APPENDIX F:
FISH AND FISH HABITAT BASELINE DATA REPORT
PALMER ENVIRONMENTAL

Prepared for:
Canadian Environmental Assessment Agency

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AMBERSHAW PROJECT SITE

FISH AND FISH HABITAT BASELINE DATA REPORT
ADVANCED EXPLORATION PERMIT

PREPARED FOR:
AMBERSHAW METALLICS INC.

PREPARED BY:
PALMER ENVIRONMENTAL CONSULTING GROUP INC.

MARCH 20, 2019

Revision History

REV. NO.	DATE	AUTHOR	DESCRIPTION
1	March 20, 2019	SF, AC, AB	Updated to most recent mine plan layout and minor revisions from PB

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1 INTRODUCTION

1.1 Background

Ambershaw Metallics Inc. ("AMI") is a Canadian DR-grade magnetite pellet developer company with interests in the Bending Lake Property ("Property" or "site") located approximately 35 km southwest of Ignace, Ontario and 80 km north of Atikokan, Ontario and accessed via a secondary access road from Highway 622 (Figure 1-1). This document is one of a series of environmental baseline reports prepared by Palmer Environmental Consulting Group Inc. (PECG) to describe the existing environmental conditions at the property to support an application to the Ministry of Energy, Northern Development and Mines (ENDM) to support the Bending Lake Advanced Exploration Project ("Project").

The Project consists of an open pit with the extraction of up to 100,000 tonnes of iron mineralized rock to allow for an examination of potential development options with respect to the mineralized rocks present and process options to assess the potential of a commercially viable extraction area. To support this project PECG initiated an integrated baseline environmental program in May 2017 to expand upon the limited environmental information available near the site to provide a comprehensive understanding of the existing environmental conditions.

This introduction section is included in each environmental baseline document prepared by PECG such that each report can be read independently. This report presents the Baseline Fish and Fish Habitat Conditions for the Project. The other baseline reports in the series are those prepared for the following environmental disciplines:

- Hydrogeology;
- Hydrology;
- Water Quality; and
- Terrestrial Ecology.

While each baseline document has been prepared separately, is recognized that all physical, chemical and biological systems are interconnected. As such, PECG has focused on taking an ecosystem and watershed-based approach to understanding the integrated nature of the existing environmental conditions for the Project.

1.2 Project Setting

The Bending Lake property is situated at the southeasterly end of a 30 km long northwest-southeast trending belt of Achaean metamorphosed volcanic and sedimentary rocks which is part of a 70 km long belt of supracrustal rocks referred to as the Manitou-Stormy Lakes greenstone belt. The Project site is located at UTM Zone 15 N 5463800 m, E 559600 m.

Presently, the area is characterized by a wilderness, forestry and mineral exploration land use. Access to the site is along a series of historical exploration and logging roads, accessed from Highway 622 (Figure 1-2). The Advanced Exploration site is located on a local topographic high between the Wabigoon Lake Subwateshed and the Bending Lake Subwatershed, with extraction activities focus in the Bending Lake Subwatershed (Figure 1-3). Page Lake is located south of the site and Bending Lake is located to the east. Page Lake drains into Bending Lake along a small first order stream located in the southern portion of the Project Development Area. Surface water flow at the site is towards the north towards a wetland and drainage features that ultimately discharges onto Bending Lake.

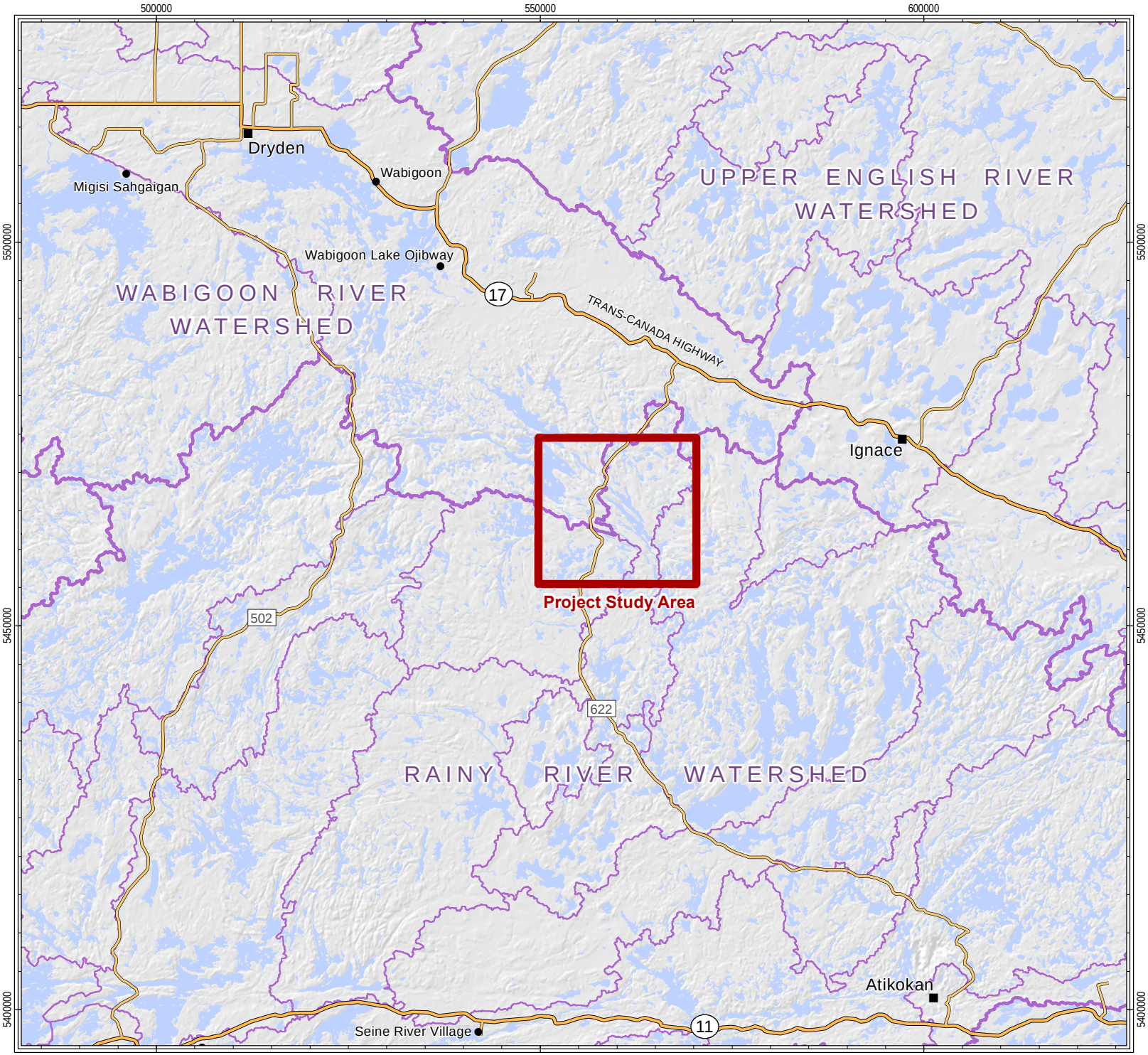
1.3 Overview of the Project

AMI proposes to complete a bulk sampling program as part of an Advanced Exploration Project for the Bending Lake Property. As part of this program, AMI proposes to complete earthworks and bedrock extraction from an open pit for an up to 100,000 tonne bulk sampling program, with crushing and sampling completed on-site. The bulk sample will be trucked off-site for processing at an approved facility to test metallurgical recoveries to assess the commercial viability of the exploration. The Project Description prepared by AMI (October 2018) provides additional details on the proposed Project.

The proposed exploration site facilities layout is presented within the Project Development Area on Figure 1-3. Preference has been given to utilizing previously disturbed areas and existing access roads to complete the Project. The major proposed Project components are expected to include:

- Open Pit Extraction Area (104 m by 71 m by 10 m deep);
- Stockpiles (overburden, mineralized rock);
- Portable Crusher;
- Administration and Parking Facilities;
- On-Site Power and Waste Facilities;
- Extraction area Roads; and
- Access Road.

The Project is proposed to be completed in three phases, with an overall project duration of 4 months. A monitoring and mitigation plan will be implemented based on the recommendations from each of the technical environmental disciplines.



Ambershaw Metallics, Inc.

LEGEND

- Major Highway
- Minor Highway
- Watershed Boundary
- Subwatershed Boundary

Data Sources: Ministry of Natural Resources and Forestry (Watersheds), Natural Resources Canada (Roads, Place Names), Esri basemap service (Imagery).

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kilometres

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DRAWN: B. Elder/S. Feist
CHECKED: J. Cole
PROJECT: 17018
DATE: Dec 16, 2018
Scale 1:700000
UTM Zone 15N
NAD 1983

PALMER ENVIRONMENTAL CONSULTING GROUP INC.

CLIENT: Ambershaw Metallics Inc.
PROJECT: AMI Bending Lake AEP

Project Location

FIGURE 1-1

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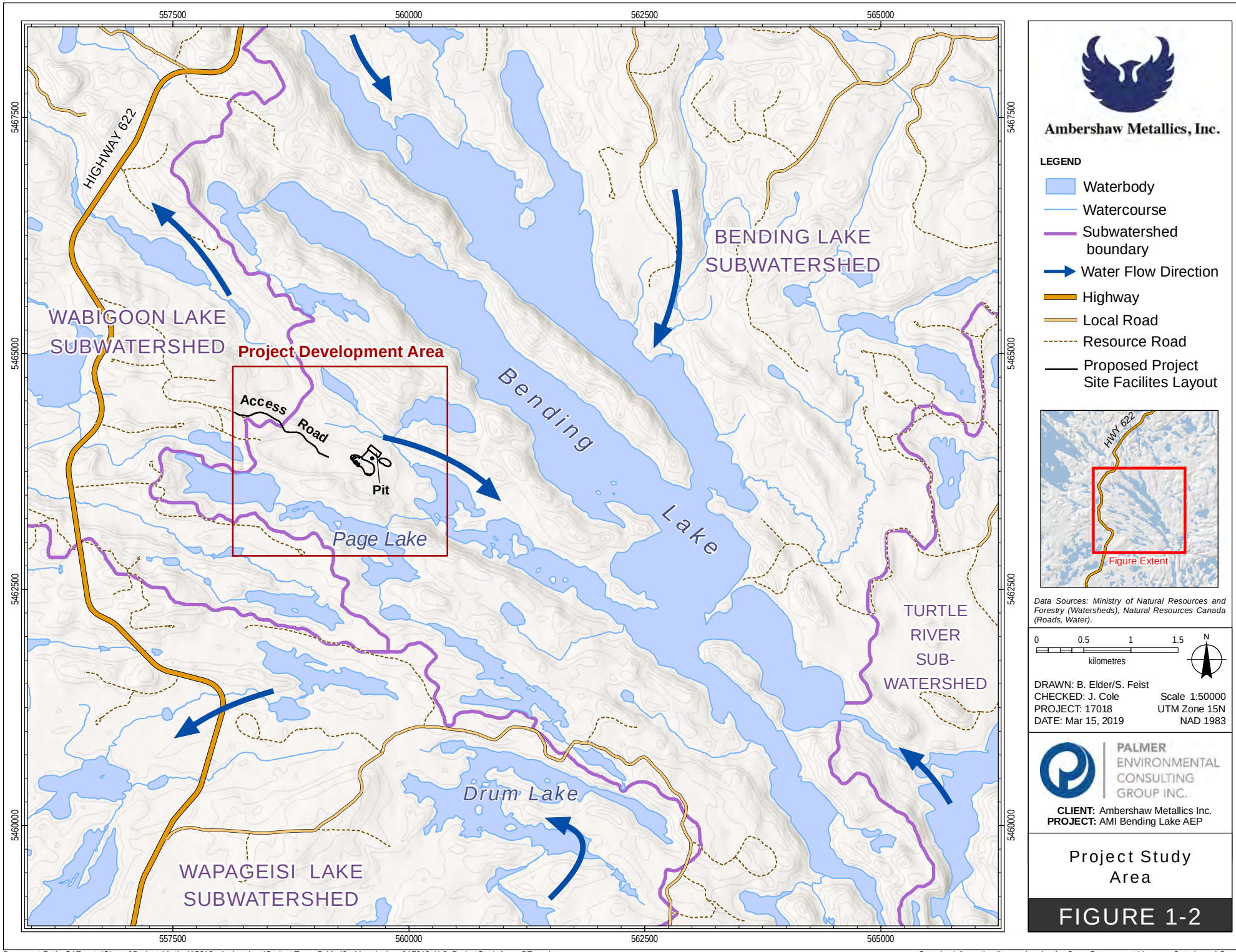

Ambershaw Metallics, Inc.

LEGEND

- Waterbody
- Watercourse
- Subwatershed boundary
- Water Flow Direction
- Highway
- Local Road
- Resource Road
- Proposed Project Site Facilites Layout

Data Sources: Ministry of Natural Resources and Forestry (Watersheds), Natural Resources Canada (Roads, Water).

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DRAWN: B. Elder/S. Feist
CHECKED: J. Cole
PROJECT: 17018
DATE: Mar 15, 2019

Scale 1:50000
UTM Zone 15N
NAD 1983

PALMER ENVIRONMENTAL CONSULTING GROUP INC.

CLIENT: Ambershaw Metallics Inc.
PROJECT: AMI Bending Lake AEP

Project Study Area

FIGURE 1-2

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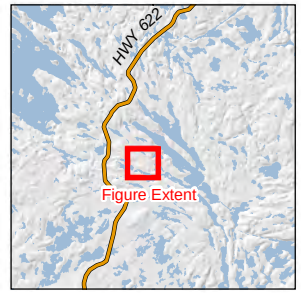
Ambershaw Metallics, Inc.

LEGEND

- Watercourse
- Proposed Project Site Facilities Layout
- Contour (10 m)



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CHECKED: J. Cole
PROJECT: 17018
DATE: Mar 14, 2019

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UTM Zone 15N
NAD 1983

PALMER ENVIRONMENTAL CONSULTING GROUP INC.

CLIENT: Ambershaw Metallics Inc.
PROJECT: AMI Bending Lake AEP

Project Development Area

FIGURE 1-3

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2 FISH AND FISH HABITAT BASELINE PROGRAM OVERVIEW

2.1 Project Objective

The objectives of the 2017/2018 fish and fish habitat baseline program were to:

- Summarize existing fish and fish habitat data collected in the vicinity of the AMI Bending Lake Property;
- Complete fish community sampling, habitat data collection and sediment sampling at select waterbodies based upon proposed infrastructure placement;
- Investigate potential reference sites used for future environmental monitoring of fish and fish habitat; and
- Deploy temperature loggers for long-term temperature monitoring in select areas near the proposed bulk sample pit location.

2.2 Scope of Work

This report presents methods and results of baseline surface water quality studies in support of the Advanced Exploration (AE) permit for Ambershaw Project (the Project). The work conducted in August 2017 included the assessment of fish communities and habitat in areas where infrastructure was proposed in early project plans. In September 2017, work focused on the waterbodies near the proposed bulk sample pit location and included fish community and habitat data collection and sediment collections for baseline metals analysis. In May 2018, habitat near the bulk sample pit was assessed for potential spawning fish and barriers to fish movement were identified in creeks. Temperature loggers were also deployed for continuous water tempterature monitoring in the Project area. The data collected in 2017 and 2018 aimed to fill data gaps identified in previous research at the Project site and will be used to inform planning and permitting in the future.

2.3 Temporal Boundaries

The Project area has been studied in the past, with various programs taking place between 1977 and 2018. Studies include the 1977 Environmental Assessment completed for the Bending Lake Project, prepared for Steep Rock Mines Limited in Atikokan, Ontario (Beak Consultants Limited 1977).

Fish and fish habitat data specific to Ambershaw Metallics Inc. used in the development of this baseline report were collected in 2017 and 2018 programs.

2.4 Spatial Boundaries

The extent of the spatial boundaries for the Fish and Fish Habitat Baseline Study for the Project includes the following areas:

Project Study Area – The Project Study Area boundaries have been delineated to coincide with mapped watershed boundaries of the Bending Lake, Wabigoon Lake, Wapageisi Lake and Turtle River subwatersheds as shown on Figure 1-2. Discipline specific investigations may extend outside of the area shown on Figure 1-2 but are fully contained with the mapped subwatershed boundaries shown on Figure 1-1.

Project Development Area – The Project Development Area boundary encompasses the area immediately affected by the proposed Bending Lake Advanced Exploration site facilities as shown on Figure 1-3.

3 BACKGROUND INFORMATION

3.1 Regulatory Context

Fish and fish habitat are protected under a variety of federal regulatory acts and regulations. The primary document used to guide the 2017/2018 fish and fish habitat baseline program is the *Fisheries Act* (DFO 1985). The *Fisheries Act* (DFO 1985) prohibits "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". "Serious harm" is defined to include the death of fish and any permanent alternation or destruction of habitat. Any proposed works suspected to result in serious harm require a *Fisheries Act* Authorization. Serious harm to fish should be avoided or mitigated where possible. Avoidance measures may include the relocation of infrastructure to non-fish bearing areas or by timing activities to avoid harm to fish and fish habitat. Mitigation measures include the implementation of best management practices during all phases of the project to reduce the intensity of any potential impacts where serious harm to fish and fish habitat cannot be completely avoided.

3.2 Regional Setting

The Project is located within the Bears Passage-Rainy Lake and Wabigoon Watersheds. The majority of proposed infrastructure is located within the Bending Lake sub-watershed, with only a small section of the proposed road passing through the Wabigoon Lake sub-watershed (Figure 1-2). Fish and fish habitat studies conducted for the Project in 2017 covered a wide spatial range to capture key areas where infrastructure could potentially be placed as well as reference areas, whereas studies conducted in 2018

focused on waterbodies in the potential receiving environment downstream of the proposed bulk sample pit (Figure 1-2). Sites sampled in 2017 and 2018 were located in the Wapageisi Lake sub-watershed, Wabigoon Lake sub-watershed and the Bending Lake sub-watershed.

The Project area is characterized by a variety of waterbody types including large and small lakes, ponds, wetlands and streams. Bending Lake is located adjacent to the proposed bulk sample pit. The lake derives its name from the fact that the Turtle River forms a large bend in the lake at the southwest end, draining into Redgut Bay on Rainy Lake approximately 110 km downstream. Bending Lake is divided into six basins: the west bay, middle bay, north bay, inlet bay, outlet bay and the central basin. Most of the lake's volume is contributed by the middle and north bays with maximum depths of 48 m and 38 m, respectively (Beak Consultants 1977). The west bay is the closest in proximity to the proposed infrastructure and is distinctly different from the other bays of Bending Lake. The maximum depth of the west bay is approximately 6 m, with the majority of the bay exhibiting depths of less than 3 m (Beak Consultants 1977).

3.3 Historical Studies

The purpose of the literature review was to summarize data previously collected in the vicinity of the AMI Bending Lake Property. Several years of baseline studies have been completed near the Project area, corresponding to previous ownership of the property and prospective activities. Historical information relating to fish communities and fish habitat reviewed include:

a) Environmental Assessment of the Bending Lake Project (Beak Consultants Limited 1977); and

b) Ministry of Natural Resources Fish ON-Line database.

A comprehensive Environmental Assessment (EA) was conducted by Beak Consultants Limited in 1977 for Steep Rock Iron Mines Limited, a previous owner of the property. The EA detailed the environmental setting at the time, including a thorough description of the local aquatic biota communities. The EA reported a fish community typical of large oligotrophic lakes in the area, consisting of lake trout (*Salvelinus namaycush*), cisco (*Coregonus artedi*), lake whitefish (*Coregonus clupeaformis*), northern pike (*Esox lucius*), white sucker (*Catastomus commersonii*), silver redhorse (*Moxostoma anisurum*), burbot (*Lota lota*), yellow perch (*Perca flavescens*) and walleye (*Sander vitreus*). Little is known regarding the life history and ecology of the fish in Bending Lake, however it was suggested that shallow bays of the lake may act as excellent rearing habitat for young walleye and is also likely to be appropriate northern pike habitat. The majority of the lake is deep and well-oxygenated, providing key habitat for lake trout whitefish, cisco and burbot (Beak Consultants Limited 1977).

The Ontario Ministry of Natural Resources and Forestry (MNRF) ON-Line database was used to assess fish catch data collected by the MNRF in waterbodies within the Project area. These waterbodies include Bending Lake, Bending Creek, Beak Lake, and Page Lake. Fish community data aided in the selection of sample sites for the 2017/2018 field programs.

4 METHODOLOGY

4.1 Study Design

The study design for the 2017 and 2018 field programs focused on assessing the fish community and general habitat in areas specifically identified as potential locations for the placement of project infrastructure as well as in potential reference areas. Two site visits were completed in 2017 (August and September) and one visit was completed in 2018 (in May).

4.2 Field and Laboratory Methods

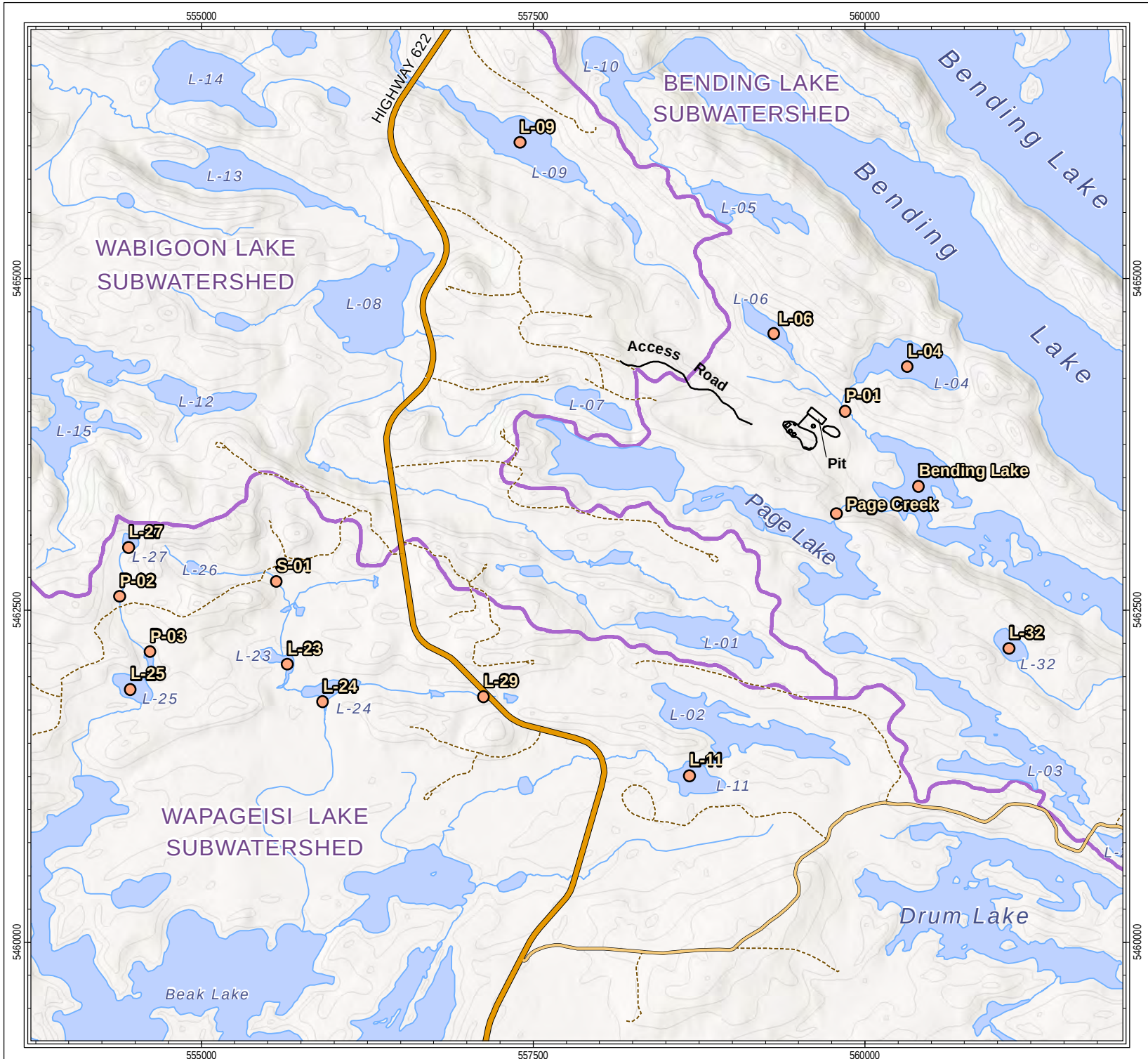
A total of 11 lakes, 2 streams and 3 ponds were assessed for fish community and habitat (Table 4-1, Figure 4-1). Sediment was collected at 4 sites within the vicinity of the proposed bulk sample pit location, and temperature loggers were deployed at 4 sites (Figure 4-2). A summary of site locations is presented in Table 4-1.

Table 4-1. Summary of fisheries and aquatics sampling completed during three field visits conducted within the Project area between 2017 and 2018.

Site	Coordinates Zone 15 U		August 2017		September 2017			May 2018	
	Easting	Northing	Fish Community Sampling	Fish Habitat Assessments	Fish Community Sampling	Fish Habitat Assessments	Sediment	Fish Habitat Assessments	Temperature Logger Deployment
L-11	558459	5461391	X	X					
L-23	555634	5461950	X	X					
L-24	555909	5461827	X	X					
L-25	554598	5461968	X	X					
L-27	554418	5462929	X	X					
L-29	557029	5461878	X	X					
L-32	561213	5462216	X	X					
Bending Lake	560463	5463446			X	X	X*	X**	
L-04	559877	5464145			X	X	X		X (outlet)
L-06	559450	5464394			X	X			
L-09	556576	5466459							X
Page Creek	559810	5463214			X	X		X**	X
S-01	555567	5462716	X	X					
P-01	559839	5463985			X	X	X		X
P-02	554384	5462604	X	X					
P-03	554616	5462187	X	X					

* Waterbodies where two sediment samples were taken from different locations

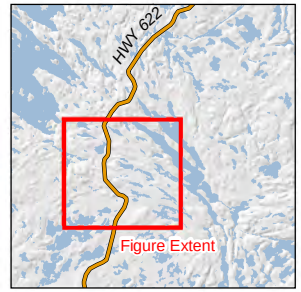
** Sampling focused on identifying spawning habitat



Ambershaw Metallics, Inc.

LEGEND

- Waterbody
- Watercourse
- Subwatershed boundary
- Highway
- Local Road
- Resource Road
- Proposed Project Site Facilites Layout
- Lake / Stream Site



Data Sources: Ministry of Natural Resources and Forestry (Watersheds), Natural Resources Canada (Roads, Water).

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DRAWN: B. Elder/S. Feist
CHECKED: A. Crichton
PROJECT: 17018
DATE: Mar 15, 2019

Scale 1:40000
UTM Zone 15N
NAD 1983

PALMER ENVIRONMENTAL CONSULTING GROUP INC.

CLIENT: Ambershaw Metallics Inc.
PROJECT: AMI Bending Lake AEP

Lake/ Stream Sites

FIGURE 4-1

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4.2.1 Temperature

Four TidbiT v2 Water Temperature Data Loggers (Onset) were deployed in May 2018 to record in situ water temperature within the Project area (Table 4-2). Water temperatures will provide insight into the timing of seasonal activity which dictate many life-history tactics in fish species present. Locations for loggers were chosen based upon their proximity to the proposed bulk sample pit location. Loggers were placed in the deepest water possible in each waterbody, secured to the shoreline using a steel cable and flagged with flagging tape. All loggers were set to begin logging temperature at 12:00 pm, at a frequency of one record every 30 minutes.

Table 4-2. Summary of temperature logger locations, Ambershaw Metallics Inc. Bending Lake Property, 2018

Site	UTM Coordinates Zone 15 U		Date of Deployment
	Easting	Northing	
P-01	559839	5463985	May 29, 2018
L-04 (outlet stream)	559849	5464119	May 29, 2018
Page Creek	560123	5463315	May 29, 2018
L-09	557817	5465737	May 29, 2018

4.2.2 Sediment

Sediment chemistry analysis is an important environmental monitoring component as sediments provide habitat for algae, plants, microorganisms, and macro-invertebrates, which in turn support higher trophic communities such as fish. Sediment chemistry analysis may provide more insight into long-term contaminant levels in comparison to water quality testing, as contaminants are integrated into sediments over time, and are more likely to capture periodic or storm-based contamination events. Sediment contaminants may be incorporated into the aquatic food web, resulting in harm to aquatic organisms.

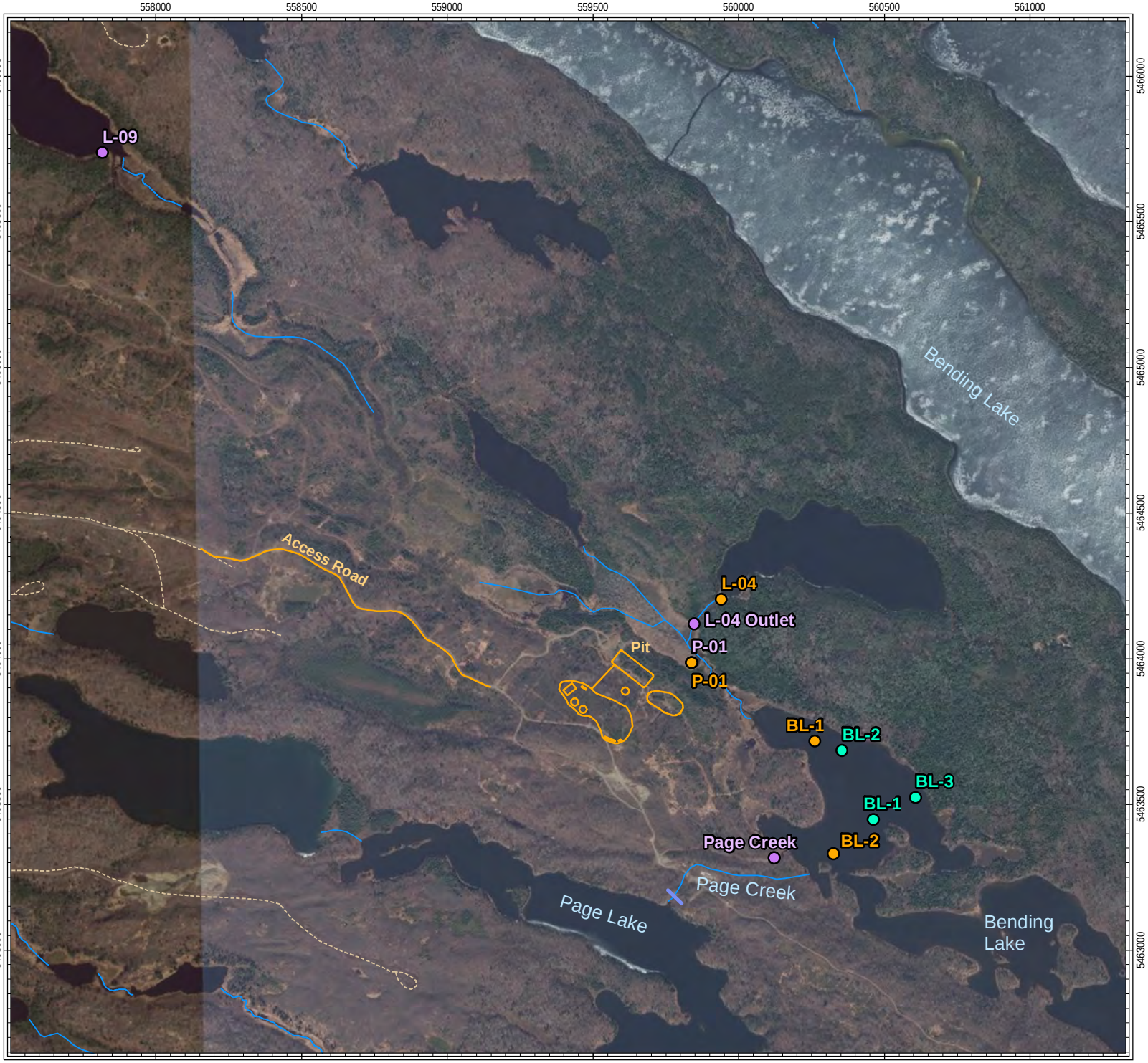
Sediment samples were collected at 4 sites in the vicinity of the proposed bulk sample pit location in September 2017 including two sites in the west bay of Bending Lake (BL-1 and BL-2), one site at P-01 and one site in the outlet creek of L-04 (Table 4-1, Figure 4-2). At each site, 2 jars of sediment were collected either by using an Ekman grab sampler at deeper depths (greater than 0.5 m deep; BL-1 and BL-2) or by hand using clean gloved hands at shallower depths (less than 0.5 m deep; P-01 and L-04 outlet). A duplicate sample was taken at one of the sample sites (L-04 outlet) for Quality Assurance and Quality Control (QA/QC).

Sediment samples were submitted to ALS Environmental in Thunder Bay, Ontario for metals, total solids, volatile solids and total organic carbon analysis on September 15, 2017. Samples were dried in an oven at 103 – 105°C. The weight of the residual solids represented the total solids. The residue was then ignited to 550°C, and the weight lost on ignition represented the volatile solids. Soil was treated with excess acidic dichromate, which reacts with the organic carbon, oxidizing it to CO_2. The residual dichromate was titrated

with ferrous ammonium sulphate and TOC calculated by difference. Metals analysis was completed using a heated strong acid digestion with HNO_3 and HCl, which is intended to liberate metals that may be environmentally available. The solution was then analyzed by Collision/Reaction Cell ICPMS.

Table 4-3. Summary of sediment sampling site locations and descriptions, Ambershaw Metallics Inc. Bending Lake Property, 2017.

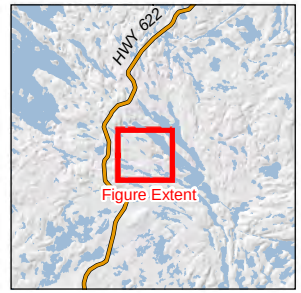
Site	Coordinates Zone 15 U		Date Visited	Site Description
	Easting	Northing		
BL-1	560262	5463715	Sept 13, 2017	Sediment sample was collected in the center of the channel leading from the inlet
BL-2	560326	5463330	Sept 13, 2017	Sediment sample was collected in the center of the narrows leading out of the west bay of Bending Lake into the south arm
P-01	559839	5463985	Sept 13, 2017	Sediment was collected immediately upstream of the beaver dam limiting flow into the west bay of Bending Lake
L-04	559942	5464202	Sept 13, 2017	Sediment sample was collected in the bay upstream of a large beaver dam restricting flow at the outlet of the lake



Ambershaw Metallics, Inc.

LEGEND

- Watercourse
- Proposed Project Site Facilities Layout
- Resource Road
- Gill Net Location
- Sediment Sample Site
- Temperature Logger
- Waterfall



Data Sources: Natural Resources Canada (Roads, Water, Contours, DEM).

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DRAWN: S. Feist
CHECKED: A. Crichton
PROJECT: 17018
DATE: Mar 15, 2019

Scale 1:18600
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PALMER ENVIRONMENTAL CONSULTING GROUP INC.

CLIENT: Ambershaw Metallics Inc.
PROJECT: AMI Bending Lake AEP

Sampling Locations

FIGURE 4-2

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4.2.3 Fish Community

Fish community assessment provides valuable insight into the distribution of fish species within a given area. This data can be used to influence infrastructure planning to avoid areas of importance to local fish communities. It also assists in the identification of non fish-bearing waterbodies, which provide ideal locations for potential infrastructure.

Site specific fish sampling methods were conducted and included backpack electrofishing, minnow trapping and gill netting. Method of fish collection was dependent on accessibility of site, as well as water depth. Limited access to the majority of the sites resulted in the use of electrofishing and minnow trapping for fishing efforts, with gill-netting only completed on one lake.

Electrofishing was completed at 12 sites using a Smith-Root LR-20 Backpack Electrofisher and a two or three-person crew (Table 4-3). The area of sampling varied among water bodies and water depth, however effort was made to sample a variety of sections along the shoreline of each water body. All fish captured were placed into a bucket until sampling was completed and the number of seconds spent fishing was recorded.

Gill nets were set in in the west bay of Bending Lake, which was the only lake sampled in 2017 by boat access due to logistical constraints (Table 4-3). Nets were set in three areas (Figure 4-2), and varied in mesh sizes to ensure that all sizes of fish were targeted. Nets were set for short periods of time (35 to 53 minutes) to minimize the potential for fish mortality. All fish were removed from the net, placed into a holding tank, and promptly sampled. Immediately after sampling, fish were live-released a minimum of 50 m away from the net location to avoid recapture.

Minnow trapping was conducted in water bodies that were easily accessible and had deep pools that were difficult to sample using a backpack electrofishing unit (Table 4-3). Minnow traps were set in the afternoon and were picked up the following day, with set times ranging from 18 to 21 hours.

All fish were identified to species, total length was measured to the nearest 1 mm and wet weight was measured to the nearest 0.1 g with an electronic balance (Ohaus Scout Pro SP2001) or mechanical spring scale, depending on size. During the August 8-11 field program only total length was obtained. Due to the large number of fish captured at some sites, up to 30 fish/species were measured per sampling event.

All fish sampling was conducted under a Licence to Collect Fish for Scientific Purposes (Licence No. 1087478) issued by the Ontario Ministry of Natural Resources and Forestry.

Table 4-4. Summary of fishing methods employed at waterbodies within the Project area in August and September, 2017.

Fish Habitat/Fish Community Sites Visited	Fish Capture Method	Date Sampled
L-11	BEF	August 10, 2017
L-24	BEF	August 10, 2017
L-25	BEF	August 9, 2017
L-27	MT, BEF	August 9, 2017
L-29	MT	August 9, 2017
L-32	BEF	August 11, 2017
Bending Lake (west bay)	GN	September 13, 2017
L-04	BEF	September 13, 2017
L-06	BEF	September 14, 2017
L-09	BEF	September 14, 2017
Page Creek	BEF	September 14, 2017
S-01	BEF	August 9, 2017
P-01	BEF	September 13, 2017
P-02	BEF	August 9, 2017
P-03	MT	August 9, 2017

Notes: BEF=backpack electrofishing, MT=minnow trap, GN=gill net

Table 4-5. Summary of Bending Lake gill net sampling site locations, Ambershaw Metallics Inc. Bending Lake Property, 2017.

Site	Coordinates Zone 15 U		Date
	Easting	Northing	
BL-1	560463	5463446	September 13, 2017
BL-2	560356	5463684	September 13, 2017
BL-3	560607	5463522	September 13, 2017

4.2.4 Fish Habitat

A total of 16 sites located in lakes and streams in the vicinity of the AMI Bending Lake property were chosen to assess fish habitat (Table 4-1, Figure 4-1). All sites were visited by the field crew and were photographed. Habitat was identified as fish-bearing or non-fish bearing. Due to remote access and logistical constraints in transporting gear to some sites, habitat assessments were confined to shoreline assessments. General habitat characteristics were recorded including dominant streamside vegetation, presence/absence of beaver activity, estimated depth, presence/absence of aquatic macrophytes and the potential suitability for fish habitat.

Spawning habitat in the vicinity of the proposed bulk sample pit location was assessed in May 2018. Areas investigated included the west bay of Bending Lake near the inlet and Page Creek (Figure 4-1). The west bay inlet and Page Creek were also assessed for barriers to fish passage that would limit spawning fish movement into these systems.

4.3 Data Analysis

4.3.1 Sediment

All sediment data was compared to the Canadian Council of Ministers of the Environment (CCME) Sediment Quality Guidelines for the protection of aquatic life (1999) to identify any parameter exceedances. CCME established two types of guidelines, Interim Sediment Quality Guidelines (ISQG) and Probable Effects Level (PEL). ISQG are concentrations below which adverse biological effects are expected to rarely occur, and PEL are concentrations above which biological effects are expected to occur frequently.

4.3.2 Fish Community

Fish abundance in the study area was determined using a catch per unit effort (CPUE) index, defined as the fish caught per 100s of electrofishing effort, number of fish caught per minnow trap per day (24h), or number of fish caught per hour with a gill net.

4.4 Quality Assurance and Quality Control

The quality assurance/quality control (QA/QC) analysis encompasses both field and laboratory activities for all site visits and sediment samples collected in October 2017.

4.4.1 Field Data Collection QA/QC Procedures

4.4.1.1 Equipment

The backpack electrofishing unit was provided by TBT Engineering Consulting Group (TBTE) where it was maintained and serviced regularly. Batteries were charged each night prior to field visits and an extra battery was brought into the field each day.

4.4.1.2 Field Procedures

Field notes and in situ data were recorded on waterproof paper. At the end of each day, field notes were checked to ensure completeness. In addition, field photographs were collected at each site and photo numbers and descriptions were recorded at each site location.

Sterile jars were provided by ALS Environmental and samples were collected using a clean Ekman grab sampler. The Ekman was cleaned thoroughly between samples to ensure that no cross contamination occurred. Samples were returned to ALS with labels, chain of custody (COC) forms, and any additional instructions.

4.4.1.3 QA/QC Samples

A duplicate sample was taken at one of the four sediment sample locations to evaluate repeatability and reliability of the sample results. The purpose of a duplicate sample is to estimate sampling and laboratory analytical precision, are collected and handled the same as their primary sample and are collected at the same time or shortly after the primary sample.

4.4.1.4 Laboratory Analysis QA/QC Procedures

ALS Environmental was retained for sample analysis for this Project. ALS is an accredited laboratory for sediment analysis with rigorous internal QA/QC procedures. In the event of a failed internal QA/QC test, the laboratory re-runs all analyses affected by the same factors as the failed internal QA/QC sample.

4.4.1.5 Office Data Management QA/QC Procedures

Data is received from ALS Environmental as a Microsoft Excel spreadsheet and a PDF version of the Certificate of Analysis (COA). Upon receipt of the laboratory results, the data is reviewed to ensure the data reported in the COA and Excel file are identical. All original lab files are saved and stored for reference.

5 RESULTS AND DISCUSSION

5.1 Temperature

Temperature loggers were deployed at four sites on May 29, 2018. Temperature logger sites included one site downstream of the proposed bulk sample pit within the Bending Lake subwatershed (P-01), one site downstream of the proposed bulk sample location within the Wabigoon Lake subwatershed, one site within Page Creek immediately upstream of its confluence with Bending Lake and one within the outlet creek of L-04 (Table 4-2, Figure 4-2).

At the time of development of this report, the temperature loggers have not been revisited to extract data. Future sampling efforts (proposed for spring 2019) should include the download of logger data for analysis and incorporation into the dataset, to further understand the timing of seasonal activity for fish species.

5.2 Sediment Quality

5.2.1 Comparisons to CCME Sediment Quality Guidelines

Sediment quality results were compared to CCME guidelines, summarized in Table 4-5. Sediments were analyzed for metals and concentrations (µg/gram dry weight) were compared to both CCME Interim Sediment Quality Guidelines (ISQG) and CCME Probable Effects Level (PEL). As only six metals have associated CCME sediment quality guidelines (arsenic, cadmium, chromium, copper, lead and zinc), these metals are discussed further in this report. Currently no CCME sediment guidelines exist for iron, therefore iron content in the sediment is not discussed further. Further information on concentrations of iron in other environmental media (e.g. water) is presented in the 2018 Surface Water Quality Baseline Data Report: Advanced Exploration Permit (PECG, 2019). Out of the six metals with associated guidelines, exceedances of ISQG guidelines were observed for three: cadmium (Cd), chromium (Cr) and copper (Cu). All exceedances were observed at different sites. Cadmium guidelines were exceeded at BL-01, chromium guidelines were exceeded at L-04 and copper guidelines were exceeded at S-01 (Table 5-2). No PEL exceedances were observed.

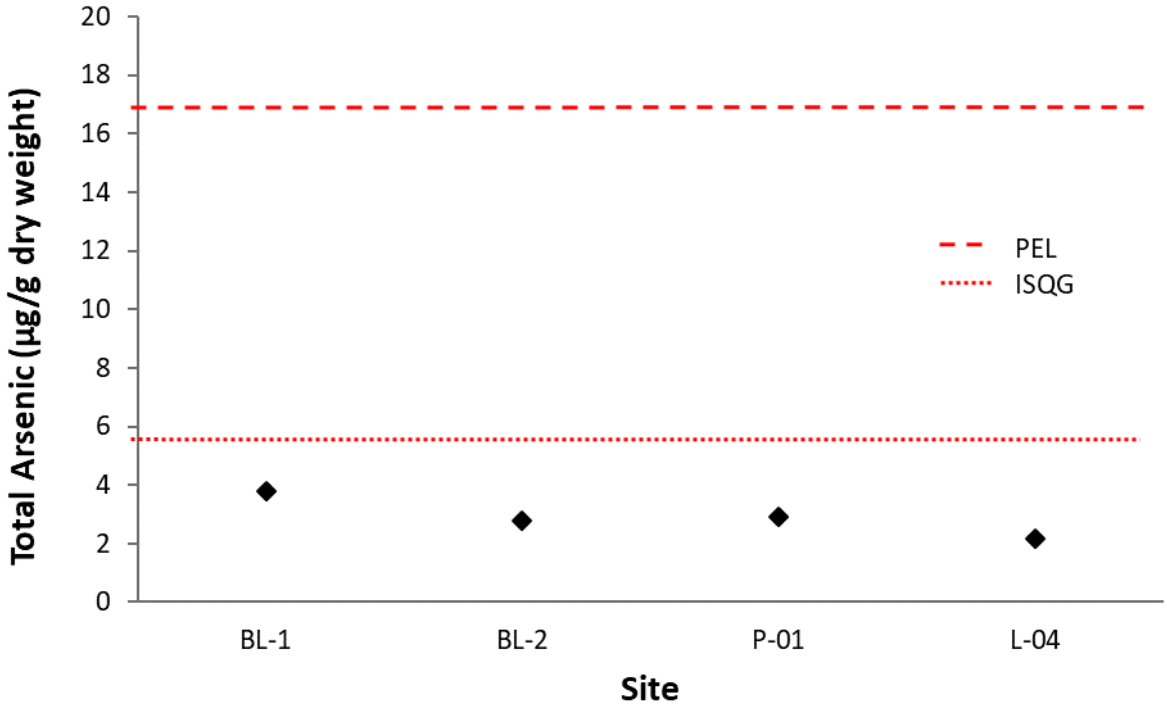
The complete dataset received from ALS Environmental can be found in Appendix C.

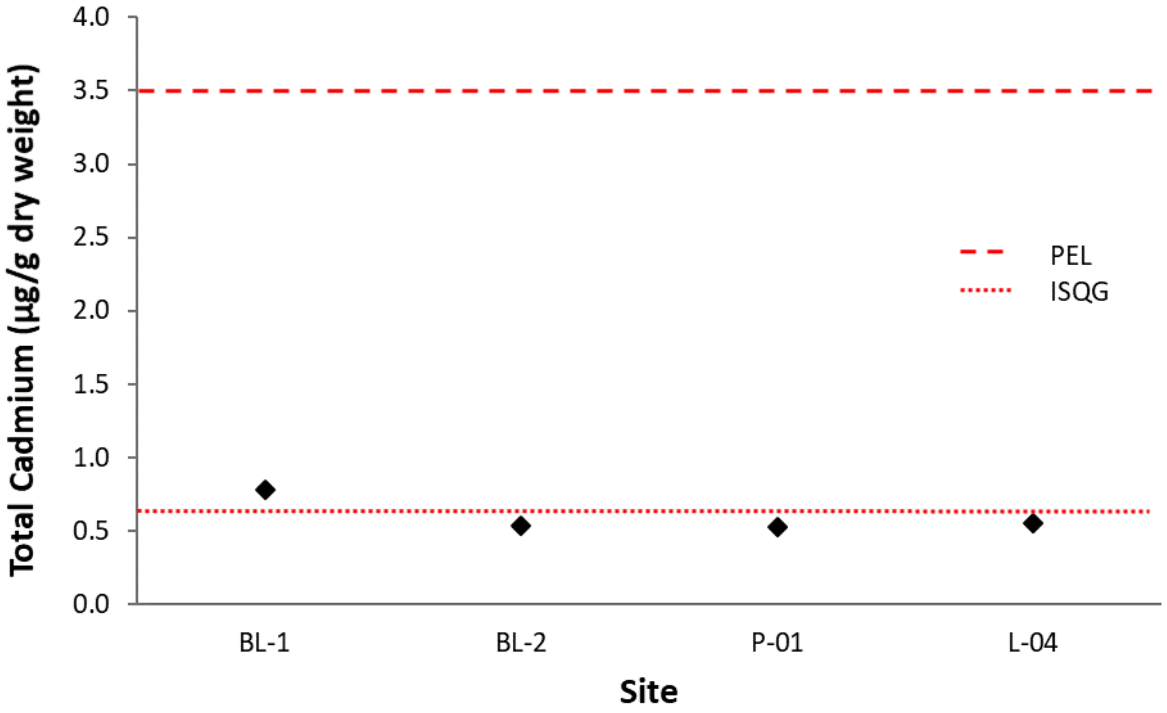
Table 5-1. Summary of CCME sediment quality guidelines for the protection of aquatic life (1999) for six of the metals analyzed with associated guidelines.

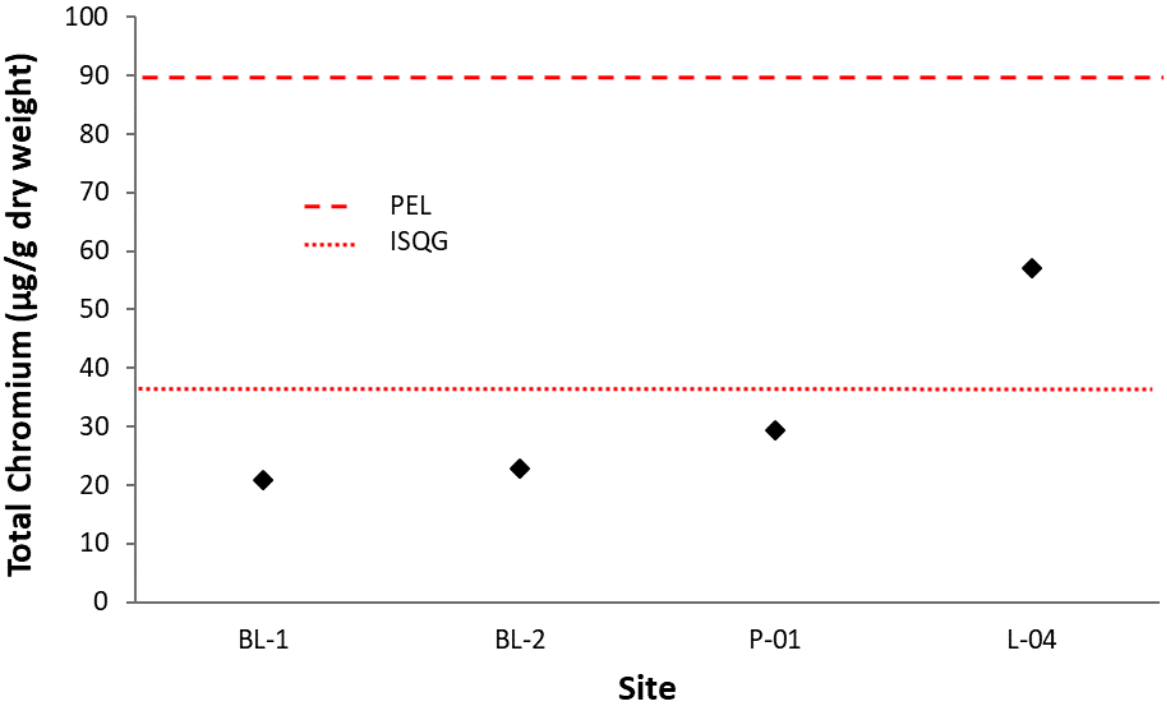
Metal	CCME Sediment Quality Guideline (µg/g dry weight)	
	Interim Freshwater Sediment Quality Guideline (ISQG)	Probable Effects Level (PEL)
Arsenic	5.9	17.0
Cadmium	0.6	3.5
Chromium	37.3	90.0
Copper	35.7	197.0
Lead	35.0	91.3
Zinc	123.0	315.0

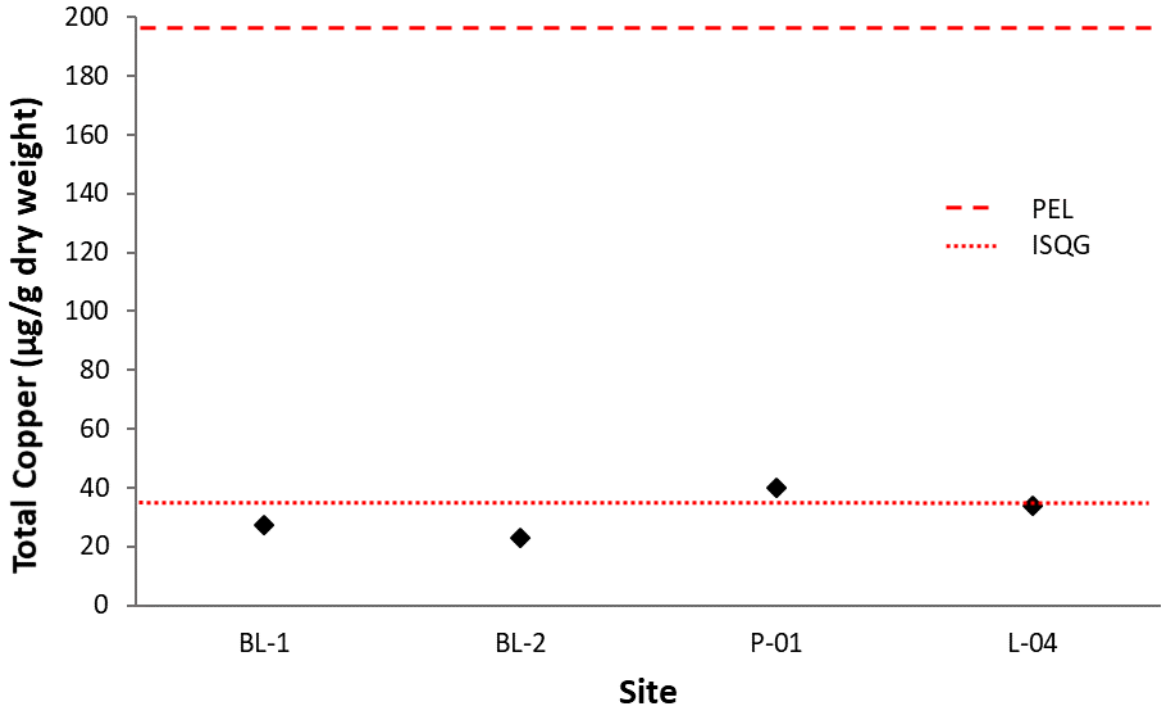
Table 5-2. Sediment quality parameters exceeding CCME guidelines, Ambershaw Metallics Inc. Bending Lake Property, 2017.

Site	Interim Freshwater Sediment Quality Guideline (ISQG)	Probable Effects Level (PEL)
BL-1	Cadmium	-
P-01	Copper	-
L-04	Chromium	-


Total Arsenic (µg/g dry weight)
20
18
16
14
12
10
8
6
4
2
0
PEL
ISQG
BL-1
BL-2
P-01
L-04
Site


Total Cadmium (µg/g dry weight)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
PEL
ISQG
BL-1
BL-2
P-01
L-04
Site


Total Chromium (µg/g dry weight)
100
90
80
70
60
50
40
30
20
10
0
PEL
ISQG
BL-1
BL-2
P-01
L-04
Site


Total Copper (µg/g dry weight)
200
180
160
140
120
100
80
60
40
20
0
PEL
ISQG
BL-1
BL-2
P-01
L-04
Site

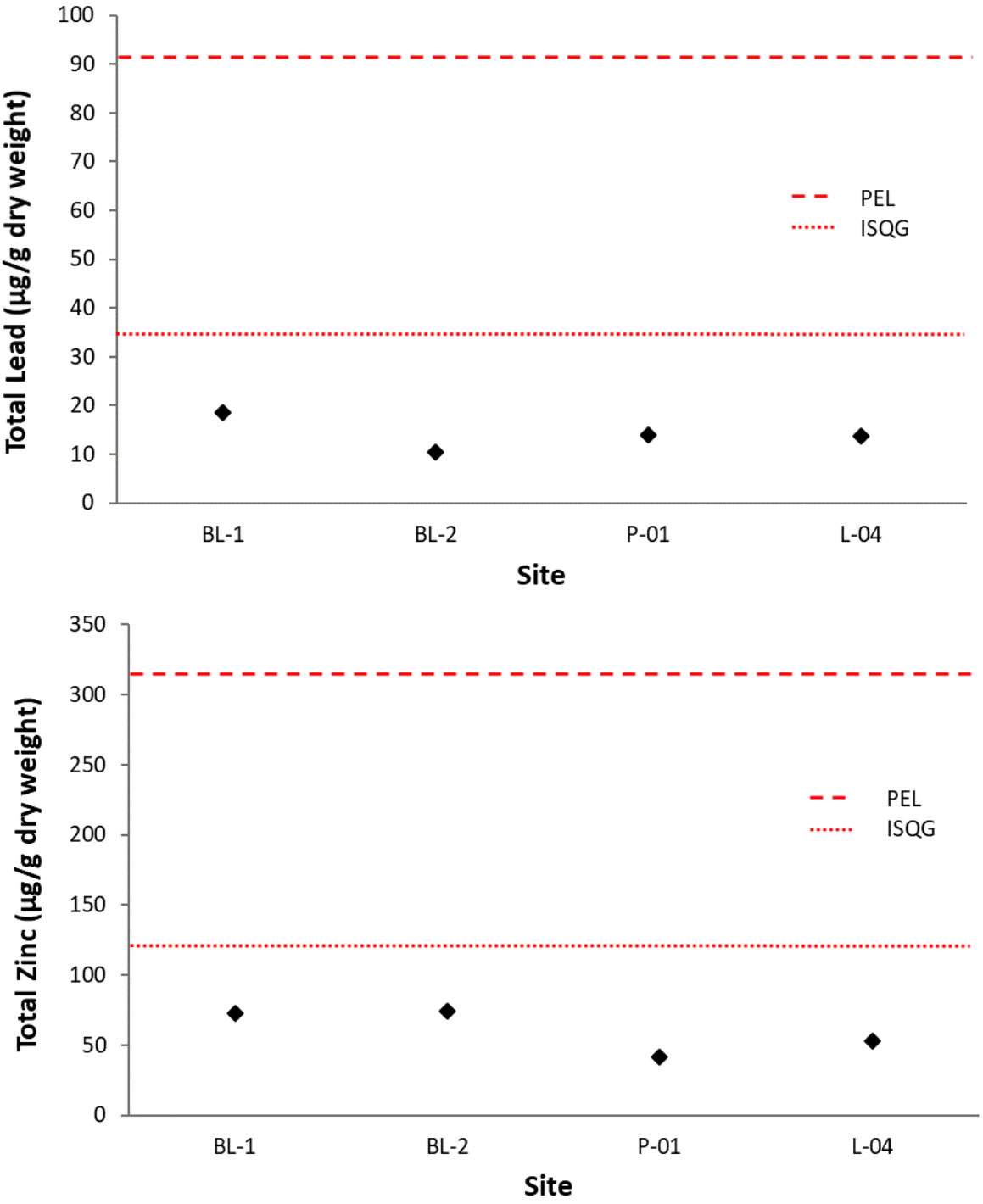


Figure 5-1. Values of selected total metals with comparisons to CCME Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, Ambershaw Metallics Inc. Bending Lake Property, 2017. The dotted line is CCME Interim Sediment Quality Guideline (ISQG) and the dashed line is CCME Probable Effects Level (PEL) guideline.

5.3 Fish Habitat

A total of 16 sites (11 lakes, 3 ponds, 2 streams) were visited in the vicinity of the AMI Bending Lake Property and fish habitat assessments were completed at these sites (Figure 4-1). Site descriptions and fish habitat suitability assessment can be found in Table 5-3. Site specific photos are included as Appendix A.

Table 5-3. Summary of fish habitat community sampling site locations and descriptions, grouped by waterbody category (lake, stream, pond), Ambershaw Metallics Inc. Bending Lake Property, 2017.

Site	Coordinates Zone 15 U		Date Visited	Suitable Fish Habitat (Y/N/Un)	Site Description
	Easting	Northing			
Lakes					
L-11	558459	5461391	Aug 10, 2017	Y	Large, deep lake with rocky northern shoreline. Southern shoreline is heavily vegetated, with areas of wetland. Inlet from L-02 is blocked by two large beaver dams. Outlet retains a permanent flow to a lower pond, which then runs through a culvert beneath Highway 622.
L-23	555634	5461950	Aug 10, 2017	Un	L-23 and L-24 are connected by a deep, wide, permanent creek. Outlet of L-24 runs into a large wetland, and an open channel could not be located. L-24 is a large, deep lake and shoreline/aquatic vegetation suggests it could potentially contain Northern Pike.
L-24	555909	5461827	Aug 10, 2017	Un	L-23 and L-24 are connected by a deep, wide, permanent creek. L-23 is a large, deep lake and shoreline/aquatic vegetation suggests it could potentially contain Northern Pike.
L-25	554598	5461968	Aug 9, 2017	Un	Large lake, connected to a smaller upstream pond by a deep, wide stream. A large beaver dam is found at the outlet of the lake, heavily restricting flow downstream. Shoreline vegetation and lake depth suggests it could potentially contain Northern Pike
L-27	554418	5462929	Aug 9, 2017	N	L-27 is a shallow, small pond. Substrate is a deep layer of silt and organic matter. Pond outlet has little to no flow, and leads to a large dry meadow.
L-29	557029	5461878	Aug 9. 2017	N	L-29 is a waterbody intersected by Highway 622. A large beaver dam is found on the West side of the highway, which completely restricts flow
L-32	561213	5462216	Aug 11, 2017	Un	Lake is shallow, with organic/silt bottom. Outlet is a small stream which winds through a wetland area.
Bending Lake	560463	5463446	Sept 13, 2017	Y	The West bay of Bending Lake was the only area assessed. Bay is shallow, with a mud/silt substrate and is dominated by aquatic macrophytes. Shoreline is a mix of rock, beach and marshy area.
L-04	559877	5464145	Sept 13, 2017	Un	Large, deep lake upgradient from low, wetland area. A small, permanent stream connects L-04 to a downgradient wetland area, which drains into the SW bay of Bending Lake.
L-06	559450	5464394	Sept 14, 2017	Un	Large, shallow lake upstream of P-01. A permanent stream exists through the wetland area, connecting L-06 to P-01. This lake is upgradient from P-01/wetland area.

L-09	556576	5466459	Sept 14, 2017	Un	Large lake located near Highway 622. Water flows out of lake via a stream traveling through a culvert beneath Highway 622,
Streams					
Page Creek	559810	5463214	Sept 14, 2017	N	Fast-flowing stream connecting Page Lake to Bending Lake. A waterfall can be found approximately 25m upstream from where Page Creek crosses the Bending Lake Road, and acts as a barrier to fish moving upstream.
S-01	555567	5462716	Aug 9, 2017	N	Stream connecting L-26 to L-23/L-24. Stream travels both above and below ground, emerging as small pools.
Ponds					
P-01	559839	5463985	Sept 12, 2017	N	Pond formed by beaver activity on stream flowing from L-04, L-06 and a large wetland area into the Wesr bay of Bending Lake. Beaver dam is solid and heavily restricts flow, creating a small, shallow pond. Organic bottom with aquatic macrophytes.
P-02	554384	5462604	Aug 9, 2017	N	Small pond originating from seasonal stream draining L-27. At the time of sampling, no connections were identified and pond was isolated.
P-03	554616	5462187	Aug 9, 2017	Un	Pond upstream of L-25, separated by a large beaver dam. Connectivity between the pond and L-25 is unknown, however it is likely that fish are able to migrate between the waterbodies during periods of high flow.

Notes: Fish habitat suitability was determined by assessing field sites visually and through fishing methods; Y=Yes, N=No, Un=Unknown/Insufficient Data.

Of the 11 lakes visited, 2 lakes were identified as fish habitat (i.e. fish were caught or visually identified in the lake), 7 lakes were identified as potential fish habitat, and 2 did not provide suitable fish habitat. Those lakes providing potential fish habitat were large enough to support a small fish population, exhibited adequate baitfish and provided ample cover through both riparian and aquatic vegetation. At the time of sampling, maximum depth and connectivity to larger lakes for overwintering, as well as targeted sampling to assess presence/absence of key species could not be performed due to logistical constraints.

Spawning habitat assessments were completed in May 2018 at 3 sites including Page Creek, the inlet to Bending Lake and the west bay of Bending Lake. Page Creek had a newly constructed beaver dam at the outlet where it meets Bending Lake, creating a barrier to fish movement. In addition, a waterfall barrier is located immediately upstream of the Bending Lake Access road on Page Creek. This waterfall is approximately 10 m in height and acts as an impassible barrier to fish potentially moving upstream. No spawning habitat for common species in Bending Lake was identified in Page Creek. The west bay of Bending Lake is characterized by a soft muddy bottom and both submerged and emergent aquatic macrophytes. Appropriate spawning habitat for Northern Pike is available, however no spawning fish were observed. The creek at the inlet to the west bay of Bending Lake has a large, wetted area as well as a permanent, shallow channel (approximately 5-10 cm) dominated by aquatic macrophytes. This area also provides adequate Northern Pike spawning habitat, however a beaver dam acts as a barrier approximately 200 m upstream from the confluence with Bending Lake.

5.4 Fish Community

Minnow traps and backpack electrofishing targeted small-bodied fish species including *Phoxinus sp.* , brook stickleback (*Culaea inconstans*), Iowa darter (*Etheostoma exile*), blackchin shiner (*Notropis heterodon*), pumpkinseed sunfish (*Lepomis gibbosus*), and common logperch (*Percina caprodes*). Fish capture method and species caught can be found in Table 5-4. Detailed fish catch data is included in Appendix B. *Phoxinus sp*. were the most abundant fish species captured throughout the study area. Due to the potential for hybridization between northern redbelly dace (*Phoxinus eos*) and finescale dace (*Phoxinus neogaeus*) and difficulty in identification between the two species, all fish fitting the description of these species were combined under one name: *Phoxinus sp*.

Gill netting in the west bay of Bending Lake confirmed the presence of large-bodied fish species including northern pike (*Esox lucius*), smallmouth bass (*Micropterus dolomieu*), yellow perch (*Perca flavescens*) and lake whitefish (*Coregonus clupeaformis*) (Table 5-4).

5.4.1 Species Composition, Abundance and Distribution

5.4.1.1 Bending Lake

Gill nets set in the west bay of Bending Lake confirmed the presence of fish habitat. A total of 16 fish were caught, including one Northern pike, three smallmouth bass, two lake whitefish, eight yellow perch and two pumpkinseed sunfish (Table 5-7). Gill nets were set for various amounts of time with a miniumum set time of 0.58 h and a maximum set time of 0.88 h. CPUE was highest for yellow perch at 9.06 fish caught/hour and lowest for Northern pike at 1.40 fish caught/hour. This data indicates that various species occupy the west bay of Bending Lake, including sportfish and smaller baitfish.

5.4.1.2 Other Lakes Sites

Due to the remote locations of the lake sites, and logistical constraints of transporting gear, fish were collected through backpack electrofishing and minnow trapping at all lakes and no gill-netting was conducted except in Bending Lake. This limited the areas sampled at these lakes to shoreline and near-shore. Lake L-11 was the only lake besides Bending Lake where fish were either captured or visually identified (Table 5-2). *Phoxinus sp*. were caught at all lake sites except L-06, L-09 and L-11 using both minnow trapping and electrofishing (Table 5-3, Appendix B). The only other species captured was brook stickleback (n=1), in a minnow trap at L-29.

5.4.1.3 Ponds

A total of 339 fish were caught at three ponds (4 at P-01; 10 at P-02; and 325 at P-03) through a combination of minnow trapping and backpack electrofishing. *Phoxinus sp*. was the only species identified during fishing efforts at each pond. P-03 yielded the highest catch of 325 Phoxinus sp., however this was the only pond where minnow trapping was employed (Table 5-5).

5.4.1.4 Streams

Two streams that have the potential to support fish populations were sampled to assess connectivity between lakes in the Project area. S-01 flows from the proposed tailings area into L-23 and L-24. S-01 travels above and below ground, and emerges as shallow pools. A large pool was identified and electrofished. Both *Phoxinus sp*. and brook stickleback were caught at the large pool (Table 5-6). Page Creek was also sampled and a waterfall approximately 5 m in height was identified 25 m upstream from

where the creek traveled beneath the Bending Lake Road (Figure 4-2). This acted as a barrier for any fish traveling upstream from Bending Lake to Page Lake. Electrofishing was completed downstream of the waterfall barrier, and the only species caught in this section of Page Creek was *Phoxinus sp*. (Table 5-6). No electrofishing was completed upstream of the barrier. Fish captured below the barrier likely traveled upstream into the creek from Bending Lake.

Table 5-4. Summary of fish community sampling, method of fish capture and fish species identified at each site.

Fish Habitat/Fish Community Sites Visited	Fish Capture Method	Species Identified
L-11	BEF	BCS, YP, NRPK
L-24	BEF	PH, BSB
L-25	BEF	PH, ID
L-27	MT, BEF	PH
L-29	MT	PH, BSB
L-32	BEF	PH
P-02	BEF	PH
P-03	MT	PH
S-01	BEF	PH, BSB
Bending Lake (west bay)	GN	LKWF, SMB, NRPK, PKS, YP
Page Creek	BEF	PH
L-04	BEF	PH, LP
L-06	BEF	PKS
L-09	BEF	
P-01	BEF	PH

Notes: BEF=backpack electrofishing, MT=minnow trap, GN=gill net; BCS=blackchin shiner, YP=yellow perch, NRPK=northern pike, PH=*Phoxinus sp*., BSB=brook stickleback, ID=Iowa darter, PKS=pumpkinseed, SMB=smallmouth bass, LKWF=lake whitefish, LP=common logperch

Table 5-5. Minnow Trapping Catch Per Unit Effort (CPUE) by Site, Ambershaw Metallics Inc. Bending Lake Property, 2017.

Site	Trap #	Set Time (h)	# Fish Caught/Species		CPUE (#fish/trap/day)			CPUE Average Per Site
			Ph sp.	BSB	*Ph sp.*	BSB	Total	
L-27	1	18.25	24	0	31.56	-	31.56	73.64
	2	18.25	88	0	115.73	-	115.73	
P-03	1	19.5	162	0	199.38	-	199.38	200.00
	2	19.5	163	0	200.62	-	200.61	
L-29	1	21.33	11	1	12.38	1.13	13.50	67.23
	2	21.33	17	0	19.13	-	19.13	
	3	21.33	178	0	200.28	-	200.28	
	4	21.33	32	0	36.01	-	36.01	

Notes: PH=*Phoxinus sp.*, BSB=brook stickleback

Table 5-6. Backpack Electrofishing Catch Per Unit Effort (CPUE) by Site, Ambershaw Metallics Inc. Bending Lake Property, 2017.

Site	Effort (s)	# Fish Caught/Species							CPUE (# Fish/100s)							
		Ph sp.	BSB	ID	BCS	PKS	YP	LP	*Ph sp.*	BSB	ID	BCS	PKS	YP	LP	Total
L-25	458	5	0	4	0	0	0	0	1.09	-	0.87	-	-	-	-	1.97
L-24	188	3	1	0	0	0	0	0	1.59	0.53	-	-	-	-	-	2.13
L-11	262	0	0	0	9	0	1	0	-	-	-	3.43	-	0.38	-	3.82
L-32	400	65	0	0	0	0	0	0	16.25	-	-	-	-	-	-	16.25
L-04	626	2	0	0	0	0	0	2	0.32	-	-	-	-	-	0.32	0.64
L-06	440	0	0	0	0	2	0	0	-	-	-	-	0.45	-	-	0.45
Page Creek	133	3	0	0	0	0	0	0	2.26	-	-	-	-	-	-	2.26
P-01	150	4	0	0	0	0	0	0	2.67	-	-	-	-	-	-	2.67
P-02	129	10	0	0	0	0	0	0	7.75	-	-	-	-	-	-	7.75
S-01	143	6	0	0	0	0	0	0	4.20	2.10	-	-	-	-	-	6.29

Notes: BCS=blackchin shiner, YP=yellow perch, *Ph sp.*=*Phoxinus sp.*, BSB=brook stickleback, ID=Iowa darter, PKS=pumpkinseed, LP=common logperch.

Table 5-7. Gill Netting Catch Per Unit Effort (CPUE) by Site, Ambershaw Metallics Inc. Bending Lake Property, 2017.

Site	Set #	Effort (hour)	CPUE (# Fish/hour)						CPUE Average Per Site
			NRPK	YP	LKWF	SMB	PKS	Total	
BL-1	1	0.58	-	-	-	-	-	-	0.86
	2	0.58	-	-	1.71	-	-	1.71	
BL-2	1	0.70	-	-	1.43	4.23	-	5.71	3.55
	2	0.72	1.40	-	-	-	-	1.40	
BL-3	1	0.88	-	9.06	-	-	2.26	11.32	11.32

Notes: YP=yellow perch, NRPK=northern pike, PKS=pumpkinseed, SMB=smallmouth bass, LKWF=lake whitefish

6 SUMMARY

6.1 Sediment Quality

Of the six metals with CCME sediment quality guidelines, baseline exceedances were observed for three metals: cadmium, lead and chromium. All exceedances were observed at separate sites (cadmium at BL-01, copper at P-01, and chromium at L-04), and only Interim Freshwater Sediment Quality Guidelines (ISQG) were exceeded, with none of the metals exceeding the Probable Effect Level (PEL).

6.2 Fish Habitat

A total of 16 sites were visited during the 2017 field programs and fish habitat was assessed at each site, specifically for it's potential to support species of sportfish. Two of the lake sites (Bending Lake and L-11) were identified as sportfish habitat, with northern pike and yellow perch being visually identified at each. Of the remaining lake sites, 7 were classified as potential habitat, exhibiting adequate conditions and food availability for a population of sportfish to occupy the waterbody, however since no fish were caught or visually identified, a final classification could not be made.

All sites visited were fish-bearing and with the exception of one site (L-09), the field crew were able to catch fish at each site. Despite the lack of fish caught during fishing efforts in Lake L-09, the lake is still considered fish habitat as a permanent channel achieves connectivity between this lake and Stormy Lake. Stormy Lake is a large oligotrophic lake, supporting various species of sportfish and baitfish.

6.3 Fish Community

The most commonly caught fish among the surveyed sites was *Phoxinus sp*., which was caught at 11 of the 16 sites visited. This species was caught in shallow areas around the perimeter of lakes as well as in the streams and ponds. Sportfish species including northern pike, yellow perch and smallmouth bass were caught using short set gill nets in the west bay of Bending Lake. Lake L-11 was the only other site where northern pike and yellow perch were documented. Further investigation is necessary to determine the fish communities and confirm presence of sportfish in the larger remote lakes.

7 CERTIFICATION

This report was prepared, reviewed and approved by the undersigned:

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Approved By:

Rick Palmer, M.Sc., R.P.Bio

President, Senior Fisheries Biologist

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Appendix A

Site Photos

a) Beaver dam at outlet of L-04

b) L-04 looking east from outlet

c) L-04 looking northeast from outlet

Figure A- 1. L-04, photos taken in September 2017

a) Beaver dam at outlet of L-06

b) L-06 looking northwest from outlet

c) L-06 looking north from outlet

Figure A- 2. L-06, photos taken in September 2017

a) L-09 looking southeast from outlet

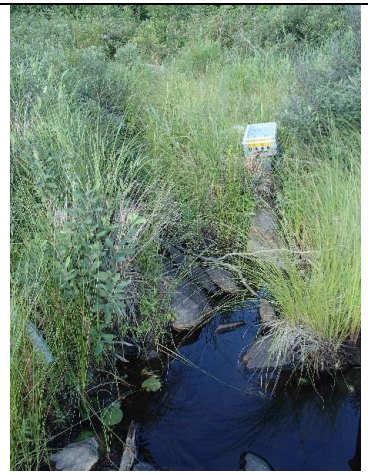
b) L-09 looking northwest from inlet

c) L-09 inlet dominated by grassy macrophytes

Figure A- 3. L-09, photos taken in May 2018

a) L-11 looking southeast from outlet

b) L-11 outlet



c) L-11 inlet

Figure A- 4. L-11, photos taken in August 2017

a) L-24 outlet

b) L-24 looking northeast from outlet

c) L-24 looking north from outlet

Figure A- 5. L-24, photos taken in August 2017

a) L-25 inlet

b) L-25 looking south at outlet from inlet

c) L-25 looking southwest from northern shore

Figure A- 6. L-25, photos taken in August 2017

a) L-27 looking north from outlet

b) L-27 outlet creek

Figure A- 7. L-27, photos taken in August 2017

a) L-32 looking southwest from northeast shore

b) L-32 looking south from northeast shore

c) L-32 outlet location at southern end of the lake. Outlet is located within a wetland/bog

Figure A- 8. L-32, photos taken in August 2017

a) Inlet of west bay of Bending Lake

b) West bay of Bending Lake

c) West bay of Bending Lake northern shoreline

d) West bay of Bending Lake

e) West bay of Bending Lake

Figure A- 9. West bay of Bending Lake, photos taken in May, 2018

a) P-01

b) Beaver dam at outlet of P-01, upstream of Bending Lake

c) Creek upstream of P-01

Figure A- 10. P-01, photos taken in September 2017(a, b) and May 2018 (c)

a) P-02

b) P-02 looking north towards dry meadow

Figure A- 11. P-02, photos taken in August 2017

a) P-03

Figure A- 12. P-03, photos taken in August 2017

a) Representative open pool present along the stream S-01

b) Representative open pool present along the stream S-01

Figure A- 13. S-01, photos taken in August 2017

a) Page Creek outlet at Bending Lake, looking upstream

b) Page Creek outlet at Bending Lake, beaver activity

c) Waterfall barrier on Page Creek upstream of the Bending Lake access road

Figure A- 14. Page Creek, photos taken in May 2018

Appendix B

Raw Fish Catch Data

PALMER ENVIRONMENTAL CONSULTING GROUP INC.

Site Name: L-04
UTM: Zone 15U 559877 E 5464145 N

Method: Backpack electrofishing

Fish #	Species	Length (mm)	Weight (g)	Comments
1	*Phoxinus sp.*	36	1	
2	*Phoxinus sp.*	41	0.4	
3	Logperch	69	3.3	
4	Logperch	67	2.5	

Site Name: L-06
UTM: Zone 15U 559450 E 5464394 N

Method: Backpack electrofishing

Fish #	Species	Length (mm)	Weight (g)	Comments
1	Pumpkinseed	64	4.3	
2	Pumpkinseed	70	5.5	

Site Name: L-11
UTM: Zone 15U 558678 E 5461252 N

Method: Backpack electrofishing

Fish #	Species	Length (mm)	Weight (g)	Comments
1	Blackchin Shiner	35	N/A	
2	Blackchin Shiner	51	N/A	
3	Blackchin Shiner	40	N/A	
4	Blackchin Shiner	46	N/A	
5	Blackchin Shiner	45	N/A	
6	Blackchin Shiner	21	N/A	
7	Blackchin Shiner	20	N/A	
8	Blackchin Shiner	26	N/A	
9	Blackchin Shiner	25	N/A	
10	Yellow Perch	49	N/A	

Site Name: L-24
UTM: Zone 15U 555909 E 5461827 N

Method: Backpack electrofishing

Fish #	Species	Length (mm)	Weight (g)	Comments
1	*Phoxinus sp.*	5	N/A	
2	*Phoxinus sp.*	3.5	N/A	
3	*Phoxinus sp.*	3	N/A	
4	Brook Stickleback	3	N/A	

Site Name: L-25
UTM: Zone 15U 554598 E 5461968 N

Method: Backpack electrofishing

Fish #	Species	Length (mm)	Weight (g)	Comments
1	*Phoxinus sp.*	40	1	Estimated weight
2	*Phoxinus sp.*	55	1	Estimated weight
3	*Phoxinus sp.*	51	1	Estimated weight
4	*Phoxinus sp.*	53	1	Estimated weight
5	*Phoxinus sp.*	47	1	Estimated weight
6	Iowa Darter	51	1	Estimated weight
7	Iowa Darter	52	1	Estimated weight
8	Iowa Darter	35	1	Estimated weight
9	Iowa Darter	26	1	Estimated weight

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Site Name: L-27
UTM: Zone 15U 554418 E 5462929 N

Method: Minnow Trapping

Extra Small	31-40 mm
Small	41-50 mm
Medium	51-60 mm
Large	61-70 mm

Fish #	Species	Length (mm)	Weight (g)	Comments
1	*Phoxinus sp.*	74	5	Estimated weight
2	*Phoxinus sp.*	76	5	Estimated weight
3	*Phoxinus sp.*	77	5	Estimated weight
4	*Phoxinus sp.*	67	3	Estimated weight
5	*Phoxinus sp.*	68	3	Estimated weight
6	*Phoxinus sp.*	67	3	Estimated weight
7	*Phoxinus sp.*	66	3	Estimated weight
8	*Phoxinus sp.*	59	3	Estimated weight
9	*Phoxinus sp.*	50	1	Estimated weight
10	*Phoxinus sp.*	50	1	Estimated weight
11	*Phoxinus sp.*	51	1	Estimated weight
12	*Phoxinus sp.*	41	1	Estimated weight
13	*Phoxinus sp.*	48	1	Estimated weight
14	*Phoxinus sp.*	42	1	Estimated weight
15	*Phoxinus sp.*	56	1	Estimated weight
16	*Phoxinus sp.*	54	1	Estimated weight
17	*Phoxinus sp.*	48	1	Estimated weight
18	*Phoxinus sp.*	50	1	Estimated weight
19	*Phoxinus sp.*	50	1	Estimated weight
20	*Phoxinus sp.*	44	1	Estimated weight
21	*Phoxinus sp.*	43	1	Estimated weight
22	*Phoxinus sp.*	43	1	Estimated weight
23	*Phoxinus sp.*	45	1	Estimated weight
24	*Phoxinus sp.*	45	1	Estimated weight
25	*Phoxinus sp.*	Large	N/A	
26	*Phoxinus sp.*	Large	N/A	
27	*Phoxinus sp.*	Large	N/A	
28	*Phoxinus sp.*	Large	N/A	
29	*Phoxinus sp.*	Large	N/A	
30	*Phoxinus sp.*	Large	N/A	
31	*Phoxinus sp.*	Large	N/A	
32	*Phoxinus sp.*	Large	N/A	
33	*Phoxinus sp.*	Large	N/A	
34	*Phoxinus sp.*	Large	N/A	
35	*Phoxinus sp.*	Large	N/A	
36	*Phoxinus sp.*	Large	N/A	
37	*Phoxinus sp.*	Large	N/A	

38	*Phoxinus sp.*	Large	N/A	
39	*Phoxinus sp.*	Large	N/A	
40	*Phoxinus sp.*	Medium	N/A	
41	*Phoxinus sp.*	Medium	N/A	
42	*Phoxinus sp.*	Medium	N/A	
43	*Phoxinus sp.*	Medium	N/A	
44	*Phoxinus sp.*	Medium	N/A	
45	*Phoxinus sp.*	Medium	N/A	
46	*Phoxinus sp.*	Medium	N/A	
47	*Phoxinus sp.*	Medium	N/A	
48	*Phoxinus sp.*	Medium	N/A	
49	*Phoxinus sp.*	Medium	N/A	
50	*Phoxinus sp.*	Medium	N/A	
51	*Phoxinus sp.*	Medium	N/A	
52	*Phoxinus sp.*	Medium	N/A	
53	*Phoxinus sp.*	Medium	N/A	
54	*Phoxinus sp.*	Medium	N/A	
55	*Phoxinus sp.*	Medium	N/A	
56	*Phoxinus sp.*	Medium	N/A	
57	*Phoxinus sp.*	Medium	N/A	
58	*Phoxinus sp.*	Medium	N/A	
59	*Phoxinus sp.*	Medium	N/A	
60	*Phoxinus sp.*	Medium	N/A	
61	*Phoxinus sp.*	Small	N/A	
62	*Phoxinus sp.*	Small	N/A	
63	*Phoxinus sp.*	Small	N/A	
64	*Phoxinus sp.*	Small	N/A	
65	*Phoxinus sp.*	Small	N/A	
66	*Phoxinus sp.*	Small	N/A	
67	*Phoxinus sp.*	Small	N/A	
68	*Phoxinus sp.*	Small	N/A	
69	*Phoxinus sp.*	Small	N/A	
70	*Phoxinus sp.*	Small	N/A	
71	*Phoxinus sp.*	Small	N/A	
72	*Phoxinus sp.*	Small	N/A	
73	*Phoxinus sp.*	Small	N/A	
74	*Phoxinus sp.*	Small	N/A	
75	*Phoxinus sp.*	Small	N/A	
76	*Phoxinus sp.*	Small	N/A	
77	*Phoxinus sp.*	Small	N/A	
78	*Phoxinus sp.*	Small	N/A	
79	*Phoxinus sp.*	Small	N/A	
80	*Phoxinus sp.*	Small	N/A	
81	*Phoxinus sp.*	Small	N/A	
82	*Phoxinus sp.*	Small	N/A	
83	*Phoxinus sp.*	Small	N/A	
84	*Phoxinus sp.*	Small	N/A	
85	*Phoxinus sp.*	Small	N/A	
86	*Phoxinus sp.*	Small	N/A	

87	*Phoxinus sp.*	Small	N/A	
88	*Phoxinus sp.*	Small	N/A	
89	*Phoxinus sp.*	Small	N/A	
90	*Phoxinus sp.*	Small	N/A	
91	*Phoxinus sp.*	Small	N/A	
92	*Phoxinus sp.*	Small	N/A	
93	*Phoxinus sp.*	Small	N/A	
94	*Phoxinus sp.*	Small	N/A	
95	*Phoxinus sp.*	Small	N/A	
96	*Phoxinus sp.*	Small	N/A	
97	*Phoxinus sp.*	Small	N/A	
98	*Phoxinus sp.*	Small	N/A	
99	*Phoxinus sp.*	Small	N/A	
100	*Phoxinus sp.*	Small	N/A	
101	*Phoxinus sp.*	Small	N/A	
102	*Phoxinus sp.*	Small	N/A	
103	*Phoxinus sp.*	Small	N/A	
104	*Phoxinus sp.*	Small	N/A	
105	*Phoxinus sp.*	Small	N/A	
106	*Phoxinus sp.*	Small	N/A	
107	*Phoxinus sp.*	Small	N/A	
108	*Phoxinus sp.*	Small	N/A	
109	*Phoxinus sp.*	Small	N/A	
110	*Phoxinus sp.*	Small	N/A	
111	*Phoxinus sp.*	Small	N/A	
112	*Phoxinus sp.*	Small	N/A	

Site Name: L-29
UTM: Zone 15U 557029 E 5461878 N

Method: Minnow Trapping

* 10 fish of each size range were measured. The remaining fish were separated into extra small, small, medium and large categories

Extra Small	31-40 mm
Small	41-50 mm
Medium	51-60 mm
Large	61-70 mm

Fish #	Species	Length (mm)	Weight (g)	Comments
1	Brook Stickleback	48		Estimated weight
2	*Phoxinus sp.*	50	2	Estimated weight
3	*Phoxinus sp.*	53	2	Estimated weight
4	*Phoxinus sp.*	55	2	Estimated weight
5	*Phoxinus sp.*	51	2	Estimated weight
6	*Phoxinus sp.*	58	2	Estimated weight
7	*Phoxinus sp.*	56	2	Estimated weight
8	*Phoxinus sp.*	58	2	Estimated weight
9	*Phoxinus sp.*	56	2	Estimated weight
10	*Phoxinus sp.*	59	2.5	Estimated weight
11	*Phoxinus sp.*	69	2.5	Estimated weight
12	*Phoxinus sp.*	62	2.5	Estimated weight
13	*Phoxinus sp.*	62	2.5	Estimated weight
14	*Phoxinus sp.*	68	2.5	Estimated weight
15	*Phoxinus sp.*	63	2.5	Estimated weight
16	*Phoxinus sp.*	60	2.5	Estimated weight
17	*Phoxinus sp.*	62	2.5	Estimated weight
18	*Phoxinus sp.*	65	2.5	Estimated weight
19	*Phoxinus sp.*	67	2.5	Estimated weight
20	*Phoxinus sp.*	62	2.5	Estimated weight
21	*Phoxinus sp.*	74	4	Estimated weight
22	*Phoxinus sp.*	73	4	Estimated weight
23	*Phoxinus sp.*	71	4	Estimated weight
24	*Phoxinus sp.*	77	4	Estimated weight
25	*Phoxinus sp.*	77	4	Estimated weight
26	*Phoxinus sp.*	77	4	Estimated weight
27	*Phoxinus sp.*	70	4	Estimated weight
28	*Phoxinus sp.*	73	4	Estimated weight
29	*Phoxinus sp.*	74	4	Estimated weight
30	*Phoxinus sp.*	76	4	Estimated weight
31	*Phoxinus sp.*	86	5	Estimated weight
32	*Phoxinus sp.*	Small	N/A	
33	*Phoxinus sp.*	Small	N/A	
34	*Phoxinus sp.*	Small	N/A	
35	*Phoxinus sp.*	Small	N/A	
36	*Phoxinus sp.*	Small	N/A	
37	*Phoxinus sp.*	Small	N/A	
38	*Phoxinus sp.*	Small	N/A	
39	*Phoxinus sp.*	Small	N/A	
40	*Phoxinus sp.*	Small	N/A	
41	*Phoxinus sp.*	Small	N/A	
42	*Phoxinus sp.*	Small	N/A	
43	*Phoxinus sp.*	Small	N/A	
44	*Phoxinus sp.*	Small	N/A	

45	*Phoxinus sp.*	Small	N/A	
46	*Phoxinus sp.*	Small	N/A	
47	*Phoxinus sp.*	Small	N/A	
48	*Phoxinus sp.*	Small	N/A	
49	*Phoxinus sp.*	Small	N/A	
50	*Phoxinus sp.*	Small	N/A	
51	*Phoxinus sp.*	Small	N/A	
52	*Phoxinus sp.*	Small	N/A	
53	*Phoxinus sp.*	Small	N/A	
54	*Phoxinus sp.*	Small	N/A	
55	*Phoxinus sp.*	Small	N/A	
56	*Phoxinus sp.*	Small	N/A	
57	*Phoxinus sp.*	Small	N/A	
58	*Phoxinus sp.*	Small	N/A	
59	*Phoxinus sp.*	Small	N/A	
60	*Phoxinus sp.*	Small	N/A	
61	*Phoxinus sp.*	Small	N/A	
62	*Phoxinus sp.*	Small	N/A	
63	*Phoxinus sp.*	Small	N/A	
64	*Phoxinus sp.*	Small	N/A	
65	*Phoxinus sp.*	Small	N/A	
66	*Phoxinus sp.*	Small	N/A	
67	*Phoxinus sp.*	Small	N/A	
68	*Phoxinus sp.*	Small	N/A	
69	*Phoxinus sp.*	Small	N/A	
70	*Phoxinus sp.*	Small	N/A	
71	*Phoxinus sp.*	Small	N/A	
72	*Phoxinus sp.*	Small	N/A	
73	*Phoxinus sp.*	Small	N/A	
74	*Phoxinus sp.*	Small	N/A	
75	*Phoxinus sp.*	Small	N/A	
76	*Phoxinus sp.*	Small	N/A	
77	*Phoxinus sp.*	Small	N/A	
78	*Phoxinus sp.*	Small	N/A	
79	*Phoxinus sp.*	Small	N/A	
80	*Phoxinus sp.*	Small	N/A	
81	*Phoxinus sp.*	Small	N/A	
82	*Phoxinus sp.*	Small	N/A	
83	*Phoxinus sp.*	Small	N/A	
84	*Phoxinus sp.*	Small	N/A	
85	*Phoxinus sp.*	Small	N/A	
86	*Phoxinus sp.*	Small	N/A	
87	*Phoxinus sp.*	Small	N/A	
88	*Phoxinus sp.*	Small	N/A	
89	*Phoxinus sp.*	Small	N/A	
90	*Phoxinus sp.*	Small	N/A	
91	*Phoxinus sp.*	Small	N/A	
92	*Phoxinus sp.*	Small	N/A	
93	*Phoxinus sp.*	Small	N/A	
94	*Phoxinus sp.*	Small	N/A	
95	*Phoxinus sp.*	Small	N/A	
96	*Phoxinus sp.*	Small	N/A	
97	*Phoxinus sp.*	Small	N/A	
98	*Phoxinus sp.*	Small	N/A	
99	*Phoxinus sp.*	Small	N/A	
100	*Phoxinus sp.*	Small	N/A	

101	*Phoxinus sp.*	Small	N/A	
102	*Phoxinus sp.*	Small	N/A	
103	*Phoxinus sp.*	Small	N/A	
104	*Phoxinus sp.*	Small	N/A	
105	*Phoxinus sp.*	Small	N/A	
106	*Phoxinus sp.*	Medium	N/A	
107	*Phoxinus sp.*	Medium	N/A	
108	*Phoxinus sp.*	Medium	N/A	
109	*Phoxinus sp.*	Medium	N/A	
110	*Phoxinus sp.*	Medium	N/A	
111	*Phoxinus sp.*	Medium	N/A	
112	*Phoxinus sp.*	Medium	N/A	
113	*Phoxinus sp.*	Medium	N/A	
114	*Phoxinus sp.*	Medium	N/A	
115	*Phoxinus sp.*	Medium	N/A	
116	*Phoxinus sp.*	Medium	N/A	
117	*Phoxinus sp.*	Medium	N/A	
118	*Phoxinus sp.*	Medium	N/A	
119	*Phoxinus sp.*	Medium	N/A	
120	*Phoxinus sp.*	Medium	N/A	
121	*Phoxinus sp.*	Medium	N/A	
122	*Phoxinus sp.*	Medium	N/A	
123	*Phoxinus sp.*	Medium	N/A	
124	*Phoxinus sp.*	Medium	N/A	
125	*Phoxinus sp.*	Medium	N/A	
126	*Phoxinus sp.*	Medium	N/A	
127	*Phoxinus sp.*	Medium	N/A	
128	*Phoxinus sp.*	Medium	N/A	
129	*Phoxinus sp.*	Medium	N/A	
130	*Phoxinus sp.*	Medium	N/A	
131	*Phoxinus sp.*	Medium	N/A	
132	*Phoxinus sp.*	Medium	N/A	
133	*Phoxinus sp.*	Medium	N/A	
134	*Phoxinus sp.*	Medium	N/A	
135	*Phoxinus sp.*	Medium	N/A	
136	*Phoxinus sp.*	Medium	N/A	
137	*Phoxinus sp.*	Medium	N/A	
138	*Phoxinus sp.*	Medium	N/A	
139	*Phoxinus sp.*	Medium	N/A	
140	*Phoxinus sp.*	Medium	N/A	
141	*Phoxinus sp.*	Medium	N/A	
142	*Phoxinus sp.*	Medium	N/A	
143	*Phoxinus sp.*	Medium	N/A	
144	*Phoxinus sp.*	Medium	N/A	
145	*Phoxinus sp.*	Medium	N/A	
146	*Phoxinus sp.*	Medium	N/A	
147	*Phoxinus sp.*	Medium	N/A	
148	*Phoxinus sp.*	Medium	N/A	
149	*Phoxinus sp.*	Medium	N/A	
150	*Phoxinus sp.*	Medium	N/A	
151	*Phoxinus sp.*	Medium	N/A	
152	*Phoxinus sp.*	Medium	N/A	
153	*Phoxinus sp.*	Medium	N/A	
154	*Phoxinus sp.*	Medium	N/A	
155	*Phoxinus sp.*	Medium	N/A	
156	*Phoxinus sp.*	Medium	N/A	

157	*Phoxinus sp.*	Medium	N/A	
158	*Phoxinus sp.*	Medium	N/A	
159	*Phoxinus sp.*	Medium	N/A	
160	*Phoxinus sp.*	Medium	N/A	
161	*Phoxinus sp.*	Medium	N/A	
162	*Phoxinus sp.*	Medium	N/A	
163	*Phoxinus sp.*	Medium	N/A	
164	*Phoxinus sp.*	Medium	N/A	
165	*Phoxinus sp.*	Medium	N/A	
166	*Phoxinus sp.*	Medium	N/A	
167	*Phoxinus sp.*	Medium	N/A	
168	*Phoxinus sp.*	Medium	N/A	
169	*Phoxinus sp.*	Medium	N/A	
170	*Phoxinus sp.*	Medium	N/A	
171	*Phoxinus sp.*	Medium	N/A	
172	*Phoxinus sp.*	Medium	N/A	
173	*Phoxinus sp.*	Medium	N/A	
174	*Phoxinus sp.*	Medium	N/A	
175	*Phoxinus sp.*	Medium	N/A	
176	*Phoxinus sp.*	Medium	N/A	
177	*Phoxinus sp.*	Medium	N/A	
178	*Phoxinus sp.*	Medium	N/A	
179	*Phoxinus sp.*	Medium	N/A	
180	*Phoxinus sp.*	Medium	N/A	
181	*Phoxinus sp.*	Medium	N/A	
182	*Phoxinus sp.*	Medium	N/A	
183	*Phoxinus sp.*	Medium	N/A	
184	*Phoxinus sp.*	Medium	N/A	
185	*Phoxinus sp.*	Medium	N/A	
186	*Phoxinus sp.*	Medium	N/A	
187	*Phoxinus sp.*	Medium	N/A	
188	*Phoxinus sp.*	Medium	N/A	
189	*Phoxinus sp.*	Medium	N/A	
190	*Phoxinus sp.*	Medium	N/A	
191	*Phoxinus sp.*	Medium	N/A	
192	*Phoxinus sp.*	Medium	N/A	
193	*Phoxinus sp.*	Medium	N/A	
194	*Phoxinus sp.*	Medium	N/A	
195	*Phoxinus sp.*	Medium	N/A	
196	*Phoxinus sp.*	Medium	N/A	
197	*Phoxinus sp.*	Medium	N/A	
198	*Phoxinus sp.*	Medium	N/A	
199	*Phoxinus sp.*	Medium	N/A	
200	*Phoxinus sp.*	Medium	N/A	
201	*Phoxinus sp.*	Medium	N/A	
202	*Phoxinus sp.*	Medium	N/A	
203	*Phoxinus sp.*	Medium	N/A	
204	*Phoxinus sp.*	Medium	N/A	
205	*Phoxinus sp.*	Medium	N/A	
206	*Phoxinus sp.*	Medium	N/A	
207	*Phoxinus sp.*	Medium	N/A	
208	*Phoxinus sp.*	Medium	N/A	
209	*Phoxinus sp.*	Medium	N/A	
210	*Phoxinus sp.*	Medium	N/A	
211	*Phoxinus sp.*	Medium	N/A	
212	*Phoxinus sp.*	Medium	N/A	

213	*Phoxinus sp.*	Medium	N/A	
214	*Phoxinus sp.*	Medium	N/A	
215	*Phoxinus sp.*	Medium	N/A	
216	*Phoxinus sp.*	Medium	N/A	
217	*Phoxinus sp.*	Medium	N/A	
218	*Phoxinus sp.*	Medium	N/A	
219	*Phoxinus sp.*	Medium	N/A	
220	*Phoxinus sp.*	Medium	N/A	
221	*Phoxinus sp.*	Medium	N/A	
222	*Phoxinus sp.*	Medium	N/A	
223	*Phoxinus sp.*	Medium	N/A	
224	*Phoxinus sp.*	Medium	N/A	
225	*Phoxinus sp.*	Medium	N/A	
226	*Phoxinus sp.*	Medium	N/A	
227	*Phoxinus sp.*	Large	N/A	
228	*Phoxinus sp.*	Large	N/A	
229	*Phoxinus sp.*	Large	N/A	
230	*Phoxinus sp.*	Large	N/A	
231	*Phoxinus sp.*	Large	N/A	
232	*Phoxinus sp.*	Large	N/A	
233	*Phoxinus sp.*	Large	N/A	
234	*Phoxinus sp.*	Large	N/A	
235	*Phoxinus sp.*	Large	N/A	
236	*Phoxinus sp.*	Large	N/A	
237	*Phoxinus sp.*	Large	N/A	
238	*Phoxinus sp.*	Large	N/A	

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Site Name: L-32
UTM: Zone 15U 561213 E 5462216 N

Method: Backpack electrofishing

Fish #	Species	Length (mm)	Weight (g)	Comments
1	*Phoxinus sp.*	72	N/A	
2	*Phoxinus sp.*	42	N/A	
3	*Phoxinus sp.*	60	N/A	
4	*Phoxinus sp.*	65	N/A	
5	*Phoxinus sp.*	45	N/A	
6	*Phoxinus sp.*	51	N/A	
7	*Phoxinus sp.*	56	N/A	
8	*Phoxinus sp.*	52	N/A	
9	*Phoxinus sp.*	52	N/A	
10	*Phoxinus sp.*	52	N/A	
11	*Phoxinus sp.*	59	N/A	
12	*Phoxinus sp.*	48	N/A	
13	*Phoxinus sp.*	46	N/A	
14	*Phoxinus sp.*	49	N/A	
15	*Phoxinus sp.*	70	N/A	
16	*Phoxinus sp.*	69	N/A	
17	*Phoxinus sp.*	65	N/A	
18	*Phoxinus sp.*	62	N/A	
19	*Phoxinus sp.*	53	N/A	
20	*Phoxinus sp.*	54	N/A	
21	*Phoxinus sp.*	68	N/A	
22	*Phoxinus sp.*	48	N/A	
23	*Phoxinus sp.*	49	N/A	
24	*Phoxinus sp.*	55	N/A	
25	*Phoxinus sp.*	53	N/A	
26	*Phoxinus sp.*	66	N/A	
27	*Phoxinus sp.*	64	N/A	
28	*Phoxinus sp.*	69	N/A	
29	*Phoxinus sp.*	62	N/A	
30	*Phoxinus sp.*	56	N/A	
31	*Phoxinus sp.*	59	N/A	
32	*Phoxinus sp.*	51	N/A	
33	*Phoxinus sp.*	52	N/A	
34	*Phoxinus sp.*	54	N/A	
35	*Phoxinus sp.*	55	N/A	
36	*Phoxinus sp.*	71	N/A	
37	*Phoxinus sp.*	69	N/A	
38	*Phoxinus sp.*	63	N/A	
39	*Phoxinus sp.*	65	N/A	
40	*Phoxinus sp.*	66	N/A	
41	*Phoxinus sp.*	59	N/A	
42	*Phoxinus sp.*	52	N/A	
43	*Phoxinus sp.*	53	N/A	

44	*Phoxinus sp.*	55	N/A	
45	*Phoxinus sp.*	59	N/A	
46	*Phoxinus sp.*	60	N/A	
47	*Phoxinus sp.*	61	N/A	
48	*Phoxinus sp.*	68	N/A	
49	*Phoxinus sp.*	70	N/A	
50	*Phoxinus sp.*	55	N/A	
51	*Phoxinus sp.*	54	N/A	
52	*Phoxinus sp.*	51	N/A	
53	*Phoxinus sp.*	46	N/A	
54	*Phoxinus sp.*	48	N/A	
55	*Phoxinus sp.*	59	N/A	
56	*Phoxinus sp.*	43	N/A	
57	*Phoxinus sp.*	45	N/A	
58	*Phoxinus sp.*	44	N/A	
59	*Phoxinus sp.*	59	N/A	
60	*Phoxinus sp.*	53	N/A	
61	*Phoxinus sp.*	52	N/A	
62	*Phoxinus sp.*	51	N/A	
63	*Phoxinus sp.*	46	N/A	
64	*Phoxinus sp.*	44	N/A	
65	*Phoxinus sp.*	58	N/A	
66	*Phoxinus sp.*	52	N/A	
67	*Phoxinus sp.*	65	N/A	
68	*Phoxinus sp.*	67	N/A	
69	*Phoxinus sp.*	69	N/A	
70	*Phoxinus sp.*	55	N/A	
71	*Phoxinus sp.*	52	N/A	
72	*Phoxinus sp.*	51	N/A	
73	*Phoxinus sp.*	45	N/A	
74	*Phoxinus sp.*	48	N/A	
75	*Phoxinus sp.*	49	N/A	

PALMER ENVIRONMENTAL CONSULTING GROUP INC.

Site Name: Bending Lake
UTM: Zone 15U 560463 E 5463446 N

Method: Gill Net

Fish #	Net #	Set #	Species	Length (mm)	Weight (g)	Comments
1	2	1	Lake Whitefish	590	1750	
2	2	1	Smallmouth Bass	465	1450	
3	2	1	Smallmouth Bass	396	1000	
4	2	1	Smallmouth Bass	402	750	
5	3	1	Pumpkinseed	89	11	
6	3	1	Pumpkinseed	69	6	
7	3	1	Yellow Perch	117	15	
8	3	1	Yellow Perch	128	24.2	
9	3	1	Yellow Perch	115	16.2	
10	3	1	Yellow Perch	111	15	
11	3	1	Yellow Perch	118	19.8	
12	3	1	Yellow Perch	137	29	
13	3	1	Yellow Perch	131	27.5	
14	3	1	Yellow Perch	98	9.8	
15	2	2	Northern Pike	900	4200	
16	1	2	Lake Whitefish	574	1800	

Site Name: P-01
UTM: Zone 15U 559839 E 5463985 N

Method: Backpack electrofishing

Fish #	Species	Length (mm)	Weight (g)	Comments
1	*Phoxinus sp.*	40	0.9	
2	*Phoxinus sp.*	18	0.1	
3	*Phoxinus sp.*	41	1.1	
4	*Phoxinus sp.*	60	1.2	

Site Name: P-02
UTM: Zone 15U 554384 E 5462604 N

Method: Backpack electrofishing

Fish #	Species	Length (mm)	Weight (g)	Comments
1	*Phoxinus sp.*	70	3	Estimated weight
2	*Phoxinus sp.*	70	3	Estimated weight
3	*Phoxinus sp.*	72	3	Estimated weight
4	*Phoxinus sp.*	72	3	Estimated weight
5	*Phoxinus sp.*	65	3	Estimated weight
6	*Phoxinus sp.*	58	2	Estimated weight
7	*Phoxinus sp.*	50	2	Estimated weight
8	*Phoxinus sp.*	53	2	Estimated weight
9	*Phoxinus sp.*	55	2	Estimated weight
10	*Phoxinus sp.*	55	2	Estimated weight

PALMER ENVIRONMENTAL CONSULTING GROUP INC.

Site Name: P-03
UTM: Zone 15U 554616 E 5462187 N

Method: Minnow Trapping

* 10 fish of each size range were measured. The remaining fish were separated into extra small, small, medium and large categories

Extra Small	31-40 mm
Small	41-50 mm
Medium	51-60 mm
Large	61-70 mm

Fish #	Species	Length (mm)	Weight (g)	Comments
1	*Phoxinus sp.*	52	2	
2	*Phoxinus sp.*	51	2	
3	*Phoxinus sp.*	57	2	
4	*Phoxinus sp.*	52	2	
5	*Phoxinus sp.*	55	2	
6	*Phoxinus sp.*	52	2	
7	*Phoxinus sp.*	53	2	
8	*Phoxinus sp.*	55	2	
9	*Phoxinus sp.*	50	2	
10	*Phoxinus sp.*	57	2	
11	*Phoxinus sp.*	67	2.7	
12	*Phoxinus sp.*	62	2.7	
13	*Phoxinus sp.*	70	2.7	
14	*Phoxinus sp.*	64	2.7	
15	*Phoxinus sp.*	83	2.7	
16	*Phoxinus sp.*	65	2.7	
17	*Phoxinus sp.*	63	2.7	
18	*Phoxinus sp.*	66	2.7	
19	*Phoxinus sp.*	70	2.7	
20	*Phoxinus sp.*	68	2.7	
21	*Phoxinus sp.*	48	1	
22	*Phoxinus sp.*	49	1	
23	*Phoxinus sp.*	45	1	
24	*Phoxinus sp.*	47	1	
25	*Phoxinus sp.*	50	1	
26	*Phoxinus sp.*	47	1	
27	*Phoxinus sp.*	50	1	
28	*Phoxinus sp.*	50	1	
29	*Phoxinus sp.*	46	1	
30	*Phoxinus sp.*	44	1	
31	*Phoxinus sp.*	Extra Small	N/A	
32	*Phoxinus sp.*	Extra Small	N/A	
33	*Phoxinus sp.*	Extra Small	N/A	
34	*Phoxinus sp.*	Extra Small	N/A	
35	*Phoxinus sp.*	Extra Small	N/A	
36	*Phoxinus sp.*	Extra Small	N/A	
37	*Phoxinus sp.*	Extra Small	N/A	
38	*Phoxinus sp.*	Extra Small	N/A	
39	*Phoxinus sp.*	Extra Small	N/A	
40	*Phoxinus sp.*	Small	N/A	
41	*Phoxinus sp.*	Small	N/A	
42	*Phoxinus sp.*	Small	N/A	

43	*Phoxinus sp.*	Small	N/A	
44	*Phoxinus sp.*	Small	N/A	
45	*Phoxinus sp.*	Small	N/A	
46	*Phoxinus sp.*	Small	N/A	
47	*Phoxinus sp.*	Small	N/A	
48	*Phoxinus sp.*	Small	N/A	
49	*Phoxinus sp.*	Small	N/A	
50	*Phoxinus sp.*	Small	N/A	
51	*Phoxinus sp.*	Small	N/A	
52	*Phoxinus sp.*	Small	N/A	
53	*Phoxinus sp.*	Small	N/A	
54	*Phoxinus sp.*	Small	N/A	
55	*Phoxinus sp.*	Small	N/A	
56	*Phoxinus sp.*	Small	N/A	
57	*Phoxinus sp.*	Small	N/A	
58	*Phoxinus sp.*	Small	N/A	
59	*Phoxinus sp.*	Small	N/A	
60	*Phoxinus sp.*	Small	N/A	
61	*Phoxinus sp.*	Small	N/A	
62	*Phoxinus sp.*	Small	N/A	
63	*Phoxinus sp.*	Small	N/A	
64	*Phoxinus sp.*	Small	N/A	
65	*Phoxinus sp.*	Small	N/A	
66	*Phoxinus sp.*	Small	N/A	
67	*Phoxinus sp.*	Small	N/A	
68	*Phoxinus sp.*	Small	N/A	
69	*Phoxinus sp.*	Small	N/A	
70	*Phoxinus sp.*	Small	N/A	
71	*Phoxinus sp.*	Small	N/A	
72	*Phoxinus sp.*	Small	N/A	
73	*Phoxinus sp.*	Small	N/A	
74	*Phoxinus sp.*	Small	N/A	
75	*Phoxinus sp.*	Small	N/A	
76	*Phoxinus sp.*	Small	N/A	
77	*Phoxinus sp.*	Small	N/A	
78	*Phoxinus sp.*	Small	N/A	
79	*Phoxinus sp.*	Small	N/A	
80	*Phoxinus sp.*	Small	N/A	
81	*Phoxinus sp.*	Small	N/A	
82	*Phoxinus sp.*	Small	N/A	
83	*Phoxinus sp.*	Small	N/A	
84	*Phoxinus sp.*	Small	N/A	
85	*Phoxinus sp.*	Small	N/A	
86	*Phoxinus sp.*	Small	N/A	
87	*Phoxinus sp.*	Small	N/A	
88	*Phoxinus sp.*	Small	N/A	
89	*Phoxinus sp.*	Small	N/A	
90	*Phoxinus sp.*	Small	N/A	
91	*Phoxinus sp.*	Small	N/A	
92	*Phoxinus sp.*	Small	N/A	
93	*Phoxinus sp.*	Small	N/A	
94	*Phoxinus sp.*	Small	N/A	
95	*Phoxinus sp.*	Small	N/A	
96	*Phoxinus sp.*	Small	N/A	
97	*Phoxinus sp.*	Small	N/A	

98	*Phoxinus sp.*	Small	N/A	
99	*Phoxinus sp.*	Small	N/A	
100	*Phoxinus sp.*	Small	N/A	
101	*Phoxinus sp.*	Small	N/A	
102	*Phoxinus sp.*	Small	N/A	
103	*Phoxinus sp.*	Small	N/A	
104	*Phoxinus sp.*	Small	N/A	
105	*Phoxinus sp.*	Small	N/A	
106	*Phoxinus sp.*	Small	N/A	
107	*Phoxinus sp.*	Small	N/A	
108	*Phoxinus sp.*	Small	N/A	
109	*Phoxinus sp.*	Small	N/A	
110	*Phoxinus sp.*	Small	N/A	
111	*Phoxinus sp.*	Small	N/A	
112	*Phoxinus sp.*	Small	N/A	
113	*Phoxinus sp.*	Small	N/A	
114	*Phoxinus sp.*	Small	N/A	
115	*Phoxinus sp.*	Small	N/A	
116	*Phoxinus sp.*	Small	N/A	
117	*Phoxinus sp.*	Small	N/A	
118	*Phoxinus sp.*	Small	N/A	
119	*Phoxinus sp.*	Small	N/A	
120	*Phoxinus sp.*	Small	N/A	
121	*Phoxinus sp.*	Small	N/A	
122	*Phoxinus sp.*	Small	N/A	
123	*Phoxinus sp.*	Small	N/A	
124	*Phoxinus sp.*	Small	N/A	
125	*Phoxinus sp.*	Small	N/A	
126	*Phoxinus sp.*	Small	N/A	
127	*Phoxinus sp.*	Small	N/A	
128	*Phoxinus sp.*	Small	N/A	
129	*Phoxinus sp.*	Small	N/A	
130	*Phoxinus sp.*	Small	N/A	
131	*Phoxinus sp.*	Small	N/A	
132	*Phoxinus sp.*	Small	N/A	
133	*Phoxinus sp.*	Small	N/A	
134	*Phoxinus sp.*	Small	N/A	
135	*Phoxinus sp.*	Small	N/A	
136	*Phoxinus sp.*	Small	N/A	
137	*Phoxinus sp.*	Small	N/A	
138	*Phoxinus sp.*	Small	N/A	
139	*Phoxinus sp.*	Small	N/A	
140	*Phoxinus sp.*	Small	N/A	
141	*Phoxinus sp.*	Small	N/A	
142	*Phoxinus sp.*	Small	N/A	
143	*Phoxinus sp.*	Small	N/A	
144	*Phoxinus sp.*	Small	N/A	
145	*Phoxinus sp.*	Small	N/A	
146	*Phoxinus sp.*	Small	N/A	
147	*Phoxinus sp.*	Small	N/A	
148	*Phoxinus sp.*	Small	N/A	
149	*Phoxinus sp.*	Small	N/A	
150	*Phoxinus sp.*	Small	N/A	
151	*Phoxinus sp.*	Small	N/A	
152	*Phoxinus sp.*	Small	N/A	

153	*Phoxinus sp.*	Small	N/A	
154	*Phoxinus sp.*	Small	N/A	
155	*Phoxinus sp.*	Small	N/A	
156	*Phoxinus sp.*	Small	N/A	
157	*Phoxinus sp.*	Small	N/A	
158	*Phoxinus sp.*	Small	N/A	
159	*Phoxinus sp.*	Small	N/A	
160	*Phoxinus sp.*	Small	N/A	
161	*Phoxinus sp.*	Small	N/A	
162	*Phoxinus sp.*	Small	N/A	
163	*Phoxinus sp.*	Small	N/A	
164	*Phoxinus sp.*	Small	N/A	
165	*Phoxinus sp.*	Small	N/A	
166	*Phoxinus sp.*	Small	N/A	
167	*Phoxinus sp.*	Small	N/A	
168	*Phoxinus sp.*	Small	N/A	
169	*Phoxinus sp.*	Small	N/A	
170	*Phoxinus sp.*	Small	N/A	
171	*Phoxinus sp.*	Small	N/A	
172	*Phoxinus sp.*	Small	N/A	
173	*Phoxinus sp.*	Small	N/A	
174	*Phoxinus sp.*	Small	N/A	
175	*Phoxinus sp.*	Small	N/A	
176	*Phoxinus sp.*	Small	N/A	
177	*Phoxinus sp.*	Small	N/A	
178	*Phoxinus sp.*	Small	N/A	
179	*Phoxinus sp.*	Small	N/A	
180	*Phoxinus sp.*	Small	N/A	
181	*Phoxinus sp.*	Small	N/A	
182	*Phoxinus sp.*	Small	N/A	
183	*Phoxinus sp.*	Small	N/A	
184	*Phoxinus sp.*	Small	N/A	
185	*Phoxinus sp.*	Small	N/A	
186	*Phoxinus sp.*	Small	N/A	
187	*Phoxinus sp.*	Small	N/A	
188	*Phoxinus sp.*	Small	N/A	
189	*Phoxinus sp.*	Small	N/A	
190	*Phoxinus sp.*	Small	N/A	
191	*Phoxinus sp.*	Medium	N/A	
192	*Phoxinus sp.*	Medium	N/A	
193	*Phoxinus sp.*	Medium	N/A	
194	*Phoxinus sp.*	Medium	N/A	
195	*Phoxinus sp.*	Medium	N/A	
196	*Phoxinus sp.*	Medium	N/A	
197	*Phoxinus sp.*	Medium	N/A	
198	*Phoxinus sp.*	Medium	N/A	
199	*Phoxinus sp.*	Medium	N/A	
200	*Phoxinus sp.*	Medium	N/A	
201	*Phoxinus sp.*	Medium	N/A	
202	*Phoxinus sp.*	Medium	N/A	
203	*Phoxinus sp.*	Medium	N/A	
204	*Phoxinus sp.*	Medium	N/A	
205	*Phoxinus sp.*	Medium	N/A	
206	*Phoxinus sp.*	Medium	N/A	
207	*Phoxinus sp.*	Medium	N/A	

208	*Phoxinus sp.*	Medium	N/A	
209	*Phoxinus sp.*	Medium	N/A	
210	*Phoxinus sp.*	Medium	N/A	
211	*Phoxinus sp.*	Medium	N/A	
212	*Phoxinus sp.*	Medium	N/A	
213	*Phoxinus sp.*	Medium	N/A	
214	*Phoxinus sp.*	Medium	N/A	
215	*Phoxinus sp.*	Medium	N/A	
216	*Phoxinus sp.*	Medium	N/A	
217	*Phoxinus sp.*	Medium	N/A	
218	*Phoxinus sp.*	Medium	N/A	
219	*Phoxinus sp.*	Medium	N/A	
220	*Phoxinus sp.*	Medium	N/A	
221	*Phoxinus sp.*	Medium	N/A	
222	*Phoxinus sp.*	Medium	N/A	
223	*Phoxinus sp.*	Medium	N/A	
224	*Phoxinus sp.*	Medium	N/A	
225	*Phoxinus sp.*	Medium	N/A	
226	*Phoxinus sp.*	Medium	N/A	
227	*Phoxinus sp.*	Medium	N/A	
228	*Phoxinus sp.*	Medium	N/A	
229	*Phoxinus sp.*	Medium	N/A	
230	*Phoxinus sp.*	Medium	N/A	
231	*Phoxinus sp.*	Medium	N/A	
232	*Phoxinus sp.*	Medium	N/A	
233	*Phoxinus sp.*	Medium	N/A	
234	*Phoxinus sp.*	Medium	N/A	
235	*Phoxinus sp.*	Medium	N/A	
236	*Phoxinus sp.*	Medium	N/A	
237	*Phoxinus sp.*	Medium	N/A	
238	*Phoxinus sp.*	Medium	N/A	
239	*Phoxinus sp.*	Medium	N/A	
240	*Phoxinus sp.*	Medium	N/A	
241	*Phoxinus sp.*	Medium	N/A	
242	*Phoxinus sp.*	Medium	N/A	
243	*Phoxinus sp.*	Medium	N/A	
244	*Phoxinus sp.*	Medium	N/A	
245	*Phoxinus sp.*	Medium	N/A	
246	*Phoxinus sp.*	Medium	N/A	
247	*Phoxinus sp.*	Medium	N/A	
248	*Phoxinus sp.*	Medium	N/A	
249	*Phoxinus sp.*	Medium	N/A	
250	*Phoxinus sp.*	Medium	N/A	
251	*Phoxinus sp.*	Medium	N/A	
252	*Phoxinus sp.*	Medium	N/A	
253	*Phoxinus sp.*	Medium	N/A	
254	*Phoxinus sp.*	Medium	N/A	
255	*Phoxinus sp.*	Medium	N/A	
256	*Phoxinus sp.*	Medium	N/A	
257	*Phoxinus sp.*	Medium	N/A	
258	*Phoxinus sp.*	Medium	N/A	
259	*Phoxinus sp.*	Medium	N/A	
260	*Phoxinus sp.*	Medium	N/A	
261	*Phoxinus sp.*	Medium	N/A	
262	*Phoxinus sp.*	Medium	N/A	

263	*Phoxinus sp.*	Medium	N/A	
264	*Phoxinus sp.*	Medium	N/A	
265	*Phoxinus sp.*	Medium	N/A	
266	*Phoxinus sp.*	Medium	N/A	
267	*Phoxinus sp.*	Medium	N/A	
268	*Phoxinus sp.*	Medium	N/A	
269	*Phoxinus sp.*	Medium	N/A	
270	*Phoxinus sp.*	Medium	N/A	
271	*Phoxinus sp.*	Medium	N/A	
272	*Phoxinus sp.*	Medium	N/A	
273	*Phoxinus sp.*	Medium	N/A	
274	*Phoxinus sp.*	Medium	N/A	
275	*Phoxinus sp.*	Medium	N/A	
276	*Phoxinus sp.*	Medium	N/A	
277	*Phoxinus sp.*	Medium	N/A	
278	*Phoxinus sp.*	Medium	N/A	
279	*Phoxinus sp.*	Medium	N/A	
280	*Phoxinus sp.*	Medium	N/A	
281	*Phoxinus sp.*	Medium	N/A	
282	*Phoxinus sp.*	Medium	N/A	
283	*Phoxinus sp.*	Medium	N/A	
284	*Phoxinus sp.*	Medium	N/A	
285	*Phoxinus sp.*	Medium	N/A	
286	*Phoxinus sp.*	Medium	N/A	
287	*Phoxinus sp.*	Medium	N/A	
288	*Phoxinus sp.*	Medium	N/A	
289	*Phoxinus sp.*	Medium	N/A	
290	*Phoxinus sp.*	Medium	N/A	
291	*Phoxinus sp.*	Medium	N/A	
292	*Phoxinus sp.*	Medium	N/A	
293	*Phoxinus sp.*	Medium	N/A	
294	*Phoxinus sp.*	Medium	N/A	
295	*Phoxinus sp.*	Medium	N/A	
296	*Phoxinus sp.*	Medium	N/A	
297	*Phoxinus sp.*	Large	N/A	
298	*Phoxinus sp.*	Large	N/A	
299	*Phoxinus sp.*	Large	N/A	
300	*Phoxinus sp.*	Large	N/A	
301	*Phoxinus sp.*	Large	N/A	
302	*Phoxinus sp.*	Large	N/A	
303	*Phoxinus sp.*	Large	N/A	
304	*Phoxinus sp.*	Large	N/A	
305	*Phoxinus sp.*	Large	N/A	
306	*Phoxinus sp.*	Large	N/A	
307	*Phoxinus sp.*	Large	N/A	
308	*Phoxinus sp.*	Large	N/A	
309	*Phoxinus sp.*	Large	N/A	
310	*Phoxinus sp.*	Large	N/A	
311	*Phoxinus sp.*	Large	N/A	
312	*Phoxinus sp.*	Large	N/A	
313	*Phoxinus sp.*	Large	N/A	
314	*Phoxinus sp.*	Large	N/A	
315	*Phoxinus sp.*	Large	N/A	
316	*Phoxinus sp.*	Large	N/A	
317	*Phoxinus sp.*	Large	N/A	

318	*Phoxinus sp.*	Large	N/A	
319	*Phoxinus sp.*	Large	N/A	
320	*Phoxinus sp.*	Large	N/A	
321	*Phoxinus sp.*	Large	N/A	
322	*Phoxinus sp.*	Large	N/A	
323	*Phoxinus sp.*	Large	N/A	
324	*Phoxinus sp.*	Large	N/A	
325	*Phoxinus sp.*	Large	N/A	

Site Name: S-01
UTM: Zone 15U 555567 E 5462716 N

Method: Backpack electrofishing

Fish #	Species	Length (mm)	Weight (g)	Comments
1	*Phoxinus sp.*	44	1.3	
2	*Phoxinus sp.*	47	1.3	
3	*Phoxinus sp.*	48	1.3	
4	*Phoxinus sp.*	47	1.3	
5	*Phoxinus sp.*	45	1.3	
6	*Phoxinus sp.*	38	1.3	
7	Brook Stickleback	55	2	
8	Brook Stickleback	53	2	
9	Brook Stickleback	36	2	

Site Name: Page Creek
UTM: Zone 15U 559810 E 5463214 N

Method: Backpack electrofishing

Fish #	Species	Length (mm)	Weight (g)	Comments
1	*Phoxinus sp.*	73	3.8	
2	*Phoxinus sp.*	68	2.6	
3	*Phoxinus sp.*	80	4.1	

Appendix C

Laboratory Certificate of Analysis (CoA) and Chain of Custody (CoC) - Sediment Samples

PALMER ENVIRONMENTAL CONSULTING GROUP INC. TORONTO
ATTN: Jake McQueen
374 Wellington Street West
Suite 3
Toronto ON M5V 1E3

Date Received: 15-SEP-17
Report Date: 28-SEP-17 14:43 (MT)
Version: FINAL

Client Phone: 647-795-8153

Certificate of Analysis

Lab Work Order #: L1992514

Project P.O. #: NOT SUBMITTED
Job Reference: AMBERSHAW
C of C Numbers:
Legal Site Desc:

<Original signed by>

Christine Paradis
Project Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1992514-1 L04-SED1 (WPT 315) Sampled By: Client on 13-SEP-17 @ 16:00 Matrix: Sediment							
Physical Tests							
Volatile Solids	50.8		0.010	%	25-SEP-17	26-SEP-17	R3838662
Total Solids	14.7		0.10	%	25-SEP-17	26-SEP-17	R3838662
Organic / Inorganic Carbon							
Fraction Organic Carbon	0.183		0.0010	g/g	27-SEP-17	28-SEP-17	R3840143
Total Organic Carbon	18.3		0.10	%	27-SEP-17	28-SEP-17	R3840143
Metals							
Aluminum (Al)	8930		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Antimony (Sb)	0.26		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Arsenic (As)	2.17		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Barium (Ba)	119		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Beryllium (Be)	0.17		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Bismuth (Bi)	<0.20		0.20	ug/g	26-SEP-17	26-SEP-17	R3838985
Boron (B)	5.0		5.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Cadmium (Cd)	0.551		0.020	ug/g	26-SEP-17	26-SEP-17	R3838985
Calcium (Ca)	12200		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Chromium (Cr)	57.1		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Cobalt (Co)	6.44		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Copper (Cu)	34.0		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Iron (Fe)	10400		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Lead (Pb)	13.7		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Lithium (Li)	7.0		2.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Magnesium (Mg)	4160		20	ug/g	26-SEP-17	26-SEP-17	R3838985
Manganese (Mn)	381		1.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Molybdenum (Mo)	0.60		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Nickel (Ni)	27.7		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Phosphorus (P)	504		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Potassium (K)	760		100	ug/g	26-SEP-17	26-SEP-17	R3838985
Selenium (Se)	1.78		0.20	ug/g	26-SEP-17	26-SEP-17	R3838985
Silver (Ag)	0.13		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Sodium (Na)	119		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Strontium (Sr)	23.2		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Sulfur (S)	4000		1000	ug/g	26-SEP-17	26-SEP-17	R3838985
Thallium (Tl)	0.111		0.050	ug/g	26-SEP-17	26-SEP-17	R3838985
Tin (Sn)	<2.0		2.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Titanium (Ti)	550		1.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Tungsten (W)	<0.50		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Uranium (U)	1.03		0.050	ug/g	26-SEP-17	26-SEP-17	R3838985
Vanadium (V)	23.6		0.20	ug/g	26-SEP-17	26-SEP-17	R3838985
Zinc (Zn)	53.1		2.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Zirconium (Zr)	3.0		1.0	ug/g	26-SEP-17	26-SEP-17	R3838985
L1992514-2 BC-SED1 (WPT 307) Client on 13-SEP-17 @ 13:00							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1992514-2 BC-SED1 (WPT 307) Sampled By: Client on 13-SEP-17 @ 13:00 Matrix: Sediment							
Physical Tests							
Volatile Solids	66.4		0.010	%	25-SEP-17	26-SEP-17	R3838662
Total Solids	13.4		0.10	%	25-SEP-17	26-SEP-17	R3838662
Organic / Inorganic Carbon							
Fraction Organic Carbon	0.241		0.0010	g/g	27-SEP-17	28-SEP-17	R3840143
Total Organic Carbon	24.1		0.10	%	27-SEP-17	28-SEP-17	R3840143
Metals							
Aluminum (Al)	9510		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Antimony (Sb)	0.20		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Arsenic (As)	2.89		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Barium (Ba)	134		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Beryllium (Be)	0.18		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Bismuth (Bi)	<0.20		0.20	ug/g	26-SEP-17	26-SEP-17	R3838985
Boron (B)	<5.0		5.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Cadmium (Cd)	0.523		0.020	ug/g	26-SEP-17	26-SEP-17	R3838985
Calcium (Ca)	11800		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Chromium (Cr)	29.4		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Cobalt (Co)	8.34		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Copper (Cu)	39.8		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Iron (Fe)	11500		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Lead (Pb)	14.0		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Lithium (Li)	5.8		2.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Magnesium (Mg)	2160		20	ug/g	26-SEP-17	26-SEP-17	R3838985
Manganese (Mn)	384		1.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Molybdenum (Mo)	0.77		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Nickel (Ni)	25.2		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Phosphorus (P)	738		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Potassium (K)	770		100	ug/g	26-SEP-17	26-SEP-17	R3838985
Selenium (Se)	1.75		0.20	ug/g	26-SEP-17	26-SEP-17	R3838985
Silver (Ag)	0.12		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Sodium (Na)	147		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Strontium (Sr)	33.0		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Sulfur (S)	6000		1000	ug/g	26-SEP-17	26-SEP-17	R3838985
Thallium (Tl)	0.132		0.050	ug/g	26-SEP-17	26-SEP-17	R3838985
Tin (Sn)	<2.0		2.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Titanium (Ti)	306		1.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Tungsten (W)	<0.50		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Uranium (U)	1.38		0.050	ug/g	26-SEP-17	26-SEP-17	R3838985
Vanadium (V)	20.2		0.20	ug/g	26-SEP-17	26-SEP-17	R3838985
Zinc (Zn)	41.1		2.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Zirconium (Zr)	1.7		1.0	ug/g	26-SEP-17	26-SEP-17	R3838985
L1992514-3 BL-SED1 (WPT 311) Client on 13-SEP-17 @ 10:00							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1992514-3 BL-SED1 (WPT 311) Sampled By: Client on 13-SEP-17 @ 10:00 Matrix: Sediment							
Physical Tests							
Volatile Solids	36.7		0.010	%	25-SEP-17	26-SEP-17	R3838662
Total Solids	8.65		0.10	%	25-SEP-17	26-SEP-17	R3838662
Organic / Inorganic Carbon							
Fraction Organic Carbon	0.150		0.0010	g/g	27-SEP-17	28-SEP-17	R3840143
Total Organic Carbon	15.0		0.10	%	27-SEP-17	28-SEP-17	R3840143
Metals							
Aluminum (Al)	10700		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Antimony (Sb)	0.17		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Arsenic (As)	3.79		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Barium (Ba)	88.9		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Beryllium (Be)	0.21		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Bismuth (Bi)	<0.20		0.20	ug/g	26-SEP-17	26-SEP-17	R3838985
Boron (B)	<5.0		5.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Cadmium (Cd)	0.782		0.020	ug/g	26-SEP-17	26-SEP-17	R3838985
Calcium (Ca)	6830		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Chromium (Cr)	20.8		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Cobalt (Co)	9.89		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Copper (Cu)	27.4		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Iron (Fe)	15300		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Lead (Pb)	18.6		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Lithium (Li)	6.1		2.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Magnesium (Mg)	2110		20	ug/g	26-SEP-17	26-SEP-17	R3838985
Manganese (Mn)	287		1.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Molybdenum (Mo)	0.75		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Nickel (Ni)	25.8		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Phosphorus (P)	810		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Potassium (K)	890		100	ug/g	26-SEP-17	26-SEP-17	R3838985
Selenium (Se)	1.44		0.20	ug/g	26-SEP-17	26-SEP-17	R3838985
Silver (Ag)	0.12		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Sodium (Na)	132		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Strontium (Sr)	18.8		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Sulfur (S)	4900		1000	ug/g	26-SEP-17	26-SEP-17	R3838985
Thallium (Tl)	0.110		0.050	ug/g	26-SEP-17	26-SEP-17	R3838985
Tin (Sn)	<2.0		2.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Titanium (Ti)	306		1.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Tungsten (W)	<0.50		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Uranium (U)	1.87		0.050	ug/g	26-SEP-17	26-SEP-17	R3838985
Vanadium (V)	20.7		0.20	ug/g	26-SEP-17	26-SEP-17	R3838985
Zinc (Zn)	72.7		2.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Zirconium (Zr)	2.3		1.0	ug/g	26-SEP-17	26-SEP-17	R3838985
L1992514-4 BL-SED2 (WPT 313) Client on 13-SEP-17 @ 14:00							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1992514-4 BL-SED2 (WPT 313) Sampled By: Client on 13-SEP-17 @ 14:00 Matrix: Sediment							
Physical Tests							
Volatile Solids	25.1		0.010	%	25-SEP-17	26-SEP-17	R3838662
Total Solids	14.5		0.10	%	25-SEP-17	26-SEP-17	R3838662
Organic / Inorganic Carbon							
Fraction Organic Carbon	0.101		0.0010	g/g	27-SEP-17	28-SEP-17	R3840143
Total Organic Carbon	10.1		0.10	%	27-SEP-17	28-SEP-17	R3840143
Metals							
Aluminum (Al)	10300		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Antimony (Sb)	0.13		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Arsenic (As)	2.80		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Barium (Ba)	83.9		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Beryllium (Be)	0.20		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Bismuth (Bi)	<0.20		0.20	ug/g	26-SEP-17	26-SEP-17	R3838985
Boron (B)	<5.0		5.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Cadmium (Cd)	0.530		0.020	ug/g	26-SEP-17	26-SEP-17	R3838985
Calcium (Ca)	4940		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Chromium (Cr)	22.8		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Cobalt (Co)	10.5		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Copper (Cu)	23.1		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Iron (Fe)	20200		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Lead (Pb)	10.5		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Lithium (Li)	8.3		2.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Magnesium (Mg)	3100		20	ug/g	26-SEP-17	26-SEP-17	R3838985
Manganese (Mn)	358		1.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Molybdenum (Mo)	0.84		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Nickel (Ni)	23.3		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Phosphorus (P)	702		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Potassium (K)	1070		100	ug/g	26-SEP-17	26-SEP-17	R3838985
Selenium (Se)	1.19		0.20	ug/g	26-SEP-17	26-SEP-17	R3838985
Silver (Ag)	<0.10		0.10	ug/g	26-SEP-17	26-SEP-17	R3838985
Sodium (Na)	133		50	ug/g	26-SEP-17	26-SEP-17	R3838985
Strontium (Sr)	15.4		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Sulfur (S)	3500		1000	ug/g	26-SEP-17	26-SEP-17	R3838985
Thallium (Tl)	0.132		0.050	ug/g	26-SEP-17	26-SEP-17	R3838985
Tin (Sn)	<2.0		2.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Titanium (Ti)	467		1.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Tungsten (W)	<0.50		0.50	ug/g	26-SEP-17	26-SEP-17	R3838985
Uranium (U)	1.97		0.050	ug/g	26-SEP-17	26-SEP-17	R3838985
Vanadium (V)	27.9		0.20	ug/g	26-SEP-17	26-SEP-17	R3838985
Zinc (Zn)	74.1		2.0	ug/g	26-SEP-17	26-SEP-17	R3838985
Zirconium (Zr)	2.1		1.0	ug/g	26-SEP-17	26-SEP-17	R3838985

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
MET-200.2-CCMS-WT	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO3 and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

SOLIDS-TS-WT	Soil	Total Solids on Solid Matrix	APHA 2540B

A well-mixed sample is evaporated in a weighed dish and dried to constant weight in an oven at 103 to 105°C. The increase in weight over that of the empty dish represents the total solids. Results are reported as the percentage of the total sample.

SOLIDS-VS-WT	Soil	Volatile Solids on Solid Matrix	APHA 2540B

A well-mixed sample is evaporated in a weighed dish and dried to constant weight in an oven at 103 to 105°C. The increase in weight over that of the empty dish represents the total solids.
This residue is ignited to constant weight at 550°C. The remaining solids represent the fixed total solids while the weight lost on ignition is the volatile solids. Results are reported as Percent of the Total solids as Volatile.

TOC-WT	Soil	TOC & FOC in Solids	CARTER 21.3.2

Soil is treated with excess acidic dichromate, which reacts with the organic carbon, oxidizing it to CO2. The residual dichromate is titrated with ferrous ammonium sulphate and TOC calculated by difference.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1992514 Report Date: 28-SEP-17

Client: PALMER ENVIRONMENTAL CONSULTING GROUP INC. TORONTO
374 Wellington Street West Suite 3
Toronto ON M5V 1E3
Contact: Jake McQueen

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R3838985								
WG2624891-2 CRM		**WT-CANMET-TILL1**						
Aluminum (Al)			101.0		%		70-130	26-SEP-17
Antimony (Sb)			102.8		%		70-130	26-SEP-17
Arsenic (As)			102.9		%		70-130	26-SEP-17
Barium (Ba)			96.6		%		70-130	26-SEP-17
Beryllium (Be)			100.7		%		70-130	26-SEP-17
Bismuth (Bi)			105.0		%		70-130	26-SEP-17
Boron (B)			2.9		mg/kg		0-8.2	26-SEP-17
Cadmium (Cd)			100.8		%		70-130	26-SEP-17
Calcium (Ca)			101.2		%		70-130	26-SEP-17
Chromium (Cr)			100.4		%		70-130	26-SEP-17
Cobalt (Co)			100.8		%		70-130	26-SEP-17
Copper (Cu)			102.4		%		70-130	26-SEP-17
Iron (Fe)			101.1		%		70-130	26-SEP-17
Lead (Pb)			104.8		%		70-130	26-SEP-17
Lithium (Li)			96.6		%		70-130	26-SEP-17
Magnesium (Mg)			101.4		%		70-130	26-SEP-17
Manganese (Mn)			102.9		%		70-130	26-SEP-17
Molybdenum (Mo)			99.9		%		70-130	26-SEP-17
Nickel (Ni)			101.4		%		70-130	26-SEP-17
Phosphorus (P)			104.2		%		70-130	26-SEP-17
Potassium (K)			101.6		%		70-130	26-SEP-17
Selenium (Se)			0.30		mg/kg		0.11-0.51	26-SEP-17
Silver (Ag)			0.24		mg/kg		0.13-0.33	26-SEP-17
Sodium (Na)			98.6		%		70-130	26-SEP-17
Strontium (Sr)			98.2		%		70-130	26-SEP-17
Thallium (Tl)			0.129		mg/kg		0.077-0.18	26-SEP-17
Tin (Sn)			1.1		mg/kg		0-3.1	26-SEP-17
Titanium (Ti)			98.8		%		70-130	26-SEP-17
Tungsten (W)			0.17		mg/kg		0-0.66	26-SEP-17
Uranium (U)			102.4		%		70-130	26-SEP-17
Vanadium (V)			101.3		%		70-130	26-SEP-17
Zinc (Zn)			100.2		%		70-130	26-SEP-17
Zirconium (Zr)			0.7		mg/kg		0-1.8	26-SEP-17
WG2624891-4 LCS		**1+2**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R3838985								
WG2624891-4 LCS		**1+2**						
Aluminum (Al)			96.6		%		80-120	26-SEP-17
Antimony (Sb)			97.0		%		80-120	26-SEP-17
Arsenic (As)			95.8		%		80-120	26-SEP-17
Barium (Ba)			97.2		%		80-120	26-SEP-17
Beryllium (Be)			91.8		%		80-120	26-SEP-17
Bismuth (Bi)			92.0		%		80-120	26-SEP-17
Boron (B)			85.8		%		80-120	26-SEP-17
Cadmium (Cd)			95.4		%		80-120	26-SEP-17
Calcium (Ca)			94.2		%		80-120	26-SEP-17
Chromium (Cr)			91.5		%		80-120	26-SEP-17
Cobalt (Co)			92.4		%		80-120	26-SEP-17
Copper (Cu)			89.3		%		80-120	26-SEP-17
Iron (Fe)			92.4		%		80-120	26-SEP-17
Lead (Pb)			93.2		%		80-120	26-SEP-17
Lithium (Li)			89.8		%		80-120	26-SEP-17
Magnesium (Mg)			94.1		%		80-120	26-SEP-17
Manganese (Mn)			94.3		%		80-120	26-SEP-17
Molybdenum (Mo)			93.8		%		80-120	26-SEP-17
Nickel (Ni)			90.7		%		80-120	26-SEP-17
Phosphorus (P)			95.5		%		80-120	26-SEP-17
Potassium (K)			98.2		%		80-120	26-SEP-17
Selenium (Se)			91.6		%		80-120	26-SEP-17
Silver (Ag)			97.6		%		80-120	26-SEP-17
Sodium (Na)			94.5		%		80-120	26-SEP-17
Strontium (Sr)			92.8		%		80-120	26-SEP-17
Sulfur (S)			90.2		%		80-120	26-SEP-17
Thallium (Tl)			92.0		%		80-120	26-SEP-17
Tin (Sn)			95.4		%		80-120	26-SEP-17
Titanium (Ti)			91.1		%		80-120	26-SEP-17
Tungsten (W)			97.4		%		80-120	26-SEP-17
Uranium (U)			98.4		%		80-120	26-SEP-17
Vanadium (V)			95.3		%		80-120	26-SEP-17
Zinc (Zn)			87.6		%		80-120	26-SEP-17
Zirconium (Zr)			91.9		%		80-120	26-SEP-17

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	**Soil**							
Batch R3838985								
WG2624891-1 MB								
Aluminum (Al)			<50		mg/kg		50	26-SEP-17
Antimony (Sb)			<0.10		mg/kg		0.1	26-SEP-17
Arsenic (As)			<0.10		mg/kg		0.1	26-SEP-17
Barium (Ba)			<0.50		mg/kg		0.5	26-SEP-17
Beryllium (Be)			<0.10		mg/kg		0.1	26-SEP-17
Bismuth (Bi)			<0.20		mg/kg		0.2	26-SEP-17
Boron (B)			<5.0		mg/kg		5	26-SEP-17
Cadmium (Cd)			<0.020		mg/kg		0.02	26-SEP-17
Calcium (Ca)			<50		mg/kg		50	26-SEP-17
Chromium (Cr)			<0.50		mg/kg		0.5	26-SEP-17
Cobalt (Co)			<0.10		mg/kg		0.1	26-SEP-17
Copper (Cu)			<0.50		mg/kg		0.5	26-SEP-17
Iron (Fe)			<50		mg/kg		50	26-SEP-17
Lead (Pb)			<0.50		mg/kg		0.5	26-SEP-17
Lithium (Li)			<2.0		mg/kg		2	26-SEP-17
Magnesium (Mg)			<20		mg/kg		20	26-SEP-17
Manganese (Mn)			<1.0		mg/kg		1	26-SEP-17
Molybdenum (Mo)			<0.10		mg/kg		0.1	26-SEP-17
Nickel (Ni)			<0.50		mg/kg		0.5	26-SEP-17
Phosphorus (P)			<50		mg/kg		50	26-SEP-17
Potassium (K)			<100		mg/kg		100	26-SEP-17
Selenium (Se)			<0.20		mg/kg		0.2	26-SEP-17
Silver (Ag)			<0.10		mg/kg		0.1	26-SEP-17
Sodium (Na)			<50		mg/kg		50	26-SEP-17
Strontium (Sr)			<0.50		mg/kg		0.5	26-SEP-17
Sulfur (S)			<1000		mg/kg		1000	26-SEP-17
Thallium (Tl)			<0.050		mg/kg		0.05	26-SEP-17
Tin (Sn)			<2.0		mg/kg		2	26-SEP-17
Titanium (Ti)			<1.0		mg/kg		1	26-SEP-17
Tungsten (W)			<0.50		mg/kg		0.5	26-SEP-17
Uranium (U)			<0.050		mg/kg		0.05	26-SEP-17
Vanadium (V)			<0.20		mg/kg		0.2	26-SEP-17
Zinc (Zn)			<2.0		mg/kg		2	26-SEP-17
Zirconium (Zr)			<1.0		mg/kg		1	26-SEP-17

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TS-WT	**Soil**							
Batch R3838662								
WG2624750-3 DUP		**L1992514-1**						
Total Solids		14.7	14.5		%	1.3	20	26-SEP-17
WG2624750-2 LCS								
Total Solids			100.1		%		85-115	26-SEP-17
WG2624750-1 MB								
Total Solids			<0.10		%		0.1	26-SEP-17
SOLIDS-VS-WT	**Soil**							
Batch R3838662								
WG2624750-3 DUP		**L1992514-1**						
Volatile Solids		50.8	47.7		%	6.3	20	26-SEP-17
WG2624750-1 MB								
Volatile Solids			<0.010		%		0.01	26-SEP-17
TOC-WT	**Soil**							
Batch R3840143								
WG2626382-3 CRM		**WT-TOC-CRM**						
Total Organic Carbon			106.0		%		70-130	28-SEP-17
WG2626382-4 DUP		**L1992514-1**						
Total Organic Carbon		18.3	17.3		%	5.7	20	28-SEP-17
Fraction Organic Carbon		0.183	0.173		g/g	5.7	25	28-SEP-17
WG2626382-2 LCS								
Total Organic Carbon			100.7		%		80-120	28-SEP-17
WG2626382-1 MB								
Total Organic Carbon			<0.10		%		0.1	28-SEP-17
Fraction Organic Carbon			<0.0010		g/g		0.001	28-SEP-17

Quality Control Report

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1992514-COFC

COC Number: 15 -

Page of

Report To	Contact and company name below will appear on the final report
Company:	Palmer Environmental Consulting Group Inc.
Contact:	Jake McQueen
Phone:	647-795-8153
Company address below will appear on the final report	
Street:	374 Wellington Street West , Suite 3
City/Province:	Toronto, ON
Postal Code:	M5V 1E3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☐ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1	jake@pecg.ca
Email 2	
Email 3	

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1	jake@pecg.ca
Email 2	

Project Information	
ALS Account # / Quote #:	Q62364
Job #:	Ambershaw
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): L1992514

ALS Contact: Sampler:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-200.2-CCMS-WT	TOC-WT	SOLIDS-VS-P-WT	Number of Containers
	L04-Sed 1 (Wpt 315)	Sep 13/17	4pm	Sediment	x	x	x	2 jars
	BC-Sed 1 (Wpt 307)	Sep 13/17	1pm	Sed.	X	X	X	"
	BL-Sed 1 (Wpt 311)	"	10am	Sed.	X	X	X	"
	BL-Sed 2 (Wpt 313)	"	2pm	Sed.	X	X	X	"

Drinking Water (DW) Samples [1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human drinking water use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☑

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
12.3					

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	Sep 15/17	3:45	LS	09/15/17	15:49			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System please submit using an Authorized DW COC form

MM