lake ST. No 1	Lac Joyce Lake ST. No 2
	Matrice	Sédiment	Sédiment	Sédiment	Sédiment
	Prélevé par	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
	Lieu de prélèvement	Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
	Prélevé le	2013-08-22	2013-08-23	2013-08-24	2013-08-25
	Reçu Labo	2013-08-28	2013-08-28	2013-08-28	2013-08-28
Paramètre(s) Méthode Référence					
Granulométrie (sous-traité)	Préparation	-	-	-	-
(Analyse effectuée en sous-traitance)	Analyse	-	-	-	-
	No. séquence	NA	NA	NA	NA
Granulométrie		Annexe	Annexe	Annexe	Annexe
Humidité (pour calcul)	Préparation	2013-08-29	2013-08-29	2013-08-29	2013-08-29
QC034-95 / Séchage à 105℃, gravimétrie (Accrédité)	Analyse	2013-08-30	2013-08-30	2013-08-30	2013-08-30
SM2540 B / MA. 100 - S.T. 1.1 R1	No. séquence	436748	436748	436748	436748
Humidité	%	88.1	88.2	47.5	25.0
Sédimentométrie (sous-traité)	Préparation	-	-	-	-
(Analyse effectuée en sous-traitance)	Analyse	-	-	-	-
	No. séquence	NA	NA	NA	NA
Sédimentométrie		Annexe	Annexe	Annexe	Annexe

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Certificat d'analyses

Client: **GENIVAR inc.**

Numéro de demande: 13-558008

Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

		Échantillon(s)		
No Labo.		**2427336**	**2427337**	**2427338**
Votre Référence		Lac Joyce Lake ST. No 3	La Gilling River ST. No 1	La Gilling River ST. No 2
Matrice		Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
Lieu de prélèvement		Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
Prélevé le		2013-08-25	2013-08-26	2013-08-26
Reçu Labo		2013-08-28	2013-08-28	2013-08-28
Paramètre(s) Méthode Référence				
Granulométrie (sous-traité)	Préparation	-	-	-
(Analyse effectuée en sous-traitance)	Analyse	-	-	-
	No. séquence	NA	NA	NA
Granulométrie		Annexe	Annexe	Annexe
Humidité (pour calcul)	Préparation	2013-08-29	2013-08-29	2013-08-29
QC034-95 / Séchage à 105℃, gravimétrie (Accrédité)	Analyse	2013-08-30	2013-08-30	2013-08-30
SM2540 B / MA. 100 - S.T. 1.1 R1	No. séquence	436748	436748	436748
Humidité	%	24.3	28.0	25.9
Sédimentométrie (sous-traité)	Préparation	-	-	-
(Analyse effectuée en sous-traitance)	Analyse	-	-	-
	No. séquence	-	NA	NA
Sédimentométrie		-	Annexe	Annexe

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Certificat d'analyses

Client: **GENIVAR inc.**

Numéro de demande: 13-558008

Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2427328**	**2427333**	**2427334**	**2427335**
Votre Référence		Étang I	Lac H	Lac Joyce Lake ST. No 1	Lac Joyce Lake ST. No 2
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
Lieu de prélèvement		Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
Prélevé le		2013-08-22	2013-08-23	2013-08-24	2013-08-25
Reçu Labo		2013-08-28	2013-08-28	2013-08-28	2013-08-28
Paramètre(s) Méthode Référence					
Aluminium (Al)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Aluminium	mg/kg	7090	6560	11200	12800
Antimoine (Sb)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Antimoine	mg/kg	0.4	0.2	0.7	0.9
Argent (Ag)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Argent	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Arsenic (As)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Arsenic	mg/kg	19.0	5.1	9.9	14.4
Baryum (Ba)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Baryum	mg/kg	23	19	33	45
Béryllium (Be)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Béryllium	mg/kg	0.3	0.3	0.6	0.6

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Numéro de demande: 13-558008

Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2427328**	**2427333**	**2427334**	**2427335**
Votre Référence		Étang I	Lac H	Lac Joyce Lake ST. No 1	Lac Joyce Lake ST. No 2
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
Lieu de prélèvement		Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
Prélevé le		2013-08-22	2013-08-23	2013-08-24	2013-08-25
Reçu Labo		2013-08-28	2013-08-28	2013-08-28	2013-08-28
Paramètre(s)					
Méthode					
Référence					
Bismuth (Bi)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	438016	437808	437808	437808
Bismuth	mg/kg	<10	< 10	< 10	< 10
Bore (B)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Bore	mg/kg	2	5	3	4
Cadmium (Cd)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Cadmium	mg/kg	5.0	0.9	0.4	0.9
Calcium (Ca)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Calcium	mg/kg	2140	3930	433	391
Chrome (Cr)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Chrome	mg/kg	7	13	23	26
Cobalt (Co)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Cobalt	mg/kg	5	4	9	16

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Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2427328**	**2427333**	**2427334**	**2427335**
Votre Référence		Étang I	Lac H	Lac Joyce Lake ST. No 1	Lac Joyce Lake ST. No 2
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
Lieu de prélèvement		Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
Prélevé le		2013-08-22	2013-08-23	2013-08-24	2013-08-25
Reçu Labo		2013-08-28	2013-08-28	2013-08-28	2013-08-28
Paramètre(s)					
Méthode					
Référence					
Cuivre (Cu)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Cuivre	mg/kg	69	15	23	30
Étain (Sn)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Étain	mg/kg	3	3	3	3
Fer (Fe)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Fer	mg/kg	13800	13700	62400	76200
Lithium (Li)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Lithium	mg/kg	2	6	12	13
Magnésium (Mg)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Magnésium	mg/kg	777	2270	3360	4210
Manganèse (Mn)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Manganèse	mg/kg	420	166	835	2010

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Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2427328**	**2427333**	**2427334**	**2427335**
Votre Référence		Étang I	Lac H	Lac Joyce Lake ST. No 1	Lac Joyce Lake ST. No 2
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
Lieu de prélèvement		Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
Prélevé le		2013-08-22	2013-08-23	2013-08-24	2013-08-25
Reçu Labo		2013-08-28	2013-08-28	2013-08-28	2013-08-28
Paramètre(s) Méthode Référence					
Molybdène (Mo)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Molybdène	mg/kg	2.8	1.4	3.0	3.8
Nickel (Ni)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Nickel	mg/kg	37	16	21	26
Plomb (Pb)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Plomb	mg/kg	8	12	8	11
Potassium (K)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Potassium	mg/kg	547	981	1020	1130
Sélénium (Se)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	438015	438015
Sélénium	mg/kg	1.2	1.0	<0.05	<0.05
Sodium (Na)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	438015	437808
Sodium	mg/kg	58	142	< 50	51

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NA	121-18002-01 Lot 200	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2427328**	**2427333**	**2427334**	**2427335**
Votre Référence		Étang I	Lac H	Lac Joyce Lake ST. No 1	Lac Joyce Lake ST. No 2
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
Lieu de prélèvement		Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
Prélevé le		2013-08-22	2013-08-23	2013-08-24	2013-08-25
Reçu Labo		2013-08-28	2013-08-28	2013-08-28	2013-08-28
Paramètre(s) Méthode Référence					
Strontium (Sr)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Strontium	mg/kg	21	44	< 10	< 10
Thallium (Tl)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	438016	437808	437808	437808
Thallium	mg/kg	< 0.1	< 0.1	< 0.1	0.1
Titane (Ti)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Titane	mg/kg	72	128	383	420
Vanadium (V)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Vanadium	mg/kg	8	16	48	52
Zinc (Zn)	Préparation	2013-09-09	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808	437808
Zinc	mg/kg	317	97	62	71

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Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

		Échantillon(s)		
No Labo.		**2427336**	**2427337**	**2427338**
Votre Référence		Lac Joyce Lake ST. No 3	La Gilling River ST. No 1	La Gilling River ST. No 2
Matrice		Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
Lieu de prélèvement		Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
Prélevé le		2013-08-25	2013-08-26	2013-08-26
Reçu Labo		2013-08-28	2013-08-28	2013-08-28
Paramètre(s)				
Méthode				
Référence				
Aluminium (Al)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Aluminium	mg/kg	15200	3400	3230
Antimoine (Sb)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Antimoine	mg/kg	0.7	0.3	0.3
Argent (Ag)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Argent	mg/kg	< 0.5	< 0.5	< 0.5
Arsenic (As)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Arsenic	mg/kg	12.7	9.5	8.6
Baryum (Ba)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Baryum	mg/kg	35	86	116
Béryllium (Be)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Béryllium	mg/kg	0.6	0.8	0.7

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Client: **GENIVAR inc.**

Numéro de demande: 13-558008

Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

		Échantillon(s)		
No Labo.		**2427336**	**2427337**	**2427338**
Votre Référence		Lac Joyce Lake ST. No 3	La Gilling River ST. No 1	La Gilling River ST. No 2
Matrice		Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
Lieu de prélèvement		Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
Prélevé le		2013-08-25	2013-08-26	2013-08-26
Reçu Labo		2013-08-28	2013-08-28	2013-08-28
Paramètre(s)				
Méthode				
Référence				
Bismuth (Bi)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Bismuth	mg/kg	< 10	< 10	< 10
Bore (B)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Bore	mg/kg	2	3	2
Cadmium (Cd)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Cadmium	mg/kg	0.6	0.4	0.5
Calcium (Ca)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Calcium	mg/kg	384	300	247
Chrome (Cr)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Chrome	mg/kg	29	9	8
Cobalt (Co)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Cobalt	mg/kg	9	13	13

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Certificat d'analyses

Client: **GENIVAR inc.**

Numéro de demande: 13-558008

Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

		Échantillon(s)		
No Labo.		**2427336**	**2427337**	**2427338**
Votre Référence		Lac Joyce Lake ST. No 3	La Gilling River ST. No 1	La Gilling River ST. No 2
Matrice		Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
Lieu de prélèvement		Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
Prélevé le		2013-08-25	2013-08-26	2013-08-26
Reçu Labo		2013-08-28	2013-08-28	2013-08-28
Paramètre(s)				
Méthode				
Référence				
Cuivre (Cu)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Cuivre	mg/kg	29	13	13
Étain (Sn)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Étain	mg/kg	3	3	4
Fer (Fe)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Fer	mg/kg	69900	90900	92900
Lithium (Li)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Lithium	mg/kg	15	5	5
Magnésium (Mg)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Magnésium	mg/kg	4190	789	672
Manganèse (Mn)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Manganèse	mg/kg	671	4910	5770

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Numéro de demande: 13-558008

Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

		Échantillon(s)		
No Labo.		**2427336**	**2427337**	**2427338**
Votre Référence		Lac Joyce Lake ST. No 3	La Gilling River ST. No 1	La Gilling River ST. No 2
Matrice		Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
Lieu de prélèvement		Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
Prélevé le		2013-08-25	2013-08-26	2013-08-26
Reçu Labo		2013-08-28	2013-08-28	2013-08-28
Paramètre(s)				
Méthode				
Référence				
Molybdène (Mo)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Molybdène	mg/kg	4.1	1.8	1.8
Nickel (Ni)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Nickel	mg/kg	21	14	14
Plomb (Pb)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Plomb	mg/kg	8	4	4
Potassium (K)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Potassium	mg/kg	1260	419	435
Sélénium (Se)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	438015	438015	438015
Sélénium	mg/kg	<0.05	<0.05	<0.05
Sodium (Na)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	438015	438015	438015
Sodium	mg/kg	< 50	< 50	< 50

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Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

		Échantillon(s)		
No Labo.		**2427336**	**2427337**	**2427338**
Votre Référence		Lac Joyce Lake ST. No 3	La Gilling River ST. No 1	La Gilling River ST. No 2
Matrice		Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
Lieu de prélèvement		Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
Prélevé le		2013-08-25	2013-08-26	2013-08-26
Reçu Labo		2013-08-28	2013-08-28	2013-08-28
Paramètre(s)				
Méthode				
Référence				
Strontium (Sr)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Strontium	mg/kg	< 10	< 10	< 10
Thallium (Tl)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Thallium	mg/kg	< 0.1	0.2	0.2
Titane (Ti)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Titane	mg/kg	332	76	69
Vanadium (V)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Vanadium	mg/kg	63	27	26
Zinc (Zn)	Préparation	2013-09-09	2013-09-09	2013-09-09
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09
MA. 200 - Mét 1.2 R1	No. séquence	437808	437808	437808
Zinc	mg/kg	60	27	26

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Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

	Échantillon(s)		
No Labo.	**2427336**	**2427337**	**2427338**
Votre Référence	Lac Joyce Lake ST. No 3	La Gilling River ST. No 1	La Gilling River ST. No 2
Matrice	Sédiment	Sédiment	Sédiment
Prélevé par	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
Lieu de prélèvement	Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
Prélevé le	2013-08-25	2013-08-26	2013-08-26
Reçu Labo	2013-08-28	2013-08-28	2013-08-28

Paramètre(s)
Méthode
Référence

Note 1 : Ces résultats et commentaires, le cas échéant, ne se rapportent qu'aux échantillons soumis pour les analyses réalisées au site de Saint-Augustin-de-Desmaures.

Catherine Blais, chimiste

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Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

		Échantillon(s)			
	No Labo.	**2427328**	**2427333**	**2427334**	**2427335**
	Votre Référence	Étang I	Lac H	Lac Joyce Lake ST. No 1	Lac Joyce Lake ST. No 2
	Matrice	Sédiment	Sédiment	Sédiment	Sédiment
	Prélevé par	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
	Lieu de prélèvement	Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
	Prélevé le	2013-08-22	2013-08-23	2013-08-24	2013-08-25
	Reçu Labo	2013-08-28	2013-08-28	2013-08-28	2013-08-28
Paramètre(s) Méthode Référence					
Azote ammoniacal (en N)	Préparation	2013-08-30	2013-08-30	2013-08-30	2013-08-30
Azote ammoniacal par colorimétrie. Résultats sur poids sec. (Accrédité)	Analyse	2013-08-30	2013-08-30	2013-08-30	2013-08-30
E-A-EN-EN-CHI-PC-MD003 (REF:MA.300-N 1.1, CEAEQ)	No. séquence	436895	436895	436895	436895
Azote ammoniacal en N	mg/kg	60	91	< 5	< 5
Carbone organique total par titrage	Préparation	2013-09-04	2013-09-04	2013-09-04	2013-09-04
Carbone organique total dans les solides. Dosage par titrage. (Accrédité)	Analyse	2013-09-04	2013-09-04	2013-09-04	2013-09-04
E-A-EN-EN-CHI-PC-MD033 (MA 405-C 1.0)	No. séquence	437313	437313	437313	437313
Carbone organique total	%	16.4	23.8	1.90	0.30
Matière organique par oxydation chimique	%	28.3	41.0	3.28	0.52
Conductivité	Préparation	2013-09-03	2013-09-03	2013-09-03	2013-09-03
Conductivité (méthode électrométrique) (Accrédité)	Analyse	2013-09-03	2013-09-03	2013-09-03	2013-09-03
E-A-EN-EN-CHI-PC-MD021 (MA .115 - Cond. 1.0)	No. séquence	437095	437095	437095	437095
Conductivité	µmhos/cm	32	36	7	4
pH	Préparation	2013-09-03	2013-09-03	2013-09-03	2013-09-03
pH (Accrédité)	Analyse	2013-09-03	2013-09-03	2013-09-03	2013-09-03
E-A-EN-EN-CHI-PC-MD015 (REF: S.M. 4500-H)	No. séquence	437099	437099	437099	437099
pH (solide)		5.3	5.7	5.9	5.8

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Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

		Échantillon(s)		
No Labo.		**2427336**	**2427337**	**2427338**
Votre Référence		Lac Joyce Lake ST. No 3	La Gilling River ST. No 1	La Gilling River ST. No 2
Matrice		Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
Lieu de prélèvement		Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
Prélevé le		2013-08-25	2013-08-26	2013-08-26
Reçu Labo		2013-08-28	2013-08-28	2013-08-28
Paramètre(s)				
Méthode				
Référence				
Azote ammoniacal (en N)	Préparation	2013-08-30	2013-08-30	2013-08-30
Azote ammoniacal par colorimétrie. Résultats sur poids sec. (Accrédité)	Analyse	2013-08-30	2013-08-30	2013-08-30
E-A-EN-EN-CHI-PC-MD003 (REF:MA.300-N 1.1, CEAEQ)	No. séquence	436895	436895	436895
Azote ammoniacal en N	mg/kg	< 5	< 5	< 5
Carbone organique total par titrage	Préparation	2013-09-04	2013-09-04	2013-09-04
Carbone organique total dans les solides. Dosage par titrage. (Accrédité)	Analyse	2013-09-04	2013-09-04	2013-09-04
E-A-EN-EN-CHI-PC-MD033 (MA 405-C 1.0)	No. séquence	437313	437313	437313
Carbone organique total	%	0.43	0.20	0.09
Matière organique par oxydation chimique	%	0.74	0.34	0.16
Conductivité	Préparation	2013-09-03	2013-09-03	2013-09-03
Conductivité (méthode électrométrique) (Accrédité)	Analyse	2013-09-03	2013-09-03	2013-09-03
E-A-EN-EN-CHI-PC-MD021 (MA .115 - Cond. 1.0)	No. séquence	437095	437095	437095
Conductivité	µmhos/cm	5	19	36
pH	Préparation	2013-09-03	2013-09-03	2013-09-03
pH (Accrédité)	Analyse	2013-09-03	2013-09-03	2013-09-03
E-A-EN-EN-CHI-PC-MD015 (REF: S.M. 4500-H)	No. séquence	437099	437099	437099
pH (solide)		5.7	6.9	7.1

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Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2427328**	**2427333**	**2427334**	**2427335**
Votre Référence		Étang I	Lac H	Lac Joyce Lake ST. No 1	Lac Joyce Lake ST. No 2
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
Lieu de prélèvement		Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
Prélevé le		2013-08-22	2013-08-23	2013-08-24	2013-08-25
Reçu Labo		2013-08-28	2013-08-28	2013-08-28	2013-08-28
Paramètre(s) Méthode Référence					
Chlorures solubles à l'eau (C.I.)	Préparation	2013-09-03	2013-09-03	2013-09-03	2013-09-03
Anions par C.I. (extr. à l'eau). Résultats sur poids sec. (non-accrédité)	Analyse	2013-09-03	2013-09-03	2013-09-03	2013-09-03
E-A-EN-EN-CHI-PC-MD028 (REF MA.300-IONS 1.1 CEAEQ)	No. séquence	436926	436926	436926	436926
Chlorures	mg/Kg	< 559	< 535	< 114	< 83
Nitrates (C.I.)	Préparation	2013-09-03	2013-09-03	2013-09-03	2013-09-03
Anions par C.I. (extr. à l'eau). Résultats sur poids sec. (Accrédité)	Analyse	2013-09-03	2013-09-03	2013-09-03	2013-09-03
E-A-EN-EN-CHI-PC-MD028 (REF MA.300-IONS 1.1 CEAEQ)	No. séquence	436926	436926	436926	436926
Nitrates en N	mg/Kg	< 11.2	< 10.7	< 2.3	< 1.7
Nitrites (C.I.)	Préparation	2013-09-03	2013-09-03	2013-09-03	2013-09-03
Anions par C.I. (extr. à l'eau). Résultats sur poids sec. (Accrédité)	Analyse	2013-09-03	2013-09-03	2013-09-03	2013-09-03
E-A-EN-EN-CHI-PC-MD028 (REF MA.300-IONS 1.1 CEAEQ)	No. séquence	436926	436926	436926	436926
Nitrites en N	mg/Kg	< 11.2	< 10.7	< 2.3	< 1.7
Sulfates (C.I.)	Préparation	2013-09-03	2013-09-03	2013-09-03	2013-09-03
Anions par C.I. (extr. à l'eau). Résultats sur poids sec. (non-accrédité)	Analyse	2013-09-03	2013-09-03	2013-09-03	2013-09-03
E-A-EN-EN-CHI-PC-MD028 (REF MA.300-IONS 1.1 CEAEQ)	No. séquence	436926	436926	436926	436926
Sulfates en SO4	mg/Kg	< 559	< 535	< 114	< 83

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Certificat d'analyses

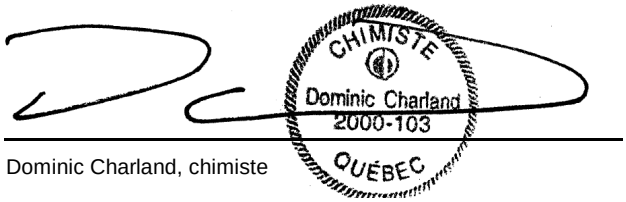
Client: **GENIVAR inc.**

Numéro de demande: 13-558008

Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

		Échantillon(s)		
No Labo.		**2427336**	**2427337**	**2427338**
Votre Référence		Lac Joyce Lake ST. No 3	La Gilling River ST. No 1	La Gilling River ST. No 2
Matrice		Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant	T. Laberge / T. Lieutenant
Lieu de prélèvement		Joyce Lake Schefferville	Joyce Lake Schefferville	Joyce Lake Schefferville
Prélevé le		2013-08-25	2013-08-26	2013-08-26
Reçu Labo		2013-08-28	2013-08-28	2013-08-28
Paramètre(s)				
Méthode				
Référence				
Chlorures solubles à l'eau (C.I.)	Préparation	2013-09-03	2013-09-03	2013-09-03
Anions par C.I. (extr. à l'eau). Résultats sur poids sec. (non-accrédité)	Analyse	2013-09-03	2013-09-03	2013-09-03
E-A-EN-EN-CHI-PC-MD028 (REF MA.300-IONS 1.1 CEAEQ)	No. séquence	436926	436926	436926
Chlorures	mg/Kg	< 78	< 93	< 84
Nitrates (C.I.)	Préparation	2013-09-03	2013-09-03	2013-09-03
Anions par C.I. (extr. à l'eau). Résultats sur poids sec. (Accrédité)	Analyse	2013-09-03	2013-09-03	2013-09-03
E-A-EN-EN-CHI-PC-MD028 (REF MA.300-IONS 1.1 CEAEQ)	No. séquence	436926	436926	436926
Nitrates en N	mg/Kg	< 1.6	< 1.9	< 1.7
Nitrites (C.I.)	Préparation	2013-09-03	2013-09-03	2013-09-03
Anions par C.I. (extr. à l'eau). Résultats sur poids sec. (Accrédité)	Analyse	2013-09-03	2013-09-03	2013-09-03
E-A-EN-EN-CHI-PC-MD028 (REF MA.300-IONS 1.1 CEAEQ)	No. séquence	436926	436926	436926
Nitrites en N	mg/Kg	< 1.6	< 1.9	< 1.7
Sulfates (C.I.)	Préparation	2013-09-03	2013-09-03	2013-09-03
Anions par C.I. (extr. à l'eau). Résultats sur poids sec. (non-accrédité)	Analyse	2013-09-03	2013-09-03	2013-09-03
E-A-EN-EN-CHI-PC-MD028 (REF MA.300-IONS 1.1 CEAEQ)	No. séquence	436926	436926	436926
Sulfates en SO4	mg/Kg	< 78	< 93	< 84

Note 1 : Ces résultats et commentaires, le cas échéant, ne se rapportent qu'aux échantillons soumis pour les analyses réalisées au site de Pointe-Claire.



Dominic Charland, chimiste

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Certificat d'analyses

Client: **GENIVAR inc.**

Numéro de demande: 13-558008

Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

Résultats du Contrôle de Qualité (CQ)

Paramètres (No.Séquence)	Unité	LDR	Blanc	Contrôle certifié	
				Obtenu	Attendu (Intervalle)
Conductivité					
No Séquence: 437095					
Conductivité	µmhos/cm	< 1	< 1	134	118 - 176
Carbone organique total par titrage					
No Séquence: 437313					
Carbone organique total	%	< 0.01	< 0.01	3.66	3.52 - 5.28
Matière organique par oxydation chimique	%	< 0.01	< 0.01	NA	NA
Humidité (pour calcul)					
No Séquence: 436748					
Humidité	%	< 0.1	<0.1	55.7	40 - 60
Chlorures solubles à l'eau (C.I.)					
No Séquence: 436926					
Chlorures	mg/Kg	< 10	< 10	270	218 - 326
Nitrites (C.I.)					
No Séquence: 436926					
Nitrites en N	mg/Kg	< 0.2	< 0.2	NA	NA
Nitrates (C.I.)					
No Séquence: 436926					
Nitrates en N	mg/Kg	< 0.2	< 0.2	247	204 - 306
Sulfates (C.I.)					
No Séquence: 436926					
Sulfates en SO4	mg/Kg	< 10	< 10	596	538 - 808
Argent (Ag)					
No Séquence: 437808					
Argent	mg/kg	< 0.5	<0.5	132	92.8 - 139.2
Aluminium (Al)					
No Séquence: 437808					
Aluminium	mg/kg	< 10	<10	7030	5960 - 8940
Arsenic (As)					
No Séquence: 437808					
Arsenic	mg/kg	< 0.5	<0.5	218	180.8 - 271.2
Baryum (Ba)					
No Séquence: 437808					
Baryum	mg/kg	< 5	<5	982	767 - 1151
Béryllium (Be)					
No Séquence: 437808					
Béryllium	mg/kg	< 0.1	<0.1	84.7	73 - 110

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Certificat d'analyses

Client: **GENIVAR inc.**

Numéro de demande: 13-558008

Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

Résultats du Contrôle de Qualité (CQ)

Paramètres (No.Séquence)	Unité	LDR	Blanc	Contrôle certifié	
				Obtenu	Attendu (Intervalle)
Bismuth (Bi)					
No Séquence: 437808					
Bismuth	mg/kg	< 10	<10	90	80 - 120
Bismuth (Bi)					
No Séquence: 438016					
Bismuth	mg/kg	< 10	<10	93	80 - 120
Bore (B)					
No Séquence: 437808					
Bore	mg/kg	< 2	<2	100	80 - 120
Calcium (Ca)					
No Séquence: 437808					
Calcium	mg/kg	< 20	<20	42900	37280 - 55920
Cadmium (Cd)					
No Séquence: 437808					
Cadmium	mg/kg	< 0.1	<0.1	182	137 - 206
Cobalt (Co)					
No Séquence: 437808					
Cobalt	mg/kg	< 1	<1	31	23 - 35
Chrome (Cr)					
No Séquence: 437808					
Chrome	mg/kg	< 1	<1	150	122 - 184
Cuivre (Cu)					
No Séquence: 437808					
Cuivre	mg/kg	< 1	<1	874	687 - 1031
Fer (Fe)					
No Séquence: 437808					
Fer	mg/kg	< 50	<50	25300	18080 - 27120
Potassium (K)					
No Séquence: 437808					
Potassium	mg/kg	< 50	<50	4180	2800 - 4200
Lithium (Li)					
No Séquence: 437808					
Lithium	mg/kg	< 1	<1	101	80 - 120
Magnésium (Mg)					
No Séquence: 437808					
Magnésium	mg/kg	< 10	<10	4410	3432 - 5148

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Numéro de demande: 13-558008

Bon de commande	Votre Projet	Chargé de Projet
NA	121-18002-01 Lot 200	Mme Annie Bérubé

Résultats du Contrôle de Qualité (CQ)

Paramètres (No.Séquence)	Unité	LDR	Blanc	Contrôle certifié	
				Obtenu	Attendu (Intervalle)
Manganèse (Mn)					
No Séquence: 437808					
Manganèse	mg/kg	< 1	<1	722	551 - 827
Molybdène (Mo)					
No Séquence: 437808					
Molybdène	mg/kg	< 0.5	<0.5	144	107 - 161
Sodium (Na)					
No Séquence: 437808					
Sodium	mg/kg	< 50	<50	1560	1312 - 1968
Sodium (Na)					
No Séquence: 438015					
Sodium	mg/kg	< 50	<50	1550	1312 - 1968
Nickel (Ni)					
No Séquence: 437808					
Nickel	mg/kg	< 1	<1	140	103 - 155
Plomb (Pb)					
No Séquence: 437808					
Plomb	mg/kg	< 1	<1	147	115 - 173
Antimoine (Sb)					
No Séquence: 437808					
Antimoine	mg/kg	< 0.1	<0.1	210	148 - 223
Sélénium (Se)					
No Séquence: 437808					
Sélénium	mg/kg	< 0.5	<0.5	98.2	81 - 122
Sélénium (Se)					
No Séquence: 438015					
Sélénium	mg/kg	< 0.5	<0.5	94.9	81 - 122
Étain (Sn)					
No Séquence: 437808					
Étain	mg/kg	< 1	2	115	80 - 120
Strontium (Sr)					
No Séquence: 437808					
Strontium	mg/kg	< 10	<10	347	271 - 407
Titane (Ti)					
No Séquence: 437808					
Titane	mg/kg	< 1	<1	99	80 - 120

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Numéro de demande: 13-558008

Bon de commande	Votre Projet	Chargé de Projet
NA	**121-18002-01 Lot 200**	**Mme Annie Bérubé**

Résultats du Contrôle de Qualité (CQ)

Paramètres (No.Séquence)	Unité	LDR	Blanc	Contrôle certifié	
				Obtenu	Attendu (Intervalle)
Thallium (Tl)					
No Séquence: 437808					
Thallium	mg/kg	< 0.1	<0.1	122	92 - 138
Thallium (Tl)					
No Séquence: 438016					
Thallium	mg/kg	< 0.1	<0.1	124	92 - 138
Vanadium (V)					
No Séquence: 437808					
Vanadium	mg/kg	< 1	<1	145	100 - 150
Zinc (Zn)					
No Séquence: 437808					
Zinc	mg/kg	< 5	<5	1240	968 - 1452
Azote ammoniacal (en N)					
No Séquence: 436895					
Azote ammoniacal en N	mg/kg	< 5	< 5	45	36 - 54
pH					
No Séquence: 437099					
pH (solide)		NA	NA	7.4	7.2 - 8

Commentaires CQ

Séquence no. 437808 : Étain (Sn) : Blanc positif non soustrait des échantillons / Positive blank not subtracted from the samples.

LDR : Limite de détection rapportée

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Numéro de demande: 13-558008

Bon de commande	Votre Projet	Chargé de Projet
NA	**121-18002-01 Lot 200**	**Mme Annie Bérubé**

Résultats du Contrôle de Qualité (CQ) - 2e partie

Paramètres (No.Séquence)	Unité	Duplicata		
		Valeur 1	Valeur 2	Écart (%)
Chlorures solubles à l'eau (C.I.)				
No Séquence: 436926	(No éch)		(2427328)	
Chlorures	mg/Kg	< 559	< 559	-
Conductivité				
No Séquence: 437095	(No éch)		(2427328)	
Conductivité	µmhos/cm	32	32	0.0
Nitrates (C.I.)				
No Séquence: 436926	(No éch)		(2427328)	
Nitrates en N	mg/Kg	< 11.2	< 11.2	-
Nitrites (C.I.)				
No Séquence: 436926	(No éch)		(2427328)	
Nitrites en N	mg/Kg	< 11.2	< 11.2	-
Sulfates (C.I.)				
No Séquence: 436926	(No éch)		(2427328)	
Sulfates en SO4	mg/Kg	< 559	< 559	-

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Certificat d'analyses

Numéro de demande d'analyse: **13-559171**

Demande d'analyse reçue le: 2013-09-04

Date d'émission du certificat: 2013-11-28

Numéro de version du certificat: 3

☑ Certificat d'analyse officiel

☐ Certificat d'analyse préliminaire

Requérant

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Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

Commentaires

Version 03 : Reprise de l'analyse de l'arsenic de l'échantillon 2432059 à la demande du client. Résultat rapporté sous l'échantillon 2489806.

Version 02: Correction de la configuration du certificat

Cette version remplace et annule toute version antérieure, le cas échéant.

NA : Information non-fournie et/ou non-applicable

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Certificat d'analyses

Client: **GENIVAR inc.**

Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
	No Labo.	**2432053**	**2432054**	**2432055**	**2432056**
	Votre Référence	Iron Arm Station No2	Iron Arm Station No3	Iron Arm Station No5	Iron Arm Station No6
	Matrice	Sédiment	Sédiment	Sédiment	Sédiment
	Prélevé par	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
	Lieu de prélèvement	Schefferville	Schefferville	Schefferville	Schefferville
	Prélevé le	2013-09-01	2013-09-01	2013-09-01	2013-09-01
	Reçu Labo	2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s) Méthode Référence					
Granulométrie (sous-traité)	Préparation	-	-	-	-
(Analyse effectuée en sous-traitance)	Analyse	-	-	-	-
	No. séquence	NA	NA	NA	NA
Granulométrie		Annexe	Annexe	Annexe	Annexe
Humidité (pour calcul)	Préparation	2013-09-06	2013-09-06	2013-09-06	2013-09-06
QC034-95 / Séchage à 105℃, gravimétrie (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
SM2540 B / MA. 100 - S.T. 1.1 R1	No. séquence	437618	437618	437618	437618
Humidité	%	42.4	29.6	80.7	85.4
Sédimentométrie (sous-traité)	Préparation	-	-	-	-
(Analyse effectuée en sous-traitance)	Analyse	-	-	-	-
	No. séquence	NA	NA	NA	NA
Sédimentométrie		Annexe	Annexe	Annexe	Annexe

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Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2432057**	**2432058**	**2432059**	**2432077**
Votre Référence		Iron Arm Station No7	Iron Arm Station No8	Timmins Bay Station No1	Traverses-CR10-ST.01
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
Lieu de prélèvement		Schefferville	Schefferville	Schefferville	Schefferville
Prélevé le		2013-09-01	2013-09-01	2013-09-02	2013-08-28
Reçu Labo		2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s)					
Méthode					
Référence					
Granulométrie (sous-traité)	Préparation	-	-	-	-
(Analyse effectuée en sous-traitance)	Analyse	-	-	-	-
	No. séquence	NA	NA	NA	NA
Granulométrie		Annexe	Annexe	Annexe	Annexe
Humidité (pour calcul)	Préparation	2013-09-06	2013-09-06	2013-09-06	2013-09-06
QC034-95 / Séchage à 105℃, gravimétrie (Accrédité)	Analyse	2013-09-09	2013-09-09	2013-09-09	2013-09-09
SM2540 B / MA. 100 - S.T. 1.1 R1	No. séquence	437618	437618	437618	437618
Humidité	%	83.5	80.6	89.5	33.9
Sédimentométrie (sous-traité)	Préparation	-	-	-	-
(Analyse effectuée en sous-traitance)	Analyse	-	-	-	-
	No. séquence	NA	NA	NA	NA
Sédimentométrie		Annexe	Annexe	Annexe	Annexe

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Client: **GENIVAR inc.**

Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)	
No Labo.		**2432078**	**2432082**
Votre Référence		Traverses-CR23-ST.01	Effluent de la Halde ST.01
Matrice		Sédiment	Sédiment
Prélevé par		T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
Lieu de prélèvement		Schefferville	Schefferville
Prélevé le		2013-08-29	2013-08-31
Reçu Labo		2013-09-04	2013-09-04
Paramètre(s) Méthode Référence			
Granulométrie (sous-traité)	Préparation	-	-
(Analyse effectuée en sous-traitance)	Analyse	-	-
	No. séquence	NA	NA
Granulométrie		Annexe	Annexe
Humidité (pour calcul)	Préparation	2013-09-06	2013-09-06
QC034-95 / Séchage à 105°C, gravimétrie (Accrédité)	Analyse	2013-09-09	2013-09-09
SM2540 B / MA. 100 - S.T. 1.1 R1	No. séquence	437618	437618
Humidité	%	91.1	50.5
Sédimentométrie (sous-traité)	Préparation	-	-
(Analyse effectuée en sous-traitance)	Analyse	-	-
	No. séquence	NA	NA
Sédimentométrie		Annexe	Annexe

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Client: **GENIVAR inc.**

Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2432053**	**2432054**	**2432055**	**2432056**
Votre Référence		Iron Arm Station No2	Iron Arm Station No3	Iron Arm Station No5	Iron Arm Station No6
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
Lieu de prélèvement		Schefferville	Schefferville	Schefferville	Schefferville
Prélevé le		2013-09-01	2013-09-01	2013-09-01	2013-09-01
Reçu Labo		2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s) Méthode Référence					
Aluminium (Al)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Aluminium	mg/kg	19800	15000	19100	18200
Argent (Ag)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Argent	mg/kg	<0.5	<0.5	<0.5	<0.5
Arsenic (As)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Arsenic	mg/kg	16.5	12.0	7.3	18.8
Baryum (Ba)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Baryum	mg/kg	71	61	96	138
Béryllium (Be)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Non-Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Béryllium	mg/kg	0.8	0.8	1.1	0.9
Bismuth (Bi)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Non-Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Bismuth	mg/kg	<10	<10	<10	<10

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Client: **GENIVAR inc.**

Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2432053**	**2432054**	**2432055**	**2432056**
Votre Référence		Iron Arm Station No2	Iron Arm Station No3	Iron Arm Station No5	Iron Arm Station No6
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
Lieu de prélèvement		Schefferville	Schefferville	Schefferville	Schefferville
Prélevé le		2013-09-01	2013-09-01	2013-09-01	2013-09-01
Reçu Labo		2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s)					
Méthode					
Référence					
Bore (B)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Bore	mg/kg	3	3	3	2
Cadmium (Cd)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Cadmium	mg/kg	1.9	2.0	2.4	1.8
Calcium (Ca)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Calcium	mg/kg	1500	1240	1580	2060
Chrome (Cr)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Chrome	mg/kg	51	32	43	38
Cobalt (Co)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Cobalt	mg/kg	19	15	12	16
Cuivre (Cu)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Cuivre	mg/kg	59	43	67	89

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Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2432053**	**2432054**	**2432055**	**2432056**
Votre Référence		Iron Arm Station No2	Iron Arm Station No3	Iron Arm Station No5	Iron Arm Station No6
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
Lieu de prélèvement		Schefferville	Schefferville	Schefferville	Schefferville
Prélevé le		2013-09-01	2013-09-01	2013-09-01	2013-09-01
Reçu Labo		2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s)					
Méthode					
Référence					
Étain (Sn)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Étain	mg/kg	2	3	3	2
Fer (Fe)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-16	2013-09-16	2013-09-16	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438727	438727	438727	438797
Fer	mg/kg	75700	67900	18000	91400
Lithium (Li)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Non-Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Lithium	mg/kg	21	19	18	15
Magnésium (Mg)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Magnésium	mg/kg	6840	5290	5010	4230
Manganèse (Mn)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Manganèse	mg/kg	1820	3350	851	32800
Molybdène (Mo)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Molybdène	mg/kg	6.8	5.3	3.8	8.8

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Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2432053**	**2432054**	**2432055**	**2432056**
Votre Référence		Iron Arm Station No2	Iron Arm Station No3	Iron Arm Station No5	Iron Arm Station No6
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
Lieu de prélèvement		Schefferville	Schefferville	Schefferville	Schefferville
Prélevé le		2013-09-01	2013-09-01	2013-09-01	2013-09-01
Reçu Labo		2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s)					
Méthode					
Référence					
Nickel (Ni)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Nickel	mg/kg	59	42	78	75
Plomb (Pb)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Plomb	mg/kg	14	13	13	26
Potassium (K)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-16	2013-09-16	2013-09-16	2013-09-18
MA. 200 - Mét 1.2 R1	No. séquence	438690	438690	438690	438862
Potassium	mg/kg	1990	1500	1390	1330
Sélénium (Se)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Sélénium	mg/kg	<0.5	<0.5	0.8	1.1
Sodium (Na)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Sodium	mg/kg	89	63	78	70
Strontium (Sr)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Non-Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Strontium	mg/kg	11	<10	11	16

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Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
	No Labo.	**2432053**	**2432054**	**2432055**	**2432056**
	Votre Référence	Iron Arm Station No2	Iron Arm Station No3	Iron Arm Station No5	Iron Arm Station No6
	Matrice	Sédiment	Sédiment	Sédiment	Sédiment
	Prélevé par	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
	Lieu de prélèvement	Schefferville	Schefferville	Schefferville	Schefferville
	Prélevé le	2013-09-01	2013-09-01	2013-09-01	2013-09-01
	Reçu Labo	2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s) Méthode Référence					
Thallium (Tl)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Thallium	mg/kg	<0.1	<0.1	<0.1	0.2
Titane (Ti)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Non-Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Titane	mg/kg	892	527	528	436
Vanadium (V)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Vanadium	mg/kg	67	54	52	44
Zinc (Zn)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-17
MA. 200 - Mét 1.2 R1	No. séquence	438299	438299	438299	438797
Zinc	mg/kg	126	106	262	192

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Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2432057**	**2432058**	**2432059**	**2432082**
Votre Référence		Iron Arm Station No7	Iron Arm Station No8	Timmins Bay Station No1	Effluent de la Halde ST.01
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
Lieu de prélèvement		Schefferville	Schefferville	Schefferville	Schefferville
Prélevé le		2013-09-01	2013-09-01	2013-09-02	2013-08-31
Reçu Labo		2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s)	Méthode / Référence				
Aluminium (Al)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Aluminium	mg/kg	22500	22100	12600	14200
Argent (Ag)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Argent	mg/kg	<0.5	<0.5	0.6	<0.5
Arsenic (As)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Arsenic	mg/kg	16.6	6.8	106	12.3
Baryum (Ba)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Baryum	mg/kg	156	105	489	53
Béryllium (Be)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Non-Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Béryllium	mg/kg	1.3	1.2	0.5	0.7
Bismuth (Bi)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Non-Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Bismuth	mg/kg	<10	<10	<10	<10

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Certificat d'analyses

Client: **GENIVAR inc.**

Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2432057**	**2432058**	**2432059**	**2432082**
Votre Référence		Iron Arm Station No7	Iron Arm Station No8	Timmins Bay Station No1	Effluent de la Halde ST.01
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
Lieu de prélèvement		Schefferville	Schefferville	Schefferville	Schefferville
Prélevé le		2013-09-01	2013-09-01	2013-09-02	2013-08-31
Reçu Labo		2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s)					
Méthode					
Référence					
Bore (B)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Bore	mg/kg	3	3	2	3
Cadmium (Cd)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Cadmium	mg/kg	2.0	3.3	1.8	1.1
Calcium (Ca)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Calcium	mg/kg	1710	1640	1860	1560
Chrome (Cr)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Chrome	mg/kg	46	47	22	32
Cobalt (Co)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Cobalt	mg/kg	19	10	13	17
Cuivre (Cu)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Cuivre	mg/kg	105	104	42	38

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Client: **GENIVAR inc.**

Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

	No Labo.	Échantillon(s) 2432057	2432058	2432059	2432082
	Votre Référence	Iron Arm Station No7	Iron Arm Station No8	Timmins Bay Station No1	Effluent de la Halde ST.01
	Matrice	Sédiment	Sédiment	Sédiment	Sédiment
	Prélevé par	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
	Lieu de prélèvement	Schefferville	Schefferville	Schefferville	Schefferville
	Prélevé le	2013-09-01	2013-09-01	2013-09-02	2013-08-31
	Reçu Labo	2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s) Méthode Référence					
Étain (Sn)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Étain	mg/kg	2	4	3	2
Fer (Fe)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-16	2013-09-16
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438727	438727
Fer	mg/kg	88600	46000	136000	64100
Lithium (Li)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Non-Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Lithium	mg/kg	19	21	9	16
Magnésium (Mg)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Magnésium	mg/kg	5320	5270	2780	5520
Manganèse (Mn)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-16	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438727	438299
Manganèse	mg/kg	3680	1110	56200	1010
Molybdène (Mo)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Molybdène	mg/kg	5.0	4.9	41.7	3.0

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Client: **GENIVAR inc.**

Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2432057**	**2432058**	**2432059**	**2432082**
Votre Référence		Iron Arm Station No7	Iron Arm Station No8	Timmins Bay Station No1	Effluent de la Halde ST.01
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
Lieu de prélèvement		Schefferville	Schefferville	Schefferville	Schefferville
Prélevé le		2013-09-01	2013-09-01	2013-09-02	2013-08-31
Reçu Labo		2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s)					
Méthode					
Référence					
Nickel (Ni)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Nickel	mg/kg	91	83	41	37
Plomb (Pb)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Plomb	mg/kg	18	15	21	13
Potassium (K)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-18	2013-09-18	2013-09-16	2013-09-16
MA. 200 - Mét 1.2 R1	No. séquence	438862	438862	438690	438690
Potassium	mg/kg	1940	1680	927	1120
Sélénium (Se)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Sélénium	mg/kg	0.9	0.7	1.3	<0.5
Sodium (Na)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Sodium	mg/kg	102	90	67	67
Strontium (Sr)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Non-Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Strontium	mg/kg	11	11	30	<10

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Client: **GENIVAR inc.**

Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2432057**	**2432058**	**2432059**	**2432082**
Votre Référence		Iron Arm Station No7	Iron Arm Station No8	Timmins Bay Station No1	Effluent de la Halde ST.01
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
Lieu de prélèvement		Schefferville	Schefferville	Schefferville	Schefferville
Prélevé le		2013-09-01	2013-09-01	2013-09-02	2013-08-31
Reçu Labo		2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s)					
Méthode					
Référence					
Thallium (Tl)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Thallium	mg/kg	0.2	0.2	<0.1	<0.1
Titane (Ti)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Non-Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Titane	mg/kg	524	481	280	504
Vanadium (V)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Vanadium	mg/kg	57	55	33	55
Zinc (Zn)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-13	2013-09-13
MA. 200 - Mét 1.2 R1	No. séquence	438797	438797	438299	438299
Zinc	mg/kg	242	277	171	101

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Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)
No Labo.		**2489806**
Votre Référence		Reprise 559171-2432059 Arsenic
Matrice		Sédiment
Prélevé par		T. Laberge/T. Lieutenant
Lieu de prélèvement		Schefferville
Prélevé le		2013-09-01
Reçu Labo		2013-09-04
Paramètre(s) Méthode Référence		
Arsenic (As)	Préparation	2013-11-26
QC091-08 / Digestion acide, dosage ICP-MS Résultat sur base sèche (Accrédité)	Analyse	2013-11-26
MA. 200 - Mét 1.2 R1	No. séquence	447249
Arsenic	mg/kg	134

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Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

Échantillon(s)

No Labo.	**2489806**
Votre Référence	Reprise 559171-2432059 Arsenic
Matrice	Sédiment
Prélevé par	T. Laberge/T. Lieutenant
Lieu de prélèvement	Schefferville
Prélevé le	2013-09-01
Reçu Labo	2013-09-04

Paramètre(s)
Méthode
Référence

Commentaires:

2432053	Iron Arm Station No2	Nitrites, Nitrates, Chlorures et Sulfates : Échantillon dilué car effet de matrice (limite de détection augmentée).
2432054	Iron Arm Station No3	Nitrites, Nitrates, Chlorures et Sulfates : Échantillon dilué car effet de matrice (limite de détection augmentée).
2432055	Iron Arm Station No5	Nitrites, Nitrates, Chlorures et Sulfates : Échantillon dilué car effet de matrice (limite de détection augmentée).
2432056	Iron Arm Station No6	Nitrites, Nitrates, Chlorures et Sulfates : Échantillon dilué car effet de matrice (limite de détection augmentée).
2432057	Iron Arm Station No7	Nitrites, Nitrates, Chlorures et Sulfates : Échantillon dilué car effet de matrice (limite de détection augmentée).
2432058	Iron Arm Station No8	Nitrites, Nitrates, Chlorures et Sulfates : Échantillon dilué car effet de matrice (limite de détection augmentée).
2432059	Timmins Bay Station No1	Nitrites, Nitrates, Chlorures et Sulfates : Échantillon dilué car effet de matrice (limite de détection augmentée).
2432082	Effluent de la Halde ST.01	Nitrites, Nitrates, Chlorures et Sulfates : Échantillon dilué car effet de matrice (limite de détection augmentée).

Note 1 : Ces résultats et commentaires, le cas échéant, ne se rapportent qu'aux échantillons soumis pour les analyses réalisées au site de Saint-Augustin-de-Desmaures.

Catherine Blais, chimiste

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Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2432053**	**2432054**	**2432055**	**2432056**
Votre Référence		Iron Arm Station No2	Iron Arm Station No3	Iron Arm Station No5	Iron Arm Station No6
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
Lieu de prélèvement		Schefferville	Schefferville	Schefferville	Schefferville
Prélevé le		2013-09-01	2013-09-01	2013-09-01	2013-09-01
Reçu Labo		2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s)					
Méthode					
Référence					
Azote ammoniacal (en N)	Préparation	2013-09-18	2013-09-18	2013-09-18	2013-09-18
Azote ammoniacal par colorimétrie. Résultats sur poids sec. (Accrédité)	Analyse	2013-09-18	2013-09-18	2013-09-18	2013-09-18
E-A-EN-EN-CHI-PC-MD003 (REF:MA.300-N 1.1, CEAEQ)	No. séquence	438940	438940	438940	438940
Azote ammoniacal en N	mg/kg	< 5	< 5	30	< 5
Carbone organique total par titrage	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-13
Carbone organique total dans les solides. Dosage par titrage. (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-13
E-A-EN-EN-CHI-PC-MD033 (MA 405-C 1.0)	No. séquence	438567	438567	438567	438567
Carbone organique total	%	1.16	0.37	5.36	4.47
Matière organique par oxydation chimique	%	2.00	0.64	9.24	7.71
Conductivité	Préparation	2013-09-11	2013-09-11	2013-09-11	2013-09-11
Conductivité (méthode électrométrique) (Accrédité)	Analyse	2013-09-11	2013-09-11	2013-09-11	2013-09-11
E-A-EN-EN-CHI-PC-MD021 (MA .115 - Cond. 1.0)	No. séquence	438105	438105	438105	438105
Conductivité	µmhos/cm	7	8	12	7
pH	Préparation	2013-09-11	2013-09-11	2013-09-11	2013-09-11
pH (Accrédité)	Analyse	2013-09-11	2013-09-11	2013-09-11	2013-09-11
E-A-EN-EN-CHI-PC-MD015 (REF: S.M. 4500-H)	No. séquence	438107	438107	438107	438107
pH (solide)		6.5	6.6	5.9	6.3

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Client: **GENIVAR inc.**

Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
No Labo.		**2432057**	**2432058**	**2432059**	**2432077**
Votre Référence		Iron Arm Station No7	Iron Arm Station No8	Timmins Bay Station No1	Traverses-CR10-ST.01
Matrice		Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par		T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
Lieu de prélèvement		Schefferville	Schefferville	Schefferville	Schefferville
Prélevé le		2013-09-01	2013-09-01	2013-09-02	2013-08-28
Reçu Labo		2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s)					
Méthode					
Référence					
Azote ammoniacal (en N)	Préparation	2013-09-18	2013-09-18	2013-09-18	-
Azote ammoniacal par colorimétrie. Résultats sur poids sec. (Accrédité)	Analyse	2013-09-18	2013-09-18	2013-09-18	-
E-A-EN-EN-CHI-PC-MD003 (REF:MA.300-N 1.1, CEAEQ)	No. séquence	438940	438940	438940	-
Azote ammoniacal en N	mg/kg	47	32	34	-
Carbone organique total par titrage	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-13
Carbone organique total dans les solides. Dosage par titrage. (Accrédité)	Analyse	2013-09-13	2013-09-13	2013-09-13	2013-09-13
E-A-EN-EN-CHI-PC-MD033 (MA 405-C 1.0)	No. séquence	438567	438567	438567	438567
Carbone organique total	%	4.97	4.95	6.66	1.12
Matière organique par oxydation chimique	%	8.57	8.53	11.5	1.93
Conductivité	Préparation	2013-09-11	2013-09-11	2013-09-11	-
Conductivité (méthode électrométrique) (Accrédité)	Analyse	2013-09-11	2013-09-11	2013-09-11	-
E-A-EN-EN-CHI-PC-MD021 (MA .115 - Cond. 1.0)	No. séquence	438105	438105	438105	-
Conductivité	µmhos/cm	23	13	42	-
pH	Préparation	2013-09-11	2013-09-11	2013-09-11	-
pH (Accrédité)	Analyse	2013-09-11	2013-09-11	2013-09-11	-
E-A-EN-EN-CHI-PC-MD015 (REF: S.M. 4500-H)	No. séquence	438107	438107	438107	-
pH (solide)		6.0	6.1	7.2	-

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NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)	
No Labo.		**2432078**	**2432082**
Votre Référence		Traverses-CR23-ST.01	Effluent de la Halde ST.01
Matrice		Sédiment	Sédiment
Prélevé par		T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
Lieu de prélèvement		Schefferville	Schefferville
Prélevé le		2013-08-29	2013-08-31
Reçu Labo		2013-09-04	2013-09-04
Paramètre(s) Méthode Référence			
Azote ammoniacal (en N)	Préparation	-	2013-09-18
Azote ammoniacal par colorimétrie. Résultats sur poids sec. (Accrédité)	Analyse	-	2013-09-18
E-A-EN-EN-CHI-PC-MD003 (REF:MA.300-N 1.1, CEAEQ)	No. séquence	-	438940
Azote ammoniacal en N	mg/kg	-	< 5
Carbone organique total par titrage	Préparation	2013-09-13	2013-09-13
Carbone organique total dans les solides. Dosage par titrage. (Accrédité)	Analyse	2013-09-13	2013-09-13
E-A-EN-EN-CHI-PC-MD033 (MA 405-C 1.0)	No. séquence	438567	438567
Carbone organique total	%	33.0	1.47
Matière organique par oxydation chimique	%	56.8	2.53
Conductivité	Préparation	-	2013-09-11
Conductivité (méthode électrométrique) (Accrédité)	Analyse	-	2013-09-11
E-A-EN-EN-CHI-PC-MD021 (MA .115 - Cond. 1.0)	No. séquence	-	438105
Conductivité	µmhos/cm	-	11
pH	Préparation	-	2013-09-11
pH (Accrédité)	Analyse	-	2013-09-11
E-A-EN-EN-CHI-PC-MD015 (REF: S.M. 4500-H)	No. séquence	-	438107
pH (solide)		-	6.4

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Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
	No Labo.	**2432053**	**2432054**	**2432055**	**2432056**
	Votre Référence	Iron Arm Station No2	Iron Arm Station No3	Iron Arm Station No5	Iron Arm Station No6
	Matrice	Sédiment	Sédiment	Sédiment	Sédiment
	Prélevé par	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
	Lieu de prélèvement	Schefferville	Schefferville	Schefferville	Schefferville
	Prélevé le	2013-09-01	2013-09-01	2013-09-01	2013-09-01
	Reçu Labo	2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s) Méthode Référence					
Chlorures solubles à l'eau (C.I.)	Préparation	2013-09-10	2013-09-10	2013-09-10	2013-09-10
Anions par C.I. (extr. à l'eau). Résultats sur poids sec. (non-accrédité)	Analyse	2013-09-10	2013-09-10	2013-09-10	2013-09-10
E-A-EN-EN-CHI-PC-MD028 (REF MA.300-IONS 1.1 CEAEQ)	No. séquence	438234	438234	438234	438234
Chlorures	mg/Kg	< 92	< 64	< 249	< 321
Nitrates (C.I.)	Préparation	2013-09-10	2013-09-10	2013-09-10	2013-09-10
Anions par C.I. (extr. à l'eau). Résultats sur poids sec. (Accrédité)	Analyse	2013-09-10	2013-09-10	2013-09-10	2013-09-10
E-A-EN-EN-CHI-PC-MD028 (REF MA.300-IONS 1.1 CEAEQ)	No. séquence	438234	438234	438234	438234
Nitrates en N	mg/Kg	< 1.8	< 1.3	< 5.0	< 6.4
Nitrites (C.I.)	Préparation	2013-09-10	2013-09-10	2013-09-10	2013-09-10
Anions par C.I. (extr. à l'eau). Résultats sur poids sec. (Accrédité)	Analyse	2013-09-10	2013-09-10	2013-09-10	2013-09-10
E-A-EN-EN-CHI-PC-MD028 (REF MA.300-IONS 1.1 CEAEQ)	No. séquence	438234	438234	438234	438234
Nitrites en N	mg/Kg	< 1.8	< 1.3	< 5.0	< 6.4
Sulfates (C.I.)	Préparation	2013-09-10	2013-09-10	2013-09-10	2013-09-10
Anions par C.I. (extr. à l'eau). Résultats sur poids sec. (non-accrédité)	Analyse	2013-09-10	2013-09-10	2013-09-10	2013-09-10
E-A-EN-EN-CHI-PC-MD028 (REF MA.300-IONS 1.1 CEAEQ)	No. séquence	438234	438234	438234	438234
Sulfates en SO4	mg/Kg	< 92	< 64	< 249	< 321

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Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
	No Labo.	**2432057**	**2432058**	**2432059**	**2432082**
	Votre Référence	Iron Arm Station No7	Iron Arm Station No8	Timmins Bay Station No1	Effluent de la Halde ST.01
	Matrice	Sédiment	Sédiment	Sédiment	Sédiment
	Prélevé par	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
	Lieu de prélèvement	Schefferville	Schefferville	Schefferville	Schefferville
	Prélevé le	2013-09-01	2013-09-01	2013-09-02	2013-08-31
	Reçu Labo	2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s) Méthode Référence					
Chlorures solubles à l'eau (C.I.)	Préparation	2013-09-10	2013-09-10	2013-09-10	2013-09-10
Anions par C.I. (extr. à l'eau). Résultats sur poids sec. (non-accrédité)	Analyse	2013-09-10	2013-09-10	2013-09-10	2013-09-10
E-A-EN-EN-CHI-PC-MD028 (REF MA.300-IONS 1.1 CEAEQ)	No. séquence	438234	438234	438234	438234
Chlorures	mg/Kg	< 288	< 243	< 469	< 93
Nitrates (C.I.)	Préparation	2013-09-10	2013-09-10	2013-09-10	2013-09-10
Anions par C.I. (extr. à l'eau). Résultats sur poids sec. (Accrédité)	Analyse	2013-09-10	2013-09-10	2013-09-10	2013-09-10
E-A-EN-EN-CHI-PC-MD028 (REF MA.300-IONS 1.1 CEAEQ)	No. séquence	438234	438234	438234	438234
Nitrates en N	mg/Kg	< 5.8	< 4.9	< 9.4	< 1.9
Nitrites (C.I.)	Préparation	2013-09-10	2013-09-10	2013-09-10	2013-09-10
Anions par C.I. (extr. à l'eau). Résultats sur poids sec. (Accrédité)	Analyse	2013-09-10	2013-09-10	2013-09-10	2013-09-10
E-A-EN-EN-CHI-PC-MD028 (REF MA.300-IONS 1.1 CEAEQ)	No. séquence	438234	438234	438234	438234
Nitrites en N	mg/Kg	< 5.8	< 4.9	< 9.4	< 1.9
Sulfates (C.I.)	Préparation	2013-09-10	2013-09-10	2013-09-10	2013-09-10
Anions par C.I. (extr. à l'eau). Résultats sur poids sec. (non-accrédité)	Analyse	2013-09-10	2013-09-10	2013-09-10	2013-09-10
E-A-EN-EN-CHI-PC-MD028 (REF MA.300-IONS 1.1 CEAEQ)	No. séquence	438234	438234	438234	438234
Sulfates en SO4	mg/Kg	< 288	< 243	< 469	< 93

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Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
	No Labo.	**2432053**	**2432054**	**2432055**	**2432056**
	Votre Référence	Iron Arm Station No2	Iron Arm Station No3	Iron Arm Station No5	Iron Arm Station No6
	Matrice	Sédiment	Sédiment	Sédiment	Sédiment
	Prélevé par	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
	Lieu de prélèvement	Schefferville	Schefferville	Schefferville	Schefferville
	Prélevé le	2013-09-01	2013-09-01	2013-09-01	2013-09-01
	Reçu Labo	2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s) Méthode Référence					
Antimoine (Sb)	Préparation	2013-09-13	2013-09-13	2013-09-13	2013-09-17
Métaux par ICP. Résultats sur base sèche. (non accrédité)	Analyse	2013-09-17	2013-09-17	2013-09-17	2013-09-18
E-A-EN-EN-CHI-PC-MD017 (REF: MA. 200 - Mét 1.2)	No. séquence	438957	438957	438957	438985
Antimoine	mg/kg	0.8	0.8	0.4	0.7

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Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

		Échantillon(s)			
	No Labo.	**2432057**	**2432058**	**2432059**	**2432082**
	Votre Référence	Iron Arm Station No7	Iron Arm Station No8	Timmins Bay Station No1	Effluent de la Halde ST.01
	Matrice	Sédiment	Sédiment	Sédiment	Sédiment
	Prélevé par	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
	Lieu de prélèvement	Schefferville	Schefferville	Schefferville	Schefferville
	Prélevé le	2013-09-01	2013-09-01	2013-09-02	2013-08-31
	Reçu Labo	2013-09-04	2013-09-04	2013-09-04	2013-09-04
Paramètre(s) Méthode Référence					
Antimoine (Sb)	Préparation	2013-09-17	2013-09-17	2013-09-13	2013-09-13
Métaux par ICP. Résultats sur base sèche. (non accrédité)	Analyse	2013-09-18	2013-09-18	2013-09-17	2013-09-17
E-A-EN-EN-CHI-PC-MD017 (REF: MA. 200 - Mét 1.2)	No. séquence	438985	438985	438957	438957
Antimoine	mg/kg	0.5	0.5	0.4	0.7

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Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

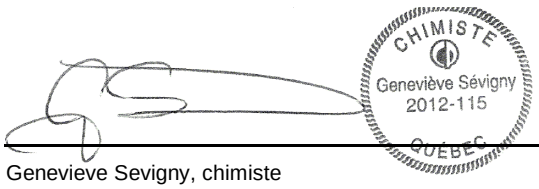
	Échantillon(s)			
No Labo.	**2432057**	**2432058**	**2432059**	**2432082**
Votre Référence	Iron Arm Station No7	Iron Arm Station No8	Timmins Bay Station No1	Effluent de la Halde ST.01
Matrice	Sédiment	Sédiment	Sédiment	Sédiment
Prélevé par	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant	T. Laberge/T. Lieutenant
Lieu de prélèvement	Schefferville	Schefferville	Schefferville	Schefferville
Prélevé le	2013-09-01	2013-09-01	2013-09-02	2013-08-31
Reçu Labo	2013-09-04	2013-09-04	2013-09-04	2013-09-04

Paramètre(s)
Méthode
Référence

Commentaires:

2432053	Iron Arm Station No2	Nitrites, Nitrates, Chlorures et Sulfates : Échantillon dilué car effet de matrice (limite de détection augmentée).
2432054	Iron Arm Station No3	Nitrites, Nitrates, Chlorures et Sulfates : Échantillon dilué car effet de matrice (limite de détection augmentée).
2432055	Iron Arm Station No5	Nitrites, Nitrates, Chlorures et Sulfates : Échantillon dilué car effet de matrice (limite de détection augmentée).
2432056	Iron Arm Station No6	Nitrites, Nitrates, Chlorures et Sulfates : Échantillon dilué car effet de matrice (limite de détection augmentée).
2432057	Iron Arm Station No7	Nitrites, Nitrates, Chlorures et Sulfates : Échantillon dilué car effet de matrice (limite de détection augmentée).
2432058	Iron Arm Station No8	Nitrites, Nitrates, Chlorures et Sulfates : Échantillon dilué car effet de matrice (limite de détection augmentée).
2432059	Timmins Bay Station No1	Nitrites, Nitrates, Chlorures et Sulfates : Échantillon dilué car effet de matrice (limite de détection augmentée).
2432082	Effluent de la Halde ST.01	Nitrites, Nitrates, Chlorures et Sulfates : Échantillon dilué car effet de matrice (limite de détection augmentée).

Note 1 : Ces résultats et commentaires, le cas échéant, ne se rapportent qu'aux échantillons soumis pour les analyses réalisées au site de Pointe-Claire.



Genevieve Sevigny, chimiste

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Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

Résultats du Contrôle de Qualité (CQ)

Paramètres (No.Séquence)	Unité	LDR	Blanc	Contrôle certifié	
				Obtenu	Attendu (Intervalle)
Conductivité					
No Séquence: 438105					
Conductivité	µmhos/cm	< 1	< 1	140	118 - 176
Carbone organique total par titrage					
No Séquence: 438567					
Carbone organique total	%	< 0.01	< 0.01	3.99	3.52 - 5.28
Matière organique par oxydation chimique	%	< 0.01	< 0.01	NA	NA
Humidité (pour calcul)					
No Séquence: 437618					
Humidité	%	< 0.1	<0.1	55.4	40 - 60
Chlorures solubles à l'eau (C.I.)					
No Séquence: 438234					
Chlorures	mg/Kg	< 10	< 10	272	218 - 326
Nitrites (C.I.)					
No Séquence: 438234					
Nitrites en N	mg/Kg	< 0.2	< 0.2	NA	NA
Nitrates (C.I.)					
No Séquence: 438234					
Nitrates en N	mg/Kg	< 0.2	< 0.2	250	204 - 306
Sulfates (C.I.)					
No Séquence: 438234					
Sulfates en SO4	mg/Kg	< 10	< 10	612	538 - 808
Argent (Ag)					
No Séquence: 438299					
Argent	mg/kg	< 0.5	<0.5	138	92.8 - 139.2
Argent (Ag)					
No Séquence: 438797					
Argent	mg/kg	< 0.5	<0.5	113	92.8 - 139.2
Aluminium (Al)					
No Séquence: 438299					
Aluminium	mg/kg	< 10	<10	7600	5960 - 8940
Aluminium (Al)					
No Séquence: 438797					
Aluminium	mg/kg	< 10	<10	6990	5960 - 8940
Arsenic (As)					
No Séquence: 438299					
Arsenic	mg/kg	< 0.5	<0.5	225	180.8 - 271.2

LDR : Limite de détection rapportée

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Client: **GENIVAR inc.**

Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

Résultats du Contrôle de Qualité (CQ)

Paramètres (No.Séquence)	Unité	LDR	Blanc	Contrôle certifié	
				Obtenu	Attendu (Intervalle)
Arsenic (As)					
No Séquence: 438797					
Arsenic	mg/kg	< 0.5	<0.5	218	180.8 - 271.2
Arsenic (As)					
No Séquence: 447249					
Arsenic	mg/kg	< 0.5	<0.5	214	180.8 - 271.2
Baryum (Ba)					
No Séquence: 438299					
Baryum	mg/kg	< 5	<5	1120	767 - 1151
Baryum (Ba)					
No Séquence: 438797					
Baryum	mg/kg	< 5	<5	971	767 - 1151
Béryllium (Be)					
No Séquence: 438299					
Béryllium	mg/kg	< 0.1	<0.1	92.6	73 - 110
Béryllium (Be)					
No Séquence: 438797					
Béryllium	mg/kg	< 0.1	<0.1	95.0	73 - 110
Bismuth (Bi)					
No Séquence: 438299					
Bismuth	mg/kg	< 10	<10	109	80 - 120
Bismuth (Bi)					
No Séquence: 438797					
Bismuth	mg/kg	< 10	<10	116	80 - 120
Bore (B)					
No Séquence: 438299					
Bore	mg/kg	< 2	<2	103	80 - 120
Bore (B)					
No Séquence: 438797					
Bore	mg/kg	< 2	<2	109	80 - 120
Calcium (Ca)					
No Séquence: 438299					
Calcium	mg/kg	< 20	<20	45100	37280 - 55920
Calcium (Ca)					
No Séquence: 438797					
Calcium	mg/kg	< 20	<20	43300	37280 - 55920

LDR : Limite de détection rapportée

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W: www.exova.com

Certificat d'analyses

Client: **GENIVAR inc.**

Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

Résultats du Contrôle de Qualité (CQ)

Paramètres (No.Séquence)	Unité	LDR	Blanc	Contrôle certifié	
				Obtenu	Attendu (Intervalle)
Cadmium (Cd)					
No Séquence: 438299					
Cadmium	mg/kg	< 0.1	<0.1	185	137 - 206
Cadmium (Cd)					
No Séquence: 438797					
Cadmium	mg/kg	< 0.1	<0.1	165	137 - 206
Cobalt (Co)					
No Séquence: 438299					
Cobalt	mg/kg	< 1	<1	31	23 - 35
Cobalt (Co)					
No Séquence: 438797					
Cobalt	mg/kg	< 1	<1	29	23 - 35
Chrome (Cr)					
No Séquence: 438299					
Chrome	mg/kg	< 1	<1	158	122 - 184
Chrome (Cr)					
No Séquence: 438797					
Chrome	mg/kg	< 1	<1	151	122 - 184
Cuivre (Cu)					
No Séquence: 438299					
Cuivre	mg/kg	< 1	<1	968	687 - 1031
Cuivre (Cu)					
No Séquence: 438797					
Cuivre	mg/kg	< 1	1	883	687 - 1031
Fer (Fe)					
No Séquence: 438727					
Fer	mg/kg	< 50	<50	25200	15820 - 29380
Fer (Fe)					
No Séquence: 438797					
Fer	mg/kg	< 50	<50	22000	15820 - 29380
Potassium (K)					
No Séquence: 438690					
Potassium	mg/kg	< 50	<50	3010	2800 - 4200
Potassium (K)					
No Séquence: 438862					
Potassium	mg/kg	< 50	<50	3500	2800 - 4200

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Certificat d'analyses

Client: **GENIVAR inc.**

Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

Résultats du Contrôle de Qualité (CQ)

Paramètres (No.Séquence)	Unité	LDR	Blanc	Contrôle certifié	
				Obtenu	Attendu (Intervalle)
Lithium (Li)					
No Séquence: 438299					
Lithium	mg/kg	< 1	<1	111	80 - 120
Lithium (Li)					
No Séquence: 438797					
Lithium	mg/kg	< 1	<1	118	80 - 120
Magnésium (Mg)					
No Séquence: 438299					
Magnésium	mg/kg	< 10	<10	4680	3432 - 5148
Magnésium (Mg)					
No Séquence: 438797					
Magnésium	mg/kg	< 10	<10	4320	3432 - 5148
Manganèse (Mn)					
No Séquence: 438299					
Manganèse	mg/kg	< 1	<1	764	551 - 827
Manganèse (Mn)					
No Séquence: 438727					
Manganèse	mg/kg	< 1	< 1	770	551 - 827
Manganèse (Mn)					
No Séquence: 438797					
Manganèse	mg/kg	< 1	<1	670	551 - 827
Molybdène (Mo)					
No Séquence: 438299					
Molybdène	mg/kg	< 0.5	<0.5	157	107 - 161
Molybdène (Mo)					
No Séquence: 438797					
Molybdène	mg/kg	< 0.5	<0.5	136	107 - 161
Sodium (Na)					
No Séquence: 438299					
Sodium	mg/kg	< 50	<50	1580	1312 - 1968
Sodium (Na)					
No Séquence: 438797					
Sodium	mg/kg	< 50	<50	1490	1312 - 1968
Nickel (Ni)					
No Séquence: 438299					
Nickel	mg/kg	< 1	<1	148	103 - 155

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Client: **GENIVAR inc.**

Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

Résultats du Contrôle de Qualité (CQ)

Paramètres (No.Séquence)	Unité	LDR	Blanc	Contrôle certifié	
				Obtenu	Attendu (Intervalle)
Nickel (Ni)					
No Séquence: 438797					
Nickel	mg/kg	< 1	<1	135	103 - 155
Plomb (Pb)					
No Séquence: 438299					
Plomb	mg/kg	< 1	<1	161	115 - 173
Plomb (Pb)					
No Séquence: 438797					
Plomb	mg/kg	< 1	<1	147	115 - 173
Antimoine (Sb)					
No Séquence: 438957					
Antimoine	mg/kg	< 0.1	< 0.1	193	148 - 223
Antimoine (Sb)					
No Séquence: 438985					
Antimoine	mg/kg	< 0.1	< 0.1	214	148 - 223
Sélénium (Se)					
No Séquence: 438299					
Sélénium	mg/kg	< 0.5	<0.5	99.3	81 - 122
Sélénium (Se)					
No Séquence: 438797					
Sélénium	mg/kg	< 0.5	<0.5	95.5	81 - 122
Étain (Sn)					
No Séquence: 438299					
Étain	mg/kg	< 1	2	113	80 - 120
Étain (Sn)					
No Séquence: 438797					
Étain	mg/kg	< 1	1	105	80 - 120
Strontium (Sr)					
No Séquence: 438299					
Strontium	mg/kg	< 10	<10	390	271 - 407
Strontium (Sr)					
No Séquence: 438797					
Strontium	mg/kg	< 10	<10	370	271 - 407
Titane (Ti)					
No Séquence: 438299					
Titane	mg/kg	< 1	<1	107	80 - 120

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Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

Résultats du Contrôle de Qualité (CQ)

Paramètres (No.Séquence)	Unité	LDR	Blanc	Contrôle certifié	
				Obtenu	Attendu (Intervalle)
Titane (Ti)					
No Séquence: 438797					
Titane	mg/kg	< 1	<1	110	80 - 120
Thallium (Tl)					
No Séquence: 438299					
Thallium	mg/kg	< 0.1	<0.1	130	92 - 138
Thallium (Tl)					
No Séquence: 438797					
Thallium	mg/kg	< 0.1	<0.1	118	92 - 138
Vanadium (V)					
No Séquence: 438299					
Vanadium	mg/kg	< 1	<1	148	100 - 150
Vanadium (V)					
No Séquence: 438797					
Vanadium	mg/kg	< 1	<1	141	100 - 150
Zinc (Zn)					
No Séquence: 438299					
Zinc	mg/kg	< 5	<5	1370	968 - 1452
Zinc (Zn)					
No Séquence: 438797					
Zinc	mg/kg	< 5	7	1270	968 - 1452
Azote ammoniacal (en N)					
No Séquence: 438940					
Azote ammoniacal en N	mg/kg	< 5	< 5	54	36 - 54
pH					
No Séquence: 438107					
pH (solide)		NA	NA	7.4	7.2 - 8

Commentaires CQ

Séquence no. 438797 : Métaux : Cuivre (Cu), Étain (Sn) et Zinc (Zn) : Blanc positif non soustrait des échantillons / Positive blank not subtracted from the samples.

LDR : Limite de détection rapportée

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Client: **GENIVAR inc.**

Numéro de demande: 13-559171

Bon de commande	Votre Projet	Chargé de Projet
NA	Joyce Lake 121-18002-01	Mme Annie Bérubé

Résultats du Contrôle de Qualité (CQ) - 2e partie

Paramètres (No.Séquence)	Unité	Duplicata Valeur 1	Duplicata Valeur 2	Duplicata Écart (%)
Carbone organique total par titrage				
No Séquence: 438567	(No éch)		(2432053)	
Carbone organique total	%	1.16	1.05	10.0
Matière organique par oxydation chimique	%	2.00	1.81	10.0
Chlorures solubles à l'eau (C.I.)				
No Séquence: 438234	(No éch)		(2432053)	
Chlorures	mg/Kg	< 92	< 92	-
Conductivité				
No Séquence: 438105	(No éch)		(2432053)	
Conductivité	µmhos/cm	7	7	0.0
Nitrates (C.I.)				
No Séquence: 438234	(No éch)		(2432053)	
Nitrates en N	mg/Kg	< 1.8	< 1.8	-
Nitrites (C.I.)				
No Séquence: 438234	(No éch)		(2432053)	
Nitrites en N	mg/Kg	< 1.8	< 1.8	-
pH				
No Séquence: 438107	(No éch)		(2432053)	
pH (solide)		6.5	6.5	0.0
Sulfates (C.I.)				
No Séquence: 438234	(No éch)		(2432053)	
Sulfates en SO4	mg/Kg	< 92	< 92	-

LVM

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RAPPORT DE TRANSMISSION

INGÉNIERIE DES MATÉRIAUX

DESTINATAIRE

Madame Catherine Blais
Exova
237, rue de Liverpool
Québec
QC, CAN
G3A 2C8

PROJET

Essais en laboratoire Exova; Divers essais en laboratoire

Québec

Notre n° de dossier : **P-0003210-0-01-500**

DOCUMENT(S) TRANSMIS

Monsieur ,

Il nous fait plaisir de vous transmettre ce rapport relativement aux services rendus par LVM, pour le projet cité en titre. Les documents suivants sont joints en annexe:

Sols, gran. & autres matér.	Rapports 013, 014, 015, 016, 017, 018 et 019

REMARQUES

Les résultats de l'analyse sédimentométrique de l'échantillon n° 13 peuvent être considérés douteux en raison du fort pourcentage de matières organiques.

COPIE(S) CONFORME(S)

Courriel : Madame Céline Boutet, Exova (celine.boutet@exova.com)

Les résultats des essais effectués ne sont valides que pour l'échantillon décrit dans le rapport. Une partie des essais, ou la totalité, peut avoir été réalisée par des fournisseurs ou sous-traitants dûment qualifiés selon la procédure PQ-06 de notre manuel qualité.

Pour de plus amples informations, veuillez contacter Sylvie Hamel, Chef laboratoire responsable de votre projet au (418) 647-2435 Ext:231.

Date de transmission
2013-09-09

LVM

325, rue de l'Espinay
Québec, G1L 2J2
Téléphone: (418) 647-1402

Essais sur sols, granulats et autres matériaux

Client : Exova
Projet : Essais en laboratoire Exova; Divers essais en laboratoire
Endroit : Québec

Dossier : P-0003210-0-01-500
Réf. client : CT-043459
Rapport n° : 13 **Rév.** 0

ÉCHANTILLONNAGE

Provenance :
N° d'échantillon : 13 N° d'échantillon client : 2427328
Matériau :
Profondeur :
Localisation :

Échantillonné par : le client
Date d'échantillonnage : 2013-08-22
Date de réception : 2013-08-30
Densité relative des particules < 2 mm : 2,700(estimé)

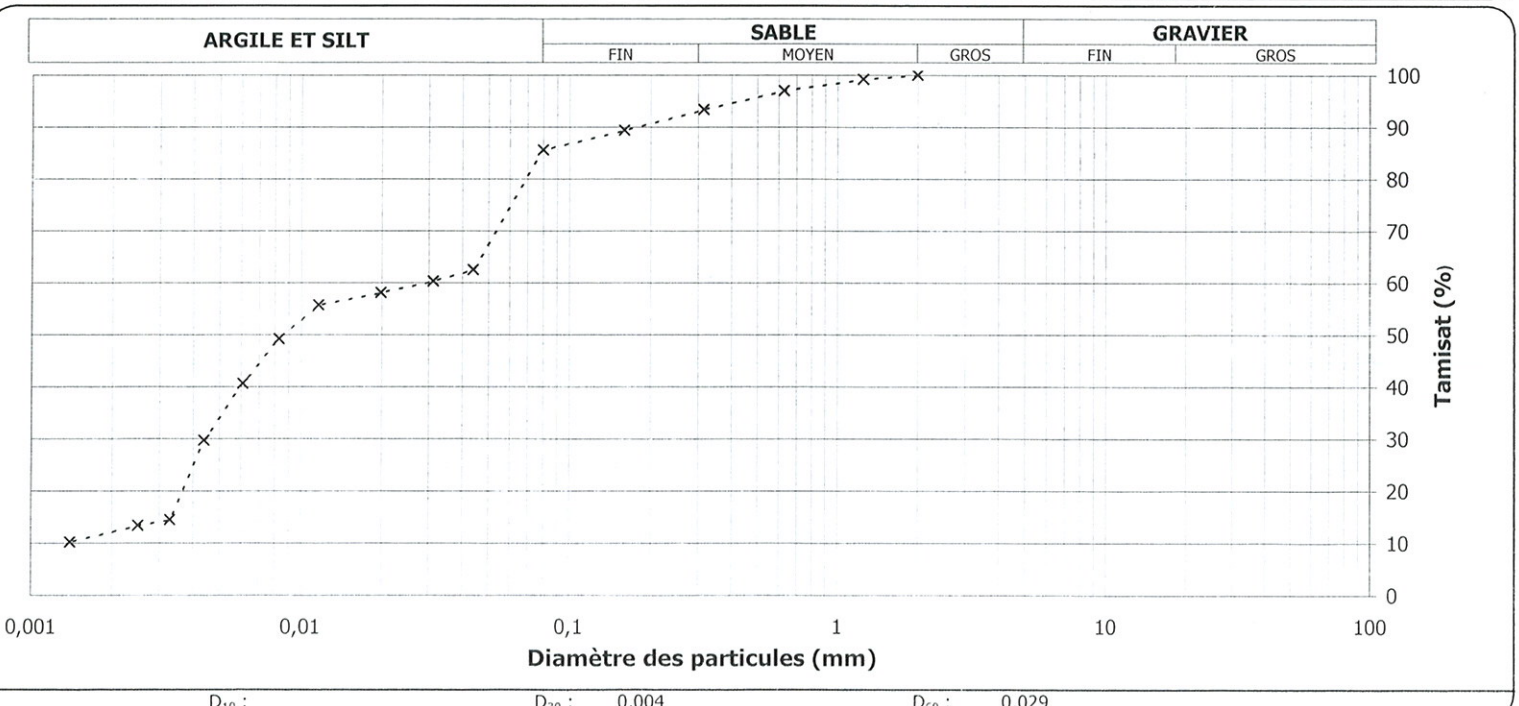
Analyse granulométrique (LC 21-040)		Analyse sédimentométrique (NQ 2501-025)	
Tamis	Tamisat (%)	Diamètre équivalent	Tamisat (%)
112 mm			
80 mm			
56 mm		44,0 µm	62,5
40 mm		31,2 µm	60,3
31,5 mm		19,9 µm	58,1
20 mm		11,6 µm	55,7
14 mm		8,3 µm	49,2
10 mm		6,1 µm	40,6
5 mm		4,4 µm	29,7
2 mm	100	3,3 µm	14,5
1,25 mm	99	2,5 µm	13,4
0,630 mm	97	1,4 µm	10,2
0,315 mm	93		
0,160 mm	89		
0,080 mm	85,6		

AUTRES ESSAIS	MESURÉ

REMARQUES

Gravier (>2 mm): 0,0 %, Sable grossier (<2 mm et > 0.2 mm): 10,0 %, Sable fin (< 0.2 mm et > 0.06 mm): 17,3 %, Limon(<0.06 mm et > 0.004 mm) : 48,6 %, Argile et colloide(< 0.004 mm) : 24,2 %.Forte présence de matières organiques.

Proportion selon analyse (%)			
Cailloux :	0,0	Sable :	14,4
Gravier :	0,0	Silt :	73,7
		Argile :	11,9



D_{10} : D_{30} : 0,004 D_{60} : 0,029

Préparé par : Sylvie Hamel, Chef laboratoire **Date :** 2013-09-06

Approuvé par : **Sylvie Hamel, Chef laboratoire** **Date :** 2013-09-07

LVM

325, rue de l'Espinay
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Téléphone: (418) 647-1402

Essais sur sols, granulats et autres matériaux

Client : Exova
Projet : Essais en laboratoire Exova; Divers essais en laboratoire
Endroit : Québec

Dossier : P-0003210-0-01-500
Réf. client : CT-043459
Rapport n° : 14 Rév. 0

ÉCHANTILLONNAGE

Provenance :
N° d'échantillon : 14 N° d'échantillon client : 2427333
Matériau :
Profondeur :
Localisation :

Échantillonné par : le client
Date d'échantillonnage : 2013-08-23
Date de réception : 2013-08-30
Densité relative des particules < 2 mm : 2,700(estimé)

Analyse granulométrique (LC 21-040)		Analyse sédimentométrique (NQ 2501-025)	
Tamis	Tamisat (%)	Diamètre équivalent	Tamisat (%)
112 mm			
80 mm			
56 mm		41,5 µm	44,8
40 mm		30,1 µm	41,1
31,5 mm		20,0 µm	32,3
20 mm		12,3 µm	21,0
14 mm		9,2 µm	9,6
10 mm		6,5 µm	7,8
5 mm	100	4,6 µm	6,6
2 mm	99	3,3 µm	5,3
1,25 mm	96	2,6 µm	4,7
0,630 mm	87	1,4 µm	4,7
0,315 mm	72		
0,160 mm	60		
0,080 mm	53,1		

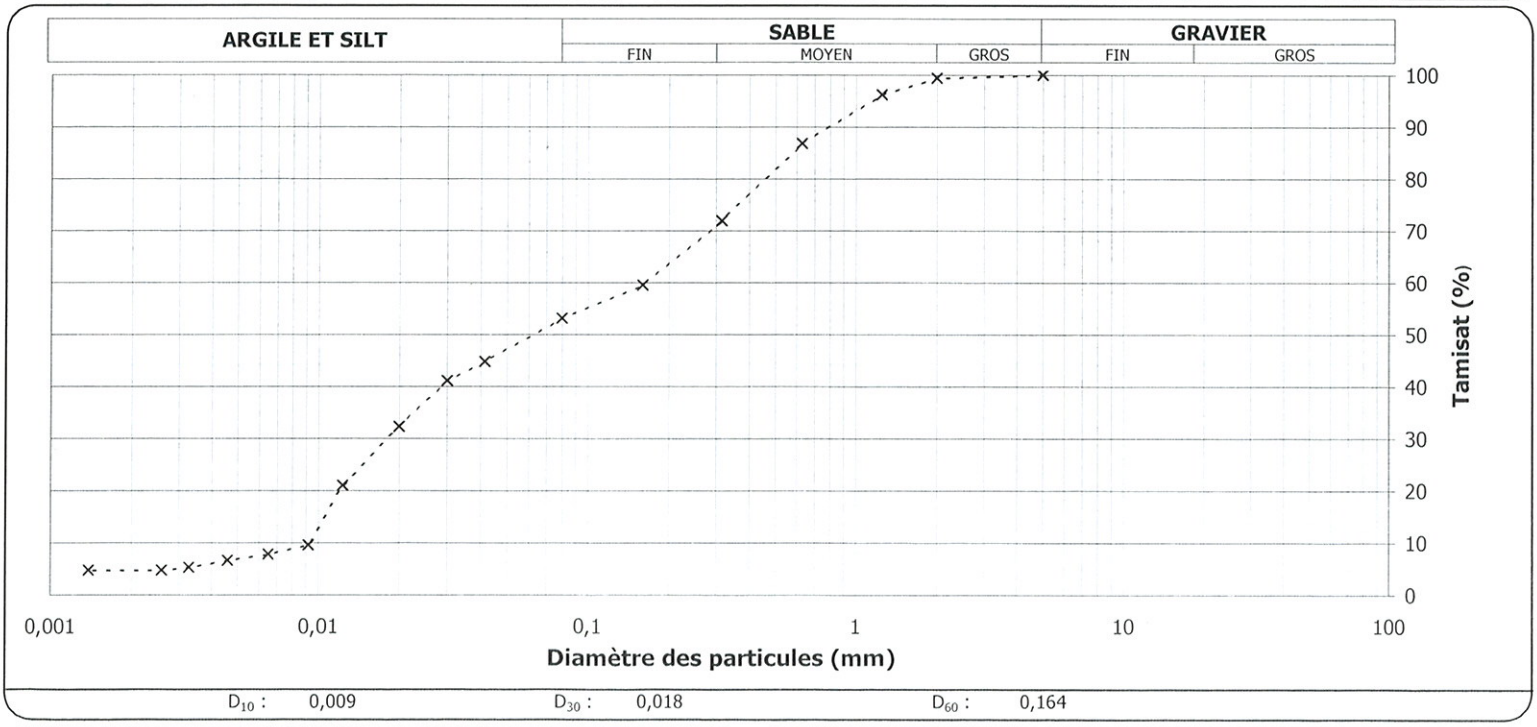
AUTRES ESSAIS	MESURÉ

REMARQUES

Gravier (>2 mm): 1,0 %, Sable grossier (<2 mm et > 0.2 mm): 35,9 %, Sable fin (< 0.2 mm et > 0.06 mm): 14,3 %, Limon(<0.06 mm et > 0.004 mm) : 42,8 %, Argile et colloide(< 0.004 mm) : 6,0 %.Présence de matières organiques.

Proportion selon analyse (%)

Cailloux :	0,0	Sable :	46,9
Gravier :	0,0	Silt :	48,4
		Argile :	4,7



D_{10} : 0,009 D_{30} : 0,018 D_{60} : 0,164

Préparé par : Sylvie Hamel, Chef laboratoire — **Date :** 2013-09-06

Approuvé par : Sylvie Hamel, Chef laboratoire — **Date :** 2013-09-09

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Essais sur sols, granulats et autres matériaux

Client : **Exova**
Projet : **Essais en laboratoire Exova; Divers essais en laboratoire**
Endroit : **Québec**

Dossier : **P-0003210-0-01-500**
Réf. client : **CT-043459**
Rapport n° : **15** **Rév. 0**
Page **1 de 1**

ÉCHANTILLONNAGE

Provenance :
N° d'échantillon : 15 N° d'échantillon client : 2427334
Matériau :
Profondeur :
Localisation :

Échantillonné par : le client
Date d'échantillonnage : 2013-08-24
Date de réception : 2013-08-30
Densité relative des particules < 2 mm : 2,700(estimé)

Analyse granulométrique (LC 21-040)		Analyse sédimentométrique (NQ 2501-025)	
Tamis	Tamisat (%)	Diamètre équivalent	Tamisat (%)
112 mm			
80 mm			
56 mm		49,0 µm	12,2
40 mm		34,8 µm	11,7
31,5 mm	100	22,1 µm	11,2
20 mm	100	12,8 µm	10,7
14 mm	100	9,1 µm	10,2
10 mm	98	6,4 µm	9,2
5 mm	87	4,6 µm	8,1
2 mm	70	3,3 µm	7,1
1,25 mm	56	2,5 µm	5,5
0,630 mm	46	1,4 µm	3,9
0,315 mm	35		
0,160 mm	23		
0,080 mm	12,2		

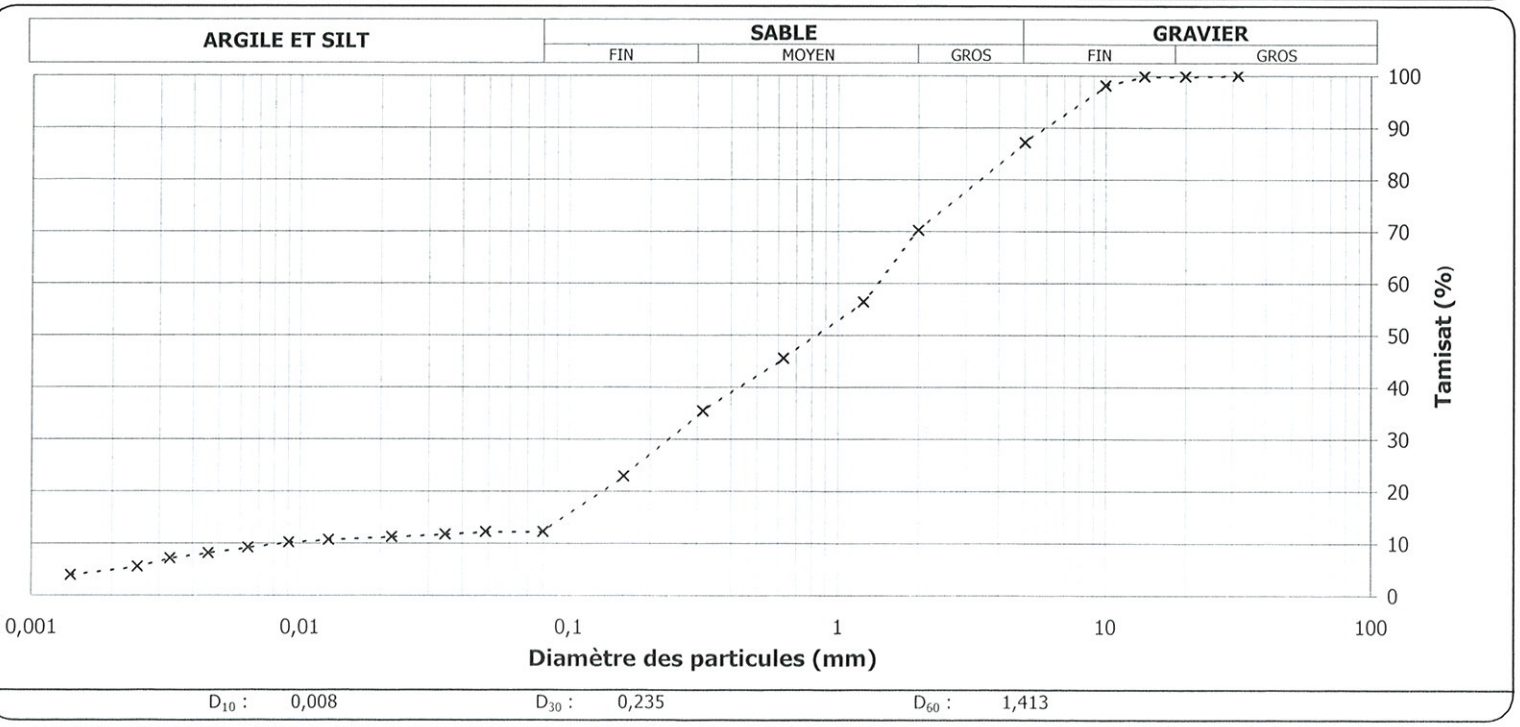
AUTRES ESSAIS	MESURÉ

REMARQUES

Gravier (>2 mm): 30,0 %, Sable grossier (<2 mm et > 0.2 mm): 43,9 %, Sable fin (< 0.2 mm et > 0.06 mm): 13,9 %, Limon(<0.06 mm et > 0.004 mm) : 4,6 %, Argile et colloide(< 0.004 mm) : 7,6 %.Forte présence de matières organiques.

Proportion selon analyse (%)

Cailloux :	0,0	Sable :	74,9
Gravier :	12,9	Silt :	7,4
		Argile :	4,8



D_{10} : 0,008 D_{30} : 0,235 D_{60} : 1,413

Préparé par : **Date :**
Sylvie Hamel, Chef laboratoire 2013-09-06

Approuvé par : **Date :**
2013-09-09
Sylvie Hamel, Chef laboratoire

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325, rue de l'Espinay
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Téléphone: (418) 647-1402

Essais sur sols, granulats et autres matériaux

Client : **Exova**
Projet : **Essais en laboratoire Exova; Divers essais en laboratoire**
Endroit : **Québec**

Dossier : **P-0003210-0-01-500**
Réf. client **CT-043459**
Rapport n° : **16** **Rév. 0**
Page 1 de 1

ÉCHANTILLONNAGE

Provenance :
N° d'échantillon : 16 N° d'échantillon client : 2427335
Matériau :
Profondeur :
Localisation :

Échantillonné par : le client
Date d'échantillonnage : 2013-08-25
Date de réception : 2013-08-30
Densité relative des particules < 2 mm : 2,700(estimé)

Analyse granulométrique (LC 21-040)		Analyse sédimentométrique (NQ 2501-025)	
Tamis	Tamisat (%)	Diamètre équivalent	Tamisat (%)
112 mm			
80 mm			
56 mm		45,1 µm	23,9
40 mm		32,0 µm	23,4
31,5 mm	100	20,4 µm	22,9
20 mm	99	11,8 µm	22,5
14 mm	97	8,4 µm	20,6
10 mm	96	6,1 µm	18,2
5 mm	90	4,4 µm	15,2
2 mm	82	3,1 µm	12,9
1,25 mm	73	2,3 µm	10,9
0,630 mm	60	1,3 µm	7,5
0,315 mm	42		
0,160 mm	29		
0,080 mm	24,1		

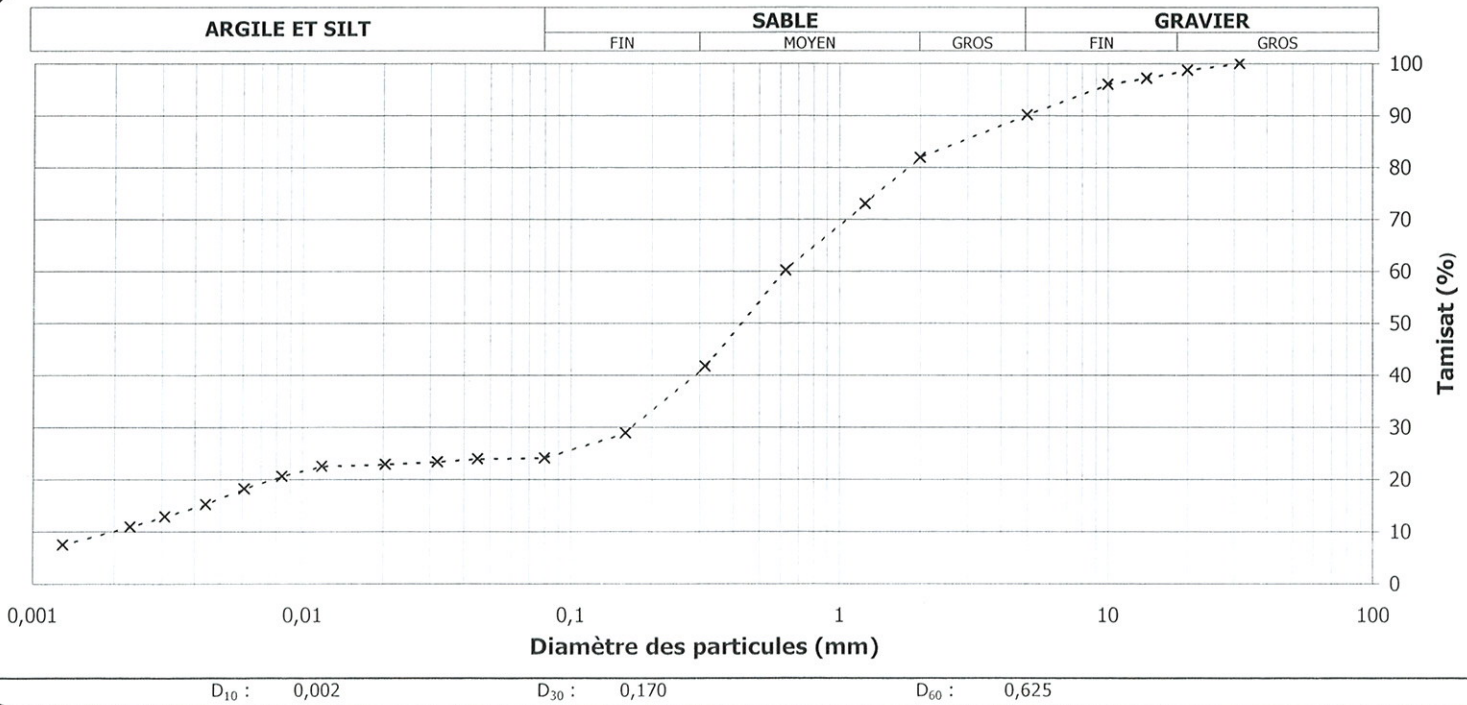
AUTRES ESSAIS	MESURÉ

REMARQUES

Gravier (>2 mm): 18,0 %, Sable grossier (<2 mm et > 0.2 mm): 49,6 %, Sable fin (< 0.2 mm et > 0.06 mm): 8,4 %, Limon(<0.06 mm et > 0.004 mm) : 9,5 %, Argile et colloide(< 0.004 mm) : 14,5 %.Présence de matières organiques.

Proportion selon analyse (%)

Cailloux :	0,0	Sable :	66,0
Gravier :	9,9	Silt :	14,2
		Argile :	9,9



D_{10} : 0,002 D_{30} : 0,170 D_{60} : 0,625

Préparé par : **Date :**
Sylvie Hamel, Chef laboratoire 2013-09-06

Approuvé par : **Date :**
2013-09-09
Sylvie Hamel, Chef laboratoire

LVM

325, rue de l'Espinay
Québec, G1L 2J2
Téléphone: (418) 647-1402

Essais sur sols, granulats et autres matériaux

Client : Exova
Projet : Essais en laboratoire Exova; Divers essais en laboratoire
Endroit : Québec

Dossier : P-0003210-0-01-500
Réf. client : CT-043459
Rapport n° : 17 **Rév.** 0

Échantillonnage

N° d'échantillon	:	17
N° d'échantillon client	:	2427336
Type de matériau	:	
Source première; ville	:	
Endroit échantillonné	:	

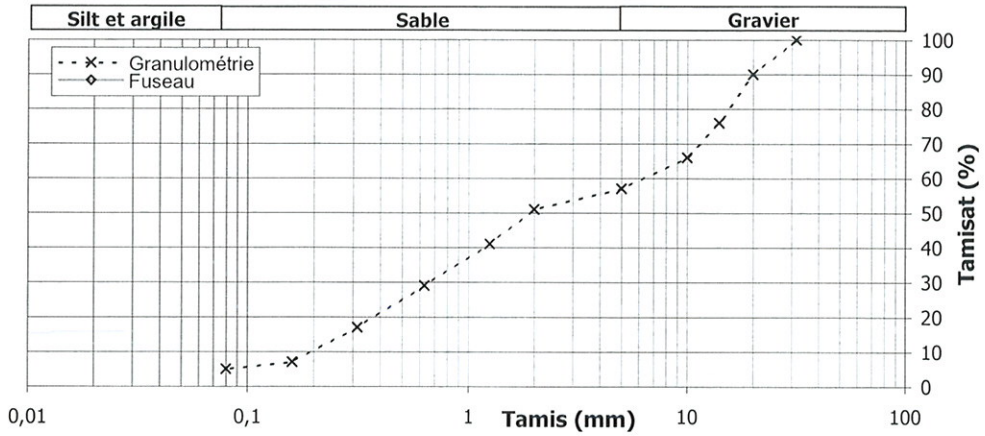
Spécification n° 2

Référence	:	
Usage	:	
Calibre	:	Sédimentométrie
Classe	:	

Prélevé le	:	2013-08-25
Par	:	le client
Reçu le	:	2013-08-30

Analyse granulométrique (LC 21-040)

TAMIS (mm)	TAMISAT (%) EXIGENCES	TAMISAT (%) MESURÉ
112		
80		
56		
40		
31,5		100
20		90
14		76
10		66
5		57
2		51
1,25		41
0,630		29
0,315		17
0,160		7
0,080		5,0



Cu : 32,0 Cc : 0,4 MF : 3,99 | D_{10} : 0,194 D_{30} : 0,665 D_{60} : 6,216

Masse vol. sèche maximale kg/m³	Humidité optimale %	Retenu 5 mm %

Proportions selon analyse granulométrique (%)

Cailloux :	0,0	Sable :	52,3
Gravier :	42,7	Silt et argile :	5,0

Autres essais	Exigé	Mesuré

Remarques

Gravier (>2 mm) : 49,0 %, Sable grossier (<2 mm et > 0.2 mm) : 41,4%, Sable fin (< 0.2 mm et > 0.06 mm) : 9,6 %, * Le % indiqué à " sable fin " est la somme de " sable fin + limon + argile et colloide ". Analyse sédimentométrique annulé en raison du faible % passant au tamis 80 µm.

UN ASTERISQUE ACCOMPAGNE TOUT RESULTAT NON CONFORME

Préparé par : Sylvie Hamel, Chef laboratoire — **Date :** 2013-09-06

Approuvé par : Sylvie Hamel, Chef laboratoire — **Date :** 2013-09-09

LVM

325, rue de l'Espinay
Québec, G1L 2J2
Téléphone: (418) 647-1402

Essais sur sols, granulats et autres matériaux

Client : **Exova**
Projet : **Essais en laboratoire Exova; Divers essais en laboratoire**
Endroit : **Québec**

Dossier : **P-0003210-0-01-500**
Réf. client : **CT-043459**
Rapport n° : **18** **Rév. 0**
Page 1 de 1

ÉCHANTILLONNAGE

Provenance :
N° d'échantillon : 18 N° d'échantillon client : 2427337
Matériau :
Profondeur :
Localisation :

Échantillonné par : le client
Date d'échantillonnage : 2013-08-26
Date de réception : 2013-08-30
Densité relative des particules < 2 mm : 2,700(estimé)

Analyse granulométrique (LC 21-040)		Analyse sédimentométrique (NQ 2501-025)	
Tamis	Tamisat (%)	Diamètre équivalent	Tamisat (%)
112 mm			
80 mm			
56 mm		51,1 µm	5,5
40 mm		36,4 µm	4,4
31,5 mm		23,0 µm	4,5
20 mm		13,3 µm	4,5
14 mm		9,4 µm	3,9
10 mm	100	6,7 µm	3,3
5 mm	100	4,7 µm	2,7
2 mm	99	3,4 µm	2,1
1,25 mm	95	2,5 µm	2,1
0,630 mm	89	1,4 µm	2,0
0,315 mm	64		
0,160 mm	20		
0,080 mm	5,5		

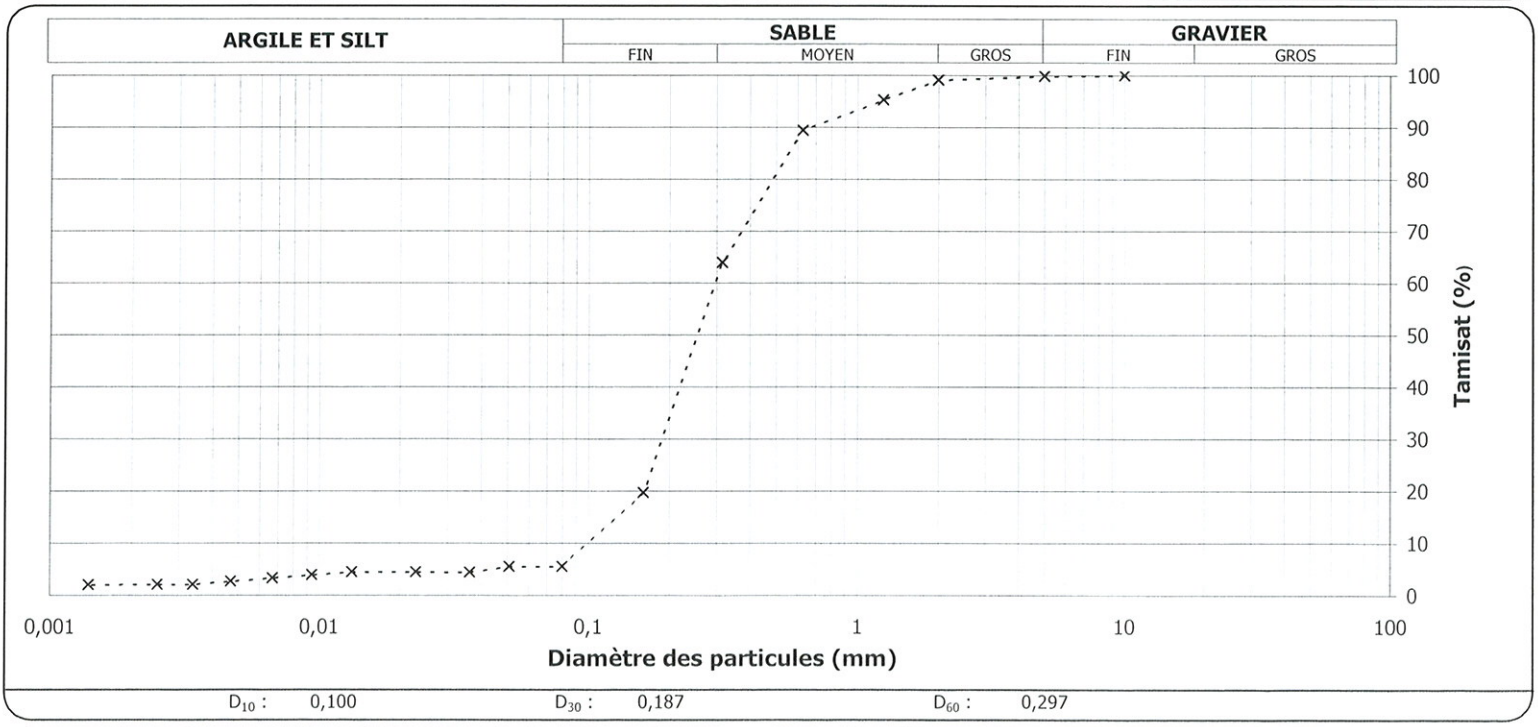
AUTRES ESSAIS	MESURÉ

REMARQUES

Gravier (>2 mm): 1,0 %, Sable grossier (<2 mm et > 0.2 mm): 67,6 %, Sable fin (< 0.2 mm et > 0.06 mm): 25,9 %, Limon(<0.06 mm et > 0.004 mm) : 3,1 %, Argile et colloide(< 0.004 mm) : 2,4 %.Présence de matières organiques.

Proportion selon analyse (%)

Cailloux :	0,0	Sable :	94,4
Gravier :	0,1	Silt :	3,4
		Argile :	2,1



D_{10} : 0,100 D_{30} : 0,187 D_{60} : 0,297

Préparé par : Sylvie Hamel, Chef laboratoire **Date :** 2013-09-06

Approuvé par : **Sylvie Hamel, Chef laboratoire** **Date :** 2013-09-09

LVM

325, rue de l'Espinay
Québec, G1L 2J2
Téléphone: (418) 647-1402

Essais sur sols, granulats et autres matériaux

Client : Exova
Projet : Essais en laboratoire Exova; Divers essais en laboratoire
Endroit : Québec

Dossier : P-0003210-0-01-500
Réf. client : CT-043459
Rapport n° : 19 Rév. 0

ÉCHANTILLONNAGE

Provenance :
N° d'échantillon : 19 N° d'échantillon client : 2427338
Matériau :
Profondeur :
Localisation :

Échantillonné par : le client
Date d'échantillonnage : 2013-08-26
Date de réception : 2013-08-30
Densité relative des particules < 2 mm : 2,700(estimé)

Analyse granulométrique (LC 21-040)		Analyse sédimentométrique (NQ 2501-025)	
Tamis	Tamisat (%)	Diamètre équivalent	Tamisat (%)
112 mm			
80 mm			
56 mm		51,3 µm	4,9
40 mm		36,4 µm	4,3
31,5 mm		23,0 µm	3,8
20 mm		13,3 µm	3,2
14 mm	100	9,4 µm	3,2
10 mm	100	6,7 µm	2,7
5 mm	100	4,7 µm	2,7
2 mm	98	3,4 µm	2,1
1,25 mm	93	2,5 µm	2,1
0,630 mm	84	1,4 µm	0,7
0,315 mm	56		
0,160 mm	18		
0,080 mm	5,1		

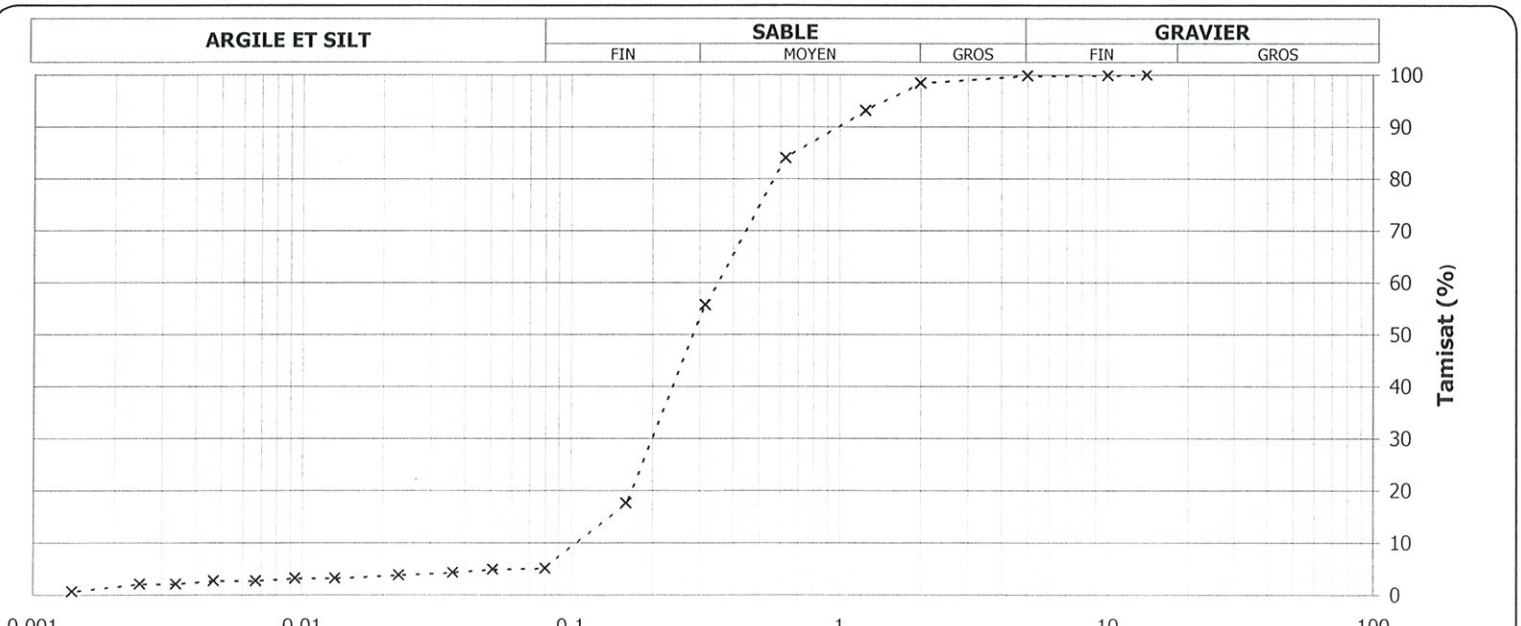
AUTRES ESSAIS	MESURÉ

REMARQUES

Gravier (>2 mm): 2,0 %, Sable grossier (<2 mm et > 0.2 mm): 70,2 %, Sable fin (< 0.2 mm et > 0.06 mm): 22,8 %, Limon(<0.06 mm et > 0.004 mm) : 2,6 %, Argile et colloide(< 0.004 mm) : 2,4 %.Présence de matières organiques.

Proportion selon analyse (%)

Cailloux :	0,0	Sable :	94,7
Gravier :	0,2	Silt :	3,6
		Argile :	1,5



D_{10} : 0,105 D_{30} : 0,199 D_{60} : 0,350

Préparé par : Sylvie Hamel, Chef laboratoire **Date :** 2013-09-06

Approuvé par : Sylvie Hamel, Chef laboratoire **Date :** 2013-09-09

LVM

325, rue de l'Espinay
Québec, G1L 2J2
Téléphone: (418) 647-1402

RAPPORT DE TRANSMISSION

INGÉNIERIE DES MATÉRIAUX

DESTINATAIRE

Madame Catherine Blais
Exova
237, rue de Liverpool
Québec
QC, CAN
G3A 2C8

PROJET

Essais en laboratoire Exova; Divers essais en laboratoire

Québec

Notre n° de dossier : P-0003210-0-01-500

DOCUMENT(S) TRANSMIS

Madame,

Il nous fait plaisir de vous transmettre ce rapport relativement aux services rendus par LVM, pour le projet cité en titre. Les documents suivants sont joints en annexe:

Sols, gran. & autres matér.	Rapports 020, 021, 022, 023, 024, 025, 026, 027, 028 et 029

REMARQUES

COPIE(S) CONFORME(S)

Courriel : Madame Céline Boutet, Exova (celine.boutet@exova.com)

Les résultats des essais effectués ne sont valides que pour l'échantillon décrit dans le rapport. Une partie des essais, ou la totalité, peut avoir été réalisée par des fournisseurs ou sous-traitants dûment qualifiés selon la procédure PQ-06 de notre manuel qualité.

Pour de plus amples informations, veuillez contacter Sylvie Hamel, Chef laboratoire responsable de votre projet au (418) 647-2435 Ext:231.

Date de transmission
2013-09-20

LVM

325, rue de l'Espinay
Québec, G1L 2J2
Téléphone: (418) 647-1402

Essais sur sols, granulats et autres matériaux

Client : **Exova**
Projet : **Essais en laboratoire Exova; Divers essais en laboratoire**
Endroit : **Québec**

Dossier : **P-0003210-0-01-500**
Réf. client : **CT-043540**
Rapport n° : **20** **Rév. 0**
Page 1 de 1

ÉCHANTILLONNAGE

Provenance :
N° d'échantillon : 20 N° d'échantillon client : 2432053
Matériau :
Profondeur :
Localisation :

Échantillonné par : le client
Date d'échantillonnage : 2013-09-01
Date de réception : 2013-09-06
Densité relative des particules < 2 mm : 2,700(estimé)

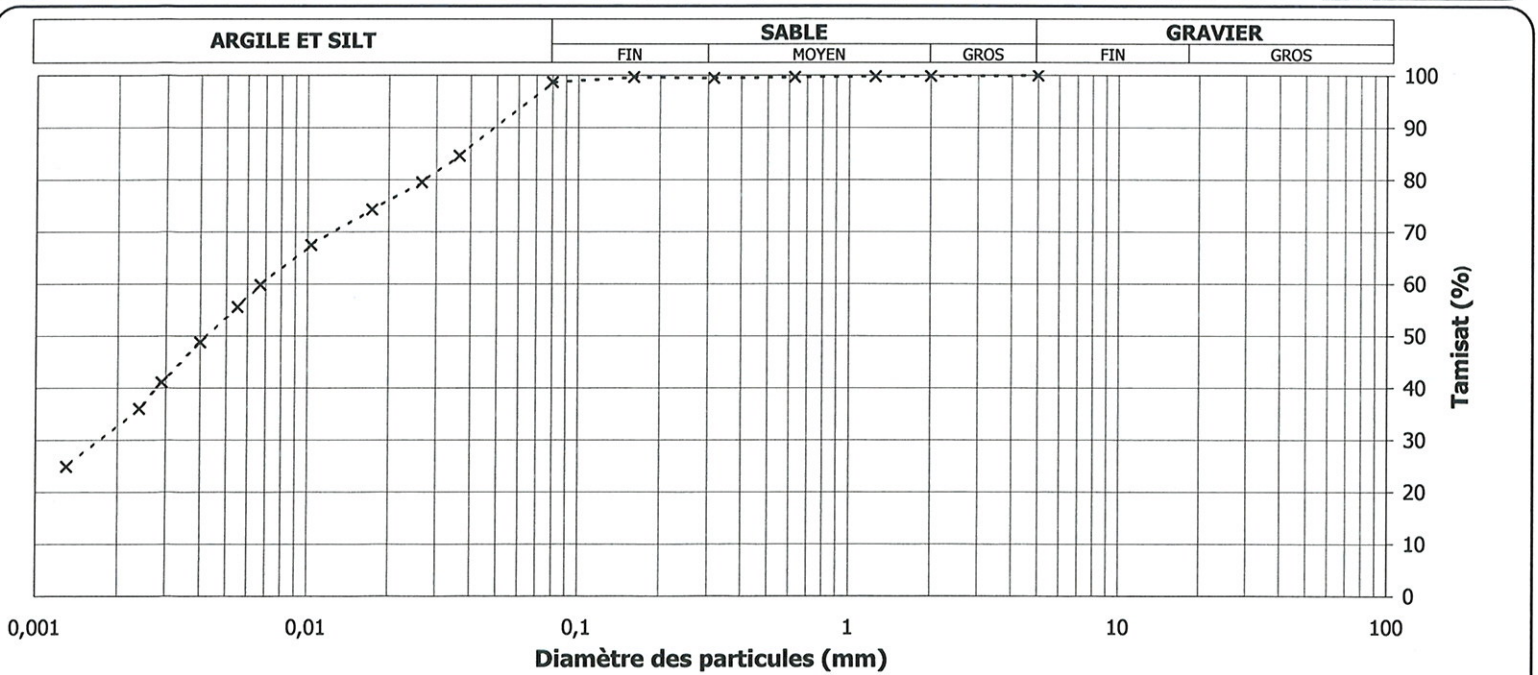
Analyse granulométrique (LC 21-040)		Analyse sédimentométrique (NQ 2501-025)	
Tamis	Tamisat (%)	Diamètre équivalent	Tamisat (%)
112 mm			
80 mm			
56 mm		36,4 µm	84,6
40 mm		26,5 µm	79,5
31,5 mm		17,3 µm	74,3
20 mm		10,3 µm	67,5
14 mm		6,7 µm	59,8
10 mm		5,5 µm	55,6
5 mm	100	4,0 µm	48,8
2 mm	100	2,9 µm	41,1
1,25 mm	100	2,4 µm	36,0
0,630 mm	100	1,3 µm	24,9
0,315 mm	100		
0,160 mm	100		
0,080 mm	98,7		

AUTRES ESSAIS	MESURÉ

REMARQUES

Gravier (>2 mm): 0,0 %, Sable grossier (<2 mm et > 0.2 mm): 0,0 %, Sable fin (< 0.2 mm et > 0.06 mm): 7,8 %, Limon(<0.06 mm et > 0.004 mm) : 43,4 %, Argile et colloide(< 0.004 mm) : 48,8 %.

Proportion selon analyse (%)			
Cailloux :	0,0	Sable :	1,3
Gravier :	0,0	Silt :	66,7
		Argile :	32,0



D_{10} : D_{30} : 0,002 D_{60} : 0,007

Préparé par : **Date :**
Sylvie Hamel, Chef laboratoire 2013-09-18

Approuvé par : **Date :**
Sylvie Hamel, Chef laboratoire

LVM

325, rue de l'Espinay
Québec, G1L 2J2
Téléphone: (418) 647-1402

Essais sur sols, granulats et autres matériaux

Client : **Exova**
Projet : **Essais en laboratoire Exova; Divers essais en laboratoire**
Endroit : **Québec**

Dossier : **P-0003210-0-01-500**
Réf. client : **CT-043540**
Rapport n° : **21** **Rév. 0**
Page 1 de 1

ÉCHANTILLONNAGE

Provenance :
N° d'échantillon : 21 N° d'échantillon client : 243054
Matériau :
Profondeur :
Localisation :

Échantillonné par : le client
Date d'échantillonnage : 2013-09-01
Date de réception : 2013-09-06
Densité relative des particules < 2 mm : 2,700(estimé)

Analyse granulométrique (LC 21-040)		Analyse sédimentométrique (NQ 2501-025)	
Tamis	Tamisat (%)	Diamètre équivalent	Tamisat (%)
112 mm			
80 mm			
56 mm		36,8 µm	66,8
40 mm		26,5 µm	64,1
31,5 mm	100	17,5 µm	58,6
20 mm	93	10,6 µm	51,8
14 mm	92	7,7 µm	46,8
10 mm	91	5,6 µm	40,6
5 mm	88	4,1 µm	34,5
2 mm	84	3,0 µm	28,2
1,25 mm	83	2,4 µm	24,9
0,630 mm	80	1,3 µm	17,3
0,315 mm	77		
0,160 mm	74		
0,080 mm	72,0		

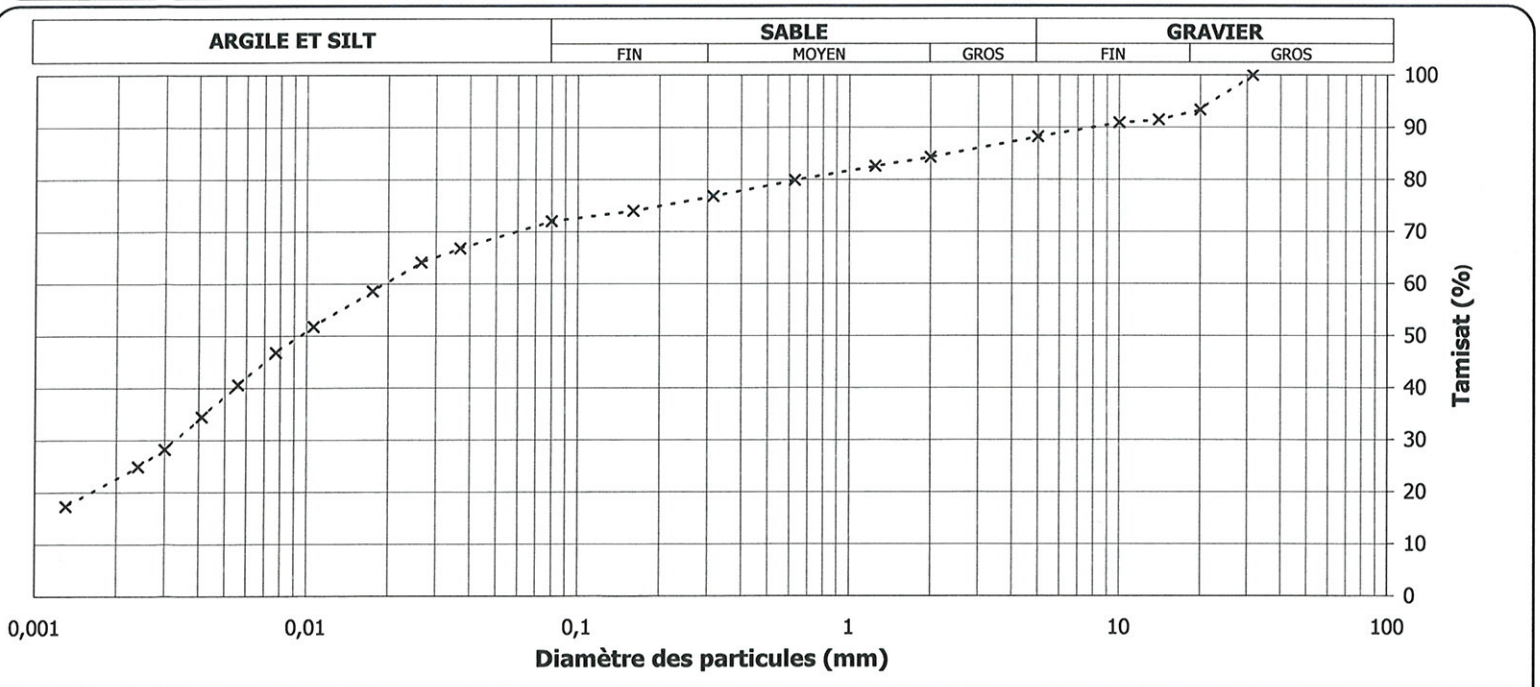
AUTRES ESSAIS	MESURÉ

REMARQUES

Gravier (>2 mm): 16,0 %, Sable grossier (<2 mm et > 0.2 mm): 9,2 %, Sable fin (< 0.2 mm et > 0.06 mm): 5,2 %, Limon(<0.06 mm et > 0.004 mm) : 35,7 %, Argile et colloide(< 0.004 mm) : 33,9 %.

Proportion selon analyse (%)

Cailloux :	0,0	Sable :	16,2
Gravier :	11,8	Silt :	49,9
		Argile :	22,1



D_{10} : D_{30} : 0,003 D_{60} : 0,019

Préparé par : Sylvie Hamel, Chef laboratoire **Date :** 2013-09-18

Approuvé par : **Sylvie Hamel, Chef laboratoire** **Date :**

LVM

325, rue de l'Espinay
Québec, G1L 2J2
Téléphone: (418) 647-1402

Essais sur sols, granulats et autres matériaux

Client : Exova
Projet : Essais en laboratoire Exova; Divers essais en laboratoire
Endroit : Québec

Dossier : P-0003210-0-01-500
Réf. client : CT-043540
Rapport n° : 22 Rév. 0

ÉCHANTILLONNAGE

Provenance :
N° d'échantillon : 22 N° d'échantillon client : 2432055
Matériau :
Profondeur :
Localisation :

Échantillonné par : le client
Date d'échantillonnage : 2013-09-01
Date de réception : 2013-09-06
Densité relative des particules < 2 mm : 2,700(estimé)

Analyse granulométrique (LC 21-040)		Analyse sédimentométrique (NQ 2501-025)	
Tamis	Tamisat (%)	Diamètre équivalent	Tamisat (%)
112 mm			
80 mm			
56 mm		39,4 µm	81,0
40 mm		28,6 µm	75,2
31,5 mm		18,7 µm	67,4
20 mm		11,3 µm	55,7
14 mm		8,0 µm	47,8
10 mm		5,9 µm	42,0
5 mm		4,3 µm	34,2
2 mm	100	3,1 µm	26,4
1,25 mm	100	2,5 µm	22,5
0,630 mm	99	1,4 µm	14,8
0,315 mm	99		
0,160 mm	98		
0,080 mm	94,4		

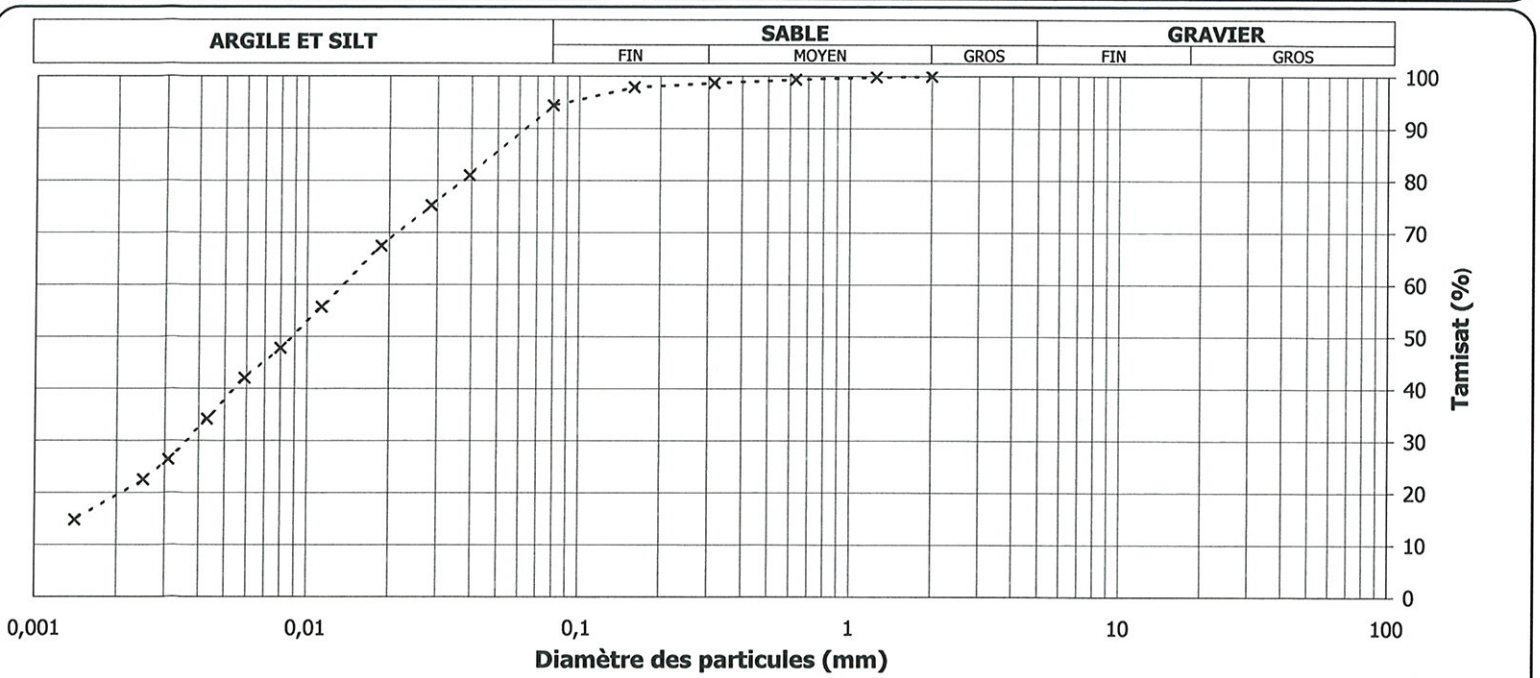
AUTRES ESSAIS	MESURÉ

REMARQUES

Gravier (>2 mm): 0,0 %, Sable grossier (<2 mm et > 0.2 mm): 1,7 %, Sable fin (< 0.2 mm et > 0.06 mm): 10,5 %, Limon(<0.06 mm et > 0.004 mm) : 55,5 %, Argile et colloide(< 0.004 mm) : 32,3 %.

Proportion selon analyse (%)

Cailloux :	0,0	Sable :	5,6
Gravier :	0,0	Silt :	75,4
		Argile :	19,0



D_{10} : D_{30} : 0,004 D_{60} : 0,014

Préparé par : Sylvie Hamel, Chef laboratoire **Date :** 2013-09-18

Approuvé par : **Sylvie Hamel, Chef laboratoire** **Date :**

LVM

325, rue de l'Espinay
Québec, G1L 2J2
Téléphone: (418) 647-1402

Essais sur sols, granulats et autres matériaux

Client : Exova
Projet : Essais en laboratoire Exova; Divers essais en laboratoire
Endroit : Québec

Dossier : P-0003210-0-01-500
Réf. client : CT-043540
Rapport n° : 23 Rév. 0

ÉCHANTILLONNAGE

Provenance :
N° d'échantillon : 23 N° d'échantillon client : 2432056
Matériau :
Profondeur :
Localisation :

Échantillonné par : le client
Date d'échantillonnage : 2013-09-01
Date de réception : 2013-09-06
Densité relative des particules < 2 mm : 2,700(estimé)

Analyse granulométrique (LC 21-040)		Analyse sédimentométrique (NQ 2501-025)	
Tamis	Tamisat (%)	Diamètre équivalent	Tamisat (%)
112 mm			
80 mm			
56 mm		36,4 µm	83,0
40 mm		27,0 µm	74,7
31,5 mm		17,6 µm	69,6
20 mm		10,7 µm	59,5
14 mm		7,4 µm	51,1
10 mm		5,5 µm	42,8
5 mm		4,2 µm	36,1
2 mm		3,1 µm	28,6
1,25 mm	100	2,5 µm	25,2
0,630 mm	99	1,3 µm	16,9
0,315 mm	99		
0,160 mm	97		
0,080 mm	91,3		

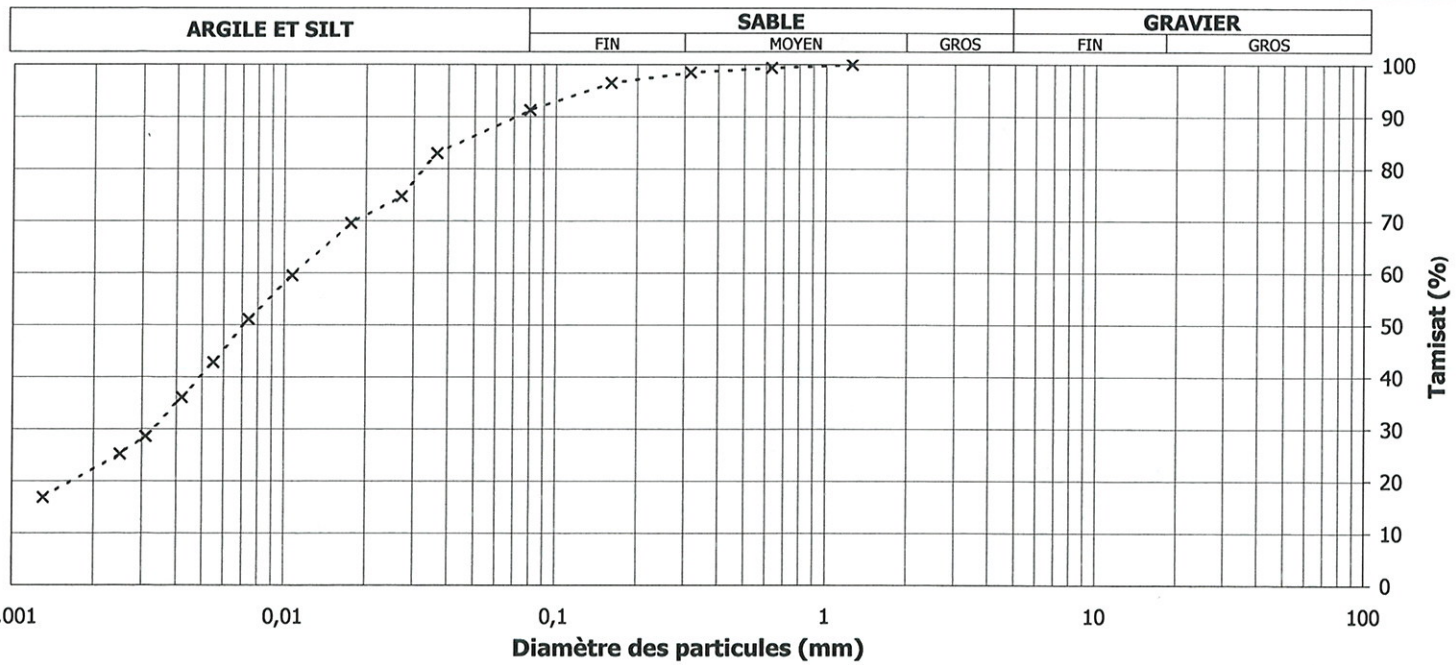
AUTRES ESSAIS	MESURÉ

REMARQUES

Gravier (>2 mm): 0,0 %, Sable grossier (<2 mm et > 0.2 mm): 2,5 %, Sable fin (< 0.2 mm et > 0.06 mm): 10,0 %, Limon(<0.06 mm et > 0.004 mm) : 52,8 %, Argile et colloide(< 0.004 mm) : 34,7 %.

Proportion selon analyse (%)

Cailloux :	0,0	Sable :	8,7
Gravier :	0,0	Silt :	69,6
		Argile :	21,7



D_{10} : D_{30} : 0,003 D_{60} : 0,011

Préparé par : Sylvie Hamel, Chef laboratoire **Date :** 2013-09-18

Approuvé par : **Sylvie Hamel, Chef laboratoire** **Date :**

LVM

325, rue de l'Espinay
Québec, G1L 2J2
Téléphone: (418) 647-1402

Essais sur sols, granulats et autres matériaux

Client : Exova
Projet : Essais en laboratoire Exova; Divers essais en laboratoire
Endroit : Québec

Dossier : P-0003210-0-01-500
Réf. client : CT-043540
Rapport n° : 24 Rév. 0

ÉCHANTILLONNAGE

Provenance :
N° d'échantillon : 24
N° d'échantillon client : 2432057
Matériau :
Profondeur :
Localisation :

Échantillonné par : le client
Date d'échantillonnage : 2013-09-01
Date de réception : 2013-09-06
Densité relative des particules < 2 mm : 2,700(estimé)

Analyse granulométrique (LC 21-040)		Analyse sédimentométrique (NQ 2501-025)	
Tamis	Tamisat (%)	Diamètre équivalent	Tamisat (%)
112 mm			
80 mm			
56 mm		38,7 µm	79,5
40 mm		28,1 µm	74,1
31,5 mm		18,7 µm	63,2
20 mm		11,3 µm	53,2
14 mm		8,2 µm	44,8
10 mm		5,6 µm	36,6
5 mm		4,2 µm	30,2
2 mm		3,1 µm	24,8
1,25 mm	100	2,5 µm	21,1
0,630 mm	99	1,3 µm	13,8
0,315 mm	97		
0,160 mm	94		
0,080 mm	89,1		

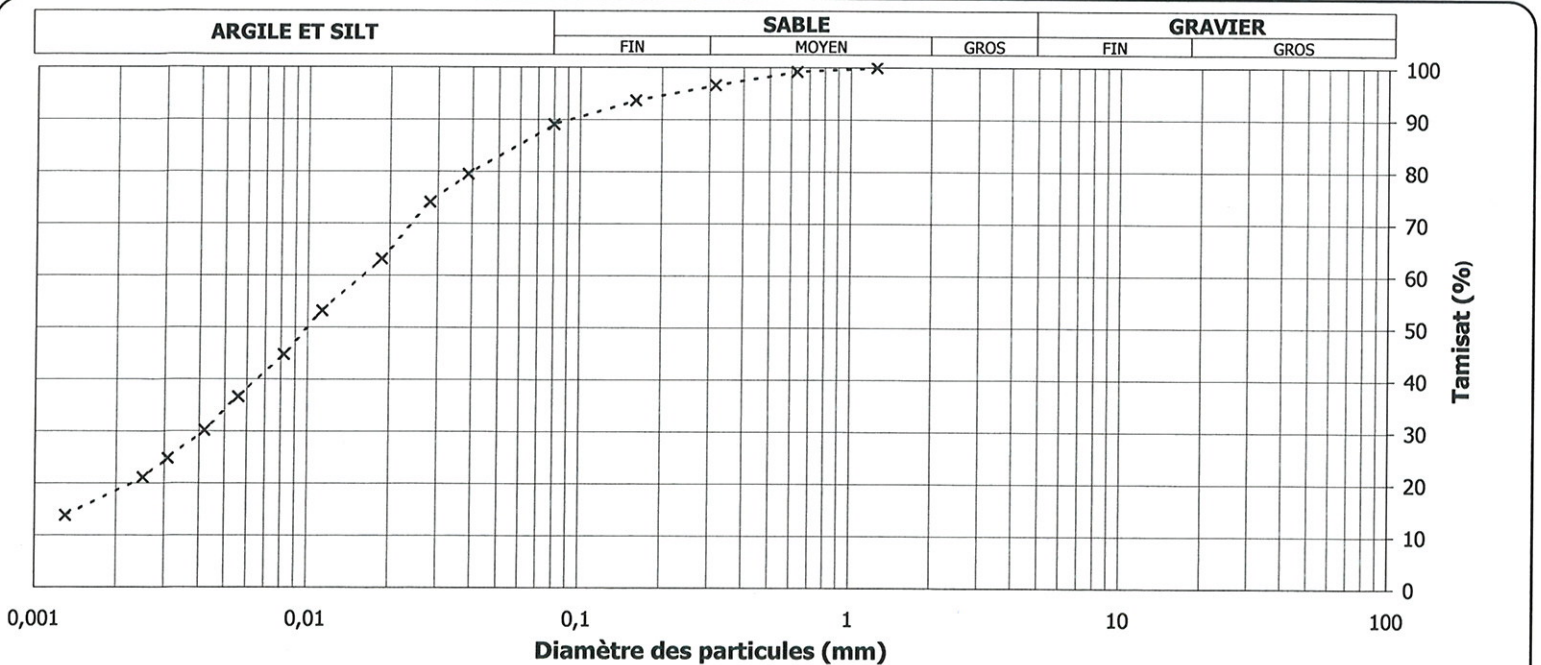
AUTRES ESSAIS	MESURÉ

REMARQUES

Gravier (>2 mm): 0,0 %, Sable grossier (<2 mm et > 0.2 mm): 5,2 %, Sable fin (< 0.2 mm et > 0.06 mm): 10,3 %, Limon(<0.06 mm et > 0.004 mm) : 55,2 %, Argile et colloide(< 0.004 mm) : 29,2 %.

Proportion selon analyse (%)

Cailloux :	0,0	Sable :	10,9
Gravier :	0,0	Silt :	71,0
		Argile :	18,1



D_{10} :
D_{30} : 0,004
D_{60} : 0,016

Préparé par : Sylvie Hamel, Chef laboratoire
Date : 2013-09-18

Approuvé par : Sylvie Hamel, Chef laboratoire
Date :

LVM

325, rue de l'Espinay
Québec, G1L 2J2
Téléphone: (418) 647-1402

Essais sur sols, granulats et autres matériaux

Client : **Exova**
Projet : **Essais en laboratoire Exova; Divers essais en laboratoire**
Endroit : **Québec**

Dossier : **P-0003210-0-01-500**
Réf. client : **CT-043540**
Rapport n° : **25** **Rév. 0**
Page 1 de 1

ÉCHANTILLONNAGE

Provenance :
N° d'échantillon : 25 N° d'échantillon client : 2432058
Matériau :
Profondeur :
Localisation :

Échantillonné par : le client
Date d'échantillonnage : 2013-09-01
Date de réception : 2013-09-06
Densité relative des particules < 2 mm : 2,700(estimé)

Analyse granulométrique (LC 21-040)		Analyse sédimentométrique (NQ 2501-025)	
Tamis	Tamisat (%)	Diamètre équivalent	Tamisat (%)
112 mm			
80 mm			
56 mm		36,8 µm	82,8
40 mm		27,4 µm	74,3
31,5 mm		18,1 µm	65,8
20 mm		10,9 µm	56,4
14 mm		8,0 µm	48,7
10 mm		5,9 µm	38,5
5 mm		4,3 µm	31,7
2 mm	100	3,1 µm	26,6
1,25 mm	100	1,5 µm	21,5
0,630 mm	100	1,3 µm	14,7
0,315 mm	100		
0,160 mm	99		
0,080 mm	96,3		

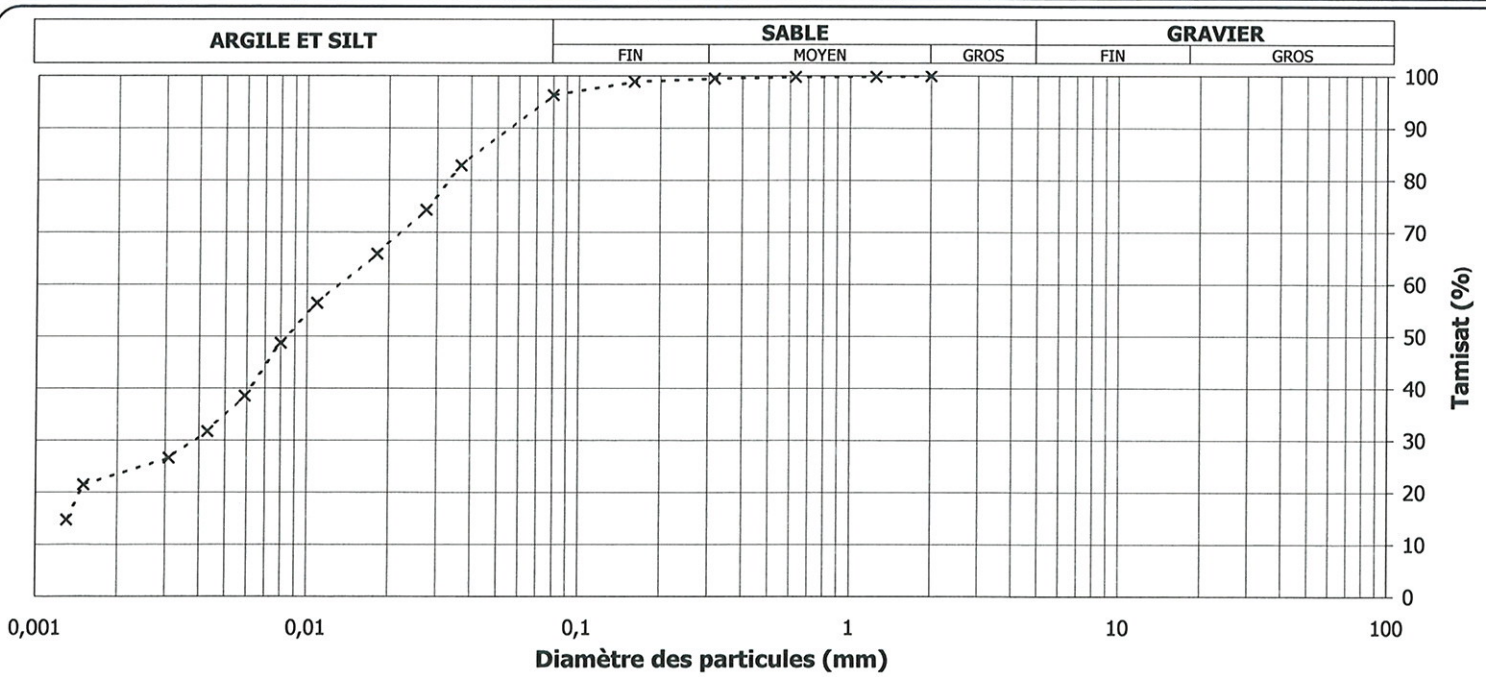
AUTRES ESSAIS	MESURÉ

REMARQUES

Gravier (>2 mm): 0,0 %, Sable grossier (<2 mm et > 0.2 mm): 0,7 %, Sable fin (< 0.2 mm et > 0.06 mm): 9,2 %, Limon(<0.06 mm et > 0.004 mm) : 59,6 %, Argile et colloide(< 0.004 mm) : 30,4 %.

Proportion selon analyse (%)

Cailloux :	0,0	Sable :	3,7
Gravier :	0,0	Silt :	73,2
		Argile :	23,1



D_{10} : D_{30} : 0,004 D_{60} : 0,013

Préparé par : Sylvie Hamel, Chef laboratoire **Date :** 2013-09-18

Approuvé par : **Sylvie Hamel, Chef laboratoire** **Date :**

LVM

325, rue de l'Espinay
Québec, G1L 2J2
Téléphone: (418) 647-1402

Essais sur sols, granulats et autres matériaux

Client : Exova
Projet : Essais en laboratoire Exova; Divers essais en laboratoire
Endroit : Québec

Dossier : P-0003210-0-01-500
Réf. client : CT-043540
Rapport n° : 26 **Rév.** 0
Page 1 de 1

ÉCHANTILLONNAGE

Provenance :
N° d'échantillon : 26
N° d'échantillon client : 2432059
Matériau :
Profondeur :
Localisation :

Échantillonné par : le client
Date d'échantillonnage : 2013-09-02
Date de réception : 2013-09-06
Densité relative des particules < 2 mm : 2,700(estimé)

Analyse granulométrique (LC 21-040)		Analyse sédimentométrique (NQ 2501-025)	
Tamis	Tamisat (%)	Diamètre équivalent	Tamisat (%)
112 mm			
80 mm			
56 mm		41,9 µm	62,5
40 mm		30,5 µm	55,3
31,5 mm		20,2 µm	44,4
20 mm		12,0 µm	35,4
14 mm		8,7 µm	31,8
10 mm		5,7 µm	24,6
5 mm		4,5 µm	20,9
2 mm		3,2 µm	17,3
1,25 mm	100	2,5 µm	13,7
0,630 mm	99	1,4 µm	10,1
0,315 mm	97		
0,160 mm	91		
0,080 mm	77,8		

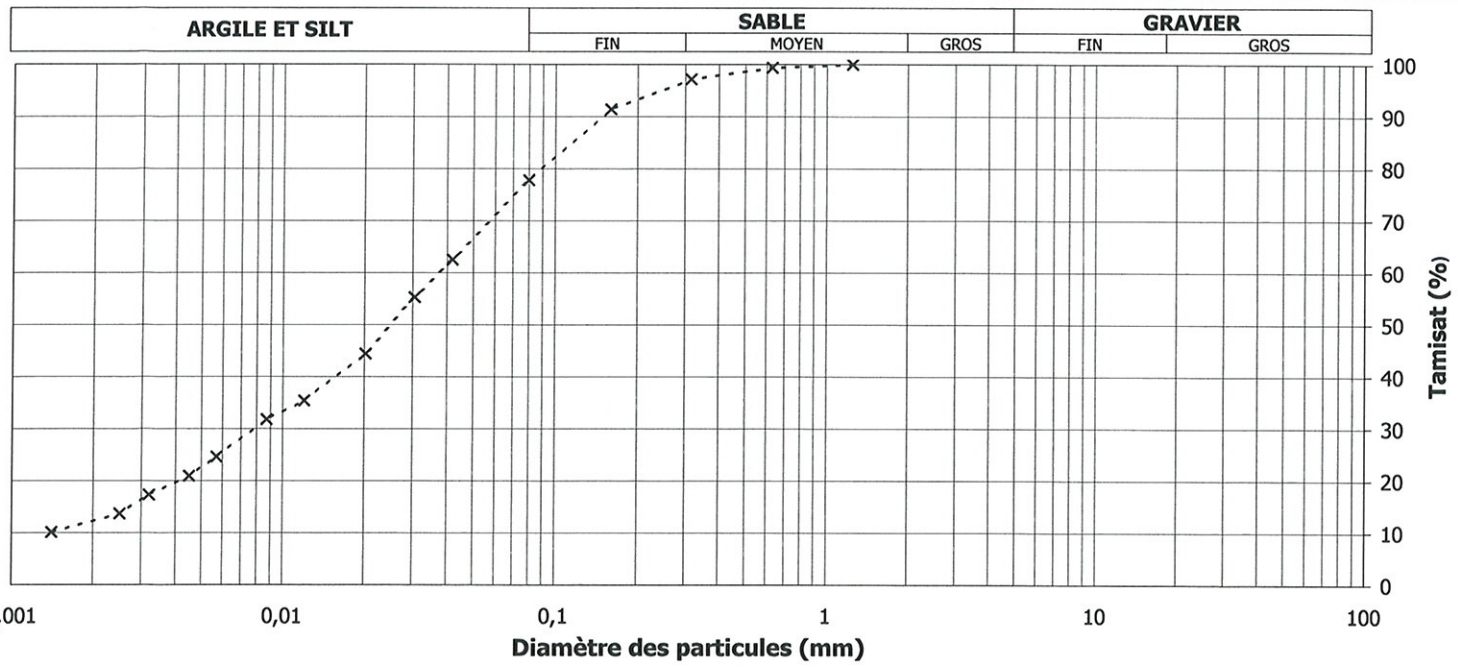
AUTRES ESSAIS	MESURÉ

REMARQUES

Gravier (>2 mm): 0,0 %, Sable grossier (<2 mm et > 0.2 mm): 7,5 %, Sable fin (< 0.2 mm et > 0.06 mm): 22,8 %, Limon(<0.06 mm et > 0.004 mm) : 50,3 %, Argile et colloide(< 0.004 mm) : 19,5 %.

Proportion selon analyse (%)

Cailloux :	0,0	Sable :	22,2
Gravier :	0,0	Silt :	65,7
		Argile :	12,1



D_{10} :
D_{30} : 0,008
D_{60} : 0,038

Préparé par :
Sylvie Hamel, Chef laboratoire
Date : 2013-09-18

Approuvé par :
Sylvie Hamel, Chef laboratoire
Date :

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Essais sur sols, granulats et autres matériaux

Client : **Exova**
Projet : **Essais en laboratoire Exova; Divers essais en laboratoire**
Endroit : **Québec**

Dossier : **P-0003210-0-01-500**
Réf. client : **CT-043540**
Rapport n° : **27** **Rév. 0**
Page 1 de 1

ÉCHANTILLONNAGE

Provenance :
N° d'échantillon : 27 N° d'échantillon client : 2432077
Matériau :
Profondeur :
Localisation :

Échantillonné par : le client
Date d'échantillonnage : 2013-08-28
Date de réception : 2013-09-06
Densité relative des particules < 2 mm : 2,700(estimé)

Analyse granulométrique (LC 21-040)		Analyse sédimentométrique (NQ 2501-025)	
Tamis	Tamisat (%)	Diamètre équivalent	Tamisat (%)
112 mm			
80 mm			
56 mm		48,8 µm	19,1
40 mm		35,2 µm	14,6
31,5 mm		22,3 µm	13,1
20 mm	100	13,0 µm	11,6
14 mm	99	9,2 µm	11,0
10 mm	99	6,4 µm	8,5
5 mm	99	4,7 µm	7,0
2 mm	99	3,3 µm	7,0
1,25 mm	99	2,6 µm	5,4
0,630 mm	96	1,4 µm	5,4
0,315 mm	89		
0,160 mm	63		
0,080 mm	30,2		

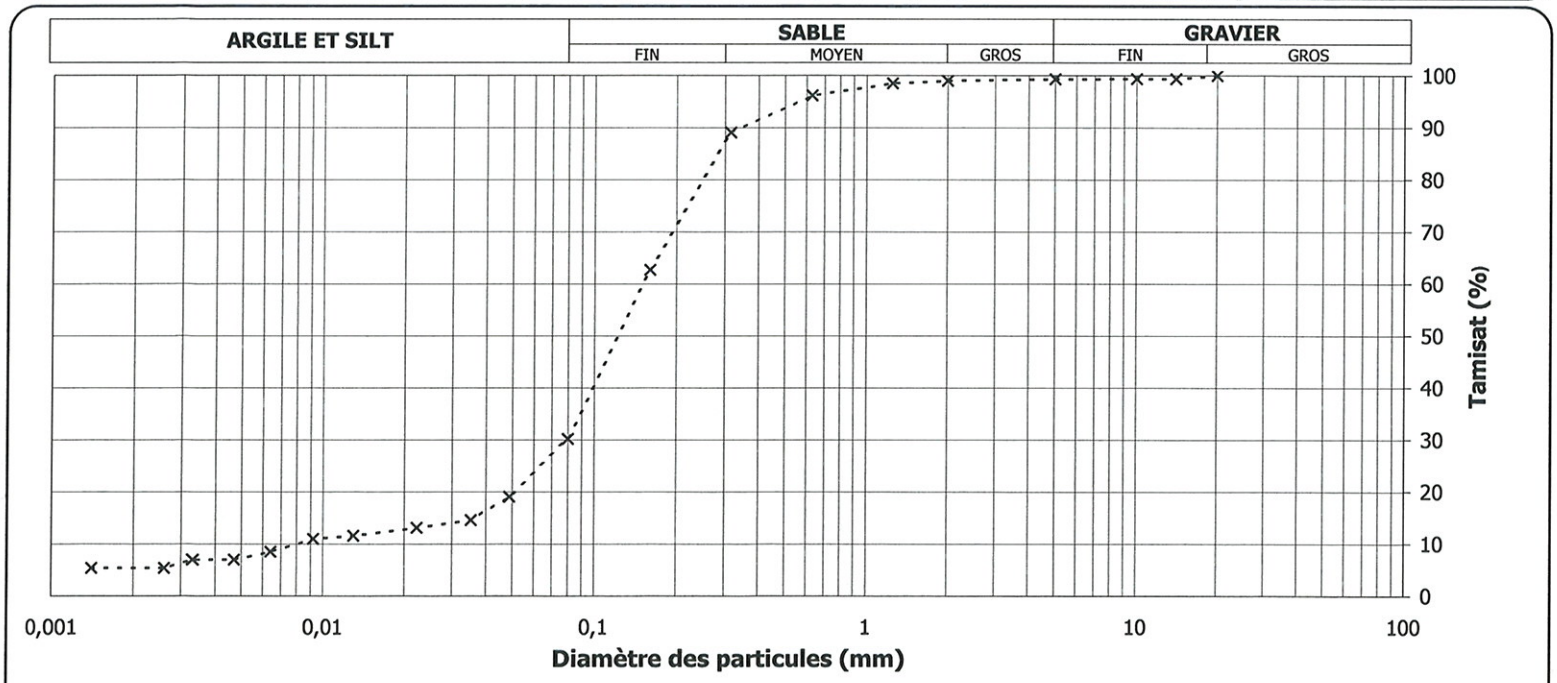
AUTRES ESSAIS	MESURÉ

REMARQUES

Gravier (>2 mm): 0,0 %, Sable grossier (<2 mm et > 0.2 mm): 30,3 %, Sable fin (< 0.2 mm et > 0.06 mm): 46,6 %, Limon(<0.06 mm et > 0.004 mm) : 16,1 %, Argile et colloide(< 0.004 mm) : 7,0 %.présence de matière organique.

Proportion selon analyse (%)

Cailloux :	0,0	Sable :	69,1
Gravier :	0,7	Silt :	24,8
		Argile :	5,4



D_{10} : 0,008 D_{30} : 0,079 D_{60} : 0,151

Préparé par : **Date :**
Sylvie Hamel, Chef laboratoire 2013-09-18

Approuvé par : **Date :**
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Essais sur sols, granulats et autres matériaux

Client : **Exova**
Projet : **Essais en laboratoire Exova; Divers essais en laboratoire**
Endroit : **Québec**

Dossier : **P-0003210-0-01-500**
Réf. client : **CT-043540**
Rapport n° : **28** **Rév. 0**
Page **1 de 1**

ÉCHANTILLONNAGE

Provenance :
N° d'échantillon : 28 N° d'échantillon client : 2432078
Matériau :
Profondeur :
Localisation :

Échantillonné par : le client
Date d'échantillonnage : 2013-08-29
Date de réception : 2013-09-06
Densité relative des particules < 2 mm : 2,700(estimé)

Analyse granulométrique (LC 21-040)		Analyse sédimentométrique (NQ 2501-025)	
Tamis	Tamisat (%)	Diamètre équivalent	Tamisat (%)
112 mm			
80 mm			
56 mm		48,1 µm	21,4
40 mm		34,3 µm	20,0
31,5 mm	100	21,9 µm	17,8
20 mm	99	12,7 µm	17,1
14 mm	99	9,0 µm	16,1
10 mm	99	6,4 µm	15,4
5 mm	99	4,5 µm	14,7
2 mm	91	3,2 µm	12,5
1,25 mm	80	2,6 µm	9,6
0,630 mm	61	1,4 µm	6,0
0,315 mm	47		
0,160 mm	33		
0,080 mm	23,0		

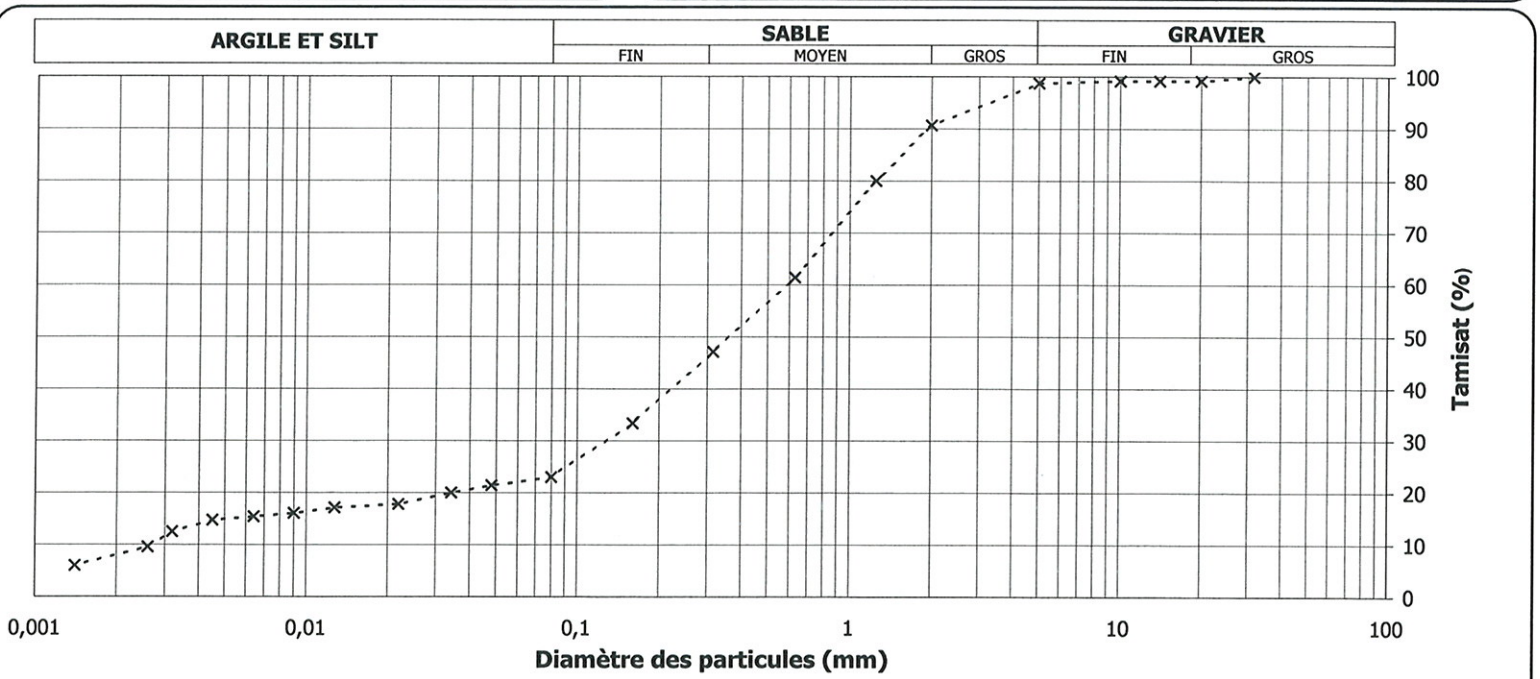
AUTRES ESSAIS	MESURÉ

REMARQUES

Gravier (>2 mm): 0,0 %, Sable grossier (<2 mm et > 0.2 mm): 63,4 %, Sable fin (< 0.2 mm et > 0.06 mm): 14,6 %, Limon(<0.06 mm et > 0.004 mm) : 8,1 %, Argile et colloide(< 0.004 mm):13,9%. Forte présence de matière organique.

Proportion selon analyse (%)

Cailloux :	0,0	Sable :	75,8
Gravier :	1,2	Silt :	15,2
		Argile :	7,8



D_{10} : 0,003 D_{30} : 0,128 D_{60} : 0,589

Préparé par : **Date :**
Sylvie Hamel, Chef laboratoire 2013-09-18

Approuvé par : **Date :**
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Essais sur sols, granulats et autres matériaux

Client : **Exova**
Projet : **Essais en laboratoire Exova; Divers essais en laboratoire**
Endroit : **Québec**

Dossier : **P-0003210-0-01-500**
Réf. client **CT-043540**
Rapport n° : **29** **Rév. 0**
Page **1 de 1**

ÉCHANTILLONNAGE

Provenance :
N° d'échantillon : 29 N° d'échantillon client : 2432082
Matériau :
Profondeur :
Localisation :

Échantillonné par : le client
Date d'échantillonnage : 2013-08-31
Date de réception : 2013-09-06
Densité relative des particules < 2 mm : 2,700(estimé)

Analyse granulométrique (LC 21-040)		Analyse sédimentométrique (NQ 2501-025)	
Tamis	Tamisat (%)	Diamètre équivalent	Tamisat (%)
112 mm			
80 mm			
56 mm		43,6 µm	35,2
40 mm	100	31,5 µm	31,6
31,5 mm	83	20,4 µm	28,0
20 mm	78	12,0 µm	24,5
14 mm	74	8,6 µm	22,1
10 mm	72	6,2 µm	18,5
5 mm	70	4,3 µm	16,2
2 mm	66	3,2 µm	13,8
1,25 mm	64	2,5 µm	12,0
0,630 mm	60	1,3 µm	9,0
0,315 mm	55		
0,160 mm	49		
0,080 mm	41,4		

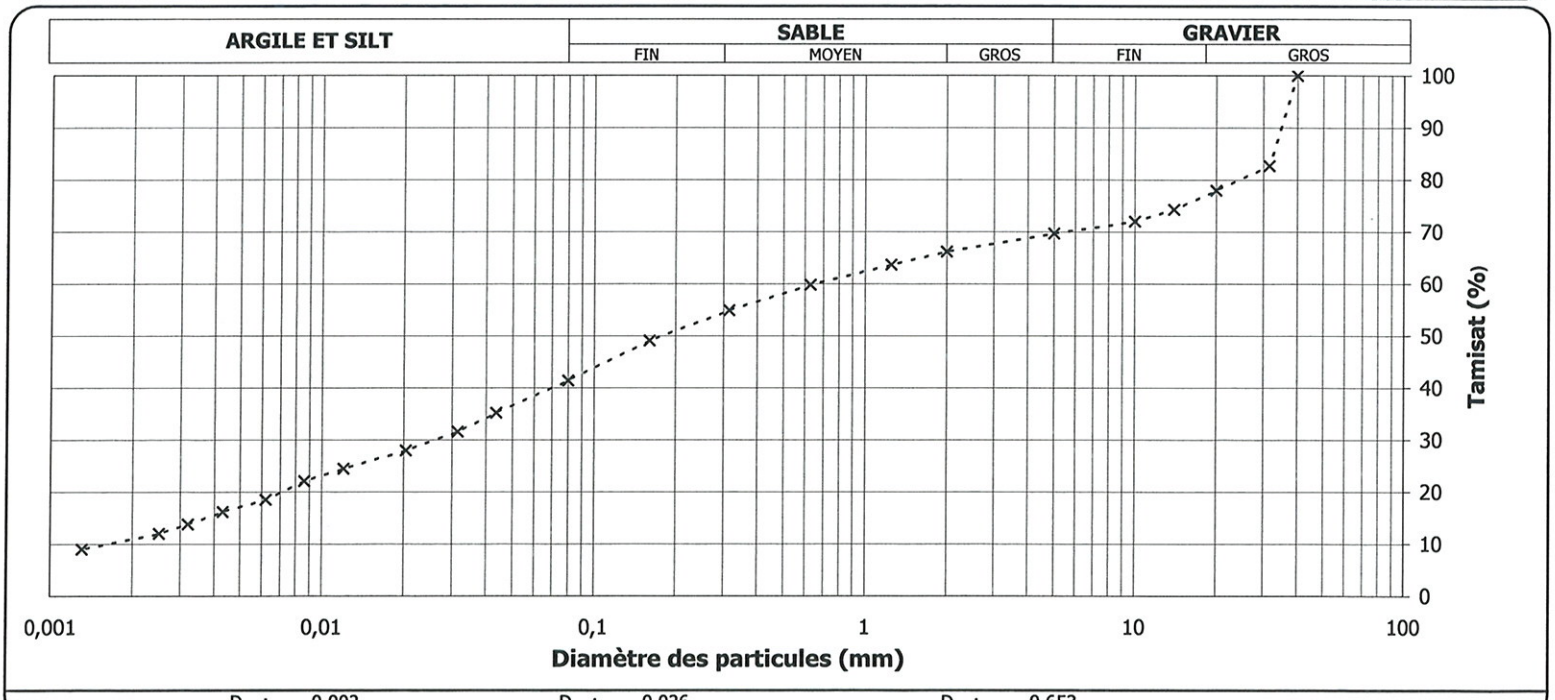
AUTRES ESSAIS	MESURÉ

REMARQUES

Gravier (>2 mm): 34,0 %, Sable grossier (<2 mm et > 0.2 mm): 15,5 %, Sable fin (< 0.2 mm et > 0.06 mm): 12,6 %, Limon(<0.06 mm et > 0.004 mm) : 22,4 %, Argile et colloide(< 0.004 mm):15,5%. Présence de matière organique.

Proportion selon analyse (%)

Cailloux :	0,0	Sable :	28,3
Gravier :	30,3	Silt :	30,7
		Argile :	10,8



D_{10} : 0,002 D_{30} : 0,026 D_{60} : 0,653

Préparé par : **Date :**
Sylvie Hamel, Chef laboratoire 2013-09-18

Approuvé par : **Date :**
Sylvie Hamel, Chef laboratoire

Appendix F: Benthic Invertebrate Identification – Laboratoires SAB Report

Laboratoires

SAB inc.

Référence: SAB: 113428

ANALYSE DU BENTHOS

récolté dans le cadre du projet Joyce Lake

Rapport final

préparé pour

Genivar
Rivière-du-Loup

par

Bernadette Jacquaz
Laboratoires SAB Inc.
Longueuil

Décembre 2013

1166 Saint-Laurent
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Téléphone 450-463-9666
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ÉQUIPE DE TRAVAIL

Chargée de projet et contrôle de qualité	Bernadette Jacquaz (MSc.)
Taxinomie	Fernand Therrien (M.Sc.)
Tri	Houda Bourghoud (B.Sc.)
	Jason Micocci (B.Sc.)

ANALYSE EN LABORATOIRE

Tri

Au laboratoire, les échantillons ont été rincés à l'eau claire dans des tamis superposés ayant des ouvertures de mailles de 4000, 2000, 1000 et 500 µm. La fraction grossière retenue par le tamis de 2000 µm a été triée en totalité à l'aide d'une loupe éclairante. Pour ce qui est de la fraction plus fine (1000 et 500 µm), le tri a été effectué à l'aide d'une loupe binoculaire.

Les organismes récoltés dans les échantillons ont été dénombrés et regroupés selon les grands groupes taxinomiques. Ils ont été conservés dans l'alcool à 70% glycériné pour une identification ultérieure.

Un contrôle de qualité du tri a été effectué sur deux échantillons et consistait en un tri des matières organiques conservées par une personne autre que le trieur d'origine. Les résultats du contrôle de qualité sont présentés au tableau 1.

Identification

L'évaluation taxinomique des organismes benthiques a été effectuée à partir des clés d'identification citées dans Merritt et al. (2008) et dans Thorp et Covich (2010). Le niveau de précision taxinomique visé pour chaque grand groupe d'invertébrés est à la famille sauf les nématodes qui demandent une méthodologie d'échantillonnage et de préservation particulière pour une identification plus précise. Dans certains cas les spécimens n'ont pu être identifiés jusqu'au niveau taxinomique demandé car ils étaient trop petits, trop jeunes, abîmés ou que les clés d'identification disponibles étaient non adéquates.

Dans la majorité des cas, tous les organismes étaient identifiés. Toutefois, dans le cas des trichoptères de la station CR1501 qui étaient abondants (345), cent individus ont été prélevés au hasard dans les fioles puis identifiés. La répartition des différents genres a ensuite été appliquée au nombre total.

Saisi des données

Les données de dénombrement (nombre d'organismes benthiques identifiés) ont été saisies dans un fichier EXCEL sous forme de matrice qui présente les taxons sur les lignes et les échantillons sur les colonnes (tableau 2).

Références

Merritt, R. W., Cummins, K. W. et M.B.Berg, eds. 2008. An introduction to the aquatic insects of North America. 4rd ed., Kendall/Hunt, Dubuque, IA, 1158 pp.

Thorp, J. H., Covich A. P. 2010. Ecology and classification of North American freshwater invertebrates, Third edition. Elsevier Science. 1088 pp.

TABLEAUX

Tableau 1. Résultats du contrôle de qualité sur le tri des organismes benthiques récoltés dans le cadre du projet Joyce Lake en 2013

Échantillon	Nombre total d'organismes triés	Nombre oublié	Pourcentage oublié
CR12 01	477	27	5,7
Iron Arm 01	151	8	5,3

Tableau 2. Nombre d'organismes benthiques récoltés dans le cadre du projet Joyce Lake en 2013.

Taxon	CR 10	CR 12	CR 15	CR 23	Eff. Halde	Gilling R.		Iron Arm									
	01	01	01	01	01	01	02	01	02	03	04	05	06	07	08	9	10
PORIFERA																	
Demospongiae																	
Spongillidae	C							C			C	C				C	
NEMATODA	3	3			42			10			14		2			10	12
MOLLUSCA																	
Gastropoda																	
Heterobranchia																	
Lymnaeidae					1						2						4
Planorbidae			4					9			129					10	3
Valvatidae			1					6		2		1		1	1		1
Bivalvia																	
Sphaeriidae	26		52		3	1			6	6		7	4	17	12	12	4
ANNELIDA																	
Oligochaeta																	
Enchytraeidae	3	20	10		26		3	13			8					15	10
Naididae																	3
Tubificidae	2			2	5							1	3		2		2
Lumbriculidae					4			5			3					2	5
Hirudinea																	
Erpobdellidae								6			1					4	1
Glossiphoniidae					1							1				2	
ARTHROPODA																	
Chelicerata																	
Arachnida																	
Acari																	
Oribati			2														
Prostigmata																	
Hygrobatidae		6						40			100			1		20	7
Laversiidae		1															
Lebertiidae	1	2	3					6			5		1		2	11	2
Limnesiidae					1			3								1	
Sperchontidae		44															
Torrenticolidae			2														
Crustacea																	
Branchiopoda																	
Cladocera																	
Chydoridae											16					13	4
Daphniidae															1		
Holopedidae														1	8		
Ophryoxide					1						6					9	4
Sididae											1					2	
Copepoda																	
Cyclopoida																	
Cyclopidae benthiques																2	1
Ostracoda																	
Podocopida																	
Candonidae											5					9	
Cyprididae																2	
Malacostraca																	
Amphipoda																	
Gammaridae								14			47					8	14
Hyalellidae					6			1						1		2	2

Tableau 2. Nombre d'organismes benthiques récoltés dans le cadre du projet Joyce Lake en 2013.

Taxon	CR 10 01	CR 12 01	CR 15 01	CR 23 01	Eff. Halde 01	Gilling R. 01	02	Iron Arm 01	02	03	04	05	06	07	08	9	10
Uniramia																	
Insecta																	
Odonata																	
Anisoptera																	
Aeshnidae																	
Corduliidae					1												
Ephemeroptera																	
Baetidae		6	1													1	
Ephemerellidae		219	104								1					1	2
Ephemeridae	2					1											
Heptageniidae		1	16					17			42					62	4
Leptophlebiidae			19													47	12
Plecoptera																	
Capniidae											2		2			30	1
Chloroperlidae		1	111														
Leuctridae		5															
Nemouridae		35															
Perlodidae			2														
Taeniopterygidae							1										
Hemiptera																	
Corixidae																	
Trichoptera																	
Apataniidae																2	1
Glossosomatidae			3														
Hydropsychidae		2	28														
Hydroptilidae											1						1
Lepidostomatidae		1															
Leptoceridae																	1
Limnephilidae								11	1		13					5	2
Philopotamidae			242	1													
Phryganeidae					1						13						2
Rhyacophilidae		25	72														
Coleoptera																	
Haliplidae					1						1					1	
Diptera																	
Nematocera																	
Ceratopogonidae	3	9	3		24								1			2	
Chironomidae (pupes)		6									10	1				6	
Chironomidae (larves)	2	78	20	32	33	7	7	10			31	17	2	20	8	37	15
Simuliidae (pupes)		2	1														
Simuliidae (larves)		8															
Tipulidae	1		2		2	1					1						2
Brachycera																	
Dolichopodidae																	
Empididae		2	1		1						1						
Muscidae			13														
Tabanidae	1				2												
CHORDATA																	
Pisces																	
Cottidae		1															

C = Colonie

Tableau 2. Nombre d'organisr

Taxon	Joyce L. 01	02	03	Lac H 01	Lac I 01	Tim.Bay 01
PORIFERA						
Demospongiae						
Spongillidae				C		C
NEMATODA			1	3	1	
MOLLUSCA						
Gastropoda						
Heterobranchia						
Lymnaeidae						
Planorbidae						
Valvatidae				4	6	
Bivalvia						
Sphaeriidae	1			3	22	3
ANNELIDA						
Oligochaeta						
Enchytraeidae	5	3				
Naididae						
Tubificidae						1
Lumbriculidae				1	2	
Hirudinea						
Erpobdellidae				2		
Glossiphoniidae				2		
ARTHROPODA						
Chelicerata						
Arachnida						
Acari						
Oribati						
Prostigmata						
Hygrobatidae						
Laversiidae						
Lebertiidae						
Limnesiidae						
Sperchontidae						
Torrenticolidae						
Crustacea						
Branchiopoda						
Cladocera						
Chydoridae						
Daphniidae						
Holopedidae						
Ophryoxide						
Sididae						
Copepoda						
Cyclopoida						
Cyclopidae benthiques						
Ostracoda						
Podocopida						
Candonidae						2
Cyprididae						
Malacostraca						
Amphipoda						
Gammaridae				3		
Hyalellidae				16		

Tableau 2. Nombre d'organisr

Taxon	Joyce L. 01	02	03	Lac H 01	Lac I 01	Tim.Bay 01
Uniramia						
Insecta						
Odonata						
Anisoptera						
Aeshnidae				1		
Corduliidae						
Ephemeroptera						
Baetidae						
Ephemerellidae						
Ephemeridae						
Heptageniidae						
Leptophlebiidae						
Plecoptera						
Capniidae						
Chloroperlidae						
Leuctridae						
Nemouridae						
Perlodidae						
Taeniopterygidae						
Hemiptera						
Corixidae						
Trichoptera						
Apataniidae						
Glossosomatidae						
Hydropsychidae						
Hydroptilidae						
Lepidostomatidae						
Leptoceridae						
Limnephilidae						
Philopotamidae						
Phryganeidae						
Rhyacophilidae						
Coleoptera						
Haliplidae						
Diptera						
Nematocera						
Ceratopogonidae				2	12	
Chironomidae (pupes)					1	1
Chironomidae (larves)	2			7	119	4
Simuliidae (pupes)						
Simuliidae (larves)						
Tipulidae						
Brachycera						
Dolichopodidae	1					
Empididae						
Muscidae						
Tabanidae						
CHORDATA						
Pisces						
Cottidae						

C = Colonie

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