Whale Tail Pit Expansion Project

Fish Habitat Offsetting Plan

March 2020

Project No.: 0459286-0108

The business of sustainability

March 2020

Whale Tail Pit Expansion Project

Fish Habitat Offsetting Plan

This document has been prepared by ERM Consultants Canada Ltd., with input from: C. Portt and Associates on the habitat accounting (Habitat Evaluation Procedure) methodology and results; Golder and Associates for the conceptual design of the offsetting measure (sill) and contingency offsetting measure of Pistol Bay.

ERM Consultants Canada Ltd.

120 Adelaide Street West, Suite 2010
Toronto, ON
Canada M5H 1T1

T: +1 416 646 3608
F: +1 416 642 1269

EXECUTIVE SUMMARY

Agnico Eagle Mines Limited (Agnico Eagle) operates the Meadowbank Gold Mine, located on Inuit-owned lands approximately 70 km north of the hamlet of Baker Lake in the Kivalliq Region of Nunavut. In 2018, Agnico Eagle gained approval to construct and operate the Whale Tail Pit at the satellite Amaruq property, located approximately 50 km northwest of the Meadowbank Mine (herein referred to as the Approved Project). Agnico Eagle is proposing to expand and extend the Approved Project, and therefore extend the Life of Mine at the Meadowbank Mine, Nunavut, for up to four years. The Whale Tail Pit Expansion Project (herein known as the Expansion Project) would include an additional open pit, and an underground mine.

Agnico Eagle is seeking a reconsideration of the Project Certificate (No. 008) by the Nunavut Impact Review Board (NIRB), and an amendment to the Type A Water Licence of the Approved Project (Type A Water Licence 2AM WTP1826).

The Expansion Project will result in unavoidable harmful alteration, disruption or destruction (HADD) of fish habitat through direct habitat loss from infrastructure footprint, change in flows, as well as through the deposition of mine waste and associated management of contact water. The Expansion Project is anticipated to result in small, additional fish habitat losses, overlapping with, and in close proximity to, the area included in the Whale Tail Pit Authorization (PATH No.: 16-HCAA-00370). It is estimated that during both the operations and post-closure phases, there will be a loss of 10.37 habitat units, which will be required to be offset as per Sections 35 and 36 of the *Fisheries Act*.

In addition to previous consultation with communities and regulators for the Approved Whale Tail Pit Project, Agnico Eagle has engaged with the communities of Baker Lake and Chesterfield Inlet in July 2018 and March 2019 to seek feedback on potential fish habitat offsetting measures related to the Expansion Project. The consultation program included the alternatives assessment process for the selection of the IVR attenuation pond, IVR waste rock storage facility and groundwater storage pond (Schedule 2 Amendment process), and how input from participants would be incorporated into the process.

The main offsetting measure to counterbalance the predicted loses for the Expansion Project is the construction of a permanent sill between Whale Tail Lake and Lake A18. This sill will maintain water levels in Lake A18 at 1.3 m above those currently authorized under the Approved Project. Thus, the offsetting sill will permanently maintain temporary fish habitat in and upstream from Lake A18 that was temporarily created, but scheduled to be lost during closure, as part of the Approved Whale Tail Pit Project. Maintaining the already established fish habitat will provide immediate gains to offset the HADD associated with the Expansion Project and achieves a ratio of net gain of fish habitat units equal to 1.75:1 (gain:loss).

CONTENTS

List of Tables

List of Figures

List of Photos

ACRONYMS AND ABBREVIATIONS

Agnico Eagle	Agnico Eagle Mines Ltd.
Approved Project	The approved Whale Tail Pit Project, as defined in the Whale Tail Pit Project Proposal (NIRB File No.: 16MN056), Project Certificate 008 and NWB Type A Water Licence 2AM-WTP1826.
DFO	Fisheries and Oceans Canada
ECCC	Environment and Climate Change Canada
ECCC Guidelines	*Guidelines for the Assessment of Alternatives for Mine Waste Disposal*, Environment and Climate Change Canada, 2016.
Expansion Project	The proposed expansion of the Whale Tail Pit Project.
FEIS	Final Environmental Impact Statement
HADD	Harmful alteration, disruption, or destruction
HEP	Habitat Evaluation Procedure
HTO	Hunters and Trappers Organization
GSP	Groundwater Storage Pond
HTO	Hunters and Trappers Organization
IIBA	Inuit Impact and Benefit Agreement
IQ	Inuit Qaujimajatuqangit
KIA	Kivalliq Inuit Association
masl	Metres above sea level
MDMER	Metal and Diamond Mining Effluent Regulations (https://laws-lois.justice.gc.ca/PDF/SOR-2002-222.pdf)
mine site, the	Whale Tail Pit mine site (site of the Whale Tail Pit Project)
NIRB	Nunavut Impact Review Board
NWB	Nunavut Water Board
WRSF	Waste Rock Storage Facility

1. INTRODUCTION

Agnico Eagle Mines Limited (Agnico Eagle) operates the Meadowbank Gold Mine, located on Inuit-owned lands approximately 70 km north of the hamlet of Baker Lake in the Kivalliq Region of Nunavut (Figure 1-1). In 2018, Agnico Eagle gained approval to construct and operate the Whale Tail Pit at the satellite Amaruq property, located approximately 50 km northwest of the Meadowbank Mine (herein referred to as the Approved Project).

Agnico Eagle is proposing to expand and extend the Approved Project, and therefore extend the Life of Mine at the Meadowbank Mine for up four years. The Whale Tail Pit Expansion Project (herein known as the Expansion Project) would include an additional open pit, and an underground mine. As with the Approved Project, all ore and tailings would be processed at the Meadowbank Mine.

Agnico Eagle is seeking a reconsideration of the Project Certificate (No. 008) by the Nunavut Impact Review Board (NIRB), and an amendment to the Type A Water Licence of the Approved Project (Type A Water Licence 2AM WTP1826) by the Nunavut Water Board (NWB). The Expansion Project will affect fish and fish habitat through mine infrastructure, expansion of approved facilities, as well as through the deposition of mine waste and associated management of contact water. The Expansion Project is anticipated to result in relatively small, additional fish habitat losses, overlapping with and in close proximity to, the area included in the Whale Tail Pit Authorization (PATH No.: 16-HCAA-00370). These additional fish habitat losses will arise from both the extraction footprint and deposition of mine waste and require a *Fisheries Act* Authorization under Sections 35 and 36 of the *Fisheries Act*.

1.1 Regulatory Context

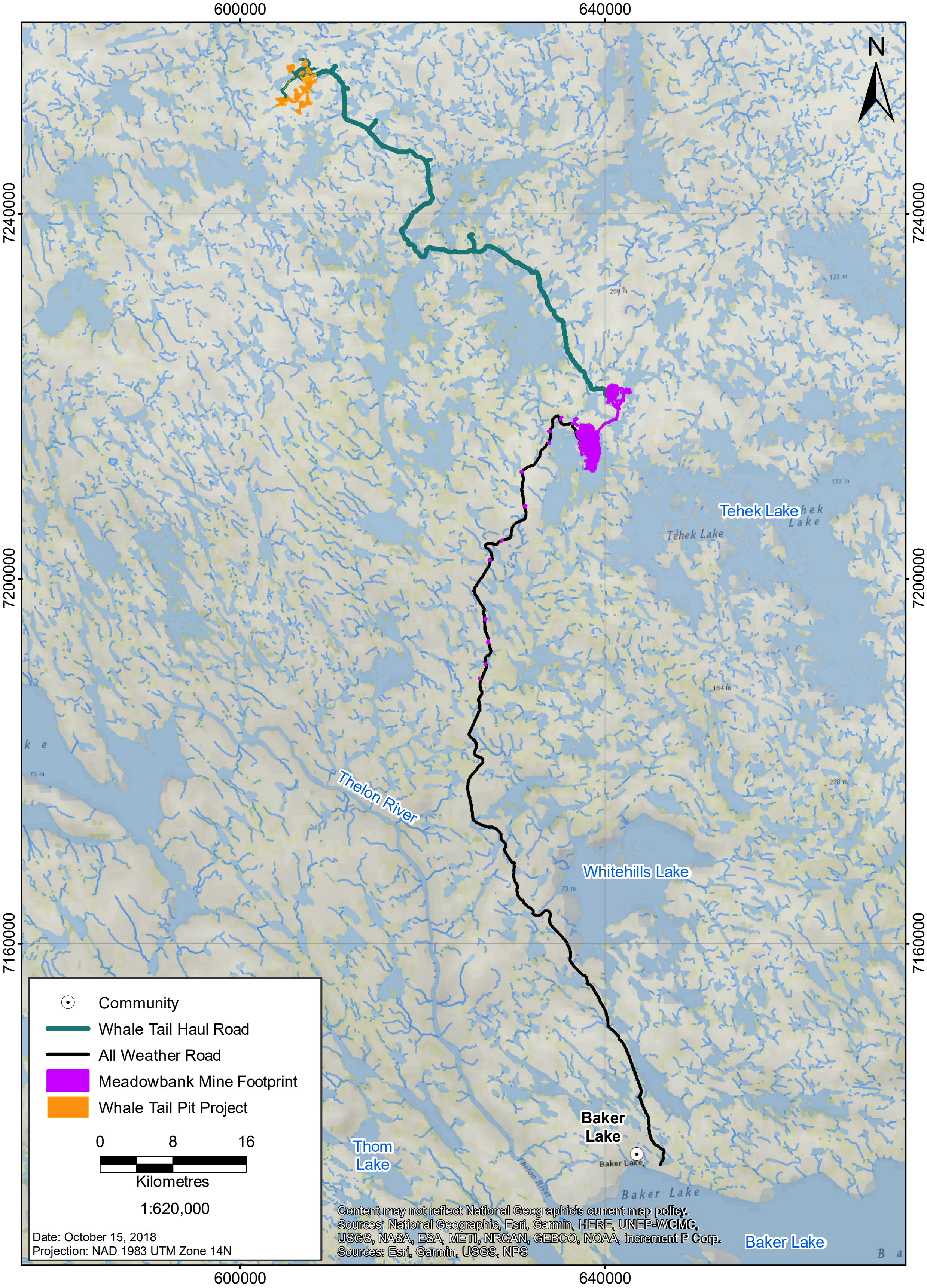
There are two provisions of the *Fisheries Act* that are relevant to the Whale Tail Pit Expansion Project.

Subsection 35(1) of the *Fisheries Act* prohibits the harmful alteration, disruption or destruction (HADD) of fish habitat. Where proponents are unable to avoid or mitigate HADD of fish habitat, projects require authorization under subsection 35(2) of the *Fisheries Act* in order for the project to proceed without contravening the Act. As part of an Application for Authorization under Paragraph 35(2)(b), proponents develop an offsetting plan that counterbalances the unavoidable HADD of fish habitat. The habitat protection provisions of the *Fisheries Act* are administered by Fisheries and Oceans Canada (DFO).

Subsection 36(3) of the *Fisheries Act* prohibits the deposit of deleterious substances of any type in water frequented by fish, unless the waterbody is designated as a tailings impoundment area (TIA) through an amendment to Schedule 2 of the Metal and Diamond Mining Effluent Regulations (MDMER). The MDMER regulate the deposit of mine waste (including mine effluent, mine contact water, waste rock, tailings, low-grade ore and/or overburden) into natural waters frequented by fish. Proponents that seek to use a natural waterbody frequented by fish to store mine waste must conduct an assessment of alternatives. The pollution prevention provisions of the *Fisheries Act* are administered by Environment and Climate Change Canada (ECCC).

Agnico Eagle has prepared an alternatives assessment to demonstrate that the use of a fish-frequented water body as an attenuation pond, and overprinting of three small fish-frequented lakes/ponds by a Waste Rock Storage Facility (WRSF) and Groundwater Storage Ponds (GSPs), are the most appropriate options based on environmental, technical and socio-economic considerations (ERM 2020). The alternatives assessment for the Expansion Project followed the transparent and standardized process described in *Environment and Climate Change Canada's Guidelines for the Assessment of Alternatives for Mine Waste Disposal* (ECCC 2016). Based on this assessment process, Lake A53 was selected as the preferred alternative for a new attenuation pond for the Project, and Lakes A50, A51, and A52 (and ephemeral watercourse A51-A50, A52-A53, and a portion of ephemeral watercourse A50-A17) as the preferred alternatives under the footprint of the WRSF and GSP. As these waterbodies are frequented by fish, in accordance with Section 27.1 of the MDMER, under Section 36 of the *Fisheries Act*, a fish habitat compensation plan is required to offset the loss of fish habitat resulting from the deposit of any deleterious substance.

Figure 1-1
Location of Meadowbank Gold Mine and Whale Tail Pit Project



1.2 Report Structure

This report provides the required documentation in support of the application for *Issuance of an Authorization under Paragraphs 34.4(2)(b) and 35(2)(b) of the Fisheries Act*, as well as to support the process to amend Schedule 2 of the MDMER, under the streamlined approvals process.
Although two different regulatory agencies administer Section 35 and Section 36 of the *Fisheries Act*, offsetting plans[1] to support each application require DFO approval.

It is recognized that separate accounting is required for each of the *Fisheries Act* provisions, and the fish habitat offsetting plan has therefore been organized to clearly differentiate between habitat losses and gains under each of the Section 35 (direct habitat impacts) and Section 36 (loss of habitat due to deleterious substances). One fish habitat offsetting plan has been prepared to facilitate indigenous, public and regulatory review.

The outline of the fish habitat offsetting plan follows the Information and Documents to be Provided in Schedule 1 of the *Fisheries Act* (Appendix A of this report provides a Table of Concordance to Schedule 1); as well as section 27.1 of the MDMER (Appendix B of this report provides a Table of Concordance to S.27.1).

[1] Section 27.1 of the MMDER refers to fish habitat compensation rather than offsetting. The different terminology does not alter the intent of the plans, and the term ‘offsetting’ is used throughout this document in relation to both Section 35 and Section 36 *Fisheries Act* requirements.

2. PROJECT DESCRIPTION

2.1 Project Overview

Agnico Eagle operates the Meadowbank Gold Mine, located on Inuit-owned lands approximately 70 km north of the hamlet of Baker Lake in the Kivalliq Region of Nunavut. The Meadowbank mine began commercial production in 2010. As a satellite operation, the Amaruq Whale Tail Pit is approved to operate and feed the Meadowbank Mine Mill, Tailings Storage Facility, and use associated Meadowbank Mine infrastructure under Project Certificate No.004 and Type A Water Licence 2AM-MEA1526. The Approved Project (Project Certificate No. 008; Type A Water Licence 2AM-WTP1826), achieved commercial production in October 2019.

The Approved Project has a *Fisheries Act* Authorization under Paragraph 35(2)(b) for the Whale Tail Pit Project for the loss of 74.33 ha of fish habitat (PATH No.:16-HCAA-00370; July 2018). To remain consistent with the approach already approved for the Whale Tail Project and, as the proposed offsetting habitat lies within the Approved Project area, the Whale Tail Pit Fish Habitat Offsetting Plan (C. Portt and Associates and Agnico Eagle Mines Limited, 2018) forms the basis of the habitat accounting procedure and monitoring program.

The Expansion Project includes plans to expand mining operations at the Whale Tail Pit mine site by:

- expanding the Whale Tail Pit;
- expanding the Whale Tail WRSF;
- developing an additional pit (the IVR Pit);
- developing an underground mine;
- developing an additional WRSF (the IVR WRSF);
- developing an additional water attenuation pond (the IVR Attenuation Pond); and
- developing GSPs.

The above infrastructure will expand and extend mining at the Whale Tail Pit mine site by four years. As in the Approved Project, ore and tailings from the Expansion Project will be transported to the Meadowbank Mine for processing.

The economic effects of the Expansion Project are substantial and are expected to be of significant benefit to the territory. The Expansion Project is expected to generate 99 new employment opportunities for Nunavummiut incremental to those created by the Approved Project and extend employment and incomes for the Approved Project workforce until 2026. The Expansion Project will continue to have positive effects in communities for an extended period, in terms of household incomes and associated access to nutritious food, recreation, education, and resources with which to conduct traditional activities. Similarly, the Expansion Project will continue support for community programming and educational initiatives, as well as Inuit Impact and Benefit Agreements (IIBAs) royalties and commitments. Health and safety training over the operational life of the Expansion Project is also expected to continue to be of benefit to communities.

2.2 Description of Proposed Project Works

The Project Description and Alternatives, including Project Components and Activities is outlined in Section 1.2 of the Whale Tail Pit Expansion Final Environmental Impact Statement (FEIS) Addendum (https://www.nirb.ca/portal/pdash.php?appid=125418#!), as well as in the Main Application Document for the Nunavut Water Board Licence 2AM-WTP1826 Amendment (see Appendix C this report).

In summary, the Expansion Project is designed to operate as a satellite of the main Meadowbank facilities and will be accessed by the existing approved haul road. Transportation to the mine site (marine barging, airstrip, and transportation along the all-weather access road), housing and handling will remain the same as authorized under Project Certificate No. 004 and/or Project Certificate No. 008. The Expansion Project is subject to reconsideration of the Project Certificate (No. 008) by the NIRB, Agnico Eagle is seeking to amend the Type A Water Licence (2AM-WTP1826).

The Expansion Project will begin as soon as approval and permits for the amendment applications are received (anticipated for mid 2020). The operational phase of the Approved and Expansion Project will span from Year 1 (2020) to Year 7 (2026). Mining activities are expected to end in Year 7 (2026). Closure will occur from Year 8 (2027) to Year 24 (2042).

The Expansion Project is an extension of mining operations for the Approved Project that has existing and licensed waste and water management facilities. Consistent with the Approved Project, water management infrastructure includes: contact water collection ponds, freshwater collection ponds, diversion channels, retention dikes, dams, culverts, water treatment plants for effluent, potable water treatment plant, sewage treatment plant, and discharge diffusers (Figure 2.2-1). Additional GSPs, IVR dikes and diversions, as well as contact water collection systems will be put in place to effectively manage and mitigate impacts to water.

The approved Whale Tail WRSF will continue to be used for the expansion of Whale Tail Pit; however, the waste storage facilities will be expanded vertically and horizontally to the southeast. The newly proposed IVR WRSF will accommodate waste rock and overburden generated from the IVR Pit. The waste rock storage footprint, water management infrastructure, and camp have been designed consistent with the Approved Project and will accommodate growth of the project within the modified project footprint.
The existing underground WRSF permitted under the Type B Water Licence 2BB-MEA1828 will have an increased footprint to accommodate additional waste storage and groundwater from the underground mine. Consistent with the approved Meadowbank and Whale Tail Pit operations, a classification system will be used to identify and safely store Non-Potentially Acid Generating (NPAG), Potentially Acid Generating (PAG), and Metal Leaching (ML) rock. PAG mine rock will be stored in the designated storage areas designed for long-term geochemical and geotechnical stability. The proposed WRSF location was subject to an Alternatives Assessment (ERM 2020) according to ECCC Guidelines (ECCC 2016).

Upon approval of the expansion, the Meadowbank Mine facility will continue to operate as an approved mining and milling operation (Project Certificate No. 004 and Type A Water Licence 2AMMEA1526); as a result, Agnico Eagle is looking to extend the milling and tailings storage at Meadowbank Mine, through the Expansion Project. No new infrastructure is required at the existing Meadowbank Mine to support the Expansion Project. Agnico Eagle proposes to process the Whale Tail ore and placement of the tailings slurry at the existing Meadowbank Mine Tailing Storage Facility as approved by NIRB Project Certificate No. 008 and Type A Water Licence 2AM MEA1526. By extending the life of mine at Whale Tail Pit and Meadowbank, Agnico Eagle will progressively close portions of these sites while operating. The closure strategies for the Expansion Project are consistent with the approved Whale Tail Pit Project and securities for the Expansion Project have been arranged with Crown- Indigenous Relations and Northern Affairs Canada (CIRNAC) and Kivalliq Inuit Association (KIA) and will be posted in accordance with Type A 2AM-WTP1826.

2.3 Overview of Waterbodies Affected by the Project

The Expansion Project will result in the loss of habitat from the development of the IVR Pit, the WRSF and GSPs, and a new attenuation pond. Figure 2.3-1 shows an overview of waterbodies affected by the mine infrastructure, and Table 2.3-1 provides location details. Further details are found in Section 4 of this report.

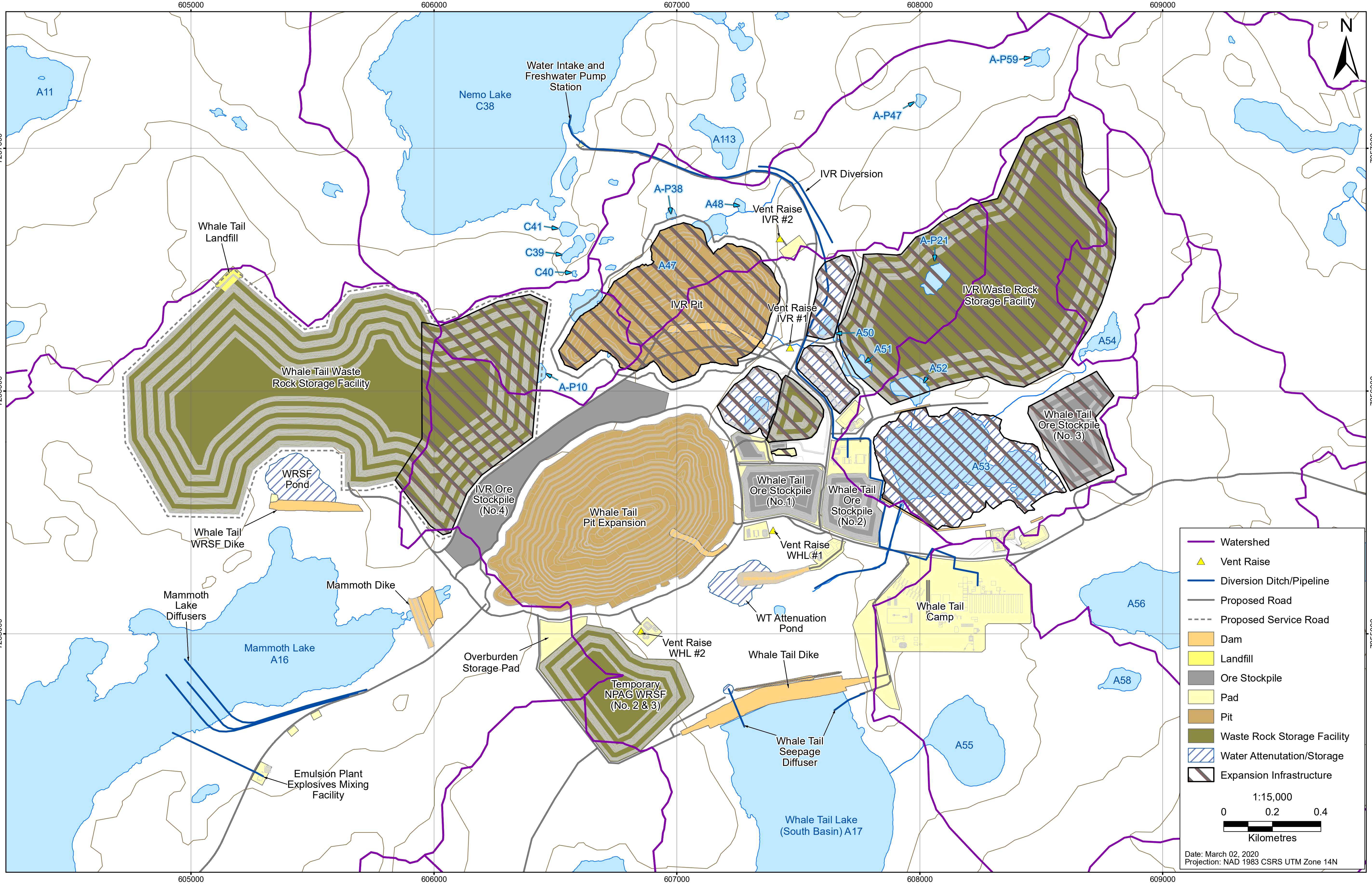


Figure 2.2-1: Whale Tail Pit Expansion Project – Approved Project and Expansion Project Infrastructure

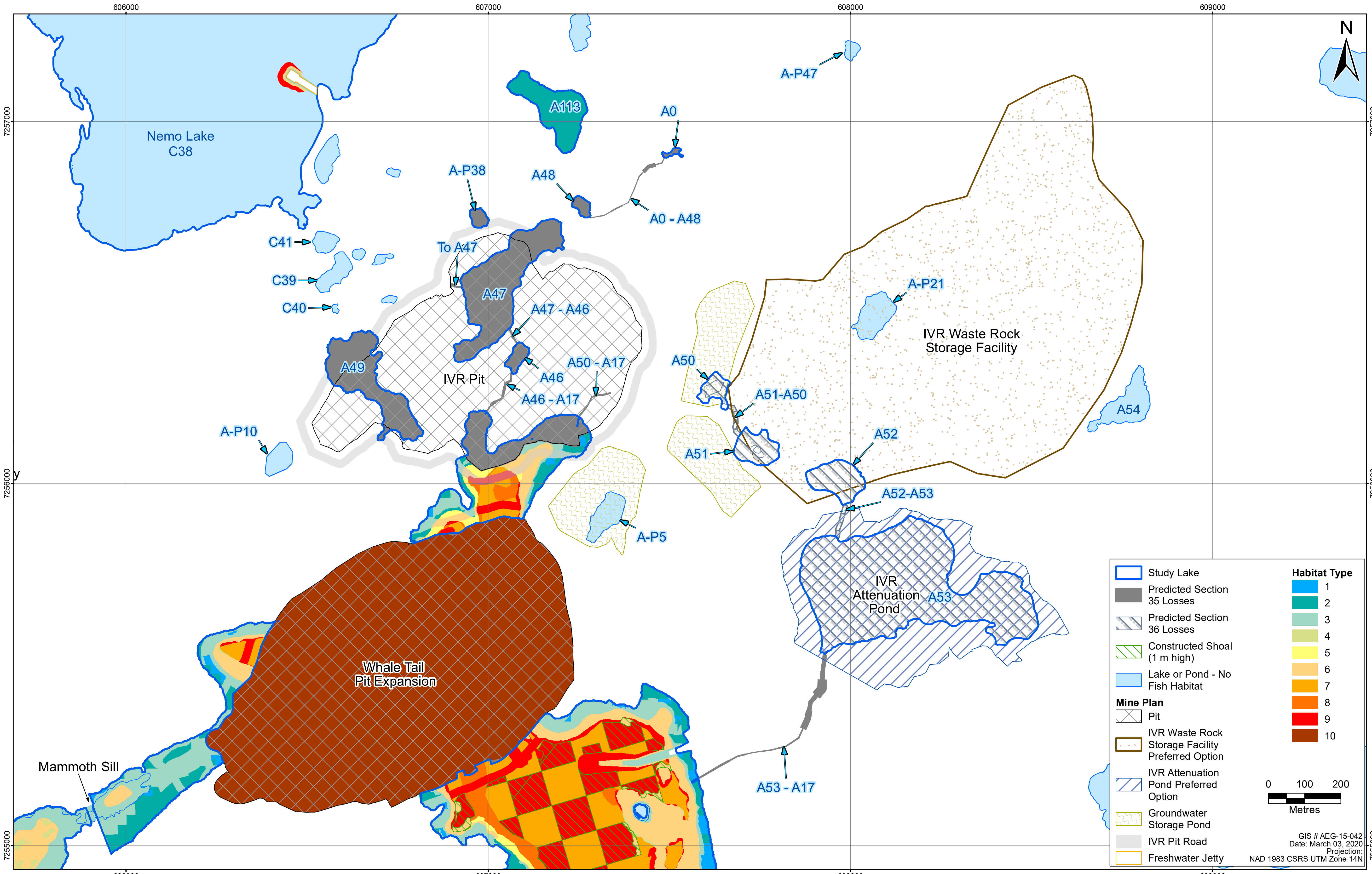


Figure 2.3-1: Areas of Predicted Fish Habitat Loss

Table 2.3-1: Geographic Coordinates of Waterbodies Affected by the Expansion Project

Waterbody/ Watercourse Identification	Description	UTM Northing	UTM Easting	Effect of Expansion Project
A-P38	Pond	7256732	606974	Feature lost (Section 35)
A-P38-A47	Diffuse ephemeral watercourse	7256690	607041	Feature lost (Section 35)
A0	Lake	7256914	607510	Feature lost (Section 35)
A0-A48	Defined seasonal watercourse	7256841	607414	Feature lost (Section 35)
A113	Lake	7257030	607207	Drainage pattern altered – flow to Nemo Lake watershed only
A113-A48	Diffuse ephemeral watercourse	7256843	607247	Feature lost (Section 35)
A16	Lake	7254740	604891	Increased duration of temporary Approved Project losses in dewatered portion
A17	Lake	7254756	607455	Increased duration of temporary Approved Project gains due to higher water elevation south of Whale Tail dike. Increased duration of temporary Approved Project losses in dewatered portion north of Whale Tail dike. Portion overprinted by IVR pit and changes due to Whale Tail Pit reconfiguration.
A17-A16	Connecting Channel	7255211	606135	Increased duration of temporary Approved Project losses due to dewatering
A17-A45	Diversion Channel	7252943	604803	Increased duration of temporary Approved Project gains due to higher water elevation (flooding)
A18	Lake	7253061	606289	Increased duration of temporary Approved Project gains due to higher water elevation (flooding)
A18-A17	Connecting Channel	7253147	606750	Increased duration of temporary Approved Project gains due to higher water elevation (flooding)
A19	Lake	7252367	606139	Increased duration of temporary Approved Project gains due to higher water elevation (flooding)
A19-A18	Connecting Channel	7252625	606215	Increased duration of temporary Approved Project gains due to higher water elevation (flooding)
A20	Lake	7252672	605005	Increased duration of temporary Approved Project gains due to higher water elevation (flooding)

Waterbody/ Watercourse Identification	Description	UTM Northing	UTM Easting	Effect of Expansion Project
A20-A19	Connecting Channel	7252312	605832	Increased duration of temporary Approved Project gains due to higher water elevation (flooding)
A21	Lake	7252056	604716	Increased duration of temporary Approved Project gains due to higher water elevation (flooding)
A21-A20	Connecting Channel	7252298	604549	Increased duration of temporary Approved Project gains due to higher water elevation (flooding)
A22	Lake	7251936	604140	Increased duration of temporary Approved Project gains due to higher water elevation (flooding)
A22-A21	Connecting Channel	7252110	604396	Increased duration of temporary Approved Project gains due to higher water elevation (flooding)
A23-A22	Connecting Channel	7251772	603804	Increased duration of temporary Approved Project gains due to higher water elevation (flooding)
A45	Lake	7253163	604752	Increased duration of temporary Approved Project gains due to higher water elevation (flooding)
A45-A16	Diversion Channel	7253406	604608	Increased duration of temporary Approved Project change in flow due to higher water elevation (flooding)
A46	Lake	7256349	607083	Feature lost (Section 35)
A46-A17	Defined seasonal watercourse	7256243	607040	Feature lost (Section 35)
A47	Lake	7256543	607010	Feature lost (Section 35)
To A47	Defined seasonal watercourse	7256545	606908	Feature lost (Section 35)
A47-A46	Defined seasonal watercourse	7256407	607067	Feature lost (Section 35)
A48	Lake	7256765	607261	Feature lost (Section 35)
A48-A47	Diffuse seasonal watercourse	7256737	607232	Feature lost (Section 35)
A49	Lake	7256305	606648	Feature lost (Section 35)
A50	Lake	7256257	607622	Feature lost (Section 36)
A50-A17	Downstream reach - defined seasonal watercourse. Upstream reach - diffuse ephemeral watercourse	7256206	607267	Feature lost (Section 35 and Section 36)

Waterbody/ Watercourse Identification	Description	UTM Northing	UTM Easting	Effect of Expansion Project
A51	Lake	7256098	607743	Feature lost (Section 36)
A51-A50	Diffuse ephemeral watercourse	7256173	607684	Feature lost (Section 36)
A52	Lake	7256010	607953	Feature lost (Section 36)
A52-A53	Diffuse ephemeral watercourse	7255905	607976	Feature lost (Section 36)
A53	Lake	7255726	608072	Feature lost (Section 36)
A53-A17	Defined seasonal watercourse	7255330	607872	Feature lost (Section 35)
A53-A17 Diversion Channel	Diversion Stream (during operations)	7255087	607744	Feature lost (Section 35)
A55	Lake	7254562	608209	Increased duration of temporary Approved Project effects
A55-A17	Defined seasonal watercourse	7254482	607962	Increased duration of temporary Approved Project effects
A59-A17	Defined seasonal watercourse	7253735	607672	Increased duration of temporary Approved Project effects
A62	Lake	7253943	606732	Increased duration of temporary Approved Project effects
A62-A17	Defined seasonal watercourse	7253780	606871	Increased duration of temporary Approved Project effects
A63	Lake	7253567	606156	Increased duration of temporary Approved Project effects
A63-A18	Defined seasonal watercourse	7253308	606265	Increased duration of temporary Approved Project effects
A65	Lake	7252076	606894	Increased duration of temporary Approved Project effects
C38	Lake	7257116	606465	Approved Project effects

3. CONSULTATION

Since operations of Meadowbank Mine began, Agnico Eagle has continued public consultation by annually meeting with the community and local stakeholders within the Kivalliq Region, regulatory agencies and local employees. This has allowed a better general understanding of the rights, interests, values, aspirations, and concerns of the potentially affected stakeholders, with particular reference to the community of Baker Lake. Through this continued consultation, Agnico Eagle has developed an operational culture that recognizes and respects these relevant interests in the planning and executing processes. Agnico Eagle has consulted with local stakeholders and regulators regarding ongoing operations of the Whale Tail Pit and haul road development, as well as the proposed Expansion Project.

Inuit Qaujimajatuqangit (IQ) encompasses not only traditional knowledge (TK) about land and resources, but also the skills to apply this knowledge to livelihoods, and a value system that is founded upon respect, sharing, collaboration, collective decision-making, skills development, and the responsible use of resources. Agnico Eagle makes efforts to incorporate IQ in all aspects of planning and developing the Whale Tail Pit Project and the Expansion Project, and to engage and consult with potentially affected communities (including Baker Lake, Nunavut) and land users to seek their feedback and answer questions.

As part of the Approved Project, Agnico Eagle has conducted consultation with community and stakeholders on the project location, potential effects, and fish offsetting options. Examples of relevant fisheries community consultation has included:

- Site tours with the Baker Lake Hunters and Trappers Organization (HTO) in 2014 to introduce the Amaruq (Whale Tail) Exploration Area;
- Focus group discussions in Baker Lake throughout 2016 on traditional land use on the Whale Tail Project Area;
- Offsetting review meetings throughout 2017 including discussions on dewatering, offsetting fishout procedures, and a workshop held in June 2017 with the KIA, Baker Lake HTO and Nunavut Tunngavik Inc. (NTI), on future fisheries offsetting.

In addition to previous consultation with the community and regulators for the approved Whale Tail Pit Project, Agnico Eagle sought feedback and presented possible projects for fish habitat offsetting for the Expansion Project to the communities of Baker Lake and Chesterfield Inlet in July 2018 and March 2019 (Table 3-1). The consultation program included the alternatives assessment process for the selection of the attenuation pond (Schedule 2 Amendment process), and how input from participants would be incorporated into the process.

Agnico Eagle has considered TK and IQ in the alternatives assessment for mine waste (ERM 2020). Existing information—including the *Inuit Qaujimajatuqangit Baseline Report* compiled for the Whale Tail Pit Project[2]—has been reviewed and incorporated in the baseline setting description, in the critical flaw assessment, in the characterization of alternatives, in the development of meaningful indicators for the MAA, and in the determination of value-based weightings. Consultation with Elders and community members in Baker Lake and Chesterfield Inlet also highlighted traditional values, areas of use, and concerns related to the attenuation pond alternatives.

The main methods of engagement were a community open-house and small focus group meetings with elders, women, and youth, in addition to meetings with Hamlets, HTOs, and the KIA. Appendix D provides and the consultation record for public and government engagement on the project from 2016 to 2018, as well as presentation material, meeting notes, and photos of the July 2018 and March 2019 sessions.

[2] *Inuit Qaujimajatuqangit Baseline Report*. June 2016. Included as Appendix 7-A of the Whale Tail Pit Project: Final Environmental Impact Statement (FEIS).

Table 3-1: Community Consultation, Expansion Project, Fish Offsetting and Mine Waste Alternatives Assessment

	Community Meetings	Focus Groups	Meetings
July 10-11 2018	▪ Presentation and open house at Baker Lake community hall ▪ Presentation and open house at Chesterfield Inlet Hamlet Chambers	▪ Women ▪ Youth ▪ Elders	▪ Hamlet of Baker Lake ▪ Baker Lake Hunters and Trappers Organization (HTO) ▪ Kivalliq Inuit Association ▪ Hamlet of Chesterfield Inlet ▪ Chesterfield Inlet HTO
March 26-29, 2019	▪ Presentation and open house at Baker Lake community hall	▪ Women ▪ Youth ▪ Elders	▪ Hamlet of Baker Lake ▪ Kivalliq Inuit Association

During the July 2018 consultation, Agnico Eagle presented an overview of the Whale Tail Pit Expansion Project, and outlined that impacts to fish must be described and offsetting implemented that outweigh the predicted impacts. In order to help maintain sustainable fisheries in Nunavut and offset for future developments, Agnico Eagle communicated that they would like to receive ideas for new fish habitat offsetting projects. Ultimately, Agnico Eagle would like to create sustainable fisheries projects that are of value to communities and stakeholders. The main methods of engagement were community open-house and small focus group meetings with elders, women, and youth in addition to meetings with Hamlets, the HTO, and the KIA.

At the meetings, the loss of fish habitat from the Expansion Project was explained, and there were no concerns raised, except to point out that relocating fish may change the environment and that fish should not be moved to new areas (different sources of water). The focus groups in general were most interested in Arctic char, followed by lake trout, with offsetting options that supported an increase in Arctic char generating the most discussion. No new ideas for fish habitat offsetting options were generated from the group.

Five examples of fish habitat offsetting options were presented, in order to solicit feedback and generate discussion on new ideas that groups may have:

1. Forage fish habitat creation or enhancement;
2. Hatchery;
3. Access enhancement;
4. Enhancement of juvenile rearing habitat;
5. Sewage treatment upgrades in other Kivalliq communities.

Forage Fish Habitat Creation or Enhancement

- Excavate shallow ponds that would be connected to existing streams to create habitat for small fish (stickleback/sculpin);
- Increase the number of forage fish that provide prey to other fish species, thereby improving general fisheries productivity;
- An example of this would be converting a quarry into fish habitat.

The focus groups in general were not aware of the prevalence of the smaller forage fish in the area, and did not show enthusiasm for the potential importance of this offsetting option to fisheries in general. The HTO focus group were interested whether this type of compensation had been successfully implemented before, especially in the north, and it was noted that there were no known examples of similar compensation options in the Arctic.

Hatchery

- Build an Arctic char hatchery in Rankin Inlet or other community;
- Grow Arctic char from wild broodstock and stock into waterbodies;
- Creation of a hatchery could help grow the population of Arctic char;
- Local job creation to run and maintain the hatchery.

The focus groups had mixed opinions about a hatchery. There was interest in how the hatchery would work, and how this may enhance Arctic char populations. The Hamlet of Baker Lake and Baker Lake HTO in particular, could see the benefits for the community regarding employment and training, as well as potential opportunities to improve local Arctic char fisheries. However, some members of the Elder's focus group expressed concern that the fish produced would not be natural and may taste different. It was recognized in all Focus Groups that more work would be needed to confirm the viability of this option.

Access Enhancement

- Increase productive capacity of char, or other fish, by improving access to overwintering areas or little-used lakes;
- Remove boulders or create new connecting channels;
- Could be low-impact and lead by community groups (may or may not need heavy equipment);
- Could be hard to find locations where fish cannot pass easily and obstructions could be removed.

The Elder's Group expressed concerns that moving fish from one location to another would change the habitat, which could change the nature of the fish themselves. Only one location with a physical obstruction (the falls at Prince River) was identified during discussions, and there was little interest in community-led groups to remove obstructions without machinery (per an example described by ERM). However, the importance of over-wintering habitat was recognized during focus groups, as well as in conversation as part of the Baker Lake Open House.

Enhancement of Juvenile Rearing Habitat

- Develop a standardized approach to improving juvenile fish rearing habitat that could be applied in various locations, by industry and communities.

Focus group participants did not recognize juvenile rearing habitat as being particularly important for fisheries productivity, although there was some interest in previous habitat enhancements (including channel realignment) that had been done in the Arctic (examples provided by ERM).

Sewage Treatment Upgrades in Other Kivalliq Communities

- In many communities, sewage treatment issues are the same as Baker Lake;
- Improve water quality in lakes and therefore productive capacity of fish habitat;
- Use the planned project in Baker Lake as a case study to lay out a framework for sewage treatment projects in other communities.

There was support from all groups for this option, specifically concerning the Airplane Lake/Baker Lake sewage treatment upgrades. However, few people made the link between sewage treatment and fisheries, except for a comment that fishing for char was better further away from the hamlet of Baker Lake. No other communities were identified as potential locations for future sewage treatment upgrades.

Arctic char were a favourite species to catch, and it was noted that the sea-run individuals tasted different, but that locals (Baker Lake) had to buy Arctic char mainly from the Kitikmeot region, which was expensive. Offsetting options that supported an increase in Arctic char in the region generated the most discussion and interest. It was noted in the consultation that fish species from outside the Project area could also be the focus for offsetting options (e.g., Arctic grayling), but there was no support or mention of other species, aside from Arctic char and lake trout.

Agnico Eagle presented four alternatives for water attenuation to the communities of Baker Lake and Chesterfield Inlet in sessions held July 10 to 13, 2018. In summary, the community response to the alternatives suggested for water attenuation was a general concern with potential impacts of large containment dams on caribou migration and the movements of other wildlife. There was agreement from the community that the attenuation pond should try to avoid impacts to fish and fish habitat, and concern about the relocation of fish. The communities supported the use of a lake or area that is already affected by the Whale Tail Pit Project however, the use of Mammoth Lake was considered unfavourable because of the anticipated impacts to a large fish-bearing lake.

In March 2019, Agnico Eagle conducted additional community engagement in Baker Lake, and meetings were proposed in Chesterfield Inlet but were cancelled due to a blizzard which restricted travel. An update on the alternatives assessment for an attenuation pond as part of the Expansion Project was provided during the sessions, in addition to a general update on the overall Whale Tail Pit Expansion Project, including the upcoming expansion of the Baker Lake Fuel Farm. An overview of fish habitat losses and offsetting/compensation was provided and potential offsetting measures and community interests in fisheries were discussed. Focus groups (with elders, women, youth, hamlets, HTO and KIA) and an open-house community meeting were the main methods of engagement.

During discussion of the loss of fish habitat related to the Expansion Project, there were no concerns raised, with the exception that fish should not be re-located to new areas where food web dynamics could be affected. There were no objections raised from community members regarding the concept of the proposed fish offsetting through the placement of a sill between Whale Tail Lake and Lake A18. This approach will allow fish to move into their new habitat (on their own) and will not require fish re-location. No new ideas were forthcoming for fish offsetting, and as found in the July 2018 consultation, there was little interest from participants in small-bodied fish, or burbot. Arctic char remained the preferred fish species in the area. There was interest in the fish hatchery as a means for fish offsetting, but groups would require additional information to learn about the process and potentially see a small-scale trial before full support. No concerns were raised related to the use of Lake A53 as the IVR Attenuation Pond.

In summary, no new ideas for fish habitat offsetting options were generated from the group. Most interest lay with projects that would help enhance local Arctic char fisheries, but these projects were deemed to be on a larger-scale or longer-term projects that may comprise a future habitat bank, than the options need to offset impacts from the Whale Tail Pit Expansion Project.

Agnico Eagle has also worked closely with DFO throughout the review of the Whale Tail Pit Project, meeting with DFO Fisheries Protection Program and Science Departments on at least 15 occasions from 2016 to 2019 to discuss the Whale Tail Pit Project, the approved Whale Tail Pit Project offsetting plan, as well as the conceptual offsetting plan for the Expansion Project. Key decisions from this series of consultation on the *Fisheries Act* Authorization for the Approved Project, such as agreement on the benchmark for lake elevation habitat mapping, and application of the Habitat Evaluation Model, have informed the direction of subsequent community consultation, and formed the basis for this offsetting plan for the Expansion Project.

4. DESCRIPTION OF FISH AND FISH HABITAT

The description of the fish community and fish habitat below, describes, primarily, conditions prior to the authorized development of the Whale Tail Pit. The present conditions in some locations are affected are by current approved operations. Those areas predicted to be affected by Expansion Project, located north and east of the Whale Tail Pit (Figure 2.2-2), are the focus of the description below.

The Whale Tail Pit study area is situated in the headwaters of a small river that flows northwest for approximately 13 km to a lake that is on a tributary of the Meadowbank River, which in turn is a tributary of the Back River that flows to tidewater at the Chantrey Inlet and the Arctic Ocean. The study area is located on the Canadian Shield within a Low Arctic ecoclimate of continuous permafrost and is one of the coldest and driest regions of Canada.

The lakes within the Whale Tail Pit study area are ultra-oligotrophic/oligotrophic (nutrient poor, unproductive) headwater lakes that are typical of the Arctic. The ice-free season on the lakes is very short. Ice break-up usually begins during mid- to late-June, with the lakes becoming ice-free in early July. Ice begins to form again on the lakes in late September or early October. Complete ice cover is attained by late October, with maximum ice thickness of about 2 m occurring in March/April (Azimuth 2013). Many small watercourses become dry once the land begins to freeze in the fall and, where water is present, most freeze to the bottom during the winter (BAER 2005; Jones *et al* 2010). Flows during the spring melt and the summer vary with drainage area.

The fish community and habitat of the affected areas are well-studied. Baseline fisheries investigations in support of the Approved Project and the *Fisheries Act* Authorization were conducted in Mammoth Lake, Whale Tail Lake, and tributary streams and lakes in 2014, 2015, and 2016 and are described in (C. Portt and Associates and Agnico Eagle Mines 2018; Appendix E). Additional fish sampling was conducted in the Project area in 2018 and 2019, in support of plans for the Expansion Project (C. Portt and Associates 2019a, 2019b; Appendix E). The 2018 and 2019 field investigations generally corroborated the earlier findings. No new fish species were captured in the study area. All life stages of a total of six fish species are present in the study area, comprised of four large-bodied species (lake trout, *Salvelinus namaycush*; Arctic char, *Salvelinus alpinus*; round whitefish, *Prosopium cylindraceum*; and burbot, *Lota lota*); as well as two small-bodied species (slimy sculpin, *Cottus cognatus*; and ninespine stickleback, *Pungitius pungitius*).

Burbot and slimy sculpin were captured in Lake A53, and slimy sculpin were captured in Lake A49 for the first time in 2018. In 2019, sampling in Lakes A50, A51 and A52 captured ninespine stickleback. No fish had been captured in these lakes in previous years and therefore they were previously thought to be fishless. Both A50 and A51 are shallow; their maximum depths, measured on August 24, 2019, were 0.7 m and 1.1 m respectively, so they are expected for freeze to the bottom each winter. Therefore, fish that are present during the open-water season must move into these lakes from downstream. Lake A52 is shallow and goes dry each summer, but is ephemerally connected to Lake A53 via watercourse A52-A53. It is reasonable to conclude that the ninespine stickleback captured in A52 in June 2019 migrated from A53 during the current year.

In the approved Whale Tail Pit Offsetting Plan (C. Portt and Associates and Agnico Eagle Mines 2018), Lake A113 was considered to flow toward Whale Tail Lake, although minor flow toward the Nemo Lake watershed had also been observed during spring freshet. Field investigations in 2019 confirmed that a connection exists and flow occurs between Lake A113 and C44 which is connected to Nemo Lake. Thus, Lake A113 has is no longer considered to be isolated by activity in the Whale Tail Lake watershed.

There are two broad categories of watercourses present in the study area. One type is connecting channels between larger lakes. These are generally wide and shallow with boulder and cobble substrate. Some of these connecting channels never have surface flow. Others have sufficient depth during spring freshet for adult large-bodied fish to pass through them but, as flow subsides, they become shallower and impassible to and unusable by large fish and, eventually, all of the flow is interstitial.

The other type of watercourses present is small streams, most of which drain smaller catchments. These shallow streams often have multiple channels (i.e., are braided). Peat is the dominant substrate in most of these watercourses. Some of these watercourses flow throughout the open-water season and most of those have defined channels; others are ephemeral with diffuse flow across tundra or among boulders and cobbles. The mean total wetted width of the Whale Tail Lake tributaries with flow throughout the open-water season ranged from 0.7 m to 7.6 m and their mean depth ranged from 6 cm to 17 cm. Riffle and run habitat is dominant and there are few pools in these tributaries.

The fish species that have been captured in individual waterbodies and watercourses affected by the Expansion Project are presented in Table 4-1.

Table 4-1: Fish Species in Waterbodies and Watercourses Where Habitat Losses Will Occur as a Result of the Whale Tail Pit Expansion Project

Waterbody/ Watercourse	Lake Trout	Arctic Char	Round Whitefish	Burbot	Ninespine Stickleback	Slimy Sculpin
Section 35						
Whale Tail Lake	X	X	X	X	X	X
A47		X			X	
A49	X					X
A46					X	X
A48					X	
A0					X	
A46-A17		X		X	X	X
A-P38					X	
A47-A46						X
A0-A48					X	
A50-A17 (defined portion)	X	X		X	X	X
A53-A17	X	X			X	X
Section 36						
A53	X	X		X	X	X
A50					X	
A51					X	
A52					X	
A51-A50					X[1]	
A52-A53					X[1]	
A50-A17 (diffuse portion)					X[1]	

[1]*Assumed to be fish-frequented during periods of flow*

5. DESCRIPTION OF EFFECTS ON FISH AND FISH HABITAT

A comprehensive analysis of the potential pathways for effects on fish and fish habitat during the construction, dewatering, operational, closure, and post-closure phases of the Expansion Project, is provided in Volume 3, Appendix 3-C of the FEIS Addendum. Predicted effects are outlined in Section 6.5 (181219-16MN056-FEIS Addendum Main Document; Golder 2018).

For the purpose of the offsetting plan for the Expansion Project, the effects to fish and fish habitat were assessed against the post-closure footprint of fish habitat under the Approved Project. Thus, the baseline conditions for the Expansion Project are considered to be the Post-Closure conditions of the Approved Whale Tale Pit Project (Figure 5-1). Effects to fish and fish habitat are predicted to occur through the loss of waterbody area due to the footprint of Project Infrastructure and resulting alteration of the hydrological landscape (Figure 2.2-1). For clarity, the following description of effects has been split into those occurring through infrastructure footprint and water loss (Section 35 of the *Fisheries Act*) and those lost through the footprint required for the deposition of deleterious substances (Section 36 of the *Fisheries Act*).

Note that the quantification of effects using the HEP model conservatively assumes that all six fish species present utilize all potentially effected waterbodies (see section 7.1).

5.1 Effects on Fish and Fish Habitat Lost through Project Infrastructure (Section 35)

5.1.1 Whale Tail Lake

IVR Pit will overprint a portion of the north end of Whale Tail Lake that is north of Whale Tail Pit. The elevation of Whale Tail Lake will increase by one metre as part of the authorized offsetting for Whale Tail Pit. Even with this increase, most of the area that will be overprinted is less than 4 metres deep. It includes areas of fine, mixed, and coarse substrate. It is assumed that all six fish species present utilize this portion of Whale Tail Lake.

5.1.2 Small Lakes and Watercourses North of Whale Tail Lake

A series of shallow lakes and ponds and small watercourses north of Whale Tail Lake will either be overprinted, drain, or will cease to receive water as a result of IVR Pit. Moving upstream from Whale Tail Lake, these are Watercourse A46-A17, Lake A46, Watercourse A47-A46, Lake A47, Watercourse A48-A47, Lake A48, Watercourse A0-A48, and Lake A0. There is no defined watercourse, but there is diffuse, overland flow between Lake A47 and Lake A48 during the open-water season. There are no defined watercourses between Lake A113 and Lake A48 or between Pond A-P38 and Lake A47 but there is diffuse flow during the spring freshet. It is expected that, given its proximity to IVR Pit, Pond A-P38 will drain. Lake A113, which is further from the IVR Pit and not connected to it by a defined channel will remain post-closure and drain to the Nemo Lake watershed.

With the exception of Lake A47, the waterbodies are less than 2 m deep and are thought to freeze to the bottom and therefore not to support fish through winter. Sampling through the ice at the deepest point in Lake A47 on May 21, 2018, prior to the spring freshet, found that there was slightly less than a metre of water beneath 1.8 m of ice with a minimum dissolved oxygen concentration of 6.7 mg/l, indicating that Lake A47 could support fish through the winter. The watercourses are shallow and freeze during the winter. Substrate in the lakes is either fine or mixed, except for one small area of coarse substrate in Lake A46.

In addition to the small-bodied species, Arctic char have been captured as far upstream in this series as Lake A47 and a juvenile burbot was captured in Watercourse A46-A17. Only ninespine stickleback have been captured upstream from Lake A47, including Lake A113 and Pond A-P38.

Watercourse A50-A17 also drains to the north end of Whale Tail Lake. The downstream section of this watercourse is defined and flows throughout the open-water season. There is an ephemeral connection to A50, from which there is another diffuse ephemeral connection to A51. Five species have been captured in the defined reach of A50-A17. Ninespine stickleback and slimy sculpin dominated electrofishing catches, with 76 and 15 individuals captured, respectively. Five juvenile Arctic char, one juvenile lake trout and one juvenile burbot were also captured. As with the other small and ephemeral watercourses, no habitat units were attributed to the ephemeral portion of this watercourse (refer to Section 7.3) in the HEP model for the calculations of habitat area or habitat units lost.

5.1.3 Lake A49

Lake A49 was not altered by the Approved Project but is planned to be drained during the IVR Pit operations phase for the Expansion Project. Lake A49 is isolated, with no surface connection to any other waterbody. The east and south shorelines are primarily exposed bedrock. There are two basins that exceed 4 metres in depth and coarse, mixed and fine substrates are present. Lake trout and slimy sculpin have been captured in Lake A49.

5.1.4 Watercourse A53 to A17

During IVR pit operations, it is anticipated that Lake A53 will be isolated by a berm and used as an attenuation pond. Watercourse A53-A17, which flows from Lake A53 to Whale Tail Lake, will cease to exist once flow is isolated by the berm at the outlet of Lake A53, resulting in a loss of fish habitat. The existing watercourse is a multi-thread watercourse along most of its length, with up to eight channels present, and flows throughout the open-water season. The average total wetted width (sum of all channels) is 7.6 m and it is shallow, with a mean depth of 7 cm and a maximum depth of 27 cm. The watercourse is 62% flats, 35% riffles and 3% pools. The substrate is 90% peat, 6% gravel and 4% cobble. The watercourse freezes during the winter.

Lake trout, slimy sculpin, ninespine stickleback, and juvenile Arctic char have been captured in Watercourse A53-A17 during the open-water season.

5.2 Effects on Fish and Fish Habitat Lost by Deposit of Mine Waste (Section 36)

The Whale Tail Pit Expansion Project will increase the surface area (and therefore catchment area) of the mine site, and the expanded pits and underground works will increase the volume of groundwater infiltration. As a result, the expansion will create a greater volume of contact water[3]. The water management for the Expansion Project will align with the approved water management on the site, in that contact water from across the site will be collected and pumped (or diverted) to an attenuation pond. Water from the attenuation pond will be reused for mine operations and treated at the contact water treatment plant. The water in the attenuation pond will mainly contain suspended solids and arsenic. Treated water will be pumped via a pipeline for discharge into the approved receiving environment during the open water season.

The expanded Whale Tail Pit perimeter will also constrain the Whale Tail Attenuation Pond, reducing its storage capacity from 455,000 m^3 to 133,000 m^3. Thus, an additional attenuation pond is required to accommodate at least 617,000 m^3 (providing a cumulative 750,000 m^3 storage capacity required for the Whale Tail Pit Expansion Project, for the purposes of the alternatives assessment). The Expansion Project will also result in additional WRSF. The location of the IVR Attenuation Pond and IVR WRSF (and adjacent GSPs) were subject to an alternatives assessment to identify the most suitable alternatives.

[3] Water that has been in contact with mining, including the open pit, underground works, waste rock storage facilities, or other infrastructure

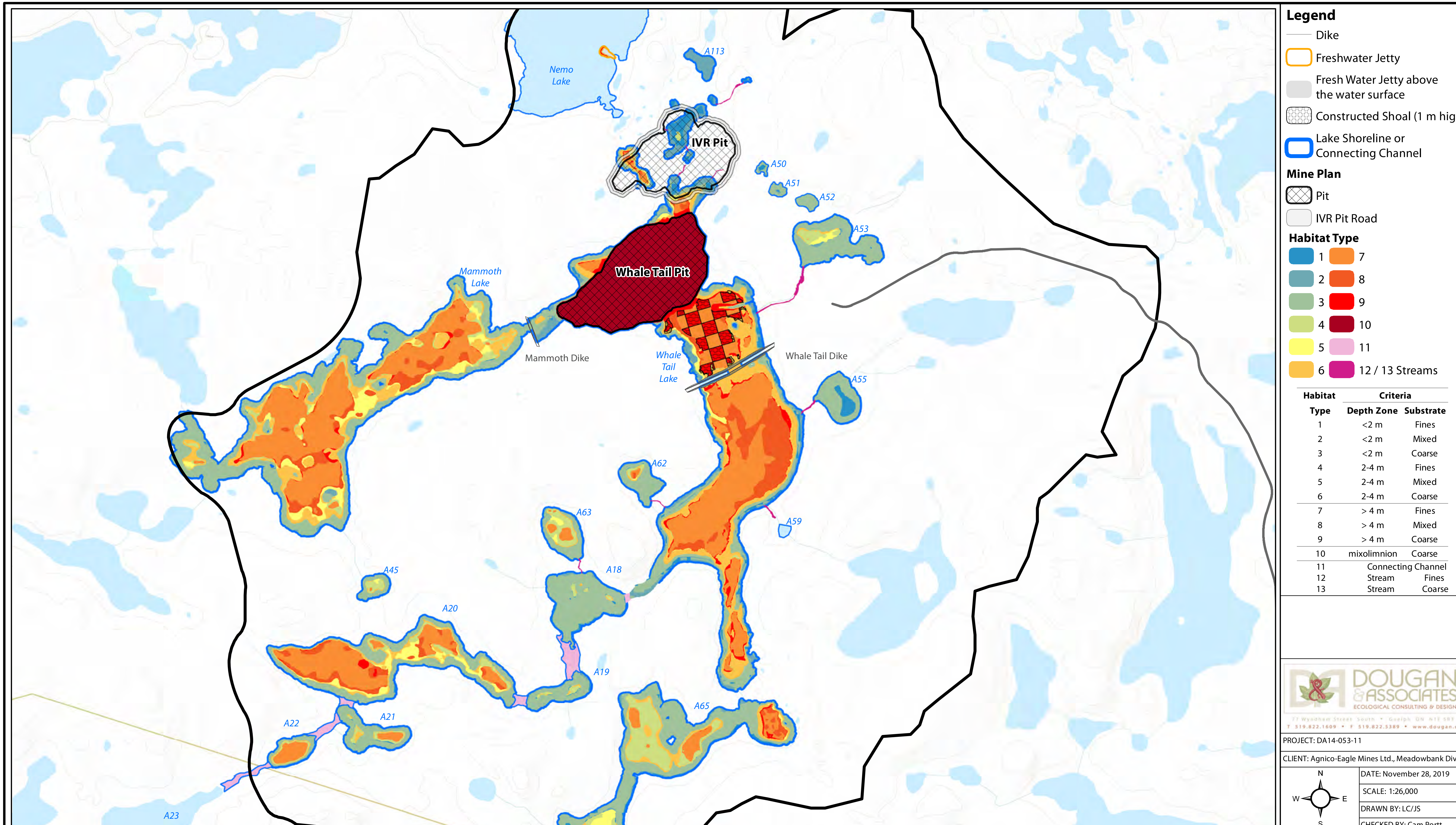


FIGURE 5.1. Baseline Conditions for the Expansion Project

5.2.1 Lake A53

The location and design of the attenuation pond for the Project expansion is the subject of an alternatives assessment, that was completed according to ECCC Guidelines (2016) (ERM 2020). Based on the results of the assessment alternative, out of five feasible alternatives, including non fish bearing options, Lake A53 (Alternative I) has the highest merit rating (ERM 2020). Lake A53 is therefore the preferred option for the IVR attenuation pond. Lake A53 is situated within close proximity to the Approved Project (Figure 5.2-1), and within the site layout of the Whale Tail Pit Expansion Project, with the IVR WRSF located to the north; the haul road, mine camp and industrial area to the south; and the Whale Tail and IVR open pits to the west. Thus, the lake is surrounded on three sides by mine infrastructure.

The conversion of Lake A53 to an attenuation pond (Figure 5-2-1),and listing as a Tailings Impoundment Area under a Schedule 2 amendment of the MDMER, will result in the complete loss of fish habitat in the lake.

Lake trout, Arctic char, burbot, slimy sculpin, and ninespine stickleback have been captured in Lake A53.

5.2.2 Lake A52

The location of the IVR WRSF and GSPs is the subject of an alternatives assessment that was completed according to ECCC Guidelines (2016) (ERM 2020). Based on the results of the assessment alternative, out of three feasible alternatives, including non fish bearing options, Alternative I (overprints Lakes A50, A51, A52), has the highest merit rating (ERM 2020). Although no fish had been captured in previous years, two ninespine stickleback were captured in Lake A52 in June 2019.

Lake A52 drains to Lake A53 via a shallow multi-thread watercourse during spring freshet. As the season progresses the watercourse goes dry, isolating Lake A52. Lake A52 goes dry later in the summer each year. Lake A52 will be overprinted by the IVR WRSF and therefore is considered a Section 36 habitat loss.

5.2.3 Lakes A50 and A51

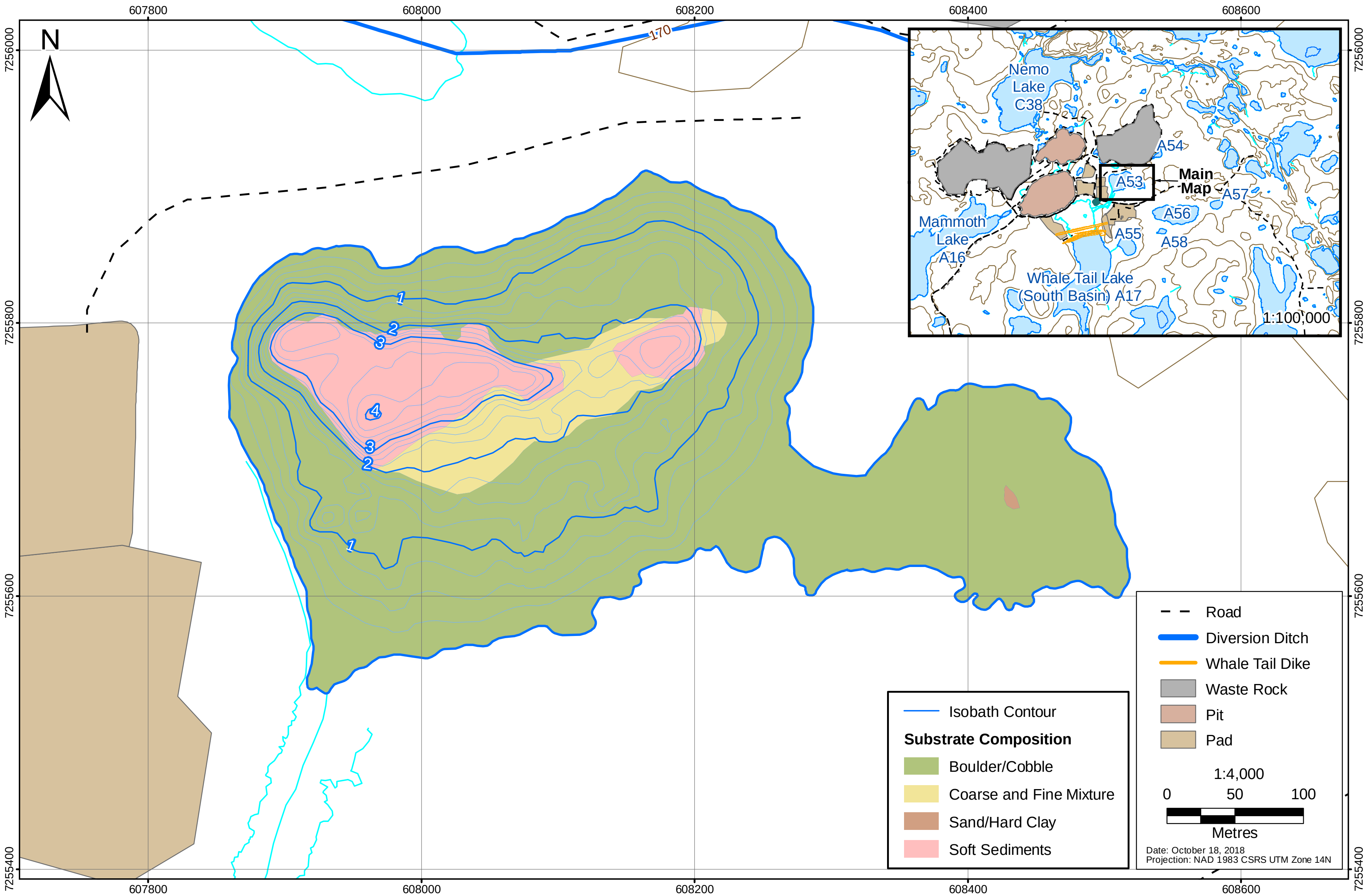
Despite multiple sampling events, fish were not captured in Lakes A50 or A51 prior to the issuance of the Whale Tail Pit *Fisheries Act* Authorization. In 2019, ninespine stickleback were captured in Lakes A50 and A51. Lake A51 will be overprinted by the IVR WRSF and Lake A50 will be overprinted by a GSP. Therefore, both Lake A50 and Lake A51 are considered Section 36 habitat losses for the Expansion Project.

It should be noted that if Lakes A50 and A51 were not overprinted by mine infrastructure they would still be habitat losses due to the Expansion Project, except under Section 35 instead of Section 36.
As described in Section 4, they freeze to the bottom each winter and, due to a vertical drop at the edge of IVR pit, they will no longer be accessible from downstream over-wintering habitat in Lake A17.

5.2.4 Watercourse A52-A53

Watercourse A52-A53 is an ephemeral, shallow, multi-thread watercourse that connects Lake A52 to Lake A53 during freshet. As Lake A53 goes dry each year, the capture of two ninespine stickleback in A53 in late June of 2019 means that those fish must have passed through watercourse A52-A53.
This watercourse is a habitat loss under Section 36. As with the other small and ephemeral watercourses, no habitat units were attributed to this feature (refer to Section 7.3) in the HEP model calculations of habitat area or habitat units lost.

Figure 5.2-1
Baseline Conditions for Lake A53



5.2.5 Watercourse A52-A51

Watercourse A52-A51 does not exist. It is a mapping artifact. There is a bedrock outcrop that creates a drainage divide between Lake A51 and Lake A52. Lake A52 flows to Lake A53 and Lake A51 flows to Lake A50.

5.2.6 Watercourse A51-A50

Watercourse A51-A50 is a diffuse seasonal connection that flows from Lake A51 to Lake A50. Ninespine stickleback were captured in Lake A51 in 2019. This lake had a maximum depth of 1.1 m, so it freezes completely each winter. The only way that ninespine stickleback could access this lake is via watercourse A51-A50. It will be overprinted by the IVR WRSF and therefore is considered a Section 36 habitat loss. As with the other small and ephemeral watercourses, no habitat units were attributed to this feature (refer to Section 7.3) in the HEP model calculations of habitat area or habitat units lost.

It should be noted that if watercourse A51-A50 was not overprinted by mine infrastructure it would still be a habitat loss due to the Expansion Project, except under Section 35 instead of Section 36. As described in Section 4, Lakes A50 and A51 freeze to the bottom each winter and, due to a vertical drop at the edge of IVR pit, they will no longer be accessible from downstream over-wintering habitat in Lake A17.

5.2.7 Watercourse A50-A17

As described in Section 5.1.3, watercourse A50-A17 has a defined downstream section that flows throughout the open-water season and an ephemeral section that connects to Lake A50. Most of this watercourse is considered a Section 35 loss, however, small areas in the ephemeral section are overprinted by GSPs and considered a Section 36 loss. As with the other small and ephemeral watercourses, no habitat units were attributed to the ephemeral portions of this feature in the HEP model calculations of habitat area or habitat units lost (refer to Section 7.3).

It should be noted that if the portion of watercourse A50-A17 considered to be a Section 36 loss were not overprinted by mine infrastructure it would still be a habitat loss due to the Expansion Project under Section 35. As described in Section 4, Lakes A50 and A51 freeze to the bottom each winter and, due to a vertical drop at the edge of IVR pit, watercourse A50-A17 will no longer be accessible from downstream over-wintering habitat in Lake A17.

6. MEASURES AND STANDARDS TO AVOID OR MITIGATE IMPACTS TO FISH

6.1 Description of Measures and Standards

All measures to avoid impacts due to the Expansion Project are outlined in the FEIS Addendum (specifically for fish in Section 6.5.8.1), including Agnico Eagle's commitment to conduct its operations in an environmentally and socially responsible manner, and to avoid adverse effects on the environment and people who use the land and resources. As part of this commitment, where possible, Agnico Eagle have located waste rock stock piles away from fish-bearing waterbodies. Agnico Eagle's commitment to minimize the footprint of the Whale Tail Pit Expansion Project is further demonstrated in the Alternatives Assessment Report (ERM 2020). One of the four threshold criteria for attenuation pond and the WRSF alternatives is the location of the pond to be within the sub-watersheds that will contain the approved and planned mine infrastructures. This threshold criteria to the selection of viable alternatives avoids extending potential environmental impacts to areas otherwise undisturbed by physical infrastructure.

Project-specific measures and standards to avoid and mitigate harm to fish and fish habitat during Project Activities, including the construction of offsetting habitat will include the following measures:

- Erosion and sediment control measures will be in place before commencing any works that have the potential to release sediment into waters frequented by fish.
- Site-specific sediment and erosion control measures will be in place, and monitored, for all near and in-water works.
- A Fish-Out Plan according to current published DFO Guidelines (Tyson et al. 2011) for lakes A53 and A49.
- All water intakes within waterbodies that support fish shall adhere to the Freshwater Intake End-of-Pipe Fish Screen Guideline (Fisheries and Oceans Canada 1995).
- Water withdrawal will adhere to the Protocol for Winter Water Withdrawal from Ice covered Waterbodies in the Northwest Territories and Nunavut (Fisheries and Oceans Canada 2010).
- Detailed engineering plans will be provided to DFO review, for construction works that have the potential to impact fish and fish habitat, prior to the commencement of the works, as per Water Licence 2AM-WTP1826 Part Items 1 and 2.

6.2 Monitoring Effectiveness of Measures and Standards

Agnico Eagle has developed monitoring and management programs required to mitigate, monitor, and report on its environmental performance against the regulatory requirements contained within its Whale Tail Pit and Meadowbank operating authorizations, permits, licenses, and leases consistent with the legal requirements of applicable Acts and Regulations in Nunavut. Where appropriate, existing Meadowbank Mine plans or Whale Tail Pit stand-alone plans have been updated or addendums have been added to reflect the Expansion Project, and Whale Tail Project Certificate requirements. These existing and approved programs will focus on ensuring impacts to waste and water are consistent with those predicted for the Approved Project. The accuracy of the environmental impact predictions and the effectiveness of the mitigation measures will be verified through monitoring and annual reporting. If unusual or unforeseen adverse environmental impacts are noticed, corrective action will be put in place. Contingency measures to account for effects unable to be mitigated by measures outlined in Section 6.1 will be addressed through the adaptive management process. Under this process the existing mitigation measures will be adjusted or new mitigation measures implemented if necessary. External reporting will be completed, as required. For additional information related to Agnico Eagles adaptive management system and precautionary approach, refer to Approved Project FEIS Volume 1, Section 1.6 (Agnico Eagle 2016).

Section 6.5.9 of the FEIS Addendum outlines applicable monitoring plans to fish habitat, including:

- Whale Tail Pit – Water Quality Monitoring and Management Plan for Dike Construction Dewatering (Volume 8, Appendix 8-A.4).
- Whale Tail Pit – Water Management Plan (Section 6.2.7; Volume 8, Appendix 8-B.2).
- Whale Tail Pit – Water Quality and Flow Monitoring Plan (Section 6.2.7; Volume 8, Appendix 8-B.3).
- Spill Contingency Plan (Volume 8, Appendix 8-D.5), which will be implemented to prevent effects from emergency spills and help address Inuit concerns related to effects to fish and fish habitat.
- Core receiving Environment Monitoring Program (CREMP) (Volume 8, Appendix 8-E.10), developed to monitor mining-related processes that could potentially impact the aquatic receiving environment, including fish.
- Habitat Compensation Monitoring Plan developed in consultation with DFO during the Phaser Lake authorization phase (Agnico Eagle 2016i).

In addition, a monitoring plan for the Expansion Project Offsetting Plan is outlined in Section 8.2.2 of this report, which includes monitoring to confirm that offsetting measures are implemented and effectively counterbalancing the habitat losses from the Expansion Project.

Consistent with Project Certificate No. 008, Agnico Eagle is required to:

- mitigate potential impacts to groundwater, surface waters, and freshwater aquatic environment (T&C #19);
- mitigate impacts of runoff/sedimentation from project quarries and borrow pits into freshwater aquatic habitat (T&C #20);
- prevent blockages or restrictions to fish passages (T&C #21);
- mitigate impacts of explosives use on fish and fish habitat (T&C #22);
- minimize potential project impacts to freshwater ecosystem productivity (T&C #23); and
- determine the viability of the flooded south basin of Whale Tail Lake as an effective offsetting measure for habitat losses (T&C #24).

7. RESIDUAL EFFECTS

The Project will result in permanent, unavoidable fish habitat losses through direct habitat loss from infrastructure footprint, change in flows, and through the deposit of mine waste. The residual effects (HADD) to fish and fish habitat were assessed against the post-closure footprint of fish habitat under the Whale Tail Pit Project Authorization (i.e., baseline conditions found in Figure 5-1). Thus, the final accounting of habitat area lost was calculated as the difference between fish habitat area available in Post-Closure for the Expansion Project and the habitat area available in Post-Closure for the Approved Project. It should be noted that the ephemeral watercourses A52-A53, A51-A50, and the ephemeral portion of A50-A17 are not included in the calculations of habitat losses (Habitat Units), nor is A48-A47 which had no defined channel. However, the habitat loss (in ha) due to mine waste overprinting (Section 36 loss) for both waterbodies and watercourses, including and ephemeral watercourses, are shown in Table 7-1 to support the Schedule 2 listing and requirements for Regulatory Impact Analysis Statement (RIAS). The total Section 36 habitat losses by surface area is equal to 17.47 ha.

The location of the losses attributable to Section 35 and Section 36 of the *Fisheries Act* that were included in the HEP calculations are provided in Figure 2.2-2 and described below in Table 7-1 and Sections 7.1, 7.2 and 7.3. Although the sum total of change in aquatic habitat area is positive (i.e. more habitat area is present and available to fish due to the Expansion Project, prior to any offsetting), the increase in habitat area is due to the creation of habitat in the flooded IVR pit. The approach taken in this offsetting plan, and in the offsetting plan for the Approved Project, is to assign zero fish habitat value to flooded pits. Therefore, differences in habitat quality for local species (see Section 7.3) indicates that these habitat losses will require offsetting.

Table 7-1: Anticipated Changes to Fish Habitat Area arising from the Whale Tail Pit Expansion

Habitat Losses	Waterbody/ Watercourse	Habitat Loss (ha)	Max. Depth (m)	Downstream Connection	Fish Species Captured
Section 35 included in calculation of habitat losses using HEP	Pond A-P38	-0.21	<2	Freshet, diffuse	NSSB
	Lake A0	-0.07	<2	Seasonal, defined	NSSB
	Lake A48	-0.20	<2	Seasonal, diffuse	NSSB
	Lake A47	-4.54	3.40	Seasonal, defined	ARCH, NSSB
	Lake A46	-0.30	<2	Seasonal, defined	NSSB, SLSC
	Lake A49	-3.17	7.30	Freshet, bedrock	LKTR, SLSC
	Whale Tail	32.76	18.30	Seasonal, defined	LKTR, ARCH, RNWH, BURB, NSSB, SLSC
	A0-A48	-0.08	0.30	Seasonal, defined	NSSB
	To A47	-0.01	0.12	Seasonal, defined	*
	A47-A46	-0.01	0.21	Seasonal, defined	SLSC
	A46-A17	-0.03	0.36	Seasonal, defined	ARCH, BURB, NSSB, SLSC
	A50-A17[1]	-0.01	0.26	Seasonal, defined	LKTR, ARCH, BURB, NSSB, SLSC
	A53-A17	-0.44	0.27	Seasonal, defined	LKTR, ARCH, NSSB, SLSC
	Sub-total	*23.71*	-	-	-

Habitat Losses	Waterbody/ Watercourse	Habitat Loss (ha)	Max. Depth (m)	Downstream Connection	Fish Species Captured
Section 35 not included in calculation of habitat losses using HEP[2]	A-P38-A47	-0.19	-	Freshet, diffuse	-
	A113-A48	-0.12	-	Freshet, diffuse	NSSB
	A50-A17[1]	-0.98	-	Freshet, diffuse	-
	A48-A47	-0.23	-	Seasonal, diffuse	-
	Sub-total	*-1.52*	-	-	-
Section 36 included in calculation of habitat losses using HEP	Lake A53	-14.39	3.80	Seasonal, defined	LKTR, ARCH, BURB, NSSB, SLSC
	Lake A50	-0.49	0.70	Freshet, diffuse	NSSB
	Lake A51	-0.91	1.10	Freshet, diffuse	NSSB
	Lake A52	-1.24	goes dry	Freshet, diffuse	NSSB
	Sub-total	*-17.03*	-	-	-
Section 36 not included in calculation of habitat losses using HEP[2]	A52-A53	-0.17	-	Freshet, diffuse	Assumed NSSB passage during interstitial flow
	A51-A50	-0.22	-	Freshet, diffuse	Assumed NSSB passage during interstitial flow
	A50-A17[1]	-0.05	-	Freshet, diffuse	Assumed NSSB passage during interstitial flow
	Sub-total	*-0.44*	-	-	-
Total net change included in HEP		**0.67**	**-**	**-**	**-**
Total net change not included in HEP		**-1.96**	**-**	**-**	**-**
Total net change		**4.71**	**-**	**-**	**-**

Notes:

Negative values indicate a loss, positive values indicate a gain.

Species: NSSB= ninespine stickleback, ARCH= Arctic char, LKTR= lake trout, SLSC= slimy sculpin, BURB= burbot, RNWH= round whitefish.

[*]Immediately adjacent to and accessible from Lake A47.

[1]The upstream part of this watercourse is diffuse and flows during freshet and the downstream part is defined and seasonal.

[2.] Watercourses not included in the HEP calculation due to ephemeral and diffuse nature (Appendix F)

7.1 Calculation of Habitat Losses and Habitat Equivalence Units (HU)

The Habitat Evaluation Procedure (HEP) model used to quantify habitat losses and gains for the Project is the same as was used in the approved Whale Tail Pit Offsetting Plan (C. Portt and Associates and Agnico Eagle Mines 2018). The HEP model is based on previously accepted modelling approaches developed by DFO researchers (Minns et al., 2001; DFO 2016). Consistent with the DFO policy and the assessment of HADD, using HEP calculations to measure habitat abundance is a relatively straightforward component of the modelling approach.

Much of the area affected by the Expansion Project, was previously quantified and presented in the approved Whale Tail Pit offsetting plan, using the same HEP model. Lakes A50, A51, A52 and A53 were not directly affected by the Approved Project. These lakes have been quantified for the Expansion Project using the same methodology as was used for waterbodies quantified for the Approved Project, which is by selecting a best-fit elevation using the digital elevation model to delineate the shoreline, with the following exceptions. Lake A53 consists of two basins connected by an area where the tops of boulders are above the water surface, which resulted in the digital elevation model containing elevations in that area that were above the water surface, underestimating the area of habitat. The margins of this boulder area were digitized by hand, based on the July 21, 2011 imagery. This is the method that was used to quantify boulder-filled connecting channels between lakes for the Approved Project. The shoreline of Lake A50 was also digitized by hand based on the July 21, 2011 imagery because the shoreline was not accurately represented using the digital elevation model. The areas of ephemeral watercourses were estimated by hand digitizing their margins based on colouration in the July 21, 2011 imagery. These area estimations are considered to be conservative, because no attempt was made to distinguish between wet and dry areas between those margins.

The detailed HEP methodology used in the approved Whale Tail Pit offsetting plan, and applied here, is provided in Appendix F. A summary of the accounting procedure is outlined below.

The HEP model applied in this offsetting plan is based on the procedure used for the approved 2012 No Net Loss Plan for the Meadowbank Mine (Agnico Eagle Mines, 2012). The HEP incorporates refinements introduced during subsequent work between 2014 and 2016 to develop offsetting measures for Vault and Phaser Lake, and changes incorporated as a result of DFO review of the conceptual and final offsetting plans for the approved Whale Tail Pit Project.

The HEP model assigns the existing habitat to one of 13 habitat types, which are shown in Table 7.1-1. Lake habitats are assigned to one of nine habitat types, based on depth and substrate. The pit and pit cap are considered a distinct habitat type that, at the request of DFO, are assumed to have no habitat value. The boulder filled connecting channels that are between some of the lakes are considered a distinct habitat type and the shallow seasonal watercourses in the study area that have defined channels are divided into two distinct habitat types based on their substrate. No habitat value was attributed to ephemeral watercourses by the HEP model but their role in providing fish access was considered. The area of each habitat type is based on field observations and calculated using Geographic Information System (GIS).

Table 7.1-1: Characteristics of the Habitat Types Used in the Approved and Expanded Whale Tail Pit Project Habitat Evaluation Procedure

Habitat Type	Feature: Depth	Substrate
1	Lake: 0-2 m	Fine
2	Lake: 0-2 m	Mixed
3	Lake: 0-2 m	Coarse
4	Lake: 2-4 m	Fine
5	Lake: 2-4 m	Mixed
6	Lake: 2-4 m	Coarse
7	Lake: >4 m	Fine
8	Lake: >4 m	Mixed
9	Lake: >4 m	Coarse
10	pit and pit cap*	Pit and pit cap*
11	connecting channels	Coarse
12	small streams	Fine
13	small streams	Coarse

** Depth and substrate in pit and pit cap areas are not relevant because Habitat type 10 is assigned 0 value.*

The suitability of each habitat type is ranked between 0 and 1 for each of four life functions (spawning, nursery, foraging, overwintering) for each fish species that is (or is assumed to be) present.
The suitabilities used in this offsetting plan are the same as those used in the approved Whale Tail Pit Offsetting Plan and are presented in Appendix F.

Using the equation below, the area of each habitat type (in hectares) is multiplied by the habitat suitability index (HSI) and a series of weights (a species weight, a life-function weight and an access weight) and a habitat cofactor, and summed to derive a value in habitat units (HUs) for an individual species. The habitat units are summed across all species to arrive at the total number of habitat units, which describes both the quality and quantity of habitat for the fish community. In this offsetting plan, like in the approved Whale Tail Pit Offsetting Plan all species and life stages are given equal weight. The access weight for all species for all affected habitat was one, which conservatively assumes that all six species present in the study area utilize all of the affected habitats. No habitat cofactor was applied for the Expansion Project nor the Approved Project.

For each fish species (spp 1-n) as:

$$\mathbf{HU}_{spp}1\text{-}n =$$

$$\sum \mathbf{HT}_{1\text{-}13}\ (\sum sp,nu,fo,ow(\mathbf{HT}_{1\text{-}13} * \mathbf{HSI}_{sp,nu,fo,ow} * \textbf{life function weight} * \textbf{species weight})]\ ) * \textbf{access factor} * \textbf{habitat co-factor}$$

Where $HT_{1\text{-}13}$ = area (ha) of habitat types 1 through 13 (Table 7.1-1)

$HSI_{sp,nu,fo,ow}$ = habitat suitability index for each life function (Appendix F):

- sp = spawning use
- nu = nursery use
- fo = foraging use
- ow = overwintering use

7.1.1 Life Function Weight

This HEP values all life functions equally, with a weight of 0.25 each assigned for spawning, nursery, foraging and overwintering.

7.1.2 Species Weight

This HEP weights all species equally.

7.1.3 Access Factor

In a workshop conducted in February, 2012 (The Basic Concepts of No Net Loss Accounting – February 2012) Dr. Charles K. Minns suggested the use of an access factor when fish assemblages are expected to change in the offsetting scenario. According to this concept, the access factor is 1 for any species present in the habitat area, and 0 for any species not present (Table 7.1-2). Each species receives an access factor in both the loss and gain calculations. Therefore, the opening of access to a habitat area for a species (that did not have access previously), results in an increase of habitat units. Similarly, the loss of access results in a loss of habitat units. These gains or losses may be complete (i.e. affect all species), or partial (only some species are affected). The presence or absence of a species in loss calculations is typically based on the observed presence/absence of each species during baseline monitoring studies (AEM, 2012, 2013, 2016). If a change in access is predicted for an offset scenario (i.e. due to the removal of a barrier to fish movement) the change would need to be confirmed as part of compensation monitoring.

Table 7.1-2: Access Factor Theoretically Applied to Each Species for Habitat Loss and Gain Calculations, based on Presence/Absence (or Anticipated Presence/Absence for Offsetting Projects)

Scenario	Access Factor	
	Losses	Gains
Species Present	1	1
Species Not Present	0	0

Typically, the access factors applied are based on the observed presence/absence of each species during baseline monitoring studies (Agnico Eagle Mines, 2012, 2013, 2016). For the calculations in this report, an access factor of 1 has been applied for all six fish species that have been captured in the study area. The effect of isolating the north-east pond during operations was addressed in the Approved Project by conservatively assuming that habitat is 'lost' during that time period.

7.1.4 Habitat Co-factor

The habitat co-factor represents any changes to non-mapped habitat quality (thermal, hydrological, biological or chemical regimes) that will occur as a result of impacts or offsetting. The use of this factor is suggested by Dr. Ken Minns, and his suggested values as presented in a workshop for DFO in February, 2012 are shown in Table 7.1-3. No habitat co-factor has been applied to the HEP calculations presented in this report.

Table 7.1-3: Habitat Co-factor for Various Pre- and Post-compensation Scenarios, according to Minns 2012

Change in Regime	Description	Baseline Conditions Factor	Post-closure Factor
Degradation (expected)	Thermal, hydrologic, chemical and/or biological regime shifts away from preferred state for fish habitat	1	> 0 and < 1
No change	-	1	1
Enhancement (anticipated or proposed)	Thermal, hydrologic, chemical and/or biological regime expected to shift towards preferred state for fish habitat	> 0 and < 1	1

7.2 Section 35 Habitat Losses

The following fish habitat losses are predicted to result in HADD under Section 35 of the *Fisheries Act* and arise from the development, operation and closure of the IVR Pit, north east of the approved Whale Tail Pit (Figure 2.2-2).

7.2.1 Whale Tail Lake

The north end of Whale Tail Lake will be overprinted by IVR Pit. An area of Whale Tail Lake is also over-printed by the IVR Pit road. Changes to the configuration of Whale Tail Pit include changes to the pit outline, elimination of the pit cap and changes to the location of the Whale Tail pit road. Some parts of Whale Tail Lake that were not affected by Whale Tail Pit in the Approved Project are affected by Whale Tail Pit in the Expansion Project and some parts of Whale Tail Lake that were affected by the Whale Tail pit configuration in the Approved Project are no longer affected. The net result is that the habitat losses that occur due to conversion of existing Whale Tail Lake habitat to habitat type 10 due to the Expansion

Project Whale Tail Pit is 0.44 HU less than it was for the Approved Project configuration. Overall, there is anticipated to be a net gain of 32.76 ha of fish habitat area from the Expansion Project (Table 7-1); however, due primarily to flooded pit habitat being assigned zero fish habitat value, there will be a net loss of 0.39 HU (Table 7.2-1).

The location proposed for a portion of one of the grid shoals to be constructed as offsetting for the Approved Project is overprinted as a result changes to Whale Tail Pit. The construction of these shoals has not taken place, so the location for that grid shoal will be changed to south of the Expansion Project Whale Tail Pit. This change was taken into account in the calculation of habitat gains and losses.

7.2.2 Lake A49

Part of Lake A49, which was not affected by the Approved Project, is overprinted by IVR Pit. The portion of Lake A49 that is not overprinted will be isolated by the vertical drop at the pit wall and will cease to be fish habitat. The loss of Lake A49 will equal 3.17 ha and 1.56 HU of fish habitat (Tables 7-1 and 7.2-1).

7.2.3 Small Lakes and Watercourses North of Whale Tail Lake

For the Approved Project, the small waterbodies and watercourses north of Whale Tail Lake that were either dewatered or overprinted by the North-east Pond during operations, were scheduled to revert to their pre-construction condition post-closure, with the exception of short reaches of watercourses A46-A17 and A50-A17 that were flooded as a result of the increase in the water elevation of Whale Tail Lake. As a result of the Expansion Project, those watercourses and waterbodies are either overprinted by IVR pit or isolated by a vertical drop where they flow into IVR pit. With no potential for seasonal use, the waterbodies and watercourses that are isolated, which are expected to freeze completely during the winter, will cease to be fish habitat and are Section 35 losses. The exception is Lake A113 which, as described in Section 4, is now part of the Nemo Lake watershed.

Effects on lakes and watercourses North of Whale Tail Lake will equal 5.45 ha and 1.44 HU of fish habitat losses (Tables 7-1 and 7.2-1).

7.2.4 Watercourse A53-A17

The Whale Tail Pit approved offsetting plan called for the downstream reach of stream A53-A17 that was realigned so that it flowed into Whale Tail Lake south of the Whale Tail dike during operations to be returned to its pre-construction location after closure. The upstream reach of A53-A17 was not altered by the Approved Project. During IVR pit operations, it is anticipated that Lake A53 will be isolated by a berm and used as a water attenuation pond. Therefore, stream A53-A17 will be permanently dewatered, resulting in a loss of 0.44 ha and 0.08 HU of fish habitat (Tables 7-1 and 7.2-1).

7.3 Section 36 Habitat Losses

There were no Section 36 losses incurred as a result of the Approved Project. All Section 36 losses that are incurred from the Expansion Project are anticipated to be permanent and are described below and in Tables 7-1 and 7.2-1

7.3.1 Lake A53

If approved, Lake A53 will be used as a water attenuation pond during IVR Pit operations. The loss of Lake A53 will equal 14.39 ha and 5.90 HU of fish habitat (Tables 7-1 and 7.2-1).

Table 7.2-1: Fish Habitat Unit Losses under Section 35 and 36 of the *Fisheries Act*

Habitat Type	Habitat Units																			
	Section 35 Losses														Section 36 Losses					Section 35 and 36
	Pond A-P38	Lake A0	Lake A48	Lake A47	Lake A46	Lake A49	Whale Tail	A0-A48	To A47	A47-A46	A46-A17	A50-A17	A53-A17	Total	Lake A53	Lake A50	Lake A51	Lake A52	Total	Net Change
1	-0.03	-0.01	-0.03	-0.57	-0.03	-0.02	-0.12	0.00	0.00	0.00	0.00	0.00	0.00	-0.81	-0.01	-0.03	-0.01	0.00	-0.05	-0.86
2	-0.02	-0.01	-0.03	-0.54	-0.04	-0.04	-0.09	0.00	0.00	0.00	0.00	0.00	0.00	-0.76	-0.06	-0.01	-0.01	0.00	-0.08	-0.84
3	0.00	0.00	0.00	-0.01	-0.01	-0.41	0.04	0.00	0.00	0.00	0.00	0.00	0.00	-0.39	-4.61	-0.13	-0.33	-0.49	-5.56	-5.95
4	0.00	0.00	0.00	-0.08	0.00	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.10	-0.55	0.00	0.00	0.00	-0.55	-0.65
5	0.00	0.00	0.00	0.00	0.00	-0.09	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.02	-0.41	0.00	0.00	0.00	-0.41	-0.39
6	0.00	0.00	0.00	0.00	0.00	-0.54	0.32	0.00	0.00	0.00	0.00	0.00	0.00	-0.85	-0.26	0.00	0.00	0.00	-0.26	-1.11
7	0.00	0.00	0.00	0.00	0.00	-0.25	0.07	0.00	0.00	0.00	0.00	0.00	0.00	-0.32	0.00	0.00	0.00	0.00	0.00	-0.32
8	0.00	0.00	0.00	0.00	0.00	-0.10	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.03
9	0.00	0.00	0.00	0.00	0.00	-0.09	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00	-0.16
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.003	0.00	-0.07	-0.08	0.00	0.00	0.00	0.00	0.00	-0.08
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	-0.004	0.00	-0.01	-0.03	0.00	0.00	0.00	0.00	0.00	-0.03
Total	**-0.05**	**-0.02**	**-0.05**	**-1.20**	**-0.08**	**-1.56**	**-0.39**	**-0.02**	**-<0.01**	**-<0.01**	**-0.01**	**-<0.01**	**-0.08**	**-3.47**	**-5.90**	**-0.17**	**-0.35**	**-0.49**	**-6.91**	**-10.37**

7.3.2 Lake A52

If approved, Lake A52 will be overprinted by the IVR WRSF and therefore is considered a permanent loss of fish habitat. The loss of Lake A52 will equal in 1.24 ha and 0.49 HU of fish habitat (Tables 7-1 and 7.2-1).

7.3.3 Lakes A50 and A51

If approved, Lakes A50 and A51 will be overprinted by the IVR WRSF and GSP. The loss of lakes A50 and A51 will equal in 1.40 ha and 0.52 HU of fish habitat (Tables 7-1 and 7.2-1).

8. OFFSETTING PLAN

8.1 Objective

Following closure of the Expansion Project, there will be an anticipated net decrease of 10.37 Habitat Units (Section 7), when compared to the Approved Project in post-closure. Fish offsetting will be required to counterbalance this loss.

Using the recently approved Meadowbank Authorization (NU03-0191) and the Whale Tail Pit Project Authorization (16-HCAA-00370) as a benchmark, a ratio of offsetting gains:losses of 1.66:1, would require 17.22 HUs gained through offsetting for the Whale Tail Pit Expansion Project (i.e. losses of 10.37 HU multiplied by 1.66). The offsetting program proposed for the Expansion Project is anticipated to provide a gain of 18.13 HUs and produce an offsetting ratio of 1.75:1 (gains:losses).

Following DFO's Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat under the *Fisheries Act* (Fisheries and Oceans Canada 2019), Agnico Eagle has applied avoidance and mitigation prior to considering offsetting for Project effects (Sections 5 and 6). According to the new policy, offsetting measures may be grouped into the following general categories (Fisheries and Oceans Canada 2019):

- Habitat restoration and enhancement, which includes physical manipulation of existing habitat to improve habitat function and productivity;
- Habitat creation which is the development or expansion of aquatic habitat into a terrestrial area;
- Chemical or biological manipulation, which includes chemical manipulation of water bodies, and stocking of fish or shellfish, management or control of aquatic invasive species; and
- Complementary measures, which are investments in data collection and scientific research related to maintaining or enhancing the productivity of commercial, recreational or Aboriginal fisheries.

Explicit within the offsetting plan was an effort to consider Indigenous Peoples perspectives during its development. Additional community and stakeholder engagement was conducted in 2018 and 2019, as were field programs, to inform potential offsetting options. Community engagement specific to this offsetting plan is summarized in Section 3 and Appendix D. Field surveys investigated areas with the potential to provide areas of habitat creation (e.g., disused quarries) or isolated waterbodies that could be connected to larger waterbodies. The results of the field surveys did not find any suitable areas that could generate habitat gains to offset the habitat losses from the Project. This finding was supported by community and stakeholder engagement, which did not result in the identification of any new areas for habitat creation or new ideas for offsetting options, other than the example projects presented in the focus groups.

Considering that fish habitat losses are from the same watershed and fish community as the approved Whale Tail Pit Project, the proposed approach to offsetting is to build upon the gains already authorized thought the Approved Project. This includes a combination of physical habitat creation and habitat enhancement.

8.2 Habitat Creation and Enhancement

Physical offsetting will be achieved by installing a permanent sill between Lake A18 and Whale Tail Lake, and by scarifying the road that crosses Whale Tail Lake south of IVR pit so that it provides coarse (instead of mixed) substrate during post-closure conditions (Figure 8.2-1).

The gain in habitat units due to the road scarification is 0.127 HUs. The principal offsetting measure will be to construct a sill between Whale Tail Lake and Lake A18 that will maintain the upstream water level at 1.3 meters above the baseline condition, which it would have returned to post-closure under the Approved Project. This will maintain water levels in a portion of the area that was flooded in 2018 by the

Approved Project, permanently maintaining the newly created, temporary fish habitat that would have been lost in 2026 under the Approved Project plan. This fish habitat will be immediately suitable for the existing fish community (all six species found in the study area) and will provide a ‘like for like’ habitat offset for the lost habitat. The proposed offsetting approach is consistent with feedback received from DFO during the approved Whale Tail Pit Project which suggested leaving the water level raised in the Whale Tail Lake south basin. The offsetting will offset all Habitat Units lost under both Section 35 and Section 36, while providing a net benefit to the established fish community within the watershed.

During operations, the Whale Tail Lake water level will rise to 156 masl following the construction of the Whale Tail Dike and then fall to 154.02 masl post-closure. As of Q4 2019, the water elevation in Whale Tail south is 155.86 masl. Under the current (approved) Whale Tail Pit Project post-closure scenario, upstream from the connecting channel between Lake A18 and Whale Tail Lake water elevations will return to their baseline elevations. The proposed offsetting sill would maintain the water level immediately upstream at 155.3 masl, thus maintaining some of the flooding of terrestrial areas that occurs during operations.

The habitat types (including depth and substrate class) for the area that will be affected by the sill between Lake A18 and Whale Tail Lake are shown without and with the sill in Figures 5-1 and 8.2-1, respectively. The area and HU gains are shown in Table 8.2-1.

The water level increase due to the sill between A18 and A17 and the reconfiguration of the Whale Tail Lake, results in increase of 31.35 ha and 18.03 HUs (Table 8.2-1). This, together with the habitat gain from road scarification of 0.127 HU, results in an offsetting gains:losses ratio of 1.75:1 (gains of 18.15 HU:losses of 10.37 HU; Table 8.2-2). This ratio includes consideration of the habitat losses that are predicted from the footprint of the offsetting sill itself (see Section 8.2.1.2).

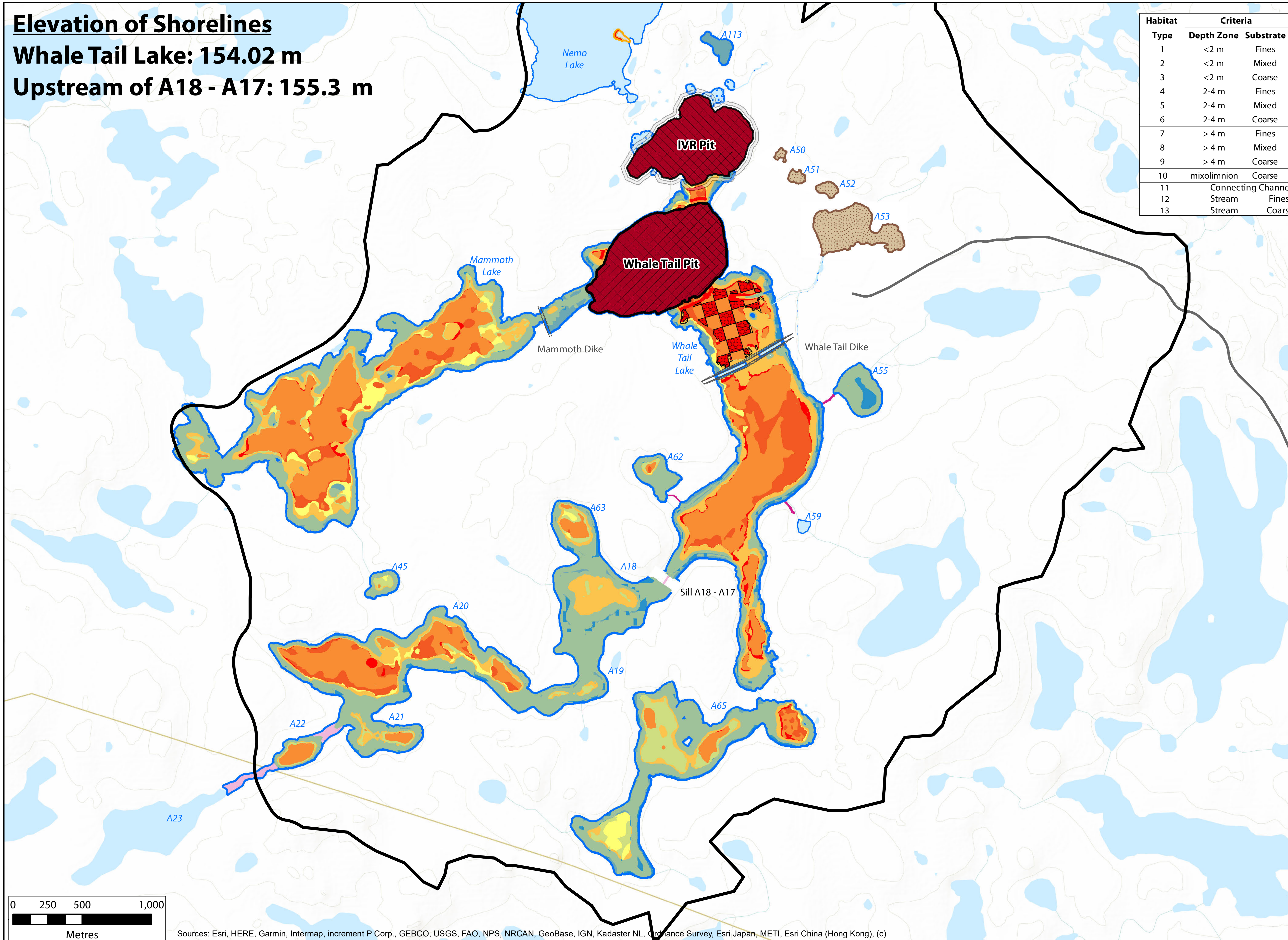
8.2.1 Timeline, Design, and Construction of the Offsetting Measure

The timeline of the Expansion Project is presented in Table 8.2-3 with the Approved Project timelines for comparison.

8.2.1.1 Offsetting Measure Schedule

The loss of fish habitat due to the development of the IVR WRSF, attenuation pond, and GSP (Section 36 habitat losses) is anticipated to occur in 2020 (Table 8.2-3). Construction of the offsetting sill between Lake A18 and Whale Tail Lake will occur in 2026, prior to the lowering of water levels upstream of Whale Tail Pit. The offsetting sill will maintain water levels upstream of Lake A18, 1.3 m higher than authorized under the Approved Project, maintaining the temporary increase in fish habitat established upstream of Whale Tail Lake in 2018. This temporary increase in fish habitat of Lake A18 (and upstream) was not included as a gain under the Approved Project *Fisheries Act* Authorization, however utilizing the already established fish habitat will provide immediate gains to offset the HADD associated with the Expansion Project. Thus, although there is a six year difference in timing between fish habitat losses and the construction of the offsetting sill for the Expansion Project, by permanently maintaining the temporary gains in fish habitat under the Approved Project, there is no time lag anticipated between HADD of fish habitat (losses) and offsetting (habitat gains; Figure 8.2-2).

In addition, the Expansion Project proposes to adjust the timing of reconnection between the North and South basins of Whale Tail Lake. Under the Approved Project, the basins were scheduled to reconnect 21 years after modification, in 2029. In the proposed Expansion Project, the reconnection would occur 13 years later, in 2042.



Habitat	Criteria	
Type	Depth Zone	Substrate
1	<2 m	Fines
2	<2 m	Mixed
3	<2 m	Coarse
4	2-4 m	Fines
5	2-4 m	Mixed
6	2-4 m	Coarse
7	> 4 m	Fines
8	> 4 m	Mixed
9	> 4 m	Coarse
10	mixolimnion	Coarse
11	Connecting Channel	
12	Stream	Fines
13	Stream	Coarse

DOUGAN & ASSOCIATES
ECOLOGICAL CONSULTING & DESIGN
77 Wyndham Street South • Guelph ON N1E 5R3
T 519.822.1609 • F 519.822.5389 • www.dougan.ca

PROJECT: DA14-053-11

CLIENT: Agnico-Eagle Mines Ltd., Meadowbank Div.

N W E S
UTM Zone 14 NAD83

DATE: January 23, 2020

SCALE: 1:26,000

DRAWN BY: LC/JS

CHECKED BY: Cam Portt

FIGURE 8.2-1. Expansion Project Offsetting Habitat

Table 8.2-1: Predicted Gains in Fish Habitat resulting from Physical Offsetting

	Habitat Area (Hectares)												
Habitat Type	Whale Tail	Lake 18	A18-A17	Lake A19	A19-A18	Lake A20	A20-A19	Lake A21	A21-A20	A22-A21	A63	A63-A18	Net change
1	-0.03	2.97	0.00	-0.14	0.00	-0.10	0.00	-0.11	0.00	0.00	-0.02	0.00	2.49
2	-0.94	0.47	0.00	-0.21	0.00	-0.14	0.00	-0.08	0.00	0.00	-0.09	0.00	-0.98
3	-0.865	50.87	0.00	-5.19	0.00	-16.26	0.00	-6.28	0.00	0.00	-3.32	0.00	19.04
4	0.00	4.09	0.00	-0.49	0.00	-2.62	0.00	-0.99	0.00	0.00	-2.46	0.00	-2.47
5	-0.36	2.75	0.00	0.00	0.00	-4.95	0.00	0.00	0.00	0.00	-0.48	0.00	-3.04
6	0.36	20.25	0.00	-0.15	0.00	-3.92	0.00	-0.53	0.00	0.00	-0.43	0.00	15.58
7	0.00	24.17	0.00	0.00	0.00	-19.23	0.00	-1.01	0.00	0.00	-1.21	0.00	2.72
8	-0.26	8.41	0.00	0.00	0.00	-5.68	0.00	0.00	0.00	0.00	0.00	0.00	2.47
9	0.26	0.92	0.00	0.00	0.00	-0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.50
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	-0.13	0.00	-2.97	0.00	-0.76	0.00	-0.56	-0.49	0.00	0.00	-4.91
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.03	-0.03
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01
Total	**-1.76**	**114.83**	**-0.13**	**-6.18**	**-2.97**	**-53.58**	**-0.76**	**-8.99**	**-0.56**	**-0.49**	**-8.02**	**-0.04**	**31.35**
	Habitat Units												
Habitat Type	Whale Tail	Lake 18	A18-A17	Lake A19	A19-A18	Lake A20	A20-A19	Lake A21	A21-A20	A22-A21	A63	A63-A18	Net change
1	-0.01	0.69	0.00	-0.03	0.00	-0.02	0.00	-0.03	0.00	0.00	-0.01	0.00	0.60
2	-0.26	0.13	0.00	-0.06	0.00	-0.04	0.00	-0.02	0.00	0.00	-0.02	0.00	-0.28
3	-0.31	20.14	0.00	-2.05	0.00	-6.44	0.00	-2.48	0.00	0.00	-1.32	0.00	7.54
4	0.00	1.53	0.00	-0.18	0.00	-0.98	0.00	-0.37	0.00	0.00	-0.92	0.00	-0.93
5	-0.21	1.60	0.00	0.00	0.00	-2.89	0.00	0.00	0.00	0.00	-0.28	0.00	-1.77
6	0.27	15.40	0.00	-0.12	0.00	-2.98	0.00	-0.40	0.00	0.00	-0.33	0.00	11.84
7	0.00	9.07	0.00	0.00	0.00	-7.21	0.00	-0.38	0.00	0.00	-0.45	0.00	1.02
8	-0.13	4.38	0.00	0.00	0.00	-2.96	0.00	0.00	0.00	0.00	0.00	0.00	1.29
9	0.17	0.62	0.00	0.00	0.00	-0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.34
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	-0.04	0.00	-0.90	0.00	-0.23	0.00	-0.17	-0.15	0.00	0.00	-1.48
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**-0.48**	**53.57**	**-0.04**	**-2.45**	**-0.90**	**-23.98**	**-0.23**	**-3.68**	**-0.17**	**-0.15**	**-3.33**	**-0.01**	**18.15**

Note: Negative numbers represent reductions in habitat area or habitat units (i.e. habitat losses).

Table 8.2-2: Summary of Fish Habitat Losses and Gains from the Expansion Project

	Losses			Gains
	Section 35 Losses	Section 36 Losses	Section 35 and 36	
Habitat Area (Hectares)	23.71	-17.03	6.67	31.35
Habitat Units	-3.47	-6.91	-10.37	18.15

Note: negative numbers indicate lost area or HU.

Table 8.2-3: Schedule of Activities under the Proposed Expansion Project and Approved Project

Activity	Expansion Project Date	Approved Project Date
Whale Tail and Mammoth dikes completed. Fishout of north basin of Whale Tail	NA	Summer 2018
Flooding of South Whale Tail begins	NA	Summer 2019
South Whale Tail reaches 156.0 masl	NA	Q2 2020
Begin to reduce water levels upstream from Whale Tail dike	Summer 2026	Summer 2022
Lake A53 and A49 fished out and dewatered	Summer 2020	NA
Lake A53 dewatered/ Loss of A53, A50, A51, A52 and A53-A17	Fall 2020	NA
Construction of A18-A17 Offsetting Sill	2026	NA
Water elevations upstream from A18-A17 sill reach post-closure levels	2026	NA
Water elevations in south Whale Tail Lake reach post-closure levels	NA	2026
Reconnection of North Basin and South Basin of Whale Tail Lake	Winter 2042	Winter 2029

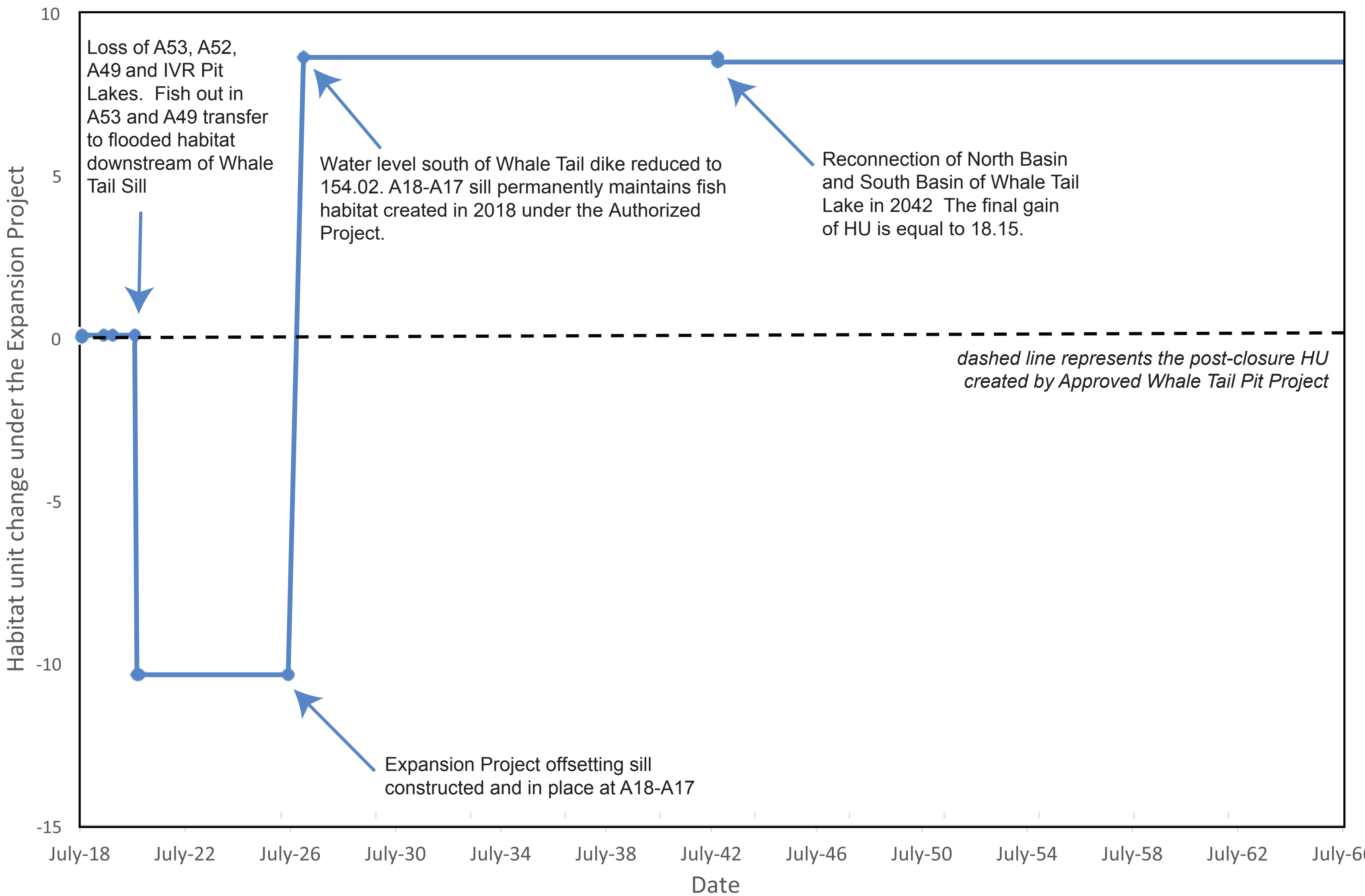
In recognition of the uncertainty of the effects of timing differences between the Approved Project and Expansion Project, Agnico Eagle has designed the offsetting program with an additional 5.4% in offset ratio, from 1.66:1 in the Approved Project, to 1.75:1 in the Expansion Project.

8.2.1.2 Design, Construction and Effects of Offsetting Measures

The design of the sill between Lake A18 and Whale Tail Lake is similar to the conceptual design for the Mammoth Sill as presented in the approved Whale Tail Pit offsetting plan, although with the important update that the proposed A18-Whale Tail sill is a naturalized sill incorporating principles of natural channel design. Golder has provided a conceptual design of a naturalized sill at the outlet of Lake A18 (Figure 5 in Appendix G).

The naturalized sill considers a 1.3 m increase to the minimum elevation at the lake outlet and the upstream water levels to approximately 155.3 masl. The sill is designed with a central channel that is narrower than the existing connecting channel between Lake A18 and Whale Tail Lake. In the existing connecting channel, flow is interstitial during much of the open-water season. Thus the narrower channel was designed to result in greater water depth during the open-water season and in velocities that permit the passage of juvenile-sized round whitefish, lake trout and Arctic char during the post-freshet period.

Figure 8.2-2
Timing Schematic of Effects to Fish and Fish Habitat under the Expansion Project



To determine the direct loss of fish habitat incurred by the footprint of the sill, the habitat area provided by the channel through the sill was calculated using the wetted width at the two-year return flow (Q2) and the habitat units were calculated by applying the habitat suitabilities for connecting channels (habitat type 11) to that area (Section 7.1 and Appendix F). The sill will overprint 0.78 ha and 0.29 Habitat Units at the south end of Whale Tail Lake. The area of the sill that will be below the water surface (upstream and downstream ends combined) is 0.32 ha and the area of the channel through the sill at Q2 flow is 0.10 ha. These equal, in total, 0.16 habitat units. Thus, the direct decrease in existing fish habitat as a result of the physical structure of the offsetting measures is 0.36 ha and 0.13 habitat units.

8.2.2 Monitoring Offsetting Measures

As offsetting gains under the Expansion Project are based on permanently maintaining fish habitat created during operations of the Approved Project, the proposed monitoring program will focus on measuring stability and function of the sill, with a supplementary biological and ecological monitoring program based on the existing Monitoring Plan (Agnico Eagle, March 2018; Appendix H: Whale Tail Pit Fisheries Offsetting Monitoring Plan) and Authorization (PATH No.: 16-HCAA-00370).

A sill monitoring plan will examine the stability of the offsetting sill and water elevation at Lake A18 elevation. This program will be completed using the following criteria:

1. Demonstration that the sill was built as designed, including:
   a. Dated photographs of works and construction activities;
   b. Construction monitoring and inspection records; and
   c. As built drawings.
2. Photographic and bathymetric evidence of sill integrity.
3. Water level monitoring to confirm predictions of lake level in Lake A18.

The sill has been designed for a 1-in-1,000 year flood (Appendix G) and, thus engineered to be resilient beyond conceivable conditions. However, monitoring the stability of the sill over a 10-year period following construction will be used to establish its efficacy to maintain water levels at predicted levels and examine for incidence of erosion or slumping. The anticipated sill monitoring program would be completed annually for two years following construction of the sill, then bi-annually for the remaining 8 years. A successful demonstration of sill stability and water level maintenance over 10 years is anticipated to complete the sill monitoring component.

The proposed monitoring program will also continue to monitor both biological (fish use, health and biological traits) and ecological (water quality, periphyton productivity) properties of the offsetting habitat as found in sections 3.1.2 and 3.1.3 of the approved Monitoring Program (Appendix H) and as required in the *Fisheries Act* Authorization for the Approved Project (PATH No.: 16-HCAA-00370). Sampling procedures, QA/QC for the biological and ecological will also follow the authorized Monitoring Program for the Approved Project. The frequency of the biological monitoring programs will follow the authorized Monitoring Program for the Approved Project, with monitoring in years 1, 3, 5 and 10 following construction of the sill at Lake A18. Criteria for success will be determined following criteria set out in the authorization for the Approved Project (PATH No.: 16-HCAA-00370), namely that a demonstration that the sill is built as designed on schedule, that monitoring is performed and reported on schedule and that offsetting habitat is demonstrated to have established aquatic biota and to be used by fish for one or more lifestage(s).

Although downstream effects are not predicted to constitute a HADD, monitoring of water surface levels in Lake A16 (Mammoth Lake) is expected to provide a reasonable surrogate for detecting changes in surface areas and volumes during closure and will be conducted to verify predictions provided in the FEIS and Responses to DFO Technical Comments (Appendix I). Monitoring methods will include the installation of a staff gauge where the surface water level of Mammoth Lake can be visually estimated, Staff gauges in downstream lakes (A12, A15, and A76) will also be installed for any supplemental monitoring of potential downstream effects on surface water levels.

8.2.3 Contingency Offsetting Measures

Contingency measures are planned secondary measures which would be implemented if the planned offsetting measures did not meet their objective(s). Agnico Eagle have identified two contingency measures that would provide more than the required habitat units for the losses identified for the Expansion Project, and that already have some level of community support.

8.2.3.1 Pistol Bay

During informal discussions Agnico Eagle and the Rankin Inlet HTO in 2010 and 2011 as part of community engagement for the Agnico Eagle Meliadine Project (Golder 2014), the HTO raised concerns about fish barriers (falls) on several nearby watersheds that may be preventing ocean-run Arctic char from overwintering and spawning in upstream lakes. To address this concern, and to explore potential opportunities for an offsetting measure for the Meliadine Project, reconnaissance visits were conducted at Josephine Falls and Pistol Bay Falls in September 2011. A follow-up visit to Pistol Bay on 16 August 2012 with Agnico Eagle and DFO representatives confirmed that Pistol Bay can provide an offsetting opportunity, which would open up access for Arctic char to upstream areas that are otherwise restricted from the natural barriers created by the falls. By improving access, the offsetting measure has the potential to provide self-sustaining benefits to the Indigenous fishery in the region.

During a teleconference meeting held with Agnico Eagle and DFO on 30 September 2019, the KIA described strong support by local communities for habitat improvements to improve fish passage at Pistol Bay and Josephine Falls based on their recent engagement with local communities on fisheries conservation projects in the region. Therefore, inclusion of the Pistol Bay Falls offsetting measure as a contingency measure for the Whale Tail Expansion Project is warranted based on previous and on-going field visits and community engagement. The ecological concept underlying a potentially large increase in gains in the Pistol Bay watershed is based on connecting freshwater habitats required for overwintering and spawning to a nutrient-rich marine environment that is much more productive for growth (e.g., Finstad and Hein 2012).

A summary description of the Pistol Bay watershed and the potential habitat gains (estimated by applying a modified Habitat Evaluation Procedure [HEP] method) are provided below.

Pistol Bay Watershed

Pistol Bay Falls are located at a transition from freshwater to marine environment, approximately 380 km southeast of the Whale Tail Project, and 25 km north of Whale Cove (Figure 8.2-3). The falls are approximately 2 m in height and unlikely to be navigated by fish in an upstream direction under most flow conditions (Photos 8.2-1 and 8.2-2). Upstream of the falls, a series of waterbodies connects to a chain of larger lakes (>50 ha) that likely provide overwintering habitat for fish. Total watershed area upstream of the falls is 9,710 ha and contains 432 waterbodies, 45 of which are greater than 5 ha in area and account for 3,054 ha combined. Five lakes (PBF-2 to 6), ranging from 23 to 1,573 ha in area (total of 1,887 ha), were selected for the purpose of conceptual habitat gains calculations, mainly because of their potential to provide overwintering (and possibly spawning) habitats for Arctic char, and the absence of additional barriers upstream of the Pistol Bay Falls. One of the five lakes (PBF-6) is the biggest lake in the Pistol Bay watershed, measuring approximately 1,573 ha in size.

Figure 8.2-3

Location of Potential Pistol Bay Project (top) and Potential Fisheries Offsetting Waterbodies (bottom).

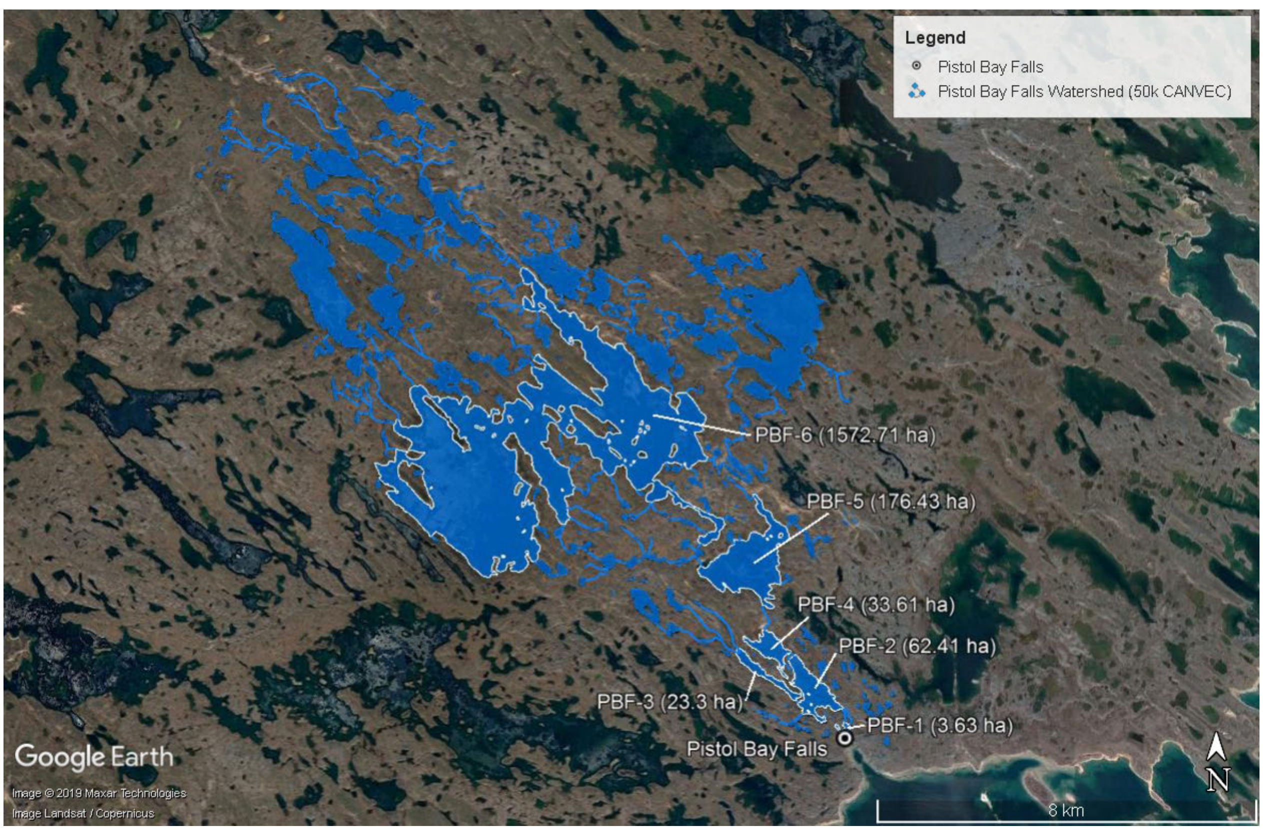


Photo 8.2-1: Aerial photo of Pistol Bay Falls (centre), facing upstream.

Photo 8.2-2: Pistol Bay Falls.

To estimate net habitat gains resulting from barrier removal at Pistol Bay Falls the Meliadine HEP model (Golder 2014) was modified and applied to a conservative selection of five lakes upstream of the falls (PBF-2 to 6; Figure 8.2-3. Assuming that the current species assemblage in the Pistol Bay watershed includes lake trout, round whitefish, Arctic grayling, cisco, burbot, slimy sculpin and ninespine stickleback, the existing number of habitat units in the five lakes under consideration (total area of 1,887 ha) was estimated at 427.06 HU. The inclusion of Arctic char in the species assemblage during the post-offsetting scenario results in a total of 588.94 HU for the same five lakes. This resulting net gain would be a minimum of 161.88 HU, and may be much higher than this preliminary estimate if considering other lakes in the watershed as gains or if Arctic char is assigned alternative weighting in the offsetting accounting.

To further develop this contingency offsetting measure, detailed field studies on the upstream lakes will focus on identifying presence/ absence of fish species, combined with a detailed assessment of hydrological conditions at Pistol Bay Falls to refine predictions and passage designs. If Arctic char are present in the system, strontium analysis will be conducted to determine if they are anadromous (i.e., the falls are not an absolute barrier to access) or land-locked (i.e., adapted to freshwater-only life cycle). Furthermore, Agnico Eagle will conduct bathymetric and substrate surveys at representative lakes to produce habitat maps that will replace the habitat type assumptions used in the preliminary estimate of habitat gains. Agnico Eagle is committed to work with the DFO and KIA on the design and implementation of the Pistol Bay Falls contingency offsetting measure.

If measures to improve Arctic char passage are undertaken, offsetting measures at Pistol Bay Falls will be monitored following the construction of the measures to improve fish passage. The proposed methodology and criteria for monitoring the offsetting measure will consider Traditional Knowledge and will be selected to best evaluate the success of the offsetting measure, specifically to confirm that the offsetting measure results in gains that exceed losses incurred at the Whale Tail Expansion Project (DFO 2013). A multi-year post-construction monitoring effort will be implemented with considerations of lessons learned during previous monitoring years. Post-construction monitoring will also include two types of monitoring: functional monitoring (e.g., physical conditions of the fishway), and effectiveness monitoring (e.g., migration success rate) (Smokorowski et al. 2015). The primary focus of the effectiveness monitoring will be on upstream migration success of migrating adults to confirm the assumptions of the offsetting accounting model. Following each year of monitoring, the success of both monitoring efforts and the offsetting measure will be evaluated and discussed in the monitoring report submitted to DFO. The monitoring plan and schedule will consider on-going feedback from DFO, and other interested parties (e.g., KIA).

8.2.3.2 Proof of Concept for a Small-scale Community-based Arctic Char Hatchery

The development of a fish hatchery in the Kivalliq Region offers significant potential to provide a direct benefit to local fisheries productivity, as well as establish community-led businesses and support economic growth in the region. Arctic char are a popular subsistence fish, and community consultation on the Whale Tail Pit Expansion Project identified that preferred offsetting options are those focused on improving Arctic char fisheries. The concept of a fish hatchery is relatively simple, and has been developed successfully before in Arctic environments. There is community interest in the concept of a hatchery (Appendix D), and this contingency offsetting measure aims to determine proof-of-concept for a small-scale hatchery based on three main measurable points:

1. Community
2. Facilities
3. Fisheries

Community

- Engage with the community and incorporate Inuit Qaujimajatuqangit to select the location of the temporary hatchery facility and the locations of the Arctic char broodstock acquisition and juvenile release points.
- Provide training to community members that will oversee the hatchery; provide daily feed after yolk-sac absorption; record performance metrics of the system; and fin clip prior to release.

Facilities

- Establish a temporary structure to house fibre-glass tanks, with a recirculating water system, bio-filer, heat, light, and an alarm monitor for water supply to the tanks.

Fisheries

- Record mortalities during incubation, as well as feed quantities; growth rates up to release date (approximately 0.5 -1g), and numbers of fish released.
- Implement a community-based recording system for any fin-clipped fish caught.

Agnico Eagle is committed to work with the DFO and KIA on the design and implementation of the community based hatchery contingency offsetting measure. With support and participation from the KIA and community members, the contingency offsetting plan will determine the feasibility of a community-based Arctic char hatchery that can improve local subsistence fisheries. The concept for the small-scale hatchery is to obtain wild broodstock that are returned unharmed immediately after bankside stripping. The hatchery would incubate eggs in the same water source as the origin of the broodstock, before the juveniles are released into the same watershed as the broodstock, thereby providing a direct benefit to local fisheries.

Fish hatcheries have been successfully developed in other far-north (Arctic) environments, including Nunavik, the Yukon, as well as across Scandinavia. Arctic char respond well to hatchery conditions, and thrive in relatively simple conditions using standard commercial feed from salmon farms. The concept for the small-scale hatchery would be to obtain wild fish from the same watershed as the hatchery as broodstock, so that no adult fish would need to be kept in tanks. The hatchery would be for rearing and stocking only, as is the case in Kuujjuaq, Nunavik. The Nappukaliuvik Hatchery has been active from 1999-2013, and 2017, and is an Inuit-led initiative. Monitoring of the Nepihjee River Arctic char population, led by Nunavik Research Centre, has taken place every summer following the creation of the hatchery and a fishway, which was constructed in 1998 at the mouth of the Nepihjee River to allow anadromous Arctic char to migrate past an impassable waterfall. In July 2018, approximately 12,000 juvenile char were released into Qamutitsait Lake, north of Kuujjuaq, after being hatched at the Nappukaliuvik hatchery in the winter, from eggs collected in the fall 2017. The program has been successful in populating the Nepihjee River system with Arctic char, as well as successful in creating youth employment opportunities, and training opportunities for students.

During community consultation in Baker Lake, the focus groups presented mixed opinions about a hatchery. There was interest in how the hatchery would work, and how this may enhance Arctic char populations. The Hamlet of Baker Lake and Baker Lake HTO in particular, could see the benefits for the community regarding employment and training, as well as potential opportunities to improve local Arctic char fisheries. However, some members of the Elder’s focus group expressed concern that the fish produced would not be natural and may taste different. It was recognized in all Focus Groups that more work would be needed to confirm the viability of this option and next steps to develop this contingency offsetting measure would include further community engagement.

A key component of the proposed project is to demonstrate how a hatchery may enhance the local fisheries, and that only adults from the same watershed would be used as a source of juveniles, which would in turn, be returned to the same system as the broodstock. Although a hatchery could ultimately be used to support a fish-farm, where char are raised to adults, this is not the objective of the hatchery as currently proposed. As hatcheries are a new concept in the Kivalliq Region, an important component of the contingency offsetting measure will be to demonstrate how the hatchery will function, and to seek community engagement and determine support.

Training will be provided for community member(s) to look after the hatchery during juvenile rearing. Once the juvenile char are 0.5 to 1 g in size, fish would be fin-clipped and released into the natal system. Based on numbers from existing char hatcheries in other far-north locations, a 10 m x 10 m rearing tank, can provide hundreds of thousands of juvenile char in one season. Community members would inform the location of the release points, and would be actively involved in transferring fish. A community-based monitoring program would then be implemented that would informally record fin-clipped char that are caught in the future year(s).

It is recognised that more rigorous, and long-term, fish monitoring may be needed in the future to confirm successful stocking rates, and contribution of hatchery-reared char to local fisheries. However, the objective of this initial research project is to confirm proof-of-concept, and whether community support exists, and whether a suitable location and facility can be selected that can successful support successful char rearing. It is anticipated that if this proof-of concept study is successful, that future work would build upon these outcomes.

Given that this is a unique contingency offsetting measures focused on the unique Arctic environment and the local fisheries objectives, the currency of habitat units to counterbalance the 10.37 HU lost from the Expansion Project may be equated to monetary values to establish the set up of facilities. The numbers of fish that are successfully reared and returned to the river may also be a suitable currency of habitat losses to gains. Agnico Eagle commits to working with all relevant DFO departments, alongside the KIA, to establish the most appropriate habitat accounting.

8.2.4 Offsetting Measures Cost Estimate

Agnico Eagle has calculated costs to construct the proposed fish habitat offsetting features, using Reclaim v.0.7, except where noted. Detailed breakdown of costs are shown in Appendix J.

9. SUMMARY

There will be HADD to fish habitat as a result of Whale Tail Pit Expansion Project during both the operations and post-closure phases, resulting in a loss of 10.37 habitat units required to be offset as per Sections 35 and 36 of the *Fisheries Act* (Table 8.2-2). Accepted methods of habitat enhancement and habitat creation will be utilized, to offset the HADD that will occur.

The main offsetting measure proposed for the Whale Tail Pit Project is the construction of a permanent sill upstream of Lake A18 which will maintain water levels at 1.3 m above those authorized under the Approved Project. This offsetting program achieves a ratio of net gain of fish habitat units equal to 1.75:1 (gain:loss).

10. REFERENCES

Agnico Eagle Mines Limited, 2012. *AEM Meadowbank Division – No Net Loss Plan*. October 15, 2012.

Agnico Eagle. 2016. *Whale Tail Pit Project - Meadowbank Mine Final Environmental Impact Statement and Type A Water Licence Amendments*. Amendment/Reconsideration of the Project Certificate (No. 004/ File No. 03MN107) and Amendment to the Type A Water Licence (No. 2AM-MEA1525). Submitted to the Nunavut Impact Review Board. June 2016.

Agnico Eagle Mines Limited. 2018a (March). *Whale Tail Pit Fish Habitat Offset Monitoring Plan*. 24 pp.

Agnico Eagle Mines Limited. 2018b (November). *Whale Tail Pit – Expansion Project, Final Environmental Impact Statement Addendum*, submission to the Nunavut Impact Review Board.

Azimuth 2005. *BAER (Baseline Aquatic Ecosystem Report)*. Prepared by Azimuth Consulting Group, Vancouver for Cumberland Resources Ltd. October, 2005.

Azimuth. 2013. *Aquatic Effects Monitoring Program – Core Receiving Environment Monitoring Program 2012, Meadowbank Gold Project.* Report prepared by Azimuth Consulting Group Inc., Vancouver, BC for Agnico-Eagle Mines Ltd., Baker Lake, NU.

C. Portt and Associates 2018. *Whale Tail Pit 2014 - 2016 Fish and Fish Habitat Field Investigations:* Agnico Eagle Mines Limited. - Meadowbank Division. xi +157 pp. Prepared by C. Portt and Associates, Guelph, ON.

C. Portt and Associates and Agnico Eagle Mines Limited. 2018. *Whale Tail Pit Fish Habitat Offsetting Plan*. v + 49 pp + appendices. Prepared by C. Portt and Associates, Guelph, ON.

C. Portt and Associates. 2019a. *Whale Tail Expansion Project 2018 Fish and Fish Habitat Field Investigations: Agnico Eagle Mines Ltd. - Meadowbank Division*. iv + 60 pp. Prepared by C. Portt and Associates, Guelph, ON.

C. Portt and Associates. 2019b. *Whale Tail Expansion Project 2019 Fish and Fish Habitat Field Investigations: Agnico Eagle Mines Ltd. - Meadowbank Division*. iv + 21 pp.+ appendices. Prepared by C. Portt and Associates, Guelph, ON.

Fisheries and Oceans Canada, 1995. *Freshwater Intake End-of-Pipe Fish Screen Guideline*. ISBN 0-662-23168-6.DFO (Fisheries and Oceans Canada). 2013. F*isheries Productivity Investment Policy: A Proponent's Guide to Offsetting*. Ottawa, ON, Canada. ISBN 978-1-100-22930-0.

DFO (Fisheries and Oceans Canada). 2016. *Review of Habitat Evaluation Procedure (HEP) Input Parameters and Model Results for the Meadowbank Gold Mine Project*. DFO Canadian Science Advisory Secretariat Science Response 2016/038. 18 pp.

ERM. 2020. W*hale Tail Pit Expansion Project: Alternatives Assessment Report.* Prepared for Agnico Eagle Mines Limited by ERM Consultants Canada Ltd.: Toronto, Ontario.

Finstad, A.G. and Hein, C.L., 2012. Migrate or stay: terrestrial primary productivity and climate drive anadromy in Arctic char. *Global Change Biology*, *18*(8), pp.2487-2497.

Fisheries and Oceans Canada, 2010. *DFO Protocol for Winter Water Withdrawal from Ice-covered Waterbodies in the Northwest Territories and Nunavut*

Fisheries and Oceans Canada, 2019. *Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat Under the* Fisheries Act. Ecosystem Programs Policy, Fisheries and Oceans Canada. Ottawa, Ontario. http://dfo-mpo.gc.ca/pnw-ppe/reviews-revues/policies-politiques-eng.html#_699 (Accessed December 6, 2019)

Golder (Golder Associates Ltd). 2014. *SD 7-4 Conceptual Fisheries Protection and Offsetting Plan – Meliadine Gold Project, Nunavut*. Submitted to Agnico Eagle Mines Limited.

Jones, N.E., G.J. Scrimgeour, and W.M. Tonn. 2010. Fish species traits and communities in relation to a habitat template for Arctic rivers and streams. *American Fisheries Society Symposium* 73:000-000, 2010.

Minns, C.K., Moore, J.E., Stoneman, M., Cudmore-Vokey, B. 2001. Defensible Methods for Assessing Fish Habitat: Lacustrine habitats in the Great Lakes Basin - Conceptual basis and approach using a habitat suitability matrix (HSM) method. *Canadian Technical Report on Fisheries and Aquatic Sciences*. 2559: viii+70 p.

Smokorowski, K.E., M. J. Bradford, K. D. Clarke, M. Clément, R. S. Gregory, and R. G. Randall RG. 2015. Assessing the effectiveness of habitat offset activities in Canada: Monitoring design and metrics*. Can. Tech. Rep. Fish. Aquat. Sci.* 3132: vi + 48 p

Tyson, J.D., Tonn, W.M., Boss, S., Hanna, B.W. 2011. General fish-out protocol for lakes and impoundments in the Northwest Territories and Nunavut. *Canadian Technical Report of Fisheries and Aquatic Sciences* 2935.

APPENDIX A CONCORDANCE WITH SCHEDULE 1 AUTHORIZATIONS CONCERNING FISH AND FISH HABITAT PROTECTION REGULATIONS

Table A-1: Concordance with Authorizations Concerning Fish and Fish Habitat Protection Regulations (Schedule 1)

Schedule 1 Description	Section of Report
Section 2. A detailed description of the proposed work, undertaking or activity and, if applicable, a detailed description of the project of which the proposed work, undertaking or activity is a part, including:	
(a) the purpose of the proposed work, undertaking or activity and, if applicable, the project;	Section 2.1 Appendix C Sections 1.1 & 1.2.1 FEIS Addendum: Section 1.2
(b) the associated infrastructure;	Section 2.1 & 2.2 Appendix C Section 1.2.2 - 1.2.13 FEIS Addendum: Sections 1.2.3-1.2.15
(c) any permanent or temporary structure involved; and	Section 2.1 & 2.2 Appendix C Section 1.2.2 - 1.2.13 FEIS Addendum: Sections 1.2.3-1.2.15
(d) the construction methods, building materials, explosives, machinery and other equipment that will be used.	Section 2.1 & 2.2 Appendix G FEIS Addendum: Sections 1.2.3-1.2.15
Section 3. If physical works are proposed, the project engineering specifications, scale drawings and dimensional drawings.	Figure 8.2-1 Detailed design will be prepared and provided to DFO and the Nunavut Water Board at least 60 days prior to construction.
Section 4. A description of the phases and the schedule of the proposed work, undertaking or activity and, if applicable, the project of which the proposed work, undertaking or activity is a part.	Section 8.2.1, Table 8.2-3, Figure 8.2-2 Appendix C Table 1.4-1 FEIS Addendum: Section 1.4, Table 1.4-1
Section 5. A description of the location of the proposed work, undertaking or activity and, if applicable, of the location of the project of which the proposed work, undertaking or activity is a part, including:	
(a) geographic coordinates	Table 2.3-1
(b) a small-scale plan identifying the overall location and boundaries	Figure 1-1 FEIS Addendum: Figure 1.1-1
(c) a large-scale site plan indicating the size and spatial relationship of the planned facilities, infrastructure and other components and of any existing structures, landmarks, water sources or water bodies and other geographic features	Figures 2.2-1 and 2.3-1, 5.1, 8.2-1 Appendix C Figure 1.2-1 FEIA Addendum: Figures 6.1-2 & 6.2-1
(d) the name of any watersheds, water sources and water bodies that are likely to be affected and the geographic coordinates of the water sources and water bodies.	Section 2.3 and Section 4, Figure 2.3-1 and Table 2.3-1
Section 6. The name of the community nearest to the location and the name of the county, district or region and the province in which the proposed work, undertaking or activity will be carried on	Section 1

Schedule 1 Description	Section of Report
Section 7. A description and the results of any consultations undertaken in relation to the proposed work, undertaking or activity, including with Indigenous communities or groups and the public. If applicable, the applicant must include information about any consultation already undertaken prior to submitting the application These consultations would have to have related to the work, undertaking, or activity for which an authorization would be sought. The description should provide an overview of consultations, if any, held with Indigenous groups and/or with the public at large.	Section 3 Appendix C Section 1.1.6
Section 8. A detailed description of the fish and fish habitat found at the location of the proposed work, undertaking or activity and within the area likely to be affected by the proposed work, undertaking or activity, including:	
(a) the type of water source or water body	Sections 4 & 5, Appendix E
(b) the characteristics of the fish habitat and how those characteristics directly or indirectly support fish in carrying out their life processes	Sections 4, 5 & 7.1, Appendix E, Appendix F
(c) the fish species that are present and an estimate of the abundance of those species	Section 4, Table 4-1, and Appendix E, Abundance included in Sections 5.1 and 5.2
(d) a description of how the information provided under paragraphs (a) to (c) was obtained, including the sources, methods and sampling techniques used.	Section 4, Appendix E, Appendix F
Section 9 (1) A detailed description of the likely effects of the proposed work, undertaking or activity on fish and fish habitat. The description must include:	
(a) the fish species that are likely to be affected and the life stages of the individuals of those species	Sections 5, & 7.1 FEIS Addendum: Section 6.5
(b) the extent and type of fish habitat that is likely to be affected	Section 5, Tables 7-1& 7.2-1; Figures 2.2-2 & 5.1 FEIS Addendum: Section 6.5
(c) the probability, magnitude, geographic extent and duration of the likely effects on fish and fish habitat	Sections 5, 7.2, 7.3, Appendix I FEIS Addendum: Section 6.5, Appendix 3-C
(d) a description of how the information provided under paragraphs (a) to (c) was derived, including the methodologies used	Section 5, Appendix E FEIS Addendum: Section 6.5, Appendix 3-C
Section 9 (2) A detailed description of:	
(a) how the effects referred to in subsection (1) are likely to result in the death of fish or the harmful alteration, disruption or destruction of fish habitat	Sections 5.1,5.2 and 5.7
(b) the extent of the elements referred to in paragraph (a).	Sections 5.1 and 5.2, Figure 2.3-1
Section 10. A detailed description of the measures and standards that will be implemented, including an analysis of the expected effectiveness of those measures and standards, to:	
(a) avoid the death of fish or to mitigate the extent of their death or	Section 6.1
(b) avoid or mitigate the harmful alteration, disruption or destruction of fish habitat	Section 6.1

Schedule 1 Description	Section of Report
Section 11. A detailed description of the monitoring measures that will be implemented to assess the effectiveness of the measures and standards referred to in section 10	Section 6.2 FEIS Addendum: Appendix 3C
Section 12. A detailed description of the contingency measures that will be implemented if the measures and standards referred to in section 10 do not meet their objectives.	Section 6.2
Section 13. A quantitative and detailed description of the death of fish referred to in subsection 9(2) after the measures and standards referred to in paragraph 10(a) are implemented.	Section 7
Section 14. A quantitative and detailed description of the harmful alteration, disruption or destruction of fish habitat referred to in subsection 9(2) after the measures and standards referred to in paragraph 10(b) are implemented.	Section 7.2, Table 7-1 & 7.2-1
Section 15. The number of habitat credits that the applicant plans to use to offset the death of fish referred to in section 13 and the harmful alteration, disruption or destruction of fish habitat referred to in section 14, as well as the number of any certificate referred to in paragraph 42.02(1)(b) of the Act.	No habitat credits are to be used
Section 16. A detailed description of a plan to offset the death of fish referred to in section 13 and the harmful alteration, disruption or destruction of fish habitat referred to in section 14 that were not offset by the habitat credits referred to in section 15, including:	
(a) the geographic coordinates of the location where offsetting measures will be implemented;	Table 2.3-1
(b) a small-scale site plan identifying the general location and boundaries of the location where the measures will be implemented;	Figure 8.2-1, Appendix G
(c) a detailed description of the measures and how those measures will meet their objectives;	Sections 8.1 & 8.2, Appendix G
(d) a detailed description of the monitoring measures that will be implemented to assess the effectiveness of the measures referred to in paragraph (c);	Section 8.2.2, Appendix H
(e) a detailed description of the contingency measures and associated monitoring measures that will be implemented if the measures referred to in paragraph (c) do not meet their objectives;	Section 8.2.3
(f) a detailed description of any adverse effects on fish and fish habitat that could result from the implementation of the plan;	Section 8.2.1.2
(g) a detailed description of the measures and standards that will be implemented to avoid or mitigate the adverse effects and how those measures will meet their objectives;	Referred to within Sections 6.1 & 6.2
(h) the timeline for the implementation of the plan;	Section 8.2.1, Figure 8.2-2,Table 8.2-3
(i) an estimate of the cost of implementing each element of the plan; and	Section 8.2.4, Appendix J

Schedule 1 Description	Section of Report
(j) if the implementation of the plan requires access to lands, water sources or water bodies that are not owned by the applicant, a description of the steps that are proposed to be taken to obtain the authorization required for the applicant, the Department of Fisheries and Oceans and anyone authorized to act on the Department's behalf to access the lands, water sources or water bodies in question. This information is not required if the applicant is Her Majesty in right of Canada, Her Majesty in right of a province or the government of a territory."	Not Applicable

APPENDIX B CONCORDANCE WITH S.27.1 METAL AND DIAMOND MINING EFFLUENT REGULATIONS

Table B-1: Concordance with Section 27.1 of the Metal and Diamond Mining Effluent Regulations

27.1 (1) The owner or operator of a mine shall, before depositing a deleterious substance into a tailings impoundment area that is set out in Schedule 2, submit to the Minister of the Environment a compensation plan that includes the information described in subsection (2) and obtain that Minister's approval of the plan.

(2) The purpose of the compensation plan is to offset the loss of fish habitat resulting from the deposit of any deleterious substance into the tailings impoundment area. It shall contain the following information:

(a) a description of the location of the tailings impoundment area and of fish habitat that will be affected by the deposit;	*The fish and fish habitat description of the location of the IVR Attenuation Pond and WRSF and GSP requiring a Schedule2 amendment is found in Section 4, including Table 4-1 and Figures 2.3-1 and Figure 5.2-1.*
(b) a quantitative impact assessment of the deposit on fish habitat;	*A description of the area and habitat units lost due to the IVR Attenuation Pond and WRSF and GSP is found in Section 5.2*
(c) a description of the measures to be taken to offset the loss of fish habitat;	*A description of the offsetting measures and gains to balance losses of fish habitat is found in Section 8. Section 8.2 and Figure 8.2-1 contain the design and quantitative assessment of offsetting measures.*
(d) a description of the measures to be taken during the planning and implementation of the compensation plan to mitigate any potential adverse effects on fish habitat that could result from the plan's implementation;	*Section 6 describes the measures and standards that are taken to avoid and mitigate effects to fish and fish habitat as a result of Project Activity, including construction of offsetting infrastructure.*
(e) a description of the measures to be taken to monitor the plan's implementation;	*The sill monitoring program found in Section 8.2.2 provides a description of monitoring the infrastructure built as part of the offsetting.*
(f) a description of the measures to be taken to verify the extent to which the plan's purpose has been achieved;	*Biological and ecological monitoring form part of the monitoring plan found in Section 8.2.2.*
(g) the time required to implement the plan that allows for the achievement of the plan's purpose within a reasonable time; and	*The timing of habitat losses and gains can be found in Section 8.2.1.1.*
(h) an estimate of the cost of implementing each element of the plan.	*Appendix J*

27.1 (1) The owner or operator of a mine shall, before depositing a deleterious substance into a tailings impoundment area that is set out in Schedule 2, submit to the Minister of the Environment a compensation plan that includes the information described in subsection (2) and obtain that Minister's approval of the plan.	
(3) The owner or operator of a mine shall submit with the compensation plan an irrevocable letter of credit to cover the plan's implementation costs, which letter of credit shall be payable upon demand on the declining balance of the implementation costs.	*A letter of credit will be submitted with final authorization package.*
(4) The Minister of the Environment shall approve the compensation plan if it meets the requirements of subsection (2) and the owner or operator of a mine has complied with subsection (3).	*This acknowledgement to be completed with final authorization package.*
(5) The owner or operator of a mine shall ensure that the compensation plan approved by the Minister of the Environment is implemented and, if the compensation plan's purpose is not being achieved, the owner or operator shall inform the Minister of the Environment.	*This acknowledgement to be completed with final authorization package.*
(6) If the compensation plan's purpose is not being achieved, the owner or operator of a mine shall, as soon as practicable in the circumstances, identify and implement all necessary remedial measures to ensure that the purpose is achieved.	*This acknowledgement to be completed with final authorization package.*

APPENDIX C MAIN APPLICATION DOCUMENT NWB WATER LICENCE 2AM-WTP1826 AMENDMENT

Main Application Document NWB Water Licence 2AM-WTP1826 Amendment

MAY 2019

VERSION 1

EXECUTIVE SUMMARY

Agnico Eagle Mines Limited – Meadowbank Division (Agnico Eagle) is proposing an expansion to the approved Whale Tail Pit and Haul Road Project (referred to as the Expansion Project). The expansion and extension is proposed to include: a larger Whale Tail open pit, development of the IVR open pit, associated IVR Waste Rock Storage Facility and IVR Attenuation Pond, as well as underground operations while continuing to operate and process ore at the Meadowbank Mine. The project is located on Inuit Owned Land approximately 150 kilometres (km) north of the hamlet of Baker Lake and approximately 50 km north of Meadowbank Mine in the Kivalliq Region of Nunavut. The Expansion Project is designed to operate as a satellite of the main Meadowbank facilities and will be accessed by the existing approved haul road. Transportation to the mine site (marine barging, airstrip, and transportation along the all-weather access road), housing and handling will remain the same as authorized under Project Certificate No. 004 and/or Project Certificate No. 008. The Expansion Project is subject to reconsideration of the Project Certificate (No. 008) by the Nunavut Impact Review Board, Agnico Eagle is seeking to amend the Type A Water Licence (2AM-WTP1826).

The Expansion Project will begin as soon as approval and permits for the amendment applications are received (anticipated for mid 2020). The operational phase of the Approved and Expansion Project will span from Year 1 (2019) to Year 7 (2025). Mining activities are expected to end in Year 7 (2025) and ore processing is expected to end during Year 8 (2026). Closure will occur from Year 8 (2026) to Year 24 (2042) after the completion of mining and will include removal of the non-essential site infrastructure and flooding of the mined-out open pits and underground, as well as re-establishment of the natural Whale Tail Lake water level.

The Expansion Project is an extension of mining operations for the Approved Project that has existing and licensed waste and water management facilities. Consistent with the Approved Project, water management infrastructure includes: contact water collection ponds, freshwater collection ponds, diversion channels, retention dikes, dams, culverts, water treatment plants for effluent, potable water treatment plant, sewage treatment plant, and discharge diffusers. Additional Groundwater Storage Ponds, IVR dikes and diversions, as well as contact water collection systems will be put in place to effectively manage and mitigate impacts to water.

The approved Whale Tail Waste Rock Storage Facility will continue to be used for the expansion; however, the waste storage facilities will be expanded vertically and horizontally to the southeast. The newly proposed IVR Waste Rock Storage Facility will accommodate waste rock and overburden generated from the IVR Pit. The waste rock storage footprint, water management infrastructure, and camp have been designed consistent with the Approved Project and will accommodate growth of the project within the modified project footprint. The existing underground Waste Rock Storage Facility permitted under the Type B Water Licence 2BB-MEA1828 will have an increased footprint to accommodate additional waste storage and groundwater of the underground mine. Consistent with the approved Meadowbank and Whale Tail Pit operations, a classification system will be used to identify and safely store NPAG, PAG, and ML rock. PAG mine rock will be stored in the designated storage areas designed for long-term geochemical and geotechnical stability.

Upon approval of the expansion, the Meadowbank Mine facility will continue to operate as an approved mining and milling operation (Project Certificate No. 004 and Type A Water Licence 2AM-MEA1526); as a result, Agnico Eagle is looking to extend the milling and tailings storage at Meadowbank Mine, through the Expansion Project. No new infrastructure is required at the existing Meadowbank Mine to support the Expansion Project. Agnico Eagle proposes to process the Whale Tail ore and placement of the tailings slurry at the existing Meadowbank Mine Tailing Storage Facility as approved by NIRB Project Certificate No. 008 and Type A Water Licence 2AM MEA1526. By extending the life of mine at Whale Tail Pit and Meadowbank, Agnico Eagle will progressively close portions of these sites while operating. The closure strategies for the Expansion Project are consistent with the approved Whale Tail Pit Project and securities for the expansion will be arranged with Crown-Indigenous Relations and Northern Affairs Canada and Kivalliq Inuit Association and posted in accordance with Type A 2AM-WTP1826.

Since 2016, Agnico Eagle has continued to collect baseline data, which has been incorporated into the updated environmental assessment to identify and assess potential environmental and social effects resulting from the Expansion Project and in support of the Final Environmental Impact Statement and Type A Water Licence Amendment Application filed in 2016. The results of the environmental assessment found that with mitigation, the Expansion Project would not cause long-term significant negative effects resulting from proposed construction, operations, and closure.

Agnico Eagle has developed monitoring and management programs required to mitigate, monitor, and report on its environmental performance against the regulatory requirements contained within its Whale Tail Pit, and Meadowbank operating authorizations, permits, licenses, and leases consistent with the legal requirements of applicable Acts and Regulations in Nunavut. Where appropriate, existing Meadowbank Mine plans or Whale Tail Pit stand-alone plans have been updated or addendums have been added to reflect the Expansion Project, and Whale Tail Project Certificate requirements. These existing and approved programs will focus on ensuring impacts to waste and water, are consistent with those predicted for the Approved Project. The accuracy of the environmental impact predictions and the effectiveness of the mitigation measures will be verified through monitoring and annual reporting. If unusual or unforeseen adverse environmental impacts are noticed, corrective action will be put in place. Through the adaptive management process, the existing mitigation measures will be adjusted or new mitigation measures implemented if necessary. External reporting will be completed, as required.

The economic effects of the Expansion Project are substantial and are expected to be of significant benefit to the territory. The Expansion Project is expected to generate 99 new employment opportunities for Nunavummiut incremental to those created by the Approved Project, and extend employment and incomes for the Approved Project workforce until 2026. The Expansion Project will continue to have positive effects in communities for an extended period, in terms of household incomes and associated access to nutritious food, recreation, education, and resources with which to conduct traditional activities. Similarly, the Expansion Project will continue support for community programming and educational initiatives, as well as IIBAs royalties and commitments. Health and safety training over the operational life of the Expansion Project is also expected to continue to be of benefit to communities.

Since operations of Meadowbank Mine began, Agnico Eagle has continued public consultation by annually meeting with the community and local stakeholders within the Kivalliq Region, regulatory agencies and local employees. This has allowed a better general understanding of the rights, interests, values, aspirations, and concerns of the potentially affected stakeholders, with particular reference to Baker Lake. Through this continued consultation, Agnico Eagle has developed an operational culture that recognizes and respects these relevant interests in the planning and executing processes. Agnico Eagle has consulted with local stakeholders and regulators regarding ongoing operations of the Whale Tail Pit and haul road development, as well as proposed Expansion Project.

ᐱᓕᕆᐊᕐᒧᑦ ᓇᐃᓈᖅᓯᒪᔪᖅ

ᐊᒡᓃᑯ ᐄᒍ ᐅᔭᕋᒃᑕᓇᐊᓕᓇᔾᒃᑯᑦ - ᐊᐳᖅᑎᓈᖅᑐᒥᑦ (ᐊᒡᓃᑯᒃᑯᑦ) ᐊᖏᒡᓕᒋᐊᕈᒪᔭᖓᑦ ᓈᒻᒪᒋᔭᐅᓯᒪᔪᖅ ᐊᒪᕈᖅ ᓄᓇᒥᑦ ᐃᓗᑦᑐᖅᓯᒪᔪᖅ ᐊᒻᒪᓗ ᐅᓯᑲᑦᑕᕐᓂᕐᒧᑦ ᐊᕐᕌᒍᑎᒧᑦ ᐱᓕᕆᐊᖅ (ᐅᖃᐅᓯᐅᔪᖅ ᐊᖏᒡᓕᒋᐊᖅᑕᐅᓂᖓᓄᑦ ᐱᓕᕆᐊᖅ). ᐊᖏᒡᓕᒋᐊᖅᓯᓂᕐᒥᑦ ᐊᒻᒪᓗ ᐅᐃᒍᕆᐊᖅᓯᓂᕐᒥᑦ ᐃᓚᐅᓇᔭᖅᑐᑦ: ᐊᖏᓂᖅᓴᒥᒃ ᐊᒪᕈᖅ ᓄᓇᒥᑦ ᐅᒃᑯᐃᖓᔪᒥᑦ ᐃᓗᑦᑐᖅᓯᒪᔪᓕᐅᕐᓗᓂ, IVR ᓄᓇᒥᑦ ᐅᒃᑯᐃᖓᔪᒥᑦ ᐃᓗᑦᑐᖅᓯᒪᔪᓕᐅᕐᓗᓂ, ᐃᓚᒋᔭᐅᓗᑎᒃ IVR-ᒥᑦ ᐊᒃᑕᑰᖅᑕᐅᔪᓂᒃ ᐅᔭᖅᑲᓄᑦ ᑐᖅᑯᖅᓯᓯᒪᕚᒃ ᐊᒻᒪᓗ IVR-ᒥᑦ ᓴᙱᓕᕆᐊᖅᑎᑦᑎᕚᒃ ᑕᓯᕋᔭᒃ, ᐊᒻᒪᓗ ᓄᓇᐅᑉ ᐃᓗᐊᓂᑦ ᐊᐅᓚᖅᑎᑦᑎᓃᑦ ᐊᐅᓚᖅᑎᑦᑎᓂᖅ ᑲᔪᓯᑎᓪᓗᒍ ᐊᒻᒪᓗ ᐅᔭᕋᒃᑕᖅᑕᐅᔪᓕᓇᓂᖅ ᐊᐳᖅᑎᓈᖅᑐᒥᑦ ᐅᔭᕋᒃᑕᓇᐊᕐᒥᑦ. ᐱᓕᕆᐊᖅ ᐃᓄᐃᑦ ᓄᓇᒋᔭᙳᓃᑦᑐᖅ 150 ᑭᓛᒥᑕᓪᓗᐊᓂᒃ ᐅᙳᓯᒃᑎᒋᔪᖅ ᐅᐊᖕᓇᖓᓂᑦ ᖃᒪᓂᑦᑐᐊᑉ ᐊᒻᒪᓗ 50 ᑭᓛᒥᑕᓪᓗᐊᓂᒃ ᐅᙳᓯᒃᑎᒋᑉᓗᓂ ᐅᐊᖕᓇᖓᓂᑦ ᐊᐳᖅᑎᓈᖅᑐᖅ ᐅᔭᕋᒃᑕᓇᐊᕐᒥᑦ ᑭᕙᓪᓕᕐᒥᑦ ᓄᓇᕗᒻᒥᑦ. ᐊᖏᒡᓕᒋᐊᖅᓯᓂᕐᒧᑦ ᐱᓕᕆᐊᖅ ᐋᖅᑭᐅᒪᔪᑦ ᐊᐅᓚᖅᑎᓐᓂᐊᕐᓗᒍ ᐃᖕᒥᒃᑰᖓᓗᓂ ᐊᐳᖅᑎᓈᖅᑐᒥᑦ ᐱᕐᑯᑎᖏᓐᓂᑦ ᐊᒻᒪᓗ ᑕᐃᑯᙵᐅᖃᑦᑕᕐᓗᑎᒃ ᓈᒻᒪᒋᔭᐅᓯᒪᔫᒃᑯᑦ ᐅᓯᑲᑦᑕᖕᓂᕐᒧᑦ ᐊᕐᕌᒍᑎᒃᑯᑦ. ᐊᒡᔭᖅᑐᐃᖃᑦᑕᕐᓂᖅ ᐅᔭᕋᒃᑕᓇᐊᑉ ᐃᓂᖓᓄᑦ (ᓯᑲᐅᒃᑯᑦ, ᒥᑦᑕᕝᒃᑯᑦ, ᐊᒻᒪᓗ ᐊᒡᔭᖅᑐᐃᓂᖅ ᐅᑭᐅᓪᓗᒃᑖᖅ ᐊᕐᕌᒍᑎᒃᑯᑦ), ᐃᒡᓗᓕᕆᓂᖅ ᐊᒻᒪᓗ ᑲᒪᔭᖅᑲᕐᓂᖅ ᐊᑦᔨᒋᓂᐊᖅᑕᖓ ᐱᔪᖕᓇᖅᑎᑕᐅᓯᒪᓂᖅ ᒪᓕᒡᓗᒍ ᐱᓕᕆᐊᕐᒧᑦ ᓇᓗᓇᐃᒃᑯᑕᕐᒥᑦ ᓈᓴᐅᑎ 004 ᐊᒻᒪᓗ/ᐅᕝᕙᓘᓐᓃᑦ ᐱᓕᕆᐊᕐᒧᑦ ᓇᓗᓇᐃᒃᑯᑕᖅ ᓈᓴᐅᑎ 008-ᒥᑦ. ᐊᖏᒡᓕᒋᐊᖅᓯᓂᕐᒧᑦ ᐱᓕᕆᐊᖅ ᐃᑯᒪᒃᓴᖅᓯᐅᕈᑎᒋᔭᐅᓂᐊᖅᑐᖅ ᐱᓕᕆᐊᕐᒧᑦ ᓇᓗᓇᐃᒃᑯᑕᖅ (ᓈᓴᐅᑎ 008) ᐊᕙᑎᓕᕆᔨᒃᑯᓐᓄᑦ, ᐊᒡᓃᑯᒃᑯᑦ ᐋᖅᑭᒋᐊᕈᒪᔭᖓᑦ Type A ᐃᒪᕐᒧᑦ ᓚᐃᓴᓐᓯ (2AM-WTP1826).

ᐊᖏᒡᓕᒋᐊᖅᓯᓂᕐᒧᑦ ᐱᓕᕆᐊᖅ ᐱᒋᐊᕋᔭᖅᑐᖅ ᓈᒻᒪᒋᔭᐅᑦᑎᓂᑐᐊᖅᐸᑦ ᐊᒻᒪᓗ ᐳᒥᑦ-ᖑᔪᑦ ᐋᖅᑭᒋᐊᖅᓯᓂᕐᒧᑦ ᑐᒃᓯᕋᐅᑕᐅᔪᑦ ᐱᔭᐅᒃᐸᑕ (ᓂᕆᐅᒋᔭᐅᔪᖅ ᕿᑎᐊᓄᑦ 2020). ᐊᐅᓚᖅᑎᑦᑎᓂᖅ ᓈᒻᒪᒋᔭᐅᔫᑦ ᐊᒻᒪᓗ ᐊᖏᒡᓕᒋᐊᖅᓯᓂᕐᒧᑦ ᐱᓕᕆᐊᖅ ᐅᑭᐅᖅ 1-ᒥᑦ (2019) ᐅᑭᐅᖅ 7-ᒧᑦ (2025)-ᒨᓇᔭᖅᑐᖅ. ᐅᔭᕋᒃᑕᕐᓃᑦ ᓂᕆᐅᒋᔭᐅᔪᑦ ᐅᑭᐅᖅ 7-ᒥᑦ (2025) ᐊᒻᒪᓗ ᐅᔭᕋᒃᑕᖅᑕᐅᔪᓂᒃ ᐱᓕᕆᐊᖃᕐᓂᖅ ᓂᕆᐅᒋᔭᐅᔪᖅ ᐃᑯᓕᓐᓂᐊᕐᓂᐊᙳᓄᑦ ᐅᑭᐅᖅ 8-ᒥᑦ (2026). ᐅᒃᑯᐊᖅᐸᓪᓕᐊᓂᖅ ᐱᒋᐊᕐᓗᓂ ᐅᑭᐅᖅ 8-ᒥᑦ (2026) ᐅᑭᐅᖅ 24-ᒧᑦ (2042) ᑭᖑᓂᐊᒍᑦ ᐅᔭᕋᒃᑖᓂᒃᐸᑕ ᐊᒻᒪᓗ ᐲᖅᑕᐅᓗᑎᒃ ᐊᑐᙱᑦᑐᑦ ᐃᓂᐅᔪᒥᑦ ᐱᕐᑰᑦ ᐊᒻᒪᓗ ᐃᒻᒥᖅᑐᖅᑕᐅᓗᑎᒃ ᐅᔭᕋᒃᑕᕝᐅᓚᐅᖅᑐᑦ ᓄᓇᒥᑦ ᐅᒃᑯᐃᖓᔪᑦ ᐊᒻᒪᓗ ᓄᓇᐅᑉ ᐃᓗᐊᓂᑦ, ᐊᒻᒪᓗ ᐋᖅᑭᒃᓱᒃᑲᓐᓂᕐᓗᒍ ᐊᒪᕈᖅ ᑕᓯᐅᑉ ᐃᒪᖓᑕ ᓇᓃᓐᓂᓇᓚᐅᖅᑕᖓ.

ᐊᖏᒡᓕᒋᐊᖅᓯᓂᕐᒧᑦ ᐱᓕᕆᐊᖅ ᐅᐃᒍᕆᐊᖅᓯᓂᐅᔪᖅ ᐅᔭᕋᒃᑕᕐᓂᕐᒧᑦ ᐊᐅᓚᖅᑎᑦᑎᓂᕐᓄᑦ ᓈᒻᒪᒋᔭᐅᔫᑦ ᐱᓕᕆᐊᕐᒧᑦ ᑕᐃᒪᐅᓚᐅᖅᑐᖅ ᐊᒻᒪᓗ ᓚᐃᓴᖅᖄᓗᓂ ᐊᒃᑕᑰᓇᓂᕐᒧᑦ ᐊᒻᒪᓗ ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᑦᑎᕚᖕᓄᑦ. ᐊᑦᔨᒋᓗᓂᐅᒃ ᓈᒻᒪᒋᔭᐅᔪᖅ ᐱᓕᕆᐊᕐᒧᑦ, ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᑦᑎᕚᖕᓄᑦ ᐃᓚᐅᔪᑦ: ᐃᒪᖅ ᐊᑐᖅᑕᐊᓯᒪᔪᓂᒃ ᑲᑎᑦᑎᓂᕐᒧᑦ ᑕᓯᕋᔭᐃᑦ, ᐃᒪᑦᑎᐊᕝᕙᖕᒥᒃ ᑲᑎᑦᑎᓂᕐᒧᑦ ᑕᓯᕋᔭᐃᑦ, ᓴᖑᑎᑦᑎᓂᕐᒧᑦ ᑯᐳᓗᐃᑦ, ᐸᐸᑦᑎᓂᕐᒧᑦ ᐊᕙᓗᐃᑦ, ᓯᒥᒃᓯᓯᒪᔪᑦ, ᑯᐳᓘᑦ, ᐃᒪᓕᓇᕝᕓᑦ ᑯᕓᔪᓄᑦ, ᐊᑐᖅᑕᐅᓂᐊᖅᑐᓄᑦ ᐃᒪᓕᓇᕚᒃ, ᖁᕝᕙᖕᒥᙵᖅᑐᓕᓇᕚᒃ, ᐊᒻᒪᓗ ᑯᕓᔪᓂᑦ ᓯᐊᒻᒪᒃᑎᑦᑎᔾᔪᑏᑦ. ᓄᓇᒥᑦ ᐃᒪᕐᒥᒃ ᑐᖅᑯᖅᓯᓯᒪᕖᑦ ᑕᓯᕋᔭᒃᑲᓃᑦ, IVR ᐊᕙᓗᐃᑦ ᐊᒻᒪᓗ ᓴᖑᑎᑦᑎᔾᔪᑏᑦ, ᐊᒻᒪᓗ ᐊᑐᖅᑕᐅᔪᖅ ᐃᒪᕐᒥᒃ ᑲᑎᑦᑎᔾᔪᑏᑦ ᐃᓕᔭᐅᓂᐊᖅᑐᑦ ᐊᐅᓚᑦᑎᓂᐊᕐᓂᐊᕐᓗᒋᑦ ᐊᒻᒪᓗ ᐊᖏᓗᐊᖏᒋᐊᖅᑎᓐᓂᐊᕐᓗᒋᑦ ᐊᒃᑐᖅᓯᓂᐅᔪᑦ ᐃᒪᕐᒧᑦ.

ᓈᒻᒪᒋᔭᐅᔪᖅ ᐊᒪᕈᖅ ᐊᒃᑕᑰᖅᑕᐅᔪᑦ ᐅᔭᖅᑲᓄᑦ ᑐᖅᑯᖅᓯᓯᒪᕝᕕᒃ ᐊᑐᖅᑕᐅᓂᐊᖅᑐᖅ ᐊᖕᕆᓪᓕᕆᐊᖅᓯᓂᕐᒧᑦ; ᑭᓯᐊᓂ, ᐊᒃᑕᑯᓂᒃ ᑐᖅᑯᖅᓯᓯᒪᕝᕚᑦ ᐊᖕᕆᓪᓕᕆᐊᖅᑕᐅᓂᐊᖅᑐᑦ ᖁᒻᒧᖕᒌᖅ ᐊᒻᒪᓗ ᓴᓂᒧᑦ ᓂᕆᖅᐸᓯᐊᓄᑦ ᑲᓇᖕᓇᖅᐸᓯᐊᓄᑦ. ᓄᑖᖅ IVR-ᒧᑦ ᐊᒃᑕᑰᖅᑕᐅᔪᖅ ᐅᔭᖅᑲᓂᒃ ᑐᖅᑯᖅᓯᓯᒪᕝᕕᒃ ᐊᑐᕐᓂᐊᖅᑐᖅ ᐊᒃᑕᑰᖅᑕᐅᔪᑦ ᐅᔭᖅᑲᓄᑦ ᐊᒻᒪᓗ ᐅᖓᑕᐅᑦᑎᓂᐅᔪᓄᑦ ᐱᔭᐅᔪᓂᒃ IVR ᓄᓇᒥᑦ ᐃᓗᑦᑐᖅᓯᒪᔪᒥᑦ. IVR-ᒧᑦ ᐊᒃᑕᑰᖅᑕᐅᔪᖅ ᐅᔭᖅᑲᓂᒃ ᑐᖅᑯᖅᓯᓯᒪᕝᕕᖕᒧᑦ ᐃᓂᐅᔪᖅ, ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᑦᑎᕝᕚᑦ, ᐊᒻᒪᓗ ᓄᓇᓕᐊᓛᖅ ᐋᖅᑭᒃᑕᐅᓯᒪᔪᑦ ᐊᔾᔨᕌᑉᓗᒍ ᓈᒻᒪᒋᔭᐅᔪᖅ ᐱᓕᕆᐊᖅ ᐊᒻᒪᓗ ᐃᓂᖃᕐᓂᐊᖅᑐᖅ ᐊᖕᕆᓪᓕᕙᓪᓕᐊᓂᖕᒐᓄᑦ ᐱᓕᕆᐊᖅ ᐋᖅᑭᕆᐊᖅᓯᒪᔪᒥᑦ ᐱᓕᕆᐊᕐᒧᑦ ᐃᓂᐅᔪᒥᑦ. ᑕᐃᒪᐅᔪᖅ ᓄᓇᐅᑉ ᐃᓗᐊᓂᑦ ᐊᒃᑕᑰᖅᑕᐅᔪᑦ ᐅᔭᖅᑲᓄᑦ ᑐᖅᑯᖅᓯᓯᒪᕝᕕᒃ ᐊᔪᙱᑎᑕᐅᔪᖅ ᒪᓕᒃᑯᒍ Type B ᐃᒪᕐᒧᑦ ᓚᐃᓴᓐᓯ 2BB-MEA1828 ᐊᖕᕆᓪᓕᕆᐊᖅᑎᑦᑎᓂᐊᖅᑐᖅ ᐃᓂᐅᔪᒥᑦ ᐃᓂᖃᖅᑎᓐᓂᐊᕐᓗᒋᑦ ᐊᒃᑕᑯᓄᑦ ᑐᖅᑯᖅᓯᓯᒪᕝᕕᒃᑲᓃᑦ ᐊᒻᒪᓗ ᓄᓇᒥᑦ ᐃᒪᕐᒧᑦ ᓄᓇᐅᑉ ᐃᓗᐊᓃᑦᑐᓄᑦ ᐅᔭᖃᒃᑕᕆᐊᕐᒥᑦ. ᐊᔾᔨᒋᓗᒍ ᓈᒻᒪᒋᔭᐅᔪᖅ ᐊᐳᖅᑎᓐᓈᖅᑐᒥᑦ ᐊᒻᒪᓗ ᐊᒪᕈᖅ ᓄᓇᒥᑦ ᐃᓗᑦᑐᖅᓯᒪᔪᕐᒥᒃ ᐊᐅᓛᖅᑎᑦᑎᓂᕐᓄᑦ, ᐃᓂᓕᐅᕆᓂᕐᒧᑦ ᐋᖅᑭᐅᒪᔪᖅ ᐊᑐᖅᑕᐅᓂᐊᖅᑐᖅ ᖃᐅᔨᓂᐊᕐᓗᒋᑦ ᐊᒻᒪᓗ ᐅᓗᕆᐊᓇᙱᑦᑐᒃᑯᑦ ᑐᖅᑯᕐᓂᐊᕐᓗᒋᑦ NPAG, PAG ᐊᒻᒪᓗ ML ᐅᔭᖁᐃᑦ. PAG ᐅᔭᖁᒃᑕᖅᑕᐅᔪᑦ ᐅᔭᖅᑲᐃᑦ ᑐᖅᑯᖅᑕᐅᓂᐊᖅᑐᑦ ᐃᓂᓕᐅᖅᓯᒪᔪᓄᑦ ᑖᑉᑯᓄᙵ ᑐᖅᑯᖅᓯᓯᒪᕝᕕᖕᓄᑦ ᐋᖅᑭᒃᓯᒪᔪᖅ ᐊᑯᓂᐅᔪᒧᑦ ᓄᓇᒥᑦ ᐱᐅᖕᒋᑦᑐᓕᕆᓂᕐᒧᑦ ᐊᒻᒪᓗ ᓄᓇᓕᕆᓂᕐᒧᑦ ᐊᔪᙱᑦᑐᓄᑦ.

ᓈᒻᒪᒋᔭᐅᒃᐸᑦ ᐊᖕᕆᓪᓕᕆᐊᖅᓯᓂᖅ, ᐊᐳᖅᑎᓐᓈᖅᑐᒥᑦ ᐅᔭᖁᒃᑕᕆᐊᒥᑦ ᐱᕐᑯᑎᒋᔭᐅᔪᑦ ᐊᐅᓚᕐᓂᐊᖅᑐᑦ ᓈᒻᒪᒋᔭᐅᓯᒪᔪᑐᑦ ᐅᔭᖁᒃᑕᕆᐊᖅᑐᑦ ᐊᒻᒪᓗ ᓯᖃᓕᑎᕆᓗᓂ ᐊᐅᓚᖅᑎᑦᑎᓂᕐᓄᑦ (ᐱᓕᕆᐊᕐᒧᑦ ᓇᓗᓇᐃᒃᑯᑎ No. 004 ᐊᒻᒪᓗ Type A ᐃᒪᕐᒧᑦ ᓚᐃᓴᓐᓯ 2AM-MEA1526); ᑕᐃᒪᓐᓇᒧᑦ ᐊᒡᓃᑯᒃᑯᑦ ᐅᐃᒍᕆᐊᕈᒪᔭᖓᑦ ᓯᖃᓕᑎᕆᓂᖅ ᐊᒻᒪᓗ ᕿᒪᒃᑎᑦᑐᓄᑦ ᑐᖅᑯᖅᓯᓯᒪᕝᕕᒃ ᐊᐳᖅᑎᓐᓈᖅᑐᒥᑦ, ᐊᖕᕆᓪᓕᕆᐊᖅᓯᓂᕐᒧᑦ ᐱᕆᐊᒃᑯᑦ. ᓄᑖᓂᒃ ᐱᕐᑯᑎᑖᕆᐊᖅᑲᔾᔭᙱᑦᑐᑦ ᑕᐃᒪᐅᔪᒥᑦ ᐊᐳᖅᑎᓐᓈᖅᑐᒥᑦ ᐅᔭᖁᒃᑕᕆᐊᕐᑏᑦᑐᓂᑦ ᐊᖕᕆᓪᓕᕆᐊᖅᑕᐅᓂᖓᓄᑦ ᐱᓕᕆᐊᖅ. ᐊᒡᓃᑯᒃᑯᑦ ᐱᓕᕆᐊᕆᔪᒪᔭᖓᑦ ᐊᒪᕈᖅ-ᒥᑦ ᐅᔭᖁᒃᑕᖅᑕᐅᔪᑦ ᐊᒻᒪᓗ ᐃᓕᓯᓗᑎᒃ ᕿᒪᒃᑎᑦᑐᓄᑦ ᒪᖁᒥᒃ ᑕᐃᒪᐅᔪᒥᑦ ᐊᐳᖅᑎᓐᓇᖅᑐᒥᑦ ᐅᔭᖁᒃᑕᕆᐊᕐᒥᑦ ᕿᒪᒃᑎᑦᑐᓄᑦ ᑐᖅᑯᖅᓯᓯᒪᕝᕕᖕᒥᑦ ᓈᒻᒪᒋᔭᐅᔪᖅ ᐊᕙᑎᓕᕆᓃᒃᑯᑦ ᐱᓕᕆᐊᕐᒧᑦ ᓈᓴᐅᑎᒥᑦ No. 008 ᐊᒻᒪᓗ Type A ᐃᒪᕐᒧᑦ ᓚᐃᓴᓐᒥᑦ 2AM MEA1526. ᐅᐃᒍᕆᐊᕐᓗᒍ ᐊᐅᓚᕐᓂᕆᓂᐊᖅᑕᖓ ᐊᒪᕈᖅ ᐊᒻᒪᓗ ᐊᐳᖅᑎᓐᓈᖅᑐᖅ, ᐊᒡᓃᑯᒃᑯᑦ ᐊᐅᓚᖅᑎᑦᑎᑎᓪᓗᒋᑦ ᐱᓕᕆᐊᖃᐃᓐᓇᕐᓂᐊᖅᑐᑦ ᐅᒃᑯᐊᖅᐸᓪᓕᐊᓕᕆᓂᒥᒃ ᑖᑉᑯᓇᓂ ᐃᓂᐅᔪᓂᑦ. ᐅᒃᑯᐊᖅᐸᓪᓕᐊᓂᕐᒧᑦ ᖃᓄᖅᑑᕆᓃᑦ ᐊᖕᕆᓪᓕᕆᐊᖅᓯᓂᕐᒧᑦ ᐱᓕᕆᐊᕐᒥᑦ ᐊᔾᔨᒋᔭᖕᒋᑦ ᓈᒻᒪᒋᔭᐅᔪᖅ ᐊᒪᕈᖅ ᓄᓇᒥᑦ ᐃᓗᑦᑐᖅᓯᒪᔪᕐᒧᑦ ᐊᒻᒪᓗ ᒥᐊᓂᖅᓯᔾᔪᑏᑦ ᐊᖕᕆᓪᓕᕆᐊᖅᓯᓂᕐᒧᑦ ᐋᖅᑭᒃᑕᐅᓂᐊᖅᑐᑦ ᑲᓇᑕᒥᑦ ᓄᓇᖕᒋᓐᓄᑦ-ᓄᓇᖃᖅᑳᖅᑐᓕᕆᓃᓄᑦ ᐊᒻᒪᓗ ᐅᑭᐅᖅᑕᖅᑐᓕᕆᓃᒃᑯᓐᓄᑦ ᐊᒻᒪᓗ ᑭᕙᓪᓕᕐᒥᑦ ᐃᓄᐃᑦ ᑲᑐᔾᔨᖃᑎᒌᒃᑯᓐᓄᑦ ᓴᖅᑭᑕᐅᓗᓂᓗ ᒪᓕᒃᑯᒍ Type A 2AM-WTP1826.

ᑕᐃᒪᙵᓂᑦ 2016-ᒥᑦ, ᐊᒡᓃᑯᒃᑯᑦ ᑲᑎᖅᓱᐃᖕᒋᓐᓇᖅᑐᑦ ᑭᓪᓕᐅᔪᓄᑦ ᓈᓴᐅᑎᓂᒃ/ᑎᑎᖅᑲᓂᒃ, ᐃᓚᓕᐅᑎᔭᐅᐸᓗᑎᒃ ᐅᐸᓗᒥᒨᓕᖅᑐᖅᓯᒪᔪᒧᑦ ᐊᕙᑎᓕᕆᓂᕐᒥᒃ ᖃᐅᔨᓴᐃᓂᕐᒧᑦ ᖃᐅᔨᓂᐊᕐᓗᒋᑦ ᐊᒻᒪᓗ ᖃᐅᔨᓴᕐᓗᒋᑦ ᐊᕙᑎᒥᒃ ᐊᒻᒪᓗ ᐃᓄᖕᓄᒃ ᖃᓄᐃᖓᓕᖅᑎᑦᑎᓂᐅᔪᖕᓇᖅᑐᑦ ᐊᖕᕆᓪᓕᕆᐊᕐᓂᖓᓄᑦ ᐱᓕᕆᐊᕐᒥᒃ ᐱᔪᓂᒃ ᐊᒻᒪᓗ ᐃᑲᔪᐃᓂᕐᒧᑦ ᑭᖑᓪᓕᖅᐹᖅ ᐊᕙᑎᒥᒃ ᐊᒃᑐᖅᓯᓂᕐᒧᑦ ᑎᑎᖅᑲᕐᒥᑦ ᐊᒻᒪᓗ Type A ᐃᒪᕐᒧᑦ ᓚᐃᓴᓐᓯᒥᒃ ᐋᖅᑭᕆᐊᖅᓯᔪᒪᓂᕐᒧᑦ ᑐᒃᓯᕋᐅᑎ ᑐᓂᐅᑕᐅᓚᐅᖅᑐᖅ 2016-ᒥᑦ. ᖃᓄᐃᖕᒋᓂᐅᔪᑦ ᐊᕙᑎᒥᒃ ᖃᐅᔨᓴᐃᓂᕐᒧᑦ ᖃᐅᔨᓚᐅᖅᑐᑦ ᐊᖏᓗᐊᖏᕆᐊᖅᑎᑦᑎᓂᒃᑯᑦ, ᐊᖕᕆᓪᓕᕆᐊᕐᓂᕐᒧᑦ ᐱᓕᕆᐊᖅ ᐊᑯᓂᐅᔪᒥᑦ ᐊᖏᔪᒥᒃ ᐱᐅᖕᒋᑦᑐᓂᒃ

ᖃᓄᐃᖓᓕᖅᑎᑦᑎᓂᖃᕋᔭᕐᓂᖓᓄᑦ ᐱᔪᓂᒃ ᓴᓇᐅᔭᕚᓪᓕᐊᓂᖓ, ᐊᐅᓛᖅᑎᑦᑎᓂᕐᓂᑦ, ᐊᒻᒪᓗ ᐅᒃᑯᐊᖅᐸᓪᓕᐊᓂᕐᒥᑦ.

ᐊᒡᓃᑯᒃᑯᑦ ᖃᐅᔨᒋᐊᖃᑦᑕᕐᓂᕐᒧᑦ ᐊᒻᒪᓗ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᑐᕌᖓᔪᓕᐅᓚᐅᖅᑐᑦ ᐱᔭᕆᐊᖃᖅᑐᓂᒃ ᐊᕐᒌᓗᐊᕐᒋᒋᐊᖅᑎᑦᑎᓂᕐᒧᑦ, ᖃᐅᔨᒋᐊᖃᑦᑕᕐᓂᕐᒧᑦ, ᐊᒻᒪᓗ ᐅᓂᒃᑳᓕᐅᕆᓂᕐᒧᑦ ᐊᕙᑎᒥᒃ ᖃᓄᐃᓕᐅᕐᓂᐅᔪᓄᑦ ᒪᓕᒐᓕᕆᓂᐅᔪᓂᑦ ᐱᔭᕆᐊᖃᖅᑐᓄᑦ ᒥᒃᓵᓄᑦ ᐊᒪᕈᖅ ᓄᓇᒥᑦ ᐃᓗᑦᑐᖅᓯᒪᔪᒥᑦ, ᐊᒻᒪᓗ ᐊᐳᖅᑎᓐᓈᖅᑐᒥᑦ ᐊᐅᓛᖅᑎᑦᑎᓂᕐᒧᑦ ᐱᔪᕐᓇᖅᑎᑦᑎᑉᔪᑏᑦ, ᐳᒥᑦ, ᓚᐃᓴᓐᓴᑦ, ᐊᒻᒪᓗ ᐊᑐᖅᑐᐊᕐᓂᕐᒧᑦ ᐊᔾᔨᒋᔭᖕᒋᑦ ᒪᓕᒐᒃᑯᑦ ᐱᔭᕆᐊᖃᖅᑐᑦ ᐊᑐᖅᑕᐅᔪᓂᑦ ᐱᖁᔭᕐᓂᑦ ᐊᒻᒪᓗ ᒪᓕᒐᕋᓛᓂᑦ ᓄᓇᕗᒻᒥᑦ. ᓈᒻᒪᒃᑳᖓᑦ, ᑕᐃᒪᐅᔪᑦ ᐊᐳᖅᑎᓐᓈᖅᑐᒥᑦ ᐅᔭᕋᒃᑕᕆᐊᕐᒧᑦ ᐸᕐᓇᐅᑏᑦ ᐅᕝᕙᓘᓐᓃᑦ ᐊᒪᕈᖅ ᓄᓇᒥᑦ ᐃᓗᑦᑐᖅᓯᒪᔪᖅ ᐃᖕᒥᒃᑰᖓᔪᒧᑦ ᐸᕐᓇᐅᑏᑦ ᐅᑉᓗᒥᒨᓕᖅᑐᖅᑕᐅᖃᑦᑕᕐᓂᐊᖅᑐᑦ ᐅᕝᕙᓘᓐᓃᑦ ᐃᓚᒋᓗᑎᒃ ᑕᑯᒃᓴᐅᑎᓐᓂᐊᕐᓗᒋᑦ ᐊᖏᒡᓕᒋᐊᕐᓂᕐᒧᑦ ᐱᓕᕆᐊᖅ, ᐊᒻᒪᓗ ᐊᒪᕈᖅ ᐱᓕᕆᐊᕐᒧᑦ ᓇᓗᓇᐃᒃᑯᑕᕐᒧᑦ ᐱᔭᕆᐊᖃᖅᑐᑦ. ᑕᐃᒪᐅᔪᑦ ᐊᒻᒪᓗ ᓈᒻᒪᒋᔭᐅᔪᑦ ᑐᑦᕌᖓᔪᑦ ᑕᐅᑐᙵᖃᕐᓂᐊᖅᑐᑦ ᐊᒃᑐᖅᓯᓂᐅᔪᑦ ᐊᒃᑕᒨᖅᑕᐅᔪᓄᑦ ᐊᒻᒪᓗ ᐃᒪᕐᒧᑦ, ᐊᔾᔨᒋᓗᒋᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᓄᑦ ᓈᒻᒪᒋᔭᐅᔪᖅ ᐱᓕᕆᐊᕐᒧᑦ. ᓇᓚᐅᑦᑎᓂᖏᑦ ᐊᕙᑎᒥᒃ ᐊᒃᑐᖅᓯᓂᕐᒧᑦ ᓇᓚᐅᑦᑖᖅᑕᐅᔪᑦ ᐊᒻᒪᓗ ᐊᑑᑎᖃᕐᓂᖓ ᐊᕐᒌᓗᐊᕐᒋᒋᐊᖅᑎᑦᑎᓂᕐᔫᖓᔪᑦ ᓇᓗᓇᐃᖅᑕᐅᓂᐊᖅᑐᑦ ᖃᐅᔨᒋᐊᖃᑦᑕᕐᓂᒃᑯᑦ ᐊᒻᒪᓗ ᐊᕐᕋᒍᑕᓖᒃᑯᑦ ᐅᓂᒃᑳᓕᐅᕆᓂᒃᑯᑦ. ᐊᔾᔨᐅᖏᑦᑐᑦ ᐅᕝᕙᓘᓐᓃᑦ ᓂᕆᐅᒋᔭᐅᖏᑦᑐᓂᒃ ᐊᕐᒋᔪᒥᒃ ᐊᕙᑎᒧᑦ ᐊᒃᑐᖅᓯᓂᐅᔪᓂᒃ ᖃᐅᔾᔭᐅᒃᐸᑕ, ᐋᖅᑭᒋᐊᖅᓯᓂᕐᒧᑦ ᖃᓄᐃᓕᐅᕈᑎᓂᒃ ᓴᖅᑭᑎᓂᐊᖅᑐᑦ. ᐊᑐᓕᖅᑎᑦᑎᓂᒃᑯᑦ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐱᕙᓪᓕᐊᓂᒃᑯᑦ, ᑕᐃᒪᐅᔪᑦ ᐊᕐᒌᓗᐊᕐᒋᒋᐊᖅᑎᑦᑎᓂᕐᔫᖓᔪᑦ ᐋᖅᑭᒋᐊᖅᑕᐅᓂᐊᖅᑐᑦ ᐅᕝᕙᓘᓐᓃᑦ ᓄᑖᓂᒃ ᐊᕐᒌᓗᐊᕐᒋᒋᐊᖅᑎᑦᑎᓂᕐᔫᖓᔪᓂᒃ ᐊᑐᓕᖅᑎᑦᑎᑐᑎᒃ ᐱᔭᕆᐊᖅᐸᑕ. ᓯᓚᑖᓂᑦ ᐅᓂᒃᑳᓕᐅᕆᓂᖅ ᐱᐊᓂᒃᑕᐅᖃᑦᑕᕐᓂᐊᖅᑐᖅ, ᐱᔭᕆᐊᖃᕐᓂᖅ ᒪᓕᒡᓗᒍ.

ᐱᕈᖅᐸᓪᓕᐊᓂᕐᒧᑦ ᖃᓄᐃᖓᓕᖅᑎᑦᑎᓂᐅᔪᑦ ᐊᖏᒡᓕᒋᐊᖅᑎᑦᑎᓂᖅ ᐱᓕᕆᐊᕐᒥᑦ ᐊᖏᔫᔪᖅ ᐊᒻᒪᓗ ᓂᕆᐅᒋᔭᐅᔪᑦ ᐅᔾᔨᕐᓇᕐᓂᐊᕐᓂᖓᓄᑦ ᐃᑲᔫᑎᐅᔪᑦ ᓄᓇᕗᒻᒧᑦ. ᐊᖏᒡᓕᒋᐊᖅᑎᑦᑎᓂᖅ ᐱᓕᕆᐊᕐᒥᑦ ᓂᕆᐅᒋᔭᐅᔪᖅ 99-ᓂᒃ ᓄᑖᓂᒃ ᐱᓕᕆᐊᒃᓴᓂᒃ ᐱᕕᖃᖅᑎᑦᑎᓂᐅᔪᓂᒃ ᓄᓇᕗᒻᒥᐅᓄᑦ ᐃᓚᓯᓂᐅᔪᖅ ᓴᖅᑭᑦᑐᓂᑦ ᓈᒻᒪᒋᔭᐅᔪᖅ ᐱᓕᕆᐊᕐᒥᑦ, ᐊᒻᒪᓗ ᐅᐃᒍᒋᐊᕐᓗᒍ ᐱᓕᕆᓂᖅ ᐊᒻᒪᓗ ᑮᓇᐅᔭᓕᐊᑦ ᓈᒻᒪᒋᔭᐅᔪᖅ ᐱᓕᕆᐊᕐᒧᑦ ᐱᓕᕆᔪᓄᑦ ᑎᑭᓪᓗᒍ 2026-ᒧᑦ. ᐊᖏᒡᓕᒋᐊᖅᑎᑦᑎᓂᖅ ᐱᓕᕆᐊᖅ ᐊᑯᓂᐅᔪᑐᑦ ᐱᐅᔪᒥᒃ ᖃᓄᐃᖓᓕᖅᑎᑦᑎᓂᐅᔪᖅ ᖃᔪᓯᓂᐊᖅᑐᖅ ᓄᓇᓕᖕᓄᑦ, ᐱᔾᔪᑎᒋᐸᓗᒋᑦ ᐃᒡᓗᒥᐅᖃᑎᕆᑦ ᑮᓇᐅᔭᓕᐊᖏᑦ ᐊᒻᒪᓗ ᓂᕿᑎᐊᕙᖕᓂᒃ ᐱᖃᑦᑕᕈᓐᓇᕐᓂᖏᓐᓄᑦ, ᕿᑎᒍᑕᐅᕙᒃᑐᓄᑦ, ᐃᓕᓐᓂᐊᕐᓂᕐᒧᑦ, ᐊᒻᒪᓗ ᐱᕝᕕᐅᖃᑦᑕᖅᑐᓄᑦ ᐱᖅᑯᓯᒃᑯᑦ ᖃᓄᐃᓕᐅᕐᓂᐅᔪᓄᑦ. ᐊᔾᔨᑕᖓ, ᐊᖏᒡᓕᒋᐊᕐᓂᖓᑕ ᐱᓕᕆᐊᖅ ᐃᑲᔪᐃᓂᖃᐃᓐᓇᕐᓂᐊᖅᑐᖅ ᓄᓇᓕᖕᒧᑦ ᑐᕌᖓᔪᓕᕆᓂᕐᒧᑦ ᐊᒻᒪᓗ ᐃᓕᓐᓂᐊᕐᓂᕐᒧᑦ ᐱᓕᕆᐊᓂᒃ, ᐊᒻᒪᓗ IIBA-ᓄᑦ ᐊᑭᓖᔾᔪᑎᓄᑦ ᐊᒻᒪᓗ ᐱᓂᐊᕐᓂᐅᔪᓄᑦ. ᐋᓂᐊᖃᖅᑕᐃᓕᒪᓂᖅ ᐊᒻᒪᓗ ᐊᑦᑕᕐᓇᖅᑐᖃᙱᓐᓂᕐᒧᑦ ᐊᔪᕈᓐᓃᖅᓴᐃᓃᑦ ᐊᐅᓛᕐᓂᖓᑕ ᐊᖏᒡᓕᒋᐊᕐᓂᖓᓄᑦ ᐱᓕᕆᐊᖅ ᓂᕆᐅᒋᔭᐅᖕᒥᔪᖅ ᐃᑲᔪᐃᓂᖃᐃᓐᓇᕐᓂᐊᕐᓂᖓᓄᑦ ᓄᓇᓕᖕᓂᑦ.

ᑕᐃᒪᙵᓂᑦ ᐊᐅᓛᖅᑎᑦᑏᑦ ᐊᐳᖅᑎᓐᓈᖅᑐᒥᑦ ᐅᔭᕋᒃᑕᕆᐊᕐᒥᑦ ᐱᒋᐊᕐᒪᑕ, ᐊᒡᓃᑯᒃᑯᑦ ᐃᓄᒃᑖᓂᒃ ᐅᖃᖃᑎᖃᕐᓂᖓᑦ ᑲᔪᓯᓯᒪᔪᖅ ᐊᕐᕌᒍᑕᓕᒃᑯᑦ ᑲᑎᒪᑎᑦᑎᓂᒃᑯᑦ ᓄᓇᓕᖕᒥᐅᓂᒃ ᐊᒻᒪᓗ ᓄᓇᓕᖕᒥᑦ ᐃᓚᐅᔪᓄᑦ ᑮᕚᓕᕐᒥᑦ, ᒪᓕᒐᓕᕆᔨᓂᒃ ᐊᒻᒪᓗ ᓄᓇᓕᖕᒥᑦ ᐱᓕᕆᔨᓂᒃ. ᑕᐃᒪᓐᓇ ᓱᓇᑐᐃᓐᓇᓂᒃ ᑐᑭᓯᐊᑎᑦᑎᓂᐅᔪᖅ ᐱᔪᓐᓇᐅᑎᓄᑦ, ᐱᔪᒪᔪᓄᑦ, ᐱᒻᒪᕆᐅᑎᔭᐅᔪᓄᑦ, ᐱᔭᐅᔪᒪᔪᓄᑦ, ᐊᒻᒪᓗ ᐃᓱᒫᓘᑕᐅᔪᓄᑦ ᐊᒃᑐᖅᑕᐅᓯᒪᔪᖕᓇᖅᑐᓄᑦ ᐃᓚᐅᔪᓄᑦ, ᐱᓗᐊᖅᑐᒥᒃ ᖃᒪᓂᑦᑐᐊᕐᒧᑦ. ᑲᔪᓯᓐᓂᒃᑯ ᐅᖃᖃᑎᖃᕐᓂᖅ, ᐊᒡᓃᑯᒃᑯᑦ ᐋᖅᑭᒃᓯᓚᐅᖅᑐᑦ ᐊᐅᓛᖅᑎᑦᑎᓂᕐᒧᑦ ᐱᖅᑯᓯᒥᒃ ᐃᓕᑕᖅᓯᔪᖅ ᐊᒻᒪᓗ ᐃᒃᐱᒍᓱᒻᕕᖃᖅᑐᒥᒃ ᑕᒪᒃᑯᓈᓚ ᐱᔪᒪᔪᓄᑦ ᐸᕐᓇᐃᓂᕐᒥᑦ ᐊᒻᒪᓗ

ᐱᒋᐊᕐᑎᑦᑎᓂᕐᒥᒃ ᐱᕙᓪᓕᐊᓂᐅᔪᓂᒃ. ᐊᓪᓃᑯᒃᑯᑦ ᐅᖃᖃᑎᖃᓚᐅᕐᑐᑦ ᓄᓇᓕᖕᒥᑦ ᐃᓚᐅᔪᓂᒃ ᐊᒻᒪᓗ ᒪᓕᒐᓕᕆᓂᕐᒧᑦ ᑲᒪᔪᓂᒃ ᐱᔾᔪᑎᒋᐸᓗᒍ ᐊᐅᓚᕐᑎᑦᑎᓂᕐ ᐊᒪᕈᕐ ᓄᓇᒥᑦ ᐃᓗᑦᑐᕐᓯᒪᔪᒥᑦ ᐊᒻᒪᓗ ᐅᓯᑲᑦᑕᖕᓂᕐᒧᑦ ᐊᑉᕐᑯᑎᒥᑦ ᐱᕙᓪᓕᐊᓂᕐᒧᑦ, ᐊᒻᒪᓗ ᑐᒃᓯᕋᐅᑕᐅᔪᕐ ᐊᖏᓪᓕᒋᐊᕐᑎᑦᑎᓂᕐᒧᑦ ᐱᓕᕆᐊᕐᒥᑦ ᒥᒃᓵᓄᑦ.

AGNICO EAGLE

TABLE OF CONTENTS

FIGURES AND TABLES

SECTION 1 • PROJECT DESCRIPTION

1.1 Introduction

On November 6, 2017, the Nunavut Impact Review Board (NIRB) provided a positive decision on the Whale Tail Pit Project and on March 15, 2018 Agnico Eagle Mines Limited (Agnico Eagle) gained approval to further extend the life of mine (LOM) by constructing and operating the Whale Tail Pit and associated facilities as permitted by Project Certificate No. 008 (herein referred to as the Approved Project). On July 11, 2018, the Minister approved the Type A Water Licence 2AM-WTP1826 to begin construction and operation of the Whale Tail Pit, hauling of ore to the Meadowbank Mill, and continued milling at the Meadowbank Mill and operation of the tailings storage facility (TSF) under an amended Meadowbank Mine Type A Water Licence 2AM-MEA1526. As a satellite operation, the Whale Tail Pit is approved to operate and will continue to feed the Meadowbank Mill, TSF, and use associated Meadowbank Mine infrastructure under Project Certificate No. 004 and Type A Water Licence 2AM-MEA1526.

Agnico Eagle is proposing certain changes to the Approved Project. Specifically, Agnico Eagle is seeking approval to expand and extend the Approved Project to include the:

- IVR Pit;
- IVR Waste Rock Storage Facility (WRSF);
- IVR Attenuation Pond;
- Expanded Whale Tail Pit; and
- Underground mine.

Collectively, this is referred to as the Whale Tail Pit Expansion Project and often referred to in the Main Application Document as “the Expansion”.

The Amaruq property is a 408 square kilometre (km^2) site located on Inuit Owned Land approximately 150 kilometres (km) north of the hamlet of Baker Lake and approximately 50 km north of Meadowbank Mine (Figure 1.2-1). The Project, and its drainage basin, is located entirely within the Kivalliq region of Nunavut.

As an expansion to the existing operations at Whale Tail Pit, the proposal is subject to an Environmental Assessment (EA) reconsideration established by the *Nunavut Planning and Project Assessment Act* and the Water Licence authorities under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*. Agnico Eagle requests the Nunavut Water Board (NWB) amend Water Licence 2AM-WTP1826 where appropriate to include mining of the expansion components and associated infrastructure to account for the Expansion Project.

In support of the NWB water licence amendment, Agnico Eagle has provided this stand-alone document to guide the review process. The Main Application Document has been developed to conform with the Supplemental Information Guideline issued by the NWB.

1.1.1 Project Definition

Table 1.1-1 provides a summary of the Expansion Project as a comparison to the Approved Project. Agnico Eagle believes the scope of the Approved Project (Agnico Eagle 2016c) has not changed significantly with the proposed expansion.

Table 1.1-1 Definition of Scope

	Whale Tail Pit and Haul Road – Approved Project	**Expansion of the Whale Tail Pit Operations (May 2019)**
Location/ Land Tenure	The Amaruq property located approximately 150 km north of the Hamlet of Baker Lake and approximately 50 km north of the Meadowbank Mine.	No change. Project Development Area boundaries expanded.
Resource	The total gold resource for the Whale Tail Pit will extend the LOM of Meadowbank for three to four years.	The total gold resource for the Expansion Project will expand and extend the LOM of Meadowbank to 2026.
Life of Mine	This Whale Tail Pit resource will be extracted over approximately a three to four-year period from 2019 through 2022. Construction and pre-stripping is scheduled to begin in 2018 and mining in October 2018 with mill feed expected to begin in third quarter of 2019. Dewatering is currently scheduled to occur between the first and third quarters of 2019. Infrastructure/activities at Meadowbank Mine that support the Project will be extended for another three years and will remain the same as authorized under Project Certificate No. 004.	This expanded resource will be extracted over approximately a four-year period from 2020 thru 2025. In total, the resource extraction for the Whale Tail Project will be expanded and extended over approximately a seven-year period from 2019 to 2025. Mining activities at Whale Tail Pit are expected to end in Year 7 (2025) and ore hauling and processing is expected to end during Year 8 (2026). Construction and pre-stripping for the IVR Pit is scheduled to begin in September 2020; mining of the expanded pits and underground will begin in 2021. Infrastructure/activities at Meadowbank Mine that support the Expansion Project will be extended for another four years and will remain the same as approved under Project Certificate No. 004.

	Whale Tail Pit and Haul Road – Approved Project	Expansion of the Whale Tail Pit Operations (May 2019)
Site Access	Existing airstrip used during exploration phase will be reclaimed. The Approved Project is designed to operate as a satellite of the main Meadowbank facilities, and will be accessed by the existing exploration access road, which will be upgraded to accommodate haul trucks and increased traffic. Transportation to site (marine barging, airstrip, and transportation along the all-weather access road), housing and handling will remain the same as authorized under Project Certificate No. 004.	Existing airstrip used during exploration phase will be used as a construction access road for Whale Tail Dike. A section of the expanded haul road near the Whale Tail Pit site will be used as an airstrip during the operation of the expansion. The Expansion Project is designed to operate as a satellite of the main Meadowbank facilities, and will be accessed by the approved haul road, which Agnico Eagle proposes to expand from 9.5 m to 15 m in width to ensure safe passage of haul trucks. Additional borrow/quarry material will be needed to undertake Expansion of the haul road. Refer to Section 1.2.7 of the Main Application Document. Transportation to site (marine barging, airstrip, and transportation along the all-weather access road), housing and handling will remain the same as authorized under Project Certificate No. 004 and/or Project Certificate No. 008, where applicable.
Laydown Facilities and Baker Lake Marshalling Area	Existing Meadowbank facilities will be used. A small laydown area will be constructed on the Whale Tail Pit site.	No change. Refer to Section 1.2.11 of the Main Application Document.

	Whale Tail Pit and Haul Road – Approved Project	Expansion of the Whale Tail Pit Operations (May 2019)
On-site Facilities	Construction of on-site facilities at Whale Tail Pit: power plant, maintenance facilities, tank farm, water treatment plant, water management infrastructure, sewage treatment plant, heli-pad, and accommodation for 210 people at the main camp. Continued use of the existing Amaruq exploration camp on the property for exploration activity. All milling will be done at Meadowbank Mine at a mill rate consistent or lower than the current mill rate (9,000 to 12,000 tonnes per day). Power generation for the Mill and camp at Meadowbank will remain the same as authorized under the current Project Certificate (No. 004).	On-site, existing facilities and infrastructure will continue to be utilized including: a personnel camp (i.e., Main Camp), landfill, power plant, heli-pad, maintenance shop, tank farm, a WRSF, an ore stockpiling facility, an attenuation pond, a water and sewage collection and treatment system, haul roads, access roads, water management infrastructure (e.g., collection ponds, diversion systems, dikes, dams, and culverts), and the Whale Tail Pit. No change related to use of existing Amaruq exploration camp on the property for exploration activity (Type B Water Licence 2BB-MEA1828). No changes related to milling to be done at Meadowbank Mine. Expansion to include: • Expansion of on-site facilities at Whale Tail Pit to accommodate a maximum of 544 persons. • Installation of a larger maintenance shop, core shack and additional wings to the Main Camp, to support additional personnel.

	Whale Tail Pit and Haul Road – Approved Project	Expansion of the Whale Tail Pit Operations (May 2019)
		• Installation of an incinerator, composter, and landfarm to support waste management activities. Refer to Section 1.2.12 of the Main Application Document. • Additional diesel generators to power underground infrastructures and expanded camp facilities. • For expansion of mining and water management infrastructure see below. All other on-site facilities for the Whale Tail Project will remain the same as authorized under the current Project Certificate No. 008.
Mine Infrastructure	Open pit mining for the Approved Project is planned to occur in one area, Whale Tail Pit. Flow of surface water into the pit will be limited through construction of two dikes. Whale Tail Dike will be constructed to divide the pit area from the southern portion of Whale Tail Lake, and Mammoth Dike is required for dewatering the pit area and to limit the water flow from Mammoth Lake into the pit during important flood events. To limit the impact of dike construction, turbidity barriers will be installed.	Expansion of Whale Tail Pit; mining an additional open pit, IVR Pit; underground mining below Whale Tail and IVR pits. Flow of surface water into the Whale Tail Pit will continue to be controlled by Whale Tail Dike and Mammoth Dike. Flow of surface water into IVR Pit will be controlled by IVR Diversion and IVR-D1, IVR-D2, and IVR-D3 dikes. Construction mitigation measures and methods of IVR-D1, IVR-D2, and IVR-D3 dikes are consistent with measures and methods for dike construction of Approved infrastructure.

	Whale Tail Pit and Haul Road – Approved Project	Expansion of the Whale Tail Pit Operations (May 2019)
	Only NPAG and low metal leaching (LML) material will be used for the construction of infrastructure. Low permeability rockfill dikes with a geomembrane will be constructed. As needed, sodium bentonite will be mixed in place with aggregate or in a slurry to reduce the permeability of the construction material.	No significant changes to dike design are anticipated; although the Northeast Dike (within the IVR Pit footprint) will be removed once the IVR Pit is initiated. Dewatering of IVR Pit is currently scheduled to begin in 2020. Dewatering of Lake A53 is currently scheduled to begin in 2021. Underground mining will be mainly, long hole mining (95%) with some mechanized cut and fill in flat areas. The configuration will be a mix of transverse and longitudinal stoping. Waste rock will be temporarily stored on surface in the Underground WRSF until it is used for underground backfill. Stopes will be filled with cemented rock fill and rock fill. Ore will be extracted by truck and scoop and hauled to surface through main access ramp.
Ore Processing	Ore processing, handling, treatment, and disposal will continue at the Meadowbank Mill and tailings will be stored in the footprint of the existing approved tailings storage facility consistent with the current Project Certificate No. 004. Operations for the approved tailings facility are addressed under Type A Water Licence 2AM-MEA1526.	No change.
Tailings	No tailings to be treated or disposed of on the Whale Tail Pit site.	No change.

	Whale Tail Pit and Haul Road – Approved Project	Expansion of the Whale Tail Pit Operations (May 2019)
	The existing tailings facility at Meadowbank Mine will continue to be used for tailings disposal. All tailings treatment and placement will remain consistent with the current Project Certificate No. 004.	
Process Water	Mine process water reclamation will remain the same as authorized under the current Project Certificate No. 004 and Type A Water Licence 2AM-MEA1526.	No change.
Ore Stockpile	Three ore-stock pile areas are approved under Project Certificate No. 008 and Type A Water Licence 2AM-WTP1826.	Consistent with the Approved Project, ore will be stockpiled in a series of stockpiles located adjacent to the pits as shown on Figure 1.2-1.
Waste Rock	Waste rock and overburden generated at Whale Tail will be placed in the Whale Tail Waste Rock Storage Facility. Consistent with Meadowbank a classification system will be used to identify and safely store PAG and ML (leachable) rock in a designated storage area designed for long-term stability; and to stockpile NPAG and NML rock for use in construction and as cover material for the WRSF facility. Run-off will be appropriately handled.	The approved Whale Tail WRSF will continue to be used for the Whale Tail Pit expansion and the Whale Tail WRSF will be expanded vertically and horizontally to the southeast. Expansion includes: • A new IVR WRSF to accommodate waste rock and overburden generated from the IVR Pit. The waste rock storage footprint, water management infrastructure and camp have been designed and considers up to eight

	Whale Tail Pit and Haul Road – Approved Project	Expansion of the Whale Tail Pit Operations (May 2019)
		years storage capacity to allow for expected resource growth. • The Underground WRSF that is permitted under the Type B will be expanded. Agnico Eagle will increase the footprint of the underground exploration area to the north to accommodate additional waste rock storage. Consistent with Meadowbank and Whale Tail Pit operations, a classification system will be used to identify and safely store PAG and ML rock. PAG mine rock will be stored in the designated storage areas designed for long-term stability. NPAG and NML rock will be either stockpiled or used in construction, including for WRSF cover material. Run-off will be appropriately handled. Thermal encapsulation of the PAG and ML rocks was selected as a reclamation strategy to verify long-term stability of the waste rock storage facilities. The Expansion Project will generate approximately 15.2 Mt of tailings to be stored at Meadowbank TSF, 121.7 Mt of mine waste rock, and 5.7 Mt of overburden soil to be stored at Whale Tail, with very limited organic material.
Freshwater	The freshwater and potable water supply for the Whale Tail Camp will be pumped from Nemo Lake during construction (175,000m^3/year) and operations (191,750m^3/year) and treated	Freshwater and potable water use approved under Water Licence 2AM-WTP1826 will extend to 2025. No increase in the

	Whale Tail Pit and Haul Road – Approved Project	**Expansion of the Whale Tail Pit Operations (May 2019)**
	at the on-site water treatment plant. As part of these amount, 45,750 m^3/yr will be pumped from Nemo Lake for dust suppression on the road.17,600 m^3/yr of freshwater and potable water will be required from Whale Tail Lake during the closure phase. 2,500 m^3/yr of freshwater from the unnamed lake will be required for the purposes of explosives mixing and associated uses . 10,655,000 m^3/yr of freshwater from Whale Tail Lake will be required to complete pit flooding activity during the Closure phase.	freshwater use per year is required for the Expansion Project during the construction, operation and construction phases. Freshwater requirement during the Expansion project are detailed in Table 1.2-2 below.Expansion facilities includes construction of intake in Mammoth Lake (to replace approved unnamed lake water source) to support emulsion plant operations. A source was added to allow operational geological drilling. Water to be taken in small lakes/pond proximal to drilling sources. No change in water supply authorized under Type A Water Licence 2AM-MEA1526 for continued operation of Meadowbank Mill.
Water Management	Water management infrastructure at Meadowbank Mine tailings facility will remain the same as authorized under the current Project Certificate (No. 004) and Type A Water Licence 2AM-MEA1526. Construction of the Whale Tail Pit Attenuation Pond and related infrastructure.	No change to water management infrastructure at Meadowbank Mine. Water management infrastructure includes contact water collection ponds, freshwater collection ponds, water collection and diversion systems, retention dikes, culverts, water treatment plants for effluent, potable water treatment plant, sewage treatment plant, and discharge diffusers.

	Whale Tail Pit and Haul Road – Approved Project	Expansion of the Whale Tail Pit Operations (May 2019)
	Construction of a series of dewatering and diversion dikes for water management of Whale Tail Pit. Construction of a contact water collection system around the Whale Tail WRSF to capture contact water and convey it to the Attenuation Pond. Other contact water will be directed to the Whale Tail Attenuation Pond. Sewage at Whale Tail Pit will be treated using a treatment system similar to the system used at Meadowbank Mine. Treated sewage effluent will be discharged to the Whale Tail Attenuation Pond and discharged as effluent with other site contact water. Effluent from the Whale Tail Attenuation Pond will be treated and discharged to Mammoth Lake via an effluent diffuser. Non-contact water will be diverted from site through channels and dikes. Dewatered flows from Whale Tail Lake (North Basin) will either be pumped to Whale Tail Lake (South Basin) or discharged to Mammoth Lake through a diffuser. Any water requiring treatment will be pumped to the water treatment plant prior to discharge through the diffuser in Mammoth Lake.	Three groundwater management ponds will support underground mine operations at surface (GSP-1, GSP-2, and GSP-3). Total Dissolved Solids (TDS) and associated treatment, if required, will be provided at the associated ponds. Note, GSP-1 is approved under 2BB – MEA1828 as Stormwater Pond. **Contact Water:** • All surface contact water on-site will be directed to an Attenuation Pond. • Two attenuation ponds are planned to capture contact surface water and include the approved Whale Tail Pit Attenuation Pond and the IVR Attenuation Pond at Lake A53 to support the Expansion Project operational activities. • Operation of the Whale Tail Pit Attenuation Pond will continue during construction and a new IVR Attenuation Pond is proposed to be constructed and operated between the camp and the IVR WRSF as part of the Expansion Project. • Flow of surface water into the Whale Tail Pit will continue to be controlled by Whale Tail Dike and Mammoth Dike with new infrastructure to manage surface water into IVR Pit controlled by IVR-D1, IVR-D2,

	Whale Tail Pit and Haul Road – Approved Project	Expansion of the Whale Tail Pit Operations (May 2019)
	Raising of the water level of Whale Tail Lake (South Basin) to discharge into Mammoth Lake through a southwest diversion channel. Refilling of Whale Tail Lake (North Basin). Breaching of dikes to reconnect flow between the South Basin and North Basin of Whale Tail Lake and Mammoth Lake.	and IVR-D3 dikes and IVR Diversion. Note the Northeast Dike will be removed once the IVR Pit is initiated. No significant changes to dike design are anticipated. • Additional water management infrastructures around IVR Pit and IVR WRSF Contact Water Collection Systems. • Underground groundwater and contact water will be managed separately from surface infrastructure contact water. ○ The Groundwater Storage Ponds will be used to: ▪ Collect saline water from shallow underground development where mining through the permafrost requires brine drilling water and receive brine concentrate. ▪ Collect the lower salinity naturally brackish groundwater from underground inflows below the base of the permafrost.

	Whale Tail Pit and Haul Road – Approved Project	Expansion of the Whale Tail Pit Operations (May 2019)
		○ Treated water from TDS treatment plant will be discharged via diffuser to Mammoth Lake or Whale Tail Lake South Basin. ○ At the end of underground mining, any remaining water in the Groundwater Storage Ponds will be pumped underground for flooding of the underground workings. **Non-contact Water:** • Non-contact water will be diverted from site through a combination of diversion systems, dikes, and pumps. • A series of diversion dikes and diversion systems will continue to be used for water management of Whale Tail Pit expansion. • A new diversion system, IVR Diversion, is proposed to divert clean runoff from the upper watershed of the IVR Pit to the Nemo Lake watershed. • An additional non-contact water discharge point in Whale Tail Lake South Basin upstream of the Whale Tail Dike will be required to discharge dike seepage

	Whale Tail Pit and Haul Road – Approved Project	Expansion of the Whale Tail Pit Operations (May 2019)
		captured in Whale Tail Dike Collection Pond and pumped to Whale Tail Lake (South Basin). Sewage wastewater will continue to be treated using a New Terra System. Treated sewage effluent will be discharged to the Attenuation Pond and discharged with other site contact water. Any water requiring treatment will be pumped to the water treatment plant prior to discharge through the diffuser in Mammoth Lake, and Whale Tail Lake (South Basin). For the amendment to the Type A Water Licence, Agnico Eagle will require additional discharge point into Whale Tail Lake (South Basin); one for Whale Tail Dike Seepage and for discharge of Treated water. Agnico Eagle is also looking at alternative discharge locations such as D1 and D5 lakes which Agnico Eagle requests for inclusion in the licence in order to provide the option of these alternative discharge locations in future (further details are provided in Section 1.5). Additional alternatives under consideration by Agnico Eagle are outlined in Section 1.9.6 of the main application document.

	Whale Tail Pit and Haul Road – Approved Project	Expansion of the Whale Tail Pit Operations (May 2019)
		Agnico Eagle is committed to maintaining discharge criteria according to the Type A Water Licence 2AM-WTP1826. The water level of Whale Tail Lake (South Basin) will be raised from July 2020 to May 2026 (i.e., an additional four years beyond May 2022 from the Approved Project to support the Expansion Project activities) and will discharge into Mammoth Lake through a southwest diversion system during this period. Refilling of Whale Tail Lake (North Basin) by diversion of site runoff, consistent with the Approved Project.
Fuel and Hazardous Wastes	A Bulk Fuel Storage Facility will be constructed on the Whale Tail Pit site. All hazardous waste will be hauled to Meadowbank and disposal will remain the same as authorized under the current Project Certificate No. 004. Use, transportation, handling and storage of fuel, hazardous materials, concrete, and aggregates will remain the same as authorized under the current Project Certificate.	The approved Whale Tail Bulk Fuel Storage Facility will be expanded and storage tanks will be installed around site to support infrastructures. Expansion facilities will include construction of a landfarm on-site for the treatment of hydrocarbon contaminated material. Use, transportation, handling and storage of fuel, hazardous materials, concrete, and aggregates will remain the same as authorized under the current Project Certificate.
Closure	Closure and reclamation activities at Meadowbank Mine will remain the same as authorized under the current Project Certificate. However, closure of the Meadowbank Mill,	Closure and reclamation activities at Meadowbank Mine will remain the same as authorized under Project Certificate No. 004 and Type A Water Licence 2AM-MEA1526. With mill feed ending

	Whale Tail Pit and Haul Road – Approved Project	Expansion of the Whale Tail Pit Operations (May 2019)
	maintenance shop, powerhouse, and camp will be delayed by three years. The Whale Tail site will be closed and reclaimed in a manner consistent with the FEIS and as recommended under the current Project Certificate. Water management at closure for Whale Tail Lake will require flooding of Whale Tail Pit, refilling of Whale Tail Lake (North Basin), breaching of Northeast, Mammoth, and Whale Tail dikes, and decommissioning of North, East, and South Whale Tail diversion channels. The open pit will be filled with natural runoff and water pumped from Whale Tail Lake (South Basin). Post-closure the Whale Tail WRSF dike will be breached.	in 2026, closure of the Meadowbank Mill, maintenance shop, powerhouse, and camp will be delayed until 2033. The Whale Tail Pit operations will be closed and reclaimed in a manner consistent with the Approved Project and as required under Project Certificate No. 008 and Type A Water Licence 2AM-WTP1826. Expansion facilities, the IVR Attenuation Pond, and Groundwater Storage Pond(s) are planned to be filled with NPAG rock at closure. The underground mine, Whale Tail Pit, and IVR Pit, will be filled with a combination of natural runoff and contact water from the site, and water pumped from Whale Tail Lake (South Basin). Refilling of Whale Tail Lake (North Basin) is estimated to take between 16 and 17 years, from 2026 to 2042. Lake reconnection will be completed when the water quality monitoring results meet water quality discharge criteria as per NWB Type A Licence conditions.
Employment	The total work force employed by Agnico Eagle will increase during construction and operations of the Project. The current workforce located at Meadowbank Mine for the operational	The camp will be expanded to support a maximum of 544 employees.

	Whale Tail Pit and Haul Road – Approved Project	Expansion of the Whale Tail Pit Operations (May 2019)
	phase will remain similar for the Whale Tail Pit development and with employees stationed at Meadowbank camp for milling and at Whale Tail Pit for mining of the satellite pit.	

LOM = life of mine; NPAG = non-potentially acid generating; PAG = potentially acid generating; ML = metal leaching

1.1.2 The Proponent

The Amaruq property is owned and managed by Agnico Eagle Mines Limited (NYSE:AEM, TSX:AEM), a Canadian publicly traded mining company listed on the Toronto and New York Stock Exchange, trading symbol AEM, with head offices in Toronto, Ontario.

Agnico Eagle is a long established, Canadian headquartered, gold producer with operations located in Canada, Finland, and Mexico, and exploration and development activities in Canada, Finland, Mexico, and the United States. Agnico Eagle currently has the Meadowbank operating gold mine and Meliadine will reach commercial production Q2 2019 in Nunavut.

Key contacts within Agnico Eagle for the Project are provided in Table 1.1-2. A summary of Agnico Eagle is available on-line at: 2017 Annual Financial Information.

Table 1.1-2 Agnico Eagle Key Contacts

Agnico Eagle – Meadowbank Division	Agnico Eagles Mines Limited CP 87, 765 Chemin de la mine Goldex Val-d'Or (Qc) J9P 4N9 Ph. 819 -874-5980
General Manager	Luc Chouinard 93, Arseneault, Suite 202 Val d'Or, QC, Canada, J9P 0E9 T: 819-759-3555 Ext. 4606896 M: 819.355.9348
Project Superintendent – Whale Tail	Julie Belanger P.Eng, M.Sc.A Meadowbank Division Baker Lake, Nunavut, Canada, X0C 0A0 M: 819.856.1667 julie.belanger@agnicoeagle.com
Superintendent - Permitting and Regulatory Affairs - Nunavut	Jamie Quesnel Meadowbank Division Baker Lake, Nunavut, Canada, X0C 0A0 M: 819.856.0821 jamie.quesnel@agnicoeagle.com
Nunavut Permitting Lead	Michel Groleau Meadowbank Division Baker Lake, Nunavut, Canada, X0C 0A0 T: 819.759.3555 Ext. 4608169 M : 418.670.6590 michel.groleau@agnicoeagle.com
Nunavut Permitting Lead	Manon Turmel Agnico Eagle - Nunavut Office 11600 rue Louis-Bisson Mirabel, Quebec, Canada J7N 1G9 T: 819.759.3555 Ext. 4608172 manon.turmel@agnicoeagle.com

1.1.3 Sustainable Development and the Precautionary Principle

Agnico Eagle is committed to creating value for their shareholders by operating in a safe, socially, and environmentally responsible manner while contributing to the prosperity of their employees, their families, and the communities in which they operate. This is imbedded into the four fundamental values that make up the keystones of Agnico Eagle's Sustainable Development Policy: Operate Safely, Protect the Environment, and treat Employees and Communities with Respect. This commitment is reflected in Agnico Eagle's published Sustainable Development Policy (English, French, and Inuktitut), which includes environment and health and safety. In addition, Agnico Eagle monitors accountability to sustainable development by completing an Annual Sustainable Development Report, which is also available on the website (Agnico Eagle 2019). The commitments made in this Sustainable Development Policy are extended to all of Agnico Eagle operations world-wide, and apply to the Meadowbank Mine and the Project.

1.1.4 Regional Context

The Project falls within the boundaries of the Keewatin Regional Land Use Plan (Nunavut Planning Commission 2000) administered by the Nunavut Planning Commission. The issues considered in the Approved Project FEIS (Agnico Eagle 2016c) within a regional context remain unchanged as a result of the Expansion Project. The Expansion Project received conformity from NPC on October 16, 2018.

1.1.5 Regulatory Regime

All current, applicable, and active permits are the sole ownership and responsibility of Agnico Eagle - Meadowbank Division.

The regulatory organizations have not changed since the FEIS (Agnico Eagle 2016c). Refer to Volume 1, Appendix 1-A of the Approved Project FEIS Addendum.

1.1.6 Consultation

Public consultation and engagement are a legal requirement in Nunavut, an industry best practice, and an important corporate commitment. For additional information related to Agnico Eagle's goals and objectives for Consultation refer to the Approved Project FEIS Volume 1, Section 1.1.11 and Volume 2, Section 2.3 (Agnico Eagle 2016c).

During the regulatory review process and upon receipt of the Project Certificate No. 008 and Type A Water Licence 2AM-WTP1826 for Whale Tail Pit, Agnico Eagle has continued public consultation by meeting with local employees that live throughout the Kivalliq, meeting in the community and local stakeholders, and regulatory agencies routinely which has allowed a better general understanding of the rights, interests, values, aspirations, and concerns of the potentially affected stakeholders, with particular reference to the local population. Through this continued consultation Agnico Eagle has developed an operational culture that recognizes and respects these relevant interests in the planning and executing processes. For the Expansion Project consultations, hearings, community round-table, and meetings that were completed as part of the Approved Project have been integrated into the Addendum. Although feedback from interveners, stakeholders, and community members since 2014 is integrated into this application, only an updated record of consultation including government engagement undertaken since June 2016 is provided in Addendum Volume 2. Agnico Eagle has, and will continue to, engage with the Kivalliq Inuit Association (KivIA) and other stakeholders. Appendix F of the Main Application Document includes a summary of Project concerns raised by community members and approved project references to mitigation measures.

1.2 Project Description and Alternatives

1.2.1 Project Justification

1.2.1.1 Project Purpose and Rationale

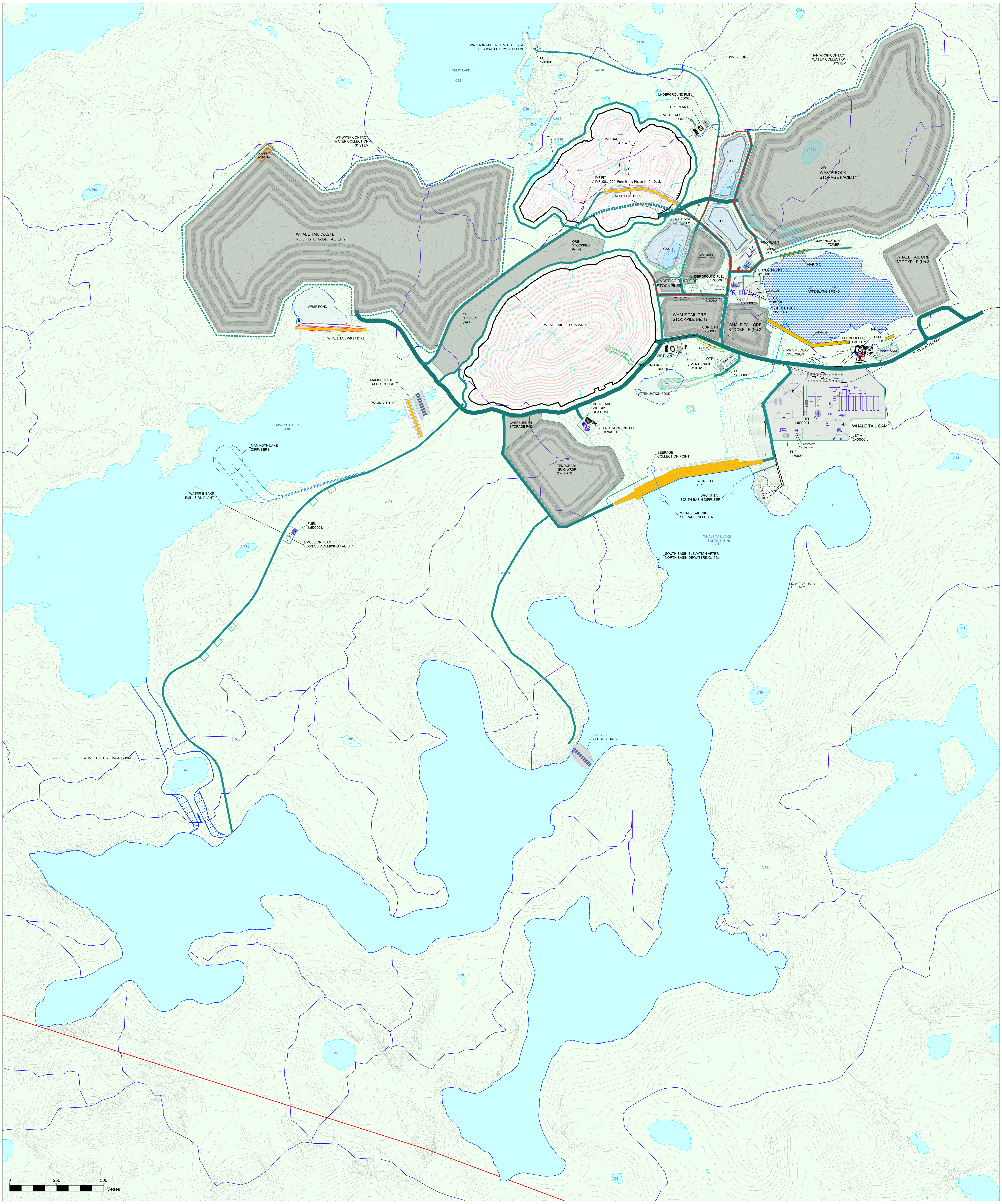
Since 2009, Agnico Eagle has operated the Meadowbank Mine. Components of the Meadowbank Mine include a marshalling facility in Baker Lake and the 110 km All-Weather Access Road (AWAR) between Baker Lake and Meadowbank (Figure 1.2-1).

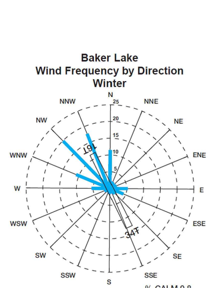
As the economics of the Meadowbank Mine have improved and Meadowbank Mine operations are optimized, mine engineers began considering the feasibility of expanding Meadowbank operations. As a result, mining of open pits at the Meadowbank Mine (more specifically Portage Pit) will continue until Q3 of 2019.

With approval of Whale Tail Pit Project in 2018, the initial extension of the Meadowbank LOM helped to bridge the production gap between the end of production at Meadowbank and the approved start of production of the Whale Tail Pit.

During the two-year permitting process, the resource at Whale Tail Pit continued to expand, which resulted in an economic expansion and extension further extending the LOM for the Meadowbank Mine. The deposits will be mined as open pits (expanded Whale Tail Pit and IVR Pit) and underground, and ore will be stockpiled then hauled to the approved infrastructure at Meadowbank Mine for milling (Figure 1.2-1). As a result of development, Agnico Eagle is also proposing to further expand the width of the haul road to accommodate traffic and haul truck safety.

FORMAT ANSI E–PORTRAIT





LEGEND

- WATERSHED
- ATTENUATION POND
- LAKE WATER
- OPEN PIT
- HAUL ROAD, LARGE WIDE
- HAUL ROAD, SINGLE LANE
- SERVICE ROAD
- ROAD, SALT PROTECTION
- ROCK PILE
- WATER POND
- PAD
- BUILDING
- SILL

NOTES GÉNÉRALES / GENERAL NOTES

ISSUED FOR PERMITTING
DATE : 2019–05–03

TITRE / TITLE	# DWG

DESSINS EN RÉFÉRENCE / REFERENCE DRAWINGS

REV	DESCRIPTION	DATE	PAR BY

REVISIONS

AMARUQ PROJECT

AGNICO EAGLE

DESSINÉ PAR / DRAWN BY	JOCELYN CRETE	DATE 2019–04–28
VÉRIFIÉ PAR / CHECKED BY	MICHEL GROLEAU	2019–04–30
APPROUVÉ PAR / APPROVED BY		
PROJET NO. / PROJECT NO.	6117	
DATE		

TITRE / TITLE
AGNICO EAGLE – MEADOWBANK DIVISION
AMARUQ MINE PROJECT
005 – SITE PREPARATION
210 GENERAL ARRANGEMENT
AMARUQ MINE SITE ARRANGEMENT – PERMITTING

ÉCHELLE / SCALE: NTS
FICHIER / FILE:

NO. DESSIN / DRAWING NO.: 6117–005–210–001
REVISION: 0
FEUILLE / SHEET: 2 / –

FILE NO.

1.2.1.2 Project Need

With approval of the Whale Tail Pit and Haul Road Project (Approved Project), as a satellite deposit to the Meadowbank Mine, mineable reserves have been extended until 2022. As described in the previous section, the Expansion Project further extends the minable reserves until 2025.

The Kivalliq region of Nunavut offers limited, and usually seasonal, employment opportunities. The population is predominately young with a high level of unemployment. Elders have stated that the young must find jobs in the wage economy as they will not be able to live off the land as Inuit did in the past. Agnico Eagle will continue exploration activities with the objective to extend the LOM beyond 2025. Inuit employment opportunities will be maximized throughout the LOM.

The Government of Nunavut (GN; 2009) describes the vision for Nunavut to the year 2030 and lists an improved standard of living; active, healthy, and happy individuals and families; self-reliant communities with strong Inuit societal values, and recognition for Nunavut's unique culture. Nunavut's economic and social development plans focus on the economic sectors that can provide the most growth and employment potential, without harming the environment. These sectors are mining, tourism (and arts and crafts), and commercial fishing (GN 2009).

As stated in the Approved Project (Agnico Eagle 2016c), the current Meadowbank Mine is an important contributor (through employment income and training opportunities) to the economy of Baker Lake and to the economy of the Kivalliq region, especially to the communities of Arviat and Rankin Inlet. The Expansion Project would mean opportunities for continued employment, as well as forthcoming benefits and revenue stream to Nunavut Tunngavik Incorporated (NTI) and KivIA, from direct taxes paid to governments, personal income tax, and sales tax from employment.

Continued operations of Meadowbank Mill through operations of the Expansion Project will reduce dependence on government, without compromising the health of the people or the land, through the creation of stable private sector employment that will both contribute to a better standard of living for the residents of Kivalliq, as well as reducing dependence on social assistance programs. The continued operation will also contribute to the economic vision of a more self-reliant Nunavut as a key contributor to the future economic well-being of Canada as projected by the Government of Canada (GN 2009).

The continued expansion and extension of the Approved Project will support the vision and contribute to the goals of Inuit Beneficiaries of Nunavut as expressed by NTI and KivIA. Benefits will accrue to Inuit from the Inuit Impact and Benefit Agreement (IIBA), and also from royalties paid to NTI over the extended operating LOM. The IIBA is available publicly on-line at the following website http://aemnunavut.ca/wp-content/uploads/2017/06/Whale-Tail-IIBA2017-06-15-.pdf

The goals and contributions of the Expansion Project are consistent with the Approved Project. For additional information refer to the Approved Project (FEIS Volume 1, Section 1.2.1).

The proposed development of the Expansion Project will be financed by Agnico Eagle from its own operating revenue stream.

1.2.2 Project Components and Activities

The Approved Project facilities already assessed under Project Certificate No. 008 and permitted under Type A Water Licence 2AM-WTP1826 include: a personnel camp (i.e., Main Camp), power plant, heli-pad, maintenance shop, tank farm, a WRSF, an ore stockpiling facility, an attenuation pond, a water and sewage collection and treatment system, haul roads (including haul road from Whale Tail Pit to the Meadowbank Mine), access roads, water management infrastructure (e.g., collection ponds, diversion system, dikes, dams, and culverts), and the Whale Tail Pit.

The general mine site layout of the Expansion Project is provided in Figure 1.2-1. The Expansion Project comparative to the Approved Project FEIS (Agnico Eagle 2016c) is defined in Table 1.1-1. A list of updated drawings is provided in Appendix I.

1.2.2.1 Deposit, Mining Methods, and Production of Whale Tail Pit Approved and Expansion

As approved under the Project Certificate No. 008 and Type A Water Licence 2AM-MEA1526, approximately 8.3 million tonnes (Mt) of ore will be mined from the Whale Tail Pit and processed from 2019 to 2022. The Approved Project mine operations will generate approximately 8.3 Mt of ore, 46.1 Mt of mine waste rock, and 5.6 Mt of overburden soil, with very limited organic material, as shown in Table 1.2-1A.

Table 1.2-1A: Approved Project – Summary of the Approved Project Materials Balance

Year	Ore Mined (t)	Ore Processed (t)	Waste Rock Excavated (t)	Overburden Excavated (t)
2017			461,625	199,454
2018	179,003		1,087,633	1,236,488
2019	2,196,993	1,642,500	17,238,276	4,111,005
2020	3,070,121	3,040,090	27,316,859	71,412
2021	2,833,027	3,596,554		
2022				
2023				
2024				
2025				
2026				
Total	**8,279,144**	**8,279,144**	**46,104,393**	**5,618,359**

The Expansion Project mine operations will generate approximately an additional 15.2 Mt of ore for a total of 23.5Mt, 122 Mt of mine waste rock for a total of 167.8Mt, and 5.7 Mt of overburden soil for a total of 11.3Mt, with very limited organic material (refer to Table 1.2-1B). Approximately an additional 45.8 Mt of non-potentially acid generating (NPAG) waste rock may be used for construction activities for a total of 58.4Mt.

Table 1.2-1B: Expansion Project – Summary of the Expansion Project Materials Balance

Year	Ore Mined (t)	Ore Processed (t)	Waste Rock Excavated (t)	Overburden Excavated (t)
2017				
2018				
2019				
2020			2,384,454	2,875,737
2021	1,082,536	233,331	31,461,155	1,342,271
2022	4,674,860	3,070,030	31,707,096	281,150
2023	3,970,053	3,224,997	31,075,034	1,226,057
2024	4,793,044	3,238,079	24,002,432	
2025	720,634	2,063,214	1,090,886	
2026[a]		3,411,477		
Total	**15,241,127**	**15,241,128**	**121,721,057**	**5,725,215**

a) Assumed balance of ore in stockpile is processed at Meadowbank in 2026.

Table 1.2-1C: Approved and Expansion Project – Updated Summary of Mine Life Materials Balance

Year	Ore Mined (t)	Ore Processed (t)	Waste Rock Excavated (t)	Overburden Excavated (t)
2017	0	0	461,625	199,454
2018	179,003	0	1,087,633	1,236,488
2019	2,196,993	1,642,500	17,238,276	4,111,005
2020	3,070,121	3,040,090	29,701,313	2,947,149
2021	3,915,563	3,829,885	31,461,155	1,342,271
2022	4,674,860	3,070,030	31,707,096	281,150
2023	3,970,053	3,224,997	31,075,034	1,226,057
2024	4,793,044	3,238,079	24,002,432	0
2025	720,634	2,063,214	1,090,886	0
2026[a]		3,411,477	0	0
Total	**23,520,271**	**23,520,272**	**167,825,450**	**11,343,574**

The Whale Tail Pit is an open pit that extends across the northern edge of Whale Tail Lake and IVR is an open pit located northeast of Whale Tail Pit (Figure 1.2-1).

Table 1.2-1D: Whale Tail Open Pit Expansion

Waste Type	Whale Tail Pit Project		Whale Tail Pit Expansion Project		Difference
	Total (t)	Total (%)	Total (t)	Total (%)	Total (t)
Total PAG and/or Moderate to High Arsenic Leachability Waste	33,449,865	56%	109,398,003	54%	75,948,138
Total NPAG and/or Low Arsenic Leachability Waste	12,654,528	21%	58,427,447	29%	45,772,919
Waste Rock Excavated	46,104,393	77%	167,825,450	83%	121,721,057
Total Ore	8,279,144	14%	23,520,271	12%	15,241,127
Total (t)	54,383,537	100%	202,689,296	100%	148,305,759
Total Overburden	5,618,359	9%	11,343,574	6%	5,725,215

The expanded construction upgrades to support the Expansion Project will begin as soon as approval and permits for the Type A Water Licence 2AM-WTP1826 amendment are received (anticipated for mid-2020). The full operational phase for the approved Whale Tail Pit Haul Road and Expansion Project will span from Year 1 (2019) to Year 8 (until 2026). Mining activities at Whale Tail Pit are expected to end in Year 7 (2025) and ore hauling and processing is expected to end during Year 8 (2026). Closure will begin in approximately Year 8 (2026) to Year 24 (2042) after the completion of mining and will include removal of the non-essential site infrastructure and flooding of the mined-out open pits and underground, as well as re-establishment of the natural Whale Tail Lake water level.

Agnico Eagle is committed to active rehabilitation activities including progressive reclamation, such as removal of surface infrastructure, and commencement of pit flooding, and restoration of Whale Tail Lake water levels as approved. Active closure will be consistent with the Approved Project FEIS (Agnico Eagle 2016c) and current Type A Water Licence 2AM-WTP1826. However, open pit reflooding of Whale Tail Pit will be postponed to Year 8. The IVR Pit will be filled with natural runoff and water pumped from Whale Tail Lake (South Basin) and the underground will be flooded. During the closure period the pits and underground have flooded, Whale Tail Lake and IVR Pit water levels are restored, and flooded pit and runoff from the WRSFs are shown to be suitable for uncontrolled release.

Consistent with the Approved Project, the pit design and geotechnical stability for the Expansion Project operations will be monitored using the same best practices currently applied at the approved Whale Tail Pit operations and Meadowbank Mine. The geological setting of the ore body is important for open pit slope design and underground mine development. The Whale Tail Pit expansion considered comments received from interested parties during the technical review phase for the Approved Project. Agnico Eagle will use the same equipment currently in use at Whale Tail Pit operations. Project design considerations are discussed in Section 1.3 of the Main Application Document.

Common and well-known underground mining methods will be used by Agnico Eagle, mainly, long hole mining (95%) with some mechanise cut and fill in flat areas. The configuration will be a mix of transverse and longitudinal stoping. The underground mine will use a ramp as the main connection to surface for haulage of ore. Truck and scoop equipment will be used for ore extraction. Stopes will be filled with cemented rock fill and rock fill.

The main lithologies encountered at the Project are summarized in Section 5 of the Expansion Project FEIS Addendum (Agnico Eagle, 2018), Appendix 5-E. As outlined in the FEIS (Agnico Eagle 2016c), there are some rock types, specifically intermediate intrusive and southern greywacke waste rock (during early mine development) from the Whale Tail Pit that are suitable for construction. There is no acid rock drainage (ARD) or metal leaching (ML) concern from the esker material tested; indicating that this material can be used for road construction. The report titled Evaluation of the Geochemical Properties of Waste Rock, Ore, Tailing, Overburden and Sediment from the Whale Tail Pit and Road Aggregate Materials (Volume 5, Appendix 5-E) provides detailed assessment of geochemical properties for the Expansion Project. Segregation of waste rock will be important to the operation and closure of the Project and is outlined in the addendum to the approved Operational ARD/ML Sampling and Testing Plan enclosed with this application.

Explosives management and blasting practices will be consistent with practices in place for the Approved Project. Refer to the Ammonia Management Plan enclosed with this application for additional details. For additional information on explosives production and storage, refer to Section 1.2.10 of the Main Application Document.

1.2.2.2 Processed Ore Containment (and Tailings Storage Facility)

Ore from the Whale Tail Pit, IVR Pit, and underground will be segregated by grade and temporarily stored in one of four primary stockpiles at the Whale Tail Pit site (Figure 1.2-1), before being transported to the Meadowbank Mine for milling. Ore will primarily be stockpiled adjacent to the Whale Tail Pit (No.1 & 4), the additional stockpiles (No. 2 and 3) are proposed to facilitate blending of ore types. Agnico Eagle would like to reiterate that our intent is to store ore efficiently and with minimal impact to the environment.

Excavated ore material will be hauled to the ore stockpile facilities, or if needed to the crushing facility using mine trucks. Material that needs to be crushed will either be dumped into a chute, which feeds the jaw crusher, or dumped on the ground and then dumped into the chute using a wheel loader. The throughput for the crusher will be approximately 9,000 to 12,000 t/day. Refer to the Approved Project FEIS Volume 1, Appendix 1-C (Agnico Eagle 2016c) for the conceptual layout of the crushing facility.

Consistent with the Approved Project, Agnico Eagle proposes to process the ore resulting from the expansion at the existing Meadowbank Mine and dispose of the tailings in the approved TSF, authorized under Project Certificate No. 004 and Type A Water Licence 2AM-MEA1526. The mill rate is not expected to change and remain on average 9,000 t/day and up to a peak mill throughput of

12,000 t/day (which is the current rate capacity at Meadowbank Mill). Agnico Eagle is planning the deposition of the Whale Tail tailings inside the Portage and Goose pits once approval is received. Agnico Eagle will review the plan as required by changes in operation and/or technology and modify the Plans accordingly in the form of an addendum to be included in the Annual Report.

1.2.3 Overburden and Waste Rock Disposal

The Expansion Project will include Whale Tail Pit, IVR Pit, and underground operations that will extract a total of 121.7 Mt of waste rock plus approximately 5.7 Mt of overburden (see Table 1.2-1B). Approximately 45.8 Mt of waste rock available for construction activities such as roads, pads, WRSF thermal cover and water management facilities (i.e., dike, berm, rip rap, etc.). The remaining waste rock and overburden material will be hauled to the WRSFs, as shown on Figure 1.2-1. The approved Whale Tail WRSF will continue to be used for the Expansion Project. The Whale Tail WRSF is proposed to be expanded vertically and horizontally to the southeast to accommodate an additional capacity required by the Expansion Project. In addition, waste rock and overburden generated from IVR Pit is proposed to be stored in the new IVR WRSF, and the currently approved underground WRSF (Licence No. 2BB-MEA1828) will be expanded to the north to accommodate additional waste rock approximately 2.2 Mt from the underground operations. Underground waste rock pile will be completely reclaimed at the end of operation and used at backfill material for the Underground mine operation. A second, temporary overburden storage facility for staging purposes is located west of Whale Tail Lake (Figure 1.2-1).

Waste rock stored in the Underground WRSF will be returned underground as backfill, with no waste rock remaining on surface at the end of mine life.

A summary of the geochemical properties of the overburden and waste rock including a summary of waste rock management including use of construction material is provided in the Whale Tail Pit Waste Rock Management Plan enclosed with this application and detailed geochemical properties are presented in Volume 5 of the Expansion Project FEIS Addendum (Agnico Eagle, 2018), Appendix 5-E. Thermal encapsulation of the potentially acid generating (PAG) and ML rocks was selected as the reclamation strategy to verify long-term stability of the waste rock storage facilities.

Overburden will mainly be produced during the construction phase (i.e., stripping of the Whale Tail Pit and IVR Pit) of the Project. Waste rock will be produced during both construction and operations. Waste rock and overburden will be co-disposed together in one of the piles constituting the storage facility.

The approved Whale Tail WRSF design has been approved by the NWB as a 60 day notice on December 20, 2018. Similar design parameters are proposed for the IVR WRSF.

Freshwater to support the Meadowbank Mill, TSF, and Meadowbank Camp is authorized under the existing Type A Water Licence 2AM-MEA1526.

An updated summary of freshwater source requirements is provided in Table 1.2-2.

The current NWB Water Licence (i.e. 2AM-WTP1826) provides for a maximum quantity of water use not to be exceeded at 240,000 m^3 annually during construction and operation. As well as 10,655,000 m^3 annually during closure.

Table 1.2-2: Summary of Freshwater Source Requirements

Water Use	Construction (2018)			Operations (2019 - 2025)			Closure (2026 – 2042)			Total for All Phases
	Daily	Annual	Total Construction	Daily	Annual	Total Operations	Daily	Annual	Total Closure	
	(m^3/d)	(m^3/yr)	(m^3)	(m^3/d)	(m^3/yr)	(m^3)	(m^3/d)	(m^3/yr)	(m^3)	(m^3)
Whale Tail Lake (North Basin)										
Dewatering (dewatering North Basin to South Basin)	38,400	3,172,810	3,172,810	-	-	-	-	-	-	**3,172,810**
Whale Tail Lake (South Basin)										
Camp Use	78	18,905	18,905	-	-	-	12	4,380	73,095	92,000
Truck Shop	103	25,053	25,053	-	-	-	-	-	-	25,053
Drilling Water - Pits	24 - 48	7,668	7,668	-	-	-	-	-	-	7,668
Transfer/Reflooding Whale Tail Pit - (Whale Tail South Basin to Open Pit and Whale Tail North)	-	-	-	-	-	-	-	8,280,000[(a)]	55,505,966	55,505,966
Total Whale Tail Lake (South Basin)	*205 - 229*	51,626	51,626	-	-	-	12	8,284,380	55,579,061	55,630,687
Nemo Lake										
Camp Use	78	21,239	21,239	78	28,397	187,187	-	-	-	208,426
Truck Shop	103	28,146	28,146	103	37,657	248,059	-	-	-	276,205
Drilling Water - Pits	24 - 48	9,120	9,120	36-96	17,197 - 35,064	211,597	-	-	-	220,717
Makeup Water Underground	4 – 10	826	826	-	-	-	-	-	-	826
Cement Mixing	-	-	-	24 - 65	8,766 - 23,741	80,769	-	-	-	80,769
Industrial/Miscellaneous – dust suppression	-	45,750	45,750	-	45,750	274,500	-	45,750	732,000	1,052,250

Water Use	Construction (2018)			Operations (2019 - 2025)			Closure (2026 – 2042)			Total for All Phases
	Daily	Annual	Total Construction	Daily	Annual	Total Operations	Daily	Annual	Total Closure	
	(m^3/d)	(m^3/yr)	(m^3)	(m^3/d)	(m^3/yr)	(m^3)	(m^3/d)	(m^3/yr)	(m^3)	(m^3)
Total Nemo Lake	*209 - 239*	*105,081*	*105,081*	*2341 - 342*	*137,767 - 170,609*	*1,002,112*	-	*45,750*	*732,000*	***1,839,193***
Mammoth Lake										
Explosives Mixing	-	2,500*	2,500	-	2,500*	15,000	-	2,500*	40,000	**57,500**
Lake A53										
Dewatering (dewatering Lake A53 to Whale Tail Lake [South Basin])	-	-	-	-	153,735	153,735	-	-	-	**153,735**
Other - Small Lakes/Ponds proximal to drilling sites										
Operational Geological Drilling	-	-	-	299	109,135	-	-	-	-	-
Total for Project										
Total for Project	-	-	3,332,017	-	-	1,170,847	-	-	56,351,061	**60,853,925**

* Licence maximum value approved prevails over value provided in NWB decision (NWB 2018)

a) max volume for first year of closure at 10, 655,000 m^3 and 4,500,000 m^3annually thereafter (NWB Decision 2018)

1.2.4 Freshwater Requirements

Currently, the Whale Tail Camp operations has a water treatment plant for potable (domestic) water. The design flow rate for the potable water for the main camp and accommodations (i.e., kitchen, laundry) is 84 cubic metres per day (m^3/day), based on a 400 people camp capacity and a nominal consumption of 240 litres (L)/day/person from Nemo Lake. Agnico Eagle suggests with a projected increase in on-site staff in 2020 to 544 people for the Expansion Project, the existing authorized volumes from Nemo Lake are adequate. Detailed plant operation specifications were provided in the Approved Project (FEIS Volume 1, Section 1. 2.4.1).

Freshwater and potable water use will extend for operations until 2025 and additional freshwater will be required from Whale Tail Lake at closure.

1.2.4.1 Freshwater Source and Capacity

The freshwater intake locations approved under 2AM-WTP1826 are shown in Figure 1.2-1.

Nemo Lake

The Nemo Lake catchment has a total area of 17.6 km^2 (including 14.4 km^2 of land surface area and 3.24 km^2 lake catchment surface area). The average outflow rates for baseline at the outlet of Nemo Lake are 0.05 cubic metres per second (m^3/s) for June, 0.02 m^3/s for August, and 0.01 m^3/s for September (Volume 6, Appendix 6-C).

Whale Tail Lake (South Basin)

The Whale Tail Lake catchment has a total area of 28.1 km^2, of which 3.9 km^2 (i.e., north of the Whale Tail Dike) will be diverted as part of operations. The average outflow rates for baseline at the outlet of Whale Tail Lake are 4.23 m^3/s for June, 0.19 m^3/s for August, and 0.01 m^3/s for September (Volume 6 of Expansion Project FEIS Addendum (Agnico Eagle 2018), Appendix 6-C).

1.2.4.2 Freshwater Infrastructure

Intakes, Pump Houses, Pipeline, Storage Tanks and Potable Water Treatment

Agnico Eagle proposes installation of an additional intake in Mammoth Lake to support emulsion plant operations. The use of water for explosives mixing is already authorized under the current water licence with source to be amended to Mammoth Lake. Location as shown on Figure 1.2-1. Intake will be constructed consistent with the intake installed at Nemo Lake. Final design and construction drawings will be provided to the NWB for review 60 days prior to construction.

1.2.5 Water Management

In support of the Expansion Project, Agnico Eagle has prepared a fully revised addendum to the Whale Tail Pit Water Management Plan and is attached to this application.

The main objectives pertaining to water management are to minimize the flow of surface water runoff in the pit and to limit the impact on the receiving environment. In developing the water management plan, the following principles were followed:

- keep the different water types separated as much as possible;
- control and minimize contact water through diversion and containment;
- minimize freshwater consumption by recycling and reusing the contact and process water wherever feasible; and
- meet discharge criteria before any site contact water is released to the downstream environment.

Consistent with the Approved Project, the preferred site water management options were selected based on four aspects: society, environment, economy, and engineering and viability. Refer to Section 1.9.6 of the Main Application Document. The selected option consists of isolating the pit area located in Whale Tail Lake with two dikes (Whale Tail Dike and Mammoth Dike) and diverting Whale Tail Lake (South Basin) to Mammoth Lake.

1.2.5.1 Water Management Infrastructure

The Expansion Project will include construction and operations of water management infrastructure, either consistent with, or in addition to Type A approved infrastructure and water management as described in Table 1.1-1.

Design criteria with required design drawings for the expansion project related to water management control structures are provided in the Water Management Plan enclosed with this application (Appendix G.5). Prior to construction detailed design drawings will be submitted to the NWB in accordance with the current Type A Water Licence 2AM-WTP1826. Any refinements to the Water Management Plan will be submitted to the NWB annually as required by the current water licence. The discharge diffusers at Whale Tail Lake (South Basin) will be similar to the diffuser designed and authorized for Mammoth Lake discharge and authorized under the current Type A Water Licence.

The water management infrastructure required for the haul road (i.e., bridges and culverts) have already been assessed and constructed under existing authorization. If necessary, to support access road development, additional authorizations may be required for the proposed expansion.

1.2.5.2 Effluent Treatment

Any water requiring treatment will be pumped to the water treatment plant(s) prior to discharge through the diffuser in Mammoth Lake or through diffusers in Whale Tail Lake (South Basin) or other alternatives.

Agnico Eagle is committed to maintaining discharge criteria according to the Type A Water Licence 2AM-WTP1826. Conceptual design and modelling results for the Expansion Project for alternative discharge locations are included in the Water Management Plan (Appendix G.5). Preliminary baseline data collection was completed in 2018 on two alternative locations for effluent discharge identified by Agnico Eagle. Both lakes have been assessed qualitatively and included in the FEIS Addendum. Additional alternatives under consideration by Agnico Eagle are outlined in Section 1.9.6 of the FEIS Addendum.

1.2.5.3 Dewatering

As per Type A Water Licence 2AM-WTP1826, Agnico Eagle has completed the construction of the dike and the fish out in March 2019 and November 2018 respectively. The proposed expansion of the Whale Tail Pit Project has not changed the dewatering of the Whale Tail Lake (North Basin); however, small waterbodies and ponds within the footprint of the IVR Pit and Lake A53 (IVR Attenuation Pond) could require approvals under the *Fisheries Act* for fishouts and dewatering during the open water season of 2020 to 2022. Dewatering for the Expansion Project where applicable is planned for release entirely through Whale Tail Lake (South Basin).

1.2.5.4 Re-Filling

Following completion of mining, the underground mine, Whale Tail Pit, and IVR Pit, will be filled with a combination of natural runoff and contact water from the site (e.g., Groundwater ponds), and water pumped from Whale Tail Lake (South Basin). During the spring of the 2026, the water accumulated in Whale Tail Lake (South Basin) during operations will be pumped into the underground mine until it is filled and into the IVR Pit thereafter. Refilling of Whale Tail Lake (North Basin) will occur from 2026 to 2042. As part of the Whale Tail Project Fisheries Offsetting, for the Approved Project, a sill will be constructed to increase the final flooded water level from the baseline elevation of 152.5 by 1 m to 153.5 masl. The Whale Tail Dike and Mammoth Dike will then be decommissioned when the water quality monitoring results meet discharge criteria to allow water to passively flow to the natural environment.

1.2.6 Marine Area

The Approved Project relies on marine transportation for most of its supplies including fuel, construction and operation equipment, materials and consumables, including dangerous goods, food, household goods, and other non-perishable supplies. Consistent with approved operations, materials will be transported to Baker Lake via barge and will either be directly transported to Meadowbank Mine and/or the Whale Tail Pit site or temporarily held in the Baker Lake marshalling area.

Fuel is supplied to Baker Lake by marine fuel tankers at an annual volume of 96.8 million L (95 million L of ULSD and 1.8 million L of Jet A). The fuel is transported by ocean-going tankers to a fuel transfer (lightering) site located near Helicopter Island, Nunavut. Once the fuel tankers are securely anchored, fuel is transferred to either tug-assisted fuel barges or smaller shuttle tankers. The fuel barges / shuttle tankers then transport the fuel shipment through Chesterfield Narrows to Baker Lake. Fuel shipping is provided by Petro-Nav a subsidiary of Groupe Desgagnes.

Agnico Eagle does not forecast changes to the existing transportation requirements related to the marine environment; in other words, no additional ship trips are expected to be added by the Expansion Project as compared to the level of shipping currently required to re-supply the Meadowbank Mine and Whale Tail Pit Approved Project on an annual basis. The proposed marine activity will simply be extended to 2025 for mining operations.

1.2.7 Haul Roads, All-Weather Road, Borrow Pits and Quarry Sites

No changes are proposed for the Meadowbank AWAR to Baker Lake.

To support the Expansion Project, Agnico Eagle proposes to update the haul road from 9.5 m width to 15 m width to ensure safe passage of haul trucks. Efficiency of traffic movement on the haul road is dictated by safety. In 2018, Agnico Eagle conducted an assessment which included field trials with the long haul trucks to determine optimal safety, efficiency, and production of hauling from Whale Tail Pit site. It has been determined that a 15 m road width would allow long haul trucks to pass each other safely, which a 9.5 m road width does not allow. Furthermore, during wintertime, snow tends to pile up on one side of the road and, as such, the proposed expansion will improve driving conditions.

No additional changes from FEIS (Agnico Eagle 2016c) are proposed related to site access. The expanded road will be constructed using waste rock or aggregates from quarry and esker sites, and top-dressed with esker or quarry material. Materials will be obtained from already permitted and leased quarry and esker sites, as well as four new quarry/esker sites. Refer to Quarry Site Location Plan Main Application Document, Figure 1-B-1. Table 1.2-3 provides a summary of quarries/eskers to be used for the expansion of the haul road. Typical cross-sections of the upgraded road based on underlying ground conditions are provided in Appendix J.

Table 1.2-3: Quarries/Eskers for the Expansion of the Haul Road

Quarry / Esker	Status	Quarry / Esker	Status
Vault	Approved	Km 34.9	Expansion proposed
Km 2.5	New location	Esker 3	Approved
Km 8	New location	Km 40.4	New location
Km 10.5	Approved	Km 50.6	Approved
Esker 1 / Quarry 17	Approved	Km 52	Approved
Esker 2 (ABC)	Approved	Km 53	New location
Km 26.5	Expansion proposed	Eskers 4 to 7	Approved
Km 30.5	Approved		

The haul road traffic volumes for the Expansion Project are consistent with those applied to the Approved Project FEIS Volume 4, Appendix 4-B, Table 4-B-15 (Agnico Eagle 2016c). Agnico Eagle assumed that long haul trucks "daily vehicle passages" on the haul road would be 154 trips per day on average and up to 173 trips per day. The upper limit number has not changed for the Expansion Project, as it is based on a maximum throughput at the mill.

Refer to the Whale Tail Pit Haul Road Management Plan enclosed with this Application (Appendix G.9).

1.2.8 Maintenance, Warehouse, and Laydown

Primary maintenance will occur using existing infrastructure at Meadowbank Mine. For light maintenance the industrial site adjacent to the Whale Tail Pit will include one maintenance shop for mine equipment and one for haul trucks. Agnico Eagle may also include a wash bay, a machine shop, and a welding shop. The concrete foundation will be designed according to the type of bay (e.g., for a wash bay, drains in the foundation will be designed for used water with a sump for an oil separator).

1.2.9 Airport Facilities

In the Approved Project FEIS, Agnico Eagle initially proposed to progressively reclaim the small airstrip at the exploration site with surface material to be reused as construction material for the proposed infrastructure at the Whale Tail site. Upon further project optimization, Agnico Eagle decided to use the existing airstrip as a construction access road for Whale Tail Dike. A section of the expanded haul road near the Whale Tail Pit site will be used as an airstrip during the operation of the expansion.

1.2.10 Explosives Production and Storage Sites

Consistent with the Approved Project, the existing emulsion plant located near the Meadowbank Mine will be maintained with deliveries on an as needed basis during operations. The haul road will be used to truck explosives between the Meadowbank Mine and the Whale Tail site, with a minimum amount of explosives to be stored at the Whale Tail site. An emulsion storage facility and plant will continue to be used at the Whale Tail Pit project. The location of general infrastructure for the management of explosives at the Whale Tail site are shown on Figure 1.2-1. Agnico Eagle will confirm compliance with legislative requirements for siting explosive storage facilities should a decision be made to relocate the facility. Any potential storage site will be located within the local study areas assessed in the FEIS Addendum.

Consistent with the Approved Project, the explosives storage facilities will be safely located away from vulnerable facilities, as stipulated by the federal and territorial *Explosives Use Act* and *Regulations*. The minimum setback distances between the proposed explosives storage facilities and the other mine site facilities will be governed by the *Quantity-Distance Principles User's Manual,* as published by the Explosives Branch of Natural Resources Canada. Use of these setback distances will ensure that the location of these proposed facilities meet all federal and territorial regulations regarding safe siting of such facilities.

For additional information on the supply, storage, and handling of explosives refer to the Ammonia Management Plan (Appendix G.10).

1.2.11 Fuel Storage Sites

Consistent with the existing Type A Water Licence 2AM-WTP1826 and the Approved Project FEIS, the Expansion Project will require the use of fuel (P-50 Fuel Diesel ULSD-43). Fuel usage between the Meadowbank Mill and operations at the Whale Tail site is projected to be approximately 96.8 million L/year. The Whale Tail Bulk Fuel Storage Facility will be located east of the Whale Tail Camp adjacent to the mine operations haul road (Figure 1.2-1).

Agnico Eagle has approval to store 500,000 L of diesel fuel under Type A Water Licence 2AM-WTP1826 to support open pit activities under the Approved Project and 1,900,000 L of diesel fuel under Water Licence 2BB-MEA1828 to support underground development and exploration activities. Under Type A Licence 2AM-WTP1826, Agnico Eagle adjusted the size of the fuel tank to one 1,500,000 L tank under the existing water licence to support open pit activities for the Approved Project. To support underground mining activities, as part of the Expansion Project, Agnico Eagle is proposing to add:

- one above ground storage tank with approximately 500,000 L capacity within the vicinity of the current Whale Tail Pit Fuel Farm; and
- 700,000 L storage capacity between five key storage locations illustrated in Figure 1.2-1.

In total, the proposed fuel storage capacity required for the Approved Project and the Expansion Project is a total of 3.325 ML. The bulk fuel tank will be re-filled by a fuel truck on a regular basis throughout the year.

The approved fuel storage facilities at Whale Tail Pit, Meadowbank Mine, and following upgrades currently under consideration of Type A Water Licence (2AM-MEA1826, to support current operational needs associated with the Approved Project), the Baker Lake marshalling area will not change as a result of the Expansion Project.

For additional information refer to the Meadowbank and Whale Tail Bulk Fuel Storage Facilities: Environmental Performance Monitoring Plan enclosed with this application (Appendix G.11).

1.2.12 Waste (Domestic and Hazardous) Management

Agnico Eagle proposes to add an incinerator, a composter and a landfarm on site, to reduce traffic on the Whale Tail Pit Haul Road and to improve waste and contaminated soil management. Reduced traffic will result in less interactions with caribou and safer road conditions.

Hazardous Waste

Agnico Eagle does not propose changes to the approved handling and disposal of hazardous waste. Hazardous material management will be implemented in accordance with the Hazardous Material Management Plan: Meadowbank Mine Site, Whale Tail Pit Site, Baker Lake Facilities enclosed with this application (Appendix G.13).

Domestic Landfill Waste

Construction debris and domestic waste generated on-site will be disposed of in an on-site landfill to be located in the Whale Tail WRSF. The total capacity of this landfill is to be 59,000 m^3 approved under Type A Water Licence 2AM-WTP1826. Agnico Eagle will implement landfill management in accordance with the Landfill and Waste Management Plan enclosed with this application (Appendix G.4).

Incineration

Agnico Eagle is proposing an incinerator on-site for the Expansion Project.

Further details are provided in the Incinerator and Composter Management Plan enclosed with this application (Appendix G.8).

Composting

Agnico Eagle is proposing a composter on-site for the Expansion Project. The composter will be at the same location as the incinerator. The objective of the composter is to reduce the amount of waste incinerated (i.e., reduce fuel consumption – reduce greenhouse gases [GHG] emissions).

Weekly organic matter quantities will consist of the following:

Further details are provided in the Incinerator and Composter Management Plan enclosed with this application (Appendix G.8).

Sewage

Agnico Eagle is proposing to increase sewage treatment facilities capacity from 350 to 544 people to accommodate the Expansion Project activities. Further details are provided in the Whale Tail Operation & Maintenance Manual - Sewage Treatment Plant enclosed with this application (Appendix G.21). As stipulated in Part B, Item 17, Agnico Eagle will review the Plans as required by changes in operation and/or technology and modify the Plans accordingly in the form of an addendum to be included in the Annual Report.

Hydrocarbon Contaminated Waste

As the Project advances, Agnico Eagle foresees the need to optimize project operations with construction and operation of an on-site landfarm facility to treat and manage potential hydrocarbon contaminated soils. The proposed location of the facility is provided in Figure 1.2-1.

A Landfarm Design and Management plan in support of Project operations has been included in this application (Appendix G.7).

1.2.13 Power

Power requirements to support the project were assessed as part of the Approved Project. Additional power is required as part of the Expansion Project to meet underground needs. For additional information refer to the Expansion Project FEIS Addendum Volume 4, Appendix 4-B Air Emissions Inventory.

1.3 Project Design

Agnico Eagle continues to conduct feasibility and design studies with both the cold northern climate and remote location as the principal engineering considerations for successful design, construction, and operations. Consistent with Approved Project FEIS, the Expansion Project was designed to minimize the areas of surface disturbance, stabilize disturbed land surfaces against erosion, and return the land to a post-mining use for traditional pursuits and wildlife habitat. This will mainly be achieved by rapidly dewatering during the open water season, mining the pits as efficiently as possible, and then refilling as early as possible during closure.

1.4 Pace, Scale, and Timing of Project

As stated in Section 1.2.1 of the Main Application Document, Meadowbank Mine was scheduled to exhaust its mineable reserves by Q1 of 2019. With the recent NIRB approval and Type A Water Licence approval for development of the Whale Tail Project, mineable reserves to supplement Meadowbank Mine have been extended to 2022, with the expansion project further extending mineable reserves until 2025. Agnico Eagle will continue exploration activities with the objective to extend Mine life beyond 2025.

As described in the Main Application Document, by extending the LOM at Meadowbank, Agnico Eagle will progressively close portions of the Meadowbank Mine while operating. Refer to Approved Project FEIS Volume 1, Section 1.4 for additional information.

The development sequence for the mine infrastructure and water management infrastructure is summarized in Table 1.4-1.

Table 1.4-1: Mine Development Sequence and Key Activities

		Construction[1]	Operations[2]							Closure[3]									Post-closure[4]
		-1	1	2	3	4	5	6	7	8	9	10	11-19	20	21	22	23	24	24
		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029-2037	2038	2039	2040	2041	Q1-Q3 2042	Q4 2042
Water Management Infrastructure	**Status[5]**																		
Groundwater Storage Pond 1 (GSP-1)	Approved																		
Groundwater Storage Pond 2 (GSP-2)	New																		
Groundwater Storage Pond 3 (GSP-3)	New (Optional)																		
Water Intake in Nemo Lake and Freshwater Pump Station	Approved																		
Whale Tail Attenuation Pond Pump Station	Approved			8															
IVR Attenuation Pond Pump Station	New																		
Whale Tail WRSF Dike	Approved*																		
WRSF Pond	Approved																		
Whale Tail Dike	Approved																		
Mammoth Dike	Approved																		
Northeast Dike	Approved			7															
Whale Tail Dike Seepage Pump Station	New																		
South Whale Tail Diversion System	Approved																		
Whale Tail WRSF Contact Water Collection System	Approved																		
IVR WRSF Contact Water Collection System	New																		
East Channel	Approved																		
IVR Diversion	New																		
IVR Attenuation Pond	New																		
Underground Water Management System	New																		
Water/Effluent Treatment																			
Freshwater Treatment Plant (Potable)	Approved																		
Sewage Treatment Plant	Approved																		
Construction Water Treatment Plant	Approved																		
Operation Water Treatment Plant	Approved																		
Mammoth Lake Diffuser	Approved																		
Whale Tail South Basin Diffuser	New																		
Whale Tail South Basin Dike Seepage Diffuser	New (Alternative)																		
Unnamed Alternate Diffuser (Lake D1 or D5)	New																		
TDS Treatment	New																		
Mining																			
Underground Mining[6]	New																		
Whale Tail Pit	Approved																		
Whale Tail Pit Expansion	New																		
IVR Pit	New																		
Waste Rock																			
Whale Tail Waste Rock Storage Facility	Approved*																		
Overburden Storage Pad	Approved																		
NPAG WRSF	Approved																		
Whale Tail Ore Stockpiles	Approved																		
Underground Ore Stockpiles	New																		
Underground WRSF	Approved																		
Ore Stockpile (No.4)	New																		

		Construction[1]	Operations[2]							Closure[3]									Post-closure[4]
		-1	1	2	3	4	5	6	7	8	9	10	11-19	20	21	22	23	24	24
		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029-2037	2038	2039	2040	2041	Q1-Q3 2042	Q4 2042
IVR Waste Rock Storage Facility	New																		
Dewatering																			
Fish Out - Whale Tail North Basin	Approved																		
Dewatering of Whale Tail Lake North Basin	Approved																		
Dewatering of A47 and A49 Lakes	New																		
Fish Out – A53 Lake	New																		
Dewatering of A53 Lake	New																		
Re-Filling/Flooding																			
Re-Filling/Flooding Whale Tail Pit	Approved																		
Flooding of Whale Tail (South Basin)	Approved																		
Re-Filling/Flooding Underground	New																		
Re-Filling/Flooding IVR	New																		
Re-Filling/Flooding Whale Tail (North Basin)	Approved																		
Reconnection North Basin and South Basin of Whale Tail Lake	Approved																		
Associated Infrastructure																			
Industrial Pad Development and associated buildings (camp, maintenance shop, communication towers, etc.)	Approved									9									
Widening Haul Road (9.5 m)	Approved																		
Widening Haul Road (15 m)	New																		
Additional Haul Road Quarries and Eskers	New									9									
Site access roads	Approved									9									
Explosives Magazines	Approved									9									
Landfill	Approved									9									
Landfarm	New									9									
Incinerator	New									9									
Composter	New									9									

1. Construction: Approved Project - 2018 to 2019
2. Operations: Approved Project - 2019 to 2022; Expansion 2020 to 2025
3. Closure: Approved Project - 2023 to 2029; Expansion - 2026 to 2042; pits fully flooded in 2042
4. Post-closure: Approved Project - 2030 to 2033; Expansion – Q4 2042
5. Status reflects "Approved" infrastructure already assessed and permitted under Project Certificate (No. 008) and Type A Water licence 2AM-WTP1826 or other permit or authorization, and "New" infrastructure associated with proposed Expansion Project
6. Underground Mining - initial ramp development authorized under 2BB-MEA1828
7. Northeast Dike required for development of Whale Tail Dike. However dismantling of facility to support expansion will occur sooner than originally projected.
8. The approved project considered treated discharge to Mammoth Lake during open water season only; The expansion proposed addition of winter discharge to Mammoth Lake
* Infrastructure approved, however, needs to remain in place longer than originally proposed due to the expansion and delaying of the closure of the facility
9. Final active closure timelines to be determined in Final Closure and Reclamation Planning process.
Green line = start of Expansion Project; Red dashed line = end of Approved Project operations phase

1.5 Adaptive Management and Precautionary Principle

As with all Meadowbank operations (i.e., Meadowbank Mine, Whale Tail Pit, ongoing exploration, and the proposed expansion), making good use of adaptive management requires the recognition that it is a structured, iterative approach to environmental management decision making (CPR 2011). Many VCs applicable to the Project are part of dynamic natural and socio-economic systems where uncertainty can be a significant factor. The goal is to reduce uncertainty over time by incorporating learnings from design, monitoring, mitigation, and changes in operations into environmental management at the proposed mine site. Where applicable, an adaptive management strategy or approach will be used for those VCs that will be monitored by Agnico Eagle.

Agnico Eagle has taken steps to integrate its sustainable development program into all aspects of its business through the development and implementation of an internal Health, Safety, Environment and Community Relations Management System, that is structured within the RMMS. Trends are compiled, followed, and analyzed in the RMMS and compared to the pre-established goals/thresholds. Any action plan and corrective actions to be taken are documented through the RMMS. For additional information related to Agnico Eagles adaptive management system and precautionary approach, refer to Approved Project FEIS Volume 1, Section 1.6 (Agnico Eagle 2016c).

As part of the Expansion Project, the followings are adaptive management strategies that have been evaluated:

- Most appropriate location to store additional surface water. A Multiple Accounts Analysis was completed and Lake A53 was selected to become the IVR Attenuation Pond;
- Addition of alternative discharge locations such as D1 and D5 lakes (which Agnico Eagle requests for inclusion in the licence in order to provide the option of these alternative discharge locations in future). Alternative discharge locations being considered are presented in Figure 1.5-1;
- Groundwater Storage Pond 3 (GSP-3) was added as a contingency should GSP-1 and GSP-2 be not sufficient;
- Water treatment. Reverse Osmosis and Saltmaker technologies were looked at. Evaluation will be continued to find the best available technology.

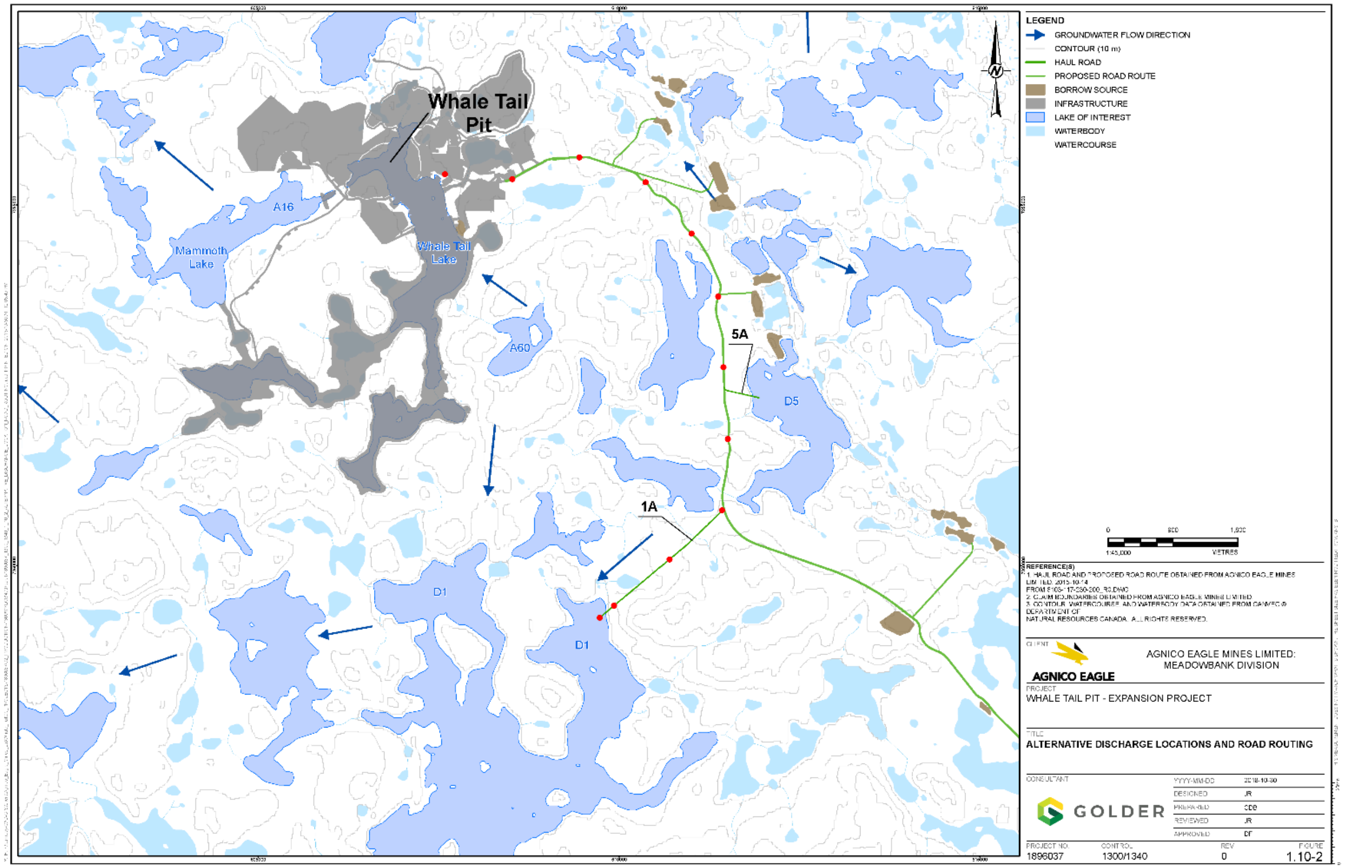


Figure 1.5-1: Alternative Discharge Locations and Route Routing

1.6 Performance Measurement and Monitoring

The Expansion Project is an extension of mining operations for the Approved Project (i.e., mining of the Whale Tail Pit orebody) that has existing waste and water management facilities and associated management plans that are approved by the NWB under Type A Water Licence 2AM-WTP1826. The existing management, monitoring, and mitigation will focus on ensuring impacts to waste and water, are consistent with those predicted for the Approved Project. The accuracy of the environmental impact predictions and the effectiveness of the mitigation measures will be verified through monitoring and annual reporting.

As indicated in the Approved Project FEIS Volume 1, Section 1.7 (Agnico Eagle 2016c), as part of the Mining Association of Canada, Agnico Eagle reports its global performance through its annual Corporate Social Responsibility report.

Regulatory requirements and targets are identified in each of the management plans required under the Project Certificate, Water Licence or any other permit, licence or authorization, as appropriate. Corrective actions will be triggered when those thresholds are reached. The RMMS will link the thresholds to appropriate corrective actions and establish accountability.

The performance of the management plans will be monitored periodically and the results communicated. Independent researchers or consultants may be engaged to review performance where necessary. The accuracy of the environmental impact predictions and the effectiveness of the mitigation measures will be verified through that process. If unusual or unforeseen adverse environmental impacts are noticed, corrective action will be put in place. Through the adaptive management process, the existing mitigation measures will be adjusted, or new mitigation measures implemented if necessary. External reporting will be completed, as required in accordance with Annual reporting requirements under the Project Certificate and/or Type A Water Licence.

For the purposes of the Expansion Project NIRB reconsideration and review process, Agnico Eagle has provided new or updated plans.

As previously stated, the Expansion Project is an extension of mining operations for the Approved Project; therefore, many of the monitoring and mitigation plans are “operational” plans in place for the Whale Tail Pit Project. By title, Agnico Eagle has indicated that these plans are intended for the NWB assessment.

These plans are living documents which will evolve as the approved and expanded project proceeds and will be updated to reflect changes in operation, technology, and direction or requests made by the NWB and subsequent approvals for the project.

The _NWB plans have been submitted for the purposes of the NWB Water Licence amendment. Final plans that are in accordance with amended or approved authorizations and licenses will be provided to the regulators as directed and will incorporate operational changes, review comments, intervener recommendations, and commitments made by Agnico Eagle for the Expansion Project.

1.7 Potential Future Developments

Agnico Eagle will continue exploration activities with the objective to extend Whale Tail Project mine life beyond 2025.

The development of Whale Tail Pit as currently approved and the Expansion Project represents a portion of the mineralization identified for the Whale Tail zone. The 408 km^2 Amaruq property has potential for future development (Figure 1.7-1 and Figure 1.7-2) as:

- Underground mining of the Whale Tail ore body;
- Mammoth intersect potential underground and/or open pit;
- Buffalo Pit;
- IVR Push Back (towards IVR WRSF) and underground.

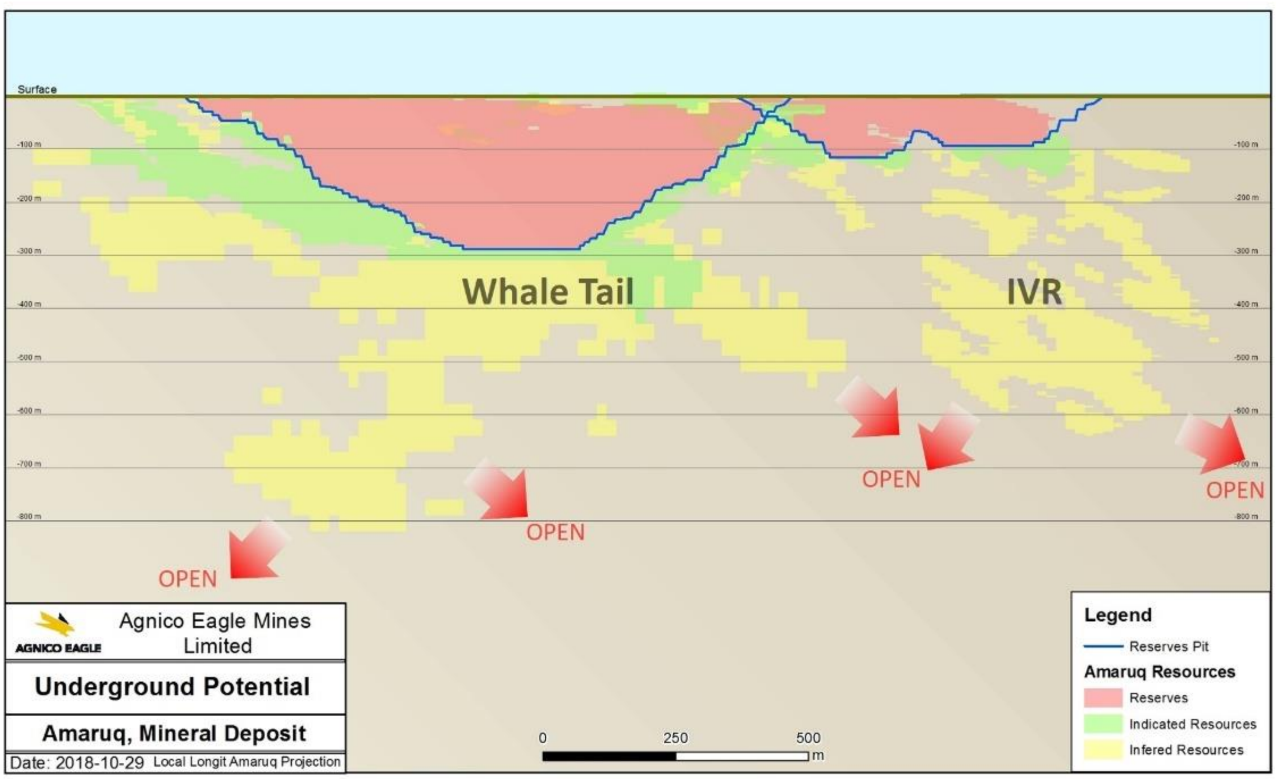


Figure 1.7-1: Underground Potential of the IVR Ore Body

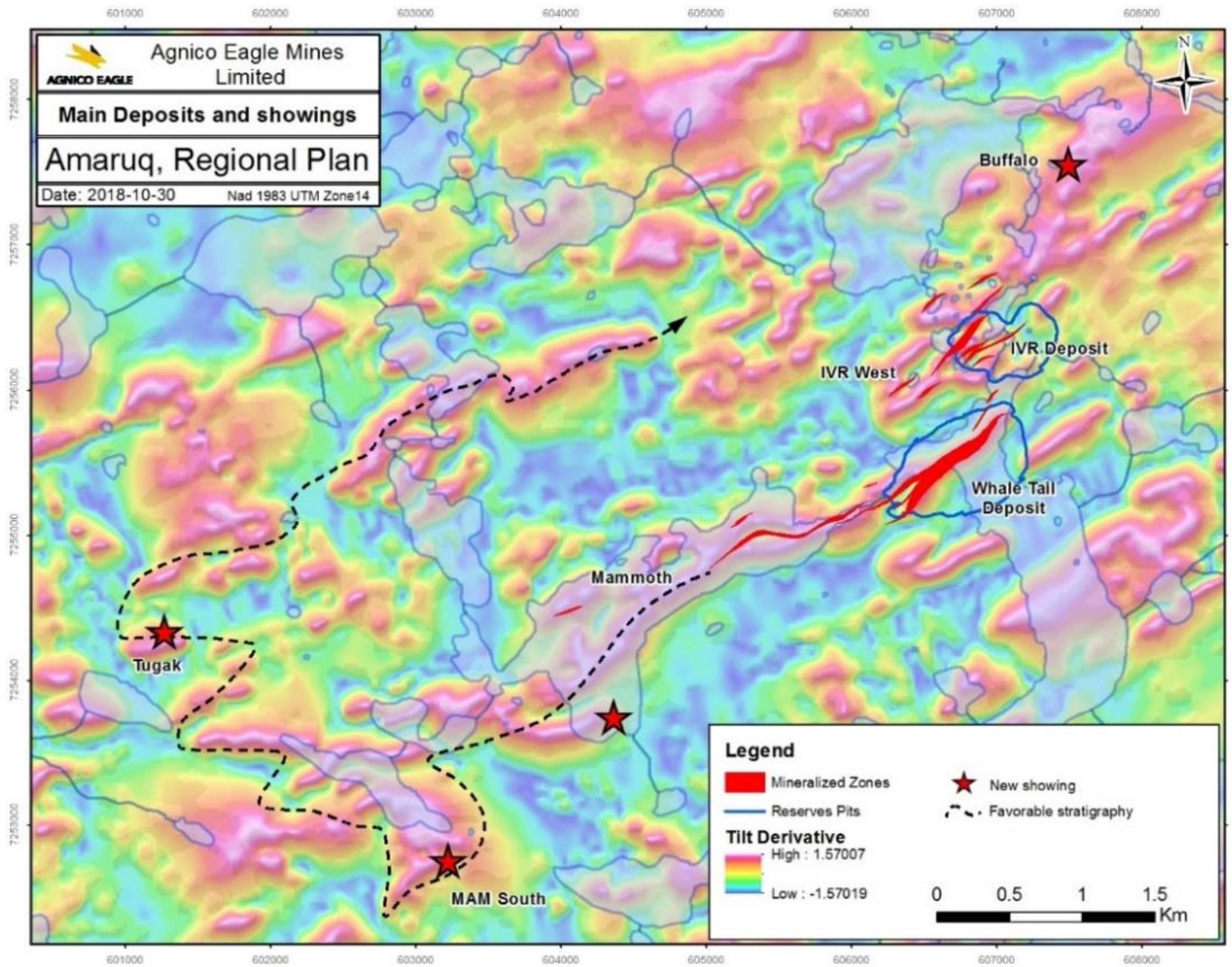


Figure 1.7-2: Geophysics Survey of the Amaruq Exploration Site and Future Development Opportunities

Agnico Eagle proposes to continue delineation drilling of the Mammoth and Buffalo intersect zones in the future.

The areas of potential future development are within the study area for the current Project. If proven economically viable the exploitation of the additional deposits would extend the LOM for Meadowbank Mine operations. Agnico Eagle would seek the appropriate modifications and/or amendments, if applicable.

1.8 Technology

The most current concepts have been selected for Project design (i.e., mining, processing, and effluent treatment). Although the technologies are considered state-of-the-art, the Meadowbank project team have adapted to difficult climatic conditions and have designed infrastructure accordingly and used up-to-date technology to solve problems.

The mining and processing techniques proposed for Expansion Project are an extension of current mining practices as described in the Approved Project (FEIS Volume 1, Section 1.10), thus Agnico Eagle intends to use familiar, proven approaches seen at many mining operations in production today; however, Agnico Eagle is continually addressing problems using proven newest technologies to improve mining efficiency, production efficiency, reduce fuel consumption, and ultimately reduce emissions.

For example, Agnico Eagle is currently researching alternative energy sources (i.e., wind turbine) in conjunction with the Meliadine Gold Project and depending on viability may in the future extend to Meadowbank operations at Meadowbank and Whale Tail Pit.

1.9 Alternatives to the Expansion Project

Alternatives were considered during all stages of Project design. Consultation and regulatory engagement discussions have been considered as part of the alternatives assessment. In general, consistent with the Approved Project, Project alternatives were evaluated for the Expansion Project according to the following criteria:

- Environmental – potential impacts to the environment, project footprint, reclamation;
- Engineering and Viability – best engineering practices, technology, permitting, risk, and flexibility;
- Economy – cost implications, construction capital, operating costs, maintenance cost for reclamation; and
- Society – community acceptance or preference, traditional knowledge (TK), health and safety, quality of life, employment, and socio-economic effects.

The alternatives that shaped the overall Project include the following:

- Project Go/No-Go decision;
- Infrastructure, Transportation, Access, and Quarry Development
- Deposit, Mining Method, and Production;
- Processed Ore Containment and Tailing Storage;
- Overburden and Waste Rock Disposal; and
- Water Management.

For additional information refer to the Approved Project (FEIS Volume 1, Section 1.10 and subsections).

1.9.1 Project Go/No-Go Decision

The proposed expansion of Whale Tail Pit is an opportunity made real by existing mining and milling facilities at Meadowbank Mine and the recent approval by NIRB and NWB for the Whale Tail Pit Project. Without the Expansion Project, the Meadowbank Mine will close in 2023.

From the economic and societal view, the no-go alternative would result in a substantial lost opportunity. Tax and royalty revenues to government and employment and business contracting opportunities to individuals and companies would be lost.

From an environmental perspective, the no-go alternative would mean no additional impacts from mining. Existing site facilities would be decommissioned and the area disturbed would be restored within the terms of the existing licenses.

Delays in the Expansion Project associated with permitting may affect the long-term economic viability of the Meadowbank Mine. Agnico Eagle has an obligation and commitment to reclaim infrastructure through progressive reclamation as facilities are no longer needed. To reduce economic and environmental liability for the Expansion Project and existing Meadowbank Mine, Agnico Eagle’s key objective is to minimize the “gap” in time between exhaustion of the Approved Project minable reserves and mining of the expansion. Mining is market driven, as such Agnico Eagle is continually aware that market conditions may yield no go scenarios.

1.9.2 Infrastructure, Transportation, Access, and Quarry Development

As stated in the Approved Project FEIS, to improve economics for the Expansion Project, Agnico Eagle has minimized Expansion Project footprint, reduced potential impacts to the environment, and reduced infrastructure requiring reclamation by using as much as possible, the established Amaruq and/or Meadowbank Mine infrastructure. All Expansion Project infrastructure is located within the local study area for the Approved Project originally assessed in the FEIS (Agnico Eagle 2016c).

The Expansion Project proposes expansion of the approved 9.5 m wide haul road to a proposed 15 m wide haul road for safety. The road allows Agnico Eagle to use Meadowbank infrastructure to the fullest extent possible and optimize operations. Operational optimization limits the need for additional on-site support infrastructure. The existence of the road allows Agnico Eagle to minimize Expansion Project footprint.

Consultation was undertaken in development of the road and road selection alternatives were discussed with community representatives (Approved Project FEIS Volume 7, Appendix 7-A; Agnico Eagle 2016c). Agnico Eagle modified the road route to take into account community preference and TK, are working with the Department of Culture and Heritage to respectfully mitigate existing cultural heritage sites, and have avoided all burial sites.

Quarry selection and use options were evaluated in the application filed for the exploration access road in 2015 and 2016. Agnico Eagle, where possible, has prioritized use based on feedback from the community and KivIA. Refer to Table 1.2-3.

Further details are provided in the Whale Tail Haul Road Management Plan enclosed with this application (Appendix G.9).

1.9.3 Deposit, Mining Method, and Production

Agnico Eagle outlined the potential for future development of the Amaruq property (Main Application Document Section 1.8) these options were considered as Expansion Project alternatives.

Additional deposits within the Amaruq property require further exploration or advanced exploration (i.e., bulk sampling) to assess economic viability.

1.9.4 Processed Ore Containment and Tailings Storage

The processing of ore and disposal of tailings will remain consistent with the Approved Project and undertaken in accordance with Project Certificate No.004 and Type A Water Licence 2AM-MEA1526.

1.9.5 Overburden and Waste Rock Disposal

As stated in the Approved Project, Agnico Eagle is continuing to explore within the Amaruq property and it was important that proposed infrastructure site locations were not sited over potential mineralization, which might prove economical in the future. Understanding the location of existing and potential future mineralization on the Amaruq property was key in the proposed siting of the overburden and waste rock disposal areas; site water management also played a key role in siting the Whale Tail WRSF. Based on the review of interveners alternative WRSFs proposed in the Approved Project FEIS are now being considered for implementation in this expansion. Whale Tail WRSF and overburden pile placements were determined by taking into account the potential for environmental impacts in consort with facilities engineered to minimize the amount of contact water generated, requiring treatment, or requiring containment during operations and especially post-closure.

Consistent with the Approved Project, Agnico Eagle considered various locations for the WRSF, while simultaneously looking at water management. Ultimately, the location was determined based on the reasons listed above, but the primary decision criteria used to select the WRSF options were:

- to evaluate options considered in the Approved Project FEIS;
- to reduce the risks to the downstream waterbodies;
- to reduce the direct impacts on waterbodies; and
- to reduce interaction of surface water with the WRSFs.

Based on operation feedback from Meadowbank Mine operations, Agnico Eagle is also considering alternatives for waste rock and/or tailings to include potentially in-pit disposal to mined out open pits.

1.9.6 Water Management

To support the Approved Project, a detailed water management multiple account analysis (MAA) was completed on various options for Project water management. Refer to the Approved Project FEIS Volume 1, Appendix 1-E (Agnico Eagle 2016c) for additional information.

Current approved water management for mine water effluent includes contact water effluent diffuser in Mammoth Lake and channelling and rerouting of non-contact water towards Mammoth Lake. The later consists of blocking the water flow with the construction of the Whale Tail Dike, raising the water level of the Whale Tail Lake (South Basin) and rerouting the water flow towards the Northwest to Mammoth watershed through a diversion system.

To support of the Expansion Project, Agnico Eagle has completed an additional MAA as one part of a larger alternatives assessment for the Whale Tail Pit Project Amendment for which a brief summary is provided below.

The Expansion Project requires an attenuation pond to annually store water between October and May, so that water can be treated and discharged mostly during ice-free conditions between June and September. The stored water would include mine contact water containing suspended solids and arsenic. It is challenging to find feasible sites that are non-fish bearing, and that would meet Agnico Eagle's objective to locate the attenuation pond within sub-watersheds that contain approved, and proposed, mine infrastructure for the Whale Tail Pit Project.

The *Fisheries Act* prohibits the deposit of deleterious substances in waters frequented by fish, unless it is authorized by regulations. Under the Metal and Diamond Mining Effluent Regulations (MDMER), an amendment to Schedule II of the Regulation is required to list the natural waterbody and authorize the disposition. A Schedule II amendment is considered by ECCC after a project has conducted an assessment of alternatives to use a natural water body to store mine waste, completed EA, prepared a fish habitat compensation plan that will offset the loss of fish habitat for consideration as part of the EA, and participated in public and Inuit Qaujimajatuqangit consultations on the EA, including on possible amendments to the MDMER.

Agnico Eagle has prepared an alternatives assessment to demonstrate that the use of a waterbody as an attenuation pond is the most appropriate option from an environmental, technical, and socio-economic perspectives. This assessment has followed the transparent and standardized process described in ECCC's *Guidelines for the Assessment of Alternatives for Mine Waste Disposal* (ECCC 2016).

The initial step in the assessment process identified eight potential alternatives that met four threshold criteria: must align with existing water management strategy; must be confined within the area already proposed to be affected by the Expansion Project; must provide sufficient storage capacity; and must not contradict the mine development plan. Following a critical flaw assessment, that included screening against criteria such as engineering and safety risks, and avoiding areas of high environmental, cultural and/or archeological value, five alternatives (Figure 1.9-1) were left that were carried through to the characterization stage and a MAA. The five alternatives were:

I. New attenuation pond at Lake A53 (fish-bearing);
II. New attenuation pond at Lake A53 and expand existing Whale Tail Attenuation Pond;
III. New attenuation pond at Lake 54 (non-fish-bearing);
IV. New attenuation pond at Mammoth Lake (fish-bearing); and
V. Expansion of existing Whale Tail Attenuation Pond (land-based).

Inuit Qaujimajatuqangit (IQ) was incorporated throughout the alternatives assessment, including in the baseline setting description, critical flaw assessment, characterization of alternatives, in the development of meaningful indicators for the MAA, and in the determination of value-based weightings. Consultation with elders and community members in Baker Lake and Chesterfield Inlet also highlighted traditional values, areas of use, and concerns related to the water attenuation alternative, that were incorporated in the assessment of alternatives.

The results of the MAA indicate that Alternative I: A53 has the highest merit rating, followed by Alternative V: Expansion of the existing Whale Tail Attenuation Pond. Alternative IV: Mammoth Lake is the lowest rated alternative. Based on the outcomes of the MAA, the preferred alternative is Lake A53.

This alternative proposes to store contact water for the Expansion Project in a new IVR Attenuation Pond, with adequate storage capacity, supplemented by the existing Whale Tail Attenuation Pond with a storage capacity. The public and Indigenous consultations throughout the EA process will continue to be used to seek feedback on the assessment of alternatives and water management at the site, in addition to the community consultations previously held in Baker Lake and Chesterfield Inlet in July 2018. Recently, updated modelling highlights better water quality than initial predictions in Lake A53 and in addition with preliminary discussions with DFO, they have indicated that an Authorization under S.35 would adequately offset serious harm to fish in Lake A53, based on two main factors: the temporary use of Lake A53 as an attenuation pond during operations; and plans to restore Lake A53 habitat to support fish after use.

We are continuing to review this information and we can provide more information during the technical review.

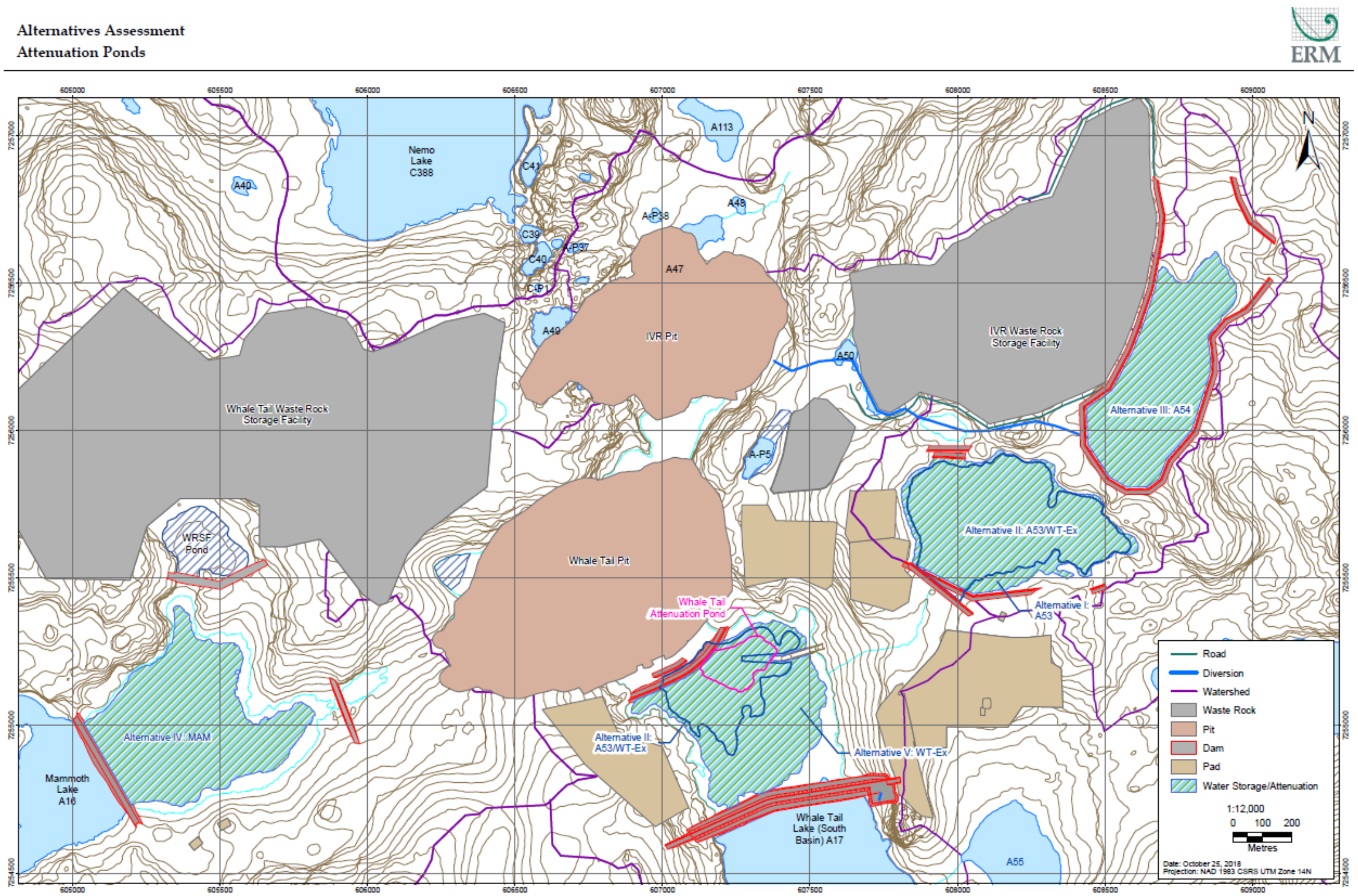


Figure 1.9-1: Alternative Assessment of Attenuation Ponds

In addition to the MAA, Agnico Eagle continues to evaluate water management alternatives including:

- Mine water effluent to the mined out open pits for flooding.
- Mine water effluent to the IVR Attenuation Pond and subsequently discharged into Whale Tail basin.
- Alternative underground groundwater and contact water management which may include increasing the storage capacity of the Groundwater Storage Pond 1.
- Potentially increasing the storage capacity of the Whale Tail Attenuation Pond.
- Possibility of placing waste rock that is either ML/PAG or non ML/NPAG into IVR Pit.
- Potentially modifying the performance of the Water Treatment Plant to modify discharge quality, discharge rate and/or schedule of discharge.
- Potentially storing additional groundwater in the GSP-3.
- Potentially increasing the storage capacity of the IVR Attenuation Pond by raising elevation of IVR-D1, IVR-D2 and IVR-D3.
- Postponing the start of the TDS Treatment and potentially modifying the performance of these treatment plants to increase or decrease the discharge rate and/or discharge schedule.

APPENDIX D SUMMARY OF CONSULTATION

Table 2-D-1: Public Consultation, Government Engagement, and IQ 2016 to October 2018

Date	Title	Description
June 7, 2016	Baker Lake Community Meeting	Exploration activities and Whale Tail Pit Project
July 5, 2016	Baker Lake HTO meeting	HTO Consultation on fishout plan for Vault Expansion into Phaser Lake Project
August 18, 2016	Baker Lake HTO meeting	Meeting with HTO regarding Phaser Lake fish out. Fishout concerns included: R02 fish habitat compensation monitoring, fish release in Wally Lake, fish tagging, nets time. Other concerns included: AWAR not closed when caribou in area, ski doo crossings.
September 16, 2016	Baker Lake HTO Meeting	Presentation of 2 seacans to HTO for storage of Search and Rescue equipment and supplies, and storage/distribution of fall Caribou harvest
October 17, 2016	Baker Lake HTO Meeting	Safety issues (hunting/driving) on the AWAR
October 24, 2016	Baker Lake Community Meeting	Baker Lake Sewage Treatment, Discharge, Downstream Water quality and Fisheries Improvement project
October 26-November 4, 2016*	Public hearing Whale tail pit and haul road project	Public hearings Whale Tail in Baker Lake, Chesterfield Inlet, Rankin Inlet, Coral Harbour, Arviat and Naujaat
November 1, 2016	Baker Lake HTO Meeting	Phaser Lake fishout
November 18, 2016	Caribou Monitoring Workshop	Amaruq Caribou Workshop #1, as part of ongoing consultation for their proposed Whale Tail Project
December 15, 2016*	Baker Lake Community Meeting	Wildlife monitoring, road closures, monitoring during caribou migration, road safety awareness
February 10, 2017*	Baker Lake HTO Meeting	Amaruq Road update, Snowmobile crossings, Phaser Lake fishout summary and results AWAR Dust pilot project, Amaruq Exploration project, AWAR safety meeting follow up
February 22-23, 2017	Caribou Monitoring Workshop	Caribou Workshop #2, as part of ongoing consultation for their proposed Whale Tail Project
April 20, 2017	Baker Lake Open Door	Hiring, business opportunities, update on Whale Tail Pit Project
April 27, 2017*	Baker Lake Hearings	Whale Tail Pit Project NIRB/NWB Technical Hearing
May 1, 2017*	Baker Lake Pre-Hearing conference	NIRB/NWB Pre-Hearing public conference for Whale Tail Pit Project
June 5, 2017	Baker Lake HTO Meeting	Amaruq road update, spring migration, habitat compensation fisheries work on AWAR, Baker Lake and AWAR km 1 - culverts, Hunter Harvest Study
June 20-21, 2017	Caribou Monitoring Workshop	TEMP and Caribou Workshop #3, as part of ongoing consultation for their proposed Whale Tail Project
July 5, 2017*	Coral Harbour HTO Meeting	Exploration and Amaruq Whale Tail Pit Project
July 5, 2017*	Chesterfield Inlet Open House	Shipping and marine mammals; road to Rankin Inlet
July 25, 2017	Baker Lake HTO site visit	Visit to Amaruq area
July 27, 2017	Baker Lake Public meeting	Wellness Report and Implementation Plan, human resources actions, wellness areas that were important to them and actions to address them
September 12, 2017*	Baker Lake HTO meeting	Recent traffic incidents involving ATVs on the AWAR, planning of a AEM/HTO AWAR Safety meeting
October 12, 2017	Baker Lake Community Liaison Committee Meeting	Environment update, AWAR road safety. Nunavut leadership program, project update
October 20, 2017	Baker Lake HTO meeting	Caribou migration and road safety concerns
December 1, 2017	Baker Lake HTO Meeting	Arcticonnexion community monitoring
December 13, 2017	Baker Lake Community Meeting	Annual AWAR Safety meeting, jointly delivered with HTO
February 9, 2018	Baker Lake Community meeting	In-Pit Deposition project
March 7, 2018	Baker Lake Community meeting	In-Pit Deposition project
March 27, 2018*	Baker Lake HTO MOU Implementation Meeting	Meeting with Baker Lake HTO Board to finalize implementation of MOU Whale Tail.
May 17, 2018*	Baker Lake Hamlet Council Meeting	Sustainable Fisheries & offsetting, Baker Lake Sewage Treatment Project, Greenhouse Gas Emission Reductions, Windpower, Shipping Management
May 22, 2018	Baker Lake Community Meeting	Safety on the AWAR with youth
May 23, 2018	Baker Lake Community Meeting	Public consultation on sewage improvement, wind and shipping
June 19-20, 2018	Terrestrial Advisory Group Meeting	Meadowbank Terrestrial Advisory Group
July 10-11, 2018	Baker Lake Community Meeting	Whale Tail Pit Expansion Project Consultations
July 12-13, 2018	Chesterfield Inlet Community Meeting	Whale Tail Pit Expansion Project Consultations
July 16, 2018	Baker Lake mayor site visit	Visit of Meadowbank and Amaruq with mayors of Baker Lake and Arviat
July 19, 2018	Baker Lake Meeting	Suggestions for lake names at Whale Tail Project
August 10, 2018	Baker Lake site visit	Visit with Elders of future Baker Lake fuel farm expansion project. Enquired about TQ/IK
August 26-28	Baker Lake	NIRB Public Hearing

* = Records reviewed and incorporated into TLRU Assessment (Addendum Volume 7)

AGNICO EAGLE

Agnico Eagle Mines:
Whale Tail Pit Amendment

July 10 -13 Community Consultation Notes

(Including: Focus Group for Baker Lake Youth, Baker Lake Open House, Meetings with Baker Lake Elders, Focus Group for Baker Lake Women, Baker Lake Hamlet, Baker Lake Kivalliq Inuit Association, Baker Lake Hunters and Trappers Organization, Chesterfield Inlet Hamlet, Chesterfield Inlet Open House, and Chesterfield Inlet Hunters and Trappers Organization

July 10-13, 2018 - Baker Lake and Chesterfield Inlet, Nunavut

AGNICO EAGLE MINES:
Whale Tail Pit Amendment

July 10 -13 Consultation Notes

Contents

EXECUTIVE SUMMARY

To support the permitting process and to meaningfully consult and integrate new traditional knowledge or Inuit Qaujimajatuqangit (IQ) into our project design, management plans, and monitoring studies, Agnico Eagle conducted a series of workshops July 10-13, 2018 to present Agnico Eagle's projects to Baker Lake and Chesterfield Inlet community stakeholders.

On March 15th, 2018 Nunavut Impact Review Board (NIRB) Project Certificate No 008 was issued to Agnico Eagle to permit the development of the Whale Tail Pit, a satellite deposit located on the Amaruq property, Agnico Eagle Mines Limited – Meadowbank Division (Agnico Eagle), often referred to internally as Amaruq - Phase I. Regulatory authorizations and Type A licensing are expected to allow for dike construction on July 2018.

Subsequently, Agnico Eagle would like community feedbackon the Amaruq Phase II project, Meliadine future expansions and potentially other Nunavut Projects in the next year. More specifically, Agnico Eagle required input from communities on: Potential sustainable fisheries andfish habitat compensation options, Increased Fuel Storage Requirements in Baker Laker and Shipping. These meetings, held in Baker Lake and Chesterfield Inlet in July 2018, were designed as focus groups to serve as a forum for consultation with stakeholders in the communities of Baker Lake and Chesterfield Inlet. During the sessions, Agnico Eagle encouraged free flowing and informal conversation, with the objective of facilitating as much discussion as possible around each of the topics to allow for early community feedback into project planning.. The results of the conversation were not only rich feedback around the topics discussed, but also valuable feedback that the community appreciated a more frequent and informal approach to interaction with Agnico Eagle. As a result of the feedback, our Community Relations team committed to return to the communities in the fall to further the discussion, as well as arrange more frequent informal engagement/ information sessions within the communities on a regular basis moving forward.

The meetings provided an opportunity for Agnico Eagle to present information about ongoing and planned activities, to hear concerns and questions from participants, and to understand related traditional knowledge or Inuit Qaujimajatuqangit (IQ) so that it can be integrated into project design, management plans and monitoring studies. Consultants were brought in from Environmental Resources Management (ERM) to address water management options for the Whale Tail Pit Amendment, as well as for potential sustainable fisheries and fish habitat offsetting projects. The Fuel Farm and shipping were also discussed during the Baker Lake Open House meeting, the Chesterfield Inlet Open House meeting, and the Chesterfield Inlet HTO meeting.

In each session the following topics were covered,

- Project update on Whale Tail Pit Project Amendment and Environmental Impact Statement
- Water management options for attenuation pond for Whale Pit Project Amendment as part of permitting for a Schedule 2 Amendment;
- Fish compensation options for the expansion of Whale Tail Pit Project Amendment
- Desired format of future consultation with Agnico Eagle;
- Any Other Business re. Agnico Eagle activities.

This report contains general summaries and notes from each meeting.

Summary of Main Topics and Feedback

In each of our focus groups and Open House meetings the key topics discussed and key points communicated were as follows;

Water Management Options

As part of the expansion (Phase II) of the Whale Tail Project, Agnico Eagle needs greater capacity to store and manage contact water (including water from surface sources such as rainfall and snow melt, as well as groundwater from seepage into pits). The contact water will be collected at the site, stored in an attenuation, treated to ensure it meets water quality standards, and discharged to the environment. Water will be stored over winter and discharged in the ice-free period.

Until the water has been treated, the water will be considered as dirty since it could contain metals harmful to aquatic life. The water treatment plant is already in place due to it being needed in Phase I, but will be expanded to accommodate the increased volume of water from the Project Amendment. The treated water will be released to a designated area, and must meet the water quality standards before it is discharged.

The attenuation pond will need to have a capacity of 750,000 m^3. Agnico is committed to minimizing the footprint of the Project. Thus, attenuation pond locations must be within the catchment areas already affected by the pits and waste rock facility, as well as within 2 km of either pit. These ‘threshold criteria’ were used to identify four alternatives for water attenuation, as described below:

1. Pond A53
    - Will need two dams, one 400 m long and 5 m tall, and the other 500 m long and 6 m tall;
    - The existing waterbody contains fish.
2. Pond A54
    - Will need one long dam, of 1,600 m in length and 10 m in height;
    - The existing waterbody does not contain fish.
3. Mammoth Lake (sectioned off)
    - A dam of 600 m in length and 9 m in height would be built to section off one end of the lake;
    - The existing water body contains fish.
4. Two smaller water bodies part of the project to use (Phase I attenuation ponds for the Waste Rock Storage Facility and Whale Tail pit)
    - One dam on each. WRSF pond will be 375 m in length and 5 m in height, Whale Tail will be 375 m in length and 9 m in height;
    - This option does not affect an existing water body. There are no fish in either of the man-made water management ponds.

Sample Questions:

- Is there an option you would prefer over the others? If so, why?
- Is there an option you dislike more than the others? If so, why?
- What would you prioritize if you were deciding where to put the pond? For example, would you want to minimize impacts on fish? Or use the smallest dams? Or make it blend into the landscape?

- Do you have concerns regarding any these options?

Some people raised concerns about the Pond A54 option, in relation to the size of the dam which would be a large obstruction on the land that might interfere with Caribou migration. Others raised concerns about potential impacts on fish; specifically, a number of Elders did not support the idea of re-locating fish from one water body to another. Overall, the focus groups indicated that the community would prefer to avoid impacts to fish if possible.

In the focus groups, Agnico Eagle asked if anyone was aware of Inuktitut names for pond A53 or A54. Responses indicated that these water bodies may not have any names as they are small, or the names may only be known by some people (i.e., those who know the area well, which could include people from Gjoa Haven). The general consensus was that if a waterbody did not have an existing Inuktitut name, then Agnico Eagle should continue with names as required for Project purposes. The groups did not see the benefit of providing Inuktitut names to waterbodies if they are currently unnamed, as these names would not have meaning and would be arbitrary. The elders' group also noted that it is difficult recognizing the smaller waterbodies from maps alone, and agreed with a suggestion from Agnico Eagle that a site visit would help them understand the location and scale of the Project development.

Fish and Fish Habitat Compensation – Example Projects

As part of the Whale Tail Pit Project Amendment, fish habitat will be affected, for example, if a fish-bearing option is chosen for an attenuation pond. As set out in the federal Fisheries Act, impacts to fish must be authorized and compensation implemented. Compensation projects should provide benefits to fish and fish habitat that outweigh the predicted impacts to fish and fish habitat.

Generally, compensation projects must be self-sustaining in the long term. In order to help maintain sustainable fisheries in Nunavut and offset for any possible future development, Agnico wants to continue looking into ideas and designs for new fish habitat offsetting projects. Ultimately, Agnico Eagle want to create sustainable fisheries projects that are of value to communities and stakeholders. In the consultations we presented five possible options, sought community feedback on these options as well as other potential fish habitat compensation projects that might be of interest and importance to Nunavummiut.

1. Forage fish habitat creation or enhancement
    - Excavate shallow ponds that would be connected to existing streams to create habitat for small fish (stickleback/sculpin);
    - Increase the number of forage fish that provide prey to other fish species, thereby improving general fisheries productivity;
    - An example of this would be converting a quarry into fish habitat.

The focus groups in general were not aware of the prevalence of the smaller forage fish in the area, and did not show enthusiasm for the potential importance of this compensation option to fisheries in general. The HTO focus group were interested whether this type of compensation had been successfully implemented before, especially in the north. ERM noted that there were no known examples of similar compensation options in the Arctic.

2. Hatchery

- Build an Arctic char hatchery in Rankin Inlet or other community;
- Grow Arctic char from wild broodstock and stock into waterbodies:
- Creation of a hatchery could help grown the population of Arctic char;Local job creation to run and maintain the hatchery.

The focus groups had mixed opinions about a hatchery. There was interest in how the hatchery would work, and how this may enhance Arctic char populations. The Hamlet of Baker Lake and Baker Lake HTO in particular, could see the benefits for the community regarding employment and training, as well as potential opportunities to improve local Arctic char fisheries. However, some members of the Elder's focus group expressed concern that the fish produced would not be natural and may taste different. It was recognised in all Focus Groups that more work would be needed to confirm the viability of this option.

3. Access enhancement
    - Increase productive capacity of char, or other fish, by improving access to overwintering areas or little-used lakes;
    - Remove boulders or create new connecting channels;;
    - Could be low-impact and lead by community groups (may or may not need heavy equipment);
    - Could be hard to find locations where fish can't pass easily and obstructions could be removed.

The Elder's Group expressed concerns that moving fish from one location to another would change the habitat, which could change the nature of the fish themselves. Only one location with a physical obstruction (the falls at Prince River) was identified during discussions, and there was little interest in community-led groups to remove obstructions without machinery (per an example described by ERM). However, the importance of over-wintering habitat was recognized during focus groups, as well as in conversation as part of the Baker Lake Open House.

4. Enhancement of juvenile rearing habitat
    - Could develop a standardized approach to improving juvenile fish rearing habitat that could be applied in various locations, by industry and communities.

Focus group participants did not recognize juvenile rearing habitat was not noted as being particularly important for fisheries productivity, although there was some interest in previous habitat enhancements (including channel realignment) that had been done in the Arctic (examples provided by ERM).

5. Sewage treatment upgrades in other Kivalliq communities
    - In many communities, sewage treatment issues are the same as Baker Lake;
    - Improve water quality in lakes and therefore productive capacity of fish habitat;
    - Use the planned project in Baker Lake as a case study to lay out a framework for sewage treatment projects in other communities.

There was support from all groups for this option, specifically in regard to the Airplane Lake/Baker Lake sewage treatment upgrades. However, few people made the link between sewage treatment and fisheries, except for a comment that fishing for char was better further away from the hamlet of Baker Lake. No other communities were identified as potential locations for future sewage treatment upgrades.

Sample Questions:

- Are there any options that you would like more than others? If so, why?
- Where could each option be built? Do any locations come to mind, especially for improving fish access?
- Do you think each option would help fish populations? Are any better than others?
- Especially for the hatchery & sewage treatment ideas, would people support the construction of these projects? Would they be interested in maintaining them?
- What are the concerns with each option?
- Are there other ways to increase fish populations that we haven't discussed?
- What fish species do you fish for? What is your favourite fish to catch and eat?

The "Baker Lake Sewage Treatment Project" received wide-spread interest and support from the groups consulted. Wastewater from the hamlet of Baker Lake is released through a series of tundra ponds and lakes into Baker Lake. The current sewage treatment system has reached the end of its expected life (25 years) and there is a possibility that contamination could be affecting water quality and fish.
Over the past few years, Agnico Eagle has become aware of the issue, and is interested in working with the Hamlet on their sewage treatment options. In the Elders, Women's and HTO focus groups, participants noted that Airplane Lake (which receives run-off from the sewage lagoon and landfill) was once used by locals for fishing and recreation but is no longer fished due to concerns of contamination. In consultations and community meetings, Baker Lake residents have expressed support for the idea of improved sewage treatment in the community.

The fish species of most interest across the groups were Arctic char, followed by Lake Trout. Char were a favourite species to catch, and it was noted that the sea-run individuals tasted different, but that locals (Baker Lake) had to buy Arctic char mainly from the Kitikmeot region, which was expensive. Compensation options that supported an increase in Arctic char in the region, generated the most discussion and interest. It was noted in the consultation that fish species from outside the Project area could also be the focus for compensation options (e.g. Arctic grayling), but there was no support or mention of other species, aside from Arctic char and Lake Trout

Summary of the Youth Focus Group Session (Baker Lake)

Six youth attended the Youth Focus Group in Baker Lake, ranging between eighth grade and those that had completed grade twelve. One of the opening questions revealed that all in attendance had a parent who currently or previously worked for Agnico Eagle. Another question revealed half the group had actually visited the Meadowbank mine.

ERM described the various options for storing water in an attenuation pond at the mine site. Some participants responded that using an are already affected by the mine would be better than creating new impacts on a water body that is otherwise not affected. They raised concerns over water being put back into Mammoth Lake, but were less concerned upon finding out the water would be treated and monitored for quality.

Regarding fish compensation, the group indicated their favourite kind of fish were Lake Trout (1), Char (3), and the rest either didn't like fish, didn't indicate a preference, or specified they prefer it dried. No one in the group indicated a particular interest for fishing; there was very little engagement or feedback during the consultation session. The group did, however, bring up that Airplane Lake used to be a good area to fish, but is not anymore because the water quality is poor. The group responded that they would not be interested in moving boulders to help improve fish access as one of the compensation examples.

Upon being asked which method of communication would be most effective to reach them, the group mentioned Facebook, Community Pages. They do not usually look at the local bulletin boards (e.g. in the Co-op store). The group all enthusiastically mentioned that Snapchat was their favourite everyday communication method.

In discussions after the session formally ended, members of the group expressed that their interest was more aligned with hunting Caribou. Their parents, specifically their dads, taught them (including a few of the girls in the group). One participant shared further insight about fishing – specifically, that she used to catch small minnow fish in ponds around Baker Lake with her hands when she was younger, and would release them afterwards. She no longer fishes or eats fish because she doesn't like the smell. The girl previously trained to take water samples, as she has an interest in science, and has applied to work for Agnico Eagle's Environment department but she has not heard back from us.

Summary of the Baker Lake Open House Meeting

The Baker Lake Open House was well-attended. There were 54 people recorded on the sign-in sheet. Emma Leith, Lee Christophe Bouchard, Anna Sundby and Nicola Lower ran through the PowerPoint presentation with a project overview/update, water management options, fish compensation examples, fuel farm information, and brief discussion around preferred methods of communication.

The Presentation was given in English, and translated by Michael Haqpi into Inuktitut (in stop and repeat fashion, rather than simultaneously). Slides were in English, partially translated with accompanied spoken translation. Information booths were set up around the hall to present the 1) fish compensation options, 2) water management options, 3) Baker Lake fuel farm design, 4) Request for information booth, for preferred methods of communication.

During the question and answer period, a community member expressed concern at the idea of having a tall berm/dam (e.g., for water management option number 2) as it could create issues for caribou migration. There were also concerns about using explosives in August due to caribou migration. The community also raised the question of changing the landscape (the lake configuration and/or by building dams/walls), which may cause issues for caribou during their migration in the fall. Lastly, a community member came up to talk to the audience – He was speaking about the work readiness program, explaining that he had made it through the labour pool process and was on the waiting list for employement.

In order to best communicate with the town, there were polling papers on the wall asking attendees their preferred/suggested method of communication. Facebook emerged as a popular option, and there was an interesting suggestion regarding the implementation of a call-in radio show to address questions and concerns of listeners. This idea was deemed to be one we should seriously look into, as Chesterfield Inlet also brought up interest in a similar program. Community radio shows are a useful tool in Northern Communities. Local organizers (schools, clinics, etc.) often use them to get information out to the communities, or to seek feedback.

Summary of the Baker Lake Elders Meeting

The Baker Lake Elders Meeting was attended by eleven people. A central issue raised by the Elders in attendance was that of traditional names. Rather than making up names such as Meadowbank or Amaruq, they would prefer if the pre-existing name was used, or at least to ensure the temporary new name not override the traditional one. There was particular displeasure with the name Whale Tail as there are no whales in the area of the project. However, in the case of the ponds referred to as A53 and A54, the Elders' suggestion was to simply pick a name that worked for us and use it internally while attempting to avoid that name becoming publicly used.

In regard to the water management options, the Elders expressed that they would appreciate being brought to the location (for example, of pond A53 and A54) as working from maps can be difficult. It is much easier to talk about their knowledge of the area, and their preferences or suggestions, when they can see the landscape first-hand. The group mentioned that those who had been born or lived in the area around the project should help making decisions, as not all of them had firsthand knowledge of the Project area. This refers particularly to the people of Gjoa Haven. It was mentioned throughout a few of the focus groups, that just as people from Baker Lake travel to Gjoa Haven, the reverse is also true. The community of Gjoa may therefore have knowledge to share and interest in having input to the project development process. People from Gjoa Haven are also known to use the area (which is on the winter travel route between Baker Lake and Gjoa Haven), so they suggested we consult with them as well.

The Mammoth Lake option was less popular with the Elders due to their displeasure with "disturbing the big lake" and the fish within it. The pond labelled as A53 also has fish and the Elders shared similar concerns. There was mixed feedback regarding the option called Pond A54, which has the highest dam; the benefit of this best option is that no fish would be disturbed, but there were concerns that the height of the dam could disturb caribou and other wildlife.

The Elders expressed concern over the idea of moving fish from one habitat to another. Their preference was to avoid moving fish as much as possible, as it could affect the fish in ways that are hard to understand or predict. There was discussion of how moving a fish from one place to another fundamentally changes the nature of that fish, so that it is no longer the same fish in being or in spirit. A new habitat can also change the taste of the fish. The Elders did not show enthusiasm for the idea of a hatchery, as they believed it may also change the taste of the fish, and make them "unnatural".

Overall, the Elders expressed that they would need more time to think about the various options, and ideally see the location, before being able to indicate a preference for some options over others. They also stressed that it is important to seek the opinions of those who had lived or camped in the affected area, which could include people from Gjoa Haven.

At the end of the meeting, the Elders provided input about placenames and the Inuktitut translations of fish species. Of particular note, there are multiple Inuktitut names for Arctic char based on the stage of the lifecycle (i.e., changing appearance), and type of water body; there were also differences based on regional dialect.

Michael Haqpi interpreted from English to Inuktitut (in stop and repeat fashion, rather than simultaneously).

Summary of the Women Focus Group Meeting

The women's focus group met in the afternoon of July 11. There were seven women in attendance. The session was successfully conducted in English, and all participated readily.

There was a lot of insight regarding preferred fish and taste (char, which tastes different from Cambridge Bay to Baker Lake), as well as regarding the need to do proper archeological surveys to ensure nearby graves (as an example) are not disturbed by the project. Prince River was identified as a popular fishing spot which could perhaps benefit from being more accessible (presumably for fish migration), and Airplane Lake/Landing Lake was identified as an area which could benefit from having its water treated, possibly to be improved by proper sewage system. It was agreed that as far as water management goes (for the attenuation pond), the option with the least possible negative environmental impact would be preferred. The group also mentioned that there are locals who have been trained in monitoring and taking water samples, so they would like for local Inuit to participate in the monitoring process as much as possible.

Some of the general questions raised included whether Inuit worked with us (David Kritterdlik is an example, though he was absent from this session), whether Mammoth Lake had an Inuktitut name (as the women did not know of that lake, and said there are no mammoths in the area), whether Inuit summer students would be hired again (the women reported there used to be Inuit summer students but that the opportunity was not available this summer), and whether things could be done to help support Inuit employees especially on site (bringing in Elders, preachers, and having both a man and woman HR representative).

The meeting was concluded with the decision that having more frequent meetings with this specific focus group would likely help ensure we have proper insight as to community wellness, and ways to promote it (both among Agnico Eagle Inuit employees and non Agnico Eagle employee locals).

Summary of the Baker Lake Hamlet Meeting

The consultation team met with the Baker Lake Mayor and Senior Administrative Officer (SAO) at the Hamlet office on the afternoon of July 11. The meeting was informal and included a brief description of Phase I and II of the Whale Tail project; the SAO had seen the presentation at the Town Hall the evening before.

The Mayor and SAO asked questions about water quality, and the level of detail known about fish populations in the affected area. In regard to fish compensation examples, they were interested in the possibility of stocking lakes (i.e., adding more fish) as well as hatcheries. Considering longer term employment and economic development for the community, they were interested in opportunities that could be associated with aquaculture.

Both Mayor and SAO would like to receive the NIRB website and fishout plan/process, as well as caribou protocol. A possible way to communicate info would be through quarterly newsletters, by including the council on these emailed newsletters, and informing population on the radio. They recommended that a meeting to discuss wellness and provide project update should be set up in September/October.

Summary of the Baker Lake KIA Meeting

The Kivalliq Inuit Association (KIA) meeting occurred in the afternoon of July 11, and was attended by two board members, one of whom is the community liaison officer (CLO) for Baker Lake. The attendees The attendees recommended that moving forward meetings be held in the fall and winter and requested that another follow up meeting be set up in the fall.

Both water management and fish habitat compensation options were discussed with the attendees.

The following questions/comments/concerns were brought up by the KIA during/following the presentation:

- Has Agnico Eagle already decided on which option is best? Will Agnico Eagle truly take their thoughts into consideration or just settle for fastest and cheapest way?
- Archeological sites, traditional places, and main hunting places should be kept in mind.
- Will there be two types of waste rock, including acid generating? If so, will it be kept away from causing harm to the environment/water?
- Will there be opportunities for Inuit to help during construction and monitoring phases?
- General questions about the fish-out process as part of the Whale Tail dike construction (i.e., the approved project under construction in 2018).

In regard to fishing, the attendees explained the char migration process and how the fish change from living in fresh to salt water. They noted that water levels in the rivers are sometimes too low for the fish migration; therefore, improving access could be a good idea for compensation. They also described fishing on Baker Lake, but noted that the fish caught further away from town (Baker Lake) taste better than fish caught close to town. They also discussed the caribou migration, herd differences, and the nearby caribou migration corridor.

Summary of the Baker Lake HTO Meeting

The meeting with the Baker Lake Hunters and Trappers Organisation (HTO) occurred on the evening of July 11 and was attended by eight people. The meeting was conducted in English, with support from Michael Haqpi to interpret (in stop and repeat fashion, rather than simultaneously).

Some of the group's concerns regarding the attenuation pond included water quality/toxicity, contingency plan for emergency overflow, and detailed review of what kind of metals could be in the rocks. The Elder present wanted to know if we would check fish eggs to see if those would be contaminated. There was interest in seeing a map with watersheds and option, also as related to caribou migration routes. As with the Hamlet meeting, the possibility of a liner on the attenuation pond was discussed. Using Mammoth Lake for the attenuation pond was not a well-liked idea. An HTO member declared he would choose option two, pond A54, with the big dam due to no fish being disturbed, and due to it being the furthest away from other water sources. This comment was supported by the Elder.

During the fish compensation part of the presentation, the HTO asked if option one (Create and enhance forage fish habitat) had ever been done in the North. The HTO reacted positively towards the hatchery option, although expressed concern in the possibility of competition with other fish. They suggest finding out the char vs. other fish ratio in the lake it would be done in. The group seemed fairly well informed on the subject of hatcheries. It was important for the Elder that we take fish diet into consideration, as some fish tend to eat everything in the environment, which may disrupt other fish. The water treatment of Airplane Lake was a popular idea. Although there was interest in all options (with the recurring comment to make sure not to disrupt habitats and environments if connecting lakes), the hatchery was the most popular one, though more information about it would likely be desired in the future. It was noted by the HTO to keep caribou and their migratory path in mind for any plans Agnico Eagle may make.

When asked about ways to communicate with them, the group said small consultation groups such as that one were preferable to bigger groups. The consensus was that big groups such as the Town Hall/Open House are effective for one way communication (present them with information), and small groups are effective for receiving information as well as providing feedback in a discussion-based consultation.

Summary of the Chesterfield Inlet Hamlet Meeting

The Chesterfield Inlet Hamlet meeting occurred in the afternoon of July 12. Three people were in attendance, including the SAO and the Mayor. This meeting consisted of a verbal high-level overview of the presentation, and was the first meeting without the ERM consultants (who only attended the Baker Lake consultations).

The following questions/comments/concerns were brought up by the Hamlet during/following the presentation:

- Which options do Baker Lake residents prefer? Chesterfield Inlet may provide input regarding the Whale Tail Pit Amendment (water management and fish offsetting), but it is likely all will ultimately defer their judgment to the people of Baker Lake, as they are more affected.
- Graves and archeological sites should be kept in mind.
- As long as the attenuation pond water isn't drained into the ocean, they are not concerned.
- Traditional Inuit names should be used and respected for sites. Although companies/people can't revert, they can be and do better moving forward.
- For communication purposes, elders don't check computers but youth do (a specific site local to Chesterfield Inlet known by our Chesterfield Inlet CLO is popular, and he already puts information on there). Radio programs are preferred by older residents.
- Concerns regarding work readiness follow-up (lack of), six months to one year is too long to wait. Desire for all employees/applicants (Inuit and non-Inuit) to be treated the same. The work-readiness process is too long, and hard. There should be more contact people than just local CLO and Labour Pool Coordinator so people hear back faster.
- Summer is not a good time for meeting, fall is preferred.

Summary of the Chesterfield Inlet Town Hall Meeting

The Chesterfield Inlet Town Hall meeting occurred on the evening of July 12, and was attended by six people. Of the six people, one was Andre Tautu, who was not only our interpreter but also an active participant to the discussion. The presentation was done on a stop-and-go basis, to allow for the interpreter to translate more easily. David Kritterdlik, the Whale Cove CLO for Agnico Eagle, was able to facilitate much of the discussion directly in Inuktitut, which was received very positively by the group. The interpreter was able to help the Agnico Eagle team understand what was being said.

Although we did go through the presentation and get to discuss some of the water management options as well as fish compensation examples, the general sentiment was that the topic was Baker Lake's business rather than Chesterfield Inlet's, and Chesterfield Inlet would prefer to talk about shipping. Some of the major concerns that emerged from this meeting were the shipping route, increase in fuel need as related to shipping, contingency fuel spill plans and training, as well as employment process. Due to computer issues, we were unable to present the visual formal fuel plant or fuel shipping information, but gave a verbal description of the project. It was established that we should set up a meeting in the fall with information regarding shipping process and schedule.

Summary of the Chesterfield Inlet HTO Meeting

The Chesterfield Inlet HTO meeting was held in the morning of July 13. There were 2 participants, who were Valerie Ipkarnark and Jimmy Krako.

The presentation was given verbally by the Agnico Eagle team, specifically Emma Leith and Karen Yip. Topics presented were the project overview, attenuation pond options, fish offsetting examples, and the fuel farm/fuel shipping increase/general shipping. Once again, the general sentiment regarding the water management options and fish offsetting examples was that Chesterfield Inlet would defer to Baker Lake's judgment, as they were the ones most affected. As with other meetings, the use of traditional names was mentioned to be preferred over the use of made-up ones. The HTO showed the Agnico Eagle team a map that was made in collaboration with local Elders and governmental agencies to keep a record of the traditional lake names, which may be of interest for us to find. As we did not see one in Baker Lake, it could be an interesting project to look into.

The Chesterfield Inlet HTO was most interested in the shipping information and schedule – it was determined that another meeting with this specific information should be planned for the fall. It was mentioned that the fuel farm and construction phase would cause an increase in shipping. The HTO raised questions concerning contingency plans, possible compensation options, as well as having proper training for locals.

ATTENDEES

The Baker Lake and Chesterfield Inlet consultations conducted by the following people:

Anna Sundby and Nicola Lower, both consultants from ERM, facilitated the six focus group meetings in Baker Lake. Emma Leith from Agnico Eagle helped to facilitate all meetings and was the main facilitator for the three meetings in Chesterfield Inlet with the help of Karen Yip (Community Liaison Coordinator for Agnico Eagle) who attended all meetings as technical support and speaker (in Chesterfield Inlet). David Kritterdlik (Community Liaison Officer from Whale Cove for Agnico Eagle), attended all meetings but the Baker Lake Women's Focus Group and the Chesterfield Inlet HTO. David was able to help facilitate the consultations directly in Inuktitut, especially in Chesterfield Inlet, which was well received with the attendees who were more receptive to having the discussion led in Inuktitut. Lee Christophe Bouchard (Reliability Specialist for Agnico Eagle) attended the Baker Lake Youth Group meeting and the Baker Lake Open House as technical expert and Fuel Farm specialist. Amelie Robitaille (Summer Student for Agnico Eagle) assisted with note-taking except for the Baker Lake Hamlet meeting. Randy Boiteau (Community Liaison Officer for Agnico Eagle in Chesterfield Inlet) was present at the Chesterfield Inlet meetings. Patrick Roy (Agnico Eagle) attended some of the meetings in Baker Lake. Michael Haqpi acted as interpreter for the Baker Lake Open House and the Baker Lake Elders meeting as Alex Alooq was unable to attend due to a family emergency. Andre Tautu was the interpreter for the Chesterfield Inlet Open House.

YOUTH SESSION

NOTES from Consultation – Whale Tail Pit Amendment
Tuesday July 10, 2018, 4:15pm – 5:20pm
Iglu Hotel Conference Room

AGENDA

- Introduction of all participants, including consultants and Agnico Eagle team.
- Group to sign the Consent Form for Focus Group Discussion
- Mention of wanting to keep community in mind, which is why smaller consultation groups will give people a chance to discuss more and in more detail.
- Emma introduction to Agnico Eagle and brief project overview (Meadowbank, water management, offsetting).
- Anna Sundby (ERM Consultant) to provide details regarding water management, as needed for the Whale Tail Pit Amendment. Overview of the four options.
- Asking input regarding the four water management options.
- Nicola Lower (ERM Consultant) to provide details regarding minimizing impact to fish, and fish compensation in order to offset. Overview of the five examples.
- Asking input regarding the five examples.
- Opening for general questions and comments.
- Discussion regarding how best to contact or communicate with them for information on the mine.
- At the end of session, the group signed the Consent Form for Focus Group Discussion.

PRESENT:

Sally Kingilik
Krista Martee
Kristen Kablutsiak
Consultant: Nicola Lower, ERM
Consultant: Anna Sundby, ERM
Agnico Eagle rep: Emma Leith
Agnico Eagle rep: David Kritterdlik
Agnico Eagle rep: Karen Yip
Agnico Eagle rep: Patrick Roy
Agnico Eagle rep: Amelie Robitaille
Ian Tagoona
William Tapatai
Janae N

Introductions – Emma Leith

- This afternoon we will present you with project overview for a proposed Amaruq expansion, for the Whale Tail Pit Amendment and permitting purposes on Amaruq Phase II. This consultation is to get feedback and hear your concerns about water management for contact water pond, and fish compensation.
- Notes will be written about the session, but these notes will be for the purpose of keeping a record of what is being discussed today and It will be shared publicly. Is that alright with everyone?
    - Everyone nodded.

- Introducing Meadowbank, an operation close to Baker Lake. Emma asks if people went to site, three people raised their hands.
- We are making sure to keep in mind what's important to develop for them moving forward, which is why these events are important to us.
- Powerpoint slide about traditional knowledge and IQ gathering, how we're getting feedback and reviewing.

Water Management – Anna Sundby (ERM)

- Site has a lot of water to manage, which means we need a place to put it in the winter so we can treat and discharge it in the summer. We are looking at what our options are to store this water.
- Whale Tail Pit Amendment:
    - Map of project that is currently permitted (Phase I), construction to start this summer.
    - Phase II will include another pit and another waste rock pile. Currently planning for phase II, looking for water storage pond and fish offsetting.
    - Phase I will start construction in summer 2018, including construction of the Whale Tail Dike.
- TK and IQ
    - Past TK/IQ studies have identified harvesting sites, cultural sites, and areas of traditional land use. Maps show the area (including spring and fall caribou migration routes) as well as how people travel through the area.
- Water Management
    - Agnico has a plan for the first pit, but for Phase II we are looking at 750,000 m^3 water from seepage into pit and from surface sources like rain or snow melt.
    - We assume that any water that touches the pit or rock pile is "dirty" because it could contain metals and be harmful to fish. We need to treat the water before we let it go back to the environment. Stored in winter, treated then released in summer. We can't release water in the winter because the lakes are frozen.
    - Water coming off mine site will be put in attenuation pond ("holding pond") over winter until ice melts, and then treat and discharge the water. Already a water treatment plan set up, because same thing is happening in Phase I. The water will be tested for a lot of different things before it is okay to be released. It will have to meet the right quality standards.
    - Attenuation pond could be a pre-existing lake or pond, or a new man-made structure (like a swimming pool) or a combination.
- Where to put attenuation pond? Few possible alternatives and options.
    - We look at map, defined study area – green area shows watersheds that are already affected by the pit or waste rock. Watershed are areas where water drains from. Landscape defined by hills and valleys, and where the water drains is the watershed.
    - In addition to the watersheds, we want to keep the footprint of the mine small. The circle on the map shows a 2km boundary around the site.
    - From these definitions, 4 options:

        - Pond A-53
        - Pond A-54
        - Mammoth Lake
        - Taking two smaller facilities that are part of the project to use them.
    - 2 options contain fish, 2 don't.
    - When comparing these options we look at different factors that are important towards decision making: environment, people, engineering, and costs.
        - Do these have different impact on fish, land use, archeological sites, parts of community?
    - We want to focus on the things that are different – same impact on birds, for example, is not very important but if there are different impacts (on fish, for example), it is relevant.
    - Multiple Accounts Analysis
        - Think about how important different things are. Different people may think different things are more or less important when making a decision.
        - Do people find fish, or caribou (tuktu), or siksiks to be most important?
        - Does company find the important part to be, for example, the length of pipeline?
        - We can think about these values when we analyze options.
    - YOUTH question: will we put water back?
        - ERM answer: we store in winter then water goes through treatment to circulate it back – no difference between amount of water leaving and going in. Mine doesn't want to take more water than can be taken into system.
    - ERM question for the group: For the pond, we can make it a smaller area, but deeper and with a higher dam, or larger area but shallower? We could also use an existing lake or pond, or build something new? What do you think?
            - YOUTH Answer: use one (a lake or pond) that's already there.
    - ERM question for the group: If we're saying we're going to put a pond that's big enough for 300 swimming pools' worth of water, what might you be concerned about?
        - No answers (questions or concerns) from Youth.

Fish Compensation – Nicola Lower

- When we do things, we want to minimize impact. Meadowbank changes the environment but we also want to minimize impact by creating opportunities.
- By doing the Whale Tail pit, Agnico will impact fish/ponds. The government states we must do habitat compensation, to offset impact on fish – put more fish back into system.
- Canada Government came up with 3 kinds compensations: restore/enhance, create, or do chemical or biological manipulation (i.e. hatcheries). Company is not required to offset the exact same kind affected, so if Arctic Char is affected but Youth want another, it can be done.
    - ERM question for group: which fish do you like and how?

    - YOUTH answers: Lake Trout (1 person), Char (3 people), I don't like fish (1 person), I like it dried (1 person).
    - ERM question for group: do you fish?
    - YOUTH answers: no.
- If there are less small fish, there are less of the lifecycle of that species because the habitat will be affected – every habitat that supports a fish is important because it goes into which kind of fish you can catch later on.
    - ERM question for group: are there good hatching/fishing areas?
    - YOUTH Answer: Airplane Lake is not good, although it used to be.
- Compensation means we listen to which areas may be enhanced or bettered and we can try to help compensate. We came up with examples of what we can do for fish compensation.
    - We can build a hatchery.
    - We can create new habitat for minnow species.
    - We can improve water quality (i.e. airplane lake)
    - We can create channels for more feeding/spawning areas.
- Cards for options handed out for Youth to look at.
    - Example 1: Improve or create forage fish habitat
        - For the smaller fish.
        - Could create new shallow ponds and excavate, or create quarries (taken rock out) with empty areas left – suitable locations to connect to existing lake, add fish, this creates a habitat.
        - YOUTH question: Would it apply to all fish species?
        - ERM answer: not right away, first for smaller fish, then bigger fish would eat them. Not a spot to fish for big fish, more like an addition to ecosystem.
        - ERM question for group: is this idea exciting?
            - YOUTH answer: no answers, no physical responses.
        - Fish like variety in their habitat, high rocks and different channels to make it more interesting for them. Rocks and boulders are great for fish.
    - Example 2: Arctic Char Hatchery
        - Take male and female fish, mix eggs together to create baby fish. Hatchery would incubate eggs and these growing fish would be stocked back in the lake. This could provide an employment opportunity for the community. Catch fish in the wild, "strip" them (express eggs) and they're unharmed, put fish back. Helps them because you're essentially growing the fish.
        - ERM question: good or bad idea?
            - YOUTH answer: no answer.
        - YOUTH question: How many to work there?
            - ERM answer: not many because seasonal, but has studying potential, means new buildings.
        - YOUTH question: has this been done in Nunavut before?

            - ERM answer: No, but Yukon yes successfully, exists in Scandinavian as well.
            - Other countries have hatcheries, which doesn't solve problems but keeps amount of fish high.
        - ERM prompt question: would anyone want to work there?
    - Example 3: Access Enhancements
        - There are sometimes migration access issues, so in some areas people have to or might have to move boulders or help improve access.
        - ERM question: would you want to do that?
            - YOUTH Answer: no.
    - Example 4: Juvenile Rearing Habitat
        - Note: no particular engagement from youth, skimming through a little quicker because the group was getting less and less engaged.
    - Example 5: Improve Water Quality, Sewage Treatment Upgrades
        - Interconnected water system that is affected (Airplane Lake), but AEM is working on a water improvement system to get better water in affected areas to make it good for fishing again.
        - Note: same as above, hurried because it was clear the group wanted to leave.

General

- Any questions? Comments?
    - YOUTH comment: People like to hunt Caribou, go every season. They go for a few hours. Herd was over here not too long ago. People were as young as 7 when they started, they were taught by their parents (dads).
- How is best to contact people?
    - YOUTH group responses: Facebook, not bulletin board (some bulletin boards), Community pages, group mentioned they all used Snapchat a lot (not useful for this specific topic but could be noted for possible future engagements)
- Thank you for participating today, please make sure you signed our consent/sign-in sheet before receiving your honorarium and before leaving.

BAKER LAKE OPEN HOUSE SESSION
NOTES from Consultation – Whale Tail Pit Amendment
Tuesday July 10, 2018, 7:30pm – 9:00pm
Baker Lake Community Hall

AGENDA

- Attendees to fill sign-in sheet at entrance of Community Hall and get ticket for prize draw.
- Introduction of presentation team, beginning of PowerPoint presentation.
- Emma introduction to Agnico Eagle.
- Lee Christophe Bouchard to provide project update (Whale Tail) and discuss Fuel Farm expansion.
- Anna Sundby (ERM Consultant) to provide details regarding water management, as needed for the Whale Tail Pit Amendment. Overview of the four options.
- Nicola Lower (ERM Consultant) to provide details regarding minimizing impact to fish, and fish compensation in order to offset. Overview of the five examples.
- Opening for general questions and comments.
- Draw for door prizes.
- Option for attendees to circulate, look at posters or cards, provide feedback on projects as well as best communication method, and talk to the specialists regarding their topic.

PHOTOS: Appendix A, Photos 1 to 5.

PRESENT:
Male in attendance: 21 Female in attendance: 31
Gender not listed: 2
Consultant: Nicola Lower, ERM
Consultant: Anna Sundby, ERM
Interpreter: Michael Haqpi
Agnico Eagle rep: Emma Leith
Agnico Eagle rep: David Kritterdlik
Agnico Ealge rep: Lee Chrisophe Bouchard
Agnico Eagle rep: Karen Yip
Agnico Eagle rep: Patrick Roy
Agnico Eagle rep: Amelie Robitaille

Introductions – Emma Leith

- Looking to work closely with community members to get feedback on project.
- Today we are giving a project overview, specifically Whale Tail Pit and next phase of development, as well as the Baker Lake fuel storage increase.
- There will also be some water management alternatives and ideas/opportunities for fish habitat compensation.
- We want to hear your comments and feedback.

Project Update and Fuel Farm – Lee Christophe Bouchard

- Lee to present the Whale Tail Project Update.
    - This meeting's goal is to hear what matters most to the community, when figuring out the future of Whale Tail.
    - Permitting team success as they received a positive decision on November 6, 2017.
    - Received ministerial decision on February 15th, 2018.
    - Proposing to amend the permit to expand the existing pit.
    - Ultimately want to add 3-5 years to the Meadowbank operation.
- In need of expanding the fuel farm due to our future Long Haul Trucks from Whale Tail to Meadowbank, proposed constructions of new tanks are Spring/Summer 2019 (1st), Spring/Summer 2020 (2nd), 3rd tbd. All pending regulatory approval.
    - No comments or questions from attendees during Open House presentation portion, or question and answer period.

Water Management – Anna Sundby (ERM)

- "Do you think water is important?" → Multiple hands raised
- ATTENDEE: water is needed (confusion as to nature of the water comment… audience seems to be saying they want presenters to drink water)
- Anna summarized the attenuation pond process (holding water until it can be treated and released in the summer) and explained the 4 options. We are looking for feedback on these options, or other possible ideas, as well as naming ideas for ponds without names (A53/A54).

Fish Habitat Compensation – Nicola Lower (ERM)

- Summarizing that by having a possible effect on fish habitat, Agnico Eagle is required by law to offset this impact.
- Asking that community members let us know which fish species they like best.
- Overview of the 5 examples of fish habitat compensation examples we have.

General

- ATTENDEE (translation): "Welcome to Baker Lake, happy you gave update but I have concerns about Caribou. When you want to make lake bigger, obviously will be using explosives and come august, Caribou migrate down to Baker and through Meadowbank. We don't have ?freshwater? (presuming an error in translation – saltwater, perhaps?) here… only concern with lake or water containment is that caribou will be migrating when it starts getting dark from the North." (concern seemed to be that the height of the dams would obstruct the path of the migration, or otherwise confuse the caribou as these manmade structures are not a part of the natural landscape) → Translation difficulties.
    - Note: the team post-consultation interpreted the comment as based on the concern of potential height of a holding dam around pond A54 as a water management option.
    - That's exactly the kind of thing we want to hear, helpful comment for us to keep in mind.
- ATTENDEE (translation): "As June 26, I took a site readiness course at Meadowbank and passed my test. I'm now on call…" (More was said, but lost in translation. Information given in Inuktitut. Emma Leith clarified with commenter post Open House, was expressing concerns regarding expansion, jobs, costs and how it would affect locals)

Notes from the fish posters at the back of the room:
Providing photos of the fish in the area was a nice way to engage youth in particular. We asked children to write their name on post-it's and put on their favourite fish. Char was a favourite, along with stickleback (maybe because it was a nice clear photo!). Not many people knew the sculpins and stickleback were in the ponds, and some people didn't know the Inuktituk names for the stickleback as this was the first time they had seen these fish.
Attendee: More natural is better for the Inuit, move fish that are already there.
Attendee: Big lakes that don't freeze to the bottom are very important.

Notes from the water management posters:

A number of people were interested in looking at the maps of the area and describing where they go for hunting, fishing, and the travel routes to get there. Most of the places identified where relatively close to Baker Lake. People said they appreciate being able to use the Meadowbank road to travel by ATV. Some people said they used to visit the Amaruq area (mainly as children). Quite a few people reported travelling by snowmobile to Gjoa Haven in the winter; the routes varied and were generally east of Amaruq.

ELDERS GROUP SESSION

NOTES from Consultation – Whale Tail Pit Amendment

Wednesday July 11, 2018, 9:30am – 1:00pm
Iglu Hotel Conference Room

AGENDA

- Prayer.
- Introduction of all participants, including consultants and Agnico Eagle team.
- Group to sign the Consent Form for Focus Group Discussion
- Mention of wanting to keep community in mind, which is why smaller consultation groups will give people a chance to discuss more and in more detail.
- Emma introduction to Agnico Eagle and brief project overview (Meadowbank, water management, offsetting).
- Anna Sundby (ERM Consultant) to provide details regarding water management, as needed for the Whale Tail Pit Amendment. Overview of the four options.
- Asking input regarding the four water management options.
- Nicola Lower (ERM Consultant) to provide details regarding minimizing impact to fish, and fish compensation in order to offset. Overview of our five examples.
- Asking input regarding the five examples.
- Opening for general questions and comments.
- Map labeling, fish name corrections.
- Discussion regarding how best to contact or communicate with them for information on the mine.
- At the end of session, the group signed the Consent Form for Focus Group Discussion.

PHOTOS: Appendix A, photos 6 to 12.

PRESENT:

James Kalluk
Edwin Evo
Philippa Iksiraq
Winnie Ikinilik
Hugh Avatituq
Simona Scottie
Consultant: Anna Sundby, ERM
Consultant: Nicola Lower, ERM
Agnico Eagle rep: Emma Leith
Agnico Eagle rep: David Kritterdlik
Agnico Ealge rep: Lee Christophe Bouchard
[1]Note: Alexander Alooq was set to interpret but was unable to do so as he had a family emergency. There were a few difficulties with the last minute change, and due to Michael's

Hugh Nateela
David Owingayak
Matthew Kunangnat
Vivian Joedee[1]
Joedee Joedee
Peggy Aittauq
Interpreter: Michael Haqpi[1]
Agnico Eagle rep: Karen Yip
Agnico Eagle rep: Patrick Roy
Agnico Eagle rep: Amelie Robitaille

inability to translate in real time, a few things were lost in translation.

Introductions – Emma Leith

- Emma thanks Elders for joining us, introduces herself and her role within the organization. Explains that today's meeting is related to our permitting process and community relations process. We want to make sure to incorporate TK into our design plan, as well as to understand what is important to Elders and community with respect to land use. Part of today will be a short project overview (seeing as most present today were also at last night's open house). What we're looking for today is feedback – there will be a few options about water and fish compensation. Another important aspect is for us to understand how they would like to receive information/updates, whether radio or meetings, to ensure the group receive information in the best way for them.
- Elder raises hand – makes comment (translated) for translator to speak louder. Meeting was paused in order to get headsets and allow time for the interpreter to arrive.

Water Management – Anna Sundby (ERM)

- Anna thanks Elders for having us today, and explains that she works for companies like Agnico to understand use of the land around projects. Anna introduces her colleague Nicola and explains that she is an expert on fish. We are hoping to learn from them about what they think is important in terms of areas around the project, and fish, and the environment, so we can help ensure the project has as little impact on the environment as possible.
- Anna says she lives in Vancouver, that this is her first time in Baker Lake and yesterday was the first time she went to Meadowbank. As such, she may ask a lot of questions because the Elders know so much about the area, and she wants to learn from them.
- Briefly, about the project. Anna asks if everybody knows about the Meadowbank mine (she shows a map of Meadowbank, points out Amaruq). Anna says Agnico is starting to build a mine at Amaruq. Currently, we have plans and permits for one pit and one waste rock storage facility. We are looking at potential impact associated with the plans regarding Phase II of Amaruq which will make the one pit bigger, the addition of another pit (for a total of two pits), as well as an underground mine, and another waste rock storage pile. Agnico is trying to keep the footprint as small as possible and there are no tailings and no processing at the Amaruq site, we will truck the ore to Meadowbank. It will be much smaller here (pointing to Amaruq) than at the Meadowbank site.
- One of the questions we have at Amaruq is about where to store the water at site. There will be groundwater coming into the pit and in the summer, Agnico will treat the water to make it good quality and then the clean water will be discharged to Mammoth Lake. In the winter, we can't discharge water to the lake because of the ice so we need a place to store the water over the winter. What happens is we collect water from the mine, to keep water with metals or contaminants from the mine separate. We collect water from the mine and put it in a pond for

the winter. This pond needs to be big, so it will be like a small lake or a large pond at the site. When the ice is gone, the water will go to a water treatment plan which is just a little building that makes the water clean again, and then the clean water will go back into the environment.

- Our question is where can we make or build this pond?
- We want to keep/make sure the pond is within a close distance to the site so we can keep our impact in one area. We believe we have four options as to where to put the pond.
- Note: Anna asks Nicola to help Elders follow along the maps. Anna presents option A53 first. Anna circles the pond to make it clearer to Elders.
- Emma asks if everyone is clear as to where the pond is in relation to Meadowbank. Clarifications are made.
- Anna says another option is there are two small ponds and we would build a dam on one side, and a dam on another side. We would then fill up the valley between the dams to make one big pond, which would contain the water collected from the mine before it goes to the water treatment. There are fish in these ponds, so we would have to take the fish out before we build the pond.
    - Anna says we heard people were concerned about the height of dams yesterday so she specifies that both dams would be, in this case, 5 meters high.
    - Anna asks if there are questions.
    - ELDER: what will the dams be made out of? If we make the dams out of gravel, when it starts melting, how will water be kept in there?
        - Anna says it's early and we don't have specifics, but we would make sure that the water won't leak out. People who are experts in building dams would be involved to make sure they are constructed properly.
    - Anna asks if anybody knows another name for this pond.
    - ELDER: every area has a name but those two are smaller so they don't have names.
    - ELDER: Because Inuit have been in and out all over the place, even to Amaruq and Meadowbank, so they have name and stuff.
    - David: they can identify next time.
    - ELDER: we know the major area and the big lake/major areas have names, but the name for this camp area is (something), but the big name is Amaruq.
    - David: we have to be careful about traditional names, there are names for that, but the name Amaruq is very traditional. When Agnico came to the site, maybe someone saw some wolves, and that's probably why they named it Amaruq. But Amaruq is not how the Inuit know the area, and we shouldn't ignore the traditional name because we call it Amaruq.
    - ELDER: Lake for the Elders, winter or summers, know every little area in an area like Amaruq, know every little area, have name for it, the people who were born earlier than us.
    - Anna says we call this area Lake A53, because we don't know another name for it, asks if we should give it a proper name or if it's better not to give it another name, because we want to be respectful to the lake and the people who love the area.

- David: keep in mind even if we give small pond a name, none of them (the Elders/Inuit) would know it by this name. If we are looking at 2/3 of them, there are already names for them, so if we put a name on it and know where it is, that's okay but have to understand that is has no meaning to them.
- ELDER: Naming, especially for mining exploration, something that has to be used (naming Amaruq), they don't know where it come from so if we do anything over there in that area we should find out from local whether there is a name before giving it one. For Whale Tail, there is no whale up there so the name makes no sense. If we are going to name something, it should be done with locals.
- Anna asks if there are other people who know more about this area. David says they're here.
- Emma asks if we name it, what would the suggestion be?
- ELDER: There are so much difference between IQ, TK and technical knowledge that so much difference between them that it's hard to mix them together in a short period of time. It takes time to get one side to understand what one side is trying to say. The elders know the land, but once we get info about this with a new name, there is no name yet.
- David suggestion: we pick name for it and keep it within group to use it, but not external – we should just call it A53.
- Emma asks, if we are trying to gain TK in the future, would it be more useful to go physically to see where we are talking about (i.e. go to Pond A53) (one Elder nodded)
- ELDER: what is the attenuation pond right at the Amaruq site (confusion in translation)
- ELDER: I has been hunting and stuff in White Hill area, there is a creek that is frozen near Baker that looks kind of dirty, what is it that's flowing near Baker area and White hill area.
    - One Elder says it's muddy water.
    - Nicola asks if it has changed.
    - ELDER: Could pond be used right now summer underground and wash spring time in area (David translation, unclear)
    - It was noticed recently that the water is muddy. The area is somewhere "around here" (Emma circled on map; see Photo 12)
    - ELDER: last year the road was washed out and then was running down to the lake, but was not water problem, just a bit muddy in the water.
- ELDER: asks for size of lake.
    - Anna says it will be 28 hectares.
- ELDER: asks if there will be fish.
- ELDER (translated by David): even lakes that are shallow freeze all the way to the bottom. Fish are cold blooded and will be alive again. We have to keep in mind, a shallow lake may have a fish, but doesn't mean only deep water lake any time make sure that fish in them or not. Given that pond or lake freeze all the way down there will be fish in them. They will freeze into the ice, springtime will thaw out and swim around.

    - ELDER: there has been so much drain that most of lake used to be higher are lower and hardly any rivers anymore, most of time not going up.
    - David wants to see change (in lakes/winter, seasons? Uncertain)
    - ELDER: there are a few lakes that freeze to bottom, become alive when it melts, but in smaller ones, some fish freeze to death. Some stay alive right through.
- Anna says second option is… conversation interrupted, questions from Elders.
    - ELDER: they know every lake around Baker Lake, but nobody gets water in between that water because something wrong with it (unsure which lake or river they are talking about)
    - ELDER: There are fish in here, how will we defish the lake.
        - Answer: we drain lake, catch fish, but them in another lake, then we will compensate to make up for it.
    - ELDER: will we do it for small ones too?
        - Answer: yes, including small stickleback, small trouts, young ones.
    - ELDER: fish can hide anywhere under rocks, etc. You might miss some fish
        - Answer: that's why we drain the lake, to avoid missing. Elders would be welcome to come in the process, help and see.
    - ELDER: The fish can hide anywhere, even in sandy areas, it might be hard to find some of them.
- Decision made to move on to fish discussion.

Fish Compensation – Nicola Lower (ERM)

- David summarizes it might be hard to get all fish drained, because of hiding and other stuff, which is why we are thinking about options to compensate.
- ELDER: to every lake, major or small lake, big pond, they have in major area, names (even around Amaruq and Meadowbank area), they recognize lakes and have name, they don't know some of them but haven't changed, but they have names.
    - Anna says we understand that. Emma says it seems like in the future it would be best to get a group of Elders together to actually go to the location.
- ELDER: People who had lived in that area before should be taken up there, because if they went up there they would know the area. Should be taken who were born or lived up there.
- Anna says in terms of the options we have, with some smaller and bigger dams, we will walk around and show on map.
- Option 1: take two small ponds and make one pond. There are fish.
- Option 2: another small pond, and make really big dam to go almost all the way around it. No fish will be disturbed (no fish in pond).
- Option 3: the Elders were all involved in consultation two years ago about Whale Tail Dike/Lake – here we would put a similar dam across Mammoth Lake (end of it). Water from mine would be stored in it, separate from mine site.
    - ELDER: you have to be very careful in which area you walk on because some lakes with fish, some lakes with no fish.

- Anna: that is what we want to talk about. Sometimes, is it better to have an option with fish but a smaller dam, so we take to fish out, or an option without fish but bigger dam?
  - Nicola asks if people have thoughts about Mammoth Lake option with a dam.
  - Emma asks what's most important as a factor for them, fish, height, etc.?
  - ELDER: They don't want fish or any animal to be moved from their habitat. For example, you've seen polar bears in zoo in Winnipeg, it becomes something else and changes completely.
- Emma asks David to talk to the elders and explain that these are the 4 options we came up with but they can help us come up with better ones.
  - David: what I'm trying to explain is we are trying to find an idea.
- ELDER: When you move fish or any kind of animals it never gets naturally fat or nutrition it turns into different animals.
  - Anna says we'll keep that in mind, understanding that the preference is to avoid moving any fish or animals.
- ELDER: we want the lowest elevation, the lower the better for less mixing. (Lower elevation being the lowest part of the catchment, so that it is easily contained and doesn't affect areas downstream)
- ELDER: I would take 3rd option, Mammoth Lake because it is the lowest elevation (confusion because there are fish, but this Elder thinks no fish)
  - Option 2 is small pond with no fish but we have to build a big dam.
- Anna asking if preference is no fish in lake but more infrastructure. Seems like people prefer options where fish aren't affected.
  - David trying to explain.
- ELDER: When you're cleaning animals people don't use, people cut out part of animal it completely changes the taste. When you're cooking a potato it taste like a potato, when you change anything it changes taste.
- Emma asks if the preference is the least impact to fish and least impact to environment.
- ELDER: Don't disturb the big lake. The first 3 options are the ones we should discuss, they are better options.
- Nicola says that Whale Tail Pit expansion will have impact to fish, whether the option we choose has fish in it or not. There will be some impact to fish, we will try to make it as small as possible, but still will be some. Nicola has ideas on how to make things better for fish.
- Nicola says the other thing we need today is ideas for how they would like to see fish compensation.
  - ELDER: if you're going to bring any fish to the elders or anybody in town, you have to freeze the fish right away, don't clean it! Just freeze it as soon as it's out of the water and bring them to town frozen and uncleaned.
  - Anna asks which fish people prefer.
  - ELDER: Freeze them right away, we want to clean the fish ourselves.
  - ELDER/David: mentions how you fish what idea there are to get fish from one pond to another. Another option is a hatchery.

- Asking Elders if they have preferred options about the projects we have to make things better for fish.
- We hand out sheets showing different fish habitat compensation options, so they can see photos.
- Hatchery is where we take Arctic Char (or other fish species), grow them and put them back in the lake.
  - Does anyone have any thoughts on the hatchery?
  - ELDER: If the fish in the hatchery, will we release them to a lake with different fish and can we fish the fish in the hatchery, but the hatchery is uncanny and changes them.
    - Nicola says we would take the same fish from the hatchery, to make the fish and put them back in the same lake.
  - ELDER: even small fish like these eaten by bigger fish so if we move them it's best to move to a bigger lake because a hatchery turns them uncanny.
    - Anna: we take baby fish, give them a safe place to grow up then put them back in the wild.
- Other option is that we could improve access between lakes, making new places for fish to go.
  - Do people think there are less deep lakes but that they are important to have?
    - ELDER: There is a something between fish here and there, but usually we know big fish feed on small fish.
    - Nicola says we could find a lake with less fish and put more fish in.
    - ELDER: if you put the small fish to a close lake when they get bigger you can release them to an actual lake where they will live.
    - David: keep them here, let them grow, then release them to bigger lakes.
    - Nicola: do they know bigger lakes? Any specifics?
    - David: keep them alive somewhere, if you're talking about giving them time to grow.
  - Anna asks David to clarify that this is a separate project, that we are looking to provide residents of Baker Lake with compensation in increasing fish around here.
    - Elder: think we should get what kind of an idea about options and then choose.
  - Nicola asks to have David specify that we're looking for any idea about fish near here.
  - Nicola asks David if there are any areas where streams or lakes aren't as good as they used to be, or if there are areas where fish aren't as good as they used to be.
  - ELDER: option 2.
    - Anna: what about option 2:
    - David: for the pond.
    - Anna: no fish, but a big dam?
    - ELDER: yes.
    - Anna: is that because of less impact on fish?
    - David: I don't know. Not to disturb fish maybe.
  - (Discussion in Inuktitut)
    - Translation summary seems to be that we should talk about options.

        - They don't want Mammoth Lake.
    - Anna explains option for David and how it's related to this summer's projects.
    - ELDER: we don't know the area.
    - Anna: but keep the impact on fish to a minimum?
    - ELDER: option 1.
    - Anna: From what I've heard so far, you prefer to avoid using a big lake that has fish in it? And you don't like the idea of moving fish from one lake to another because it changes the fish?
    - ELDER: he'll make up his mind when he sees the option.
    - Anna: this is very early right now, we have ideas and are here to talk about them, there is more work to be done.
    - ELDER: I probably won't pick an option today because I want to understand all the option.
    - Anna: you don't need to pick an option today but if you have a preference we are happy to hear it.
    - Anna: I think what we're hearing is that fish are important and we need to be careful with the fish. The other thing is if you have thoughts over lunch about projects you want to be done around Baker Lake or in the region, let us know. Like getting more small fish to feed the big fish, or making connections between lakes for fish to have more areas to go to, which would hopefully (with deep lakes) give them more water access over winter. There is also sewage treatment, if there is an area where the water is not so good (muddy or sewage) then we could do something to make water better. If any of those make you excited about fishing or would be good for people living in Baker Lake.

Break for Lunch

General Questions and Notes

- We asked an Elder if they like fishing for char or would like more, and they said yes. Some char in Baker Lake migrate down Prince River and catch the char in the rapids. Good fish to eat. Prefer over trout.
- Asking group same question
- ELDER: preferable if you're meeting with elders decide first what to talk about (inform them ahead of time perhaps)
- ELDER: not too many of the Elders now who know about the area.
- Would people like more Arctic char?
    - ELDER: If you move any fish, there are different fish and they will eat all kinds of vegetation… No moving fish.
    - What about bettering habitat for Arctic char? No moving them?
    - ELDER: You have that area but if you move fish or change habitat, the fish are going to be negatively affected.
    - ELDER: If you move any char, move them near where they are from.

- We will not move Arctic char from this area, that's not what we're looking to do, we're looking to add.
- ELDER: there are different kinds of colours on white fish, there's more orange to them than white fish here, so if you move fish it will change that.

- If there are things to do to make fishing better around Baker Lake, please let us know.
  - ELDER: If you give some fish away, some people will get them and some people won't.
  - They did last time but we don't know at the moment.
  - ELDER: that's ok.
  - Karen: on the radio and Facebook there is talk about this, usually divided in two groups, some for human consumption and other
  - ELDER: if you put them or any kind of fish into a freezer for any kind of time they get uncanny taste.
  - Karen: It's usually shortly after you catch fish and given out right away, short period of time.
  - There is fish that looks like a trout in closed area, not going to Ocean, but is different.
  - Red colour means close to spawning (more information not specified)
- Two dialects of Inuktitut in Baker Lake.
- There was discussion around the different names for fish in Inuktitut, and that it depends on where the fish comes from and whether it is an adult, or been to sea. The group added Inuktitut names to the poster showing fish species in the area.

- Gentleman used to live off the land, travel to Gjoa Haven in summer, in winter had own dog team (walk in summer), hunt for Caribou and fish, his father taught him his skills and how to build an igloo, was born in Back River Area. He misses being on the land, taught him to survive in the cold.
- Note, careful when translating because of the different dialects. We have 4 different names for char, some based in different life stages and other names are based on dialects.

WOMEN FOCUS GROUP SESSION

NOTES from Consultation – Whale Tail Pit Amendment

Wednesday July 11, 2018, 1:00pm – 2:50pm

Iglu Hotel Conference Room

AGENDA

- Introduction of all participants, including consultants and Agnico Eagle team.
- Group to sign the Consent Form for Focus Group Discussion
- Mention of wanting to keep community in mind, which is why smaller consultation groups will give people a chance to discuss more and in more detail.
- Emma introduction to Agnico Eagle and brief project overview (Meadowbank, Amaruq, water management, offsetting).
- Anna Sundby (ERM Consultant) to provide details regarding water management, as needed for the Whale Tail Pit Amendment. Overview of the four options.
- Asking input regarding the four water management options.
- Nicola Lower (ERM Consultant) to provide details regarding minimizing impact to fish, and fish compensation in order to offset. Overview of the five examples.
- Asking input regarding the five examples.
- Opening for general questions and comments.
- Discussion regarding how best to contact or communicate with them for information on the mine.
- At the end of session, the group signed the Consent Form for Focus Group Discussion.

PRESENT:

Hannah Tunguaq
Elizabeth Iksiktaaryuk
Martha Haqpi
Jennifer Qaqimaat
Consultant: Nicola Lower, ERM
Consultant: Anna Sundby, ERM
Agnico Eagle rep: Emma Leith
Agnico Eagle rep: Karen Yip
Agnico Eagle rep: Amelie Robitaille
Sarah Peryouar
Jean Simailak
Eloza Piryuaq

Introductions – Emma Leith

- Emma thanks women for joining us and says she's new to Nunavut team but has been with Agnico for 11 years. We've always been incorporating TK into our planning and development but want to do more of collecting TK and land usage, understanding what's important for the community. When doing development and production we want to put the communities' priorities into account.
- To have them tell us feedback, and let us know how they want to receive updates.
    - With a way for them to ask us questions.
- All but one in the group was at the Open House the previous night.

- We would like to get input not just on fishing option but also about the company, or feedback from them as sisters, daughters, mothers, wives, or workers at the mine and how Meadowbank can continue to do well or improve.

Water Management and Project Overview – Anna Sundby (ERM)

- Asking women if there is something they would specifically like to start with, no specific ideas.
- Meadowbank has been open since 2010, so for 8 years they've been closest people to it.
- WOMEN: Meadowbank site looks like an amauti (the parka worn by Inuit women of the eastern area of Northern Canada with the built-in baby pouch just below the hood).
    - Note: it has been speculated post-consultation that the women were referring to Whale Tail Lake's shape as resembling an amauti.
- There will be a small site at Amaruq, and what Agnico is proposing is a phase II which would make the first pit bigger, put in underground mine parts and open a second pit to the north along with another waste rock pile.
    - WOMAN: will that make a tunnel?
    - Answer: no
    - WOMAN: At Amaruq?
    - Answer: Yes
- Anna says part of the new project is to make as little impact to environment as possible, so looking for impact on fish, wildlife, air and water quality, etc. Although there will undoubtedly be impact on fish.
    - WOMAN: Mentioned if we happen to find places where people may have had artifacts or grave sites, has it already been discussed where they are or is that coming up?
    - Answer: one grave site has been identified but far from site, although that will be monitored.
    - WOMAN: a group hunted around there, so they will come, there are graves, it's part of people coming down from Gjoa Haven.
    - Answer: did do archeological study at Whale Tail lake, grave site away from water and at top of hill, couple of km from where mine site is built. Important part though, here, doing a thorough search beforehand to find anything tangible as well as talking to you guys (for example if people from Goa Haven may come down to area) to make sure we check.
    - WOMAN: make sure to check Kugaaruk and Gjoa Haven with them since their families have been around there.
        - People go up there and come down, family to see. They get there with snowmobile takes 2 or 3 days depending on weather, but not summer – although still do spring.
    - WOMAN: some of the fish and title that will be taken out from lake up there would be nice to have pictures of the fish since they described five. Some of the fish were confusing sounding and seemed like little minnows but different.

- Anna brought poster of the fish out, women congregated around them, the women looked at the fish and the name, adding corrections to names.

Fish Compensation – Nicola Lower (ERM)

- Phase II will mean bigger pit which will go over small ponds and lakes, and will encroach on areas we need for water management. We are trying to come up with ideas that will be less impactful for area although still will be. We want to compensate to put some fish back into area – what would the community like to see? Small fish, stickleback, are important because although nobody catches them they are important towards the food system. Looking to maybe build new areas for them, habitat,
- WOMAN: how do things like that work out in other parts of the world, because it's the first time for us?
    - Meadowbank project did some compensation by building spawning pads in lake and added rows of gravel out, increasing numbers. Part of government and permitting we need to study for years after it to prove it is working and KIA would be part of it. In NWT where there are diamond mines we built new streams and channels and fish went there and it worked. We would monitor.
    - There are other fish options, lake trout and char. Do you have preference?
    - WOMEN: (some) both good, (others) I only know char.
- Sidetracked asking what Mammoth Lake name is in Inuktitut because there is no Mammoth Lake.
- Cambridge Bay was identified as having the best fish (Arctic char)
- Is there interest in this?
    - WOMEN: do you have Inuk working with you?
    - On this project or Agnico?
    - WOMEN: both consultations and Agnico.
    - David was supposed to be here but we're trying to get community representation in each community, something to happen at on a community relation level. Inuit help us understand land use, but we want to find ways to cooperate with local people such as with monitoring.
    - WOMEN: but do you have a lady working with you?
    - We do have about half and half, depends who is around, but we hear you. In terms of partnering it could be jobs for fish projects or schools and kid projects so they can learn.
    - A big goal for us in environmental monitoring is ideally to have all staffed by Inuit employees, they know it best and people working for us is a layer of transparency and they know what's going on.
- Do a lot of women fish?
    - WOMEN: yes.
    - Just Arctic Char?
    - WOMEN: also white fish and grayling (but not at site)
- If there is interest in adding a grayling project we can,

- Is fishing still good?
    - WOMEN: depends on the year, some fish are skinny, they still serve us we give them to dogs, but they don't always eat it because not enough meat.
    - Is that a change or were they always skinny?
    - WOMAN: depends on how old they are
    - Are there lakes good for fishing but isn't anymore? We heard of Airplane Lake?
    - WOMEN: yes, Airplane Lake is no good anymore because of sewage.
- Agnico is looking for sewage treatment projects as a compensation project because improving water quality improves fish habitat. Commissioned study to go with researchers to sample water to see how best to treat water.
    - Water treatment sewage is an option for compensation especially if they think it would help them and are very interested. South/East of it flows down and people fish there, used to fish trout. Sewage lagoon closed down and cleaned out with new water would be of interest to them (women said this) but we can't do that exactly, we would have to improve water and test it to make sediments stay at the bottom.
    - WOMAN: every year winter, snow melts, goes to where lagoon is.
    - They started taking water samples to see if water is clean or if dirt is in sediment for contaminants. Must take samples over time.
- Any fish habitat we get rid of, we have to put more in (than we take out). Often Government Canada will ask for 2:1 ratio. Once mine finalized we look at pit, and lakes and rivers then look at quality of habitat. We have to come up with compensation to come up with new habitats and fish, add more than getting rid of. So when talking of sewage treatment as an option we can look into partnering to help but we also need possibly more tangible projects alongside. It can be ongoing, immediate, species in Amaruq or from other areas.
    - It's hard to prove and is challenging because it takes a long time to show it improved, if we were to help with the sewage. There are other projects which could show other benefits too.
    - Is it a good idea to put time and money to add char instead of trout?
    - WOMAN: what about both? Three – White, Trout, and Char.
    - WOMAN: Chars are strongest of lake, and white fish, fighting to go up rivers. There are areas of river hard to pass for Chars. Lake Trout and White fish just go for lakes and rivers. Char, Lake and up rivers.
    - Nicola: in another community, there is a problem with char migrating from sea to freshwater and low water levels with boulders so a community project was to move boulders, allowed Char to get to spawning grounds more easily. Are there areas like this here with barriers?
        - WOMAN: Prince River could have a barrier. Around there connected or close to the bridge, where George's cabin is and where the rapids are. Bridge would be place for us to look at to get a better idea. Prince River connected up there too. Better to go up when it's windy because there will be less mosquitos.

    - WOMAN: when taking fish from different lakes do you put them together or separately?
    - We try not to move fish from lakes, so i.e. at Amaruq they put a Dike in (mine on top of Whale tail and move fish from dike to other but is same lake. If the pit is expanded and goes over small pond, take fish out with ponds and put it in a nearby pond with same habitat and species.
    - WOMAN: years to come and fish on landing they should check fish first to see if fish are contaminated (Landing Lake or Airplane Lake).
    - Do a lot of families fish at Prince River?
    - WOMAN: yes, all year round. Road to there and a trail.
    - People go there and that's why there's a trail, people were already going there before we came around.
    - Would adding trails help? Yes. Where? They are talking about it.
  - Nicola: do you know why some years fish are smaller or bigger?
    - WOMEN: springtime is really fast.
    - They don't see dead fish in river, water is so deep.
    - WOMAN: spring we were coming back near point, grandchild was walking and saw a tiny post between the ice.
  - Nicola: have you driven up the Meadowbank road?
    - WOMEN: yes (some said no), they come back dirty. It's really nice going up now though, smooth. Went up on Nunavut day. They should fix the Baker Lake road too, Equipment drivers should learn from Meadowbank road.
  - N: have you seen quarries? (yes answers). One idea is to create a channel to existing lake to create a habitat, which wouldn't move fish but allows them to move like juvenile lake trout to feed.
    - WOMEN: they would have to do it themselves?
    - Yes
    - WOMEN: what if they don't survive?
    - Part of monitoring, we would have to prove it works and it's deep enough so they don't freeze and make sure vegetation could grow, move boulders.
    - WOMEN: aquariums have oxygen machine to help them breathe, could we have something like that to help them breathe, or just make sure the fish in those can get oxygen.
    - We can create more habitat to make sure fish could more naturally. We're responsible to make sure it works. (WOMEN: next generation not for us) we want to make sure it works as it should.
    - When lake freezes we drill hole and add probe and are responsible to measure oxygen and prove it was or wasn't clean. These reports would be available to everyone.
    - WOMEN: there has been training done here.
    - Yes and we want Inuit to do these jobs, all positions to be filled with local workers. Each option has job creations, not just mine jobs but also environment

jobs to improve quality of fish, whatever that looks like for you and how you prefer it, with bonus of employment.

        - Other idea is flooding. Existing lake, sometimes create dam. South of dike after mine closes, water floods and gets spread out so land around becomes lake and new fish habitat – would you mind/like/hate?
            - WOMEN: comes down to what is there for our ancestors. (traditional camp sites, possible graves, etc.) Why I mentioned having other three communities in area to make sure there is nothing.
            - Also wildlife to make sure we don't block path. But we will check to archeological region, and we are getting closer to their Kitikmeot region, ancestors buried there.
        - WOMEN: don't want them to come back and complain that you didn't start with them.
        - When talking about different options in this stuff, such as flooding, creating habitat, what is most important consideration for you, making sure as little impact as possible or good quality of fish, or other?
            - WOMAN: Biggest concern is having least possible negative environmental impact (multiple agreements).
        - Interested in more char and fishing, how do you feel about a fish hatchery/nursery? Creating building, tanks, employ people, go to Prince River, get a male and female, mix their eggs and grow small fish in tank, release fish back, and when juveniles are grown you put them back in the environment.
            - WOMAN: would the male and female survive if you pick their eggs?
            - Yes, a lot of areas in the world do it successfully.
            - WOMAN: so like a fish pond?
            - Yes, for small fish. We would have to prove and monitor it works here though. Instead of incubating in gravel in water, they would incubate in tanks then be put back.
            - Only when a certain age they would survive and when egg yolk is gone and can fend for themselves, they go back. In sensitive period of time they are not exposed to predators, lack of oxygen or harsh winters, so they go back then.
    - Emma: what changes taste of fish? A gentleman was concerned about changing taste of fish. Like for example different environments?
        - WOMAN: Baker Lake all year round but more people fish in spring it isn't cold but only reason. Depends on the person and their preference, but not because of fish taste.
        - WOMAN: Sea char do taste different than land locked, from Cambridge Bay.
        - WOMAN: In part areas they are completely different, like caribou. They agree that it tastes different depending on the foods they eat.

- WOMAN asking about caribou migration route in the Amaruq area, if they do any calving in the area, we aren't sure if they do but calving grounds are not there.
- Emma: are you familiar with our agreement about caribou and how we stop work during migration? We aren't allowed to disturb caribou, and yesterday we couldn't fly because of it
  - WOMEN seemed happy, said it was good
- We are conscious about not disturbing wildlife and fish.
  - WOMAN: have they been stuck there?
  - Yes.
  - WOMAN: do you stop hunters?
  - No, can't tell Inuit to stop hunting, it's your land, but can't shoot gun close to site for safety.
  - WOMAN: no calving ground near Amaruq project?
  - No.
  - WOMAN: there is wolverine and fox around
  - WOMAN: they are quite far
- Caribou seemed to be important and fish too, but they said they don't need grizzly bear. A woman goes hunting for fox and wolverine, just kills, skins, fleshes them and send them off. They only eat Muskox , fish and Tuktu, rarely carnivores.
- WOMAN: is there something else we can talk about?

- Emma has been wondering about how community wants to be contacted with updates about the mine. Do you like these meetings or prefer radio meetings or big town halls?
- The conversation went another way:
  - WOMAN: I have question, years before they usually hire 18 students (and over) but this time they don't have any summer students hired. I was wondering why they stopped.
  - Emma will get Patrick for HR, but in Community relations we have 2 Inuit students, not sure which community from.
  - WOMAN: mentioned that they aren't hiring summer students at mine, but it's 19 and over. They did before and they should continue with the program. I think it's really important for students to study or something and know more about mining. Useful to have programs especially because students will look for jobs for after school and want to get experience.
  - Emma, says she knows we have relationship with Nunavut education department and introducing programs starting in middle school, then summer student and transitions into full time employment. Emma explains how her own role within company has grown and how there are similar options about Haul Trucks and growing within company,
  - WOMAN: my brother worked for Agnico Eagle for years and was promoted and promoted and told he would become a manager but someone not from North told him he had to quit. That person wanted to be the administrator even though people could see her brother would be great, but that one person kept pushing him away. He hasn't worked in three years now.

- Emma says we are working hard on these development programs, and we are trying to improve, we have created HR Inuit Agent to build a bridge between people.
- WOMAN: told her supervisor that person, but the supervisor was unable to get anywhere either.
- WOMAN: other incidents like this happened. People are qualified enough but are belittled, told they don't know what they are doing but they do. Others are more vocal and good at hiding their own inabilities and make it look like their own inability is from the other (Inuit) person rather than themselves.
- Emma heard this a few times and will follow up with Patrick. Our goal is 100% local employment at all of our sites, full Inuit workforce so if that's a barrier it's an issue that needs to be addressed.
- WOMAN: they talked about that at meeting at Meadowbank, they try to stop this they say, they have 2 Inuit people working there to help deal with it.
- Is the inuit channel helpful?
- WOMAN: one said yes, others said no. If you have connections it helps, otherwise no. Right now there is a lady from Arviat, one from Baker, one French lady said they want to know if there are problems right away, like bullying or language but some of them are having problems speaking out.
- Is that because they don't feel comfortable or a culture barrier? What are some solutions we could come up with.
- WOMAN: having both a female and male (equal gender representation). Some men don't like talking to ladies. Some people are shy and not used to it, and when a person doesn't say things often and find themselves needing to talk about something serious they are dealing with, like if they don't say it right away because that's how it should be done since they want to figure it out themselves, they may be seen as a troublemaker when they do speak (which was said to be the issue with the brother).
- Mine manager can't fix a problem when they don't know what is happening?
- WOMAN: if I have problem and tell it to my supervisor, who does my manager talk to?
- HR. But if doesn't work or supervisor don't see eye to eye, asking about system.
- Have they heard about our grievance mechanism, Tusaajugut. Questions about it.

General Questions and Notes

- Appears as though family issues come up such as when a worker escorts a family member to somewhere far for health reasons, but have to stay longer because of health issues, but because they are gone too long (at Meadowbank) they were released.
- Emma says as far as she understands, with proper documentation and doctor's notes, an escort should be protected from being fired but she will follow up regarding policy. Emma will look into the medical leave policy. Asked the women to include their email addresses so she can get back to them

- WOMAN: the Inuit employee are healthy but family may not be so asking about extenuating circumstances and leave in case her nephews or their cousins have a relative who passes away, to have time to go home.
- How would future conversation formats work best?
  - WOMEN: they like small groups with just the ladies, big groups don't work well, good for short general information about the community but this is better. On the radio might be more acceptable for people who may not be able to go down. Some people may not be able to talk in person.
- Emma said we realized recently we need to support community better with family issues or community, or spousal supports (woman said maybe counselling supports), Emma mentions sewing groups we used to have, but that we want to find out how to best support employees in these kinds of situations. We would like another meeting maybe in a few months.
- WOMAN mentions elders should go up to site every so often for emotional support for workers.
- To have another session soon to see how we can best support the community, in situations like family situations.
- We had a counsellor and an elder as well as priest recently on site which was apparently well received, perhaps should do it more.

HAMLET SESSION

NOTES from Consultation – Whale Tail Pit Amendment

Wednesday July 11, 2018, 3:15pm – 4:00pm
Hamlet Council Chambers

AGENDA

- Introduction of all participants, including consultants and Agnico Eagle team.
- Presentation conducted verbally.
- Emma introduction to Agnico Eagle and brief project overview (Meadowbank, water management, offsetting).
- Anna Sundby (ERM Consultant) to provide details regarding water management, as needed for the Whale Tail Pit Amendment. Overview of the four options.
- Asking input regarding the four water management options.
- Nicola Lower (ERM Consultant) to provide details regarding minimizing impact to fish, and fish compensation in order to offset. Overview of the five examples.
- Asking input regarding the five examples.
- Opening for general questions and comments.
- Discussion regarding how best to contact or communicate with them for information on the mine.

PRESENT:

Sheldon Dorey (SAO)
Shawn Attungala (Mayor)
Consultant: Nicola Lower, ERM
Consultant: Anna Sundby, ERM
Agnico Eagle rep: Emma Leith
Agnico Eagle rep: Lee Christophe Bouchard
Agnico Eagle rep: David Kritterdlik
Agnico Eagle rep: Karen Yip
Agnico Eagle rep: Patrick Roy
Agnico Eagle rep: Amelie Robitaille

Introduction – Emma Leith

- Emma thanks Sheldon (SAO) and Shawn (Mayor) for having us. We're looking to gather community input before going down the development line. We're trying to make sure we do this in a way that works for the community. Karen helps us get focus groups and smaller groups to hear back as well as hearing about how is best for us to give updates. Trying to be a good neighbor.

Water Management and Project Overview – Anna Sundby (ERM)

- We have the Whale Tail Project and the Amaruq development. Anna introduces herself and Nicola, that they are consultants.
- We already have approval about the Phase I fish out. Putting a dam, fish out that portion of the lake this summer.

- Phase II is what we're consulting on right now, plan to build mine right now is one pit, one waste rock pike, and expansion is making the pit bigger, putting underground mine tunnels (under pit), adding a second pit north of the first pit, and a second waste pile. Ore will be trucked to Meadowbank so no tailings at Amaruq. High level overview of the project.
- Anna and Nicola here for water and fish.
- Phase II will bring about more water, so we're looking for an attenuation pond – few different options for it. Two involve existing ponds, putting dam across them and making them bigger (one of which has fish in it), one is doing the same thing as Whale Tail by adding dam to Mammoth Lake to keep clean water on one side of the dam, and use the other side as a pond.
- SAO: how do you clean the earth if we don't have a liner protecting the environment? What happens to the ground because of the sedimentation that is left and contamination?
    - Early phase, still figuring out so if a liner is determined to be needed we will do that study later on, but will eventually return to a natural state. Specifics aren't figured out yet but yes is a factor.
- Question around those options: what do people care most about, avoiding any impact on fish, keeping surface footprint of pond smallest or keeping dam sizes smaller (2-9m?), etc.?
- Elders seem to be most interested in protecting fish habitat and not altering lakes.
- MAYOR: do we have a rough idea of fish population amount?
    - Yes, we know species and population of Mammoth Lake, small pond, but before putting dirty water into pond with fish in it we need to prove that we did all the consultations.

Fish Compensation – Nicola Lower (ERM)

- Phase II will mean bigger pit which will go over small ponds and lakes, and will encroach on fish bearing lakes. We have some ideas but looking for other ideas that the community are interested in.
- SAO was at the community meeting so was aware of the five options that were presented. Interested to know that slimy sculpin were in the area. Hadn't seen these fish outside of Newfoundland before.

Notes

- Different note-taker than in previous section for this part.
- KY – would they be interested in more fish?
- NL – yes, how do we improve char fishing
- SAO – Create a pond and a manmade pond, stock it annually so I can fly fish
- AS – improving habitat, improving access for fish, over wintering habitat, fish hatchery
- NL – important thing to understand what the current issues are with fisheries
- Aqua farm possibility? growing and processing fish here and selling them, creating industry
- Permaculture – option, use the facilities using the facility to grow lettuce (for example),
- Problems, concept that it's not natural, don't want to outcompete – habitat for food.
- SAO - Phase one and phase 2, how many phases are there?

- EL – we will come back and set up another meeting to go over options and run through the program with you
- NL- We need a compensation option for permitting but there are options for bigger ideas and partnership possibilities
- MAYOR: have to be careful about messing with biodiversity
- NL: in fish compensation we make sure that we are balancing biodiversity as much as possible
- KY: there is a process for the fish out (process overview), we are achieving about a 72% success rate
- Caribou migration was brought up.
- DK – whale cove big issue caribou migration calving grounds, migration patterns are always changing, we need to be careful how we are explaining,
- That's why TK.
- Communication INFO: quarterly newsletter – including Council on quarterly emails, Radio

KIA SESSION

NOTES from Consultation – Whale Tail Pit Amendment

Wednesday July 11, 2018, 4:15pm – 5:15pm

Iglu Hotel Conference Room

AGENDA

- Introduction of all participants, including consultants and Agnico Eagle team.
- Group to sign the Consent Form for Focus Group Discussion
- Mention of wanting to keep community in mind, which is why smaller consultation groups will give people a chance to discuss more and in more detail.
- Emma introduction to Agnico Eagle and brief project overview (Meadowbank, water management, offsetting).
- Anna Sundby (ERM Consultant) to provide details regarding water management, as needed for the Whale Tail Pit Amendment. Overview of the four options.
- Asking input regarding the four water management options.
- Nicola Lower (ERM Consultant) to provide details regarding minimizing impact to fish, and fish compensation in order to offset. Overview of the five examples.
- Asking input regarding the five examples.
- Opening for general questions and comments.
- Discussion regarding how best to contact or communicate with them for information on the mine.
- At the end of session, the group signed the Consent Form for Focus Group Discussion.

PRESENT:

Thomas Elytook (Director-Baker Lake)
Valerie Niego (KIA CLO)
Consultant: Nicola Lower, ERM
Consultant: Anna Sundby, ERM
Agnico Eagle rep: Emma Leith
Agnico Eagle rep: Christoph Lee
Agnico Eagle rep: David Kritterdlik
Agnico Eagle rep: Karen Yip
Agnico Eagle rep: Amelie Robitaille

Introduction – Emma Leith

- Emma opening remarks
- Thomas says he's on board of KIA, and Valerie is CLO.
- Fall time is better time for consultations, summer is not good (everyone out boating). To plan another meeting in the fall for higher level descriptions.
- Overview of community needs and permitting needs within discussion. Key on what's important to you and to community within these decisions, is it fish habitat, environmental impact, etc.?
- Summarizing Phase I of Amaruq and Phase II, how it affects water management.

Water Management – Anna Sundby (ERM)

- Summary of the four options – one option is two little pond to join into one with a dam but the pond has fish in it. Second option is big dam with no fish, option three stores water from mine in a separated part of mammoth lake and discharged mammoth lake (has fish in it). Option four would use multiple areas to create attenuation ponds.
- KIA: will you come in the fall for more people and to help decide?
    - We don't need an answer right now, just consulting.
- KIA: what is the best option for you, do you already have a favourite option?
    - No, this is part of decision process we want to decide according to multiple criteria.
- Anna explains the Management Alternatives Assessment and asks if there are other elements we need to consider,
    - KIA: that's a lot.
    - KIA: did you guys find any archeological sites?
    - Not yet and if we will look for them and conduct studies but we know there is a graveyard near that hill.
    - KIA: I'm sure there are traditional places where you're planning on doing it and I'm not sure where the main hunting areas are but that should be looked into.
- Phase I Amaruq already approved and has been studied, archeology would have been done
    - KIA: Grey (on the map) would be waste rock?
    - Yes from Whale Tail (explains pit and locations)
    - KIA: Two types of waste rock right? One I know at Meadowbank (I forgot what called) is put away from waste rock (acid generating), is it same or different?
    - We don't remember but will get back. Potentially acid generating and possibly non-acid generating. We will make sure it's taken into consideration.

Fish Compensation – Nicola Lower (ERM)

- Overview of need for fish compensation, offsetting impact.
- KIA: Will there be a company official to come ask our preference? Is it going to be done in cheapest way anyway?
    - Will be involved, but that's why we're consulting, to see what is important to the community, so that we can consider this in the decision. For example when talking about water management options, Elders seem to prefer no fish affect and Women seem to lean towards option three.
    - KIA would like us to come back to meet with more since only a few of them are there.
- Emma asking if there would be interest in meeting more frequently
    - There is interest, especially for the fall.
- Nicola asks if they fish – both members say yes.
    - KIA asks if we will be there to manage during construction

- Yes, Community Relations team, Environmental monitors, other people to supervise.
- Clarification, we are also looking to create jobs for Inuit in the area so they can participate.

o KIA if you take fish out, how long would you take to completely take fish out?
- Nicola says it can take days
- KIA asks if they check every few hours
- Nicola says many people are involved including likely KIA itself.

- What are favourite kinds of fish?
  - KIA Trout, char (especially char, landlocked most), white fish, all kinds.
- Where are they spawned (char)
  - David: One main lake, go up and down, don't come down to the bay
  - East river, north.
- Could they get to the sea? Not here – too far – question asked, how they can breathe salt water then fresh water?
  - KIA they don't go down to Hudson bay, char we see (main) have their system of going up river for winter and come down for summer. Now, system they go through that they have to before river, prepare themselves down on the coast to take in freshwater. If they go up the river they don't go today and next day, they have to acclimatize. Two types of char.
  - Nicola says they stay similar on the outside but inside gills start pumping sodium and chloride to allow them to not drown – essentially become a different fish on the inside.
  - David: along shore of Baker they get char from Hudson Bay, freshwater or landlocked char. The taste is different. Down coast, char will go up rivers up as far as 80 miles, and will go to the same spot every year. That is changing because of climate change (water, rivers too low)
  - Asks if they can see big difference on land from climate change.
    - David says yes.
  - Nicola: do you see size difference.
  - David: if enough water no problem going back up, but rivers too low. They need water.
  - Nicola: when rivers are low flow, chars can't migrate back to lake? (nods)
    - Idea is to move boulders to improve river flow
    - Can be either people or machine moving them but preference tends to be communities doing it, less impactful although excavating is an option.
  - David: people did it, opened up creek a bit and char could go there. By making enough room for them, it helped (as long as there is enough water).
  - Nicola: do you know areas in the Kivalliq region where it could be done?
    - KIA: not sure
  - David: they did a similar one in Cambridge Bay.
  - Nicola: would Baker Lake be interested in a commercial fishery? Char?

        - Commercial fishing meaning enough fish for people to go out and catch it then sell it. Needs market, fish process in plant, supplemented with fish farm. Plant to create food to sell it in a market.
    - Nicola: would you be more interested in char to fish?
        - KIA responds affirmatively.
    - KIA: I think there are people that go up there, but most of Elders are gone. Still some areas that know the area.
    - Anna: where do people go? White Hills Lake?
        - KIA: depends on season.
    - How far from it? About 50 km. They go hunting or drive snowmobiles straight.
    - KIA: takes 2 and a half days of going to go.
    - Emma: how are you navigating yourself?
        - David: snow. Our main northwest wind is main, we know the snow marks and you go by them. As well you know land area, big teaching is look around when traveling, you're going that way but look back so on your way back you know where to go.
        - KIA: snowmobile, you watch which way to cut them.
        - David: we lived in Ottawa for a few years, mixed with Cree people, went snowmobiles and couldn't figure it out in the trees but they said look around. Learn from locals.
        - Emma: is this knowledge still being passed down to young hunters?
        - David: a lot of things we knew in our age group is not going down to younger. In order to teach everything about land you have to be out there, and people are not going out as much – they get stuck out there.
        - Emma: someone said yesterday that for caribou hunting, 2 herds, 1 herd leads (but is part of the other one) they just go first and you have to let them go first because if you disturb that first group you're going to make it hard for the followers to follow.
        - KIA: when starts getting dark, they come down the migration corridor between Meadowbank and this area (pointed to map).
        - KIA: we used to see caribou all winter but not anymore. We still get them coming down in August. All the way from Saskatchewan. They walk from and to near calving grounds.
        - David: calving in June, first part of June.
        - David: there is distinction between the two herds and when you've been hunting for a long time you can tell, even from taste and the skin. Different shades for different herds, some mane sticks out (name of herd which sounded like Beverly Hill), brown tan colour (name of other herd, did not capture), half white ones come down. When you've been hunting you know. Usually there is a specific skinniest herd in land which runs away from mosquitoes, coming down and swim from them.

- KIA: I'm sure there are knowledgeable people so if you come back you can get more information.
- Emma: come back in fall for consulting.
- Anna: is September good?
- KIA too early, we'll be out and hunting. After Mid-September is better, October best. When bugs go, boats and hunters are in their prime because no bugs.

General and Notes

- KIA member fishes for Char takes boat out Baker Lake away from town better tasting fish away from Baker Lake town. She uses jiggers in the spring and sometimes a rod, nets aren't fun, hasn't used a net since needed fish for brother's dog sled team when she was younger.

HTO SESSION

NOTES from Consultation – Whale Tail Pit Amendment

Wednesday July 11, 2018, 7:00pm – 9:30pm

Iglu Hotel Conference Room

AGENDA

- Prayer.
- Introduction of all participants, including consultants and Agnico Eagle team.
- Group to sign the Consent Form for Focus Group Discussion.
- Mention of wanting to keep community in mind, which is why smaller consultation groups will give people a chance to discuss more and in more detail.
- Emma introduction to Agnico Eagle and brief project overview (Meadowbank, water management, offsetting).
- Anna Sundby (ERM Consultant) to provide details regarding water management, as needed for the Whale Tail Pit Amendment. Overview of the four options.
- Asking input regarding the four water management options.
- Nicola Lower (ERM Consultant) to provide details regarding minimizing impact to fish, and fish compensation in order to offset. Overview of the five examples.
- Asking input regarding the five examples.
- Opening for general questions and comments.
- Discussion regarding how best to contact or communicate with them for information on the mine.
- At the end of session, the group signed the Consent Form for Focus Group Discussion.

PRESENT:

Eric Tapatai
Solomon Mariq
James Kalluk
James Taipana
Consultant: Nicola Lower, ERM
Consultant: Anna Sundby, ERM
Interpreter: Michael Haqpi
Agnico Eagle rep: Emma Leith
Agnico Eagle rep: Lee Christophe Bouchard
Agnico Eagle rep: David Kritterdlik
Agnico Eagle rep: Karen Yip
Agnico Eagle rep: Amelie Robitaille
Judy Mannik
Harold Putumiraqtuq
Richard Aksawnee
Hugh Nateela

Introduction – Emma Leith

- Emma introduction of team
- Note: David (Agnico Eagle CLO for Whale Cove) is on board of HTO as chair.
- Agnico looking to be more involved with community. Trying out small focus groups, had open house last night but please feel free to share how it works best for you.

- Part of these consultations is to understand TK around land usage around future development, but before development process to understand what community wants before there are set plans.

Water Management and Project Overview – Anna Sundby (ERM)

- Summarizing project and water tailings/attenuation pond.
- Explaining 4 different options.
- David discusses the concerns raised over the different options.
- Anna says options all have concerns, and all have good reasons.
- Anna specifies these are concepts without detailed engineering because we're looking to get feedback as to what.
- Emma says we're wondering when looking at this stuff what they think is important to their decision making – fish habitat, infrastructure, wildlife, environment, etc.
- Over next few months we're going to look at the impact of these options.
- Anna – what questions would you ask when making decisions between them.
    - HTO – what kind of metals do we expect to extract?
    - Emma: from operation, gold but there could be other metals in the rock or ground that could get into the water.
    - HTO – what about asbestos.
    - Nicola: we will analyze the options in more details to see what metals or harms could be in water, what kind of quality.
    - HTO – concerns are water quality and toxicity.
    - Anna: those are our concerns too.
    - HTO – when can you do treatments?
    - Anna: in summer, we have to store it during winter.
    - HTO – will there be a plan in case of emergency overflow?
    - Anna: yes, there will be contingency plans for such situations.
    - HTO – for ponds, there are options with fish... how much fish stocks in these lakes?
    - Anna: Two options with fish. Pond A53 has small stickleback minnow fish, and juvenile lake trout (we found two).
    - Nicola: A53 is small and shallow, not high value fish habitat. Mammoth Lake has all the fish species (lake trout, arctic char, etc.)
    - HTO Elder: The fish that are growing up are from egg, have you checked the egg to see how the eggs are (are they contaminated?).
    - Nicola: not the eggs, because we don't want to disturb the eggs. When mine is running, we have to do monitoring to fish and sediments.
- Anna: does anyone have thoughts about what the most important things to consider are?
- David: The Elders said they like options at lower elevations.
- HTO: asking for a map with watersheds and options in context (further out, more zoomed out) so board members could see full picture in relationship to watersheds and migration routes.

- Emma: (showed the map we have)
- Anna leads discussion about map options.
- Anna says we are looking at those specific options in order to keep our impact as small as possible.
    - HTO: how are the dikes or dams going to be built? Will there be a lining to hold water in?
    - Anna/Nicola: same way as Whale Tail Dike (correction- northeast dike), similar material and whether or not the pond needs to be lined will be looked at depending on results of studies and monitoring, but if it needs to be lined it will be.
- Handing out second option paper specifics.
- Any ideas about how to make things better for fish or easier to fish, let us know.

Fish Compensation – Nicola Lower (ERM)

- Overview of need for fish compensation, offsetting impact.
- Going through options.
    - HTO: has it ever been done up north? (about example one)
    - Nicola: not up North but we have to monitor it to make sure it works. Not something like this for the small fish since people mostly focus on the big fish, but if we felt that community was interested because they saw that there is less food for bigger fish
- Arctic Char Hatchery
    - HTO: good idea, but only concern would be the competition with other fish. If there are more char there could be issues so we could need to find what ratio is with lakes of char vs. others.
    - Nicola: this would not be quick, it would be a long term option so we would need to make sure there would be no competition
    - Anna: we would look for input from you and other community members about concerns
    - HTO Elder: there are fish that are different fish and probably have different diets. Some fish eat bugs, some fish eat other parts of water, there are different ways of fish eating different animals/things that may be important to different fish.
    - HTO: a project like this, what are success rates, would it be successful or what are long term effects?
        - Nicola: two ways to look at it. One is from permitting point of view, proving to the government of Canada that we have created more fish than have taken away. Second way is longer term capacity building or partnership between Agnico Eagle and other groups to possibly expand it to bigger options if other people are interested.
        - Nicola talks about hatchery and fish farm to grow fish to stock, with potential to grow food like salad and vegetable using waste from fish in same system. Long term, more planning, would take more time. There are other options which are easier to achieve shorter time.
    - David: would it be similar to hatchery in Winnipeg?

        - Nicola: not sure which one you are speaking about. Hatcheries are quite common in Canada.
        - Emma/Anna: it would probably be similar as hatcheries are usually similar
        - Anna: before going with it, we would observe other hatcheries designs and see what they did well or didn't do well before doing ours.
        - Nicola: we aren't currently proposing a fish farm at this current point in time but rather for smaller, little fish which would come from eggs of wild fish of this area.
- Third example –to improve access to connect channel to move fish from/to one system.
    - I.e. allowing char to move from one lake to another they don't currently have access to, or to help fish passage and migration if some areas need this help.
    - INTERPRETER: have you used this access before?
    - Nicola: not in the west of Nunavut but these boulders have been moved in communities to improve low flow of arctic char.
    - Nicola: someone earlier mentioned there was passage issues in Prince River near the bridge, could anybody speak to that?
    - HTO: only concern with connecting two different lake is disruption of what happens in each individual lake, thinking about competition and possible negative impact.
    - N: what about if one lake was deep and didn't freeze, do you think it would be important to have over-wintering habitat?
        - HTO: oxygen levels are different in each lakes, so depends on fish that are in the lakes.
- Example 4 – rearing habitat.
    - Spawning and channels for rearing.
- Treating water and runoff.
    - HTO mentions run off from Baker Lake is dirtier than that run off (from airplane lake?*).
- Anna: do you have a preference between long or short term projects?
    - David: Thinking that in regards of community of Baker Lake, not only fish from mining area but also others.
- HTO: do you know how fast Arctic Char grows?
    - Nicola: not sure depends on conditions, on the lake. Part of an issue in far North is low productivity environment so sometimes increasing food options helps growth become quicker.
- David: in April/May we fish and people get smaller fish but down river are bigger fish. All small ones down river by the time they go up river they are full grown.
- Nicola: do you think the food stops them from growing big and fast?
    - HTO: I like this Arctic char hatchery but my question is how early would the char be released into the system?
    - Nicola: we'll research but usually within same season, waiting until they're past being fry, keep them free from predators.

- HTO: will we release them so they're big enough to be food for fish, when they have a chance to be food?
- Nicola: we'll have to look, to see if they will maybe be eaten or be big.
- Anna: what do you like about hatchery?
- HTO: gives Arctic Char a chance and helps us catch more. We want free Char not $60 Char.
- Anna: does HTO fish and distribute?
- HTO: there is a community freezer but needs a serious upgrade, mostly individuals that help.

General and Notes

- HTO: asking about fish in each lake, measurements
  - Nicola: baseline information used for impact assessment and could have them sent over. For Phase II, looking at smaller ponds (i.e. A53), we know there are small fish in there and this year we measured oxygen under it. We can't prove we can affect fish habitat without showing we understand them.
- HTO Elder: Bigger fish and bigger chars go down river go down but smaller fish they sort of stay in one area longer than usual.
  - Nicola: do they get big if they stay in one area?
  - HTO Elder: Yes there are different kinds of fish and they have different kinds of patterns down river if cold or up river there are different ways of looking at different fish. White fish go up river, Char go up river, Lake trout go somewhere lost in translation, go up when have to go up go down when need they move.
    - Nicola: do any fish have problems when moving up or down streams?
  - HTO Elder: there are different fish that move in different ways some move not food some down river or up river it depends on food of the fish.
- HTO: I like idea of Arctic Char hatchery and improving water quality/sewage treatment of run-off for Airplane Lake and Baker Lake, those two ideas I think are most interesting.
  - Anna: probably the two that could be easiest to envisage as having an impact
  - HTO: don't have to make dikes and I've seen some of those ideas and seem well done.
- Nicola: do people agree on that?
  - HTO: I agree with what HTO Member mentioned but my board there is information of same thing after a while, likely will have more questions and comments to be raised. We have communication through our office anyway and can talk through our board. I like the idea, water monitoring and any kind of it that Agnico does has improved a lot, they have documentation that we see from time to time which we're glad about because in the past we rarely saw documentation about any kind of studies or projects. We seem to be stepping in the right direction here as far as working together on issues like this.
  - Nicola: worth mentioning that we're interested in other ideas too, so if you go away and talk to your board or community you can let us know because we do want to hear other ideas.

- HTO: I don't like Mammoth lake option (because of fish? No answer.)
- HTO: when you say the lake needs a certain capacity, what is it?
- Anna: Size of 300 Olympic pool put together. Contact water that has touched things, not tailings, not camp, just touched rock surface.
- HTO: Option two, A54 sound best. The one with big dam. Because the berm looks better. Looking at map over here, it's furthest away from other water sources.
  - Anna: note that it has the highest berm, at one point 10 meters which is a three story building – but engineered to be the proper design to be stable and secure.
- HTO Elder: would pick second option A54. No specific reason listed.
- HTO: following up to question heard last night about option 2 A54 with the berm of 10m high at highest point – if north side fenced off to deter caribou from entering when migrating or would there be a plan regarding this?
  - Anna: we would look at that and risks about caribou and make plans accordingly. From that perspective it would look like a man made pond.
  - Anna: not sure what is done at site to deter animals from site, but would look at that. Agnico already has a strong management plan for caribou, including closure or shut down for certain periods to avoid animals from putting themselves in danger.
- HTO: follow up, experienced traffic on road with last herd of caribou migration even though they were shut down, and because of running out of fuel, at one point they opened the road for delivery. Someone mentioned there may be more traffic between Amaruq, Meadowbank and new site and because it is in a migratory route, the company will have to start considering and planning these sorts of things.
- Anna: mentions strong commitment to impact
- HTO: community would be interested in seeing environment team learning about caribou migration department so they would have an idea of which group is the lead group to make sure that lead group is the least disturbed. Environment team of Agnico will need to get IQ about when to expect the lead group.
- HTO: have information of the fall, spring (different seasons), as long as they have that information it will be important.
- Emma: we have gathered that info and are monitoring, if not everyone has seen or heard of how we do that process we are happy to share, so you know exactly how we are monitoring and for every season.
- HTO: probably something we can discuss down the road, a hot topic we could talk about a lot.
- Anna: in terms of discussing, is this kind of group and forum the right way to interact or is there a better way to do it?
- HTO/Karen: HTO been consulted a lot about caribou management policies we operate under, this size of group is pretty good because it allows people to talk freely (in her opinion) and throw ideas.
- HTO: when opening it to public you start to have a hard time getting information out.

- Emma: this is useful for us, and community information sessions like last night is more about us giving information, and these small groups would be for us to receive info and feedback in a more discussion based.

- Elder HTO: as for caribou, they have different activities and groups compared to fish so there are differences between the fish and them. For example in May, more fish than usual compared to other times (it's hard to get fish in May? Translation confusion)

CHESTERFIELD INLET HAMLET SESSION

NOTES from Consultation – Whale Tail Pit Amendment

Thursday July 12, 2018, 3:40pm – 4:15pm

SAO Office

AGENDA

- Introduction of all participants, including consultants and Agnico Eagle team.
- Mention of wanting to keep community in mind, which is why smaller consultation groups will give people a chance to discuss more and in more detail.
- Emma introduction to Agnico Eagle and brief project overview (Meadowbank, water management, offsetting).
- Team to provide details regarding water management, as needed for the Whale Tail Pit Amendment. Overview of the four options.
- Asking input regarding the four water management options.
- Team to provide details regarding minimizing impact to fish, and fish compensation in order to offset. Overview of the five examples.
- Asking input regarding the five examples.
- Opening for general questions and comments.
- Discussion regarding how best to contact or communicate with them for information on the mine.

PRESENT:

Roy Mullins (SAO)
Jimmy Krako (Deputy Mayor)
Simionie Sammurtok (Mayor)
Agnico Eagle rep: Emma Leith
Agnico Eagle rep: David Kritterdlik
Agnico Eagle rep: Karen Yip
Agnico Eagle rep: Randy Boiteau
Agnico Eagle rep: Amelie Robitaille

Introduction – Emma Leith

- Emma introduction.
    - o Overview and what we're looking for, introducing ourselves, community engagement update
- Bringing up Radio show idea about what's going on with Agnico projects.
- Showing Whale Tail pit and Meadowbank site, looking to expand to Phase II, and how we're looking for water management options.

Water Management and Project Overview – Emma Leith, Karen Yip, David Kritterdlik

- Summarizing project and water tailings/attenuation pond.
- Explaining 4 different options.

    - As a note that it's contact water to store, not tailings. To be stored in winter and treated in summer, before being released back into Mammoth Lake.
- Community preferences (David, in Inuktitut) and option summaries.
    - How Elders had wanted to protect the main lake
    - Berm containment very high (10m) was a concern, what would it do with caribou migration, is an eyesore, impression was that the preference is the least visual impact and least disturbance to fish habitat while protecting large bodies of water.

Fish Compensation – Emma Leith, Karen Yip, David Kritterdlik

- Seeing as we'll most likely be disturbing fish habitat, we'll need to offset it. Put more fish back in environment than are taken out.
- Overview of need for fish compensation, offsetting impact.
- First example is to create spawning routes i.e. near Prince River, remove blockage so they can travel.
    - David mention small lakes have fish in it (ponds)
- Second example is Arctic char hatchery, where you take the natural fish you take eggs and milk, mix them and house them in a safe environment until they are juveniles before releasing them.
- Third example is creating migratory pathways.
- Fourth is i.e. the fingers at KM 10 of Meadowbank AWAR.
- Fifth is reclaiming potential existing areas like sewage treatment and make water better.
- MAYOR: which options were preferred by Baker Lake?
    - Emma summarized the concerns showed with Baker Lake residents as well as why they preferred some.
- David explaining: We'll have to work on this one (option one) to put the berm there
- MAYOR: and this is bigger picture?
    - Emma: yes this is preliminary research
- Emma: important clarification is with fish bearing water, we fish out the area so we aren't killing them. We put them into other areas, and we have done that process at Meadowbank several times. On the fish compensation options, favourites were the hatchery, helping pathways, but sewage also came up a lot for improving Airplane Lake. Fish compensation doesn't have to be in that area, it can be down closer to community as well. Open to other ideas.
- Emma: is there one you think you may have preference for?
    - MAYOR: it's more for Baker people, people here would support the option Baker Lake would prefer
    - David: Elders mentioned they want to see it so they can have a better idea at the location
    - MAYOR and SAO: making sure not to disturb the archeological sites or graves.
    - Karen: there were surveys done to identify graves and archeological sites and there are buffer zones created around gravesites.
    - MAYOR: how long would that be used, the lake?

- Emma/Karen: life of mine, five years, so after that it would be reclaimed.
- SAO/MAYOR: people in Baker Lake will know better than us and if people here are asked what they prefer, they will then ask "what did Baker Lake say" and go ahead and support that option
- HAMLET: and this is not near ocean water, the lake won't be drained into the ocean?
  - Emma/Karen: no, this is about 90km away
  - HAMLET: good, I was worried but good.
- MAYOR: and is this still Amaruq project?
- Karen: yes, but this particular project is the Whale Tail Pit.
- David: and the Elders mentioned Amaruq isn't an area name that's traditional and Whale Tail the Elders were saying "what is that" because no whales. Elders worried in covering the traditional name and have it be known as something else.
- Mining/other companies should, moving forward, recognize traditional names more and using it as opposed to making up names.
- SAO: but all mining companies go in and name stuff as they do it. But same thing you go back to historical things, white and European people came and gave names that the Inuit didn't and place names are now reverting back to traditional names to get back on mapping program. When going up inlet, you look on map and would never find Ubayoo (spelled phonetically, uncertain if real name) but you would find Stoney Point. The tradition name is the one that should be used.
- Emma: we're cognizant of that and hearing Elders comments might be too late to start reversing and calling it something else
- SAO: you can't reverse it but going forward can get better and prevent. Doesn't just apply to you guys, other companies do it too.
- Emma would like to get info out of community on how to improve communication between Agnico and communities so everyone who wants information can have it. How do they want to receive it?
- SAO: younger people check (name of something*) and Randy is good at putting stuff up but older people would prefer radio program.
- MAYOR: Elders don't look on computer

General and Notes

- MAYOR: about job opening for other people apply but didn't find out if more people can be hired, they waited all years a couple years and now don't have jobs.
- Karen: we have been holding work and site readiness programs on a more regular basis now, there had been some issues in the past year but we are now back on track and providing these programs with more frequency and consistency.
- SAO: did work readiness program then don't hear anything back for a long time, and if you run one (we ran one, 12 people, recently) you can't wait 6 months or 1 year.
- Randy: Tuunalaaq and Jerome were supposed to get back to me.
- Karen/MAYOR: they don't always know where to call when they go see Randy about this.

- MAYOR: going to have starting treating people the same. That's why I'm not happy with Agnico sometimes I feel like I don't know what they're doing.
- Randy/MAYOR: long process. You give resume, you do work readiness, it's hard.
- SAO: add more contact names out there. They should have more people who can go to than just in Rankin.
- HAMLET: in Meadowbank they have their own camp and Meliadine get the contact person's information.
- MAYOR: that's all I have right now. I'll come to meeting tonight, I don't know if more people will come.
- Emma: I know it's hard it's not great timing, thank you for taking time to meet with us right now in the future we will try to gear our stuff more in October and april, better turn out too.
- Karen: never easy, always blizzard season or stuff.
- Emma: I will check back on employment stuff and info and get back to you.

CHESTERFIELD INLET OPEN HOUSE SESSION

NOTES from Consultation – Whale Tail Pit Amendment
Thursday July 12, 2018, 7:15pm – 9:00pm
Hamlet Chambers

AGENDA

- Introduction of all participants, including consultants and Agnico Eagle team.
- Group to sign the Consent Form for Focus Group Discussion
- Mention of wanting to keep community in mind, which is why smaller consultation groups will give people a chance to discuss more and in more detail.
- Emma and Karen introduction to Agnico Eagle and brief project overview (Meadowbank, pond location, offsetting).
- Emma and David to provide details regarding water management, as needed for the Whale Tail Pit Amendment. Overview of the four options.
- Asking input regarding the four water management options.
- Emma and David to provide details regarding minimizing impact to fish, and fish compensation in order to offset. Overview of the five examples.
- Asking input regarding the five examples.
- Shipping and Fuel Farm discussion.
- Opening for general questions and comments.
- Discussion regarding how best to contact or communicate with them for information on the mine.
- Drawing of door prizes.

PRESENT:

Elizabeth Tautu
Peter Kattegatsiak
Harry Aggark
Interpreter: Andre Tautu
Agnico Eagle rep: Emma Leith
Agnico Eagle rep: David Kritterdlik
Agnico Eagle rep: Karen Yip
Agnico Eagle rep: Randy Boiteau
Agnico Eagle rep: Amelie Robitaille
Roy Mullins
Simionie Sammurtok

Introduction – Karen Yip, Emma Leith

- Karen introduction of team. We're here to give you an update on the project. (translation pause) We are happy you took the time to come and hear what we have to say tonight. We're mainly going to be talking about the Whale Tail project. To support our permitting project and to meaningfully integrate IQ into our project design, management plans and monitoring, we're holding workshops to consult with the communities. We just came from Baker Lake where we did workshops with the Youth, Women, HTO, KIA and the Hamlet and we're here in Chesterfield Inlet to talk to your Mayor, the SAO, the people here tonight and the HTO to keep you informed and also to get input from your community. We're going to be conducting these consultations more regularly about our projects in 2018 and going forward.

  - INTERPRETER: I don't know if that's the real name in Inuktitut (speaking about Amaruq)
  - E/K: yes and that's something we want to work on, we'd like to start cooperating more and start using more traditional Inuktitut names.
  - MAYOR: The names of the land, do you know it?
  - TRANSLATOR: I've heard the name before but I forgot all about it.
- K: we're here specifically to talk about Whale Tail project in the Amaruq area. Phase I has been approved; we're here for Phase 2.
- E: this part of the project we're talking about, what we want to do is incorporate TK before we submit design plans, to incorporate Traditional land uses and migration paths. Before it goes to the Nunavut Impact Review Board and the NPC. and that's why we're doing this now, because we want to incorporate design plans before submitting them.
- INTERPRETER: may I add on that there will be additional hearing before the project goes towards further process?
  - E: yes, absolutely.
- K: these are slides of Amaruq project, about 50km north of project, about 100km north of Baker Lake. This slide shows access (shipping) past Chesterfield Inlet and schedule of air routes to Baker Lake and around areas.
- E: this is slides showing (you're familiar with) the Meadowbank. Has anyone been to site?
  - INTERPRETER: I have.
- E: this is just showing Meadowbank site.
  - INTERPRETER: this whole is Meadowbank?
  - E: Yes
- E: these maps are the --
- INTERPRETER: this is bigger than Chesterfield Inlet?
  - K: I don't know the exact square footage.
- E: one recent change for us as an organization – we always had a desire to be a good community partner – but coming from Nunavut team and corporate level, we want to be a positive Indigenous partner to make sure we have positive and productive relationships.
- E: this is a bit about what we spoke about today, getting feedback about how to be better with communicating to make sure everyone who wants to receive information is getting it.
- E: This slide is to show what's been permitted as Phase I,
- E: The permitting that's been received is for the whale tail pit. Those NIRB hearings for Whale Tail pit was September 19-22. The Nunavut water board final hearing was September 26-27. November 6 we received the positive decision from NIRB. On February 15 we received the decision from Minister.

- K/E: 2 days ago is when we received the sign off, final decision. That permitting means we can start Whale Tail dike construction. Our in-pit disposal modification application was submitted February 23rd.
- E: This slide shows the amendment for phase II. The process is now what we're going through for amendment, for an additional pit. We're going to go through what we've done in Baker in consultation, and project description is what I'm going to go through. We then are looking for info and feedback on Schedule II decision which is water management. The second feedback we are looking for is fisheries offsetting, compensation.
    - INTERPRETER: fish compensation?
    - E: If we are taking away fish habitat we have to replace roughly 2 times what has been lost, Taking one fish, replacing with 2. – Through creation of new habitat, hatcheries etc.
    - (INTERPRETER and David speak in Inuktitut)
    - INTERPRETER: good move?
    - E: that's what we want your advice on!

Water Management and Project Overview – Emma Leith, David Kritterdlik

- E: We've been permitted for Phase I but we're looking for expanding the pit, adding an additional open pit, additional waste rock storage, an additional attenuation pond.
    - INTERPRETER: Lake or just a pond?
    - E: Just a pond. And an underground mine.
    - INTERPRETER: you're going to go underground?
    - E: That's what we're looking to get approved, but it's not permitted yet.
    - E: This application for Phase II means it will extend the life of the mine for 3-5 years. All of those additions are proposed to be within the same footprint we're currently permitted for. All of the additional pieces for Phase II will be in the same footprint, we won't be expanding footprint of mine, just adding more pieces within it.
- E: permitting area stays the same, we're just looking to add (points at map) this pit here, within the area. Phase II is expansion and amendment is the addition here.
- E: what we're looking for is feedback on the water options. Looking for water storage but it's contact water that's been in contact with rocks, not tailings, it's touched rocks/metals and want to make sure it's clean before releasing it back in environment. This will be a water storage facility. The water portions we have 4 options.
- David: (explains options in Inuktitut) I mentioned the side effects they are looking at. (Speaks more Inuktitut)
- E: the options you're looking at there, some are fish bearing and some are non-fish-bearing.
- David: (Speaking Inuktitut)
- INTERPRETER: interpretation that I speak to isn't exactly as tailing pond but the water is already used?
    - E: water isn't used in mining process but may have been used on site. Contact water, could have touched machinery, waste rock, but no chemicals in it.
    - INTERPRETER: water was touched by machinery or rocks?

- E: yes
- David: it's not dangerous water
- E: no, it's not dangerous. We're committed to protecting the environment around, so making sure it's fully clean and can test it before releasing to make sure.

- E: do you (at David and INTERPRETER) gentlemen want to talk about height, dams, etc. of options?
  - D: (speaking Inuktitut)
  - ATTENDEE: how high?
  - E: 10 meters.
  - ATTENDEE: 30.1 feet. Quite high.
- INTERPRETER: is there actual fish in there?
  - E: no, not in that one.
- E: Option 1 would join two ponds, build dams, and that one has fish in it.
- INTERPRETER: if you choose option 1, you say there are fish in it, where will the fish go?
  - E: that's part two of what we're asking, if we choose that one and do a fish out we want to know what you prefer if there is an area you want to move it to. We also have to do studies to make sure it's a good spot to relocate fish to not disturb the new environments but it's a process we've successfully done before at Meadowbank. We don't currently know where they would be restocked but we know what that process would look like.
- ATTENDEE: this dam is not to drain all the water, it's to move the fish from one lake to another.
  - E: right now we know what the plan is. We're not draining a lake. It would be combining two small ones, daming off part of a larger body or creating a different area on a side through flooding.
- E: do you want to move on to fish compensation?
  - ATTENDEES: yes.

Fish Compensation – David Kritterdlik, Emma Leith

- The second part of this depending on which option is chosen, it's what do we do. Regardless of the option chosen we will have to create fish habitat for sure, but we don't yet know the calculation of how much. David do you want to explain some of these and the favourites in Baker? Or I can go through it?
- David: (speaking Inuktitut) (ATTENDEES speak)
  - David: what kind of fish?
  - E: we want to know what you want. We can restock Char?
  - David: what kind is currently in it?
  - E: Ninespine Stickleback, Slimy Sculpin, Arctic Char (the landlocked kind), Lake Trout and Whitefish…
  - ATTENDEE: what size?

- A: the two first ones are minnows, small ones. The rest I don't think we are fully sure the exact sizes of the ones in those options.
    - E: we don't have our fish expert with us.
    - David and Attendees: (speaking Inuktitut)
    - E: here are examples of some of the fish that are in the area.
    - E: And if you have different names for those fish we'd like to know.
    - ATTENDEE: option 1 too shallow for arctic char. Those are just little fish.
    - E: and we can play with what kind of fish you like, which ones are the most valuable and which you may want to get offset. There was the idea of creating bigger lakes around Baker to allow those fish to get bigger over winter.
- David: (Speaking Inuktitut)
- INTERPRETER: there's no river with Char there is no river going to major lakes like Baker lake but for sure will be the small fish, lake trout, and landlocked Char, those are the ones mainly up there. No river Char. The major fish will be this (points to the fish)
- E: in terms of preference if we are creating fish habitat, do you guys like the idea of creating more – you've been to Meadowbank (to Interpreter) – we could like at km 10 create spawning area, or hatchery where we grow eggs until they're juveniles old enough to fend for themselves and put them in area where we restock fish or unblocked channels that were locked previous, or do you have other ideas?
- INTERPRETER: so far up inland that I don't think Chesterfield Inlet would be too concerned about inland fish.
- INTERPRETER: the one we worry is Arctic Char but there is Landlocked Char but if there was river Char we would be worried.
- David: there were people with fishing rods open area across lake, that's where they go for Char.
- INTERPRETER: even if we use our local fish lake we have about 5 or 6 of them, and they've been first with them over many years and we never run out of them.
- E: part of the thing with compensation is that it doesn't have to be in that area. If we take away fish habitat from there we can replace it in any area. It doesn't have to be in same area.
- ATTENDEE: bring landlocked char and drop them in the lake. (Joking)
- SAO: as mentioned this afternoon, it's not fair for us to decide for Baker Lake since it affects them and not us, but if it started affecting our fish here we would care. Don't touch my char! (seemed to be joking)
- INTERPRETER: not too concerned about way up inland about the fish because it's too far from Chester. We have our own population and we never run out of fish for many years as far as we remember. As we always then we would have our input of concern but… say though as long as you don't pollute our fish lakes, we're ok.
- ATTENDEE: Asking what the river char are going to lake up are talking about but you know the river char and arctic Char goes up to Baker Lake and beyond to Big River Lake and beyond, and (Inuktitut)
    - No arctic? Just landlocked?
    - E: no fish expert here so I will get back to you but fairly sure.

- INTERPRETER: these two gentlemen are from HTO and would be worried about Char not connected to Baker lake but if there is river Char… When it comes to fish, we're not worried too much about that area. We're mainly more concerned about land animals like caribou because… (Inuktitut)
- David: just to clean up the.. I remember what's his name, Tim? Timothy? Caribou go all over. Is that significant, two significant herds in that area we have to be concerned about them but as he was saying, fish, as old lady said, with the cane, "I don't know about that area, it's none of my business!"
- ATTENDEE: I do remember there are possibly 3 caribou herds, the one between baker and Goa Haven, the Lolad herd (?) and Beverly herd, and I would be concerned about their migration patterns and all that.
- E: I am not caribou expert, I'm not sure if you can speak to where they go and we usually defer to Barnie, our expert.. I'm not sure if you're familiar with our shut down policy but we're very careful during caribou migration.
- David: if you just playing just came out with where the herd is, the process, the guidelines…
    - E: want me to explain it?
    - D: yes.
- ATTENDEE: regarding migration of caribou, I know it, because I'm KIA director, and everyone knows there is something but not everyone knows the exact details.
    - E: Explains Caribou migration site procedure
    - E: This week was first migration I have gotten to be part of in Rankin, we get updates over emails and they monitor the herd as they're going through, I'm not sure you might know better than I do, is it 5-10km? We go on partial shut down on 10… (conversation trailed off)
    - INTERPRETER: Caribou dont like noise, pollution, vibration, smell, dust, caribou don't like smell.

General and Notes

- ATTENDEE: one question, Arctic char hatchery, is there one going on already?
    - E: no, not one already but we use Yukon one as an example, we were looking at it.
- SAO: so if you do arctic hatchery do you released them in the wild and then let it come down to inlet?
    - E: yes, we are just helping them at most vulnerable stage to allow them to mature.
- E: a hatchery is more a nursery than a fish farm but if you're talking about compensation, there are certain requirements we have to fill for DFO and that's what we look at first, but if there were interest in a fish farm there are opportunities for partnership etc.
    - SAO: well if I lived in Baker Lake I would be most interested in Hatchery and possibly growing into aquaculture, but I don't live in Baker Lake.
- ATTENDEES/Emma: conclusion is that Chesterfield Inlet defers to Baker Lake.

Shipping and Fuel

- Shipping concerns were brought up by community, so a verbal overview of the Fuel Farm was given.
- MAYOR: how many ships will be back in summer, bringing stuff?
  - E: I don't have the exact number because of the computer issues but I can show you tomorrow on my USB.
- MAYOR/SAO: concern over oil spill and shipping amount/routes, they are most affected. Even if cargo ships go through inlet comes through Chester so amount in Inlet affects them most.
  - E: would you be interested in sitting down and talking about it, I can come back when there are more people here, in the fall? With the info, for a sit down?
  - SAO: yes. In the fall? (asking mayor/community)
- INTERPRETER: propose project in Amaruq, will it increase the shipping to Chesterfield Inlet because delivering fuel?
  - E: yes there will be increased ships/shipping because we would need fuel because of increased operations.
- ATTENDEE: just for Meliadine alone, Rankin, I believe Agnico will be sending 15 ships, for Meliadine alone.
  - E: I will make a note to confirm exact numbers and get back to you.
  - K: I believe I heard 7 (speaking about Meadowbank?)
  - E: those numbers would be higher now and go reduce after the constructions phase.
- E: if you would like me to follow up with you on these topics, please include your email (or preferred mode of communication) so I can contact you.
- MAYOR: it's a big problem for Chester, ships go up and come in late, just the area starts to be traffic with the ships. I'll be trying to get support for opportunities for community so it would be easier for us to drop to community and train more people and we have to start somewhere. Smaller communities have to start doing stuff too. We don't have resources in smaller community. If we could find a way to do something for smaller communities, like for Nunavut day, we don't do things. We need support.
  - E: talking about infrastructure support, businesses?
  - MAYOR: docks, some elders get nothing out of nothing. We should get something for our Elders too. We have to have a voice now about these things, Inuit are communities.
  - E: idea for us is what wellness means for communities, what do communities desire, how can we partner in helping things happen.
  - MAYOR: people from baker take sea ports want us to have one in Chester, I was talking to Peter Tapatai and you should do something about this, we're trying to, but other companies… too much traffic with ships…
- INTERPRETER: I'm saying over the years there have been a lot of ship traffic between here and baker lake and they go through inlet, like Rankin Inlet and baker lake are getting more community in a share from the company, and the community of Chesterfield Inlet is getting

nothing, maybe a little bit because RCMP has a lot of dropouts and have nothing to do, at least the company AEM should at least have a little community initiative for Chesterfield Inlet. We are affected by ships and our sea animals
    - E: I agree with you and we had a conversation about that today about how solutions around that might look like, and all I can say about that right now is that I agree and we can have more conversations about that in the future about how to become better.
    - INTERPRETER: when you study expansion of Amaruq, once studying is done, when do you expect the next NIRB study?
- INTERPRETER: I was mentioning about last NIRB hearing about Baker Lake, I know some of the people we remaking good comment like Harry, about the people who were supposed to represent the Chester inlet, like elders and youth we were not satisfied with them and I wasn't allowed to say anything in that hearing because I'm part of the public government and that would have been a conflict of interest. Year before that, during the uranium NIRB hearing I did have a lot to say and I had to bugger up the Kigaviq project.
- ATTENDEE: I don't know how useful meeting with HTO will be, no concern for the fish, and I don't know how many will show up.
- It was determined that another meeting should be set up in the fall with Chesterfield Inlet with exact shipping information.
- INTERPRETER: I know you guys to consult about the fish but it's up way inland and it doesn't concern us, they're not even our char, because ours doesn't go up to Amaruq, but I know you have to gather information from affected communities but when it comes to fish like this it doesn't concern Chesterfield Inlet, but noise pollution, caribou, land animals then sure. Marine mammals too.
- Note: for consultations for Chesterfield Inlet interest is in Shipping and Caribou.
- ATTENDEE: Really clean char rather than trout fish… concerned about the moving fish from one lake to another, may affect because the fish will have an effect because the fish eats anything especially the trout, will feed on anything. Concern is even the spawning area would be disturbed. This is what could happen if population of fish move from one lake to another, could affect what they eat.
- ATTENDEE: (seemed to be joking) Lake trout eat anything including mice... Also human remains.

It was decided to end the meeting here, after having verbally explained that the Fuel Farm would increase fuel shipping near Chesterfield Inlet, but that another meeting would be set in the fall to provide them with more information.

CHESTERFIELD INLET HTO SESSION

NOTES from Consultation – Whale Tail Pit Amendment

Friday July 13, 2018, 10:00am – 10:30am

Hamlet Chambers

AGENDA

- Introduction of all participants, including consultants and Agnico Eagle team.
- Group to sign the Consent Form for Focus Group Discussion
- Mention of wanting to keep community in mind, which is why smaller consultation groups will give people a chance to discuss more and in more detail.
- Emma introduction to Agnico Eagle and brief project overview (Meadowbank, pond location, offsetting).
- Emma to provide details regarding water management, as needed for the Whale Tail Pit Amendment. Overview of the four options we came up with (Agnico Eagle or ERM?).
- Asking input regarding the four water management options.
- Emma to provide details regarding minimizing impact to fish, and fish compensation in order to offset. Overview of the five examples we (Agnico Eagle or ERM?) came up with.
- Asking input regarding the five examples.
- Opening for general questions and comments.
- Discussion regarding how best to contact or communicate with them for information on the mine.
- At the end of session, the group signed the Consent Form for Focus Group Discussion.

PRESENT:

Valerie Ipkarnark
Jimmy Krako
Agnico Eagle rep: Emma Leith
Agnico Eagle rep: Karen Yip
Agnico Eagle rep: Amelie Robitaille

Introduction

- Introduction of team

Water Management and Project Overview – Emma Leith

- E: been permitted for Phase I, and now we want to expand the waste rock storage facility and create a new one. Idea is that phase II exists within the same footprint, we aren't going beyond footprint we're permitted for, that way we keep impact on the land as small as possible. We've been consulting and presenting about the water management locations and what the water we're talking about managing which is contact, not tailings (no chemicals) aka run off that's touched machinery or rocks, so we aren't 100% sure it's not contaminated so we want to store it in winter until in summer it's monitored and filtered so it's for sure good before releasing.

- In Baker consultations they are leaning towards A53, with the small fish, with the small ponds. Creating berms and linking the two ponds, minimal destructions
- Second option is A54, big wall
    - HTO: why? It's so big. Going to block Caribou.
- Third is fish bearing but sectioned off, put containment pond on this site. Elders in Baker
    - HTO: But waste water back in the lake? That's not good
    - E: not waste, not tailings just contact. Big difference because it may be dirty but will be treated. Elders in Baker didn't like this option either.
- Fourth was using multiple sites.
- E: what I would like to reiterate is that we want to use traditional land use and TK and IQ to incorporate it into our planning, take feedback you give us to make sure it's incorporated into plans. We'll come back after consultations, say "here is what we're thinking how does it look". These are just studies to have first input before finalizing real plans.
- When we show you these options, what are your concerns?
    - Blocking caribou, they might not know how to get back out.
    - If this has fish, then it's a concern to me and if Baker has concerns about it then I agree.
    - The snow when melting will still have an impact, it's everywhere and melts everywhere so it may still have contact.
- E: when permitting we will have to plan carefully and prove that it's sectioned off so we don't harm the environment otherwise we won't receive the permit.
- E: I'm hearing that the main concerns are Caribou, fish and contact water.
- HTO: as we said the other day, Baker people know the land better than us so whatever they chose we support.
- HTO: Pointing to option 4 as favourite, because not touching this and solid waste, because otherwise it's close to solid and the lake.
- HTO: my main concern is the waste going to sea water but that's not happening.
    - K: and it's not waste water, it's contact water.
- HTO: concern is to use the traditional name, not made up names.
- Karen: we're going to get a map and show around to get it. We're going to move away from made up names, we recognize that it's inappropriate since these places had names before.
- Note: Chester has a map made with help of Elders to have traditional names of lakes.
    - Canada Nunavut Geoscience Office to see if we can get (or if they have done something like that) for the "Amaruq" or Baker Lake area.

Fish Compensation – Emma Leith, Karen Yip

- E: anywhere we are disrupting fish habitat, for permitting, we are regulated to do fish compensation. Roughly, don't quote me on this, but for every fish we take out we have to give back 2. When removing fish from fish bearing ponds, fish outs as we are familiar with at Meadowbank…
    - Do you have to go?

- HTO ATTENDEE: sort of but you can explain a bit.
- E: ok well quickly, this is creating more habitats like deeper lakes for bigger fish, clearing pathways for Chars to go upstream
  - HTO: that would be a very good idea.
  - Removing boulders was of interest.
- E: another idea is fish hatchery, so taking spawn and releasing them
  - HTO: that's another good option.
- E: and spawning paths and area, like at KM 10
  - K: there was deep water in that location, so areas were created naturally in the area sograyling could findspawning areas where they feel safe and would protect juveniles.
- E: another idea was to treat Airplane Lake and build another sewage treatment, it was built to last 25 years and it's been 40 years. Looking at ways to create passive filtration, planting good plants, because now oversaturated and going in water waste, affecting water quality there and discharging in Baker. They say water when testing is clean drinking water after being treated so we'd like to help it. Airplane Lake used to have a lot of fish and not so much anymore now that water is bad. No trout but there are fly fishing because those are heartier fish but helping water would benefit.
  - HTO: Well I like all ideas.
- K: and if sewage treatment pilot would work it could maybe be used in other communities.

Fuel Farm and Shipping

- E: and if doing these ideas, how would it affect Chester, there would be more ships, so yesterday we said I would come back for a consultation to let you know shipping plan (verbal overview of the Fuel Farm and shipping)
  - Shipping always an issue down the inlet because if there is an oil spill it will contaminate what we eat…
  - That's good if you come back we'd like that.
  - HTO: do you guys have anything in place in case there would be a fuel spill, would there be compensation for the people of Chester?
  - E: I'm not sure I will have to look into it and get back to you.
  - HTO: Agnico and Chester need to work on it because if there is a spill that affects the whales and seals we won't be able to eat it
  - K: I believe it is included in the IIBA- to look into it.
  - NOTE: follow up on this (compensation to Chester beneficiaries regarding fuel spills, is it included in IIBA, etc.)
- Brought up the oil/spill eating microbes, university studies of researchers in area. Could be interesting to look into to be prepared.
- HTO: Agnico and Shipping company should split up cost. And have training for people in Chester since Chester would be first contact, why not train people of Chesterfield Inlet instead of waiting for however many people would have to come. We do have some equipment here.

- K: we should, we are looking to train people in Baker for leaks, so we should do it here
- HTO: we have stuff in sea cans but we don't know how to use it.
- E: who to talk to about it?
- HTO: SAO and Mayor
- K: yes there would be emergency spill kits but people should know how to use it.
- HTO: they've been here 4-5 years but nobody knows how to use them.
- Note: verbal overview of Fuel Farm, fuel increase and shipping was given, the response was that Chesterfield Inlet would want clearly laid out contingency plans in the case of spills, training available for residents of the town so they would feel as though they don't have to rely on others and wouldn't have to wait days before starting to act. There is interest in compensation in the event of a spill damaging the sea animals they rely on to eat.

General and Notes

- HTO: want pits to be filled (post operations?) Happy it looks like Amaruq will be, but want Meadowbank to be filled, think Meadowbank might be too deep. Fill with water? Some area planned to put blast rock back in? Will have to look into the process.
- It was brought up that Randy working only part time in office is a hindrance because it makes it harder for people to bring up issues like being unable to work because of court date, so people may just quit instead, because they don't inform their supervisors.

APPENDIX A. Whale Tail Pit project Amendment: community consultations, July 10-13, 2018. Photographs.

BAKER LAKE, COMMUNITY CONSULTATION.

Photo 1: Baker Lake Open House. July 10, 2018.

Photo 2: Baker Lake Open House, July 10, 2018.

Photo 3: Baker Lake Open House, Hand-drawn snowmobile access to cabin en route to Gjoa Haven, July 10, 2018

Photo 4: Baker Lake Open House, Discussion on fish species, July 10, 2018.

Photo 5: Baker Lake Open House, favourite fish species, July 10, 2018.

Photo 6: Baker Lake Elders Meeting, Inuktitut (local dialect) fish names, July 11, 2018.

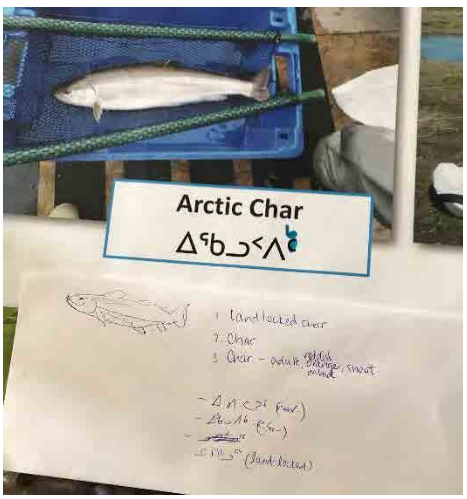


Photo 7: Baker Lake Elders Meeting, different Inuktitut (local dialect) names for Arctic char, July 11, 2018.

Photo 8: Baker Lake Elders Meeting, discussion on land use and traditional names, July 11, 2018.

Photo 9: Baker Lake Elder's Meeting, location of traditional areas and local Inuktitut names, July 11, 2018.

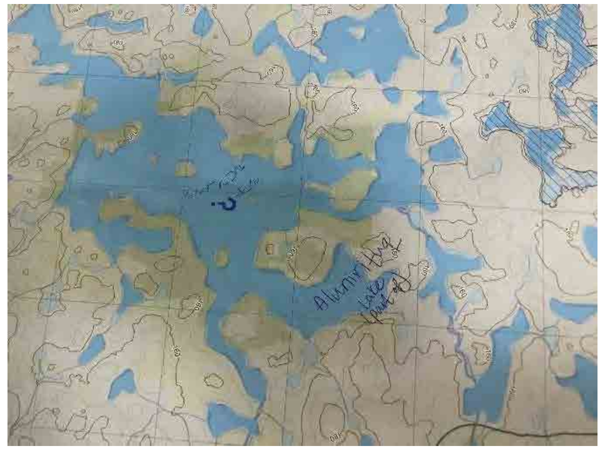


Photo 10: Baker Lake Elder's Meeting, local Inuktitut names, July 11, 2018.

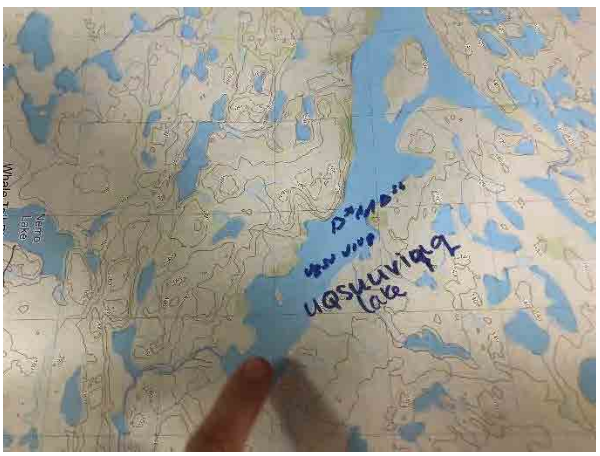


Photo 11: Baker Lake Elder's Meeting, local Inuktitut names, July 11, 2018.

Photo 12: Baker Lake Women's Meeting, good fishing area for char (Prince River) and location of bridge and falls. Muddy waters identified (source unknown), July 11, 2018.

AGNICO EAGLE

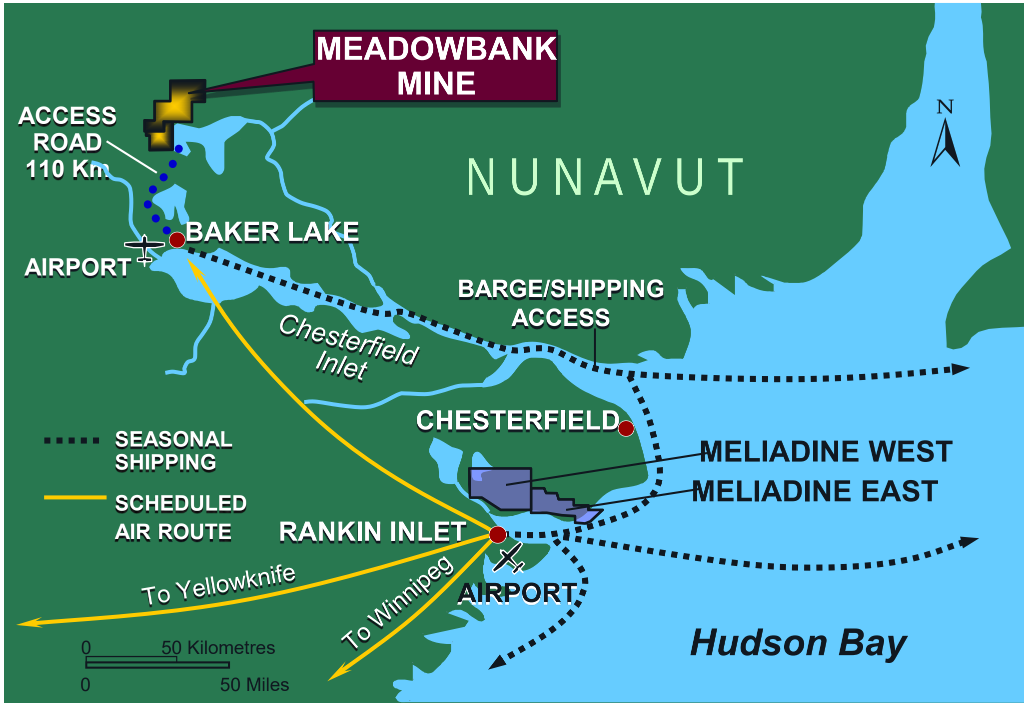
WHALE TAIL PIT AMENDMENT CONSULTATION

Kivalliq Region

July 2018

AGNICO EAGLE MINES LTD. IN NUNAVUT –

GOLD MINE OPERATIONS, FUTURE PROJECTS AND EXPLORATION



COMMITMENT TO ENGAGING WITH INDIGENOUS PEOPLE

ᐊᒡᓃᑯᒃᑯᑦ ᓄᓇᖃᖅᑳᖅᑐᑦ ᐃᓚᐅᖃᑕᐅᓂᖏᓐᓄᑦ ᐱᓂᐊᕐᓂᖓᑦ

AEM will work in partnership with Indigenous People to establish a mutually beneficial, cooperative and productive relationship. Our approach will be characterized by effective two-way communication, consultation and partnering.

ᐊᒡᓃᑯᒃᑯᑦ ᐱᓕᕆᖃᑎᖃᕐᓂᐊᖅᑐᑦ ᓄᓇᖃᖅᑳᖅᑐᓂᒃ ᐊᖏᖅᓯᒪᖃᑎᒋᓗᒋᑦ ᐃᑲᔫᑕᐅᔪᒥᒃ, ᐱᓕᕆᖃᑎᒌᖕᓂᕐᒧᑦ ᐊᒻᒪᓗ ᐱᓕᐅᕆᕋᓪᓕᐊᓂᕐᒧᑦ. ᐊᑐᖅᑕᕗᑦ ᐋᖅᑭᐅᒪᓂᐊᖅᑐᖅ ᐃᓗᐊᖅᑐᒃᑯᑦ ᒪᖅᑮᐃᖓᔪᒥᒃ ᐅᖃᖃᑎᖃᖃᑦᑕᕐᓂᕐᒥᒃ, ᐅᖃᖃᑎᒋᓂᒃᑯᑦ ᐊᒻᒪᓗ ᐱᓕᕆᖃᑎᒌᖕᓂᒃᑯᑦ.

TRADITIONAL KNOWLEDGE (TK) AND INUIT QAUJIMAJATUQANGIT (IQ)
ᐱᖁᓯᒥᒃ ᖃᐅᔨᒪᓂᖅ ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᑐᖃᖏᑦ

AGNICO EAGLE

01 TK/IQ Workshops ᐱᖁᓯᒥᒃ ᖃᐅᔨᒪᓂᖅ ᐊᒻᒪᓗ ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᑐᖃᖏᑦ ᒥᒃᓵᓄᑦ ᑲᑎᒪᓃᑦ

TK/IQ workshops and associated reports (2005-2013, December 2014, February 2016)

ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᑐᖃᖏᑦ / ᐱᖁᓯᖅᑐᐃᓂᒃ ᖃᐅᔨᒪᓂᕐᓄᑦ ᐊᒻᒪᓗ ᑕᒪᒃᑯᓄᖓ ᐅᓂᒃᑳᑦ (ᓲᕐᓗ 2005-ᒥᑦ 2013-ᒧᑦ, ᑎᓯᐱᕆ 2014 ᐊᒻᒪᓗ 2016)

02 Baseline Data Collection [ᑭᒡᓕᖕᔪᐊᓄᑦ ᓈᓴᐅᑎᓂᒃ/ᑎᑎᖅᑲᓂᒃ ᑲᑎᖅᓱᐃᓂᖅ]

2014 to 2017 – Western Science

(2014 to 2017 - ᐱᖓᓐᓇᖅᐸᓯᕝᒥᑦ ᓱᓇᕐᑐᐃᓐᓇᓕᕆᓂᖅ)

03 Feedback ᑕᓴᕐᕕᐅᔪᑦ

Presentation, sharing and discussion of baseline data to communities of interest (i.e. Elders, HTO, etc.)

ᑕᑯᖃᓈᖅᑎᑦᑎᓂᖅ, ᑐᓂᓯᖃᑦᑕᐅᑎᓂᖅ ᐊᒻᒪᓗ ᐅᖃᓪᓗᓐᓂᒃᓴᖃᑎᖃᕐᓂᖅ ᑭᒡᓕᐅᔪᓄᑦ ᓈᓴᐅᑏᑦ/ᑎᑎᖅᑲᐃᑦ ᒥᒃᓵᓄᑦ ᐱᖃᖃᑕᐅᔪᓄᑦ (ᓲᕐᓗ ᐃᓐᓇᕐᓱᐅᔪᓄᑦ, ᐆᒪᔪᓕᕆᔩᑦ ᑲᑐᔾᔨᖏᓐᓄᑦ, ᑕᒪᒃᑯᐊᖁᓗᐃᑦ)

04 Integrate ᐃᓚᒋᐅᑎᑦᑎᓂᖅ

Continued data collection, scope, design and implementation is informed by IQ/TK

ᑭᒡᓕᐅᔪᓄᑦ ᓈᓴᐅᑎᓂᒃ/ᑎᑎᖅᑲᓂᒃ ᑲᑎᖅᓱᐃᓂᖅ ᑲᔪᓯᓯᒪᔪᖅ; ᖃᓄᐃᑦᑑᓂᖓ, ᖃᓄᐃᖓᓂᖓ ᐊᒻᒪᓗ ᐊᑐᓕᖅᑎᑦᑎᓂᖅ ᐱᔭᐅᔪᑦ ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᑐᖃᖏᓐᓂᑦ / ᐱᖁᓯᖅᑐᐃᓂᒃ ᖃᐅᔨᒪᓂᕐᓂᑦ

05 Review ᕿᒥᕐᕈᓂᖅ

Review IQ/TK and Western science with communities of interest

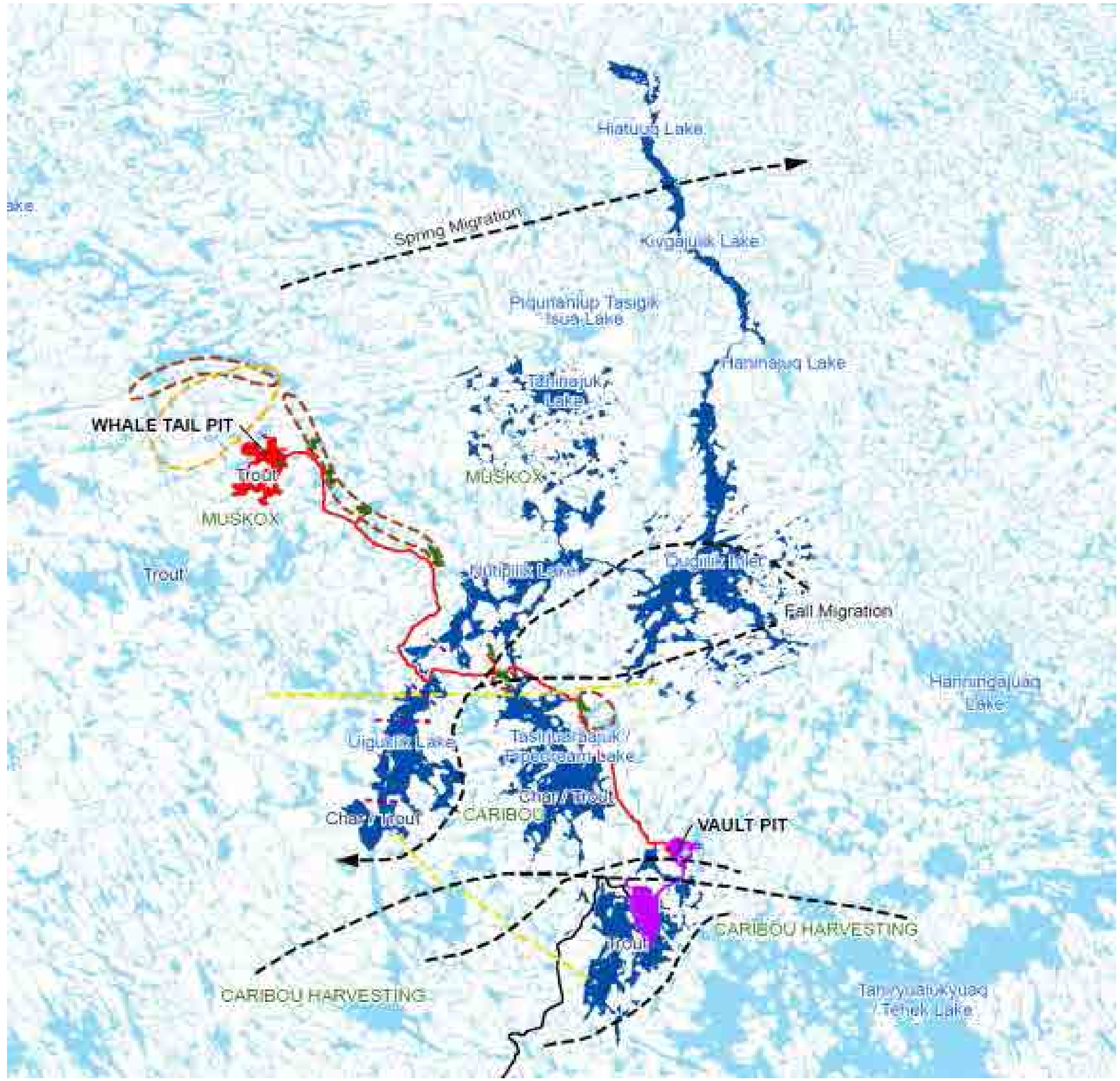
ᕿᒥᕐᕈᓂᖅ ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᑐᖃᖏᓐᓂᑦ / ᐱᖁᓯᖅᑐᐃᓂᒃ ᖃᐅᔨᒪᓂᕐᓂᑦ ᐊᒻᒪᓗ ᐱᖓᓐᓇᖅᐸᓯᕝᒥᑦ ᓱᓇᕐᑐᐃᓐᓇᓕᕆᓂᕐᓂᑦ ᐱᖃᖃᑕᐅᔪᓄᑦ

TRADITIONAL KNOWLEDGE AND INUIT QAUJIMAJATUQANGIT

ᐱᖅᑯᓯᕆᔭᐅᔪᒥᒃ ᖃᐅᔨᒪᓂᖅ ᐊᒻᒪᓗ ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᑐᖃᖏᑦ

- Harvesting Sites
- Wildlife and Fisheries IQ

- ᒪᖃᐃᕐᕕᐳᖃᑦᑕᖅᑐᑦ
- ᓂᕐᔪᑏᑦ ᐊᒻᒪᓗ ᐃᖃᓗᓕᕆᓂᕐᒧᑦ ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᑐᖃᖏᑦ

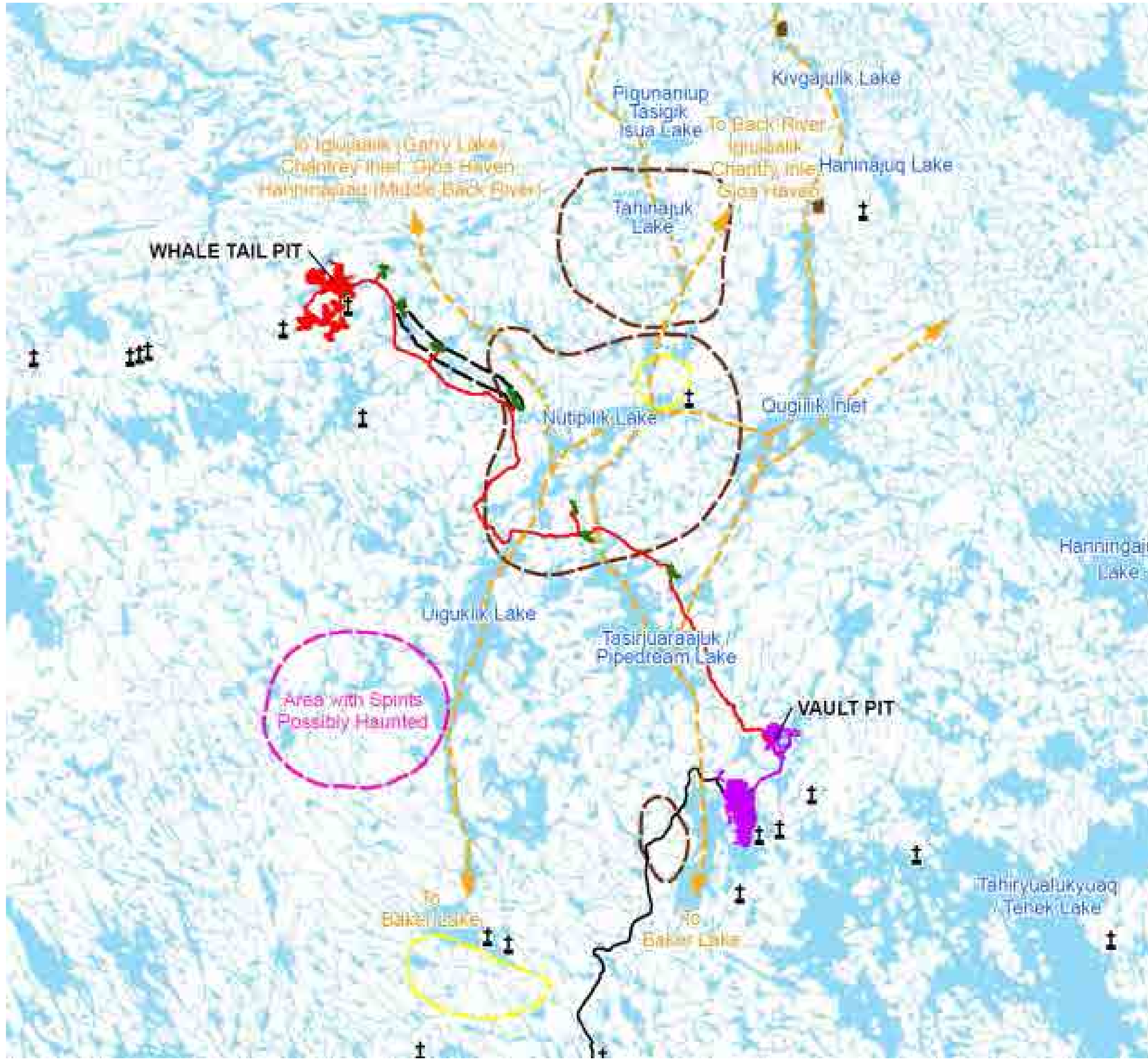


TRADITIONAL KNOWLEDGE AND INUIT QAUJIMAJATUQANGIT

ᐱᖅᑯᓯᕆᔭᐅᔪᒥᒃ ᖃᐅᔨᒪᓂᖅ ᐊᒻᒪᓗ ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᑐᖃᖏᑦ

- Cultural Sites
- Trails for traditional land use

- ᐃᑦᑕᕐᓂᑕᖃᕐᕖᑦ
- ᐊᐸᕐᑯᑏᑦ ᐱᖅᑯᓯᕆᔭᐅᔪᒃ ᓄᓇᒥᒃ ᐊᑐᕐᓂᕐᒧᑦ



OBJECTIVES

Today's objectives:

- Project overview
  - Whale Tail Pit and next phase of development
  - Baker Lake fuel storage increase
- Discussion of:
  - Water management alternatives
  - Ideas/opportunities for fish habitat compensation
- Opportunity to hear your comments and feedback

Introduction:
Project Update

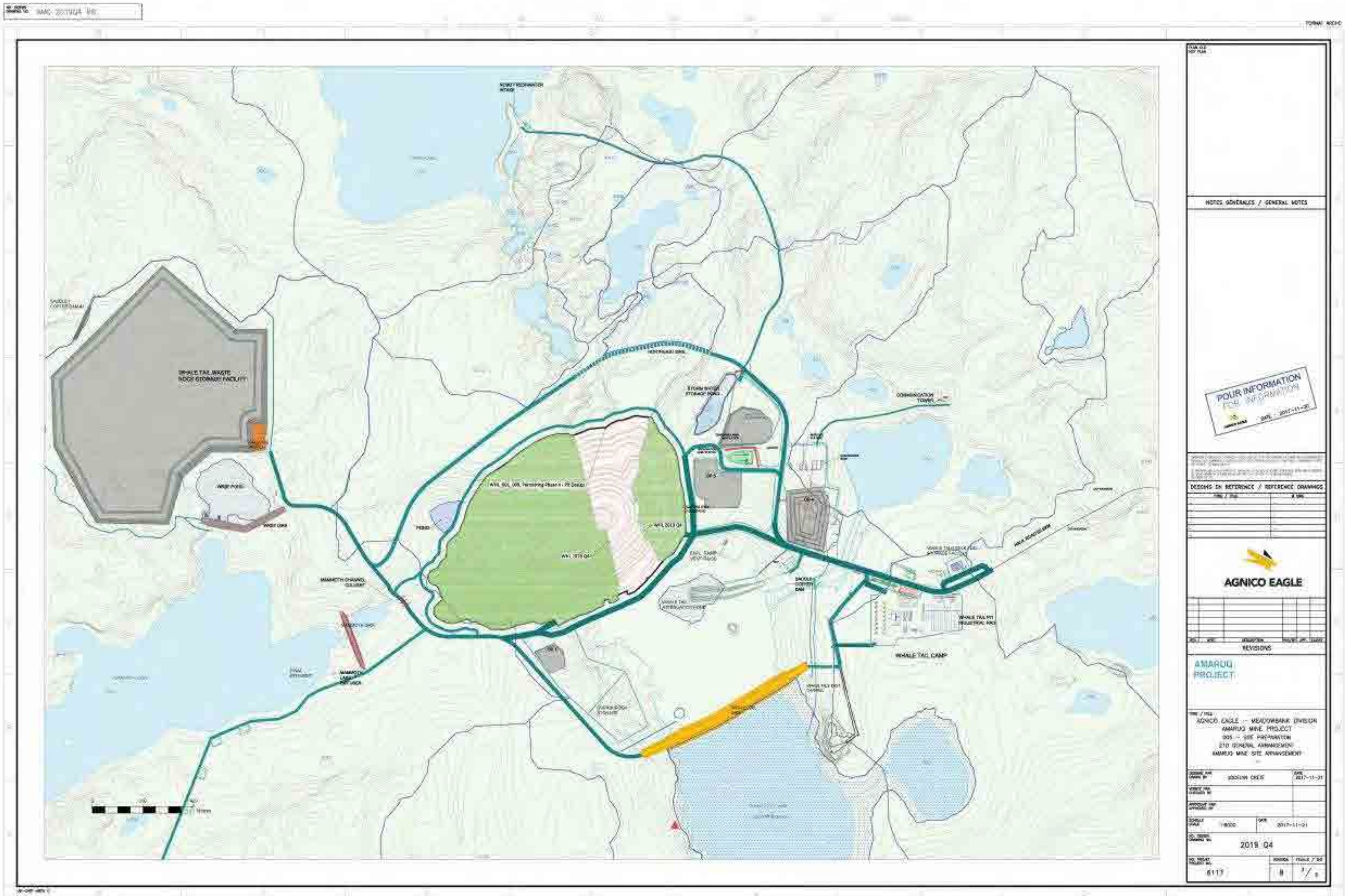
MINING IN NUNAVUT

THE MEADOWBANK MINE SITE - ᐊᐳᖅᑎᓐᓈᖅᑐᒥᑦ ᐅᔭᕋᖕᓂᐊᕐᕕᒃ

WHALE TAIL PIT

AGNICO EAGLE

PERMITTED UNDER NIRB PROJECT CERTIFICATE NO. 8 AND NUNAVUT WATER BOARD 2AM WTP 1826



WHALE TAIL PIT NIRB PROJECT CERTIFICATE AND TYPE A

AGNICO EAGLE

Highlights of hearing and decision:

- NIRB Final hearings for Whale Tail Pit were on September 19-22, 2017
  - Positive, majority support from communities (all COI with the exception of Arviat)
  - Hearings are closed
- The NWB Final Hearing was completed from September 26-27.
  - A great success
  - Support from the board with no outstanding issues
- Positive decision received from NIRB on November 6, 2017
  - Note - 1 year ago, our schedule predicted a NIRB decision by October 31st… quite an impressive accomplishment for the permitting team!
- Received Ministerial Decision on February 15th, 2018.

Overall, the process is on schedule with few delays

- We continue to target construction in Summer 2018, including Whale Tail dike construction.

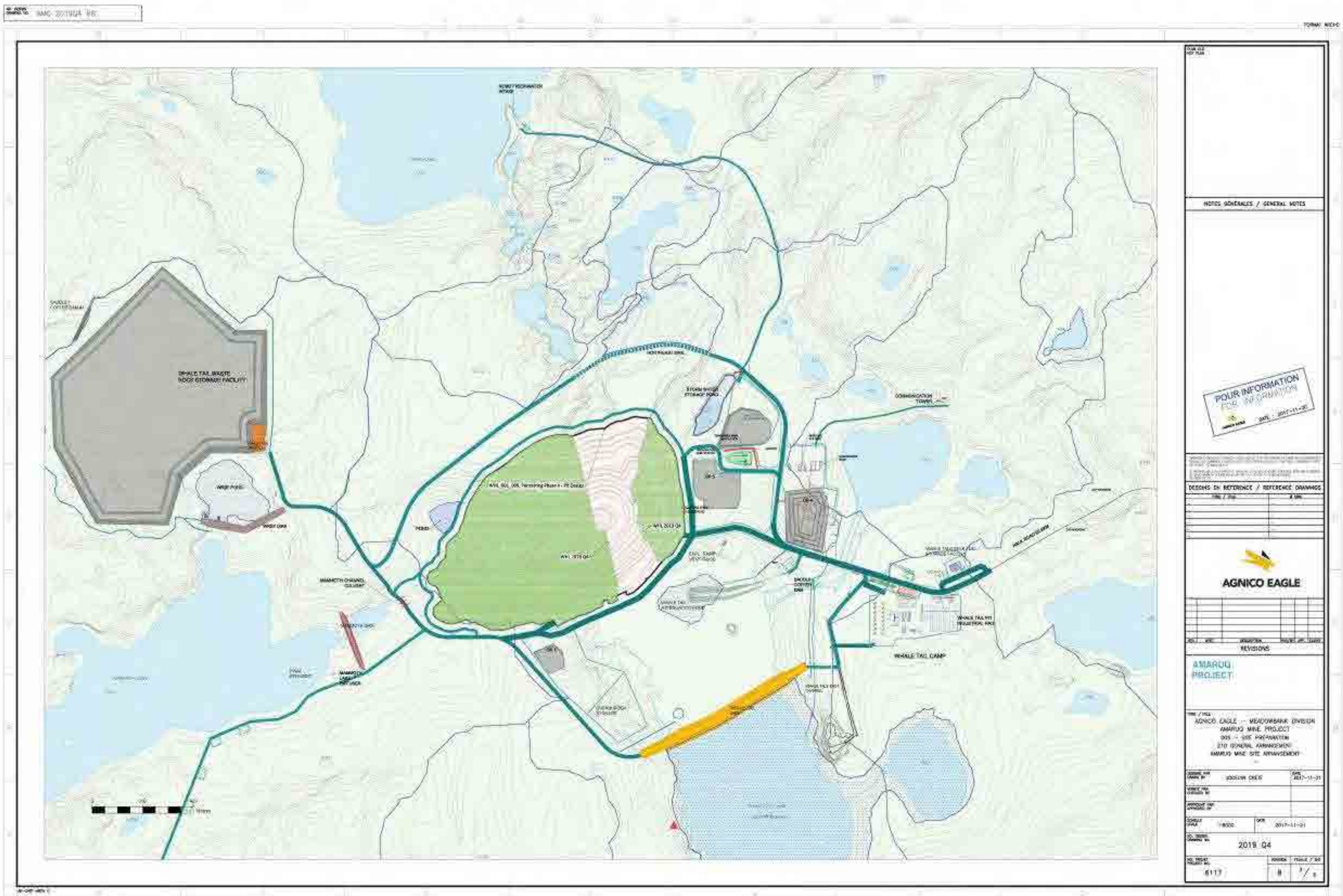
PROJECT DESCRIPTION – WHALE TAIL PIT AMENDMENT

Whale Tail Pit Amendment

- Proposed amendment to expand Whale Tail Pit:
  - expand the open pit, and add an additional open pit,
  - operate an additional Waste Rock Storage Facility;
  - operate an additional attenuation pond (IVR attenuation pond); and
  - operate an underground mine using the approved Whale Tail Pit facilities and Meadowbank Mill.
- More specifically, the total gold resource for the Whale Tail Pit will extend mining of Meadowbank for an additional 3-5 years through the operation of:
- The waste rock storage footprint, water management infrastructure and camp are proposed to:
  - Be within a compact site footprint near existing infrastructure; and
  - have been designed to provide capacity for future resource growth and potential expansion.

END OF 2019 – WHALE TAIL PIT

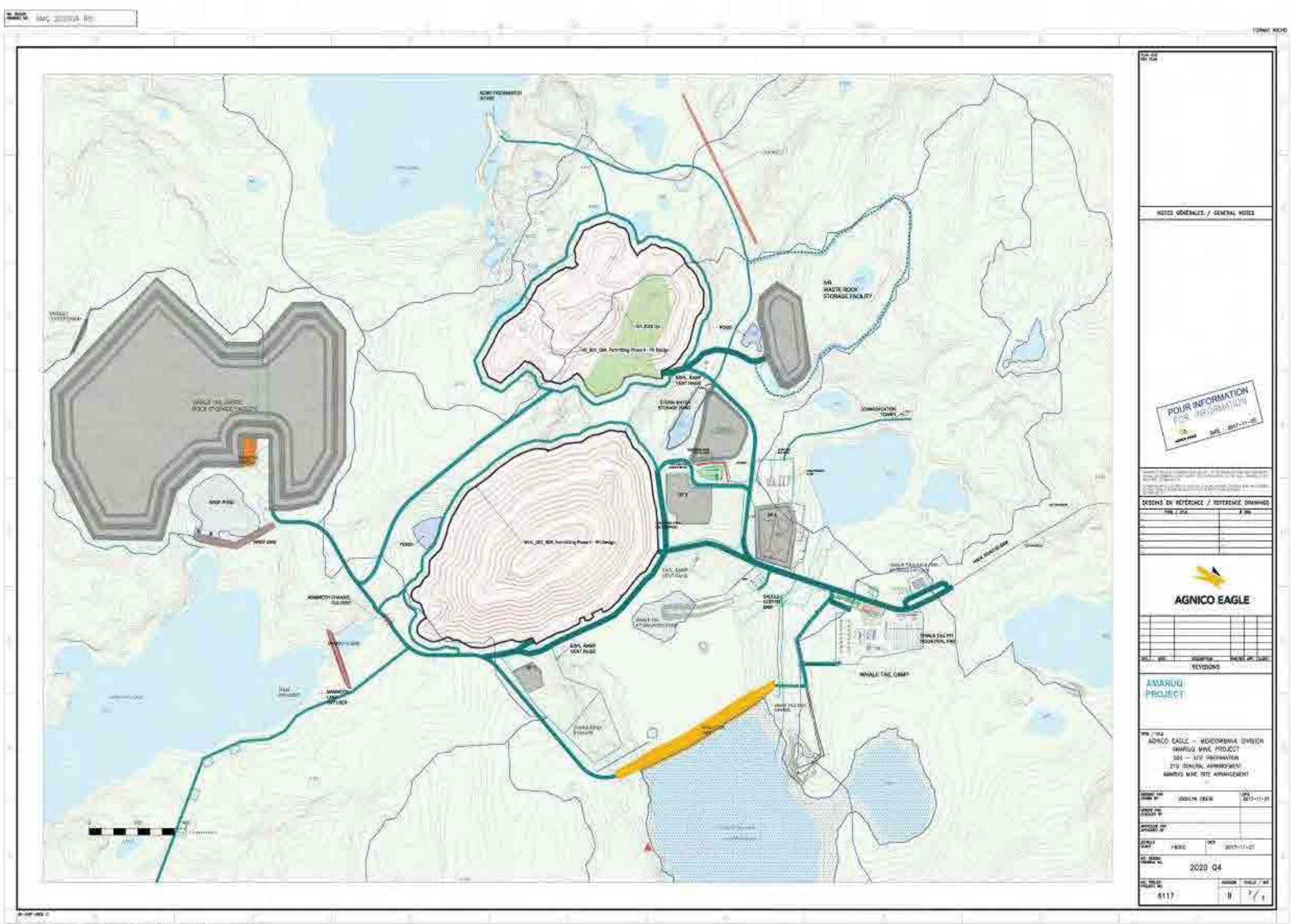
PERMITTED UNDER 2AM WTP ----



END OF 2020 – WHALE TAIL PIT EXPANSION, IVR PIT AND U/G

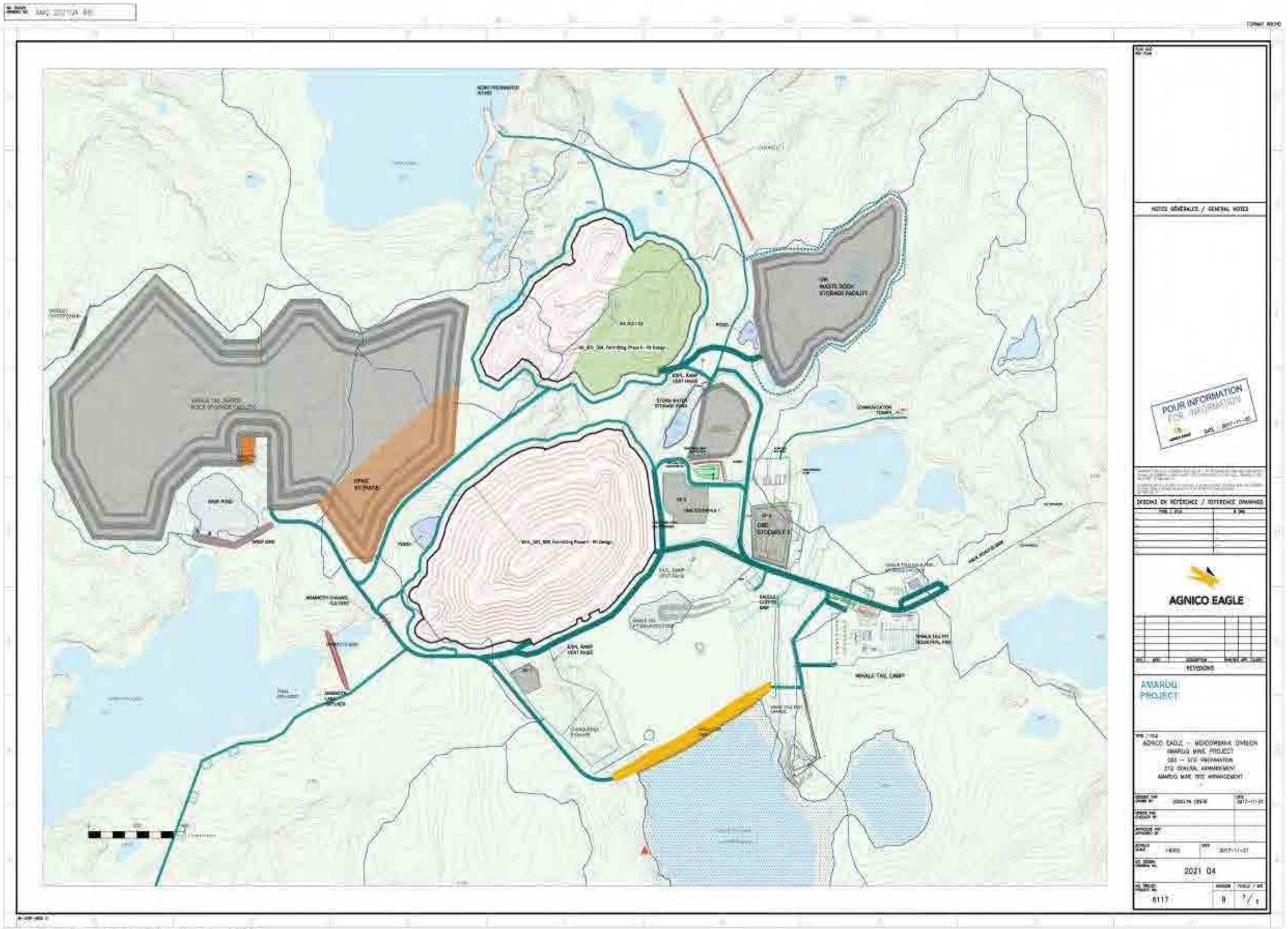
AGNICO EAGLE

START OF AMENDMENT ACTIVITIES



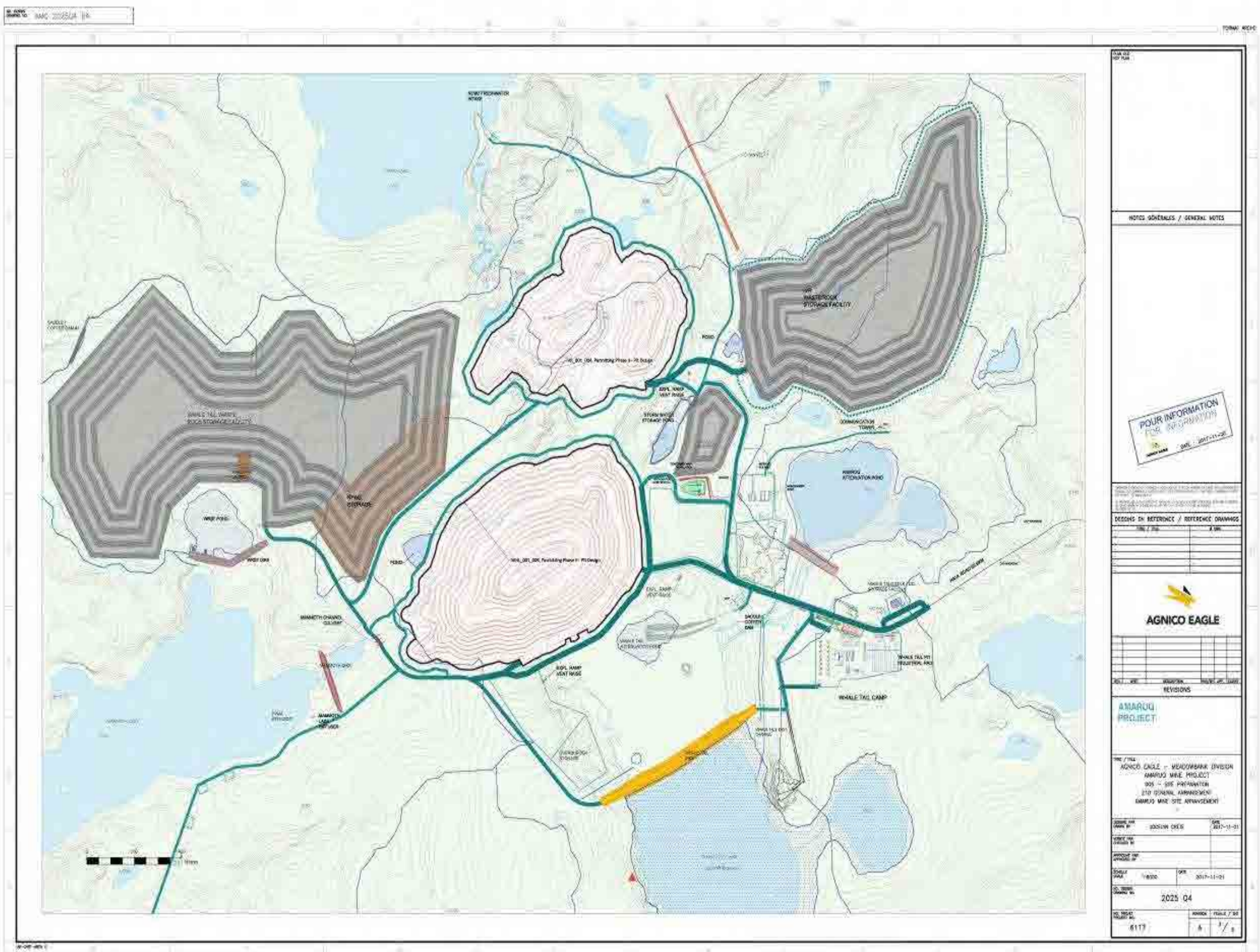
END OF 2021 – WHALE TAIL PIT AMENDMENT

AMENDMENT



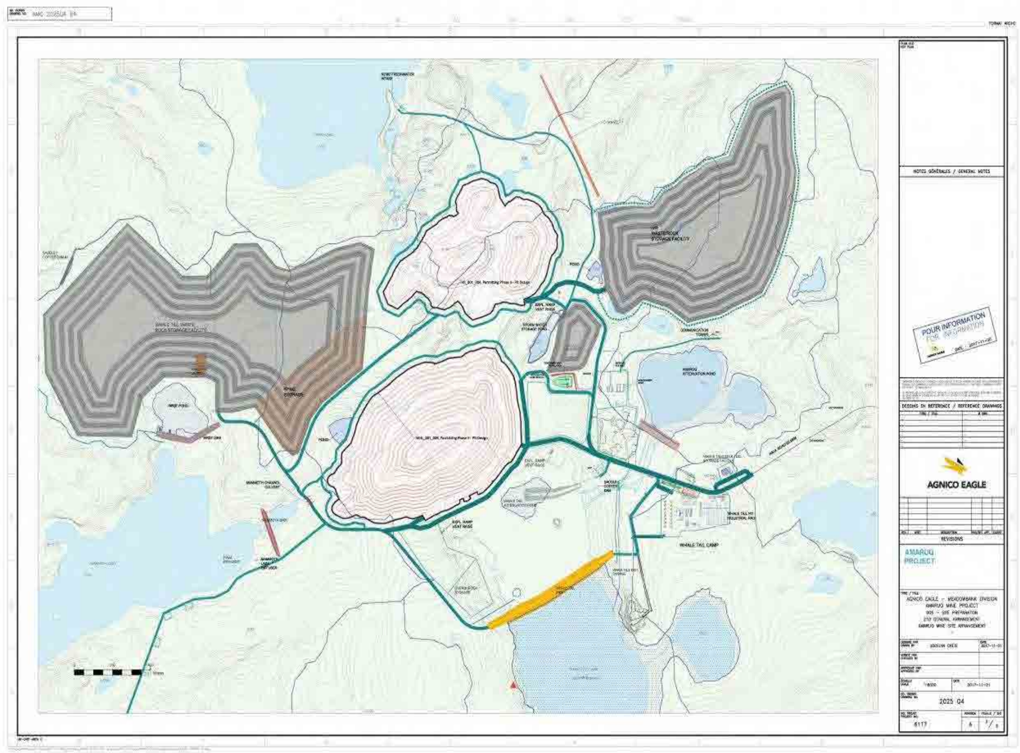
END OF 2025 TO 2027 – WHALE TAIL PIT AMENDMENT

FINAL AMENDMENT PROJECT FOOTPRINT



WHALE TAIL PIT AMENDMENT

- 3D rendering video



BAKER LAKE – FUEL FARM EXPANSION

PROJECT DESCRIPTION

AGNICO EAGLE

CONTEXT

- Increase in diesel fuel requirements for the Whale Tail project:
  - Ore hauling from Whale Tail pit to Meadowbank
  - Operation of a new Power Plant at the Whale Tail pit project
  - Buildings heating at the Whale Tail pit project
  - Whale Tail Haul Road maintenance
  - Operation of additional production equipment at the Whale Tail pit project
- To meet these needs we are proposing to add 3 diesel fuel tanks to the existing fuel farm.
- It will be designed and constructed to the same standards (CCME and National Fire Code) as existing tanks and will incorporate lessons learned.
- Tank 1 will be built in Spring/Summer 2019 (pending regulatory approval)
- Tank 2 will be built in Spring/Summer 2020 (pending regulatory approval)
- Tank 3 construction timing to be determined.

BAKER LAKE – FUEL FARM EXPANSION

PROJECT DESCRIPTION

BAKER LAKE – FUEL FARM EXPANSION

PROJECT DESCRIPTION

AGNICO EAGLE

BENEFITS TO THE COMMUNITY

- **Jobs**
  - Increase in contractor needs during the construction phase
  - Increase in contractor needs to ship fuel to the Whale Tail pit project
- **Economic Development**
  - Increase spending during construction
- **Community Support**
  - Ability to support Hamlet should diesel reserves run low

BAKER LAKE – FUEL FARM EXPANSION

MITIGATION AND MONITORING

- Health and Safety procedures will be put in place during construction to ensure safety
- It is not expected that noise levels will increase significantly
- Archaeology studies will be conducted to ensure proposed project has no impact on archaeological resources

BAKER LAKE – FUEL FARM EXPANSION

REGULATORY AFFAIRS

- The following stakeholders will be consulted with permit requests to be made when needed:
  - Government of Nunavut – Community and Government Services
  - Government of Nunavut – Culture and Heritage
  - Hamlet of Baker Lake
  - Nunavut Planning Commission
  - Nunavut Impact Review Board
  - Nunavut Water Board

- The following consultation events will occur:
  - Summer 2018
    - Site visit with Elders to discuss potential concerns
  - Spring 2019
    - presentation on how findings/concerns were incorporated into planning
    - information session to go over construction details, Health & Safety measures, and construction schedule

Part 1:
Water Management

What are our options to store water over winter?

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

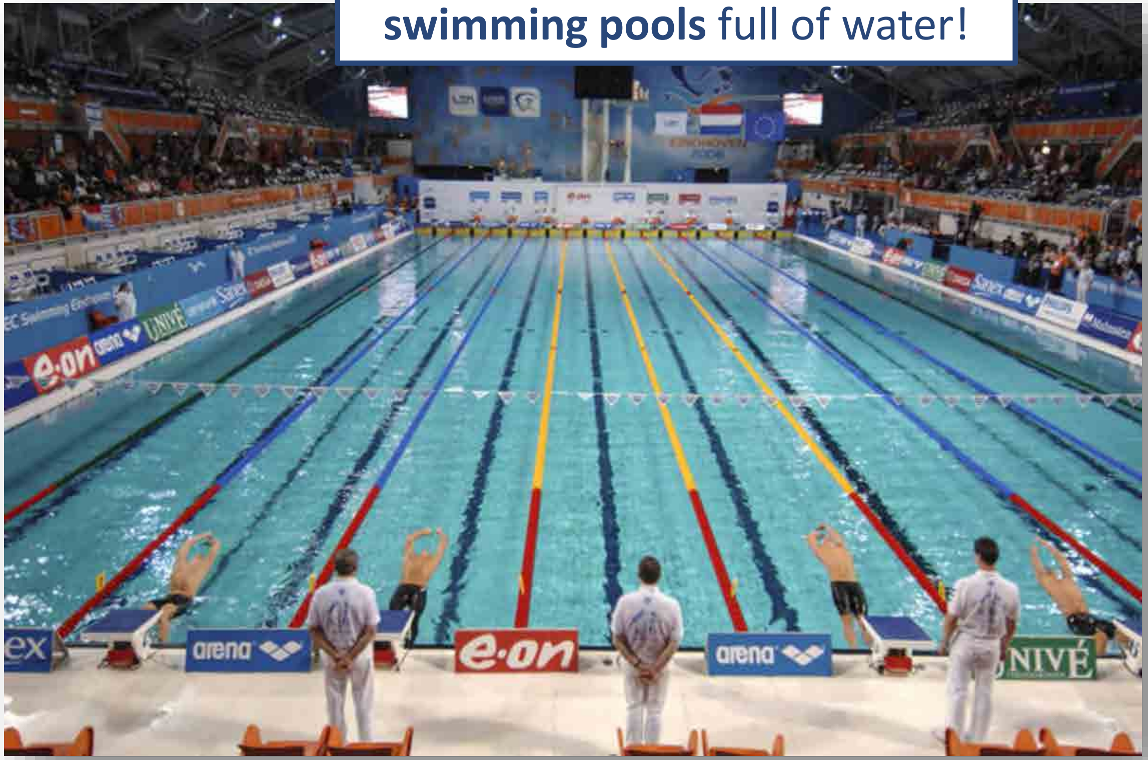
INTRODUCTION

Water management needs:

Need to store **750,000 m3** of water

- **Surface sources**
  – rainfall, snow melt
- **Groundwater**
  – seepage into pits

That's about **300** Olympic-size **swimming pools** full of water!



WATER MANAGEMENT ALTERNATIVES ASSESSMENT

INTRODUCTION

AGNICO EAGLE

Guiding principles:

- **Keep clean water clean**
  - Divert clean water away from the site
  - Collect water that has had contact with pits or waste rock

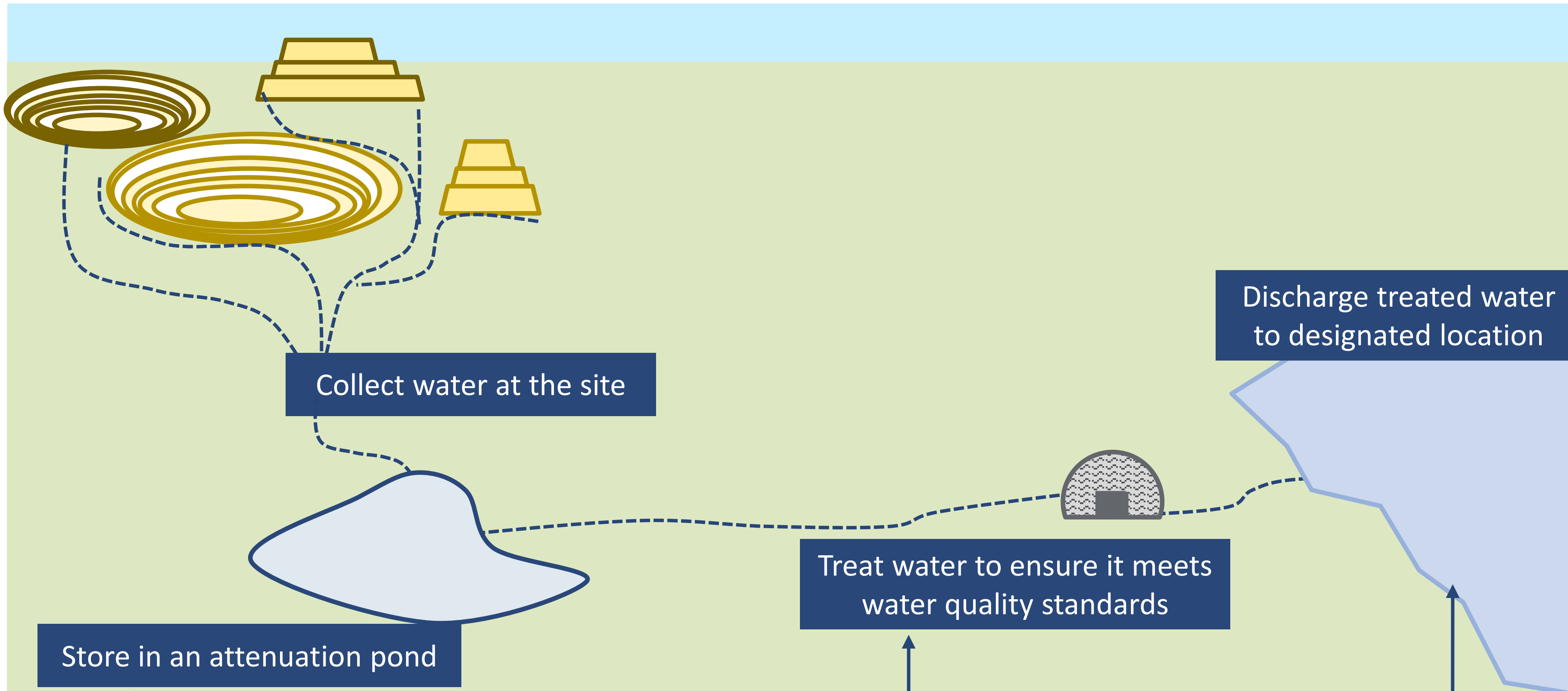
Before it is treated, this 'contact water' may contain metals and sediments that may be harmful to fish and other species

- **Store water over winter**
  - Treat and discharge water in summer

Attenuation: Collecting and storing water so that it can be released in a controlled manner

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

GENERAL APPROACH



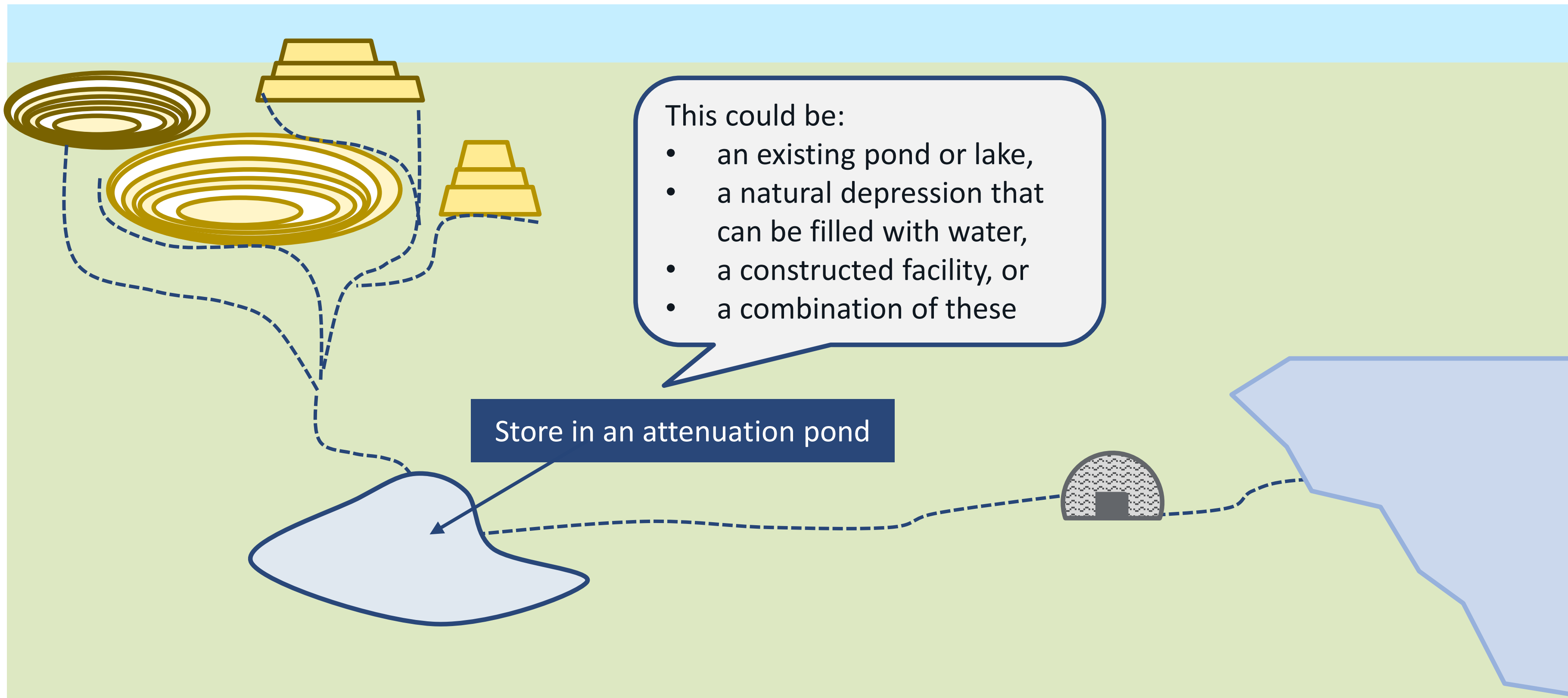
Attenuation pond is a place to store water before it can be treated and discharged.

Water treatment plant will operate in the summer so that water can be discharged during the ice-free period

Treated water will be released only when it meets water quality standards

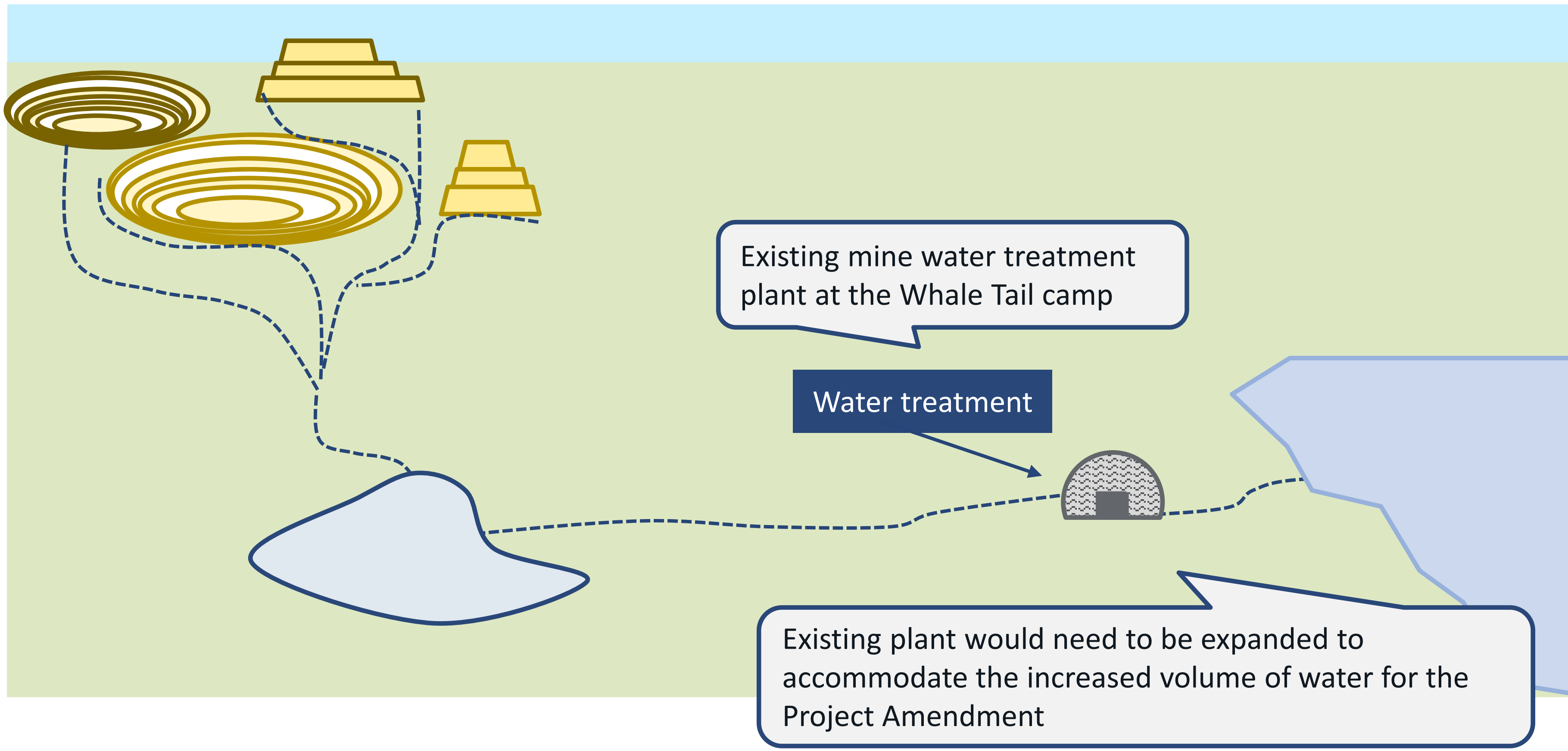
WATER MANAGEMENT ALTERNATIVES ASSESSMENT

GENERAL APPROACH



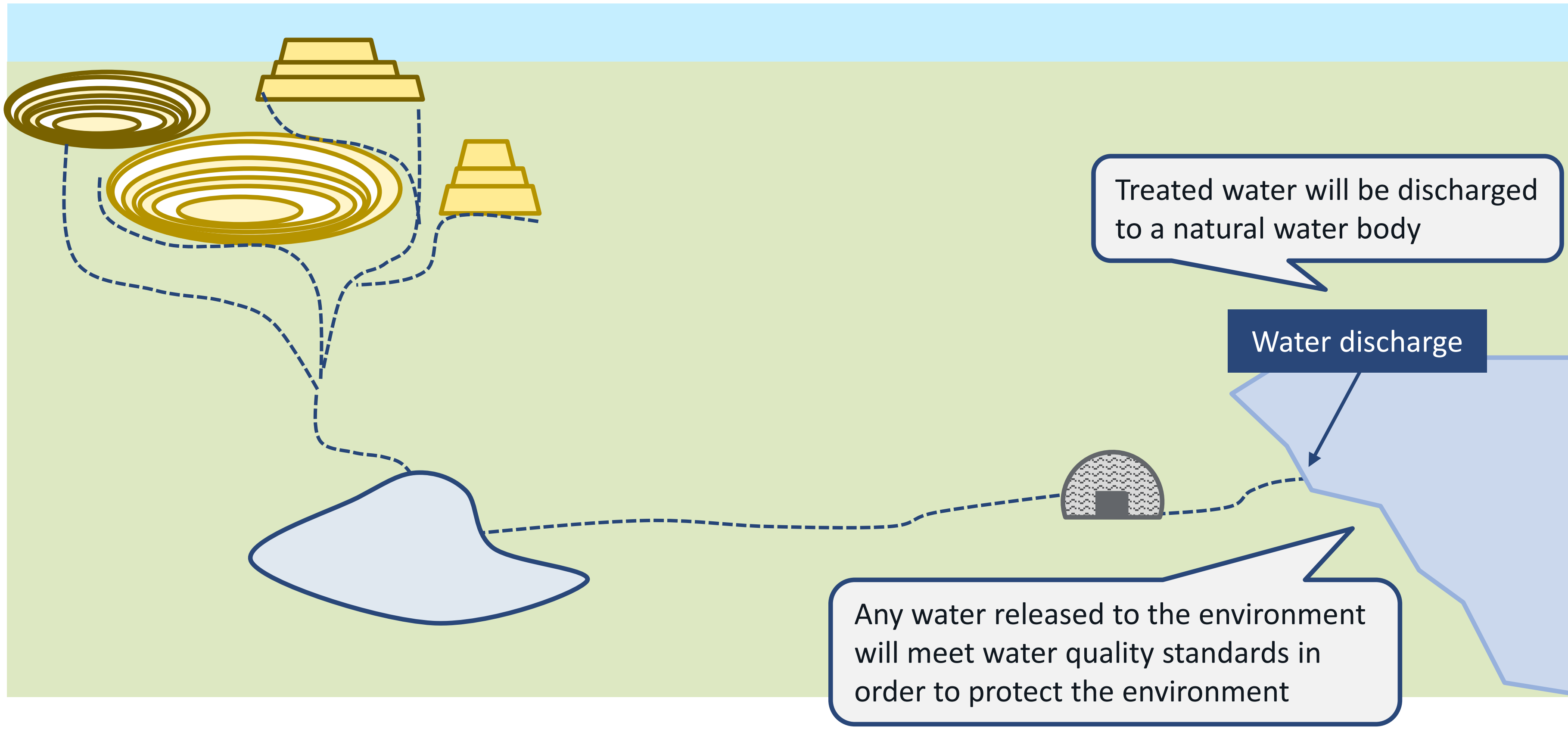
WATER MANAGEMENT ALTERNATIVES ASSESSMENT

GENERAL APPROACH



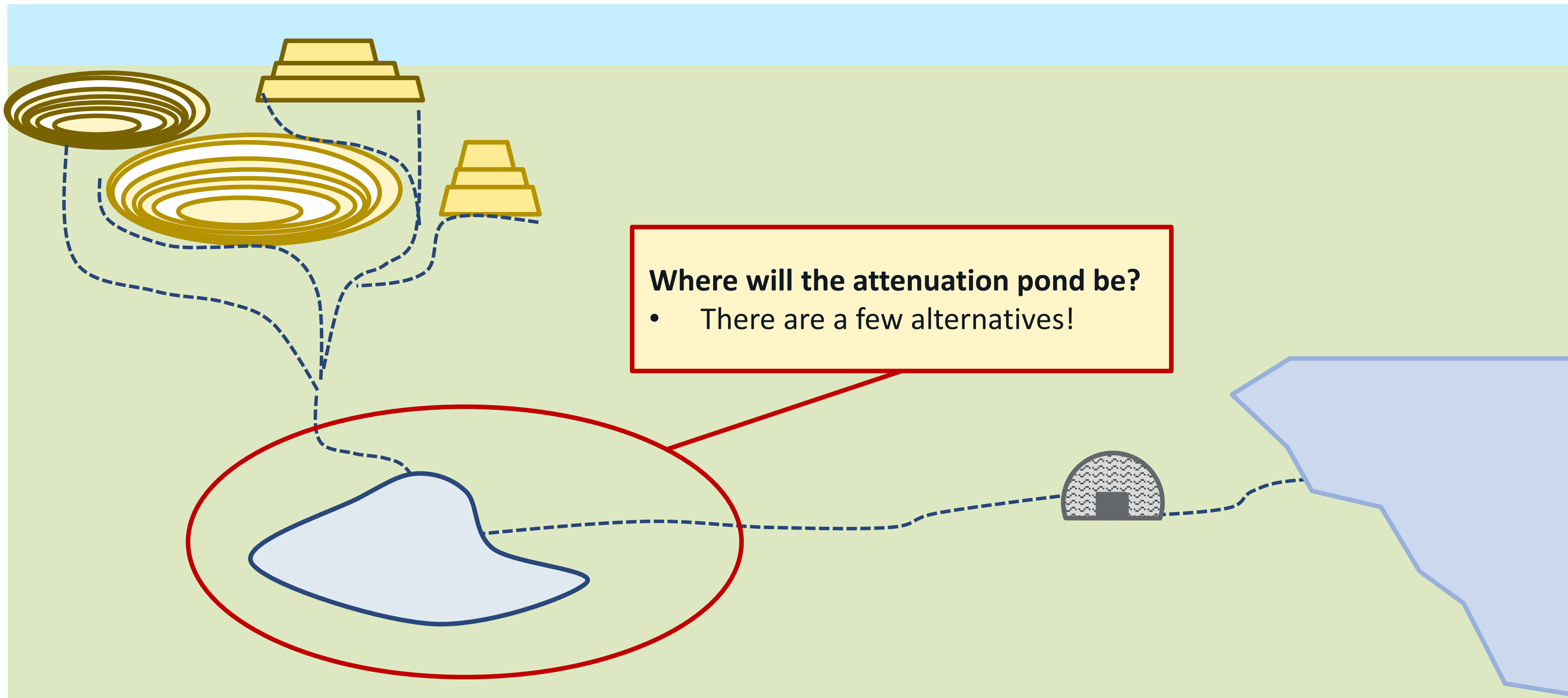
WATER MANAGEMENT ALTERNATIVES ASSESSMENT

GENERAL APPROACH



WATER MANAGEMENT ALTERNATIVES ASSESSMENT

GENERAL APPROACH



WATER MANAGEMENT ALTERNATIVES ASSESSMENT

PART 1: IDENTIFYING THE ALTERNATIVES

Part 3:

Select the "preferred" alternative

Part 2:

Compare the pros and cons of each

Part 1:

Identify possible alternatives

Part 1

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

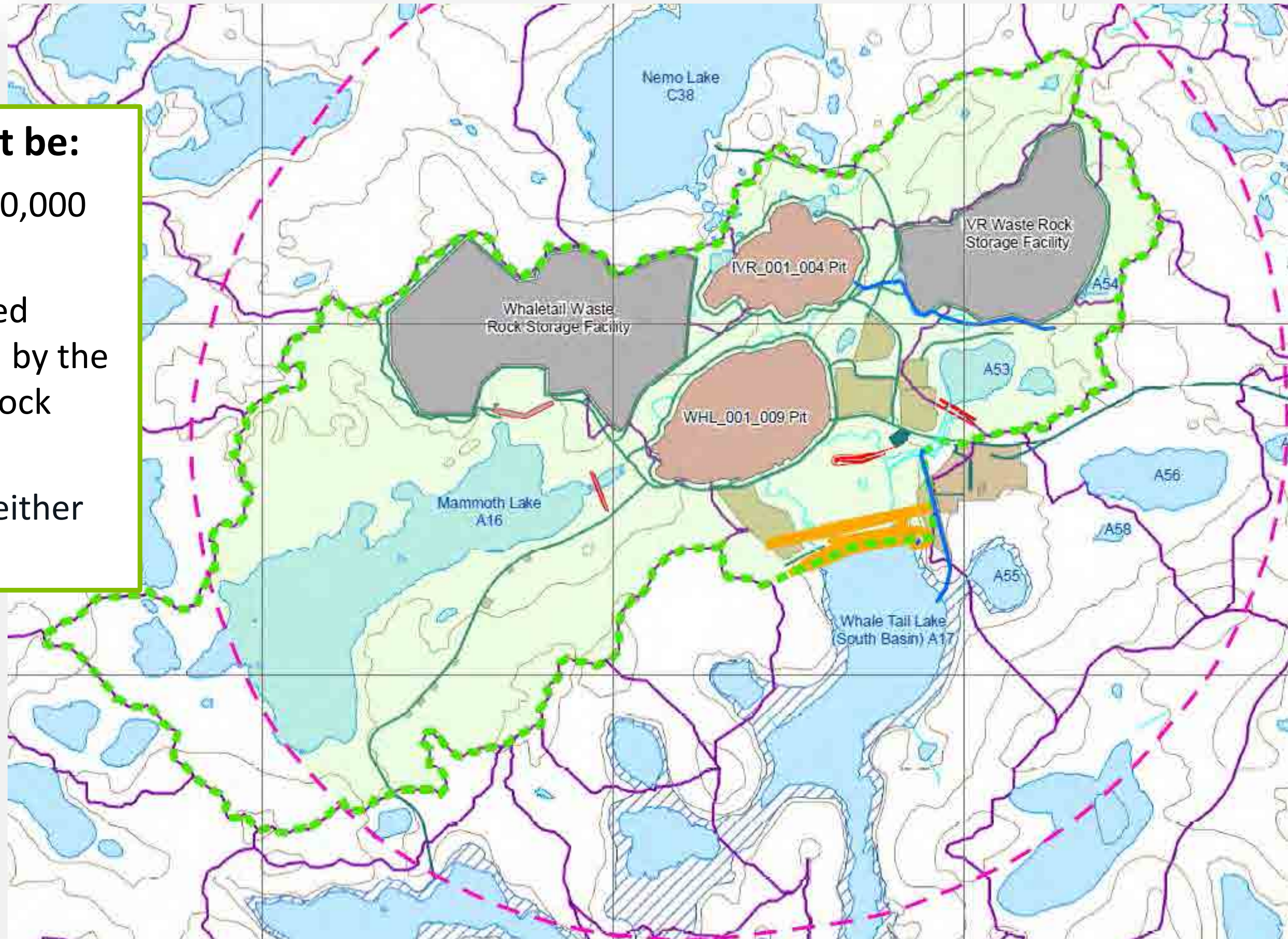
PART 1: IDENTIFYING THE ALTERNATIVES

AGNICO EAGLE

Thresholds

Alternatives must be:

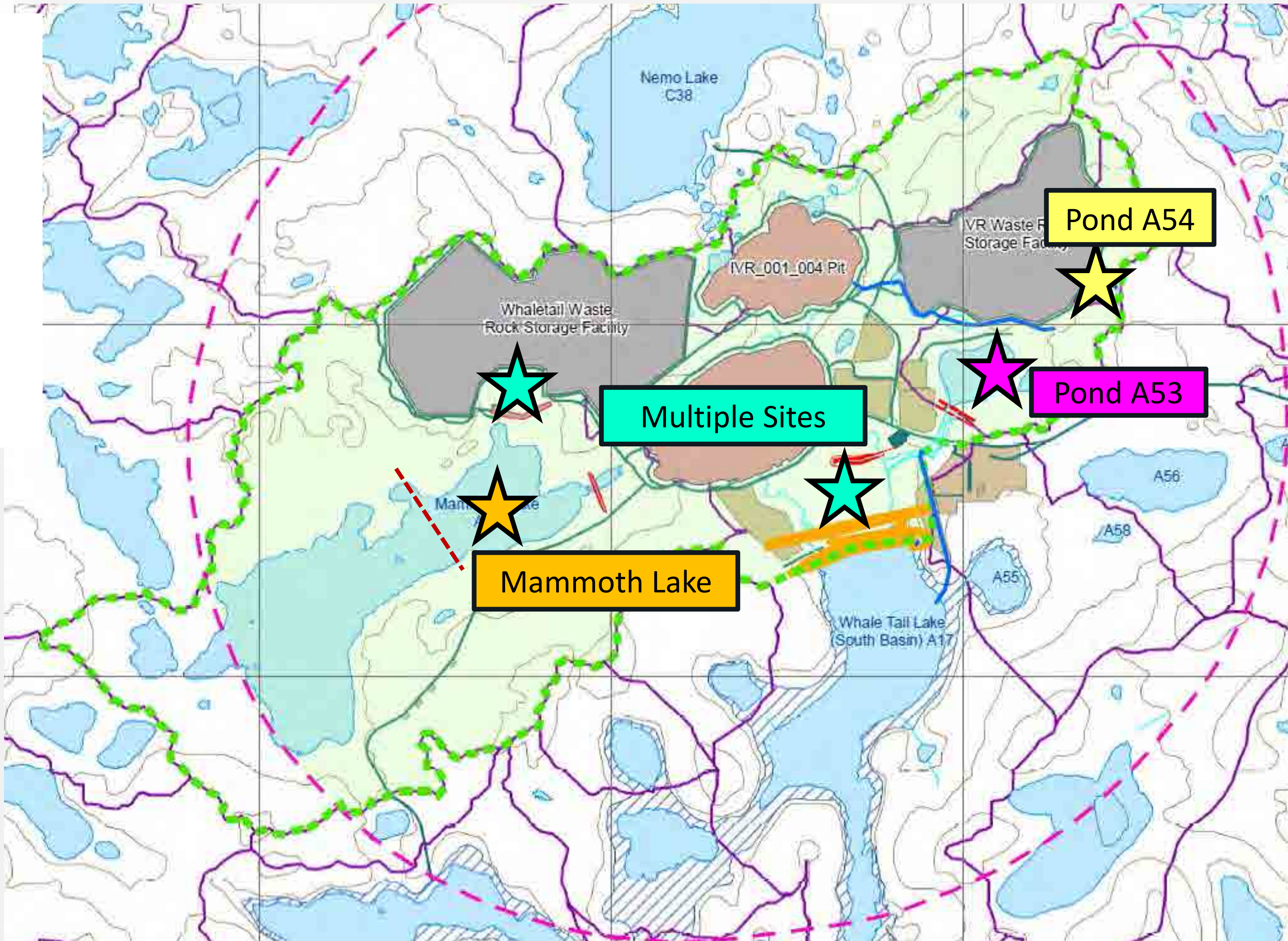
- Able to store 750,000 m^3 of water,
- Within watershed already affected by the pits and waste rock facilities, <u>and</u>
- Within 2 km of either pit.



WATER MANAGEMENT ALTERNATIVES ASSESSMENT

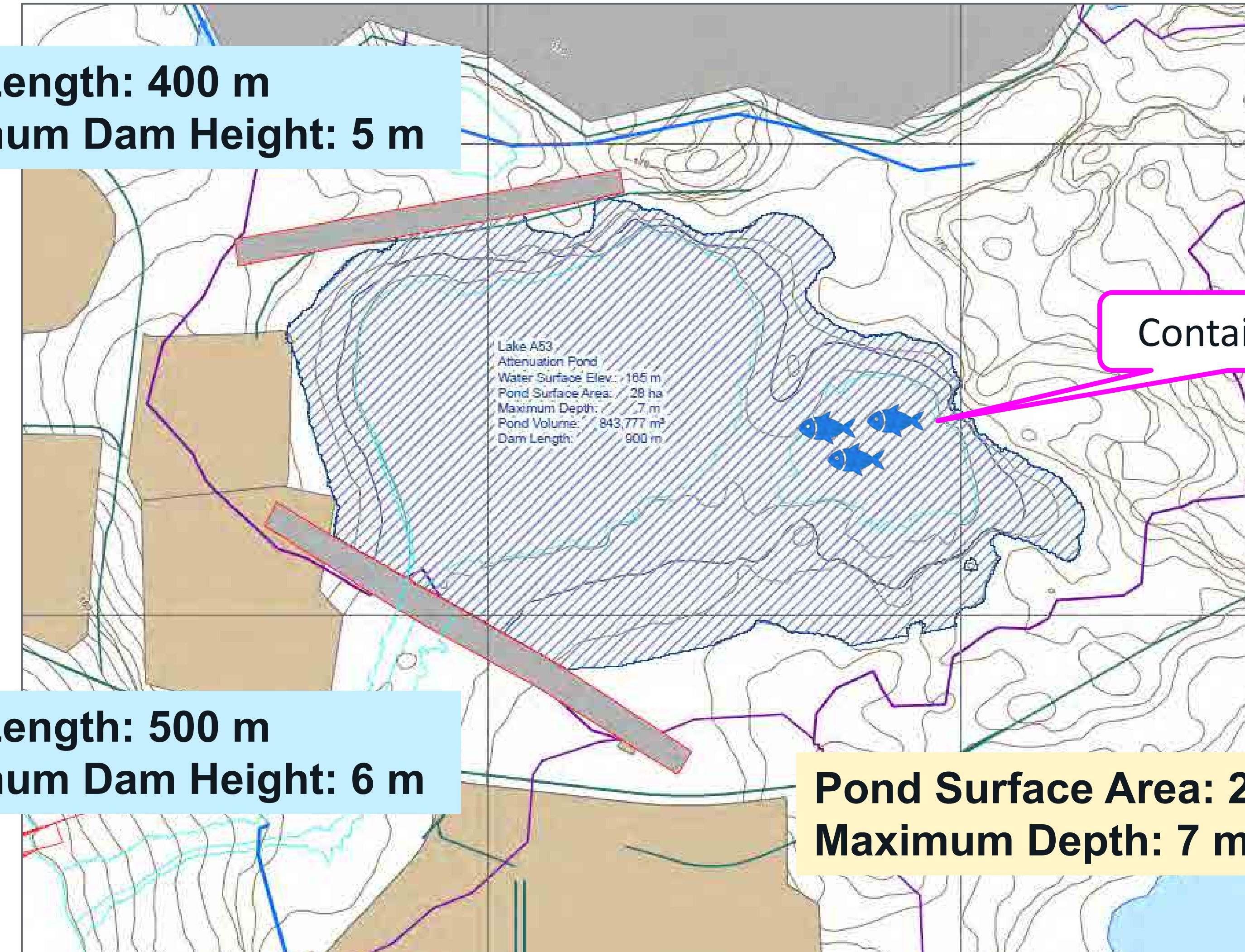
PART 1: IDENTIFYING THE ALTERNATIVES

Four possible alternatives that meet these thresholds



WATER ATTENUATION POND

ALTERNATIVE 1: POND A53



Dam Length: 400 m
Maximum Dam Height: 5 m

Contains Fish

Dam Length: 500 m
Maximum Dam Height: 6 m

Pond Surface Area: 28 ha
Maximum Depth: 7 m

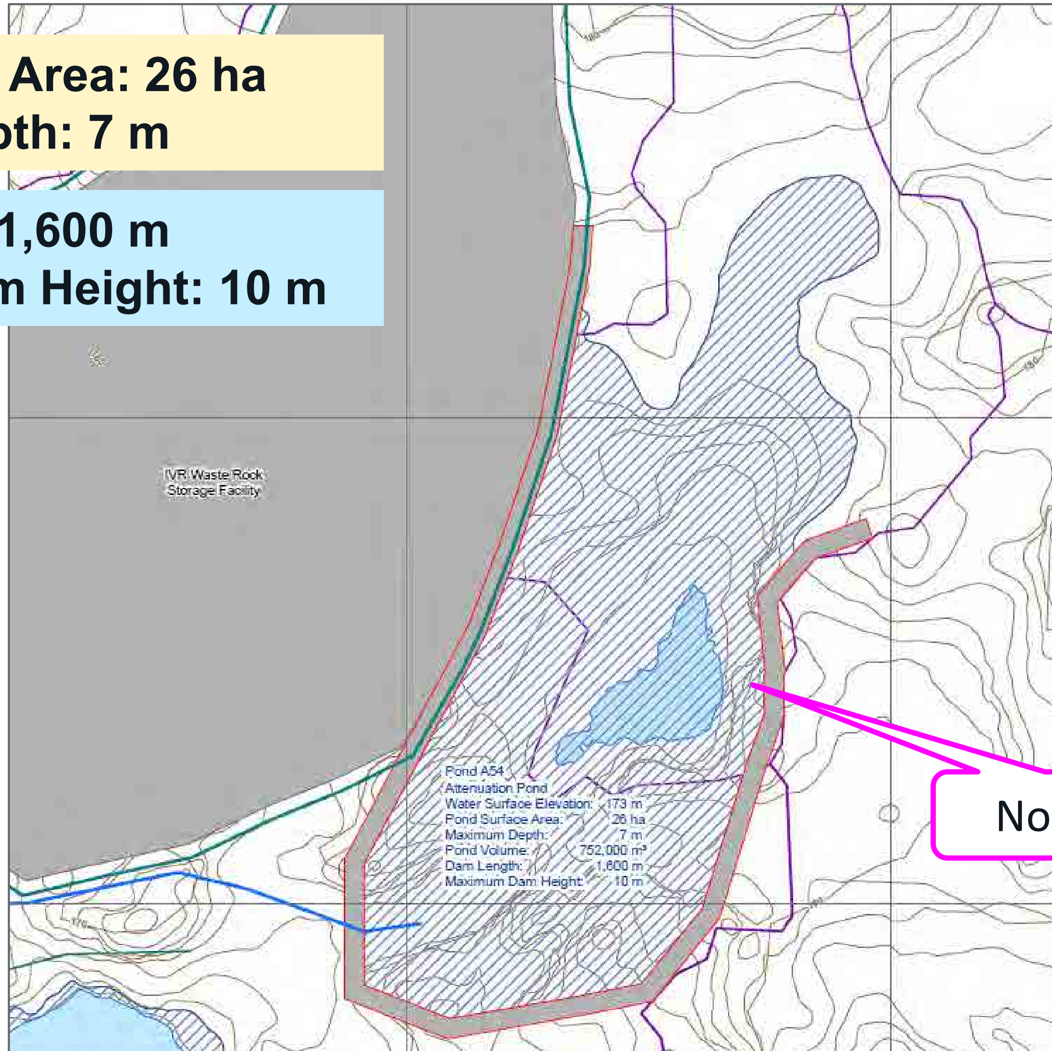
Conceptual illustration only

WATER ATTENUATION POND

ALTERNATIVE 2: POND A54

Pond Surface Area: 26 ha
Maximum Depth: 7 m

Dam Length: 1,600 m
Maximum Dam Height: 10 m



No Fish

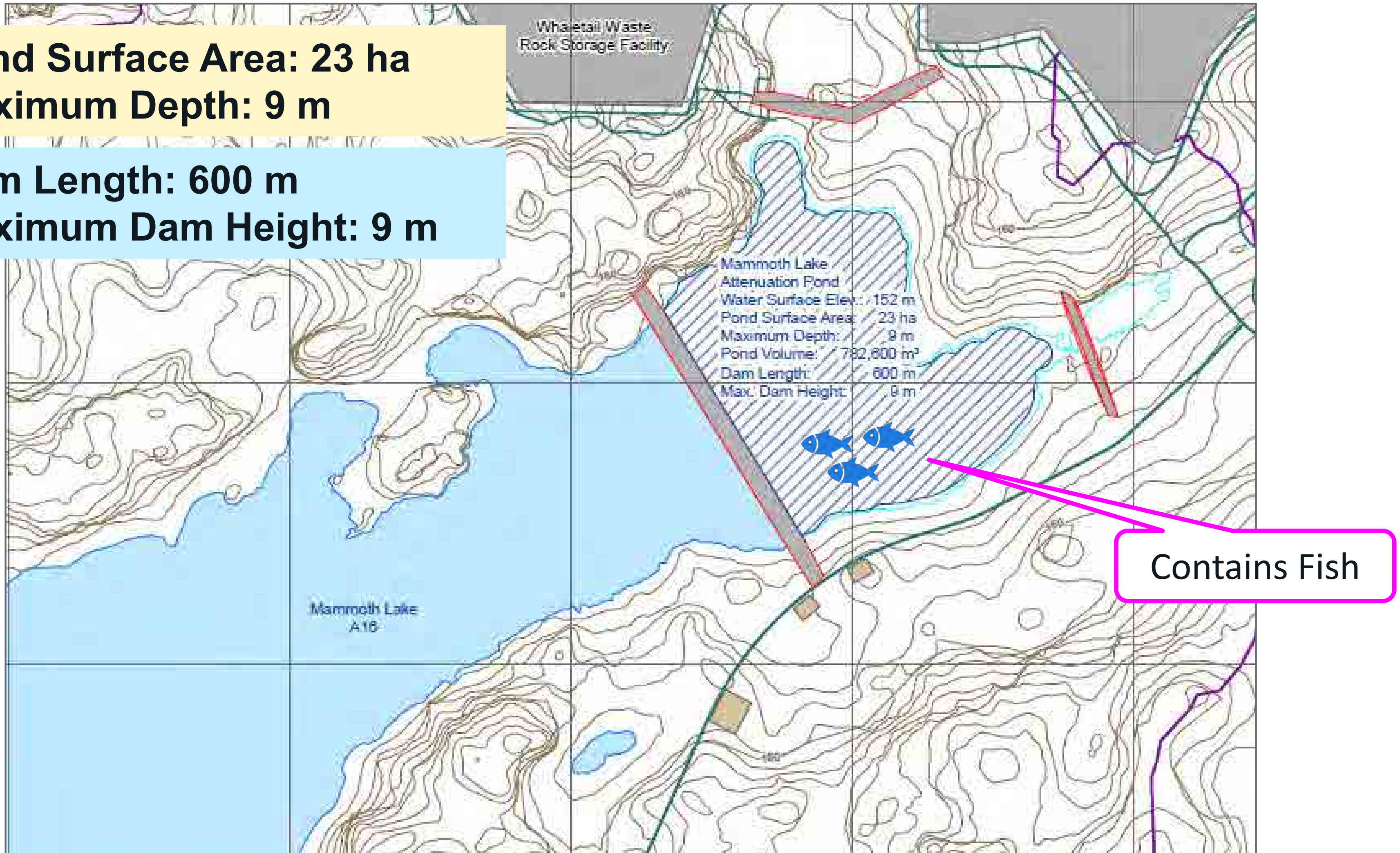
Conceptual illustration only

WATER ATTENUATION POND

ALTERNATIVE 3: MAMMOTH LAKE

Pond Surface Area: 23 ha
Maximum Depth: 9 m

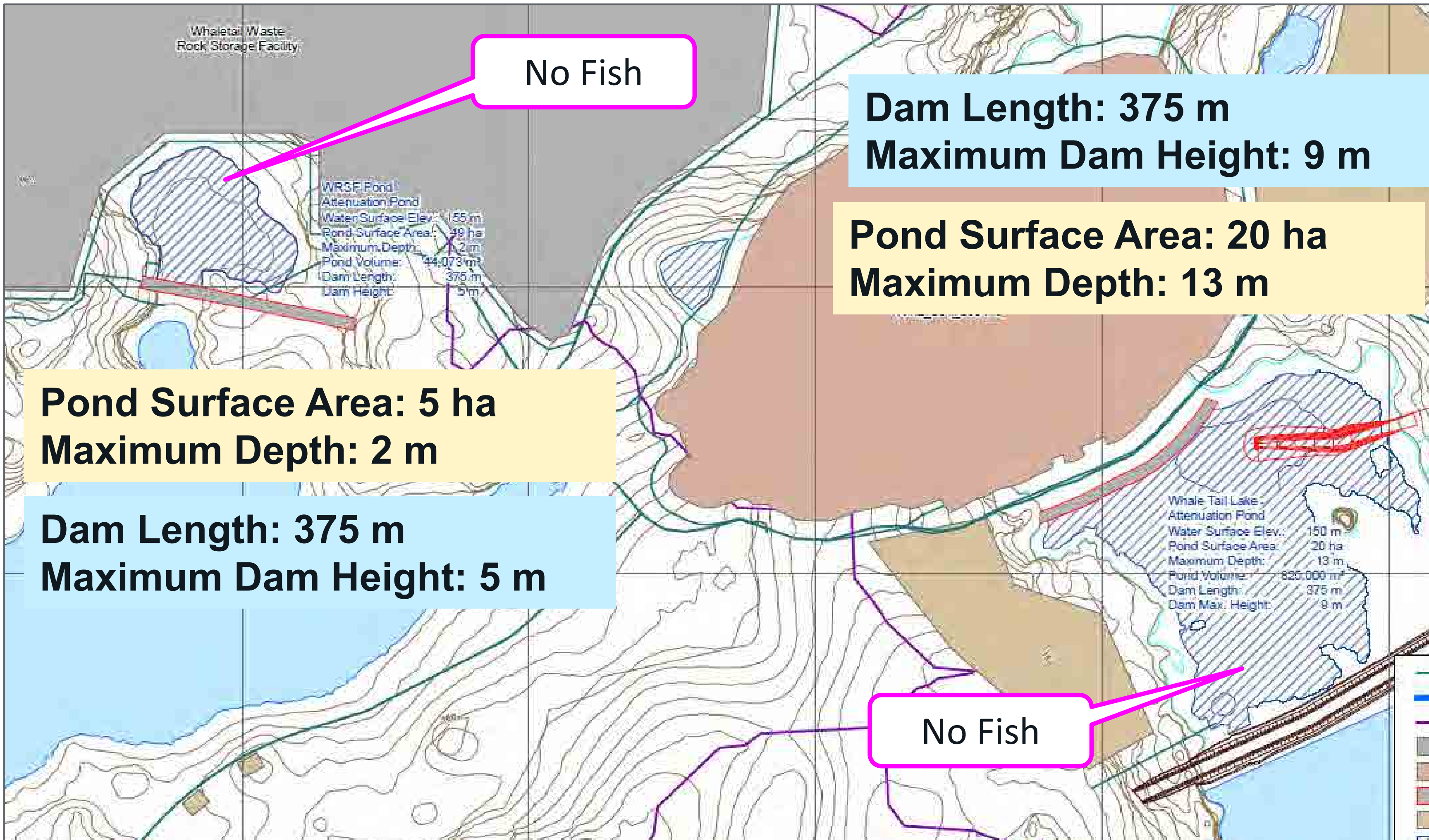
Dam Length: 600 m
Maximum Dam Height: 9 m



Conceptual illustration only

WATER ATTENUATION POND

ALTERNATIVE 4: MULTIPLE STORAGE SITES



Conceptual illustration only

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

PART 2: COMPARE AND CONTRAST

Part 1:

Identify possible alternatives

Complete ✓

Part 2:

Compare the pros and cons of each

Part 3:

Select the "preferred" alternative

Part 2

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

PART 2: COMPARE AND CONTRAST

AGNICO EAGLE

How do we compare the alternatives?

Traditional knowledge & *Inuit Qaujimanituqangit*

Technical
- Water treatment
- Containment infrastructure
- Pipelines
- Roads
- etc.

Environmental
- Air quality
- Climate
- Terrain
- Groundwater
- Surface water
- Fish
- Wildlife

People
- Archaeology
- Cultural heritage
- Land use
- Communities

Economic
- Capital costs
- Operating costs
- Closure and post-closure costs

Four “Accounts”
(categories of information)

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

PART 2: COMPARE AND CONTRAST

AGNICO EAGLE

Questions to ask about the alternatives:

- How are they the same?
- How are they different?

Focus on things that are different

- What infrastructure will be required?
- What is the footprint?
- How far will water have to be transported?

Prepare maps and diagrams for each alternative

- How might they affect the environment?
- How might they affect people, communities, and land use?

Review information from field studies and other research

Consult with communities, land users, and other stakeholders

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

PART 3: SELECT THE PREFERRED ALTERNATIVE

Part 1:

Identify possible alternatives

Part 2:

Compare the pros and cons of each

Part 3:

Select the "preferred" alternative

Complete ✓

In progress…

Part 3

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

OPPORTUNITY TO GET INVOLVED

What do you think?

Part 1:

Identify possible alternatives

Part 2:

Compare the pros and cons of each

Part 3:

Select the "preferred" alternative

Are there any alternatives we've missed?

Is the study area appropriate?

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

OPPORTUNITY TO GET INVOLVED

AGNICO EAGLE

What do you think?

Part 1:

Identify possible alternatives

Part 2:

Compare the pros and cons of each

Part 3:

Select the "preferred" alternative

- What should we look at?
- What do you know, or want to know?
- What do you think are the pros and cons?

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

OPPORTUNITY TO GET INVOLVED

AGNICO EAGLE

What do you think?

Part 1:

Identify possible alternatives

Part 2:

Compare the pros and cons of each

Part 3:

Select the "preferred" alternative

- What do you think are the most important things to consider?
- What alternative do you think you prefer, and why?

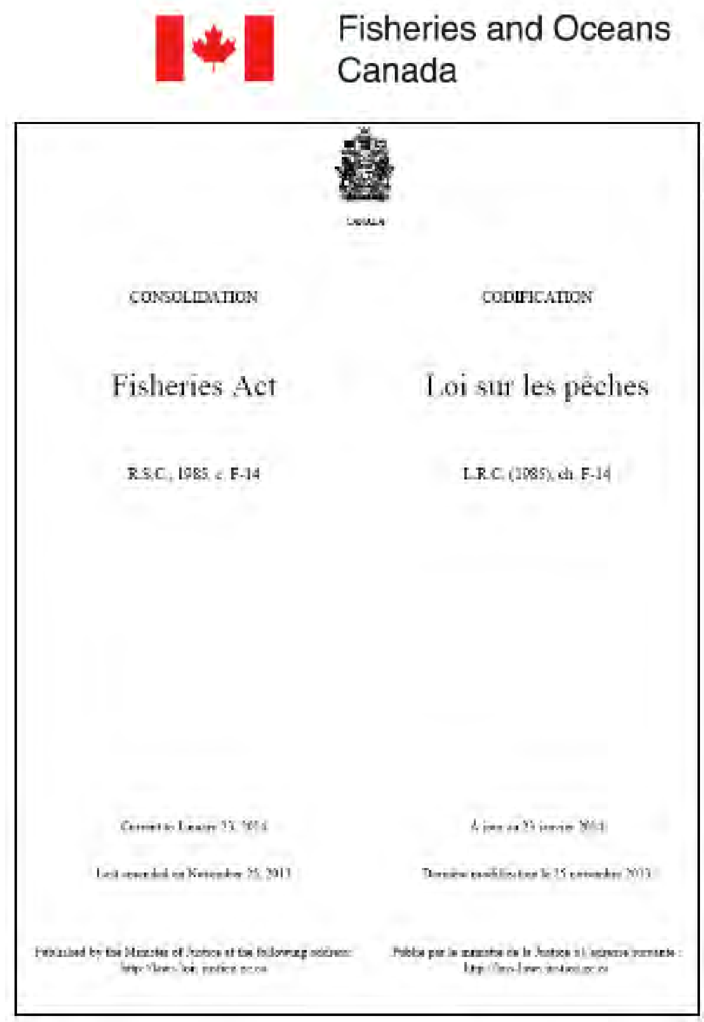
Part 2:
Fish Habitat Compensation

What are the different ways we can offset loss of fish habitat?

FISH HABITAT COMPENSATION

OBJECTIVES OF MEETING

- **Agnico Eagle would like to know what you think about fish compensation and any areas of importance or ideas for projects that you may have.**
- Develop a shared understanding of fisheries compensation
- Share examples of fish compensation projects.
- Get feedback on examples of fish compensation projects.


Fisheries and Oceans Canada

CONSOLIDATION

Fisheries Act

R.S.C., 1985, c. F-14

CODIFICATION

Loi sur les pêches

L.R.C. (1985), ch. F-14

FISHERIES COMPENSATION

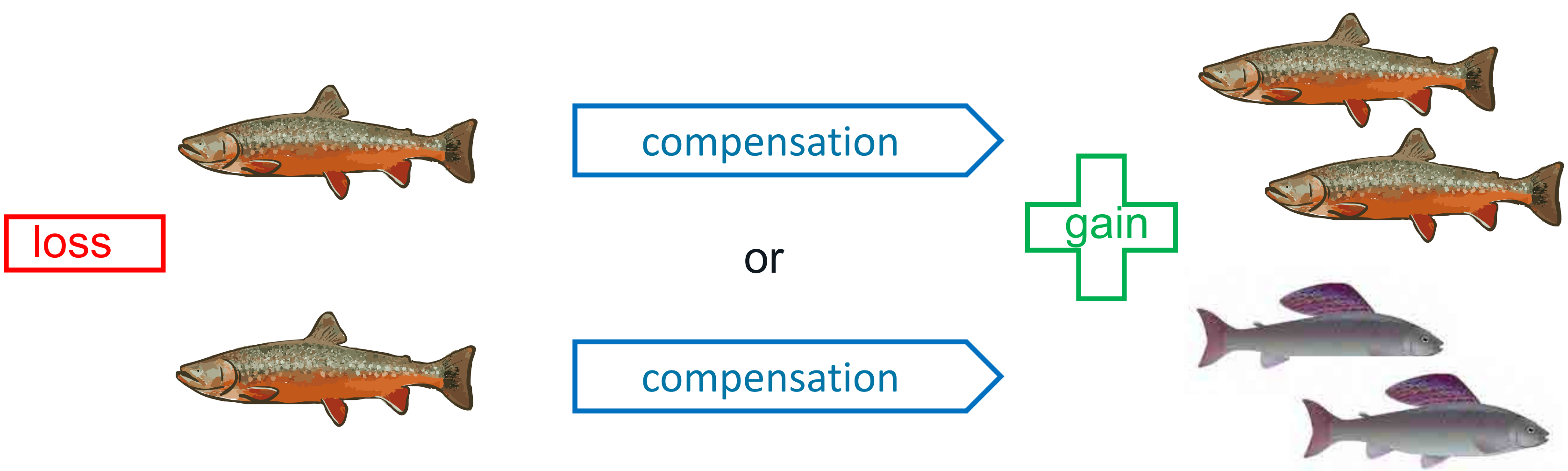
WHAT IS COMPENSATION?

- **Habitat compensation** counter-balances project impacts to fish and fish habitat
- If fish habitat is lost or altered, need to **enhance** or **create** new habitat so that numbers of fish don't decline
- Want to compensate for <u>more</u> than what has been affected

FISHERIES COMPENSATION

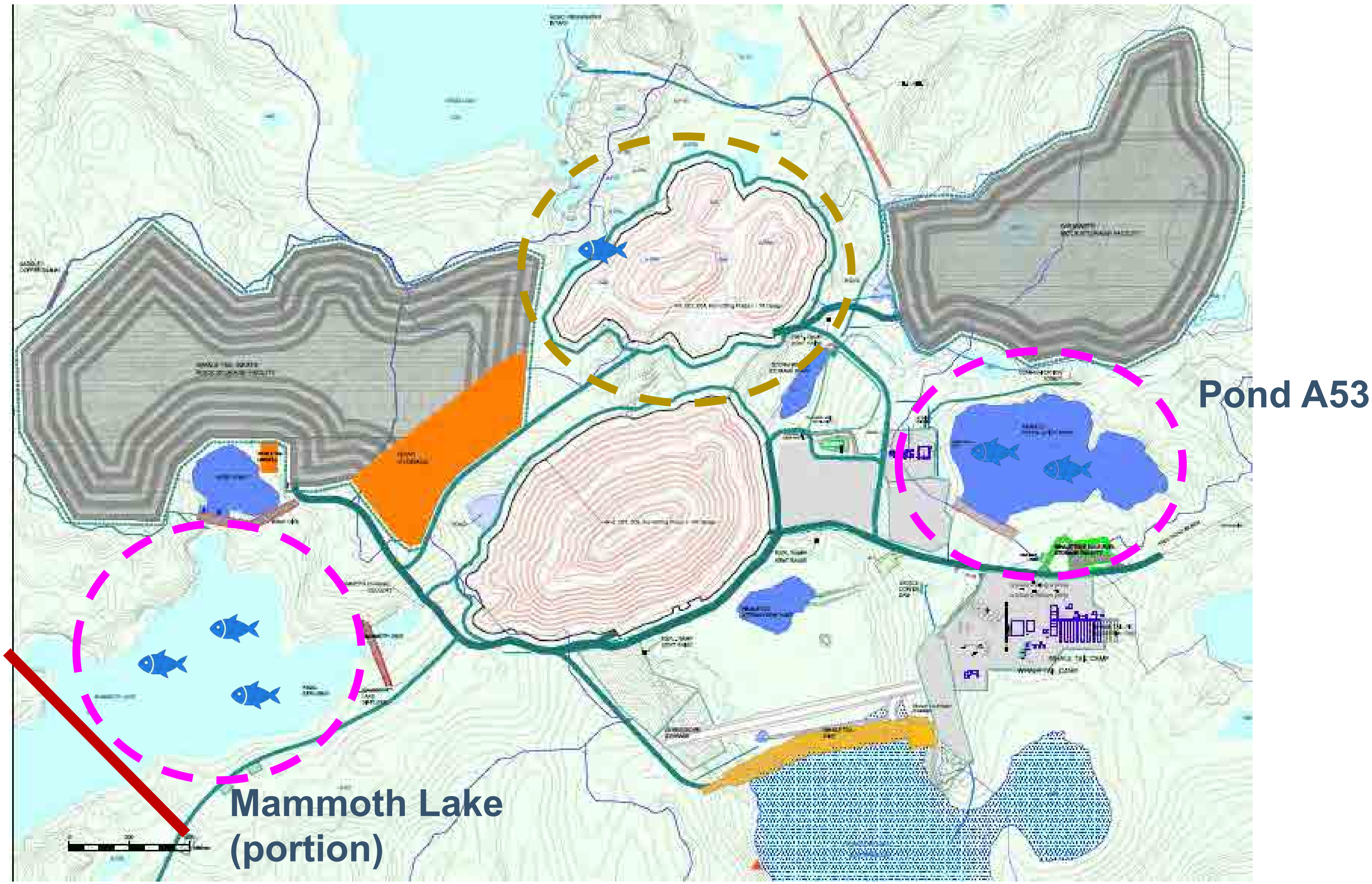
TYPE OF COMPENSATION

- Habitat Restoration and Enhancement
- Habitat Creation
- Chemical or Biological Manipulations



WHALE TAIL PIT PROJECT AMENDMENT

ALTERATION OR LOSS OF FISH HABITAT FROM PROJECT FOOTPRINT OR DELETERIOUS (HARMFUL) SUBSTANCES (ATTENUATION POND)



FISH HABITAT COMPENSATION APPROACH

FISH SPECIES IN WHALE TAIL PIT PROJECT AREA

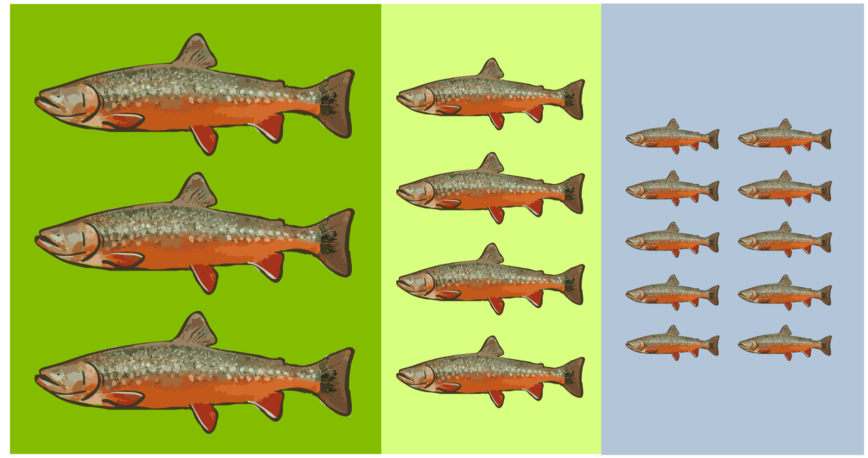
- Are any of these species of particular importance to you?

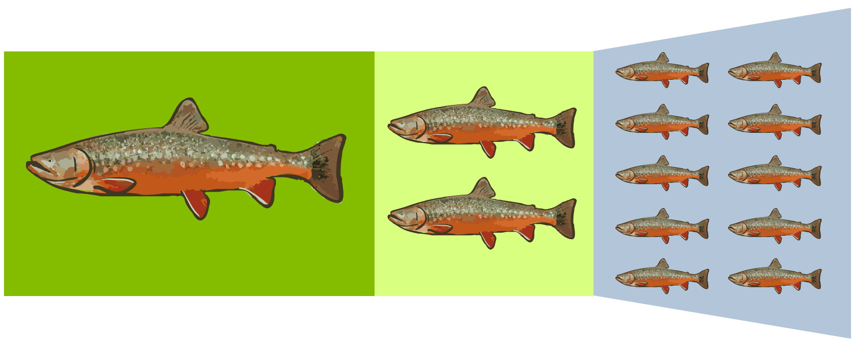
FISH HABITAT COMPENSATION APPROACH

AGNICO EAGLE

BOTTLENECKS IN PRODUCTIVITY

No limiting factor – Lots of habitat and food for all life stages





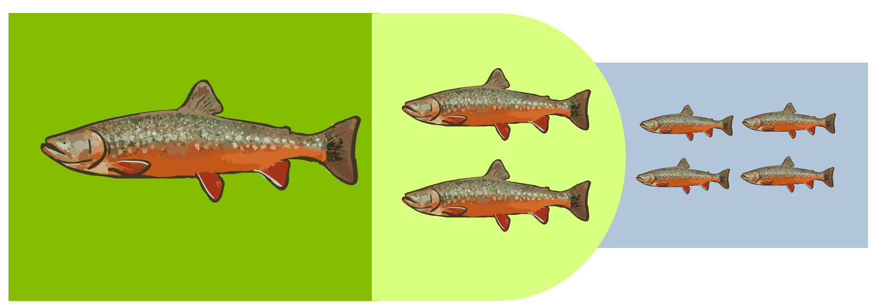
Limited juvenile habitat or food

Lake

Streams & Ponds

Lakes & Streams

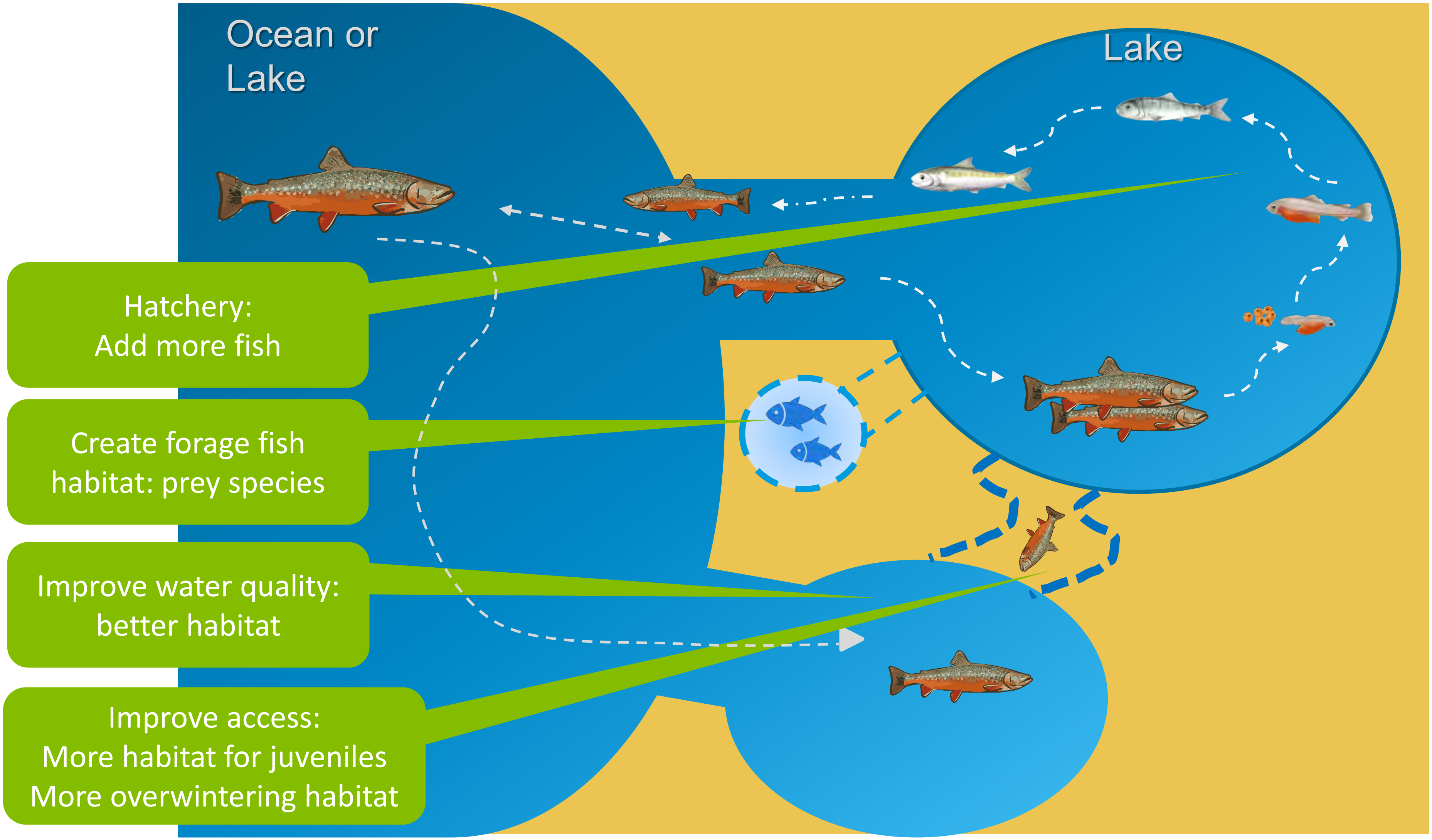
Limited spawning habitat or food



Fish outline from ERM

FISH HABITAT COMPENSATION OPTIONS – EXAMPLES

COMPENSATION OPTIONS THAT FOCUS ON THE LIFE CYCLE OF THE FISH AND BENEFITS THE FISHERY



FISH HABITAT COMPENSATION EXAMPLE 1

IMPROVE OR CREATE FORAGE FISH HABITAT

FISH HABITAT COMPENSATION EXAMPLE 1

IMPROVE OR CREATE FORAGE FISH HABITAT

- **Where**: Shallow ponds connected to existing streams. Suitable areas to be determined based on field visits and IQ.
- **What**: Increase the number of forage fish (sculpin, stickleback) that provide prey to other fish species, thereby improving general fisheries productivity.
- **How**: Excavate shallow ponds, or convert a quarry into fish habitat, or create new connecting channels between waterbodies, either by flooding or excavating channels.
- **Why**: To compensate for the loss of forage fish habitat and improve fisheries productivity in large-bodied fish.
- **Challenges:** May be difficult to show that increases in numbers of small fish are resulting in food for bigger fish and producing more of the bigger fish.

FISH HABITAT COMPENSATION EXAMPLE 2

ARCTIC CHAR HATCHERY

FISH HABITAT COMPENSATION EXAMPLE 2

AGNICO EAGLE

ARCTIC CHAR HATCHERY

- **Where**: Rankin Inlet or other community
- **What**: Produce more juvenile Arctic char to stock into the system.
- **How**: Through building a small hatchery that would grow juvenile Arctic char from wild broodstock.
- **Why**: To compensate for loss of Arctic char habitat and to provide opportunities to enhance Arctic char populations on a regional scale, and contribute to local training and employment opportunities.
- **Challenges**: Will take a long time to set-up the hatchery and understand the best place to obtain and stock fish. Will take a lot of effort in monitoring to prove that hatchery is working.

FISH HABITAT COMPENSATION EXAMPLE 3

ACCESS ENHANCEMENTS

FISH HABITAT COMPENSATION EXAMPLE 3

ACCESS ENHANCEMENTS

- **Where**: Meadowbank River, and/or other sites.
- **What**: Increase the productive capacity of Arctic char by improving access to overwintering habitat and little-used lakes.
- **How**: Remove boulder barriers or create new connecting channels. Could involve community groups where heavy equipment not needed.
- **Why**: To compensate for loss of potential overwintering habitat for Arctic char. To remove potential bottleneck in productivity by providing increased access to overwintering habitat for greater numbers of char.
- **Challenges**: Could be hard to find locations where fish can't easily pass and where obstructions could removed.

FISH HABITAT COMPENSATION EXAMPLE 4

IMPROVE OR CREATE JUVENILE REARING HABITAT

FISH HABITAT COMPENSATION EXAMPLE 4

IMPROVE OR CREATE JUVENILE REARING HABITAT

- **Where**: Multiple sites, to be determined based on field work and IQ.
- **What**: Increase productive habitat of juvenile life stage of Arctic char. Many juvenile fish do now survive (bottleneck in productivity)
- **How**: More riffles than glides in streams, in-stream substrate enhancements, new or improved access through connector channels. Standardized approach that could be applied at multiple locations.
- **Why**: Compensate for loss of Arctic Char habitat and increase productive habitat for a key life cycle stage, and determine effective method to enhance rearing habitat.
- **Challenges**: May require some studies and additional monitoring to understand which habitat is most important for the survival of Arctic char.

FISH HABITAT COMPENSATION EXAMPLE 5

IMPROVE WATER QUALITY, SEWAGE TREATMENT UPGRADES

FISH HABITAT COMPENSATION EXAMPLE 5

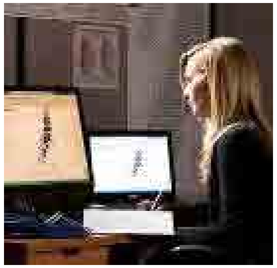
IMPROVE WATER QUALITY, SEWAGE TREATMENT UPGRADES

- **Where**: Baker Lake and/or other communities in the Kivalliq.
- **What**: Improve water quality in lakes and therefore productive capacity of fish habitat.
- **How**: Improve the efficiency of sewage treatment plants. Could also include other restoration or clean up projects.
- **Why**: To compensate for loss of fish habitat through deposition of deleterious substances and improve quality of fish habitat. Project in Baker Lake could be applied in other communities to improve sewage treatment.
- **Challenges**: Will be a long-term project that may take a while before water quality improvements are shown in fisheries

FISH HABITAT COMPENSATION

- Do you have any more ideas for enhancing fish productivity in the Kivalliq?
- Any preferred fish compensation examples from the ones presented today?

AGNICO EAGLE



Trading Symbol:
AEM on TSX & NYSE

Investor Relations:
416-847-8665
info@agnicoeagle.com

agnicoeagle.com

WORLD GOLD COUNCIL

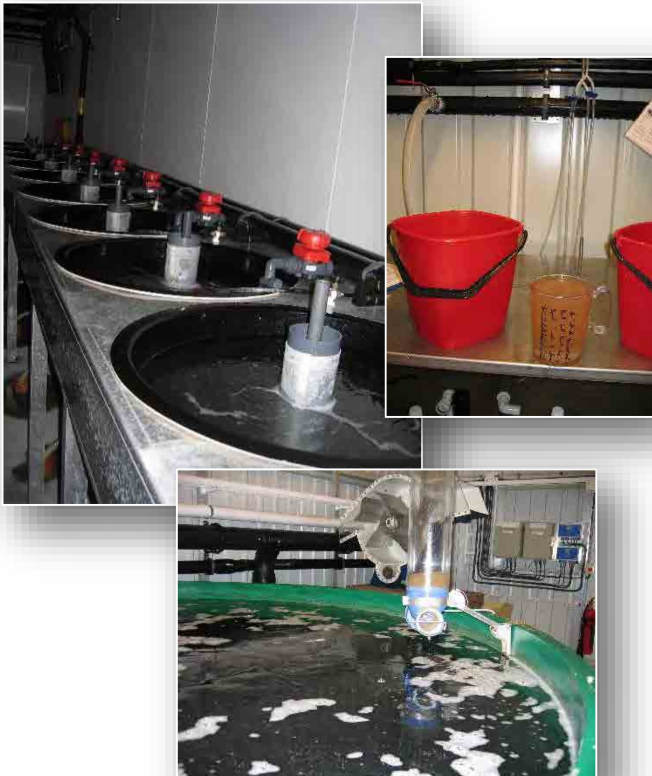
FISH COMPENSATION EXAMPLES

1. CREATE OR ENHANCE FORAGE FISH HABITAT

- What do you like about this example?
- This would be even better if….?
- What don't you like about this example?
- Do you have any other ideas or suggestions?

FISH COMPENSATION EXAMPLES

2. ARCTIC CHAR HATCHERY



- What do you like about this example?
- This would be even better if….?
- What don't you like about this example?
- Do you have any other ideas or suggestions?

FISH COMPENSATION EXAMPLES

3. IMPROVE ACCESS TO OVERWINTERING HABITAT AND OTHER AREAS

- **What do you like about this example?**
- **This would be even better if….?**
- **What don’t you like about this example?**
- **Do you have any other ideas or suggestions?**

FISH COMPENSATION EXAMPLES

4. IMPROVE OR CREATE NEW JUVENILE REARING HABITAT

- What do you like about this example?
- This would be even better if….?
- What don’t you like about this example?
- Do you have any other ideas or suggestions?

FISH COMPENSATION EXAMPLES

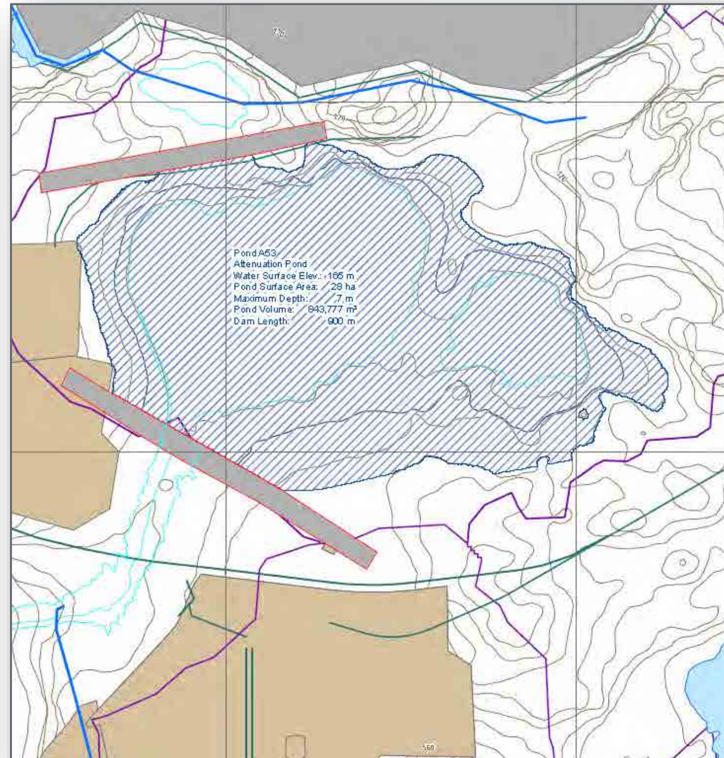
5. IMPROVE WATER QUALITY, INCLUDING SEWAGE TREATMENT

- What do you like about this example?
- This would be even better if….?
- What don’t you like about this example?
- Do you have any other ideas or suggestions?

WATER MANAGEMENT LOCATIONS

1. "POND A53" (FISH-BEARING)

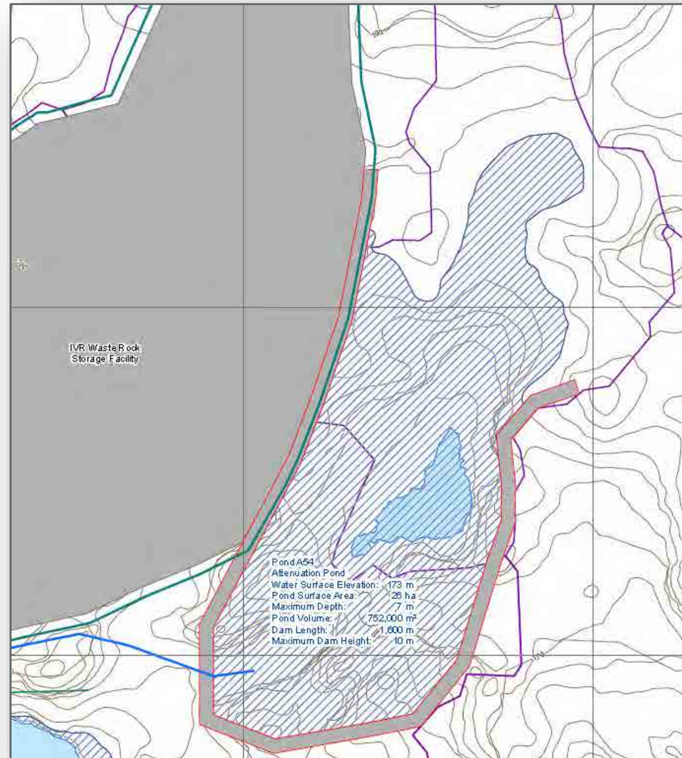
- Are there other names for this area?
- Do you think this is a good option for water storage? Why or why not?
- What impacts are you most concerned about?
- Do you have any other ideas or suggestions?



WATER MANAGEMENT LOCATIONS

2. “POND A54” (NOT FISH-BEARING)

- Are there other names for this area?
- Do you think this is a good option for water storage? Why or why not?
- What impacts are you most concerned about?
- Do you have any other ideas or suggestions?



WATER MANAGEMENT LOCATIONS

3. MAMMOTH LAKE (FISH-BEARING)

- Are there other names for this area?
- Do you think this is a good option for water storage? Why or why not?
- What impacts are you most concerned about?
- Do you have any other ideas or suggestions?

WATER MANAGEMENT LOCATIONS

4. MULTIPLE SITES (NOT FISH-BEARING)

- **Are there other names for this area?**
- **Do you think this is a good option for water storage? Why or why not?**
- **What impacts are you most concerned about?**
- **Do you have any other ideas or suggestions?**

COMMENTS AND SUGGESTIONS

AGNICO EAGLE

DO YOU HAVE ANY QUESTIONS, OR COMMENTS YOU WOULD LIKE TO SHARE?

- **Questions or comments:**

- **Optional: Your Name & Phone/Email**
  (Please include if you would like us to provide a response)

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

HOW DO WE COMPARE THE ALTERNATIVES?

AGNICO EAGLE

Technical
- Water treatment
- Containment infrastructure
- Pipelines
- Roads
- etc.

Environmental
- Air quality
- Climate
- Terrain
- Groundwater
- Surface water
- Fish
- Wildlife

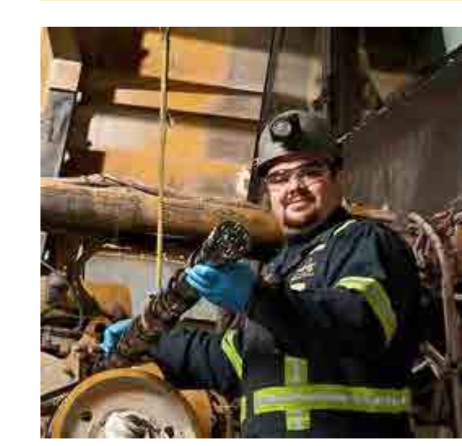
People
- Archaeology
- Cultural heritage
- Land use
- Communities

Economic
- Capital costs
- Operating costs
- Closure and post-closure costs

Traditional knowledge & *Inuit Qaujimanituqangit*



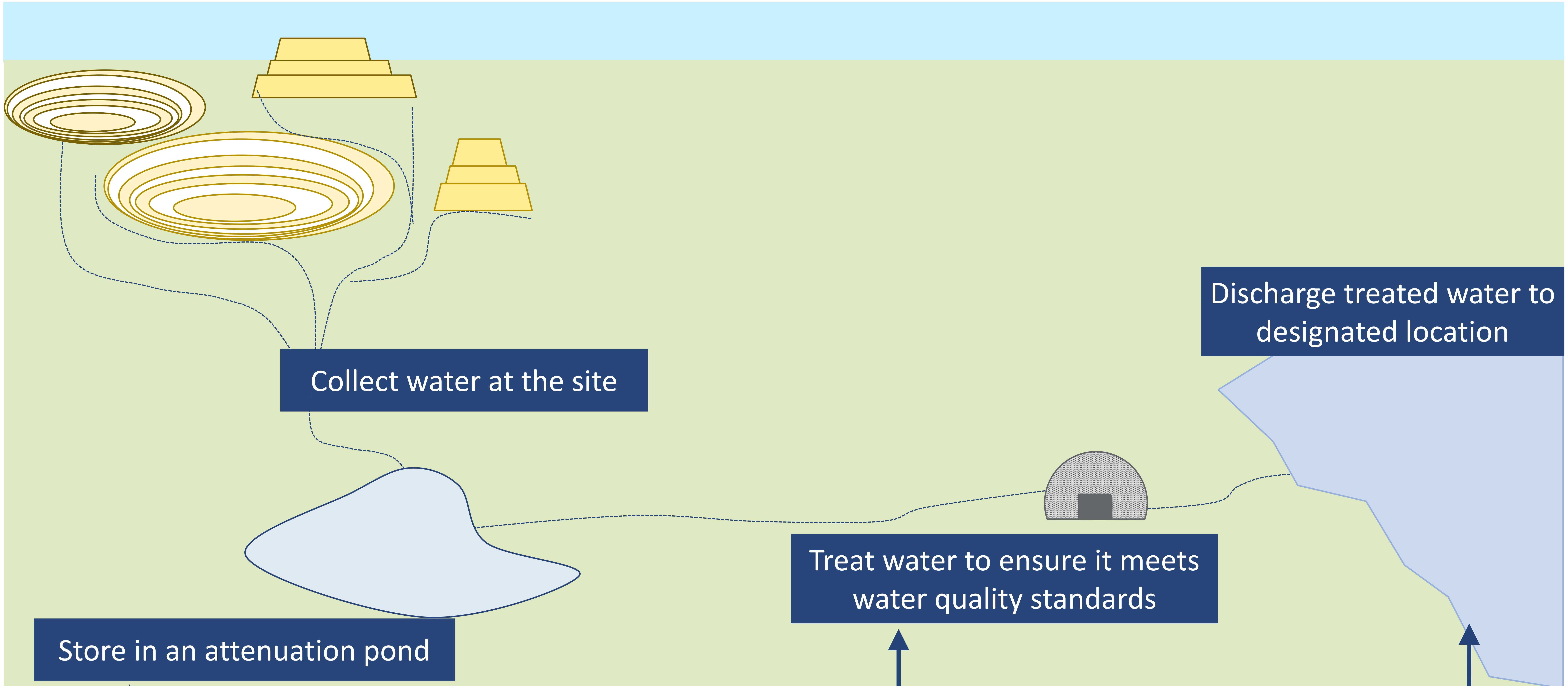




WATER MANAGEMENT ALTERNATIVES ASSESSMENT

APPROACH TO WATER MANAGEMENT

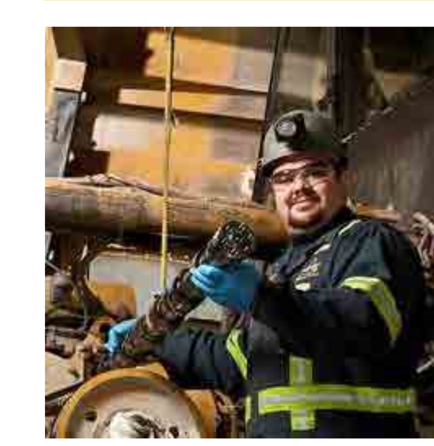
AGNICO EAGLE



Attenuation pond is a place to store water before it can be treated and discharged.

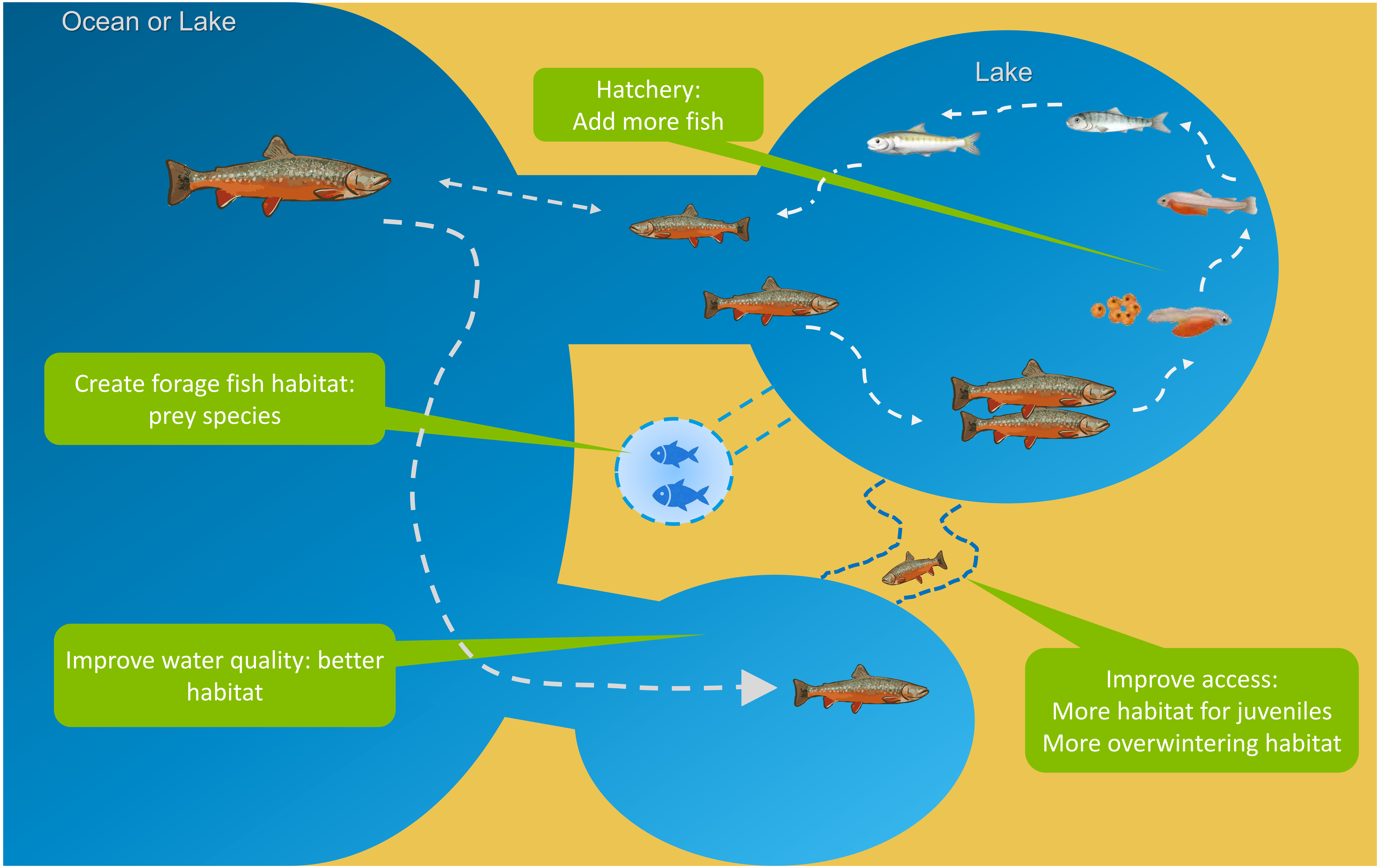
Water treatment plant will operate in the summer so that water can be discharged during the ice-free period

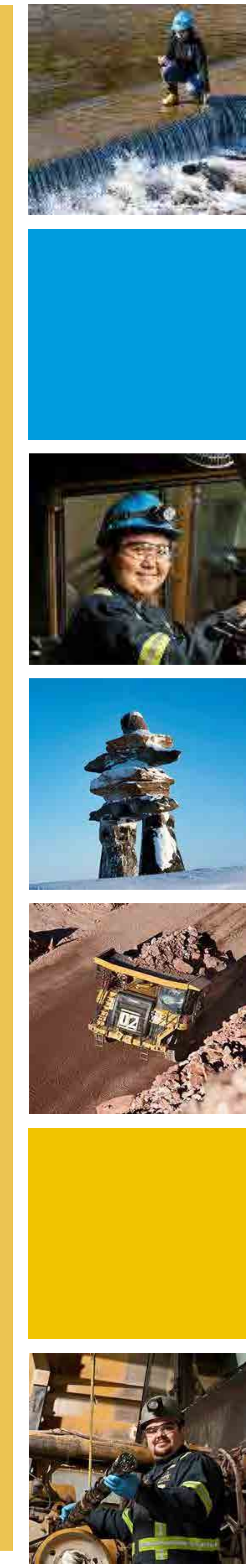
Treated water will be released only when it meets water quality standards



FISH HABITAT COMPENSATION

COMPENSATION EXAMPLES





FISH HABITAT COMPENSATION APPROACH

FISH SPECIES FOUND IN THE AREA

Arctic Char
ᐃᖃᓗᑉᐱᑦ

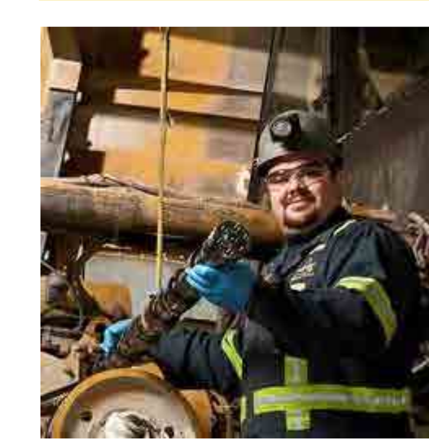
Lake Trout
ᐃᓲᖅ

Burbot
ᑎᒃᑖᓖᑦ

Ninespine Stickleback
ᑲᑭᓚᓴᒃ

Slimy Sculpin
ᑲᓇᔪᓂᒃ

Round Whitefish
ᒥᓗᒋᐊᖅ



AGNICO EAGLE

Agnico Eagle Mines Limited

Whale Tail Pit – Expansion Project

Baker Lake Fuel Farm Expansion

Community Consultation Notes

Baker Lake, Nunavut

March 26, 28 and 29, 2019

Table of Contents

List of Appendices

Executive Summary

Agnico Eagle Mines (AEM) conducted community consultation in Baker Lake on March 26, 28, and 29, 2019. Consultation meetings were proposed in Chesterfield Inlet on March 27, but had to be cancelled due to a blizzard restricting travel. The purpose of the meetings were to provide a general project update on the construction of the Whale Tail Pit Project, as well as the upcoming expansion of the Baker Lake Fuel Farm. AEM were supported by consultants from ERM, who provided an update on the Alternatives Assessment for an attenuation pond as part of the Whale Tail Pit – Expansion Project, as well as an overview on fish habitat losses and compensation (offsetting). Discussion on the alternatives assessment and fish habitat compensation continue to inform final measures as part of the environmental permitting process for the Whale Tail Pit – Expansion Project.

Focus groups and an open-house community meeting were the main methods of engagement (Appendix A), although a women's dinner proved to be a popular meeting and helped to increase engagement and feedback on a number of topics. The potential to use a radio show to reach a wider audience (including elders) will also be explored for future community consultation. The agenda for the community consultation meetings is outlined below, although the order of topics varied depending on the interest of the focus group. The major topics were previously discussed during consultation meetings in Baker Lake and Chesterfield Inlet in July 2018, and the March 2019 meetings provided an opportunity for AEM and ERM to provide an update and to respond to additional questions. All written presentation materials were translated into Inuktitut (Appendix B) and an Inuktitut translator was used for the Elder and Hamlet.The participants at the Youth Group, Women's Group and Community Open House sessions were comfortable conversing in English. A translator was available for the Community Open House, but was not required.

An overview of the ongoing construction of the Whale Tail Pit Project mainly resulted in questions on dewatering and fish relocation based on the construction of the Whale Tail Lake dike. There were no concerns noted on the construction of the Project in general, except to note that moving fish is not natural and may have environmental effects. There was interest across the groups in the success rate of the 'fish-out' from Whale Tail Lake, and AEM committed to an additional community session on this program specifically. The Elders noted that both fish and caribou are not as healthy as they used to us, and that the texture of the meat has changed, but this was a general comment, and not related to specific effects from the mine. During the community open house, one participant noted that there was increased dust from the mine that negatively affected her family's berry-picking area. The same participant at the Community Meeting also noted that the caribou were healthier (fatter) before the mine (Meadowbank).

There was interest in all groups on the upcoming construction of the Baker Lake Fuel Farm, and some concern that Inuit rights to access the land could be affected, as many people access the land via the road near the fuel farm. AEM will work with the Hunters and Trappers Organization (HTO) and others to ensure that effects are managed. The Hamlet of Baker Lake was interested in the potential for construction jobs for Baker Lake residents, as well as potential to obtain crushed rock for fixing roads in town.

The loss of fish habitat from the Whale Tail Pit – Expansion Project was explained, and there were no comments or concerns raised, except to point out that relocating fish may change the environment and that fish should not be moved to new areas (different sources of water). The preferred concept for the Whale Tail Pit – Expansion Project was described as a sill between Whale Tail Lake and Lake A18, and no objections were raised. There was one question on whether fish would be moved into Lake A18 and whether the environment would be suitable. The concept for the sill and offsetting means that fish will move into the new habitat on their own, and will not be transferred.

No new ideas were forthcoming for fisheries compensation, and as found in the July 2018 consultation, there was little interest from participants in small-bodied fish, or burbot. Arctic char remained the preferred fish species in the area. There was interest in the idea of a proof-of-concept for a fish hatchery, and the elders seemed more supportive of the project than previous discussions. Some elders continue to have concerns that the hatchery-raised fish may be unnatural and that the fish may taste different, although all groups were interested in learning more about the process and potential for a small-scale trial.

Feedback was provided to the community on the five alternatives for the attenuation pond for the Whale Tail Pit – Expansion Project, including on the preferred option – Lake A53. Previous community feedback was incorporated into the alternatives assessment, including concerns on: fish impacts; impacts to larger waterbodies such as Mammoth Lake; use of large above-ground structures that could affect movement of caribou and wildlife; and use of areas already affected by the mine. There were no concerns raised on the selection of Lake A53 as the preferred option, even though the lake contains fish. Discussion mainly turned to where the fish would be relocated and to make sure that the fish stay in the same area and do not get transferred to new areas where predator-prey (foodweb) dynamics may be affected.

The subject of monitoring came up in most groups, in relation to movement of fish; flooded pits after closure; the success of fisheries compensation; and wildlife monitoring during construction. Community-based monitoring was discussed, and AEM described ongoing work with the HTOs and the AEM environmental department to build capacity for local monitoring.

Agenda for Community Consultation

Agenda | ᐱᔭᒃᓴᐃᑦ

Project Overview | ᐱᓕᕆᐊᕐᒥᒃ ᐱᔾᔪᑎᓕᒃ:

- Baker Lake Fuel Farm Expansion Project Description and Schedule | ᖃᒪᓂ'ᑐᐊᕐᒥᑦ ᐅᖅᓱᖅᑖᕐᕖᒃ ᐊᖏᓪᓕᒋᐊᖅᑕᐅᓂᖓᓄᑦ ᐱᓕᕆᐊᖅ ᖃᓄᐃᑦᑑᓂᖓ ᐊᒻᒪᓗ ᖃᖓᒃᑯᑦ
- Whale Tail Pit and next phase of development | ᐊᒪᕈᖅ ᓄᓇᒥᑦ ᐃᓗᑦᑐᖅᓯᒪᔪᖅ ᐊᒻᒪᓗ ᐱᒋᐊᖅᑕᐅᓂᐊᖅᑐᑦ ᐱᕚᓪᓕᐊᓂᕐᒧᑦ
- Comparison of Water Management Alternatives | ᑕᐅᑐᖔᖅᔫᒋᑦ ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᖔᕈᓐᓇᖅᑐᑦ
- Preferred Water Management Alternative | ᐊᑐᖅᑕᐅᖔᕈᒪᔪᑦ ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᖔᕈᓐᓇᖅᑐᑦ
- Fisheries Compensation | ᐃᖃᓗᓕᕆᓂᕐᒧᑦ ᐊᑮᓂᖅ
- Mitigation Measures for Potential Impacts | ᐊᖏᓗᐊᖏᒋᐊᖅᑎᑦᑎᓂᕐᒨᖓᔪᑦ ᐊᒃᑐᖅᓯᓂᐅᔪᓐᓇᖅᑐᓄᑦ
- Discussion on Community Thoughts, Concerns and Questions | ᐅᖃᓪᓗᓇᒃᓴᕐᓃᑦ ᓄᓇᓕᖕᒥᐅᑦ ᐃᓱᒪᒋᔭᖏᓐᓄᑦ, ᐃᓱᓗᓘᑎᖏᓐᓄᑦ ᐊᒻᒪᓗ ᐊᐱᖁᑎᖏᓐᓄᑦ
- Opportunity to hear your comments and feedback | ᐱᕕᖃᕐᓂᐅᔪᖅ ᑐᓵᔭᐅᓂᐊᕐᓗᑎᒃ ᐅᖃᐅᓯᓯ ᐊᒻᒪᓗ ᑭᐅᔾᔪᑎᓯ

Attendees

The Baker Lake consultations were conducted by the following people:

Emma Leith, Community Relations Lead Nunavut for Agnico Eagle Mines (AEM), was the main facilitator for all meetings, and was supported by Karen Yip, Community Liaison Coordinator (AEM). Manon Turmel (AEM) provided information on the general update for the Whale Tail Pit Project , as well as the Baker Lake Fuel Farm Expansion. Olivier Jacques (AEM), supported information requests on the Baker Lake Fuel Farm Expansion. Anna Sundby and Nicola Lower, consultants from ERM, led the consultation on the Alternatives Assessment for the attenuation pond (water management) for the Whale Tail Pit – Expansion Project, as well as the fish habitat impacts and proposed fisheries compensation options. Hugh Nateela provided Inuktitut translation for the Elders Focus Group. Eric Ukpatiku provided translation for the Hamlet Focus Group. Annie Anautalik was available for Inuktitut translation for the Community Open House.

Community participants are listed under the notes for each relevant focus group.

Elders Focus Group

March 26, 2019

10:00 am

Iglu Hotel

Meeting called by:	AEM	**Type of meeting:**	Information Session/Consultation
Presenters:	Manon Turmel, Olivier Jacques, Anna Sundby, Nicola Lower	**Note takers:**	Emma Leith, Nicola Lower, Manon Turmel

Attendees: 10

Elders Consultation Summary

The Elders' meeting provided ample discussion and sharing with the Elders. The group showed a lot of interest in the dewatering of Whale Tail Lake as part of existing Whale Tail Pit Project, and the relocation of fish, and shared insights about the potential effects on things like predator-prey relationships after the fish were moved. The Elders also shared a common concern that animals and fish are not as fat as they used to be, and that the texture of the meat has changed. This comment applied to both fish and caribou. For the upcoming fuel farm construction, there was some concern that Inuit rights to access the land could be affected, as many people access the land via the road near the fuel farm. AEM will work with the Hunters and Trappers Organization (HTO) and others to ensure that effects are managed. No new ideas were forthcoming for fisheries compensation, nor concerns raised on the areas identified as being lost from the Whale Tail Pit – Expansion Project. There was interest in the idea of a hatchery, and the concept were more engaged in the idea than at the last fish consultation session in July 2018. Although some Elders have concerns that it is unnatural, they largely seemed supportive of learning more about what would be involved.

Minutes

Discussion Topic: Whale Tail Pit Project Update – Dewatering and Fish-Out of Whale Tail Lake

Discussion

AEM described the activities that have occurred at the Amaruq (Whale Tail) site in the last year, including construction of the camp and dewatering of Whale Tail Lake.

What specifically have you been constructing (at Amaruq)?

- We've built the places we are going to work, cook, sleep etc.

You've dewatered one lake?

- Yes, we dewatered a portion of one lake. The north part of Whale Tail Lake.

When you moved the water and the fish, did they go to another lake or the other half of the same lake?

- They were moved to the other half of the same lake, on the other side of the dam.

They were alive?

- Yes.

What was the success rate? How many of them survived?

- 77% transferred alive.

I ask because I saw the Meadowbank fish out previously and these didn't survive so well.

- Yes, we are getting better each time, as throughout the life of the project have had to fish out lakes, and learning each time, and were happy with this recent success rate (77%). We will also organize a presentation in Baker Lake soon, to share the results of the fish-out.

How many species did you find in the lake?

- Don't exactly know the details, but colleagues will come back for a follow-up meeting on this topic soon.

Did AEM have a size criteria on fish that were transferred?

- We transferred every fish that was caught, but sometimes it is more difficult to catch the small-bodied fish.

Some of the fish that were transferred, may be spawning. There could be a trickle-down effect on fish. Also, you need to be careful when transferring fish to a new place, as it may influence predators and prey. The new fish will feed on other new, or they will feed another fish.

- Thank you for that comment. We should also note that we are working with David Kritterdlik, who is our Traditional Knowledge and Wildlife Coordinator. His role is really to help us bridge between technical and traditional knowledge during this discussion. (Note: David was unable to join the meetings as weather conditions disrupted his travel.) We hope that this will lead to more involvement with the communities and with yourselves (the elders), so that we are able to consider these community observations. We are working closely with the HTOs, to improve the wildlife monitors programs and build capacity within the HTOs to help us involve the community more in the monitoring process. We have also just signed a new wildlife monitoring agreement with Rankin Inlet HTO, and we will use that wildlife monitor to start the new community based monitoring approach and David will help us share those best practices in Baker and throughout the Kivalliq.

We have observed changes in the animals and the fish. They don't have as much as fat as they did previously. The texture of caribou meat has changed. We are observing changes in the wildlife and fish. And if you change habits by building the mine, the wildlife may change further.

- Thank you. We will be working with David and the HTO more so can incorporate more of these traditional observations. It is in our workplan for this year. Specifically, David's role is to integrate traditional observations from elders and HTO.

I am somewhat in-between between cause I know some of the traditional knowledge (TK) but have also been educated in school. I remember someone telling me about impacts on fish transfer and predator–prey and we have to take into account that when transferring fish. They are going to be food for something. We have also seen the changes in the fish and land animals, especially caribou, including changes in texture and taste. They don't have the fat like they used to. The caribou meat texture is different.

- Thank you. Yes, we will be working with David and HTO to understand the impacts.

Conclusions/Concerns

- Follow up and more detail required with an elder focus group when AEM does the community presentation on the existing Whale Tail Pit Project Fish-Out.

Overall Sentiment: Neutral

Discussion Topic: Baker Lake Fuel Farm Expansion

Discussion

AEM described the plans for the expansion of the Baker Lake fuel farm. The Amaruq project requires more trucks and longer distances, so they need to store more fuel. They will be adding two new tanks to the existing six tanks, and construction will occur this summer (2019).

Is it already constructed?

- No, we have not started any construction. The six tanks are already there, and we will start construction in April to prepare the ground so we can build the two new tanks. There will be around 20-25 workers, and we will use local contractors including Kivalliq Contractors for the civil works and Inukshuk for the steel structure. The steel structure will come in parts on the ship, and we will erect it on the site.

How deep will you go? Will you go into the permafrost?

- Average excavation depth is 2m.

If you dig in too deep on the slope, the land could slide into the lake. We have seen this before.

- Yes, it is important to control the water (pumps etc.) to control these concerns. When the land slips, it's because of the water. We will be constructing during the freshet, so need to manage the water.

Once you dig and prepare the tank, will you will also put in a liner? I am concerned about a leak or a spill.

- Yes, we will add berms around the outside, and line the whole thing with an impermeable geotextile membrane before adding the tanks. The berms will be designed so that it can contain more than the contents of the two tanks (at least 110%), so that if they both fail then all the fuel will be contained and will not go to the environment.

What will you use to control dust on the roads and at site? Will you add calcium? We have seen impacts of calcium on the roads. It leaches into rivers and streams. The community is not comfortable with this.

- Only water will be used to control dust. No calcium or other additives, just water.

A lot of people go out to the land past the tank farm. Will there be restrictions? Will you stop people from travelling that way?

- Only work area will be restricted. The road won't be closed, although we may have to control traffic at times when bringing heavy equipment or materials in to the site.

Inuit harvesters have rights under the land claims agreement. Agnico cannot block harvester rights so cannot restrict access. It is Inuit land and you can't restrict our access.

- We will not block access. AEM respects Inuit rights and will observe them. We will work with the HTO to manage anything that comes up.

We need to educate the community with the HTO and environmental group on lead caribou and groups, they need to be protected. The lead caribou are not hunted or else it disrupts the whole herd.

- That is something we can look at with our HTO wildlife monitors and the information sessions during caribou migration time.

Conclusions/Concerns

- Dust is a concern, as is the method for dust control.
- If Agnico needs to close the road during fuel farm construction, they need to ensure Inuit can still access the land.

Overall Sentiment: Neutral

Discussion Topic: Fish Habitat Compensation

Discussion

ERM described the areas and types of habitat lost from the Whale Tail Pit – Expansion Project. Described some of the options being considered for fish habitat compensation. Expansion of the Whale Tail Pit Project will result in the loss of some fish bearing lakes, so we need to offset this. For example, we can create new fish habitat elsewhere. Explained the concept of fish compensation. One of the ideas we are looking at would create a sill at the south end of Whale Tail Lake. This would expand the size of the lake south of the sill (Lake A18). This would provide similar habitat for the same species of fish that are losing habitat from the expanded Whale Tail Pit. AEM is also interested in potentially running a pilot project (proof of concept) for an Arctic char hatchery near Baker Lake, which would involve participation from the community.

After the mining is done, will the dewatered areas be made into lakes again? Will the fish be moved back?

- The plan is that when the mine is closed, the pits would be allowed to fill with water. We would monitor the water quality, and when it is good enough, the water from Whale Tail Lake would be allowed to flow back. The fish wouldn't be moved back, but they would be able to make there way into the area themselves.

When you reflood the lake, will you make it more natural?

- Yes, before reflooding we would add rocks and scrape up the surface so that there are good places for things to grow, and for fish to hide. This will help it be more like natural habitat.
- We will monitor the quality after closure. With David K you will be involved in that monitoring process, and we will make sure you are ok with the monitoring we do.

Will you make sure there is food and nutrients? Inuit don't like skinny fish.

- Yes, small fish and vegetation will re-establish slowly as fish is moving back into this area.

Realize challenge of bringing back anthropogenic to natural environment. Once you alter something you will never bring back to 100% natural. Please try to bring back to as much natural as possible.

- We hear that. And with HTO and wildlife monitor – we want to bring this to a level that you are comfortable. Thank you for your feedback. Please come see us if you have any further feedback on this.

Spawning beds are important. Do you know if you disturbed any spawning beds during the fish-out?

- We transferred all the fish as the water level was going down. We didn't look for spawning beds. They are very important for fish. Along the road, we have built shoals to create fish habitat. Does anyone know these areas?

I remember growing up on Back River. We could look down in the water and see the fish. When there were fish around 30 cm long, we knew there could be spawning beds. [looked at photos of fish from the poster and identified fish as Arctic char].

For people who have lived off the land, knowledge was passed down from our family. Nothing was written down, so everything we learned from our forefathers. Sometimes the fish we caught were fat and healthy and full of fish eggs. Sometimes the eggs had black spots, and we knew these were the eyes of the new fish. When spawning, the female fish will stay on the bed. The male will come by once in a while but the female will stay.

- Spawning beds are very important, and one of the things Agnico would like to explore is the idea of an Arctic char hatchery in Baker Lake. This is a way to have more fish. Fewer eggs are eaten by predators. Fish are put back in same river, the same environment. If there is interest from the community, the community would be involved in this (taking eggs, look after eggs and putting back in to river).

But only god knows how things are done. What happens when we interfere with natural systems?

- The hatchery would take eggs and milt from the wild fish, and the small fry would go back to the same river. It would protect the eggs and small fry so they have better survival, but would not change them otherwise.

What is the rate of growth of fish eggs? Would it be like natural growth?

- We would have to monitor, but it would all be natural except for the fact that it's in a tank rather than in a stream.

Can you return the fish back to the water alive, after you take them out of the water to get the eggs? We know that fish need their oxygen just like we breathe air.

- Yes. They would only be out of the water for a few seconds, and then back. We will also put oxygen into the tank so that they continue breathing.

Conclusions/Concerns

- Concerns expressed that a hatchery could disrupting the natural order of things.
- Conversation was much more positive than last July 2018 when hatchery concept was previously discussed.
- They were open to, and interested in, the idea of a hatchery.
- Understanding that spawning areas are important habitat.
- No new ideas for fish compensation, or areas of habitat to restore.

Overall Sentiment: Neutral

Hamlet Meeting

March 26, 2019

1:30 pm

Hamlet Chambers

Meeting called by:	AEM	**Type of meeting:**	Information Session/Consultation
Facilitator:	Emma Leith	**Note takers:**	Emma Leith, Nicola Lower
Presenter:	Manon Turmel, Olivier Jacques, Anna Sundby, Nicola Lower		

Attendees: 5

Hamlet Consultation Summary

The meeting with the Hamlet provided an opportunity to discuss updates for the Whale Tail Pit Project and the Baker lake fuel farm; the water management alternatives assessment (for the Whale Tail Pit Expansion); and fish habitat compensation options such as a hatchery. The council members were interested in potential jobs for Baker Lake residents, as well as possibly obtaining crushed rock from Agnico to help with fixing the roads in town. The Hamlet were also interested in exploring the possibility of establishing a proof-of-concept hatchery and the timeline for this project.

Minutes

Discussion Topic: Whale Tail Pit Project Update and Baker Lake Fuel Farm Expansion

Discussion

AEM described recent activities at the Amaruq site and plans for the expansion of the Baker Lake fuel farm. The Amaruq project requires more trucks and longer distances, so they need to store more fuel. They will be adding two new tanks to the existing six tanks, and construction will occur this summer (2019).

How long will construction at the Amaruq site take?

- It started last year and should be finished in July/August. We will start mining around August. The first phase of dewatering was done, and the second phase will occur this summer.

Where was the water pumped to? Why was it pumped out; was there gold in it?

- It was pumped into the south side of the same lake. It was moved so that we could access the gold that is underground underneath the lake.

Will you hire casual workers when the fuel tanks are being constructed?

- There will be 20-25 works. We will use local contractors Kivalliq Contractors for civil works and Inukshuk Contractors for the steel structure. We would expect them to have some local hires from Baker Lake.

Will you do any blasting?

- No, we are too close to the other fuel tanks, so we will use an excavator. This will also have less noise and impact on the community compared to blasting.

Any crushing? Can you also do some crushing of rock for the community to use on our roads? The roads are pretty rough with many potholes around town.

- Yes, all the crushing will be done at the quarry at KM 13. We know this quarry has enough material for what we need at the fuel farm, and the rock is good quality (non-acid generating).
- We can certainly see if there is an opportunity to provide crushed rock to the community. If the Hamlet can submit a formal request, we will follow up with the relevant people within Agnico to get a response.

What is the liner made of?

- It is made of bitumen, which is very waterproof.
- Emma will send information about the bitumen liner.

Conclusions/Concerns

- No concerns around fuel farm construction.

Overall Sentiment: Neutral

Discussion Topic: Water Attenuation Pond Alternatives Assessment

Discussion

ERM provided an update on the Alternatives Assessment. When we were here in July, we heard from the community that they were concerned about (a) impacts on fish, (b) impacts on Mammoth Lake, (c) large above-ground structures that could affect the movement of caribou and other wildlife, (d) a preference to use areas already affected by the mine. We included these factors in the alternatives assessment. In the end, we determined that the "Lake A53" alternative was the best option. Although this alternative does affect fish habitat, it has relatively small dams, is not used for fishing and has fewer fish than Mammoth Lake, and is surrounded on three sides by the mine site. The alternatives that avoided fish habitat would require large dams and would be highly complex to construct and operate.

With regards with A53, would Elders like to provide a name for that lake?

- When we were here last July, we were looking for traditional and/or Inuit names with Elders groups. We had asked in Chesterfield Inlet as well and the response we got was no one knew the name to this lake. We had asked David K our TK and wildlife coordinator to work with HTO to find name and we didn't receive any further information.
- One of the projects AEM is working on with David Kritterdlik and the elders, is to understand and use the traditional names for places. We hope that Thomas and other elders will help us with this.

Conclusions/Concerns

- No questions or concerns expressed about the attenuation pond or the process/outcomes of the alternatives assessment.

Overall Sentiment: Neutral

Discussion Topic: Fish Habitat Compensation

Discussion

ERM provided an overview of fish habitat compensation alternatives. Areas of fish habitat will be lost through the Whale Tail Project expansion. As part of federal permits, we have to compensate for all loss of fish habitat. Last year in July, we came to Baker Lake and consulted with the community on ideas for fish projects. AEM is currently looking at constructing a sill at the south end of Whale Tail Lake, which would flood another lake and expand the area of habitat for fish. In addition, Agnico would like to continue exploring the possibility of installing a fish hatchery as a proof-of-concept in Baker Lake, with the idea that the community would be participating in its development and running the hatchery in the long term. We're also interested in other ideas the community may have, and anyone can connect Karen or David at any time if there are other ideas or areas for fish compensation.

Will you do the hatchery this summer?

- Yes, if there is interest and enough technical information available. Either 2019 or 2020 depending on level of support and practical considerations. Does council like the idea of a hatchery?

For the baby fish, will they be kept alive? How will they be looked after or monitored?

- The baby fish would come from wild fish. There would be a filter, like in a fish tank, to remove waste. A community group would help look after the hatchery as until the fish are big enough to be put back into the river/environment.

The baby fish will be kept in the same water as the water they will be put back into?

- Yes, ideally. It is a good question. Part of doing the trial project will be to find a location that works. We want the fish to be in an environment as natural as possible.

Conclusions/Concerns

- Expressed interest in the hatchery option in Baker Lake.

Overall Sentiment: Neutral

Youth Meeting

March 26, 2019

4:00 pm

Iglu Hotel

Meeting called by:	AEM	**Type of meeting:**	Information Session/Consultation
Facilitator:	Emma Leith	**Note takers:**	Emma Leith, Nicola Lower
Presenter:	Manon Turmel, Olivier Jacques, Anna Sundby, Nicola Lower		

Attendees: 4

Youth Consultation Summary

A small group of youth attended the meeting; two had been involved in the meeting in July 2018, and two were new to the AEM consultation program. The group showed interest in the description about the hatchery, but otherwise were not very conversational.

Minutes

Discussion Topic: Amaruq Update and Baker Lake Fuel Farm Expansion

Discussion

With a small group of participants, AEM and ERM led an informal discussion related to the Whale Tail Pit Project, the Baker Lake fuel farm, and ideas for fish habitat compensation. Two of the youth had attended the previous meeting in July 2018.

At least three of the four participants had someone in their family who worked for Agnico Eagle, including roles in the mill and driving haul trucks. When asked what they were excited above, responses included travelling and sports. They all went hunting regularly, and learned to hunt and fish from people in their family. The boys preferred to eat caribou meat, more than fish. They haven't been up by Meadowbank or Amaruq, but they fish in Baker Lake and Prince River.

ERM described how a fish hatchery works. The youth indicated they thought this would be something best placed close to town so people who worked there didn't have to travel far. Prince River was suggested, because the fish go up river to spawn and you can drive a truck there from town (there is a trail, but it is rough).One youth said she would be interested in working with the fish at a hatchery.

Dominic had a summer job changing tires for Arctic Fuel. The others have not worked (too young) but Janae has done some babysitting for her younger brother. None of them had strong ideas of the types of jobs they might want in the future.

Conclusions/Concerns

- Some interest in the description of a hatchery, but otherwise little interest.

Overall Sentiment: Neutral

Community Meeting

March 26, 2019

7:00 pm

Baker Lake Arena

Meeting called by:	AEM	**Type of meeting:**	Information Session/Consultation
Facilitator:	Emma Leith	**Note taker:**	Emma Leith
Presenter:	Manon Turmel, Olivier Jacques, Anna Sundby, Nicola Lower		

Attendees: 13+

Community Consultation Summary

A small group of Baker Lake residents attended the community consultation event, providing an opportunity to have an informal discussion and answer questions. Questions covered topics related to mining, the environment, and possible projects for fish habitat compensation.

Minutes

Discussion Topic: Amaruq Update, Baker Lake Fuel Farm Expansion, and Fish Habitat

Discussion

With a small group of participants, AEM and ERM led an informal discussion related to the Whale Tail Pit Project, the Baker Lake fuel farm, and ideas for fish habitat compensation. The discussion was largely driven by questions from participants.

<u>Consultation and Communication</u>

Why don't you do this on a radio show, so that more Elders can listen? They can't be here in person but they would like to listen?

- Thank you for that comment. We have heard the suggestion of a radio show before, and we will look into doing that in the future.

Last summer, we asked if an Elder could to up to KM 24 of the access road to visit his mother's grave before he dies. They want to go on ATV, not by helicopter. There are a few other Elders too, with relatives buried on the land. They would like to visit them before they die.

- Yes, we have been working with Thomas on this. We arranged something last summer with Thomas and his family in the helicopter, but unfortunately they were not able to find the location. We will take them out this year and try again with an ATV.

<u>Fuel Farm</u>

For the fuel farm, are you going to add more tanks at Meadowbank and/or Amaruq?

- No we are not adding more fuel tanks at Meadowbank or Amaruq site.

How much gas do you house at site?

- Enough to last us for 7-10 days.

<u>Mining and Related Activities</u>

Will the haul trucks from Meadowbank go to Amaruq?

- Yes, most of them are already based at Amaruq now. There are only the smaller trucks left at Meadowbank as mining activity is winding down.

If mining is winding down at Meadowbank, how do they know when there is nothing left to mine? Is it easy to tell how much is left? Do they know right away?

- Yes, we have gotten pretty good at knowing what is there. They make long holes in the ground and take out samples, and the geologists study them. Then they use a computer model to put all the pieces together so they know what's underground.

Mining at the Vault Pit is done?

- Yes, pretty much. The Vault Pit will be closed soon.

When you dig a pit, will you put the rock back into it when it's done?

- Sometimes they put rock back in, but mostly they flood it with water. They don't have to do much to flood it. There is a lot of water that comes out of the ground. While they are mining, they pump the water out. When the turn off the pumps, the water will keep filling up.

When a company is mining for gold, is there a certain depth that they are allowed to go to?

- It's not based on depth. We have to submit a mine plan to get approval to mine. If we change that mine plan, then we need to work with the regulators. We also pay royalties based on the amount of gold that we take out of the mine.

How pure is the gold from Meadowbank?

- Gold is really different depending on where it comes from, it can have different materials in it in very small amounts. The gold from this area is very good.

Did they find soapstone at Amaruq? There are different types of soapstone. Some are soft and others are very hard.

- Not so much. There is some around Meadowbank.

After Amaruq, is Agnico looking at other places to mine?

- Yes, this is the job of our exploration team. We would like to keep the mine going as long as possible, so we need to find new places to mine.

What are you doing with sewage at site?

- We have a sewage treatment plant at Meadowbank and at Amaruq. Anywhere we have people living, we have to have a way to manage the sewage.

How do you decide where the road goes?

- Mainly we look to avoid lakes and other waterways. We also avoid archaeological sites, and we have rerouted the road around these sites.

How long has the Amaruq camp been there?

- We started exploration there in 2012 but it was just a very small camp at that time.

For the hauling from Amaruq, will this be done by Agnico or by a contractor?

- Most of the hauling is done by Agnico. Contractors are mainly involved for special deliveries like fuel transport.

Before you started at Amaruq, how did you know that there was gold there?

- There is a lot of information from people who have been prospectors in the area in years past.

<u>Fish and Fish Habitat</u>

When you take fish out of the lake, what happens if you don't transfer as many fish as you said you were going to? Are you penalized?

- We have to show DFO that we have done a good job before they will let us proceed. They need to agree that we have caught enough.

How do you know how many fish are in the lake before you fish it out?

- You can estimate with fishing at a couple spots and then make an estimate of what is in that lake. Or you can use sonar to see how many fish are there.

How are you making sure that you are keeping the same food etc. for the fish when you are fishing them out / moving them to a new area?

- When you move the fish, you have to make sure it is in the same watershed. The water, and the smell, is very important to fish. They use the smell of the water for navigation.

What about with the hatchery: wouldn't it affect them to be in an unnatural environment?

- We are taking the fish from the natural environment, milking them, returning the adult fish, and then protecting them in the hatchery until the eggs hatch and the fish get a bit bigger. At the beginning it just has clean water circulating (to provide the eggs with oxygen). And then as they hatch, there is a bio filter, like in a fish tank.

When you dry up (dewater) the lake, when you are removing the water and contents that were in there, how do you determine what fish will be in there?

- We study the fish before we do any dewatering. We studied the lake and found that there were six species of fish: Arctic char, lake trout, whitefish, burbot (freshwater cod), and two species of small bodied fish: slimy sculpin and stickleback.
- Reviewing the photos of the fish, most people had never seen a burbot.
- People had not seen small fish like the sculpin.

With the hatchery you mentioned: once the fish are hatched and released, do you have to scrap it all and start again?

- It is a good question. For the first part of the project, we just want to run a small test hatchery to see if it works and if the community is interested. For this, it would be temporary structure. But if we were to build a proper hatchery, it could be a permanent building.
- Does anyone have suggestion of a good place to set up a hatchery?
  - Response was generally to "ask the Elders". Agnico noted that they are working with Elders and HTO.

<u>Cultural Heritage</u>

What are you doing to protect grave sites or old camp grounds?

- We work with an archeologist and they provide surveys of low and high probability locations. Then they look at the high probability areas in a lot of detail. They go very slowly, carefully dig holes, and look at what is in the ground. Any time that we do work in a new area, there is always an archaeologist involved. There is also a chance find procedure that tells our crews and contractors what to do if they find something.

<u>Environmental Impacts</u>

You talk a lot about the water and the fish, but what about the animals. Do you do anything to protect the caribou, or the birds?

- Yes, we have a large environmental program. This includes activities to protect the caribou, and raptors, and other animals.

What will you use to control the dust on the road?

- Just water. We spray it with water to keep the dust down. We also have strict controls on speed, because a slower vehicle makes less dust than a fast vehicle.

What about the air? Is it possible to have an effect on the air?

- Yes, it is. At the mine we measure things like dust, and can add water to control dust. We also monitor greenhouse gases that are produced by using fuel. At our Meliadine site, we are actually looking at using wind power to try and reduce Green House Gases.

<u>Social Impacts</u>

Baker Lake community has changed a lot since the mine opened. We don't want a booming town, if that is what this new expansion will do. A booming town may not be respectful to the Elders. They taught us how to live, how to survive, but many of the younger people are having problems with alcohol and drugs. There have been some big changes, and more trouble.

- That is a very good point and something we take very seriously. Agnico described programs available to community members and employees, speaking about looking into the possibility of partnering with groups in the Kivalliq to create programs available to employees, example of traditional (on-the-land) healing programs from Cambridge Bay and other places, working with KIA to create an elders counselling program on site.

<u>Other Comments</u>

- When my husband and I were fishing found a big lump on the tail of a fish. It was just up at the end of the lake (note: Whitehills Lake). We reported it to the conservation officer. I stopped eating the fish up there after I saw that lump. Now we fish south of Baker Lake. The animals from up there by the mine, are not getting as fat as they used to, from before when the mine was there. I was hunting up by the mine road two years ago. We saw a little herd of caribou, and shot one but it was too skinny! The fish and animals used to be very healthy and much fatter. Things have changed since the mine opened. When I am going berry picking I am getting very mad because of all the dust that is there from the mine, it is really annoying.
  - Note: follow-up discussion indicated that this participant (Nancy) had not been up to the Amaruq area, or travelled between Baker Lake and Gjoa Haven. She indicated on the map the location where her family used to have a cabin outside Baker Lake, which they abandoned because it was too dusty.
- There are a lot of big fat fish caught in Whitehills Lake in the winter (ice-fishing).
- Kids reported that they have seen char caught that were up to their shoulders.

Conclusions/Concerns

- Participants were interested in asking questions about how mining works.
- There was interest in exploring the idea of a hatchery, though it was noted that the Elders should be involved.

Overall Sentiment: Neutral

Women's Focus Group

March 28, 2019

6:00 to 9:00 pm

AEM Guest House

Meeting called by:	AEM	**Type of meeting:**	Information Session/Consultation
Presenter:	Emma Leith	**Note taker:**	Karen Yip

Attendees: 10

Women's Consultation Summary

The Women's Focus group session was very engaging and informative. Participants were very forthcoming with comments concerns and ideas and appreciative to be part of the process.

AEM ran through the fuel farm expansion and Whale Tail Pit Expansion Provide (water management) and fisheries offsetting options and then closed the session with a round table discussion on programs that the women would like to see in the community.

There were no major concerns around the selected water management options or fuel farm expansion other than the expressed desire for more frequent project updates and the need for AEM to be communicating in a way that was more accessible to community members, especially elders (Radio Show). The hatchery idea was well received, and they expressed the desire to have more information on many of the aspects of the project. The only concerns expressed with respect to the hatchery were around alteration of the natural environment for the fish and how that might change the taste of the fish.

At the end of the event, as we were doing our round table on programs that the women would like to see in the community, we received several requests to continue to hold this kind of event. The following day, the office received several unsolicited thank you calls. Because of the overwhelming positive feedback, we will continue to hold these group sessions every couple of months to present operational updates and receive feedback on challenges we are facing.

Minutes

Discussion Topic: Fuel Farm Expansion

Discussion

Will there be 'skilled' labour hired locally for construction?

- We do our best to hire all labour locally. It is Inukshuk doing the construction and I believe they have a good track record with local hires. The workforce will be 20 people for the first phase and 25 for the second portion.

There are people with Cabins over that way, are you going to talk with them?

- Yes, we will reach out to all of the cabin owners and work out a communication plan and arrangement that works for everyone when to have to have restricted access on the road [for health and safety reasons when we are hauling].

[Provides names of cabin owners on the road past the Fuel Farm].

Will there be a wildlife monitor hired for the area around the construction?

- Yes, we have an agreement with the Baker HTO for a wildlife monitoring program and they are working in tandem with our environmental department.

HTO Focus group should include hunters, not just board members as the hunters are the ones who really know the land.

Conclusions/ Concerns

- No Major concerns around the fuel farm expansion.
- Proper engagement/communication plan needed in advance of work.

Overall Sentiment: Neutral

Discussion Topic: Traditional Knowledge/All Weather Access Road (AWAR)

Discussion

AWAR-Caribou and people are having a difficult time getting on and off the road. Caribou are getting skinny; you need to have slopes on the roads.

- Are there particular places you would like to see sloping.
- areas that are identified as high traffic areas for where caribou are crossing, it wouldn't have to be everywhere.

It's annoying for people going to their cabins, they have to go way past where they want to go and then come back because they can't get off the road. You should have sloping at more regular intervals.

- So, it would be for land access and caribou migration?
- Yes.

Elders-information capture-by storytelling, you need to be talking to them more and recording the information.

Elders-site visits good for elders.

- Karen explains the elder's visits to the meadowbank site.

Explains David's role in helping us bridge the gap between traditional and technical knowledge, and our project to have the appropriate names for exploration projects, from the beginning.

Traditional place names-work with Inuit Heritage Trust (IHT) and KIA for names, mapping, sharing info.

- We have reached out to IHT, and they have shared the traditional place names – that our exploration team is working to incorporate into all of our Explo maps.
- It is a good suggestion to reach out to KIA Lands dept., we will talk to them tomorrow.

We have been wanted to look at choosing an appropriate name of the All-Weather Access Road (AWAR) – do you have any thoughts on how you might like to see that happen? Naming competition with the school kids?

- AWAR-doesn't need a name, but you should have the appropriate place names instead of K_ markings (i.e. Tahiryuak instead of K25).
- Sentiment repeated by everyone – really like the idea of putting traditional name signs on every KM marker.

Conclusions/Concerns

- Instead of "naming" the road AEM should install traditional name signs on every KM marker.
- Expressed desire to have slopes put on the AWAR to improve land access and ease caribou migration.

Discussion Topic: Capacity Building

Discussion

How many beneficiaries are employed in the Environment Dept.? Capacity building programs (university partnerships, etc.) should include/be directed toward beneficiaries.

- Currently we have a few beneficiaries that are on our environmental teams, but we would like to see that number improve. We couldn't agree more, we would like to see those technician, coordinator, supervisory roles being filled by beneficiaries. We have just signed a new agreement with the Rankin

HTO to add a wildlife monitor position, we would like to use that position as a pilot to look at a community based monitoring program, that is building capacity within the HTO and helping support interested individuals through arctic college and mentorships etc. Ideally that will be successful, and we will use the same model for Baker and Chester.

Not only teaching beneficiaries, but Traditional Knowledge-could benefit the Environment Dept. (example given-AMQ rivers flow north, MBK rivers flow south).

- That is the role of David Kritterdlik, our Traditional Knowledge & Wildlife Coordinator. His role at Agnico is helping to bridge the gap for us between the technical knowledge that we have and the traditional knowledge that the community has. Creating a process where the community is more involved in what we are doing (increase in transparency) and we are learning from the community and interpreting their traditional knowledge and observations into our data – an information exchange.

Does AEM sponsor biology/environmental programs/courses with Nunavut Arctic College or others? Education programs at the Baker Lake campus?

- Yes, we are very involved with the Arctic college (speaks to Anick's program booklet).
- We would like to expand our support for capacity building in the environmental monitoring and are working with David, Env & the Rankin HTO to develop a work plan for that, but also looking at bringing in support from other groups that have experience building that kind of capacity (university/consultants) so that we can make sure we are getting the work we need, but building capacity through mentorship and training in tandem.

Conclusions/ Concerns:

- They want to see more technical and leadership positions being filled by beneficiaries.

Overall Sentiment: Neutral

Discussion Topic: Water Management Options

Discussion

Are there wildlife deterrents for the tailings ponds?

- Yes, we work with the HTO/ KIA to determine the appropriate deterrents to keep the animals out of site (without disrupting the migratory paths).
- I will get back to you with what those are exactly.

What is the assessment process (water storage options), how is credit awarded?

- For the assessment process we are looking at technical, environmental, cultural and traditional and economic factors. [shows assessment breakdown slide].
- For the exact technical breakdown of how each option was weighted, I will get Anna Sundby to respond to that question for you.

Conclusions/Concerns

- More information requested on the weighting of each of the water management options.
- No major concerns expressed with the selection of A53.

Overall Sentiment: Neutral

Discussion Topic: Fish Offsetting Options

Discussion

Fish Hatchery-Needs to be done in a balanced way (to protect all species).

How are hatchery fish fed? Should be fed small fish-natural food.

- I believe the fish are fed salmon food pellets, and I will check with Nicola to confirm.

Hatchery should be where fish are from, close to their natural habitat. This is important to fish taste, colour, etc.

If fish are fed pellets will they be able to find their own food upon release?

Fish should be grown in the same environment, can be released into a different environment-with different water?

- [goes back to hatchery slide] in the hatchery system we want to maintain the natural environment as much as possible. The ideal situation pictured here would be that the eggs and milt are taking from the mature fish in the same body of water that we are taking the water from to cycle through the hatchery. And then when the fish are ready to be re-released into the environment, they are being released into the same body of water. The hatchery is just providing protection for those eggs and supporting the species in the early life stages.

I find this very interesting, but I have a lot of questions about the process.

- If the community is favourable to the idea, the next step would be to come back and consult more in depth just on the Hatchery option. I will be following up on all of your questions with Nicola, who unfortunately couldn't be with us tonight, but she would be present at the next consultations.

Hatchery has some possibilities, what about life (operation) after? Who will run it?

- Our desire is that any project like this is community run, and we are very open to any format that that takes.

There is an opportunity for teaching with the high schools, or building capacity within the HTO.

- Absolutely, we had heard some suggestions from the last women's group that maybe the grade 10 science class could run the hatchery, or in partnership with Arctic College. We love all of those ideas, and would work with you guys and other community members to make sure that we are coming up with a concept that makes sense for anyone.

I know there are a lot of outstanding questions, but at first glance, how is everyone feeling about this idea?

- Whole group is positive.

How does this idea compare to the other Fisheries offsetting options (i.e. Habitat creation, spawning pads etc.).

- They like the hatchery idea and habitat creation/spawning pads like they have at meadowbank.

Does anyone have any thoughts about where you might like to see something like this, if we had a hatchery?

- Don't want it in town, we like the way our fish taste and don't want to mess with the order.
- [Joan]: Can you do it outside of town?
- [Emma]: We can have the proof of concept pilot and ultimately the hatchery project if we get there, anywhere – it's really up to the community to decide.

How many of you fish?

- Everyone.

Where are you usually going to fish?

- We like to fish in our lake, over past the fuel farm where the cabins are.

Conclusions/Concerns

- Positive reactions to the hatchery, but outstanding questions remain.
- Concern around changing the taste of the fish with different food (pellets), and where the fish would be released, that it might upset the natural balance.

Overall Sentiment: Neutral

Discussion Topic: Round Table Discussion on Programs Suggestions

Discussion

Spouses' visits to Meadowbank and the financial literacy courses teaching budgeting, relationship counselling or relationship building, and other workshops were good, and was suggested that this might be offered in Baker Lake for the general public. Southern facilitators were brought in. Would like to see this.

Sewing programs for spouses, with paid childcare-positive.

Had talked about a cottage industry recently, sewing coop.

Code of Conduct also discussed-needs to be in plain language.

Drug and alcohol counselors needed at Meadowbank.

AEM can work with Mianiqsijit Counseling project in town-need to work on addictions first and also trauma counseling BK.

We need to rewrite the script-teach cross cultural ideas, encourage wellness and teach others, Inuit Culture should not be taught by southerners.

There need to be more counsellors on site, or Elders counselling – make it a culture of self-care, fighting the stigma associated with seeking help.

Conclusions/Concerns

- Very engaging conversation.
- A lot of suggestions around mental health/ wellness.
- They were offended that Inuit culture was being taught by southerners at our cross-cultural training.

Overall Sentiment: Positive

KIA Session

March 29, 2019

3:30pm

KIA Offices

Meeting called by:	AEM	**Type of meeting:**	Information Session/Consultation
Presenter:	Emma Leith	**Note taker:**	Karen Yip

Attendees: 4

KIA Consultation Summary

AEM ran through the fuel farm expansion and Whale Tail Pit Expansion Provide (water management) and fisheries offsetting options, and the session closed with a general discussion around mental health and wellness.

There were no major concerns around the selected water management options or fuel farm expansion, and similarly to the women's group, the KIA expressed desire for more frequent project updates and the need for AEM to be communicating in a way that was more accessible to community members, especially elders (Radio Show). The Hatchery idea was well received, and they expressed the desire to see a proof of concept this season. The group expressed interest in having a hatchery in town (contradictory to what the Women's group had said).

No comment on the water management option selection and attenuation pond.

There was brief discussion around the On-Site Working Group (OSWG) which was deferred to the relevant AEM group.

Minutes

Discussion Topic: Cabin Owners and Land Access

Discussion

What will happen to the road when you are hauling?

- When we are hauling on the road there will be restricted access to the road area. This is for health and safety reasons as it is a one lane road. Hauling if only scheduled for the Month of May, so it would just be for that period that there would be restrictions.
- Are you using the cabin in May?

Yes, if the weather is good, we might be out there.

- If that is the case, we will come to an arrangement that works for everyone. Possibly because you have a radio, we could call it and then temporarily stop hauling and provide an escort. I am not sure; I will have to speak with the Project team.

What is your plan with the Cabin Owners out there?

- We have the list of all of the cabin owners that are using that road, and will be reaching out to them, to see if they are planning on using their cabins during the period that we are planning on hauling (May).
- While we are restricting access during that period, we will decide on a communication plan with the cabin owners, community members and our team that ensures we are providing all of the information that people require in the most appropriate way (we are thinking radio announcements).

Will there be blasting at the fuel farm location?

- No, we will not be blasting (health a safety issue with the surround fuel tanks) any material moved will be through excavation.

Conclusions/Concerns

- Proper engagement plan needed through out the fuel farm works.

Overall Sentiment: Neutral

Discussion Topic: Traditional Knowledge Collection

Discussion

AEM shared information about David Kritterdlik's role in working with Inuit Heritage Trust and local elders to help us find the appropriate traditional names for exploration projects.

Explains that we were wondering what we should do about the AWAR name? proposes potential options, children's naming contest, or local elders etc., putting signs for the correct locations at each KM sign.

Instead of naming the road, we like the idea of having the correct name at the KM signs, it makes more sense.

Shares information about Traditional Place Names-KIA has been creating a map with names Baker Lake Traditional Knowledge Map 15 Place Names. Contact Maria Serra GIS at Rankin KIA office.

Elders-good to take the elders out on the AWAR to collect traditional names/info.

Elder Programs-Respected elder, Arviat had done some good programs at Meadowbank, had hoped to do more.

Conclusions/ Concerns

- We should be sharing our traditional knowledge collection more with the KIA.
- The preferred option for "naming" the road is restoring the traditional names at each KM marker, so each marker would have an accompanying sign with the correct place name.

Overall Sentiment: Neutral

Discussion Topic: Fisheries Offsetting Options

Discussion

Spawning pads [K10]-Is there data on the success of this initiative, [how many additional fish] and is there any other information about success with other species/locations [reference in general, not specific to AEM].

- Not sure exactly how much habitat was increased or exactly what that translated to in terms of number of fishes, but will check and get back to you.

I would like to know what type of fish do the best with each offsetting option.

- For the hatchery, they have selected char as it has proven to do quite well in other hatcheries that have been running for a while, such as in Northern Quebec.
- In terms of the other scenarios, I think it would depend on the body of water and which fish were existing in that body of water, as opposed to the method, but will check and get back to you.

What does success look like with either a hatchery or spawning pad [do you have calculations you are using].

- Success is improving the habitat or contributing to healthy sustained fish populations. We our using our HTO Wildlife Monitor to help our environmental teams measure and monitor the fish populations to ensure they are thriving.
- In terms of numbers or what measurement we are using, will check and get back to you.

How successful was the fish out at Amaruq?

- We had approximately a 70% success rate – AEM will be coming into the community soon to do the presentation on the fish out and will be able to give you more detail.

Discussion about vertical hydroponic projects.

Hatchery-no concerns, they love the idea.

Conclusions/Concerns

- Should provide dates and presentation for fish out.
- Need to loop back around to discuss spawning pad and how we are measuring success.
- Very positive feedback around the hatchery and they would welcome the idea of moving to the next phase/ proof of concept.

Overall Sentiment: Positive

Discussion Topic: General Discussion

Discussion

Explains the higher profile role of our CLO's and the development that is happening within the CR team. Explaining CLO meet and greet on site so that employees know where to go if they have concerns. And then speaking about Tussjugut and its role in helping build trust.

Feels that the OSWG MBK and MEL are working in different silos, should be more collaborative.

I saw the article of Ashton, the underground supervisor. How long has meadowbank been open, and no Supervisors? What are you doing to increase the number of Inuit Supervisors and Leaders?

- Training and Mentorship programs explained.
- RISE mentorship program described.
- We have been making improvements, Inuit workforce numbers to be released soon (after next week I believe).

The biggest barrier to employee retention for women is childcare, I would like to see the Highschool Library actually turned into that day care (that's why it was shut down).

- Discussion around who is the project sitting with, DEA, GN, KIA etc.

Conclusions/ Concerns

- Lack of leadership development and childcare are top issues contributing to poor Inuit employment numbers.

Overall Sentiment: Neutral

Appendix A

Whale Tail Pit – Expansion Project: Community Consultation, March 26, 28, 2019 – Photographs

Appendix A: Whale Tail Pit – Expansion Project: Community Consultation, March 26, 28, 2019 – Photographs

Baker Lake, Community Consultation

Photo 1: Baker Lake Elder's Focus Group. March 26, 2019. Overview of Fuel Farm Expansion Project. (English followed by Inuktitut translation; meeting materials in Inuktitut).

Photo 2: Baker Lake Elder's Focus Group. March 26, 2019. Describing fish species present in the Whale Tail Pit Project Area. (English followed by Inuktitut translation; meeting materials in Inuktitut).

Photo 3: Baker Lake Elder's Focus Group. March 26, 2019. Describing fish habitat impacts from the Whale Tail Pit – Expansion Project. (Inuktitut).

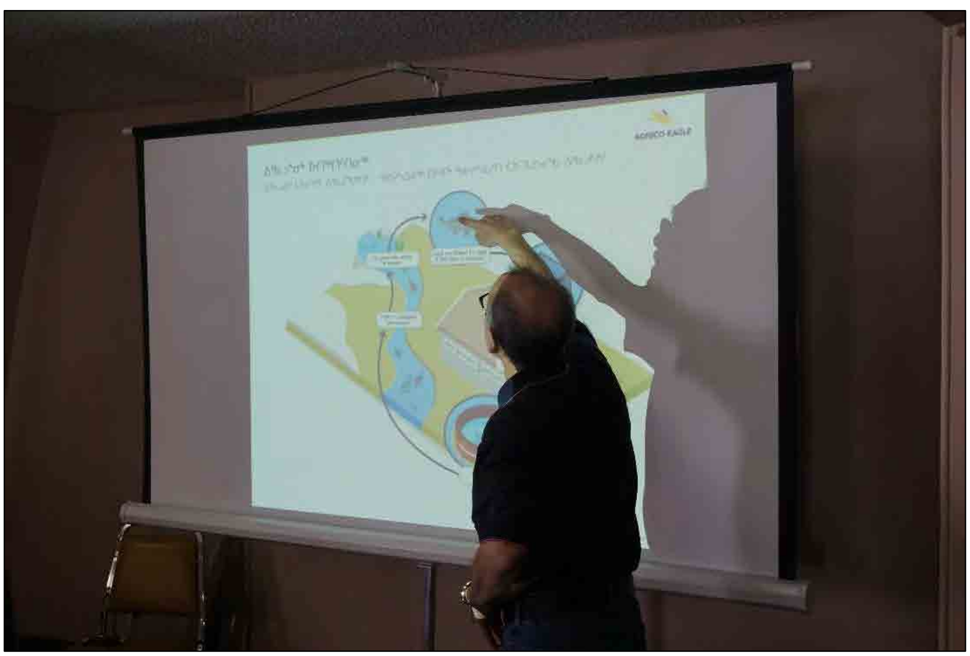


Photo 4: Baker Lake Elder's Focus Group. March 26, 2019. Describing conceptual overview of fish hatchery. (Inuktitut).

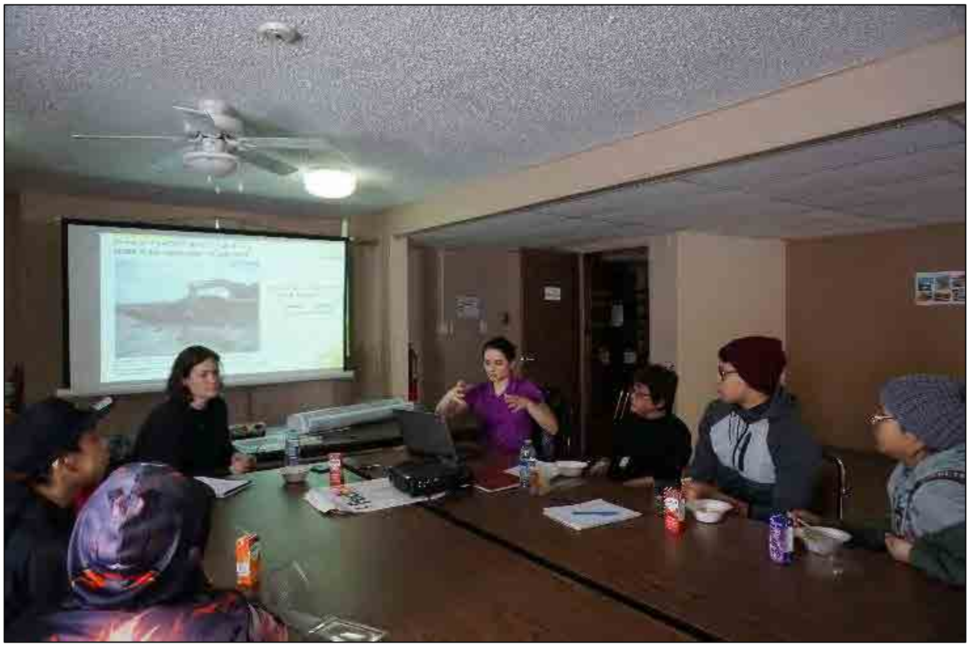


Photo 5: Baker Lake Youth Focus Group. March 26, 2019. Describing construction workplan for the Fuel Farm Expansion. (English, meeting materials in both English and Inuktitut).

Photo 6: Hamlet of Baker Lake. March 26, 2019. Describing Fuel Farm Expansion. (English, with live translation into Inuktitut).

Photo 7: Baker Lake Community Open House, March 26, 2019. Overview of Whale Tail Pit Project. (English; Inuktitut translation available but not required).

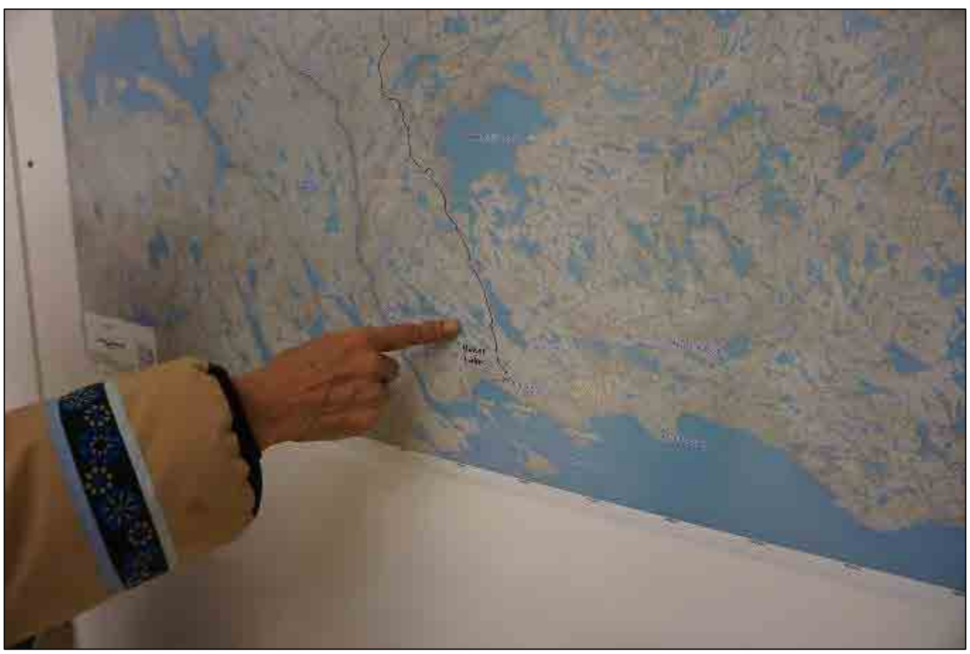


Photo 8: Baker Lake Community Open House, March 26, 2019. Location of berry-picking area no longer used due to dust on plants.

Photo 9: Baker Lake Community Open House, March 26, 2019. Favourite fish from the species found in the Whale Tail Pit Project area – Arctic char.

Photo 10: Baker Lake Community Open House, March 26, 2019. Posters for each of the water management alternatives for a new attenuation pond at the Whale Tail Pit – Expansion Project.

Photo 11: Baker Lake community meetings. Example of materials used in each session: overview of Whale Tail Pit – Expansion Project, study area for Alternatives Assessment; overview map showing Baker Lake and road access to Meadowbank Mine and Whale Tail Pit Project.

Photo 12: Baker Lake Women's Meeting, March 28, 2019.

Appendix B

Community Consultation Materials

AGNICO EAGLE

ᐊᒪᕈᖅ ᓄᓇᒥᑦ ᐃᓗᕐᑐᖅᓯᒪᔪᖅ ᐱᓕᕆᐊᖅ ᐊᖏᓪᓕᒋᐊᕐᓂᖓᓄᑦ ᓄᓇᓕᖕᒥᑦ ᐅᕐᑲᕐᑲᑎᕐᑲᕐᓂᖅ

ᖃᒪᓂ’ᑐᐊᖅ ᐊᒻᒪᓗ ᐃᒡᓗᓕᒑᕐᔪᒃ

ᒫᑦᓯ 2019

ᑲᑎᒪᔾᔪᑎᒃᓴᖅ

ᐊᒪᕈᖅ ᓄᓇᒥᑦ ᐃᓗᑦᑐᖅᓯᒪᔪᖅ ᐱᓕᕆᐊᖅ ᐊᖏᓪᓕᒋᐊᕐᓂᖓ

ᐅᑉᓗᒥ ᐱᔭᒃᓴᐅᑎᒋᔭᐅᔪᑦ:

- ᐱᓕᕆᐊᕐᒥᒃ ᐱᔾᔪᑎᓕᒃ
  - ᐊᒪᕈᖅ ᓄᓇᒥᑦ ᐃᓗᑦᑐᖅᓯᒪᔪᖅ ᐊᒻᒪᓗ ᐱᕆᐊᖅᑕᐅᓂᐊᖅᑐᑦ ᐱᕙᓪᓕᐊᓂᕐᒧᑦ
  - ᑕᐅᑐᖕᒑᖅᖢᒋᑦ ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᖕᒑᕈᖕᓇᖅᑐᑦ
  - ᐊᑐᖅᑕᐅᖕᒑᕈᒪᔪᑦ ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᖕᒑᕈᖕᓇᖅᑐᑦ
  - ᐃᖅᑲᓗᓕᕆᓂᕐᒧᑦ ᐊᑭᓖᓂᖅ
- ᐱᕕᖅᑲᖅᓂᐅᔪᖅ ᑑᓴᔭᐅᓂᐊᕐᓗᑎᒃ ᐅᖅᑲᐅᓯᓯ ᐊᒻᒪᓗ ᑭᐅᔾᔪᑎᓯ

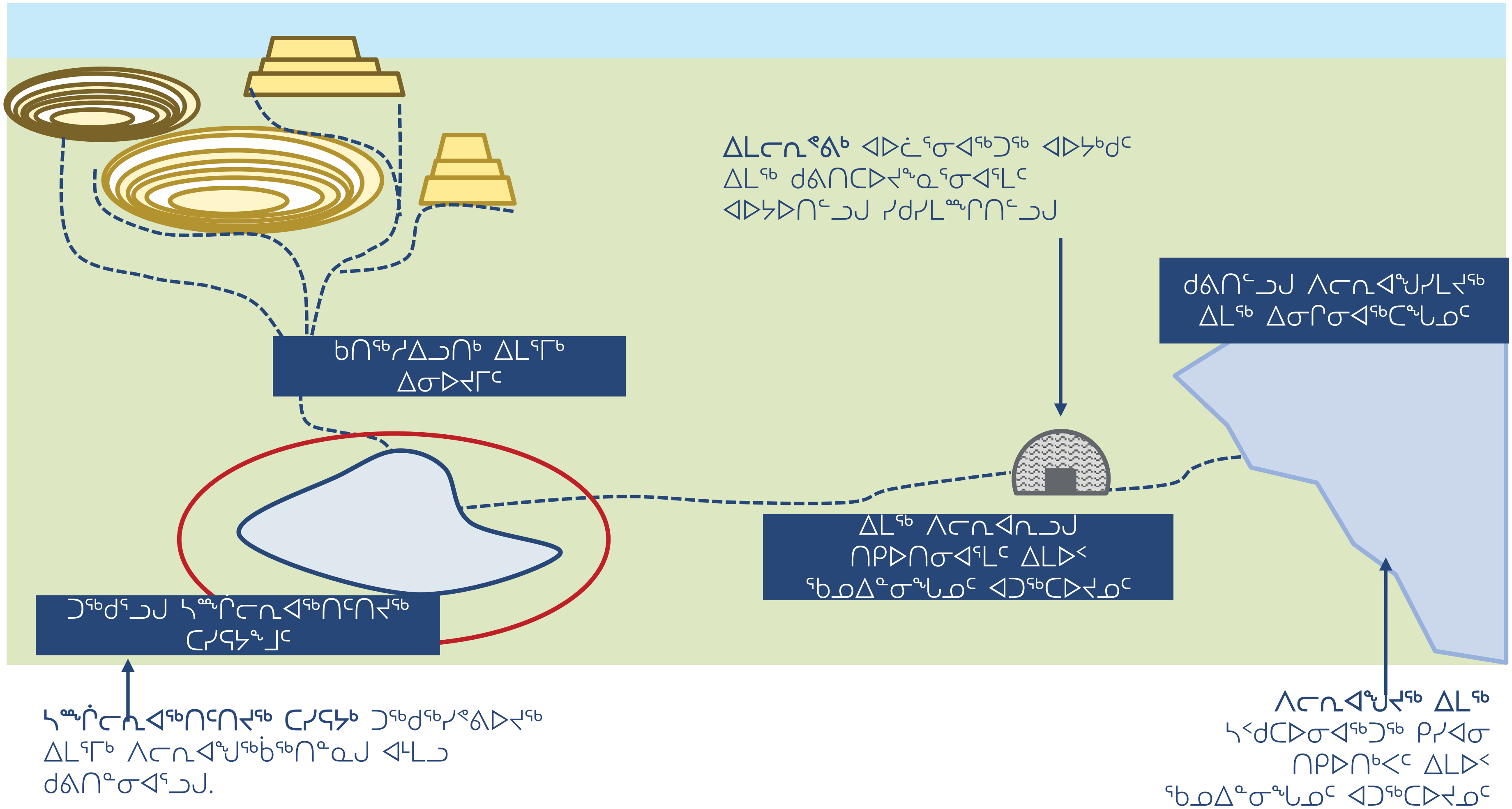
ᐊᒪᕈᖅ ᓄᓇᒥᑦ ᐃᓗᑦᑐᖅᓯᒪᔪᖅ ᐱᓕᕆᐊᖅ ᐊᖏᒡᓕᕆᐊᖅᓂᖓ

ᐃᒪᖅᒥᒃ ᐊᐅᓚᑦᑎᓂᖅ

ᓱᓇᑦ ᐊᑐᕈᖕᓇᖅᐱᑎᒍ ᐃᒪᖅ ᑐᖅᑯᖅᓂᐊᖅᓗᒍ ᐅᑭᐅᒥᑦ?

ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᓪᓚᖓᓐᓇᖅᑐᓂᒃ ᖃᐅᔨᓴᐃᓂᖅ

ᐊᑐᖅᑕᐅᓂᐊᖅᑐᖅ



AGNICO EAGLE

ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᙱᓗᕈᓐᓇᖅᑐᓂᒃ ᖃᐅᔨᓴᐃᓂᖅ

ᖃᓄᐃᓐᓂᖅᓴᐅᔪᓕᕆᓂᖅ ᐊᒻᒪᓗ ᐊᔾᔨᒌᙱᑦᑎᓐᓂᖕᒋᑦ

ᖃᓄᖅ ᖃᓄᐃᓐᓂᖅᓴᐅᔪᓕᕆᖃᑦᑕᖅᐱᑕ ᐊᑐᖅᑕᐅᙱᓗᕈᓐᓇᖅᑐᓂᒃ?

ᐱᖅᑯᓯᕆᔭᐅᕙᒃᑯᑦ ᖃᐅᔨᒪᓃᑦ ᐊᒻᒪᓗ ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᖁᖅᑲᖕᒋᑦ

ᐱᓕᕆᐊᖅ

- ᐃᒪᓕᕆᓂᖅ
- ᐃᒪᖃᖅᕕᖕᒧᑦ ᐱᖁᑎᑦ
- ᓱᐸᓗᓐᓂᑦ
- ᐊᑉᖁᑏᑦ
- ᑕᒪᒃᑯᐊᕐᕆᓗᐃᑦ

ᐊᕙᑎᓕᕆᓂᖅ

- ᐊᓂᖅᓵᖅᑐᖅᑕᑉᑕ ᖃᓄᐃᓐᓂᖓ
- ᓯᓚ
- ᓄᓇ
- ᓄᓇᒥᑦ ᐃᒪᖅ
- ᐃᒪᐅᑉ ᖃᖓ
- ᐃᖃᓗᐃᑦ
- ᓂᕐᔪᑏᑦ

ᐃᓄᐃᑦ

- ᐃᑦᑕᕐᓂᑕᓕᕆᓂᖅ
- ᐱᖅᑯᓯᕆᔭᐅᔪᖅ
- ᓄᓇᒥᒃ ᐊᑐᕐᓂᖅ
- ᓄᓇᓖᑦ

ᐱᕈᖅᐸᓪᓕᐊᓂᖅ

- ᐱᕋᑎᕐᔪᐊᓄᑦ ᐊᑭᐅᔾᑦ
- ᐊᐅᓛᖅᑎᑦᑎᓂᕐᒧᑦ ᐊᑭᐅᔾᑦ
- ᐅᒃᑯᐊᖅᐸᓪᓚᐊᓂᕐᒧᑦ ᐊᒻᒪᓗ ᐅᒃᑯᐊᖅᓯᒪᓕᖅᑎᓪᓗᒍ ᐊᑭᐅᔾᑦ

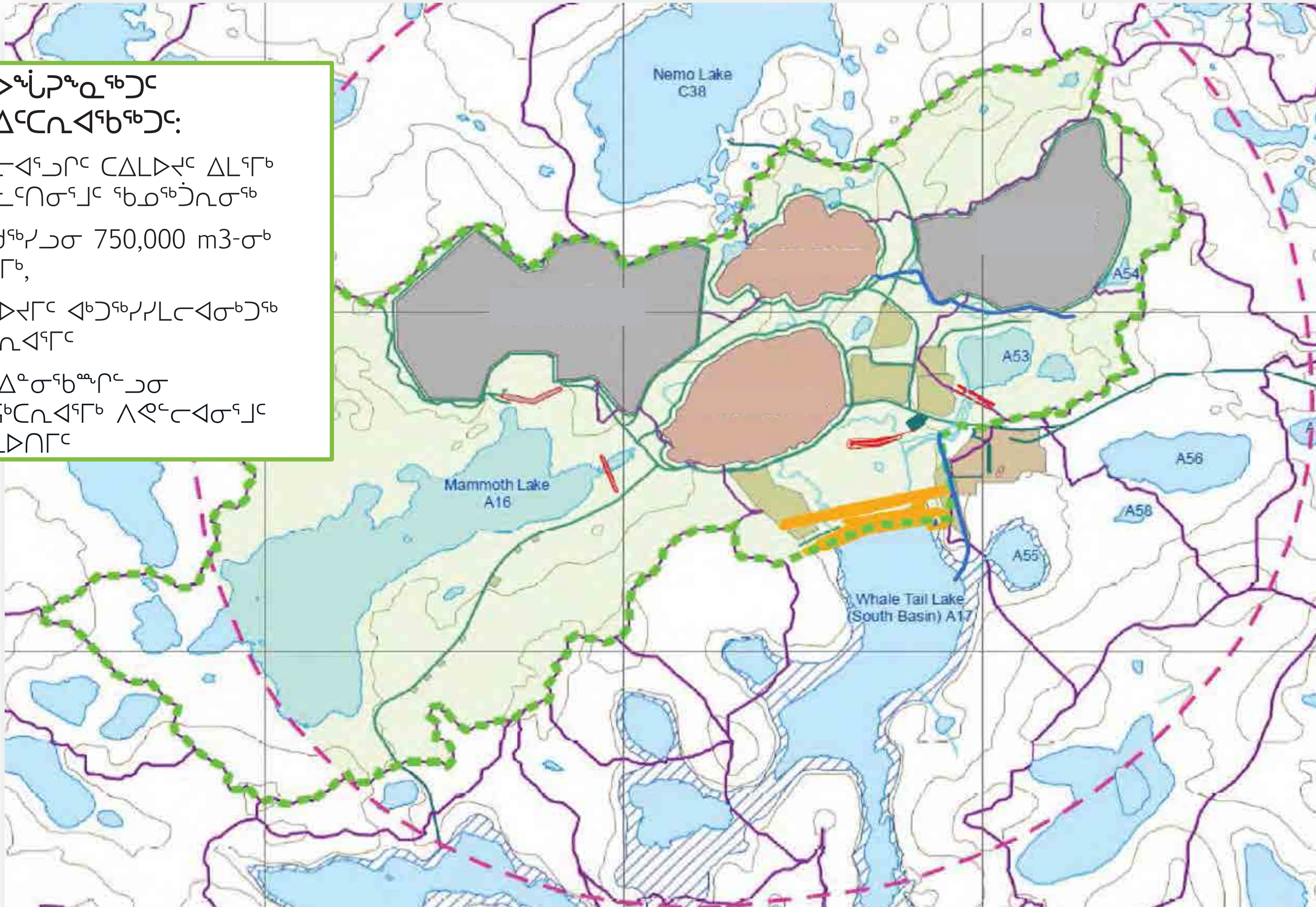
ᓯᑕᒪᑦ "ᑐᖅᑯᖅᓯᓯᒪᒑᑦ"
(ᐃᓂᓕᐅᖅᓯᒪᔪᑦ ᑐᑭᓯᐅᒪᔾᔪᑏᑦ)

ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᓵᕈᓇᖅᑐᓂᒃ ᖃᐅᔨᓴᐃᓂᖅ

ᖃᐅᔨᓗᒋᑦ ᐊᑐᖅᑕᐅᓵᕈᓇᖅᑐᑦ

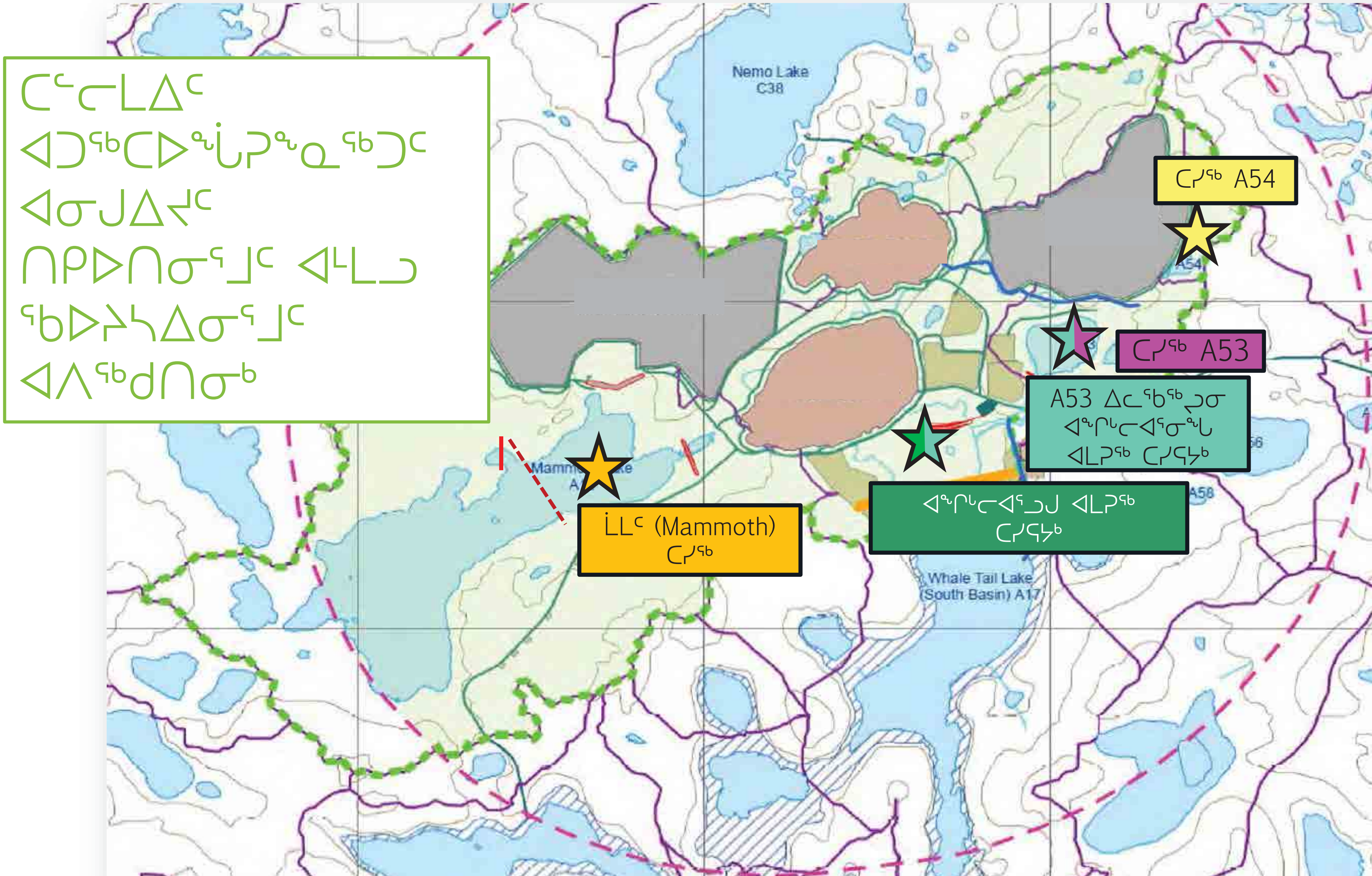
ᐊᑐᖅᑕᐅᓵᕈᓇᖅᑐᑦ ᐃᒪᓐᓇᐃᑦᑕᕆᐊᖃᖅᑐᑦ:

- ᑎᑯᓕᐊᕐᓗᒋᑦ ᑕᐃᒪᐅᔪᑦ ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᖃᓄᖅᑑᕆᓂᖅ
- ᑐᖅᑯᖅᓯᓗᓂ 750,000 m3-ᓂᒃ ᐃᒪᕐᒥᒃ,
- ᐃᓂᐅᔪᒥᑦ ᐊᒃᑐᖅᓯᓯᒪᓕᐊᓂᒃᑐᖅ ᐱᓕᕆᐊᕐᒥᑦ
- ᐃᓘᐃᓐᓂᖃᖏᓐᓗᓂ ᐅᔾᖄᑕᕆᐊᕐᒥᒃ ᐱᓯᓕᐊᓂᕐᒧᑦ ᐸᕐᓇᐅᑎᒥᑦ



ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᕙᓪᓕᕈᓐᓇᖅᑐᓂᒃ ᖃᐅᔨᓴᐃᓂᖅ

ᖃᐅᔨᓗᑎᑦ ᐊᑐᖅᑕᐅᕙᓪᓕᕈᓐᓇᖅᑐᑦ



ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᓂᖏᓐᓇᖅᑐᓂᒃ ᖃᐅᔨᓴᐃᓂᖅ

ᑕᐅᑐᙵᖅᑑᒥᑦ ᐊᑐᖅᑕᐅᓂᖏᓐᓇᖅᑐᑦ

AGNICO EAGLE

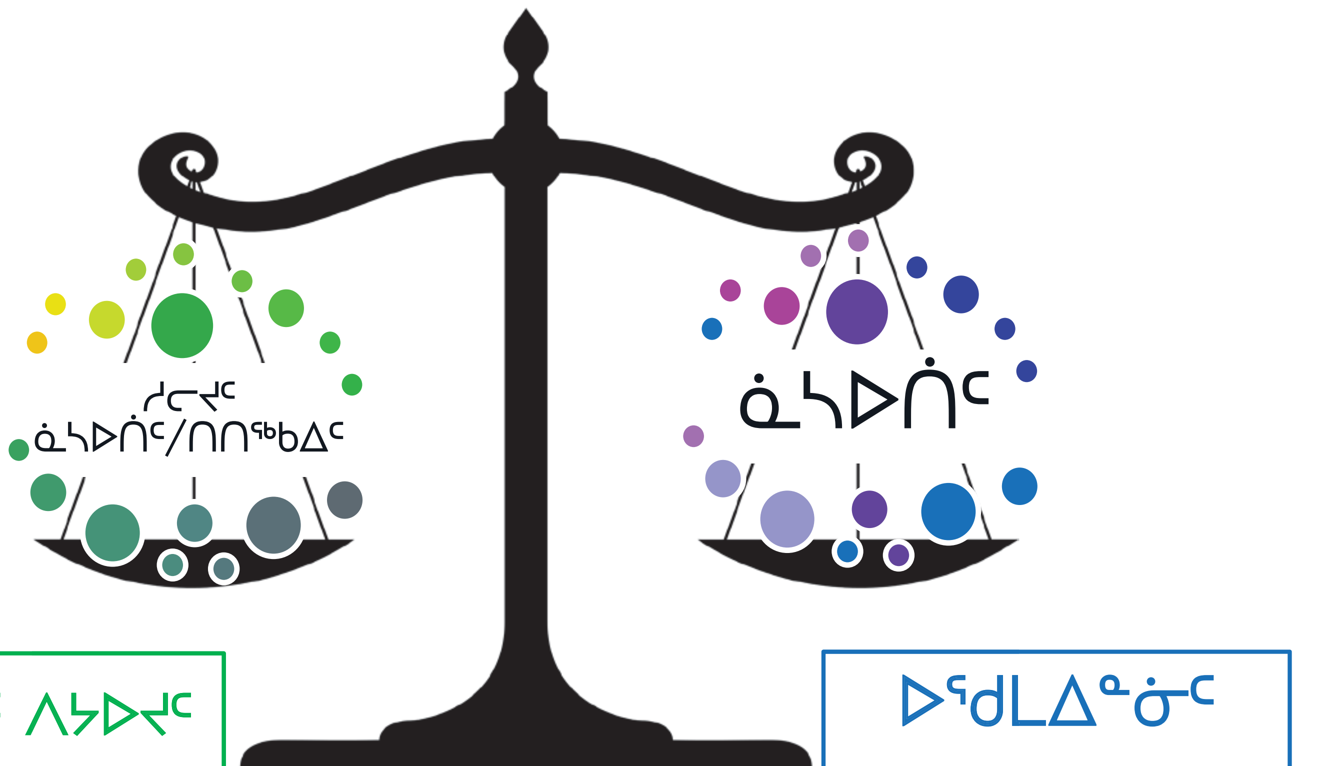
ᖃᓄᖅ ᓂᕈᐊᕐᓂᐊᖅᐱᑎᒍᑦ ᐊᑐᖅᑕᐅᓂᖏᓚᕗᖅ?

- ᑲᓇᑕᒥᑦ ᐊᕙᑎᓕᕆᔾᑯᑦ ᐊᑐᕐᑯᔪᑦ ᐊᑐᖅᑕᐅᖃᑦᑕᖅᑐᒥᒃ ᑕᐃᔭᐅᕗᒥᒃ ᐊᑕᐅᓯᐅᖏᑦᑐᖅ ᑐᖅᑯᖅᓯᓯᒪᕚᖕᓄᑦ ᖃᐅᔨᓴᐃᓂᖅ
  - ᖃᐅᔨᑎᑦᑎᕙᖅ ᐱᔾᔪᑕᐅᕙᓗᒃᑖᑦ ᐊᔾᔨᖑᓂᒃ ᐅᕐᑯᒪᐃᓐᓂᐅᕙᒥᒃ ᐱᓯᒪᙱᒪᓚᑕ ᐃᓯᒪᓕᐅᖅᑎᓪᓗᒋᑦ
  - ᐃᓚᖏᑦ ᐃᓄᐃᑦ ᓱᓇᑐᐃᓐᓇᕐᒥᒃ ᐱᒪᕆᐅᑎᑦᑎᓂᖅᓴᐅᕙᖕᓇᖅᑐᑦ ᐊᓯᖏᓐᓂᐅᖓᓂᑦ

ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᖕᒋᕈᖕᓇᖅᑐᓂᒃ ᖃᐅᔾᓴᐃᓂᖅ

ᑕᐅᑐᖕᒋᖅᓱᕆᑦ ᐊᑐᖅᑕᐅᖕᒋᕈᖕᓇᖅᑐᑦ

AGNICO EAGLE



ᓈᓴᐅᑎᓄᑦ ᐱᔭᐅᔪᑦ

ᐃᓂᖓ 1-ᒥᑦ 6-ᒧᑦ

ᓇᓗᓇᐃᖅᓯᔾᔪᑏᑦ

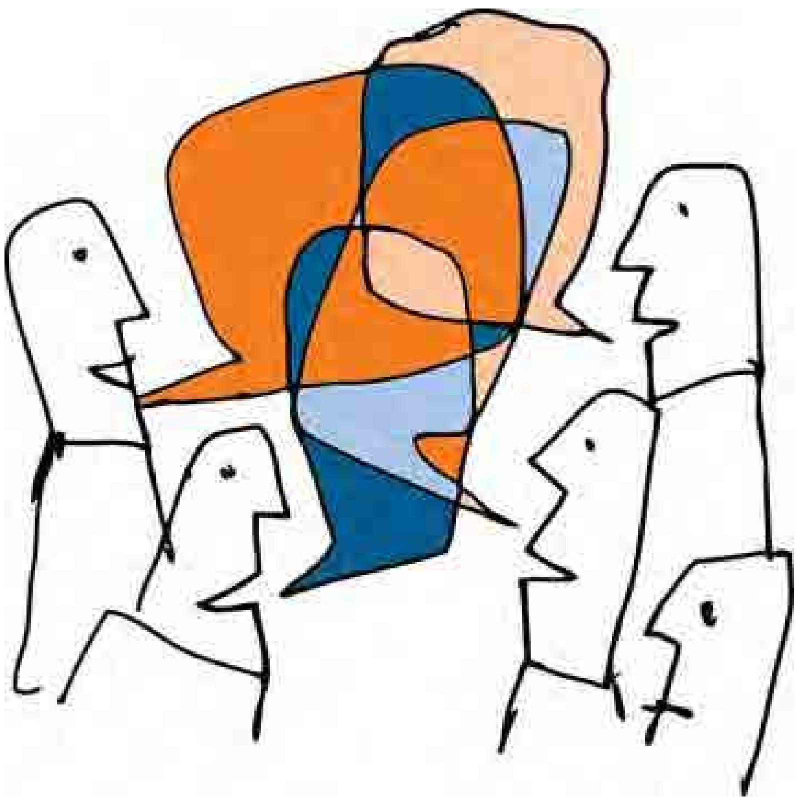
ᐅᕐᑯᒪᐃᓐᓃᑦ

ᐃᓂᖓ 1-ᒥᑦ 6-ᒧᑦ

ᓇᓗᓇᐃᖅᓯᔾᔪᑏᑦ
ᑐᖅᑯᖅᓯᓯᒪᔅᐱᖕᓄᑦ
ᐃᓚᑭᔭᐅᔪᑦ
ᑐᖅᑯᖅᓯᓯᒪᔅᐹᑦ

ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᕝᕖᕈᓐᓇᖅᑐᓂᒃ ᖃᐅᔨᓴᐃᓂᖅ

ᓄᓇᓕᖕᒥᐅᓂᑦ ᑭᐅᔾᔭᑕᐅᔾᔪᑦ



ᑐᓂᓯᔪᑦ ᐊᑐᖅᑕᐅᕝᕖᕈᓐᓇᖅᑐᓂᒃ ᔪᓚᐃ 2018-ᒥᑦ ᑭᐅᔾᔭᑕᐅᔪᓂᒃ ᐱᔪᒪᑉᓗᑎᒃ ᖃᒪᓂ’ᑐᐊᕐᒥᐅᓂᑦ ᐊᒻᒪᓗ ᐃᒡᓗᓕᒑᕐᔪᖕᒥᐅᓂᑦ

ᑭᐅᔾᔭᑕᐅᔪᑦ ᐅᕙᑉᑎᖕᓂᒃ
ᑐᑭᓯᕚᓪᓚᖅᑎᑦᑎᔪᑦ ᐱᔾᔪᑕᐅᔪᑦ
ᓇᓕᖕᒋᑦ ᐱᒻᒪᕆᐅᓂᖅᓴᐅᖕᒪᖔᑕ
ᐱᒻᒪᕆᐅᒋᔭᐅᖏᓐᓂᖅᓴᐅᖕᒪᖔᑕ

ᐃᓚᐅᑎᓚᐅᖅᑕᕗᑦ ᑐᑭᓯᐅᒪᔾᔪᓂᑦ
ᑕᒪᒃᑯᓄᖖᒍ ᐃᓱᒪᓕᐅᕆᓂᑉᑎᖕᓄᑦ

ᔪᓚᐃ 2018

- ✓ **ᓄᓇᓕᖕᒥᐅᓂᒃ ᑲᑎᒪᑎᑦᑎᓃᑦ** ᖃᒪᓂ’ᑐᐊᕐᒥᑦ ᐊᒻᒪᓗ ᐃᒡᓗᓕᒑᕐᔪᖕᒥᑦ
- ✓ **ᐊᖏᓗᐊᖏᑦᑐᓂᒃ ᑲᑎᒪᑎᑦᑎᓃᑦ** ᐊᕐᓇᕐᓂᒃ, ᒪᒃᑯᒃᑐᓂᒃ ᐊᒻᒪᓗ ᐃᓐᓇᓇᔨᐅᔪᓂᑦ
- ✓ ᑲᑎᖅᑲᑎᒋᓚᐅᕐᒥᔭᕗᑦ ᕼᐋᓚᒃᑯᑦ, ᐆᒪᔪᓕᓇᔨᐊᓖᒃ, ᐊᒻᒪᓗ ᑭᖕᖓᓕᕐᒥᑦ ᐃᓄᐃᑦ ᑲᑐᔾᔨᖅᑲᑎᒌᑦ

ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᖕᒌᕈᖕᓇᖅᑐᓂᒃ ᖃᐅᔨᓴᐃᓂᖅ

ᓄᓇᓕᖕᒥᐅᓂᑦ ᑭᐅᔾᔪᑕᐅᔪᑦ

ᑐᓴᓚᐅᖅᑕᕗᑦ:

- ᐃᓱᒫᓘᑕᐅᔪᑦ **ᐊᒃᑐᖅᓯᓂᐅᔪᖕᓇᖅᑐᑦ** ᐊᖏᔪᓄᑦ ᐱᕐᑯᑎᓄᑦ ᓲᕐᓗ ᐃᒪᕐᓂᒃ ᓯᒥᒃᓯᓯᒪᔾᔪᑏᑦ
  - ᖃᓄᖅ ᐊᒃᑐᖅᓯᓂᐊᕐᓂᖏᑦ ᑐᒃᑐᓄᑦ ᐊᓯᖏᓐᓄᓪᓗ ᓂᕐᔪᑎᓄᑦ ᐊᐅᓚᔪᑦ ᓄᓇᒥᑦ?
- **ᐊᒃᑐᖅᓯᑦᑕᐃᓕᕐᑯᔾᔭᐅᔪᑦ** ᐃᖃᓗᖕᓄᑦ ᐊᒻᒪᓗ ᐃᓂᖏᓐᓄᑦ ᐊᔪᕐᓇᙱᑉᐸᑦ
- ᐃᖃᓗᐃᑦ ᐊᓯᐊᓄᑦ ᓅᑎᑦᑕᐃᓕᓗᒋᑦ ᐊᔪᕐᓇᙱᑉᐸᑦ
- ᐃᓱᒪᒃᓴᖅᓯᐅᕈᑕᐅᓚᐅᖅᑐᖅ ᒫᒪᑦ (Mammoth) ᑕᓯᕐᒧᑦ ᐊᑐᖅᑕᐅᖕᒌᕈᖕᓇᖅᑐᖅ ᓈᒻᒪᒋᔭᐅᖏᓐᓂᖕᒐᓄᑦ ᐊᒃᑐᖅᓯᓂᖅ ᐃᓘᕐᔪᐊᕐᑲᖅᑐᓄᑦ ᑕᓯᕐᓄᑦ

- ᐃᑲᔪᖅᑐᐃᔪᑦ ᐃᓂᐅᔪᒥᑦ ᑕᓯᕐᒥᒡᓘᓐᓃᑦ ᐊᑐᖕᒌᕐᓗᑎᒃ **ᐊᒃᑐᖅᑕᐅᓯᒪᓕᐊᓂᒃᑐᓂᒃ ᐅᔾᖁᒃᑕᕆᐊᕐᒧᑦ**, ᐊᑐᖅᑕᐅᖏᖕᒌᕐᓗᓂ ᐊᒃᑐᖅᑕᐅᓯᒪᙱᓂᖅᓴᐅᔪᖅ

ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᖕᒑᑭᖕᓇᖅᑐᓂᒃ ᖃᐅᔨᓴᐃᓂᖅ

ᖃᓄᐃᖕᒐᓂᐅᔪᑦ

ᑕᒪᐃᓐᓅᖕᒐᔪᒃᑯᑦ ᖃᓄᐃᖕᒐᓂᐅᔪᑦ

ᐊᑐᖅᑕᐅᖕᒑᑭᖕᓇᖅᑐᖅ	ᖃᓄᐃᒋᔭᐅᖕᒋᖕᓂᕐᒧᑦ ᓈᓴᐅᓯᖅᑐᐃᓂᖅ
ᑕᓯᖅ A53	4.21 ★
ᑕᓯᖅ A53 ᐃᓚᒋᓗᒍ ᐊᒪᕈᖅ ᑕᓯᕋᔭᒃ ᐊᖕᒋᒡᓕᒋᐊᕐᓂᖕᒐ	3.39
ᑕᓯᖅ A54	3.59
ᒫᒪᑦ (Mammoth) ᑕᓯᖅ	3.30
ᐊᒪᕈᖅ ᑕᓯᕋᔭᒃ ᐊᖕᒋᒡᓕᒋᐊᕐᓂᖕᒐ	3.85

★ ᖁᑦᑎᖕᓂᖅᓴᒥᒃ ᓈᓴᐅᑎ = ᐱᔭᐅᖕᒑᑭᒪᔪᖅ

ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᖕᒑᕈᖕᓇᖅᑐᓂᒃ ᖃᐅᔨᓴᐃᓂᖅ

ᖃᓄᐃᖕᒐᓂᐅᔪᑦ

AGNICO EAGLE

ᖃᓄᐃᖕᒐᓂᐅᔪᑦ ᑐᖅᑯᖅᓯᓯᒪᕝᕙᒃᑎᒍᑦ

ᐊᑐᖅᑕᐅᖕᒑᕈᖕᓇᖅᑐᖅ	ᐱᓕᕆᓂᖅ	ᐊᕙᑎᐅᑉ ᐆᒪᓂᖅᑲᕈᑎᖏᓐᓄᑦ ᐱᔾᔪᑎᓕᒃ	ᐃᓄᐃᑦ ᒥᒃᓵᓄᑦ	ᐱᓕᕆᐊᖅ ᐱᕈᖅᐸᓪᓕᐊᑎᑦ ᑎᓂᖅ
1. ᑕᓯᖅ A53	4.53	3.99	4.54	3.80
2. ᑕᓯᖅ A53 ᐃᓚᒋᓗᒍ ᐊᒪᕈᖅ ᑕᓯᕋᔭᒃ ᐊᖕᒋᒡᓕᒋᐊᕐᓂᖕᒐ	2.62	3.99	2.94	3.40
3. ᑕᓯᖅ A54	2.69	3.27	5.31	3.20
4. ᒫᒪᑦ (Mammoth) ᑕᓯᖅ	2.50	3.40	4.03	3.00
5. ᐊᒪᕈᖅ ᑕᓯᕋᔭᒃ ᐊᖕᒋᒡᓕᒋᐊᕐᓂᖕᒐ	2.18	4.67	4.00	3.60

ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᖕᒌᕿᖕᓇᖅᑐᓂᒃ ᖃᐅᔾᓴᐃᓂᖅ

ᐊᑐᖅᑕᐅᖕᒌᕿᒪᔪᖅ

AGNICO EAGLE

ᐊᑐᖅᑕᐅᖕᒌᕿᒪᔪᖅ: ᑕᓯᖅ A53

- ✓ ᖁᑦᑎᓛᖅ ᑐᓪᓕᕆᔾᐅᔪᕐᔫᓐᓃᑦ ᖁᑦᑎᓛᒧᑦ ᐊᑐᖅᑕᐅᖕᒌᕐᑐᓂ ᐊᑐᖅᑕᐅᔪᖕᓇᖅᑐᓗᒃᑖᓂᑦ
- ✓ ᐊᖕᒋᓗᐊᖕᒋᑦᑐᖅ ᐃᓂᐅᔪᖅ, ᒥᒃᓵᕆᐊᕐᓂᖕᒐ ᐃᒪᐅᑉ ᖄᖕᒐᓂᑦ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐱᖁᑏᑦ
- ✓ ᐊᑐᕐᑲᑦᑕᖅᑐᖅ ᓄᓇᒥᑦ ᐃᒪᖅ ᑯᕕᔪᒥᑦ ᑲᑎᖅᓱᐃᓂᐊᕐᑐᓂ ᐃᒪᕐᒥᒃ
- ✓ ᒥᒃᓵᕆᐊᖅᑐᖅ ᐅᑐᕆᐊᓇᕐᓂᖅ ᐃᒪᕐᒥᒃ ᓯᒥᒃᓯᔾᔪᑎ ᐊᔪᓕᕐᓂᖕᒐᓄᑦ ᖃᒥᓐᓂᕐᒧᑦ ᓘᓐᓃᑦ

- ᑕᓯᖅ A53 ᐃᖃᓗᖃᖅᑐᖅ, ᑭᓯᐊᓂ ᐃᑲᔪᐃᓂᖃᕐᒥᔪᖅ ᐊᓯᖕᒋᓐᓂᐅᖕᒐᓂᑦ ᐊᑐᖅᑕᐅᖕᒌᕿᒪᔪᓂᑦ

AGNICO EAGLE

ᐃᒪᕐᒥᒃ ᐊᐅᓚᕐᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᙱᕈᓐᓇᖅᑐᓂᒃ ᖃᐅᔨᓴᐃᓂᖅ

ᐊᑐᖅᑕᐅᙱᕈᒪᔪᖅ

ᐃᓚᓕᐅᑎᔭᐅᓂᖏᑦ ᑭᐅᔾᔪᑕᐅᔪᑦ ᓄᓇᓖᖕᒥᐅᓂᑦ:

✓ ᐊᖏᕈᐊᖏᑦᑐᒥᒃ ᐃᒪᕐᒥᒃ ᓯᒥᒃᓯᒪᔾᔪᑎᒥᒃ ᐱᔭᕆᐊᖅᑲᖅᑐᑦ

- ᐊᒥᓲᙱᓐᓂᖅᓴᐅᔪᑦ ᐊᒃᑐᖅᓯᓂᐅᔪᙳᖅᑐᑦ ᓄᓇᒥᑦ ᐊᒻᒪᓗ ᓂᕐᔪᑏᑦ ᐊᐅᓚᓐᓂᖏᓐᓄᑦ

✓ ᒥᒃᓵᒋᐊᖅᑐᖅ ᐅᓗᕆᐊᓇᕐᓂᖅ ᐃᒪᕐᒥᒃ ᓯᒥᒃᓯᔾᔪᑎ ᐊᔪᕐᓂᖓᓄᑦ ᖄᒥᓐᓂᕐᒧᑦᓅᓐᓃᑦ

✓ ᐊᑐᖅᑐᑦ ᐃᓂᒥᑦ ᐊᒃᑐᖅᑕᐅᓯᒫᓂᒃᑐᒥᑦ ᐅᔭᕐᑲᖓᐊᕐᒧᑦ

- ᐊᕙᓗᔭᐅᓯᒪᔪᖅ ᐱᖓᓱᓄᑦ ᓴᓂᕋᕐᓄᑦ ᐅᔭᕐᑲᖓᐊᑉ ᐃᓂᖓᓄᑦ

✓ ᒥᑭᔪᑦ ᑕᓯᕋᔭᐃᑦ ᑕᓯᖅ A53-ᑐᑦ ᐊᑐᖅᑕᐅᕙᙱᑦᑐᑦ ᐃᖃᓗᒃᓯᐅᕐᓂᕐᒧᑦ

✓ ᐊᒃᑐᖅᓯᓂᖃᙱᑦᑐᖅ ᐊᖏᓂᖅᓴᖅ ᑕᓯᖅ ᒫᒪᑦ (Mammoth) ᑕᓯᕐᒥᑦ

- ᐊᒥᓲᙱᓐᓂᖅᓴᐃᑦ ᐃᖃᓗᐃᑦ A53-ᒥᑦ ᑕᐅᑐᙵᖅᓱᒍ ᒫᒪᑦ (Mammoth) ᑕᓯᖅ

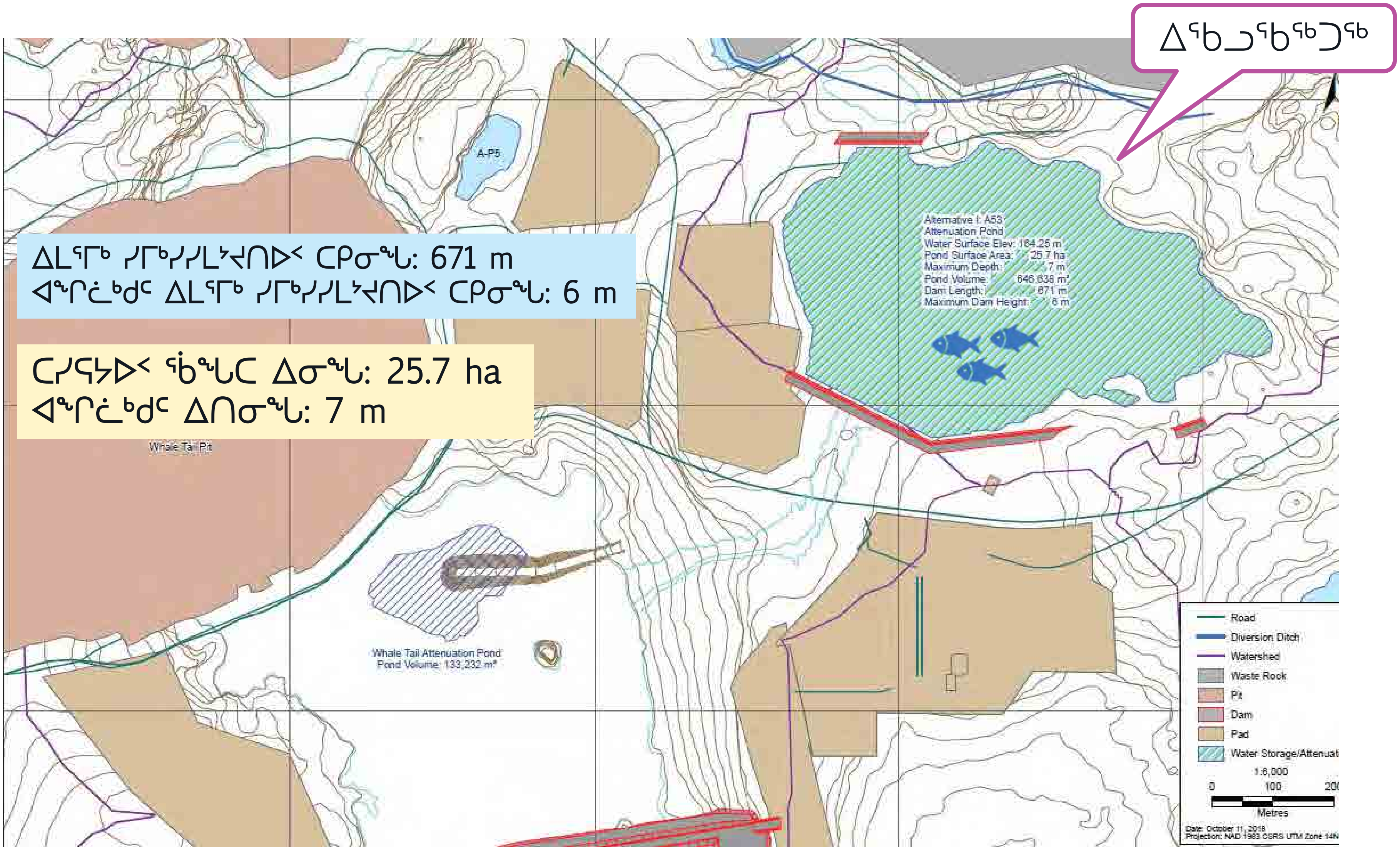
ᒪᕿᒃ ᐊᑐᖅᑕᐅᙱᕈᓐᓇᖅᑐᑦ ᐊᒃᑐᖅᓯᓂᐊᙱᑦᓱᑎᒃ ᐃᖃᓗᓐᓂᑦ, ᐱᔪᒥᓇᙱᑦᑐᖃᓚᐅᖅᑐᑦ:

✗ ᐊᖏᔪᒥᑦ ᐃᒪᕐᒥᒃ ᓯᒥᒃᓯᔾᔪᑎᖃᕆᐊᖅᑲᖅᑐᖅ

✗ ᐱᕐᑯᑎᓄᑦ ᐊᒻᒪᓗ ᐅᓗᕆᐊᓇᕐᓂᕐᒧᑦ ᐊᒃᓱᕈᕐᓇᖅᑐᑦ

ᐃᒪᕐᒥᒃ ᐊᐅᓚᕐᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᖁᔨᖕᓇᖅᑐᓂᒃ ᖃᐅᔨᓴᐃᓂᖅ

ᐊᑐᖅᑕᐅᖁᔨᒪᔪᖅ: ᑕᓯᖅ A53



ᑕᐅᑐᒐᐅᓂᖓᓄᑦ ᑎᑎᕋᖅᓯᒪᑐᐃᓐᓇᖅᑐᖅ

ᐃᒪᕐᒥᒃ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᖕᒌᕈᖕᓇᖅᑐᓂᒃ ᖃᐅᔨᓴᐃᓂᖅ

ᑕᓯᖅ A53: ᑕᒪᕐᒥᒃ ᐃᒪᐃᑦ

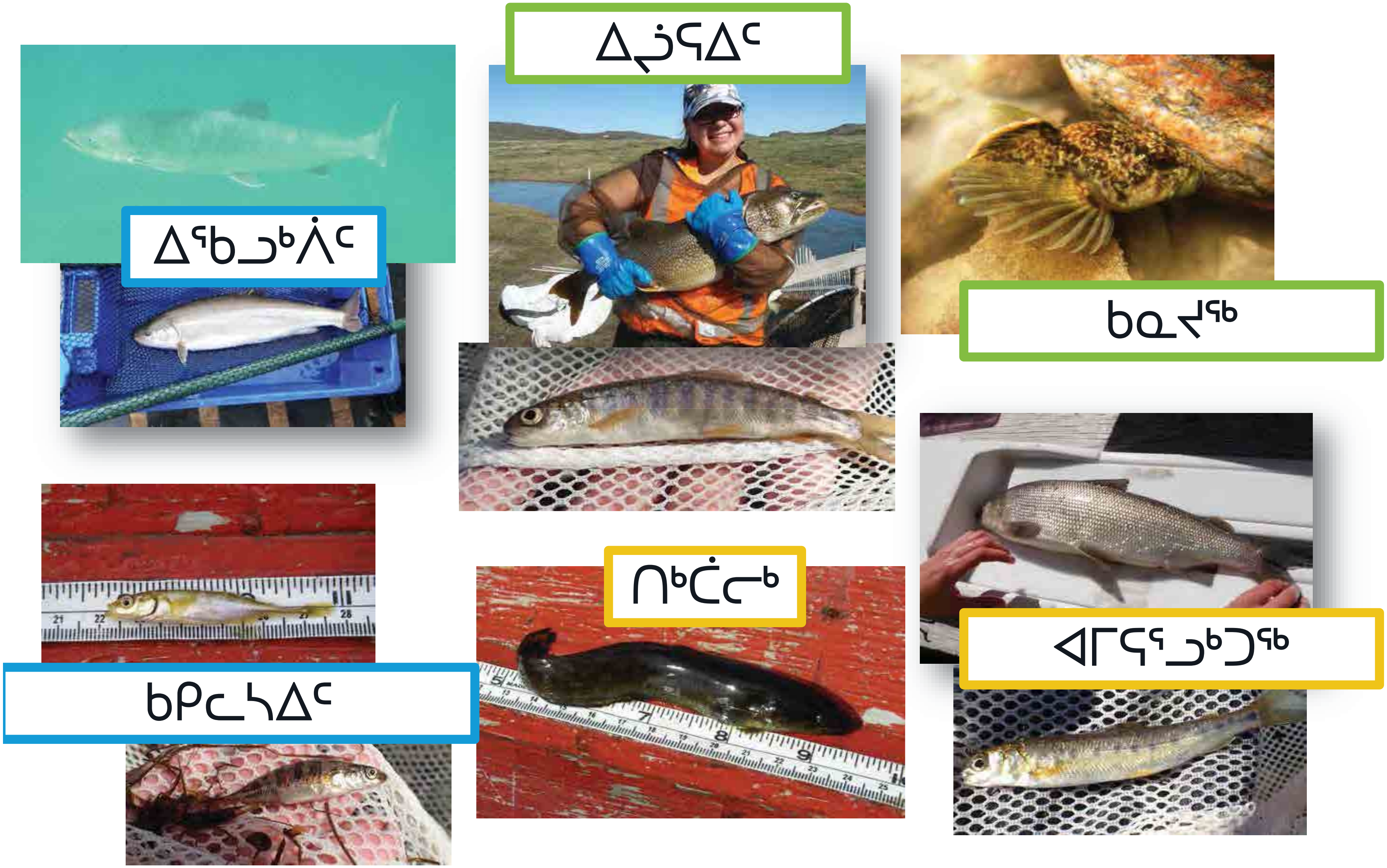
ᐊᐱᖅᑯᑏᑦ?

ᑭᐅᔾᔪᑎᒃᓴᖃᖅᐱᑦ ᖃᓄᖅ ᖃᓄᐃᓐᓂᖅᓴᐅᔪᓕᓇᖃᑦᑕᕐᒪᖕᒌᑉᑕ ᐊᑐᖅᑕᐅᖕᒌᕈᒪᔪᓂᒃ, ᐅᕝᕚᓘᓐᓃᑦ ᖃᓄᐃᖕᒐᓂᐅᔪᓂᒃ?

ᐃᖅᑲᓗᐃᑦ ᐃᓂᖏᓐᓂᒃ ᐅᑎᖅᑎᑦᑎᓂᖅ

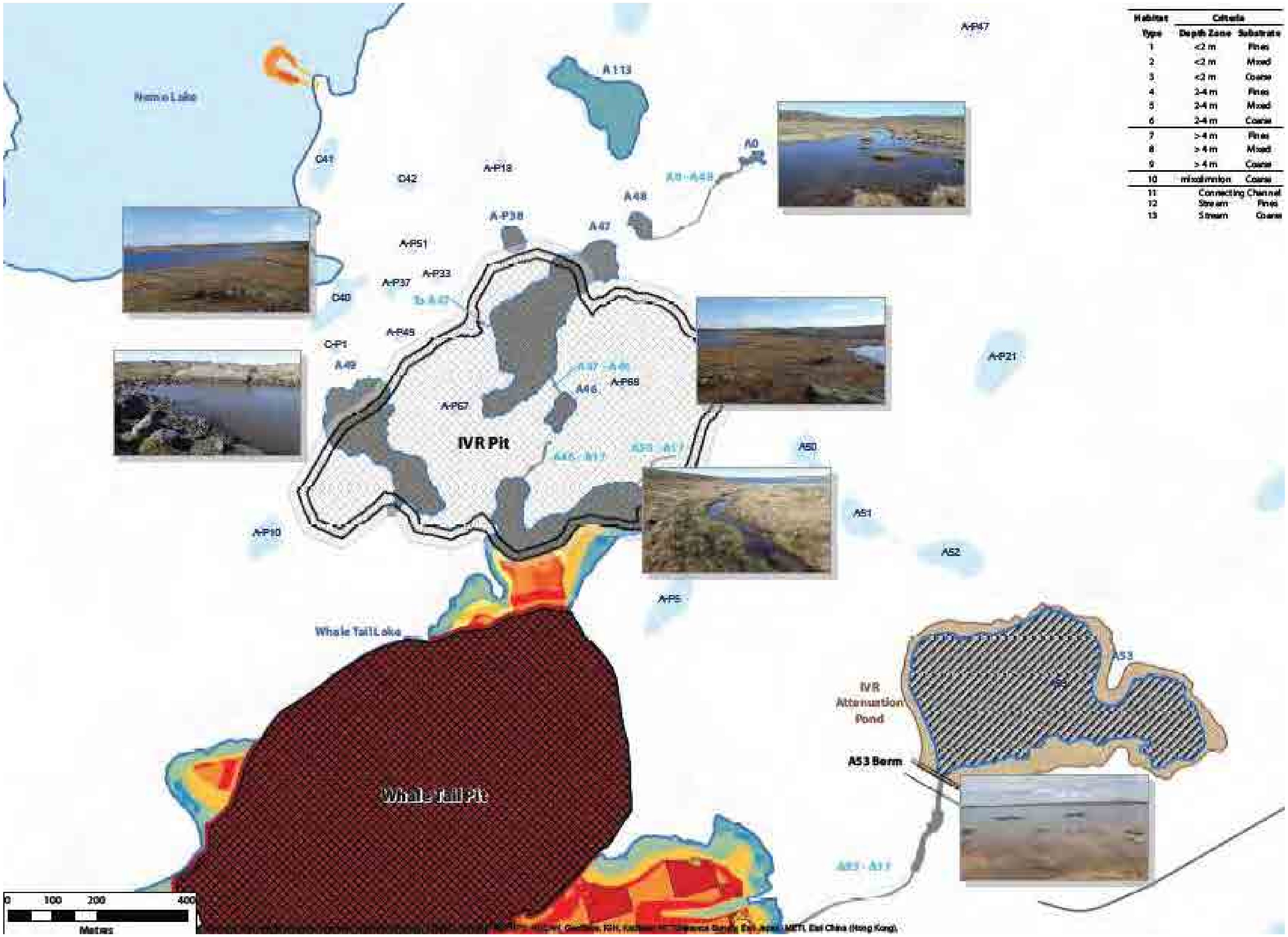
➚ ᓱᓇᐅᕙᑦ ᐊᔾᔨᒌᙱᑦᑐᑦ ᐱᓕᕆᐊᖑᔪᖕᓇᖅᑐᑦ ᐋᖅᑭᒋᐊᕐᓂᐊᕐᓗᒋᑦ ᐊᓯᐊᔨᓂᖅ ᐃᖅᑲᓗᐃᑦ ᐃᓂᖏᓐᓂᒃ?

ᐊᔾᔨᒌᙱᑦᑐᑦ ᐃᖃᓗᐃᑦ ᑕᐃᒪᐅᔪᑦ ᐊᒪᕈᖅ ᐱᑕᕆᐊᒃ ᐃᓂᖓᓂᑦ



ᐊᓯᐅᔾᓂᖅ ᐃᖃᓗᐃᑦ ᐃᓂᖏᓐᓂᒃ

ᐊᒪᕈᖅ ᓄᓇᒥᑦ ᐃᓗᑦᑐᖅᓯᒪᔪᒥᑦ ᐱᓕᕆᐊᖅ ᐊᖏᓪᓕᒋᐊᕐᓂᖓ



Habitat Type	Criteria	
	Depth Zone	Substrate
1	<2 m	Fines
2	<2 m	Mixed
3	<2 m	Coarse
4	2-4 m	Fines
5	2-4 m	Mixed
6	2-4 m	Coarse
7	>4 m	Fines
8	>4 m	Mixed
9	>4 m	Coarse
10	mixolimnion	Coarse
11	Connecting Channel	
12	Stream	Fines
13	Stream	Coarse

ᐃᖃᓗᐃᑦ ᐅᑎᖅᑎᑕᐅᓂᖏᑦ

ᓱᓇᐅᕙ ᐅᑎᖅᑎᑦᑎᓂᖅ?

AGNICO EAGLE

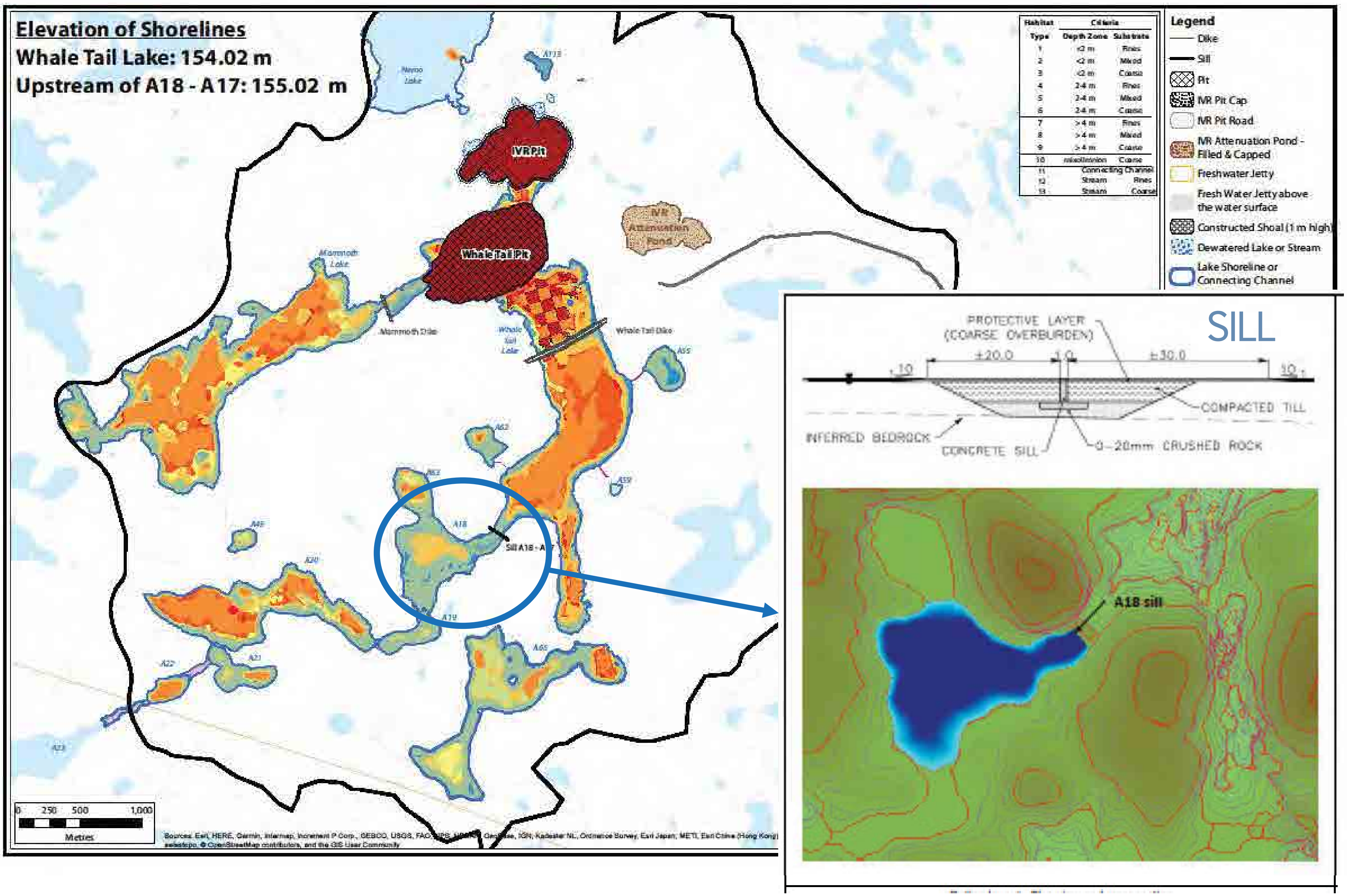
- **ᐃᓂᐅᕙᒥᑦ ᐅᑎᖅᑎᑦᑎᓂᖅ** ᐋᖅᑭᒃᓯᓂᕐᒧᑦ ᐱᓕᕆᐊᖅ ᐊᒃᑐᖅᓯᖃᑦᑕᖅᑐᖅ ᐃᖃᓗᖕᓂᒃ ᐊᒻᒪᓗ ᐃᓂᖏᓐᓂᒃ
- ᐃᖃᓗᐃᑦ ᐃᓂᖏᑦ ᐊᓯᐅᔾᔭᐅᕙᖅ ᐅᕝᕙᓘᓐᓃᑦ ᐊᓯᐊᙳᖅᑕᐅᕙᖅ, **ᐱᐅᓯᕆᐊᓇᐊᖃᖅᑐᖅ** ᐅᕝᕙᓘᓐᓃᑦ ᓄᑖᒥᒃ **ᐃᓂᓕᐅᕐᓗᓂ** ᖃᑉᓯᐅᓂᖏᑦ ᐃᖃᓗᐃᑦ ᐊᒥᓲᕙᖕᓃᕐᓂᐊᙳᕆᒻᒪᑕ
- ᐅᑎᖅᑎᑎᓇᕙᒪᓂᖅ ᐅᖓᑖᓄᑦ ᐊᒃᑐᖅᑕᐅᓚᐅᖅᑐᓂᑦ

ᐊᒪᕈᖅ ᓄᓇᒥᑦ ᐃᓗᑦᑐᖅᓯᒪᕙᒥᑦ ᐱᓕᕆᐊᖅ ᐊᖏᒡᓕᕆᐊᕐᓂᖓ

- ᑲᑎᔅᔪᒋᑦ **~27 ᐊᖏᓂᐅᔭᖅ** ᐃᖃᓗᐃᑦ ᐃᓂᖏᑦ ᐊᓯᐅᔾᔭᐅᓂᐊᖅᑐᑦ
- 10.4 ᐃᓂᒋᔭᐅᔭᑦ ᐊᕕᒃᑐᖅᓯᒪᔭᑦ

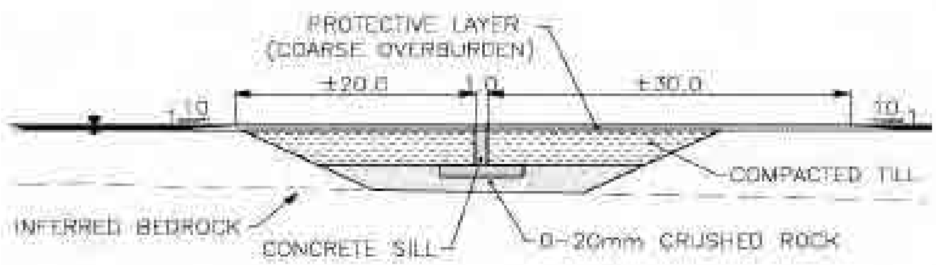
ᐃᖃᓗᖕᓂᒃ ᐅᑎᖅᑎᑦᑎᓂᖅ

ᐃᓂᐅᔭᓕᐅᕆᓂᖅ ᐃᒻᒥᖅᑐᖅᑕᐅᓯᒪᔭᒃᑯᑦ



ᐃᖃᓗᖕᓂᒃ ᐅᑎᖅᑎᑦᑎᓂᖅ

ᐃᓂᐅᔪᒥᒃ ᐱᐅᓯᒋᐊᖅᓯᓂᖅ ᓱᑉᓗᒃᑯᑦ ᑲᑎᓐᓂᒃᑯᑦ



ᐃᖃᓗᖕᓂᒃ ᐅᑎᖅᑎᑦᑎᓂᖅ

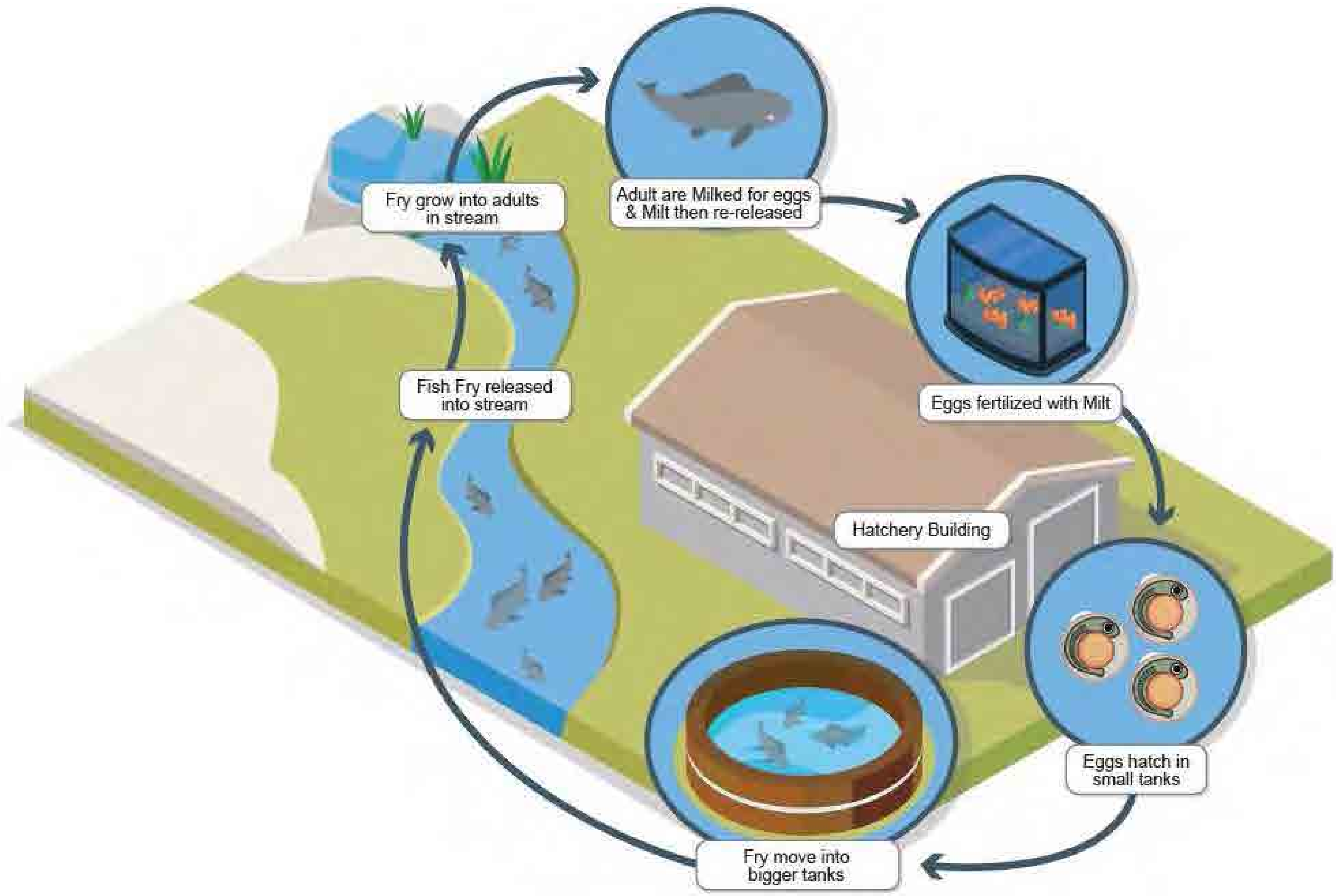
ᐃᓂᐅᔪᒥᒃ ᐱᐅᓯᕆᐊᖅᓯᓂᖅ ᒪᓐᓂᓚᐅᕐᕕᒃᑯᑦ

ᐃᖃᓗᙵᓂᒃ ᐅᑎᖅᑎᑦᑎᓂᖅ

ᓱᑉᓗᓂᒃ ᐱᐅᓯᒋᐊᖅᓯᓂᖅ

ᐃᖃᓗᖕᓂᒃ ᐅᑎᖅᑎᑦᑎᓂᖅ

ᐃᖃᓗᐃᑦ ᒪᓐᓂᖏᑦ ᐃᖃᓗᙳᖅᑐᑦ - ᖃᐅᔨᓴᐃᓂᖅ ᒥᑭᒥᒃ ᖃᐅᔾᓇᕈᑎ ᑕᐅᑐᒐᐅᓂᖓ ᐃᖃᓗᒃᐸᑦ



ᐃᖃᓗᐃᑦ ᐃᓂᖏᓐᓂᒃ ᐅᑎᖅᑎᑎᕆᓂᖅ

- ᓄᓇᒥᑦ ᐱᓕᕆᓂᖅ ᑲᔪᓯᓂᐊᖅᑐᖅ 2019-ᒥᑦ ᐱᓕᕆᐊᖃᕐᓂᐊᕐᓗᓂ ᐅᑎᖅᑎᑎᕆᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᔪᙳᖅᑐᓂᒃ

- ᐃᓱᒪᒋᔭᖃᒃᑲᓐᓂᖅᐱᑦ ᐊᖏᒡᓕᒋᐊᕐᓂᐊᕐᓗᒋᑦ ᐃᖃᓗᐃᑦ ᐃᓂᖏᑦ?
- ᐃᓱᒪᒋᔭᖃᖅᐱᑦ ᓇᓕᑐᐃᓐᓇᖏᓐᓂᒃ ᐃᖃᓗᖕᓂᑦ?
- ᐃᓂᐅᔪᑦ ᐃᖃᓗᐃᑦ ᐃᓂᖏᑦ ᐅᑎᖅᑎᖅᑕᐅᔪᓇᐊᖃᖅᑐᑦ ᐅᕝᕙᓘᓐᓃᑦ ᐋᖅᑭᒋᐊᕐᓗᒋᑦ?

AGNICO EAGLE

ᓇᒧᙵᒐᐅᓴᕆᐊᖃᖅᐹᖓ ᐊᐱᖅᑯᑎᒃᓴᖃᕈᒪ, ᐃᓱᒫᓘᑎᖃᕈᒪ, ᐅᖃᐅᓯᒃᓴᖃᕈᒪ?

ᖃᒪᓂ'ᑐᐊᖅ: ᒥᐅᓇ ᓲᓴᓐ ᑖᐸᑕᐃ ᐊᒻᒪᓗ ᕿᐅᓇᓐ ᔩᑉ

ᒥᐃᕈ ᓲᓴᓐ ᓄᓇᓕᖕᒥᑦ ᑲᒪᔨᕆᔭᖏᑦ ᖃᒪᓂ'ᑐᐊᕐᒥᑦ.
ᕿᐅᓇᓐ ᔩᑉ ᕿᑦᑖᓕᕐᒧᑦ ᑲᒪᔨᕆᔭᖏᑦ.

ᐃᑲᔪᖅᑐᑦ ᐊᒃᓅᑯᒃᑯᓐᓂᑦ ᐱᐅᓯᕆᐊᖅᓯᓂᕐᒧᑦ ᑐᓴᐅᒪᑎᑦᑎᓕᓇᓂᕐᒥᒃ ᐊᒻᒪᓗ ᑐᑭᒧᐊᒃᑎᓇᓂᕐᒥᒃ ᖃᒪᓂ'ᑐᐊᕐᒥᑦ ᐊᒻᒪᓗ ᕿᑦᑖᓕᕐᒥᑦ ᐃᒪᓐᓇ:

- ᐱᔾᔪᑕᐅᔪᓂᒃ ᑲᒪᑉᐳᑎᒃ/ᐃᓱᒫᓘᑕᐅᔪᓂᒃ ᐱᓴᐅᔪᑦ ᐊᒻᒪᓗ ᑐᓴᖅᑎᑦᑎᔾᔪᑕᐅᔪᑦ ᐊᑐᖅᑕᐅᓴᕆᐊᓕᒃᑰᕐᓗᑎᒃ
- ᖃᓄᐃᓕᐅᕆᐊᖃᕐᓂᕐᒧᑦ ᐸᕐᓇᐅᑎᓕᐅᖃᑦᑕᖅᑐᑦ ᐱᓕᕆᐊᕆᓂᐊᕐᓗᒋᑦ ᐱᔾᔪᑕᐅᔪᑦ/ᐃᓱᒫᓘᑕᐅᔪᑦ
- ᑐᓴᖅᑎᑦᑎᑉᐳᑎᒃ ᓄᓇᓕᖕᒥᐅᓂᒃ ᖃᓄᐃᖓᓂᐅᔪᓂᑦ (ᖃᐅᔨᒋᐊᖃᑦᑕᕐᓂᖅ)

ᓇᒧᙵᓕᐅᔭᕆᐊᖃᖅᐳᖓ ᐊᐱᖅᑯᑎᒃᓴᖃᕈᒪ, ᐃᓱᒫᓘᑎᖃᕈᒪ, ᐅᖃᐅᓯᒃᓴᖃᕈᒪ?

ᐃᒡᓗᓕᒫᕐᔪᒃ: ᕌᓐᑎ ᐸᐃᑑ

ᕌᓐᑎ ᐸᐃᑑ ᓄᓇᓕᖕᒥᑦ ᑲᒪᔩᕆᔭᕗᑦ ᐃᒡᓗᓕᒫᕐᔪᖕᒥᑦ.

ᐃᑲᔪᖃᑦᑕᖅᑐᖅ ᐊᒡᓃᑯᒃᑯᓐᓂᑦ ᑐᓴᐅᒪᑎᑦᑎᓂᕐᒥᒃ ᐊᒻᒪᓗ ᑐᑭᓯᐊᒃᑎᓇᓂᕐᒥᒃ ᐃᒡᓗᓕᒫᕐᔪᖕᒥᑦ ᐃᒪᓐᓇ:

- ᐱᔾᔪᑕᐅᔪᓂᒃ ᑲᒪᑉᐳᑎᒃ/ᐃᓱᒫᓘᑕᐅᔪᓂᒃ ᐱᔭᐅᔪᑦ ᐊᒻᒪᓗ ᑐᓴᖅᑎᑦᑎᔾᔪᑕᐅᔪᑦ ᐊᑐᖅᑕᐅᔭᕆᐊᓕᒃᑰᕐᓗᑎᒃ
- ᖃᓄᐃᓕᐅᕆᐊᖃᕐᓂᕐᒧᑦ ᐸᕐᓇᐅᑎᓕᐅᖃᑦᑕᖅᑐᑦ ᐱᓕᕆᐊᕆᓂᐊᕐᓗᒋᑦ ᐱᔾᔪᑕᐅᔪᑦ/ᐃᓱᒫᓘᑕᐅᔪᑦ
- ᑐᓴᖅᑎᑦᑎᑉᐳᑎᒃ ᓄᓇᓕᖕᒥᐅᓂᒃ ᖃᓄᐃᖓᓂᐅᔪᓂᑦ (ᖃᐅᔨᒋᐊᖃᑦᑕᕐᓂᖅ)

ᓇᒧᙱᒐᐅᔭᓇᐊᖃᖅᐳᖓ ᐊᐱᖅᑯᑎᒃᓴᖃᕈᒪ, ᐃᓱᒫᓘᑎᖃᕈᒪ, ᐅᖃᐅᓯᒃᓴᖃᕈᒪ?

ᑕᐃᑲᑎ ᕿᑎᖅᓱᖅ, ᐱᓕᕆᐊᒥᒃ ᖃᐅᔨᒪᓂᕐᒥᒃ ᐊᒻᒪᓗ ᓂᕆᐦᓯᕆᔨ

ᑕᐃᑲᑎ ᐊᒡᓃᑯᒃᑯᓐᓂᒃ ᑭᒡᒐᖅᑐᐃᔨᖅ ᑎᑭᕋᕐᔪᐊᕐᒥᑦ.

ᐃᑲᔪᕐᒥᔪᑦ ᐱᑕᖃᙱᑦᑐᓂᒃ ᐊᑯᓂᖕᒋᓐᓂᑦ ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᑐᖃᖕᒋᑦ ᐊᒻᒪᓗ ᐱᓕᕆᐊᒥᒃ ᖃᐅᔨᒪᓂᐅᔪᓂᒃ ᑭᓲᓯᕐᒥᑦ ᐃᑲᔪᖃᑦᑕᖅᓗᓂ ᐱᓲᓯᐊᓂᕐᒧᑦ ᐅᑯᓂᙳᑦ:

- ᓄᓇᓯᖕᒥᑦ ᐆᒪᔪᓯᓇᕗᐋᒃᑯᑦ ᓂᕐᔪᑎᓂᒃ ᖃᐅᔨᒋᐊᖃᑦᑕᕐᓂᕐᒧᑦ ᐱᓕᕆᐊᓄᑦ ᐸᕐᓇᐅᑎᓂᒃ,
- ᓄᓇᓯᖕᒥᑦ ᐱᓕᕆᐊᓄᑦ ᐅᑉᐳᒥᒨᓯᖅᑐᐃᑉᐳᓂ,
- ᑲᒪᑉᐳᕆᑦ ᐳᒥᑦ-ᓯᓇᓂᐅᔪᑦ ᓄᓇᓯᖕᓂᑦ,
- ᐃᓚᓯᐅᑎᑉᐳᕆᑦ ᓄᓇᓯᖕᒥᑦ ᐃᓱᒫᓘᑕᐅᔪᑦ ᐱᓕᕆᐊᕐᒧᑦ ᐸᕐᓇᐃᓂᕐᒧᑦ

ᓇᒧᙵᐅᓇᔭᖅᐳᖓ ᐅᖃᐅᓯᖃᕈᒪᒍᒪ ᓱᓇᑐᐃᓐᓇᒥᒃ?

ᑐᓵᔪᒍᑦ - ᓱᓇᑐᐃᓐᓇᒥᒃ ᐅᖃᐅᓯᖃᕐᓂᒃ

Tusaajugut, the formal Nunavut Community Complaints System, addresses concerns from individuals and organizations in the Kivalliq region about environmental and wildlife issues, tendering and hiring processes, or any other aspects of Agnico Eagle's operations. Complaints are taken very seriously and dedicated staff will respond to you after reviewing and investigating the issue.

ᑐᓵᔪᒍᑦ, ᐊᑐᖅᑕᐅᔪᖅ ᓄᓇᕗᒥ ᓄᓇᓕᖕᓂᑦ ᐅᓐᓂᕐᓗᒍᑕᐅᔪᓄᑦ ᐋᖅᑭᒃᓯᒪᔪᖅ. ᐱᓕᕆᐊᖃᖅᑕᖅᑐᖅ ᐃᓅᓯᓗᑕᐅᔪᓂᒃ ᐃᓄᖕᓄᑦ ᑲᑐᔾᔨᖃᑎᒌᖕᓄᓪᓗ ᑭᕙᓪᓕᕐᒥᑦ ᐱᕐᔪᑎᖃᖅᑐᓂᒃ ᐊᕙᑎᒥᒃ ᐊᒻᒪᓗ ᓂᕐᔪᑎᓂᒃ, ᐱᓕᕆᐊᕐᒥᒃ ᐅᐸᒍᑎᓄᑦ ᐊᒻᒪᓗ ᐱᓕᕆᔾᔪᑎᖃᖅᑐᓂᐅᔪᓂᒃ, ᐅᖃᓪᓗᓐᓂᑦ ᓱᓇᑐᐃᓐᓇᐃᑦ ᐊᔾᔨᒌᑦ ᐊᓯᖏᓐᓂᑦ ᐊᐅᓚᓂᐊᕐᓂᖏᓐᓄᑦ. ᐅᓐᓂᕐᓗᒍᑕᐅᔪᑦ ᐱᒻᒪᕆᐅᔭᕆᔭᐅᔪᑦ ᑲᒪᒋᔭᐅᒐᒃᑕᖅᑐᑦ ᐊᒻᒪᓗ ᐱᓕᕆᔨᑦ ᑭᐅᔭᐅᓂᐊᖅᑐᑎᑦ ᕿᒥᕐᕈᔭᐅᓚᐅᖅᑎᓪᓗᒍ ᖃᐅᔨᓴᖅᑕᐅᒐᓚᐅᕐᓗ ᐱᔪᑕᐅᔪᖅ.

Talk to us. We're listening at:
ᐅᖃᓪᓚᖃᑎᒋᑦᑎᒍᑦ. ᑐᓵᔪᒍᑦ ᐅᕙᓂ:

tusaajugut@agnicoeagle.com
www.aemnunavut.ca/tusaajugut
1-844-323-3002
P.O Box 879, Rankin Inlet, NU X0C 0G0
ᑎᑎᖅᑲᐅᓯᐅᕝᕕᐊ 879, ᑲᖏᖅᖠᓂᖅ, ᓄᓇᕗᑦ X0C 0G0

AGNICO EAGLE

WHALE TAIL PIT PROJECT EXPANSION COMMUNITY CONSULTATION

Baker Lake and Chesterfield Inlet

March 2019

AGENDA

WHALE TAIL PIT EXPANSION

Today's objectives:

- Project overview
  - Whale Tail Pit and next phase of development
  - Comparison of Water Management Alternatives
  - Preferred Water Management Alternative
  - Fisheries Compensation
- Opportunity to hear your comments and feedback

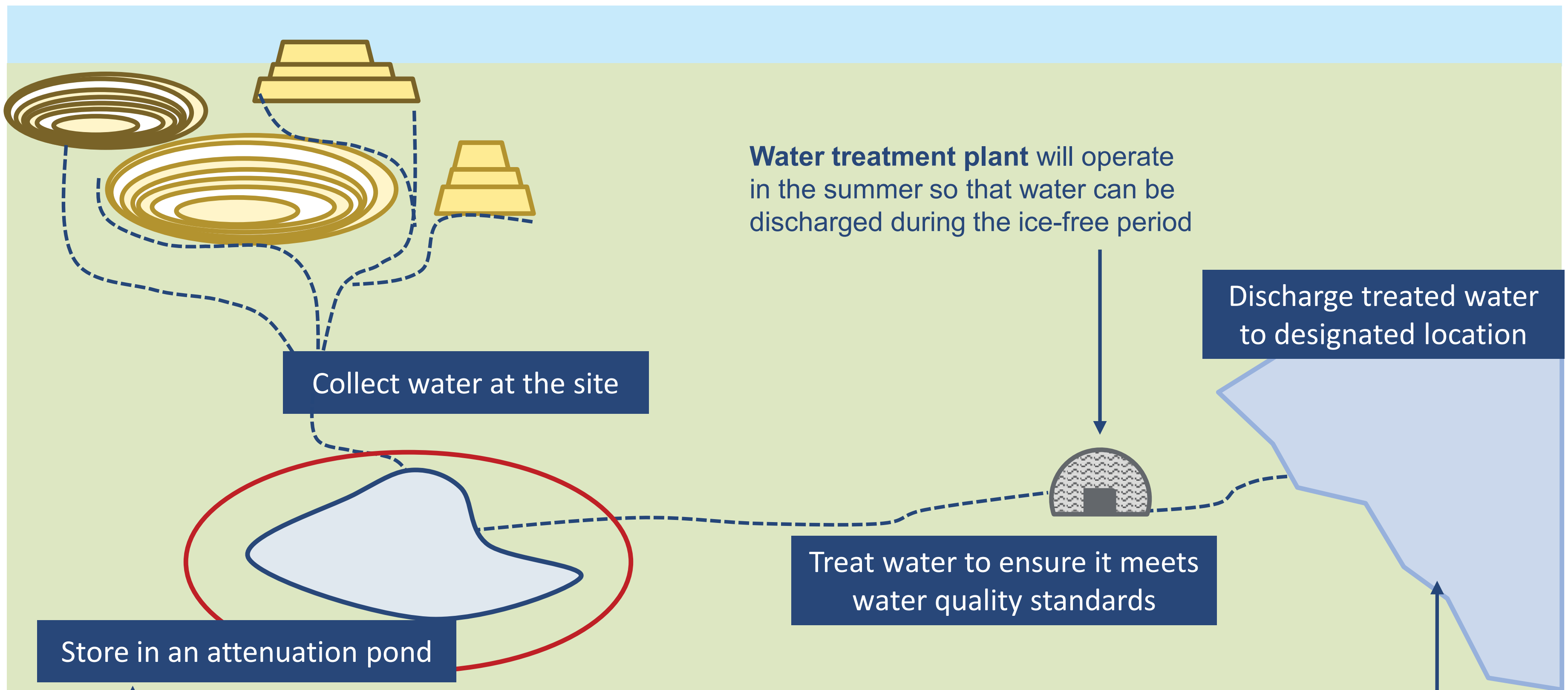
Whale Tail Pit Project Expansion

Water Management

What are our options to store water over winter?

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

GENERAL APPROACH



Attenuation pond is a place to store water before it can be treated and discharged.

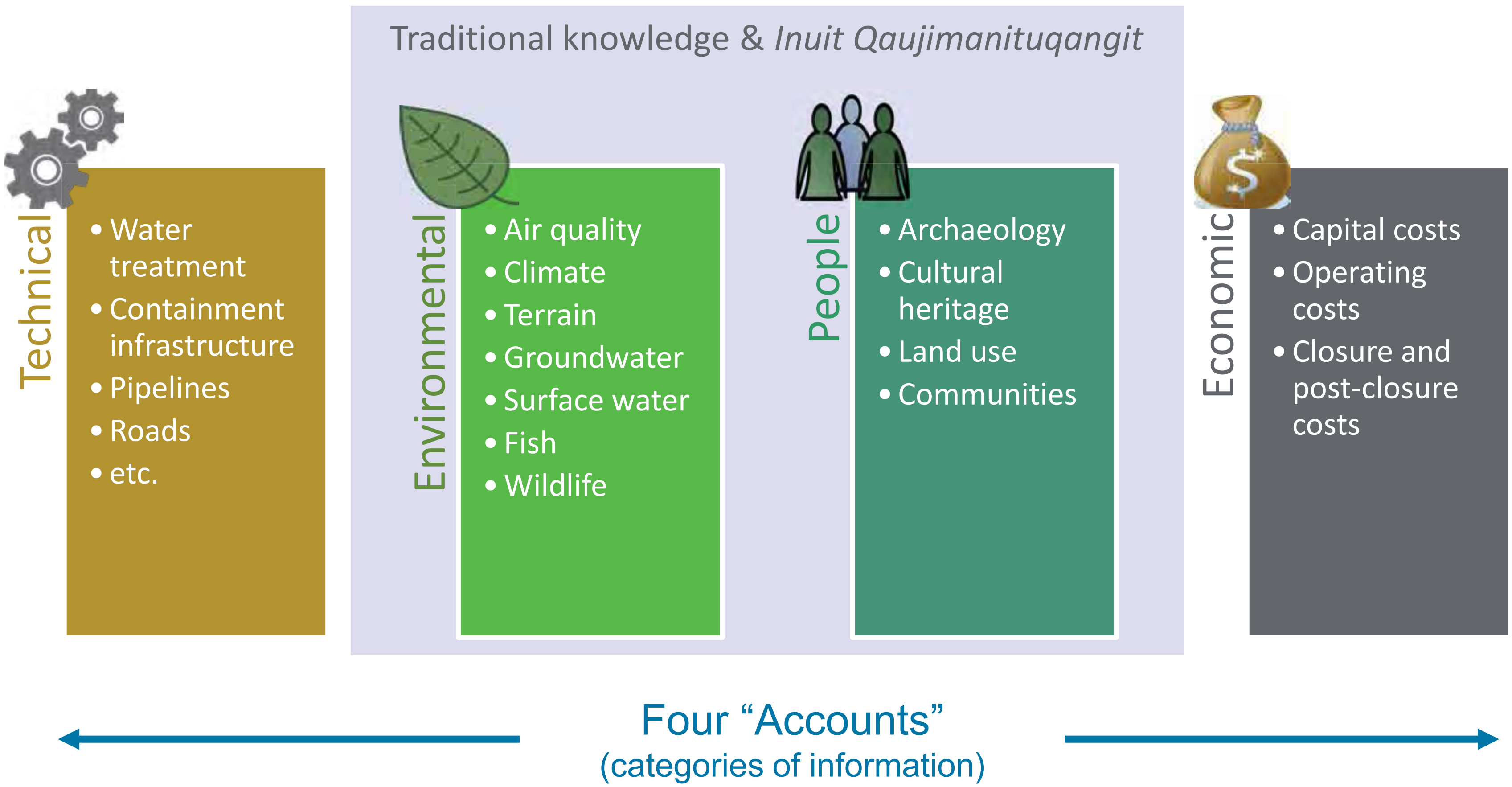
Treated water will be released only when it meets water quality standards

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

COMPARE AND CONTRAST

AGNICO EAGLE

How do we compare the alternatives?



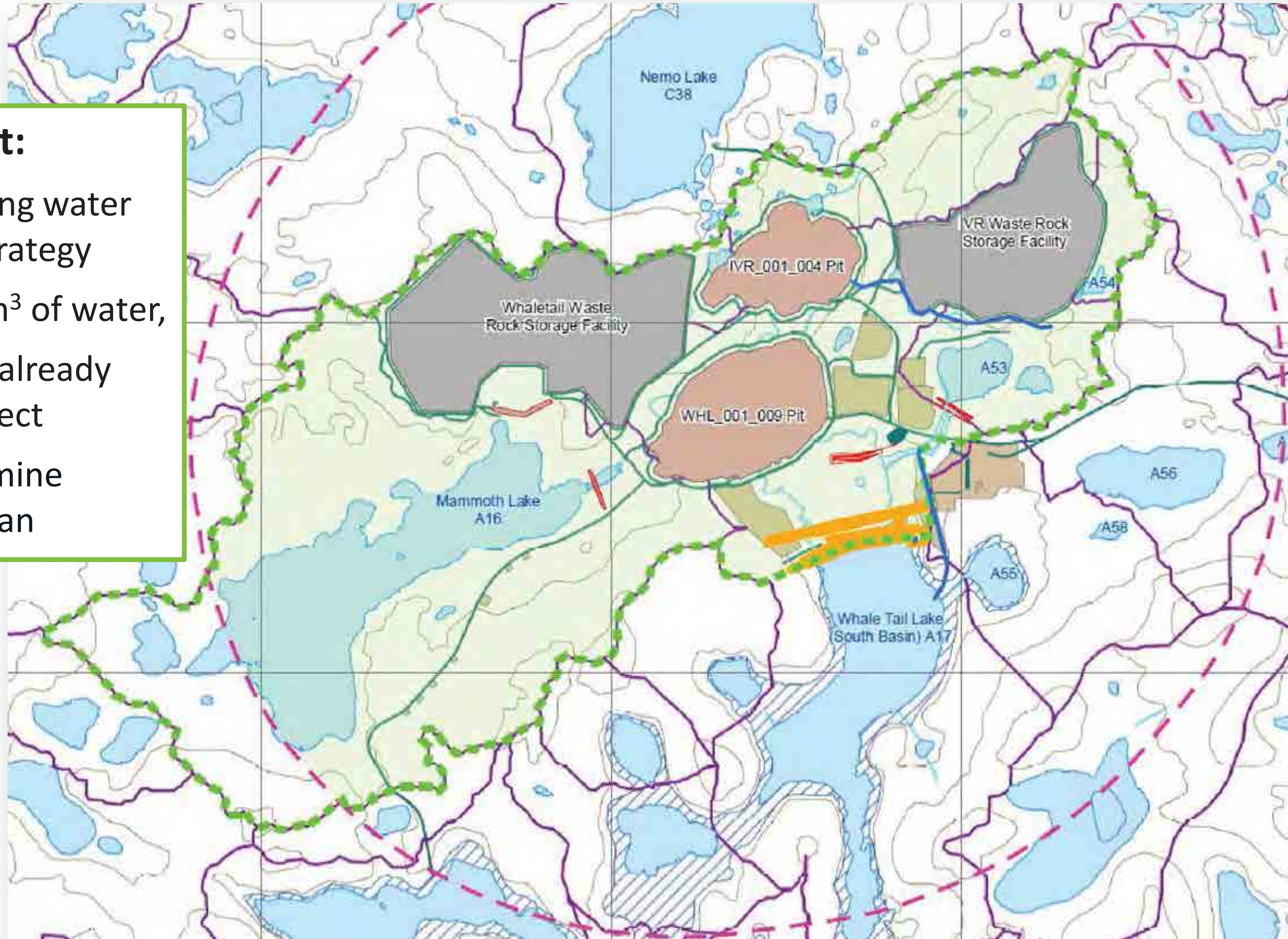
WATER MANAGEMENT ALTERNATIVES ASSESSMENT

IDENTIFYING THE ALTERNATIVES

Thresholds

Alternatives must:

- Align with existing water management strategy
- Store 750,000 m³ of water,
- Located in area already affected by Project
- Not contradict mine development plan

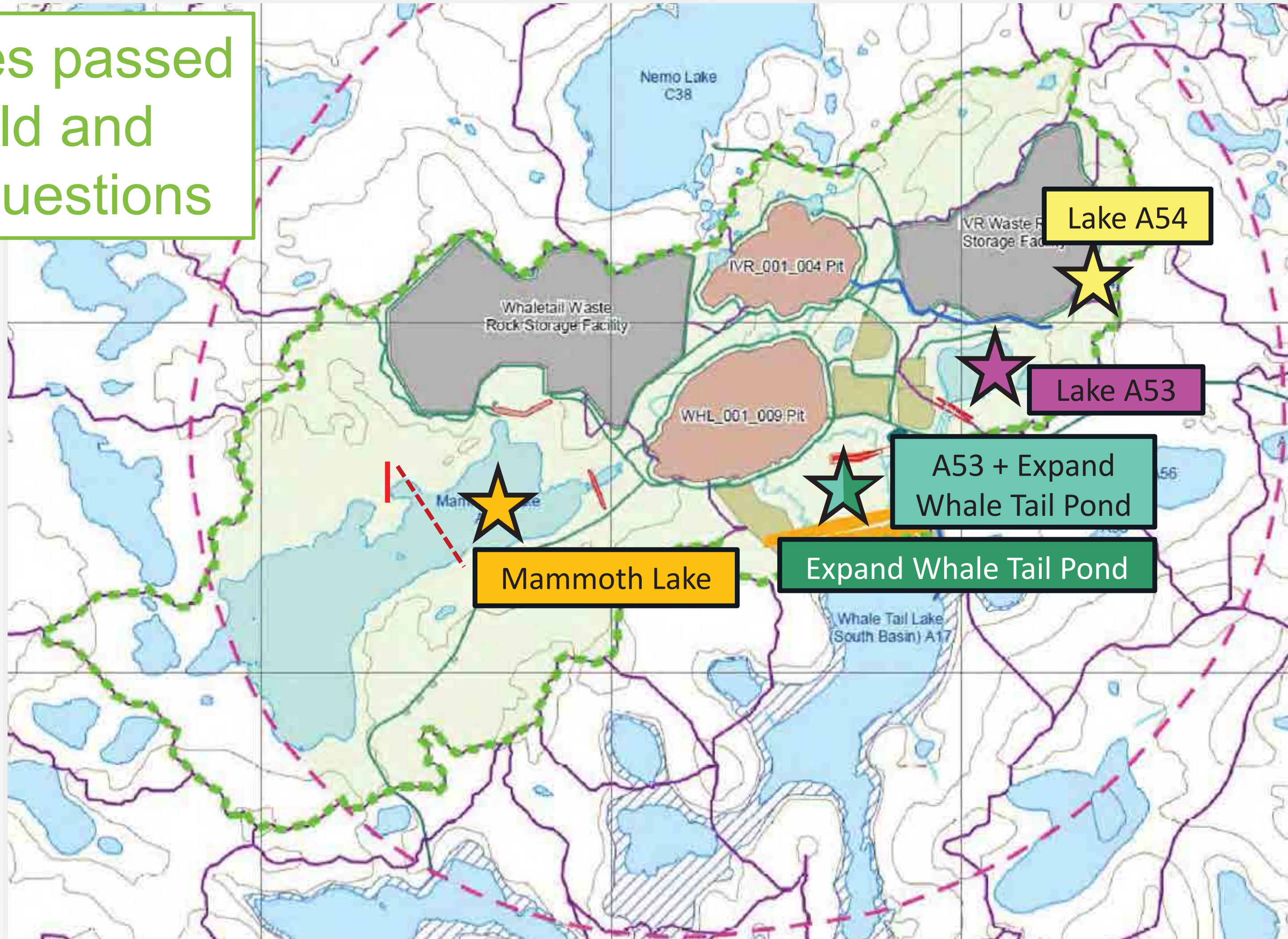


WATER MANAGEMENT ALTERNATIVES ASSESSMENT

IDENTIFYING THE ALTERNATIVES

AGNICO EAGLE

5 alternatives passed the Threshold and Screening questions

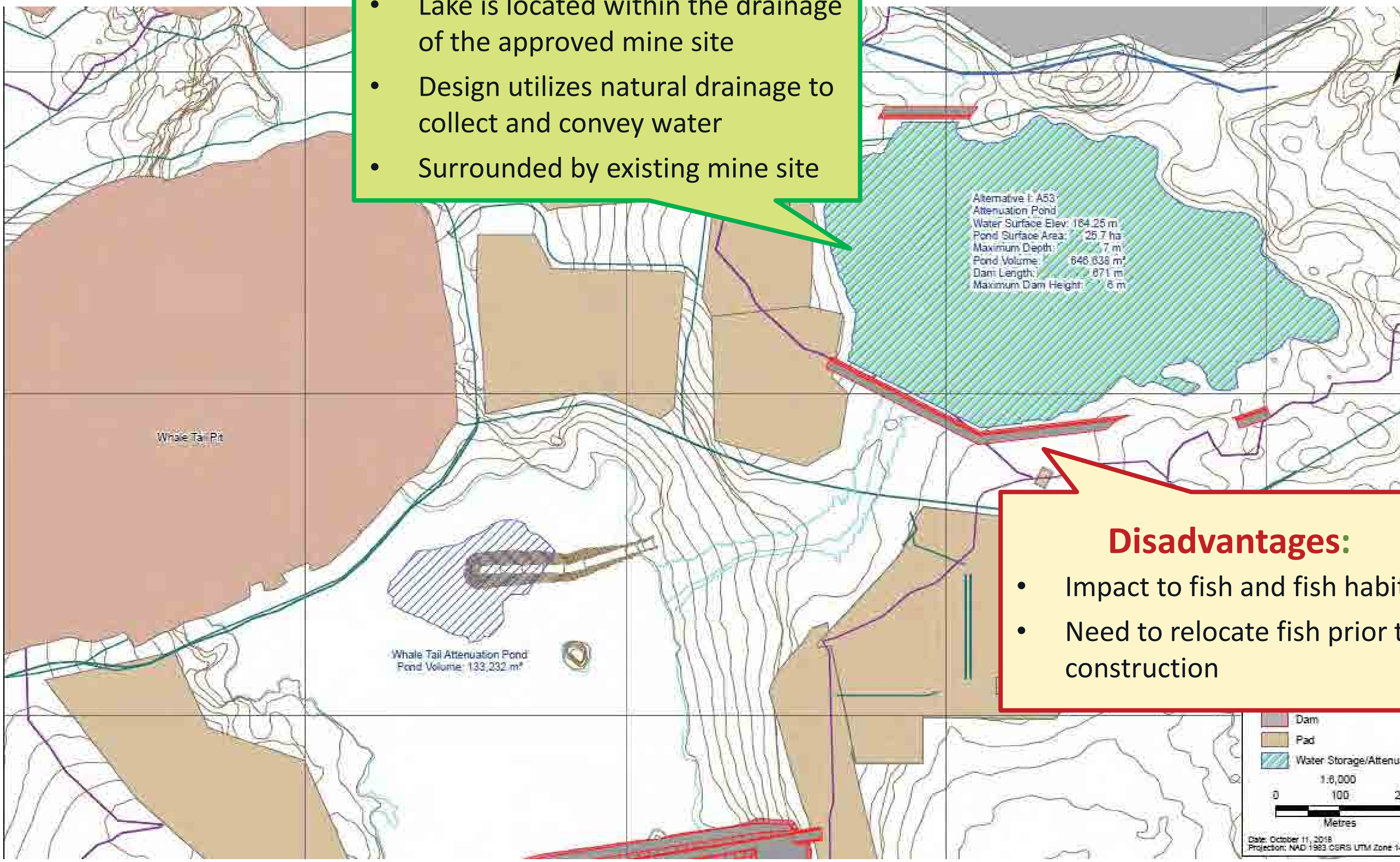


LAKE A53

AGNICO EAGLE

Advantages:

- Lake is located within the drainage of the approved mine site
- Design utilizes natural drainage to collect and convey water
- Surrounded by existing mine site



Disadvantages:

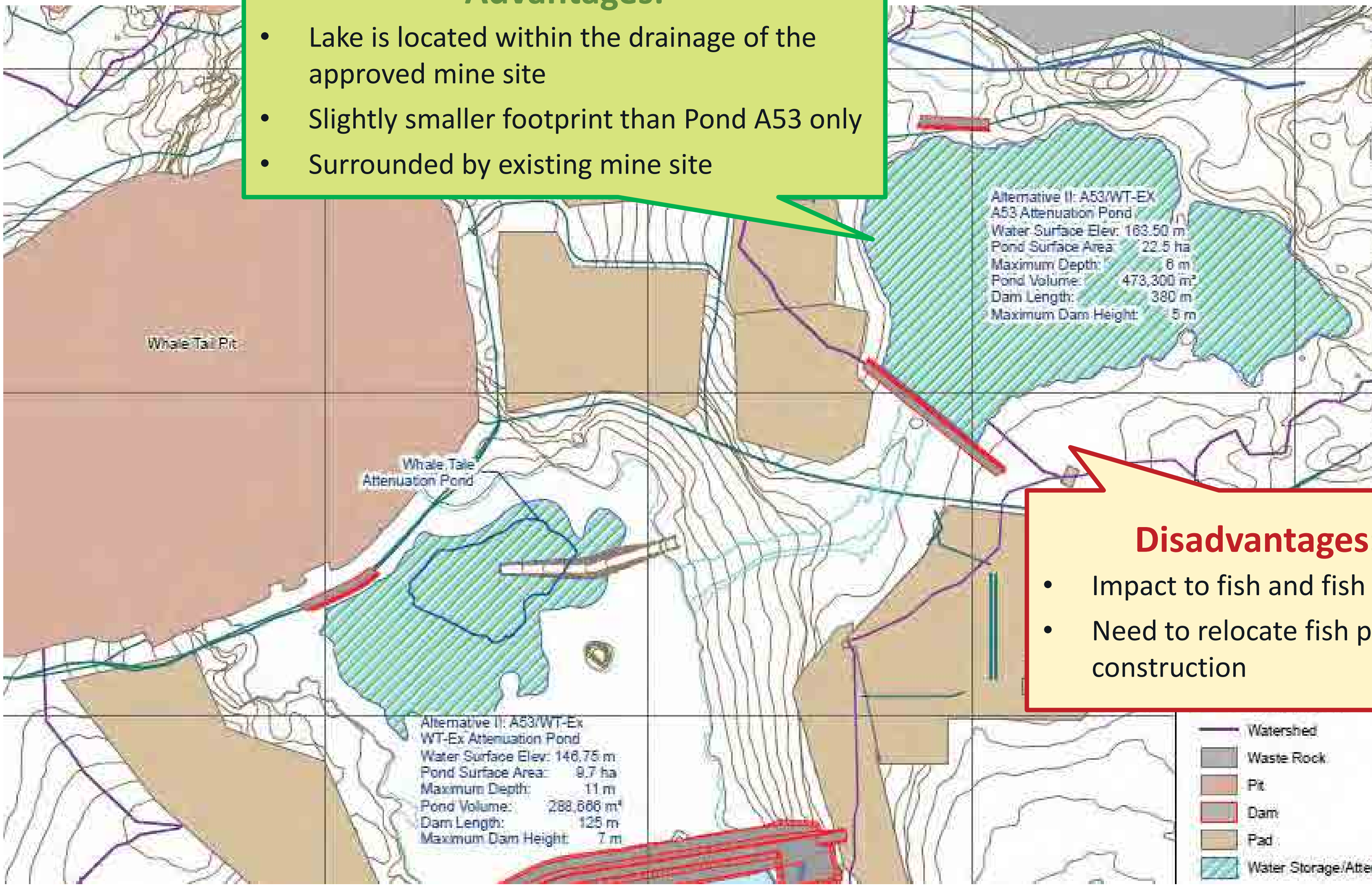
- Impact to fish and fish habitat
- Need to relocate fish prior to construction

LAKE A53 PLUS EXPAND WHALE TAIL ATTENUATION POND

AGNICO EAGLE

Advantages:

- Lake is located within the drainage of the approved mine site
- Slightly smaller footprint than Pond A53 only
- Surrounded by existing mine site

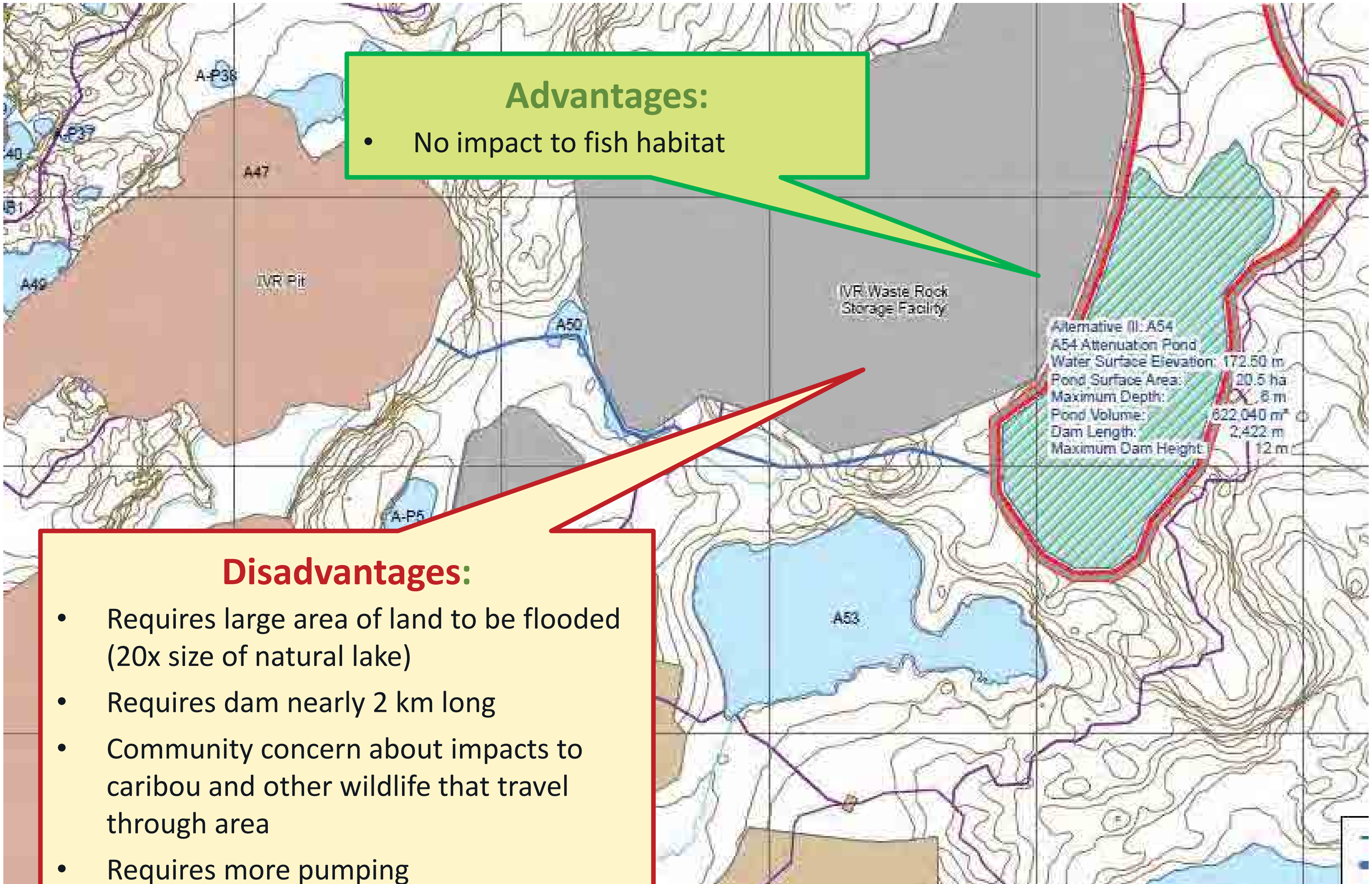


Disadvantages:

- Impact to fish and fish habitat
- Need to relocate fish prior to construction

LAKE A54

AGNICO EAGLE



Advantages:

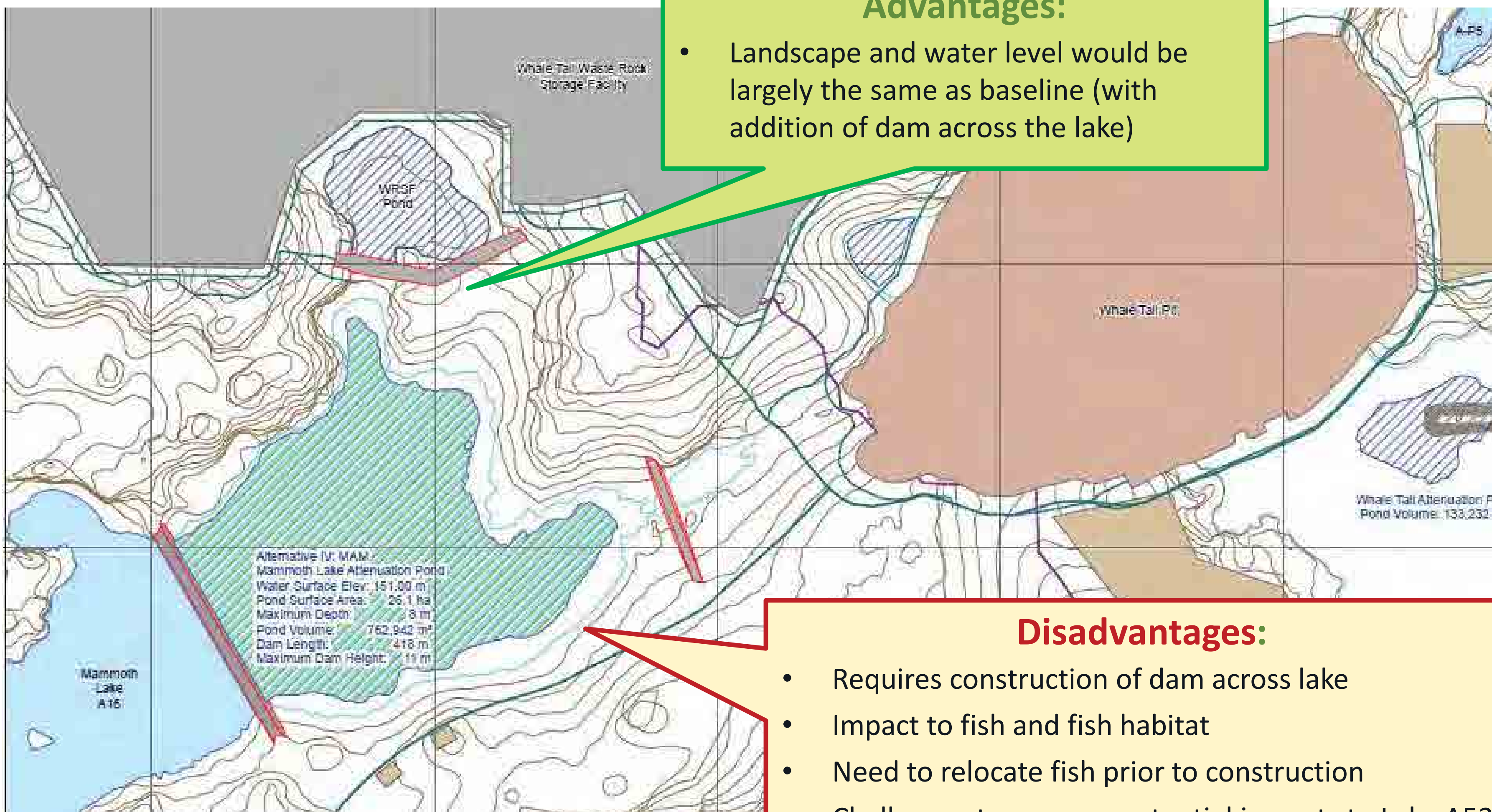
- No impact to fish habitat

Disadvantages:

- Requires large area of land to be flooded (20x size of natural lake)
- Requires dam nearly 2 km long
- Community concern about impacts to caribou and other wildlife that travel through area
- Requires more pumping
- Challenges to manage potential impacts to Lake A53

MAMMOTH LAKE

AGNICO EAGLE



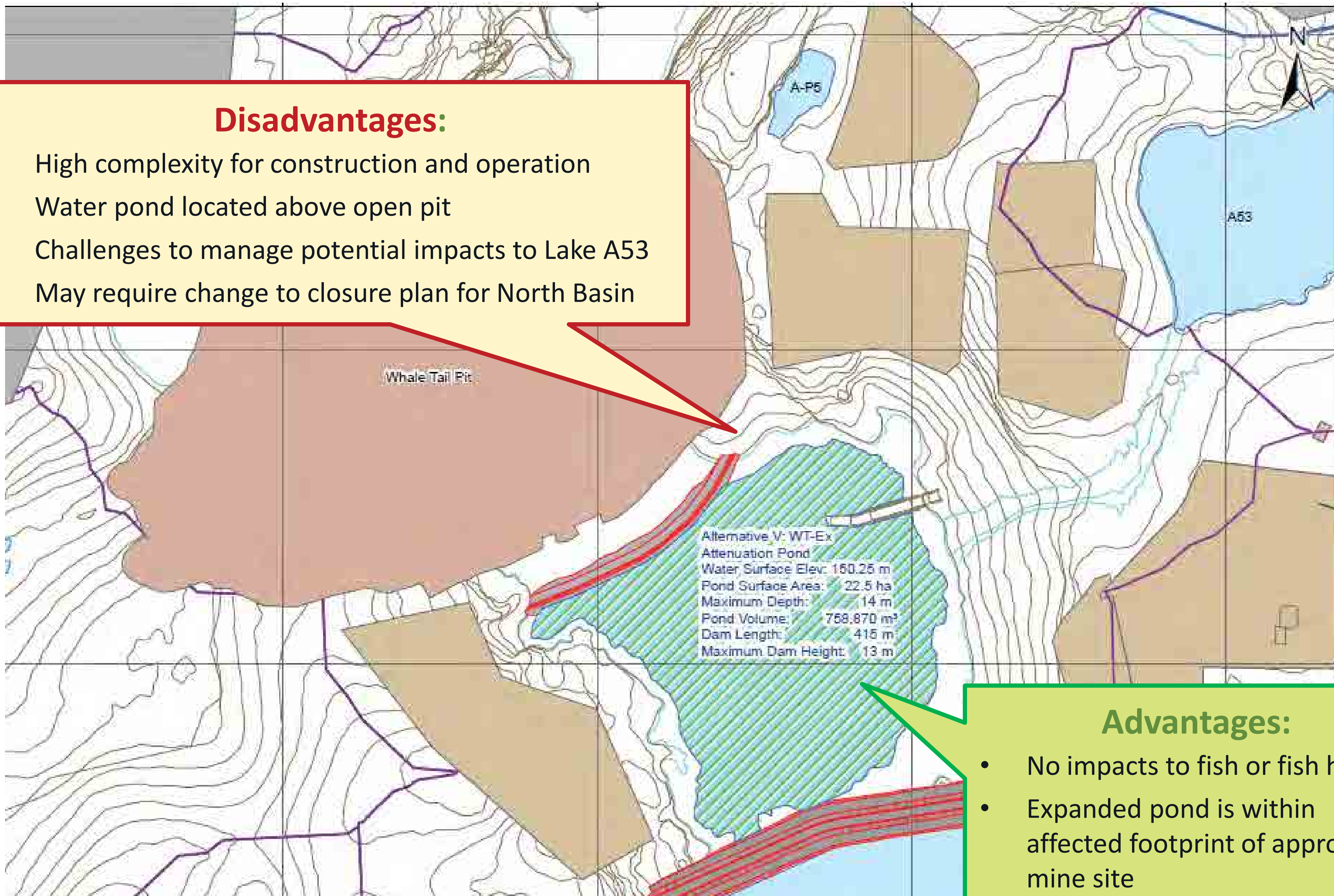
Advantages:

- Landscape and water level would be largely the same as baseline (with addition of dam across the lake)

Disadvantages:

- Requires construction of dam across lake
- Impact to fish and fish habitat
- Need to relocate fish prior to construction
- Challenges to manage potential impacts to Lake A53
- Complex construction and operation

EXPAND WHALE TAIL ATTENUATION POND



Disadvantages:

- High complexity for construction and operation
- Water pond located above open pit
- Challenges to manage potential impacts to Lake A53
- May require change to closure plan for North Basin

Advantages:

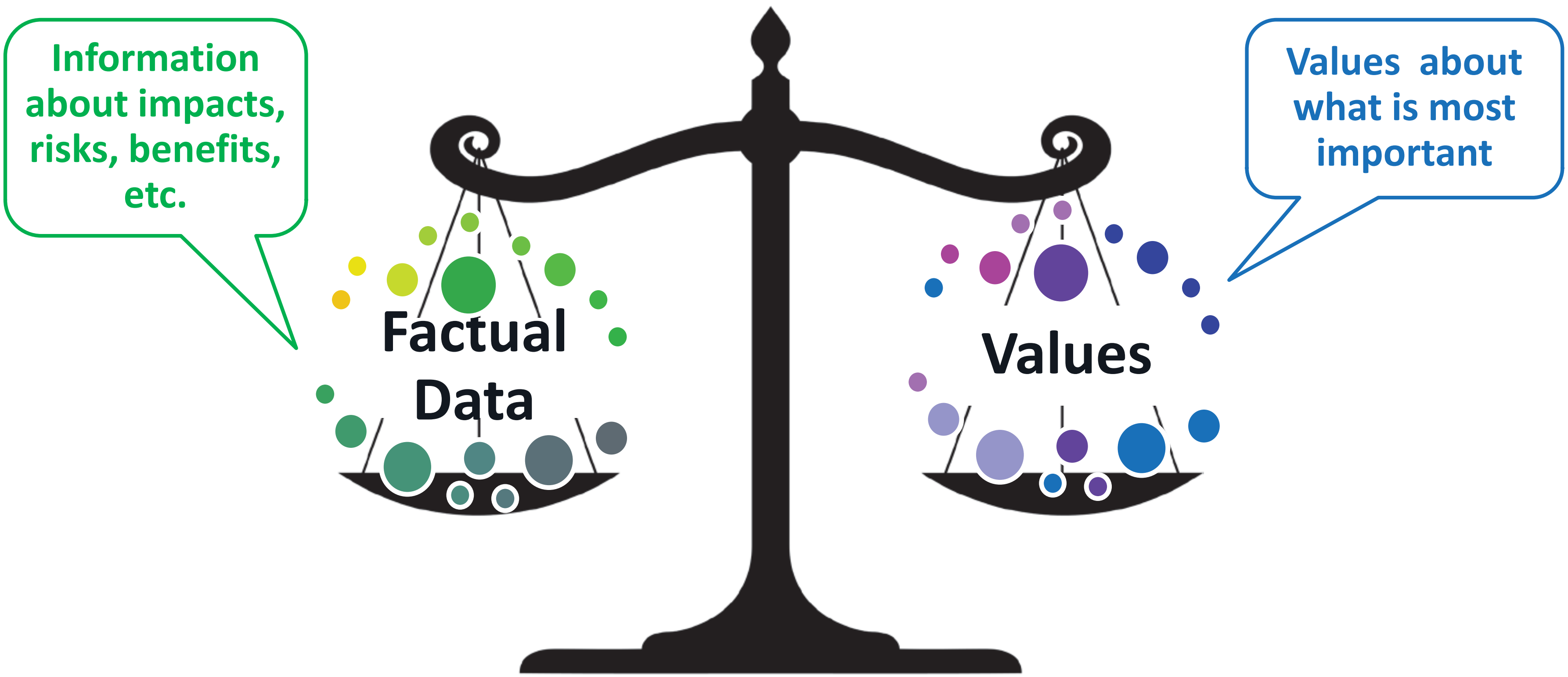
- No impacts to fish or fish habitat
- Expanded pond is within affected footprint of approved mine site

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

COMPARING THE ALTERNATIVES

How do we choose the preferred alternative?

- Environment Canada recommends a tool called **Multiple Accounts Analysis**
  - Acknowledges that not all factors carry the same weight when making a decision
  - Different people may value somethings more than others



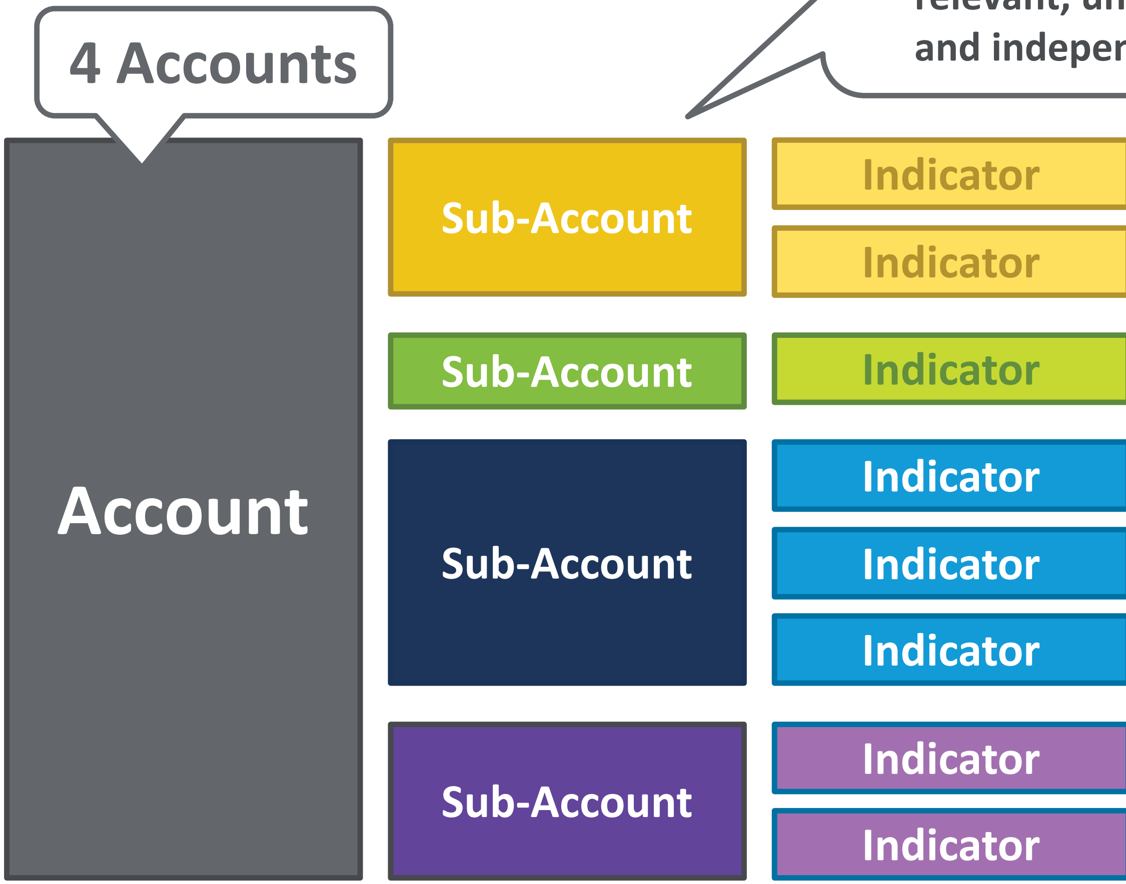
WATER MANAGEMENT ALTERNATIVES ASSESSMENT

AGNICO EAGLE

FOUNDATION FOR ASSESSMENT

"Evaluation Criteria"

- Should be differentiating, impact driven, relevant, unambiguous, non-redundant, and independent



"Measurement Criteria"

- Quantitative and qualitative
- Define parameters/units
- Six-point value scales

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

AGNICO EAGLE

Account	Sub-Accounts	Indicators
Technical Account	Containment Infrastructure	Maximum dam height
		Length of dam(s)
		Pond surface area
		Type of dam and foundation
	Ancillary Infrastructure	Length of pipeline
		Additional pumps
		Surface water management infrastructure
		Seepage collection infrastructure
	Technical Complexity	Design complexity
		Construction complexity
		Operational complexity
		Closure complexity
		Post-closure complexity
	Consequences of Failure	Consequence of overtopping
		Consequence of dam failure

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

AGNICO EAGLE

Biophysical Environment Account

Surface Water	Loss of natural waterbodies
	Ability to manage surface water quality impacts external to the attenuation pond

Fish and Aquatic Habitat	Number of fish-bearing waterbodies
	Diversity of affected fish community
	Extent of fish habitat loss
	Abundance of affected fish community

Terrestrial Habitat	Terrestrial habitat loss

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

AGNICO EAGLE

Human Environment Account

Inuit Land Use	Loss of waterbody used for fishing
	Relocation of fish
	Disruption of landscape (operations)
	Loss of waterbody used for fishing

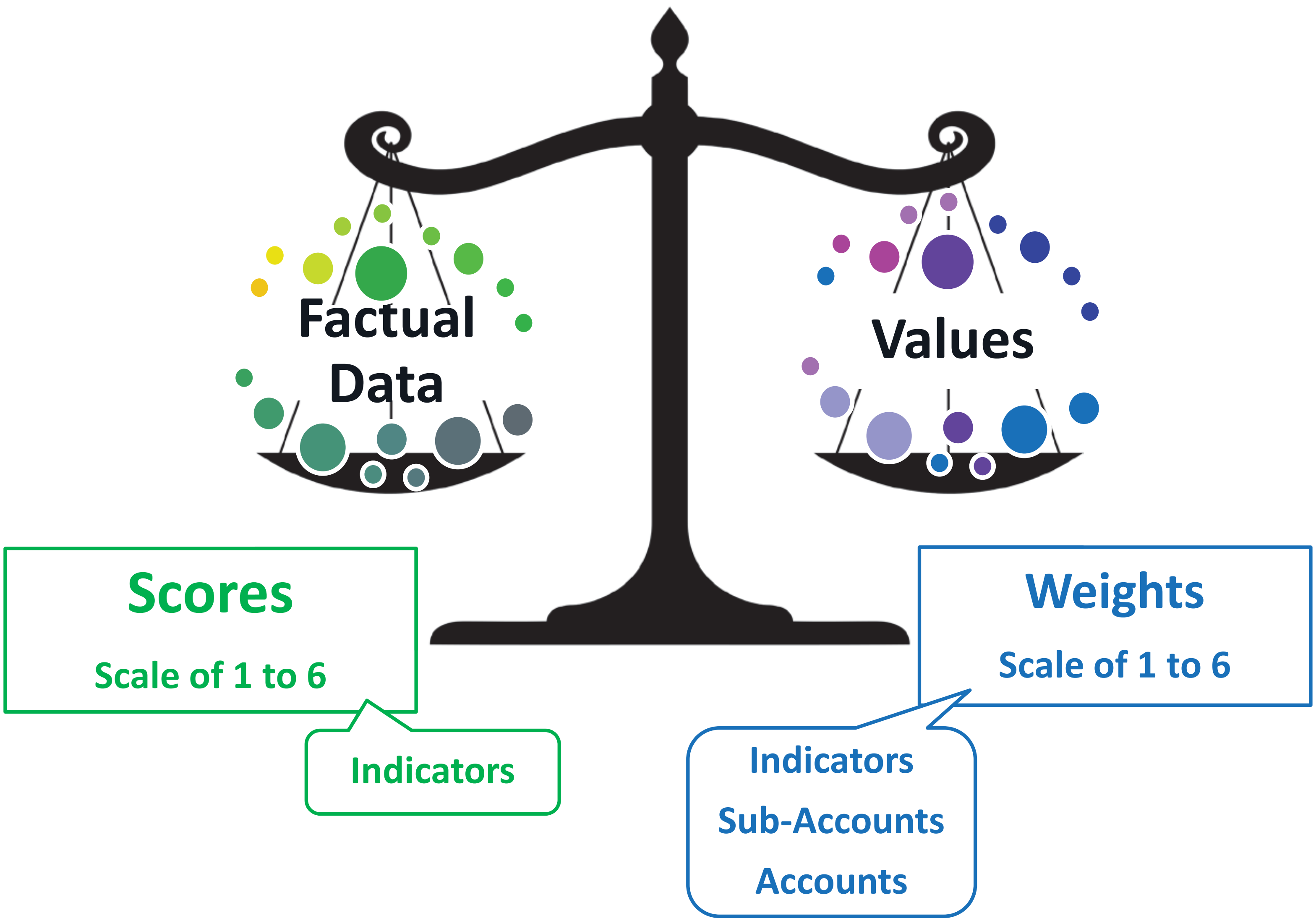
Workforce	Worker well-being

Project Economics Account

Attenuation Pond Costs	Capital costs
	Fish habitat offsetting costs
	Operating / sustaining costs
	Closure and reclamation costs
	Long-term post-closure costs

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

COMPARING THE ALTERNATIVES



WATER MANAGEMENT ALTERNATIVES ASSESSMENT

COMMUNITY FEEDBACK

Presented alternatives in July 2018 to get feedback from people in Baker Lake and Chesterfield Inlet

The community input helped us understand what factors are more or less important and we included that information in our decision making

July 2018

- **Community meetings** in Baker Lake and Chesterfield Inlet
- **Small group meetings** with Women, Youth and Elders
- Also met with Hamlets, HTOs, and KIA

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

COMMUNITY FEEDBACK

What we heard:

- Concern about **potential impacts of large structures** such as dams
  - How will they affect caribou and other animals moving across the land?
- Should **avoid impacts to fish and fish habitat** if possible
- **Avoid relocating fish** if possible
- Support for use of an area or lake that is **already affected by the mine**, rather than one that would otherwise be less affected
- Considered **Mammoth Lake** alternative unfavourable due to impacts to a large fish-bearing lake

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

RESULTS

Overall Results

Alternative	Merit Rating
Lake A53	4.21 ★
Lake A53 plus Whale Tail Pond Expansion	3.39
Lake A54	3.59
Mammoth Lake	3.30
Whale Tail Pond Expansion	3.85

★ Higher rating = Preferred

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

RESULTS

AGNICO EAGLE

Results by Account

Alternative	Technical	Biophysical Environment	Human Environment	Project Economics
Lake A53	4.53	3.99	4.54	3.80
Lake A53 plus Whale Tail Pond Expansion	2.62	3.99	2.94	3.40
Lake A54	2.69	3.27	5.31	3.20
Mammoth Lake	2.50	3.40	4.03	3.00
Whale Tail Pond Expansion	2.18	4.67	4.00	3.60

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

PREFERRED ALTERNATIVE

Preferred Alternative: Lake A53

- ✓ Highest or second-highest rated alternative across all scenarios
- ✓ Relatively small footprint, reduced need for surface water management infrastructure
- ✓ Uses natural drainage to collect water
- ✓ Reduced risk of dam failure or overtopping

- Lake A53 does contain fish, but also has advantages over the other alternatives

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

AGNICO EAGLE

PREFERRED ALTERNATIVE

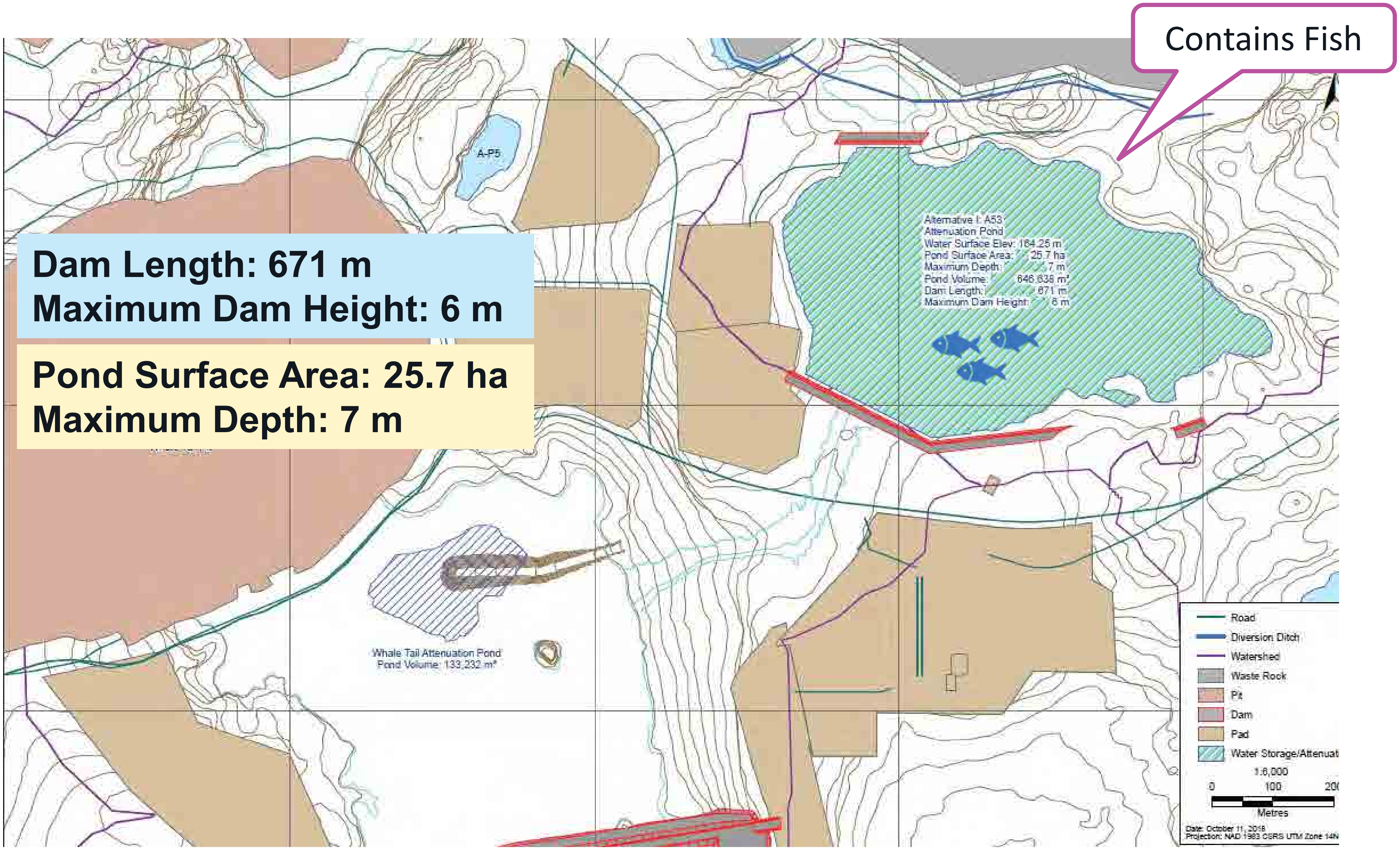
Incorporation of community feedback:

- Relatively small containment dams required
  - Fewer potential impact on landscape and wildlife movement
- Reduced risk of dam failure or overtopping.
- Uses area already affected by mine
  - Surrounded on 3 sides by the mine site
- Does not affect the larger Mammoth Lake
  - Fewer fish in Lake A53 compared to Mammoth Lake
- Small ponds like Lake A53 are not often used for fishing
- Although there were two other alternatives that would not affect fish, these had significant disadvantages
  - Large dams required
  - Structural and safety challenges

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

AGNICO EAGLE

PREFERRED ALTERNATIVE: LAKE A53



Conceptual illustration only

WATER MANAGEMENT ALTERNATIVES ASSESSMENT

LAKE A53: BOTH BASINS

AGNICO EAGLE

Questions?

Do you have any feedback about how we compared the alternatives, or the results?

AGNICO EAGLE

Fish Habitat Compensation

➚ What are the different ways we can offset loss of fish habitat?

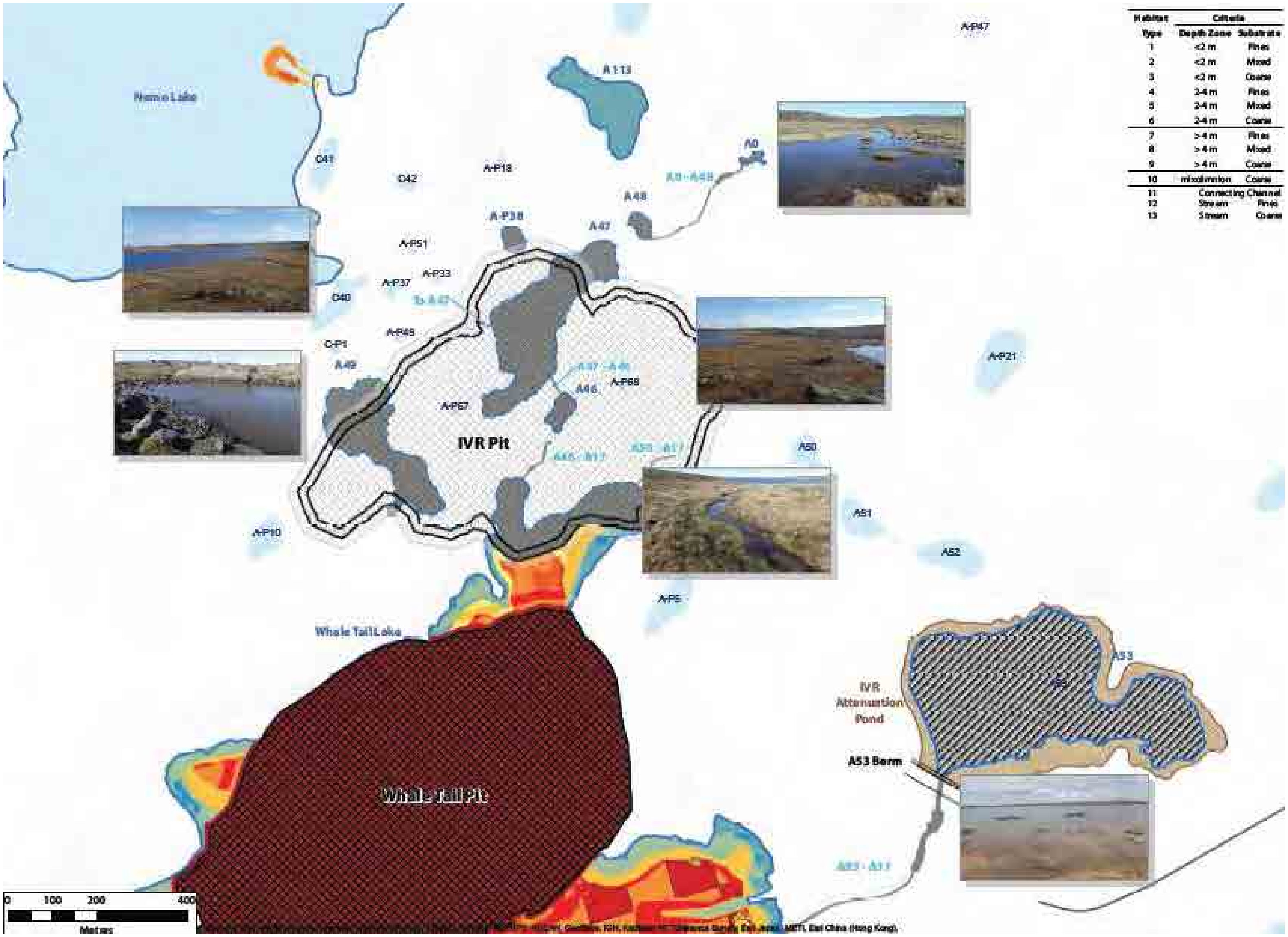
FISH SPECIES FOUND IN THE WHALE TAIL PROJECT AREA

AGNICO EAGLE

LOSS OF FISH HABITAT

FROM THE WHALE TAIL PIT PROJECT EXPANSION

AGNICO EAGLE



Habitat Type	Criteria: Depth Zone	Criteria: Substrate
1	<2 m	Fines
2	<2 m	Mixed
3	<2 m	Coarse
4	2-4 m	Fines
5	2-4 m	Mixed
6	2-4 m	Coarse
7	>4 m	Fines
8	>4 m	Mixed
9	>4 m	Coarse
10	mixolimnion	Coarse
11	Connecting Channel	
12	Stream	Fines
13	Stream	Coarse

FISHERIES COMPENSATION

WHAT IS COMPENSATION?

- **Habitat compensation** counter-balances project impacts to fish and fish habitat
- If fish habitat is lost or altered, need to **enhance** or **create** new habitat so that numbers of fish don't decline
- Want to compensate for <u>more</u> than what has been affected

Whale Tail Pit Expansion Project

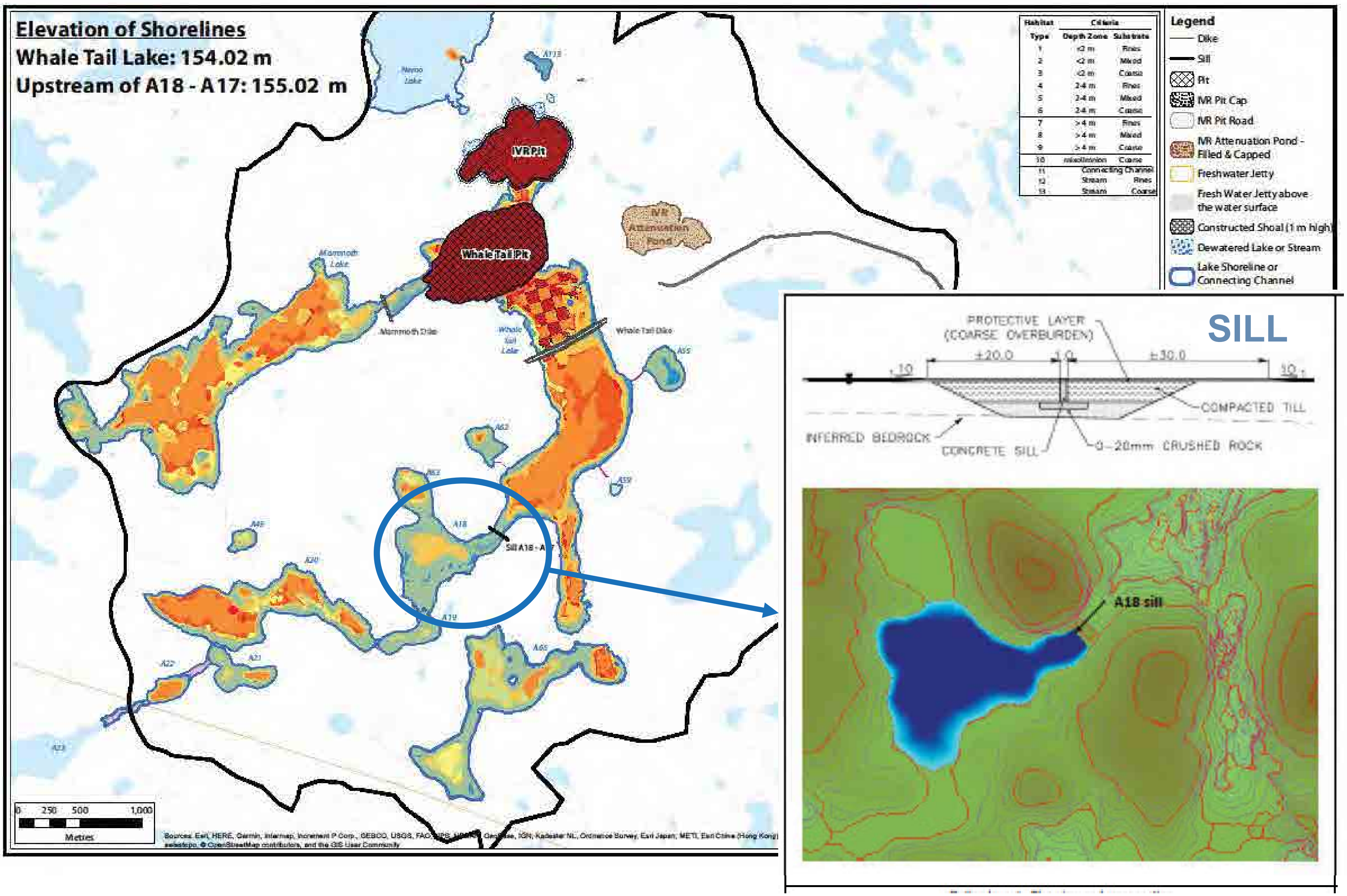
- Total **~27 hectares** of fish habitat will be lost
- 10.4 Habitat Units

Habitat Lost or Altered

Habitat Compensation

FISH COMPENSATION

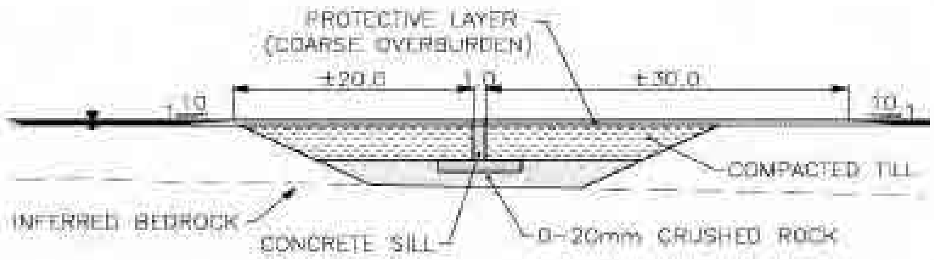
HABITAT CREATION THROUGH FLOODED AREAS



Habitat Type	Criteria: Depth Zone	Criteria: Substrate
1	<2 m	Fines
2	<2 m	Mixed
3	<2 m	Coarse
4	2-4 m	Fines
5	2-4 m	Mixed
6	2-4 m	Coarse
7	>4 m	Fines
8	>4 m	Mixed
9	>4 m	Coarse
10	[illegible]	Coarse
11	Connecting Channel	
12	Stream	Fines
13	Stream	Coarse

FISH COMPENSATION

HABITAT ENHANCEMENT THROUGH CHANNEL CONNECTION



FISH COMPENSATION

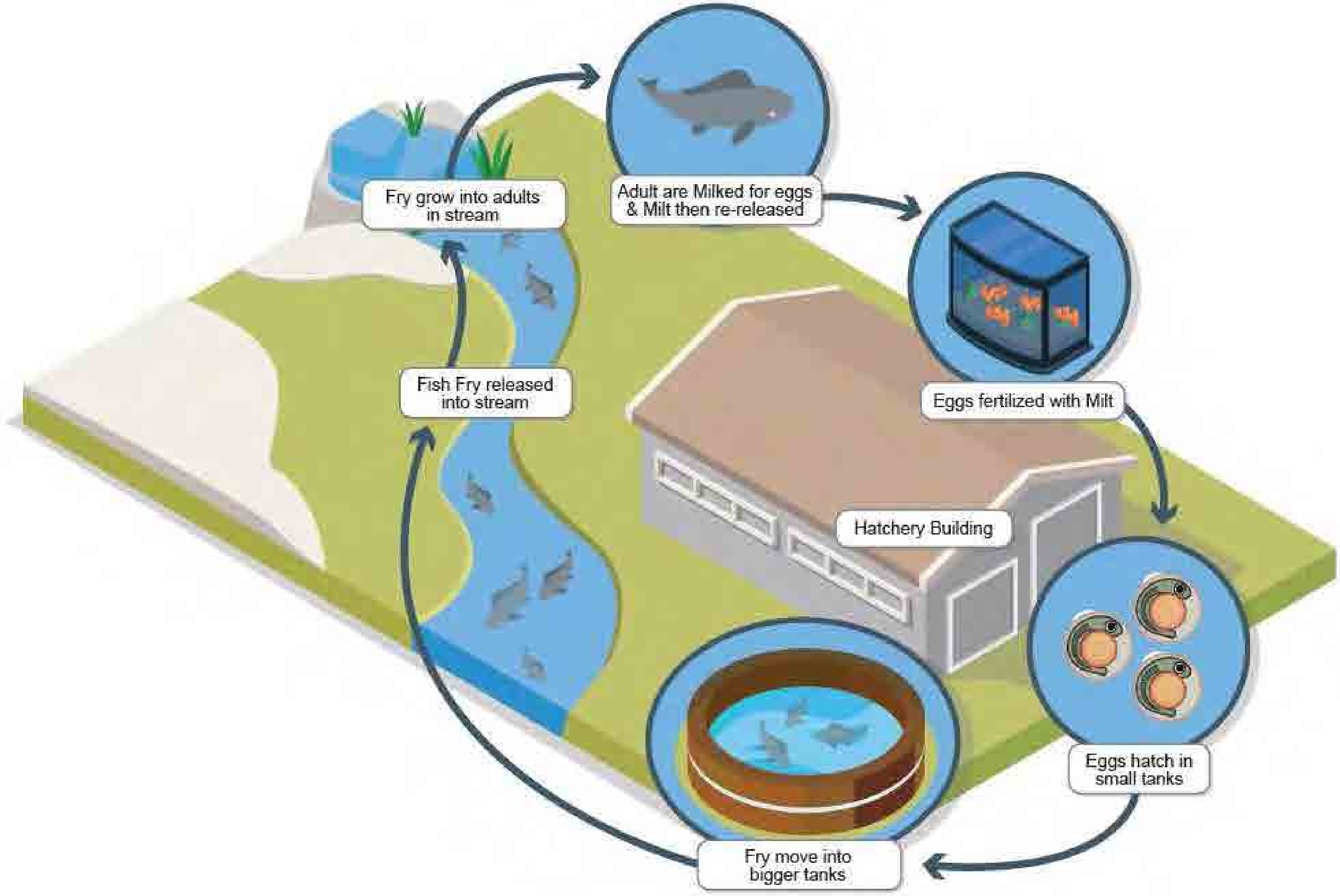
HABITAT ENHANCEMENT THROUGH SPAWNING PADS

FISH COMPENSATION

CULVERT IMPROVEMENTS

FISH COMPENSATION

FISH HATCHERY - RESEARCH ON A SMALL-SCALE PROOF OF CONCEPT FOR ARCTIC CHAR



FISH HABITAT COMPENSATION

- Field work will continue in 2019 to look at compensation options

- Do you have any more ideas for increasing fish habitat?
- Focus on any particular species?
- Areas of fish habitat that need restoration or improvement?

WHERE TO GO IF I HAVE QUESTION, CONCERN, COMMENT?

BAKER LAKE: MARY SUSAN TAPATAI & KAREN YIP

Mary Susan is our Community Liaison Officer in Baker Lake.
Karen Yip is our Kivalliq Community Liaison Coordinator.

They are helping AEM improve communication & coordination in Baker Lake and across the Kivalliq by;

- Ensuring issues/concerns are captured & communicated through the proper channels
- Creating action plans to address issues/concerns
- Communicating results to community members (follow up)

WHERE TO GO IF I HAVE QUESTION, CONCERN, COMMENT?

CHESTERFIELD INLET: RANDY BOITEAU

Randy Boiteau is our Community Liaison Officer in Chesterfield Inlet.

He is responsible for helping AEM improve communication & coordination in Chesterfield Inlet by;

- Ensuring issues/concerns are captured & communicated through the proper channels
- Creating action plans to address issues/concerns
- Communicating results to community members (follow up)

WHERE TO GO IF I HAVE QUESTION, CONCERN, COMMENT?

DAVID KRITTERDLIK, TK & WILDLIFE COORDINATOR

David is our Agnico Eagle representative in Whale Cove.

He is also helping us bridge the gap between IQ & Technical Knowledge across the kivalliq by helping to develop;

- Community Based HTO Wildlife Monitor Workplans,
- Community Project updates,
- Leading Permitting process in the communities,
- Incorporating community concerns into project planning

WHERE TO GO IF I HAVE A COMPLAINT?

TUSAAJUGUT – FORMAL COMPLAINTS

Tusaajugut, the formal Nunavut Community Complaints System, addresses concerns from individuals and organizations in the Kivalliq region about environmental and wildlife issues, tendering and hiring processes, or any other aspects of Agnico Eagle's operations. Complaints are taken very seriously and dedicated staff will respond to you after reviewing and investigating the issue.

ᑐᓴᔪᒍᑦ, ᐊᑐᖅᑕᐅᔪᖅ ᓄᓇᕗᒻᒥ ᓄᓇᓕᖕᓂᑦ ᐅᓐᓂᕐᓗᒍᑕᐅᔪᓄᑦ ᐋᖅᑭᐅᒪᔪᖅ, ᐱᓕᕆᐊᖃᖃᑦᑕᖅᑐᖅ ᐃᓅᓗᑕᐅᔪᓂᒃ ᐃᓘᓐᓇᑦ ᑲᑐᔾᔨᖃᑎᒌᓂᓪᓗ ᑭᕙᓪᓕᕐᒥᑦ ᐱᔭᕇᖃᑦᑐᓂᒃ ᐊᕙᑎᒥᒃ ᐊᒻᒪᓗ ᓂᕐᔪᑎᓂᒃ, ᐱᓕᕆᐊᕐᒥᒃ ᐆᑦᑐᕆᓂᑦ ᐊᒻᒪᓗ ᐱᓕᕆᐊᒃᑕᖅᑐᓂᒃᓴᐅᔪᓂᒃ, ᐅᖃᐅᓯᖅᓂᑦ ᓯᓇᑐᐃᓐᓇᐃᑦ ᐊᓯᖏᑦ ᐊᓐᓂᖅᓂᑦ ᐊᐅᓚᑦᓯᓂᕆᔭᕆᓪᓂᑦ. ᐅᓐᓂᕐᓗᑕᐅᔪᑦ ᐱᓯᒪᔪᐊᑎᑦ ᑲᒪᒋᔭᐅᒃᑲᓐᓂᖅᑐᑦ ᐊᒻᒪᓗ ᐱᓕᕆᔨᑦ ᑭᐅᔭᐅᓂᐊᕐᒥᔪᑦ ᕿᒥᕐᕈᔭᐅᕝᕕᒋᓪᓗᒍ ᖃᐅᔨᓴᖅᑕᐅᓚᐅᖅᑎᓪᓗᒍ ᐱᔭᑕᐅᔪᖅ.

Talk to us. We're listening at:
ᐅᖄᓚᖒᒥᑎᒍᑦ. ᑐᓴᔪᒍᑦ ᐅᕙᓂ:

tusaajugut@agnicoeagle.com
www.aemnunavut.ca/tusaajugut
1-844-323-3002
P.O Box 879, Rankin Inlet, NU X0C 0G0
ᑎᑎᖅᑲᐅᑉᓯᓈᕝᕕᐊ 879, ᑲᖏᖅᖢᓂᕐᒥᐅᑦ, ᓄᓇᕗᑦ X0C 0G0

ᑐᓴᔪᒍᑦ
tusaajugut
WE'RE LISTENING

1-844-323-3002
tusaajugut@agnicoeagle.com
aemnunavut.ca/tusaajugut

ᓄᓇᕗᒻᒥ ᓄᓇᓕᖕᓂᑦ
ᐅᓐᓂᕐᓗᒍᑕᐅᔪᓄᑦ ᐋᖅᑭᐅᒪᔪᖅ
Nunavut Community
Complaints System

AGNICO EAGLE

ᖃᒪᓂ’ᑐᐊᕐᒥᑦ ᐅᖅᓱᖅᑖᕐᕕᒃ ᐊᖏᓪᓕᒋᐊᖅᑕᐅᓂᖓ
2019-ᒥᑦ ᓴᓇᕙᓪᓚᐊᓃᑦ

AGNICO EAGLE

ᐱᔾᖃᐃᑦ

- ᓄᓇᓕᖕᒥᑦ ᑲᑎᒪᑎᑦᑎᓈᖕᒐᔪᑦ
- ᖃᒪᓂ’ᑐᐊᕐᒥᑦ ᐅᖅᓱᖅᑖᕐᕕᒃ ᐊᖏᒡᓕᒋᐊᖅᑕᐅᓂᖓᓄᑦ ᐱᓕᕆᐊᖅ ᖃᓄᐃᑦᑑᓂᖓ ᐊᒻᒪᓗ ᖃᖓᒃᑯᑦ
- ᐊᖏᓗᐊᖏᒋᐊᖅᑎᑦᑎᓂᕐᓘᖓᔪᑦ ᐊᒃᑐᖅᓯᓂᐅᔪᖕᓇᖅᑐᓄᑦ
- ᐅᕐᑲᓪᓗᓇᒃᓴᕐᓃᓪ ᓄᓇᓕᖕᒥᐅᑦ ᐃᓱᒪᒋᔭᖏᓐᓄᑦ, ᐃᓱᒫᓘᑎᖏᓐᓄᑦ ᐊᒻᒪᓗ ᐊᐱᖅᑯᑎᖏᓐᓄᑦ

ᐱᓯᒃᓴᐃᑦ

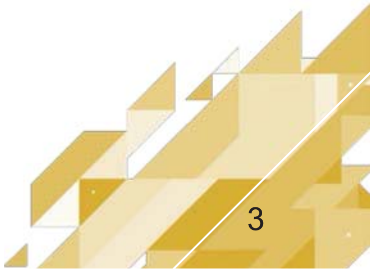
AGNICO EAGLE

ᐱᓯᒃᓴᖅ 1

ᑐᓴᐅᒪᑎᑦᓗᑭᑦ ᓄᓇᓕᖕᒥᐅᑦ 2019-ᒥᑦ ᓴᓇᕙᑦᓚᐊᓃᑦ ᒥᒃᓵᓄᑦ ᖃᒪᓂ'ᑐᐊᕐᒥᑦ ᐅᖅᓱᖅᑖᕐᕕᒃ ᐊᖏᒡᓕᒋᐊᖅᑕᐅᓂᖓᓄᑦ.

ᐱᓯᒃᓴᖅ 2

ᑲᑎᖅᓱᐃᓗᓂ ᓄᓇᓕᖕᒥᐅᑦ ᐃᓱᒫᓘᑎᒋᔭᖏᓐᓂᒃ ᐊᒻᒪᓗ ᐱᖅᑯᓯᒃᑯᑦ ᖃᐅᔨᒪᓂᕆᔭᐅᕙᓂᒃ ᐊᑑᑎᖃᑐᐃᓐᓇᕆᐊᖃᖅᑐᑦ ᐱᓕᕆᐊᕐᒥᑦ ᐃᓚᓕᐅᑎᔭᐅᕙᖕᓇᕐᓂᐊᕐᒪᑕ ᐸᕐᓇᐃᓂᑉᑎᖕᓄᑦ.



ᐱᓕᕆᐊᖅ ᖃᓄᐃᓪᓘᓂᖓ: ᖃᒪᓂ'ᑐᐊᕐᒥᑦ ᐅᖅᓱᖅᑖᕐᕕᒃ ᐊᓂᒡᓕᕆᐊᖅᑕᐅᓂᖓ

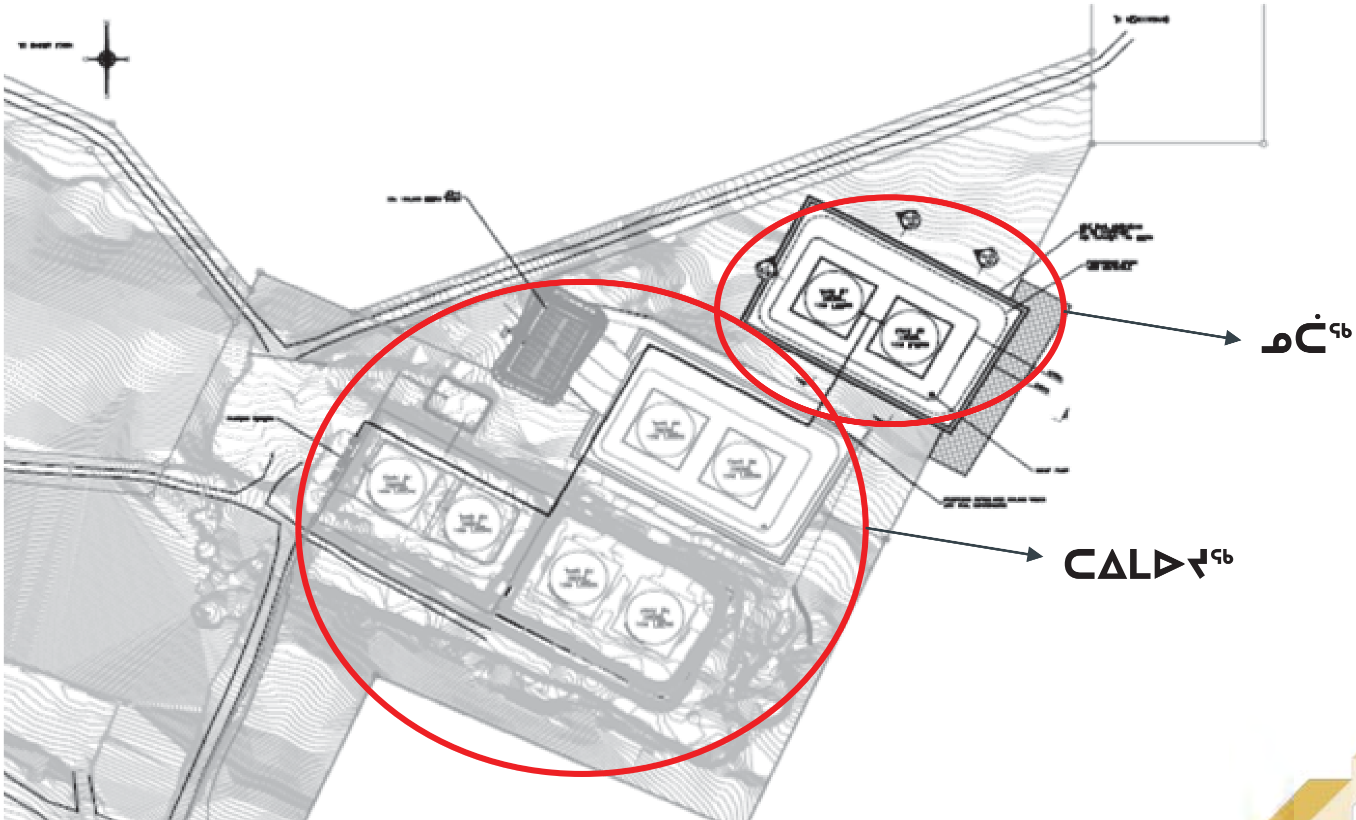
ᓲᖅ ᐅᖅᓱᐊᓘᓯᕝᕕᒃᑖᒃᑲᓐᓂᕆᐊᖃᖅᐱᑕ?

ᐃᑲᔪᐃᓂᖃᖅᑎᓐᓂᐊᕐᓗᑎᑦ
ᐊᓂᒡᓕᕈᓪᓚᐊᔪᖅ ᐊᐅᓚᖅᑎᑦᑎᓂᕚᑦ
ᐱᕈᓪᓚᐊᓂᖓᓄᑦ Whale Tail ᓄᓇᒥᑦ
ᐃᓗᑦᑐᖅᓯᒪᔪᖅ ᐊᒪᒎᖅ ᐱᑦᓭᐅᔾᒦᑦᑐᖅ,
ᐊᒥᓂᖁᖁᑦ ᐅᖅᓱᐊᓘᓯᕝᕕᒃᑖᒃᑲᓐᓂᕆᐊᖃᖅᑐᑦ.

ᐃᓂᐅᔪᖅ: ᖃᒪᓂᒫᑐᐊᕐᒥᑦ ᐅᖅᓱᖅᑖᕐᕕᒃ ᐊᖏᓪᓕᒋᐊᖅᑕᐅᓂᖓ

AGNICO EAGLE

ᖃᓄᐃᖓᓂᖓ: ᐅᖅᓱᐊᓘᓯᖕᕕᒃ ᐊᖏᒡᓕᒋᐊᕐᓂᖓ



ᓇᐃᓈᖅᓯᒪᕙᖅ 2019-ᒥᑦ ᖃᔪᐃᓕᐅᕐᓂᐅᕙᓄᑦ

AGNICO EAGLE

- ᐃᐳᕆ-ᒥᑦ ᕙᓚᐃ-ᒧᑦ 2019 (ᐅᑉᓗᒃᑯᑦ ᐱᓕᕆᓃᑦ)
  - ᓄᓇᒥᑦ ᓱᐅᕋᖅᑕᕐᓂᖅ
  - ᐅᓯᒃᑎᒃ ᑲᑎᑎᖅᓯᒪᕙᓂᑦ ᓱᐅᕋᕐᓂᑦ ᑭᓚᒥᑕ 13-ᒥᑦ ᐅᑭᐅᒃᑖᖅ ᐊᑉᖁᑎᐊᓂᑦ (AWAR) ᐅᖅᓱᖅᑖᕐᕕᖕᒧᑦ
  - ᓄᓇᐃᔾᔭᐃᓂᖅ
  - ᓴᓇᔾᔭᐅᓂᖓ ᐃᓂᐅᕙᖅ
  - 20-ᓄᑦ ᑎᑭᓪᓗᒋᑦ ᐱᓕᕆᔨᖃᕐᓗᑎᒃ
- ᕙᓚᐃ-ᒥᑦ ᓯᑎᐱᕆ-ᒧᑦ 2019 (ᐅᑉᓗᒃᑯᑦ ᐊᒻᒪᓗ ᐅᓐᓄᒃᑯᑦ ᐱᓕᕆᔫᑦ)
  - ᐅᖅᓱᐊᓘᓯᖕᕕᒃ ᐃᓕᔭᐅᓗᓂ
  - 25-ᓄᑦ ᑎᑭᓪᓗᒍ ᐱᓕᕆᔫᑦ
- ᐱᓕᕆᐊᖅ ᐱᐊᓂᒃᑕᐅᓗᓂ ᐃᓄᒃᓱᒃ-ᑯᓐᓄᑦ

ᐱᓕᕆᓂᕐᒧᑦ ᐸᕐᓇᐅᑕᐅᔪᖅ: ᐄᐳᕆ-ᒥᑦ ᔪᓚᐃ-ᒧᑦ 2019

ᐊᔾᔨ ᑕᑯᒃᓴᐅᑎᑦᑎᔪᖅ ᐱᓕᕆᐊᕐᒥᒃ ᐱᐊᓂᒃᓯᓂᐅᓚᐅᖅᑐᒥᑦ, ᐱᓕᕆᓂᓪᓚᑦᑖᖑᖕᑎᑦᑐᖅ ᖃᒪᓂ'ᑐᐊᕐᒥᑦ ᐅᖅᓱᖅᑖᕐᕕᒃ ᐊᖏᒡᓕᒋᐊᖅᑕᐅᓂᖓᓄᑦ ᐱᓕᕆᐊᕐᒧᑦ.

ᓯᐅᕋᖅᑕᕐᕕᒃ ᑭᓵᒥᑕ 13-ᒥᑦ AWAR-ᒥᑦ ᐊᑐᖅᑕᐅᓂᐊᖅᑐᖅ ᐊᑐᖅᑕᐅᔭᕆᐊᓕᖕᓄᑦ

ᐱᓕᕆᓂᕐᒧᑦ ᐸᕐᓇᐅᑕᐅᔪᖅ: ᐃᐳᕆ-ᒥᑦ ᔪᓚᐃ-ᒧᑦ 2019

ᐊᔾᔨ ᑕᑯᕐᓴᐅᑎᑦᑎᔪᖅ ᐱᓕᕆᐊᕐᒥᒃ ᐱᐊᓂᒃᓯᓂᐅᓚᐅᖅᑐᒥᑦ, ᐱᓕᕆᓂᓪᓚᑦᑖᖑᖏᑦᑐᖅ ᖃᒪᓂ'ᑐᐊᕐᒥᑦ ᐅᖅᓱᖅᑖᕐᕕᒃ ᐊᖏᓪᓕᒋᐊᖅᑕᐅᓂᖓᓄᑦ ᐱᓕᕆᐊᕐᒧᑦ.

ᓄᓇᐃᓭᐃᓂᖅ ᐊᑐᕐᓂᐊᖅᑐᓂᒃ ᓯᕗᓂᒃᓴᒥᑦ ᐅᖅᓱᐊᓗᕐᑲᐅᓯᕝᕕᖕᒧᑦ ᐃᓂᒥᒃ

ᐊᓪᓃᑯᒃᑯᑦ| 2019-ᒥᑦ ᓴᓇᕙᓪᓕᐊᓃᑦ

ᐱᓕᕆᓂᕐᒧᑦ ᐸᕐᓇᐅᑕᐅᔪᖅ: ᐋᐳᕆ-ᒥᑦ ᔪᓚᐃ-ᒧᑦ 2019

ᐊᔾᔨ ᑕᑯᒃᓴᐅᑎᑦᑎᔪᖅ ᐱᓕᕆᐊᕐᒥᒃ ᐱᐊᓂᒃᓯᓂᐅᓚᐅᖅᑐᒥᑦ, ᐱᓕᕆᓂᓪᓚᑦᑖᕐᔪᕐᕆᑦᑐᖅ ᖃᒪᓂ'ᑐᐊᕐᒥᑦ ᐅᖅᓱᖅᑖᕐᕕᒃ ᐊᕐᕆᒡᓕᕆᐊᖅᑕᐅᓂᖓᓄᑦ ᐱᓕᕆᐊᕐᒧᑦ.

ᐊᕐᕆᔩᑎᓂᒃ
ᐲᔭᐃᓂᖅ
ᓱᐅᕋᖅᑕᖅᑕᐅᔪᓂᑦ

ᐱᓕᕆᓂᕐᒧᑦ ᐸᕐᓇᐅᑕᐅᔪᖅ: ᐋᐳᕆ-ᒥᑦ ᔪᓚᐃ-ᒧᑦ 2019

ᐊᔾᔭ ᑕᑯᔅᓴᐅᑎᑦᑎᔪᖅ ᐱᓕᕆᐊᕐᒥᒃ ᐱᐊᓂᒃᓯᓂᐅᓚᐅᖅᑐᒥᑦ, ᐱᓕᕆᓂᓪᓚᑦᑖᖑᖏᑦᑐᖅ ᖃᒪᓂ'ᑐᐊᕐᒥᑦ ᐅᖅᓱᖅᑖᕐᕕᒃ ᐊᖏᕐᓕᒋᐊᖅᑕᐅᓂᖓᓄᑦ ᐱᓕᕆᐊᕐᒧᑦ.

ᐊᒡᓃᑯᒃᑯᑦ| 2019-ᒥᑦ ᓴᓇᕚᓪᓕᐊᓃᑦ

ᓴᓇᔾᔭᐅᓂᖓ ᐃᓂᐅᓂᐊᖅᑐᖅ ᐊᕙᓗᓂᐊᕐᓗᒍ ᐅᖅᓱᐊᓗᒃᑖᕐᕕᒃ ᐊᒻᒪᓗ ᑯᕕᔪᖃᖅᑎᑦᑎᑦᑕᐃᓕᓗᓂ ᐊᕙᑎᒧᑦ

ᐱᓕᕆᓂᕐᒧᑦ ᐸᕐᓇᐅᑕᐅᔪᖅ: ᐋᐳᕆ-ᒥᑦ ᔪᓚᐃ-ᒧᑦ 2019

ᐊᔾᔨ ᑕᑯᕐᓴᐅᑎᑦᑎᔪᖅ ᐱᓕᕆᐊᕐᒥᒃ ᐱᐊᓂᒃᓯᓂᐅᓚᐅᖅᑐᒥᑦ, ᐱᓕᕆᓂᓪᓚᑦᑖᕐᒍᕐᑎᑦᑐᖅ ᖃᒪᓂ'ᑐᐊᕐᒥᑦ ᐅᖅᓱᖅᑖᕐᕕᒃ ᐊᕐᕿᒡᓕᕿᐊᖅᑕᐅᓂᖓᓄᑦ ᐱᓕᕆᐊᕐᒧᑦ.

ᐃᓕᐅᖅᑲᖅᑕᐅᓂᖓ ᐊᑖᓃᓐᓂᐊᖅᑐᖅ ᐅᖅᓱᐅᓘᓯᕝᕕᖅᑲᕐᓂᐊᖅᑐᖅ

ᐊᒡᓃᖁᒃᑯᑦ| 2019-ᒥᑦ ᓴᓇᕙᓪᓕᐊᓂᑦ

ᐱᓕᕆᓂᕐᒧᑦ ᐸᕐᓇᐅᑕᐅᔪᖅ: ᐃᐳᕆ-ᒥᑦ ᔪᓚᐃ-ᒧᑦ 2019

ᐊᔾᔨ ᑕᑯᒃᓴᐅᑎᑦᑎᔪᖅ ᐱᓕᕆᐊᕐᒥᒃ ᐱᐊᓂᒃᓯᓂᐅᓚᐅᖅᑐᒥᑦ, ᐱᓕᕆᓂᓪᓚᑦᑖᕆᖑᕐᑎᑦᑐᖅ ᖃᒪᓂ’ᑐᐊᕐᒥᑦ ᐅᖅᓱᖅᑖᕐᕕᒃ ᐊᖏᒡᓕᕆᐊᖅᑕᐅᓂᖓᓄᑦ ᐱᓕᕆᐊᕐᒧᑦ.

ᐃᓕᓴᐅᓂᖕᒋᑦ ᐊᑐᖅᑕᐅᔪᑦ ᖄᖓᓄᑦ ᐊᑖᓃᓐᓂᐊᖅᑑᑉ ᒥᐊᓂᕆᓴᐅᕐᑯᑉᐳᒍ

ᐱᓕᕆᓂᖁᑦ ᐸᕐᓇᐅᑕᐅᔪᖅ: ᔪᓚᐃ-ᒥᑦ ᓯᑎᐱᕆ-ᒥᑦ 2019

ᐊᔾᔨ ᑕᑯᒃᓴᐅᑎᑦᑎᔪᖅ ᐱᓕᕆᐊᕐᒥᒃ ᐱᐊᓂᒃᓯᓂᐅᓚᐅᖅᑐᒥᑦ, ᐱᓕᕆᓂᓪᓚᑦᑖᖑᖏᑦᑐᖅ ᖃᒪᓂ’ᑐᐊᕐᒥᑦ ᐅᖅᓱᖅᑖᕐᕕᒃ ᐊᖏᒡᓕᒋᐊᖅᑕᐅᓂᖓᓄᑦ ᐱᓕᕆᐊᕐᒧᑦ.

ᐅᖅᓱᐊᓘᓯᕐᕕᒃ
ᐃᓕᓴᐅᓂᖓ

ᐊᖏᓗᐊᖏᒋᐊᖅᑎᑦᑎᓃᑦ:

- ᓂᐱᖃᕐᓂᖅ: ᐱᓕᕆᐊᖑᓚᐅᖅᑐᖅ ᓄᓇᓕᐅᑉ ᓯᓚᑖᓂᑦ. ᓂᕆᐅᒋᔭᐅᖏᑦᑐᖅ ᐊᒃᑐᖅᓯᓂᖃᕐᓂᐊᕐᓂᖓᓄᑦ ᓄᓇᓕᖕᒥᐅᓂᑦ.
- ᐳᔪᖃᑖᒃ: ᐊᑉᖁᑎ ᐃᒻᒥᖅᑐᖅᑕᐅᖃᑦᑕᕐᓂᐊᖅᑐᖅ ᐱᔭᕆᐊᖃᖄᖓᑦ.
- ᐃᖏᖁᔭᒃᑐᑦ: ᐱᓕᕆᐊᓗᒃᑖᕐᓚᒃ ᐱᐊᓂᒃᑕᐅᓂᐊᖅᑐᖅ ᐊᒡᓃᑯᒃᑯᑦ ᐊᑉᖁᑎᖏᑦ ᐊᑐᕐᓗᒋᑦ. ᐊᑐᖅᑕᐅᖃᑦᑕᖅᑐᑦ ᐊᑉᖁᑎᓄᑦ ᒪᓕᒃᑕᐅᔪᒃᓴᐃᑦ ᒪᓕᒃᑕᐅᓂᐊᖅᑐᑦ.
- ᐋᓐᓂᐊᖃᖅᑕᐃᓕᒪᓂᖅ ᐊᒻᒪᓗ ᐅᓗᕆᐊᓇᖅᑐᖃᖅᑕᐃᓕᓂᖅ: ᓴᓇᕝᕙᐅᓂᖅ ᐱᓕᕆᓘᓐᓇᕐᓄᑦ ᐊᔪᙱᓐᓂᐊᖅᑐᖅ ᐃᓄᓗᒃᑖᑦ ᐅᓗᕆᐊᓇᖅᑐᒦᖁᓇᕆᑦ. ᓇᓗᓇᐃᒃᑯᑏᑦ ᑕᐃᒪᐅᔪᑦ ᐃᑎᕆᐊᕐᕕᖕᒥᑦ ᐱᓕᕆᕝᕕᖕᒥᑦ ᐃᓕᔭᐅᓂᐊᖅᑐᑦ.

ᐅᕐᑲᓪᓗᓇᖅᓴᐅᑎᒋᔭᐅᔪᖅ

- ᐃᓱᒪᒋᔭᐃᑦ?
- ᐃᓱᒫᓘᑏᑦ?
- ᐊᐱᖅᑯᑏᑦ?

AGNICO EAGLE

BAKER LAKE FUEL FARM EXPANSION
2019 CONSTRUCTION ACTIVITIES

AGNICO EAGLE

AGENDA

- Community Session Objectives
- Baker Lake Fuel Farm Expansion Project Description and Schedule
- Mitigation Measures for Potential Impacts
- Discussion on Community Thoughts, Concerns and Questions

OBJECTIVES

AGNICO EAGLE

Objective 1

Inform the public on the 2019 construction activities related to the Baker Lake Fuel Tank Extension.

Objective 2

Gather information on community concerns and traditional knowledge that may influence the project so that it can be incorporated into our planning.

PROJECT DESCRIPTION: BAKER LAKE FUEL FARM

Photo

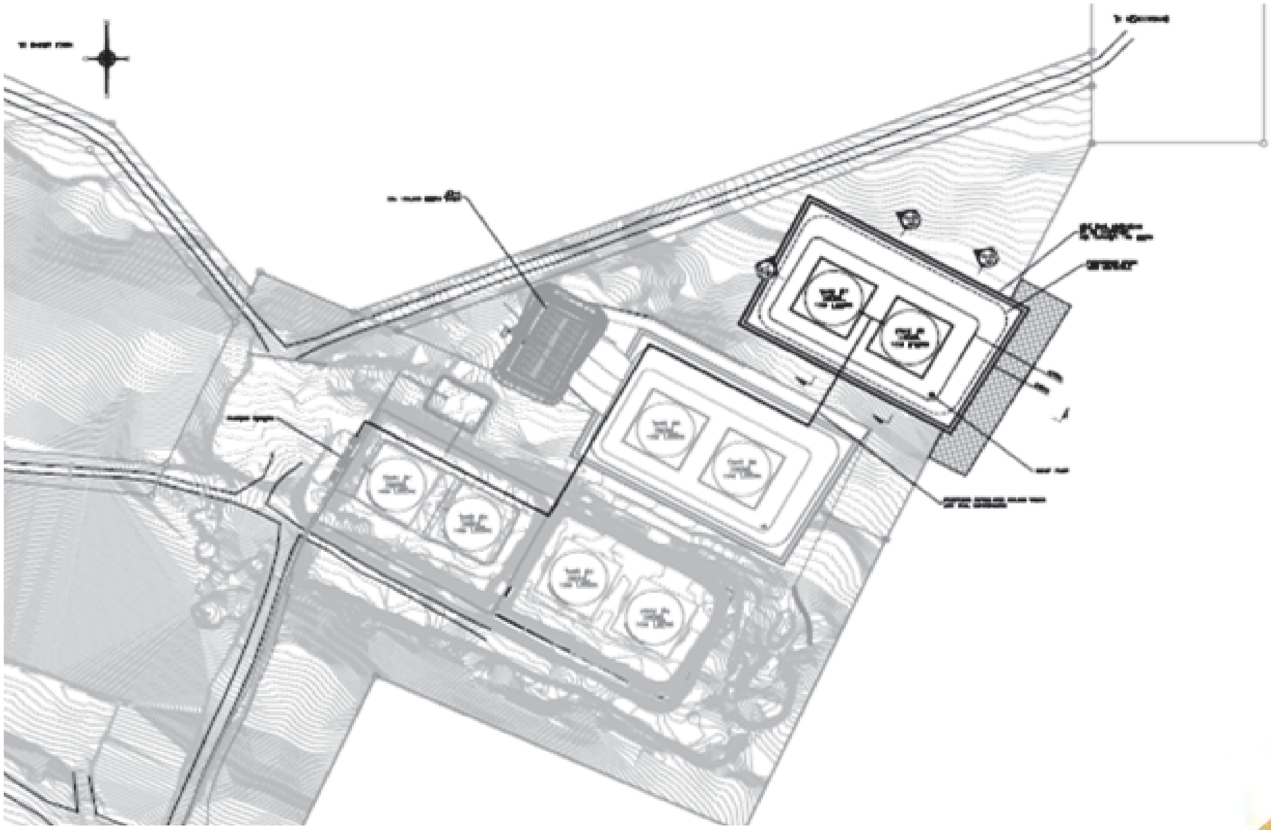
Why do we need another fuel tank?

In order to support our expanding operations with the development of the Whalt Tail pit in the Amaruq camp, Agnico Eagle will need larger fuel storage facilities.

LOCATION: BAKER LAKE FUEL FARM

AGNICO EAGLE

DESIGN: FUEL FARM EXPANSION



SUMMARY OF 2019 ACTIVITIES

- **April to July 2019 (Day shift)**
  - Quarrying
  - Hauling of aggregate from Quarry at KM 13 of All Weather Access Road (AWAR) to Fuel Farm
  - Excavation
  - Construction of basin
  - Up to 20 workers

- **July to September 2019 (Day & night shifts)**
  - Tank 1 erection
  - Up to 25 workers

- **Work to be completed by Inukshuk**

WORK PLAN: FROM APRIL TO JULY 2019

Quarry at KM 13
of AWAR to be used
as source of material

WORK PLAN: FROM APRIL TO JULY 2019

AGNICO EAGLE

Excavation of material
at futur fuel farm site

WORK PLAN: FROM APRIL TO JULY 2019

Screening of material quarried

WORK PLAN: FROM APRIL TO JULY 2019

AGNICO EAGLE

Construction of basin to surround tankfarm and prevent spill to reach environment

WORK PLAN FROM APRIL TO JULY 2019

Installation of impermeable membrane at bottom of fuel tank containment

WORK PLAN: FROM APRIL TO JULY 2019

AGNICO EAGLE

Placement of material on top of impermeable membrane to ensure protection

WORK PLAN: FROM JULY TO SEPTEMBER 2019

AGNICO EAGLE

Tank erection

MITIGATION MEASURES:

ROUND TABLE DISCUSSION

AGNICO EAGLE

- Thoughts?
- Concerns?
- Questions?

AGNICO EAGLE

APPENDIX E BASELINE FISH AND FISH HABITAT REPORTS

WHALE TAIL PIT 2014 - 2016 FISH AND FISH HABITAT FIELD INVESTIGATIONS: AGNICO EAGLE MINES LTD. - MEADOWBANK DIVISION

Submitted to:

Agnico Eagle Mines Ltd: Meadowbank Division
Regional Office - 93, Rue Arseneault, suite 202,
Val-d'Or, Québec, J9P 0E9

February 26, 2018.

C. PORTT and ASSOCIATES
63 Waterloo Avenue
Guelph, Ontario, N1H 3H5
cportt@sentex.net

EXECUTIVE SUMMARY

Agnico Eagle Mines Limited: Meadowbank Division (Agnico Eagle) is proposing to develop Whale Tail Pit, a satellite deposit on the Amaruq property, in continuation of mine operations and milling of the Meadowbank Mine. Preliminary field investigations were undertaken in September 2014, which included aerial reconnaissance and photographing the study area from a helicopter and two gill net sets in each of the three largest lakes in the study area. In 2015, more intensive field investigations examined fish and fish habitat in the Whale Tail Pit study area. The 2016 field investigations focussed on assessing the potential for upstream migration into the study area and characterizing the tributaries and smaller waterbodies within the study area that are most likely to be affected by future mining activity.

A total of six fish species are present in the primary study area, comprised of four large-bodied species (Lake Trout , Arctic Char, Round Whitefish and Burbot) and two small-bodies species (Slimy Sculpin and Ninespine Stickleback). Arctic Grayling occur further downstream in the watershed but upstream migration barriers prevent them from moving into the primary study area. Their absence in the primary study area is consistent with the paucity of suitable spawning habitat and absence of riverine adult habitat in the tributaries to Mammoth and Whale Tail Lake.

Lake Trout were the most abundant species in gill net catches and the most widely distributed among the lakes, followed by Round Whitefish and Arctic Char. Few Burbot were captured. Gill netting catch per unit effort was low for all species. In Mammoth, Whale Tail and Nemo Lakes combined, average catch per unit effort in gill nets, calculated as the number of individuals captured per hour of soak time using a standard AEM gill net was 0.5, 0.1 and 0.01 for Lake Trout, Round Whitefish and Arctic Char, respectively. Lake Trout was the most frequently observed large-bodied species on underwater video recorded in Whale Tail Lake.

Electrofishing more than 3400 m of lake shoreline and pond habitat resulted in the capture of approximately 250 Ninespine Stickleback, 55 Slimy Sculpin, 2 juvenile Arctic Char and 3 juvenile salmonids, either Arctic Char or Lake Trout, which were not identified to species. Ninespine Stickleback was also the most frequently observed small-bodied fish species on underwater video recorded in Whale Tail Lake.

At least one large-bodied fish species was captured in eleven of the larger lakes, in addition to Whale Tail, Mammoth and Nemo and Ninespine Stickleback and Slimy Sculpin were also present in most of those. In three of the smaller waterbodies, only Ninespine Stickleback were captured. There were several isolated or nearly isolated small lakes and ponds in which no fish were captured. Most of these are located north of Whale Tail Lake.

All of the watercourses in the primary study area freeze during the winter. There are two broad categories of watercourses present. One type consists of connecting channels between larger lakes. These are generally wide and shallow with boulder and cobble substrate. Some of these connecting channels have sufficient depth during spring freshet for adult large-bodied fish to pass through them

but, as flow subsides, they become shallower and impassible to and unusable by large fish and, eventually, all of the flow is interstitial. Some of these connecting channels never have surface flow. Based on the sampling conducted, there is little movement of large fish through the connecting channels that have sufficient depth to pass large fish during the spring. Juvenile Lake Trout and Round Whitefish, as well as Ninespine Stickleback and Slimy Sculpin, were captured in the connecting channels.

The other watercourses are more typical small streams and most drain smaller watersheds. These shallow streams often have multiple channels (i.e. are braided). The mean total wetted width of the Whale Tail Lake tributaries ranged from 0.7 m to 7.6 m and their mean depth ranged from 6 cm to 17 cm. Riffle and run habitat is dominant and there are few pools in these tributaries. Peat is the dominant substrate in most of these watercourses. Ninespine Stickleback and Slimy Sculpin were the most widely distributed species in the Whale Tail Lake tributaries. Low numbers of juvenile Arctic Char were captured in five of the tributaries and juvenile Lake Trout were captured in two. Juvenile Burbot were captured in three tributaries and a juvenile Round Whitefish was captured in one.

The maximum water temperature measured at the outlet of Whale Tail Lake was 18.6°C in 2015 and 18.1°C in 2016. The maximum temperatures in tributaries to Whale Tail Lake ranged from 20.1°C in a tributary which has no connected lakes or ponds upstream to 28.3°C in a tributary that passes through a series of shallow ponds before reaching Whale Tail Lake.

Table of Contents

List of Tables

List of Figures

1.0 INTRODUCTION

Agnico Eagle Mines Limited: Meadowbank Division (Agnico Eagle) is proposing to develop Whale Tail Pit, a satellite deposit on the Amaruq property, in continuation of mine operations and milling of the Meadowbank Mine. The Amaruq Exploration property is a 408 square kilometre (km^2) site located on Inuit Owned Land approximately 150 kilometres (km) north of the hamlet of Baker Lake and approximately 50 km northwest of the Meadowbank Mine in the Kivalliq region of Nunavut (**Error! Reference source not found.**). The property was acquired by Agnico Eagle in April 2013 subject to a mineral exploration agreement with Nunavut Tunngavik Incorporated.

The Meadowbank Mine is an approved mining operation and Agnico Eagle is looking to extend the life of the mine by constructing and operating Whale Tail Pit (referred to in this document as the Project). As an amendment to the existing operations at the Meadowbank mine, it is subject to an environmental review established by Article 12, Part 5 of the *Nunavut Land Claims Agreement* (NLCA). Baseline data have been collected in support of the Environmental Review to document existing conditions and to provide the foundation for a qualitative and quantitative assessment of project operations and the extension of the mine development, to be evaluated in the Environmental Impact Statement (EIS) for the Project.

Preliminary field investigations were undertaken by C. Portt and Associates in September 2014. On September 2, 2014, oblique aerial photographs were taken from a helicopter of the shoreline and near-shore of Mammoth Lake, Whale Tail Lake, Nemo Lake and adjacent smaller lakes and ponds. In addition, two gill net sets were conducted in each of Mammoth Lake, Whale Tail Lake and Nemo Lake from September 4-6, 2014.

In 2015, field investigations examining fish and fish habitat in the Whale Tail Pit study area were undertaken by C. Portt and Associates during the period June 19 – August 30. The 2015 field investigations focussed on Whale Tail Lake and Mammoth Lake, and the tributary watercourses and smaller lakes within the study area that are most likely to be affected by future mining activity.

The primary activities conducted in 2015 were:

- downstream reconnaissance to determine if there are barriers to upstream fish migration,
- deployment of hoop nets on potential migration routes at the beginning of the field season to detect spring migrations if they occurred,
- habitat characterization, visual inspections for spawning fishes, and fish sampling to determine seasonal fish use using electrofishing and large minnow traps, in the tributaries to Whale Tail Lake,
- habitat characterization in Whale Tail Lake and Mammoth Lake,
- fish sampling in Whale Tail Lake and Mammoth Lake using gill nets, shoreline electrofishing and minnow traps to characterize the fish community,

- habitat characterization and fish sampling to determine species presence:absence, by gill netting and shoreline electrofishing, in smaller lakes and ponds with surface connections to Whale Tail Lake during the summer,
- collection of tissue samples from Lake Trout in Whale Tail Lake and Mammoth Lake for the determination of the concentrations of mercury and other metals,
- characterization of periphyton development at locations in Whale Tail Lake, Lake A53 and Mammoth Lake,
- water temperature monitoring at a number of locations in Whale Tail Lake, Mammoth Lake, and their tributaries.

In 2016, field investigations were undertaken by C. Portt and Associates during the periods June 17 – July 9 and August 19 – 31. The 2016 field investigations again focussed on Whale Tail Lake and Mammoth Lake, and the tributary watercourses and smaller lakes within the study area that are most likely to be affected by future mining activity, but also included a substantial effort to determine the potential for fish to migrate into the primary study area from downstream.

The primary activities conducted in 2016 were:

- downstream reconnaissance to determine if there are barriers to upstream fish migration,
- targeted fish collections downstream of the primary study lakes to determine the upstream extent of migratory fishes; in particular Arctic Grayling since this is the only known large-bodied spring-spawning migratory fish in the broader study area,
- deployment of hoop nets at the outlet of Mammoth Lake to detect spring migrations into the primary study area, if they occurred,
- habitat characterization, visual inspections for spawning fishes, and fish sampling to determine seasonal fish use using electrofishing, gillnets and large minnow traps, in the tributaries to Whale Tail Lake,
- habitat characterization and fish sampling to determine species presence:absence, by gill netting and shoreline electrofishing, in smaller lakes and ponds with surface connections to Whale Tail Lake during the summer,
- habitat characterization of Nemo Lake,
- search for potential Lake Trout spawning locations in Whale Tail Lake,
- deployment of underwater video cameras to monitor potential Lake Trout spawning activity on selected potential spawning locations.

This report documents the methods and results of these investigations.

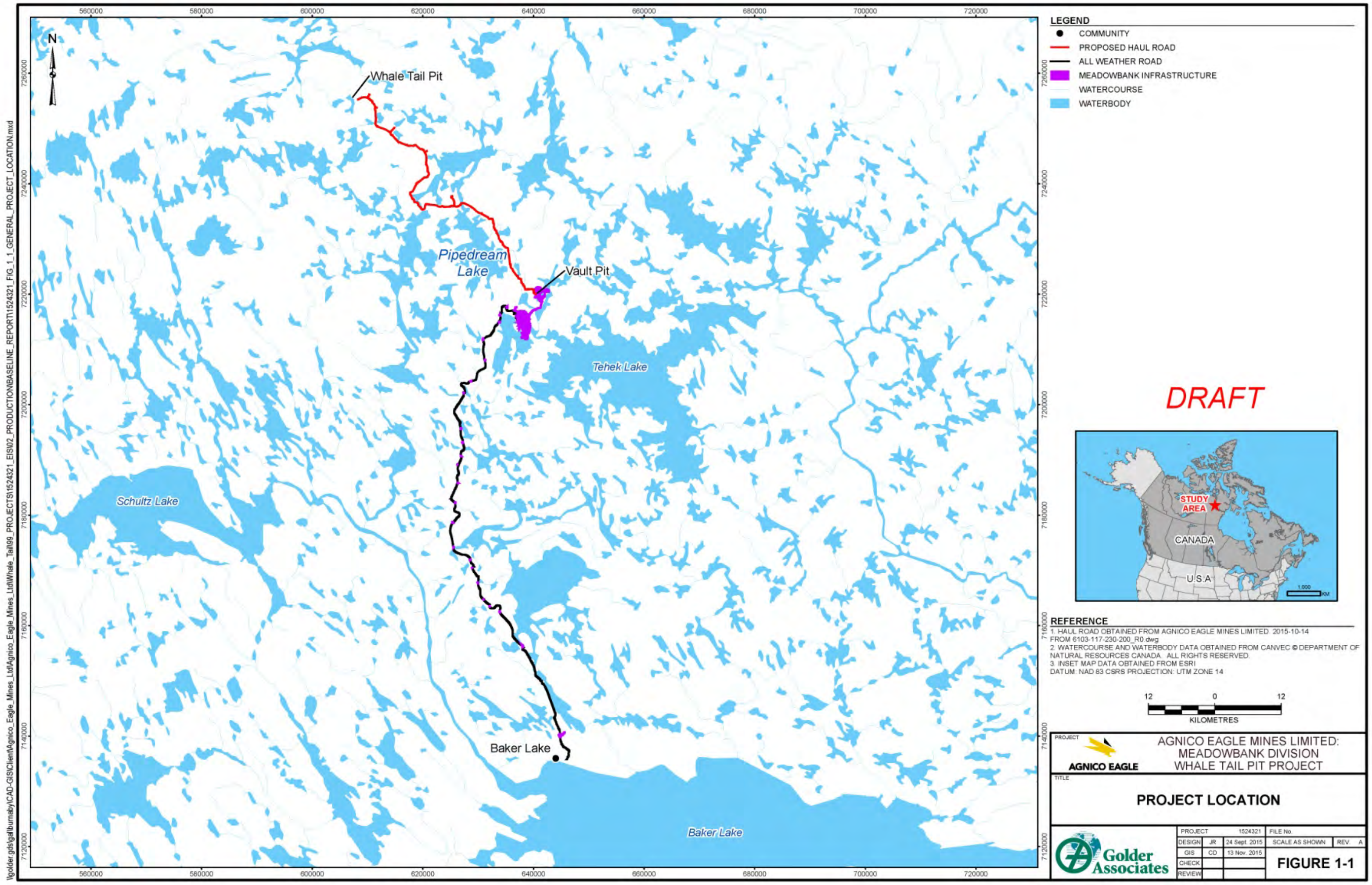


Figure 1-1. Location of the proposed Whale Tail Pit Study Area.

1.1 Scope

This report presents the investigations of fish and fish habitat conducted in the Whale Tail Pit study area based on field work conducted during the periods September 2 – 6, 2014, June 19 to August 30, 2015, and June 17 – August 31, 2016.

1.2 Objectives

- Characterize the existing fish and fish habitat conditions in Mammoth Lake, Whale Tail Lake, and smaller lakes and watercourses that would potentially be impacted by future mining.
- Investigate the connectivity of the primary Whale Tail Pit study area to downstream habitats, including barriers to fish movement and the upstream extent of spring spawning fish migrations.
- Collect fish tissue samples from Mammoth Lake and Whale Tail Lake for metals, including mercury, determinations.

1.3 Physical Setting

The study area is located on the Canadian Shield within a Low Arctic ecoclimate of continuous permafrost, which is one of the coldest and driest regions of Canada (Azimuth, 2010). The lakes within the Whale Tail pit study area are ultra-oligotrophic/oligotrophic (nutrient poor, unproductive) headwater lakes that are typical of the Arctic. The ice-free season on the lakes is very short. Ice break-up usually occurs during mid- to late-June, and ice begins to form again on the lakes in late September or early October. Complete ice cover is attained by late October, with maximum ice thickness of about 2 m occurring in March/April (Azimuth, 2013). Many small watercourses become dry once the land begins to freeze in the fall and, where water is present, most freeze to the bottom during the winter (BAER, 2005; Jones *et al*, 2010). Flows during the spring melt and the summer vary with drainage area.

The primary Whale Tail Pit study area is situated in the headwaters of a small river that flows northwest for approximately 13 km to a lake that is on a tributary of the Meadowbank River, which in turn is a tributary of the Back River that flows to tidewater at the Chantrey Inlet and the Arctic Ocean. There are two paths for flow from the primary study area to reach this downstream lake, which are discussed more thoroughly below in Section **Error! Reference source not found.**.

2.0 RECONNAISANCE TO ASSESS THE POTENTIAL FOR FISH PASSAGE FROM DOWNSTREAM

2.1 Methods

The hydrologic setting of the study area is shown in **Error! Reference source not found.**. The lakes were assigned alpha-numeric codes to facilitate discussion, with the letter designating the subwatershed and, within each branch, the number increasing in an upstream direction. The primary study area is in the headwaters of subwatershed A, which drains via two paths through a series of lakes and connecting channels to a large lake downstream, labelled DS1, which is on a major tributary of the Meadowbank River.

On June 19, 2015, the lakes and connecting channels were observed and photographed, from the air, from the outlet of Mammoth Lake downstream to the connecting channel between lakes A10 and A9. On that date the spring melt was well underway, but ice still covered most of the surface of the lakes. No barriers to fish movement were observed. On July 4, 2015, the outlet of Mammoth Lake was examined and photographed on the ground. On July 12, 2015, the connecting watercourses from the outlet of Mammoth Lake downstream to the outlets of lake A75 were observed and photographed from the air, and the channel connecting lakes A76 and A75 was examined on the ground on July 13, 2015. On July 23, 2015, a video was taken from the air, flying from lake DS1 upstream along the lakes and connecting channels to lake A11, and the two outlets of lakes A12 and A76 were examined on the ground.

On June 19, 2016, the lakes and connecting channels were observed and photographed, from the air, from the outlet of Mammoth Lake downstream along both potential flow paths to Lake DS1. A continuous video was also taken along the primary flow path, from DS1 upstream to Mammoth Lake. On that date the spring melt was well underway, but ice still covered most of the surface of the lakes. On June 24, 2016, a continuous video was also taken along the secondary flow path, when the deeper lakes were still largely ice-covered. On June 23, 24, 26-28, and July 2 and 3, 2016, potential barriers to upstream fish movement were identified, examined and photographed.

The extent to which Arctic Grayling had moved upstream from Lake DS1 was investigated by backpack electrofishing on June 23, 24, 26-28, and July 2 and 3, 2016, using a Halltech Model 200T backpack electrofisher, set at 950 volts and 60 hertz. The coordinates of the sampling sites were determined using a Garmin Oregon 650 gps and the length of watercourse sampled was determined from these coordinates superimposed on a photo-mosaic of the study area using GIS, unless the distance sampled was very short (<10 m), in which case the distance sampled was estimated in the field. The number of electroseconds was recorded at each location. All fish captured were identified to species and released as they were captured.

2.2 Results

The primary study area, which encompasses Whale Tail and Mammoth Lakes and their tributaries, drains via two paths through a series of lakes and connecting channels to Lake DS1 (Figure 2-1). There is a primary flow path through which the majority of the drainage from the primary study area passes, and a secondary flow path which receives only a small proportion of the total flow from the primary study area. There are two locations where the two flow paths diverge and water flows out of a lake in two directions. There is flow from lake A12 to lake A11 and also to lake A77 and there is flow from lake A76 to lake A75 and also to lake A10.

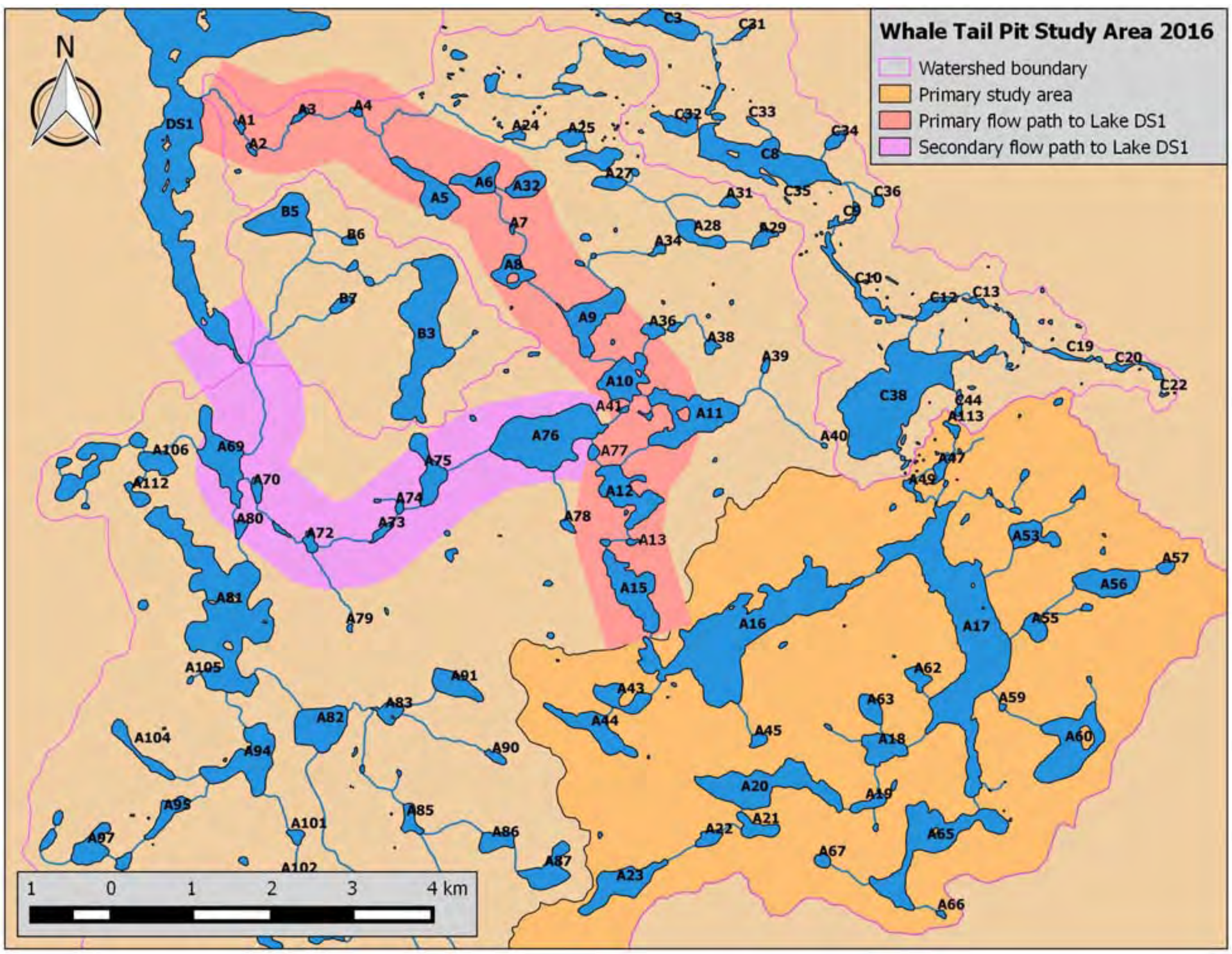


Figure 2-1. Primary Study Area showing the hydrologic setting and lake identification codes. Mammoth Lake is A16 and Whale Tail Lake is A17.

Primary Flow Path

The primary flow path, downstream of Mammoth Lake (Lake A16), passes through Lakes A15, A14, A13, A12, A11, A10, A9, A8 and A7, and then into Lake A32 (the map base, shown in Figure 2-1, is incorrect at this location) before continuing through Lakes A6, A5, A4, A3, A2, A1 and into Lake DS1. Via this route, the distance between lake DS1 and the outlet of Mammoth Lake, estimated from satellite imagery, is approximately 12.2 km. When the primary flow path was examined from Mammoth Lake to lake A9 on June 19, 2015, there was surface flow through the connecting channels and no barriers to fish movement were observed. There was no barrier to fish movement between Mammoth Lake and lake A15 on July 4, 2015, although most of the rapids was less than 20 cm deep.

There was surface flow that would permit large-bodied fish passage through the connecting channels and lakes of the primary flow path from Mammoth Lake to DS1 when this path was examined during the spring melt on June 23, 2016. There is, however, a long and steep set of rapids that are located approximately 300 m upstream from Lake DS1 (Figure 2-2; Figure 2-3). Measured using a handheld GPS, these rapids are approximately 255 m long and drop approximately 11 m over that distance. Arctic Grayling were captured between Lake DS1 and these rapids on June 26 and June 28, 2016 (Table 2-1); no Arctic Grayling were captured at the locations electrofished that are upstream from those rapids.

Table 2-1. Fish captured by electrofishing at potential Arctic Grayling spawning sites in the lower reaches of the primary flow path from the primary study area to Lake DS1. Refer to Figure 2-4 and Figure 2-5 for locations.

Watercourse	Location	Date	distance (m)	electro-seconds	Ninespine Stickleback	Slimy Sculpin	Arctic Grayling
A1-DS1	**EF-S48**	6/23/2016	156	364			
	EF-S58	6/26/2016	223	704		2	3
	EF-S67	6/28/2016	244	723	1	5	2
	EF-S70	7/2/2016	40	657		3	
	EF-S45	6/23/2016	392	533			
	EF-S60	6/26/2016	228	246		1	
A24-A4-A5	**EF-S65**	6/28/2016	93	136			
	EF-S59	6/26/2016	193	1002			
A3-A2	**EF-S66**	6/28/2016	133	372			
	EF-S46	6/23/2016	145	737			
	EF-S47	6/23/2016	5	75			
A5-A4	**EF-S64**	6/28/2016	64	300			

Figure 2-2. View from bottom of rapids located approximately 300 m upstream from Lake DS1. June 28, 2016.

Figure 2-3. Approximately midway in rapids located about 300 m upstream from Lake DS1. June 26, 2016.

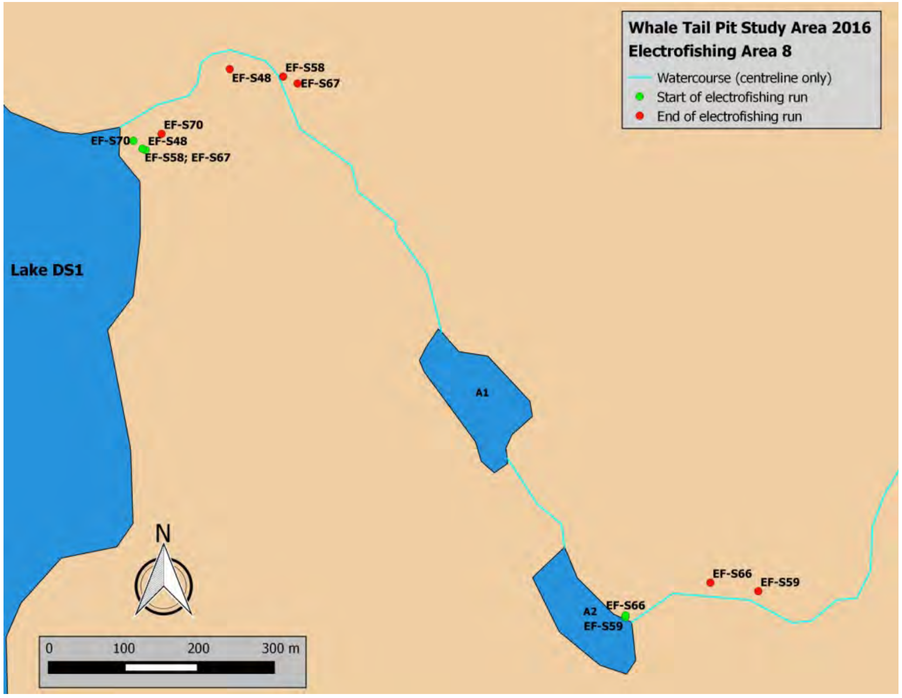


Figure 2-4. 2016 electrofishing locations at the downstream end of the primary flow path to Lake DS1. See Area 8 in Figure 5-11.

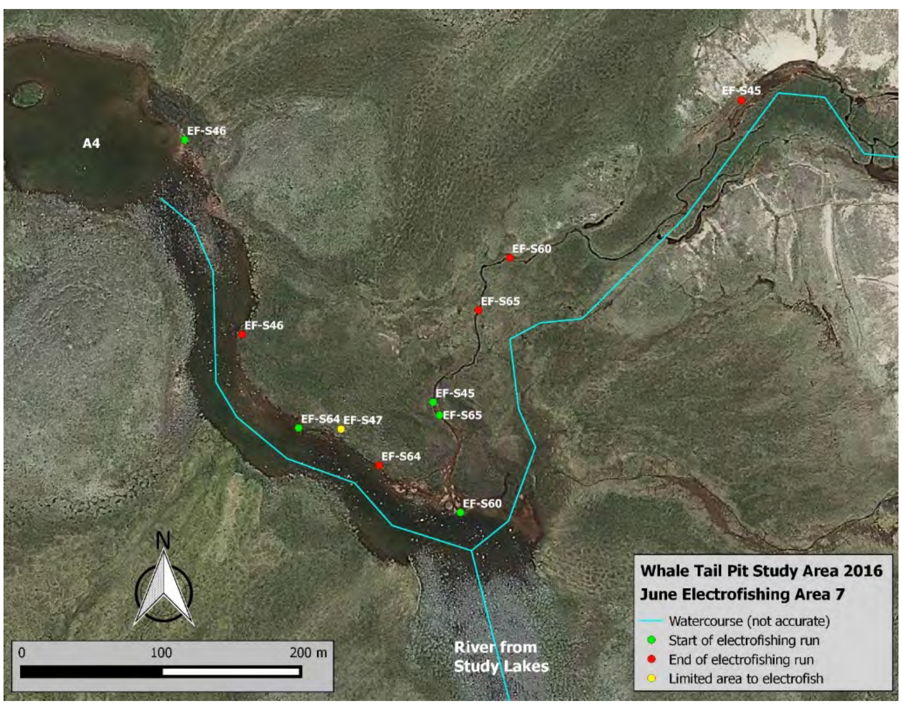


Figure 2-5. June 2016 electrofishing locations along the primary flow path to Lake DS1. Tributary from the northeast contributes flow from Lakes A24-A31. See Area 7 in Figure 5-11.

There are a number of connecting channels along the primary flow path where there is no surface connection, only interstitial flow, after the spring freshette subsides. Based on the July 12, 2015, aerial reconnaissance and photographs, large fish passage between lakes A13 and A12, between lakes A12 and A11, and between lakes A76 and A41 would have been difficult, if not impossible, under the prevailing flow conditions because there was only interstitial flow in portions of those connecting channels. The connections between lakes A10 and A76 (Figure 2-6), lakes A11 and A12 (Figure 2-7) and lakes A77 and A12 (Figure 2-8) were all considered impassable to large fish when examined on the ground on July 23, 2015. Based on the July 23, 2015, observations and a review of the aerial video taken on that date, it is thought that large fish passage would have been difficult or impossible on that date due to only interstitial flow in portions of each of the connecting channels from lake A10 downstream to lake A6 and from the downstream end of lake A5 to where the tributary from lake A24 enters, approximately 9 km downstream from the Mammoth Lake outlet.

Figure 2-6. Channel between lake A10 and lake A76. July 23, 2015.

Figure 2-7. Channel between lakes A11 and A12. July 23, 2015.

Figure 2-8. Channel between lakes A77 and A12. July 23, 2015.

In 2016, the outlet of Mammoth Lake was assessed to be passable by large-bodied fishes until July 2, but on July 3 the flow was sufficiently low and interstitial in the cobble/boulder streambed to be judged impassable by large-bodied fishes. On July 3, 2016, it was determined that only interstitial flow occurred in portions of each of the connection channels between the lakes along the primary flow path from Mammoth Lake downstream to Lake A32, blocking movement of large-bodied fishes. On that date, the channel between Lake A32 and Lake A6 was still passable by large-bodied fishes, though passage would have probably been difficult (Figure 2-9). Water levels continued to decline over the summer of 2016, and on August 30, 2016, surface flow only occurred from Lake DS1 upstream to the lower portion of the reach between Lakes A4 and A5, downstream from where the tributary draining Lakes A24-A31 joins the primary flow path (refer to Figure 2-5; Figure 2-10).

In summary, while the primary flow path that drains the primary study area has surface flow along its entire length for a short period during spring melt each year, there is a steep set of rapids near the downstream end that appear to be a barrier to the upstream movement of Arctic Grayling during their spawning run, and possibly to other large-bodied fishes as well. In 2016, by early July sections with only interstitial flow between a number of the lakes between DS1 and the primary study area prevent the upstream or downstream movement of large-bodied fish.

Figure 2-9. Upstream view in channel between Lake A32 and Lake A6. July 3, 2016.

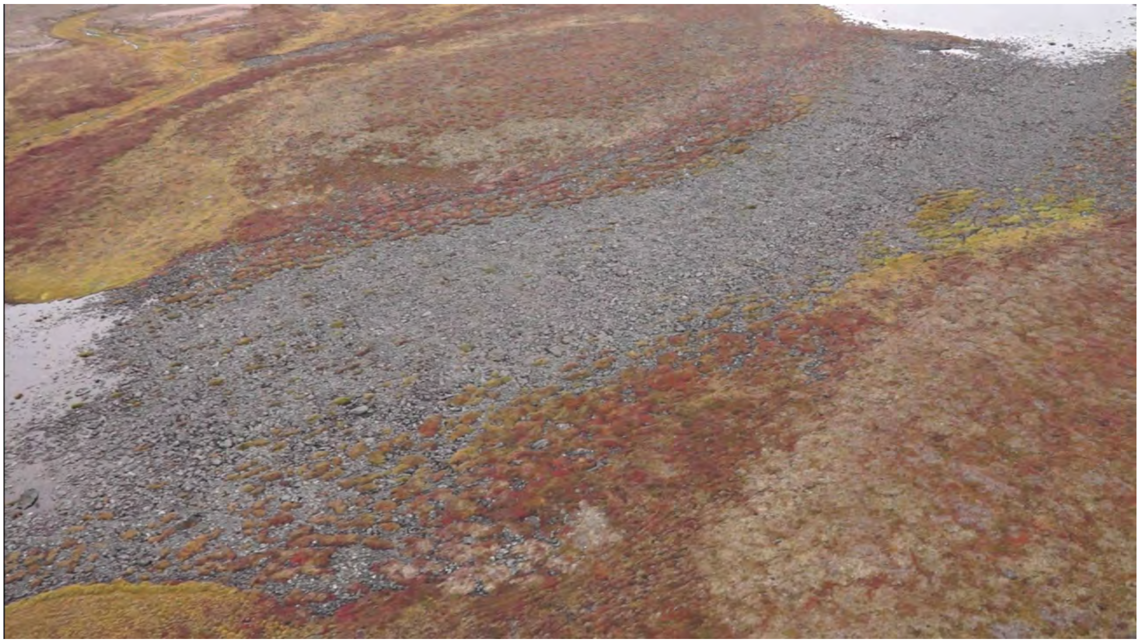


Figure 2-10. Aerial view of the boulder channel, immediately downstream of Lake A5, with only interstitial flow. August 30, 2016.

Secondary Flow Path

The secondary flow path to Lake DS1 begins where a portion of the flow exiting Lake A12 passes to Lake A77 and then to Lake A76. Lake A76 has two outlets, with about half the outflow of the lake continuing to the east through Lake A41 to rejoin the primary flow path at Lake A10, while the other half flows west through Lakes A75, A74, A73, A72, A71, A70, A69 and into Lake DS1 (refer to Figure 2-1).

While there was a surface flow connection from Lake A12 through Lake A77 and on to Lake A76 for a short period of time during the spring freshets in 2015 and 2016, there was no surface flow observed in the connection between Lakes A76 and A75, which is via a boulder feature that is over 0.5 km long (Figure 2-11). Based on the absence of surface flow in this feature during aerial reconnaissance on July 12, 2015 and examinations on the ground on July 13 and July 23, 2015, and a second and third aerial reconnaissance on June 19 and 24, 2016, it is considered unlikely that there is ever a surface connection that would allow large fish passage between Lakes A76 and A75.

On June 19, 2016, there was surface flow between Lakes A75, A74, A73, and for a portion of watercourse from Lake A73 to Lake A72. However, just upstream from Lake A72 the flow was interstitial where it dropped through a ridge of boulders which was assessed, during a follow-up on-the-ground examination on June 24, 2016, as being impassable to large-bodied fishes (Figure 2-12). Surface flow that would permit fish passage was evident from Lake A72 downstream to Lake DS1. By June 24, 2016, flow had become interstitial between Lakes A75, A74, and A73.

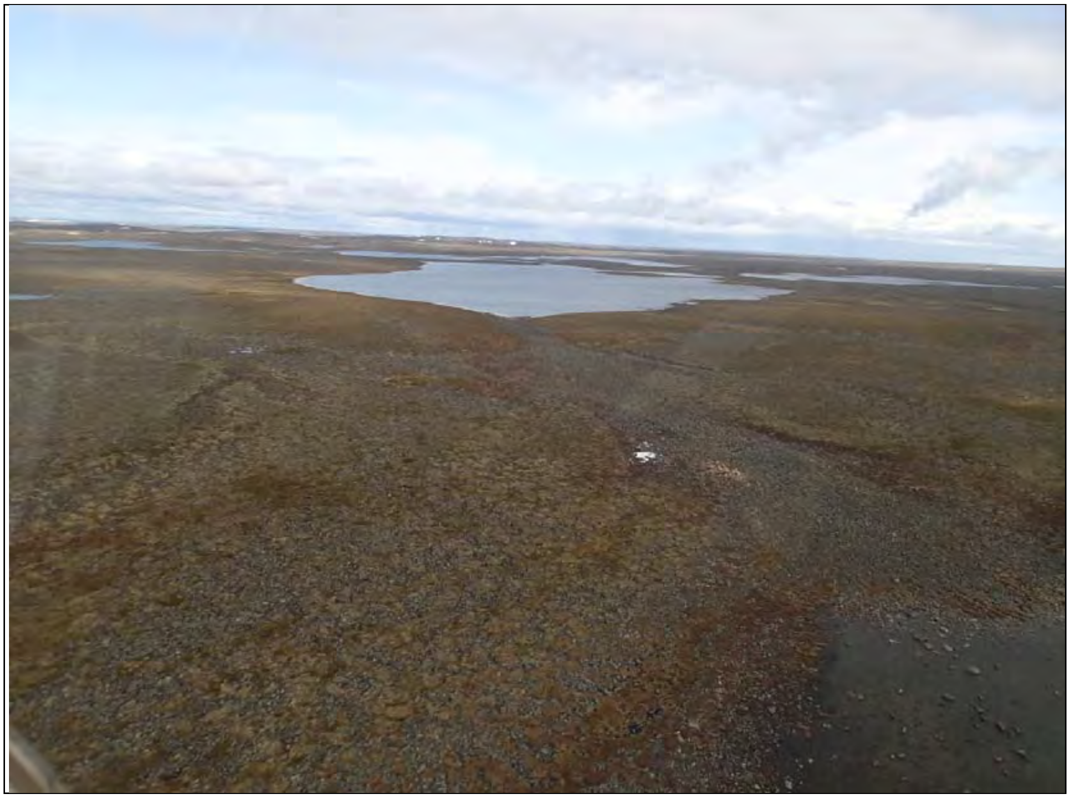


Figure 2-11. Channel between Lake A75 (foreground) and lake A76. July 12, 2015.

Figure 2-12. Boulder ridge (in background) and sloped field of tundra-covered boulders through which water from upstream Lake A73 flows to Lake A72. June 24, 2016. This is considered to be a barrier to the upstream movement of large-bodied fishes.

No Arctic Grayling were captured by electrofishing upstream from Lake A71 or between Lake A81 and Lake A80, which is on a separate branch that is tributary to Lake A69. Arctic Grayling were captured by electrofishing between Lakes A71 and A70 and between Lakes A69 and DS1, (Figure 2-13, Figure 2-14,Table 2-2).

In summary, the secondary flow path that drains the primary study area does not have a surface connection between Lakes A76 and A75 or between Lakes A73 and Lake A72, even during spring freshet. Therefore large-bodied fishes cannot move into the primary study area from downstream via this route. Arctic Grayling were captured 2.4 km upstream of Lake DS1 in this system, and may be present as far as 3.1 km upstream where a barrier to upstream movement exits.

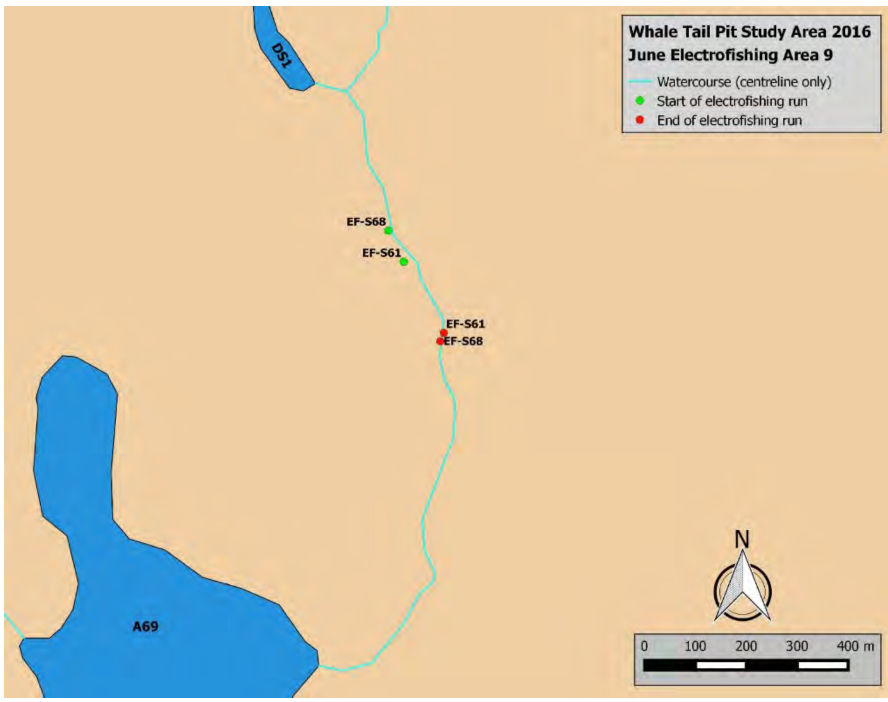


Figure 2-13. June 2016 electrofishing locations near the downstream end of the secondary flow path to Lake DS1. See Area 9 in Figure 5-11.

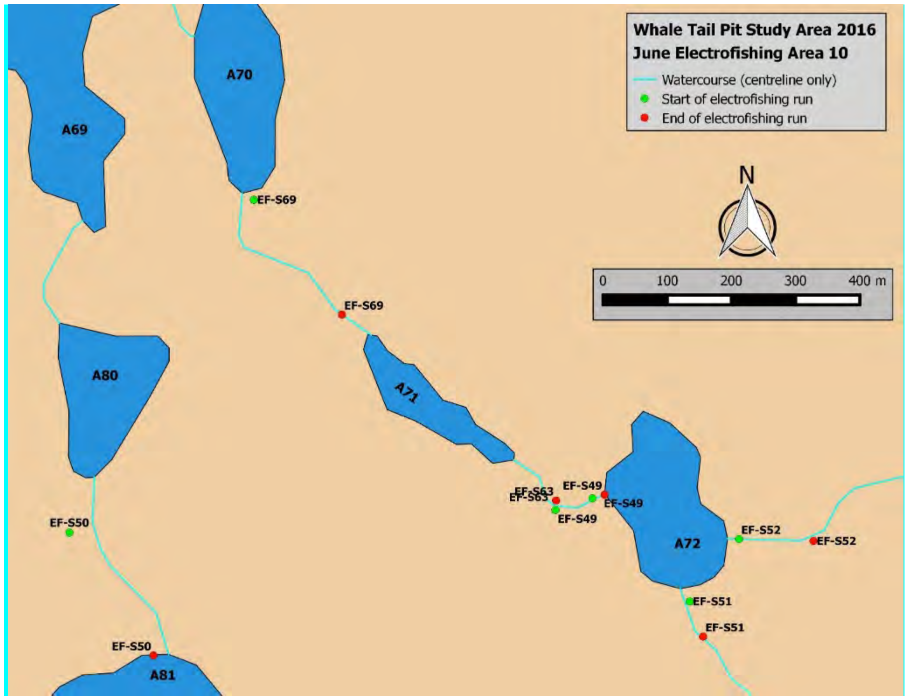


Figure 2-14. June 2016 electrofishing locations within the secondary flow path to Lake DS1. See Area 10 in Figure 5-11.

Table 2-2. Fish captured by electrofishing at potential Arctic Grayling spawning sites in the lower reaches of the secondary flow path from the primary study area to Lake DS1. Refer to Figure 2-13 and Figure 2-14 for locations.

Watercourse	Location	Date	Distance (m)	Electro-seconds	Ninespine Stickleback	Slimy Sculpin	Arctic Grayling	Round Whitefish
A69-DS1	**EF-S61**	6/27/2016	174	563				
	EF-S68	6/28/2016	257	658		3	2	
A71-A70	**EF-S69**	6/28/2016	238	746			3	
A72-A71	**EF-S49**	6/24/2016	80	605				
	EF-S63	6/27/2016	60	412		1		
A73-A72	**EF-S52**	6/24/2016	39	395				
A79-A72	**EF-S51**	6/24/2016	58	100				
A81-A80	**EF-S50**	6/24/2016	250	1143				1

3.0 HOOP NETTING ON POTENTIAL MIGRATION ROUTES

3.1 Methods

In 2015, large-mesh hoop nets were set at four general locations (Figure 3-1): in the outlet from Mammoth Lake (LHN1; June 19-July 4), in the narrows between Mammoth and Whale Tail Lake (LHN2 and LHN3; June 19 – July 13), at the south end of Whale Tail Lake near the mouth of tributary A18-A17 (LHN4; June 26-July 13) and at the mouth of tributary A55-A17 (LHN5, June 26-July 13). These nets were constructed of 4.75 cm stretch mesh and are 3 m long. The D-shaped front ‘hoop’ was 0.76 m high with a 0.51 m base, followed by four circular hoops, with 0.14 m diameter funnel throats attached to the first and third circular hoops. The wings were 0.76 m high and constructed of the same 4.75 cm stretch mesh. Four of these nets (nets 2, 3, 4 and 5, Table 3-1) had 3 m long wings and two (nets 1 and 6, Table 3-1) had 6 m long wings. No leaders were attached.

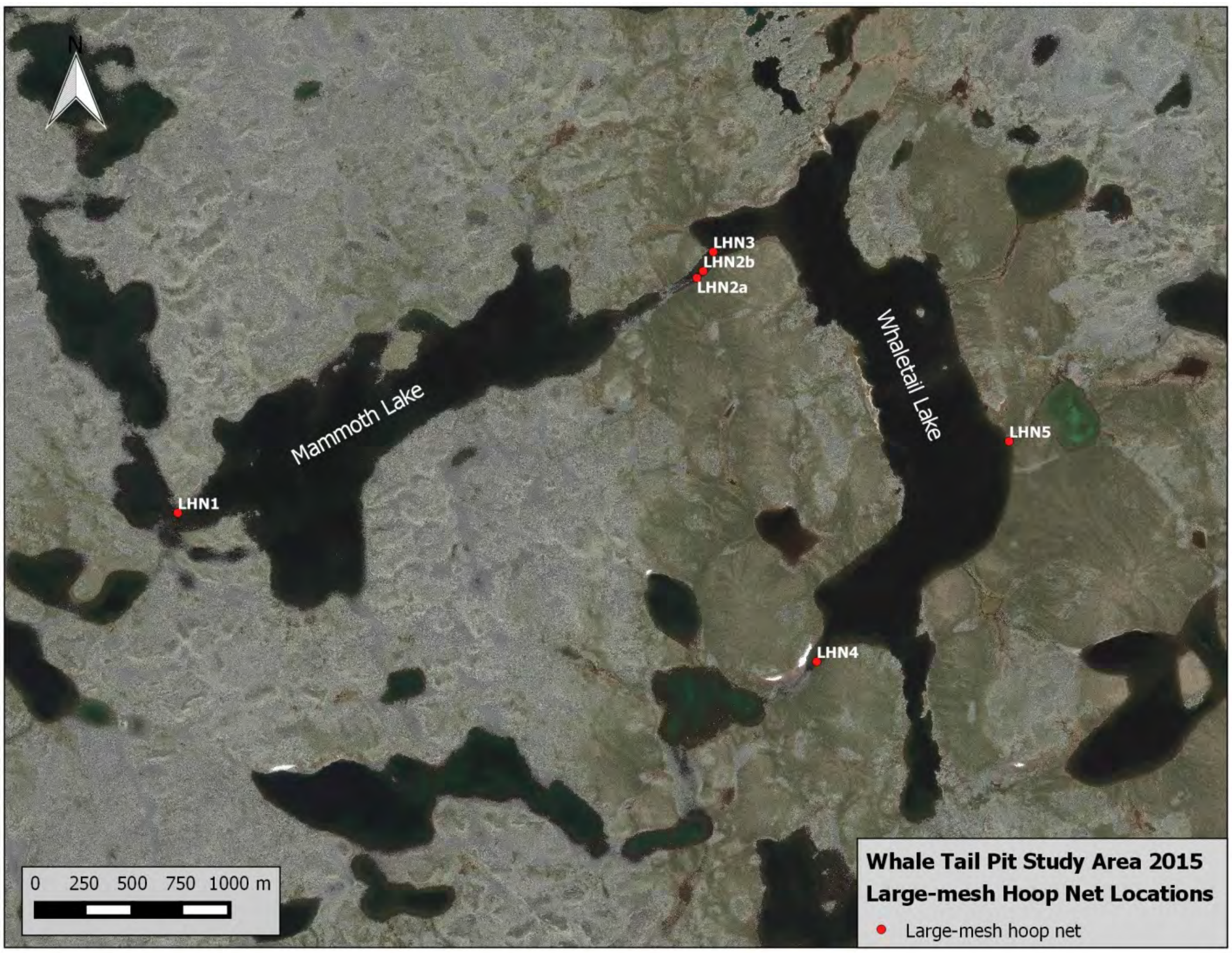


Figure 3-1. Locations where large-mesh hoop nets were set in 2015.

One net was deployed, facing downstream, in a narrows near the outlet of Mammoth Lake (LHN1) and in the narrows between Whale Tail and Mammoth lakes (LHN2a) on June 19, 2015. A second net was deployed at each of these locations, also facing downstream, on June 21, 2015. On June 27, 2015, one net at each of those locations was reversed to face upstream. At the outlet of Mammoth Lake water levels fell to below the first funnel in the net that was facing upstream between June 27 and July 3. The net was repositioned so that the funnels were all at least half submerged when it was lifted and redeployed on July 3. By July 4, 2015, however, the water level at the narrows near the outlet of Mammoth Lake had fallen to the point that there was no longer sufficient depth to deploy the large-mesh hoop nets. The two nets from that location were removed and redeployed, at Location LHN3, in the narrows between Whale Tail and Mammoth lakes, with one net facing upstream and the other facing downstream. The large-mesh hoop nets initially set in the narrows between Whale Tail and Mammoth lakes were moved to a deeper area (from LHN2a to LHN2b), approximately 50 m upstream from where they were originally deployed, on June 28, 2015. The net deployed in Whale Tail Lake near the mouth of tributary A18-A17 (LHN4) and at the mouth of tributary A55-A17 both faced downstream and remained in the same location for the duration of their deployments. The nets were typically lifted and redeployed daily, but longer soak times occurred on occasion due to weather conditions and other logistic factors.

In 2016, all six of the large-mesh hoop nets were deployed in Lake A15 at the mouth of the connecting channel from Mammoth Lake (Lake A16), to investigate the possibility of spawning Arctic Grayling or other large-bodied fish moving upstream into the primary Whale Tail Pit study area. The nets were orientated with their openings facing downstream and were placed side-by-side so that there was little or no space between the wings of adjacent nets (Figure 3-2). By clustering the hoop nets in this way it was thought that there would be a high probability of detecting any upstream migration of fish into Mammoth Lake. The nets were deployed on June 21, 2016, and were removed thirteen days later, on July 4. Water levels decreased steadily over the period of deployment and the net locations required periodic minor adjustment to ensure that the funnels were submerged. The nets were typically checked daily, but longer soak times occurred on occasion due to weather conditions and other logistic factors.

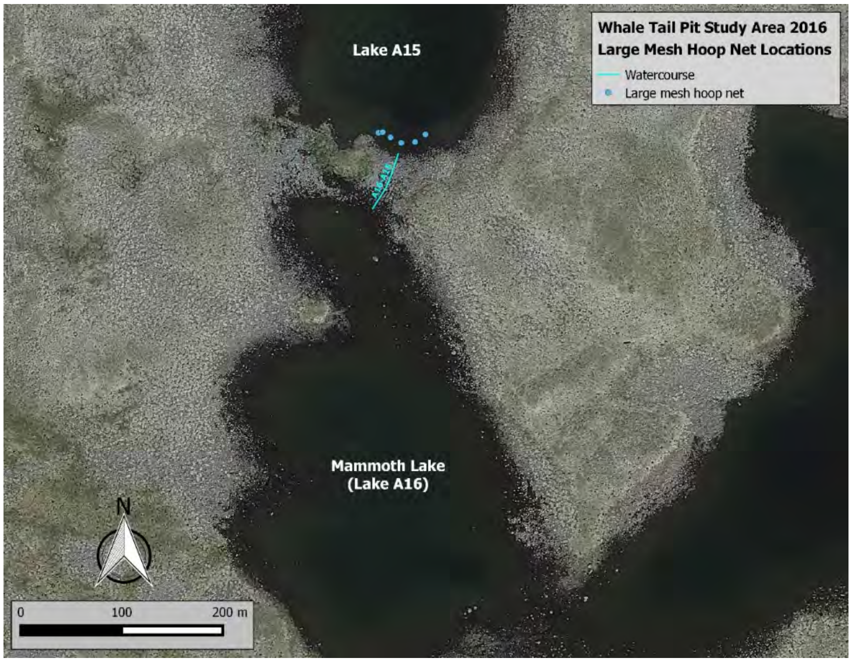


Figure 3-2. Large mesh hoop nets at the outlet of Mammoth Lake. June 21 - July 4, 2016.

3.2 Results

Dates of deployment and removal, the direction (upstream or downstream) that the opening of the net was facing, and total soak time for nets set in 2015 are provided in Table 3-1. The dates and times that each net was checked for fish are provided in Appendix A (Table A 1). In a total of 3000 hours of soak time, only two fish were captured by the large-mesh hoop nets. Both of these fish, one lake trout (fork length=69 cm) and one Arctic Char (fork length=27cm) became entangled in a wing of the net at LHN5, at the mouth of tributary A55-A17, on July 6, 2015, while the net was being checked.

In 2016, the six large-mesh hoop nets were each set for 13 consecutive days and no fish were captured. The net location coordinates and the dates and times that each net was checked for fish are provided in Appendix A (**Table A 2**).

Table 3-1. Large-mesh hoop nets locations, deployment and removal dates, net orientation and total soak time. Refer to Figure 3-1 for locations.

Location description	Location code	Net #	Opening facing	Date set	Date removed	Total soak time (days)
Narrows near outlet of Mammoth Lake	LHN1	1	downstream	June 19, 2015	July 4, 2015	15
		3	downstream	June 21, 2015	June 27, 2015	6
			upstream	June 27, 2015	July 4, 2015	7[1]
Between Whale Tail and Mammoth Lakes	LHN2a	2	downstream	June 19, 2015	June 27, 2015	8
			upstream	June 27, 2015	June 28, 2015	1
		4	downstream	June 21, 2015	June 28, 2015	7
	LHN2b	2	upstream	June 28, 2015	July 13, 2015	15
		4	downstream	June 28, 2015	July 13, 2015	15
	LHN3	1	upstream	July 4, 2015	July 13, 2015	9
		3	downstream	July 4, 2015	July 13, 2015	9
South end of Whale Tail Lake	LHN4	6	downstream	June 26, 2015	July 13, 2015	17
Whale Tail tributary A55-A17	LHN5	5	downstream	June 26, 2015	July 13, 2015	17

[1]Front funnel was not submerged when lifted on July 3.

4.0 FISH SAMPLING IN WHALE TAIL, MAMMOTH AND NEMO LAKES

In 2014 fish sampling was limited to two gill net sets in each of Whale Tail, Mammoth and Nemo Lakes. In 2015, short-duration and overnight gill netting, shoreline electrofishing and minnow trapping were undertaken to characterize the fish communities in Whale Tail and Mammoth Lakes. Two overnight sets of small-mesh hoop nets were also conducted in Whale Tail Lake in 2015. Fish sampling in Nemo Lake, which is not expected to be directly affected by the project, was limited to two gill net sets in 2015. The sampling locations are shown in Figure 4-1, Figure 4-2, and Figure 4-3 for Mammoth, Whale Tail and Nemo Lakes, respectively.

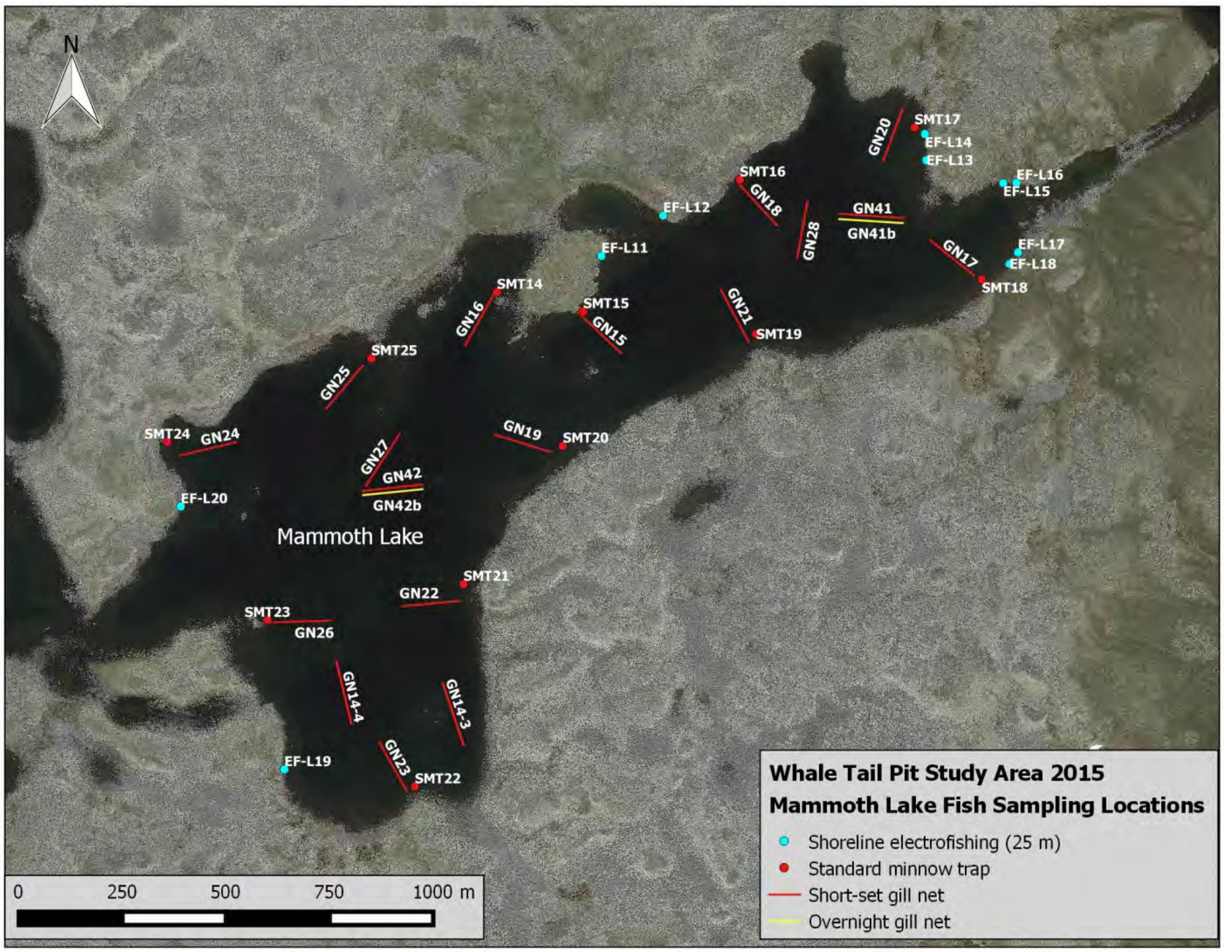


Figure 4-1. Fish sampling locations in Mammoth Lake in 2014 and 2015.

Figure 4-2. Fish sampling locations in Whale Tail Lake in 2014 and 2015.

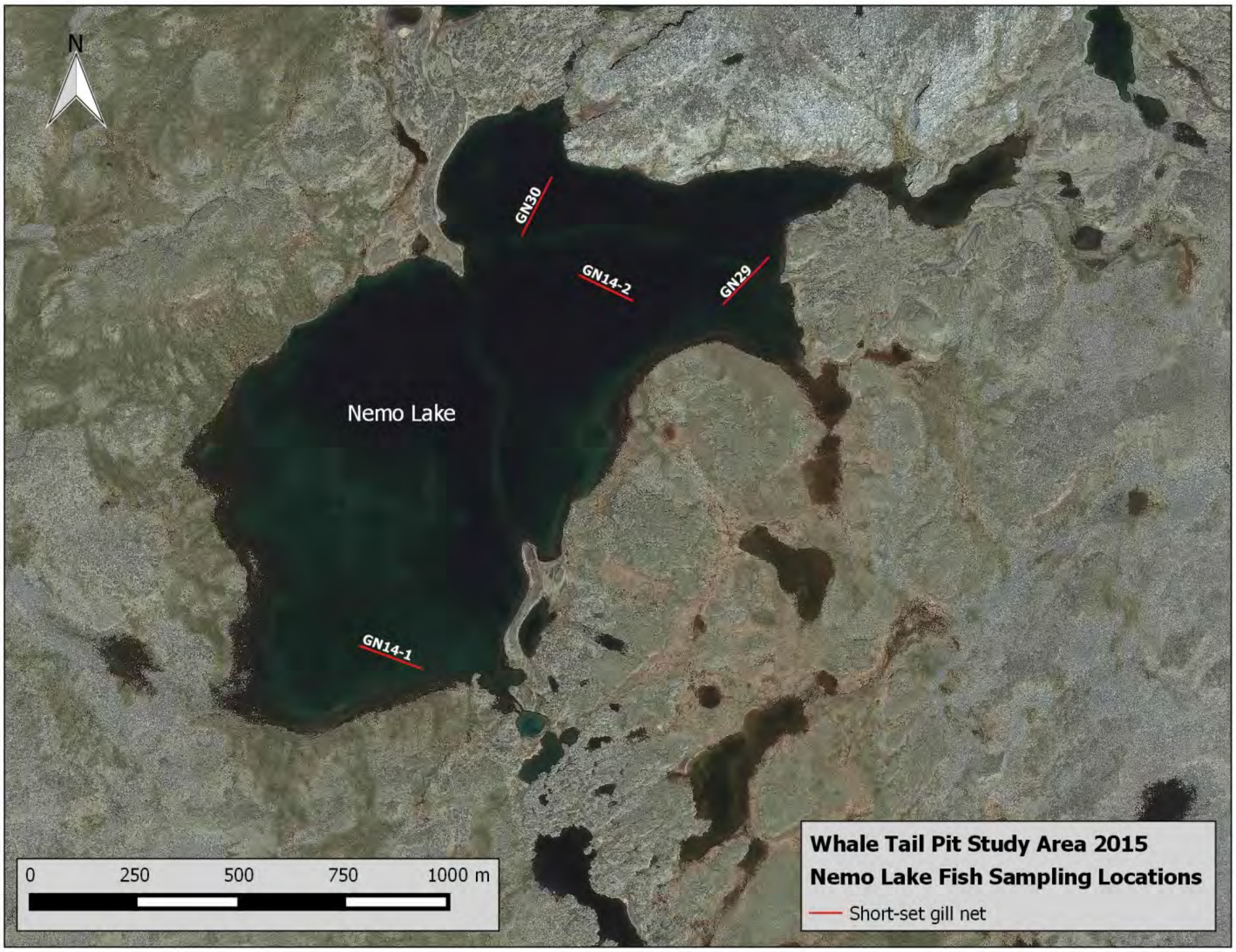


Figure 4-3. Fish sampling locations in Nemo Lake in 2014 and 2015.

4.1 Gill netting

4.1.1 Methods

All gill netting, unless otherwise noted, was conducted using standard AEM index gill nets comprised of six panels of stretched mesh (sizes 126, 102, 76, 51, 38, and 25 mm). Each panel was 1.8 m (6 feet) deep by 22.7 m (25 yards) long, so that the length of a six-panel gang was 136.4 m (150 yards).

Two daytime gill net sets were conducted in each of Mammoth Lake, Whale Tail Lake, and Nemo Lake on September 4, 5 and 6, 2014, respectively. One gill net was set in a shallow shoal area and the second was set to sample a deeper part of each lake. The date and time of deployment and lifts were recorded as were the coordinates of each end of each net, determined using a Garmin GPSmap 76CSx hand-held receiver, and the depth, determined using a portable sonar unit. The gill nets were lifted after soak times of approximately 6.5

hours (range 6.3 – 6.7 hours). Each fish captured was identified to species and, with the exception of individuals that escaped during handling, its fork length was determined to the nearest mm using a standard fish measuring board and its weight was determined to the nearest gram using a Rapala digital hanging scale. Live fish were released immediately and dead fish were retained for later disposal.

Short-duration gill netting was conducted on Whale Tail Lake on July 24-26, 2015 and on Mammoth Lake on July 28 and 29, 2015. To select the gill net locations, the shoreline of each lake was divided into 12 segments of equal length. A gill net was set in each segment, approximately perpendicular to the depth contours, within the limitations imposed by shallow areas and wind conditions. Two additional sets were located in the deepest areas of each lake for a total of 14 net sets per lake (Figure 4-1, Figure 4-2). The date and time of deployment and lifts were recorded. The coordinates at each end of each net were determined using a Garmin Oregon 650 gps, and the depth at each end was determined using a Humminbird 798ci HD SI Sonar unit. These nets were set for a mean of 2.25 hours (range 1.92 hours – 2.83 hours).

The number of individuals of each species captured in each net was recorded. Each fish was examined for external anomalies and fork length was determined to the nearest mm using a standard fish measuring board. The total weight of each individual weighing more than 500 g was determined to the nearest 10 grams using a Rapala digital hanging scale. The total weight of individuals weighing less than 500 g was determined to the nearest g, or in some cases nearest 0.1 g, using an Ohaus Scout Pro Model 6001 electronic balance. Fish that were alive were tagged with a numbered Floy tag and released.

The body cavity of dead fish was opened and the viscera were examined for any anomalies. The gonads were examined to determine the sex and maturity of the specimen. Females with opaque ovaries containing developing eggs visible with the naked eye were considered to be sexually mature. Females with translucent ovaries that did not contain eggs which were visible to the naked eye were considered to be immature. Males with opaque testes were considered to be mature, and males with small translucent testes were considered to be immature. The liver and gonads were removed and weighed to the nearest 0.1 g using an Ohaus Scout Pro Model SP6001 electronic balance. One or both otoliths and the leading ray from the right pectoral fin were taken from the majority of the dead Lake Trout for subsequent aging.

Lake Trout were aged by Louise Stanley, a fish aging expert who provides consulting services. Otoliths were mounted whole on a glass slide with CrystalBond thermoplastic adhesive, ground to the core on one side, flipped to adhere the core area to the glass, and then ground to a thin section on the other side. The proximal end of each fin ray was ground flat and then cut away from the rest of the ray with wire cutters. The flat proximal end was mounted on a glass slide with CrystalBond thermoplastic adhesive and the remaining fin ray ground away to leave a thin section. Age was estimated based on the number of annuli counted using transmitted light and a Leica GZ6 Stereo Zoom microscope. The number of annuli on fin rays and otoliths were determined independently (i.e. without reference to each other) when both were available for a fish.

One overnight gill net set was conducted on Whale Tail Lake on August 17-18 and another on August 18-19 to determine the CPUE in overnight sets and to obtain Lake Trout tissue samples for mercury and metals analysis. Unlike the short duration gill net sets which were distributed about the lakes, these nets were set in locations thought to be good Lake Trout habitat. Each of these nets was reset for several hours at the same location on the second day in order to obtain a sufficient number of samples for mercury and metals analyses. These are referred to as miscellaneous gill net sets. Two overnight gill net sets were conducted in Mammoth Lake on August 26-26, preceded by daytime (miscellaneous) sets of 5.4 and 5.5 hours duration at the same locations, also in locations considered to be good Lake Trout habitat, to obtain Lake Trout tissue samples for mercury and metals analysis.

The Lake Trout captured were euthanized with a blow to the head followed by cervical severance and processed in the same manner as dead fish from the short gill net sets. Tissue samples for mercury and metals analyses were collected from these fish as described in Section 4.6. Live Round Whitefish (*Prosopium cylindraceum*) from these nets were released without being measured, weighed or tagged.

On August 2, 2015, short duration gill net sets were conducted at two locations in Nemo Lake (Figure 4-3). Each net was lifted once and reset at the same location, resulting in a total of four net sets with a mean soak time of 3.5 hours (range 3.33 hours – 3.63 hours). The catches were processed in the same manner as for Whale Tail and Mammoth Lakes.

4.1.2 Results

The gill netting results for Whale Tail, Mammoth and Nemo Lakes are summarized in Table 4-1. The data for individual net sets are provided in Appendix A (Table A 3). Lake Trout was the most abundant species in the gill net catches in all three lakes, followed by Round Whitefish. Arctic Char were only captured in Whale Tail. Only Lake Trout were captured in Nemo Lake. CPUE in the short-duration gill net sets was higher in Mammoth Lake than in Whale Tail Lake for both Lake Trout and Round Whitefish. Lake Trout CPUE was the same in both lakes for the overnight gill net sets. This may reflect the fact that the overnight sets targeted good Lake Trout habitat unlike the short-duration sets, which were distributed more or less evenly around the lakes.

The data for individual fish captured in gill nets are provided in Appendix A (Table A 4 and Table A 5). The length distributions of Lake Trout captured by gill nets in 2015 differed between Whale Tail and Mammoth Lakes (Figure 4-4), with individuals 400 mm or shorter accounting for 81% of the catch in Mammoth Lake and only 36% of the catch in Whale Tail Lake. The Lake Trout age distributions in 2015 catches are consistent with the length distributions, with Lake Trout 15 years of age or younger, based on otolith ages, dominant in the catches from Mammoth Lake, and Lake Trout older than 15 years of age dominant in the Whale Tail Lake catches Figure 4-5. As is typically the case, ages determined from fin rays tended to be younger than those determined from otoliths (Figure 4-6). There were too few individuals of other species captured to allow meaningful comparisons of length distributions to be made.

Table 4-1. Summary of gill net catches and catch per unit effort (CPUE; number of fish caught per hour of soak time), by lake, year, set duration and species.

Lake and year	Set duration	Number of sets	Total soak time (hours)	Lake Trout		Arctic Char		Round Whitefish	
				catch	CPUE	catch	CPUE	catch	CPUE
Whale Tail 2014	miscellaneous	2	12.7	5	0.39	1	0.08	0	0.00
Mammoth 2014	miscellaneous	2	13.2	13	0.98	0	0.00	0	0.00
Nemo 2014	miscellaneous	2	13.3	15	1.13	0	0.00	0	0.00
Whale Tail 2015	short-duration	14	30.5	5	0.15	1	0.03	3	0.09
	overnight	2	34.1	23	0.67	0	0.00	2	0.06
	miscellaneous	3	12.2	1	0.08	0	0.00	0	0.00
	all	19	76.8	29	0.38	1	0.01	5	0.07
Mammoth 2015	short-duration	14	32.5	8	0.25	0	0.00	16	0.59
	overnight	2	35.8	24	0.67	0	0.00	4	0.11
	miscellaneous	2	10.9	4	0.37	0	0.00	0	0.00
	all	18	79.2	36	0.45	0	0.00	20	0.25
Nemo 2015	miscellaneous	4	14.06	7	0.50	0	0.00	0	0.00

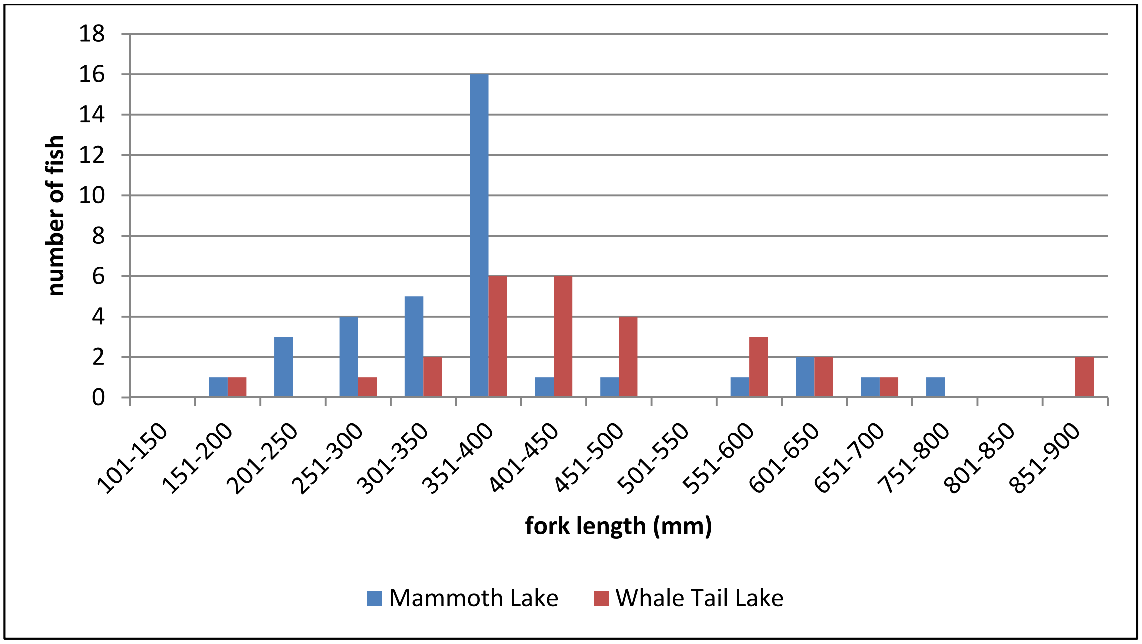


Figure 4-4. Length-frequency distributions of the Lake Trout captured by gill netting in Whale Tail and Mammoth Lakes in 2015.

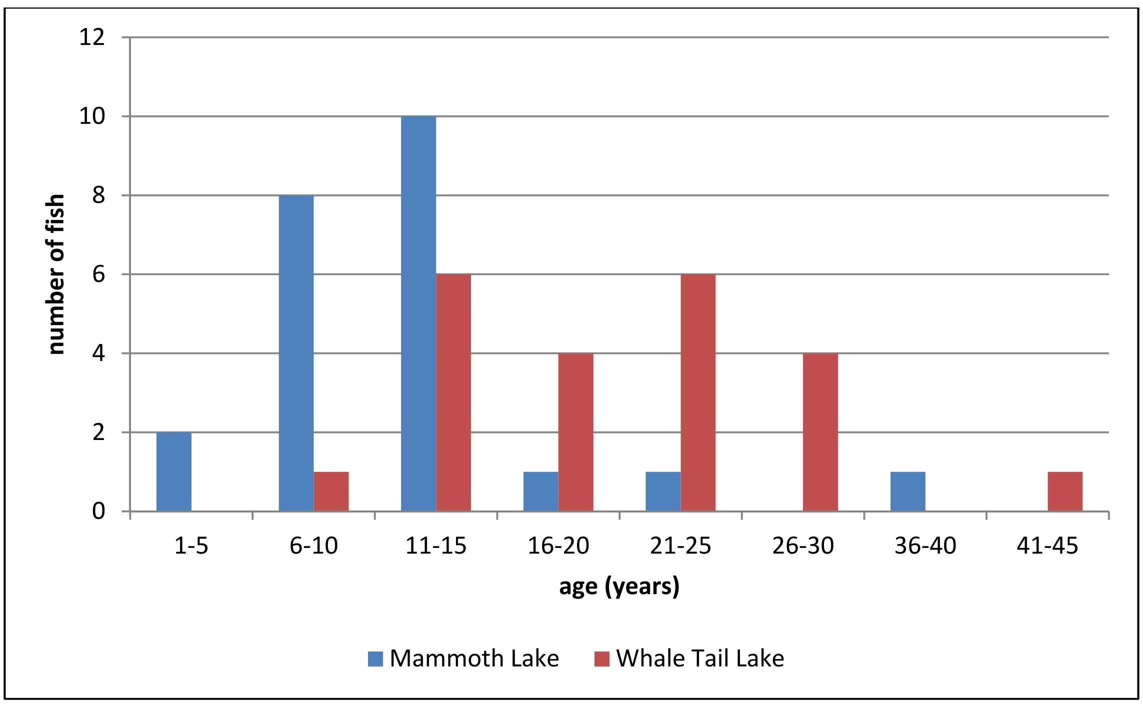


Figure 4-5. Age-frequency distributions, based on otolith ages, of Lake Trout from Mammoth and Whale Tail Lakes.

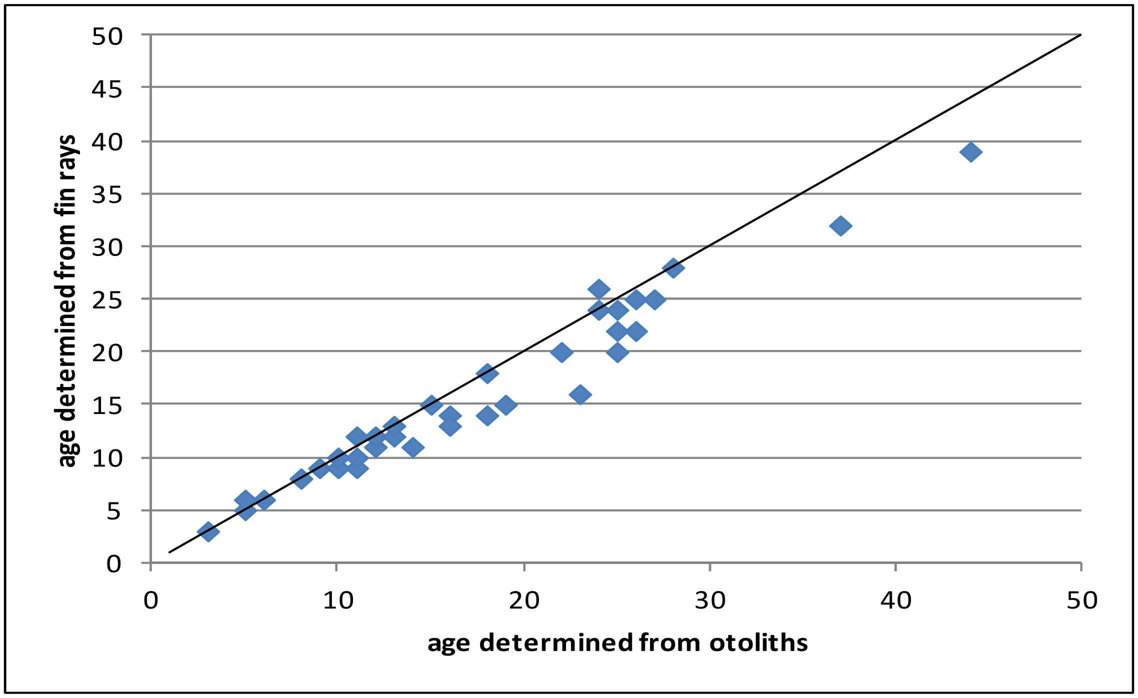


Figure 4-6. Lake Trout ages for individual fish determined from fin rays versus those determined from otoliths. The black line represents identical ages determined from both structures.

4.2 Shoreline Electrofishing

4.2.1 Methods

Shoreline electrofishing was conducted at 10 locations in Whale Tail Lake (Figure 4-1) on July 26-27 and at ten locations in Mammoth Lake on July 29-30 (Figure 4-2). The locations were selected with the objective of distributing them as widely as possible on each lake while taking safety considerations (substrate and slope) into account. At each location, 25 m was measured along the shoreline and a transect extending approximately 4 m out from the shore, was electrofished over the 25 m distance. The coordinates of the start location were determined with a Garmin Model 650 gps. The dominant substrate materials were visually identified and noted and each location was photographed. One member of a two-person crew operated the Halltech Model 200T backpack electrofisher, set at 950 volts and 60 hertz, and the second person netted immobilized fish with a dip net. The number of electroseconds was recorded at each location. The fish captured at each location were identified to species in the field. Ninespine Stickleback (*Pungitius pungitius*) were euthanized and retained for metals analyses (see Section 4.6). The other species captured were counted and released.

4.2.2 Results

The shoreline electrofishing effort and catches are summarized in Table 4-2. The data for individual transects are provided in Appendix A (Table A 6). The numbers of fish captured were similar between the two lakes. Ninespine Stickleback was the most frequently caught species in both lakes, followed by Slimy Sculpin (*Cottus cognatus*). Two juvenile salmonids were captured in Whale Tail Lake and one was captured in Mammoth Lake. All three are thought to have been Arctic Char based on their parr marks, where the width of the dark areas along the lateral line is greater than the width of the light areas (McPhail and Lindsey, 1970), and the sparsity of melanophores on the lower jaw. Catches were highly variable among individual transects, ranging from none to 15 for Ninespine Stickleback and none to six for Slimy Sculpin and did not appear to correlate with substrate.

Table 4-2. Number of individuals captured by electrofishing ten 25-meter long segments (250 m total) of shoreline in Whale Tail Lake and Mammoth Lake on July 26-27 and July 29-30, 2015, respectively. The juvenile salmonids were most likely Arctic Char.

Lake	Total e-seconds	Ninespine Stickleback	Slimy Sculpin	juvenile salmonids
Mammoth	3922	41	13	1
Whale Tail	3403	55	14	2

4.3 Minnow Traps

4.3.1 Methods

Unbaited standard (Gee) minnow traps were deployed at 13 locations in Whale Tail Lake (Figure 4-2) on July 25, 2015, lifted and redeployed on July 26, and lifted and removed on July 27. Unbaited standard (Gee) minnow traps were deployed at 12 locations in Mammoth Lake (Figure 4-1) on July 28, 2015, and lifted and removed on July 29. The date and time of deployments and lifts were recorded and the coordinates at each trap location were determined using a Garmin Oregon 650 gps. Depth was estimated visually if the depth was 1.5 m or less and determined using a Humminbird 798ci HD SI Sonar unit if the depth was greater than 1.5 m. The dominant substrates at each set location were visually assessed.

4.3.2 Results

The standard minnow trap effort and catch data are summarized in Table 4-3 and the data for individual sets are provided in Appendix A (Table A 7). Mean soak time per set was 22.7 hours in Mammoth Lake and 22.5 hours in Whale Tail Lake. Total soak time was 273 hours in Mammoth Lake and 586 hours in Whale Tail Lake. The total catches were one Ninespine Stickleback in Mammoth Lake and one Slimy Sculpin in Whale Tail Lake.

Table 4-3. Number of overnight sets, mean and total soak time, and total catch for overnight sets of standard minnow traps set in Mammoth Lake (July 28-29) and Whale Tail Lake (July 25-27).

Lake	Number of overnight sets	Mean soak time (hours)	Total soak time (hours)	catch	
				Slimy Sculpin	Ninespine Stickleback
Whale Tail	26	22.5	586.0	1	0
Mammoth	12	22.7	273.0	0	1

4.4 Fine-mesh hoop nets

4.4.1 Methods

Fine-mesh hoop nets, 2.5 m long, were constructed of 1.27 cm stretch mesh with two 1 m diameter hoops and a third 0.75 m diameter hoop at the rear of the trap. These nets had 4 m long by 1 m high wings and a 10 m long by 1 m high leader of the same 1.27 cm stretch mesh. Two of these nets were deployed for one overnight set each in Whale Tail Lake on August 18-19, 2015. Set locations, shown in Figure 4-2, were selected where the substrate was sand and gravel, adjacent to areas of cobble and boulder substrate. The lead was set perpendicular to the shoreline, with the trap located at the offshore end.

4.4.2 Results

The fine-mesh hoop net at FHN1 caught one Round Whitefish (fl=2.7 cm). One Round Whitefish (fl=12.3 cm) and one Slimy Sculpin were captured at FHN2. The set locations, dates and times, depth, substrate and catches are provided in Appendix A (Table A 8).

4.5 Lake Trout Spawning Habitat Assessment and *In Situ* Underwater Video Monitoring

4.5.1 Methods

Potential Lake Trout spawning locations were investigated in Whale Tail Lake during August 27-31, 2016. Lake Trout typically spawn at water temperatures of 8.9 to 13.9°C (Scott and Crossman, 1973) over substrates of rounded or angular cobble/rubble, 4-40 cm in size, and substrate depths of >30 cm with little sediment infilling (Fitzsimons, 1994). The water depth at spawning locations appears to be related to lake size and water level fluctuations, but Fitzsimons (1994) found that 98% of spawning shoals were in water <4.8 m deep, and averaged 1.5 m deep. In the Whale Tail pit study area the formation of thick ice (2 m) during the winter must be taken into account and so suitable spawning substrate in water less than 2 m deep was not considered viable. Lake Trout also tend to spawn in areas associated with a slope, where spawning occurs near the top of the slope, and which spawning fish access by moving up the slope itself (Fitzsimons, 1994). Locations in Whale Tail Lake which combined the above habitat attributes were located using a combination of sidescan sonar, towed underwater video, and observation from the surface, and were georeferenced with a Garmin GPSmap76CSx gps unit.

Lake Trout spawning is most frequently observed after dark, and the usual method of identifying active spawning shoals is to look for spawning Lake Trout by slowly patrolling the potential spawning locations with powerful lights in a boat after dark. However, due to the safety concerns, night work from a boat was not appropriate. Therefore, an alternative strategy was developed in which so-called "action" or "sport" video cameras (Wasp Waspcam Tack Camera) were deployed underwater with a view of an identified potential spawning shoal. The camera mode was set to commence recording when motion was detected and to record for one minute after the camera ceased to detect movement. All of the deployments were overnight, but the motion detection did not function and the video cameras did not record when it was dark. Each camera was attached to a heavy metal base, and had an external battery pack with sufficient capacity to allow video recording throughout each deployment.

Video cameras were deployed during the period August 27 – 31, 2016. The deployment and retrieval dates and times were recorded. The water depth at each deployment was determined using a Humminbird 798ci HD SI sonar unit and the coordinates were determined using a Garmin GPSmap76CSx gps unit. The recorded video was subsequently reviewed. The start and stop dates and times of each video segment and the number and the species of fish observed were determined, when possible. It was not possible to distinguish among individual fish, so a ’fish observation’ was recorded each time a fish entered the video frame, regardless of whether it appeared likely it was the same individual(s) seen previously. Adult Lake Trout were distinguished from juvenile Lake Trout with parr marks. Several juvenile salmonids with parr marks could not be identified to species from the video footage. In a few video segments Ninespine Stickleback were abundant and were simply recorded as “multiple” rather than as a specific number.

4.5.2 Results

Most of the nearshore area of Whale Tail Lake has coarse substrates, much of which has significant proportions of cobble and boulder and, therefore, could potentially be used by Lake Trout for spawning. Areas with open cobble and/or boulder and/or coarse gravel, with no fine material or excessive epiphytic growth, and located at a suitable depth along the edge of a slope to deeper areas of the lake, were identified as locations with the highest potential for Lake Trout spawning (Figure 4-7). All in situ video deployments were at locations (Figure 4-8) that met those criteria except for V11 which was on sand and gravel with a thin surface layer of fine organic debris or silt and was intended to be a ‘negative control’. The coordinate of the deployments are provided in Appendix A (Table A 9).

Figure 4-7. Locations in Whale Tail Lake with high potential for Lake Trout spawning based on the habitat characteristics.

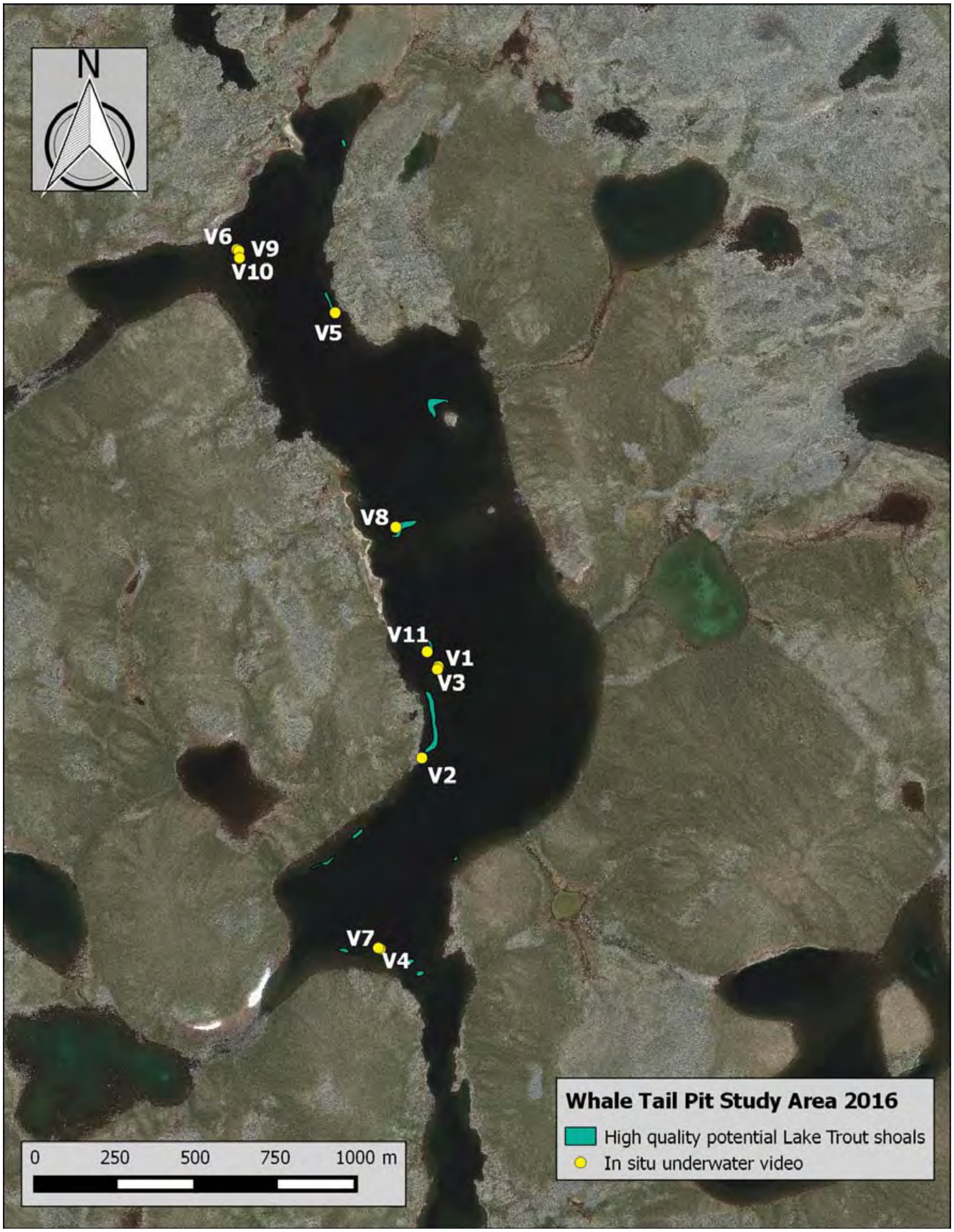


Figure 4-8. Locations of in situ underwater video monitoring. August 27-31, 2016.

The water temperature at the outlet of Whale Tail Lake during the deployment period, logged at 15 minute intervals was 8.6 – 11.1°C (refer to Section 7.0).

During deployment V6 the camera failed and no video was recorded. During deployment V8 the camera ceased to function during the night and therefore did not record video in the morning, but footage was recorded from deployment until dusk. The cameras were functioning throughout all of the other deployments.

The results of the video observations are summarized in Table 4-4. Fish were observed in video from all of the deployments except V6 (when the camera failed) and V11, which was the one deployment on fine substrate. Adult Lake Trout were observed most often and were present in video from seven deployments, with up to 33 adult observations per deployment. Lake Trout parr were observed in video from three deployments and unidentified salmonid parr were observed in video from two. Ninespine Stickleback were observed in video from three deployments and multiple individuals could be seen at one time in one or more video segments from two of those deployments. Slimy Sculpin and Round Whitefish were each observed in video from one deployment.

No Lake Trout releasing gametes or exhibiting shuddering or gaping were recorded on video. On four occasions two or three adult Lake Trout were observed in close proximity to one another (i.e. were visible at the same time) and on two separate video segments from deployment V8 one fish was clearly following another. The following fish appears to be a male. Following behavior is a component of Lake Trout spawning behavior but does not necessarily occur only during spawning.

Table 4-4. Video camera deployment depth, date and time, deployment duration, and number of fish observed.

Deployment ID	Depth (m)	Deployment Date	Deployment Time	Deployment duration (hh:mm)	Lake Trout		LakeTrout or Arctic Char parr	Slimy Sculpin	Ninespine Stickleback	Round Whitefish parr
					adult	parr				
V1	**2.1**	27/08/16	**15:34**	17:53	19	9	15	4	abundant	1
V10	**2.5**	30/08/16	**15:40**	15:37	33	1				
V11	**2.2**	30/08/16	**16:13**	15:13						
V2	**1.5**	27/08/16	**16:37**	17:30	2					
V3	**2**	28/08/16	**15:52**	17:16	2	8	6			
V4	**1.4**	28/08/16	**16:04**	16:56	21					
V5	**1.8**	28/08/16	**16:31**	14:53					multiple	
V6	**1.9**	28/08/16	**16:43**	failed						
V7	**1.5**	29/08/16	**15:05**	16:29	2					
V8	**2.4**	29/08/16	**15:52**	4:52 (stopped recording)	7					
V9	**1.8**	29/08/16	**16:03**	15:13					6	
Total					**86**	**18**	**21**	**4**	**na**	**1**

4.6 Fish Tissue Samples for Mercury and Metals Analyses

4.6.1 Methods

Samples of skinless, boneless dorsal muscle were collected from 23 lake trout from Whale Tail Lake and 25 lake trout from Mammoth Lake and analyzed for total mercury. A second sample of skinless, boneless dorsal muscle was collected from a subset of ten of the same Lake Trout from each lake and analyzed for a suite of metals. The muscle samples were removed from each fish using a standard filleting knife and individually sealed in Whirl-Pak bags. The sealed Whirl-pak bags were sealed inside larger Ziplock bags and frozen in a -20°C freezer. The frozen samples were subsequently transported to Guelph, Ontario, in coolers with ice packs and held at -20°C prior to shipping to ALS Laboratories in Burnaby, BC, in coolers with dry ice.

Seven and eight composite samples, each composed of 4 to 6 Ninespine Stickleback, were submitted for metals analysis from Whale Tail Lake and Mammoth Lake respectively. The total length in mm was determined for each individual using a standard fish measuring board and the total weight to the nearest 0.1 g was determined for the individuals in all but one of the composite samples using an Ohaus Scout Pro Model 60001 electronic balance. The number of individuals and the total length in mm of the largest and smallest individual in each composite sample are presented in Table 4-5. The composite samples were sealed in individual whirl-pak bags and frozen in a -20°C freezer. The samples were transported to Guelph, Ontario, in a cooler with frozen ice packs, and then stored in a -20°C freezer until they were shipped to ALS Laboratories in Burnaby, BC, in a cooler with dry ice. The laboratory methods, provided by ALS Laboratories, are provided in Appendix C.

Table 4-5. Number of and minimum and maximum fork length of Ninespine Stickleback in composite samples analyzed for metals.

Lake	Sample #	Number of individuals	minimum total length (mm)	maximum total length (mm)
Whale Tail	Composite # 1	5	53	68
	Composite # 2	5	45	55
	Composite # 3	5	40	46
	Composite # 4	5	37	41
	Composite # 5	5	36	45
	Composite # 6	5	31	40
	Composite # 7	8	30	47
Mammoth	Composite # 8	6	39	70
	Composite # 9	5	45	59
	Composite # 10	5	43	51
	Composite # 11	5	42	46
	Composite # 12	5	41	45
	Composite # 13	5	37	44
	Composite # 14	5	34	41
	Composite # 15	4	30	35

4.6.2 Results

The metal concentrations were determined by ALS Laboratories. The methods used to determine mercury and metals concentrations in the tissues and the results of those analyses, provided by ALS Laboratories, are presented in Appendix C. Due to a labelling error, two of the Lake Trout samples from Whale Tail Lake that were analyzed for mercury cannot be related to an individual fish. For the remaining Lake Trout samples the sample number corresponds to the fish numbers in Table A 4.

5.0 TRIBUTARY INVESTIGATIONS

In 2015, habitat was characterized in the tributaries to Whale Tail and Mammoth Lakes and fish sampling was conducted in the direct tributaries of Whale Tail and Mammoth Lakes that had surface flow and appeared capable of supporting fish during the open-water season. In most cases, these watercourses were walked from Whale Tail and Mammoth Lakes to the next lake upstream, often while electrofishing, to search for spawning grayling or potential grayling spawning habitat during the latter part of June. Most of the watercourses that are directly tributary to Whale Tail Lake were electrofished in the latter part of June, in early July, and again in August to search for young-of-the-year (YOY) fishes and to characterize the stream habitat under low flow conditions. Digital photographs were taken of representative habitats. Large minnow traps were deployed in the lower reaches of several of these watercourses during the early part of the field season, in an attempt to capture fishes moving into these watercourses during the spring. Other direct tributaries of Whale Tail and Mammoth Lakes that were smaller and unlikely to provide upstream fish passage, as well as indirect tributaries located farther upstream were examined visually at least once during the 2015 open-water season. All of these additional tributaries were characterized with respect to habitat and photographed, and several were electrofished.

In 2016, field investigations in the tributaries to Whale Tail Lake included fish sampling, habitat characterization, and temperature monitoring. Most of the watercourses that are directly tributary to Whale Tail Lake were electrofished in the latter part of June, in early July, and again in August. Large minnow traps were deployed in the lower reaches of two continuously-flowing, but very narrow, watercourses at the north end of Whale Tail Lake during the early part of the field season, in an attempt to capture fishes moving into these watercourses during the spring. Gill nets were deployed across the lower reaches of the three largest watercourses entering Whale Tail Lake during the early part of the field season, also in an attempt to capture fishes moving into these watercourses during the spring.

Also in 2016, a quantitative habitat assessment was conducted on eleven watercourses that are direct tributaries of Whale Tail Lake or indirect tributaries (i.e. flow into other lakes or ponds that drain to Whale Tail Lake). Wetted width, depth, substrate, habitat type (pool, run, riffle), and in-stream vegetation were determined using a point-transect approach.

5.1 Habitat Characterization

5.1.1 Methods

Field observations of habitat characteristics including channel form, flow conditions, and substrate were recorded and photographs were taken. A Garmin Oregon 650 hand-held GPS unit was used to record the location of all observations and photographs, and aid in the distance measurements. Stream length was measured from an orthorectified aerial photograph taken on July 21, 2011, using GIS.

Flow was characterized as “surface” when water was present above the substrate and “interstitial” when surface flow was absent but there was water flowing through the interstitial spaces among boulders and cobbles. Typically, there were multiple observations of the state of flow over the open water season.

The dominant watercourse types were characterized as boulder or graminoid, examples of which are shown in Figure 5-1. Boulder habitats occur where the watercourse flows within a boulder deposit and in these watercourses the interstitial spaces are often sufficient to convey all of the flow, at least seasonally. In some of these watercourses there is no surface water visible along some or all of their length, even during the spring freshet. Graminoid habitats are typically found where finer substrates dominate. The banks are defined by graminoid vegetation and surface flow is typically present unless the stream goes dry. Some watercourses are a combination of both habitat types.

Channel configuration was characterized as single (one defined flow path), multiple (more than one defined flow path), or poorly defined (no obvious, defined flow path, suggesting that surface flow is ephemeral). Dominant and sub-dominant substrates were characterized based on particle size, following the modified Wentworth scale (Wentworth, 1922), with the additional category “peat”, which is a cohesive mat of vegetation-derived organic material that was the substrate in a number of the smaller watercourses.

5.1.2 Results

The watercourse characteristics are summarized in Table 5-1 and photographs of each are provided in Appendix B. Coarse substrates dominated and gravel substrate which might be suitable for Arctic Grayling spawning was relatively uncommon. Several of the watercourses were observed to have only interstitial flow, which would prevent the passage of large fish, during part or all of the open-water season.

Figure 5-1. Examples of the stream habitat types encountered. The top row is boulder. The middle row is a mixture of boulder and graminoid. The bottom row is multiple channel graminoid (left) and single channel graminoid (right).

Table 5-1. Habitat characteristics and length of watercourses examined during the 2015 field season. Refer to Error! Reference source not found. for lake identification codes. Watercourse ID is assigned as "downstream lake code-upstream lake code".

Water-course ID	Flow characteristics	Channel configuration	Dominant habitat	Substrate in order of dominance	Length (m)
A0-A48	Surface flow	Single	Graminoid	Peat with occasional patch of cobble.	357
A113-A47	Surface flow on June 28. Dry on August 1.	Poorly defined	Graminoid	Peat/tundra	198
A16-A15	Surface flow during high lake water levels in spring. Interstitial flow during lower summer and fall water levels.	Single	Boulder	Boulder/ cobble	60
A17-A16	Surface flow during high lake water levels in spring. Interstitial flow during lower summer and fall water levels.	Single	Boulder	Boulder/ cobble	172
A18-A17	Shallow surface flow during spring freshet. Only interstitial flow by August.	Single	Boulder	Boulder/ cobble with 3 small patches of gravel	296
A19-A18	Shallow surface flow during spring freshet. Interstitial sections on July 9.	Single	Boulder/ graminoid	Cobble/ boulder with tundra hummocks	338
A20-A19	Surface flow during spring freshet. Interstitial flow July 9.	Single	Boulder	Cobble/ boulder	78
A21-A20	Surface flow during spring freshet. Interstitial flow during lower summer lake water levels.	Single	Boulder	Boulder/ cobble	40
A22-A21	Interstitial flow	Single	Boulder	Boulder/ cobble	285
A23-A22	Interstitial flow	Not visible	Boulder	Boulder/ cobble	396
A43-A16	Interstitial	Not visible	Boulder	Boulder/ cobble	199
A45-A16	Interstitial	Not visible	Boulder	Boulder/ cobble	446
A46-A17	Surface flow	Multiple	Graminoid	Peat substrate in some sections and cobble/ boulder/gravel/sand in others	206
A47-A46	Surface flow	Multiple	Graminoid	Peat substrate in some sections and cobble/ boulder/gravel/sand in others	43
A48-A47	Surface flow	Multiple. Poorly defined	Graminoid	Peat	53

Water-course ID	Flow characteristics	Channel configuration	Dominant habitat	Substrate in order of dominance	Length (m)
A49-A17	Surface flow only during spring freshet. Interstitial flow.	Single	Boulder	Cobble/ boulder over bedrock	214
A49-A47	Not a watercourse				
A50-A17	Surface flow	Single near downstream lake. Multiple and poorly defined upstream	Graminoid	Lower 100 m section of watercourse with single channel has sand/cobble/gravel substrate. Upstream is primarily peat.	509
A53-A17	Surface flow	Multiple	Graminoid	Mainly peat with cobble/ boulder/gravel patches	577
A54-A53	Interstitial	Not visible	Boulder	Boulder/ cobble.	518
A55-A17	Surface flow in spring and early summer, but some short sections had become interstitial by the end of August	Multiple, with one main channel and a few smaller side channels	Graminoid	Cobble/ boulder. Total of ~5 m^2 of gravel	195
A56-A55	Sections of surface flow. Sections of interstitial flow.	Multiple. Poorly defined.	Boulder/ graminoid	Boulder/ cobble, with tundra in places.	610
A59-A17	Surface flow	Multiple	Graminoid	Peat with embedded boulder/cobble and 5 patches of gravel	205
A60-A59	Surface flow in graminoid sections. Interstitial flow in boulder sections	Multiple	Graminoid/ boulder	Peat/cobble/ boulder/near Lake 59. Then boulder/ cobble.	510
A62-A17	Surface flow during spring freshet and on July 7, but likely dry later in summer based upon vegetation.	Poorly defined	Graminoid	Peat/tundra	86
A63-A18	Surface flow during spring freshet and on July 5.	Multiple	Graminoid	Peat with 2 small areas of cobble/gravel/sand	122
A65-A17	Surface flow at isolated locations, but predominantly interstitial flow.	Single. Poorly defined	Boulder	Boulder/ cobble	176
A-P21-A52	Interstitial flow, except for short section of surface flow	Single	Boulder	Boulder/ cobble/peat	371

Water-course ID	Flow characteristics	Channel configuration	Dominant habitat	Substrate in order of dominance	Length (m)
A-P23-A17	Surface flow in June. Dry by mid-July.	Single	Boulder/ graminoid	Gravel/cobble in upstream section. Cobble/gravel/peat in mid-section, and then cobble/ boulder near Lake A17.	122
A-P38-A47	Surface flow on June 19. Dry on August 1.	Single. Poorly defined	Graminoid	Peat	157
A-P54-A-P23	Surface flow during spring freshet in downstream peat section, but predominantly interstitial flow. Dry by mid-July.	Single. Poorly defined	Boulder/ graminoid	Boulder/ cobble/peat	208

5.2 Quantitative Tributary Habitat Assessment

5.2.1 Methods

In 2016, habitat was characterized in ten watercourses using a point-transect approach that was based on the Ontario Stream Assessment Protocol (Stanfield, 2013). Wetted width, depth, substrate, habitat type (pool, run, riffle), and in-stream vegetation were determined along equidistant transects across the watercourses. The transects were a minimum of ten metres apart and for streams over 100 m long the distance between transects was determined by dividing the length of the stream, estimated using GIS, by 10. The first transect was established approximately one half of the inter-transect distance from the downstream waterbody and the location of subsequent transects was determined by measuring the inter-transect distance along the bank of the watercourse with a tape measure. The coordinates of one end of each transect (on the right bank, when facing upstream) were determined using a Garmin Oregon 650 hand-held GPS.

At each transect location a tape measure was stretched across the watercourse, perpendicular to the direction of flow. The wetted-width of each channel along the transect was measured to the nearest 0.01 m. Total wetted width at each transect was calculated by summing the wetted widths of all of the channels present. Depth, habitat type, substrate and in-stream vegetation were determined at three (in channels less than 1 m wide) or five (in channels 1 m or more wide) approximately equidistant locations across each channel. Depth was measured to the nearest 0.01 m using a metre stick. Substrate at each point was characterized following a modified Wentworth scale (Wentworth, 1922), with the additional category “peat”, which is a cohesive mat of vegetation-derived organic material that was the substrate at many locations. In-stream vegetation was characterized as none if there was no vegetation present, graminoid if herbaceous vegetation (typically grasses) was present, or shrub. The habitat data were entered into Excel©.

5.2.2 Results

The results of the watercourse characterizations are summarized in Table 5-2, Table 5-3, Table 5-4 and Table 5-5. Mean total wetted width ranged from 0.7 m to 7.6 m (Table 5-2). Mean depth ranged from 6 cm to 17 cm and the maximum depth measured in any watercourse was 43 cm (Table 5-2). The habitat was primarily flats or riffles, with few pools in most of the watercourses (Table 5-3). Peat was the dominant substrate in the majority of the watercourses and only watercourse A55-A17 was dominated by coarse substrates (Table 5-4). Where in-stream vegetation was present it was nearly always graminoid in nature (Table 5-5). A shrub was present at just one point where in-stream vegetation was characterized.

Table 5-2. Number of and distance between transects, maximum number of channels per transect, mean total (sum of all channels) wetted width, number of depth measurements and mean and maximum depth.

Watercourse	Number of transects	Distance between transects (m)	Maximum number of channels	Mean total wetted width (m)	Number of depth measurements	Mean depth (cm)	Maximum depth (cm)
A0-AP48	8	40	2	2.5	44	8	30
A47-A46	4	10	1	2.0	20	9	21
to A47	4	10	1	3.4	18	6	12
A50-A17	12	18	2	0.7	41	9	26
A53-A17	11	48	8	7.6	104	7	27
A55-A17	10	16	3	5.4	74	17	43
A55-A17 (b)	11	16	2	7.2	69	17	36
A59-A17	10	10	8	6.7	164	9	20
A62-A17	11	10	2	1.2	39	6	42
A63-A18	10	10	2	2.8	55	7	22
SA46-A17	12	15	2	1.9	70	11	36

Table 5-3. Proportion of each watercourse that was flats, riffles, or pools.

Watercourse	Proportion flats	Proportion riffles	Proportion pools
A0-AP48	63.6%	22.7%	13.6%
A47-A46	50.0%	25.0%	25.0%
A49-A47	83.3%	16.7%	0.0%
A50-A17	48.8%	36.6%	14.6%
A53-A17	62.5%	34.6%	2.9%
A55-A17	24.3%	75.7%	0.0%
A55-A17 (b)	11.6%	88.4%	0.0%
A59-A17	24.4%	72.0%	3.7%
A62-A17	76.9%	15.4%	7.7%
A63-A18	60.0%	30.9%	9.1%
SA46-A17	64.3%	28.6%	7.1%

Table 5-4. Proportion of substrate determinations in each watercourse belonging to each substrate type.

Watercourse	Peat	Boulder	Cobble	Gravel	Sand	Bedrock
A0-AP48	75.0%	0.0%	2.3%	2.3%	20.5%	0.0%
A47-A46	70.0%	5.0%	5.0%	10.0%	0.0%	10.0%
A49-A47	88.9%	0.0%	0.0%	0.0%	11.1%	0.0%
A50-A17	51.2%	0.0%	19.5%	17.1%	12.2%	0.0%
A53-A17	90.4%	0.0%	3.8%	5.8%	0.0%	0.0%
A55-A17	10.8%	5.4%	77.0%	6.8%	0.0%	0.0%
A55-A17 (b)	10.3%	11.8%	61.8%	16.2%	0.0%	0.0%
A59-A17	85.4%	0.0%	14.0%	0.6%	0.0%	0.0%
A62-A17	28.2%	2.6%	12.8%	28.2%	28.2%	0.0%
A63-A18	78.2%	5.5%	14.5%	1.8%	0.0%	0.0%
SA46-A17	72.9%	4.3%	15.7%	5.7%	1.4%	0.0%

Table 5-5. Proportion of in-stream vegetation determinations in each watercourse belonging to each vegetation type.

Watercourse	Graminoid	None	Shrub
A0-AP48	50.0%	50.0%	0.0%
A47-A46	6.3%	93.8%	0.0%
A49-A47	44.4%	55.6%	0.0%
A50-A17	53.7%	46.3%	0.0%
A53-A17	93.3%	6.7%	0.0%
A55-A17	9.5%	90.5%	0.0%
A55-A17 (b)	13.2%	85.3%	1.5%
A59-A17	73.2%	26.8%	0.0%
A62-A17	43.6%	56.4%	0.0%
A63-A18	65.5%	34.5%	0.0%
SA46-A17	54.3%	45.7%	0.0%

5.3 Visual Searches for Evidence of Arctic Grayling Spawning

5.3.1 Methods

As indicated in the previous section, gravel substrate was uncommon in the tributaries to Whale Tail Lake. In early July of 2015, tributaries to Whale Tail Lake where surface flow and gravel substrate were present were examined for areas of disturbed substrate that could indicate locations where Arctic Graying spawning had occurred. Disturbance was indicated by the presence of particles with little or no periphyton on their upper surface, indicating that they had recently been overturned. Where an area of disturbed gravel substrate was observed kick samples were collected by vigorously disturbing the substrate while holding a fine-meshed dip net immediately downstream in order to collect Arctic Grayling eggs if they were present.

5.3.2 Results

Only two areas of disturbed gravel were observed, both in the watercourse between lakes A63 and A18 on July 5, 2015. One area was 0.5 m wide by 1.5 m long in approximately 0.4 m of water and the other was 0.4 m wide by 0.6 m long in slightly shallower water. Multiple kick samples were collected at both of the areas but no fish eggs were observed in the samples.

5.4 Large Minnow Traps

5.4.1 Methods

In 2015, unbaited, large minnow traps were deployed in seven tributaries to Whale Tail Lake (Figure 5-2) for periods of seven to sixteen days in late June and early July. These traps, constructed of 0.9 cm (3/8 inch) square steel mesh, were 91.4 cm long and 31.5 cm in diameter, with a 22.0 cm long funnel at one end with a 7.0 cm diameter opening into the trap. Two traps were deployed in watercourse A53-A16 (locations MT2 and MT3) and in watercourse A63-A18 (location MT7). A single trap was deployed at the other locations. The traps were deployed with the funnel facing downstream except at location MT 7 (Tributary A63-A18), where one of the two traps was deployed with the funnel facing upstream. The traps were lifted periodically and captured fish were enumerated and identified to species. With the exception of one voucher specimen, the captured fish were released near their capture location. The trap in watercourse AP23-A17 (location MT1) was not fishing for an unknown period of time between June 26 and July 3 because falling water levels left the funnel opening above the water. At the other locations the traps' funnels openings were submerged throughout their deployments.

In 2016, the same large minnow traps, unbaited, were deployed in two tributaries to Whale Tail Lake (Figure 5-3) for a period of thirteen days from June 22 to July 5, 2016. Two traps were deployed in watercourse A46-A17 (locations MT10 and MT11) and in watercourse A50-A17 (locations MT12 and MT13). The traps were deployed with the funnel facing downstream. The traps were lifted periodically and captured fish were enumerated and identified to species. All the captured fish were released near their capture location.

Figure 5-2. Locations where large minnow traps were set in June-July of 2015.

Figure 5-3. Locations where large minnow traps were set in June-July of 2016.

5.4.2 Results

The large minnow trap effort and catches are summarized in Table 5-6. Detailed set, lift and catch data are provided in Appendix A (Table A 10 and **Table A 11**). Catch-per-unit-effort (CPUE) was very low at all locations. A total of 17 Slimy Sculpin, one juvenile Round Whitefish, and one Ninespine Stickleback were captured by 163 trap-days of effort.

Table 5-6. Summary of large minnow trap deployments and catches. Trap locations are shown in Figure 5-2 and Figure 5-3. Data for individual sets and lifts are provided in Appendix A.

Watercourse	Location	Date deployed	Date removed	Soak time (days)	Funnel direction	Slimy Sculpin	juvenile Round Whitefish	Ninespine Stickleback
A46-A17	MT4	27/06/15	13/07/15	16	downstream	3	0	0
	MT10	22/06/16	05/07/16	13	downstream	1	0	0
	MT11	22/06/16	05/07/16	13	downstream	4	0	1
A50-A17	MT5	28/06/15	13/07/15	15	downstream	1	0	0
	MT12	22/06/16	05/07/16	13	downstream	0	0	0
	MT13	22/06/16	05/07/16	13	downstream	3	0	0
A53-A17	MT3	27/06/15	13/07/15	16	downstream	2	0	0
A55-A17	MT9	03/07/15	13/07/15	10	downstream	0	0	0
A59-A17	MT2	27/06/15	13/07/15	16	downstream	1	0	0
	MT6	28/06/15	13/07/15	15	downstream	2	0	0
A63-A18	MT7	05/07/15	13/07/15	8	upstream	0	0	0
	MT8	05/07/15	13/07/15	8	downstream	0	1	0
AP23-A17	MT1	26/06/15	03/07/15	7	downstream	0	0	0
Total				163		17	1	1

5.5 Stream electrofishing

5.5.1 Methods

Electrofishing typically progressed upstream with one member of the two-person crew operating the Halltech Model 200T backpack electrofisher, and the second person netting the immobilized fish. The electrofisher settings were typically 950 volts and 250 hertz but lower settings were used on occasion when higher-conductivity water was encountered. The coordinates of the sampling sites were determined using a Garmin Oregon 650 or a Garmin GPSmap 76CSx gps, and the length of watercourse sampled was determined from these coordinates superimposed on a photo-mosaic of the study area using GIS unless the distance sampled was very short (<10 m), in which case the distance sampled was estimated in the field. The number of electroseconds was also recorded at each location.

Slimy Sculpin, Ninespine Stickleback, Burbot, and Round Whitefish were identified and released as they were captured. Most juvenile Lake Trout and Arctic Char were photographed and released but a few were retained as voucher specimens. The identities of voucher specimens were confirmed by opening the abdominal cavity and counting the pyloric caeca using a dissecting microscope. Arctic Char have 20-74 pyloric caeca and Lake Trout typically have 93-208 (Scott and Crossman, 1973). The identities of photographed Lake Trout and Arctic Char were confirmed by comparison to the voucher specimens, as well as using the juvenile salmonid key in McPhail and Lindsey (1970). Juvenile Lake Trout and Arctic Char that could not be identified to species were referred to as juvenile salmonids.

5.5.2 Results

The stream electrofishing effort and catches are provided in Table 5-7 and the sampling locations are shown in Figure 5-4 to Figure 5-23. The coordinates of the sampling locations are provided in Appendix A (Table A 12 and Table A 13). A total of 23 watercourses were electrofished on one or more occasions. Slimy Sculpin and Ninespine Stickleback were the most widely distributed species, and were captured in 11 and 13 different streams respectively. Overall, Ninespine Stickleback was the most abundant species with 1271 individuals captured. This total was strongly influenced by the large catch in watercourse A46-A17 on July 7, 2015. The majority of those individuals were captured immediately downstream from a short (1 m), fast section of that tributary where it descended over a small clay ledge. This feature appeared to be impeding upstream migration of the Ninespine Sticklebacks.

Juvenile Arctic Char were captured in low numbers in five tributaries to Whale Tail Lake. Juvenile Lake Trout were each captured in low numbers from five watercourses. Three of those watercourses are connecting channels between larger lakes and two are tributaries to Whale Tail Lake. Juvenile Round Whitefish were captured in three watercourses, as were juvenile Burbot (*Lota lota).* Three additional juvenile salmonids, either Arctic Char or Lake Trout but not identified to species, were also captured.

Table 5-7. Summary of stream electrofishing effort and catches. Based on size, all of the salmonids and the Burbot are juveniles while the Slimy Sculpin and Ninespine Stickleback are adults. Locations are shown in Figure 5-4 to Figure 5-23.

Watercourse	Location	Date	distance (m)	electro-seconds	Ninespine Stickleback	Slimy Sculpin	Arctic Char	Lake Trout	juvenile Lake Trout or Arctic Char	Round Whitefish	Burbot
A0-A48	**EF-S1**	8/1/2015	10	196	2						
A113-A47	**EF-S2**	8/1/2015	10	68	1						
	EF-S36	6/19/2016	191	160							
		Total	**201**	**228**	**1**						
A16-A15	**EF-S3**	8/25/2015	43	690	2	5		1			
	EF-S40	6/21/2016	59	865							
	EF-S56	6/24/2016	23	339							
		Total	**125**	**1894**	**2**	**5**		**1**			
A17-A16	**EF-S4**	8/25/2015	240	950		4		1			
	EF-S79	7/9/2016	77	578	1	1				1	
	EF-S80	7/9/2016	112	1111				2			
		Total	**429**	**2639**	**1**	**5**		**3**		**1**	
A18-A17	**EF-S32**	6/26/2015	100	878		1					
	EF-S5	7/5/2015	112	1648		5					
	EF-S6	8/30/2015	30	210	6			1			
	EF-S41	6/22/2016	104	988		1					
	EF-S57	6/25/2016	141	740							
	EF-S78	7/8/2016	113	2228						16	
	EF-S85	8/20/2016	27	194	2						
		Total	**627**	**6886**	**8**	**7**		**1**		**16**	
A19-A18	**EF-S7**	7/9/2015	32	423							
A20-A19	**EF-S39**	6/20/2016	35	237							
A22-A21	**EF-S38**	6/20/2016	62	423							

Watercourse	Location	Date	distance (m)	electro-seconds	Ninespine Stickleback	Slimy Sculpin	Arctic Char	Lake Trout	juvenile Lake Trout or Arctic Char	Round Whitefish	Burbot
A23-A22	**EF-S37**	6/20/2016	69	256							
A46-A17	**EF-S8**	6/28/2015	201	579	11	8	1				
	EF-S9	7/9/2015	16	393	153	8	1				
	EF-S10	7/9/2015	132	532							
	EF-S11	7/12/2015	0	85	100						
	EF-S12	8/30/2015	36	470							
	EF-S43	6/22/2016	36	110	20						
	EF-S53	6/24/2016	162	608	27	8	1				
	EF-S74	7/7/2016	142	498	600	7	1				
	EF-S82	8/19/2016	194	993	7	5					1
		Total	**919**	**4268**	**918**	**36**	**4**				**1**
A47-A17	**EF-S35**	6/19/2016	348	500	1						
A47-A46	**EF-S13**	7/9/2015	17	136		1					
	EF-S54	6/24/2016	13	77							
		Total	**30**	**213**		**1**					
A48-A47	**EF-S71**	7/6/2016	147	1403	6						
A49-A47	**EF-S72**	7/7/2016	59	290							
	EF-S86	8/20/2016	7	58							
		Total	**66**	**348**							
A50-A17	**EF-S14**	6/28/2015	51	265	5						
	EF-S15	7/9/2015	163	1204	56	9	2	1			
	EF-S16	8/30/2015	52	180	2		1				1
	EF-S44	6/22/2016	37	208	20		1				
	EF-S55	6/24/2016	38	180	3						
	EF-S73	7/7/2016	195	1050	10	4	1				

Watercourse	Location	Date	distance (m)	electro-seconds	Ninespine Stickleback	Slimy Sculpin	Arctic Char	Lake Trout	juvenile Lake Trout or Arctic Char	Round Whitefish	Burbot
	EF-S81	8/19/2016	66	275		2					
		Total	**602**	**3362**	**96**	**15**	**5**	**1**			**1**
A53-A17	**EF-S17**	6/20/2015	571	1664	7						
	EF-S18	7/8/2015	182	2142	78	77	5				
	EF-S19	8/30/2015	359	518		26		4			
	EF-S33	6/18/2016	563	2565	4	4					
	EF-S87	8/26/2016	248	433	5	23	3				
	EF-S88	7/8/2016	357	2415	28	43	1				
		Total	**2280**	**9737**	**122**	**173**	**9**	**4**			
A55-A17	**EF-S20**	6/21/2015	166	996	6						
	EF-S21	7/6/2015	167	3330	20	50	1		1		
	EF-S22	8/30/2015	46	483	17	1				1	
	EF-S34	6/19/2016	182	917	1	1	1				
	EF-S62	6/26/2016	159	1482		8					
	EF-S77	7/8/2016	141	676		31	1				1
	EF-S83	8/19/2016	22	758	59	7					
		Total	**883**	**8642**	**103**	**98**	**3**		**1**	**1**	**1**
A56-A55	**EF-S23**	7/8/2015	60	634							
A59-A17	**EF-S24**	6/27/2015	126	730		6	1				
	EF-S25	7/9/2015	97	1444	2	21					
	EF-S26	8/30/2015	181	535		7	1				
	EF-S42	6/22/2016	126	766	4	6					
	EF-S76	7/7/2016	122	1115		24			2		
	EF-S84	8/20/2016	56	630	4	8	2				
		Total	**708**	**5220**	**10**	**72**	**4**		**2**		

Watercourse	Location	Date	distance (m)	electro-seconds	Ninespine Stickleback	Slimy Sculpin	Arctic Char	Lake Trout	juvenile Lake Trout or Arctic Char	Round Whitefish	Burbot
A62-A17	**EF-S27**	7/7/2015	107	1025	1						
	EF-S75	7/7/2016	129	707							
		Total	**236**	**1732**	**1**						
A63-A18	**EF-S28**	7/5/2015	81	848		3					
	EF-S29	7/7/2015	81	793		3					
		Total	**162**	**1641**		**6**					
A-P21-A52	**EF-S30**	8/1/2015	5	78							
A-P23-A17	**EF-S31**	6/26/2015	95	582		2					
Grand Total			**8131**	**51542**	**1271**	**420**	**25**	**10**	**3**	**18**	**3**

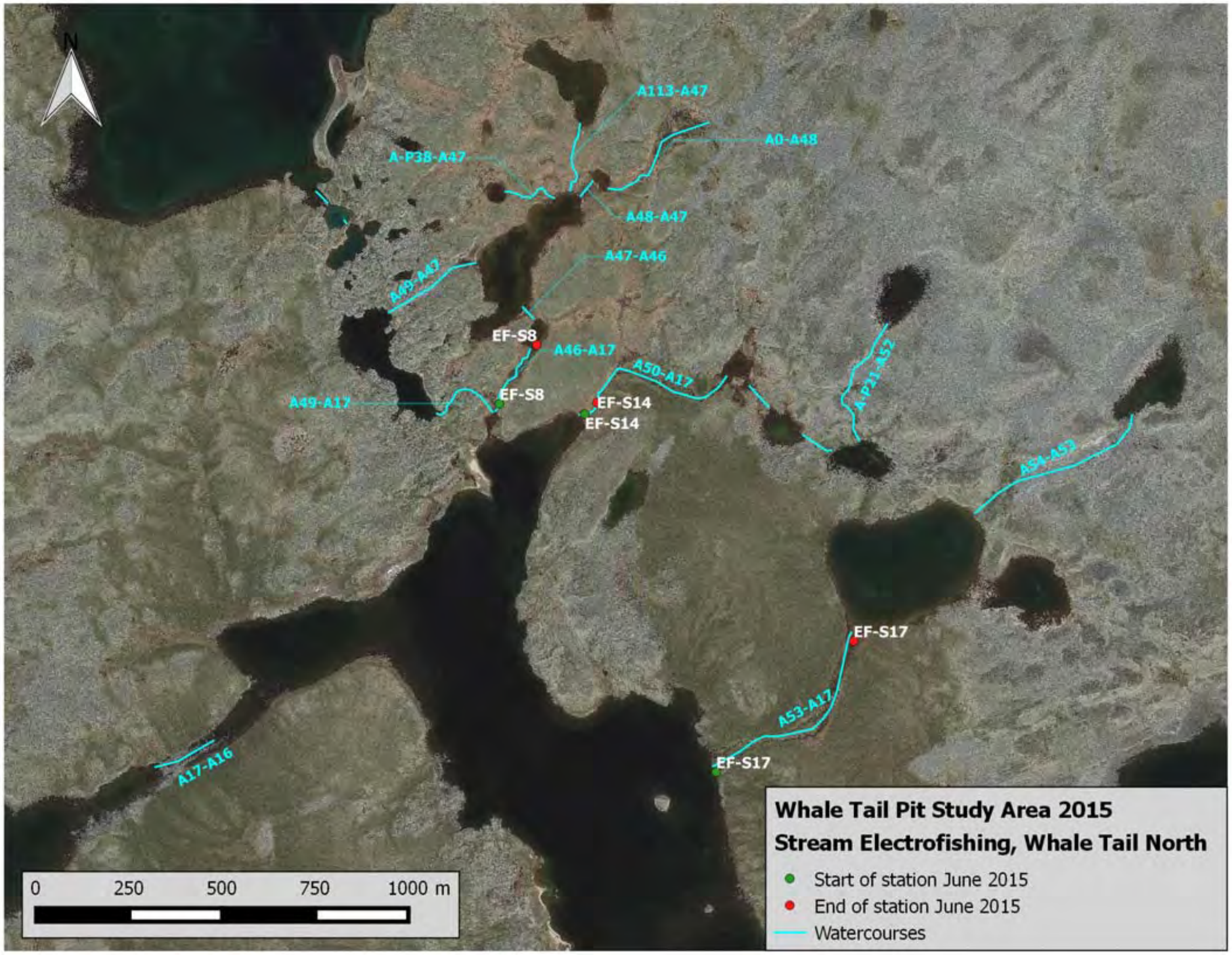


Figure 5-4. June 2015 electrofishing locations on tributaries at the north end of Whale Tail Lake.

Figure 5-5. June 2015 electrofishing locations on tributaries at the south end of Whale Tail Lake.

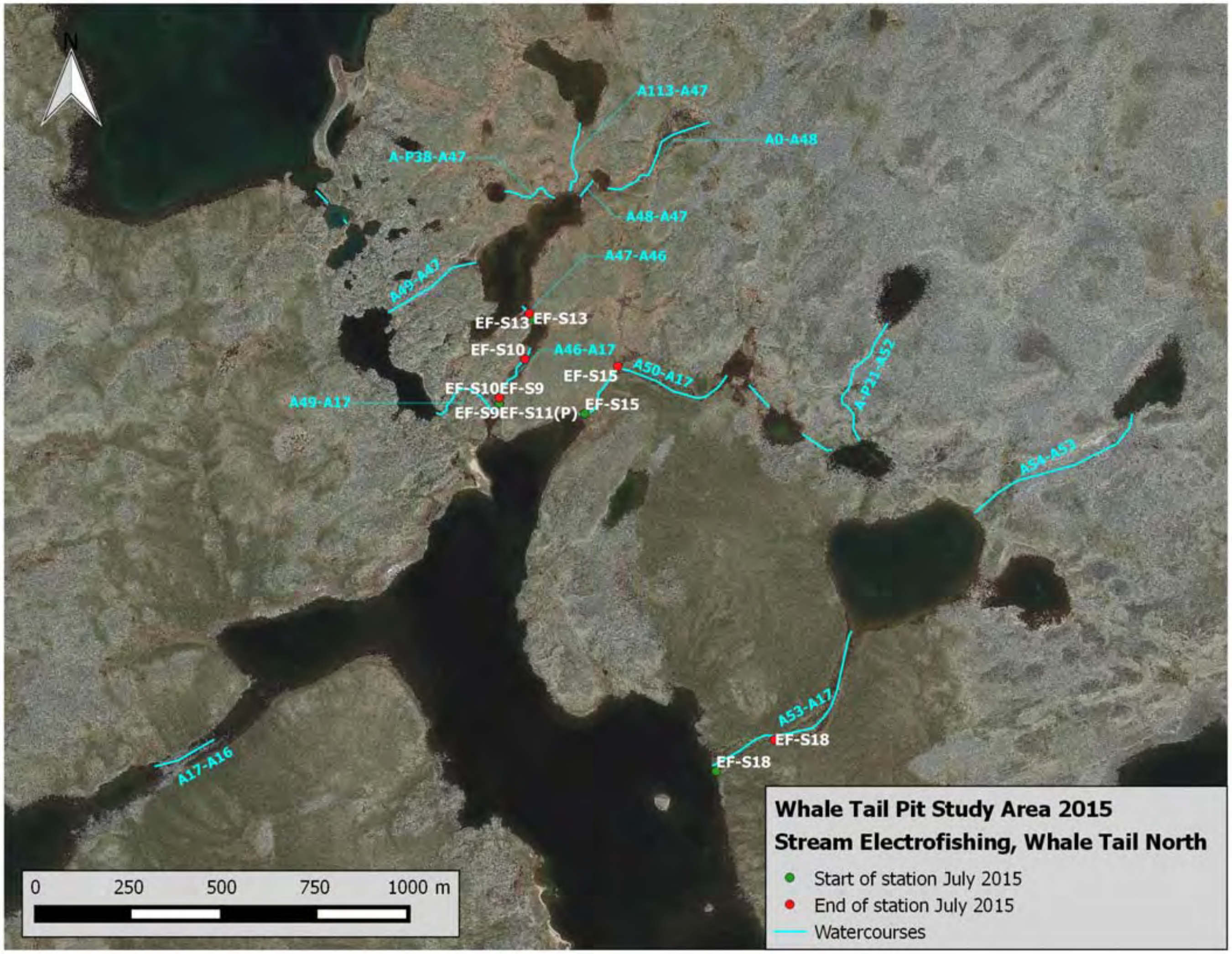


Figure 5-6. July 2015 electrofishing locations on tributaries at the north end of Whale Tail Lake.

Figure 5-7. July 2015 electrofishing locations on tributaries at the south end of Whale Tail Lake.

Figure 5-8. August 2015 electrofishing locations on tributaries at the north end of Whale Tail Lake.

Figure 5-9. August 2015 electrofishing locations on tributaries at the south end of Whale Tail Lake.

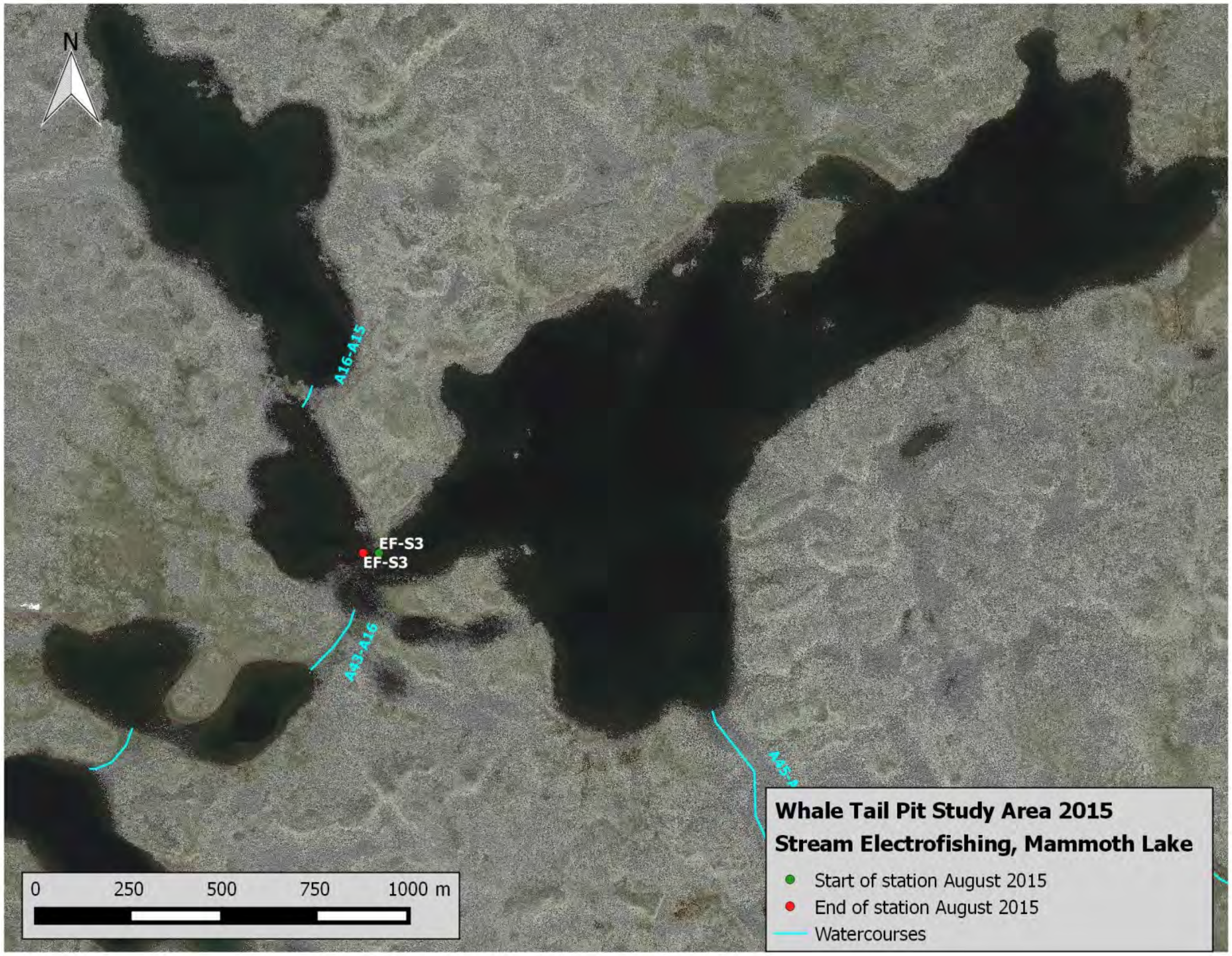


Figure 5-10. August 2015 electrofishing location near the outlet of Mammoth Lake.

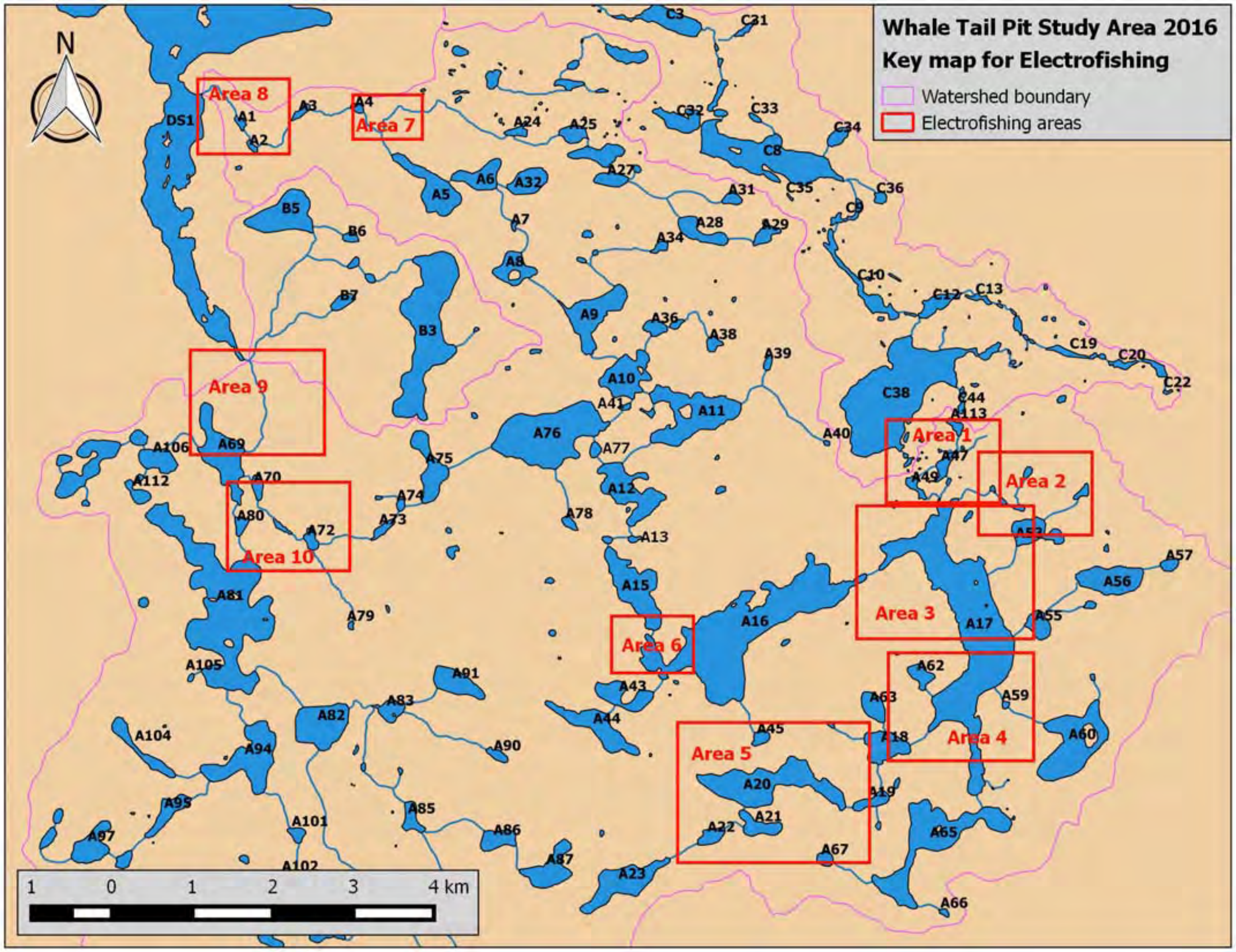


Figure 5-11. Key map showing the areas shown in the detailed 2016 electrofishing maps presented in Figure 5-12 - Figure 5-23.

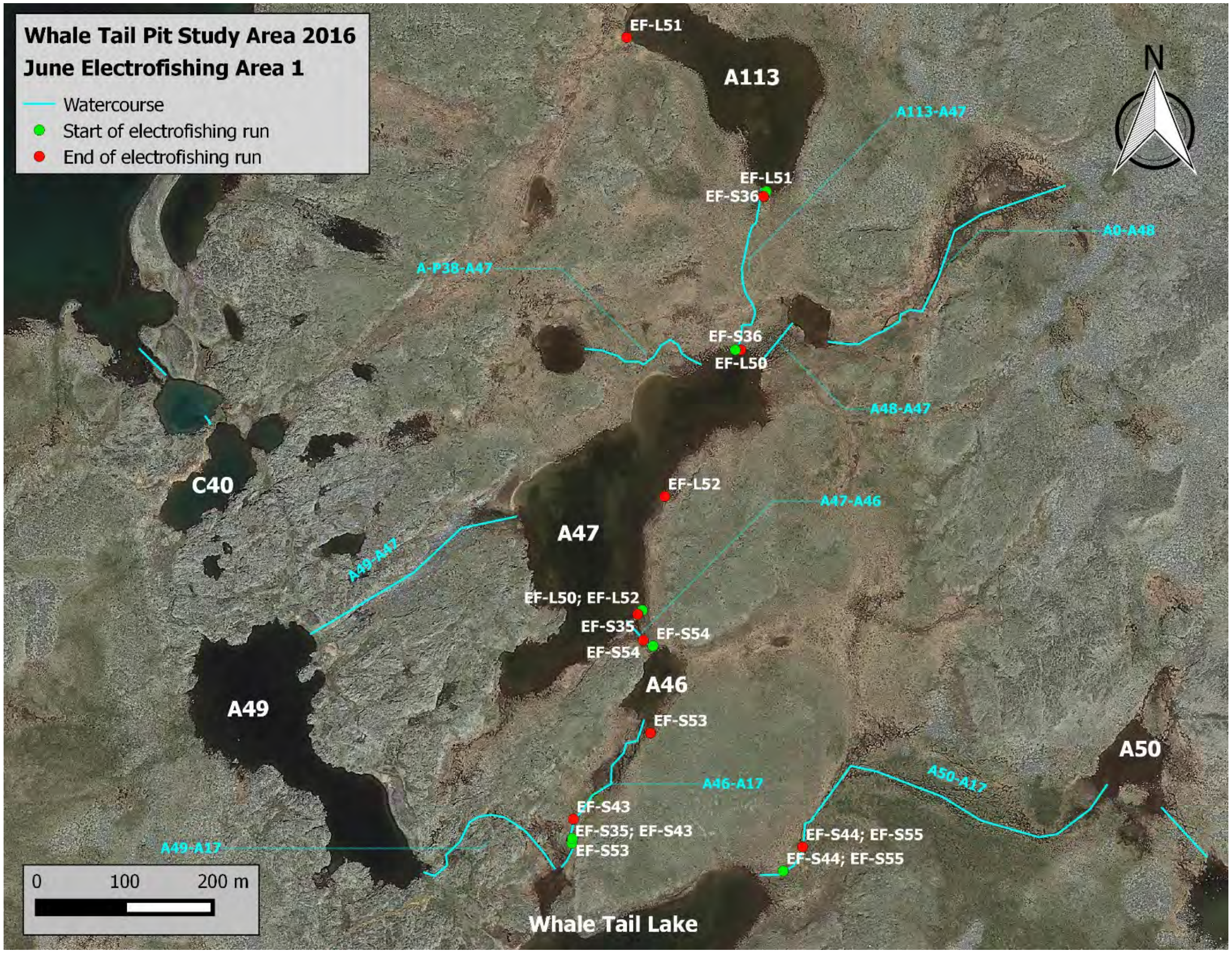


Figure 5-12. June 2016 electrofishing locations in tributaries and waterbodies at the north end of Whale Tail Lake. See Area 1 in Figure 5-11.

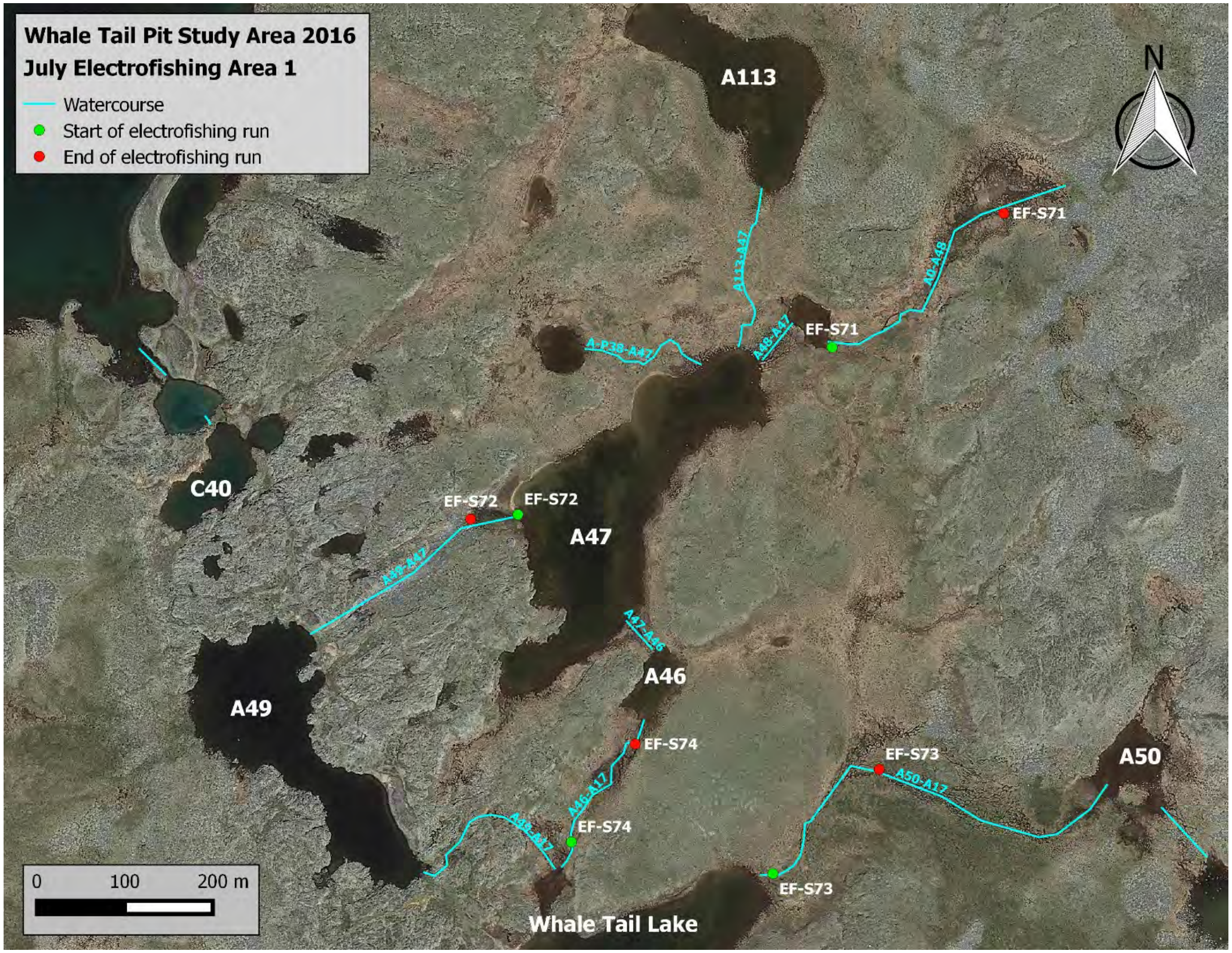


Figure 5-13. July 2016 electrofishing locations in tributaries and waterbodies at the north end of Whale Tail Lake. See Area 1 in Figure 5-11.

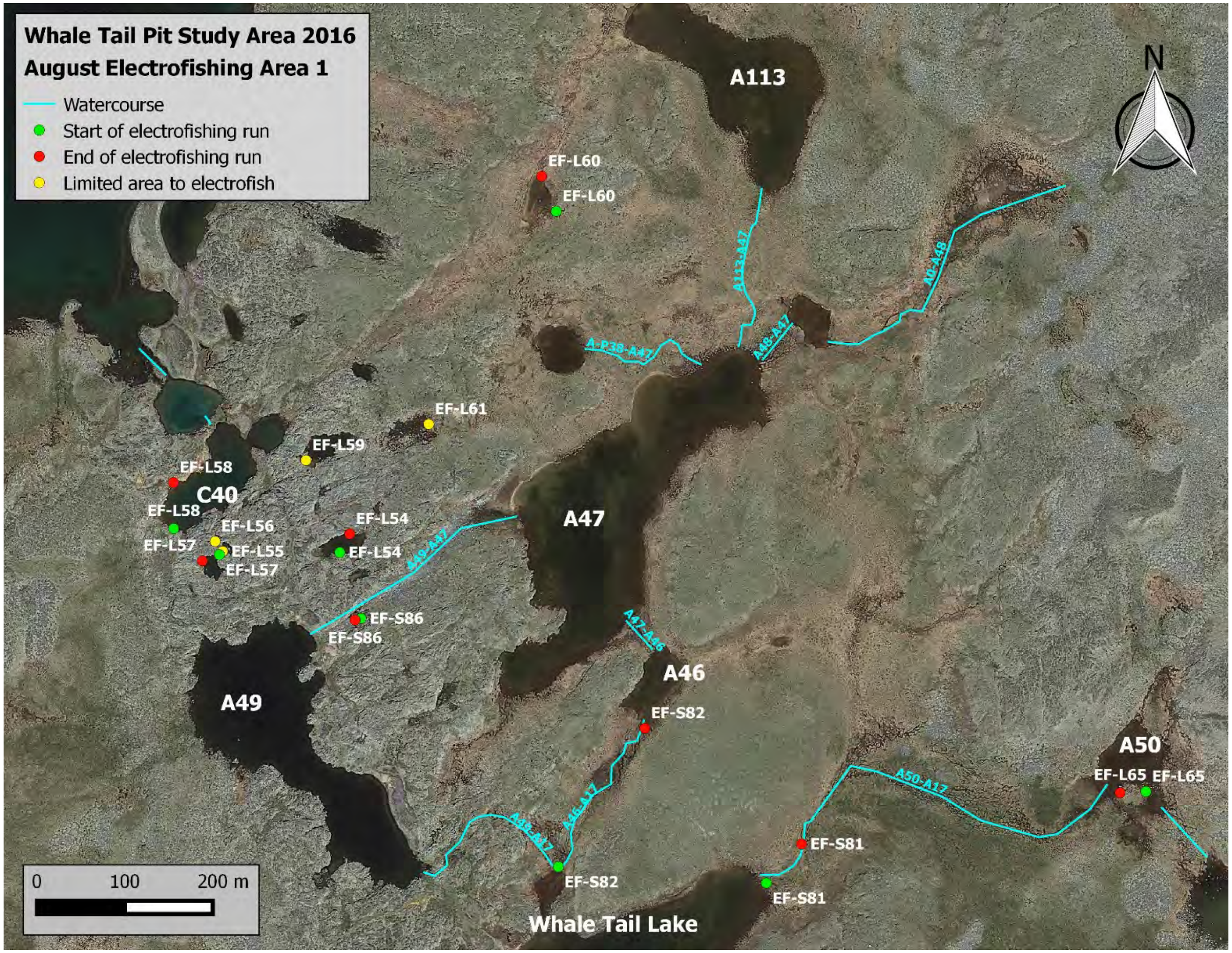


Figure 5-14. August 2016 electrofishing locations in tributaries and waterbodies at the north end of Whale Tail Lake. See Area 1 in Figure 5-11.

Figure 5-15. August 2016 electrofishing locations in tributaries and waterbodies at the north-east end of Whale Tail Lake. See Area 2 in Figure 5-11.

Figure 5-16. June 2016 electrofishing locations in tributaries and waterbodies at the central portion of Whale Tail Lake. See Area 3 in Figure 5-11.

Figure 5-17. July 2016 electrofishing locations in tributaries and waterbodies at the central portion of Whale Tail Lake. See Area 3 in Figure 5-11.

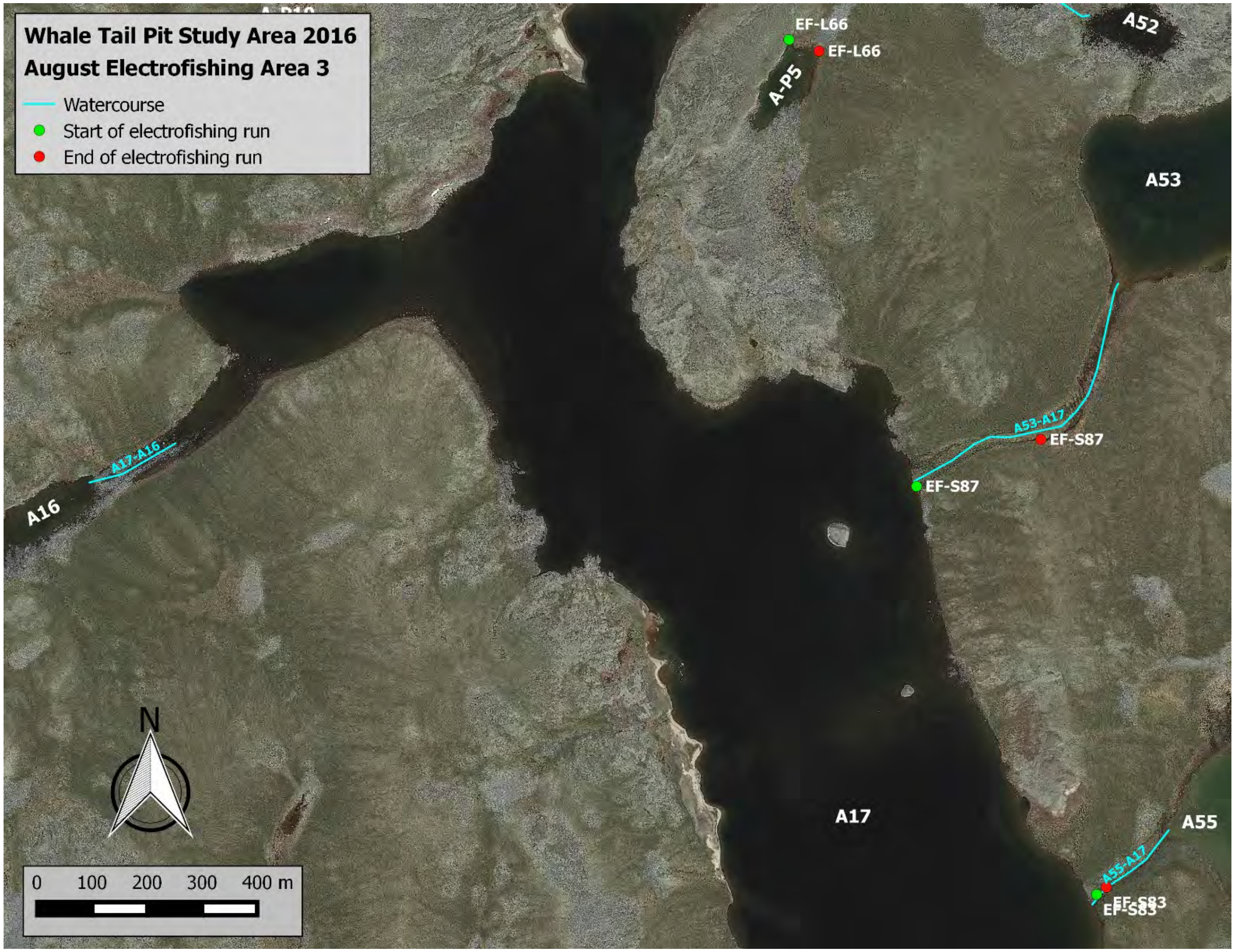


Figure 5-18. August 2016 electrofishing locations in tributaries and waterbodies at the central portion of Whale Tail Lake. See Area 3 in Figure 5-11.

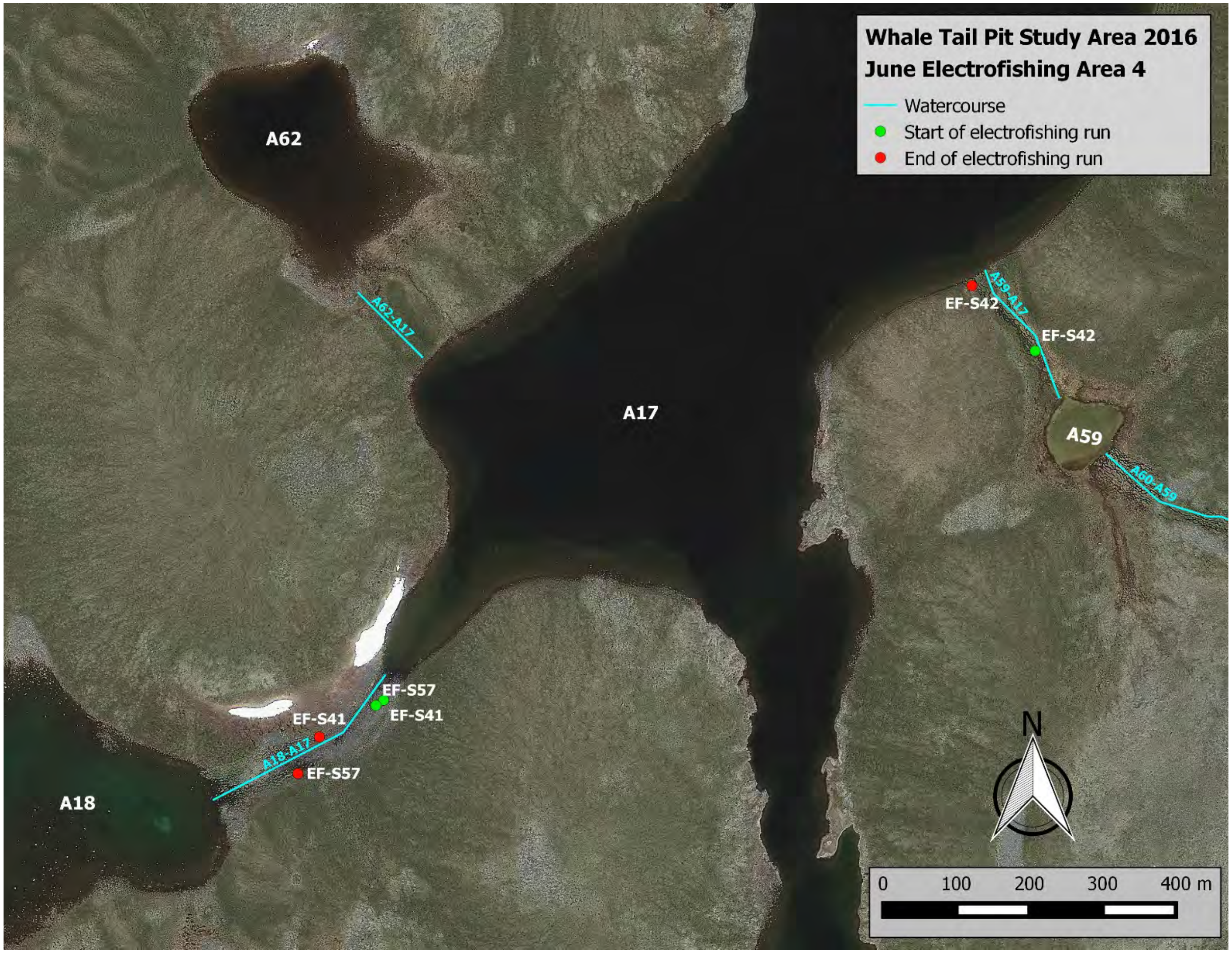


Figure 5-19. June 2016 electrofishing locations in tributaries and waterbodies at the south end of Whale Tail Lake. See Area 4 in Figure 5-11.

Figure 5-20. July 2016 electrofishing locations in tributaries and waterbodies at the south end of Whale Tail Lake. See Area 4 in Figure 5-11.

Figure 5-21. August 2016 electrofishing locations in tributaries and waterbodies at the south end of Whale Tail Lake. See Area 4 in Figure 5-11.

Figure 5-22. June 2016 electrofishing locations in tributaries and waterbodies south-east of Whale Tail Lake. See Area 5 in Figure 5-11.

Figure 5-23. June 2016 electrofishing locations at the outlet of Mammoth Lake. See Area 6 in in Figure 5-11.

5.6 Stream Gillnets

5.6.1 Methods

In the latter part of June and early July of 2016, small mesh gillnets were deployed across the downstream ends of the three largest tributaries of Whale Tail Lake that have upstream lakes containing communities of large-bodied fishes. Each net followed the cross-channel contours of the streams, and was weighted to the bottom with closely spaced rocks. Care was taken to ensure that there were no openings along the bottom of the net through which fish could move. Wooden survey stakes and rocks were used to suspend the top of the net above the stream surface (**Figure 5-24**). The nets were typically checked and redeployed daily, but longer soak times occurred on occasion due to weather conditions and other logistic factors. All the captured fish that remained alive were released in the downstream lake.

Figure 5-24. Example of stream gillnet deployment. Watercourse A55-A17, June 24, 2016.

5.6.2 Results

The stream gill net mesh size, effort and catches are summarized in Table 5-8, and sampling locations are shown in Figure 5-25. Only Arctic Char were captured in the stream gillnets. Only one fish was captured at GN-S1 and GN-S3. Five of the Arctic Char captured at GN-S2 were moving upstream and two, which were captured on the last two days of the deployment, were moving downstream. Detailed set, lift and catch data are provided in Appendix A (Table A 14), as is the information on individual fish (Table A 14).

Table 5-8. Summary of stream gillnet deployments and catches. The fish were moving upstream except for two that were captured at location GN-S2 on July 8 and July 9. Gillnet locations are shown in Figure 5-25.

Watercourse	Location	Mesh size	Date deployed	Date removed	Soak time (days)	Arctic Char
A53-A17	GN-S1	36 mm	18/06/16	28/06/16	10	1
			02/07/16	09/07/16	7	0
A55-A17	GN-S2	50 mm	19/06/16	28/06/16	9	2
			02/07/16	09/07/16	7	5
A18-A17	GN-S3	76 mm	22/06/16	28/06/16	6	1
			02/07/16	09/07/16	7	0
Total					46	9

Figure 5-25. Stream gillnet set locations.

6.0 HABITAT CHARACTERIZATION AND FISH SAMPLING OF SMALL LAKES AND PONDS

6.1 Methods

In 2015, fish sampling was conducted and the habitat was characterized on a number of lakes that are connected by surface flow to Whale Tail and Mammoth Lakes and two small lakes that drain to Nemo Lake. Where depth was sufficient, a jon boat powered by an outboard motor and equipped with a Humminbird 798ci HD SI Sonar unit was used to conduct the work.

In lakes with adequate depth, a standard AEM index gill net gang comprised of 22.7 m long and 1.8 m deep panels of 126, 102, 76, 51, 38, and 25 mm stretched mesh (total gang length = 136.4 m) was set, orientated to cross a deep (usually the deepest) portion of the lake and a shallow near-shore or shoal area, to maximize the variety of habitat fished. In lake A113 only three panels of gill net were set (38 mm, 51 mm and 76 mm) due to the small size of the lake. Most net sets were of short duration (range 1.6 – 3.3 hours) but occasionally sets were overnight. The date and time of deployment and lifts were recorded, the coordinates at each end of each net were determined using a Garmin Oregon 650 gps, and the depth at each end was determined using the sonar unit. The number of individuals of each species captured in each net was recorded. Each fish was examined for external anomalies and fork length was determined to the nearest mm using a standard fish measuring board. The total weight of each individual weighing more than 500 g was determined to the nearest 10 grams using a Rapala digital hanging scale. The total weight of individuals weighing less than 500 g was determined to the nearest g, or in some cases nearest 0.1 g, using an Ohaus Scout Pro Model 6001 electronic balance. Fish that were alive were tagged with a numbered Floy tag and released.

A section of shoreline was electrofished with a Halltech Model 200T backpack electrofisher, set at 950 volts and 250 hertz. The intent was primarily to determine what species were present, so the length of shoreline electrofished varied with habitat diversity and catch. The number of individuals of each species were recorded, as were the coordinates at each end of the electrofished shoreline, determined using a Garmin Oregon 650 gps unit.

The sonar unit was used to record georeferenced standard and side-scan sonar data. Straight, parallel boat runs, orientated to best characterize the lake's features, were used to record slightly overlapping side-scan images of the lake bottom. Additional sonar recordings were then made to obtain standard sonar data for as much of the lake bottom as was practical. In lakes for which these data were to be used to prepare bathymetric maps, a higher density of sonar transects were collected and a stake was driven into the ground at the water's edge. This elevation was later determined by a survey crew so that the depth data could be converted to elevations. Visual point observations of the substrate were also made, either from the surface where the water was clear and shallow enough, or using an Aqua-Vu 740c underwater colour video system where the water was deeper. All visual substrate observations were georeferenced with a Garmin GPSmap76CSx gps unit.

The side-scan images were processed using ReefMaster software (ver. 1.8) to create a single georeferenced side-scan mosaic of the lake's bottom, and the standard sonar data were processed to create maps of bottom hardness and water depth. ReefMaster determines bottom hardness by an analysis of the sonar output/input ratio, and lag, to calculate a unitless relative hardness and roughness value that is displayed as a colour-coded map. The georeferenced data (side-scan image, bottom hardness and water depth maps, and visual point observations) were layered using GIS software (QGIS version 2.8). Using the overlaid data, with reference to the oblique aerial photographs, the various substrate types were identified and hand digitized into substrate maps. The water depth data for selected lakes was extracted from the sonar recordings and provided to AEM in ASCI file format for use by the sub-consultant undertaking the bathymetric mapping of all the Whale Tail Pit Study Area Lakes.

A number of smaller, shallow ponds near the north end of Whale Tail Lake were also investigated in 2015, some on two occasions. The substrates in these ponds were visually assessed from shore, and a portion of shoreline was electrofished. Images of these ponds were included in the oblique aerial photographs taken in 2014 and 2015.

In 2016, gillnetting was conducted on four lakes where there was thought to be potential for large-bodied fish to be present but gillnetting in 2015 had not captured fish. The methodology was the same as in 2015. Electrofishing was conducted in a total of 15 lakes and ponds in 2016 with most of the effort directed toward small ponds north of Whale Tail Lake. The electrofishing methods were essentially the same as for the streams except that in a few locations the distance electrofished was not recorded because there was so little water present that all of the habitat was sampled.

6.2 Results

The fish catches for each of the small lakes and ponds that were sampled in 2015 are presented in Table 6-1 and the sampling locations are shown in Figure 6-1, Figure 6-2, Figure 6-3 and Figure 6-4. The information for individual gill nets and electrofishing transects are provided in Appendix A (Table A 3 and Table A 6 respectively). The substrate maps have been provided to AEM under separate cover.

Table 6-1. Summary of 2015 gill net and electrofishing catches in small lakes and ponds (na indicates the gear type was not used).

	Gill net catches				Electrofishing catches	
Lake	Lake Trout	Arctic Char	Round Whitefish	Burbot	Ninespine Stickleback	Slimy Sculpin
A18	0	0	0	0	16	3
A19	0	0	0	0	7	1
A20	10	0	6	0	0	0
A22	2	1	0	0	1	10
A45	0	0	0	0	3	0
A47	0	1	0	0	>100	0
A49	0	0	0	0	0	3
A50	na	na	na	na	0	0
A51	na	na	na	na	0	0
A52	na	na	na	na	0	0
A53	1	1	0	0	2	0
A54	na	na	na	na	0	0
A55	5	0	0	1	0	2
A62	3	0	0	0	na	na
A63	1	0	0	0	0	3
A65	2	0	2	0	3	6
A113[1]	0	0	0	0	16	0
A-P5	na	na	na	na	0	0
A-P18	na	na	na	na	0	0
A-P21	na	na	na	na	0	0
A-P33	na	na	na	na	0	0
A-P37	na	na	na	na	0	0
A-P38	na	na	na	na	1	0
A-P49	na	na	na	na	0	0
A-P51	na	na	na	na	0	0
A-P67	dry on August 1, 2015					
C40	na	na	na	na	0	0
C42	na	na	na	na	0	0

[1]Only 3 panels of net set (38 mm, 51 mm and 76 mm)

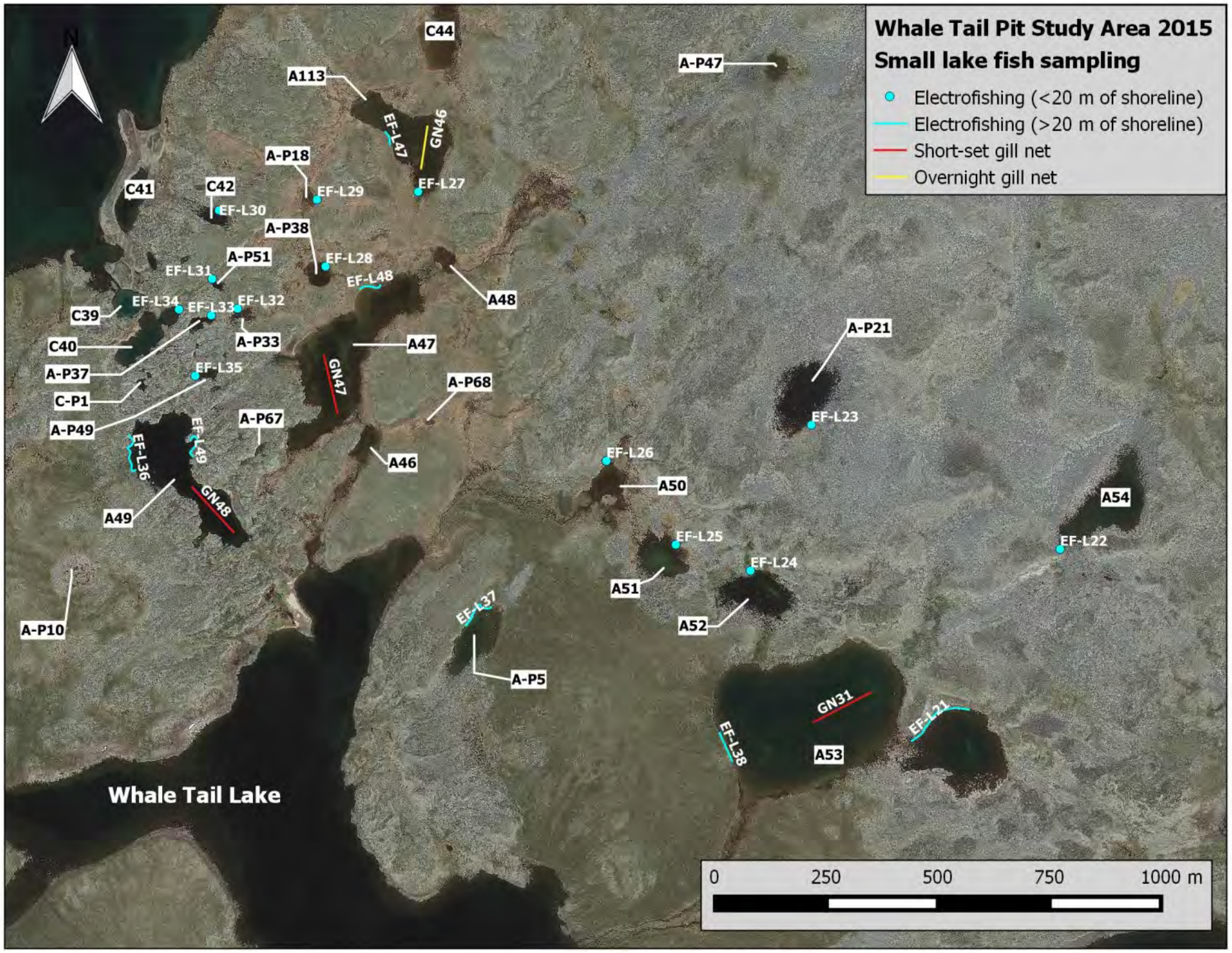


Figure 6-1. Fish sampling locations in 2015 in lakes A47, A49, and A53 and smaller lake and ponds near the north end of Whale Tail Lake.

Figure 6-2. Fish sampling locations in 2015 in lakes A18, A55, A62, and A63.

Figure 6-3. Fish sampling locations in 2015 in lakes A19 and A65.

Figure 6-4. Fish sampling locations in 2015 in lakes A20, A22 and A45.

The 2016 gill net catches are presented in**Table 6-1** Table 6-2 and the sampling locations are shown in (Figure 6-5). The information for individual gill nets is provided in Appendix A (Table A 3). Large-bodied fishes were captured in three of the four lakes sampled with gill nets in 2016. The 2016 electrofishing effort and catches in lakes and ponds in 2016 are summarized in Table 6-3, and the sampling locations are shown in Figure 5-12, Figure 5-14, Figure 5-15, Figure 5-18 and Figure 5-21. The information for the electrofishing sites is provided in Appendix A (Table A 6). No fish were captured except in Lake A62, where three Ninespine Stickleback were caught.

Table 6-2. Summary of 2016 gill net catches in small lakes. Net locations are presented in Figure 6-5. Overnight gillnet sets in Lakes A45, A19, A18 and A49. August 2016. Figure 6-1.

		Number of individuals captured		
Lake	**Gillnet set ID**	**Lake Trout**	**Arctic Char**	**Burbot**
A19	GN49	0	2	1
A18	GN50	0	8	0
A45	GN51	0	0	0
A49	GN52	3	0	0

Table 6-3. Summary of 2016 electrofishing effort and catches in lakes and ponds. Locations are shown in Figure 5-12, Figure 5-14, Figure 5-15, Figure 5-18 and Figure 5-21.

Waterbody	Location	Date	Distance (m)	Electro-seconds	Ninespine Stickleback
A113	EF-L51	6/19/2016	266	628	0
A47	EF-L50	6/19/2016	402	871	0
A47	EF-L52	6/24/2016	142	563	0
A47 Total			544	1434	0
A50	EF-L65	8/26/2016	41	210	0
A51	EF-L64	8/26/2016	75	530	0
A54	EF-L62	8/26/2016	66	534	0
A62	EF-L53	8/24/2016	89	685	3
A-P18	EF-L60	8/20/2016	44	202	0
A-P21	EF-L63	8/26/2016	80	728	0
A-P33	EF-L61	8/20/2016	entire pond	211	0
A-P37	EF-L59	8/20/2016	entire pond	194	0
A-P49	EF-L54	8/20/2016	63	173	0
A-P5	EF-L66	8/26/2016	67	433	0
C40	EF-L58	8/20/2016	64	301	0
near C-P1	EF-L55	8/20/2016	entire pond	56	0
near C-P1	EF-L56	8/20/2016	entire pond	40	0
C-P1	EF-L57	8/20/2016	20	61	0

Grand Total				6420	3

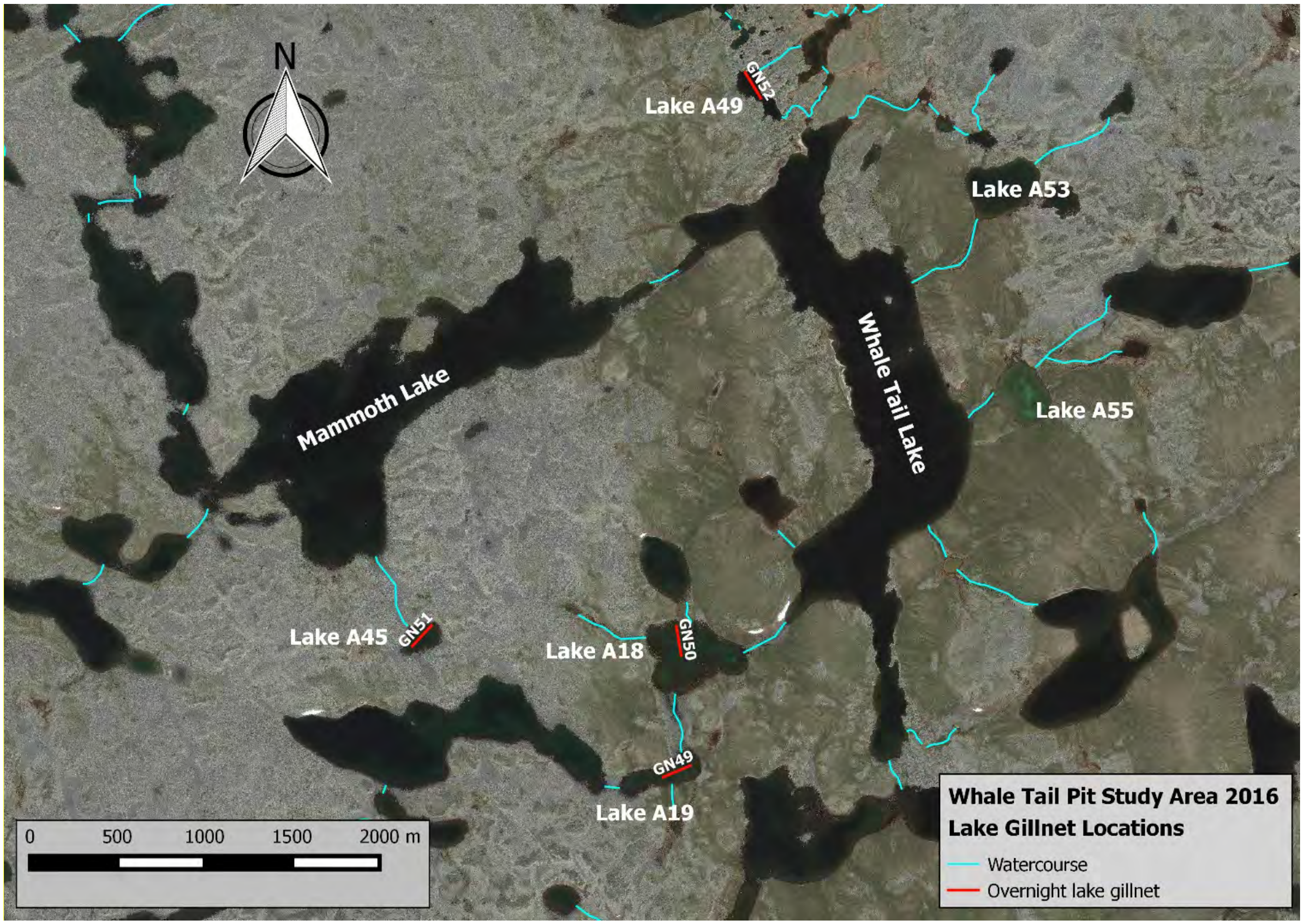


Figure 6-5. Overnight gillnet sets in Lakes A45, A19, A18 and A49. August 2016.

7.0 WATER TEMPERATURE MONITORING

7.1 Methods

Temperature loggers (WaterTemp Pro V2, Onset Corporation) were deployed in the narrows between Whale Tail Lake and Mammoth Lake (L2), and near the outlet of Mammoth Lake (L1), on June 21, 2015 (Figure 7-1). Temperature loggers were also deployed at the south end of Whale Tail Lake (L4) and in five tributaries to Whale Tail Lake (Figure 7-1) on June 26 and 27, 2015. The loggers deployed between Whale Tail and Mammoth Lakes and in the Mammoth Lake outlet recorded the temperature at one minute intervals and the others recorded the temperature at 15 minute intervals. The logger between Whale Tail Lake and Mammoth Lake was moved to a deeper location, approximately 50 metres upstream, on June 28 and again, to a third location approximately 100 m farther upstream on July 13. The logger in watercourse A-P23-A17 was removed on July 3 because the watercourse was nearly dry and the logger was exposed to the air. The other loggers were removed in late August. The data were retrieved from the loggers on one or two occasions during their deployment using a Hobo waterproof shuttle (Onset Corporation).

The temperature data from the individual data retrievals for each temperature logger were combined and plotted using HOBOware Pro software (Version 3.7.5, Onset Corporation). The plots were examined to determine if there were temperatures logged during data retrievals when the loggers were exposed to the air, characterized by larger than expected deviations from the preceding and subsequent temperatures. When these were present, they were deleted from the dataset. Four aberrant values logged at Location L4 on August 22 that were probably the result of data corruption, as they were outside of the range of the loggers, were also deleted from the dataset. The ‘clean’ dataset was exported to Excel (Microsoft Corporation) for graphing and analysis. The datasets for the loggers that recorded at one minute intervals were reduced to include only those data recorded at 15 minute intervals, beginning on the hour.

As stated above, the temperature logger in watercourse A-P23-A17 was exposed to the air prior to its removal on July 3. Examination of the plotted data showed a marked increase in the diurnal fluctuations at that location on July 2. Therefore the data for dates/times after July 1 were deleted from the dataset. The temperature logger at the south end of Whale Tail Lake (L4) and in watercourse A46-A17 (L8) were partially exposed to the air when they were retrieved on August 30. To determine if and when the logged temperatures were influenced by exposure to the air the differences between temperatures logged at those locations and temperatures logged in watercourse A53-A17 (L7) where the logger was always submerged were calculated and plotted. The difference between the temperatures at L4 and L7 were consistent during the latter part of the deployment period, indicating that the logger at L4 was recording water temperature throughout the deployment. The difference between the temperatures at L7 and L8 were markedly greater on August 29 and 30, indicating that the logger in T8 was recording air temperature on those dates; therefore the data for T8 from those two dates were deleted from the dataset.

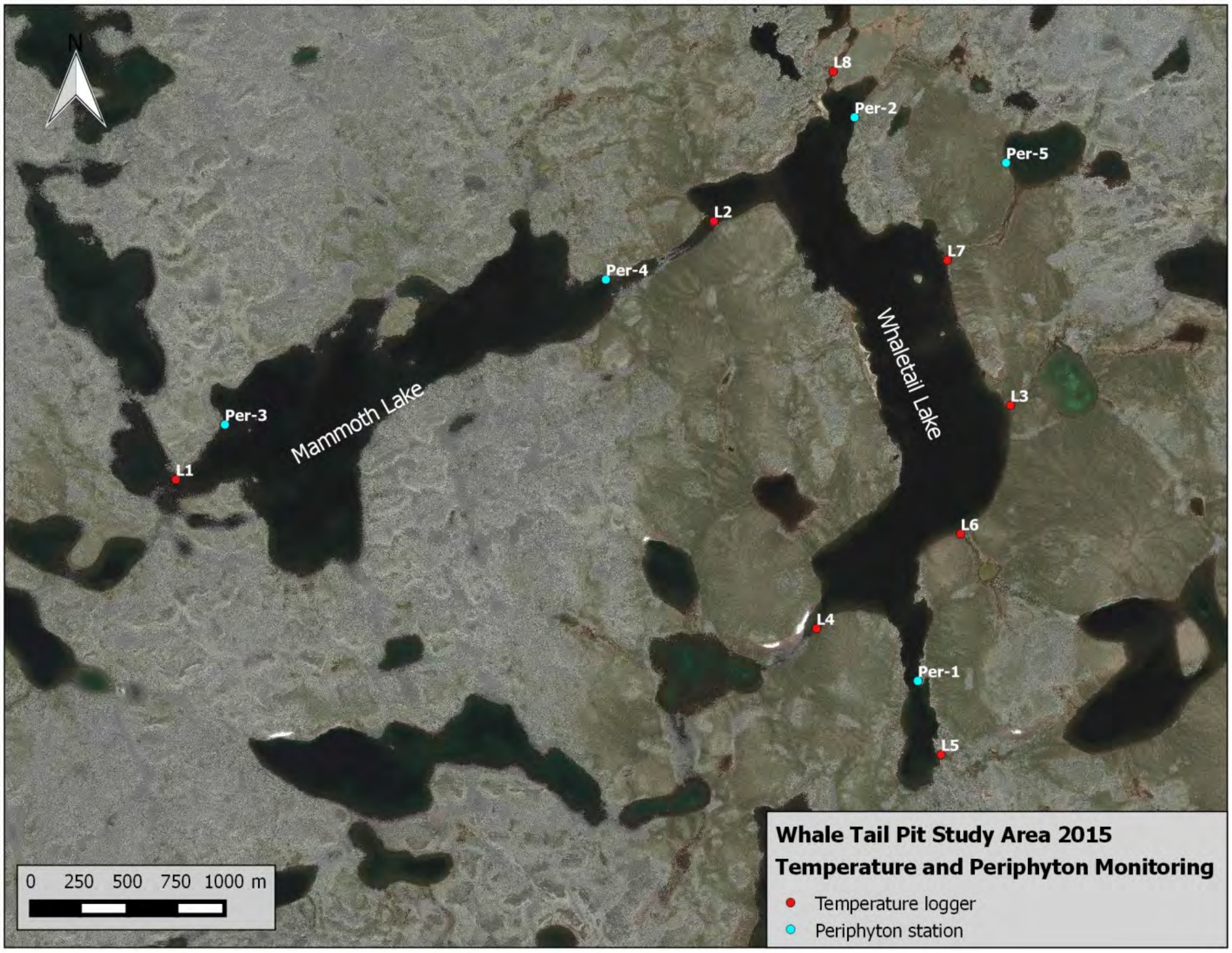


Figure 7-1. Temperature and periphyton monitoring locations in the Whale Tail Pit study area, 2015.

In early July, 2016, temperature loggers (WaterTemp Pro V2, Onset Corporation) were deployed at the outlet of Whale Tail Lake (L8), in the connecting channel between Mammoth Lake and Lake A15 (L4), in the connecting channel between Lake A18 and Whale Tail Lake (L5) and in four tributaries (L1, L2, L3 and L6) to Whale Tail Lake (Figure 7-1). A temperature logger was also deployed in watercourse A1-DS1 just upstream from Lake DS1 (refer to **Error! Reference source not found.**). The loggers were synchronized and recorded the temperature at 15 minute intervals. The loggers were removed and the data were offloaded at the end of August.

The temperature data were exported to Excel (Microsoft Corporation) for graphing and analysis. Graphs were examined to assess whether there were times when large diurnal variations indicated a logger was exposed to the air. The maximum temperature and the date that it was recorded were determined for each logger.

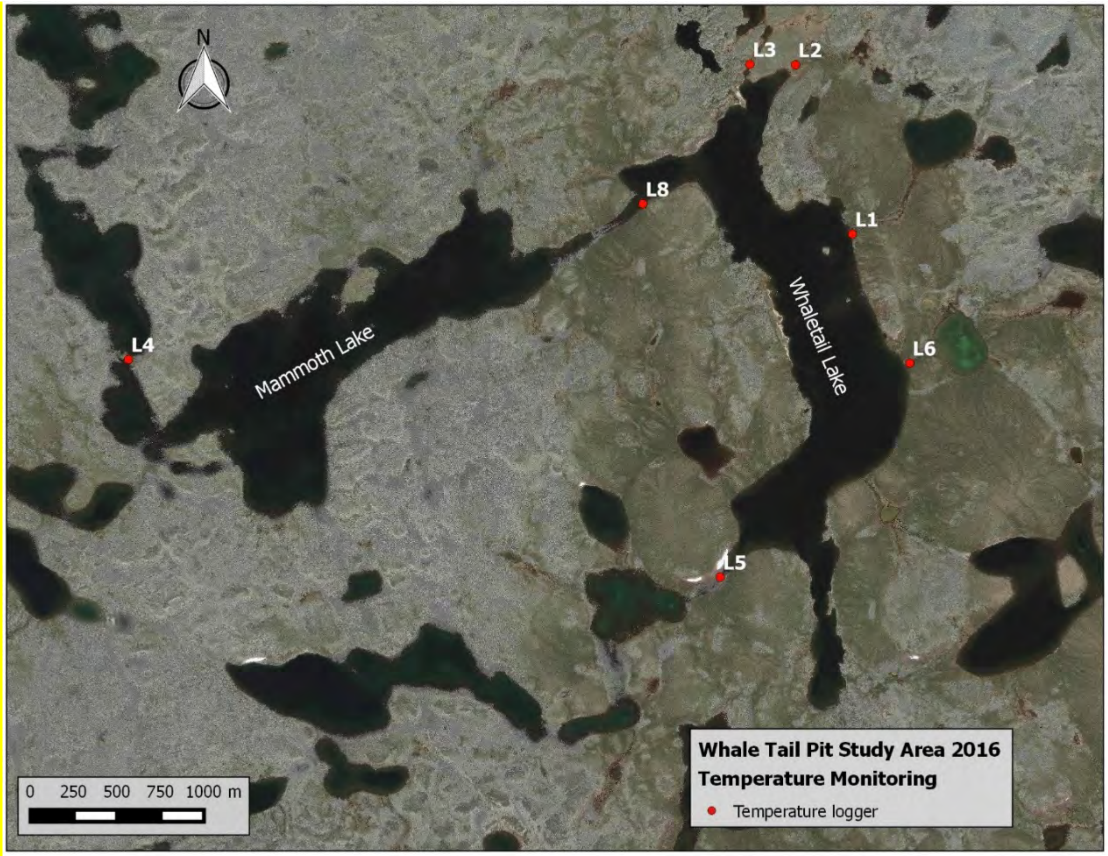


Figure 7-2. Temperature monitoring locations in the Whale Tail Pit study area, 2016. Logger 7 (L7) is not shown on this map, but is located at the downstream end of the primary flow path draining the study area, near Lake DS1 (Error! Reference source not found.).

7.2 Results

The 2015 water temperature data are summarized in Table 7-1. The temperature loggers at L1 and L2 stopped recording data on August 3 and August 12, respectively, when their memory capacity was reached. The other six loggers recorded temperatures from their deployment until their removal. In 2015, the maximum water temperatures were recorded on July 29 in the outlet from Mammoth Lake (L1) and at the south end of Whale Tail Lake (L4) and were 17.1°C and 20.5°C respectively (Table 7-1). The maximum temperature in the outlet from Whale Tail Lake occurred on August 6 and was 18.6°C (Table 7-1). The maximum water temperatures in the four tributaries where temperatures were recorded from late June through late August occurred between July 27 and August 6 and ranged from 19.5°C to 24.5°C (Table 7-1).

Table 7-1. The first and last full day for which temperature data are available, the maximum water temperature recorded and the day that the maximum water temperature was recorded at each location during 2015.

Location	Location ID	Start Date (2015)	End Date (2015)	Maximum temperature (°C)	Date of maximum temperature
Outlet of Mammoth Lake (A16-A17)	L1	June 22	August 2	17.1	July 29
Outlet of Whale Tail Lake (A17-A16)	L2	June 22	August 11	18.6	August 6
A55-A17	L3	June 27	August 29	19.5	August 4
South end of Whale Tail Lake (near mouth of A18-A17)	L4	June 27	August 29	20.5	July 29
A-P93-A17	L5	June 27	July 1	13.6	July 1
A59-A17	L6	June 28	August 29	21.1	August 6
A53-A17	L7	June 28	August 29	22.8	August 4
A46-A17	L8	June 28	August 27	24.5	July 27

In 2015, the maximum daily water temperatures in the Whale Tail Lake and Mammoth Lake outlets were less than 3°C at the beginning of the deployments when the lakes were still ice-covered (Figure 7-3). Water temperatures in the outlets increased slowly until mid-July. Then a rapid increase in temperature occurred when the last of the ice in the lakes melted. The water temperature increased more rapidly at L4, at the south end of Whale Tail Lake, than it did in the Whale Tail Lake outlet (Figure 7-3). This is probably because the ice melted from this arm of the lake sooner than it did on the main lake and also due to the influence of the warmer water from tributary A18-A17. After mid-July, when the last ice in the main part of Whale Tail Lake melted, the water temperatures at this location were more similar to those in the outlet from Whale Tail Lake.

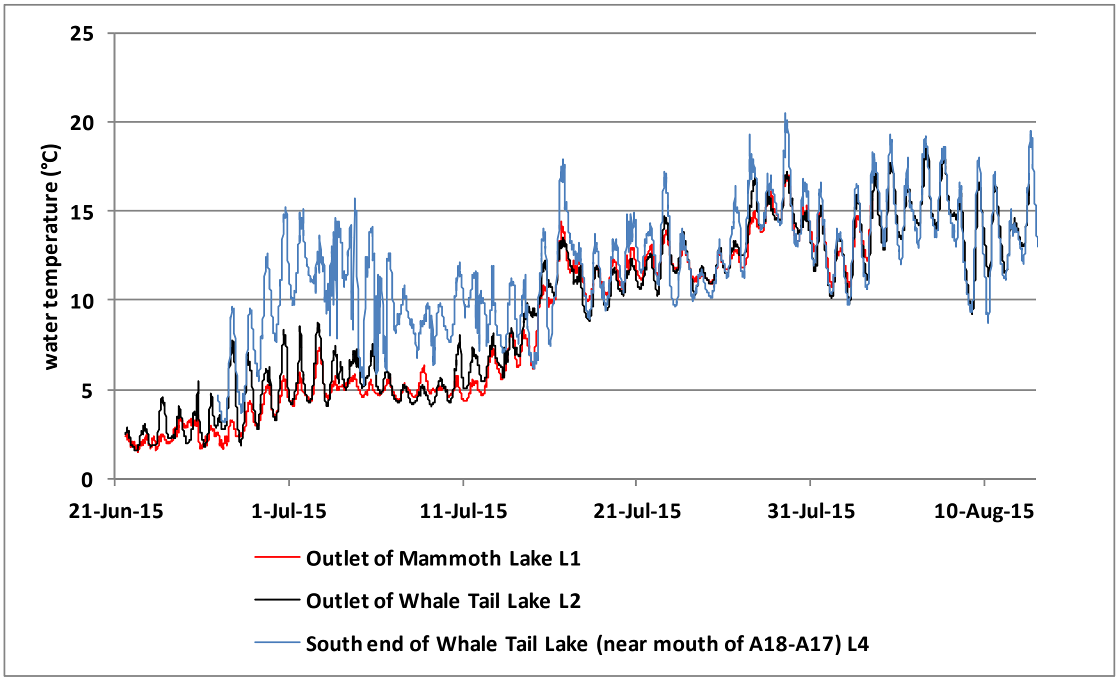


Figure 7-3. Water temperatures at the outlets of Mammoth (L1) and Whale Tail (L2) Lakes and at the south end of Whale Tail Lake (L4) for the period June 21 – August 12, 2015.

The water temperatures in tributaries to Whale Tail Lake for the period June 27- August 28, 2015, are presented in **Figure 7-4** and **Figure 7-5**. The rates of increase in temperature in late June and early July appear to be related to the duration of ice presence in the upstream lakes. Watercourse A55-A17, with only small shallow lakes and ponds upstream, warmed most quickly. Watercourse A59-A17, which has a large lake upstream, warmed most slowly. The temperatures of watercourses converged after mid-July and subsequently all four tributaries exhibited similar patterns in temperatures, presumably in response to weather conditions. In August, diurnal fluctuations were greatest in A53-17 and A46-17, which had the smallest drainage areas and shallow lakes upstream. Diurnal fluctuations were least in A55-A17.

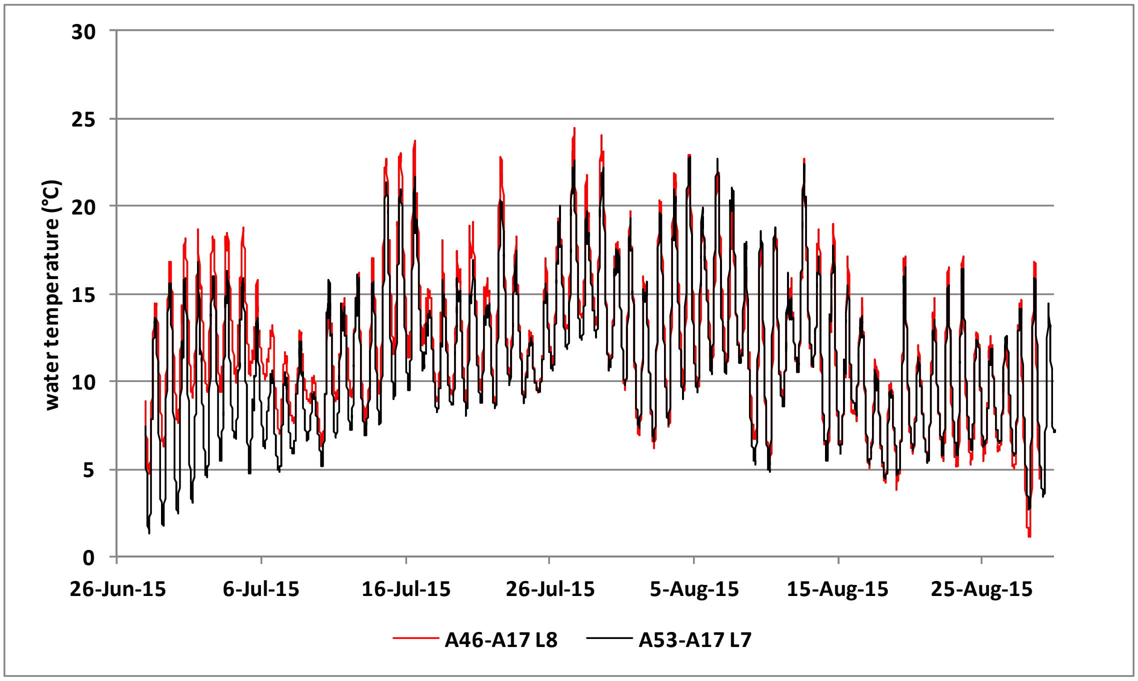


Figure 7-4. Water temperatures in tributary A46-A17 (L8) and tributary A53-A17 (L7) for the period June 27 – August 28, 2015.

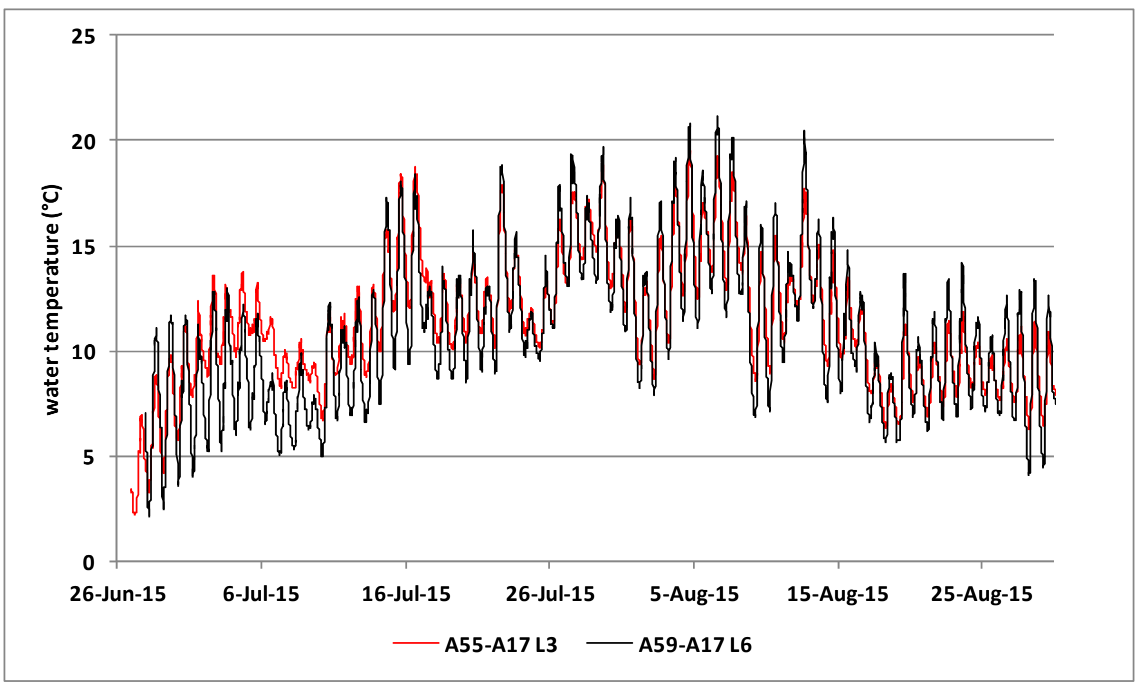


Figure 7-5. Water temperatures in tributary A55-A17 (L3) and tributary A59-A17 (L6) for the period June 27 – August 28, 2015.

The first and last complete day for which temperature data are available, the maximum water temperature recorded and the date on which the maximum temperature was recorded are presented for each location in **Table 7-2**. The temperature logger at the outlet of Mammoth Lake (A16-A15) was out of the water most of the time from July 19 on, based on the large diurnal temperature fluctuations. The other loggers recorded water temperatures from their deployment until their removal. There was a period of very warm, sunny weather during early July and the maximum water temperature occurred on July 10, 11, or 12 at all of the locations except watercourse A50-A17.

Table 7-2. The first and last full day for which temperature data are available, the maximum water temperature recorded and the day that the maximum water temperature was recorded at each location during 2016.

Location	Location ID	Start Date (2016)	End Date (2016)	Maximum temperature (°C)	Date of maximum temperature
A53-A17	L1	July 3	August 30	26.3	July 11
A50-A17	L2	July 3	August 29	20.1	August 17
A47-A17	L3	July 3	August 29	28.3	July 11
A16-A15	L4	July 3	August 29	out of water by mid-July	
A18-A17	L5	July 3	August 29	22.7	July 10
A55-A17	L6	July 3	August 29	23.3	July 10
A1-DS1	L7	July 3	August 29	22.9	July 12
Whale Tail outlet	L8	July 10	August 30	18.1	July 10

Plots of water temperature in 2016 are provided in **Figure 7-6**, **Figure 7-7**, and **Figure 7-8**. The water temperature was similar in watercourse A18-A17 and in Whale Tail Lake near its outlet after mid-July, when ice-off occurred in Whale Tail Lake. Among the Whale Tail Lake tributaries, temperatures were highest in A46-A17 which experienced maximum temperatures higher than 25°C on five days during the warm period in early July. The maximum water temperature also exceeded 25°C on four days during this period in A53-A17. The coldest tributary during this period was A50-A17, where the maximum temperature was approximately 20.1°C. There are no connected lakes or ponds along this watercourse.

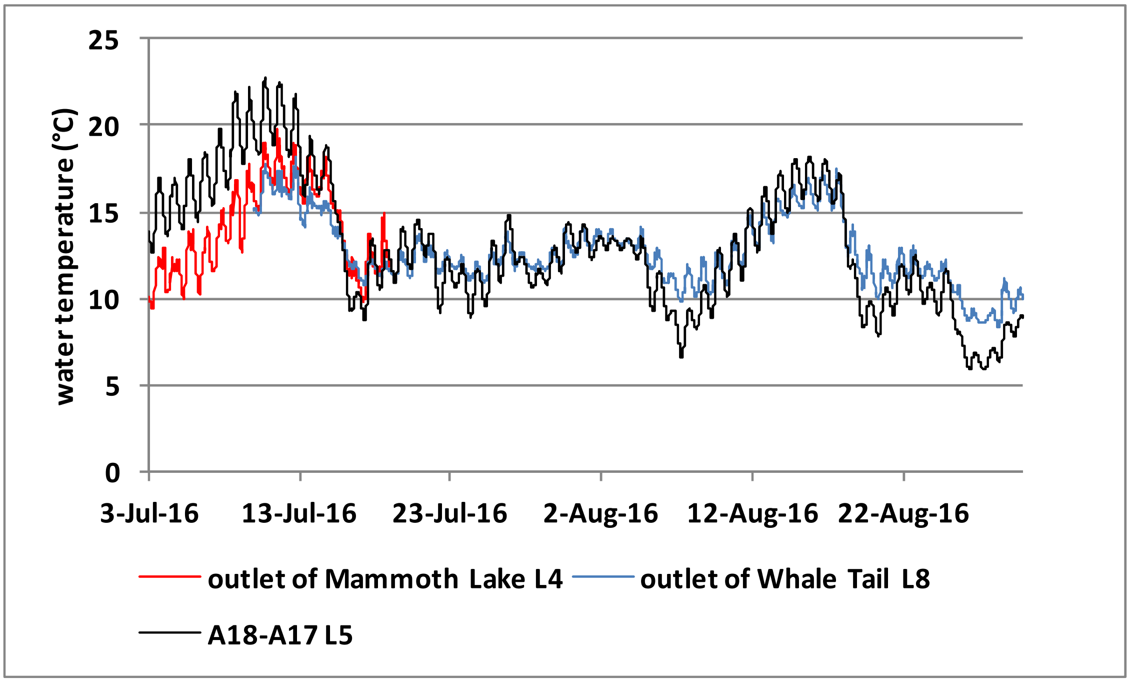


Figure 7-6. Water temperatures at the outlets of Mammoth (L4) and Whale Tail (L8) Lakes and in the connecting channel between Lake A18 and Whale Tail Lake in July and August, 2016. The logger at the outlet of Mammoth Lake was out of the water, and therefore there are no data, after July 18.

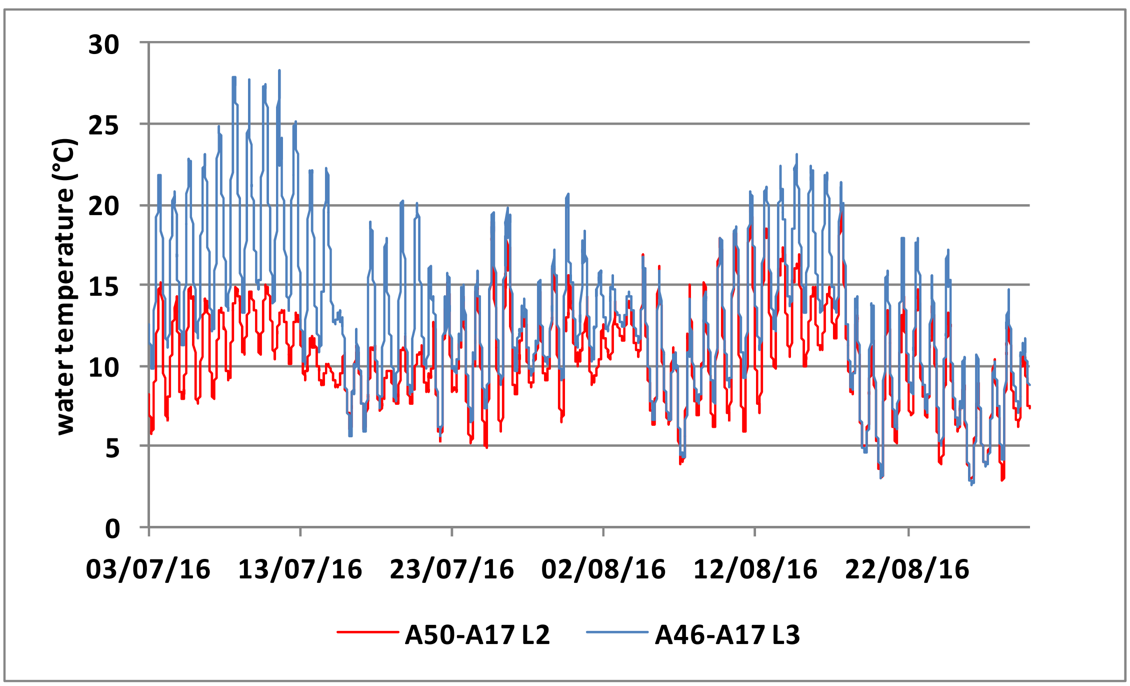


Figure 7-7. Water temperatures in Whale Tail Lake tributaries A50-A17 (L2) and A46-A17 (L3) during July and August, 2016.

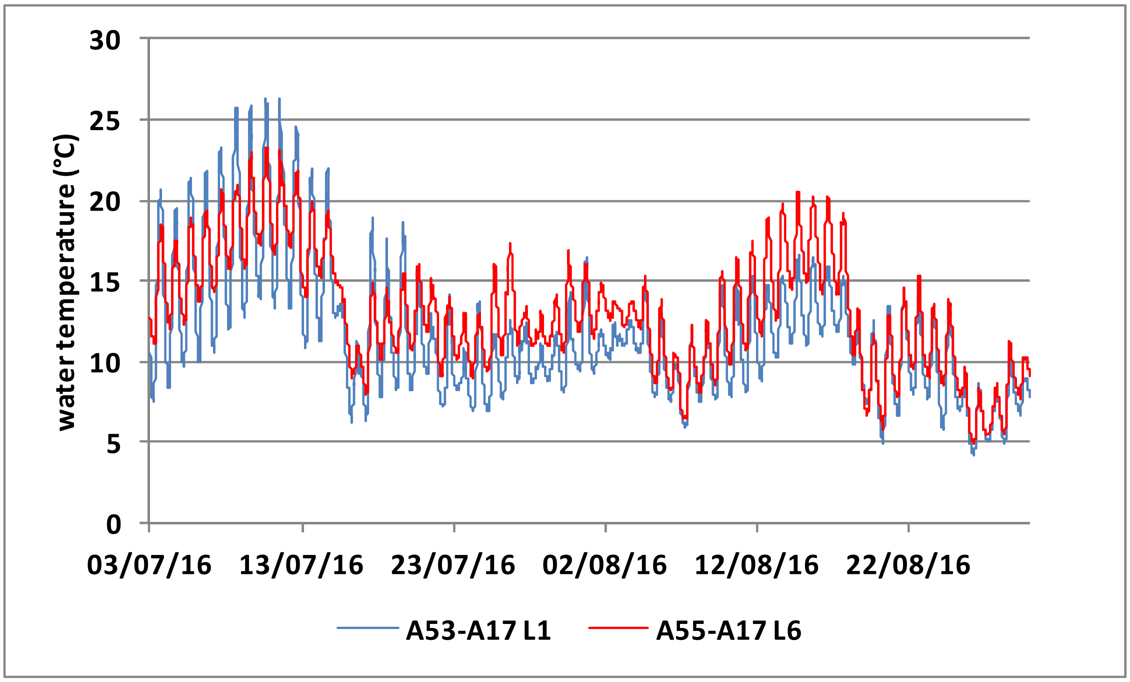


Figure 7-8. Water temperatures in Whale Tail Lake tributaries A53-A17 (L1) and A55-A17 (L6) during July and August, 2016.

8.0 PERIPHYTON MONITORING

8.1 Methods

Periphyton monitoring stations were established on Mammoth Lake, Whale Tail Lake, and Lake A53 (Figure 7-1). Stations were situated close to an accessible shore area, in water deep enough that the station would not become dry as water levels fell through the summer. The coordinates of each station were determined using a Garmin Oregon 650 gps, and a rectangular plot, approximately 2-3 m^2 in area, was established, marking each corner with flagging tape tied to a rock to ensure that the same location was examined and photographed over the course of the monitoring. Substrate type was characterized in each plot, following the Wentworth (1922) scale. Monitoring occurred when it corresponded with other field work being conducted in the vicinity, resulting in four monitoring occasions in Whale Tail Lake, two in Mammoth Lake, and three in Lake A53. Using the methods provided by Golder Associates Ltd., photographs of the substrate were taken and the following information was recorded during each monitoring event:

- date
- periphyton coverage (none 0%, sparse <5%, low 5-25%, moderate 25-75%, high >75%)
- colour of periphyton layer
- thickness (mm) of Periphyton layer
- water clarity and colour
- evenness of periphyton coverage over the broader surrounding area (even - patchy)

8.2 Results

The latitude and longitude, substrate composition and macro-scale photograph numbers are provided in Table 8-1 and the periphyton observations and photograph numbers for each station and date are provided in Table 8-2. The photographs have been provided digitally. In all cases the periphyton was a spongy, non-filamentous mat that broke away in flat chunks when disturbed, and coverage was even in the vicinity of all of the plots on all occasions.

Table 8-1. Location of and substrate composition at the periphyton monitoring locations. The locations are shown in Figure 7-1.

Lake	Location	Latitude	Longitude	Substrate composition (%)				Photographs
				Large gravel	Small cobble	Large cobble	Boulder	
Whale Tail	Per-1	-96.688532	65.382087	0	40	60	0	4389, 4390
	Per-2	-96.693274	65.408335	0	20	75	5	4415
Mammoth	Per-3	-96.76458	65.395138	0	0	30	70	4441-4443
	Per-4	-96.721609	65.401235	0	0	20	80	4448-4450
Lake A53	Per-5	-96.676592	65.405969	10	70	20	0	4595, 4596

Table 8-2. Periphyton characteristics and numbers of the photographs that document the conditions. The locations are shown in Figure 7-1.

Lake	Location	Date (2015)	Periphyton characteristics			Photographs
			Cover (%)	Colour	Thickness (mm)	
Whale Tail	Per-1	July 26	50	olive	1-3	4382-4388
		August 4	>75	olive	1-5	4601-4605
		August 19	>75	olive-brown	1-5	4618-4625
		August 30	>75	brown	1-4	4767-4770
	Per-2	July 27	>75	olive	1-2	4412-4414
		August 4	>75	olive	1-2	4597-4600
		August 19	>75	olive	1-2	4626-4630
		August 30	>75	olive-brown	1-4	4782-4784
Mammoth Lake	Per-3	July 30	>75	olive	3-4	4437-4440
		August 25	>75	olive-brown	4-7	4678-4683
	Per-4	July 30	50	olive	1-2	4444-4447
		August 25	>75	olive-brown	1-2	4705-4709
Lake A53	Per-5	August 3	>75	brown	1	4591-4594
		August 20	>75	brown	1	27, 28
		August 31	>75	brown	1	4800, 4801

9.0 SUMMARY

A total of six fish species are present in the primary study area, comprised of four large-bodied species (Lake Trout, Arctic Char, Round Whitefish and Burbot) and two small-bodies species (Slimy Sculpin and Ninespine Stickleback). Arctic Grayling occur farther downstream in the watershed but upstream migration barriers prevent them from moving to the primary study area. Their absence in the primary study area is consistent with the paucity of suitable spawning habitat and absence of riverine adult habitat in the tributaries to Mammoth and Whale Tail Lake.

Lake Trout were the most abundant species in gill net catches and the most widely distributed among the lakes, followed by Round Whitefish and Arctic Char. Two Burbot were captured by gill netting. Gill netting catch per unit effort was low for all species. In Mammoth, Whale Tail and Nemo Lakes combined, average catch per unit effort in gill nets, calculated as the number of individuals captured per hour of soak time using a standard AEM gill net was 0.5, 0.1 and 0.01 for Lake Trout, Round Whitefish and Arctic Char, respectively. Lake Trout was the most frequently observed species on underwater video recorded in Whale Tail Lake.

In total, electrofishing more than 3400 m of lake shoreline and pond habitat resulted in the capture of approximately 250 Ninespine Stickleback, 55 Slimy Sculpin, 2 juvenile Arctic Char and 3 juvenile salmonids that were either Arctic Char or Lake Trout. Ninespine Stickleback was also the most frequently observed small-bodied fish species on underwater video recorded in Whale Tail Lake.

At least one large-bodied fish species was captured in eleven of the larger lakes, in addition to Whale Tail, Mammoth and Nemo, and Ninespine Stickleback and Slimy Sculpin were also present in most of those. Only Ninespine Sticklebacks were captured in three of the smaller waterbodies. There were several isolated or nearly isolated small lakes and ponds in which no fish were captured. Most of these are located north of Whale Tail Lake.

There are two broad categories of watercourses in the primary study area. One type consists of connecting channels between larger lakes. These are generally wide and shallow with boulder and cobble substrate. Some of these connecting channels have sufficient depth during spring freshet for adult large-bodied fish to pass through them but, as flow subsides, they become shallower and impassible to and unusable by large fish and eventually all of the flow is interstitial. Some of these connecting channels never have surface flow.

The other watercourses are more typical small streams and most drain smaller watersheds. These shallow streams often have multiple channels (i.e. are braided). The mean total wetted width of the Whale Tail Lake tributaries ranged from 0.7 m to 7.6 m and their mean depth ranged from 6 cm to 17 cm. Riffle and run habitat is dominant and there are few pools in these tributaries. Peat is the dominant substrate in most of these watercourses.

All of the watercourses in the primary study area freeze during the winter. Based on the sampling conducted, there is little movement of large fish through the connecting channels that have sufficient depth to pass large fish during the spring. Large mesh hoop nets set between June 19 and July 13, 2015, in areas where there was thought to be potential for fish movement between lakes caught one Lake Trout and one Arctic Char in 3000 hours of soak time. No fish were captured in six hoop nets set from June 21 to July 3, 2016, immediately downstream of the connecting channel between Mammoth Lake and the next lake downstream (Lake A15). A gill net set across the connecting channel between Whale Tail Lake and Lake A18 in late June and early July of 2016 caught one Arctic Char. A gill net set across watercourse A53-A17 during the same period caught one Arctic Char, and a gill net set across watercourse A55-A17 caught seven Arctic Char, two of which were moving downstream.

Electrofishing effort in watercourses (excluding the electrofishing farther downstream looking for Arctic Grayling) totalled 51,524 electroseconds and over 8 km. No adult large-bodied fish were captured. The most abundant species in the catches was Ninespine Stickleback (n=1271) followed by Slimy Sculpin (n=420). Low numbers of juvenile Arctic Char (n=25) and juvenile Lake Trout (n=10) were captured as well as 3 individuals that were juveniles of one or the other of these but could not be definitively identified to species. Eighteen juvenile Round Whitefish and three juvenile Burbot were also captured. Large minnow traps set in tributaries to Whale Tail Lake caught a total of 17 Slimy Sculpin, one juvenile Round Whitefish, and one Ninespine Stickleback in 163 trap-days of effort.

Ninespine Stickleback and Slimy Sculpin were the most widely distributed species in the Whale Tail Lake tributaries. Low numbers of juvenile Arctic Char were captured in five of the Whale Tail Lake tributaries and juvenile Lake Trout were also captured in two of these. Juvenile Burbot were captured in three tributaries and a juvenile Round Whitefish was captured in one. Juvenile Lake Trout and Round Whitefish as well as Ninespine Stickleback and Slimy Sculpin were captured in the connecting channels between Mammoth and Whale Tail Lake and between Whale Tail Lake and Lake A18.

The maximum water temperature measured at the outlet of Whale Tail Lake was 18.6°C in 2015 and 18.1°C in 2016. The maximum water temperature was higher in most of the Whale Tail Lake tributaries in 2016 than in 2015. The maximum temperatures ranged from 20.1°C in a tributary which has no connected lakes or ponds upstream from Whale Tail Lake, to 28.3°C in a tributary that passes through a series of shallow ponds before reaching Whale Tail Lake.

10.0 LITERATURE CITED

Azimuth. 2010. Environmental Effects Monitoring (EEM): Cycle 1 Study Design, Meadowbank Division, Nunavut. Report prepared by Azimuth Consulting Group Inc., Vancouver, BC for Environment Canada, Edmonton, AB on behalf of Agnico-Eagle Mines Ltd., Baker Lake, NU. December, 2010.

Azimuth. 2013. Aquatic Effects Monitoring Program – Core Receiving Environment Monitoring Program 2012, Meadowbank Gold Project. Report prepared by Azimuth Consulting Group Inc., Vancouver, BC for Agnico-Eagle Mines Ltd., Baker Lake, NU.

BAER (Baseline Aquatic Ecosystem Report). 2005. A report prepared by Azimuth Consulting Group, Vancouver for Cumberland Resources Ltd. October, 2005.

Fitzsimons, J.D. 1994. An evaluation of Lake Trout spawning habitat characteristics and methods for their detection. Can. Tech. Rep. Fish. Aquat. Sci. No. 1962: 26 p.

Jones, N.E., G.J. Scrimgeour, and W.M. Tonn. 2010. Fish species traits and communities in relation to a habitat template for Arctic rivers and streams. American Fisheries Society Symposium 73:000-000, 2010.

McPhail, J.D. and C.C. Lindsey. 1970. Freshwater fishes of Northwestern Canada and Alaska. Bulletin 173. Fisheries Research Board of Canada. 381 p.

Scott, W.B. and E.J. Crossman. 1973. Freshwater fishes of Canada. Bulletin 184. Fisheries Research Board of Canada. 966 p.

Stanfield, L. (editor). 2013. Ontario Stream Assessment Protocol. Version 9.0. Fisheries Policy Section. Ontario Ministry of Natural Resources. Peterborough, Ontario. 505 Pages.

Wentworth, C.K. 1922. A scale of grade and class terms for clastic sediments. J. Geol. 30: 377-392.

APPENDIX A – FISH SAMPLING DATA

Table A 1. Hoop net number, location ID and coordinates, set and lift dates and times, direction of opening, and catch for large-mesh hoop nets set in 2015. Nets 1 and 6 had six m long wings. Nets 2, 3, 4 and 5 had 3 m long wings.

Net Number	Location ID	Latitude	Longitude	Water-course	Date Set	Time Set	Date Lifted	Time lifted	Soak Time (hours)	Opening facing	Catch
1	LHN1	65.392670	-96.770258	A16-A15	19-Jun	14:35	20-Jun	14:30	24	downstream	none
1	LHN1	65.392670	-96.770258	A16-A15	20-Jun	14:30	21-Jun	12:00	22	downstream	none
1	LHN1	65.392670	-96.770258	A16-A15	21-Jun	12:00	27-Jun	13:15	145	downstream	none
1	LHN1	65.392670	-96.770258	A16-A15	27-Jun	13:15	28-Jun	15:21	26	downstream	none
1	LHN1	65.392670	-96.770258	A16-A15	28-Jun	15:21	03-Jul	15:35	120	downstream	none
1	LHN1	65.392670	-96.770258	A16-A15	03-Jul	15:35	04-Jul	9:30	18	downstream	none
3	LHN1	65.392670	-96.770258	A16-A15	21-Jun	12:30	27-Jun	13:15	145	downstream	none
3	LHN1	65.392670	-96.770258	A16-A15	27-Jun	13:15	28-Jun	15:03	26	upstream	none
3	LHN1	65.392670	-96.770258	A16-A15	28-Jun	15:03	03-Jul	15:45	121	upstream	none
3	LHN1	65.392670	-96.770258	A16-A15	03-Jul	15:45	04-Jul	9:30	18	upstream	none
1	LHN3	65.403864	-96.709527	A17-A16	04-Jul	14:30	06-Jul	15:00	49	upstream	none
1	LHN3	65.403864	-96.709527	A17-A16	06-Jul	15:00	07-Jul	15:30	25	upstream	none
1	LHN3	65.403864	-96.709527	A17-A16	07-Jul	15:30	08-Jul	15:20	24	upstream	none
1	LHN3	65.403864	-96.709527	A17-A16	08-Jul	15:20	09-Jul	12:10	21	upstream	none
1	LHN3	65.403864	-96.709527	A17-A16	09-Jul	12:10	10-Jul	13:45	26	upstream	none
1	LHN3	65.403864	-96.709527	A17-A16	10-Jul	13:45	12-Jul	16:17	51	upstream	none
1	LHN3	65.403864	-96.709527	A17-A16	12-Jul	16:17	13-Jul	9:15	17	upstream	none
3	LHN3	65.403948	-96.709764	A17-A16	04-Jul	14:30	06-Jul	15:00	49	downstream	none
3	LHN3	65.403948	-96.709764	A17-A16	06-Jul	15:00	07-Jul	15:30	25	downstream	none
3	LHN3	65.403948	-96.709764	A17-A16	07-Jul	15:30	08-Jul	15:20	24	downstream	none
3	LHN3	65.403948	-96.709764	A17-A16	08-Jul	15:20	09-Jul	12:10	21	downstream	none
3	LHN3	65.403948	-96.709764	A17-A16	09-Jul	12:10	10-Jul	13:45	26	downstream	none
3	LHN3	65.403948	-96.709764	A17-A16	10-Jul	13:45	12-Jul	16:17	51	downstream	none

Net Number	Location ID	Latitude	Longitude	Water-course	Date Set	Time Set	Date Lifted	Time lifted	Soak Time (hours)	Opening facing	Catch
3	LHN3	65.403948	-96.709764	A17-A16	12-Jul	16:17	13-Jul	9:15	17	downstream	none
2	LHN2a	65.402724	-96.711557	A17-A16	19-Jun	15:10	20-Jun	14:45	24	downstream	none
2	LHN2a	65.402724	-96.711557	A17-A16	20-Jun	14:45	21-Jun	13:00	22	downstream	none
2	LHN2a	65.402724	-96.711557	A17-A16	21-Jun	13:00	27-Jun	13:15	144	downstream	none
2	LHN2a	65.402724	-96.711557	A17-A16	27-Jun	13:15	28-Jun	15:21	26	upstream	none
2	LHN2b	65.403052	-96.710704	A17-A16	28-Jun	15:21	29-Jun	7:40	16	upstream	none
2	LHN2b	65.403052	-96.710704	A17-A16	29-Jun	7:40	03-Jul	15:15	104	upstream	none
2	LHN2b	65.403052	-96.710704	A17-A16	03-Jul	15:15	06-Jul	14:50	72	upstream	none
2	LHN2b	65.403052	-96.710704	A17-A16	06-Jul	14:50	07-Jul	15:15	24	upstream	none
2	LHN2b	65.403052	-96.710704	A17-A16	07-Jul	15:15	08-Jul	15:15	24	upstream	none
2	LHN2b	65.403052	-96.710704	A17-A16	08-Jul	15:15	09-Jul	12:10	21	upstream	none
2	LHN2b	65.403052	-96.710704	A17-A16	09-Jul	12:10	10-Jul	14:00	26	upstream	none
2	LHN2b	65.403052	-96.710704	A17-A16	10-Jul	14:00	12-Jul	16:07	50	upstream	none
2	LHN2b	65.403052	-96.710704	A17-A16	12-Jul	16:07	13-Jul	9:30	17	upstream	none
4	LHN2a	65.402724	-96.711557	A17-A16	21-Jun	13:45	27-Jun	13:15	144	downstream	none
4	LHN2a	65.402724	-96.711557	A17-A16	27-Jun	13:15	28-Jun	15:03	26	downstream	none
4	LHN2b	65.403006	-96.710979	A17-A16	28-Jun	15:03	29-Jun	7:45	17	downstream	none
4	LHN2b	65.403006	-96.710979	A17-A16	29-Jun	7:45	03-Jul	15:17	104	downstream	none
4	LHN2b	65.403006	-96.710979	A17-A16	03-Jul	15:17	06-Jul	14:50	72	downstream	none
4	LHN2b	65.403006	-96.710979	A17-A16	06-Jul	14:50	07-Jul	15:15	24	downstream	none
4	LHN2b	65.403006	-96.710979	A17-A16	07-Jul	15:15	08-Jul	15:15	24	downstream	none
4	LHN2b	65.403006	-96.710979	A17-A16	08-Jul	15:15	09-Jul	12:10	21	downstream	none
4	LHN2b	65.403006	-96.710979	A17-A16	09-Jul	12:10	10-Jul	14:00	26	downstream	none
4	LHN2b	65.403006	-96.710979	A17-A16	10-Jul	14:00	12-Jul	16:07	50	downstream	none
4	LHN2b	65.403006	-96.710979	A17-A16	12-Jul	16:07	13-Jul	9:30	17	downstream	none

Net Number	Location ID	Latitude	Longitude	Water-course	Date Set	Time Set	Date Lifted	Time lifted	Soak Time (hours)	Opening facing	Catch
5	LHN5	65.394604	-96.677482	A55-A17	26-Jun	8:40	27-Jun	10:30	26	downstream	none
5	LHN5	65.394604	-96.677482	A55-A17	27-Jun	10:30	28-Jun	13:45	27	downstream	none
5	LHN5	65.394604	-96.677482	A55-A17	28-Jun	13:45	29-Jun	10:45	21	downstream	none
5	LHN5	65.394604	-96.677482	A55-A17	29-Jun	10:45	03-Jul	7:55	93	downstream	none
5	LHN5	65.394604	-96.677482	A55-A17	03-Jul	7:55	06-Jul	8:30	73	downstream	1 Lake Trout toothed in wing - 69 cm 1 Arctic Char caught in wing 27 cm
5	LHN5	65.394604	-96.677482	A55-A17	06-Jul	8:30	07-Jul	15:50	31	downstream	none
5	LHN5	65.394604	-96.677482	A55-A17	07-Jul	15:50	08-Jul	14:50	23	downstream	none
5	LHN5	65.394604	-96.677482	A55-A17	08-Jul	14:50	09-Jul	16:15	25	downstream	none
5	LHN5	65.394604	-96.677482	A55-A17	09-Jul	16:15	12-Jul	11:34	67	downstream	none
5	LHN5	65.394604	-96.677482	A55-A17	12-Jul	11:34	13-Jul	12:40	25	downstream	none
6	LHN4	65.384689	-96.699785	A18-A17	26-Jun	10:40	29-Jun	9:47	71	downstream	none
6	LHN4	65.384689	-96.699785	A18-A17	29-Jun	9:47	04-Jul	15:10	125	downstream	none
6	LHN4	65.384689	-96.699785	A18-A17	04-Jul	15:10	05-Jul	15:35	24	downstream	none
6	LHN4	65.384689	-96.699785	A18-A17	05-Jul	15:35	08-Jul	14:58	71	downstream	none
6	LHN4	65.384689	-96.699785	A18-A17	08-Jul	14:58	09-Jul	14:55	24	downstream	none
6	LHN4	65.384689	-96.699785	A18-A17	09-Jul	14:55	13-Jul	11:30	93	downstream	none

Table A 2. Hoop net location ID and coordinates, set and lift dates and times, soak time, direction of opening, and catch for large-mesh hoop nets set in 2016.

Location ID	Latitude	Longitude	Date Set	Time Set	Date Lifted	Time lifted	Soak Time (hours)	Opening facing	Catch
LHN5	65.3969	-96.7739	21-Jun	14:30	22-Jun	7:38	17.1	downstream	none
LHN5	65.3969	-96.7739	22-Jun	7:38	23-Jun	15:03	31.4	downstream	none
LHN5	65.3969	-96.7739	23-Jun	15:03	25-Jun	7:16	40.2	downstream	none
LHN5	65.3969	-96.7739	25-Jun	7:16	26-Jun	13:35	30.3	downstream	none
LHN5	65.3969	-96.7739	26-Jun	13:35	27-Jun	9:52	20.3	downstream	none
LHN5	65.3969	-96.7739	27-Jun	9:52	2-Jul	10:30	120.6	downstream	none
LHN5	65.3969	-96.7739	2-Jul	10:30	3-Jul	7:25	20.9	downstream	none
LHN5	65.3969	-96.7739	3-Jul	7:25	4-Jul	7:00	23.6	downstream	none
LHN6	65.3969	-96.7739	21-Jun	14:30	22-Jun	7:38	17.1	downstream	none
LHN6	65.3969	-96.7739	22-Jun	7:38	23-Jun	15:03	31.4	downstream	none
LHN6	65.3969	-96.7739	23-Jun	15:03	25-Jun	7:16	40.2	downstream	none
LHN6	65.3969	-96.7739	25-Jun	7:16	26-Jun	13:35	30.3	downstream	none
LHN6	65.3969	-96.7739	26-Jun	13:35	27-Jun	9:52	20.3	downstream	none
LHN6	65.3969	-96.7739	27-Jun	9:52	2-Jul	10:30	120.6	downstream	none
LHN6	65.3969	-96.7739	2-Jul	10:30	3-Jul	7:25	20.9	downstream	none
LHN6	65.3969	-96.7739	3-Jul	7:25	4-Jul	7:00	23.6	downstream	none
LHN7	65.3968	-96.7737	21-Jun	14:30	22-Jun	7:38	17.1	downstream	none
LHN7	65.3968	-96.7737	22-Jun	7:38	23-Jun	15:03	31.4	downstream	none
LHN7	65.3968	-96.7737	23-Jun	15:03	25-Jun	7:16	40.2	downstream	none
LHN7	65.3968	-96.7737	25-Jun	7:16	26-Jun	13:35	30.3	downstream	none
LHN7	65.3968	-96.7737	26-Jun	13:35	27-Jun	9:52	20.3	downstream	none
LHN7	65.3968	-96.7737	27-Jun	9:52	2-Jul	10:30	120.6	downstream	none
LHN7	65.3968	-96.7737	2-Jul	10:30	3-Jul	7:25	20.9	downstream	none
LHN7	65.3968	-96.7737	3-Jul	7:25	4-Jul	7:00	23.6	downstream	none

Location ID	Latitude	Longitude	Date Set	Time Set	Date Lifted	Time lifted	Soak Time (hours)	Opening facing	Catch
LHN8	65.3968	-96.7735	21-Jun	14:30	22-Jun	7:38	17.1	downstream	none
LHN8	65.3968	-96.7735	22-Jun	7:38	23-Jun	15:03	31.4	downstream	none
LHN8	65.3968	-96.7735	23-Jun	15:03	25-Jun	7:16	40.2	downstream	none
LHN8	65.3968	-96.7735	25-Jun	7:16	26-Jun	13:35	30.3	downstream	none
LHN8	65.3968	-96.7735	26-Jun	13:35	27-Jun	9:52	20.3	downstream	none
LHN8	65.3968	-96.7735	27-Jun	9:52	2-Jul	10:30	120.6	downstream	none
LHN8	65.3968	-96.7735	2-Jul	10:30	3-Jul	7:25	20.9	downstream	none
LHN8	65.3968	-96.7735	3-Jul	7:25	4-Jul	7:00	23.6	downstream	none
LHN9	65.3968	-96.7732	21-Jun	14:30	22-Jun	7:38	17.1	downstream	none
LHN9	65.3968	-96.7732	22-Jun	7:38	23-Jun	15:03	31.4	downstream	none
LHN9	65.3968	-96.7732	23-Jun	15:03	25-Jun	7:16	40.2	downstream	none
LHN9	65.3968	-96.7732	25-Jun	7:16	26-Jun	13:35	30.3	downstream	none
LHN9	65.3968	-96.7732	26-Jun	13:35	27-Jun	9:52	20.3	downstream	none
LHN9	65.3968	-96.7732	27-Jun	9:52	2-Jul	10:30	120.6	downstream	none
LHN9	65.3968	-96.7732	2-Jul	10:30	3-Jul	7:25	20.9	downstream	none
LHN9	65.3968	-96.7732	3-Jul	7:25	4-Jul	7:00	23.6	downstream	none
LHN10	65.3968	-96.7729	21-Jun	14:30	22-Jun	7:38	17.1	downstream	none
LHN10	65.3968	-96.7729	22-Jun	7:38	23-Jun	15:03	31.4	downstream	none
LHN10	65.3968	-96.7729	23-Jun	15:03	25-Jun	7:16	40.2	downstream	none
LHN10	65.3968	-96.7729	25-Jun	7:16	26-Jun	13:35	30.3	downstream	none
LHN10	65.3968	-96.7729	26-Jun	13:35	27-Jun	9:52	20.3	downstream	none
LHN10	65.3968	-96.7729	27-Jun	9:52	2-Jul	10:30	120.6	downstream	none
LHN10	65.3968	-96.7729	2-Jul	10:30	3-Jul	7:25	20.9	downstream	none
LHN10	65.3968	-96.7729	3-Jul	7:25	4-Jul	7:00	23.6	downstream	none

Table A 3. Gill net set, lift and catch data. Refer to figures in the body of the report for locations.

Waterbody	Set type	Location ID	Start depth	Start latitude	Start longitude	End depth	End latitude	End longitude	Set date	Set time	Lift date	Lift time	Lake Trout	Arctic Char	Round Whitefish	Burbot
A113	miscellaneous gill net	GN46	0.6	65.417648	-96.690075	0.5	65.418488	-96.689693	28-Aug-15	15:14	29-Aug-15	7:50	0	0	0	0
A18	miscellaneous gill net	GN37	1	65.383806	-96.713253	1.1	65.382809	-96.715195	22-Aug-15	12:45	22-Aug-15	15:03	0	0	0	0
A18	overnight gill net	GN50	1.5	65.384385	-96.714427	3	65.382907	-96.713961	22-Aug-16	09:45	23-Aug-16	7:28	0	8	0	0
A19	miscellaneous gill net	GN38	1	65.377131	-96.713333	1	65.376886	-96.716198	23-Aug-15	9:36	23-Aug-15	11:30	0	0	0	0
A19	overnight gill net	GN49	2	65.377223	-96.713340	2	65.376687	-96.716715	21-Aug-16	15:34	22-Aug-16	7:41	0	2	0	1
A20	miscellaneous gill net	GN39a	2.4	65.379587	-96.746692	7.8	65.378869	-96.749023	23-Aug-15	14:16	23-Aug-15	16:01	0	0	1	0
A20	overnight gill net	GN39b	2.4	65.379587	-96.746692	7.8	65.378869	-96.749023	23-Aug-15	16:20	24-Aug-15	8:07	11	0	5	0
A22	miscellaneous gill net	GN40	3.5	65.373967	-96.757500	6.7	65.373660	-96.760268	24-Aug-15	15:02	24-Aug-15	16:38	2	1	0	0
A45	miscellaneous gill net	GN45	2	65.384859	-96.744752	3	65.384002	-96.746927	28-Aug-15	10:50	28-Aug-15	12:49	0	0	0	0
A45	overnight gill net	GN51	1.1	65.384877	-96.744566	1.5	65.383875	-96.746983	23-Aug-16	09:34	24-Aug-16	14:45	0	0	0	0
A47	miscellaneous gill net	GN47	0.7	65.412776	-96.694540	1	65.413968	-96.695097	29-Aug-15	9:25	29-Aug-15	11:40	0	1	0	0
A49	miscellaneous gill net	GN48	2.5	65.410462	-96.699762	3.5	65.411405	-96.701695	29-Aug-15	13:27	29-Aug-15	15:58	0	0	0	0
A49	overnight gill net	GN52	1.5	65.412679	-96.703493	2.5	65.411339	-96.701679	24-Aug-16	16:12	25-Aug-16	7:48	3	0	0	0
A53	miscellaneous gill net	GN31	1.2	65.406759	-96.669336	2	65.406215	-96.672075	03-Aug-15	14:28	03-Aug-15	16:51	1	2	0	0
A55	miscellaneous gill net	GN44	0.8	65.396819	-96.671340	0.7	65.395737	-96.669831	27-Aug-15	15:57	28-Aug-15	8:07	5	0	0	1
A62	miscellaneous gill net	GN43	1.5	65.391819	-96.702106	3.3	65.390929	-96.703743	27-Aug-15	11:49	27-Aug-15	13:46	3	0	0	0
A63	miscellaneous gill net	GN36	4.2	65.388938	-96.717718	3.3	65.387855	-96.716076	22-Aug-15	8:31	22-Aug-15	10:07	1	0	0	0
A65	miscellaneous gill net	GN35	1	65.373144	-96.694364	1.5	65.373712	-96.696831	20-Aug-15	10:37	20-Aug-15	13:57	2	0	2	0
Mammoth Lake	2014 miscellaneous gill net	GN14-5	3.2	65.389745	-96.750904	3.5	65.391114	-96.751886	04-Sep-14	11:03	04-Sep-14	17:35	7	0	0	0
Mammoth Lake	2014 miscellaneous gill net	GN14-6	5.3	65.390281	-96.756683	2	65.391654	-96.757351	04-Sep-14	11:23	04-Sep-14	18:03	6	0	0	0
Mammoth Lake	miscellaneous gill net	GN41a	2.5	65.400782	-96.727100	5	65.400924	-96.730386	25-Aug-15	8:48	25-Aug-15	14:11	1	0	0	0
Mammoth Lake	miscellaneous gill net	GN42a	8	65.395395	-96.752570	5.3	65.395304	-96.755652	25-Aug-15	9:07	25-Aug-15	14:36	3	0	0	0
Mammoth Lake	overnight gill net	GN41b	2.5	65.400782	-96.727100	5	65.400924	-96.730386	25-Aug-15	14:27	26-Aug-15	8:09	10	0	4	0
Mammoth Lake	overnight gill net	GN42b	8	65.395395	-96.752570	5.3	65.395304	-96.755652	25-Aug-15	14:45	26-Aug-15	8:50	14	0	0	0
Mammoth Lake	short-set gill net	GN15	1.3	65.399001	-96.744166	4.2	65.398085	-96.742010	28-Jul-15	8:24	28-Jul-15	10:39	1	0	3	0
Mammoth Lake	short-set gill net	GN16	1.4	65.399447	-96.748510	7.2	65.398371	-96.750074	28-Jul-15	8:39	28-Jul-15	11:15	3	0	5	0
Mammoth Lake	short-set gill net	GN17	0.9	65.399489	-96.723543	3.3	65.400282	-96.725747	28-Jul-15	9:23	28-Jul-15	12:02	0	0	0	0
Mammoth Lake	short-set gill net	GN18	1.8	65.401677	-96.735628	2.3	65.400710	-96.733640	28-Jul-15	11:10	28-Jul-15	13:30	0	0	1	0
Mammoth Lake	short-set gill net	GN19	1.5	65.396002	-96.745847	4.7	65.396414	-96.748668	28-Jul-15	11:50	28-Jul-15	13:51	1	0	1	0
Mammoth Lake	short-set gill net	GN20	2.7	65.403152	-96.726912	3	65.402034	-96.728046	28-Jul-15	12:19	28-Jul-15	14:26	1	0	4	0
Mammoth Lake	short-set gill net	GN21	1.7	65.398226	-96.735355	6.7	65.399367	-96.736694	28-Jul-15	13:47	28-Jul-15	15:46	0	0	0	0
Mammoth Lake	short-set gill net	GN22	3.1	65.392852	-96.750834	4.7	65.392783	-96.753812	28-Jul-15	14:15	28-Jul-15	16:11	2	0	2	0
Mammoth Lake	short-set gill net	GN23	2.1	65.388788	-96.753937	4.5	65.389863	-96.755265	29-Jul-15	7:59	29-Jul-15	10:13	0	0	0	0
Mammoth Lake	short-set gill net	GN24	1.8	65.396210	-96.765103	5.5	65.396455	-96.762148	29-Jul-15	8:40	29-Jul-15	10:38	0	0	0	0
Mammoth Lake	short-set gill net	GN25	2.1	65.398015	-96.755425	4.3	65.397118	-96.757389	29-Jul-15	8:49	29-Jul-15	11:10	0	0	0	0

Waterbody	Set type	Location ID	Start depth	Start latitude	Start longitude	End depth	End latitude	End longitude	Set date	Set time	Lift date	Lift time	Lake Trout	Arctic Char	Round Whitefish	Burbot
Mammoth Lake	short-set gill net	GN26	3.8	65.392535	-96.760530	2.4	65.392523	-96.757591	29-Jul-15	10:30	29-Jul-15	12:33	0	0	0	0
Mammoth Lake	short-set gill net	GN27	6.8	65.396505	-96.753644	6	65.395413	-96.755496	29-Jul-15	11:08	29-Jul-15	13:08	0	0	0	0
Mammoth Lake	short-set gill net	GN28	8.7	65.401212	-96.732046	6.3	65.400005	-96.732679	29-Jul-15	11:36	29-Jul-15	13:36	0	0	0	0
Nemo Lake	2014 miscellaneous gill net	GN14-1	4.2	65.416952	-96.713128	2.3	65.416430	-96.710065	06-Sep-14	11:16	06-Sep-14	17:47	4	0	0	0
Nemo Lake	2014 miscellaneous gill net	GN14-2	15	65.424743	-96.701119	17	65.424159	-96.698448	06-Sep-14	11:40	06-Sep-14	18:24	11	0	0	0
Nemo Lake	miscellaneous gill net	GN29a	3.4	65.424979	-96.691333	5.8	65.424018	-96.693733	02-Aug-15	8:00	02-Aug-15	11:20	2	0	0	0
Nemo Lake	miscellaneous gill net	GN29b	3.4	65.424979	-96.691333	5.8	65.424018	-96.693733	02-Aug-15	11:20	02-Aug-15	14:58	1	0	0	0
Nemo Lake	miscellaneous gill net	GN30a	16.7	65.426865	-96.702389	2.4	65.425660	-96.704009	02-Aug-15	8:22	02-Aug-15	11:50	1	0	0	0
Nemo Lake	miscellaneous gill net	GN30b	16.7	65.426865	-96.702389	2.4	65.425660	-96.704009	02-Aug-15	11:50	02-Aug-15	15:28	3	0	0	0
Whale Tail Lake	2014 miscellaneous gill net	GN14-3	1.2	65.405026	-96.701889	6	65.404261	-96.699056	05-Sep-14	13:39	05-Sep-14	20:00	4	1	0	0
Whale Tail Lake	2014 miscellaneous gill net	GN14-4	8.5	65.406093	-96.699462	5.5	65.405514	-96.696848	05-Sep-14	13:26	05-Sep-14	19:44	1	0	0	0
Whale Tail Lake	miscellaneous gill net	GN33a	3.3	65.393862	-96.688366	4.9	65.392600	-96.687569	18-Aug-15	9:34	18-Aug-15	14:43	0	0	0	0
Whale Tail Lake	miscellaneous gill net	GN34a	8.3	65.391789	-96.686985	3.2	65.392956	-96.688082	19-Aug-15	9:16	19-Aug-15	13:23	1	0	0	0
Whale Tail Lake	miscellaneous gill net	GN34b	8.3	65.391789	-96.686985	3.2	65.392956	-96.688082	19-Aug-15	13:40	19-Aug-15	16:37	0	0	0	0
Whale Tail Lake	overnight gill net	GN32	2.1	65.394058	-96.688595	6.3	65.392843	-96.687670	17-Aug-15	16:43	18-Aug-15	8:45	15	0	1	0
Whale Tail Lake	overnight gill net	GN33b	3.3	65.393862	-96.688366	4.9	65.392600	-96.687569	18-Aug-15	14:39	19-Aug-15	8:43	9	0	1	0
Whale Tail Lake	short-set gill net	GN01	1.5	65.399818	-96.684135	1.1	65.400431	-96.686871	24-Jul-15	9:23	24-Jul-15	11:21	0	0	0	0
Whale Tail Lake	short-set gill net	GN02	1.5	65.394034	-96.678016	2.4	65.394661	-96.680711	24-Jul-15	11:53	24-Jul-15	14:16	0	1	0	0
Whale Tail Lake	short-set gill net	GN03	4	65.388220	-96.688720	7.5	65.389392	-96.691743	24-Jul-15	14:10	24-Jul-15	16:05	0	0	0	0
Whale Tail Lake	short-set gill net	GN04	1	65.382051	-96.687806	7	65.383325	-96.689765	24-Jul-15	15:19	24-Jul-15	17:16	0	0	0	0
Whale Tail Lake	short-set gill net	GN05	1.5	65.385880	-96.695145	5.1	65.386787	-96.697035	25-Jul-15	9:35	25-Jul-15	11:54	0	0	0	0
Whale Tail Lake	short-set gill net	GN06	5.5	65.387701	-96.695769	0.6	65.388262	-96.698160	25-Jul-15	9:56	25-Jul-15	12:12	0	0	0	0
Whale Tail Lake	short-set gill net	GN07	8.8	65.390880	-96.685918	5.8	65.392023	-96.687253	25-Jul-15	11:23	25-Jul-15	14:07	1	0	0	0
Whale Tail Lake	short-set gill net	GN08	2	65.397723	-96.692555	4.7	65.398602	-96.690395	25-Jul-15	12:37	25-Jul-15	14:54	0	0	0	0
Whale Tail Lake	short-set gill net	GN09	4.2	65.402652	-96.699378	10.3	65.403331	-96.696805	25-Jul-15	12:48	25-Jul-15	15:38	2	0	1	0
Whale Tail Lake	short-set gill net	GN10	1.3	65.404365	-96.705779	4.3	65.404824	-96.708425	25-Jul-15	15:18	25-Jul-15	17:30	2	0	2	0
Whale Tail Lake	short-set gill net	GN11	1	65.408242	-96.693524	2.3	65.408855	-96.696033	25-Jul-15	15:34	25-Jul-15	18:07	0	0	0	0
Whale Tail Lake	short-set gill net	GN12	7.4	65.401087	-96.692770	3.5	65.402197	-96.694221	26-Jul-15	7:34	26-Jul-15	9:54	0	0	0	0
Whale Tail Lake	short-set gill net	GN13	11.2	65.403443	-96.696530	4.7	65.404775	-96.695607	26-Jul-15	7:46	26-Jul-15	10:08	0	0	0	0
Whale Tail Lake	short-set gill net	GN14	11.5	65.394851	-96.687671	6.3	65.396062	-96.687896	26-Jul-15	8:04	26-Jul-15	10:27	0	0	0	0

Table A 4. Capture location, net number and date of capture, mesh size, length and weight, liver weight, gonad weight, sex (male=m, female=f), maturity (m=mature, i=immature), age determined from fin rays and otoliths, and number of the tag applied to released individuals for fish captured in gill nets in 2015 and 2016.

Waterbody name or code	Fish #	Net set # and lift	Date of lift	Mesh size (mm)	Species	Fork length (mm)	Weight (g)	Liver weight (g)	Gonad weight (g)	Sex	Maturity	Fin-ray age	Otolith age	Ext. DELT/ Parasites	Tag applied
Mammoth Lake	1	15	28-Jul-15	51	round whitefish	345	429	3.4	2	f	i	na	na	none	
Mammoth Lake	2	15	28-Jul-15	51	lake trout	497	860					na	na	none	0359
Mammoth Lake	3	15	28-Jul-15	51	round whitefish	342	435.2	3.2	1.3	m	i	na	na	none	
Mammoth Lake	4	15	28-Jul-15	38	round whitefish	272	198.8	1.8	na	m	i	na	na	none	
Mammoth Lake	5	16	28-Jul-15	76	lake trout	639	2920					na	na	none	0360
Mammoth Lake	6	16	28-Jul-15	51	lake trout	620	2570					na	na	none	0361
Mammoth Lake	7	16	28-Jul-15	51	lake trout	392	660					na	na	none	0362
Mammoth Lake	8	16	28-Jul-15	51	round whitefish	384	641.3	7	15.4	f	m	na	na	none	
Mammoth Lake	9	16	28-Jul-15	51	round whitefish	350	467.7	2.9	0.8	m	m	na	na	none	
Mammoth Lake	10	16	28-Jul-15	51	round whitefish	290	230.9	2.6	na	m	i	na	na	none	
Mammoth Lake	11	16	28-Jul-15	51	round whitefish	270	201.4	1.6	1.1	f	m	na	na	none	
Mammoth Lake	12	16	28-Jul-15	38	round whitefish	252	158.4	1	na	m	i	na	na	none	
Mammoth Lake	13	19	28-Jul-15	38	lake trout	752	3870					na	na	none	0363
Mammoth Lake	14	19	28-Jul-15	38	round whitefish	359	460	4.4	11.2	f	m	na	na	none	
Mammoth Lake	15	20	28-Jul-15	na	lake trout	311	323					na	na	none	0364
Mammoth Lake	16	20	28-Jul-15	na	round whitefish	310	333					na	na	none	0365
Mammoth Lake	17	20	28-Jul-15	na	round whitefish	284	238					na	na	none	
Mammoth Lake	18	20	28-Jul-15	na	round whitefish	296	256					na	na	none	
Mammoth Lake	19	20	28-Jul-15	na	round whitefish	328	362	2.7	4.9	f	m	na	na	none	
Mammoth Lake	20	21	28-Jul-15	51	round whitefish	353	281	4.2	1.6	m	i	na	na	none	
Mammoth Lake	21	21	28-Jul-15	38	lake trout	361	460					na	na	none	0366
Mammoth Lake	22	22	28-Jul-15	76	round whitefish	na	na					na	na	none	
Mammoth Lake	23	22	28-Jul-15	76	lake trout	414	675					na	na	none	
Mammoth Lake	24	22	28-Jul-15	38	round whitefish	na	na					na	na	none	
Mammoth Lake	25	22	28-Jul-15	38	lake trout	214	97					na	na	none	
Mammoth Lake	26	27	29-Jul-15	51	lake trout	342	475	6.6	na	m	i	7	na	none	
Nemo Lake	27	29a	02-Aug-15	102	lake trout	511	1290					na	na	none	0367
Nemo Lake	28	29a	02-Aug-15	102	lake trout	500	1290					na	na	none	0368
Nemo Lake	29	30a	02-Aug-15	76	lake trout	425	950					na	na	none	0369
Nemo Lake	30	29b	02-Aug-15	102	lake trout	483	1120					na	na	none	0370
Nemo Lake	31	30b	02-Aug-15	76	lake trout	800	7140					na	na	none	0371
Nemo Lake	32	30b	02-Aug-15	102	lake trout	828	7050					na	na	none	0372
Nemo Lake	33	30b	02-Aug-15	102	lake trout	612	2200	13.1	19.5	f	m	na	na	none	
A53	34	31	03-Aug-15	51	arctic char	433	970					na	na	none	0374

Waterbody name or code	Fish #	Net set # and lift	Date of lift	Mesh size (mm)	Species	Fork length (mm)	Weight (g)	Liver weight (g)	Gonad weight (g)	Sex	Maturity	Fin-ray age	Otolith age	Ext. DELT/ Parasites	Tag applied
A53	35	31	03-Aug-15	51	arctic char	515	1290					na	na	none	
A53	36	31	03-Aug-15	51	lake trout	580	2200					na	na	none	0375
Whale Tail Lake	37	7	25-Jul-15	76	lake trout	390	660					na	na	none	0352
Whale Tail Lake	38	9	25-Jul-15	51	lake trout	641	2710					na	na	none	0354
Whale Tail Lake	39	9	25-Jul-15	51	lake trout	880	8000					na	na	none	0353
Whale Tail Lake	40	9	25-Jul-15	51	round whitefish	411	775					na	na	none	
Whale Tail Lake	41	10	25-Jul-15	76	round whitefish	332	400					na	na	none	
Whale Tail Lake	42	10	25-Jul-15	51	round whitefish	388	590					na	na	none	0357
Whale Tail Lake	43	10	25-Jul-15	51	lake trout	263	170					na	na	none	0358
Whale Tail Lake	44	10	25-Jul-15	51	lake trout	355	440					na	na	none	
Whale Tail Lake	45	2	24-Jul-15	51	arctic char	453	780					na	na	none	0351
Whale Tail Lake	na	2	24-Jul-15	na	arctic char	510	780					na	na	none	0351
Whale Tail Lake	46	32	18-Aug-15	126	lake trout	568	1830	14	15.2	f	m	28	28	none	
Whale Tail Lake	47	32	18-Aug-15	102	lake trout	661	3110	22.2	3.3	m	m	26	24	none	
Whale Tail Lake	48	32	18-Aug-15	102	lake trout	581	2210	20	20.4	f	m	25	27	none	
Whale Tail Lake	49	32	18-Aug-15	76	lake trout	608	2230	35.4	194	f	m	25	26	none	
Whale Tail Lake	50	32	18-Aug-15	76	lake trout	481	1090		1	m	i	24	25	none	
Whale Tail Lake	51	32	18-Aug-15	76	round whitefish	na	na					na	na	na	
Whale Tail Lake	52	32	18-Aug-15	76	lake trout	445	1130	9.7	22	m	m	15	15	none	
Whale Tail Lake	53	32	18-Aug-15	76	lake trout	472	970	5.3	1	m	i	18	18	none	
Whale Tail Lake	54	32	18-Aug-15	76	lake trout	424	1060	14	130.1	f	m	20	22	none	
Whale Tail Lake	55	32	18-Aug-15	76	lake trout	396	778	11.3	91.3	f	m	14	16	none	
Whale Tail Lake	56	32	18-Aug-15	51	lake trout	407	775	5	25.1	m	m	16	23	none	
Whale Tail Lake	57	32	18-Aug-15	51	lake trout	388	607	4	34.5	m	m	12	13	none	
Whale Tail Lake	58	32	18-Aug-15	51	lake trout	469	987	11.5	0.7	m	i	14	18	none	
Whale Tail Lake	59	32	18-Aug-15	51	lake trout	380	655	3.6	15.6	m	m	11	12	none	
Whale Tail Lake	60	32	18-Aug-15	51	lake trout	430	687	6.1	4.5	f	m	12	13	none	
Whale Tail Lake	61	33b	19-Aug-15	25	lake trout	860	7320	55.6	371.4	m	m	39	44	none	
Whale Tail Lake	62	33b	19-Aug-15	38	lake trout	585	2110	14.6	74.7	m	m	22	26	none	
Whale Tail Lake	63	33b	19-Aug-15	38	lake trout	475	1020	6.7	25	m	m	20	25	none	
Whale Tail Lake	64	33b	19-Aug-15	38	lake trout	410	745	5.9	8.9	f	m	22	25	none	
Whale Tail Lake	65	33b	19-Aug-15	51	lake trout	423	693	5.3	3.6	f	m	11	14	none	
Whale Tail Lake	66	33b	19-Aug-15	51	lake trout	335	427	3.3		m	i	11	12	none	
Whale Tail Lake	67	33b	19-Aug-15	76	round whitefish	na	na					na	na	na	
Whale Tail Lake	68	33b	19-Aug-15	102	lake trout	319	348	2.5		m	i	9	9	none	
Whale Tail Lake	69	33b	19-Aug-15	102	lake trout	159	37.4	0.5		u	i	4	na	none	

Waterbody name or code	Fish #	Net set # and lift	Date of lift	Mesh size (mm)	Species	Fork length (mm)	Weight (g)	Liver weight (g)	Gonad weight (g)	Sex	Maturity	Fin-ray age	Otolith age	Ext. DELT/ Parasites	Tag applied
Whale Tail Lake	70	34b	19-Aug-15	51	lake trout	390	672	9.6	71	f	r	15	19	none	
A65	71	35	20-Aug-15	38	round whitefish	na	na					na	na	na	
A65	72	35	20-Aug-15	38	round whitefish	na	na					na	na	na	
A65	73	35	20-Aug-15	51	lake trout	na	na					na	na	na	
A65	74	35	20-Aug-15	51	lake trout	na	na					na	na	na	
A63	75	36	22-Aug-15	38	lake trout	na	na					na	na	na	
A20	76	39a	23-Aug-15	25	round whitefish	137	na					na	na	na	
A20	77	39b	24-Aug-15	76	round whitefish	na	na					na	na	na	
A20	78	39b	24-Aug-15	76	lake trout	349	420					na	na	none	0376
A20	79	39b	24-Aug-15	51	lake trout	549	1920					na	na	none	0377
A20	80	39b	24-Aug-15	51	lake trout	378	620					na	na	none	0378
A20	81	39b	24-Aug-15	51	lake trout	351	430					na	na	none	0379
A20	82	39b	24-Aug-15	51	lake trout	545	1980					na	na	none	0380
A20	83	39b	24-Aug-15	51	round whitefish	365	510					na	na	none	
A20	84	39b	24-Aug-15	51	round whitefish	369	530					na	na	none	
A20	85	39b	24-Aug-15	51	lake trout	381	500					12	12	none	
A20	86	39b	24-Aug-15	51	lake trout	305	280					na	na	none	0381
A20	87	39b	24-Aug-15	51	round whitefish	278	210					na	na	none	
A20	88	39b	24-Aug-15	51	lake trout	369	570					12	11	none	
A20	89	39b	24-Aug-15	38	round whitefish	230	120					na	na	none	
A20	90	39b	24-Aug-15	38	lake trout	189	80					3	3	none	
A20	91	39b	24-Aug-15	38	lake trout	250	170					na	na	none	
A20	92	39b	24-Aug-15	38	lake trout	366	550					na	na	none	0382
A22	93	40	24-Aug-15	51	lake trout	445	870					na	na	none	0383
A22	94	40	24-Aug-15	51	lake trout	na	na					na	na	na	
A22	95	40	24-Aug-15	28	arctic char	376	520					na	na	none	0384
Mammoth Lake	96	41a	25-Aug-15	38	lake trout	na	na					na	na	na	
Mammoth Lake	97	42a	25-Aug-15	51	lake trout	370	510	3.2	4.5	f	m	13	13	none	
Mammoth Lake	98	42a	25-Aug-15	51	lake trout	369	501	4	6.1	f	m	12	13	none	
Mammoth Lake	99	42a	25-Aug-15	51	lake trout	373	550	6.2	48.3	f	m	9	11	none	
Mammoth Lake	100	41b	26-Aug-15	126	lake trout	363	542	4.1	13	m	m	9	na	none	
Mammoth Lake	101	41b	26-Aug-15	76	lake trout	343	460	2.6	5.7	f	m	9	9	none	
Mammoth Lake	102	41b	26-Aug-15	76	lake trout	353	433	2.3	2	f	m	9	10	none	
Mammoth Lake	103	41b	26-Aug-15	76	lake trout	373	474	3.6	12	f	m	13	16	none	
Mammoth Lake	104	41b	26-Aug-15	76	round whitefish	430	763					na	na	none	
Mammoth Lake	105	41b	26-Aug-15	76	lake trout	385	612	3.5	12.1	f	m	10	11	none	

Waterbody name or code	Fish #	Net set # and lift	Date of lift	Mesh size (mm)	Species	Fork length (mm)	Weight (g)	Liver weight (g)	Gonad weight (g)	Sex	Maturity	Fin-ray age	Otolith age	Ext. DELT/ Parasites	Tag applied
Mammoth Lake	106	41b	26-Aug-15	76	lake trout	395	692	9.3	63	f	m	11	12	none	
Mammoth Lake	107	41b	26-Aug-15	76	round whitefish	390	596					na	na	none	
Mammoth Lake	108	41b	26-Aug-15	76	lake trout	351	474	2.2	8.5	m	m	8	na	none	
Mammoth Lake	109	41b	26-Aug-15	76	round whitefish	na	na					na	na	none	
Mammoth Lake	110	41b	26-Aug-15	76	lake trout	346	478	7.6	45	f	m	9	10	none	
Mammoth Lake	111	41b	26-Aug-15	51	lake trout	365	504	2.8	14.2	m	m	12	12	none	
Mammoth Lake	112	41b	26-Aug-15	51	lake trout	365	504	7.1	5.2	f	m	13	13	none	
Mammoth Lake	113	41b	26-Aug-15	51	round whitefish	na	na					na	na	none	
Mammoth Lake	114	42b	26-Aug-15	126	lake trout	590	2110	10.9	2.3	m	m	24	24	none	
Mammoth Lake	115	42b	26-Aug-15	76	lake trout	369	511	2.8	12.3	m	m	12	12	none	
Mammoth Lake	116	42b	26-Aug-15	76	lake trout	354	472	3.2	11.1	m	m	12	13	none	
Mammoth Lake	117	42b	26-Aug-15	76	lake trout	366	534	2.1		m	i	13	13	none	
Mammoth Lake	118	42b	26-Aug-15	76	lake trout	316	319	1.6		m	i	10	10	none	
Mammoth Lake	119	42b	26-Aug-15	76	lake trout	290	269	2.5		m	i	8	8	none	
Mammoth Lake	120	42b	26-Aug-15	76	lake trout	290	287	2.8	0.7	f	i	8	8	none	
Mammoth Lake	121	42b	26-Aug-15	51	lake trout	285	239	1.7		u	i	8	8	none	
Mammoth Lake	122	42b	26-Aug-15	51	lake trout	254	181	1.5	0.2	u	i	6	6	none	
Mammoth Lake	123	42b	26-Aug-15	51	lake trout	215	96.2	0.6		u	i	5	5	none	
Mammoth Lake	124	42b	26-Aug-15	38	lake trout	700	4670	51.5	630	f	m	32	37	none	
Mammoth Lake	125	42b	26-Aug-15	38	lake trout	176	50.1					4	na	none	
Mammoth Lake	126	42b	26-Aug-15	38	lake trout	218	111	0.5		u	i	6	5	none	
Mammoth Lake	127	42b	26-Aug-15	38	lake trout	na	na					na	na	na	
A62	129	43	27-Aug-15	102	lake trout	434	870					na	na	none	0385
A62	130	43	27-Aug-15	102	lake trout	440	980			f	m	na	na	none	0386
A62	131	43	27-Aug-15	102	lake trout	413	760					na	na	none	
A55	132	44	28-Aug-15	51	lake trout	267	210					na	na	none	
A55	133	44	28-Aug-15	51	lake trout	278	240					na	na	none	
A55	134	44	28-Aug-15	38	burbot	na	na					na	na	na	
A55	135	44	28-Aug-15	38	lake trout	181	na					na	na	none	
A55	136	44	28-Aug-15	38	lake trout	190	80					na	na	none	
A55	137	44	28-Aug-15	25	lake trout	127	na					na	na	none	
A47	138	47	29-Aug-15	51	arctic char	283	110					na	na	none	0388
A19	na	GN49	22-Aug-16	na	arctic char	116	na								
A19	na	GN49	22-Aug-16	na	arctic char	133	na								
A19	na	GN49	22-Aug-16	na	burbot	192	na								
A18	na	GN50	23-Aug-16	na	arctic char	221	na								

Waterbody name or code	Fish #	Net set # and lift	Date of lift	Mesh size (mm)	Species	Fork length (mm)	Weight (g)	Liver weight (g)	Gonad weight (g)	Sex	Maturity	Fin-ray age	Otolith age	Ext. DELT/ Parasites	Tag applied
A18	na	GN50	23-Aug-16	na	arctic char	256	na								
A18	na	GN50	23-Aug-16	na	arctic char	214	na								
A18	na	GN50	23-Aug-16	na	arctic char	125	na								
A18	na	GN50	23-Aug-16	na	arctic char	175	na								
A18	na	GN50	23-Aug-16	na	arctic char	183	na								
A18	na	GN50	23-Aug-16	na	arctic char	129	na								
A18	na	GN50	23-Aug-16	na	arctic char	174	na								
A49	na	GN52	25-Aug-16	na	arctic char	320									
A49	na	GN52	25-Aug-16	na	arctic char	300									
A49	na	GN52	25-Aug-16	na	arctic char	293									
A53-A17	na	GN-S1	25-Jun-16	50	arctic char	181									
A55-A17	na	GN-S2	25-Jun-16	50	arctic char	248									
A55-A17	na	GN-S2	26-Jun-16	50	arctic char	248	140								
A55-A17	na	GN-S2	3-Jul-16	50	arctic char	280	260								
A55-A17	na	GN-S2	3-Jul-16	50	arctic char	270	170								
A55-A17	na	GN-S2	3-Jul-16	50	arctic char	270	180								
A55-A17	na	GN-S2	8-Jul-16	50	arctic char	230									
A55-A17	na	GN-S2	9-Jul-16	50	arctic char	170									
A18-A17	na	GN-S3	28-Jun-16	76	arctic char	396	620								

Table A 5. Waterbody, net set ID, species, fork length and weight of fish captured by gill netting in 2014.

Waterbody	Net set ID	Species	Fork length (mm)	Weight (g)
Nemo Lake	GN14-1	lake trout	879	8510
Nemo Lake	GN14-1	lake trout	639	2580
Nemo Lake	GN14-1	lake trout	430	840
Nemo Lake	GN14-1	lake trout	855	8140
Nemo Lake	GN14-2	lake trout	478	1280
Nemo Lake	GN14-2	lake trout	395	750
Nemo Lake	GN14-2	lake trout	472	1300
Nemo Lake	GN14-2	lake trout	481	1180
Nemo Lake	GN14-2	lake trout	520	1520
Nemo Lake	GN14-2	lake trout	766	5290
Nemo Lake	GN14-2	lake trout	878	5840
Nemo Lake	GN14-2	lake trout	678	3100
Nemo Lake	GN14-2	lake trout	540	1600
Nemo Lake	GN14-2	lake trout	476	1310
Nemo Lake	GN14-2	lake trout	465	1220
Whale Tail Lake	GN14-3	Arctic char	424	850
Whale Tail Lake	GN14-3	lake trout	736	4450
Whale Tail Lake	GN14-3	lake trout	646	2940
Whale Tail Lake	GN14-3	lake trout	500	1190
Whale Tail Lake	GN14-3	lake trout	510	1180
Whale Tail Lake	GN14-4	lake trout	570	1790
Mammoth Lake	GN14-5	lake trout	700	3670
Mammoth Lake	GN14-5	lake trout	705	3480
Mammoth Lake	GN14-5	lake trout	629	2680
Mammoth Lake	GN14-5	lake trout	619	2310
Mammoth Lake	GN14-5	lake trout	464	1240
Mammoth Lake	GN14-6	lake trout	323	410
Mammoth Lake	GN14-6	lake trout	305	350
Mammoth Lake	GN14-6	lake trout	427	760
Mammoth Lake	GN14-6	lake trout	850	6200
Mammoth Lake	GN14-6	lake trout	255	170

Table A 6. Lake electrofishing locations, dates, effort, catches and dominant substrates at the sampling locations. All Lake Trout and Arctic Char were juveniles. Juvenile salmonids are either Arctic Char of Lake Trout that were not be identified to species.

waterbody	location ID	Date (2015)	Start latitude	Start longitude	distance (m)	e-seconds	Nine-spine Stickle-back	Slimy Sculpin	Lake Trout	Arctic Char	juvenile Lake Trout or Arctic Char	dominant substrates
Whale Tail	EF-L1	26-Jul-15	65.408307	-96.693163	25	195	0	0	0	0	0	cobble
Whale Tail	EF-L2	26-Jul-15	65.404024	-96.706512	25	458	11	1	0	0	0	cobble/boulder
Whale Tail	EF-L3	26-Jul-15	65.402524	-96.700425	25	616	12	1	0	0	0	cobble/boulder
Whale Tail	EF-L4	26-Jul-15	65.397592	-96.693160	25	264	0	2	0	2	2	sand/gravel/cobble
Whale Tail	EF-L5	26-Jul-15	65.388576	-96.685952	25	248	3	4	0	0	0	gravel/cobble/few boulders
Whale Tail	EF-L6	26-Jul-15	65.393346	-96.677342	25	755	15	6	0	0	0	boulder/cobble
Whale Tail	EF-L7	27-Jul-15	65.402980	-96.692034	25	287	11	0	0	0	0	cobble/boulder
Whale Tail	EF-L8	27-Jul-15	65.401038	-96.683590	25	180	1	0	0	0	0	cobble/some boulder
Whale Tail	EF-L9	27-Jul-15	65.382070	-96.688423	25	170	0	0	0	0	0	cobble
Whale Tail	EF-L10	27-Jul-15	65.385106	-96.698296	25	230	2	0	0	0	0	cobble/gravel/boulder
Mammoth	EF-L11	29-Jul-15	65.400198	-96.742841	25	464	4	1	0	0	0	peat/cobble/gravel
Mammoth	EF-L12	29-Jul-15	65.401025	-96.739563	25	357	1	0	0	0	0	cobble/boulder/peat
Mammoth	EF-L13	29-Jul-15	65.402013	-96.725795	25	441	15	1	0	0	0	cobble/gravel/peat/boulder
Mammoth	EF-L14	29-Jul-15	65.402580	-96.725815	25	445	14	0	0	0	0	cobble/gravel/boulder/peat/ soil
Mammoth	EF-L15	30-Jul-15	65.401459	-96.721846	25	448	1	4	0	0	0	peat/cobble/boulder
Mammoth	EF-L16	30-Jul-15	65.401453	-96.721162	25	417	2	2	0	0	0	peat/cobble/boulder
Mammoth	EF-L17	30-Jul-15	65.399949	-96.721210	25	344	2	0	0	0	0	cobble/boulder/peat
Mammoth	EF-L18	30-Jul-15	65.399708	-96.721674	25	219	1	2	0	0	0	cobble/boulder/peat
Mammoth	EF-L19	30-Jul-15	65.389346	-96.760241	25	455	0	2	0	0	1	cobble/boulder
Mammoth	EF-L20	30-Jul-15	65.395107	-96.765136	25	332	1	1	0	0	0	cobble/boulder/peat

waterbody	location ID	Date (2015)	Start latitude	Start longitude	distance (m)	e-seconds	Nine-spine Stickle-back	Slimy Sculpin	Lake Trout	Arctic Char	juvenile Lake Trout or Arctic Char	dominant substrates
A53	EF-L21	01-Aug-15	65.405909	-96.666885	150	930	0	0	0	0	0	peats with protruding rocks and graminoid shoreline
A54	EF-L22	01-Aug-15	65.409510	-96.659912	40	301	0	0	0	0	0	na
A-P21	EF-L23	01-Aug-15	65.412196	-96.671690	25	372	0	0	0	0	0	boulder/cobble with some peat
A52	EF-L24	01-Aug-15	65.409306	-96.674894	34	360	0	0	0	0	0	boulder/cobble and peat with graminoid along shore.
A51	EF-L25	01-Aug-15	65.409886	-96.678449	44	200	0	0	0	0	0	cobble/boulder
A50	EF-L26	01-Aug-15	65.411624	-96.681647	54	284	0	0	0	0	0	boulder/cobble with graminoid vegetation along 80% of shoreline
A113	EF-L27	01-Aug-15	65.417182	-96.690260	31	68	1	0	0	0	0	na
A-P38	EF-L28	01-Aug-15	65.415746	-96.694860	55	306	1	0	0	0	0	detritus with some boulder/cobble
A-P18	EF-L29	01-Aug-15	65.417099	-96.695154	33	130	0	0	0	0	0	detritus with some boulder/cobble/gravel. Anaerobic beneath top layer of substrate
C42	EF-L30	01-Aug-15	65.416955	-96.699902	40	207	0	0	0	0	0	boulder/cobble
A-P51	EF-L31	01-Aug-15	65.415578	-96.700354	20	98	0	0	0	0	0	pelagic inverts observed
A-P33	EF-L32	01-Aug-15	65.414962	-96.699182	30	170	0	0	0	0	0	cobble/boulder. Very shallow
A-P37	EF-L33	01-Aug-15	65.414846	-96.700462	21	155	0	0	0	0	0	boulder/cobble. Very shallow.
C40	EF-L34	01-Aug-15	65.414989	-96.702009	45	181	0	0	0	0	0	cobble/gravel/boulder. Shallow, but deeper area to south
A-P49	EF-L35	01-Aug-15	65.413640	-96.701340	20	126	0	0	0	0	0	boulder/cobble. Isolated on

waterbody	location ID	Date (2015)	Start latitude	Start longitude	distance (m)	e-seconds	Nine-spine Stickle-back	Slimy Sculpin	Lake Trout	Arctic Char	juvenile Lake Trout or Arctic Char	dominant substrates
												bedrock
A49	EF-L36	01-Aug-15	65.412482	-96.704629	93	580	0	0	0	0	0	bedrock/cobble/boulder with graminoid patches.
A-P51	EF-L37	01-Aug-15	65.408414	-96.688723	88	668	0	0	0	0	0	most is shallow but may be up to 1.5 m max depth in small area
A53	EF-L38	20-Aug-15	65.406061	-96.676669	69	404	2	0	0	0	0	cobble/gravel/peat/boulder
A65	EF-L39	21-Aug-15	65.371734	-96.695557	36	342	3	6	0	0	0	na
A63	EF-L40	22-Aug-15	65.388957	-96.715819	51	332	0	3	0	0	0	boulder/cobble
A18	EF-L41	22-Aug-15	65.382344	-96.705942	54	483	16	3	0	0	0	na
A19	EF-L42	23-Aug-15	65.377185	-96.717139	49	437	7	1	0	0	0	na
A45	EF-L43	24-Aug-15	65.383594	-96.748582	47	239	3	0	0	0	0	boulder
A20	EF-L44	24-Aug-15	65.380931	-96.752270	43	324	0	0	0	0	0	na
A22	EF-L45	24-Aug-15	65.374540	-96.759132	45	409	1	10	0	0	0	na
A55	EF-L46	28-Aug-15	65.395661	-96.667459	111	417	0	2	0	0	0	cobble/boulder/peat
A113	EF-L47	28-Aug-15	65.418406	-96.691724	33	184	15	0	0	0	0	cobble/gravel/peat
A47	EF-L48	28-Aug-15	65.415275	-96.693228	51	244	>100	0	0	0	0	na
A49	EF-L49	29-Aug-15	65.412019	-96.701603	66	313	0	3	0	0	0	na
A47	EF-L50	19-Jun-16	65.412912	-96.693493	402	871	0	0	0	0	0	SE shoreline. Sand, tundra, cobble
A113	EF-L51	19-Jun-16	65.417139	-96.690081	266	628	0	0	0	0	0	flooded tundra, rocky point
A47	EF-L52	24-Jun-16	65.412912	-96.693493	142	563	0	0	0	0	0	no substrate recorded
A62	EF-L53	24-Aug-16	65.389665	-96.701515	89	685	3	0	0	0	0	boulder/cobble
A-P49	EF-L54	20-Aug-16	65.413614	-96.700858	63	173	0	0	0	0	0	

waterbody	location ID	Date (2015)	Start latitude	Start longitude	distance (m)	e-seconds	Nine-spine Stickle-back	Slimy Sculpin	Lake Trout	Arctic Char	juvenile Lake Trout or Arctic Char	dominant substrates
near C-P1	EF-L55	20-Aug-16	65.413669	-96.703730	all	56	0	0	0	0	0	
near C-P1	EF-L56	20-Aug-16	65.413774	-96.703904	all	40	0	0	0	0	0	
C-P1	EF-L57	20-Aug-16	65.413636	-96.703811	20	61	0	0	0	0	0	
C40	EF-L58	20-Aug-16	65.413920	-96.704908	64	301	0	0	0	0	0	
A-P37	EF-L59	20-Aug-16	65.414567	-96.701605	all	194	0	0	0	0	0	
A-P18	EF-L60	20-Aug-16	65.417015	-96.695246	44	202	0	0	0	0	0	
A-P33	EF-L61	20-Aug-16	65.414890	-96.698564	all	211	0	0	0	0	0	
A54	EF-L62	26-Aug-16	65.409595	-96.659737	66	534	0	0	0	0	0	
A-P21	EF-L63	26-Aug-16	65.412425	-96.671678	80	728	0	0	0	0	0	
A51	EF-L64	26-Aug-16	65.410159	-96.679063	75	530	0	0	0	0	0	
A50	EF-L65	26-Aug-16	65.410871	-96.681316	41	210	0	0	0	0	0	
A-P5	EF-L66	26-Aug-16	65.408870	-96.688107	67	433	0	0	0	0	0	

Table A 7. Standard minnow trap set locations, date and time of lifts and sets, soak times, depths, substrate and catches.

Waterbody	Location ID	Latitude	Longitude	Date Set (2015)	Time Set	Date Lifted (2015)	Time lifted	Soak Time (hours)	Depth	Substrate	Slimy Sculpin	Ninespine Stickleback
Whale Tail	SMT1	65.385682	-96.693709	25-Jul	10:08	26-Jul	9:04	22.93	0.5	boulder	0	0
Whale Tail	SMT2	65.385370	-96.698520	25-Jul	10:37	26-Jul	9:10	22.55	0.7	boulder	0	0
Whale Tail	SMT3	65.386642	-96.698668	25-Jul	10:39	26-Jul	9:14	22.58	0.7	boulder	0	0
Whale Tail	SMT4	65.388648	-96.696584	25-Jul	10:43	26-Jul	10:53	24.17	0.7	boulder	0	0
Whale Tail	SMT5	65.399344	-96.683697	25-Jul	10:55	26-Jul	11:20	24.42	0.7	cobble	0	0
Whale Tail	SMT6	65.394644	-96.677961	25-Jul	11:01	26-Jul	11:07	24.10	0.7	boulder	0	0
Whale Tail	SMT7	65.388146	-96.687963	25-Jul	11:09	26-Jul	10:59	23.83	0.7	cobble/boulder	0	0
Whale Tail	SMT8	65.382286	-96.688790	25-Jul	11:31	26-Jul	8:17	20.77	1.7	boulder/cobble	0	0
Whale Tail	SMT9	65.391694	-96.689627	25-Jul	17:08	26-Jul	10:44	17.60	0.7	cobble/boulder	0	0
Whale Tail	SMT10	65.397849	-96.693197	25-Jul	17:17	26-Jul	11:27	18.17	0.8	sand	1	0
Whale Tail	SMT11	65.401774	-96.699048	25-Jul	17:22	26-Jul	11:37	18.25	1.4	boulder	0	0
Whale Tail	SMT12	65.404388	-96.706044	25-Jul	17:46	26-Jul	11:45	17.98	1.5	boulder	0	0
Whale Tail	SMT13	65.408332	-96.693251	25-Jul	18:19	26-Jul	11:51	17.53	0.4	cobble	0	0
Whale Tail	SMT1	65.385682	-96.693709	26-Jul	9:04	27-Jul	10:15	25.18	0.5	boulder	0	0
Whale Tail	SMT2	65.385370	-96.698520	26-Jul	9:10	27-Jul	10:25	25.25	0.7	boulder	0	0
Whale Tail	SMT3	65.386642	-96.698668	26-Jul	9:14	27-Jul	10:43	25.48	0.7	boulder	0	0
Whale Tail	SMT4	65.388648	-96.696584	26-Jul	10:53	27-Jul	10:47	23.90	0.7	boulder	0	0
Whale Tail	SMT5	65.399344	-96.683697	26-Jul	11:20	27-Jul	9:30	22.17	0.7	cobble	0	0
Whale Tail	SMT6	65.394644	-96.677961	26-Jul	11:07	27-Jul	9:41	22.57	0.7	boulder	0	0
Whale Tail	SMT7	65.388146	-96.687963	26-Jul	10:59	27-Jul	9:48	22.82	0.7	cobble/boulder	0	0
Whale Tail	SMT8	65.382286	-96.688790	26-Jul	8:17	27-Jul	9:54	25.62	1.7	boulder/cobble	0	0
Whale Tail	SMT9	65.391694	-96.689627	26-Jul	10:44	27-Jul	10:51	24.12	0.7	cobble/boulder	0	0

Waterbody	Location ID	Latitude	Longitude	Date Set (2015)	Time Set	Date Lifted (2015)	Time lifted	Soak Time (hours)	Depth	Substrate	Slimy Sculpin	Ninespine Stickleback
Whale Tail	SMT10	65.397849	-96.693197	26-Jul	11:27	27-Jul	10:59	23.53	0.8	sand	0	0
Whale Tail	SMT11	65.401774	-96.699048	26-Jul	11:37	27-Jul	11:04	23.45	1.4	boulder	0	0
Whale Tail	SMT12	65.404388	-96.706044	26-Jul	11:45	27-Jul	11:13	23.47	1.5	boulder	0	0
Whale Tail	SMT13	65.408332	-96.693251	26-Jul	11:51	27-Jul	11:24	23.55	0.4	cobble	0	0
Mammoth	SMT14	65.399497	-96.748329	28-Jul	8:42	29-Jul	9:00	24.30	1	boulder	0	0
Mammoth	SMT15	65.399013	-96.743882	28-Jul	8:51	29-Jul	10:02	25.18	1	boulder	0	0
Mammoth	SMT16	65.401738	-96.735509	28-Jul	9:02	29-Jul	9:59	24.95	1.5	boulder	0	0
Mammoth	SMT17	65.402729	-96.726339	28-Jul	9:06	29-Jul	9:54	24.80	1	boulder	0	1
Mammoth	SMT18	65.399393	-96.723136	28-Jul	9:15	29-Jul	9:51	24.60	0.5	boulder/cobble	0	0
Mammoth	SMT19	65.398389	-96.734949	28-Jul	9:35	29-Jul	9:43	24.13	3.7	boulder	0	0
Mammoth	SMT20	65.396123	-96.745191	28-Jul	9:41	29-Jul	9:07	23.43	1.5	na	0	0
Mammoth	SMT21	65.393214	-96.750599	28-Jul	9:46	29-Jul	8:54	23.13	1	boulder	0	0
Mammoth	SMT22	65.388874	-96.753499	28-Jul	9:51	29-Jul	8:03	22.20	1	cobble/boulder	0	0
Mammoth	SMT23	65.392583	-96.760847	28-Jul	9:55	29-Jul	8:08	22.22	1	bedrock/cobble	0	0
Mammoth	SMT24	65.396511	-96.765716	28-Jul	15:36	29-Jul	8:33	16.95	1	na	0	0
Mammoth	SMT25	65.398159	-96.754967	28-Jul	15:40	29-Jul	8:43	17.05	1	boulder/cobble	0	0

Table A 8. Fine-mesh hoop net set locations, dates and times of sets and lifts, soak times, orientation and catches.

Waterbody	location ID	Latitude	Longitude	Date Set (2015)	Time Set	Date Lifted (2015)	Time lifted	Soak Time (hours)	Opening facing	Slimy Sculpin	Round Whitefish
Whale Tail	FHN1	65.397921	-96.693629	18-Aug	16:00	19-Aug	14:00	22.00	toward shore	0	1
	FHN2	65.408464	-96.697416	18-Aug	17:00	19-Aug	14:30	21.50	toward shore	1	1

Table A 9. Coordinates of 2016 video camera deployments.

Deployment ID	Latitude	Longitude
V1	65.39383393	-96.68832472
V2	65.39129958	-96.68965509
V3	65.39376662	-96.68839479
V4	65.38600104	-96.69291255
V5	65.40385709	-96.69437452
V6	65.40572223	-96.7008099
V7	65.38602912	-96.69303761
V8	65.39779094	-96.69082982
V9	65.40567907	-96.70069372
V10	65.4054841	-96.70066137
V11	65.39426979	-96.68903232

Table A 10. Large minnow trap set locations, dates and times of sets and lifts, soak times, orientation and catches in 2015.

Watercourse code	Location ID	Latitude	Longitude	Date set (2015)	Time set	Date lifted (2015)	Time lifted	Soak time (hours)	Opening facing	Slimy Sculpin	Juvenile Round Whitefish
A46-A17	MT4	65.4105	-96.6955	27-Jun	15:48	28-Jun	12:32	20.73	downstream	0	0
A46-A17	MT4	65.4105	-96.6955	28-Jun	12:32	29-Jun	11:21	22.82	downstream	0	0
A46-A17	MT4	65.4105	-96.6955	29-Jun	11:21	03-Jul	14:00	98.65	downstream	0	0
A46-A17	MT4	65.4105	-96.6955	03-Jul	14:00	06-Jul	14:35	72.58	downstream	0	0
A46-A17	MT4	65.4105	-96.6955	06-Jul	14:35	07-Jul	16:10	25.58	downstream	0	0
A46-A17	MT4	65.4105	-96.6955	07-Jul	16:10	08-Jul	15:50	23.67	downstream	0	0
A46-A17	MT4	65.4105	-96.6955	08-Jul	15:50	09-Jul	11:20	19.50	downstream	0	0
A46-A17	MT4	65.4105	-96.6955	09-Jul	11:20	11-Jul	8:30	45.17	downstream	2	0
A46-A17	MT4	65.4105	-96.6955	11-Jul	8:30	12-Jul	13:20	28.83	downstream	1	0
A46-A17	MT4	65.4105	-96.6955	12-Jul	13:20	13-Jul	8:21	19.02	downstream	0	0
A50-A17	MT5	65.4104	-96.6898	28-Jun	13:25	29-Jun	11:30	22.08	downstream	0	0
A50-A17	MT5	65.4104	-96.6898	29-Jun	11:30	03-Jul	13:15	97.75	downstream	0	0
A50-A17	MT5	65.4104	-96.6898	03-Jul	13:15	06-Jul	14:20	73.08	downstream	0	0
A50-A17	MT5	65.4104	-96.6898	06-Jul	14:20	07-Jul	16:00	25.67	downstream	1	0
A50-A17	MT5	65.4104	-96.6898	07-Jul	16:00	08-Jul	15:50	23.83	downstream	0	0
A50-A17	MT5	65.4104	-96.6898	08-Jul	15:50	09-Jul	11:08	19.30	downstream	0	0
A50-A17	MT5	65.4104	-96.6898	09-Jul	11:08	11-Jul	8:50	45.70	downstream	0	0
A50-A17	MT5	65.4104	-96.6898	11-Jul	8:50	12-Jul	13:10	28.33	downstream	0	0
A50-A17	MT5	65.4104	-96.6898	12-Jul	13:10	13-Jul	8:10	19.00	downstream	0	0
A53-A17	MT3	65.4016	-96.6838	27-Jun	10:43	03-Jul	12:50	146.12	downstream	1	0
A53-A17	MT3	65.4016	-96.6838	03-Jul	12:50	06-Jul	13:50	73.00	downstream	1	0
A53-A17	MT3	65.4016	-96.6838	06-Jul	13:50	07-Jul	15:55	26.08	downstream	0	0

Watercourse code	Location ID	Latitude	Longitude	Date set (2015)	Time set	Date lifted (2015)	Time lifted	Soak time (hours)	Opening facing	Slimy Sculpin	Juvenile Round Whitefish
A53-A17	MT3	65.4016	-96.6838	07-Jul	15:55	08-Jul	11:35	19.67	downstream	0	0
A53-A17	MT3	65.4016	-96.6838	08-Jul	11:35	11-Jul	10:00	70.42	downstream	0	0
A53-A17	MT3	65.4016	-96.6838	11-Jul	10:00	13-Jul	7:30	45.50	downstream	0	0
A55-A17	MT9	65.3946	-96.6775	03-Jul	12:00	07-Jul	15:50	99.83	downstream	0	0
A55-A17	MT9	65.3946	-96.6775	07-Jul	15:50	08-Jul	14:50	23.00	downstream	0	0
A55-A17	MT9	65.3946	-96.6775	08-Jul	14:50	09-Jul	16:15	25.42	downstream	0	0
A55-A17	MT9	65.3946	-96.6775	09-Jul	16:15	12-Jul	11:00	66.75	downstream	0	0
A55-A17	MT9	65.3946	-96.6775	12-Jul	11:00	13-Jul	12:40	25.67	downstream	0	0
A59-A17	MT2	65.3888	-96.6832	27-Jun	9:00	28-Jun	13:55	28.92	downstream	0	0
A59-A17	MT2	65.3888	-96.6832	28-Jun	13:55	03-Jul	9:30	115.58	downstream	1	0
A59-A17	MT2	65.3888	-96.6832	03-Jul	9:30	06-Jul	9:10	71.67	downstream	0	0
A59-A17	MT2	65.3888	-96.6832	06-Jul	9:10	08-Jul	14:35	53.42	downstream	0	0
A59-A17	MT2	65.3888	-96.6832	08-Jul	14:35	09-Jul	15:10	24.58	downstream	0	0
A59-A17	MT2	65.3888	-96.6832	09-Jul	15:10	12-Jul	10:02	66.87	downstream	0	0
A59-A17	MT2	65.3888	-96.6832	12-Jul	10:02	13-Jul	12:15	26.22	downstream	0	0
A59-A17	MT6	65.3890	-96.6835	28-Jun	14:00	03-Jul	9:20	115.33	downstream	0	0
A59-A17	MT6	65.3890	-96.6835	03-Jul	9:20	06-Jul	9:10	71.83	downstream	2	0
A59-A17	MT6	65.3890	-96.6835	06-Jul	9:10	07-Jul	15:45	30.58	downstream	0	0
A59-A17	MT6	65.3890	-96.6835	07-Jul	15:45	08-Jul	14:35	22.83	downstream	0	0
A59-A17	MT6	65.3890	-96.6835	08-Jul	14:35	09-Jul	15:10	24.58	downstream	0	0
A59-A17	MT6	65.3890	-96.6835	09-Jul	15:10	12-Jul	10:00	66.83	downstream	0	0
A59-A17	MT6	65.3890	-96.6835	12-Jul	10:00	13-Jul	12:15	26.25	downstream	0	0
A63-A18	MT7	65.3848	-96.7127	05-Jul	15:12	06-Jul	15:50	24.63	upstream	0	0
A63-A18	MT7	65.3848	-96.7127	06-Jul	15:50	07-Jul	13:14	21.40	upstream	0	0

Watercourse code	Location ID	Latitude	Longitude	Date set (2015)	Time set	Date lifted (2015)	Time lifted	Soak time (hours)	Opening facing	Slimy Sculpin	Juvenile Round Whitefish
A63-A18	MT7	65.3848	-96.7127	07-Jul	13:14	08-Jul	15:00	25.77	upstream	0	0
A63-A18	MT7	65.3848	-96.7127	08-Jul	15:00	09-Jul	15:00	24.00	upstream	0	0
A63-A18	MT7	65.3848	-96.7127	09-Jul	15:00	13-Jul	12:00	93.00	upstream	0	0
A63-A18	MT8	65.3848	-96.7127	05-Jul	15:12	06-Jul	15:50	24.63	downstream	0	0
A63-A18	MT8	65.3848	-96.7127	06-Jul	15:50	07-Jul	13:14	21.40	downstream	0	1
A63-A18	MT8	65.3848	-96.7127	07-Jul	13:14	08-Jul	15:00	25.77	downstream	0	0
A63-A18	MT8	65.3848	-96.7127	08-Jul	15:00	09-Jul	15:00	24.00	downstream	0	0
A63-A18	MT8	65.3848	-96.7127	09-Jul	15:00	13-Jul	12:00	93.00	downstream	0	0
AP23-A17	MT1	65.3786	-96.6862	26-Jun	13:54	03-Jul	10:40	164.77	downstream	0	0

Table A 11. Large minnow trap set locations, dates and times of sets and lifts, soak times, orientation and catches in 2016.

Watercourse code	Location ID	Latitude	Longitude	Date set (2016)	Time set	Date lifted (2016)	Time lifted	Soak time (hours)	Opening facing	Slimy Sculpin	Ninespine Stickleback
A46-A17	MT10	65.4106	-96.6954	22-Jun	15:00	24-Jun	14:10	47.17	downstream	0	0
A46-A17	MT11	65.4106	-96.6954	22-Jun	15:05	24-Jun	14:15	47.17	downstream	0	0
A46-A17	MT10	65.4106	-96.6954	24-Jun	14:10	2-Jul	9:00	186.83	downstream	0	0
A46-A17	MT11	65.4106	-96.6954	24-Jun	14:15	2-Jul	9:00	186.75	downstream	3	0
A46-A17	MT10	65.4106	-96.6954	2-Jul	9:00	3-Jul	7:00	22.00	downstream	0	0
A46-A17	MT11	65.4106	-96.6954	2-Jul	9:00	3-Jul	7:00	22.00	downstream	0	0
A46-A17	MT10	65.4106	-96.6954	3-Jul	7:00	4-Jul	10:25	27.42	downstream	0	0
A46-A17	MT11	65.4106	-96.6954	3-Jul	7:00	4-Jul	10:25	27.42	downstream	0	0
A46-A17	MT10	65.4106	-96.6954	4-Jul	10:25	5-Jul	13:30	27.08	downstream	1	0
A46-A17	MT11	65.4106	-96.6954	4-Jul	10:25	5-Jul	13:35	27.17	downstream	0	0
A46-A17	MT10	65.4106	-96.6954	5-Jul	13:30	7-Jul	9:30	44.00	downstream	0	0
A46-A17	MT11	65.4106	-96.6954	5-Jul	13:30	7-Jul	9:30	44.00	downstream	1	1
A50-A17	MT12	65.4102	-96.6901	22-Jun	15:29	24-Jun	14:25	46.93	downstream	0	0
A50-A17	MT13	65.4104	-96.6898	22-Jun	15:32	24-Jun	14:35	47.05	downstream	0	0
A50-A17	MT12	65.4102	-96.6901	24-Jun	14:25	2-Jul	8:30	186.08	downstream	0	0
A50-A17	MT13	65.4104	-96.6898	24-Jun	14:35	2-Jul	8:30	185.92	downstream	1	0
A50-A17	MT12	65.4102	-96.6901	2-Jul	8:35	3-Jul	6:53	22.30	downstream	0	0
A50-A17	MT13	65.4104	-96.6898	2-Jul	8:35	3-Jul	6:50	22.25	downstream	0	0
A50-A17	MT12	65.4102	-96.6901	3-Jul	6:53	4-Jul	10:20	27.45	downstream	0	0
A50-A17	MT13	65.4104	-96.6898	3-Jul	6:50	4-Jul	10:20	27.50	downstream	0	0
A50-A17	MT12	65.4102	-96.6901	4-Jul	10:20	5-Jul	15:30	29.17	downstream	0	0
A50-A17	MT13	65.4104	-96.6898	4-Jul	10:20	5-Jul	15:30	29.17	downstream	0	0
A50-A17	MT12	65.4102	-96.6901	5-Jul	15:30	7-Jul	9:00	41.50	downstream	0	0
A50-A17	MT13	65.4104	-96.6898	5-Jul	15:30	7-Jul	9:00	41.50	downstream	2	0

Table A 12. Watercourses code, sampling location ID, date, latitude and longitude of the starting point, and electrofisher settings for tributary and connecting channel electrofishing conducted in 2015. Refer to Figure 5-4 and Figure 5-5 for June sampling locations, Figure 5-6 and Figure 5-7 for July sampling locations, and Figure 5-8, Figure 5-9 and Figure 5-10 for August sampling locations.

Watercourse	Location ID	Date (2015)	Start latitude	Start longitude	Voltage	Frequency
A0-A48	EF-S1	01-Aug	65.415765	-96.686928	950	250
A113-A47	EF-S2	01-Aug	65.417182	-96.690260	950	250
A16-A15	EF-S3	25-Aug	65.392606	-96.770026	950	250
A17-A16	EF-S4	25-Aug	65.400991	-96.720011	950	250
A18-A17	EF-S5	05-Jul	65.383288	-96.703374	950	250
A18-A17	EF-S6	30-Aug	65.384323	-96.700957	950	250
A19-A18	EF-S7	09-Jul	65.378628	-96.714845	950	250
A46-A17	EF-S8	28-Jun	65.410496	-96.695450	950	250
A46-A17	EF-S9	09-Jul	65.410496	-96.695450	950	250
A46-A17	EF-S10	09-Jul	65.410634	-96.695442	950	250
A46-A17	EF-S11	12-Jul	65.410496	-96.695450	950	250
A46-A17	EF-S12	30-Aug	65.410477	-96.695459	550	130
A47-A46	EF-S13	09-Jul	65.412515	-96.693319	950	250
A50-A17	EF-S14	28-Jun	65.410174	-96.690529	950	250
A50-A17	EF-S15	09-Jul	65.410174	-96.690529	950	250
A50-A17	EF-S16	30-Aug	65.410162	-96.690570	550	130
A53-A17	EF-S17	20-Jun	65.401450	-96.683688	450	60
A53-A17	EF-S18	08-Jul	65.401450	-96.683688	950	250
A53-A17	EF-S19	30-Aug	65.401432	-96.683701	950	250
A55-A17	EF-S20	21-Jun	65.394604	-96.677482	950	250
A55-A17	EF-S21	06-Jul	65.394604	-96.677482	950	250
A55-A17	EF-S22	30-Aug	65.394722	-96.677244	950	250
A56-A55	EF-S23	08-Jul	65.397864	-96.666318	950	250
A59-A17	EF-S24	27-Jun	65.388830	-96.683468	950	250
A59-A17	EF-S25	09-Jul	65.388829	-96.683167	950	250
A59-A17	EF-S26	30-Aug	65.388820	-96.683208	950	250
A62-A17	EF-S27	07-Jul	65.388363	-96.699974	950	250
A63-A18	EF-S28	05-Jul	65.384819	-96.712699	950	250
A63-A18	EF-S29	07-Jul	65.384819	-96.712699	950	250
A-P21-A52	EF-S30	01-Aug	65.410581	-96.675165	950	250
A-P23-A17	EF-S31	26-Jun	65.378590	-96.686449	950	250
A18-A17	EF-S32	26-Jun	65.384374	-96.700225	950	250

Table A 13. Watercourses code, sampling location ID, date, latitude and longitude of the starting point, and electrofisher settings for tributary and connecting channel electrofishing conducted in 2016. Refer to Figure 5-12, Figure 5-16, Figure 5-19, Figure 5-22 and Figure 5-23 for June sampling locations, Figure 5-13, Figure 5-17 and Figure 5-20 for July sampling locations, and Figure 5-14, Figure 5-15, Figure 5-18 and Figure 5-21 for August sampling locations.

Watercourse	Location ID	Date (2016)	Start latitude	Start longitude	Voltage	Frequency
A53-A17	EF-S33	18-Jun	65.4015	-96.6835	950	250
A55-A17	EF-S34	19-Jun	65.3947	-96.6774	950	250
A47-A17	EF-S35	19-Jun	65.4106	-96.6954	950	250
A113-A47	EF-S36	19-Jun	65.4155	-96.6908	950	250
A23-A22	EF-S37	20-Jun	65.3721	-96.7667	850	100
A22-A21	EF-S38	20-Jun	65.3747	-96.7540	850	100
A20-A19	EF-S39	20-Jun	65.3761	-96.7235	850	100
A16-A15	EF-S40	21-Jun	65.3968	-96.7741	850	100
A18-A17	EF-S41	22-Jun	65.3841	-96.7011	950	100
A59-A17	EF-S42	22-Jun	65.3881	-96.6816	950	100
A46-A17	EF-S43	22-Jun	65.4106	-96.6954	650	100
A50-A17	EF-S44	22-Jun	65.4102	-96.6903	650	100
A24-A4-A5	EF-S45	23-Jun	65.4543	-96.8424	950	250
A5-A4	EF-S46	23-Jun	65.4560	-96.8461	950	250
A5-A4	EF-S47	23-Jun	65.4541	-96.8438	950	250
A1-DS1	EF-S48	23-Jun	65.4580	-96.8888	950	250
A72-A71	EF-S49	24-Jun	65.4082	-96.8680	950	250
A81-A80	EF-S50	24-Jun	65.4081	-96.8843	950	250
A79-A72	EF-S51	24-Jun	65.4068	-96.8636	950	250
A73-A72	EF-S52	24-Jun	65.4077	-96.8619	950	250
A46-A17	EF-S53	24-Jun	65.4106	-96.6954	450	100
A47-A46	EF-S54	24-Jun	65.4125	-96.6933	450	100
A50-A17	EF-S55	24-Jun	65.4102	-96.6903	950	250
A16-A15	EF-S56	24-Jun	65.3965	-96.7737	950	250
A18-A17	EF-S57	25-Jun	65.3840	-96.7013	950	250
A1-DS1	EF-S58	26-Jun	65.4580	-96.8889	950	250
A3-A2	EF-S59	26-Jun	65.4522	-96.8754	950	250
A24-A4-A5	EF-S60	26-Jun	65.4535	-96.8420	950	250
A69-DS1	EF-S61	27-Jun	65.4253	-96.8771	950	250
A55-A17	EF-S62	26-Jun	65.3947	-96.6774	950	250
A72-A71	EF-S63	27-Jun	65.4083	-96.8667	950	250

Watercourse	Location ID	Date (2016)	Start latitude	Start longitude	Voltage	Frequency
A5-A4	EF-S64	28-Jun	65.4541	-96.8445	950	250
A24-A4-A5	EF-S65	28-Jun	65.4542	-96.8423	950	250
A3-A2	EF-S66	28-Jun	65.4522	-96.8753	950	250
A1-DS1	EF-S67	28-Jun	65.4580	-96.8889	950	250
A69-DS1	EF-S68	28-Jun	65.4259	-96.8777	950	250
A71-A70	EF-S69	28-Jun	65.4126	-96.8778	950	250
A1-DS1	EF-S70	2-Jul	65.4581	-96.8891	950	250
A48-A47	EF-S71	6-Jul	65.4155	-96.6886	650	250
A49-A47	EF-S72	7-Jul	65.4139	-96.6965	450	250
A50-A17	EF-S73	7-Jul	65.4102	-96.6905	350	250
A46-A17	EF-S74	7-Jul	65.4106	-96.6954	550	250
A62-A17	EF-S75	7-Jul	65.3886	-96.6987	550	250
A59-A17	EF-S76	7-Jul	65.3889	-96.6834	750	250
A55-A17	EF-S77	8-Jul	65.3947	-96.6771	950	250
A18-A17	EF-S78	8-Jul	65.3843	-96.7010	950	250
A17-A16	EF-S79	9-Jul	65.4022	-96.7159	950	250
A17-A16	EF-S80	9-Jul	65.4021	-96.7157	950	250
A50-A17	EF-S81	19-Aug	65.4101	-96.6907	150	60
A46-A17	EF-S82	19-Aug	65.4103	-96.6958	150	60
A55-A17	EF-S83	19-Aug	65.3947	-96.6773	950	250
A59-A17	EF-S84	20-Aug	65.3889	-96.6834	950	250
A18-A17	EF-S85	20-Aug	65.3842	-96.7012	950	250
A49-A47	EF-S86	20-Aug	65.4129	-96.7004	250	60
A53-A17	EF-S87	26-Aug	65.4015	-96.6838	650	60
A53-A17	EF-S88	8-Jul	65.4015	-96.6837	950	250

Table A 14. Location ID, coordinates, set, lift and catch data for gill net sets in tributaries to Whale Tail Lake in 2016.

Watercourse	Set type	Location ID	mesh size (mm)	Start latitude	Start longitude	Set date	Set time	Lift date	Lift time	Arctic Char
A53-A17	stream gill net	GN-S1	36	65.4015	-96.6835	18-Jun	11:10	23-Jun[1]	16:45	0
A53-A17	stream gill net	GN-S1	36	65.4015	-96.6835	23-Jun	16:45	25-Jun	17:18	1
A53-A17	stream gill net	GN-S1	36	65.4015	-96.6835	25-Jun	17:18	26-Jun	16:19	0
A53-A17	stream gill net	GN-S1	36	65.4015	-96.6835	26-Jun	16:19	27-Jun	12:57	0
A53-A17	stream gill net	GN-S1	36	65.4015	-96.6835	27-Jun	12:57	28-Jun	16:32	0
A53-A17	stream gill net	GN-S1	36	65.4015	-96.6835	2-Jul	7:50	3-Jul	6:15	0
A53-A17	stream gill net	GN-S1	36	65.4015	-96.6835	3-Jul	6:15	4-Jul	11:00	0
A53-A17	stream gill net	GN-S1	36	65.4015	-96.6835	4-Jul	11:00	5-Jul	6:50	0
A53-A17	stream gill net	GN-S1	36	65.4015	-96.6835	5-Jul	6:50	6-Jul	6:30	0
A53-A17	stream gill net	GN-S1	36	65.4015	-96.6835	6-Jul	7:30	7-Jul	15:40	0
A53-A17	stream gill net	GN-S1	36	65.4015	-96.6835	7-Jul	15:40	8-Jul	13:41	0
A53-A17	stream gill net	GN-S1	36	65.4015	-96.6835	8-Jul	13:41	9-Jul	11:03	0
A55-A17	stream gill net	GN-S2	50	65.3948	-96.6770	19-Jun	08:35	23-Jun[1]	16:30	0
A55-A17	stream gill net	GN-S2	50	65.3948	-96.6770	23-Jun	16:30	25-Jun	16:30	1
A55-A17	stream gill net	GN-S2	50	65.3948	-96.6770	25-Jun	16:30	26-Jun	14:31	1
A55-A17	stream gill net	GN-S2	50	65.3948	-96.6770	26-Jun	14:31	27-Jun	11:57	0
A55-A17	stream gill net	GN-S2	50	65.3948	-96.6770	27-Jun	11:57	28-Jun	15:48	0
A55-A17	stream gill net	GN-S2	50	65.3948	-96.6770	2-Jul	11:50	3-Jul	13:00	3
A55-A17	stream gill net	GN-S2	50	65.3948	-96.6770	3-Jul	13:00	4-Jul	10:35	0
A55-A17	stream gill net	GN-S2	50	65.3948	-96.6770	4-Jul	10:35	5-Jul	10:20	0
A55-A17	stream gill net	GN-S2	50	65.3948	-96.6770	5-Jul	6:50	6-Jul	7:00	0
A55-A17	stream gill net	GN-S2	50	65.3948	-96.6770	6-Jul	7:30	7-Jul	15:35	0
A55-A17	stream gill net	GN-S2	50	65.3948	-96.6770	7-Jul	15:40	8-Jul	6:30	1[2]

Watercourse	Set type	Location ID	mesh size (mm)	Start latitude	Start longitude	Set date	Set time	Lift date	Lift time	Arctic Char
A55-A17	stream gill net	GN-S2	50	65.3948	-96.6770	8-Jul	6:30	9-Jul	10:12	1[2]
A18-A17	stream gill net	GN-S3	76	65.3840	-96.7013	22-Jun	12:47	23-Jun	16:25	0
A18-A17	stream gill net	GN-S3	76	65.3840	-96.7013	23-Jun	16:25	26-Jun[1]	14:07	0
A18-A17	stream gill net	GN-S3	76	65.3840	-96.7013	26-Jun	14:07	27-Jun	11:53	0
A18-A17	stream gill net	GN-S3	76	65.3840	-96.7013	27-Jun	11:53	28-Jun	14:52	1
A18-A17	stream gill net	GN-S3	76	65.3840	-96.7013	2-Jul	11:05	3-Jul	12:50	0
A18-A17	stream gill net	GN-S3	76	65.3840	-96.7013	3-Jul	12:50	4-Jul	10:30	0
A18-A17	stream gill net	GN-S3	76	65.3840	-96.7013	4-Jul	10:30	5-Jul	12:04	0
A18-A17	stream gill net	GN-S3	76	65.3840	-96.7013	5-Jul	6:50	6-Jul	7:30	0
A18-A17	stream gill net	GN-S3	76	65.3840	-96.7013	6-Jul	7:30	7-Jul	15:35	0
A18-A17	stream gill net	GN-S3	76	65.3840	-96.7013	7-Jul	15:40	8-Jul	11:00	0

[1]Nets were checked during this period but times were not recorded as no fish had been captured.
[2]Fish was moving downstream.

APPENDIX B – WATERCOURSE PHOTOGRAPHS

Watercourse A0-A48. Downstream view. August 1, 2015.

Watercourse A16-A15. Aerial view of outlet of Mammoth Lake. June 19, 2015. Flow is from left to right.

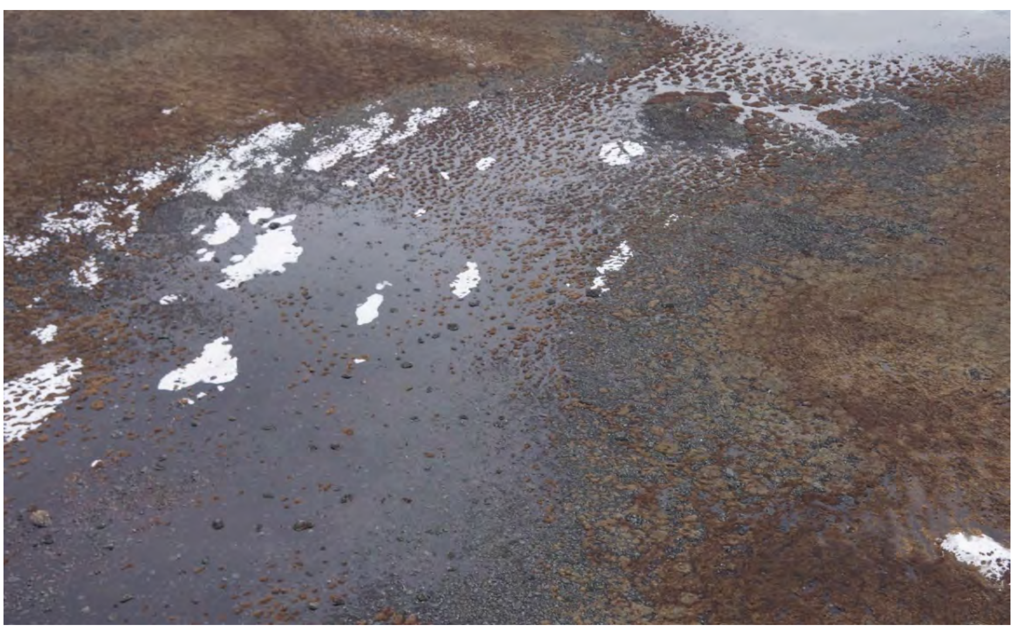
Watercourse A16-A15. Outlet of Mammoth Lake. July 4, 2015.

Watercourse A17-A16. Narrows between Whale Tail and Mammoth Lakes. July 4, 2015.

Watercourse A17-A16. Narrows between Whale Tail and Mammoth Lakes. August 25, 2015.

Watercourse A18-A17. Downstream view. June 26, 2015.

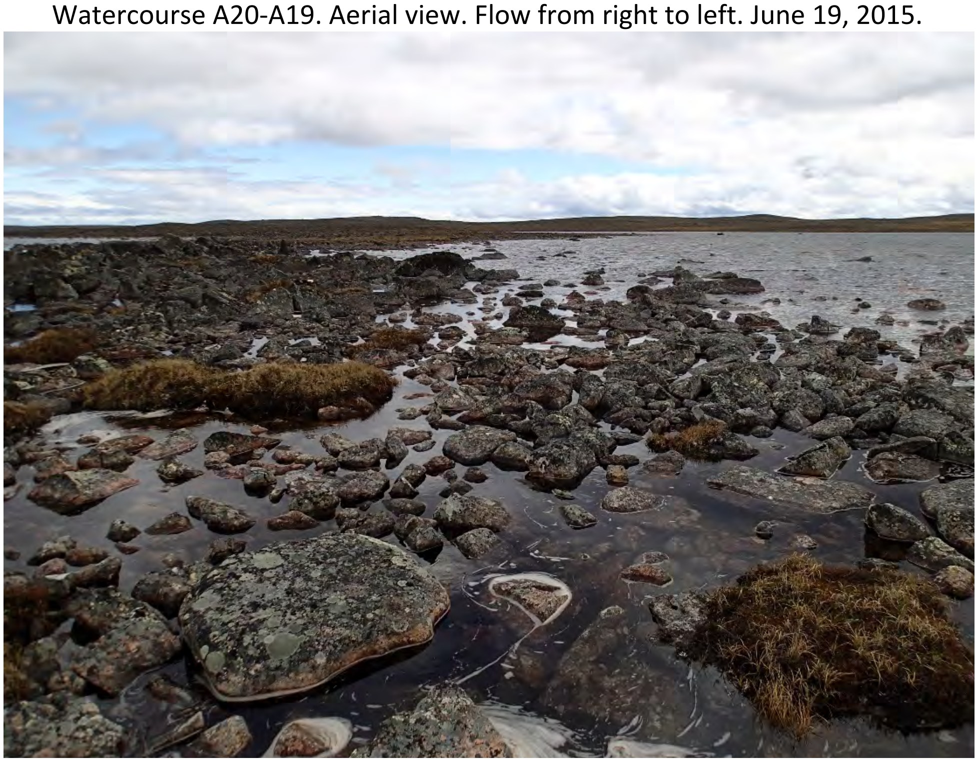

Watercourse A18-A17. Upstream view. August 30, 2015.


Watercourse A19-A18. Aerial view upstream. June 19, 2015.

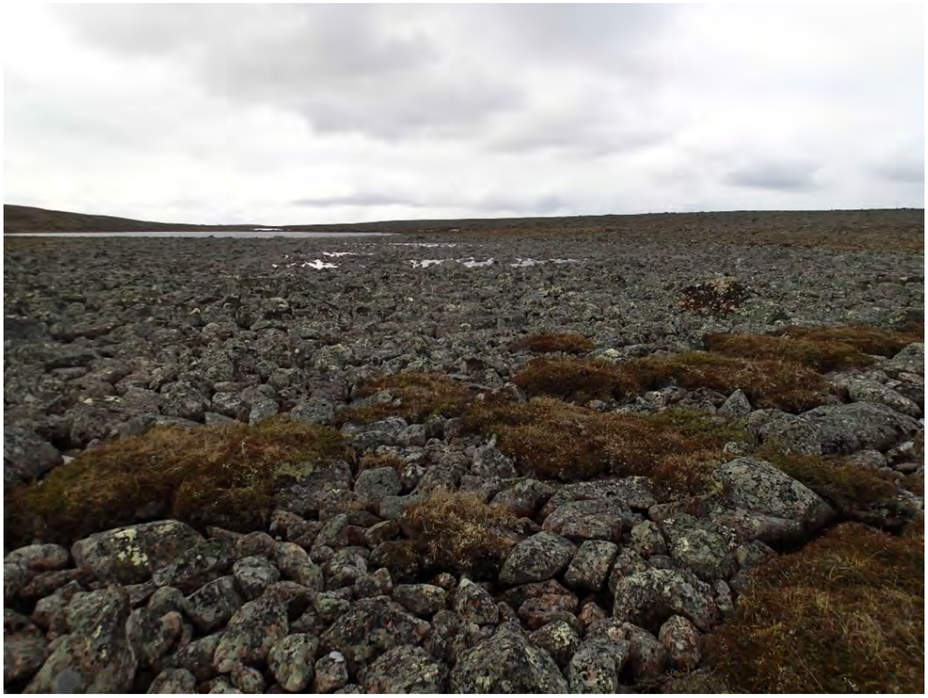
Watercourse A19-A18. Downstream view. June 26, 2015.

Watercourse A19-A18. Upstream view. July 9, 2015.

Watercourse A20-A19. Aerial view. Flow from right to left. June 19, 2015.



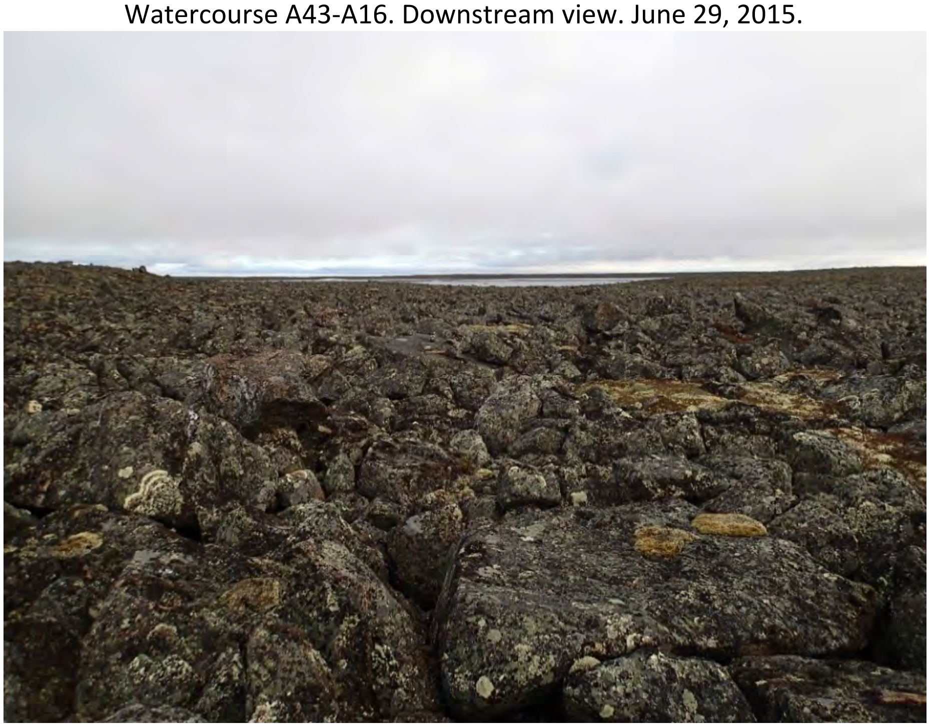
Watercourse A21-A20. Flow from right to left. July 10, 2015.



Watercourse A22-A21. Upstream view. July 10, 2015.

Watercourse A23-A22. Downstream view. July 10, 2015.


Watercourse A43-A16. Downstream view. June 29, 2015.

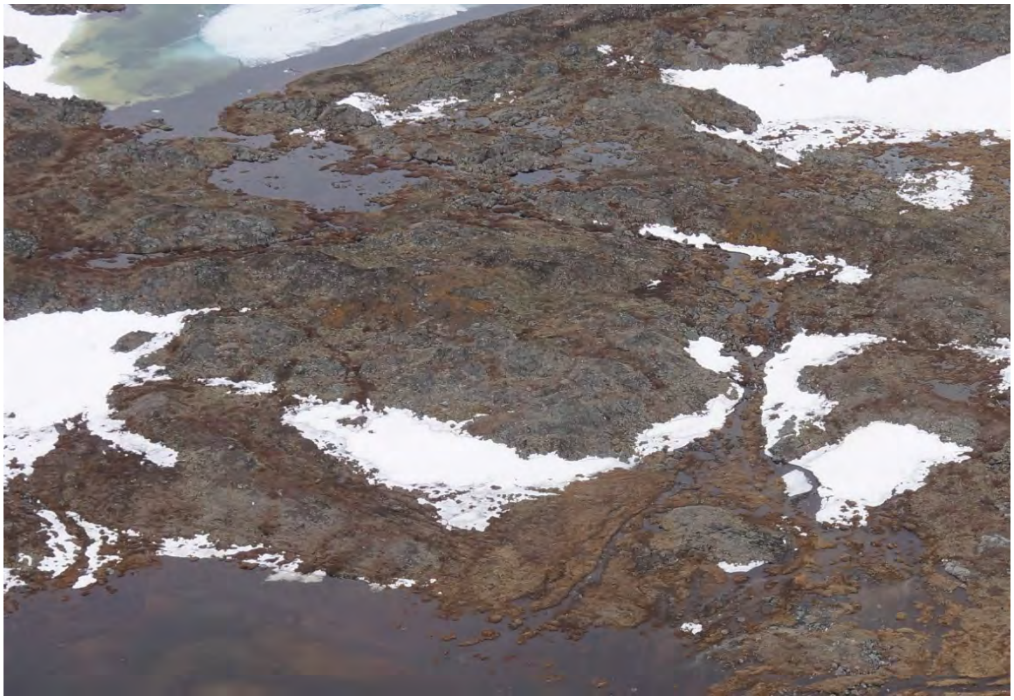

Watercourse A45-A16. Downstream view. July 11, 2015.

Watercourse A46-A17. Downstream view. June 28, 2015.

Watercourse A46-A17. Downstream view. August 30, 2015.

Watercourse A47-A46. Upstream view. July 9, 2015.

Watercourse A48-A47. Downstream view. August 1, 2015.



Watercourse A49-A17. A49 at top of photo, and A17 at bottom. June 19, 2015.

Watercourse A49-A17. Upstream view. August 1, 2015.


Watercourse A49-A47. Upstream view to A49. June 28, 2015.


Watercourse A50-A17. Upstream view. June 28, 2015.


Watercourse A50-A17. Upstream view. August 30, 2015.


Watercourse A53-A17. Upstream view. June 28, 2015.

Watercourse A53-A17. Upstream view. August 30, 2015.

Watercourse A54-A53. Downstream view. August 1, 2015.

Watercourse A55-A17. Upstream view. August 30, 2015.

Watercourse A56-A55. Downstream view. July 8, 2015.

Watercourse A59-A17. Upstream view. June 27, 2015.

Watercourse A59-A17. Upstream view. August 30, 2015.


Watercourse A60-A59. Downstream view. July 6, 2015.


Watercourse A62-A17. Aerial view. Flow from right to left. June 19, 2015.

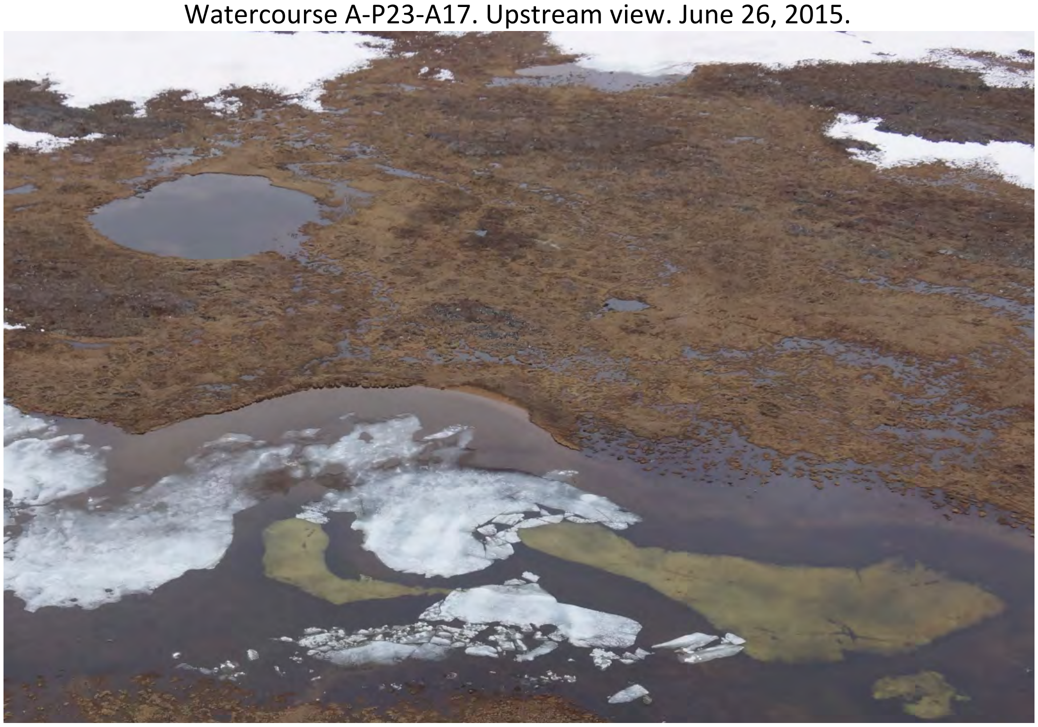
Watercourse A62-A17. Upstream view from near Lake A17. July 7, 2015.

Watercourse A63-A18. Downstream view from near Lake A63. July 5, 2015.

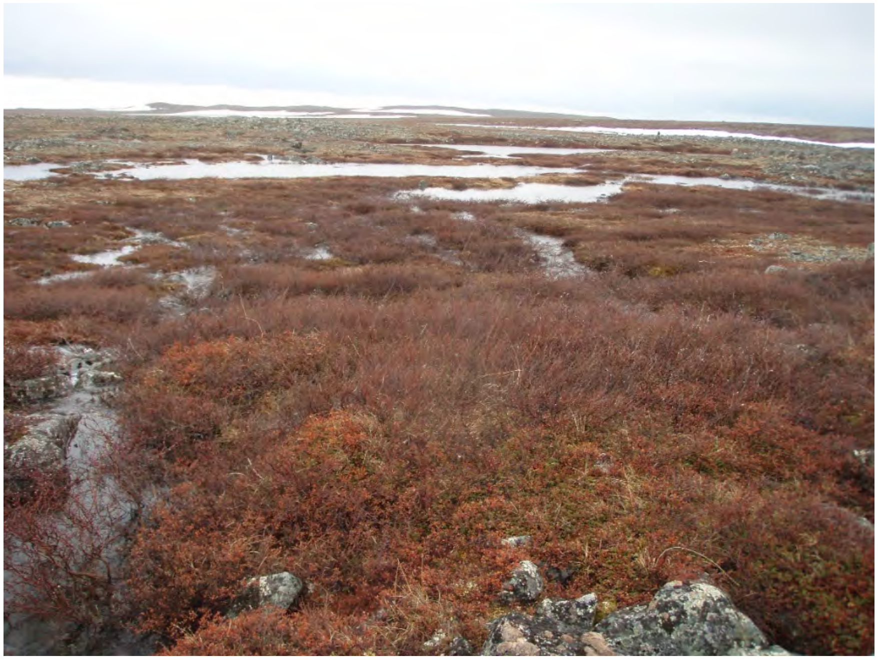
Watercourse A65-A17. Downstream view. June 27 2015.

Watercourse A-P21-A52. Downstream view. August 1, 2015.

Watercourse A-P23-A17. Upstream view. June 26, 2015.



Watercourse A-P38-A47. Aerial photo shows A-P38 as small pond in upper-left, with poorly defined watercourse flowing down to the right to A47 across bottom. June 19, 2015.


Watercourse A-P54-A-P23. Downstream view. June 26, 2015.


Watercourse A113-A47. Downstream view. June 28, 2015.


Watercourse A113-A47. Downstream view. August 1, 2015.

APPENDIX C. MERCURY AND METALS ANALYSES

Table C-1. Total length and weight of Ninespine Stickleback in composite samples submitted for mercury and metals analyses.

Lake	Composite Sample #	total length (mm)	weight (g)
Whale Tail	1	68	2.2
		53	1.0
		58	1.1
		55	0.9
		56	1.0
	2	55	1.0
		45	0.5
		51	0.8
		53	0.7
		47	0.5
	3	45	0.5
		40	0.4
		40	0.3
		46	0.5
		45	0.5
	4	37	0.3
		37	0.3
		39	0.3
		40	0.4
		41	0.4
	5	44	0.5
		40	0.3
		36	0.2
		37	0.4
		45	0.6
	6	37	0.2
		31	0.1
		40	0.4
		37	0.3
		38	0.3
	7	31	<0.1
		40	0.4
		35	0.1
		42	0.5
		36	0.2
		30	<0.1
		47	0.3
		35	0.3
Mammoth	8	64	na
		70	na
		60	na
		52	na
		53	na
		39	na
	9	47	0.5
		45	0.7
		51	0.9
		59	1.1
		47	0.5
	10	51	0.7
		46	0.6
		43	0.5
		45	0.6
		44	0.6
	11	46	0.6
		43	0.5
		42	0.6
		44	0.6
		43	0.5
	12	45	0.7
		42	0.4
		44	0.5
		45	0.5
		41	0.4
	13	38	0.4
		39	0.4
		38	0.3
		44	0.6
		37	0.4
	14	37	0.3
		40	0.4
		40	0.4
		41	0.4
		34	0.2
	15	30	0.2
		34	0.3
		35	0.3
		33	0.3

C. PORTT & ASSOCIATES
ATTN: Cameron Portt
56 Waterloo Avenue
Guelph ON N1H 3H5

Date Received: 23-SEP-15
Report Date: 10-NOV-15 11:49 (MT)
Version: FINAL

Client Phone: 519-824-8227

Certificate of Analysis

Lab Work Order #: L1677176

Project P.O. #:	NOT SUBMITTED
Job Reference:	AMARUQ 2015
C of C Numbers:	1, 2, 3, 4, 5, 6, 7
Legal Site Desc:	

Courtney Duncan
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-1	L1677176-2	L1677176-3	L1677176-4	L1677176-5
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15
	Sampled Time					
	Client ID	WHALE TAIL LAKE LAKE TROUT #46	WHALE TAIL LAKE LAKE TROUT #47	WHALE TAIL LAKE LAKE TROUT #48	WHALE TAIL LAKE LAKE TROUT #49	WHALE TAIL LAKE LAKE TROUT #50
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	80.4	78.3	79.1	80.1	78.4
Metals	Aluminum (Al)-Total (mg/kg)					
	Aluminum (Al)-Total (mg/kg wwt)					
	Antimony (Sb)-Total (mg/kg)					
	Antimony (Sb)-Total (mg/kg wwt)					
	Arsenic (As)-Total (mg/kg)					
	Arsenic (As)-Total (mg/kg wwt)					
	Barium (Ba)-Total (mg/kg)					
	Barium (Ba)-Total (mg/kg wwt)					
	Beryllium (Be)-Total (mg/kg)					
	Beryllium (Be)-Total (mg/kg wwt)					
	Bismuth (Bi)-Total (mg/kg)					
	Bismuth (Bi)-Total (mg/kg wwt)					
	Boron (B)-Total (mg/kg)					
	Boron (B)-Total (mg/kg wwt)					
	Cadmium (Cd)-Total (mg/kg)					
	Cadmium (Cd)-Total (mg/kg wwt)					
	Calcium (Ca)-Total (mg/kg)					
	Calcium (Ca)-Total (mg/kg wwt)					
	Cesium (Cs)-Total (mg/kg)					
	Cesium (Cs)-Total (mg/kg wwt)					
	Chromium (Cr)-Total (mg/kg)					
	Chromium (Cr)-Total (mg/kg wwt)					
	Cobalt (Co)-Total (mg/kg)					
	Cobalt (Co)-Total (mg/kg wwt)					
	Copper (Cu)-Total (mg/kg)					
	Copper (Cu)-Total (mg/kg wwt)					
	Iron (Fe)-Total (mg/kg)					
	Iron (Fe)-Total (mg/kg wwt)					
	Lead (Pb)-Total (mg/kg)					
	Lead (Pb)-Total (mg/kg wwt)					
	Lithium (Li)-Total (mg/kg)					
	Lithium (Li)-Total (mg/kg wwt)					
	Magnesium (Mg)-Total (mg/kg)					
	Magnesium (Mg)-Total (mg/kg wwt)					
	Manganese (Mn)-Total (mg/kg)					
	Manganese (Mn)-Total (mg/kg wwt)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-6	L1677176-7	L1677176-8	L1677176-9	L1677176-10
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15
	Sampled Time					
	Client ID	WHALE TAIL LAKE LAKE TROUT #52	WHALE TAIL LAKE LAKE TROUT #53	WHALE TAIL LAKE LAKE TROUT #54A	WHALE TAIL LAKE LAKE TROUT #54B	WHALE TAIL LAKE LAKE TROUT #56
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	69.6	78.5	75.1	75.3	74.8
Metals	Aluminum (Al)-Total (mg/kg)					
	Aluminum (Al)-Total (mg/kg wwt)					
	Antimony (Sb)-Total (mg/kg)					
	Antimony (Sb)-Total (mg/kg wwt)					
	Arsenic (As)-Total (mg/kg)					
	Arsenic (As)-Total (mg/kg wwt)					
	Barium (Ba)-Total (mg/kg)					
	Barium (Ba)-Total (mg/kg wwt)					
	Beryllium (Be)-Total (mg/kg)					
	Beryllium (Be)-Total (mg/kg wwt)					
	Bismuth (Bi)-Total (mg/kg)					
	Bismuth (Bi)-Total (mg/kg wwt)					
	Boron (B)-Total (mg/kg)					
	Boron (B)-Total (mg/kg wwt)					
	Cadmium (Cd)-Total (mg/kg)					
	Cadmium (Cd)-Total (mg/kg wwt)					
	Calcium (Ca)-Total (mg/kg)					
	Calcium (Ca)-Total (mg/kg wwt)					
	Cesium (Cs)-Total (mg/kg)					
	Cesium (Cs)-Total (mg/kg wwt)					
	Chromium (Cr)-Total (mg/kg)					
	Chromium (Cr)-Total (mg/kg wwt)					
	Cobalt (Co)-Total (mg/kg)					
	Cobalt (Co)-Total (mg/kg wwt)					
	Copper (Cu)-Total (mg/kg)					
	Copper (Cu)-Total (mg/kg wwt)					
	Iron (Fe)-Total (mg/kg)					
	Iron (Fe)-Total (mg/kg wwt)					
	Lead (Pb)-Total (mg/kg)					
	Lead (Pb)-Total (mg/kg wwt)					
	Lithium (Li)-Total (mg/kg)					
	Lithium (Li)-Total (mg/kg wwt)					
	Magnesium (Mg)-Total (mg/kg)					
	Magnesium (Mg)-Total (mg/kg wwt)					
	Manganese (Mn)-Total (mg/kg)					
	Manganese (Mn)-Total (mg/kg wwt)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		L1677176-11	L1677176-12	L1677176-13	L1677176-14	L1677176-15
	Sample ID	L1677176-11	L1677176-12	L1677176-13	L1677176-14	L1677176-15
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15
	Sampled Time					
	Client ID	WHALE TAIL LAKE LAKE TROUT #57	WHALE TAIL LAKE LAKE TROUT #58	WHALE TAIL LAKE LAKE TROUT #59	WHALE TAIL LAKE LAKE TROUT #60	WHALE TAIL LAKE LAKE TROUT #61
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	72.7	75.3	76.0	78.7	77.0
Metals	Aluminum (Al)-Total (mg/kg)			<2.0		<2.0
	Aluminum (Al)-Total (mg/kg wwt)			<0.40		<0.40
	Antimony (Sb)-Total (mg/kg)			<0.010		<0.010
	Antimony (Sb)-Total (mg/kg wwt)			<0.0020		<0.0020
	Arsenic (As)-Total (mg/kg)			0.033		0.025
	Arsenic (As)-Total (mg/kg wwt)			0.0079		0.0058
	Barium (Ba)-Total (mg/kg)			0.090		<0.050
	Barium (Ba)-Total (mg/kg wwt)			0.022		<0.010
	Beryllium (Be)-Total (mg/kg)			<0.010		<0.010
	Beryllium (Be)-Total (mg/kg wwt)			<0.0020		<0.0020
	Bismuth (Bi)-Total (mg/kg)			<0.010		<0.010
	Bismuth (Bi)-Total (mg/kg wwt)			<0.0020		<0.0020
	Boron (B)-Total (mg/kg)			<1.0		<1.0
	Boron (B)-Total (mg/kg wwt)			<0.20		<0.20
	Cadmium (Cd)-Total (mg/kg)			<0.0050		<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)			<0.0010		<0.0010
	Calcium (Ca)-Total (mg/kg)			508		261
	Calcium (Ca)-Total (mg/kg wwt)			122		60.0
	Cesium (Cs)-Total (mg/kg)			0.0273		0.0801
	Cesium (Cs)-Total (mg/kg wwt)			0.0066		0.0185
	Chromium (Cr)-Total (mg/kg)			<0.050		<0.050
	Chromium (Cr)-Total (mg/kg wwt)			<0.010		<0.010
	Cobalt (Co)-Total (mg/kg)			<0.020		<0.020
	Cobalt (Co)-Total (mg/kg wwt)			<0.0040		<0.0040
	Copper (Cu)-Total (mg/kg)			0.91		1.48
	Copper (Cu)-Total (mg/kg wwt)			0.218		0.341
	Iron (Fe)-Total (mg/kg)			12.9		10.5
	Iron (Fe)-Total (mg/kg wwt)			3.10		2.42
	Lead (Pb)-Total (mg/kg)			<0.020		<0.020
	Lead (Pb)-Total (mg/kg wwt)			<0.0040		<0.0040
	Lithium (Li)-Total (mg/kg)			<0.50		<0.50
	Lithium (Li)-Total (mg/kg wwt)			<0.10		<0.10
	Magnesium (Mg)-Total (mg/kg)			1270		1150
	Magnesium (Mg)-Total (mg/kg wwt)			306		266
	Manganese (Mn)-Total (mg/kg)			0.302		0.328
	Manganese (Mn)-Total (mg/kg wwt)			0.072		0.076

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-16	L1677176-17	L1677176-18	L1677176-19	L1677176-20
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15
	Sampled Time					
	Client ID	WHALE TAIL LAKE LAKE TROUT #62	WHALE TAIL LAKE LAKE TROUT #63	WHALE TAIL LAKE LAKE TROUT #64	WHALE TAIL LAKE LAKE TROUT #65	WHALE TAIL LAKE LAKE TROUT #66
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	77.3	77.1	78.6	75.7	77.5
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<0.40	<0.40	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.100	0.114	0.030	0.029	0.038
	Arsenic (As)-Total (mg/kg wwt)	0.0226	0.0261	0.0065	0.0071	0.0086
	Barium (Ba)-Total (mg/kg)	0.093	0.116	<0.050	<0.050	0.074
	Barium (Ba)-Total (mg/kg wwt)	0.021	0.027	0.010	<0.010	0.017
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	0.020
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	0.0046
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Calcium (Ca)-Total (mg/kg)	306	419	239	463	660
	Calcium (Ca)-Total (mg/kg wwt)	69.3	96.0	51.2	113	148
	Cesium (Cs)-Total (mg/kg)	0.114	0.0704	0.0372	0.107	0.0421
	Cesium (Cs)-Total (mg/kg wwt)	0.0259	0.0161	0.0080	0.0260	0.0094
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cobalt (Co)-Total (mg/kg)	<0.020	<0.020	0.022	<0.020	<0.020
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	<0.0040	0.0048	<0.0040	<0.0040
	Copper (Cu)-Total (mg/kg)	1.49	0.68	0.75	0.94	0.92
	Copper (Cu)-Total (mg/kg wwt)	0.338	0.157	0.161	0.230	0.206
	Iron (Fe)-Total (mg/kg)	11.4	13.1	12.6	10.6	10.4
	Iron (Fe)-Total (mg/kg wwt)	2.59	3.00	2.69	2.58	2.35
	Lead (Pb)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1390	1290	989	1150	1260
	Magnesium (Mg)-Total (mg/kg wwt)	316	296	212	281	284
	Manganese (Mn)-Total (mg/kg)	0.468	0.611	0.444	0.471	0.593
	Manganese (Mn)-Total (mg/kg wwt)	0.106	0.140	0.095	0.115	0.133

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-21	L1677176-22	L1677176-23	L1677176-24	L1677176-25
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	18-AUG-15	18-AUG-15	18-AUG-15	25-AUG-15	25-AUG-15
	Sampled Time					
	Client ID	WHALE TAIL LAKE LAKE TROUT #68	WHALE TAIL LAKE LAKE TROUT #69	WHALE TAIL LAKE LAKE TROUT #70	MAMMOTH LAKE LAKE TROUT #97	MAMMOTH LAKE LAKE TROUT #98
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	77.8	76.9	75.3	74.8	75.1
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<5.0	2.3	<2.0	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<1.0	0.56	<0.40	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.031	<0.030	0.034	0.113	0.182
	Arsenic (As)-Total (mg/kg wwt)	0.0068	<0.0060	0.0084	0.0286	0.0453
	Barium (Ba)-Total (mg/kg)	0.146	0.162	0.080	0.095	0.159
	Barium (Ba)-Total (mg/kg wwt)	0.033	0.037	0.020	0.024	0.040
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	<0.010	<0.0050	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	<0.0020	<0.0010	<0.0010	<0.0010
	Calcium (Ca)-Total (mg/kg)	760	1350	647	499	549
	Calcium (Ca)-Total (mg/kg wwt)	169	312	160	126	137
	Cesium (Cs)-Total (mg/kg)	0.0335	0.0279	0.0339	0.0533	0.0832
	Cesium (Cs)-Total (mg/kg wwt)	0.0075	0.0064	0.0084	0.0134	0.0207
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.20	<0.050	<0.050	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.040	<0.010	<0.010	<0.010
	Cobalt (Co)-Total (mg/kg)	<0.020	<0.020	<0.020	0.029	0.049
	Cobalt (Co)-Total (mg/kg wwt)	<0.0040	0.0043	<0.0040	0.0072	0.0122
	Copper (Cu)-Total (mg/kg)	0.93	0.85	0.79	0.75	0.76
	Copper (Cu)-Total (mg/kg wwt)	0.207	0.196	0.195	0.188	0.188
	Iron (Fe)-Total (mg/kg)	9.7	10.8	16.6	11.6	9.5
	Iron (Fe)-Total (mg/kg wwt)	2.15	2.5	4.10	2.93	2.36
	Lead (Pb)-Total (mg/kg)	<0.020	<0.050	<0.020	<0.020	<0.020
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.010	<0.0040	<0.0040	<0.0040
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1340	1020	1130	1130	1230
	Magnesium (Mg)-Total (mg/kg wwt)	298	235	280	284	307
	Manganese (Mn)-Total (mg/kg)	0.533	0.543	0.538	0.676	0.539
	Manganese (Mn)-Total (mg/kg wwt)	0.119	0.125	0.133	0.171	0.134

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID		L1677176-26	L1677176-27	L1677176-28	L1677176-29	L1677176-30
Description		Tissue	Tissue	Tissue	Tissue	Tissue
Sampled Date		25-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15
Sampled Time						
Client ID		MAMMOTH LAKE LAKE TROUT #99	MAMMOTH LAKE LAKE TROUT #100	MAMMOTH LAKE LAKE TROUT #101	MAMMOTH LAKE LAKE TROUT #102	MAMMOTH LAKE LAKE TROUT #103
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	76.0	74.8	75.9	76.1	75.7
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	3.5	<2.0	3.3	<2.0
	Aluminum (Al)-Total (mg/kg wwt)	0.42	0.89	<0.40	0.80	<0.40
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	0.0023	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.470	0.108	0.055	0.227	0.363
	Arsenic (As)-Total (mg/kg wwt)	0.113	0.0273	0.0134	0.0543	0.0883
	Barium (Ba)-Total (mg/kg)	0.126	0.154	0.067	0.210	0.058
	Barium (Ba)-Total (mg/kg wwt)	0.030	0.039	0.016	0.050	0.014
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	0.0021	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cadmium (Cd)-Total (mg/kg wwt)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Calcium (Ca)-Total (mg/kg)	856	1030	294	1360	455
	Calcium (Ca)-Total (mg/kg wwt)	206	259	70.6	325	111
	Cesium (Cs)-Total (mg/kg)	0.0889	0.0650	0.0618	0.0827	0.0864
	Cesium (Cs)-Total (mg/kg wwt)	0.0213	0.0163	0.0149	0.0198	0.0210
	Chromium (Cr)-Total (mg/kg)	0.057	0.074	<0.050	0.060	<0.050
	Chromium (Cr)-Total (mg/kg wwt)	0.014	0.019	<0.010	0.014	<0.010
	Cobalt (Co)-Total (mg/kg)	0.054	<0.020	<0.020	0.043	0.070
	Cobalt (Co)-Total (mg/kg wwt)	0.0130	<0.0040	0.0041	0.0102	0.0171
	Copper (Cu)-Total (mg/kg)	0.95	0.69	1.16	0.85	0.85
	Copper (Cu)-Total (mg/kg wwt)	0.229	0.174	0.280	0.204	0.208
	Iron (Fe)-Total (mg/kg)	12.8	16.3	11.9	19.5	11.3
	Iron (Fe)-Total (mg/kg wwt)	3.08	4.11	2.86	4.65	2.74
	Lead (Pb)-Total (mg/kg)	<0.020	0.120	<0.020	0.042	0.029
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	0.0302	0.0044	0.0102	0.0070
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1440	1210	1290	1250	1300
	Magnesium (Mg)-Total (mg/kg wwt)	347	304	310	299	317
	Manganese (Mn)-Total (mg/kg)	0.756	1.05	0.443	1.23	0.467
	Manganese (Mn)-Total (mg/kg wwt)	0.181	0.263	0.107	0.294	0.114

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-31	L1677176-32	L1677176-33	L1677176-34	L1677176-35
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15
	Sampled Time					
	Client ID	MAMMOTH LAKE LAKE TROUT #105	MAMMOTH LAKE LAKE TROUT #106	MAMMOTH LAKE LAKE TROUT #108	MAMMOTH LAKE LAKE TROUT #110	MAMMOTH LAKE LAKE TROUT #111
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	75.4	80.0	77.4	74.0	75.9
Metals	Aluminum (Al)-Total (mg/kg)	<2.0	<2.0	<2.0		
	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<0.40	0.44		
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010		
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020		
	Arsenic (As)-Total (mg/kg)	0.188	0.358	0.109		
	Arsenic (As)-Total (mg/kg wwt)	0.0462	0.0715	0.0247		
	Barium (Ba)-Total (mg/kg)	0.053	0.152	0.153		
	Barium (Ba)-Total (mg/kg wwt)	0.013	0.030	0.035		
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010		
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020		
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010		
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020		
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0		
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20		
	Cadmium (Cd)-Total (mg/kg)	0.0130	<0.0050	<0.0050		
	Cadmium (Cd)-Total (mg/kg wwt)	0.0032	<0.0010	<0.0010		
	Calcium (Ca)-Total (mg/kg)	381	550	641		
	Calcium (Ca)-Total (mg/kg wwt)	93.7	110	145		
	Cesium (Cs)-Total (mg/kg)	0.0594	0.0598	0.0682		
	Cesium (Cs)-Total (mg/kg wwt)	0.0146	0.0120	0.0154		
	Chromium (Cr)-Total (mg/kg)	<0.050	<0.050	<0.050		
	Chromium (Cr)-Total (mg/kg wwt)	<0.010	<0.010	<0.010		
	Cobalt (Co)-Total (mg/kg)	0.049	0.063	0.051		
	Cobalt (Co)-Total (mg/kg wwt)	0.0119	0.0126	0.0115		
	Copper (Cu)-Total (mg/kg)	0.88	0.98	1.00		
	Copper (Cu)-Total (mg/kg wwt)	0.217	0.196	0.227		
	Iron (Fe)-Total (mg/kg)	15.8	21.4	15.7		
	Iron (Fe)-Total (mg/kg wwt)	3.89	4.27	3.57		
	Lead (Pb)-Total (mg/kg)	<0.020	0.047	0.024		
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	0.0094	0.0054		
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50		
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10		
	Magnesium (Mg)-Total (mg/kg)	1210	1360	1420		
	Magnesium (Mg)-Total (mg/kg wwt)	297	271	321		
	Manganese (Mn)-Total (mg/kg)	0.622	0.474	0.677		
	Manganese (Mn)-Total (mg/kg wwt)	0.153	0.095	0.153		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-36	L1677176-37	L1677176-38	L1677176-39	L1677176-40
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15
	Sampled Time					
	Client ID	MAMMOTH LAKE LAKE TROUT #112	MAMMOTH LAKE LAKE TROUT #114	MAMMOTH LAKE LAKE TROUT #115	MAMMOTH LAKE LAKE TROUT #116	MAMMOTH LAKE LAKE TROUT #117
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	74.8	80.0	77.2	77.0	74.6
Metals	Aluminum (Al)-Total (mg/kg)					
	Aluminum (Al)-Total (mg/kg wwt)					
	Antimony (Sb)-Total (mg/kg)					
	Antimony (Sb)-Total (mg/kg wwt)					
	Arsenic (As)-Total (mg/kg)					
	Arsenic (As)-Total (mg/kg wwt)					
	Barium (Ba)-Total (mg/kg)					
	Barium (Ba)-Total (mg/kg wwt)					
	Beryllium (Be)-Total (mg/kg)					
	Beryllium (Be)-Total (mg/kg wwt)					
	Bismuth (Bi)-Total (mg/kg)					
	Bismuth (Bi)-Total (mg/kg wwt)					
	Boron (B)-Total (mg/kg)					
	Boron (B)-Total (mg/kg wwt)					
	Cadmium (Cd)-Total (mg/kg)					
	Cadmium (Cd)-Total (mg/kg wwt)					
	Calcium (Ca)-Total (mg/kg)					
	Calcium (Ca)-Total (mg/kg wwt)					
	Cesium (Cs)-Total (mg/kg)					
	Cesium (Cs)-Total (mg/kg wwt)					
	Chromium (Cr)-Total (mg/kg)					
	Chromium (Cr)-Total (mg/kg wwt)					
	Cobalt (Co)-Total (mg/kg)					
	Cobalt (Co)-Total (mg/kg wwt)					
	Copper (Cu)-Total (mg/kg)					
	Copper (Cu)-Total (mg/kg wwt)					
	Iron (Fe)-Total (mg/kg)					
	Iron (Fe)-Total (mg/kg wwt)					
	Lead (Pb)-Total (mg/kg)					
	Lead (Pb)-Total (mg/kg wwt)					
	Lithium (Li)-Total (mg/kg)					
	Lithium (Li)-Total (mg/kg wwt)					
	Magnesium (Mg)-Total (mg/kg)					
	Magnesium (Mg)-Total (mg/kg wwt)					
	Manganese (Mn)-Total (mg/kg)					
	Manganese (Mn)-Total (mg/kg wwt)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-41	L1677176-42	L1677176-43	L1677176-44	L1677176-45
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15
	Sampled Time					
	Client ID	MAMMOTH LAKE LAKE TROUT #118	MAMMOTH LAKE LAKE TROUT #119	MAMMOTH LAKE LAKE TROUT #120	MAMMOTH LAKE LAKE TROUT #121	MAMMOTH LAKE LAKE TROUT #122
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	77.8	75.4	75.3	74.6	76.1
Metals	Aluminum (Al)-Total (mg/kg)					
	Aluminum (Al)-Total (mg/kg wwt)					
	Antimony (Sb)-Total (mg/kg)					
	Antimony (Sb)-Total (mg/kg wwt)					
	Arsenic (As)-Total (mg/kg)					
	Arsenic (As)-Total (mg/kg wwt)					
	Barium (Ba)-Total (mg/kg)					
	Barium (Ba)-Total (mg/kg wwt)					
	Beryllium (Be)-Total (mg/kg)					
	Beryllium (Be)-Total (mg/kg wwt)					
	Bismuth (Bi)-Total (mg/kg)					
	Bismuth (Bi)-Total (mg/kg wwt)					
	Boron (B)-Total (mg/kg)					
	Boron (B)-Total (mg/kg wwt)					
	Cadmium (Cd)-Total (mg/kg)					
	Cadmium (Cd)-Total (mg/kg wwt)					
	Calcium (Ca)-Total (mg/kg)					
	Calcium (Ca)-Total (mg/kg wwt)					
	Cesium (Cs)-Total (mg/kg)					
	Cesium (Cs)-Total (mg/kg wwt)					
	Chromium (Cr)-Total (mg/kg)					
	Chromium (Cr)-Total (mg/kg wwt)					
	Cobalt (Co)-Total (mg/kg)					
	Cobalt (Co)-Total (mg/kg wwt)					
	Copper (Cu)-Total (mg/kg)					
	Copper (Cu)-Total (mg/kg wwt)					
	Iron (Fe)-Total (mg/kg)					
	Iron (Fe)-Total (mg/kg wwt)					
	Lead (Pb)-Total (mg/kg)					
	Lead (Pb)-Total (mg/kg wwt)					
	Lithium (Li)-Total (mg/kg)					
	Lithium (Li)-Total (mg/kg wwt)					
	Magnesium (Mg)-Total (mg/kg)					
	Magnesium (Mg)-Total (mg/kg wwt)					
	Manganese (Mn)-Total (mg/kg)					
	Manganese (Mn)-Total (mg/kg wwt)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-46	L1677176-47	L1677176-48	L1677176-49	L1677176-50
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15
	Sampled Time					
	Client ID	MAMMOTH LAKE LAKE TROUT #123	MAMMOTH LAKE LAKE TROUT #124	MAMMOTH LAKE LAKE TROUT #126	WHALE TAIL LAKE SMALL FISH COMPOSITE #1	WHALE TAIL LAKE SMALL FISH COMPOSITE #2
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	78.0	78.7	78.1	74.4	74.0
Metals	Aluminum (Al)-Total (mg/kg)				8.0	<5.0
	Aluminum (Al)-Total (mg/kg wwt)				2.1	<1.0
	Antimony (Sb)-Total (mg/kg)				<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)				<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)				0.521	0.538
	Arsenic (As)-Total (mg/kg wwt)				0.133	0.140
	Barium (Ba)-Total (mg/kg)				19.1	16.0
	Barium (Ba)-Total (mg/kg wwt)				4.89	4.16
	Beryllium (Be)-Total (mg/kg)				<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)				<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)				<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)				<0.0020	<0.0020
	Boron (B)-Total (mg/kg)				<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)				<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)				0.140	0.233
	Cadmium (Cd)-Total (mg/kg wwt)				0.0360	0.0604
	Calcium (Ca)-Total (mg/kg)				50300	40500
	Calcium (Ca)-Total (mg/kg wwt)				12900	10500
	Cesium (Cs)-Total (mg/kg)				0.0427	0.0310
	Cesium (Cs)-Total (mg/kg wwt)				0.0109	0.0081
	Chromium (Cr)-Total (mg/kg)				<0.20	<0.20
	Chromium (Cr)-Total (mg/kg wwt)				0.041	<0.040
	Cobalt (Co)-Total (mg/kg)				0.071	0.057
	Cobalt (Co)-Total (mg/kg wwt)				0.0182	0.0148
	Copper (Cu)-Total (mg/kg)				6.89	6.81
	Copper (Cu)-Total (mg/kg wwt)				1.76	1.77
	Iron (Fe)-Total (mg/kg)				87.2	72.7
	Iron (Fe)-Total (mg/kg wwt)				22.3	18.9
	Lead (Pb)-Total (mg/kg)				0.066	0.057
	Lead (Pb)-Total (mg/kg wwt)				0.017	0.015
	Lithium (Li)-Total (mg/kg)				<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)				<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)				1960	1570
	Magnesium (Mg)-Total (mg/kg wwt)				503	409
	Manganese (Mn)-Total (mg/kg)				59.3	63.8
	Manganese (Mn)-Total (mg/kg wwt)				15.2	16.6

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-51	L1677176-52	L1677176-53	L1677176-54	L1677176-55
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15
	Sampled Time					
	Client ID	WHALE TAIL LAKE SMALL FISH COMPOSITE #3	WHALE TAIL LAKE SMALL FISH COMPOSITE #4	WHALE TAIL LAKE SMALL FISH COMPOSITE #5	WHALE TAIL LAKE SMALL FISH COMPOSITE #6	WHALE TAIL LAKE SMALL FISH COMPOSITE #7
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	73.7	73.6	74.1	74.4	74.8
Metals	Aluminum (Al)-Total (mg/kg)	15.2	11.8	9.4	8.6	9.4
	Aluminum (Al)-Total (mg/kg wwt)	4.0	3.1	2.4	2.2	2.4
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.447	0.442	0.398	0.426	0.501
	Arsenic (As)-Total (mg/kg wwt)	0.118	0.117	0.103	0.109	0.126
	Barium (Ba)-Total (mg/kg)	13.8	15.8	13.1	18.8	18.3
	Barium (Ba)-Total (mg/kg wwt)	3.63	4.18	3.41	4.82	4.60
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.293	0.255	0.199	0.228	0.251
	Cadmium (Cd)-Total (mg/kg wwt)	0.0771	0.0673	0.0515	0.0584	0.0632
	Calcium (Ca)-Total (mg/kg)	37000	44500	36000	47000	40000
	Calcium (Ca)-Total (mg/kg wwt)	9740	11800	9340	12000	10100
	Cesium (Cs)-Total (mg/kg)	0.0238	0.0204	0.0226	0.0198	0.0227
	Cesium (Cs)-Total (mg/kg wwt)	0.0063	0.0054	0.0059	0.0051	0.0057
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Cobalt (Co)-Total (mg/kg)	0.061	0.056	0.058	0.059	0.064
	Cobalt (Co)-Total (mg/kg wwt)	0.0161	0.0148	0.0150	0.0152	0.0161
	Copper (Cu)-Total (mg/kg)	4.77	5.03	4.54	4.67	5.70
	Copper (Cu)-Total (mg/kg wwt)	1.25	1.33	1.18	1.19	1.44
	Iron (Fe)-Total (mg/kg)	81.2	83.2	76.1	83.1	84.1
	Iron (Fe)-Total (mg/kg wwt)	21.3	22.0	19.7	21.3	21.2
	Lead (Pb)-Total (mg/kg)	0.084	0.060	0.063	0.059	0.060
	Lead (Pb)-Total (mg/kg wwt)	0.022	0.016	0.016	0.015	0.015
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1600	1600	1510	1720	1560
	Magnesium (Mg)-Total (mg/kg wwt)	420	423	392	440	394
	Manganese (Mn)-Total (mg/kg)	42.9	48.1	46.8	64.5	56.8
	Manganese (Mn)-Total (mg/kg wwt)	11.3	12.7	12.1	16.5	14.3

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-56	L1677176-57	L1677176-58	L1677176-59	L1677176-60
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	30-AUG-15	29-AUG-15	29-AUG-15	29-AUG-15	29-AUG-15
	Sampled Time					
	Client ID	MAMMOTH LAKE SMALL FISH COMPOSITE #8	MAMMOTH LAKE SMALL FISH COMPOSITE #9	MAMMOTH LAKE SMALL FISH COMPOSITE #10	MAMMOTH LAKE SMALL FISH COMPOSITE #11	MAMMOTH LAKE SMALL FISH COMPOSITE #12
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	73.8	73.0	73.6	74.0	73.3
Metals	Aluminum (Al)-Total (mg/kg)	<5.0	11.6	8.4	14.8	12.8
	Aluminum (Al)-Total (mg/kg wwt)	<1.0	3.1	2.2	3.8	3.4
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg)	0.483	0.568	0.558	0.602	0.577
	Arsenic (As)-Total (mg/kg wwt)	0.127	0.154	0.148	0.156	0.154
	Barium (Ba)-Total (mg/kg)	13.5	10.9	12.2	11.5	14.4
	Barium (Ba)-Total (mg/kg wwt)	3.54	2.94	3.21	2.99	3.84
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20	<0.20	<0.20
	Cadmium (Cd)-Total (mg/kg)	0.121	0.203	0.253	0.309	0.266
	Cadmium (Cd)-Total (mg/kg wwt)	0.0316	0.0549	0.0670	0.0803	0.0710
	Calcium (Ca)-Total (mg/kg)	37400	34200	33300	34400	37600
	Calcium (Ca)-Total (mg/kg wwt)	9800	9240	8790	8940	10100
	Cesium (Cs)-Total (mg/kg)	0.0519	0.0583	0.0661	0.0620	0.0595
	Cesium (Cs)-Total (mg/kg wwt)	0.0136	0.0158	0.0175	0.0161	0.0159
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Cobalt (Co)-Total (mg/kg)	0.038	0.075	0.064	0.086	0.087
	Cobalt (Co)-Total (mg/kg wwt)	0.0101	0.0204	0.0169	0.0224	0.0234
	Copper (Cu)-Total (mg/kg)	5.77	7.66	3.58	4.70	4.78
	Copper (Cu)-Total (mg/kg wwt)	1.51	2.07	0.947	1.22	1.28
	Iron (Fe)-Total (mg/kg)	48.9	74.2	52.8	77.4	77.4
	Iron (Fe)-Total (mg/kg wwt)	12.8	20.1	14.0	20.1	20.7
	Lead (Pb)-Total (mg/kg)	<0.050	0.091	0.076	0.069	0.079
	Lead (Pb)-Total (mg/kg wwt)	<0.010	0.025	0.020	0.018	0.021
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10	<0.10	<0.10
	Magnesium (Mg)-Total (mg/kg)	1560	1370	1360	1380	1410
	Magnesium (Mg)-Total (mg/kg wwt)	410	370	359	358	378
	Manganese (Mn)-Total (mg/kg)	45.0	55.7	53.4	57.8	47.7
	Manganese (Mn)-Total (mg/kg wwt)	11.8	15.1	14.1	15.0	12.7

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-61	L1677176-62	L1677176-63		
	Description	Tissue	Tissue	Tissue		
	Sampled Date	29-AUG-15	29-AUG-15	29-AUG-15		
	Sampled Time					
	Client ID	MAMMOTH LAKE SMALL FISH COMPOSITE #13	MAMMOTH LAKE SMALL FISH COMPOSITE #14	MAMMOTH LAKE SMALL FISH COMPOSITE #15		
Grouping	**Analyte**					
TISSUE						
Physical Tests	% Moisture (%)	73.2	73.9	74.7		
Metals	Aluminum (Al)-Total (mg/kg)	8.8	15.9	10.2		
	Aluminum (Al)-Total (mg/kg wwt)	2.4	4.1	2.6		
	Antimony (Sb)-Total (mg/kg)	<0.010	<0.010	<0.010		
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020		
	Arsenic (As)-Total (mg/kg)	0.615	0.654	0.582		
	Arsenic (As)-Total (mg/kg wwt)	0.164	0.171	0.147		
	Barium (Ba)-Total (mg/kg)	13.5	15.0	14.4		
	Barium (Ba)-Total (mg/kg wwt)	3.61	3.91	3.66		
	Beryllium (Be)-Total (mg/kg)	<0.010	<0.010	<0.010		
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020		
	Bismuth (Bi)-Total (mg/kg)	<0.010	<0.010	<0.010		
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020		
	Boron (B)-Total (mg/kg)	<1.0	<1.0	<1.0		
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	<0.20		
	Cadmium (Cd)-Total (mg/kg)	0.223	0.359	0.207		
	Cadmium (Cd)-Total (mg/kg wwt)	0.0597	0.0937	0.0525		
	Calcium (Ca)-Total (mg/kg)	32900	39400	34900		
	Calcium (Ca)-Total (mg/kg wwt)	8810	10300	8830		
	Cesium (Cs)-Total (mg/kg)	0.0563	0.0636	0.0624		
	Cesium (Cs)-Total (mg/kg wwt)	0.0151	0.0166	0.0158		
	Chromium (Cr)-Total (mg/kg)	<0.20	<0.20	<0.20		
	Chromium (Cr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040		
	Cobalt (Co)-Total (mg/kg)	0.081	1.51	0.143		
	Cobalt (Co)-Total (mg/kg wwt)	0.0216	0.393	0.0362		
	Copper (Cu)-Total (mg/kg)	5.45	4.80	4.38		
	Copper (Cu)-Total (mg/kg wwt)	1.46	1.25	1.11		
	Iron (Fe)-Total (mg/kg)	69.2	83.1	74.6		
	Iron (Fe)-Total (mg/kg wwt)	18.5	21.7	18.9		
	Lead (Pb)-Total (mg/kg)	0.088	0.102	0.103		
	Lead (Pb)-Total (mg/kg wwt)	0.023	0.027	0.026		
	Lithium (Li)-Total (mg/kg)	<0.50	<0.50	<0.50		
	Lithium (Li)-Total (mg/kg wwt)	<0.10	<0.10	<0.10		
	Magnesium (Mg)-Total (mg/kg)	1370	1560	1680		
	Magnesium (Mg)-Total (mg/kg wwt)	368	408	426		
	Manganese (Mn)-Total (mg/kg)	55.4	71.3	61.8		
	Manganese (Mn)-Total (mg/kg wwt)	14.8	18.6	15.7		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-1	L1677176-2	L1677176-3	L1677176-4	L1677176-5
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15
	Sampled Time					
	Client ID	WHALE TAIL LAKE LAKE TROUT #46	WHALE TAIL LAKE LAKE TROUT #47	WHALE TAIL LAKE LAKE TROUT #48	WHALE TAIL LAKE LAKE TROUT #49	WHALE TAIL LAKE LAKE TROUT #50
Grouping	**Analyte**					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	3.01	3.84	4.13	4.84	2.20
	Mercury (Hg)-Total (mg/kg wwt)	0.590	0.831	0.863	0.965	0.474
	Molybdenum (Mo)-Total (mg/kg)					
	Molybdenum (Mo)-Total (mg/kg wwt)					
	Nickel (Ni)-Total (mg/kg)					
	Nickel (Ni)-Total (mg/kg wwt)					
	Phosphorus (P)-Total (mg/kg)					
	Phosphorus (P)-Total (mg/kg wwt)					
	Potassium (K)-Total (mg/kg)					
	Potassium (K)-Total (mg/kg wwt)					
	Rubidium (Rb)-Total (mg/kg)					
	Rubidium (Rb)-Total (mg/kg wwt)					
	Selenium (Se)-Total (mg/kg)					
	Selenium (Se)-Total (mg/kg wwt)					
	Sodium (Na)-Total (mg/kg)					
	Sodium (Na)-Total (mg/kg wwt)					
	Strontium (Sr)-Total (mg/kg)					
	Strontium (Sr)-Total (mg/kg wwt)					
	Tellurium (Te)-Total (mg/kg)					
	Tellurium (Te)-Total (mg/kg wwt)					
	Thallium (Tl)-Total (mg/kg)					
	Thallium (Tl)-Total (mg/kg wwt)					
	Tin (Sn)-Total (mg/kg)					
	Tin (Sn)-Total (mg/kg wwt)					
	Uranium (U)-Total (mg/kg)					
	Uranium (U)-Total (mg/kg wwt)					
	Vanadium (V)-Total (mg/kg)					
	Vanadium (V)-Total (mg/kg wwt)					
	Zinc (Zn)-Total (mg/kg)					
	Zinc (Zn)-Total (mg/kg wwt)					
	Zirconium (Zr)-Total (mg/kg)					
	Zirconium (Zr)-Total (mg/kg wwt)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-6	L1677176-7	L1677176-8	L1677176-9	L1677176-10
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15
	Sampled Time					
	Client ID	WHALE TAIL LAKE LAKE TROUT #52	WHALE TAIL LAKE LAKE TROUT #53	WHALE TAIL LAKE LAKE TROUT #54A	WHALE TAIL LAKE LAKE TROUT #54B	WHALE TAIL LAKE LAKE TROUT #56
Grouping	**Analyte**					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.444	1.71	1.33	1.16	1.30
	Mercury (Hg)-Total (mg/kg wwt)	0.135	0.368	0.331	0.286	0.328
	Molybdenum (Mo)-Total (mg/kg)					
	Molybdenum (Mo)-Total (mg/kg wwt)					
	Nickel (Ni)-Total (mg/kg)					
	Nickel (Ni)-Total (mg/kg wwt)					
	Phosphorus (P)-Total (mg/kg)					
	Phosphorus (P)-Total (mg/kg wwt)					
	Potassium (K)-Total (mg/kg)					
	Potassium (K)-Total (mg/kg wwt)					
	Rubidium (Rb)-Total (mg/kg)					
	Rubidium (Rb)-Total (mg/kg wwt)					
	Selenium (Se)-Total (mg/kg)					
	Selenium (Se)-Total (mg/kg wwt)					
	Sodium (Na)-Total (mg/kg)					
	Sodium (Na)-Total (mg/kg wwt)					
	Strontium (Sr)-Total (mg/kg)					
	Strontium (Sr)-Total (mg/kg wwt)					
	Tellurium (Te)-Total (mg/kg)					
	Tellurium (Te)-Total (mg/kg wwt)					
	Thallium (Tl)-Total (mg/kg)					
	Thallium (Tl)-Total (mg/kg wwt)					
	Tin (Sn)-Total (mg/kg)					
	Tin (Sn)-Total (mg/kg wwt)					
	Uranium (U)-Total (mg/kg)					
	Uranium (U)-Total (mg/kg wwt)					
	Vanadium (V)-Total (mg/kg)					
	Vanadium (V)-Total (mg/kg wwt)					
	Zinc (Zn)-Total (mg/kg)					
	Zinc (Zn)-Total (mg/kg wwt)					
	Zirconium (Zr)-Total (mg/kg)					
	Zirconium (Zr)-Total (mg/kg wwt)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-11	L1677176-12	L1677176-13	L1677176-14	L1677176-15
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15
	Sampled Time					
	Client ID	WHALE TAIL LAKE LAKE TROUT #57	WHALE TAIL LAKE LAKE TROUT #58	WHALE TAIL LAKE LAKE TROUT #59	WHALE TAIL LAKE LAKE TROUT #60	WHALE TAIL LAKE LAKE TROUT #61
Grouping	**Analyte**					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	1.03	1.49	0.727	2.13	9.52
	Mercury (Hg)-Total (mg/kg wwt)	0.281	0.370	0.175	0.453	2.19
	Molybdenum (Mo)-Total (mg/kg)			<0.020		<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)			<0.0040		<0.0040
	Nickel (Ni)-Total (mg/kg)			<0.20		<0.20
	Nickel (Ni)-Total (mg/kg wwt)			<0.040		<0.040
	Phosphorus (P)-Total (mg/kg)			10500		10600
	Phosphorus (P)-Total (mg/kg wwt)			2520		2450
	Potassium (K)-Total (mg/kg)			16700		17500
	Potassium (K)-Total (mg/kg wwt)			4020		4030
	Rubidium (Rb)-Total (mg/kg)			12.1		19.1
	Rubidium (Rb)-Total (mg/kg wwt)			2.91		4.40
	Selenium (Se)-Total (mg/kg)			1.16		2.14
	Selenium (Se)-Total (mg/kg wwt)			0.279		0.494
	Sodium (Na)-Total (mg/kg)			603		1280
	Sodium (Na)-Total (mg/kg wwt)			145		294
	Strontium (Sr)-Total (mg/kg)			0.594		0.245
	Strontium (Sr)-Total (mg/kg wwt)			0.143		0.056
	Tellurium (Te)-Total (mg/kg)			<0.020		<0.020
	Tellurium (Te)-Total (mg/kg wwt)			<0.0040		<0.0040
	Thallium (Tl)-Total (mg/kg)			0.0149		0.0215
	Thallium (Tl)-Total (mg/kg wwt)			0.00359		0.00495
	Tin (Sn)-Total (mg/kg)			<0.10		<0.10
	Tin (Sn)-Total (mg/kg wwt)			0.023		<0.020
	Uranium (U)-Total (mg/kg)			<0.0020		<0.0020
	Uranium (U)-Total (mg/kg wwt)			<0.00040		<0.00040
	Vanadium (V)-Total (mg/kg)			<0.10		<0.10
	Vanadium (V)-Total (mg/kg wwt)			<0.020		<0.020
	Zinc (Zn)-Total (mg/kg)			12.4		13.8
	Zinc (Zn)-Total (mg/kg wwt)			2.98		3.19
	Zirconium (Zr)-Total (mg/kg)			<0.20		<0.20
	Zirconium (Zr)-Total (mg/kg wwt)			<0.040		<0.040

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-16	L1677176-17	L1677176-18	L1677176-19	L1677176-20
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15	18-AUG-15
	Sampled Time					
	Client ID	WHALE TAIL LAKE LAKE TROUT #62	WHALE TAIL LAKE LAKE TROUT #63	WHALE TAIL LAKE LAKE TROUT #64	WHALE TAIL LAKE LAKE TROUT #65	WHALE TAIL LAKE LAKE TROUT #66
Grouping	**Analyte**					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	3.52	2.12	1.36	1.26	0.614
	Mercury (Hg)-Total (mg/kg wwt)	0.798	0.486	0.292	0.306	0.138
	Molybdenum (Mo)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	11800	10600	8460	10400	11100
	Phosphorus (P)-Total (mg/kg wwt)	2680	2430	1810	2520	2490
	Potassium (K)-Total (mg/kg)	19300	17900	13900	17300	18000
	Potassium (K)-Total (mg/kg wwt)	4370	4100	2980	4210	4050
	Rubidium (Rb)-Total (mg/kg)	27.2	19.5	9.74	22.5	17.5
	Rubidium (Rb)-Total (mg/kg wwt)	6.16	4.48	2.09	5.48	3.92
	Selenium (Se)-Total (mg/kg)	1.58	2.26	1.18	1.44	1.41
	Selenium (Se)-Total (mg/kg wwt)	0.358	0.519	0.252	0.350	0.317
	Sodium (Na)-Total (mg/kg)	1130	866	545	741	704
	Sodium (Na)-Total (mg/kg wwt)	256	199	117	180	158
	Strontium (Sr)-Total (mg/kg)	0.265	0.368	0.180	0.543	0.836
	Strontium (Sr)-Total (mg/kg wwt)	0.060	0.084	0.038	0.132	0.188
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0246	0.0152	0.0176	0.0191	0.0287
	Thallium (Tl)-Total (mg/kg wwt)	0.00557	0.00349	0.00378	0.00464	0.00645
	Tin (Sn)-Total (mg/kg)	<0.10	<0.10	0.10	<0.10	0.15
	Tin (Sn)-Total (mg/kg wwt)	<0.020	<0.020	0.022	<0.020	0.034
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	14.4	12.5	9.93	12.8	16.1
	Zinc (Zn)-Total (mg/kg wwt)	3.26	2.87	2.13	3.11	3.61
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	0.26
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	0.058

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-21	L1677176-22	L1677176-23	L1677176-24	L1677176-25
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	18-AUG-15	18-AUG-15	18-AUG-15	25-AUG-15	25-AUG-15
	Sampled Time					
	Client ID	WHALE TAIL LAKE LAKE TROUT #68	WHALE TAIL LAKE LAKE TROUT #69	WHALE TAIL LAKE LAKE TROUT #70	MAMMOTH LAKE LAKE TROUT #97	MAMMOTH LAKE LAKE TROUT #98
Grouping	**Analyte**					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.711	0.334	1.29	0.902	0.625
	Mercury (Hg)-Total (mg/kg wwt)	0.158	0.0771	0.318	0.227	0.156
	Molybdenum (Mo)-Total (mg/kg)	<0.020	<0.040	<0.020	<0.020	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	<0.0080	<0.0040	<0.0040	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	11300	8620	9110	9460	10600
	Phosphorus (P)-Total (mg/kg wwt)	2510	1990	2250	2380	2640
	Potassium (K)-Total (mg/kg)	18200	16600	14600	15300	17200
	Potassium (K)-Total (mg/kg wwt)	4040	3830	3610	3860	4280
	Rubidium (Rb)-Total (mg/kg)	16.9	13.0	11.4	12.1	13.3
	Rubidium (Rb)-Total (mg/kg wwt)	3.75	3.01	2.82	3.06	3.31
	Selenium (Se)-Total (mg/kg)	1.25	1.58	0.981	1.03	1.24
	Selenium (Se)-Total (mg/kg wwt)	0.278	0.365	0.243	0.259	0.310
	Sodium (Na)-Total (mg/kg)	696	2770	831	896	822
	Sodium (Na)-Total (mg/kg wwt)	155	639	206	226	205
	Strontium (Sr)-Total (mg/kg)	0.999	4.30	0.728	0.448	0.490
	Strontium (Sr)-Total (mg/kg wwt)	0.222	0.992	0.180	0.113	0.122
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0177	0.0126	0.0151	0.0203	0.0137
	Thallium (Tl)-Total (mg/kg wwt)	0.00393	0.00292	0.00372	0.00512	0.00341
	Tin (Sn)-Total (mg/kg)	0.16	<0.10	0.13	0.11	0.11
	Tin (Sn)-Total (mg/kg wwt)	0.035	<0.020	0.031	0.027	0.028
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	14.8	46.0	9.77	15.3	12.5
	Zinc (Zn)-Total (mg/kg wwt)	3.28	10.6	2.42	3.86	3.10
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-26	L1677176-27	L1677176-28	L1677176-29	L1677176-30
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	25-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15
	Sampled Time					
	Client ID	MAMMOTH LAKE LAKE TROUT #99	MAMMOTH LAKE LAKE TROUT #100	MAMMOTH LAKE LAKE TROUT #101	MAMMOTH LAKE LAKE TROUT #102	MAMMOTH LAKE LAKE TROUT #103
Grouping	**Analyte**					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.655	0.504	0.566	0.578	0.739
	Mercury (Hg)-Total (mg/kg wwt)	0.157	0.127	0.136	0.138	0.180
	Molybdenum (Mo)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040
	Phosphorus (P)-Total (mg/kg)	12300	10900	10700	11400	11300
	Phosphorus (P)-Total (mg/kg wwt)	2940	2740	2570	2720	2750
	Potassium (K)-Total (mg/kg)	20300	16200	17000	17800	18400
	Potassium (K)-Total (mg/kg wwt)	4880	4090	4080	4250	4470
	Rubidium (Rb)-Total (mg/kg)	19.4	12.4	15.0	14.6	21.4
	Rubidium (Rb)-Total (mg/kg wwt)	4.66	3.12	3.61	3.49	5.20
	Selenium (Se)-Total (mg/kg)	1.62	1.31	1.22	1.42	1.57
	Selenium (Se)-Total (mg/kg wwt)	0.388	0.330	0.293	0.339	0.380
	Sodium (Na)-Total (mg/kg)	884	922	664	656	1020
	Sodium (Na)-Total (mg/kg wwt)	212	232	160	157	249
	Strontium (Sr)-Total (mg/kg)	0.944	1.27	0.298	1.72	0.396
	Strontium (Sr)-Total (mg/kg wwt)	0.227	0.321	0.072	0.411	0.096
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0257	0.0123	0.0155	0.0253	0.0184
	Thallium (Tl)-Total (mg/kg wwt)	0.00617	0.00309	0.00373	0.00604	0.00448
	Tin (Sn)-Total (mg/kg)	0.12	0.10	0.14	0.18	0.11
	Tin (Sn)-Total (mg/kg wwt)	0.028	0.025	0.033	0.043	0.026
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020	0.0026	<0.0020
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	0.00063	<0.00040
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	12.1	13.1	13.6	14.6	13.3
	Zinc (Zn)-Total (mg/kg wwt)	2.90	3.30	3.28	3.49	3.23
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-31	L1677176-32	L1677176-33	L1677176-34	L1677176-35
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15
	Sampled Time					
	Client ID	MAMMOTH LAKE LAKE TROUT #105	MAMMOTH LAKE LAKE TROUT #106	MAMMOTH LAKE LAKE TROUT #108	MAMMOTH LAKE LAKE TROUT #110	MAMMOTH LAKE LAKE TROUT #111
Grouping	**Analyte**					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.700	1.34	0.531	0.602	0.785
	Mercury (Hg)-Total (mg/kg wwt)	0.172	0.268	0.120	0.156	0.189
	Molybdenum (Mo)-Total (mg/kg)	<0.020	<0.020	<0.020		
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040		
	Nickel (Ni)-Total (mg/kg)	<0.20	<0.20	<0.20		
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	<0.040	<0.040		
	Phosphorus (P)-Total (mg/kg)	10400	11500	12000		
	Phosphorus (P)-Total (mg/kg wwt)	2560	2300	2720		
	Potassium (K)-Total (mg/kg)	17100	18700	20000		
	Potassium (K)-Total (mg/kg wwt)	4200	3730	4520		
	Rubidium (Rb)-Total (mg/kg)	12.8	13.2	13.7		
	Rubidium (Rb)-Total (mg/kg wwt)	3.15	2.63	3.09		
	Selenium (Se)-Total (mg/kg)	1.49	1.29	1.26		
	Selenium (Se)-Total (mg/kg wwt)	0.365	0.258	0.286		
	Sodium (Na)-Total (mg/kg)	759	742	614		
	Sodium (Na)-Total (mg/kg wwt)	187	148	139		
	Strontium (Sr)-Total (mg/kg)	0.328	0.610	0.702		
	Strontium (Sr)-Total (mg/kg wwt)	0.081	0.122	0.159		
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020		
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040		
	Thallium (Tl)-Total (mg/kg)	0.0167	0.0156	0.0184		
	Thallium (Tl)-Total (mg/kg wwt)	0.00411	0.00312	0.00417		
	Tin (Sn)-Total (mg/kg)	0.11	0.20	0.16		
	Tin (Sn)-Total (mg/kg wwt)	0.028	0.039	0.035		
	Uranium (U)-Total (mg/kg)	<0.0020	<0.0020	<0.0020		
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040		
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10		
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020		
	Zinc (Zn)-Total (mg/kg)	12.3	13.6	13.2		
	Zinc (Zn)-Total (mg/kg wwt)	3.01	2.72	2.99		
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20		
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-36	L1677176-37	L1677176-38	L1677176-39	L1677176-40
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15
	Sampled Time					
	Client ID	MAMMOTH LAKE LAKE TROUT #112	MAMMOTH LAKE LAKE TROUT #114	MAMMOTH LAKE LAKE TROUT #115	MAMMOTH LAKE LAKE TROUT #116	MAMMOTH LAKE LAKE TROUT #117
Grouping	**Analyte**					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.693	2.91	0.572	0.811	0.845
	Mercury (Hg)-Total (mg/kg wwt)	0.175	0.583	0.130	0.187	0.215
	Molybdenum (Mo)-Total (mg/kg)					
	Molybdenum (Mo)-Total (mg/kg wwt)					
	Nickel (Ni)-Total (mg/kg)					
	Nickel (Ni)-Total (mg/kg wwt)					
	Phosphorus (P)-Total (mg/kg)					
	Phosphorus (P)-Total (mg/kg wwt)					
	Potassium (K)-Total (mg/kg)					
	Potassium (K)-Total (mg/kg wwt)					
	Rubidium (Rb)-Total (mg/kg)					
	Rubidium (Rb)-Total (mg/kg wwt)					
	Selenium (Se)-Total (mg/kg)					
	Selenium (Se)-Total (mg/kg wwt)					
	Sodium (Na)-Total (mg/kg)					
	Sodium (Na)-Total (mg/kg wwt)					
	Strontium (Sr)-Total (mg/kg)					
	Strontium (Sr)-Total (mg/kg wwt)					
	Tellurium (Te)-Total (mg/kg)					
	Tellurium (Te)-Total (mg/kg wwt)					
	Thallium (Tl)-Total (mg/kg)					
	Thallium (Tl)-Total (mg/kg wwt)					
	Tin (Sn)-Total (mg/kg)					
	Tin (Sn)-Total (mg/kg wwt)					
	Uranium (U)-Total (mg/kg)					
	Uranium (U)-Total (mg/kg wwt)					
	Vanadium (V)-Total (mg/kg)					
	Vanadium (V)-Total (mg/kg wwt)					
	Zinc (Zn)-Total (mg/kg)					
	Zinc (Zn)-Total (mg/kg wwt)					
	Zirconium (Zr)-Total (mg/kg)					
	Zirconium (Zr)-Total (mg/kg wwt)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-41	L1677176-42	L1677176-43	L1677176-44	L1677176-45
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15
	Sampled Time					
	Client ID	MAMMOTH LAKE LAKE TROUT #118	MAMMOTH LAKE LAKE TROUT #119	MAMMOTH LAKE LAKE TROUT #120	MAMMOTH LAKE LAKE TROUT #121	MAMMOTH LAKE LAKE TROUT #122
Grouping	**Analyte**					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.986	0.523	0.492	0.531	0.325
	Mercury (Hg)-Total (mg/kg wwt)	0.219	0.129	0.122	0.135	0.0777
	Molybdenum (Mo)-Total (mg/kg)					
	Molybdenum (Mo)-Total (mg/kg wwt)					
	Nickel (Ni)-Total (mg/kg)					
	Nickel (Ni)-Total (mg/kg wwt)					
	Phosphorus (P)-Total (mg/kg)					
	Phosphorus (P)-Total (mg/kg wwt)					
	Potassium (K)-Total (mg/kg)					
	Potassium (K)-Total (mg/kg wwt)					
	Rubidium (Rb)-Total (mg/kg)					
	Rubidium (Rb)-Total (mg/kg wwt)					
	Selenium (Se)-Total (mg/kg)					
	Selenium (Se)-Total (mg/kg wwt)					
	Sodium (Na)-Total (mg/kg)					
	Sodium (Na)-Total (mg/kg wwt)					
	Strontium (Sr)-Total (mg/kg)					
	Strontium (Sr)-Total (mg/kg wwt)					
	Tellurium (Te)-Total (mg/kg)					
	Tellurium (Te)-Total (mg/kg wwt)					
	Thallium (Tl)-Total (mg/kg)					
	Thallium (Tl)-Total (mg/kg wwt)					
	Tin (Sn)-Total (mg/kg)					
	Tin (Sn)-Total (mg/kg wwt)					
	Uranium (U)-Total (mg/kg)					
	Uranium (U)-Total (mg/kg wwt)					
	Vanadium (V)-Total (mg/kg)					
	Vanadium (V)-Total (mg/kg wwt)					
	Zinc (Zn)-Total (mg/kg)					
	Zinc (Zn)-Total (mg/kg wwt)					
	Zirconium (Zr)-Total (mg/kg)					
	Zirconium (Zr)-Total (mg/kg wwt)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-46	L1677176-47	L1677176-48	L1677176-49	L1677176-50
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15
	Sampled Time					
	Client ID	MAMMOTH LAKE LAKE TROUT #123	MAMMOTH LAKE LAKE TROUT #124	MAMMOTH LAKE LAKE TROUT #126	WHALE TAIL LAKE SMALL FISH COMPOSITE #1	WHALE TAIL LAKE SMALL FISH COMPOSITE #2
Grouping	**Analyte**					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.340	4.99	0.329	0.252	0.270
	Mercury (Hg)-Total (mg/kg wwt)	0.0747	1.07	0.0722	0.0645	0.0701
	Molybdenum (Mo)-Total (mg/kg)				0.129	0.128
	Molybdenum (Mo)-Total (mg/kg wwt)				0.0329	0.0332
	Nickel (Ni)-Total (mg/kg)				0.22	<0.20
	Nickel (Ni)-Total (mg/kg wwt)				0.057	0.042
	Phosphorus (P)-Total (mg/kg)				33800	28000
	Phosphorus (P)-Total (mg/kg wwt)				8660	7270
	Potassium (K)-Total (mg/kg)				10500	9820
	Potassium (K)-Total (mg/kg wwt)				2690	2550
	Rubidium (Rb)-Total (mg/kg)				17.4	14.2
	Rubidium (Rb)-Total (mg/kg wwt)				4.44	3.70
	Selenium (Se)-Total (mg/kg)				1.64	1.86
	Selenium (Se)-Total (mg/kg wwt)				0.419	0.484
	Sodium (Na)-Total (mg/kg)				4470	4080
	Sodium (Na)-Total (mg/kg wwt)				1140	1060
	Strontium (Sr)-Total (mg/kg)				68.1	59.1
	Strontium (Sr)-Total (mg/kg wwt)				17.4	15.3
	Tellurium (Te)-Total (mg/kg)				<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)				<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)				0.0101	0.0101
	Thallium (Tl)-Total (mg/kg wwt)				0.00259	0.00262
	Tin (Sn)-Total (mg/kg)				0.11	0.14
	Tin (Sn)-Total (mg/kg wwt)				0.028	0.036
	Uranium (U)-Total (mg/kg)				0.0300	0.0361
	Uranium (U)-Total (mg/kg wwt)				0.00768	0.00938
	Vanadium (V)-Total (mg/kg)				<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)				<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)				173	151
	Zinc (Zn)-Total (mg/kg wwt)				44.4	39.2
	Zirconium (Zr)-Total (mg/kg)				<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)				<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-51	L1677176-52	L1677176-53	L1677176-54	L1677176-55
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15	26-AUG-15
	Sampled Time					
	Client ID	WHALE TAIL LAKE SMALL FISH COMPOSITE #3	WHALE TAIL LAKE SMALL FISH COMPOSITE #4	WHALE TAIL LAKE SMALL FISH COMPOSITE #5	WHALE TAIL LAKE SMALL FISH COMPOSITE #6	WHALE TAIL LAKE SMALL FISH COMPOSITE #7
Grouping	**Analyte**					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.212	0.300	0.209	0.218	0.255
	Mercury (Hg)-Total (mg/kg wwt)	0.0557	0.0794	0.0543	0.0559	0.0643
	Molybdenum (Mo)-Total (mg/kg)	0.125	0.120	0.114	0.131	0.117
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0330	0.0317	0.0296	0.0335	0.0295
	Nickel (Ni)-Total (mg/kg)	0.24	0.24	0.29	0.20	0.21
	Nickel (Ni)-Total (mg/kg wwt)	0.063	0.064	0.075	0.052	0.053
	Phosphorus (P)-Total (mg/kg)	27100	30000	26400	32100	28600
	Phosphorus (P)-Total (mg/kg wwt)	7130	7930	6850	8220	7200
	Potassium (K)-Total (mg/kg)	9790	10100	9550	11200	10100
	Potassium (K)-Total (mg/kg wwt)	2570	2660	2480	2870	2550
	Rubidium (Rb)-Total (mg/kg)	13.9	11.4	12.1	13.1	12.2
	Rubidium (Rb)-Total (mg/kg wwt)	3.66	3.01	3.14	3.34	3.08
	Selenium (Se)-Total (mg/kg)	1.60	1.64	1.50	1.63	1.38
	Selenium (Se)-Total (mg/kg wwt)	0.420	0.433	0.390	0.417	0.348
	Sodium (Na)-Total (mg/kg)	3740	3790	3490	4280	4000
	Sodium (Na)-Total (mg/kg wwt)	982	1000	906	1090	1010
	Strontium (Sr)-Total (mg/kg)	55.2	59.7	51.4	65.2	56.3
	Strontium (Sr)-Total (mg/kg wwt)	14.5	15.8	13.3	16.7	14.2
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0110	0.0102	0.0128	0.0125	0.0115
	Thallium (Tl)-Total (mg/kg wwt)	0.00288	0.00269	0.00332	0.00320	0.00291
	Tin (Sn)-Total (mg/kg)	0.25	0.29	0.32	0.25	0.30
	Tin (Sn)-Total (mg/kg wwt)	0.067	0.076	0.082	0.063	0.075
	Uranium (U)-Total (mg/kg)	0.0299	0.0544	0.0414	0.0652	0.0384
	Uranium (U)-Total (mg/kg wwt)	0.00787	0.0144	0.0108	0.0167	0.00966
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	146	167	153	180	161
	Zinc (Zn)-Total (mg/kg wwt)	38.5	44.0	39.7	46.1	40.6
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-56	L1677176-57	L1677176-58	L1677176-59	L1677176-60
	Description	Tissue	Tissue	Tissue	Tissue	Tissue
	Sampled Date	30-AUG-15	29-AUG-15	29-AUG-15	29-AUG-15	29-AUG-15
	Sampled Time					
	Client ID	MAMMOTH LAKE SMALL FISH COMPOSITE #8	MAMMOTH LAKE SMALL FISH COMPOSITE #9	MAMMOTH LAKE SMALL FISH COMPOSITE #10	MAMMOTH LAKE SMALL FISH COMPOSITE #11	MAMMOTH LAKE SMALL FISH COMPOSITE #12
Grouping	**Analyte**					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.307	0.196	0.206	0.189	0.155
	Mercury (Hg)-Total (mg/kg wwt)	0.0805	0.0531	0.0544	0.0490	0.0414
	Molybdenum (Mo)-Total (mg/kg)	0.098	0.111	0.118	0.112	0.118
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0256	0.0301	0.0313	0.0292	0.0314
	Nickel (Ni)-Total (mg/kg)	<0.20	0.29	0.28	0.38	0.32
	Nickel (Ni)-Total (mg/kg wwt)	<0.040	0.077	0.075	0.099	0.085
	Phosphorus (P)-Total (mg/kg)	24000	26700	24200	24000	25900
	Phosphorus (P)-Total (mg/kg wwt)	6290	7230	6390	6230	6930
	Potassium (K)-Total (mg/kg)	9300	8760	9100	10700	9200
	Potassium (K)-Total (mg/kg wwt)	2440	2370	2410	2780	2460
	Rubidium (Rb)-Total (mg/kg)	15.2	12.4	13.6	13.9	13.1
	Rubidium (Rb)-Total (mg/kg wwt)	3.97	3.36	3.59	3.62	3.49
	Selenium (Se)-Total (mg/kg)	1.61	1.48	1.61	1.66	1.54
	Selenium (Se)-Total (mg/kg wwt)	0.423	0.400	0.425	0.431	0.413
	Sodium (Na)-Total (mg/kg)	3720	3360	3800	4270	3770
	Sodium (Na)-Total (mg/kg wwt)	975	908	1000	1110	1010
	Strontium (Sr)-Total (mg/kg)	45.7	45.7	41.6	43.1	51.3
	Strontium (Sr)-Total (mg/kg wwt)	12.0	12.4	11.0	11.2	13.7
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg)	0.0094	0.0115	0.0130	0.0137	0.0141
	Thallium (Tl)-Total (mg/kg wwt)	0.00246	0.00310	0.00343	0.00355	0.00377
	Tin (Sn)-Total (mg/kg)	0.11	0.17	0.14	0.14	0.10
	Tin (Sn)-Total (mg/kg wwt)	0.028	0.047	0.036	0.035	0.027
	Uranium (U)-Total (mg/kg)	0.0222	0.0247	0.0232	0.0268	0.0270
	Uranium (U)-Total (mg/kg wwt)	0.00583	0.00667	0.00613	0.00697	0.00720
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10	<0.10	<0.10
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020	<0.020
	Zinc (Zn)-Total (mg/kg)	154	157	120	140	133
	Zinc (Zn)-Total (mg/kg wwt)	40.3	42.5	31.8	36.4	35.6
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	<0.040

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1677176-61	L1677176-62	L1677176-63		
	Description	Tissue	Tissue	Tissue		
	Sampled Date	29-AUG-15	29-AUG-15	29-AUG-15		
	Sampled Time					
	Client ID	MAMMOTH LAKE SMALL FISH COMPOSITE #13	MAMMOTH LAKE SMALL FISH COMPOSITE #14	MAMMOTH LAKE SMALL FISH COMPOSITE #15		
Grouping	**Analyte**					
TISSUE						
Metals	Mercury (Hg)-Total (mg/kg)	0.192	0.193	0.205		
	Mercury (Hg)-Total (mg/kg wwt)	0.0513	0.0503	0.0520		
	Molybdenum (Mo)-Total (mg/kg)	0.115	0.130	0.154		
	Molybdenum (Mo)-Total (mg/kg wwt)	0.0308	0.0338	0.0390		
	Nickel (Ni)-Total (mg/kg)	0.27	0.38	0.52		
	Nickel (Ni)-Total (mg/kg wwt)	0.073	0.100	0.132		
	Phosphorus (P)-Total (mg/kg)	24600	27600	26700		
	Phosphorus (P)-Total (mg/kg wwt)	6570	7200	6770		
	Potassium (K)-Total (mg/kg)	9480	9440	11200		
	Potassium (K)-Total (mg/kg wwt)	2540	2460	2840		
	Rubidium (Rb)-Total (mg/kg)	12.3	13.9	14.3		
	Rubidium (Rb)-Total (mg/kg wwt)	3.29	3.63	3.62		
	Selenium (Se)-Total (mg/kg)	1.59	1.79	1.51		
	Selenium (Se)-Total (mg/kg wwt)	0.427	0.467	0.382		
	Sodium (Na)-Total (mg/kg)	3540	3890	4140		
	Sodium (Na)-Total (mg/kg wwt)	946	1010	1050		
	Strontium (Sr)-Total (mg/kg)	45.8	49.3	43.6		
	Strontium (Sr)-Total (mg/kg wwt)	12.3	12.9	11.1		
	Tellurium (Te)-Total (mg/kg)	<0.020	<0.020	<0.020		
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040		
	Thallium (Tl)-Total (mg/kg)	0.0128	0.0168	0.0146		
	Thallium (Tl)-Total (mg/kg wwt)	0.00343	0.00438	0.00370		
	Tin (Sn)-Total (mg/kg)	0.19	0.76	0.17		
	Tin (Sn)-Total (mg/kg wwt)	0.051	0.199	0.042		
	Uranium (U)-Total (mg/kg)	0.0229	0.0417	0.0357		
	Uranium (U)-Total (mg/kg wwt)	0.00612	0.0109	0.00905		
	Vanadium (V)-Total (mg/kg)	<0.10	<0.10	<0.10		
	Vanadium (V)-Total (mg/kg wwt)	<0.020	<0.020	<0.020		
	Zinc (Zn)-Total (mg/kg)	139	155	154		
	Zinc (Zn)-Total (mg/kg wwt)	37.1	40.5	39.1		
	Zirconium (Zr)-Total (mg/kg)	<0.20	<0.20	<0.20		
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040		

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Copper (Cu)-Total	DUP-H	L1677176-22, -49, -50, -51, -52, -53, -54, -55, -56, -57, -58, -59, -60, -61, -62, -63
Duplicate	Copper (Cu)-Total	DUP-H	L1677176-22, -49, -50, -51, -52, -53, -54, -55, -56, -57, -58, -59, -60, -61, -62, -63

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
HG-DRY-CVAFS-N-VA	Tissue	Mercury in Tissue by CVAFS (DRY)	EPA 200.3, EPA 245.7

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

HG-DRY-MICR-CVAF-VA Tissue Mercury in Tissue by CVAFS Micro (DRY) EPA 200.3, EPA 245.7

This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

HG-WET-CVAFS-N-VA Tissue Mercury in Tissue by CVAFS (WET) EPA 200.3, EPA 245.7

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

HG-WET-MICR-CVAF-VA Tissue Mercury in Tissue by CVAFS Micro (WET) EPA 200.3, EPA 245.7

This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry or atomic absorption spectrophotometry, adapted from US EPA Method 245.7.

MET-DRY-CCMS-N-VA Tissue Metals in Tissue by CRC ICPMS (DRY) EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-DRY-MICR-HRMS-VA Tissue Metals in Tissue by HR-ICPMS Micro (DRY) EPA 200.3/200.8

Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on dry weight basis.

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-WET-CCMS-N-VA Tissue Metals in Tissue by CRC ICPMS (WET) EPA 200.3/6020A

This method is conducted following British Columbia Lab Manual method "Metals in Animal Tissue and Vegetation (Biota) - Prescriptive". Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with addition of hydrogen peroxide. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals. Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MET-WET-MICR-HRMS-VA Tissue Metals in Tissue by HR-ICPMS Micro (WET) EPA 200.3/200.8

Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.

Method Limitation: This method employs a strong acid/peroxide digestion, and is intended to provide a conservative estimate of bio-available metals.

Reference Information

Near complete recoveries are achieved for most toxicologically important metals, but elements associated with recalcitrant minerals may be only partially recovered.

MOISTURE-TISS-VA	Tissue	% Moisture in Tissues	ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

** 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

Chain of Custody Numbers:

1	2	3	4	5
6	7			

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

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

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1677176-COFC

COC Number: 14 -

Report To
Company: C. Portt and Associates
Contact: Cam Portt
Address: 56 Waterloo Avenue, Guelph, ON N1H 3H5
Phone:

Report Format / Distribution
Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report
☐ Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: cportt@sentex.net
Email 2

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
R ☑ Regular (Standard TAT if received by 3 pm - business days)
P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Specify Date Required for E2,E or P:

Invoice To Same as Report To
Copy of Invoice with Report
Company:
Contact:

Invoice Distribution
Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax
Email 2

Project Information
ALS Quote #: Q52131
Job #: Amaruq 2015
PO / AFE:
LSD:

Oil and Gas Required Fields (client use)
Approver ID: | Cost Center:
GL Account: | Routing Code:
Activity Code:
Location:

ALS Lab Work Order # (lab use only): L1677176
ALS Contact:
Sampler: George Coker

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	Moisture	Mercury (Wet and Dry)	Number of Containers
	Whale Tail Lake Lake Trout #46	18-Aug-15		Tissue	R	R	1
	Whale Tail Lake Lake Trout #47	18-Aug-15		Tissue	R	R	1
	Whale Tail Lake Lake Trout #48	18-Aug-15		Tissue	R	R	1
	Whale Tail Lake Lake Trout #49	18-Aug-15		Tissue	R	R	1
	Whale Tail Lake Lake Trout #50	18-Aug-15		Tissue	R	R	1
	Whale Tail Lake Lake Trout #52	18-Aug-15		Tissue	R	R	1
	Whale Tail Lake Lake Trout #53	18-Aug-15		Tissue	R	R	1
	Whale Tail Lake Lake Trout #54A	18-Aug-15		Tissue	R	R	1
	Whale Tail Lake Lake Trout #54B	18-Aug-15		Tissue	R	R	1
	Whale Tail Lake Lake Trout #56	18-Aug-15		Tissue	R	R	1
	Whale Tail Lake Lake Trout #57	18-Aug-15		Tissue	R	R	1
	Whale Tail Lake Lake Trout #58	18-Aug-15		Tissue	R	R	1

Drinking Water (DW) Samples[1] (client use)
Are samples taken from a Regulated DW System?
Are samples for human drinking water use?

Special Instructions / Specify Criteria to add on report (client Use)
Please report wet and dry weight concentrations for Hg and metals.

2
Frozen ☑ SIF Observations Yes ☐ No ☐
Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐
INITIAL COOLER TEMPERATURES °C | FINAL COOLER TEMPERATURES °C: -2

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: C. Portt (signature)	Date: Sept. 22/15	Time:	Received by:	Date:	Time:	Received by: DJ	Date: Sep 23/15	Time: 8:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY

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.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1677176-COFC

COC Number: 14 -

Report To		Report Format / Distribution	
Company:	C. Portt and Associates	Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Contact:	Cam Portt	Quality Control (QC) Report with Report	
Address:	56 Waterloo Avenue Guelph, ON N1H 3H5	☐ Criteria on Report - provide details below if box checked	
		Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Phone:		Email 1 or Fax	cportt@sentex.net
		Email 2	

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To	Same as Report To	Invoice Distribution	
	Copy of Invoice with Report	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Company:		Email 1 or Fax	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q52131	Approver ID:	Cost Center:
Job #:	Amaruq 2015	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact:	Sampler: George Coker

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	Mercury (Wet and Dry)	Metals scan (Wet and Dry)	Moisture	Number of Containers
	Whale Tail Lake Lake Trout #59	18-Aug-15		Tissue	R		R	1
	Whale Tail Lake Lake Trout #60	18-Aug-15		Tissue	R		R	1
	Whale Tail Lake Lake Trout #61	18-Aug-15		Tissue	R	R	R	2
	Whale Tail Lake Lake Trout #62	18-Aug-15		Tissue	R	R	R	2
	Whale Tail Lake Lake Trout #63	18-Aug-15		Tissue	R	R	R	2
	Whale Tail Lake Lake Trout #64	18-Aug-15		Tissue	R	R	R	2
	Whale Tail Lake Lake Trout #65	18-Aug-15		Tissue	R	R	R	2
	Whale Tail Lake Lake Trout #66	18-Aug-15		Tissue	R	R	R	2
	Whale Tail Lake Lake Trout #68	18-Aug-15		Tissue	R	R	R	2
	Whale Tail Lake Lake Trout #69	18-Aug-15		Tissue	R	R	R	2
	Whale Tail Lake Lake Trout #70	19-Aug-15		Tissue	R	R	R	2

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

Are samples taken from a Regulated DW System?

Are samples for human drinking water use?

Special Instructions / Specify Criteria to add on report (client Use)

Fish 69 is a small, whole fish. I would like to have a dorsal skinless boneless fillet analysed for both Hg and metals from this fish if possible, but if insufficient tissue Hg is the priority. Otherwise there are two samples, each in a separate bag, from fish for which metals are requested. I would like to have 10 metal analyses from Whale Tail lake trout, so if there is one sample (or two if fish 69 is too small to do metals) that is large enough for both Hg and metals to be done, please do that. Please report wet and dry weight concentrations for Hg and metals.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☑ SIF Observations Yes ☐ No ☐
Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C

FINAL COOLER TEMPERATURES °C: -2°

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: C. Portt [signature]	Date: Sept. 22/15	Time:	Received by:	Date:	Time:	Received by: DJ	Date: Sep 23/15	Time: 8:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY

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.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1677176-COFC

COC Number: 14 -

Report To	
Company:	C. Portt and Associates
Contact:	Cam Portt
Address:	56 Waterloo Avenue Guelph, ON N1H 3H5
Phone:	

Report Format / Distribution
Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report
☐ Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: cportt@sentex.net
Email 2

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
R ☑ Regular (Standard TAT if received by 3 pm - business days)
P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Specify Date Required for E2,E or P:

Invoice To	Same as Report To
	Copy of Invoice with Report
Company:	
Contact:	

Invoice Distribution
Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax
Email 2

Project Information

ALS Quote #:	Q52131
Job #:	Amaruq 2015
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)
Approver ID: | Cost Center:
GL Account: | Routing Code:
Activity Code:
Location:

ALS Lab Work Order # (lab use only):
ALS Contact:
Sampler: George Coker

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	Mercury (Wet and Dry)	Metals scan (Wet and Dry)	Moisture	Number of Containers
	Mammoth Lake Lake Trout #97	25-Aug-15		Tissue	R	R	R	2
	Mammoth Lake Lake Trout #98	25-Aug-15		Tissue	R	R	R	2
	Mammoth Lake Lake Trout #99	25-Aug-15		Tissue	R	R	R	2
	Mammoth Lake Lake Trout #100	26-Aug-15		Tissue	R	R	R	2
	Mammoth Lake Lake Trout #101	26-Aug-15		Tissue	R	R	R	2
	Mammoth Lake Lake Trout #102	26-Aug-15		Tissue	R	R	R	2
	Mammoth Lake Lake Trout #103	26-Aug-15		Tissue	R	R	R	2
	Mammoth Lake Lake Trout #105	26-Aug-15		Tissue	R	R	R	2
	Mammoth Lake Lake Trout #106	26-Aug-15		Tissue	R	R	R	2
	Mammoth Lake Lake Trout #108	26-Aug-15		Tissue	R	R	R	2
	Mammoth Lake Lake Trout #110	26-Aug-15		Tissue	R		R	1
	Mammoth Lake Lake Trout #111	26-Aug-15		Tissue	R		R	1

Drinking Water (DW) Samples[1] (client use)
Are samples taken from a Regulated DW System?
Are samples for human drinking water use?

Special Instructions / Specify Criteria to add on report (client Use)
There are two samples, each in a separate bag, from fish for which metals are requested. Please report wet and dry weight concentrations for Hg and metals.

SAMPLE CONDITION AS RECEIVED (lab use only)
Frozen ☐ SIF Observations Yes ☐ No ☐
Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐
INITIAL COOLER TEMPERATURES °C | FINAL COOLER TEMPERATURES °C
-2

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: C. Portt	Date: Sept. 22/15	Time:	Received by:	Date:	Time:	Received by: DJ	Date: Sep 23/15	Time: 8:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION   WHITE - LABORATORY COPY   YELLOW - CLIENT COPY

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.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1677176-COFC

COC Number: 14 -

Report To	
Company:	C. Portt and Associates
Contact:	Cam Portt
Address:	56 Waterloo Avenue, Guelph, ON N1H 3H5
Phone:	
Invoice To	Same as Report To
	Copy of Invoice with Report
Company:	
Contact:	
Project Information	
ALS Quote #:	Q52131
Job #:	Amaruq 2015
PO / AFE:	
LSD:	
ALS Lab Work Order # (lab use only)	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report

☐ Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: cportt@sentex.net

Email 2

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax

Email 2

Oil and Gas Required Fields (client use)

Approver ID: | Cost Center:

GL Account: | Routing Code:

Activity Code:

Location:

ALS Contact: | Sampler: George Coker

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

R ☑ Regular (Standard TAT if received by 3 pm - business days)

P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT

E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT

E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

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	Mercury (Wet and Dry)	Moisture	Number of Containers
	Mammoth Lake Lake Trout #112	26-Aug-15		Tissue	R	R	1
	Mammoth Lake Lake Trout #114	26-Aug-15		Tissue	R	R	1
	Mammoth Lake Lake Trout #115	26-Aug-15		Tissue	R	R	1
	Mammoth Lake Lake Trout #116	26-Aug-15		Tissue	R	R	1
	Mammoth Lake Lake Trout #117	26-Aug-15		Tissue	R	R	1
	Mammoth Lake Lake Trout #118	26-Aug-15		Tissue	R	R	1
	Mammoth Lake Lake Trout #119	26-Aug-15		Tissue	R	R	1
	Mammoth Lake Lake Trout #120	26-Aug-15		Tissue	R	R	1
	Mammoth Lake Lake Trout #121	26-Aug-15		Tissue	R	R	1
	Mammoth Lake Lake Trout #122	26-Aug-15		Tissue	R	R	1
	Mammoth Lake Lake Trout #123	26-Aug-15		Tissue	R	R	1
	Mammoth Lake Lake Trout #124	26-Aug-15		Tissue	R	R	1

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

Are samples taken from a Regulated DW System?

Are samples for human drinking water use?

Special Instructions / Specify Criteria to add on report (client Use)

Please report wet and dry weight concentrations for Hg and metals.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☑ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C | FINAL COOLER TEMPERATURES °C: -2

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: C. Portt	Date: Sept. 22/15	Time:	Received by:	Date:	Time:	Received by: DJ	Date: Sep 23	Time: 8:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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.

NA-FM-0326e v08 Front/04 January 2014

ALS Environmental
www.alsglobal.com

# of Custody (COC) / Analy Request Form

inada Toll Free: 1 800 668 9878

L1677176-COFC

COC Number: 14 -

Report To	
Company:	C. Portt and Associates
Contact:	Cam Portt
Address:	56 Waterloo Avenue, Guelph, ON N1H 3H5
Phone:	

Report	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	
☐ Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	cportt@sentex.net
Email 2	

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To	Same as Report To
	Copy of Invoice with Report
Company:	
Contact:	

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	
Email 2	

Project Information	
ALS Quote #:	Q52131
Job #:	Amaruq 2015
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
Approver ID:	Cost Center:
GL Account:	Routing Code:
Activity Code:	
Location:	

ALS Lab Work Order # (lab use only)		ALS Contact:		Sampler:	George Coker

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	Mercury (Wet and Dry)	Moisture	Number of Containers
	Mammoth Lake Lake Trout #126	26-Aug-15		Tissue	R	R	1

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? Are samples for human drinking water use?	Please report wet and dry weight concentrations for Hg and metals.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
	-2

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: C. Portt	Date: Sept. 22/15	Time:	Received by:	Date:	Time:	Received by: DJ	Date: Sep 23/15	Time: 8:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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.

ALS Environmental

www.alsglobal.com

of Custody (COC) / Analytica Request Form

anada Toll Free: 1 800 668 9878

L1677176-COFC

COC Number: 14 -

Report To	
Company:	C. Portt and Associates
Contact:	Cam Portt
Address:	56 Waterloo Avenue, Guelph, ON N1H 3H5
Phone:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report

☐ Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: cportt@sentex.net

Email 2

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To	Same as Report To
	Copy of Invoice with Report
Company:	
Contact:	

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax

Email 2

Project Information

ALS Quote #:	Q52131
Job #:	Amaruq 2015
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

Approver ID:	Cost Center:
GL Account:	Routing Code:
Activity Code:	
Location:	

ALS Lab Work Order # (lab use only)

ALS Contact:

Sampler: George Coker

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	Mercury (Wet and Dry)	Metals scan (Wet and Dry)	Moisture	Number of Containers
	Whale Tail Lake Small Fish composite #1	26-Jul-15		Tissue	R	R	R	1
	Whale Tail Lake Small Fish composite #2	26-Jul-15		Tissue	R	R	R	1
	Whale Tail Lake Small Fish composite #3	26-Jul-15		Tissue	R	R	R	1
	Whale Tail Lake Small Fish composite #4	26-Jul-15		Tissue	R	R	R	1
	Whale Tail Lake Small Fish composite #5	26-Jul-15		Tissue	R	R	R	1
	Whale Tail Lake Small Fish composite #6	26-Jul-15		Tissue	R	R	R	1
	Whale Tail Lake Small Fish composite #7	26-Jul-15		Tissue	R	R	R	1
	Mammoth Lake Small Fish composite #8	30-Jul-15		Tissue	R	R	R	1
	Mammoth Lake Small Fish composite #9	29-Jul-15		Tissue	R	R	R	1
	Mammoth Lake Small Fish composite #10	29-Jul-15		Tissue	R	R	R	1
	Mammoth Lake Small Fish composite #11	29-Jul-15		Tissue	R	R	R	1
	Mammoth Lake Small Fish composite #12	29-Jul-15		Tissue	R	R	R	1

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

Are samples taken from a Regulated DW System?

Are samples for human drinking water use?

Special Instructions / Specify Criteria to add on report (client Use)

Please report wet and dry weight concentrations for Hg and metals.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☑ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C

FINAL COOLER TEMPERATURES °C: -2°

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: C. Portt	Date: Sept. 22/15	Time:	Received by:	Date:	Time:	Received by: DJ	Date: Sep 23/15	Time: 8:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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.

ALS Environmental

www.alsglobal.com

stody (COC) / Analytical
ìequest Form

Toll Free: 1 800 668 9878

L1677176-COFC

OC Number: 14 -

Report To		Report Format / Distribution	
Company:	C. Portt and Associates	Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Contact:	Cam Portt	Quality Control (QC) Report with Report	
Address:	56 Waterloo Avenue, Guelph, ON N1H 3H5	☐ Criteria on Report - provide details below if box checked	
		Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Phone:		Email 1 or Fax	cportt@sentex.net
		Email 2	

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To	Same as Report To	Invoice Distribution	
	Copy of Invoice with Report	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Company:		Email 1 or Fax	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q52131	Approver ID:	Cost Center:
Job #:	Amaruq 2015	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact:	Sampler: George Coker

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	Mercury (Wet and Dry)	Metals scan (Wet and Dry)	Moisture	Number of Containers
	Mammoth Lake Small Fish composite #12	29-Jul-15		Tissue	R	R	R	1
	Mammoth Lake Small Fish composite #13	29-Jul-15		Tissue	R	R	R	1
	Mammoth Lake Small Fish composite #14	29-Jul-15		Tissue	R	R	R	1
	Mammoth Lake Small Fish composite #15	29-Jul-15		Tissue	R	R	R	1

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System?	Please report wet and dry weight concentrations for Hg and metals.
Are samples for human drinking water use?	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☑ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C | FINAL COOLER TEMPERATURES °C

-2°

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: C. Portt	Date: Sept. 22/15	Time:	Received by:	Date:	Time:	Received by: DJ	Date: Sep 23/15	Time: 8:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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

WHALE TAIL EXPANSION PROJECT 2018 FISH AND FISH HABITAT FIELD INVESTIGATIONS: AGNICO EAGLE MINES LTD. - MEADOWBANK DIVISION

Submitted to:

Agnico Eagle Mines Ltd: Meadowbank Division
Regional Office - 93, Rue Arseneault, suite 202,
Val-d'Or, Québec, J9P 0E9

March 10, 2019

C. PORTT and ASSOCIATES
56 Waterloo Avenue
Guelph, Ontario, N1H 3H5
cportt@sentex.net

EXECUTIVE SUMMARY

Agnico Eagle Mines Limited: Meadowbank Division is proposing to expand operations at their Whale Tail Pit, a satellite deposit on the Amaruq property, in continuation of mine operations and milling of the Meadowbank Mine. Baseline fisheries investigations in the Whale Tail Pit study area were conducted in 2014, 2015, and 2016. The 2018 field investigations focussed on additional fish sampling in the smaller lakes and ponds and small connecting watercourses north and east of Whale Tail Lake in the area that will be affected by the proposed project expansion. Fish sampling was also conducted in two lakes that were being considered as alternative locations to discharge treated effluent, one potential future reference lake, and two lakes where it was thought that future offsetting opportunities might be present. Quarries along the Amaruq Road were also examined to determine if future offsetting opportunities were present.

Previous field investigations had found a total of six fish species in the primary study area, comprised of four large-bodied species (Lake Trout, Arctic Char, Round Whitefish and Burbot) and two small-bodied species (Slimy Sculpin and Ninespine Stickleback). No additional species were captured during the 2018 field investigations.

Small-mesh fyke nets set in two small streams in late June captured Ninespine Stickleback and low numbers of Arctic Char moving upstream. Slimy Sculpin were also captured in one of the streams. Small-mesh fyke nets set in Lake A53 captured Ninespine Stickleback, Slimy Sculpin, and Arctic Char. Standard minnow traps set in Lake A53 from June 29 to July 1 and from August 4 to August 5 caught only Ninespine Stickleback. A total of 22 small lakes and ponds were electrofished. Ninespine Stickleback, the most widely distributed species, was captured in eight waterbodies. Slimy Sculpin was captured in three waterbodies and juvenile Burbot was captured in one. No fish were captured in 13 of the 22 waterbodies. Those waterbodies where no fish were captured are all shallow, with either no surface connection or only diffuse flow connecting them to larger lakes.

The entire length of watercourse A0-A48 was electrofished on August 4, 2018; 15 Ninespine Stickleback were captured.

Arctic Char was the only species captured by gill netting in Lake A47. Only one fish, a Lake Trout, was captured by two overnight gill net sets in Lake A49. Lake Trout and Arctic Char were captured by gill netting in Lake A53. Lake 1, Lake 5 and Lake 8 had not been sampled previously. Lake Trout and Round Whitefish were captured in gill nets in Lake 1. Lake Trout and Arctic Char were captured in gill nets in Lake 5 and Lake 8. Slimy Sculpin and juvenile Arctic Char were captured by electrofishing in each of the three lakes. Juvenile Lake Trout, juvenile Burbot, and Ninespine Stickleback were captured by electrofishing in Lake 8, Lake 1, and Lake 5, respectively.

No potential offsetting opportunities were identified at quarries along the Amaruq Road based on current conditions Two lakes, referred to as Lake Esker 5A and Lake Esker 6A, were thought to be potential offsetting opportunities if they did not support salmonids. Sampling revealed that both Lake Trout and Arctic Char were present in Lake Esker 5A and Arctic Char and Burbot were captured in Lake Esker 6A.

Table of Contents

List of Tables

List of Figures

1.0 INTRODUCTION

Agnico Eagle Mines Limited: Meadowbank Division (Agnico Eagle) is proposing to expand the Whale Tail Pit Project. Whale Tail Pit is a satellite deposit, on the Amaruq property, in continuation of mine operations and milling of the Meadowbank Mine.

Agnico Eagle is constructing and preparing to mine a satellite mineral property (the Amaruq property) located approximately 50 km northwest of the Meadowbank Mine and 150 km north of Baker Lake (Figure 1-1). The first phase of the development of the Amaruq property is the Whale Tail Pit Project, approved in 2018.[1] Construction of the Whale Tail Pit Project began in 2018, and mining is scheduled to begin in 2019. The Whale Tail Pit Project also has an approved *Fisheries Act* Authorization under Paragraph 35(2)(b) for the Whale Tail Pit Project for the loss of 74.33 ha of fish habitat (PATH No.:16-HCAA-00370; July 2018), and associated offsetting as outlined in the approved Whale Tail Pit Fish Habitat Offsetting Plan (C. Portt and Associates, and Agnico Eagle Mines Ltd., 2018).

The proposed expansion project includes expansion of approved facilities and additional operations (IVR Pit and underground mining), while operations and milling continue at the Meadowbank Mine. As an amendment to the approved operations at the Whale Tail site, the Whale Tail Project Expansion is subject to an environmental review established by Article 12, Part 5 of the *Nunavut Land Claims Agreement* (NLCA).

Baseline data were collected from 2014 through 2016 in support of the Environmental Review for the Whale Tail Pit Project, to document existing conditions and to provide the foundation for a qualitative and quantitative assessment of project operations and the extension of the mine development, to be evaluated in the Environmental Impact Statement (EIS) for the Project. The scope of those field investigations included fish and fish habitat in waterbodies and watercourses north and east of Whale Tail Lake that will be directly affected by the Whale Tail Project Expansion and the results were reported in C. Portt and Associates (2018). Additional field investigations were undertaken during the period June 26 – August 28, 2018, by C. Portt and Associates in support of the Whale Tail Pit Project Expansion. The field investigations focussed on additional fish sampling in the smaller lakes and ponds and small connecting watercourses north and east of Whale Tail Lake in the area that will be affected by the proposed project expansion. Fish sampling was also conducted in two lakes that were being considered as alternative locations to discharge treated effluent, one potential reference lake, and two lakes where it was thought that offsetting opportunities might be present.

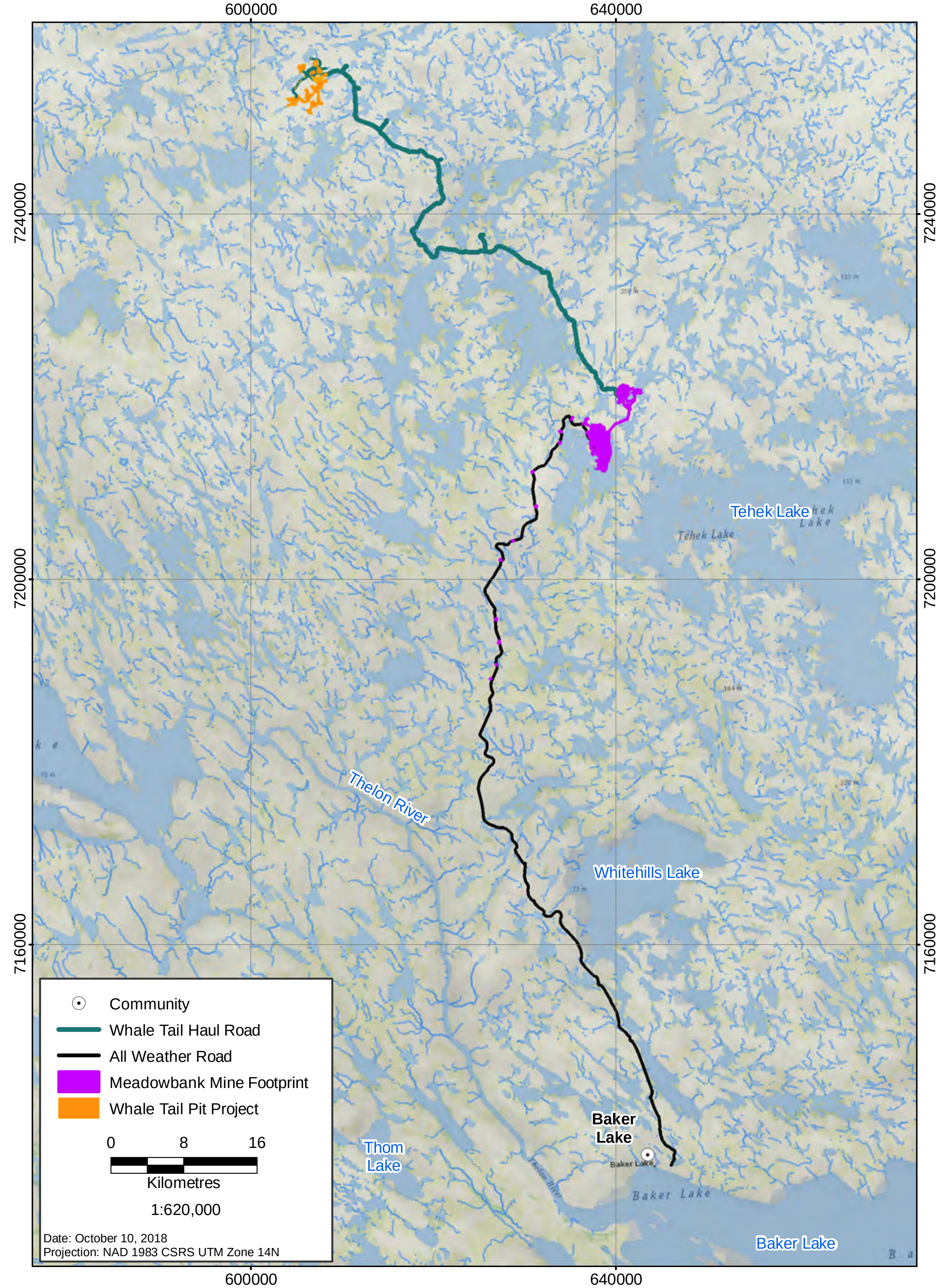
[1] Positive decision received from NIRB on November 6, 2017. Ministerial Decision received on February 15, 2018, Project Certificate 008. Nunavut Water Board Type A Licence received July 16, 2018 (2AM WTP 1826).

The primary activities conducted were:

- deployment of fyke nets in two small watercourses at the beginning of the field season to detect spring upstream fish migrations if they occurred,
- fish sampling in three small lakes that will be affected by the proposed project expansion using gill nets, shoreline electrofishing and, in one of the lakes, minnow traps, to characterize the fish community,
- electrofishing in small lakes and ponds that would potentially be affected by the proposed project expansion,
- gill netting and shoreline electrofishing to determine species presence:absence in two lakes that were being considered as locations to discharge treated effluent,
- gill netting and shoreline electrofishing to determine species presence:absence in a potential reference lake,
- water temperature monitoring in two small watercourses and one small lake that would be affected by the proposed project expansion,
- investigations of possible future offsetting project locations, including gill netting to determine salmonid species presence:absence in two lakes.

This report documents the methods and results of these investigations.

Figure 1-1
Location of Meadowbank Gold Mine and Whale Tail Pit Project



1.1 Scope

This report presents the baseline investigations of fish and fish habitat conducted by C. Portt and Associates in the Whale Tail Pit study area in 2018.

1.2 Objectives

- Confirm fish presence:absence and, where fish are present, the species present in lakes and ponds that would be impacted by the Whale Tail Pit Expansion Project.
- Examine upstream fish movement in two watercourses that connect small lakes and ponds to Whale Tail Lake.
- Assess fish species presence:absence in two lakes where discharge of treated effluent was being considered.
- Assess fish species presence:absence in a potential future reference lake.
- Investigate possible future offsetting opportunities.

1.3 Physical Setting

The study area is located on the Canadian Shield within a Low Arctic ecoclimate of continuous permafrost, and is one of the coldest and driest regions of Canada (Azimuth, 2010). The lakes within the Whale Tail pit study area are ultra-oligotrophic/oligotrophic (nutrient poor, unproductive) headwater lakes that are typical of the Arctic. The ice-free season on the lakes is very short. Ice break-up usually begins during mid- to late-June, with the lakes becoming ice-free in early July. Ice begins to form again on the lakes in late September or early October. Complete ice cover is attained by late October, with maximum ice thickness of about 2 m occurring in March/April (Azimuth, 2013). Many small watercourses become dry once the land begins to freeze in the fall and, where water is present, most freeze to the bottom during the winter (BAER, 2005; Jones *et al*, 2010). Flows during the spring melt and the summer vary with drainage area.

The primary Whale Tail Pit study area is situated in the headwaters of a small river that flows northwest for approximately 13 km to a lake that is on a tributary of the Meadowbank River, which in turn is a tributary of the Back River that flows to tidewater at the Chantrey Inlet and the Arctic Ocean.

2.0 FYKE NETS IN STREAMS DURING FRESHET

2.1 Methods

A fyke net was deployed with the opening facing downstream in watercourse A53-A17 (Location FN-2, Figure 2-1) on June 26, 2018, and in watercourse A46-A17 on June 27, 2018 (Location FN-1, Figure 2-1). The wings of each trap were deployed so that the entire width of each watercourse was blocked. Two fyke nets were deployed side by side, facing in opposite directions, in Lake A53 on June 29 (Locations FN-3 and FN-4, Figure 2-1).

The two-chamber fyke nets are constructed of 0.4 mm (1/8 inch) black, delta mesh, with a 0.76 m square metal frame at the front followed by four 0.76 m diameter metal hoops. Their total length from the front frame to the back of the net is 4.9 m and they have 0.76 m high by 7.6 m long wings of the same mesh. The first (front) and second throats are 10.2 cm in diameter 6.4 cm in diameter, respectively.

The nets were checked daily until their removal on July 1, 2018. Captured fish were removed, identified to species, and most were measured to the nearest millimetre using a standard fish measuring board. Slimy Sculpin and juvenile *Salvelinus* were weighed to the nearest 0.1 g. using an Ohaus CS200 electronic balance. Juvenile *Salvelinus* were photographed and their identification was subsequently confirmed using the photographs. After processing the fish were released upstream of the net.

2.2 Results

The fyke net effort and catches are provided in Table 2-1. The coordinates of the net locations and set and lift dates and times are provided in Appendix A (Table A-1). Length and weights are provided in Appendix A (Table A-6). Ninespine Stickleback were the most abundant species in the catches; the number caught per day in the streams varied widely. Arctic Char were captured in each of the streams and one was also captured in Lake A53. Their fork lengths ranged from 110 to 220 mm. Slimy Sculpin were captured in Lake A53 and in watercourse A53-A17.

Table 2-1. Fyke net set and lift dates, soak times and catches. Net locations are shown in Figure 2-1.

Net Location	Date Set	Date Lifted	Soak Time (hrs)	Slimy Sculpin	Ninespine Stickleback	Arctic Char
A46-A17 (FN-1)	6/27/18	6/28/18	21.6	0	0	0
	6/28/18	6/29/18	24.2	0	22	4
	6/29/18	6/30/18	25.3	0	2	0
	6/30/18	7/1/18	22.3	0	134	0
Total			93.4	0	158	4
A53-A17 (FN-2)	6/26/18	6/27/18	16.8	0	3	1
	6/27/18	6/28/18	23.9	0	0	0
	6/28/18	6/29/18	25.5	3	2	0
	6/29/18	6/30/18	24.2	1	0	1
	6/30/18	7/1/18	22.9	1	35	3
Total			113.3	5	40	5
A53 (FN-3)	6/29/18	6/30/18	25.0	0	37	0
	6/30/18	7/1/18	26.0	0	17	0
A53 (FN-4)	6/29/18	6/30/18	25.0	0	31	1
	6/30/18	7/1/18	26.2	2	13	0
Total			102.2	2	98	1

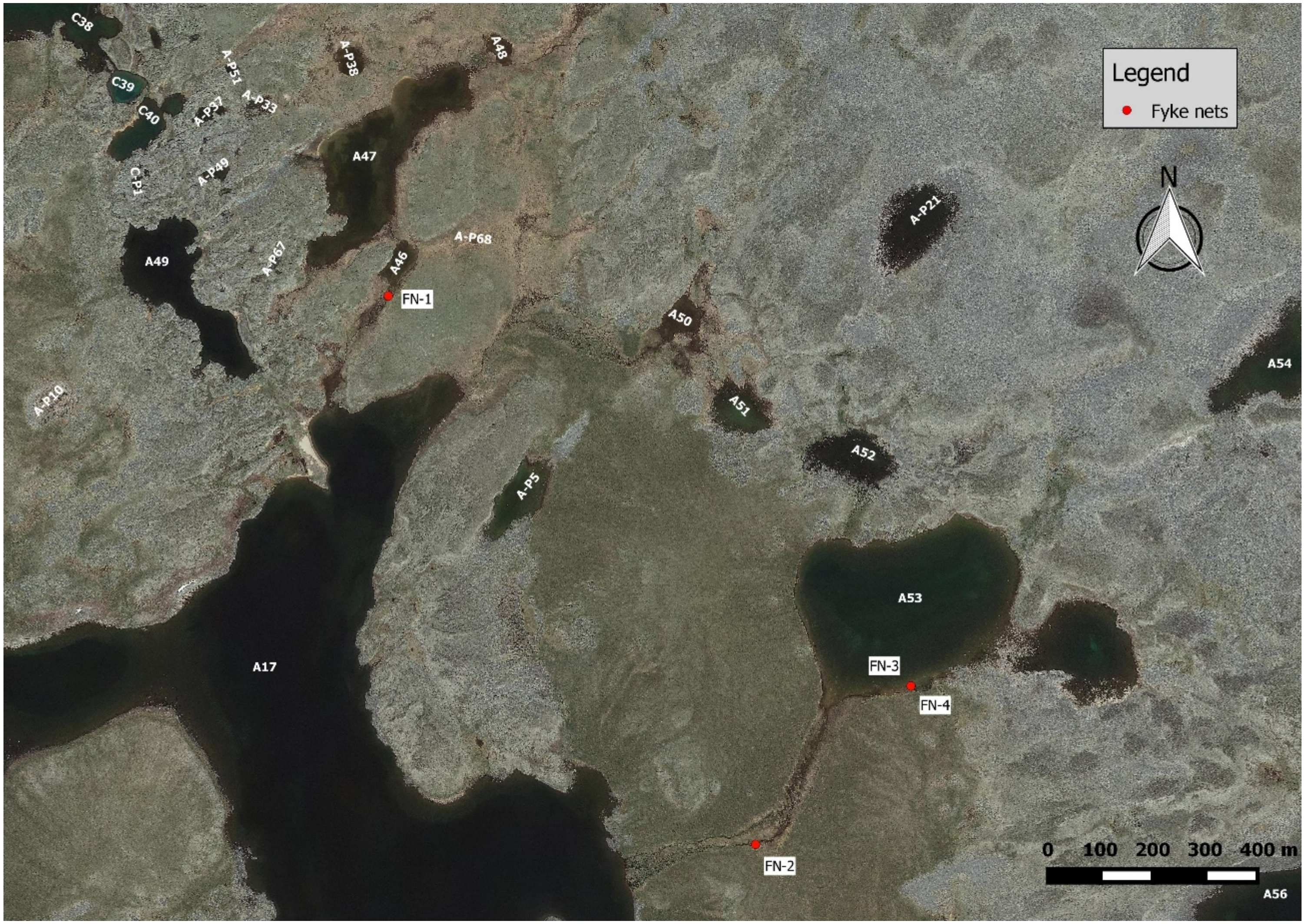


Figure 2-1. Fyke net locations.

3.0 MINNOW TRAPS IN LAKE A53

3.1 Methods

Standard (Gee) minnow traps baited with two pellets of artificial bait (Atlas and Mike's Glo Mallows – Cerise/Shrimp) were deployed at 8 locations in Lake A53 (Figure 3-1) on June 29, 2018. Where each trap was deployed, the depth was measured to the nearest centimetre with a ruler, the substrate was described, and the coordinates were determined using a Garmin GPSmap 76CSx handheld GPS. The traps were lifted, rebaited and redeployed on June 30 and removed on July 1. The time of sets and lifts were recorded. The traps were redeployed, following the same procedures at approximately the same locations, with some slight adjustments due to changes in water depth, on August 4, 2018. The traps were lifted and redeployed during the morning of August 5 and then checked and removed during the late afternoon. Captured fish were identified to species, counted and released near their capture location.

3.2 Results

The minnow trap catch data are summarized in Table 3-1 and the set locations are shown in Figure 3-1. Set coordinates, set and lift times, depth and substrate are provided in Appendix A (Table A-2). Only Ninespine Stickleback were captured. Catches were higher in the June 29 - July 1 sets, which had a mean CPUE of 1.2 fish per trap per hour soak time, than in the August 4 – 5 sets which had a mean CPUE of 0.2 fish per trap per hour of soak time.

Table 3-1. Minnow trap locations, set and lift dates, soak time and catches. The trap locations are shown in Figure 3-1.

Location	Date Set	Date Lifted	Soak Time (hrs)	Ninespine Stickleback
SMT26	June 29, 2018	June 30, 2018	27.5	25
SMT27	June 29, 2018	June 30, 2018	27.5	3
SMT28	June 29, 2018	June 30, 2018	27.5	43
SMT29	June 29, 2018	June 30, 2018	27.3	29
SMT30	June 29, 2018	June 30, 2018	27.2	22
SMT31	June 29, 2018	June 30, 2018	27.2	43
SMT32	June 29, 2018	June 30, 2018	27.1	83
SMT33	June 29, 2018	June 30, 2018	27.1	2
SMT26	June 30, 2018	July 1, 2018	21.5	63
SMT27	June 30, 2018	July 1, 2018	21.3	4
SMT28	June 30, 2018	July 1, 2018	21.2	48
SMT29	June 30, 2018	July 1, 2018	21.0	17
SMT30	June 30, 2018	July 1, 2018	20.8	10
SMT31	June 30, 2018	July 1, 2018	20.6	33
SMT32	June 30, 2018	July 1, 2018	20.4	37
SMT33	June 30, 2018	July 1, 2018	20.3	3
SMT26	August 4, 2018	August 5, 2018	14.4	0
	August 5, 2018	August 5, 2018	6.2	3
SMT27	August 4, 2018	August 5, 2018	14.4	0
	August 5, 2018	August 5, 2018	6.2	0
SMT28	August 4, 2018	August 5, 2018	14.5	12
	August 5, 2018	August 5, 2018	6.1	5
SMT29	August 4, 2018	August 5, 2018	14.4	0
	August 5, 2018	August 5, 2018	6.1	1
SMT30	August 4, 2018	August 5, 2018	14.4	0
	August 5, 2018	August 5, 2018	6.1	0
SMT31	August 4, 2018	August 5, 2018	14.3	0
	August 5, 2018	August 5, 2018	6.1	0
SMT32	August 4, 2018	August 5, 2018	14.3	0
	August 5, 2018	August 5, 2018	6.1	0
SMT33	August 4, 2018	August 5, 2018	14.2	1
	August 5, 2018	August 5, 2018	6.1	1
Total			**549.4**	**488**

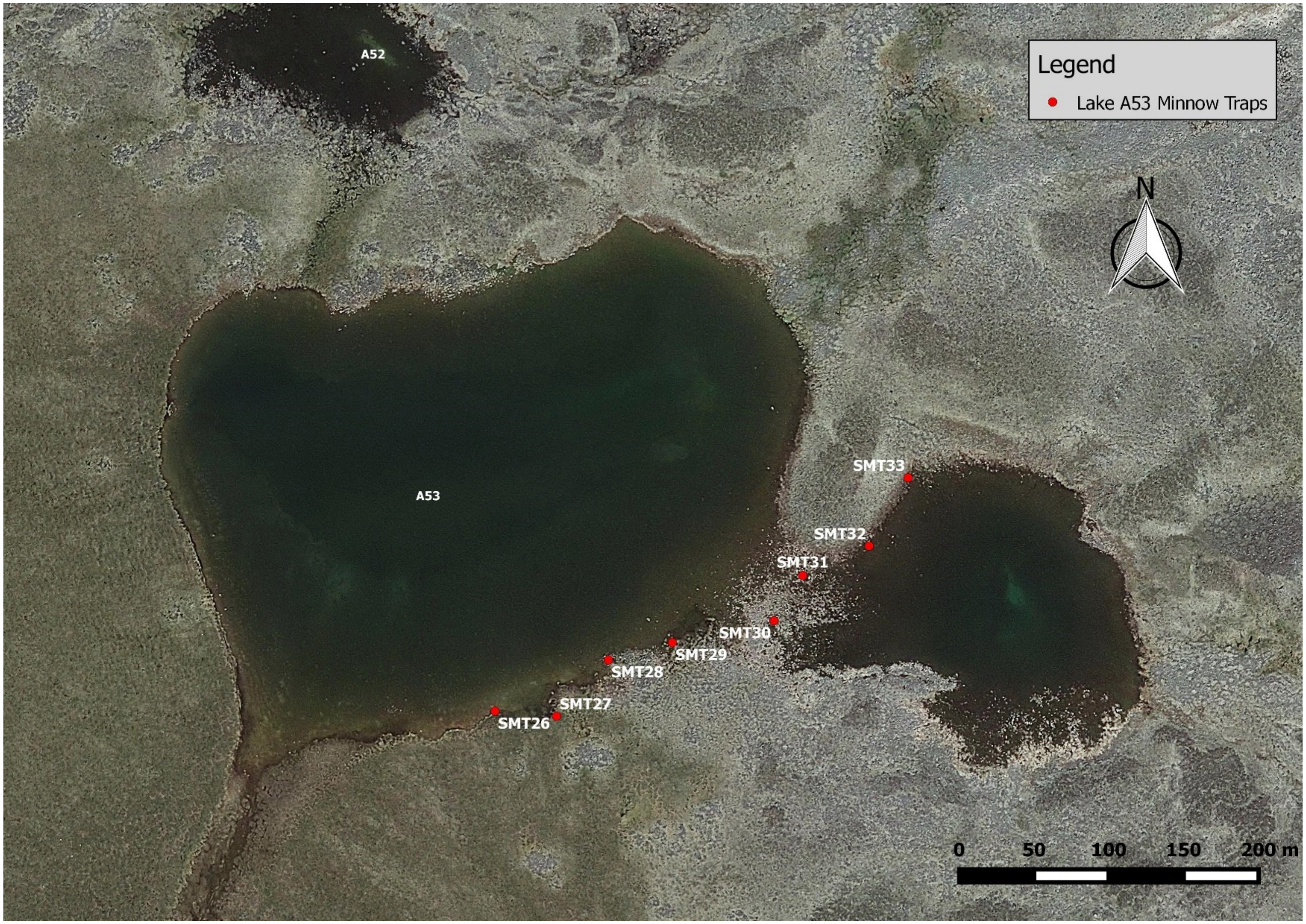


Figure 3-1. Locations of minnow traps set in Lake A53.

4.0 ELECTROFISHING OF SMALL LAKES AND PONDS

4.1 Methods

Electrofishing was conducted in 22 small lakes and ponds north and east of Whale Tail Lake. A section of shoreline or, in the case of small ponds, the entire perimeter, was electrofished with a Halltech Model 200T backpack electrofisher, set at 60 hertz with the voltage adjusted to generate a mean current of approximately 3.5 amperes. A minimum effort of 1000 electroseconds was expended if no fish were captured, except for very small ponds where adequate coverage was achieved with less effort. The number of individuals captured of each species were recorded, as were the coordinates at each end of the electrofished shoreline, determined using a Garmin GPSmap 76CSx handheld GPS. The distance electrofished was determined using GIS from the waypoints and recorded tracks.

4.2 Results

The electrofishing catch and effort data are provided in Table 4-1 and the locations are shown in Figure 4-1. The coordinates at the beginning and end of the electrofished reaches are provided in Appendix A (Table A-3). Ninespine Stickleback were the most widely distributed species and were captured in 8 waterbodies. Slimy Sculpin were captured in three waterbodies and juvenile Burbot were captured in one. No fish were captured in 13 of the 22 waterbodies. Those waterbodies are all shallow and with either no surface connection or only diffuse flow during spring freshet connecting them to larger lakes.

Table 4-1. Electrofishing locations, dates, effort and catches in small lakes and ponds. The locations are shown in Figure 4-1.

Waterbody	Location	Date	e-seconds	Distance (m)	Ninespine Stickleback	Slimy Sculpin	Juvenile Burbot
A0	**EF-L76**	August 4, 2018	1000+	198	25	0	0
A113	**EF-L77**	August 4, 2018	1066	103	38	0	0
A46	**EF-L71**	August 3, 2018	1000+	120	7	1	0
A47	**EF-L72**	August 3, 2018	616	41	10	0	0
A48	**EF-L78**	August 4, 2018	1071	168	3	0	0
A49	**EF-L82**	August 23, 2018	819	137	0	8	0
	EF-L83	August 23, 2018	288	21	0	6	0
A50	**EF-L73**	August 3, 2018	1013	163	0	0	0
A51	**EF-L74**	August 3, 2018	1023	176	0	0	0
A52	**EF-L75**	August 3, 2018	1062	96	0	0	0
A53	**EF-L79**	August 4, 2018	1000+	189	7	4	3
A54	**EF-L84**	August 23, 2018	1018	143	0	0	0
A-P18	**EF-L85**	August 23, 2018	479	120	0	0	0
AP21	**EF-L80**	August 4, 2018	1004	113	0	0	0
A-P33	**EF-L86**	August 23, 2018	325	85	0	0	0
A-P37	**EF-L87**	August 23, 2018	556	94	0	0	0
A-P38	**EF-L81**	August 4, 2018	935	174	4	0	0
A-P49	**EF-L88**	August 23, 2018	419	109	0	0	0
C39	**EF-L90**	August 24, 2018	511	156	0	0	0
C40	**EF-L91**	August 24, 2018	415	93	0	0	0
C41	**EF-L92**	August 24, 2018	503	113	7	0	0
CP1	**EF-L89**	August 23, 2018	287	96	0	0	0
A49-A47[1]	**EF-S89**	August 23, 2018	216	22	0	0	0

1. This is a small isolated pond that was coded as a watercourse prior to field investigations being conducted. There is no watercourse present. The coding has been retained to avoid confusion.

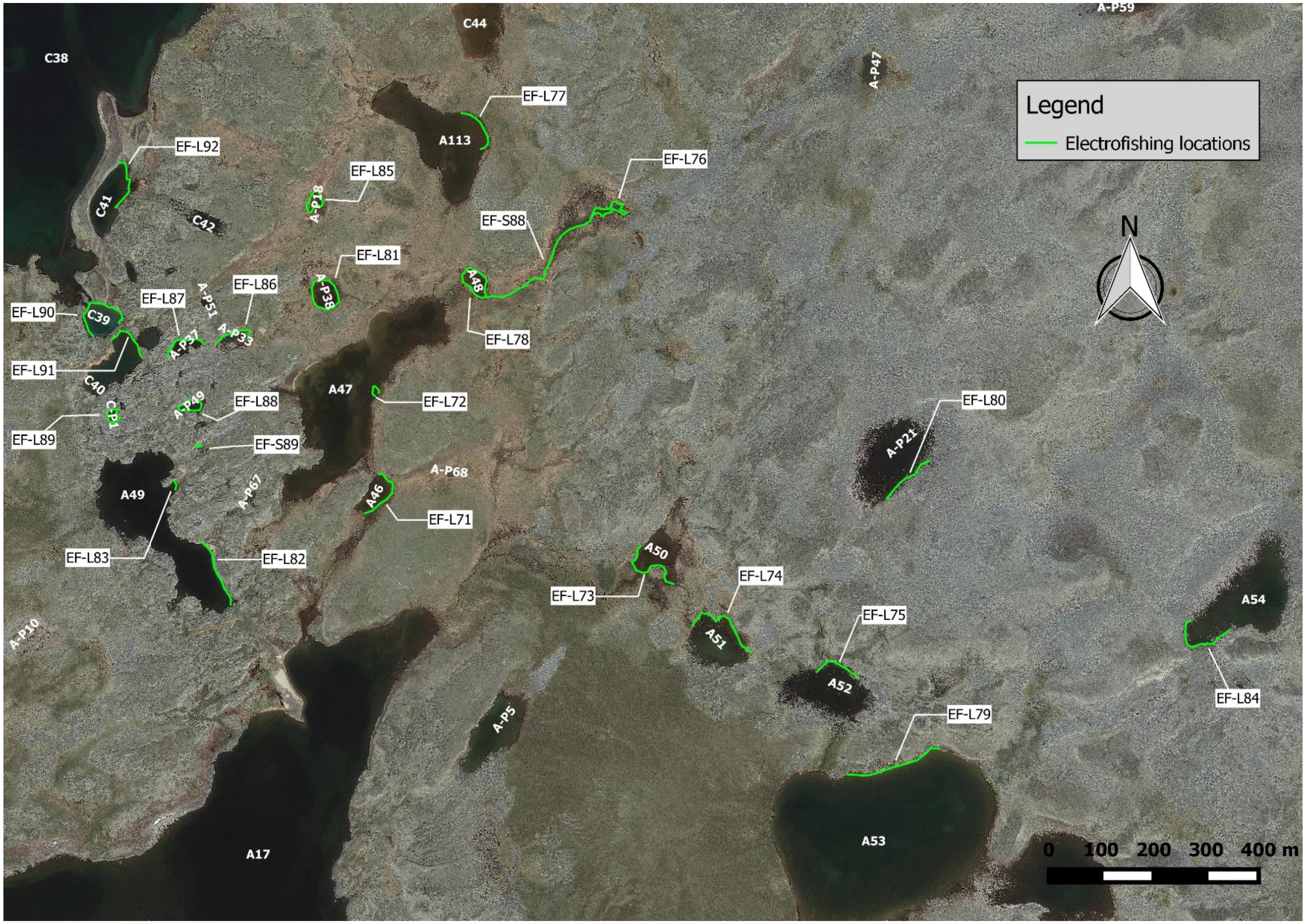


Figure 4-1. Locations electrofished in small lakes and ponds north and east of Whale Tail Lake.

5.0 ELECTROFISHING STREAM A0-A48

5.1 Methods

The entire length of watercourse A0-A48 was electrofished on August 4, 2018. Electrofishing progressed upstream with one member of the two-person crew operating the Halltech Model 200T backpack electrofisher, set at 650 volts and 60 hertz, and the second person netting the immobilized fish. The captured fish were identified to species and released as they were captured. The coordinates of the locations where the electrofishing started and ended were determined using a Garmin GPSmap 76CSx GPS, and the length of watercourse sampled was determined from these coordinates superimposed on a photo-mosaic of the study area using GIS.

5.2 Results

The 280 m long electrofished reach, EF-S88, is shown in Figure 4-1. The total catch was 15 Ninespine Stickleback. The coordinates at the beginning and end of the electrofished reach are provided in Appendix A (Table A-3).

6.0 GILL NETTING IN LAKES A47, A49 AND A53

6.1 Methods

Three types of gill nets were used. Small-mesh Ontario broad-scale monitoring nets consist of 2.5 meter long by 1.8 metre deep panels of 13 mm, 19 mm, 25 mm, 32 mm, and 38 mm stretched mesh joined in a single 12.5 metre long gang. These nets were set as a single gang. North American Standard (NA1) gill nets consist of 3.1 meter long by 1.8 metre deep panels of 38 mm, 51 mm, 64 mm, 76 mm, 89 mm, 102 mm, 114 mm and 127 mm stretched mesh joined in a single 24.8 metre long gang. These nets were set as straps of two gangs joined together as a 49.6 metre long gang. Standard Agnico index gill nets are comprised of six 1.8 m deep by 22.7 m long panels of 25 mm, 38 mm, 51 mm, 76 mm, 102 mm and 126, mm stretched mesh joined to form a six-panel gang that is 136.2 m long.

Both short-duration daytime sets and overnight sets were conducted. The date and time of deployments and lifts were recorded as were the coordinates of each end of each net, determined using a Garmin GPSmap 76CSx GPS, and the depth at each end of the net, determined using a portable sonar unit.

The number of individuals of each fish species captured in each net was recorded. Each fish was examined for external anomalies and fork length was determined to the nearest mm using a standard fish measuring board. The total weight of individuals weighing less than 100 g was determined to the nearest 0.1 g, and the total weight of individuals weighing between 100 and 1000 g was determined to the nearest gram using an Ohaus CS2000 electronic balance. Fish weighing more than 1 kg were weighed to the nearest 10 g using a Rapala digital hanging scale. Fish that were alive were released after they were weighed and measured.

The body cavity of dead fish was opened and the gonads were examined to determine the sex and maturity of the specimen. Females with opaque ovaries containing developing eggs visible with the naked eye were considered sexually mature. Females with translucent ovaries that did not contain eggs which were visible to the naked eye were considered immature. Males with opaque testes were considered mature, and males with small translucent testes were considered immature. One or both otoliths were taken from dead Lake Trout and Arctic Char and retained for future aging.

6.2 Results

The gill net catches and catch per unit effort (CPUE), expressed as number of individuals caught per hour of soak time, are presented in Table 6-1. The netting locations are shown in Figure 6-1. The coordinates and depth at each end of the net sets are provided in Appendix A (Table A-4). The information for individual fish is provided in Appendix A (Table A-6).

Arctic Char was the only species captured in Lake A47; fork lengths (FL) ranged from 180 mm to 291 mm. One Lake Trout (FL=299 mm) was captured in two overnight sets of a standard Agnico gill net in Lake A49. A total of 15 Lake Trout, with FL ranging from 464 mm to 574 mm, and two Arctic Char (FL= 179 mm and 204 mm) were captured in Lake A53.

Table 6-1. Gill net set net type, set type, location, dates and catches in Lakes A47, A49, and A53. CPUE is calculated as number of individuals caught per hour of soak time. The net locations are shown in Figure 6-1.

Waterbody	Net Type	Set Type	Location	Set date	Lift date	Soak time (hrs)	Lake Trout		Arctic Char	
							Catch	CPUE	Catch	CPUE
A47	Agnico	overnight	GN60	21-Aug-18	22-Aug-18	18.3	0	0.00	10	0.55
A49	Agnico	overnight	GN61	22-Aug-18	23-Aug-18	12.7	1	0.08	0	0.00
			GN62	24-Aug-18	24-Aug-18	12.3	0	0.00	0	0.00
	Total					24.9	1	0.04	0	0.00
A53	small mesh broad-scale	short-duration	GN53	5-Aug-18	5-Aug-18	8.1	0	0.00	0	0.00
			GN54	5-Aug-18	5-Aug-18	7.6	0	0.00	0	0.00
			GN55	5-Aug-18	5-Aug-18	7.6	0	0.00	1	0.13
	2 x large mesh broad-scale	overnight	GN56	20-Aug-18	21-Aug-18	11.5	8	0.70	1	0.09
			GN57	20-Aug-18	21-Aug-18	11.9	6	0.51	0	0.00
	Total					46.7	14	0.30	2	0.04

Figure 6-1. Gill net set locations in Lakes A47, A49 and A53.

7.0 FISH SAMPLING IN LAKES 1, 5 AND 8

7.1 Methods

Gill netting was conducted in Lake 1, Lake 5 and Lake 8, using North American Standard (NA1) gill nets. These nets consist of 3.1 meter long by 1.8 metre deep panels of 38 mm, 51 mm, 64 mm, 76 mm, 89 mm, 102 mm, 114 mm and 127 mm stretched mesh joined in a single 24.8 metre long gang and they were set as straps of two gangs joined together as a 49.6 metre long gang. Short-duration daytime sets were conducted in Lakes 1 and 5. Overnight sets were conducted in Lake 8. The date and time of deployments and lifts were recorded as were the coordinates of each end of each net, determined using a Garmin GPSmap 76CSx GPS. Depth at each end of each net was determined using a portable sonar unit.

The number of individuals of each fish species captured in each net was recorded. Each fish was examined for external anomalies and fork length was determined to the nearest mm using a standard fish measuring board. The total weight of individuals weighing less than 100 g was determined to the nearest 0.1 g, and the total weight of individuals weighing between 100 and 1000 g was determined to the nearest gram using an Ohaus CS2000 electronic balance. Fish weighing more than 1 kg were weighed to the nearest 10 g using a Rapala digital hanging scale. Fish that were alive were released after they were weighed and measured.

The number of individuals of each fish species captured in each net was recorded. Each fish was examined for external anomalies and fork length was determined to the nearest mm using a standard fish measuring board. The total weight of each individual weighing more than 500 g was determined to the nearest 10 grams using a Rapala digital hanging scale. The total weight of individuals weighing less than 500 g was determined to the nearest g, or in some cases the nearest 0.1 g, using an Ohaus Scout Pro Model 6001 electronic balance. Fish that were alive were released after they were weighed and measured.

The body cavity of dead fish was opened and the gonads were examined to determine the sex and maturity of the specimen. Females with opaque ovaries containing developing eggs visible with the naked eye were considered sexually mature. Females with translucent ovaries that did not contain eggs which were visible to the naked eye were considered immature. Males with opaque testes were considered mature, and males with small translucent testes were considered immature. One or both otoliths were taken from dead Lake Trout and Arctic Char and retained for future aging.

One or more sections of shoreline were electrofished with a Halltech Model 200T backpack electrofisher in each of the three lakes. The number of individuals captured of each species were recorded, as were the coordinates at each end of the electrofished shoreline, determined using a Garmin GPSmap 76CSx handheld GPS. The distance electrofished was determined using GIS from the waypoints and recorded tracks. Juvenile *Salvelinus* were photographed and their identification was subsequently confirmed using the photographs. Angling was conducted in Lake 5, with one rod trolling a silver spoon (Williams Wabler™).

7.2 Results

The gill net catches and catch per unit effort (CPUE), expressed as number of individuals caught per hour of soak time, are presented in Table 7-1 and the electrofishing catches are presented in Table 7-2. Figure 7-1 is a key map and the sampling locations for lakes 1, 5 and 8 are shown in Figures 7-2, 7-3, and 7-4, respectively. The times, coordinates, and depths for net sets (Table A-4) and the data for individual fish (Table A-6) are provided in Appendix A.

Lake Trout and Round Whitefish were captured in gill nets in Lake 1. Lake Trout and Arctic Char were captured in gill nets in Lake 5 and Lake 8. Three Lake Trout were captured during 48 minutes of angling in Lake 5.

The electrofishing catches are presented in Table 7-2. Slimy Sculpin and juvenile Artic Char were captured in each of the three lakes. One juvenile Lake Trout, one juvenile Burbot, and one Ninespine Stickleback were captured in Lake 8, Lake 1, and Lake 5, respectively.

Table 7-1. Gill net set net type, set type, location, dates and catches in Lakes 1, 5, and 8. CPUE is calculated as number of individuals caught per hour of soak time. The lake locations are shown in Figure 7-1 and net set locations are shown in Figures 7-2, 7-3 and 7-4.

Waterbody	Net Type	Set Type	Location	Set date	Lift date	Soak time (hrs)	Lake Trout		Arctic Char		Round Whitefish	
							Catch	CPUE	Catch	CPUE	Catch	CPUE
Lake 1	2 x large mesh broad-scale	short-duration	GN63	25-Aug-18	25-Aug-18	6.8	4	0.59	0	0.00	0	0.00
			GN64	25-Aug-18	25-Aug-18	6.3	0	0.00	0	0.00	1	0.16
	Total					13.0	4	0.31	0	0.00	1	0.08
Lake 5	2 x large mesh broad-scale	short-duration	GN65	26-Aug-18	26-Aug-18	6.5	3	0.46	0	0.00	0	0.00
			GN66	26-Aug-18	26-Aug-18	3.5	3	0.86	0	0.00	0	0.00
			GN67	26-Aug-18	26-Aug-18	3.0	1	0.33	1	0.33	0	0.00
	Total					13.0	7	0.54	1	0.08	0	0.00
Lake 8	2 x large mesh broad-scale	overnight	GN58	21-Aug-18	22-Aug-18	17.4	19	1.09	0	0.00	0	0.00
			GN59	21-Aug-18	22-Aug-18	17.7	4	0.23	1	0.06	0	0.00
	Total					35.2	23	0.65	1	0.03	0	0.00

Table 7-2. Electrofishing locations, dates, effort and catches in Lakes 1, 5 and 8. The sampling locations for lakes 1, 5 and 8 are shown in Figures 7-2, 7-3 and 7-4, respectively.

Waterbody	Location	Date	e-seconds	Distance (m)	Ninespine Stickleback	Slimy Sculpin	Juvenile Burbot	Juvenile Lake Trout	Juvenile Arctic Char
Lake 1	**EF-L93**	August 25, 2018	2460	223	0	27	1	0	7
Lake 5	**EF-L94**	August 26, 2018	na	206	0	19	0	0	3
	EF-L95	August 26, 2018	700	122	1	4	0	0	0
	Total				1	23	0	0	3
Lake 8	**EF-L67**	August 2, 2018	1408	78	0	15	0	1	3
	EF-L68	August 2, 2018	2738	233	0	37	0	0	5
	EF-L69	August 2, 2018	1040	70	0	31	0	0	1
	EF-L70	August 2, 2018	683	60	0	17	0	0	1
	Total				0	100	0	1	10

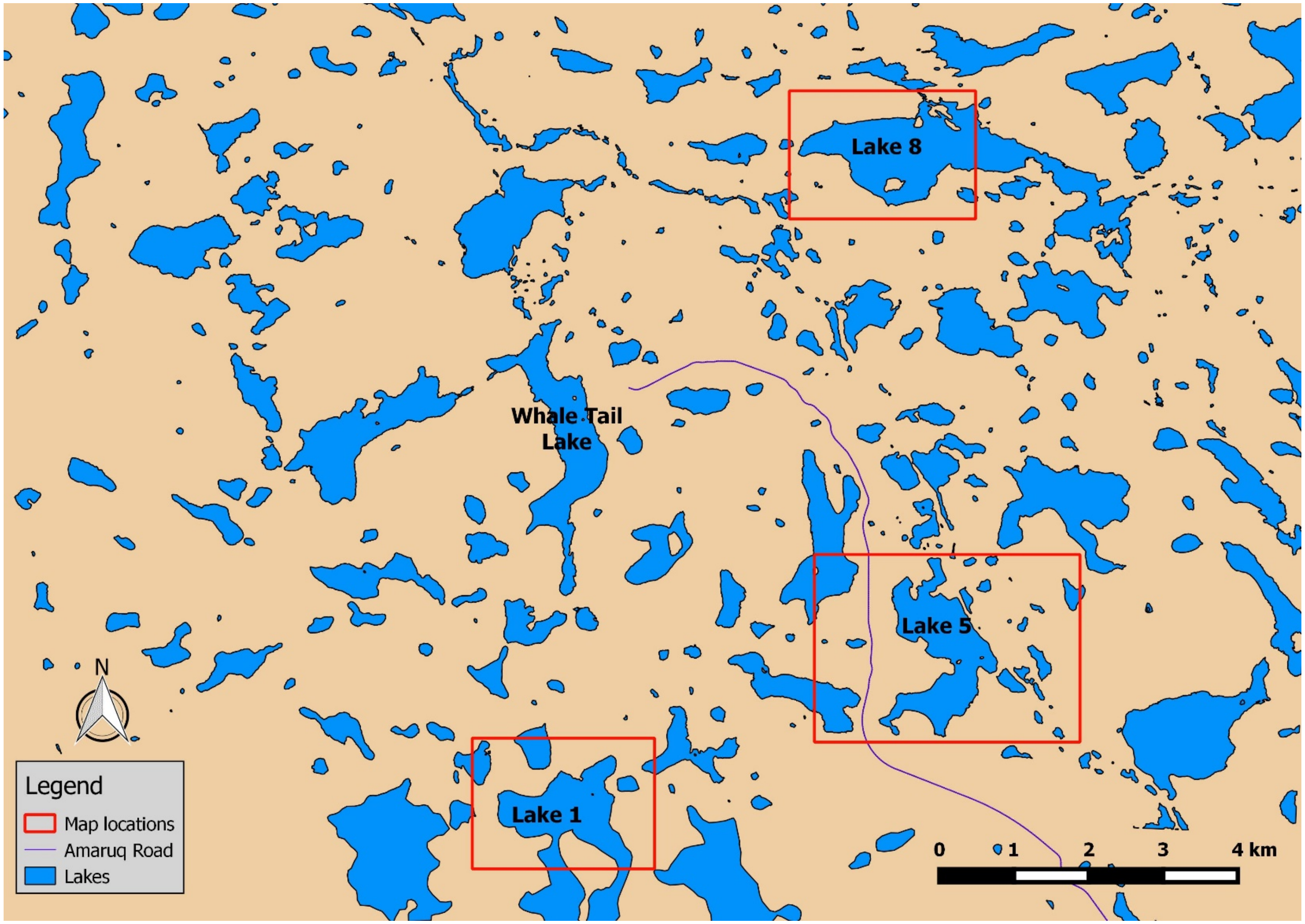


Figure 7-1. Key map showing the locations of the maps showing the sampling locations in Lake 1 (Figure 7-2), Lake 5 (Figure 7-3), and Lake 8 (Figure 7-4).

Figure 7-2. Fish sampling locations in Lake 1. August 25, 2018.

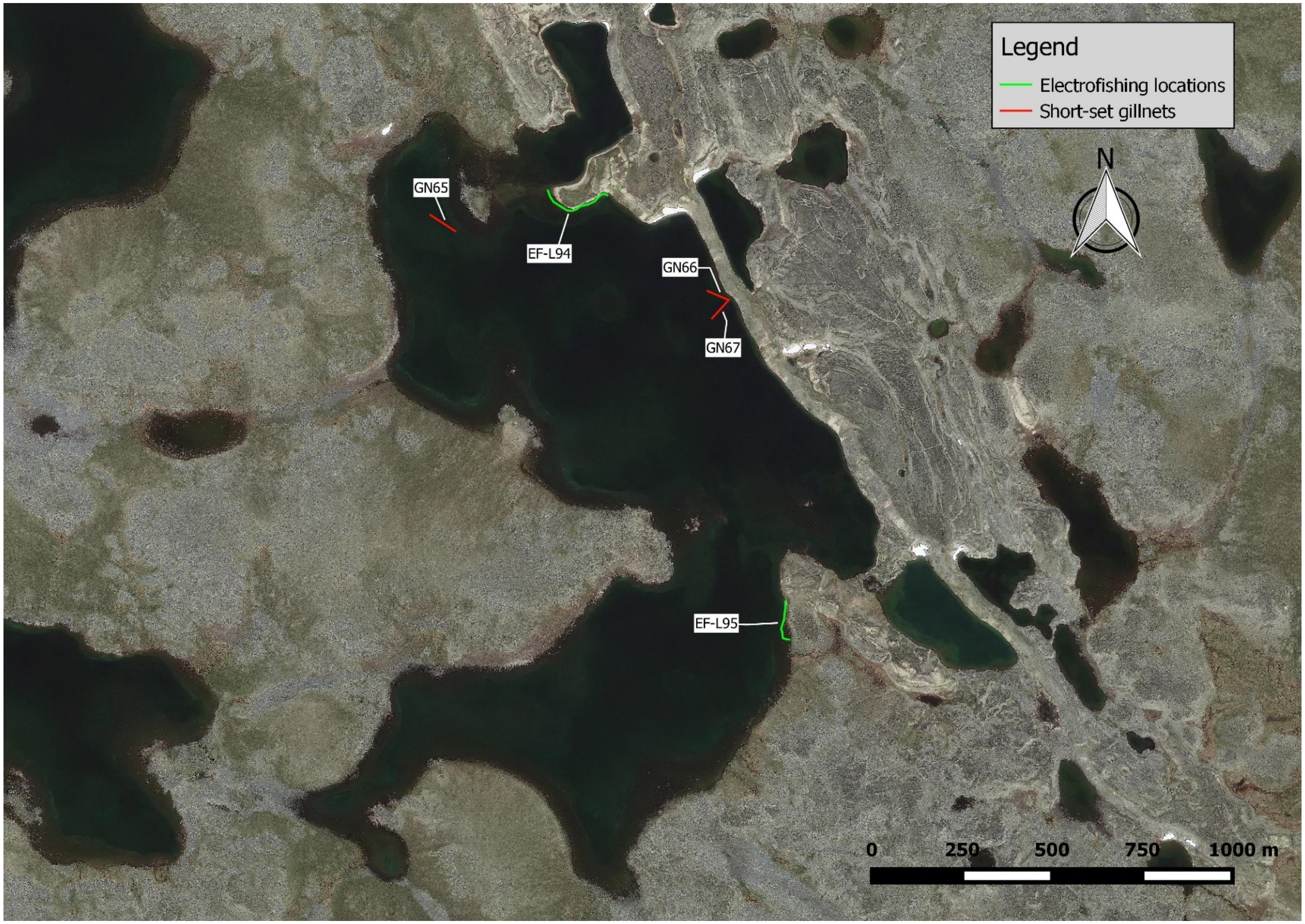


Figure 7-3. Fish sampling locations in Lake 5. August 26, 2018.

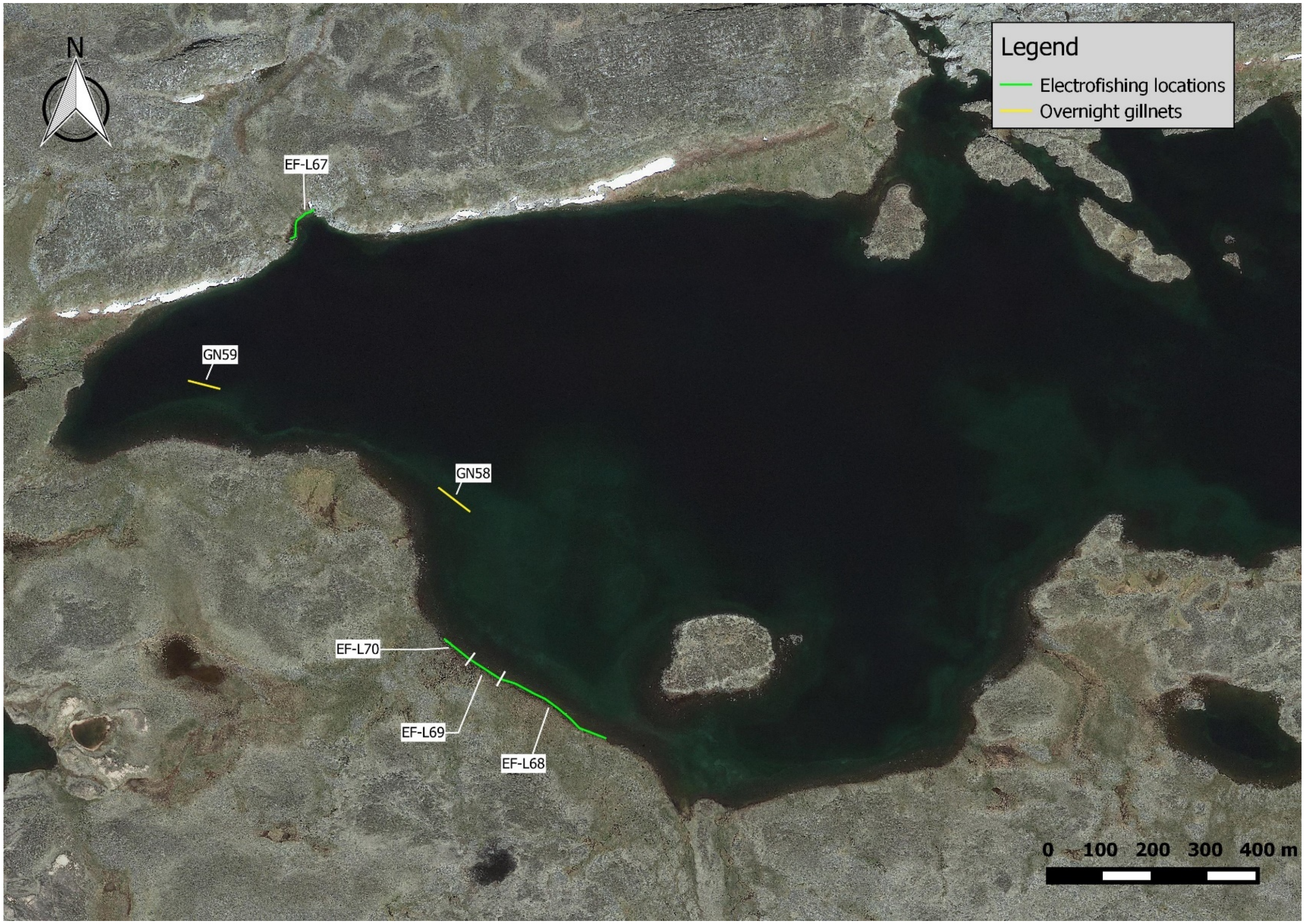


Figure 7-4. Fish sampling locations in Lake 8. August 2 - 3, 2018.

8.0 WATER TEMPERATURE MONITORING

8.1 Methods

Temperature loggers (WaterTemp® Pro V2, Onset Corporation) were deployed in watercourses A53-A17 and A47-A17 on June 26, 2018, and June 27, 2018, respectively. Each logger was attached to a steel rod that was laid on the bottom. A temperature logger was deployed in Lake A53 on July 1, 2018. The logger was deployed in approximately 1 m of water and was suspended 30 cm off the bottom. All three loggers were removed on August 28, 2018. The logger locations are shown in Figure 8-1, and their coordinates are provided in Appendix A (Table A-5).

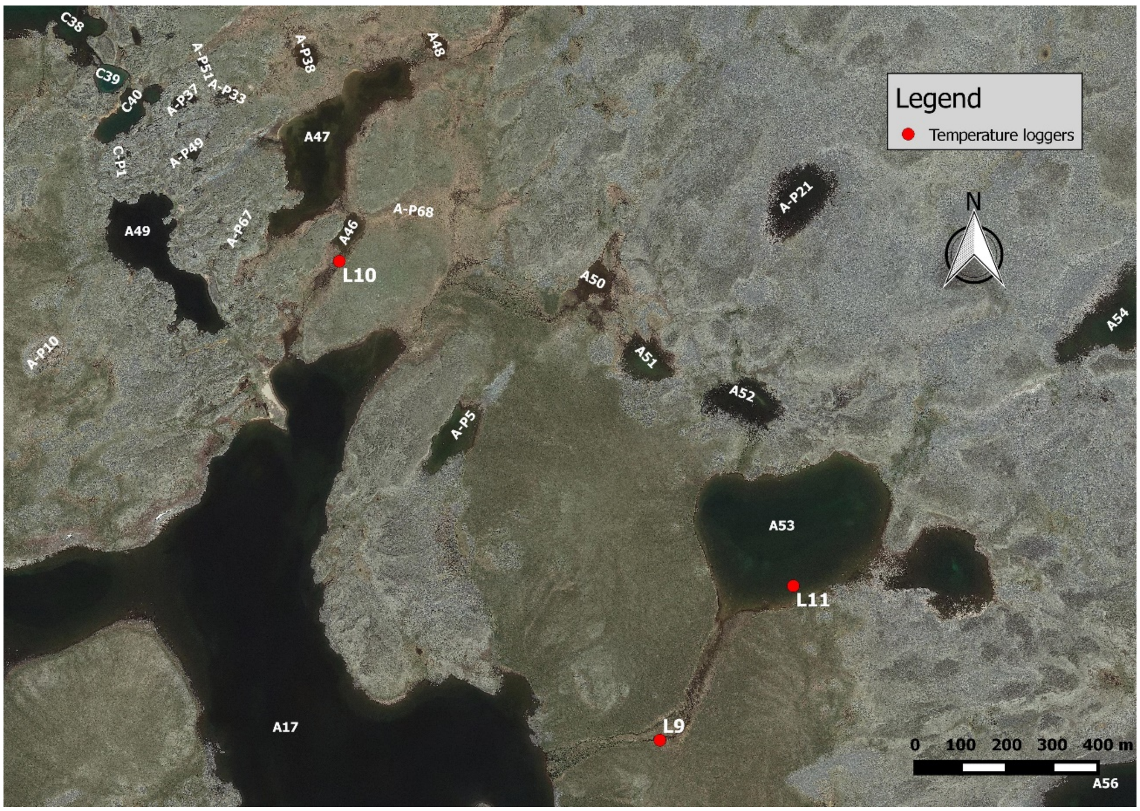


Figure 8-1. Locations where temperature loggers were deployed in 2018.

The loggers recorded the temperature at 15-minute intervals. The data were retrieved from the loggers using a Hobo® waterproof shuttle (Onset Corporation). The temperature data were plotted using HOBOware® Pro software (Version 3.7.13, Onset Corporation). The plots were examined to determine if there were periods with larger than expected diurnal ranges that might be the result of the loggers being exposed to the air or aberrant values that might be the result of data corruption; there were none. The data were exported to Excel (Microsoft Corporation) for graphing and analysis.

8.2 Results

The 2018 water temperature data are summarized in Table 8-1 and shown in Figure 8-2. watercourse A46-A17 reached slightly higher temperatures than watercourse A53-A17 on several days and its maximum temperature was 1.2 centigrade degrees higher. Mean water temperatures for the period July 2 – August 27, 2018, differed by less than one degree.

Table 8-1. The first and last full day for which temperature data are available, the maximum water temperature recorded and the day that the maximum water temperature was recorded at each location during 2018.

Watercourse/ waterbody	Location	Start Date (2018)	End Date (2018)	Maximum temperature (°C)	Date of maximum temperature	Mean temperature July 2 – August 27 (°C)
A53-A17	L9	June 27	August 27	24.8	July 11	11.3
A46-A17	L10	June 26	August 27	26.0	July 27	11.9
A53	L11	July 2	August 27	19.2	July 12	11.8

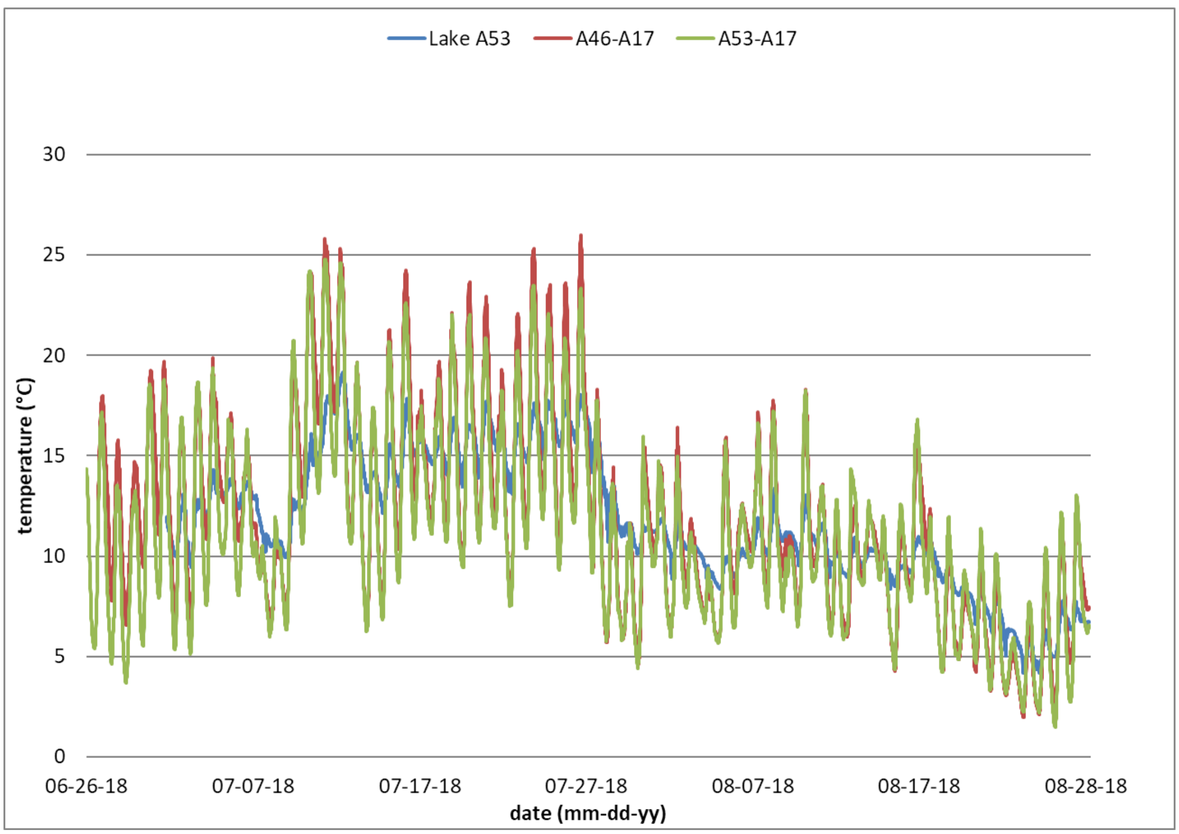


Figure 8-2. Water temperature in Lake A53 and watercourses A46-A17 and A53-A17 in 2018.

9.0 INVESTIGATION OF POTENTIAL FUTURE OFFSETTING OPPORTUNITIES

9.1 Introduction

The Final Fish Habitat Compensation Plan for Whale Tail Pit Expansion will include a section on contingency options that may also form the basis for future fish compensation in Nunavut. DFO requires a description of the contingency measures and associated monitoring measures that could be put into place if the proposed offsetting measure is not successful in offsetting. As a result of workshops and stakeholder consultation, introducing fish to fishless waterbodies is one method of offsetting for habitat losses that Agnico Eagle are considering as future offsetting, provided that the waterbody can sustain a population of one or more fish species. Connecting waterbodies that provide year-round fish habitat to waterbodies that do not could also be an effective offsetting measure.

Investigations were undertaken to identify and assess isolated waterbodies that, based on size and depth, were potentially either fishless or without populations of large-bodied fishes, where either species introductions or the creation of connections passable by fish might create offsetting. Borrow pits where aggregate was excavated for construction of the Amaruq Road were also examined to determine if previous or future excavation might provide opportunities for fish habitat creation. A water-filled quarry, referred to as Quarry 4, along the Baker Lake Road was also examined.

9.2 Methods

Prior to the 2018 field season, aerial imagery of the Amaruq Exploration Road corridor was searched for small or shallow lakes with no apparent surface connection to other large lakes or watercourses, and where it appeared that creating a surface connection might be feasible. The small or shallow lakes identified through review of the aerial imagery were examined on the ground on June 27 and 28, 2018, and from the air on June 30, 2018. The focus during these field investigations was on assessing whether there were existing surface connections and, if there were not, the feasibility of establishing a surface connection. The latter was assessed primarily based on the amount of excavation that would be required. A number of borrow pits were also examined on foot on June 27 and 28, 2018 and all of the borrow pits along the Amaruq Road were examined from the air on June 30, 2018.

Based on the site visits, two lakes, referred to as Esker 5A and Esker 6A, were identified as having the most potential as offsetting opportunities. Gill netting was conducted in these lakes using North American Standard (NA1) gill nets. These nets consist of 3.1 meter long by 1.8 metre deep panels of 38 mm, 51 mm, 64 mm, 76 mm, 89 mm, 102 mm, 114 mm and 127 mm stretched mesh joined in a single 24.8 metre long gang and they were set as straps of two gangs joined together as a 49.6 metre long gang. Short-duration daytime sets were conducted in Lakes 1 and 5. Overnight sets were conducted in Lake Esker 5A and both short-duration daytime sets and overnight sets were conducted in Lake Esker 6A. The date and time of deployments and lifts were recorded as were the coordinates of each end of each net, determined using a Garmin GPSmap 76CSx GPS. Depth at each end of each net was determined using a portable sonar unit.

The number of individuals of each fish species captured in each net was recorded. Each fish was examined for external anomalies and fork length was determined to the nearest mm using a standard fish measuring board. The total weight of individuals weighing less than 100 g was determined to the nearest 0.1 g, and the total weight of individuals weighing between 100 and 1000 g was determined to the nearest gram using an Ohaus CS2000 electronic balance. Fish weighing more than 1 kg were weighed to the nearest 10 g using a Rapala digital hanging scale. Fish that were alive were released after they were weighed and measured.

The body cavity of dead fish was opened and the gonads were examined to determine the sex and maturity of the specimen. Females with opaque ovaries containing developing eggs visible with the naked eye were considered sexually mature. Females with translucent ovaries that did not contain eggs which were visible to the naked eye were considered immature. Males with opaque testes were considered mature, and males with small translucent testes were considered immature. One or both otoliths were taken from dead Lake Trout and Arctic Char and retained for future aging.

Angling was also conducted in Lake Esker 5A, with one rod trolling a silver spoon (Williams Wabler™).

The approximate length of three sides of Quarry 4 was determined using an AOFAR model AF-700L rangefinder on June 25, 2018. Standard (Gee) minnow traps baited with two pellets of artificial bait (Atlas and Mike's Glo Mallows – Cerise/Shrimp) were deployed at five locations in Quarry 4 on July 21, 2018. Where each trap was deployed, the depth was measured to the nearest centimetre with a ruler, the substrate was described, and the coordinates were determined using a Garmin GPSmap 76CSx handheld GPS. The minnow traps were lifted approximately 23 hours later, on July 22. The wadeable section of the quarry shoreline was electrofished with a Halltech Model 200T backpack electrofisher on July 20, 2018. Effort was 382 electroseconds over approximately 40 m.

9.3 Results

No waterbodies with the potential to provide fish habitat were observed to have been created by past excavation at borrow pits along the Amaruq Road. The borrow pits are located along an esker which, in most locations, has quite steep sides. The excavated areas are higher than the surrounding waterbodies and have not resulted in the creation of significant permanent ponds. The regulatory requirement to maintain a buffer between the extraction areas and the adjacent waterbodies would, at most locations, preclude excavating below the elevation of the adjacent waterbodies in order to create fish habitat. Creation of fish habitat at these locations might be feasible if it was planned and approved by the regulatory agencies in advance of aggregate extraction.

Both Lake Trout and Arctic Char were captured in Lake Esker 5A and Lake Esker 6A. The gill net catches and catch per unit effort (CPUE), expressed as number of individuals caught per hour of soak time, are presented in Table 9-1. Figure 9-1 is a key map and the sampling locations for lakes Esker 5A and Esker 6A are shown in Figures 9-2 and 9-3, respectively. The times, coordinates, and depths for net sets (Table A-4) and the data for individual fish (Table A-6) are provided in Appendix A. Both Lake Trout and Arctic Char were captured in gill nets in Lake Esker 5A. Three Arctic Char and a Burbot were captured in Lake Esker 6A. Three Lake Trout were captured during 48 minutes of angling in Lake Esker 5A.

Using the dimensions determined by range finder, the surface area of Quarry 4 is approximately 0.36 ha. No fish were caught by electrofishing or in the minnow traps in Quarry 4.

Table 9-1. Gill net set net type, set type, location, dates and catches in lakes Esker 5A and Esker 6A. CPUE is calculated as number of individuals caught per hour of soak time. The lake locations are shown in Figure 9-1 and net set locations are shown in Figures 9-2 and 9-3.

Waterbody	Net Type	Set Type	Location	Set date	Lift date	Soak time (hrs)	Lake Trout		Arctic Char		Burbot	
							Catch	CPUE	Catch	CPUE	Catch	CPUE
Esker 5A	2 x large mesh broad-scale	overnight	GN68	26-Aug-18	27-Aug-18	15.6	13	0.83	1	0.06	0	0.00
			GN69	26-Aug-18	27-Aug-18	14.8	6	0.40	2	0.13	0	0.00
	Total					30.4	19	0.62	3	0.10	0	0.00
Esker 6A	2 x large mesh broad-scale	short-duration	GN70	27-Aug-18	27-Aug-18	4.3	0	0.00	0	0.00	0	0.00
			GN71	27-Aug-18	27-Aug-18	4.4	0	0.00	0	0.00	0	0.00
		overnight	GN72	27-Aug-18	28-Aug-18	12.3	0	0.00	1	0.08	1	0.08
			GN73	27-Aug-18	28-Aug-18	12.3	0	0.00	2	0.16	0	0.00
	Total					33.5	0	0.00	3	0.09	1	0.03

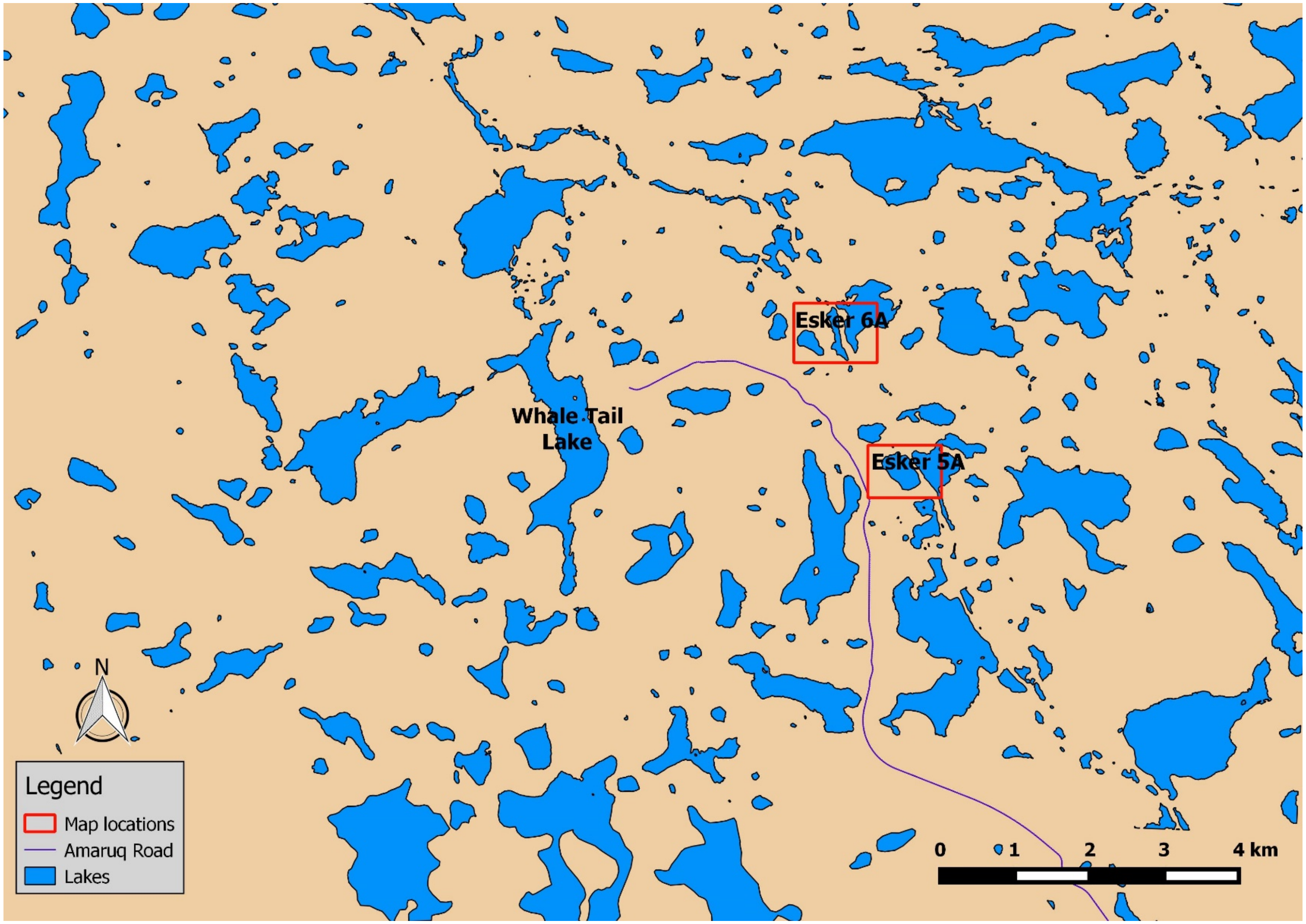


Figure 9-1. Key map showing locations of Lake Esker 5A and Lake Esker 6A.

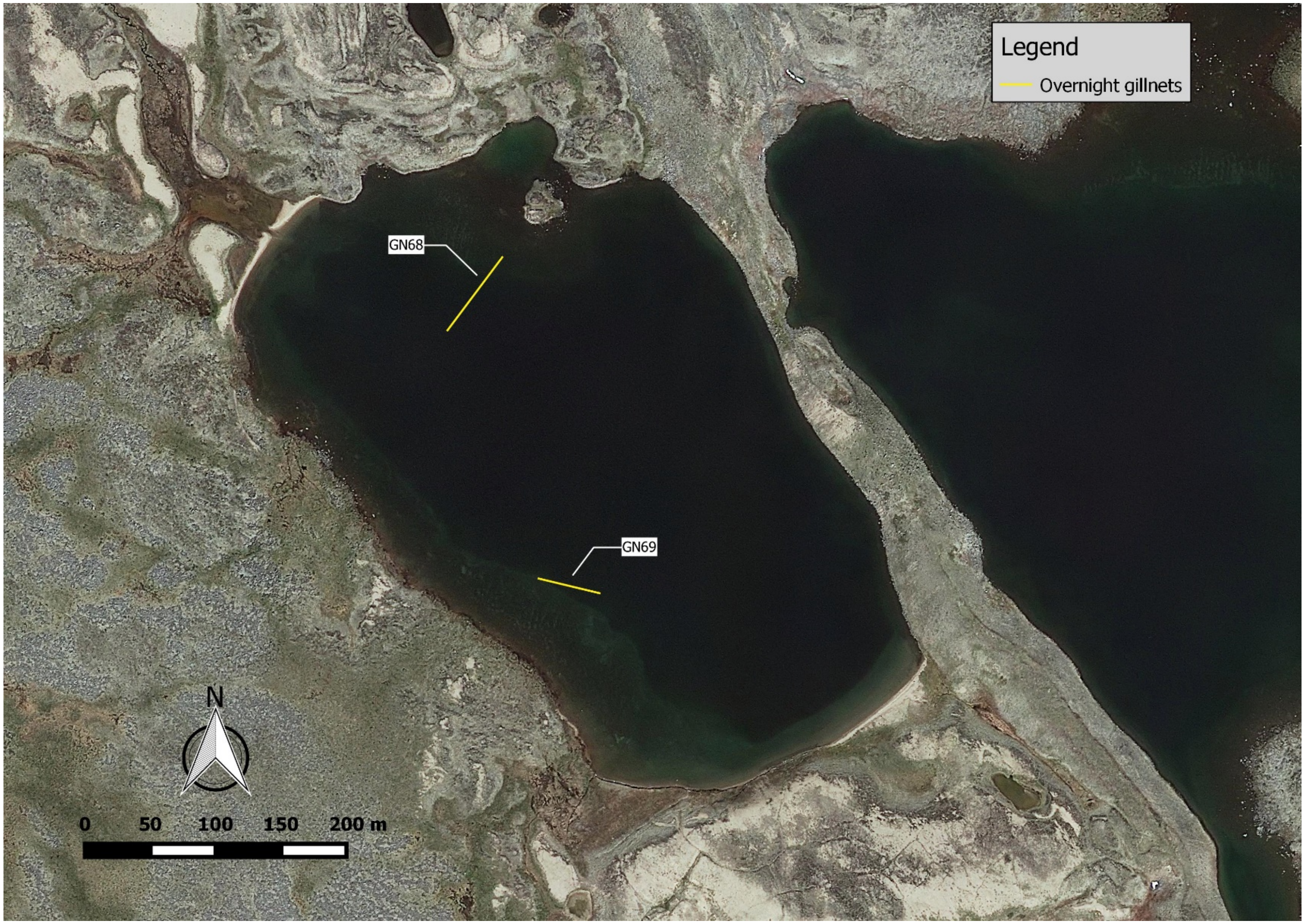


Figure 9-2. Gill net set locations in Lake Esker 5A.

Figure 9-3. Gill net set locations in Lake Esker 6A.

10.0 LITERATURE CITED

Azimuth. 2010. Environmental Effects Monitoring (EEM): Cycle 1 Study Design, Meadowbank Division, Nunavut. Report prepared by Azimuth Consulting Group Inc., Vancouver, BC for Environment Canada, Edmonton, AB on behalf of Agnico-Eagle Mines Ltd., Baker Lake, NU. December, 2010.

Azimuth. 2013. Aquatic Effects Monitoring Program – Core Receiving Environment Monitoring Program 2012, Meadowbank Gold Project. Report prepared by Azimuth Consulting Group Inc., Vancouver, BC for Agnico-Eagle Mines Ltd., Baker Lake, NU.

BAER (Baseline Aquatic Ecosystem Report). 2005. A report prepared by Azimuth Consulting Group, Vancouver for Cumberland Resources Ltd. October, 2005.

C. Portt and Associates. 2018. Whale tail pit 2014 - 2016 fish and fish habitat field investigations: Agnico Eagle Mines Ltd. - Meadowbank Division. xi +157 pp.

C. Portt and Associates and Agnico Eagle Mines Ltd. 2018. Whale Tail Pit Fish Habitat Offsetting Plan. v + 49 pp + appendices.

Jones, N.E., G.J. Scrimgeour, and W.M. Tonn. 2010. Fish species traits and communities in relation to a habitat template for Arctic rivers and streams. American Fisheries Society Symposium 73:000-000, 2010.

APPENDIX A – ADDITIONAL SAMPLING INFORMATION

Table A- 1. Waterbody/watercourse, Location ID, coordinates, set and lift dates and times, soak time and direction of the opening for fyke netting conducted in 2018.

Waterbody/watercourse	Location ID	Latitude	Longitude	Date and Time Set m/dd/yy hr:min	Date and Time Lifted m/dd/yy hr:min	Soak Time (hrs)	Opening facing
A46-A17	FN-1	65.411583	-96.693681	6/27/18 10:15	6/28/18 7:50	21.6	downstream
A46-A17	FN-1	65.411583	-96.693681	6/28/18 7:50	6/29/18 8:00	24.2	downstream
A46-A17	FN-1	65.411583	-96.693681	6/29/18 8:00	6/30/18 9:20	25.3	downstream
A46-A17	FN-1	65.411583	-96.693681	6/30/18 9:20	7/1/18 7:40	22.3	downstream
A53-A17	FN-2	65.402200	-96.678585	6/26/18 15:30	6/27/18 8:20	16.8	downstream
A53-A17	FN-2	65.402200	-96.678585	6/27/18 8:20	6/28/18 8:16	23.9	downstream
A53-A17	FN-2	65.402200	-96.678585	6/28/18 8:16	6/29/18 9:45	25.5	downstream
A53-A17	FN-2	65.402200	-96.678585	6/29/18 9:45	6/30/18 9:55	24.2	downstream
A53-A17	FN-2	65.402200	-96.678585	6/30/18 9:55	7/1/18 8:50	22.9	downstream
A53	FN-3	65.404913	-96.672197	6/29/18 12:00	6/30/18 13:00	25.0	south-west
A53	FN-3	65.404913	-96.672197	6/30/18 13:00	7/1/18 15:00	26.0	south-west
A53	FN-4	65.404913	-96.672197	6/29/18 12:00	6/30/18 13:00	25.0	north-east
A53	FN-4	65.404913	-96.672197	6/30/18 13:00	7/1/18 15:10	26.2	north-east

Table A- 2. **Waterbody/watercourse, Location ID, coordinates, set and lift date and time, depth and substrate for standard minnow traps set in Lake A53 in 2018.**

Waterbody	Location ID	Latitude	Longitude	Date and Time Set m/dd/yy hr:min	Date and Time Lifted m/dd/yy hr:min	Depth (m)	Substrate
A-53	SMT26	65.404913	-96.672197	6/29/18 13:44	6/30/18 17:16	0.19	fines/moss
A-53	SMT27	65.404883	-96.671312	6/29/18 13:53	6/30/18 17:23	0.41	fines/grass
A-53	SMT28	65.405220	-96.670567	6/29/18 14:00	6/30/18 17:28	0.28	cobble/boulder
A-53	SMT29	65.405324	-96.669648	6/29/18 14:12	6/30/18 17:33	0.19	boulder
A-53	SMT30	65.405455	-96.668185	6/29/18 14:25	6/30/18 17:39	0.38	boulder
A-53	SMT31	65.405725	-96.667772	6/29/18 14:33	6/30/18 17:47	0.27	boulder/cobble
A-53	SMT32	65.405902	-96.666818	6/29/18 14:49	6/30/18 17:53	0.21	boulder/cobble
A-53	SMT33	65.406311	-96.666258	6/29/18 14:55	6/30/18 18:00	0.33	fines/boulder
A-53	SMT26	65.404913	-96.672197	6/30/18 17:16	7/1/18 14:46	0.19	fines/moss
A-53	SMT27	65.404883	-96.671312	6/30/18 17:23	7/1/18 14:42	0.41	fines/grass
A-53	SMT28	65.405220	-96.670567	6/30/18 17:28	7/1/18 14:38	0.28	cobble/boulder
A-53	SMT29	65.405324	-96.669648	6/30/18 17:33	7/1/18 14:33	0.19	boulder
A-53	SMT30	65.405455	-96.668185	6/30/18 17:39	7/1/18 14:27	0.38	boulder
A-53	SMT31	65.405725	-96.667772	6/30/18 17:47	7/1/18 14:24	0.27	boulder/cobble
A-53	SMT32	65.405902	-96.666818	6/30/18 17:53	7/1/18 14:20	0.21	boulder/cobble
A-53	SMT33	65.406311	-96.666258	6/30/18 18:00	7/1/18 14:16	0.33	fines/boulder
A-53	SMT26	65.404913	-96.672197	8/4/18 20:16	8/5/18 10:40	0.15	fines
A-53	SMT27	65.404883	-96.671312	8/4/18 20:20	8/5/18 10:43	0.33	fines
A-53	SMT28	65.405220	-96.670567	8/4/18 20:24	8/5/18 10:52	0.17	cobble/boulder
A-53	SMT29	65.405324	-96.669648	8/4/18 20:30	8/5/18 10:56	0.18	cobble/boulder
A-53	SMT30	65.405455	-96.668185	8/4/18 20:37	8/5/18 10:59	0.37	boulder/cobble
A-53	SMT31	65.405725	-96.667772	8/4/18 20:44	8/5/18 11:02	0.26	boulder/cobble
A-53	SMT32	65.405902	-96.666818	8/4/18 20:48	8/5/18 11:05	0.19	cobble/boulder

Waterbody	Location ID	Latitude	Longitude	Date and Time Set m/dd/yy hr:min	Date and Time Lifted m/dd/yy hr:min	Depth (m)	Substrate
A-53	SMT33	65.406311	-96.666258	8/4/18 20:55	8/5/18 11:08	0.23	boulder/fines
A-53	SMT26	65.404913	-96.672197	8/5/18 10:40	8/5/18 16:50	0.15	fines
A-53	SMT27	65.404883	-96.671312	8/5/18 10:43	8/5/18 16:54	0.33	fines
A-53	SMT28	65.405220	-96.670567	8/5/18 10:52	8/5/18 16:57	0.17	cobble/boulder
A-53	SMT29	65.405324	-96.669648	8/5/18 10:56	8/5/18 17:01	0.18	cobble/boulder
A-53	SMT30	65.405455	-96.668185	8/5/18 10:59	8/5/18 17:07	0.37	boulder/cobble
A-53	SMT31	65.405725	-96.667772	8/5/18 11:02	8/5/18 17:09	0.26	boulder/cobble
A-53	SMT32	65.405902	-96.666818	8/5/18 11:05	8/5/18 17:11	0.19	cobble/boulder
A-53	SMT33	65.406311	-96.666258	8/5/18 11:08	8/5/18 17:13	0.23	boulder/fines

Table A- 3. Waterbody, location, date, start and stop location coordinates, distance electrofished and electro-seconds for electrofishing conducted in 2018.

Waterbody	Location	Date (mm/dd/yy)	Start Latitude	Start Longitude	End Latitude	End Longitude
A46	EF-L71	08/03/18	65.411855	-96.693649	65.412528	-96.693078
A47	EF-L72	08/03/18	65.413859	-96.693239	65.413913	-96.693092
A50	EF-L73	08/03/18	65.410645	-96.680976	65.411292	-96.682331
A51	EF-L74	08/03/18	65.409476	-96.677781	65.409918	-96.680212
A52	EF-L75	08/03/18	65.409140	-96.675096	65.409052	-96.673394
A0	EF-L76	08/04/18	65.416918	-96.684356	65.416918	-96.684356
A113	EF-L77	08/04/18	65.418698	-96.689685	65.418085	-96.688896
A48	EF-L78	08/04/18	65.415936	-96.689654	65.415936	-96.689654
A53	EF-L79	08/04/18	65.407831	-96.670063	65.407389	-96.673840
AP21	EF-L80	08/04/18	65.412100	-96.672231	65.412751	-96.670460
A-P38	EF-L81	08/04/18	65.415750	-96.694912	65.415750	-96.694912
A49	EF-L82	08/23/18	65.410294	-96.699169	65.411367	-96.700383
A49	EF-L83	08/23/18	65.412261	-96.701438	65.412419	-96.701544
A54	EF-L84	08/23/18	65.409852	-96.658156	65.410015	-96.659753
A-P18	EF-L85	08/23/18	65.417135	-96.696060	65.417135	-96.696060
A-P33	EF-L86	08/23/18	65.414762	-96.699750	65.414845	-96.698406
A-P37	EF-L87	08/23/18	65.414534	-96.701674	65.414745	-96.700251
A-P49	EF-L88	08/23/18	65.413674	-96.701313	65.413674	-96.701313
C-P1	EF-L89	08/23/18	65.413636	-96.703781	65.413636	-96.703781
C39	EF-L90	08/24/18	65.415122	-96.703768	65.414887	-96.704822
C40	EF-L91	08/24/18	65.414826	-96.704042	65.414524	-96.702815
C41	EF-L92	08/24/18	65.417842	-96.703757	65.417088	-96.703903
A0-A48	EF-S88	08/04/18	65.415595	-96.688550	65.416918	-96.684356
A49-A47	EF-S89	08/23/18	65.412991	-96.700601	65.412991	-96.700601

Waterbody	Location	Date (mm/dd/yy)	Start Latitude	Start Longitude	End Latitude	End Longitude
Lake 8	EF-L67	08/02/18	65.434026	-96.611786	65.433540	-96.612700
Lake 8	EF-L68	08/02/18	65.424998	-96.599786	65.426010	-96.604111
Lake 8	EF-L69	08/02/18	65.426010	-96.604111	65.426349	-96.605375
Lake 8	EF-L70	08/02/18	65.426349	-96.605375	65.426687	-96.606388
Lake 1	EF-L93	08/25/18	65.352977	-96.698793	65.353369	-96.703411
Lake 5	EF-L94	08/26/18	65.377285	-96.581411	65.377393	-96.584941
Lake 5	EF-L95	08/26/18	65.367190	-96.570787	65.366247	-96.570564

Table A- 4. Waterbody, location, set type, gill net type, and start and end depths, coordinates, dates and times for gill net sets conducted in 2018. Gill net types: SM-BSM = small-mesh broad-scale monitoring, 2x NA = 2 North American standard, Agnico = Agnico standard net. Refer to text in Section 6.1 for mesh sizes and dimensions.

Waterbody	Location	Set type	Net type	Start depth (m)	Start latitude	Start longitude	End depth (m)	End latitude	End longitude	Set Date and Time m/dd/yy hr:min	Lift Date and Time m/dd/yy hr:min
A53	GN53	short-duration	SM-BSM	2.29	65.4061	-96.6729	2.32	65.4061	-96.6735	8/5/2018 9:40	8/5/2018 13:45
A53	GN54	short-duration	SM-BSM	1.77	65.4071	-96.6698	1.77	65.4072	-96.6703	8/5/2018 10:20	8/5/2018 13:34
A53	GN55	short-duration	SM-BSM	3.54	65.4067	-96.6735	3.96	65.4066	-96.6742	8/5/2018 10:30	8/5/2018 13:10
A53	GN53	short-duration	SM-BSM	2.29	65.4061	-96.6729	2.32	65.4061	-96.6735	8/5/2018 13:45	8/5/2018 17:48
A53	GN54	short-duration	SM-BSM	1.77	65.4071	-96.6698	1.77	65.4072	-96.6703	8/5/2018 13:34	8/5/2018 17:57
A53	GN55	short-duration	SM-BSM	3.54	65.4067	-96.6735	3.96	65.4066	-96.6742	8/5/2018 13:10	8/5/2018 18:05
A53	GN56	overnight	2x NA	2.13	65.4069	-96.6711	3.96	65.4066	-96.6723	8/20/2018 20:15	8/21/2018 7:45
A53	GN57	overnight	2x NA	3.96	65.4065	-96.6738	1.83	65.4068	-96.6724	8/20/2018 20:24	8/21/2018 8:15
Lake 8	GN58	overnight	2x NA	1.83	65.4293	-96.6066	3.05	65.4289	-96.6054	8/21/2018 15:45	8/22/2018 9:10
Lake 8	GN59	overnight	2x NA	4.27	65.4310	-96.6157	9.14	65.4311	-96.6169	8/21/2018 16:16	8/22/2018 10:00
A47	GN60	overnight	Agnico	1.83	65.4139	-96.6950	0.61	65.4125	-96.6955	8/21/2018 20:10	8/22/2018 14:30
A49	GN61	overnight	Agnico	2.44	65.4121	-96.7026	6.40	65.4107	-96.7004	8/22/2018 19:35	8/23/2018 8:15
A49	GN62	overnight	Agnico	2.99	65.4124	-96.7039	2.19	65.4113	-96.7016	8/24/2018 7:45	8/24/2018 20:00
Lake 1	GN63	short-duration	2x NA		65.3524	-96.6992		65.3518	-96.6984	8/25/2018 7:30	8/25/2018 10:35
Lake 1	GN64	short-duration	2x NA	0.55	65.3532	-96.6827	2.80	65.3527	-96.6834	8/25/2018 7:45	8/25/2018 11:05
Lake 1	GN63	short-duration	2x NA		65.3524	-96.6992		65.3518	-96.6984	8/25/2018 10:35	8/25/2018 14:15
Lake 1	GN64	short-duration	2x NA	0.55	65.3532	-96.6827	2.80	65.3527	-96.6834	8/25/2018 11:05	8/25/2018 14:00
Lake 5	GN65	short-duration	2x NA	1.83	65.3764	-96.5905	3.05	65.3768	-96.5919	8/26/2018 8:00	8/26/2018 11:25
Lake 5	GN66	short-duration	2x NA	1.83	65.3747	-96.5742	4.88	65.3749	-96.5754	8/26/2018 8:15	8/26/2018 11:45
Lake 5	GN65	short-duration	2x NA	1.83	65.3764	-96.5905	3.05	65.3768	-96.5919	8/26/2018 11:25	8/26/2018 14:30
Lake 5	GN67	short-duration	2x NA	1.83	65.3747	-96.5742	11.80	65.3742	-96.5752	8/26/2018 11:45	8/26/2018 14:45
Esker 5A	GN68	overnight	2x NA	1.83	65.3934	-96.5944	9.75	65.3929	-96.5953	8/26/2018 17:00	8/27/2018 8:35

Esker 5A	GN69	overnight	2x NA	5.18	65.3911	-96.5928	1.52	65.3912	-96.5938	8/26/2018 17:10	8/27/2018 8:00
Esker 6A	GN70	short-duration	2x NA	6.71	65.4101	-96.6113	11.89	65.4103	-96.6128	8/27/2018 15:00	8/27/2018 19:20
Esker 6A	GN71	short-duration	2x NA	1.83	65.4068	-96.6110	2.44	65.4075	-96.6111	8/27/2018 15:12	8/27/2018 19:35
Esker 6A	GN72	overnight	2x NA	6.71	65.4101	-96.6113	11.89	65.4103	-96.6128	8/27/2018 19:20	8/28/2018 7:40
Esker 6A	GN73	overnight	2x NA	1.83	65.4068	-96.6110	2.44	65.4075	-96.6111	8/27/2018 19:35	8/28/2018 8:00

Table A- 5. Waterbody, logger serial number, location ID and coordinates for temperature loggers deployed in 2018.

Waterbody	Serial #	Location ID	Latitude	Longitude
A53-A17	10739627	L9	65.402200	-96.678585
A46-A17	10718703	L10	65.411583	-96.693681
A53	10739639	L11	65.405222	-96.672303

Table A- 6. Data for individual fish captured during the 2018 field investigations.

Date	Waterbody	Location ID	Gear type	Species	Fork length (mm)	Weight (g)	Sex	Maturity
27-Jun-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	47			
27-Jun-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	57			
27-Jun-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	47			
27-Jun-18	A53-A17	FN-2	fyke net	Arctic Char	114	12.3		
29-Jun-18	A46-A17	FN-1	fyke net	Arctic Char	222	98.8		
29-Jun-18	A46-A17	FN-1	fyke net	Arctic Char	222	95.6		
29-Jun-18	A46-A17	FN-1	fyke net	Arctic Char	179	51.1		
29-Jun-18	A46-A17	FN-1	fyke net	Arctic Char	120	13.5		
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	53			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	55			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	66			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	54			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	51			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	55			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	51			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	45			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	54			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	53			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	54			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	63			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	62			

Date	Waterbody	Location ID	Gear type	Species	Fork length (mm)	Weight (g)	Sex	Maturity
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	55			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	50			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	52			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	54			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	52			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	53			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	56			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	51			
29-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	32			
29-Jun-18	A53-A17	FN-2	fyke net	Slimy Sculpin	95	6.6		
29-Jun-18	A53-A17	FN-2	fyke net	Slimy Sculpin	75	3.7		
29-Jun-18	A53-A17	FN-2	fyke net	Slimy Sculpin	67	2.6		
29-Jun-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	64			
29-Jun-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	51			
30-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	50			
30-Jun-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	56			
30-Jun-18	A53-A17	FN-2	fyke net	Slimy Sculpin	79	3.9		
30-Jun-18	A53-A17	FN-2	fyke net	Arctic Char	110	10.3		
30-Jun-18	A53	FN-4	fyke net	Arctic Char	125	17.0		
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	59			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	58			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	56			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	55			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	61			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	54			

Date	Waterbody	Location ID	Gear type	Species	Fork length (mm)	Weight (g)	Sex	Maturity
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	63			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	58			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	63			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	56			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	54			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	59			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	52			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	62			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	54			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	55			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	63			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	55			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	30			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	59			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	47			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	51			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	63			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	52			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	40			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	22			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	24			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	38			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	22			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	22			
30-Jun-18	A53	FN-4	fyke net	Ninespine Stickleback	33			

Date	Waterbody	Location ID	Gear type	Species	Fork length (mm)	Weight (g)	Sex	Maturity
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	28			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	61			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	60			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	61			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	52			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	56			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	32			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	33			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	61			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	58			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	40			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	32			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	59			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	26			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	61			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	31			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	57			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	49			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	31			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	34			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	54			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	35			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	64			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	31			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	57			

Date	Waterbody	Location ID	Gear type	Species	Fork length (mm)	Weight (g)	Sex	Maturity
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	36			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	53			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	32			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	31			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	25			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	53			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	36			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	25			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	50			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	36			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	27			
30-Jun-18	A53	FN-3	fyke net	Ninespine Stickleback	26			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	49			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	50			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	51			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	49			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	49			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	54			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	51			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	51			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	53			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	46			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	57			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	52			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	59			

Date	Waterbody	Location ID	Gear type	Species	Fork length (mm)	Weight (g)	Sex	Maturity
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	55			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	47			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	51			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	48			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	47			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	56			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	51			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	51			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	44			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	52			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	38			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	49			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	46			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	51			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	48			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	50			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	49			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	49			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	50			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	52			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	53			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	55			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	56			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	52			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	47			

Date	Waterbody	Location ID	Gear type	Species	Fork length (mm)	Weight (g)	Sex	Maturity
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	46			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	54			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	53			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	54			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	49			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	51			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	46			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	63			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	54			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	50			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	53			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	56			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	56			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	60			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	58			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	48			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	57			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	49			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	50			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	60			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	53			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	51			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	52			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	45			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	49			

Date	Waterbody	Location ID	Gear type	Species	Fork length (mm)	Weight (g)	Sex	Maturity
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	48			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	63			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	54			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	59			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	56			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	55			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	42			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	61			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	52			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	62			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	47			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	59			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	58			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	61			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	51			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	52			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	52			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	48			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	55			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	58			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	46			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	46			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	56			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	54			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	51			

Date	Waterbody	Location ID	Gear type	Species	Fork length (mm)	Weight (g)	Sex	Maturity
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	50			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	57			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	51			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	56			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	53			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	52			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	50			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	52			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	58			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	49			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	53			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	46			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	52			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	48			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	57			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	47			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	56			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	48			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	52			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	42			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	56			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	54			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	56			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	55			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	40			

Date	Waterbody	Location ID	Gear type	Species	Fork length (mm)	Weight (g)	Sex	Maturity
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	38			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	59			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	53			
1-Jul-18	A46-A17	FN-1	fyke net	Ninespine Stickleback	51			
1-Jul-18	A53-A17	FN-2	fyke net	Arctic Char	160	33.0		
1-Jul-18	A53-A17	FN-2	fyke net	Arctic Char	152	25.2		
1-Jul-18	A53-A17	FN-2	fyke net	Arctic Char	120	12.9		
1-Jul-18	A53-A17	FN-2	fyke net	Slimy Sculpin	94	7.6		
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	61			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	56			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	36			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	56			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	45			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	53			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	35			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	35			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	36			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	43			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	40			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	32			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	54			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	60			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	46			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	50			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	51			

Date	Waterbody	Location ID	Gear type	Species	Fork length (mm)	Weight (g)	Sex	Maturity
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	49			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	59			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	55			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	39			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	53			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	55			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	55			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	37			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	39			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	34			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	37			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	31			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	33			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	35			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	36			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	37			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	36			
1-Jul-18	A53-A17	FN-2	fyke net	Ninespine Stickleback	35			
5-Aug-18	A53	GN55	small mesh broad-scale gill net	Arctic Char	204	100		
21-Aug-18	A53	GN56	large mesh broad-scale gill net	Lake Trout	511	1540		
21-Aug-18	A53	GN56	large mesh broad-scale gill net	Lake Trout	512	1640		
21-Aug-18	A53	GN56	large mesh broad-scale gill net	Lake Trout	541	1970		
21-Aug-18	A53	GN56	large mesh broad-scale gill net	Lake Trout	530	1890		
21-Aug-18	A53	GN56	large mesh broad-scale gill net	Lake Trout	558	1870		
21-Aug-18	A53	GN56	large mesh broad-scale gill net	Lake Trout	504	1440		

Date	Waterbody	Location ID	Gear type	Species	Fork length (mm)	Weight (g)	Sex	Maturity
21-Aug-18	A53	GN56	large mesh broad-scale gill net	Lake Trout	566	2030		
21-Aug-18	A53	GN56	large mesh broad-scale gill net	Lake Trout	521	1540	F	U
21-Aug-18	A53	GN57	large mesh broad-scale gill net	Lake Trout	528	1670	F	U
21-Aug-18	A53	GN57	large mesh broad-scale gill net	Lake Trout	481	1310		
21-Aug-18	A53	GN57	large mesh broad-scale gill net	Lake Trout	574	2300		
21-Aug-18	A53	GN57	large mesh broad-scale gill net	Lake Trout	464	1060		
21-Aug-18	A53	GN57	large mesh broad-scale gill net	Lake Trout	532	1630		
21-Aug-18	A53	GN57	large mesh broad-scale gill net	Lake Trout	532	1750		
21-Aug-18	A53	GN56	large mesh broad-scale gill net	Lake Trout	570	1990	M	U
21-Aug-18	A53	GN56	large mesh broad-scale gill net	Arctic Char	179	59.8	F	I
22-Aug-18	Lake 8	GN59	large mesh broad-scale gill net	Lake Trout	375	596	F	I
22-Aug-18	Lake 8	GN59	large mesh broad-scale gill net	Lake Trout	488	1080		
22-Aug-18	Lake 8	GN59	large mesh broad-scale gill net	Arctic Char	422	780		
22-Aug-18	Lake 8	GN59	large mesh broad-scale gill net	Lake Trout	199	71		
22-Aug-18	Lake 8	GN59	large mesh broad-scale gill net	Lake Trout	240	135		
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	557	1830		
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	463	1140		
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	520	1480		
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	628	2430		
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	579	1620		
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	499	1180		
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	456	1170		
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	490	1030		
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	659	3010		
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	544	1670		

Date	Waterbody	Location ID	Gear type	Species	Fork length (mm)	Weight (g)	Sex	Maturity
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	296	240		
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	527	1370		
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	583	1980	M	U
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	491	1170	F	U
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	490	1320	M	G
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	480	1210	F	G
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	582	1410	F	U
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	204	83.3	M	I
22-Aug-18	Lake 8	GN58	large mesh broad-scale gill net	Lake Trout	246	134.7	M	I
22-Aug-18	A47	GN60	Agnico standard gill net	Arctic Char	180	69.3	M	I
22-Aug-18	A47	GN60	Agnico standard gill net	Arctic Char	263	197.5	UNK	I
22-Aug-18	A47	GN60	Agnico standard gill net	Arctic Char	236	166.4	UNK	I
22-Aug-18	A47	GN60	Agnico standard gill net	Arctic Char	257	198.2	F	I
22-Aug-18	A47	GN60	Agnico standard gill net	Arctic Char	199	97.8	M	I
22-Aug-18	A47	GN60	Agnico standard gill net	Arctic Char	291	295		
22-Aug-18	A47	GN60	Agnico standard gill net	Arctic Char	270	227		
22-Aug-18	A47	GN60	Agnico standard gill net	Arctic Char	284	253		
22-Aug-18	A47	GN60	Agnico standard gill net	Arctic Char	271	233		
22-Aug-18	A47	GN60	Agnico standard gill net	Arctic Char	241	174		
23-Aug-18	A49	GN61	Agnico standard gill net	Lake Trout	299	294		
25-Aug-18	Lake 1	GN63	large mesh broad-scale gill net	Lake Trout	780	6110		
25-Aug-18	Lake 1	GN63	large mesh broad-scale gill net	Lake Trout	436	874		
25-Aug-18	Lake 1	GN63	large mesh broad-scale gill net	Lake Trout	355	460		
25-Aug-18	Lake 1	GN64	large mesh broad-scale gill net	Round Whitefish	248	142		
25-Aug-18	Lake 1	GN63	large mesh broad-scale gill net	Lake Trout	518	1158	M	M

Date	Waterbody	Location ID	Gear type	Species	Fork length (mm)	Weight (g)	Sex	Maturity
26-Aug-18	Lake 5	GN65	large mesh broad-scale gill net	Lake Trout	338	361		
26-Aug-18	Lake 5	GN65	large mesh broad-scale gill net	Lake Trout	443	858		
26-Aug-18	Lake 5	GN65	large mesh broad-scale gill net	Lake Trout	454	864		
26-Aug-18	Lake 5	GN66	large mesh broad-scale gill net	Lake Trout	404	704		
26-Aug-18	Lake 5	GN66	large mesh broad-scale gill net	Lake Trout	410	752		
26-Aug-18	Lake 5	GN66	large mesh broad-scale gill net	Lake Trout	407	717	F	U
26-Aug-18	Lake 5	GN67	large mesh broad-scale gill net	Lake Trout	460	997		
26-Aug-18	Lake 5	GN67	large mesh broad-scale gill net	Arctic Char	471	868		
27-Aug-18	Esker 5A	GN69	large mesh broad-scale gill net	Arctic Char	449	870		
27-Aug-18	Esker 5A	GN69	large mesh broad-scale gill net	Arctic Char	326	317		
27-Aug-18	Esker 5A	GN69	large mesh broad-scale gill net	Lake Trout	427	787		
27-Aug-18	Esker 5A	GN69	large mesh broad-scale gill net	Lake Trout	302	291		
27-Aug-18	Esker 5A	GN69	large mesh broad-scale gill net	Lake Trout	254	156		
27-Aug-18	Esker 5A	GN69	large mesh broad-scale gill net	Lake Trout	288	249		
27-Aug-18	Esker 5A	GN69	large mesh broad-scale gill net	Lake Trout	529	1571	M	U
27-Aug-18	Esker 5A	GN69	large mesh broad-scale gill net	Lake Trout	827	6420	M	G
27-Aug-18	Esker 5A	GN68	large mesh broad-scale gill net	Lake Trout	295	266		
27-Aug-18	Esker 5A	GN68	large mesh broad-scale gill net	Lake Trout	572	2380		
27-Aug-18	Esker 5A	GN68	large mesh broad-scale gill net	Arctic Char	494	1171		
27-Aug-18	Esker 5A	GN68	large mesh broad-scale gill net	Lake Trout	569	2080		
27-Aug-18	Esker 5A	GN68	large mesh broad-scale gill net	Lake Trout	554	2330		
27-Aug-18	Esker 5A	GN68	large mesh broad-scale gill net	Lake Trout	475	1009		
27-Aug-18	Esker 5A	GN68	large mesh broad-scale gill net	Lake Trout	252	160		
27-Aug-18	Esker 5A	GN68	large mesh broad-scale gill net	Lake Trout	324	347		
27-Aug-18	Esker 5A	GN68	large mesh broad-scale gill net	Lake Trout	279	220		

Date	Waterbody	Location ID	Gear type	Species	Fork length (mm)	Weight (g)	Sex	Maturity
27-Aug-18	Esker 5A	GN68	large mesh broad-scale gill net	Lake Trout	197	72		
27-Aug-18	Esker 5A	GN68	large mesh broad-scale gill net	Lake Trout	301	300		
27-Aug-18	Esker 5A	GN68	large mesh broad-scale gill net	Lake Trout	764	4230	M	U
27-Aug-18	Esker 5A	GN68	large mesh broad-scale gill net	Lake Trout	412	677	M	I
27-Aug-18	Esker 5A	GN68	large mesh broad-scale gill net	Lake Trout	292	254	UNK	I
28-Aug-18	Esker 6A	GN73	large mesh broad-scale gill net	Arctic Char	256	153.7		
28-Aug-18	Esker 6A	GN73	large mesh broad-scale gill net	Arctic Char	167	46.8		
28-Aug-18	Esker 6A	GN72	large mesh broad-scale gill net	Burbot	203	48.1		
28-Aug-18	Esker 6A	GN72	large mesh broad-scale gill net	Arctic Char	356	42.2	F	I

WHALE TAIL EXPANSION PROJECT 2019 FISH AND FISH HABITAT FIELD INVESTIGATIONS: AGNICO EAGLE MINES LTD. - MEADOWBANK DIVISION

Submitted to:

Agnico Eagle Mines Ltd: Meadowbank Division
Regional Office – 11600 Rue Louis-Bisson, Mirabel, J7N 1G9

December 2019

C. PORTT and ASSOCIATES
63 Waterloo Avenue
Guelph, Ontario, N1H 3H5
cportt@sentex.net

EXECUTIVE SUMMARY

Agnico Eagle Mines Limited: Meadowbank Division is proposing to expand operations at their Whale Tail Pit, a satellite deposit on the Amaruq property, in continuation of mine operations and milling of the Meadowbank Mine. Baseline fisheries investigations in the Whale Tail Pit study area were conducted in 2014, 2015, 2016 and 2018. The primary activities in 2019 were:

- deployment of a fyke net and drift nets in a small watercourse at the beginning of the field season to detect spring upstream or downstream fish migrations if they occurred,
- fish sampling in small lakes and ponds that will be affected by the proposed project expansion using electrofishing and minnow traps,
- gill netting and electrofishing to determine salmonid species presence:absence in a lake being considered as a possible offsetting location, and
- collection of bathymetry data and preparation of bathymetry maps for two lakes downstream from the project.

Previous field investigations had found a total of six fish species in the primary study area, comprised of four large-bodied species (Lake Trout, Arctic Char, Round Whitefish and Burbot) and two small-bodied species (Slimy Sculpin and Ninespine Stickleback). No additional species were captured during the 2019 field investigations.

A fyke net was deployed with the opening facing downstream and two drift nets were deployed with the openings facing upstream in stream A55-A17, from June 21 - 25, 2019. In total, nine Ninespine Stickleback (fork lengths ranging from 23 mm to 64 mm), two Arctic Char (fork lengths 211 and 165 mm) and one Round Whitefish (fork length 114 mm) were captured in the fyke net. No fish were caught in the drift nets.

Standard (Gee) minnow traps were deployed in seven small lakes or ponds (A50, A51, A52, A53, A54, A-P10 and A-P21) in 2019. A53 was intended to function as a 'positive control' because Ninespine Stickleback were known to be present in it. Waterbodies A50, A51, A52, A53, A54, A-P10 and A-P21, and watercourse A52-A53, were electrofished. Ninespine Stickleback, Slimy Sculpin, and one juvenile Burbot were captured in A53. Ninespine Stickleback were also captured, in lower numbers, in Lakes A50, A51, and A52, where they had not been captured previously.

Improving access to allow more fish species to utilize waterbodies is a potential method of offsetting for habitat losses. Based on aerial imagery lakes A43 and A44 were identified as potential candidates for improved connections, if salmonids do not occur in them under current conditions. The connections between A44 and A43 and between A43 and Mammoth Lake were examined, and a gill net was set in A44, which was also electrofished. No fish were captured in the gill net. The electrofishing catch consisted of Slimy Sculpin, Ninespine Stickleback, juvenile Burbot and juvenile Lake Trout.

Sonar data were acquired for lakes A15 and Lake A12 and processed to create bathymetric maps.

Table of Contents

List of Tables

List of Figures

1.0 INTRODUCTION

Agnico Eagle Mines Limited: Meadowbank Division (Agnico Eagle) is proposing to expand the Whale Tail Pit Project. Whale Tail Pit is a satellite deposit, on the Amaruq property, in continuation of mine operations and milling of the Meadowbank Mine. The Amaruq Exploration property is a 408 square kilometer (km^2) site located on Inuit Owned Land approximately 150 kilometers (km) north of the hamlet of Baker Lake and approximately 50 km northwest of the Meadowbank Mine in the Kivalliq region of Nunavut. The property was acquired by Agnico Eagle in April 2013, subject to a mineral exploration agreement with Nunavut Tunngavik Incorporated.

Agnico Eagle operates the Meadowbank Gold Mine, located on Inuit-owned lands approximately 70 km north of the hamlet of Baker Lake in the Kivalliq Region of Nunavut (Figure 1-1). The Meadowbank mine began commercial production in 2010 and has been producing gold from open pits at the Meadowbank site, which is scheduled to cease operations in 2019. The first phase of the development of the Amaruq property is the Whale Tail Pit Project, approved in 2018.[1] Construction of the Whale Tail Pit Project began in 2018. The Whale Tail Pit Project has an approved *Fisheries Act* Authorization under Paragraph 35(2)(b) for the Whale Tail Pit Project (PATH No.:16-HCAA-00370; July 2018) habitat losses and offsetting as outlined in the approved Whale Tail Pit Fish Habitat Offsetting Plan (C. Portt and Associates, and Agnico Eagle Mines Ltd., 2018).

The proposed expansion project includes expansion of approved facilities and additional operations (IVR Pit and underground mining), while operations and milling continue at the Meadowbank Mine. As an amendment to the approved operations at the Whale Tail site, the Whale Tail Project Expansion is subject to an environmental review established by Article 12, Part 5 of the *Nunavut Land Claims Agreement* (NLCA).

Baseline data were collected from 2014 through 2016 and in 2018 in support of the Environmental Review for the Whale Tail Pit Project, to document existing conditions and to provide the foundation for a qualitative and quantitative assessment of project operations and the extension of the mine development, to be evaluated in the Environmental Impact Statement (EIS) for the Project. The scope of those field investigations included fish and fish habitat in waterbodies and watercourses north and east of Whale Tail Lake that will be directly affected by the Whale Tail Project Expansion, and the results were reported in C. Portt and Associates (2018, 2019). Additional field investigations were undertaken during the periods June 18 - July 1 and August 18 - 28, 2018, by C. Portt and Associates in support of the Whale Tail Pit Project Expansion.

[1] Positive decision received from NIRB on November 6, 2017. Ministerial Decision received on February 15, 2018, Project Certificate 008. Nunavut Water Board Type A Licence received July 16, 2018 (2AM WTP 1826).

The primary activities were:

- deployment of a fyke net and drift nets in a small watercourse at the beginning of the field season to detect spring upstream or downstream fish migrations if they occurred,
- fish sampling in small lakes and ponds that will be affected by the proposed project expansion using electrofishing and minnow traps,
- gill netting and electrofishing to determine salmonid species presence:absence in a lake being considered as a possible offsetting location, and
- collection of bathymetry data and preparation of bathymetry maps for two lakes downstream from the project.

This report documents the methods and results of the 2019 field investigations.

1.1 Physical Setting

The study area is located on the Canadian Shield within a Low Arctic ecoclimate of continuous permafrost and is one of the coldest and driest regions of Canada (Azimuth, 2010). The lakes within the Whale Tail pit study area are ultra-oligotrophic/oligotrophic (nutrient poor, unproductive) headwater lakes that are typical of the Arctic. The ice-free season on the lakes is very short. Ice break-up usually begins during mid- to late-June, with the lakes becoming ice-free in early July. Ice begins to form again on the lakes in late September or early October. Complete ice cover is attained by late October, with maximum ice thickness of about 2 m occurring in March/April (Azimuth, 2013). Many small watercourses become dry once the land begins to freeze in the fall and, where water is present, most freeze to the bottom during the winter (BAER, 2005; Jones *et al*, 2010). Flows during the spring melt and the summer vary with drainage area.

The primary Whale Tail Pit study area is situated in the headwaters of a small river that flows northwest for approximately 13 km to a lake that is on a tributary of the Meadowbank River, which in turn is a tributary of the Back River that flows to tidewater at the Chantrey Inlet and the Arctic Ocean. Figure 1-2 provides an overview of the study area and shows the location other figures in this document.

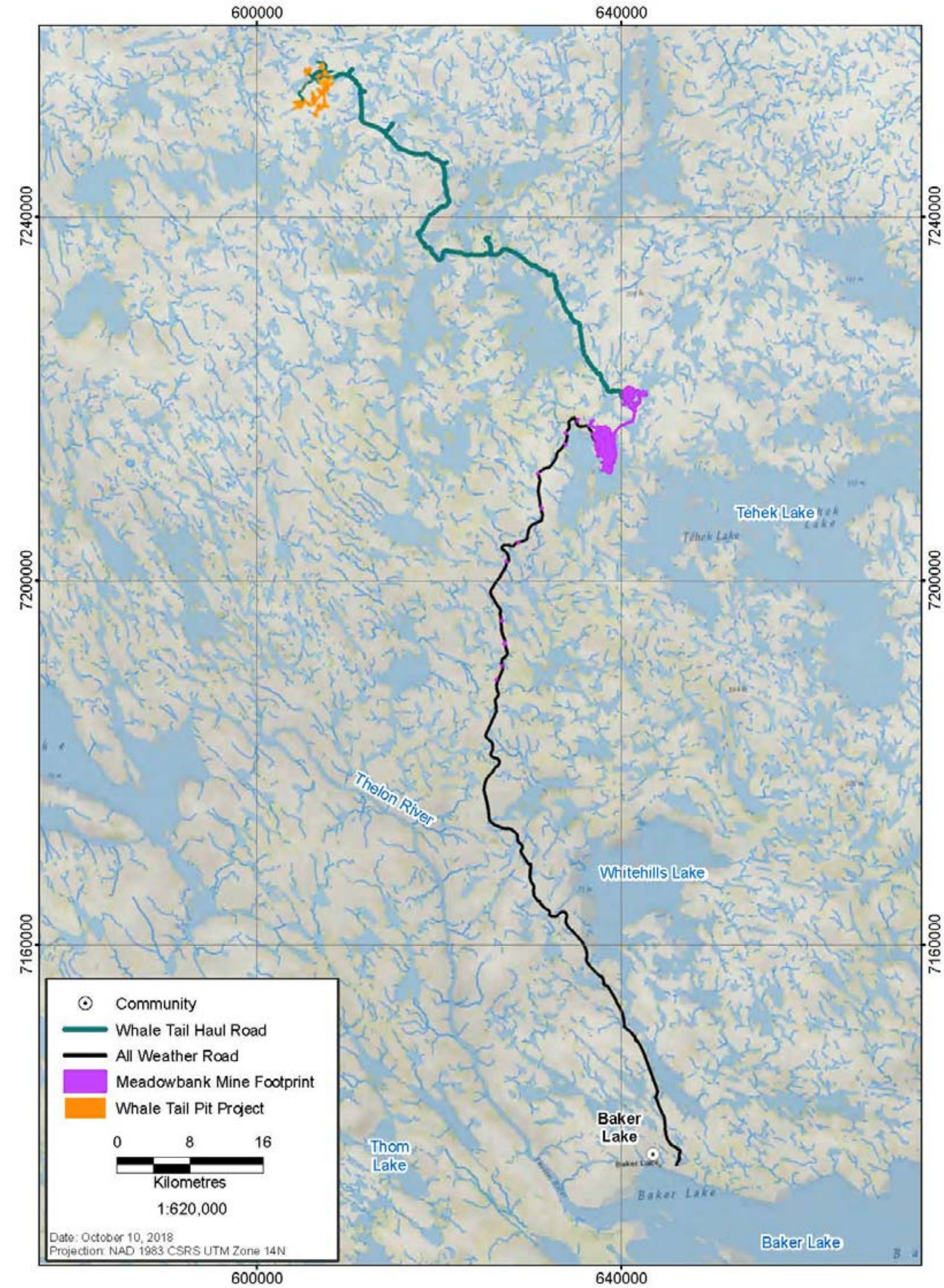


Figure 1-1. Map showing the location of the Meadowbank Gold Mine and the Whale Tail Pit Project. Source: ERM Canada Consultants Ltd., 2018

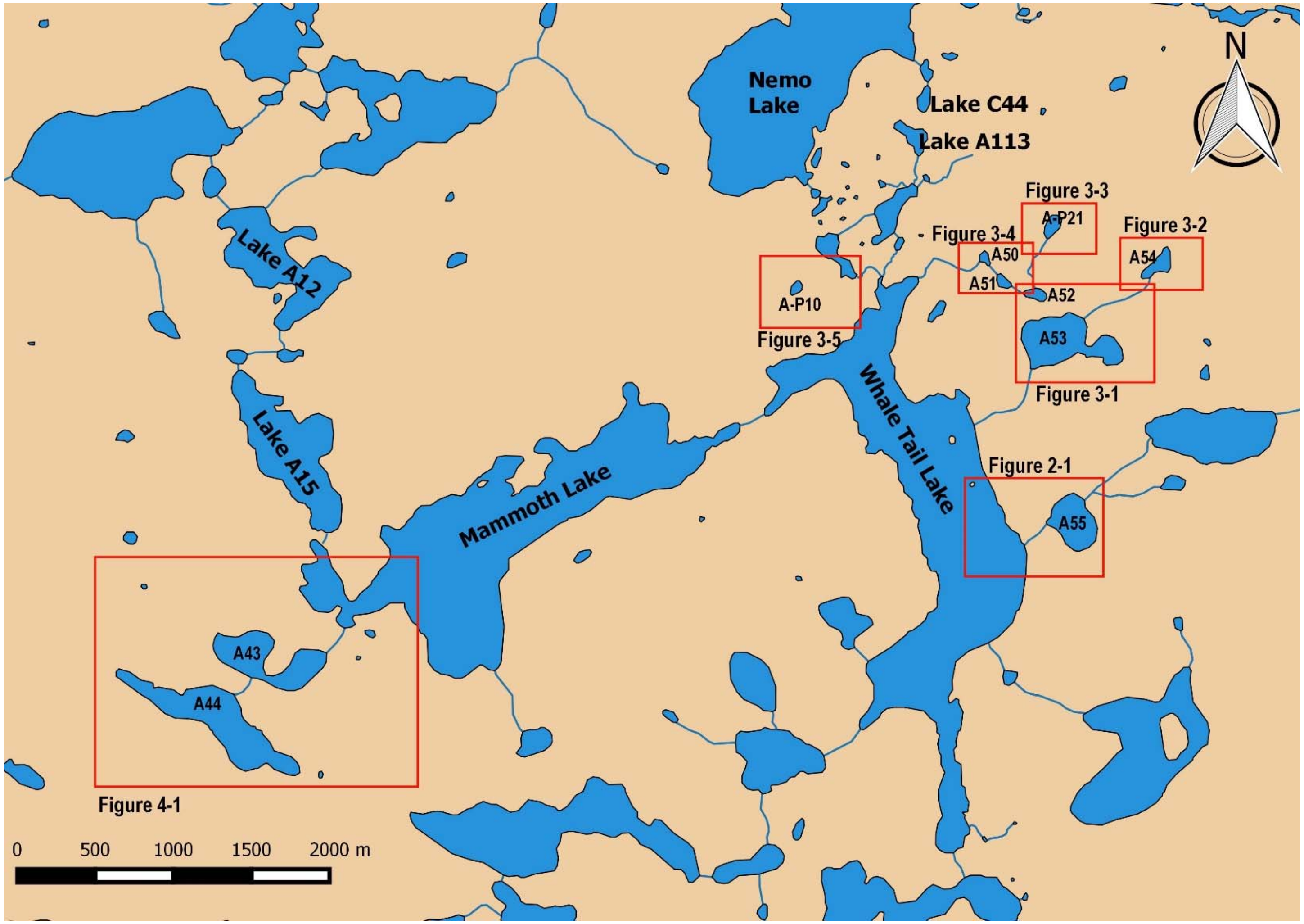


Figure 1-2. Key map showing the locations of other figure in this report.

2.0 FYKE NET AND DRIFT NETS IN STREAM A55-A17

A fyke net and drift nets were deployed in watercourse A55-A17 at the beginning of the field season to detect upstream or downstream fish migrations, if they occurred. This work was undertaken to support investigations by Fisheries and Oceans staff, who arrived on site a few days after C. Portt and Associates staff. These investigations were continued by Fisheries and Oceans staff after they arrived on site.

2.1 Methods

A fyke net was deployed with the opening facing downstream (Location FN-5, Figure 2-1) and two drift nets were deployed with the openings facing upstream (Locations DN-1 and DN-2, Figure 2-1), in stream A55-A17, on June 21, 2019. The coordinates of the net locations were determined using a handheld GPS. The coordinates of the net locations and set and lift dates and times are provided in Appendix A (Table A-1). The net locations are shown in Figure 2-1. Photographs of the set nets are provided in Figures B 1 – B 3, Appendix B.

The fyke net was constructed of 3.2 mm (1/8 inch) knotless nylon mesh and two 122 cm by 61 cm rectangular steel frames, with a single 76 mm (3 inch) throat on the front frame. Watercourse A55-A17 was too shallow to submerge the fyke net throat, so the net was set in Whale Tail Lake at the mouth of the watercourse.

The drift nets consisted of a stainless-steel D-frame, 76 cm wide and 53 cm high, to which a cone of 1.6 mm mesh, 3.6 m long and tapering to a 11.4 cm diameter opening, was attached. A detachable collection container with filtering holes covered by 1000 µm mesh was attached to the small end of the mesh cone. A bridle attached to the front of the D-frame was attached with rope to an anchor placed approximately 5 m upstream. It was estimated that one quarter of the flow in A55-A17 was passing through each drift net. A temperature logger (WaterTemp® Pro V2, Onset Corporation) was attached to the upstream drift net.

The nets were checked daily until June 25, 2019, when the operation of these nets was assumed by Fisheries and Oceans Canada (DFO) staff. Fish captured in the fyke net were identified to species and measured to the nearest millimetre using a standard fish measuring board. *Salvelinus* spp. were photographed and the field identification was subsequently confirmed using the photographs. After processing, the fish were released upstream of the net.

During retrieval, each drift net was lifted from front to back, rinsing the mesh so that retained material was moved into the collection container at the end of the mesh cone. The collection container was then removed, and the collected material was emptied into a bucket. The collection container was re-attached, and the net was reset. The bucket contents were then carefully searched for fish.

2.2 Results

The fyke net and drift net soak times and catches are provided in Table 2-1. The fyke net was deployed continuously for 88.7 hours. In total, nine Ninespine Stickleback (fork lengths ranging from 23 mm to 64 mm), two Arctic Char (fork lengths 211 and 165 mm) and one Round Whitefish (fork length 114 mm) were captured in the fyke net. Soak times were 88.3 hours and 88.1 hours for drift net DN-1 and DN-2 respectively. No fish were caught in the drift nets.

Table 2-1. Fyke net and drift net set and lift dates, soak times and catches. Net locations are shown in Figure 2-1.

Net Location	Date Set	Date Lifted	Soak Time (hrs)	Ninespine Stickleback	Arctic Char	Round Whitefish
A55-A17 (FN-5)	21-Jun-19	22-Jun-19	13.8	3	0	0
	22-Jun-19	23-Jun-19	26.8	0	1	0
	23-Jun-19	24-Jun-19	23.2	5	1	0
	24-Jun-19	25-Jun-19	24.9	1	0	1
A55-A17 (DN-1)	21-Jun-19	22-Jun-19	13.7	0	0	0
	22-Jun-19	23-Jun-19	26.8	0	0	0
	23-Jun-19	24-Jun-19	23.1	0	0	0
	24-Jun-19	25-Jun-19	24.7	0	0	0
	21-Jun-19	22-Jun-19	13.7	0	0	0
A55-A17 (DN-2)	21-Jun-19	22-Jun-19	13.7	0	0	0
	22-Jun-19	23-Jun-19	26.7	0	0	0
	23-Jun-19	24-Jun-19	23.2	0	0	0
	24-Jun-19	25-Jun-19	24.5	0	0	0
	21-Jun-19	22-Jun-19	13.7	0	0	0

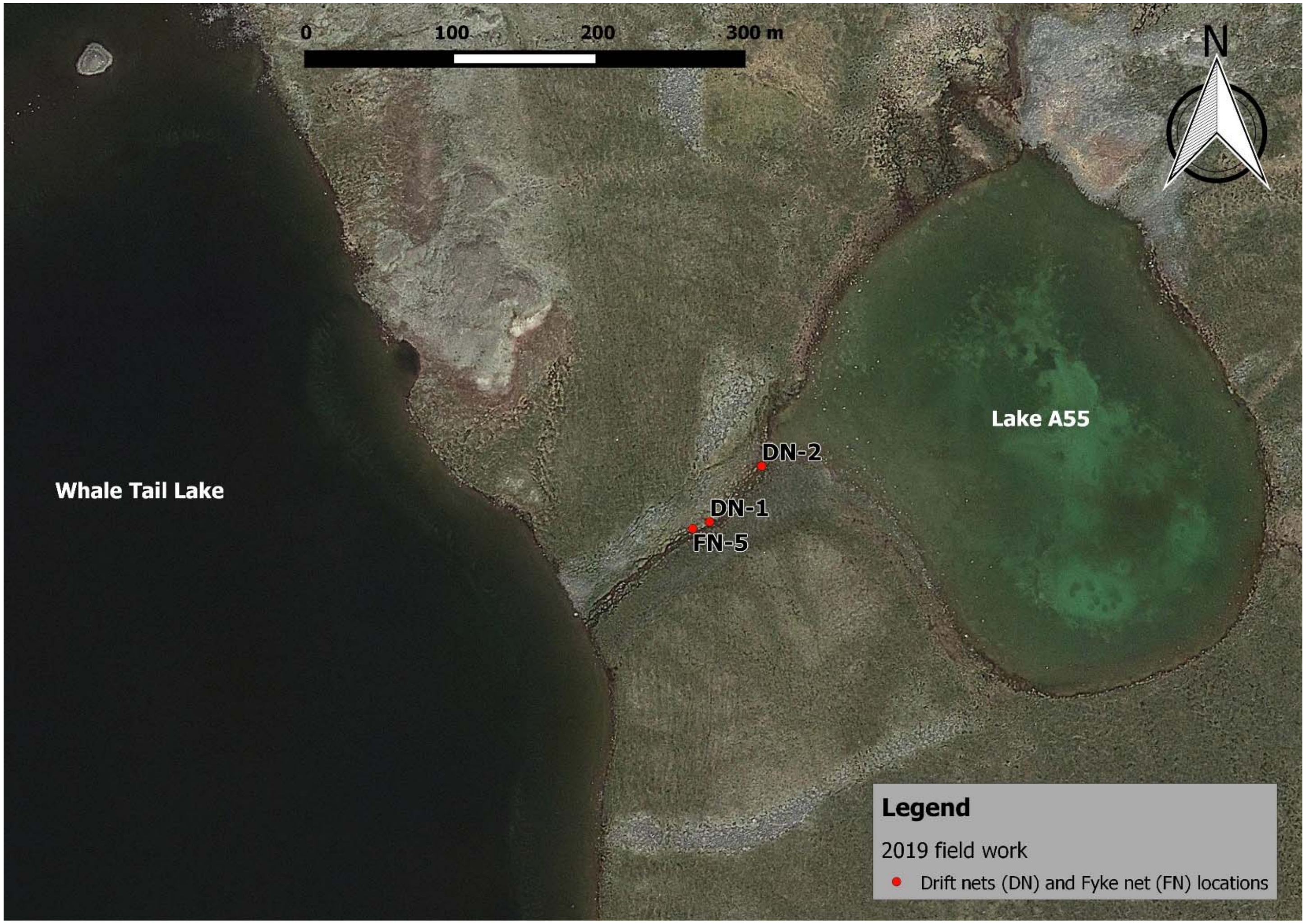


Figure 2-1. Fyke net and drift net locations in watercourse A55-A17. The water levels in Whale Tail Lake in June, 2019, were higher than shown in the aerial photograph, and FN-5 was in Whale Tail Lake at the mouth of the watercourse.

3.0 INVESTIGATIONS OF SMALL LAKES AND PONDS AND ASSOCIATED WATERCOURSES

3.1 Methods

The area between Lake A113 and Nemo Lake was examined on the ground on June 19 and from the air on August 27 to determine if there was a surface connection between the two lakes.

Standard (Gee) minnow traps were deployed in seven small lakes or ponds (A50, A51, A52, A53, A54, A-P10 and A-P21) in 2019. A53 was intended to function as a 'positive control' because Ninespine Stickleback were known to be present in it. Each trap was baited with two pellets of artificial bait (Mike's Glo Mallows – Cerise/Shrimp) and new bait was added when traps were lifted and redeployed at the same location. Where each trap was deployed, the depth was measured to the nearest centimetre with a ruler, the substrate was described, and the coordinates were determined using a Garmin GPSmap 76CSx handheld GPS. The dates and times of trap deployments and retrievals were recorded. Most sets were approximately 24 hours in duration but sets in A54 in August were approximately 52 hours.

Captured fish were identified to species. Most captured individuals were measured using a standard fish measuring board and all were released near their capture location. Catch-pre-unit-effort (CPUE) was calculated as the number if individuals captured per 24 hours of soak time.

Watercourse A52-A53 and waterbodies A50, A51, A52, A53, A54, A-P10 and A-P21 were electrofished in June, using a Halltech Mark 5 backpack electrofisher. The coordinates at the beginning and end of electrofishing transects and the electrofishing path was recorded using a handheld GPS. Captured fish were identified to species and most were measured to the nearest mm using a standard fish measuring board. Fish were released near the point of capture.

3.2 Results

The minnow trap effort and catch data are summarized in Table 3-1 and the information for individual sets is provided in Table A-2 (Appendix A). Electrofishing catches are summarized in Table 3-2 and the coordinates of the sampling locations are provided in Table A-3 (Appendix A).

3.2.1 Connection between Lake A113 and Nemo Lake

On June 17, there was a surface connection between A113 and C44, which is in the Nemo Lake watershed, that was passable for small fish (Figures B 4 - B 6, Appendix B). A surface connection was also observed to be present on August 27, 2019.

Table 3-1. Summary of 2019 minnow trapping effort and catches. Trap locations are shown in Figures 3-1, 3-2, 3-3, 3-4 and 3-5. Data for individual trap sets are provided in Appendix A (Table A-2).

Waterbody	Season	Date set	Date lifted	Number of traps	Mean soak time (hours)	Total soak time (hours)	Ninespine Stickleback	Burbot	Catch per 24 hours of soak time
A50	spring	June 27, 2019	June 28, 2019	10	23.3	233.0	116	0	11.9
	late summer	August 27, 2019	August 28, 2019	10	23.9	239.3	21	0	2.1
	Total			20	23.6	472.4	137	0	7.0
A51	spring	June 28, 2019	June 29, 2019	5	24.5	122.4	1	0	0.2
	late summer	August 26, 2019	August 27, 2019	10	24.0	239.5	12	0	1.2
	Total			15	24.1	361.9	13	0	0.9
A52	spring	June 28, 2019	June 29, 2019	5	23.9	119.3	2	0	0.4
A53	spring	June 25, 2019	June 26, 2019	10	21.8	218.2	435	1	48.0
	spring	June 26, 2019	June 27, 2019	10	23.2	232.2	366	0	37.8
	Total			20	22.5	450.4	801	1	42.7
A54	spring	July 1, 2019	July 2, 2019	10	24.0	239.7	0	0	0.0
	late summer	August 24, 2019	August 26, 2019	10	52.0	520.3	0	0	0.0
	Total			20	38.0	759.9	0	0	0.0
A-P10	spring	June 29, 2019	June 30, 2019	10	20.8	208.4	0	0	0.0
A-P21	spring	June 30, 2019	July 1, 2019	10	23.6	235.7	0	0	0.0
	late summer	August 23, 2019	August 24, 2019	10	23.0	229.5	0	0	0.0
	Total			20	23.3	465.2	0	0	0.0

Table 3-2. Locations, dates, effort (distance electrofished and electroseconds) and catches for electrofishing conducted in small lakes and ponds and in watercourse A52-A53 in 2019. Electrofishing locations are shown in Figures 3-1, 3-2, 3-3, 3-4 and 3-5. Coordinates for the start and end of each electrofishing location are provided in Appendix A (Table A-3).

Waterbody/ watercourse	Location ID	Date	Distance (m)	Electro-seconds	Ninespine Stickleback	Slimy Sculpin
A53	EF-L100	27-Jun-19	126	750	124	9
A52	EF-L102	28-Jun-19	77	1051	0	0
A52-A53	EF-S90	28-Jun-19	78	579	0	0
A50	EF-L101	27-Jun-19	37	294	1	0
A50	EF-L104	29-Jun-19	245	1014	1	0
A51	EF-L103	29-Jun-19	230	1054	0	0
A54	EF-L97	24-Jun-19	159	1114	0	0
A-P10	EF-L96	23-Jun-19	163	1178	0	0
A-P21	EF-L99	24-Jun-19	139	1018	0	0

3.2.2 Lakes A52 and A53 and watercourse A52-A53

The minnow trap and electrofishing locations are shown in Figure 3-1. Only Ninespine Stickleback were captured in the minnow traps set in late June in A53 and A52 (Table 3-1). The mean CPUE in A53 (42.7) was two orders of magnitude greater than the CPUE in A52 (0.4). Ninespine Stickleback and Slimy Sculpin were captured by electrofishing in A53 but no fish were captured by electrofishing in A52.

Watercourse A52-A53 is an ephemeral, shallow, diffuse watercourse that flows from A52 to A53 for part of the summer (Figures B 7 – B 10, Appendix B). No fish were captured by electrofishing this watercourse in June. Lake A52 and watercourse A52-A53 were dry when examined in August 2019 (Figure B 11. Appendix B). There is a drainage divide between lakes A52 and A51 and no watercourse between them (Figure B 12. Appendix B).

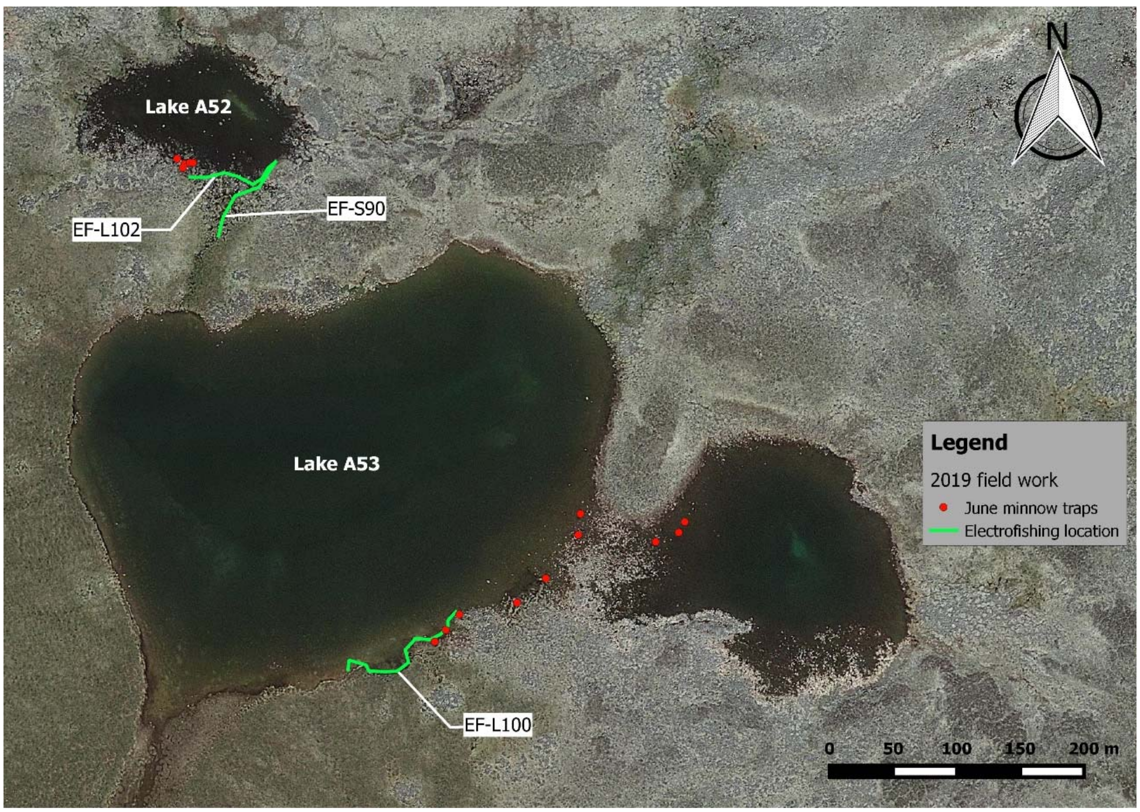


Figure 3-1. Minnow trap and electrofishing locations in A52 and A53 in June 2019.

3.2.3 A54

The minnow trap and electrofishing locations are shown in Figure 3-2. No fish were captured in minnow traps set in early July and August (Table 3-1) or by electrofishing in June (Table 3-2). Watercourse A54-A53 was examined on the ground on June 19 and August 26, 2019. There was no surface connection between A54 and A53 on either of those dates (Figures B 13 – B 20, Appendix B).

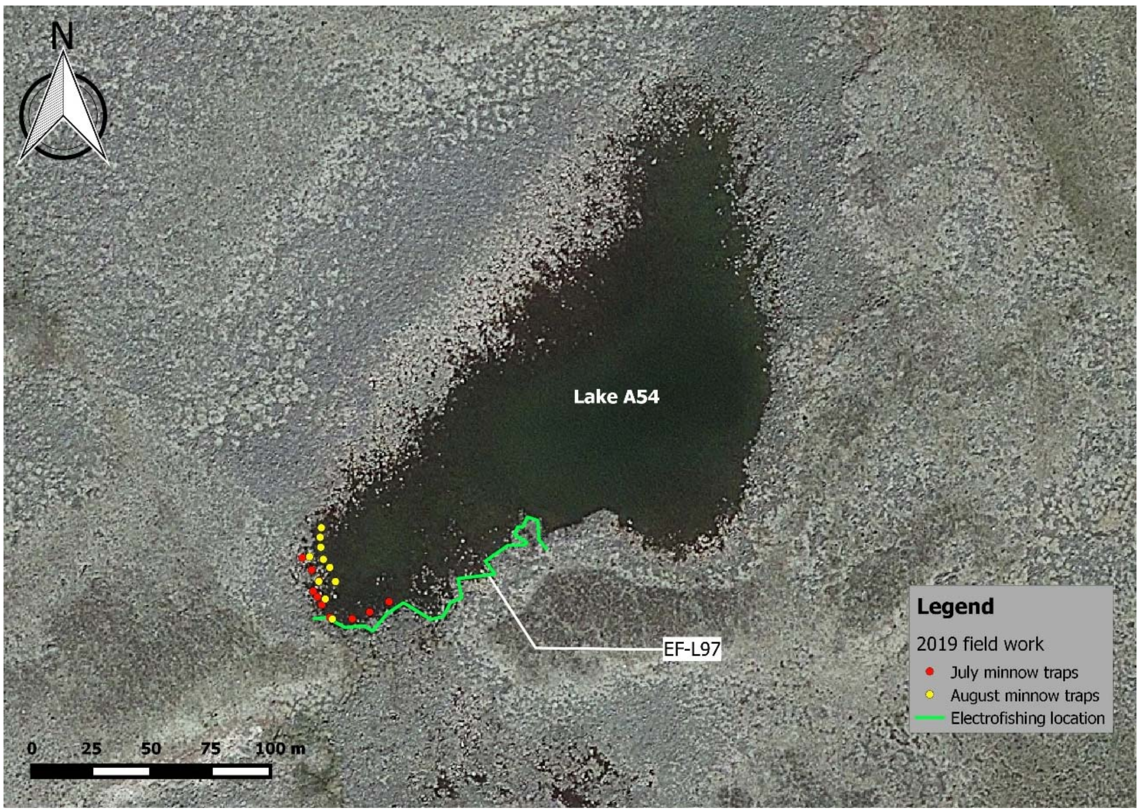


Figure 3-2. Electrofishing and minnow trap locations in A54.

3.2.4 A-P21

The minnow trap and electrofishing locations are shown in Figure 3-3. No fish were captured by electrofishing A-P21 in June (Table 3-2) or in minnow traps set in late June/early July and in August (Table 3-1). Watercourse A-P21-A52 was examined on the ground on June 19 and August 26, 2019. There was no surface connection between A-P21 and A52 on June 19 (Photograph B 21, Appendix B) and on August 26, A-P21 and A52 were dry.

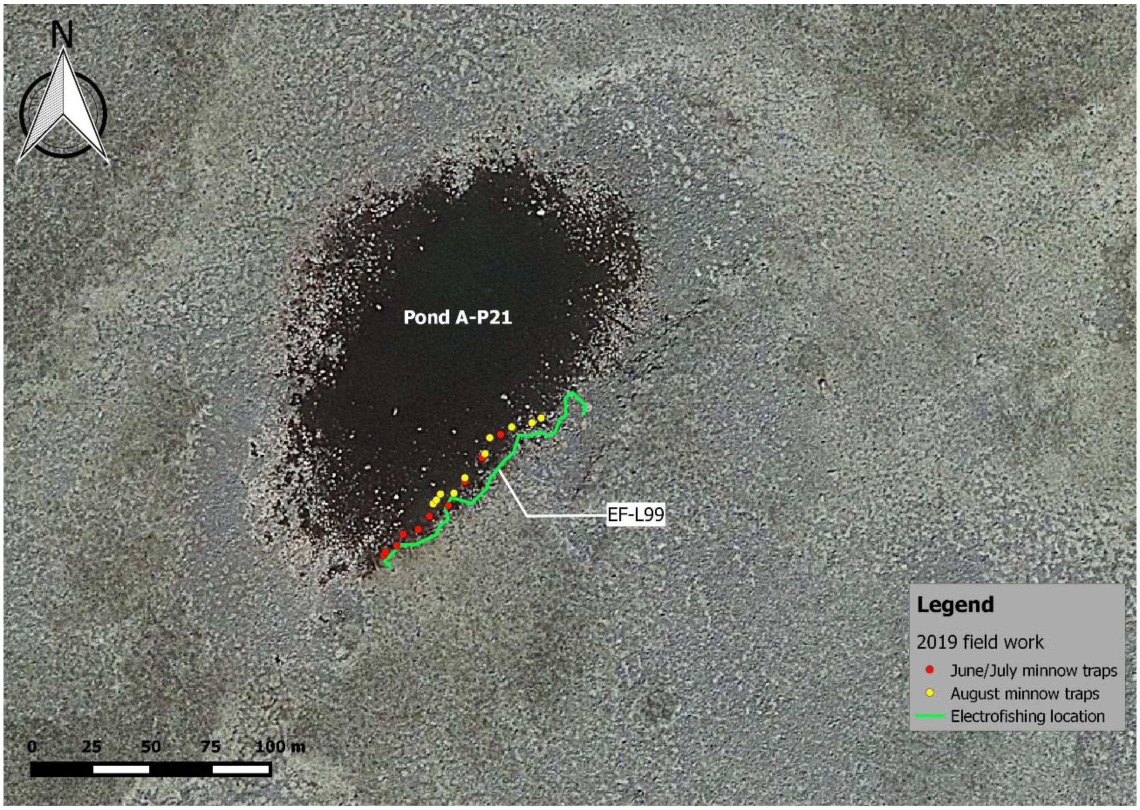


Figure 3-3. Electrofishing and minnow trap locations in A-P21.

3.2.5 Lakes A50 and A51 and Watercourse A51-A50

The minnow trap and electrofishing locations are shown in Figure 3-4. Ninespine Stickleback were captured in A50 and A51 in minnow traps in June and August of 2019, and by electrofishing in A50 (Table 3-2). CPUE in June was low relative to Lake A53.

These results contrasted with previous years, when no fish were captured by electrofishing in A50 or A51. The reason for this difference is not known, however one possibility is that changes to the connection between A50 and downstream overwintering habitats improved accessibility. Both A50 and A51 are shallow; their maximum depths, measured on August 24, 2019, were 0.7 m and 1.1 m respectively, so they are expected to freeze to the bottom each winter. Therefore, fish that are present during the open-water season must move into these lakes from downstream. In previous years, there was flow in a diffuse watercourse across the tundra from A50 to the defined downstream portion of A50-A17 which flowed to Whale Tail Lake and a similar watercourse from A51 to A50. During the winter of 2019-2020 the Northeast dike was constructed, which created the Northeast Pond, flooding the defined portion of A50-A17. In addition, a road was constructed that crosses the previous diffuse watercourse from A50 and that flow is now conveyed beneath that road in a culvert. By focusing downstream flow, the culvert may have improved access for Ninespine Stickleback. An alternative possibility is that higher precipitation in 2019 than in previous years when field work was conducted improved access.

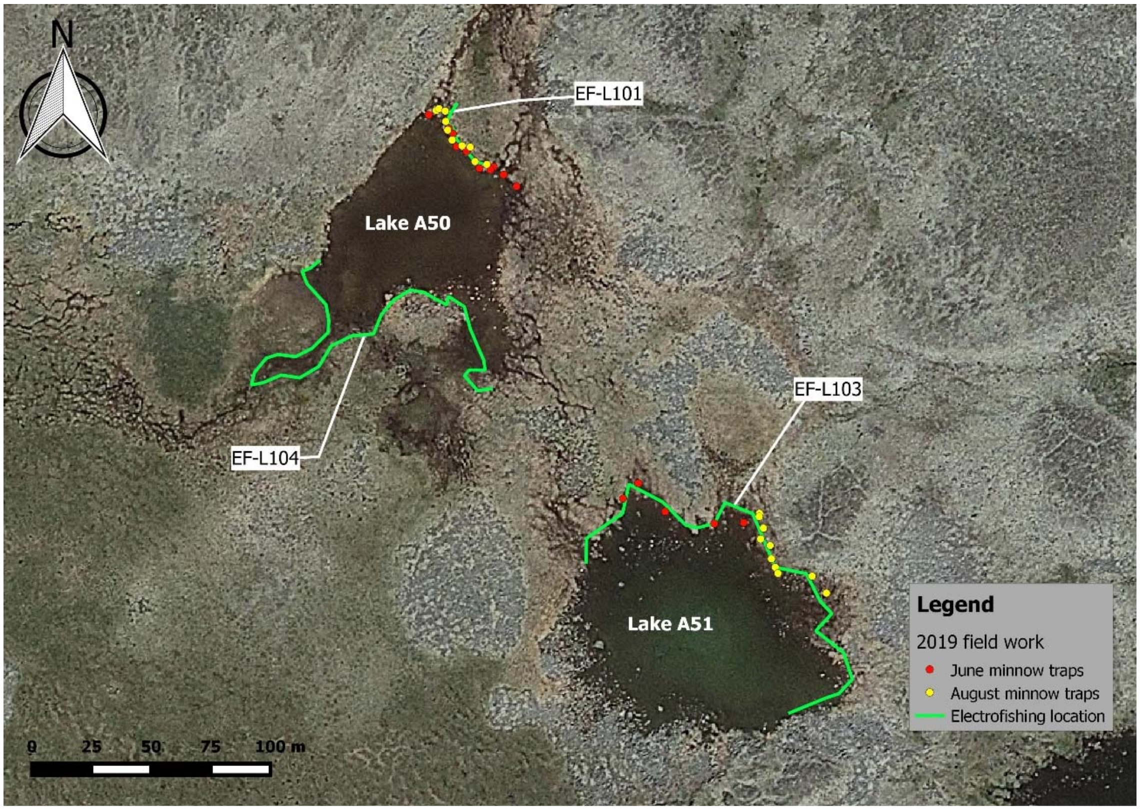


Figure 3-4. Electrofishing and minnow trap locations in A50 and A51.

3.2.6 A-P10

The minnow trap and electrofishing locations are shown in Figure 3-5. Pond A-P10 was examined on the ground on June 19, 2019. There was no surface connection to any other waterbody or watercourse. No fish were captured by electrofishing pond A-P10 (Table 3-2) or in minnow traps set in June (Table 3-1).

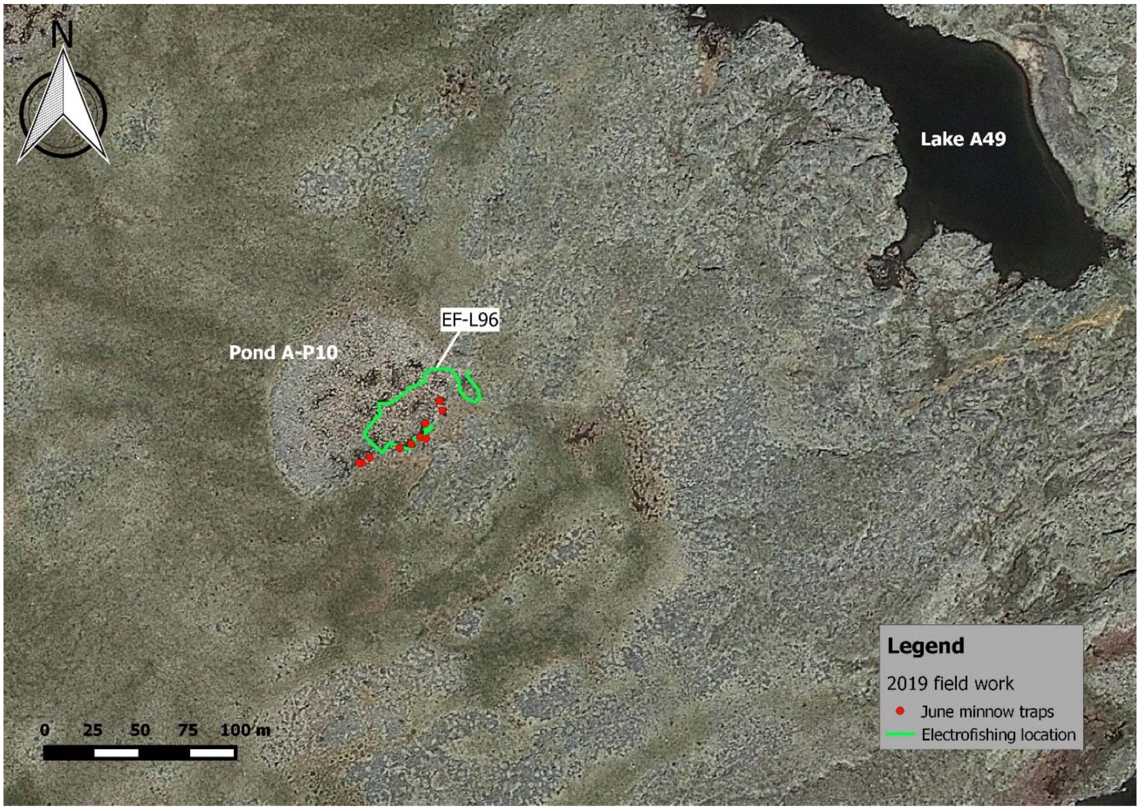


Figure 3-5. Electrofishing and minnow trap locations in A-P10.

4.0 SEARCH FOR POTENTIAL OFFSETTING OPPORTUNITIES – LAKES A43 AND A44

4.1 Introduction

Improving access to allow more fish species to utilize waterbodies is a potential method of offsetting for habitat losses. Based on aerial imagery, lakes A43 and A44 (Figure 1-2) were identified as potential candidates for improved connections if salmonids do not occur in them under current conditions. A44 drains to A43 which drains to Mammoth Lake (A16).

4.2 Methods

On June 22 the connections between A44 and A43 and between A43 and Mammoth Lake were examined from the air and on the ground. A gill net was set in A44 on August 18. The gill net consisted of two North American standard nets (3.1 meter long by 1.8 meter deep panels of 38 mm, 51 mm, 64 mm, 76 mm, 89 mm, 102 mm, 114 mm and 127 mm stretched mesh joined in a single 24.8 meter long gang) joined together as a 49.6 meter long gang. The date and time of deployment and lift were recorded as were the coordinates of each end of the net, determined using a handheld GPS. Depth at each end of each net was determined using a portable sonar unit.

Electrofishing was conducted in A44 on August 18 using a Halltech Mark 5 backpack electrofisher. The coordinates at the beginning and end of electrofishing transects and the electrofishing path were recorded using a handheld GPS. Effort was 2158 electroseconds and the distance fished was 97 m. Captured fish were identified to species. Slimy Sculpin were retained for use in a study being conducted by the University of Waterloo. Individuals of other species were released near the point of capture.

4.3 Results

There were sections where there was no surface watercourse, only subsurface flow, between A44 and A43 and between A43 and Mammoth Lake on June 22. No fish were captured in the gill net set in A44. The electrofishing catch consisted of 34 Slimy Sculpin, two (2) Ninespine Stickleback, one (1) juvenile Burbot and one (1) juvenile Lake Trout. Given the presence of Lake Trout in A44, which is the upstream lake, it was concluded that no significant offsetting opportunities existed through enhancing connections between the lakes.

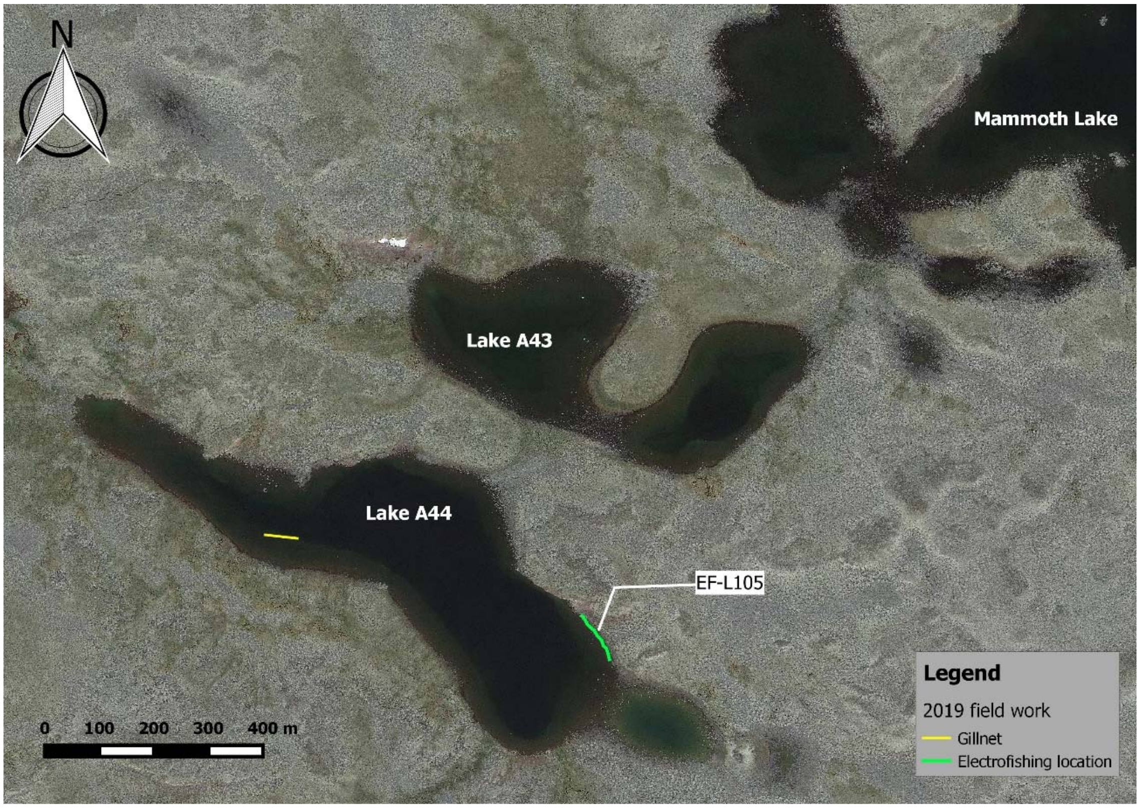


Figure 4-1. Gill net set and electrofishing locations in A44.

5.0 BATHYMETRY OF LAKES A15 AND A12

Bathymetry data were collected and bathymetric maps were created for lakes A15 and A12 for use by others to assess potential impacts of changes in flow on those two waterbodies.

5.1 Methods

A Humminbird 798ci HD SI Sonar unit mounted on a 16-foot aluminum boat was used to record georeferenced standard and side-scan sonar data on Lake A15, on August 22, and on Lake A12, on August 25 (Figure 1-2). On each lake, an initial sounding transect was recorded around the perimeter of the lake, as close to shore as possible. Then transects were recorded across the lake with a higher density of transects recorded where more rapid changes in depth were observed. A rock marked with flagging tape was used to mark the water elevation on the day that the sounding was conducted. This elevation was later determined by a survey crew.

A shoreline was created using the surveyed water elevation and the digital elevation model for the study area. The standard sonar data were processed to create maps of water depth using ReefMaster software (ver. 2.0). The depth maps were provided to Agnico in GIS format, for use by others.

5.2 Results

The bathymetry maps for A12 and A15 are presented in Figures 5-1 and 5-2, respectively. The shapefiles were provided to Agnico for use in analyses by others.

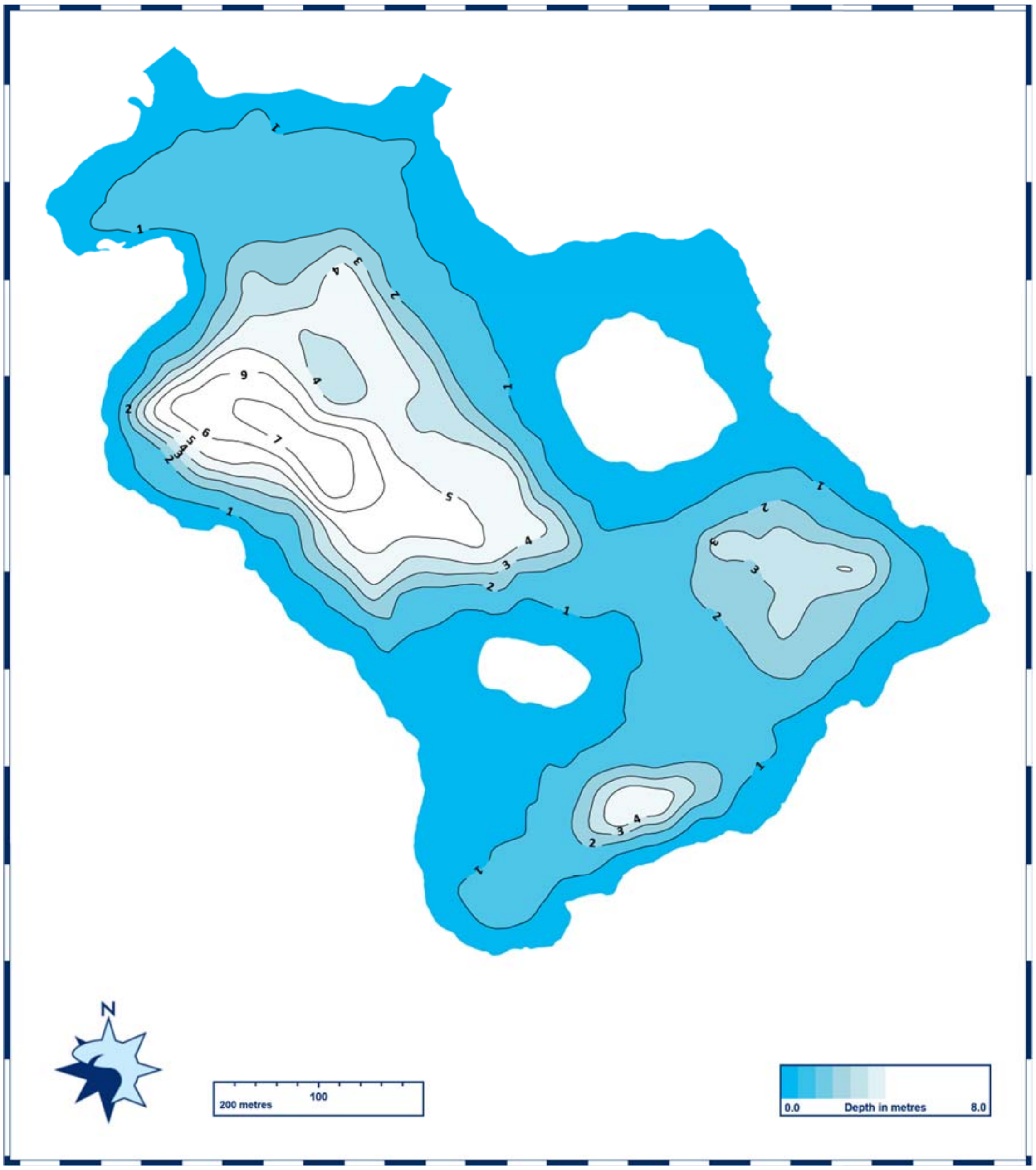


Figure 5-1. Bathymetry of Lake A12, based on a water elevation of 149.04 masl.

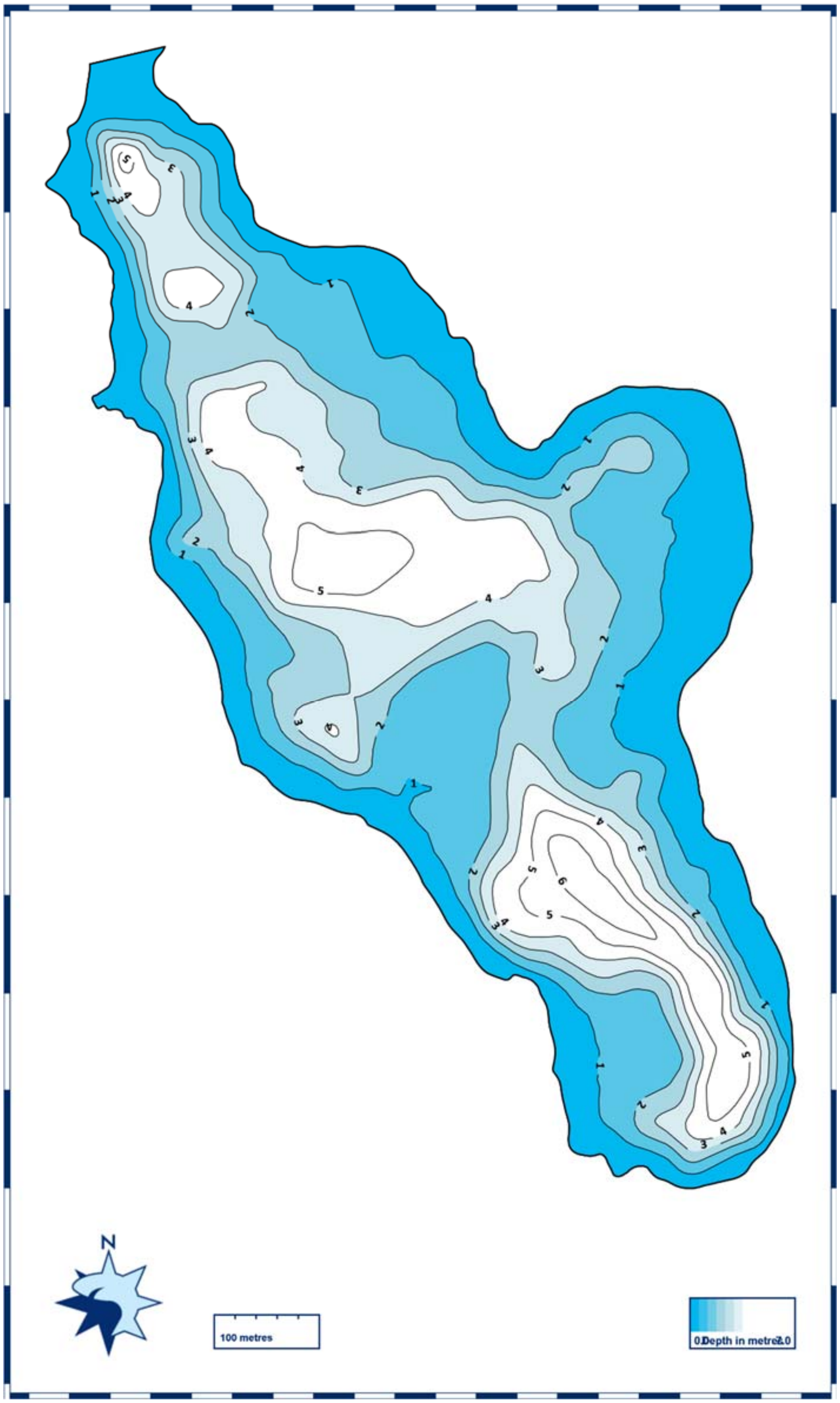


Figure 5-2. Bathymetry of Lake A15, based on a water elevation of 151.72 masl.

6.0 LITERATURE CITED

Azimuth. 2010. Environmental Effects Monitoring (EEM): Cycle 1 Study Design, Meadowbank Division, Nunavut. Report prepared by Azimuth Consulting Group Inc., Vancouver, BC for Environment Canada, Edmonton, AB on behalf of Agnico-Eagle Mines Ltd., Baker Lake, NU. December, 2010.

Azimuth. 2013. Aquatic Effects Monitoring Program – Core Receiving Environment Monitoring Program 2012, Meadowbank Gold Project. Report prepared by Azimuth Consulting Group Inc., Vancouver, BC for Agnico-Eagle Mines Ltd., Baker Lake, NU.

BAER (Baseline Aquatic Ecosystem Report). 2005. A report prepared by Azimuth Consulting Group, Vancouver for Cumberland Resources Ltd. October, 2005.

C. Portt and Associates. 2018. Whale tail pit 2014 - 2016 fish and fish habitat field investigations: Agnico Eagle Mines Ltd. - Meadowbank Division. xi + 157 pp.

C. Portt and Associates. 2019. Whale Tail expansion project 2018 fish and fish habitat field investigations: Agnico Eagle Mines Ltd. - Meadowbank Division. iv + 60 pp.

C. Portt and Associates and Agnico Eagle Mines Ltd. 2018. Whale Tail Pit Fish Habitat Offsetting Plan. v + 49 pp + appendices.

Jones, N.E., G.J. Scrimgeour, and W.M. Tonn. 2010. Fish species traits and communities in relation to a habitat template for Arctic rivers and streams. American Fisheries Society Symposium 73:000-000, 2010.

APPENDIX A – ADDITIONAL SAMPLING INFORMATION

Table A- 1. Waterbody/watercourse, Location ID, coordinates, set and lift dates and times, soak time and direction of the opening for fyke netting (FN) and drift netting (DN) conducted in 2019.

Waterbody/watercourse	Location ID	Latitude	Longitude	Date and Time Set m/dd/yy hr:min	Date and Time Lifted m/dd/yy hr:min	Soak Time (hrs)	Opening facing
A55-A17	FN-5	65.39516	-96.67586	6/21/19 17:21	6/22/19 7:10	13.8	downstream
A55-A17	DN-1	65.3952	-96.675606	6/21/19 17:39	6/22/19 7:20	13.7	upstream
A55-A17	DN-2	65.39553	-96.674808	6/21/19 17:50	6/22/19 7:35	13.7	upstream
A55-A17	FN-5	65.39516	-96.67586	6/22/19 7:10	6/23/19 10:00	26.8	downstream
A55-A17	DN-1	65.3952	-96.675606	6/22/19 7:20	6/23/19 10:10	26.8	upstream
A55-A17	DN-2	65.39553	-96.674808	6/22/19 7:35	6/23/19 10:15	26.7	upstream
A55-A17	FN-5	65.39516	-96.67586	6/23/19 10:00	6/24/19 9:10	23.2	downstream
A55-A17	DN-1	65.3952	-96.675606	6/23/19 10:10	6/24/19 9:15	23.1	upstream
A55-A17	DN-2	65.39553	-96.674808	6/23/19 10:15	6/24/19 9:25	23.2	upstream
A55-A17	FN-5	65.39516	-96.67586	6/24/19 9:10	6/25/19 10:05	24.9	downstream
A55-A17	DN-1	65.3952	-96.675606	6/24/19 9:15	6/25/19 9:55	24.7	upstream
A55-A17	DN-2	65.39553	-96.674808	6/24/19 9:25	6/25/19 9:55	24.5	upstream

Table A- 2. Waterbody/watercourse, Location ID, coordinates, set and lift date and time, depth and substrate for standard minnow traps set in 2019.

Waterbody	Location ID	Latitude	Longitude	Date and Time Set m/dd/yy hr:min	Date and Time Lifted m/dd/yy hr:min	Depth (m)	Substrate
A53	SMT34	65.405054	-96.670932	6/25/2019 11:35	6/26/2019 9:04	0.33	peat/cobble
A53	SMT35	65.405133	-96.670739	6/25/2019 11:38	6/26/2019 9:16	0.27	peat/boulder
A53	SMT36	65.405239	-96.670500	6/25/2019 11:41	6/26/2019 9:30	0.44	cobble/boulder
A53	SMT37	65.405307	-96.669517	6/25/2019 11:47	6/26/2019 9:38	0.25	peat
A53	SMT38	65.405471	-96.669014	6/25/2019 11:49	6/26/2019 9:42	0.34	boulder/cobble
A53	SMT39	65.405769	-96.668439	6/25/2019 11:54	6/26/2019 9:49	0.34	cobble
A53	SMT40	65.405917	-96.668387	6/25/2019 11:57	6/26/2019 9:52	0.35	cobble/boulder
A53	SMT41	65.405699	-96.667132	6/25/2019 12:00	6/26/2019 9:54	0.28	boulder/cobble
A53	SMT42	65.405759	-96.666734	6/25/2019 12:03	6/26/2019 9:57	0.33	boulder/cobble
A53	SMT43	65.405832	-96.666625	6/25/2019 12:03	6/26/2019 10:00	0.30	boulder/cobble
A53	SMT34	65.405054	-96.670932	6/26/2019 9:04	6/27/2019 8:40	0.33	peat/cobble
A53	SMT35	65.405133	-96.670739	6/26/2019 9:16	6/27/2019 8:43	0.27	peat/boulder
A53	SMT36	65.405239	-96.670500	6/26/2019 9:30	6/27/2019 8:46	0.44	cobble/boulder
A53	SMT37	65.405307	-96.669517	6/26/2019 9:38	6/27/2019 8:48	0.25	peat
A53	SMT38	65.405471	-96.669014	6/26/2019 9:42	6/27/2019 8:52	0.34	boulder/cobble
A53	SMT39	65.405769	-96.668439	6/26/2019 9:49	6/27/2019 8:56	0.34	cobble
A53	SMT40	65.405917	-96.668387	6/26/2019 9:52	6/27/2019 8:58	0.35	cobble/boulder
A53	SMT41	65.405699	-96.667132	6/26/2019 9:54	6/27/2019 9:02	0.28	boulder/cobble
A53	SMT42	65.405759	-96.666734	6/26/2019 9:57	6/27/2019 9:04	0.33	boulder/cobble
A53	SMT43	65.405832	-96.666625	6/26/2019 10:00	6/27/2019 9:06	0.30	boulder/cobble
A50	SMT44	65.411607	-96.681507	6/27/2019 17:13	6/28/2019 16:15	0.27	fine
A50	SMT45	65.411553	-96.681329	6/27/2019 17:11	6/28/2019 16:19	0.28	fine
A50	SMT46	65.411533	-96.681295	6/27/2019 17:12	6/28/2019 16:23	0.27	fine
A50	SMT47	65.411484	-96.681266	6/27/2019 17:10	6/28/2019 16:25	0.42	booulder/fine

Waterbody	Location ID	Latitude	Longitude	Date and Time Set m/dd/yy hr:min	Date and Time Lifted m/dd/yy hr:min	Depth (m)	Substrate
A50	SMT48	65.411465	-96.681178	6/27/2019 17:09	6/28/2019 16:27	0.30	boulder/fines
A50	SMT49	65.411402	-96.680940	6/27/2019 17:07	6/28/2019 16:27	0.40	cobble/fine
A50	SMT50	65.411399	-96.681068	6/27/2019 17:04	6/28/2019 16:28	0.30	cobble gravel
A50	SMT51	65.411393	-96.680968	6/27/2019 17:05	6/28/2019 16:31	0.27	boulder/fine
A50	SMT52	65.411372	-96.680852	6/27/2019 17:06	6/28/2019 16:34	0.35	fine/detritus
A50	SMT53	65.411326	-96.680738	6/27/2019 17:07	6/28/2019 16:37	0.28	fine/boulder
A51	SMT54	65.410030	-96.678799	6/28/2019 16:56	6/29/2019 17:18	0.32	boulder/fine
A51	SMT55	65.410030	-96.679065	6/28/2019 16:53	6/29/2019 17:19	0.36	boulder/fine
A51	SMT56	65.410082	-96.679505	6/28/2019 16:52	6/29/2019 17:21	0.30	boulder
A51	SMT57	65.410192	-96.679739	6/28/2019 16:46	6/29/2019 17:22	0.32	fine
A51	SMT58	65.410137	-96.679881	6/28/2019 16:55	6/29/2019 17:23	0.25	boulder/fine
A52	SMT59	65.408523	-96.674989	6/28/2019 17:08	6/29/2019 7:18	0.36	boulder
A52	SMT60	65.408484	-96.674869	6/28/2019 17:09	6/29/2019 7:19	0.27	boulder/fine
A52	SMT61	65.408458	-96.674897	6/28/2019 17:10	6/29/2019 7:19	0.32	boulder
A52	SMT62	65.408492	-96.674777	6/28/2019 17:12	6/29/2019 7:20	0.26	boulder/grass
A52	SMT63	65.408491	-96.674726	6/28/2019 17:13	6/29/2019 7:21	0.30	boulder/grass
A52	SMT59	65.408523	-96.674989	6/29/2019 7:18	6/29/2019 16:58	0.36	boulder
A52	SMT60	65.408484	-96.674869	6/29/2019 7:19	6/29/2019 16:59	0.27	boulder/fine
A52	SMT61	65.408458	-96.674897	6/29/2019 7:19	6/29/2019 17:02	0.32	boulder
A52	SMT62	65.408492	-96.674777	6/29/2019 7:20	6/29/2019 17:04	0.26	boulder/grass
A52	SMT63	65.408491	-96.674726	6/29/2019 7:21	6/29/2019 17:05	0.30	boulder/grass
A-P10	SMT64	65.409745	-96.706692	6/29/2019 18:44	6/30/2019 15:30	na	boulder
A-P10	SMT65	65.409697	-96.706664	6/29/2019 18:43	6/30/2019 15:31	na	boulder
A-P10	SMT66	65.409639	-96.706865	6/29/2019 18:42	6/30/2019 15:32	na	na
A-P10	SMT67	65.409576	-96.706929	6/29/2019 18:41	6/30/2019 15:34	na	na
A-P10	SMT68	65.409566	-96.706863	6/29/2019 18:40	6/30/2019 15:35	na	boulder/grass

Waterbody	Location ID	Latitude	Longitude	Date and Time Set m/dd/yy hr:min	Date and Time Lifted m/dd/yy hr:min	Depth (m)	Substrate
A-P10	SMT69	65.409545	-96.707030	6/29/2019 18:46	6/30/2019 15:36	na	boulder/grass
A-P10	SMT70	65.409529	-96.707164	6/29/2019 18:47	6/30/2019 15:36	na	boulder/grass
A-P10	SMT71	65.409488	-96.707505	6/29/2019 18:47	6/30/2019 15:38	na	boulder/fine
A-P10	SMT72	65.409463	-96.707593	6/29/2019 18:48	6/30/2019 15:38	na	boulder/grass
A-P10	SMT73	65.409465	-96.707626	6/29/2019 18:48	6/30/2019 15:39	na	boulder
A-P21	SMT74	65.412025	-96.672671	6/30/2019 16:12	7/1/2019 15:50	0.26	fine/grass
A-P21	SMT75	65.412037	-96.672651	6/30/2019 16:13	7/1/2019 15:50	0.24	fine/grass
A-P21	SMT76	65.412059	-96.672550	6/30/2019 16:15	7/1/2019 15:52	0.27	fine/grass
A-P21	SMT77	65.412101	-96.672489	6/30/2019 16:16	7/1/2019 15:52	0.30	fine/grass
A-P21	SMT78	65.412117	-96.672350	6/30/2019 16:17	7/1/2019 15:53	0.28	fine/grass
A-P21	SMT79	65.412165	-96.672245	6/30/2019 16:20	7/1/2019 15:53	0.23	cobble/grass
A-P21	SMT80	65.412202	-96.672070	6/30/2019 16:21	7/1/2019 15:53	0.36	cobble/grass
A-P21	SMT81	65.412290	-96.671916	6/30/2019 16:22	7/1/2019 15:54	0.34	cobble/fine
A-P21	SMT82	65.412378	-96.671749	6/30/2019 16:24	7/1/2019 15:54	0.37	cobble/boulder
A-P21	SMT83	65.412462	-96.671575	6/30/2019 16:25	7/1/2019 15:55	0.32	cobble/boulder
A54	SMT84	65.409844	-96.660062	7/1/2019 16:21	7/2/2019 16:20	0.25	boulder
A54	SMT85	65.409797	-96.659981	7/1/2019 16:22	7/2/2019 16:22	0.60	boulder
A54	SMT86	65.409756	-96.659919	7/1/2019 16:24	7/2/2019 16:22	0.70	boulder
A54	SMT87	65.409717	-96.659976	7/1/2019 16:28	7/2/2019 16:23	0.22	boulder
A54	SMT88	65.409695	-96.659938	7/1/2019 16:28	7/2/2019 16:25	0.45	boulder
A54	SMT89	65.409665	-96.659901	7/1/2019 16:30	7/2/2019 16:27	0.44	boulder
A54	SMT90	65.409617	-96.659833	7/1/2019 16:31	7/2/2019 16:30	0.42	boulder
A54	SMT91	65.409608	-96.659632	7/1/2019 16:33	7/2/2019 16:30	0.47	boulder
A54	SMT92	65.409631	-96.659472	7/1/2019 16:33	7/2/2019 16:32	0.35	boulder
A54	SMT93	65.409667	-96.659294	7/1/2019 16:35	7/2/2019 16:35	0.30	boulder
A-P21	SMT94	65.412211	-96.672207	8/23/2019 10:41	8/24/2019 9:37	0.29	boulder

Waterbody	Location ID	Latitude	Longitude	Date and Time Set m/dd/yy hr:min	Date and Time Lifted m/dd/yy hr:min	Depth (m)	Substrate
A-P21	SMT95	65.412225	-96.672175	8/23/2019 10:41	8/24/2019 9:38	0.27	boulder
A-P21	SMT96	65.412247	-96.672136	8/23/2019 10:41	8/24/2019 9:38	0.22	peat
A-P21	SMT97	65.412248	-96.672015	8/23/2019 10:42	8/24/2019 9:37	0.23	boulder
A-P21	SMT98	65.412304	-96.671912	8/23/2019 10:43	8/24/2019 9:41	0.30	boulder
A-P21	SMT99	65.412392	-96.671722	8/23/2019 10:44	8/24/2019 9:42	0.22	boulder
A-P21	SMT100	65.412451	-96.671673	8/23/2019 10:45	8/24/2019 9:44	0.33	boulder
A-P21	SMT101	65.412488	-96.671472	8/23/2019 10:49	8/24/2019 9:45	0.21	cobble
A-P21	SMT102	65.412501	-96.671288	8/23/2019 10:49	8/24/2019 9:46	0.24	boulder
A-P21	SMT103	65.412518	-96.671203	8/23/2019 10:49	8/24/2019 9:47	0.25	boulder
A54	SMT104	65.409954	-96.659880	8/24/2019 10:27	8/26/2019 14:30	0.19	boulder
A54	SMT105	65.409918	-96.659894	8/24/2019 10:28	8/26/2019 14:31	0.24	boulder
A54	SMT106	65.409881	-96.659892	8/24/2019 10:30	8/26/2019 14:31	0.24	boulder
A54	SMT107	65.409847	-96.659996	8/24/2019 10:31	8/26/2019 14:32	0.36	boulder
A54	SMT108	65.409835	-96.659873	8/24/2019 10:32	8/26/2019 14:33	0.23	boulder
A54	SMT109	65.409804	-96.659817	8/24/2019 10:33	8/26/2019 14:35	0.34	boulder
A54	SMT110	65.409750	-96.659771	8/24/2019 10:34	8/26/2019 14:35	0.28	boulder
A54	SMT111	65.409753	-96.659921	8/24/2019 10:35	8/26/2019 14:37	0.28	boulder
A54	SMT112	65.409686	-96.659868	8/24/2019 10:37	8/26/2019 14:38	0.20	boulder
A54	SMT113	65.409610	-96.659811	8/24/2019 10:39	8/26/2019 14:39	0.28	boulder
A51	SMT114	65.410062	-96.678655	8/26/2019 17:02	8/27/2019 17:00	0.27	peat
A51	SMT115	65.410050	-96.678658	8/26/2019 17:08	8/27/2019 17:03	0.22	peat/boulder
A51	SMT116	65.410006	-96.678624	8/26/2019 17:08	8/27/2019 17:04	0.34	peat
A51	SMT117	65.409966	-96.678652	8/26/2019 17:09	8/27/2019 17:05	0.17	peat
A51	SMT118	65.409940	-96.678569	8/26/2019 17:10	8/27/2019 17:07	0.22	peat
A51	SMT119	65.409890	-96.678561	8/26/2019 17:10	8/27/2019 17:08	0.22	peat
A51	SMT120	65.409858	-96.678530	8/26/2019 17:11	8/27/2019 17:09	0.23	peat/boulder

Waterbody	Location ID	Latitude	Longitude	Date and Time Set m/dd/yy hr:min	Date and Time Lifted m/dd/yy hr:min	Depth (m)	Substrate
A51	SMT121	65.409835	-96.678508	8/26/2019 17:12	8/27/2019 17:10	0.38	boulder
A51	SMT122	65.409819	-96.678200	8/26/2019 17:14	8/27/2019 17:12	0.23	boulder
A51	SMT123	65.409754	-96.678076	8/26/2019 17:15	8/27/2019 17:13	0.18	peat
A50	SMT124	65.411622	-96.681438	8/27/2019 17:27	8/28/2019 17:22	0.25	peat
A50	SMT125	65.411629	-96.681413	8/27/2019 17:29	8/28/2019 17:23	0.15	peat
A50	SMT126	65.411619	-96.681357	8/27/2019 17:30	8/28/2019 17:25	0.18	peat
A50	SMT127	65.411580	-96.681356	8/27/2019 17:32	8/28/2019 17:26	0.25	peat
A50	SMT128	65.411547	-96.681341	8/27/2019 17:32	8/28/2019 17:28	0.22	peat
A50	SMT129	65.411509	-96.681304	8/27/2019 17:33	8/28/2019 17:29	0.33	peat
A50	SMT130	65.411486	-96.681217	8/27/2019 17:34	8/28/2019 17:31	0.33	peat
A50	SMT131	65.411480	-96.681143	8/27/2019 17:35	8/28/2019 17:32	0.17	peat
A50	SMT132	65.411425	-96.681105	8/27/2019 17:36	8/28/2019 17:34	0.44	boulder
A50	SMT133	65.411413	-96.680999	8/27/2019 17:37	8/28/2019 17:35	0.28	cobble

Table A- 3. Waterbody or waterbody, location, date, and start and stop location coordinates for electrofishing conducted in 2019.

Waterbody	Location	Date (mm/dd/yy)	Start Latitude	Start Longitude	End Latitude	End Longitude
A-P10	EF-L96	23-Jun-19	65.409876	-96.706356	65.409626	-96.706791
A54	EF-L97	24-Jun-19	65.409844	-96.657857	65.409614	-96.659973
A-P21	EF-L99	24-Jun-19	65.412529	-96.670814	65.411982	-96.672618
A53	EF-L100	27-Jun-19	65.404879	-96.672418	65.405259	-96.670556
A50	EF-L101	27-Jun-19	65.411643	-96.681253	65.411402	-96.680940
A52	EF-L102	28-Jun-19	65.408388	-96.674783	65.408475	-96.673328
A52-A53	EF-S90	28-Jun-19	65.408475	-96.673328	65.407969	-96.67434
A51	EF-L103	29-Jun-19	65.409904	-96.680236	65.409309	-96.678446
A50	EF-L104	29-Jun-19	65.4093	96.67847	65.411072	-96.682546
A44	EF-L105	18-Aug-19	65.385350	-96.783314	65.384621	-96.782294

Table A- 4. Waterbody, location, set type, gill net type, and start and end depths, coordinates, dates and times for gill net sets conducted in 2019. 2x NA = 2 North American standard nets joined.

Waterbody	Location	Net type	Start depth (m)	Start latitude	Start longitude	End depth (m)	End latitude	End longitude	Set Date and Time m/dd/yy hr:min	Lift Date and Time m/dd/yy hr:min
A46	GN74	2x NA	3	65.3868	-96.7944	2	65.3869	-96.7957	8/18/2019 8:45	8/18/2019 11:00

Table A- 5. Waterbody, gear, location, date, species and fork length (Arctic Char, Round Whitefsh) or total length (Ninespine Stickleback, Slimy Sculpin) of fish measured in 2019.

Waterbody	Gear	Gear/Location ID	Date	Species	total/fork length (mm)
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	53
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	56
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	54
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	61
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	50
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	66
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	46
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	58
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	45
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	55
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	49
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	54
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	55
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	53
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	53
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	51
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	51
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	49
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	54
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	57
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	52
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	58
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	53
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	57
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	52
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	44
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	56
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	52
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	50
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	55
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	53
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	54

Waterbody	Gear	Gear/Location ID	Date	Species	total/fork length (mm)
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	54
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	63
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	52
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	48
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	52
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	49
A-53	standard minnow trap	SMT34	June 26, 2019	Ninespine Stickleback	55
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	57
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	56
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	55
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	67
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	56
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	58
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	48
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	47
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	52
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	44
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	48
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	46
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	55
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	51
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	53
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	55
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	61
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	46
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	64
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	54
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	64
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	44
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	44
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	48
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	53
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	58
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	54
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	55
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	55

Waterbody	Gear	Gear/Location ID	Date	Species	total/fork length (mm)
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	53
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	49
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	54
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	64
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	48
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	53
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	46
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	59
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	45
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	68
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	54
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	56
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	49
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	47
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	61
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	52
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	53
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	53
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	46
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	54
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	54
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	51
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	51
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	51
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	63
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	49
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	49
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	53
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	47
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	47
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	57
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	43
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	52
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	54
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	57
A-53	standard minnow trap	SMT35	June 26, 2019	Ninespine Stickleback	49

Waterbody	Gear	Gear/Location ID	Date	Species	total/fork length (mm)
A-53	standard minnow trap	SMT36	June 26, 2019	Burbot	147
A-50	standard minnow trap	SMT44	June 28, 2019	Ninespine Stickleback	60
A-50	standard minnow trap	SMT44	June 28, 2019	Ninespine Stickleback	67
A-50	standard minnow trap	SMT44	June 28, 2019	Ninespine Stickleback	64
A-50	standard minnow trap	SMT44	June 28, 2019	Ninespine Stickleback	57
A-50	standard minnow trap	SMT44	June 28, 2019	Ninespine Stickleback	63
A-50	standard minnow trap	SMT44	June 28, 2019	Ninespine Stickleback	56
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	64
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	62
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	59
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	64
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	60
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	52
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	67
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	66
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	64
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	63
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	55
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	52
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	63
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	67
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	69
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	64
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	61
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	58
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	66
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	55
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	55
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	58
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	66
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	61
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	65
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	64
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	55
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	68
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	60

Waterbody	Gear	Gear/Location ID	Date	Species	total/fork length (mm)
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	58
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	62
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	64
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	63
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	59
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	63
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	60
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	66
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	61
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	56
A-50	standard minnow trap	SMT45	June 28, 2019	Ninespine Stickleback	57
A-50	standard minnow trap	SMT46	June 28, 2019	Ninespine Stickleback	56
A-50	standard minnow trap	SMT46	June 28, 2019	Ninespine Stickleback	62
A-50	standard minnow trap	SMT46	June 28, 2019	Ninespine Stickleback	65
A-50	standard minnow trap	SMT46	June 28, 2019	Ninespine Stickleback	65
A-50	standard minnow trap	SMT46	June 28, 2019	Ninespine Stickleback	59
A-50	standard minnow trap	SMT46	June 28, 2019	Ninespine Stickleback	53
A-50	standard minnow trap	SMT47	June 28, 2019	Ninespine Stickleback	56
A-50	standard minnow trap	SMT47	June 28, 2019	Ninespine Stickleback	61
A-50	standard minnow trap	SMT47	June 28, 2019	Ninespine Stickleback	70
A-50	standard minnow trap	SMT47	June 28, 2019	Ninespine Stickleback	55
A-50	standard minnow trap	SMT48	June 28, 2019	Ninespine Stickleback	57
A-50	standard minnow trap	SMT48	June 28, 2019	Ninespine Stickleback	60
A-50	standard minnow trap	SMT48	June 28, 2019	Ninespine Stickleback	70
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	61
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	63
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	65
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	60
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	62
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	54
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	49
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	64
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	58
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	72
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	48
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	60

Waterbody	Gear	Gear/Location ID	Date	Species	total/fork length (mm)
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	65
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	64
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	70
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	67
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	57
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	65
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	66
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	65
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	60
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	56
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	61
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	68
A-50	standard minnow trap	SMT50	June 28, 2019	Ninespine Stickleback	62
A-50	standard minnow trap	SMT51	June 28, 2019	Ninespine Stickleback	63
A-50	standard minnow trap	SMT51	June 28, 2019	Ninespine Stickleback	63
A-50	standard minnow trap	SMT51	June 28, 2019	Ninespine Stickleback	65
A-50	standard minnow trap	SMT51	June 28, 2019	Ninespine Stickleback	65
A-50	standard minnow trap	SMT51	June 28, 2019	Ninespine Stickleback	59
A-50	standard minnow trap	SMT51	June 28, 2019	Ninespine Stickleback	62
A-50	standard minnow trap	SMT51	June 28, 2019	Ninespine Stickleback	55
A-50	standard minnow trap	SMT51	June 28, 2019	Ninespine Stickleback	65
A-50	standard minnow trap	SMT51	June 28, 2019	Ninespine Stickleback	66
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	47
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	53
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	60
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	63
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	64
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	59
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	63
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	59
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	59
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	60
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	73
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	60
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	65
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	59

Waterbody	Gear	Gear/Location ID	Date	Species	total/fork length (mm)
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	52
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	63
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	50
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	61
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	61
A-50	standard minnow trap	SMT52	June 28, 2019	Ninespine Stickleback	57
A-50	standard minnow trap	SMT53	June 28, 2019	Ninespine Stickleback	68
A-50	standard minnow trap	SMT53	June 28, 2019	Ninespine Stickleback	65
A-50	standard minnow trap	SMT53	June 28, 2019	Ninespine Stickleback	52
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	64
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	51
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	52
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	31
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	34
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	24
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	25
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	52
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	26
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	48
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	53
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	24
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	28
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	24
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	25
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	54
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	51
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	53
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	34
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	34
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	36
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	22
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	27
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	26
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	33
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	26
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	31

Waterbody	Gear	Gear/Location ID	Date	Species	total/fork length (mm)
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	23
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	27
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	28
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	34
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	34
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	29
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	24
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	25
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	26
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	26
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	22
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	25
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	23
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	25
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	24
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	23
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	30
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	29
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	26
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	25
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	25
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	25
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	27
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	24
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	31
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	26
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	27
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	31
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	33
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	47
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	50
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	32
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	34
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	22
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	22
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	30

Waterbody	Gear	Gear/Location ID	Date	Species	total/fork length (mm)
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	26
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	33
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	27
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	28
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	23
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	34
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	31
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	24
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	23
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	23
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	30
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	25
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	31
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	27
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	24
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	30
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	27
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	27
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	21
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	34
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	26
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	22
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	22
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	25
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	32
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	23
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	26
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	24
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	23
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	33
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	36
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	28
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	23
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	25
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	47
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	33

Waterbody	Gear	Gear/Location ID	Date	Species	total/fork length (mm)
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	26
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	26
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	21
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	23
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	58
A-53	electrofisher	EF-L100	June 27, 2019	Ninespine Stickleback	56
A-53	electrofisher	EF-L100	June 27, 2019	Slimy Sculpin	56
A-53	electrofisher	EF-L100	June 27, 2019	Slimy Sculpin	42
A-53	electrofisher	EF-L100	June 27, 2019	Slimy Sculpin	35
A-53	electrofisher	EF-L100	June 27, 2019	Slimy Sculpin	41
A-53	electrofisher	EF-L100	June 27, 2019	Slimy Sculpin	36
A-53	electrofisher	EF-L100	June 27, 2019	Slimy Sculpin	35
A-53	electrofisher	EF-L100	June 27, 2019	Slimy Sculpin	38
A-53	electrofisher	EF-L100	June 27, 2019	Slimy Sculpin	37
A-53	electrofisher	EF-L100	June 27, 2019	Slimy Sculpin	33
A-50	electrofisher	EF-L101	June 27, 2019	Ninespine Stickleback	46
A52	standard minnow trap	SMT60	June 29, 2019	Ninespine Stickleback	62
A52	standard minnow trap	SMT61	June 29, 2019	Ninespine Stickleback	57
A51	standard minnow trap	SMT58	June 29, 2019	Ninespine Stickleback	61
A51	electrofisher	EF-L104	June 29, 2019	Ninespine Stickleback	57
A55-A17	fyke net	FN-5	June 22, 2019	Ninespine Stickleback	31
A55-A17	fyke net	FN-5	June 22, 2019	Ninespine Stickleback	33
A55-A17	fyke net	FN-5	June 23, 2019	Arctic Char	211
A55-A17	fyke net	FN-5	June 24, 2019	Arctic Char	165
A55-A17	fyke net	FN-5	June 24, 2019	Ninespine Stickleback	23
A55-A17	fyke net	FN-5	June 24, 2019	Ninespine Stickleback	30
A55-A17	fyke net	FN-5	June 24, 2019	Ninespine Stickleback	30
A55-A17	fyke net	FN-5	June 24, 2019	Ninespine Stickleback	28
A55-A17	fyke net	FN-5	June 24, 2019	Ninespine Stickleback	64
A55-A17	fyke net	FN-5	June 25, 2019	Ninespine Stickleback	32
A55-A17	fyke net	FN-5	June 25, 2019	Round Whitefish	114

Appendix B – PHOTOGRAPHS

Figure B 1. Fyke net at location FN-5 in Whale Tail Lake, at the mouth of A55-A17. June 21, 2019.

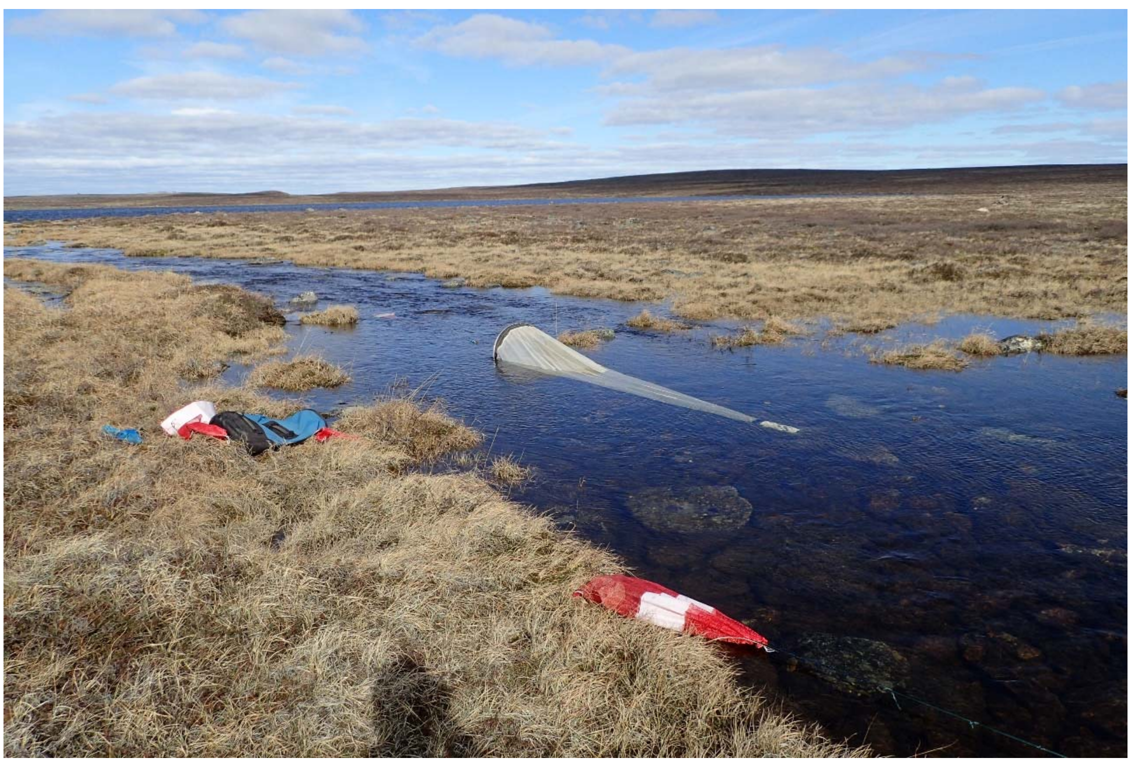


Figure B 2. Drift net at DN-1 in A55-A17. June 21, 2019.

Figure B 3. Drift net at DN-2 in A55-A17. June 21, 2019.

Figure B 4. Connection between A113 and C44, looking upstream toward A113 from the same vantage point as Figures B 5 and B 6. June 19, 2019.

Figure B 5. View across the connection between A113 and C44 from the same vantage point as Figures B 4 and B 6. June 19, 2019.

Figure B 6. Connection between A113 and C44, looking downstream toward Nemo Lake from the same vantage point as Figures B 4 and B 5. June 19, 2019.

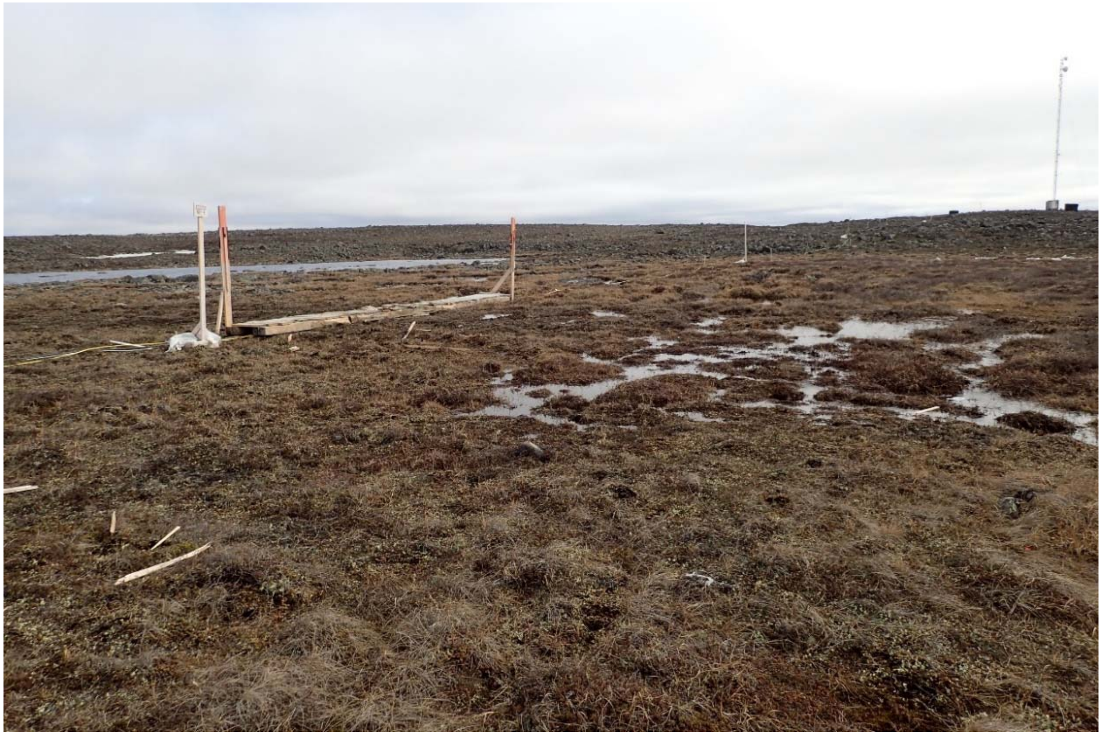


Figure B 7. Watercourse A52-A53 looking upstream toward A52 from the same vantage point as Figures B 8 and B 9. June 19, 2019.

Figure B 8. Looking across watercourse A52-A53 from the same vantage point as Figures B 7 and B 9. June 19, 2019.

Figure B 9. Watercourse A52-A53 looking downstream toward A53 from the same vantage point as Figures B 7 and B 8. June 19, 2019.

Figure B 10. Watercourse A52-A53 looking downstream toward A53. June 28, 2019.

Figure B 11. Lakes A52 (dry in foreground) and A53 (background). August 27, 2019.

Figure B 12. Height of land between A52 and A51. June 28, 2019.

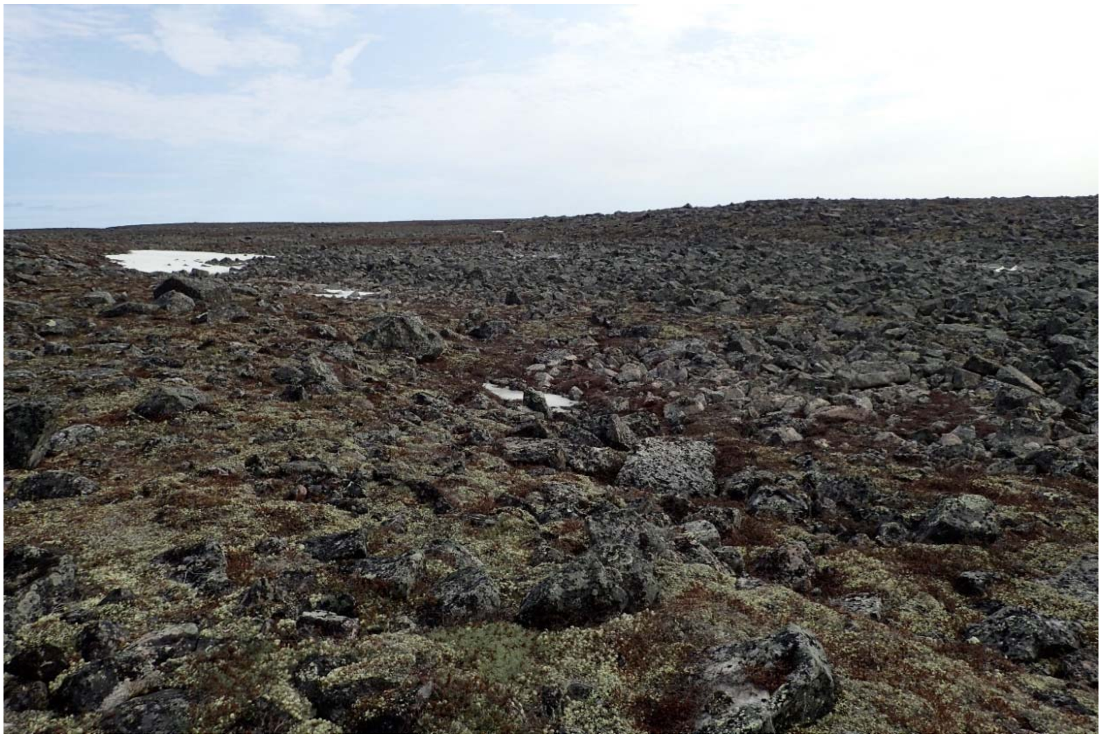


Figure B 13. View along A54-A53, looking upstream toward A54 from the same vantage point as Figures B 14, B 15 and B 16. June 19, 2019.

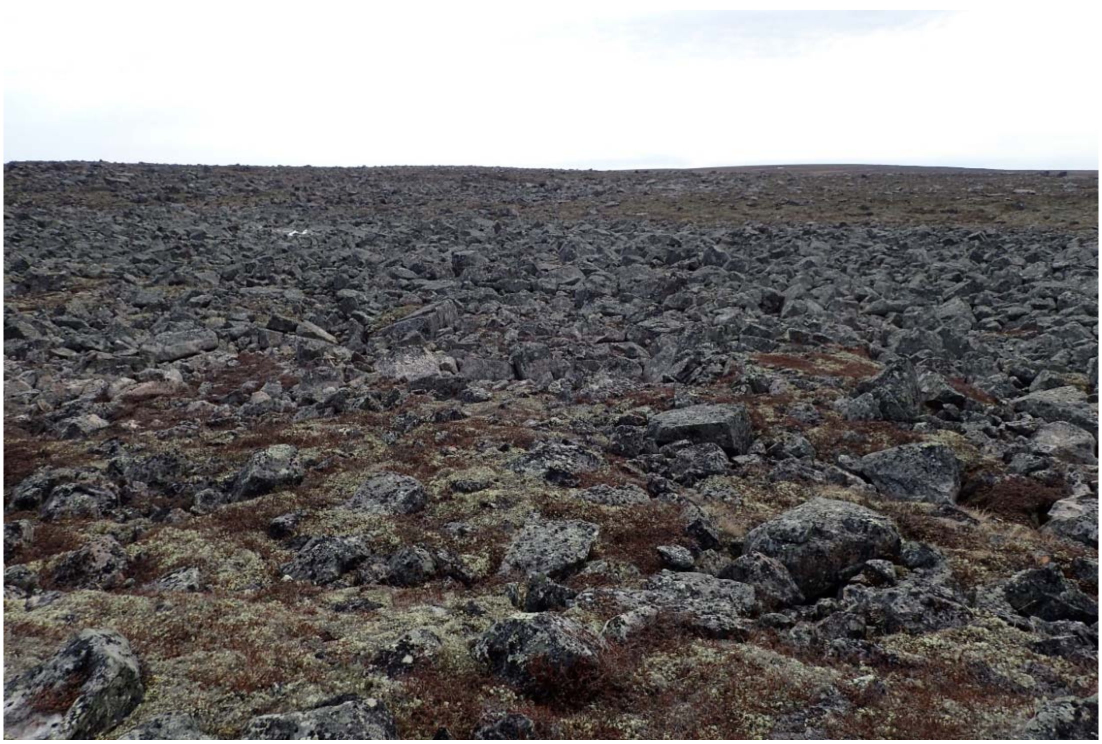


Figure B 14. View across A54-A53 from the same vantage point as Figures B 13, B 15 and B 16. June 19, 2019.

Figure B 15. View along A54-A53, looking slightly downstream toward A53 from the same vantage point as Figures B 13, B 14 and B 16. August 19, 2019.

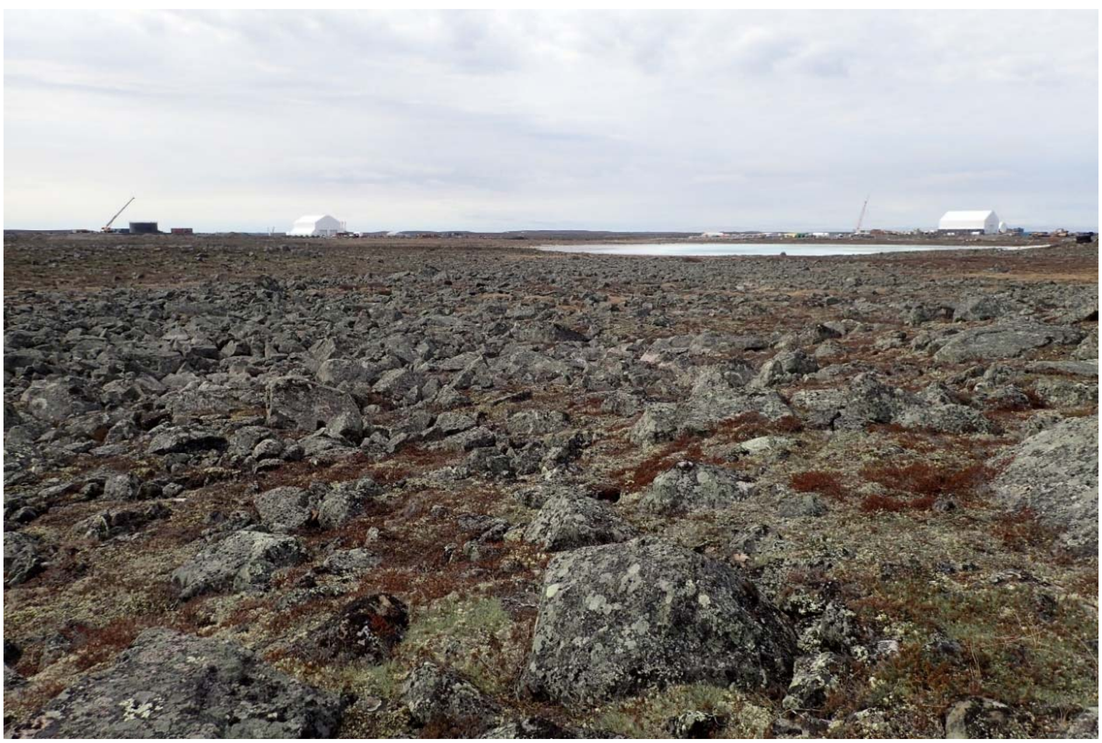


Figure B 16. View along A54-A53, looking downstream toward A53 from the same vantage point as Figures B 13, B 14 and B 15. June 19, 2019.

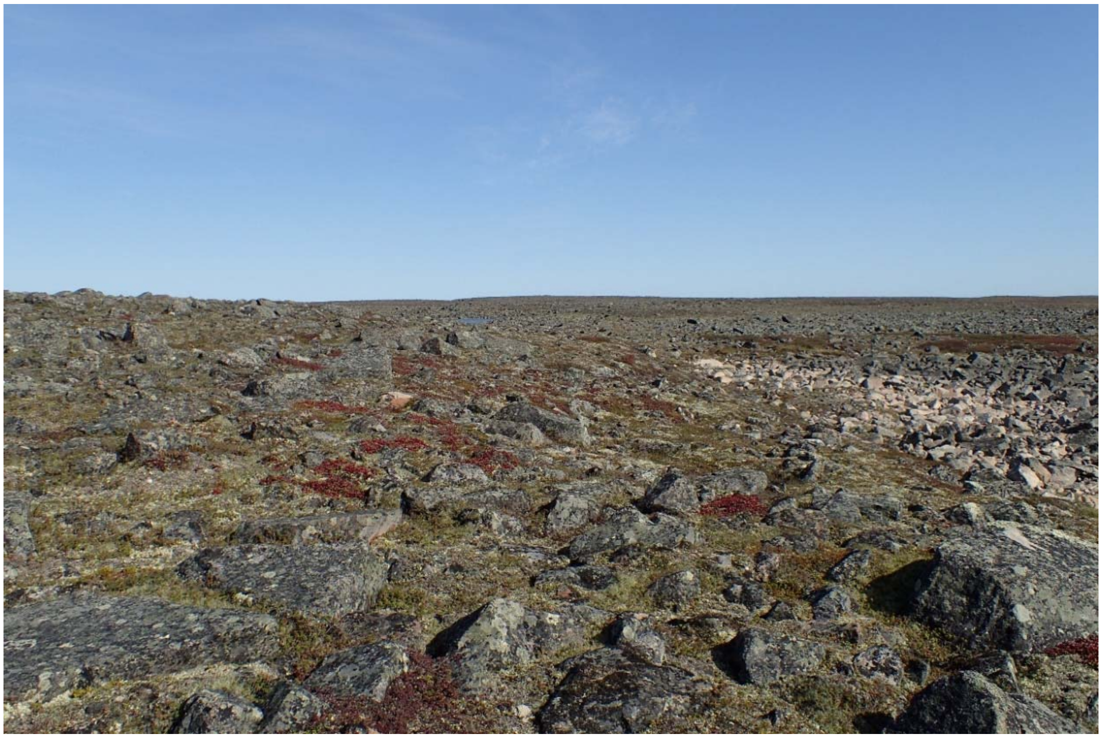


Figure B 17. View along A54-A53, looking upstream toward A54 from the same vantage point as Figures B 18, B 19 and B 20. August 26, 2019.

Figure B 18. View across A54-A53 from the same vantage point as Figures B 17, B 19 and B 20. August 26, 2019.

Figure B 19. View downstream along A54-A53 from the same vantage point as Figures B 17, B 18 and B 20. August 26, 2019.

Figure B 20. View downstream along A54-A53 from the same vantage point as Figures B 17, B 18 and B 19. August 26, 2019.

Figure B 21. Looking toward lake A52 from a vantage point between A-P21 and A52. June 19, 2019.

APPENDIX F HABITAT EVALUATION PROCEDURE

Appendix F: Habitat Evaluation Procedure

The Habitat Evaluation Procedure (HEP) model used for Agnico Eagle Meadowbank Mine projects can be described, for each fish species (spp 1-n) as:

HU$_{spp\ 1\text{-}n}$=

$\sum_{HT\ 1\text{-}13}$ ($\sum_{sp,nu,fo,ow}$(**HT**$_{1\text{-}13}$ x **HSI** $_{sp,nu,fo,ow}$ x **life function weight** x **species weight**)]) x **access factor x habitat co-factor**

Where HT$_{1\text{-}13}$ = area (ha) of habitat types 1 through 13
HSI $_{sp,nu,fo,ow}$ = habitat suitability index for each life function:

sp = spawning use
nu = nursery use
fo = foraging use
ow = overwintering use

Habitat Types (HT1-13)

The foundation of the HEP is the delineation of areas that provide certain "habitat types" based on depth and substrate (Table F-1). Habitat types 1 to 9 are lake habitats and were components of the original Meadowbank HEP model. These habitats are delineated by intersecting depth and substrate polygons.

Table D-1: Physical Characteristics of the Habitat Types Used in the Whale Tail Lake HEP

Habitat Type	Depth Zone	Substrate
1	0-2 m	Fine
2	0-2 m	Mixed
3	0-2 m	Coarse
4	2-4 m	Fine
5	2-4 m	Mixed
6	2-4 m	Coarse
7	>4 m	Fine
8	>4 m	Mixed
9	>4 m	Coarse
10	Pit and Pit cap*	Pit and Pit cap*
11	connecting channels	Coarse
12	small streams	Fine
13	small streams	Coarse

Notes:
Habitat Type 10 is applied to all non-backfilled pit areas, independent of depth and substrate characteristics.
** Depth and substrate in pit and pit cap areas are not relevant to suitability, which is assigned 0 value (see Section 2.1.2).*

Habitat Type 10 was added to the HEP model during the development of the Phaser Lake offsetting plan at the request of DFO to address uncertainty with respect to fish utilization of the deep pit areas. At that time, DFO indicated that the uncertainty arises primarily because there are “no examples of successful re-establishment of self-sustaining fish populations in refilled pits in Canada’s North upon which to base end pit lake design” and there is a possibility that the deep areas of flooded pit may become meromictic (i.e., permanently stratified) and therefore be unsuitable for fish (DFO letter to Agnico Eagle dated November 27, 2015). DFO requested that the deep areas of the pit be designated Habitat Type 10 and that zero habitat value be assigned to those deep areas. After reviewing that conceptual offsetting plan for Whale Tail Pit, DFO requested, at a meeting in Baker Lake on September 23, 2017, that, at Whale Tail, the entire pit area, regardless of depth and including the pit cap, be designated Habitat Type 10. This was done for the Whale Tail Pit final offsetting plan and is done for the IVR Pit calculations presented here.

In the offsetting plan for Whale Tail Pit, and in this offsetting plan, Habitat Type 11 was assigned to the connecting channels that occur between several of the lakes in the Whale Tail Pit study area. These channels are wide and have predominantly boulder and cobble substrates. They have shallow surface flow over most or all of their length during spring freshet and only interstitial flow over most or all of their length later in the open-water season. They freeze during the winter. The edge of the water in the connecting channels was observed in the field to correspond closely to the edge of the tundra vegetation. Therefore, these channels were delineated by digitizing the edge of the tundra vegetation in the July 21, 2011, satellite imagery. The upstream and downstream limits of the connecting channels are defined by the intersection of the upstream and downstream lake elevations with the DEM. When an area that is Type 11 habitat under baseline conditions is flooded during the post-closure phase, it becomes the lake habitat type with coarse substrate that corresponds to its new depth.

Habitat types 12 and 13 are also specific to the Whale Tail offsetting plan, and this offsetting plan, and represent small streams with seasonal flow and defined channels, with fine and coarse substrate respectively. These streams were characterized from field measurements made using a point-transect method during the period July 5 through July 8, 2016 (C. Portt and Associates, 2018). Many of these small streams have multiple channels and the width of each of the channels was measured at transects across the watercourses and those widths were summed to determine the total wetted width at a transect. To facilitate GIS analysis, the primary flow path of each of these streams was digitized based on the July 21, 2011, satellite imagery and a ‘stream polygon’ was created by assigning the total wetted width to the digitized flow path at each transect location. This allows the areas of stream habitat to be visualized and calculated during baseline and subsequent stages using standard GIS techniques. The portion of stream habitat that is fine substrate (Habitat Type 12) or coarse substrate (Habitat Type 13) was calculated by multiplying the stream polygon area by the proportion of the points where substrate was fine or coarse based on the field measurements. In the post-closure phase, when Type 12 or 13 habitat was flooded due to increased water levels it was considered converted to lake habitat and the habitat type was assigned based on depth and substrate. Ephemeral streams were quantified or assigned any habitat value.

Determination of Shorelines

The shorelines used to determine baseline habitat areas in the Whale Tail Pit Conceptual Fish Habitat Offsetting Plan (Agnico Eagle, 2016) were from CanVec mapping. Comparison of these shorelines to satellite imagery from July 21, 2011, indicated that the water levels represented by the CanVec shorelines were lower than those shown in the imagery. Water elevations were estimated by overlaying the digital elevation model for the study area and the July 21, 2011, satellite imagery for three lakes where actual water level data were available for 2015 and 2016 and the estimated elevations were compared to the field data[1]. The results (Table F-2) were shared with DFO (meeting held in Winnipeg, March 23, 2017) and it was agreed that the water elevations and shorelines used to calculate habitat areas in the final offsetting plan would be determined using DEM and the July 21, 2011, imagery.

Table F-2: Estimated Water Elevation

Parameter	Whale Tail Lake (A17)		Lake A18		Nemo Lake (C38)	
Water elevation estimated from July 21, 2011 imagery (masl)	153.02		154.05		156.00	
Year	2015	2016	2015	2016	2015	2016
Maximum water elevation (masl)	153.31	153.11	154.20	154.10	155.98	156.04
Minimum water elevation (masl)	152.46	152.59	153.80	153.78	155.65	155.70
Range (m)	0.85	0.53	0.40	0.32	0.33	0.34
Difference between estimated water elevation and the recorded maximum (m)	0.29	0.09	0.15	0.05	-0.02	0.04
Difference between estimated water elevation and the recorded minimum (m)	-0.56	-0.43	-0.25	-0.27	-0.35	-0.30
# of days water elevation was higher than the water elevation estimated from shoreline elevation	10	5	11	5	0	11

Notes:

Water elevation estimated from the July 21, 2011, imagery, the minimum, maximum and range of water elevations recorded in the field in 2015 and 2016.

Difference between the minimum and maximum water elevations recorded in the field and the water elevation estimated from the July 21, 2011, imagery, and the number of days each year that the recorded water elevation was higher than the water elevation estimated from the July 21, 2011, imagery, for 2015 and 2016.

Preparation of Depth, Substrate and Habitat Type

In order to calculate the extents of each habitat type, bathymetry for each of the lakes was merged with the digital elevation model in GIS. Bathymetry for Whale Tail, Mammoth and Nemo Lakes was provided by Agnico Eagle. For the smaller lakes that were deep enough to operate a boat, bathymetry was determined using a Humminbird 798ci HD SI Sonar unit. The sonar unit recorded georeferenced standard and side-scan sonar data. Straight, parallel boat runs, orientated to best characterize the lake's features, were used to record slightly overlapping side-scan images of the lake bottom. Additional sonar recordings were then made to obtain standard sonar data for as much of the lake bottom as was practical. A stake was driven into the ground at the water’s edge on the day that the Sonar data were collected and this elevation was later determined by a survey crew, so that the depth data could be converted to elevations and integrated with the digital elevation model.

The side-scan images were processed using ReefMaster software (ver. 1.8) to create a single georeferenced side-scan mosaic of the lake's bottom, and the standard sonar data were processed to create maps of bottom hardness and water depth. ReefMaster determines bottom hardness by analysis of

[1] The following determination of shoreline elevations was provided in response to DFO IR 4 and 7. Agnico Eagle (January, 2017). DFO IR 4 – Freshwater Environment – Habitat Alteration; DFO IR 7 – Monitoring, Mitigation and Management Plans – Conceptual Offsetting Plan. January 20th, 2017 submission RE: NIRB File No 16MN056 Application No: 124683/NWB File No. 2AM WTP ----: Information Requests Received from Parties Regarding Agnico Eagles Mines Ltd’s “Whale Tail Pit” Project.

the sonar output/input ratio, and lag, to calculate a unitless relative hardness and roughness value that is displayed as a colour-coded map. The georeferenced data (side-scan image, bottom hardness and water depth maps, and visual point observations) were layered using GIS software (QGIS version 2.8). Visual point observations of the substrate were also made, either from the surface where the water was clear and shallow enough or using an Aqua-Vu 740c underwater colour video system where the water was deeper. All visual substrate observations were georeferenced with a Garmin GPSmap76CSx gps unit.

In anticipation of the need to prepare substrate mapping, on September 2, 2014, oblique aerial photographs were taken, from a helicopter, of the shoreline and near-shore areas of Mammoth Lake, Whale Tail Lake, Nemo Lake and the adjacent smaller lakes and ponds. Additional oblique photographs were taken in June and August 2016. Using the overlaid data, with reference to the oblique aerial photographs (n=229), the areas of the various substrate types were identified and hand digitized as polygons in GIS, creating substrate maps. With the exception of Nemo Lake this was done for each lake in its entirety. For Nemo Lake substrate mapping was only prepared in the area that would be impacted by the freshwater intake, as no other alterations of Nemo Lake are anticipated.

A few small, shallow ponds near the north end of Whale Tail Lake were too shallow to permit use of a boat and motor. The depths and substrates in these ponds were visually assessed from shore in 2015, and depth and substrate mapping was prepared based on those observations, aerial imagery, and the oblique aerial photographs taken in 2014 and 2015.

The habitat-type area calculations and mapping were completed by Dougan and Associates using standard GIS methods consistent with mapping procedures used in AEM (2012) and the Phaser Lake offsetting plan. The digital elevation model was used to determine depth and the depth information was overlain with the substrate layers, determined as described above, to delineate polygons with the characteristics of habitat types 1 through 9. The area of habitat types 1 – 9 was determined by summing the area of those polygons.

For the post-closure phase, depths were determined using the water elevations proposed for each phase and the digital elevation model. The substrate under baseline conditions was left unchanged unless a physical change was made to the habitat (i.e., a road was built). If connecting channels were flooded so that they became lake habitat, their new habitat types was assigned based on their depth and their existing coarse substrate. If small streams were flooded so that they became lake habitat their new habitat type was based on depth and their existing substrate. The substrate for terrestrial areas that are flooded post-closure was assigned based on the ecological land classification community types, as shown in Table F-3.

Table F-3: Substrate Category Assigned to Flooded Terrestrial Areas Based on the Terrestrial Ecological Land Classification Community Types that Are Present under Baseline Conditions

Habitat Type	Depth Zone
Coarse	Boulder/gravel
	Lichen/rock
Fine	Graminoid tundra
	Wet graminoid
	Sand

Habitat Type	Depth Zone
Mixed	Graminoid/Shrub tundra
	Heath tundra
	Heath upland
	Heath upland/rock complex
	Lichen tundra
	Shrub tundra
	Shrub/heath tundra

Habitat Suitability Index ($HSI_{sp,nu,fo,ow}$)

The habitat suitabilities that were used for the Whale Tail Pit offsetting plan have also been used for IVR Pit. The habitat suitability term represents the relative quality of each habitat type for each life function of each fish species present in the region. In the case of this HEP, the life functions spawning, nursery, foraging and overwintering were considered. Habitat suitability for each life function is indicated through a ranking of 0, 0.25, 0.5, 0.75 or 1. HSIs for all fish species[2] and habitat types used in this HEP are shown in Table F-4. The HSIs for the lake habitats (habitat types 1 to 9) were developed through a series of consultations and workshops beginning in July 2011 with KivIA, HTO, and DFO in Baker Lake, and a series of workshops held with Golder Associates and DFO between November 2011 and December 2011 (by webex and in Ottawa). The process is further described in AEM (2012). Further review of the HEP by Dr. Ken Minns (August 2017) recommended continued use of this method by Agnico Eagle. As stated previously, for the time being, it has been conservatively assumed that habitat type 10 will provide no fish habitat (i.e., all HSIs are zero) with the understanding that HSIs and the provision of habitat units will be re-evaluated if field investigations demonstrate that there is no stratification or that fish use the pelagic zone above a chemocline.

The HSIs for habitat types 11, 12, and 13 were assigned based on their habitat characteristics and the fish sampling conducted as part of the Whale Tail pit baseline investigations, taking into consideration the HSIs previously developed for lake habitats[3]. The connecting channels have primarily boulder and cobble substrate. There is shallow water above the substrate during the spring freshet in most of these channels but later in the summer there is only interstitial flow. No adult large-bodied fish have been observed or captured by electrofishing in these connecting channels and hoop nets set in or immediately downstream from these connecting channels in 2015 and 2016 captured no fish. A single Arctic Char was captured in a gill net set across the connecting channel between Lake A18 and Whale Tail Lake from June 22 to 28, 2016 and July 2 to 8, 2016. Based on these data, these connecting channels do not provide foraging habitat for large-bodied fish (foraging HIS = 0). Juvenile Lake Trout and juvenile Lake Whitefish have been captured by electrofishing in the connecting channels and it has been assumed that juvenile Arctic Char and juvenile Burbot can also use this habitat during the open-water season. Therefore, for all large-bodied species the connecting channels have been assigned the same nursery HSIs as coarse substrate in the 0 to 2 m lake depth stratum. The connecting channels freeze during the winter and therefore have been assigned HSIs of zero for overwintering for all species and zero for spawning for fall/winter-spawning species, which includes all of the large-bodied species that are present.

---

[2] Addresses, DFO 1- Freshwater Environment – Habitat Losses technical comment regarding consideration of all species, including bottom dwellers. Agnico Eagle (April, 2017). April 7, 2017 submission NIRB File No. 16MN056 Application No: 124683/NWB File No. 2AM WTP ---- : Receipt of Technical Review Comment Submissions for the NIRBs Review and NWB Consideration of Agnico Eagle Mines Ltd's " Whale Tail Pit" Project Proposal and associated Water License Application

[3] The stream habitat types were developed in response to DFO 4 and 8 Information Request. Agnico Eagle (January, 2017). DFO- 4 and 8 – Freshwater Environment- Habitat Alteration. January 20, 2017 submission RE: NIRB File No 16MN056 Application No: 124683/NWB File No. 2AM WTP ----: Information Requests Received from Parties Regarding Agnico Eagles Mines Ltd's "Whale Tail Pit" Project.

Slimy Sculpin and Ninespine Stickleback, the two small-bodied species that are present in the study area, have both been captured in the connecting channels and are likely to use the shallow areas and interstitial spaces in much the same way that they do in shallow areas with coarse substrate in lake habitats. Therefore, for these two species the HSIs for coarse substrate in the 0 to 2 m deep stratum has also been used for the connecting channels.

These streams in the Whale Tail primary study area typically have multiple channels and are shallow, with mean depths ranging from 6 cm to 17 cm. Peat is the dominant substrate in the majority of the watercourses. These watercourses freeze in the winter and have been assigned HSIs of zero for overwintering for all species and zero for spawning for fall/winter-spawning species, which includes all of the large-bodied species that are present.

Electrofishing catches in these streams were dominated by Ninespine Stickleback and Slimy Sculpin and for these two species the HSIs for fine and for coarse substrates in the 0 to 2 m lake depth habitat (Habitat Types 1 and 3, respectively) were applied to Habitat Types 12 and 13 for spawning, nursery and foraging.

One or more juveniles of all of the large-bodied species were captured in the small streams, although the numbers were low. The nursery HSIs for fine and for coarse substrates in the 0 to 2 m lake depth habitat (Habitat Types 1 and 3, respectively) have been applied to Habitat Types 12 and 13 for the four large-bodied species.

The absence of adult large-bodied fish from the electrofishing catches in the small streams is consistent with little if any foraging in these shallow streams by large-bodied adults, as would be expected. It is thought that the few individuals that were captured in gill nets or hoop nets set in these streams were moving between lake habitats. The small streams have been assigned a HSI of zero (0) for foraging by the four large-bodied species.

Table F-4a: HSI Values for the Whale Tail Fish Species

Habitat Type	Depth	Substrate	Arctic Char				Lake Trout				Round Whitefish			
			SP	NU	FO	OW	SP	NU	FO	OW	SP	NU	FO	OW
1	<2 m	Fines	0	0.25	0.25	0	0	0.25	0.25	0	0	0.25	0.75	0
2	<2 m	Mixed	0	0.25	0.25	0	0	0.5	0.5	0	0	0.75	0.5	0
3	<2 m	Coarse	0	0.5	0.5	0	0	1	0.75	0	0	0.75	0.5	0
4	2-4 m	Fines	0	0.5	0.5	0.75	0	0.5	0.5	0.75	0	0.25	1	0.75
5	2-4 m	Mixed	0.5	0.75	0.75	0.75	0.5	0.75	0.75	0.75	0.5	0.75	0.75	0.75
6	2-4 m	Coarse	1	1	1	0.75	1	1	1	0.75	1	1	0.75	0.75
7	>4 m	Fines	0	0.25	0.5	1	0	0.25	0.5	1	0	0.25	1	1
8	>4 m	Mixed	0.5	0.5	0.75	1	0.5	0.5	0.75	1	0.25	0.25	0.5	1
9	>4 m	Coarse	1	0.5	1	1	1	0.5	1	1	0.75	0.5	0.5	1
10*	pit area	pit area	0	0	0	0	0	0	0	0	0	0	0	0
11	connecting channel	Coarse	0	0.5	0	0	0	1	0	0	0	0.75	0	0
12	stream	Fines	0	0.25	0	0	0	0.25	0	0	0	0.25	0	0
13	stream	Coarse	0	0.5	0	0	0	1	0	0	0	0.75	0	0

Table F-4b: HSI Values for the Whale Tail Fish Species

Habitat Type	Depth	Substrate	Burbot				Slimy Sculpin				Ninespine Stickleback			
			SP	NU	FO	OW	SP	NU	FO	OW	SP	NU	FO	OW
1	<2 m	Fines	0	0.25	0.25	0	0	0	0.25	0	1	1	1	0
2	<2 m	Mixed	0	0.75	0.5	0	0.25	0.25	0.5	0	0.5	0.5	0.75	0
3	<2 m	Coarse	0	1	0.5	0	1	1	1	0	0	0.25	0.75	0
4	2-4 m	Fines	0	0.25	0.25	0.75	0	0	0.25	0.75	0	0	0.5	0.75
5	2-4 m	Mixed	1	0.5	0.75	0.75	0.25	0.25	0.5	0.75	0	0	0.25	0.75
6	2-4 m	Coarse	0.75	0.5	1	0.75	0.75	0.75	1	0.75	0	0	0.25	0.75
7	>4 m	Fines	0	0	0.25	1	0	0	0	1	0	0	0	1
8	>4 m	Mixed	1	0	0.75	1	0	0	0.25	1	0	0	0	1
9	>4 m	Coarse	0.75	0.25	1	1	0.5	0.5	0.5	1	0	0	0	1
10	pit area	pit area	0	0	0	0	0	0	0	0	0	0	0	0
11	11	connecting channel	0	1	0	0	1	1	1	0	0	0.25	0.75	0
12	12	stream	0	0.25	0	0	0	0	0.25	0	1	1	1	0
13	13	stream	0	1	0	0	1	1	1	0	0	0.25	0.75	0

Notes:

(sp=spawning, nu=nursery, fo=foraging, ow=overwintering).

**Habitat type 10 is applied to all pit and pit cap areas regardless of depth and substrate.*

Table F-5a: Potential Changes in Habitat Areas (HAs) Resulting from the IVR Pit and Associated Infrastructure by Habitat Type

Habitat Type	Habitat Area (Hectares)																			
	Section 35 losses														Section 36 losses					Section 35 and 36
	Pond AP38	Lake A0	Lake A48	Lake A47	Lake A46	Lake A49	Whale Tail	A0-A48	To A47	A47-A46	A46-A17	A50-A17	A53-A17	Total	Lake A53	Lake A50	Lake A51	Lake A52	Total	Total Losses
1	-0.14	-0.04	-0.11	-2.39	-0.12	-0.09	-0.49	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-3.38	-0.03	-0.14	-0.03	-0.00	-0.20	-3.58
2	-0.07	-0.03	-0.09	-1.90	-0.15	-0.13	-0.32	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-2.70	-0.21	-0.03	-0.05	-0.00	-0.28	-2.98
3	-0.00	-0.00	-0.00	-0.03	-0.04	-1.03	0.10	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.99	-11.64	-0.32	-0.83	-1.24	-14.04	-15.03
4	-0.00	-0.00	-0.00	-0.21	-0.00	-0.05	-0.01	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.27	-1.46	-0.00	-0.00	-0.00	-1.46	-1.73
5	-0.00	-0.00	-0.00	-0.00	-0.00	-0.16	0.19	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.03	-0.70	-0.00	-0.00	-0.00	-0.70	-0.67
6	-0.00	-0.00	-0.00	-0.00	-0.00	-0.70	-0.42	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-1.12	-0.34	-0.00	-0.00	-0.00	-0.34	-1.47
7	-0.00	-0.00	-0.00	-0.00	-0.00	-0.67	-0.18	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.86	-0.01	-0.00	-0.00	-0.00	-0.01	-0.86
8	-0.00	-0.00	-0.00	-0.00	-0.00	-0.20	0.25	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.05	-0.00	-0.00	-0.00	-0.00	-0.00	0.05
9	-0.00	-0.00	-0.00	-0.00	-0.00	-0.13	-0.11	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.23	-0.00	-0.00	-0.00	-0.00	-0.00	-0.23
10	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	33.75	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	33.75	-0.00	-0.00	-0.00	-0.00	-0.00	33.75
11	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
12	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.01	-0.01	-0.02	-0.00	-0.42	-0.46	-0.00	-0.00	-0.00	-0.00	-0.00	-0.46
13	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.07	-0.00	-0.00	-0.01	-0.00	-0.02	-0.12	-0.00	-0.00	-0.00	-0.00	-0.00	-0.12
Total	**-0.21**	**-0.07**	**-0.20**	**-4.54**	**-0.30**	**-3.17**	**32.76**	**-0.08**	**-0.01**	**-0.01**	**-0.03**	**-0.01**	**-0.44**	**23.71**	**-14.39**	**-0.49**	**-0.91**	**-1.24**	**-17.03**	**6.67**

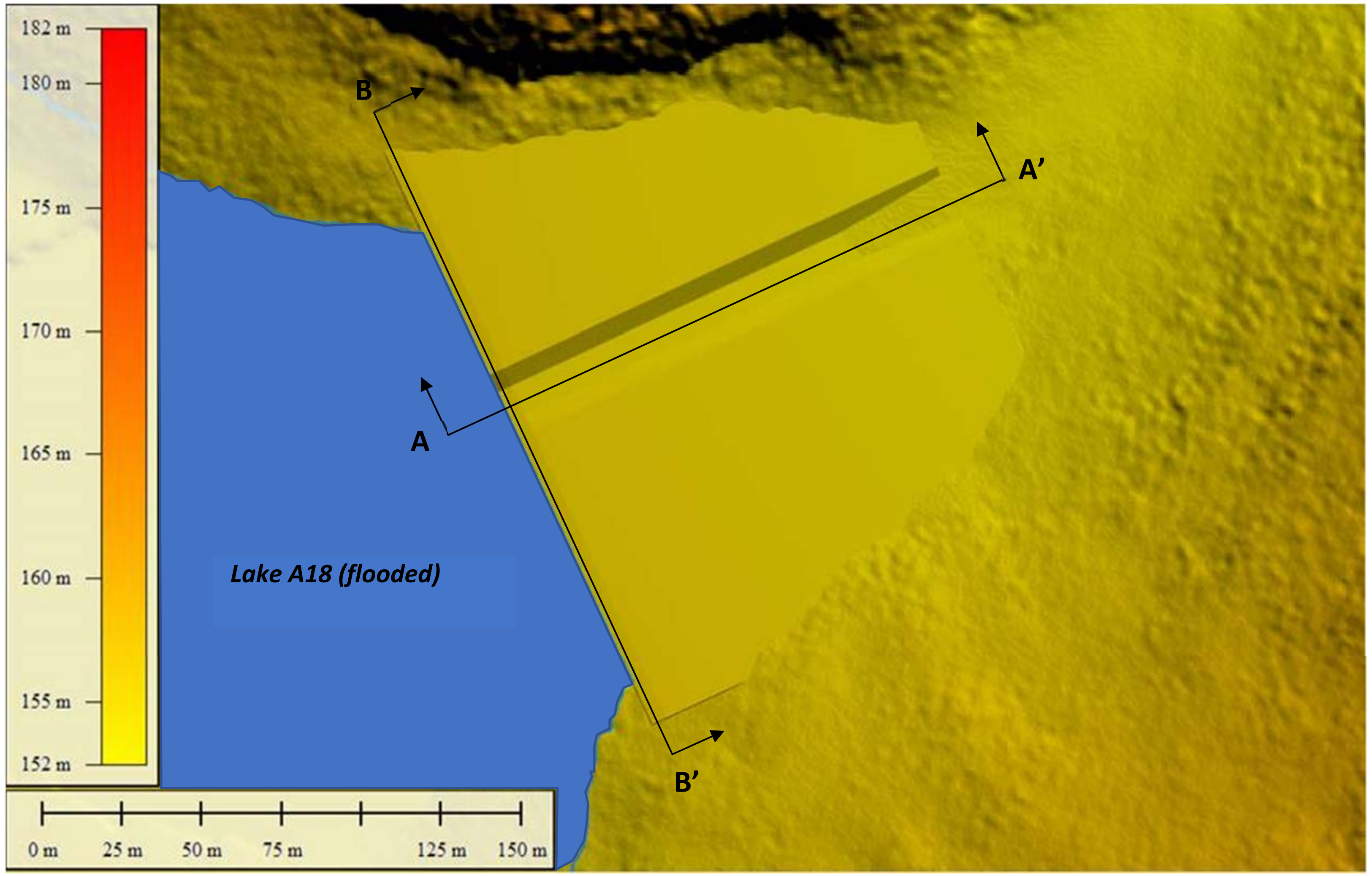
Table F-5b: Potential Changes in Habitat Units (HUs) Resulting from the IVR Pit and Associated Infrastructure by Habitat Type

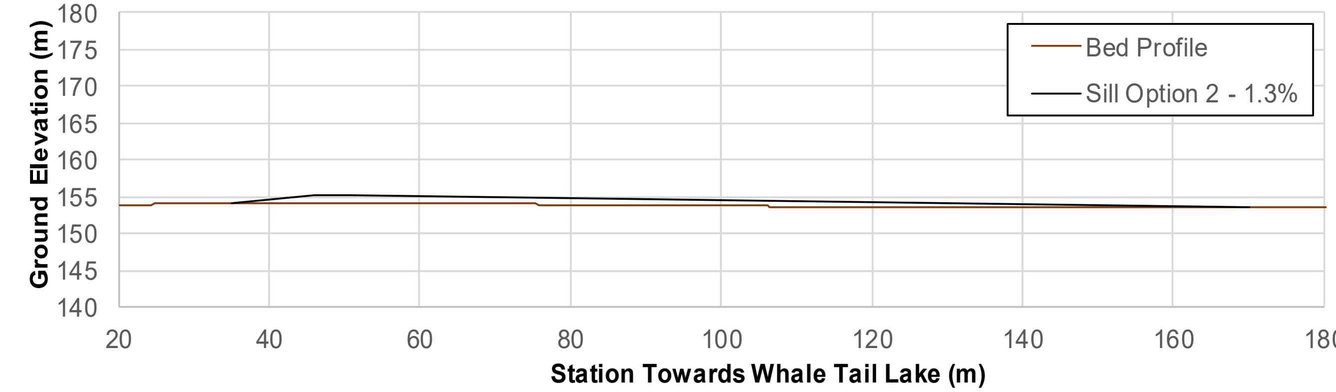
Habitat Type	Habitat Units																			
	Section 35 losses														Section 36 losses					Section 35 and 36
	Pond AP38	Lake A0	Lake A48	Lake A47	Lake A46	Lake A49	Whale Tail	A0-A48	To A47	A47-A46	A46-A17	A50-A17	A53-A17	Total	Lake A53	Lake A50	Lake A51	Lake A52	Total	Net Change
1	-0.03	-0.01	-0.03	-0.57	-0.03	-0.02	-0.12	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.81	-0.01	-0.03	-0.01	-0.00	-0.05	-0.86
2	-0.02	-0.01	-0.03	-0.54	-0.04	-0.04	-0.09	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.76	-0.06	-0.01	-0.01	-0.00	-0.08	-0.84
3	-0.00	-0.00	-0.00	-0.01	-0.01	-0.41	0.04	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.39	-4.61	-0.13	-0.33	-0.49	-5.56	-5.95
4	-0.00	-0.00	-0.00	-0.08	-0.00	-0.02	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.10	-0.55	-0.00	-0.00	-0.00	-0.55	-0.65
5	-0.00	-0.00	-0.00	-0.00	-0.00	-0.09	0.11	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-.02	-0.41	-0.00	-0.00	-0.00	-0.41	-0.39
6	-0.00	-0.00	-0.00	-0.00	-0.00	-0.54	-0.32	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.85	-0.26	-0.00	-0.00	-0.00	-0.26	-1.11
7	-0.00	-0.00	-0.00	-0.00	-0.00	-0.25	-0.07	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.32	-0.00	-0.00	-0.00	-0.00	-0.00	-0.32
8	-0.00	-0.00	-0.00	-0.00	-0.00	-0.10	0.13	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.03	-0.00	-0.00	-0.00	-0.00	-0.00	--0.03
9	-0.00	-0.00	-0.00	-0.00	-0.00	-0.09	-0.07	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.16	-0.00	-0.00	-0.00	-0.00	-0.00	-0.16
10	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
11	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
12	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.07	-0.08	-0.00	-0.00	-0.00	-0.00	-0.00	-0.08
13	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.02	-0.00	-0.00	-0.00	-0.00	-0.01	-0.03	-0.00	-0.00	-0.00	-0.00	-0.00	-0.03
Total	**-0.05**	**-0.02**	**-0.05**	**-1.20**	**-0.08**	**-1.56**	**-0.39**	**-0.02**	**-<0.01**	**-<0.01**	**-0.01**	**-<0.01**	**-0.08**	**-3.47**	**-5.90**	**-0.17**	**-0.35**	**-0.49**	**-6.91**	**-10.37**

Table F-6: Habitat Area (HAs) and Habitat Units (HUs) with and without a 1.3 m Sill between Lakes A18 and Whale Tail Lake and Road Scarification, and the Differences Resulting from the Sill and Road Scarification by Habitat Type

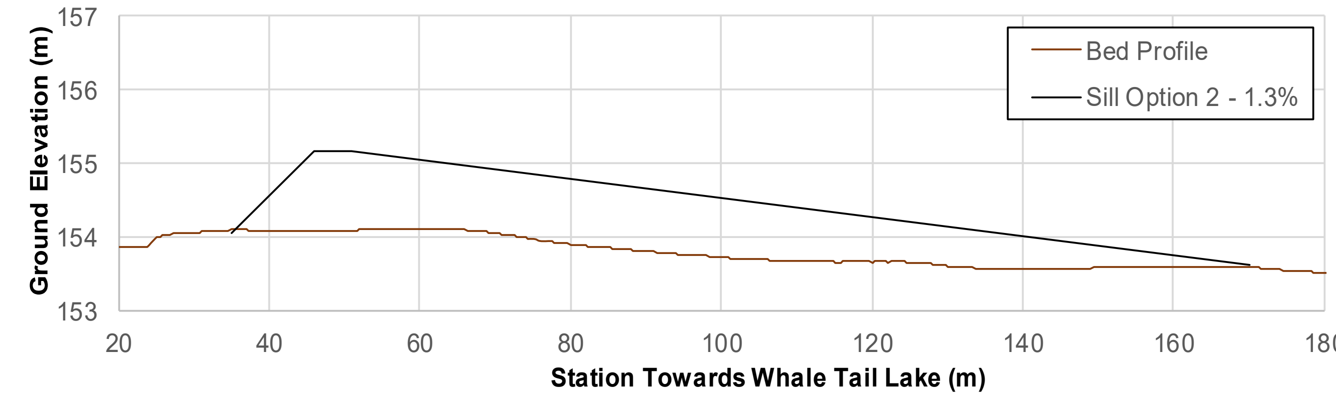
Habitat Type	Hectares		Habitat Units	
	Without Offsetting	Change due to Offsetting	Without Offsetting	Change due to Offsetting
1	-3.58	2.49	-0.86	0.60
2	-2.98	-0.98	-0.84	-0.28
3	-15.03	19.04	-5.95	7.84
4	-1.73	-2.47	-0.65	-0.93
5	-0.67	-3.04	-0.39	-1.77
6	-1.47	15.58	-1.11	11.84
7	-0.86	2.72	-0.32	1.02
8	0.05	2.47	0.03	1.29
9	-0.23	0.5	-0.16	0.34
10	33.75	0	0	0
11	0	-4.91	0	-1.48
12	-0.46	-0.03	-0.08	0
13	-0.12	-0.01	-0.03	0
Total	**6.67**	**31.35**	**-10.37**	**18.15**

APPENDIX G OFFSETTING MEASURE DESIGN



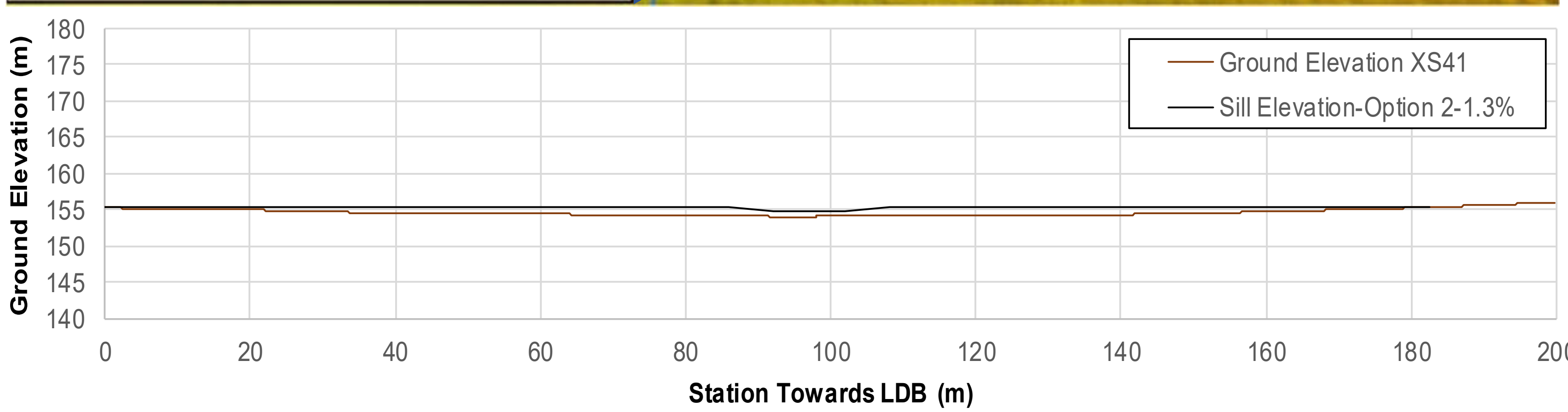


Section A-A' Profile of Sill Bed Elevation (vertical scale unexaggerated)

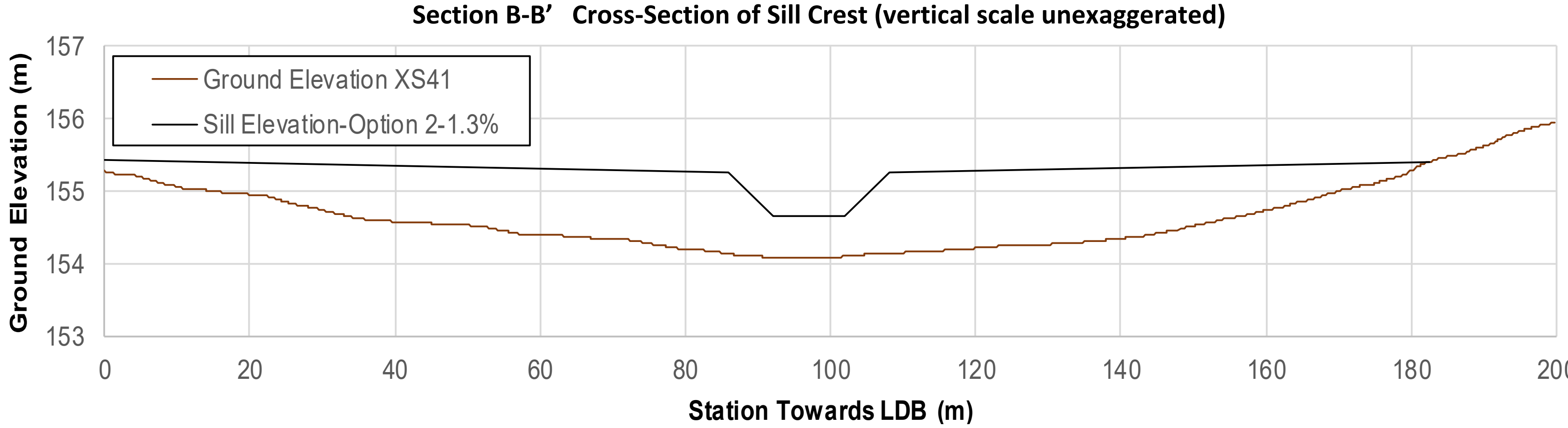


Section A-A' Profile of Sill Bed Elevation (vertical scale exaggerated 10x)

NOT FOR CONSTRUCTION



Section B-B' Cross-Section of Sill Crest (vertical scale unexaggerated)



Section B-B' Cross-Section of Sill Crest (vertical scale exaggerated 10x)

CLIENT	AGNICO EAGLE
PROJECT	WHALE TAIL EXPANSION PROJECT
TITLE	LAKE A18 SILL CONCEPT DESIGN
CONSULTANT	GOLDER

YYYY-MM-DD	2020-02-21
DESIGNED	NS
PREPARED	YT
REVIEWED	-
APPROVED	-

PROJECT NO.	PHASE	REV.	MAP
19122020	3000	A	

TECHNICAL MEMORANDUM

DATE 16 December 2019

Project No. 19122020-436-TM-Rev0

TO Manon Turmel
Agnico Eagle Mines Limited

CC Jen Range

FROM Nathan Schmidt, Cam Stevens, Julien Lacrampe

EMAIL nathan_schmidt@golder.com

WHALE TAIL EXPANSION PROJECT – DFO REGULATORY SUPPORT
CONCEPTUAL DESIGN – FISH PASSAGE AT LAKE A18 SILL

1.0 SCOPE OF WORK

Agnico Eagle Mines Limited (Agnico Eagle) engaged Nuqsana Golder (Golder) to prepare a technical memorandum describing conceptual design of a naturalized sill to provide fish passage at the outlet of Lake A18. The design considers a 1.3 m increase to the minimum elevation at the lake outlet. The scope of work for the technical memorandum requires that it include:

- A summary of fish passage requirements to be met by the sill.
- Design geometry of a naturalized lake outlet to meet those fish passage requirements, including upstream and downstream slopes, cross-sectional geometries, and material characteristics.
- An update to the baseline hydrology of Lake A18 to consider the increase in water surface elevation and corresponding increase in lake evaporation. The hydrology assessment will consider an updated stage-discharge rating curve for the lake outlet, corresponding to the sill geometry.
- Development of a 1-D HEC-RAS hydraulic model to characterize flow velocities and depths over a range of flows (e.g., median open-water discharge, 2-year and 10-year discharges, 7Q10 discharge, mean monthly discharges for open water season) at various locations on the downstream face of the sill.
- Other recommendations associated with the design, including those required to guide future refinements of the design.

A general description of site conditions is provided in Section 2 of this technical memorandum. The approach and methods are described in Section 3, and the resulting concept design, including hydrology, hydraulic, fish passage considerations and potential impacts, is presented in Section 4.

2.0 EXISTING SITE OVERVIEW

Existing conditions at the Lake A18 outlet were described in the Amaruq hydrology baseline (Golder 2016):

Lake A18 has a surface area of approximately 15.8 ha, and drains into Lake A17 (Whale Tail Lake). The outlet channel is approximately 45 m wide, with a poorly defined channel mainly composed of boulders. The water flows through or under the boulders for almost the entire length of the channel. The slope of the water surface in the channel was measured and indicated a typical gradient of 0.42%. The water surface elevation at Lake A18 at the time of survey (i.e., 16 September 2015) was measured as 153.71 masl, and the ordinary high water level was estimated as 153.97 masl. Upstream and downstream views at the Lake A18 outlet are provided in Table 1.

Table 1: Site Photographs of Lake A18 Outlet

7 August 2015. Upstream view of the watercourse and Lake (southwest).

16 September 2015. Downstream view of the watercourse (north).

The Lake A18 basin is shown outlined in red in Figure 1, with the raised lake water surface elevation shown outlined in yellow. The raised water surface will create a single lake extending over existing lakes A18, A19 and A63, but is not anticipated to inundate the Lake A20 outlet channel. The basin has a drainage area of 8.9 km^2 contributing runoff to the lake outlet, approximately 6.8 km^2 (76%) of which is located above Lake A19.

Figure 1: Google Earth Imagery showing lake locations and basin delineations

A more detailed description of the lake shoreline is presented in Table 2, and is based on the field reconnaissance and satellite imagery provided by Agnico Eagle (PhotoSat 2015). Terrain slopes calculated for the Lake A18 shoreline, based on a LiDAR-derived digital elevation model (DEM) are shown in Figure 2.

Table 2: Lake A18 Shoreline Description

Criteria	Description
Bank materials	Mostly boulders and cobble with limited vegetation. The northeast shoreline and the inlet channel from Lake A63 have vegetation.
Typical bank slopes	Most of the shoreline has shallow slopes, typically less than 2%. Only the northeast and southeast shorelines show some sections with slopes between 5% and 10%.
Typical shoreline geometry	Irregular shoreline with small bays in some areas.
Fetch	Maximum fetch length was estimated in GIS at approximately 0.6 km, on an east-west direction.

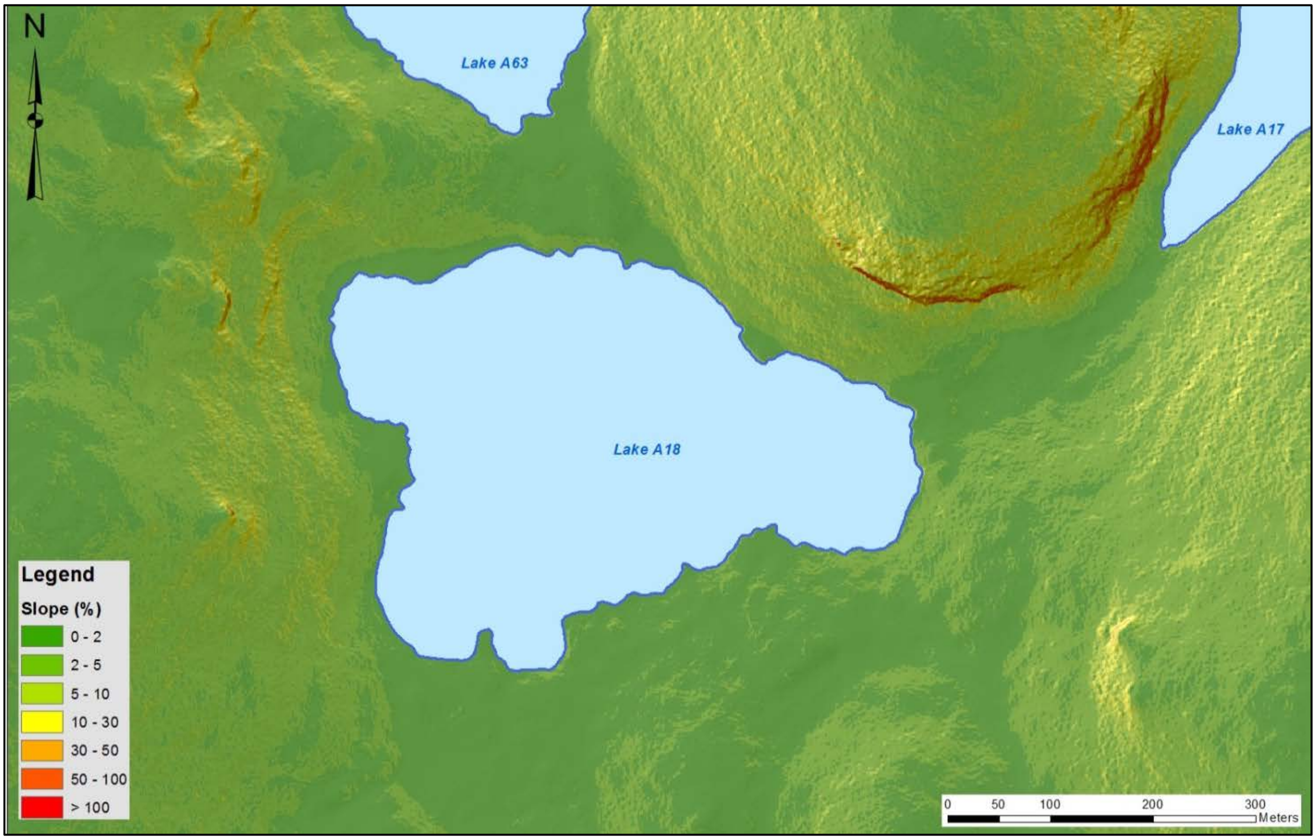


Figure 2: Lake A18 Shoreline Slope (Based on available DEM data [PhotoSat 2015])

The hydrology baseline report (Golder 2016) included baseline hydrological modeling to provide estimates of discharge and water surface elevation for various return periods, timing and locations, as described in Table 3 to Table 6. The model was calibrated based on continuous discharge and water level data collected during the open water season of 2015 (Golder 2016), and validated based on continuous discharge and water level data collected during the open water season of 2016 (Golder 2017). A continuous monitoring station was installed at Lake A18 during the 2015 and 2016 monitoring programs.

The baseline modeling indicates a mean annual water surface elevation variation of 0.30 m and an extreme (based on 100-year return period) value of 0.46 m.

Table 3: Estimated Baseline Monthly Mean Discharges at the Lake A18 Outlet

Condition	Return Period (years)	Monthly Mean Discharge (m^3/d)					
		May	June	July	August	September	October
Wet	100	12,200	57,000	32,600	23,000	24,900	13,700
	50	9,870	53,500	28,300	20,200	22,700	11,600
	20	6,910	48,200	22,700	16,600	19,500	9,080
	10	4,760	43,500	18,700	13,700	16,700	7,300
	5	2,700	38,100	14,600	10,700	13,600	5,580
Median	2	190	28,400	8,930	6,220	8,310	3,230
Dry	5	0	20,100	5,150	2,870	4,160	0
	10	0	16,700	3,720	1,440	2,540	0
	20	0	14,300	2,750	388	1,510	0
	50	0	12,100	1,840	0	662	0
	100	0	11,100	1,330	0	261	0

m^3/d = cubic metres per day.

Table 4: Estimated Baseline Peak and Low Flow Discharges at the Lake A18 Outlet

Condition	Return Period (years)	Peak Daily Q (m^3/s)	7-Day Mean Peak Q (m^3/d)	14-Day Mean Peak Q (m^3/d)	30-Day Low Flow Q (m^3/d)	60-Day Low Flow Q (m^3/d)	90-Day Low Flow Q (m^3/d)
Wet	100	3.38	146,000	112,000	12,000	16,700	18,400
	50	2.92	135,000	103,000	10,500	15,200	17,200
	20	2.36	119,000	91,400	8,570	13,000	15,300
	10	1.97	106,000	81,200	7,090	11,200	13,700
	5	1.61	90,300	69,700	5,560	9,160	11,800
Median	2	1.11	64,400	50,700	3,300	5,840	8,490
Dry	5	0.81	44,600	36,300	1,650	3,130	5,680
	10	0.70	37,100	30,900	953	1,920	4,500
	20	0.63	32,300	27,600	446	997	3,710
	50	0.57	28,500	25,000	0	42	3,020
	100	0.54	26,700	23,800	0	0	2,670

Q = discharge; m^3/s = cubic metres per second; m^3/d = cubic metres per day.

Table 5: Estimated Baseline Monthly Mean Stages (i.e., Water Levels) at the Lake A18 Outlet

Condition	Return Period (years)	Monthly Mean Stage (m)					
		May	June	July	August	September	October
Wet	100	0.405	0.549	0.492	0.459	0.466	0.415
	50	0.389	0.543	0.478	0.448	0.458	0.401
	20	0.362	0.531	0.458	0.431	0.444	0.382
	10	0.336	0.521	0.441	0.415	0.431	0.366
	5	0.301	0.507	0.420	0.395	0.414	0.347
Median	2	0.178	0.479	0.381	0.355	0.376	0.312
Dry	5	-	0.447	0.342	0.304	0.328	-
	10	-	0.431	0.320	0.266	0.297	-
	20	-	0.418	0.302	0.205	0.268	-
	50	-	0.405	0.279	-	0.228	-
	100	-	0.398	0.262	-	0.190	-

m = metres.

Table 6: Estimated Baseline Peak and Low Flow Stages at the Lake A18 Outlet

Condition	Return Period (years)	Peak Daily Stage (m)	7-Day Mean Peak Stage (m)	14-Day Mean Peak Stage (m)	30-Day Low Flow Stage (m)	60-Day Low Flow Q Stage (m)	90-Day Low Flow Stage (m)
Wet	100	0.759	0.662	0.628	0.404	0.431	0.439
	50	0.737	0.651	0.617	0.393	0.423	0.434
	20	0.707	0.635	0.603	0.378	0.410	0.424
	10	0.682	0.621	0.589	0.364	0.398	0.415
	5	0.655	0.602	0.572	0.347	0.383	0.403
Median	2	0.609	0.563	0.537	0.313	0.350	0.377
Dry	5	0.572	0.523	0.503	0.273	0.310	0.348
	10	0.555	0.505	0.487	0.245	0.281	0.333
	20	0.544	0.491	0.476	0.211	0.247	0.320
	50	0.533	0.479	0.467	-	0.132	0.308
	100	0.527	0.473	0.462	-	-	0.300

m = metres.

3.0 APPROACH AND METHODS

3.1 Fish Passage Requirements

Fish passage requirements were estimated based on fish swimming performance curves as presented by Katopodis and Gervais (2016). The selected fish length and the 'Salmonid and Walleye Group' fatigue equation described in Katopodis and Gervais (2016) were the same as those used to identify specific velocity thresholds for the Whale Tail Expansion Project's Haul Road (Golder 2019), and were previously accepted by DFO for that application. The fatigue equation was defined by the following relationship between dimensionless fish speed (U*) and dimensionless endurance time (t*) (Katopodis and Gervais 2016):

$$U_* = 4.004(t_*)^{-0.25}$$

Where: $U_* = {}^{U}\!\big/\!\sqrt{gl}$ and $t_* = {}^{t}\!\big/\!\sqrt{{}^{l}\!/\!{}_{g}}$

Where: *U* = fish swimming speed
t = endurance time (seconds)
l = fish length (metres)
g = gravitational acceleration (9.81 m/s^2)

The swimming performance targets for young salmonids (fork length 0.12 m) is presented in Table 7. These criteria were then compared to the results from the hydraulic evaluation of the sill concepts (see further below). It is understood that there are no true spring/freshet spawning species in the Lake A18 basin (e.g., no Arctic Grayling). However, it is expected that the proposed sill design has the potential to improve the connectivity of Whale Tail Lake to Lake A18 for juvenile (or immature) salmonid movements following the spring freshet (e.g., young Round Whitefish, Lake Trout, and Arctic Char). Movements may be related to dispersal, new foraging opportunities, or for seeking refugia from larger predators. Median year, mean monthly discharges for the months of July and August are recommended to be examined as design criteria for fish passage.

Table 7: Fish Swimming Performance Values for Young Salmonid (Fork Length 0.12 m)

Water Velocity (m/s)	Maximum Distance (m)	Water Velocity (m/s)	Maximum Distance (m)	Water Velocity (m/s)	Maximum Distance (m)	Water Velocity (m/s)	Maximum Distance (m)
1.00	4.1	**0.82**	7.5	**0.64**	15.6	**0.46**	42.6
0.98	4.4	**0.80**	8.1	**0.62**	17.3	**0.44**	48.6
0.96	4.7	**0.78**	8.7	**0.60**	19.2	**0.42**	54.7
0.94	5.0	**0.76**	9.5	**0.58**	21.2	**0.40**	63.0
0.92	5.3	**0.74**	10.2	**0.56**	23.1	**0.38**	75.6
0.90	5.7	**0.72**	11.0	**0.54**	26.3	**0.36**	88.2
0.88	6.1	**0.70**	12.0	**0.52**	29.5	**0.34**	100.8
0.86	6.5	**0.68**	13.2	**0.50**	32.8	**0.32**	123.1
0.84	7.0	**0.66**	14.4	**0.48**	36.5	**0.30**	153.9

3.2 Hydrology

The baseline water balance model of the Lake A18 watershed (Golder 2016), developed in GoldSim, was modified to consider a 1.3 m increase in lake outlet sill elevation and a stage-discharge rating curve representative of the preliminary concept design. Mean daily flow values were used to identify annual values of maximum daily mean discharge, maximum 7-day duration mean discharge, monthly mean discharges for July and August, and median open-water discharge. These were used as input to a frequency analysis to provide estimates of those discharges at various return periods.

3.3 Hydraulics

A HEC-RAS 1D hydraulic model was set up to represent the lake outlet channel and floodplain from Lake A18 to Lake A17. Cross-sections were cut on a 10-m interval from the available LiDAR data for the area, and those cross-sections were sampled at 5 m intervals to provide cross-sections for input to the baseline hydraulic model.

Cross-sections representing the concept design were then inserted into the model to allow water surface profiles, flow widths and depths, flow velocities and other parameters to be estimated for selected discharges as identified in Section 3.2.

3.4 Concept Design

A preliminary concept design was proposed based on the existing outlet channel geometry, based on natural materials (small boulder, cobble and smaller fractions) to provide a maintenance-free naturalized lake outlet that will provide fish passage.

The base width of the outlet channel was reduced from baseline conditions, as it is assumed that the future sill will not include very large-scale roughness elements that are present in the existing channel (Table 1) and that occupy a large proportion of the cross-sectional area up to the bankfull elevation.

Two downstream channel bed slopes were selected to evaluate and provide a comparison of feasible sill profile geometries for fish passage, and preliminary descriptions of channel and floodplain fill material were specified.

4.0 CONCEPT DESIGN

4.1 Sill and Channel Geometry and Materials

The preliminary concept design considered a short, flat control section, with an upstream (approach) bed slope that was steep relative to the downstream bed slope. Two downstream bed slopes were examined to provide a comparison of flow velocities for reasonable sill lengths. A conceptual outlet control section is proposed, comprising a sill with the following characteristics, roughly analogous to the existing outlet geometry:

- base elevation 1.3 m above the existing lake spill elevation
- flat top streamwise length of 5 m
- channel base width of 10 m and 10H:1V side slopes to a bank height of 0.6 m
- overbank (floodplain) generally flat relative to the channel banks (modeled as 500H:1V)
- upstream bed slope 10H:1V
- downstream channel bed slopes (two scenarios) of:
  - 2.0%, corresponding to a downstream sill length of 74 m at transition to existing 0.42% bed slope; and
  - 1.3%, corresponding to a downstream sill length of 119 m at transition to existing 0.42% bed slope.

The conceptual design channel profiles are shown in Figure 3 and typical channel cross-sections are shown in Figure 4.

Channel bed and overbank materials should comprise a well-graded mix of granular material from silt and sand sizes to boulders of appropriate size to remain stable for extreme runoff events (e.g., 1000-year return period or greater). A well-graded mix is required to reduce overall void space and hydraulic conductivity, to discourage subsurface flow; post-freshet flows are expected to be relatively low (e.g., typically less than 0.1 m^3/s) and it is essential that the flow remains on the surface to facilitate fish passage.

A low permeability barrier (e.g., clay or similar material) should be considered under the crest of the sill, again to discourage seepage through the structure. A 0.5 to 1.0 m wide (streamwise direction) barrier should be installed across the channel, with a filter layer installed between the barrier and upstream and downstream fill materials.

A channel roughness (Manning's n value) of 0.050 was estimated, in consideration of a moderately rough cobble-boulder channel, with limited large-scale roughness elements projecting above the bed. Placement of random boulders or boulder clusters to enhance fish passage could increase local roughness and provide additional fish habitat features, but would be unlikely to significantly increase the overall channel roughness unless placed with high frequency.

Similar concepts have been applied for various purposes for projects across Canada, inclusive of northern Canada (e.g., Schmidt 2007, Schmidt et al. 2011). Sufficiently large rock (small boulder and cobble) and smaller fractions of granular material are available at the Whale Tail Expansion Project to support construction of the sill. Agnico Eagle has identified that local tills tend to be sandy, with low clay content, and may not be suitable as low-permeability material. Therefore, it would likely be necessary to substitute an alternative (e.g., bentonite mix or low-permeability silt; or a long-lived impermeable synthetic geomembrane) or confirm that that, based on sill geometry and materials, that subsurface seepage through the sill would be small relative to surface flow.

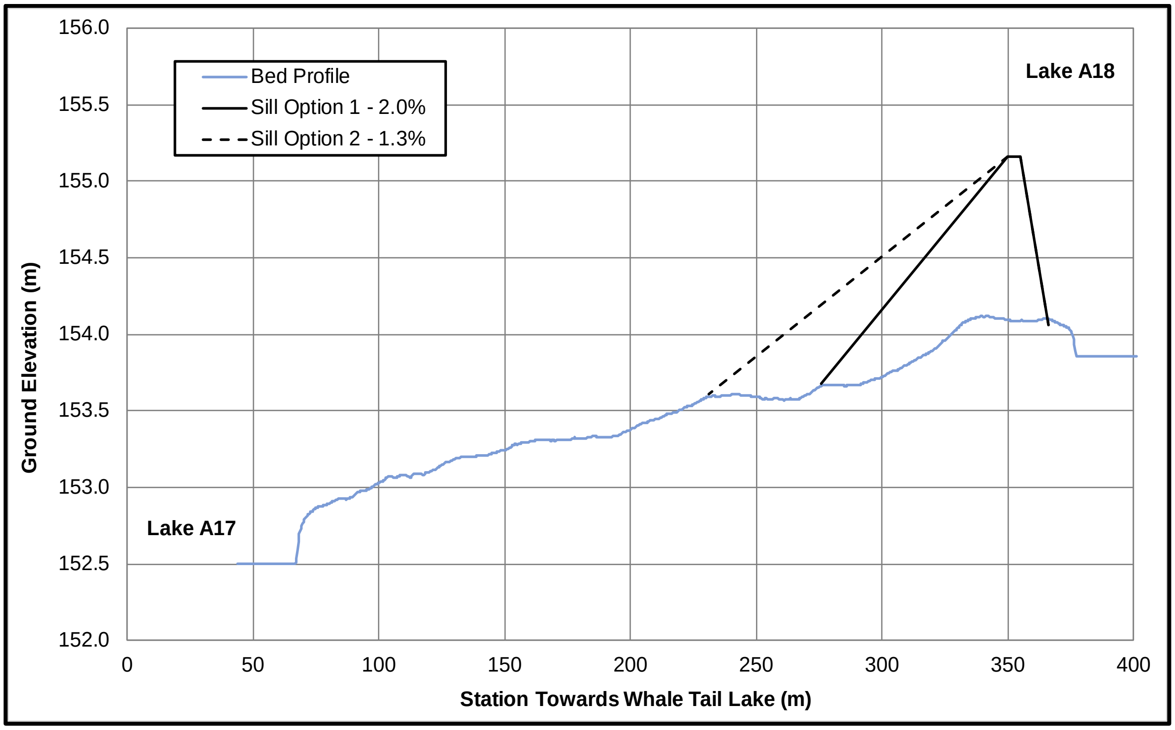


Figure 3: Existing Channel Bed and Conceptual Sill Elevation Profiles (Vertical Exaggeration 60:1)

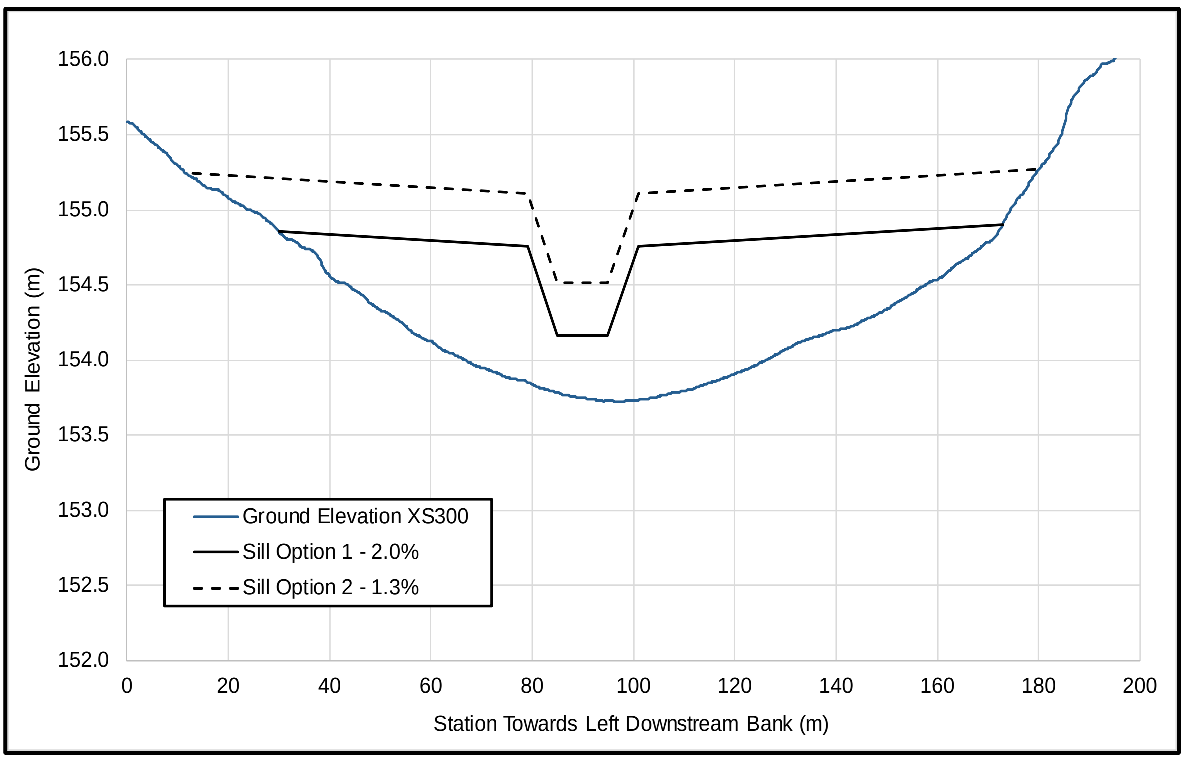


Figure 4: Typical Existing Channel Bed and Conceptual Sill Cross-Sections (Vertical Exaggeration 30:1)

4.2 Hydrology

The modified baseline water balance model of the Lake A18 watershed provided a time series of daily mean discharges for the period 1 October 1951 to 30 September 2019 (65 hydrological years from 1952 to 2019, with three missing years of climate data input [Golder 2016]). The model results were used as input to a frequency analysis that provided values for the parameters listed in Table 8. Annual values and frequency analysis plots are provided in Appendix A.

The water level regimes are expected to be similar to baseline conditions, with a mean annual water surface elevation variation of 0.2 m to 0.3 m and an extreme (based on 100-year return period) value of 0.3 to 0.4 m. This compares to the baseline values of 0.30 m (median year) and 0.46 m (extreme year).

The water balance model indicates a mean annual water yield of approximately 1.8 million m^3 at the Lake A18 outlet, corresponding to a water depth of 200 mm across the upstream basin area. Based on a future lake water surface area of 470,000 m^2 and a fill depth of 1.3 m, the raised lake should fill in less than a year under mean hydrological conditions.

Table 8: Hydrological Design Basis Values

Parameter	Discharge (m^3/s)	Stage (m)
1000-year maximum daily mean, Q_{1000}	5.201	0.49
100-year maximum daily mean, Q_{100}	3.759	0.42
10-year maximum daily mean, Q_{10}	2.439	0.34
2-year maximum daily mean, Q_2	1.474	0.27
10-year, 7-day duration mean discharge, 7Q10	1.380	0.26
2-year, 7-day duration mean discharge, 7Q2	0.880	0.21
Median of Annual Mean July Discharge, Q_{Jul}	0.075	0.07
Median of Annual Mean August Discharge, Q_{Aug}	0.065	0.06
Median of Annual Open Water Discharge, Q_{OW}	0.054	0.06

4.3 Hydraulic Modeling

Detailed results of the HEC-RAS 1D hydraulic model are presented in Appendix B. Typical mean channel velocities and flow depths on the downstream face of the sill, as well as in the natural portion of the channel below the sill, are summarized in Table 9.

Table 9: Mean Channel Velocity (V), Mean Depth (D) and Flow Area (A) at Representative Cross-Section on Lake A18 Outlet Channel

Discharge Parameter	Discharge Value (m^3/s)	Downstream Face of Sill (Cross-Section 300)						Below Sill (Cross-Section 110)		
		2.0% Downstream Bed Slope			1.3% Downstream Bed Slope			Natural Bed Slope (0.4%)		
		V (m/s)	D (m)	A (m^2)	V (m/s)	D (m)	A (m^2)	V (m/s)	D (m)	A (m^2)
Q_{1000}	5.201	1.20	0.33	4.34	1.01	0.38	5.16	0.52	0.32	9.94
Q_{100}	3.759	1.10	0.27	3.43	0.91	0.31	4.12	0.47	0.28	8.03
Q_{10}	2.439	0.97	0.21	2.51	0.79	0.25	3.08	0.41	0.23	6.01
Q_2	1.474	0.85	0.15	1.74	0.67	0.19	2.20	0.34	0.18	4.32
7Q10	1.380	0.83	0.15	1.66	0.65	0.18	2.11	0.33	0.18	4.13
7Q2	0.880	0.72	0.11	1.21	0.56	0.14	1.56	0.29	0.15	3.07
Q_{Jul}	0.075	0.27	0.03	0.28	0.23	0.03	0.33	0.12	0.06	0.62
Q_{Aug}	0.065	0.23	0.03	0.28	0.22	0.03	0.30	0.12	0.05	0.56
Q_{OW}	0.054	0.20	0.03	0.27	0.20	0.03	0.26	0.11	0.05	0.50

4.4 Fish Passage

A comparison of the modeled flow velocities for seasonal discharges (Q_{Jul}, Q_{Aug}, Q_{OW}) indicates that the modeled downstream channel slopes of 2.0% and 1.3% would both provide mean channel velocities below 0.3 m/s. A comparison to the fish swimming performance requirements presented in Section 3.1 suggests that this would meet the objectives of passing juvenile salmonids for either sill length (74 m for the 2.0% slope and 119 m for the 1.3% slope).

Modeled flow depths are small for the seasonal discharges at which fish passage is desired. However, the hydraulic model is based on an idealized, smooth and flat-bottomed cross-section and the results provide representative mean flow velocities and cross-sectional areas. Bed material placement would not be expected to be uniform, and roughness elements (cobbles and boulders projecting above the mean bed elevation) would provide variability in the bed surface elevation.

This means that at low flows, there would be variations in channel bed surface, leading to small-scale variability in flow depth and velocity. These may result in locally increased flow velocities over small distances, but conversely would also provide deeper and slower flowing resting areas in between. Care would need to be taken during construction to prevent the creation of any actual blockages, including oversteepened sections or drops. This requirement should be incorporated in the advanced design.

4.5 Impacts to Downstream Water Level Regimes of Downstream Lakes

The permanently raised elevation of Lake A18 at post-closure is expected to increase its surface area by approximately 65% from baseline conditions (an increase from 29 ha to 47 ha, considering baseline surface areas of lakes A19 and A63). This will result in proportional increases in direct precipitation and evaporative losses, and decreases in runoff from adjacent land areas from baseline conditions. However, over 75% of the overall drainage area at Lake A18 originates in upstream basins that will not be disturbed, and this will moderate any potential effects on hydrological conditions at Lake A18.

Similarly to the conclusions presented for the post-closure conditions of Whale Tail Lake in the Final Environmental Impact Statement (Golder 2018), the increase in direct precipitation is expected to be offset by the decrease in evaporative losses and runoff from adjacent land areas, resulting in low to negligible impacts on the water level regimes of lakes downstream of Whale Tail Lake. The magnitude of the impacts was not quantified as part of this scope of work.

4.6 Future Design Considerations

This technical memo presents a conceptual design of the proposed Lake A18 sill. Advancement of the design to a preliminary engineering stage should consider the following items:

- Confirming the design basis (e.g., what design discharges should the sill be designed to; which slope option will be selected.
- Conducting site surveys to supplement LiDAR data.
- Updating the hydraulic model to consider finer scale channel bed elevation variability.
- Confirming the required sizing and gradation of fill materials, to provide an inerodible surface that supports fish passage at the Lake A18 sill.

- Confirming availability of materials with Agnico Eagle, or identifying acceptable alternatives. This includes either identifying natural low-permeability material (clay, silt or bentonite mix) or an acceptable synthetic alternative, or confirming that the hydraulic conductivity of sill materials will be sufficient to limit subsurface seepage to acceptable levels.
- Investigating subsurface soil conditions in areas where fill will be placed, in particular at the sill crest and upstream areas away from the existing channel, to assess the potential for permafrost melt and ground instability, and to identify mitigation measures if required.
- Design drawings will be submitted to DFO for approval prior to construction.

5.0 CLOSURE

We trust the above meets your needs, please contact the undersigned with any questions.

REGISTERED PROFESSIONAL ENGINEER
16 DEC 2019
N.P. SCHMIDT
LICENSEE
N.W.T.

Cam Stevens, Ph.D.
Associate, Senior Aquatic Ecologist

Nathan Schmidt, Ph.D., P.Eng.
Principal, Senior Water Resources Engineer

CS/NS/jr

https://golderassociates.sharepoint.com/sites/109587/project files/5 technical work/conceptual sill design/09_final_report/19122020-436-tm-rev0-silldesignlakea18.docx

PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature
Date 16 DECEMBER 2019
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

References

Golder (Golder Associates Ltd.). 2016. 2015 Hydrology Baseline Report, Agnico Eagle Mines: Meadowbank Division – Whale Tail Pit Project. Prepared by Golder Associates Ltd., Doc 037-1524321.1300 Ver 1, January 2016, 75 p. + 3 appendices.

Golder. 2017. 2016 Hydrology Baseline Report, Agnico Eagle Mines: Meadowbank Division – Whale Tail Pit Project. Prepared by Golder Associates Ltd., Doc 088-1656381 Ver 1, January 2017, 19 p. + 1 appendix.

Golder. 2018. Whale Tail Pit – Expansion Project. Final Environmental Impact Statement Addendum. December 2018.

Golder. 2019. Estimated Velocities for Fish Passage at Culvert Crossings for the Whale Tail Expansion Project Haul Road. Prepared by Golder Associates Ltd, Project No. 19115196-402-TM-Rev0, 16 October 2019, 5 pages + appendix.

Katopodis, C. and R. Gervais. 2016. Fish swimming performance database and analyses. DFO Can. Sci. Advis. Sec. Res. Doc. 2016/002. vi + 550 p.

PhotoSat (PhotoSat Information Ltd.). 2015. PhotoSat Stereo Satellite Elevation Mapping Project Report. Reference No. 3631.

Schmidt, N. 2007. The Hardisty Creek Restoration Project. Canadian Water Resources Association National Conference, Saskatoon, Saskatchewan, June 25-28, 2007. Poster presentation.

Schmidt, N., D. Ciobotaru, Z. Craciunescu and L. Purcka. 2011. Hill Creek Culvert Fish Passage Remediation. 20th Canadian Hydrotechnical Conference, Ottawa, ON, 14-17 June 2011. 10 p.

APPENDIX A

Hydrology Design Basis

Table A-1: Annual Hydrology Values from Water Balance Model

Year	Q_{max}	7Q	Q_{July}	Q_{August}	Median Open Water	Year	Q_{max}	7Q	Q_{July}	Q_{August}	Median Open Water
1952	1.508	0.785	0.046	0.085	0.089	**1986**	1.055	0.828	0.056	0.100	0.080
1953	1.318	0.695	0.107	0.112	0.047	**1987**	3.287	1.634	0.341	0.146	0.092
1954	0.960	0.615	0.009	0.012	0.022	**1988**	2.064	1.232	0.072	0.079	0.096
1955	1.132	0.929	0.036	0.157	0.092	**1989**	1.304	1.068	0.139	0.077	0.062
1956	0.962	0.587	0.180	0.142	0.044	**1990**	1.489	0.802	0.166	0.093	0.099
1957	1.204	0.497	0.172	0.068	0.033	**1991**	1.279	0.951	0.084	0.015	0.070
1958	0.786	0.439	0.035	0.055	0.065	**1992**	1.904	1.192	0.176	0.014	0.016
1959	0.928	0.588	0.086	0.173	0.081	**1994**	1.836	0.838	0.174	0.064	0.112
1960	1.008	0.654	0.013	0.064	0.060	**1995**	0.890	0.510	0.012	0.057	0.031
1961	1.334	0.699	0.009	0.030	0.039	**1996**	2.079	0.795	0.074	0.172	0.081
1962	1.403	0.889	0.151	0.065	0.071	**1997**	0.963	0.702	0.041	0.000	0.017
1963	0.878	0.532	0.076	0.027	0.024	**1998**	1.804	1.196	0.072	0.103	0.125
1964	1.587	1.184	0.124	0.000	0.000	**1999**	1.398	0.722	0.154	0.088	0.069
1965	1.580	1.257	0.094	0.001	0.000	**2000**	1.059	0.600	0.043	0.074	0.062
1966	2.056	1.045	0.048	0.018	0.028	**2001**	1.390	0.798	0.021	0.154	0.046
1967	1.158	0.725	0.134	0.049	0.054	**2002**	2.234	1.041	0.206	0.180	0.117
1968	2.038	1.342	0.143	0.055	0.073	**2003**	1.263	0.847	0.072	0.001	0.030
1969	0.797	0.578	0.105	0.063	0.007	**2004**	0.997	0.679	0.029	0.000	0.003
1970	2.164	1.121	0.166	0.110	0.120	**2005**	2.037	1.225	0.137	0.069	0.101
1971	1.344	1.010	0.068	0.090	0.062	**2006**	4.184	1.570	0.058	0.025	0.025
1972	1.701	0.931	0.113	0.036	0.050	**2007**	1.902	1.216	0.090	0.097	0.034
1973	1.126	0.655	0.001	0.002	0.011	**2008**	1.358	0.928	0.045	0.190	0.076
1974	0.972	0.575	0.088	0.017	0.038	**2009**	0.653	0.438	0.009	0.164	0.111
1975	1.733	1.315	0.042	0.248	0.063	**2011**	1.419	0.866	0.044	0.009	0.013
1976	3.353	1.696	0.090	0.000	0.026	**2012**	1.349	0.751	0.004	0.006	0.011

Year	Q_{max}	7Q	Q_{July}	Q_{August}	Median Open Water	Year	Q_{max}	7Q	Q_{July}	Q_{August}	Median Open Water
1977	2.171	1.537	0.039	0.037	0.069	**2013**	1.422	0.822	0.049	0.000	0.008
1978	2.200	1.484	0.436	0.018	0.017	**2014**	1.539	0.781	0.065	0.060	0.061
1980	1.868	0.931	0.117	0.161	0.076	**2015**	2.545	1.655	0.152	0.001	0.013
1981	1.504	0.770	0.120	0.000	0.020	**2016**	1.388	0.737	0.024	0.125	0.073
1982	1.361	0.696	0.079	0.063	0.109	**2017**	2.504	1.443	0.008	0.028	0.011
1983	2.590	1.232	0.030	0.100	0.072	**2018**	1.803	1.052	0.045	0.027	0.030
1984	1.815	1.106	0.076	0.124	0.087	**2019**	2.106	1.179	0.123	0.150	0.059
1985	1.329	0.822	0.206	0.173	0.137						

Frequency Analysis of Annual Maximum Mean Daily Discharges

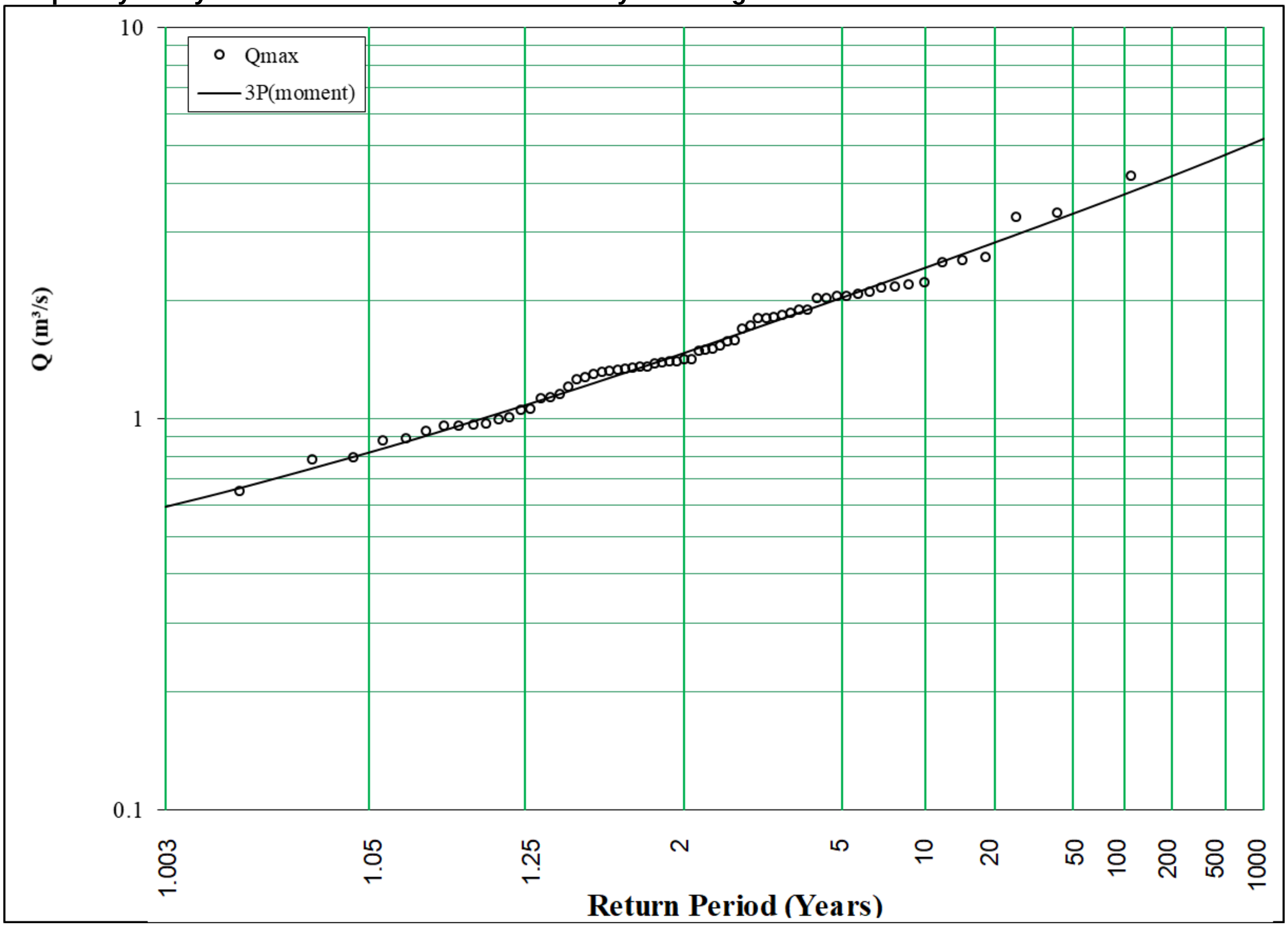


Figure A-1: Frequency Analysis Plot of Annual Maximum Mean Daily Discharges

Table A-2: Frequency Analysis Table of Annual Maximum Mean Daily Discharges

Return Period	Value (m^3/s)
2	1.474
10	2.439
20	2.829
50	3.352
100	3.759
1000	5.201

No outliers were identified in the annual maximum mean daily discharge series.

Frequency Analysis of Annual Maximum 7-Day Duration Discharges

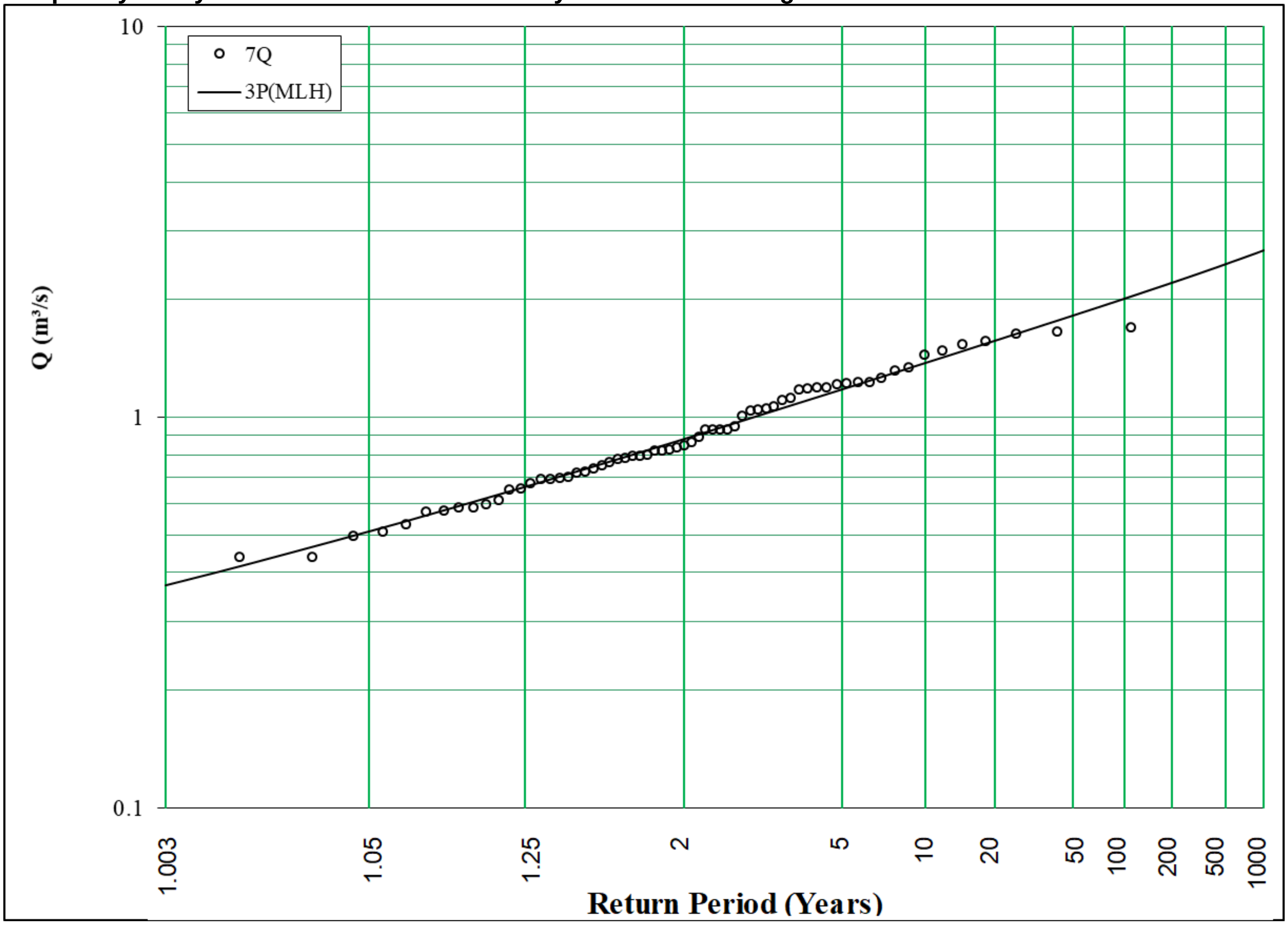


Figure A-2: Frequency Analysis Plot of Annual Maximum 7-Day Duration Discharges

Table A-3: Frequency Analysis Table of Annual Maximum 7-Day Duration Discharges

Return Period	Value (m^3/s)
2	0.880
10	1.380
20	1.574
50	1.826
100	2.019

No outliers were identified in the annual maximum 7-day duration discharge series.

Frequency Analysis of Annual Mean July Discharges

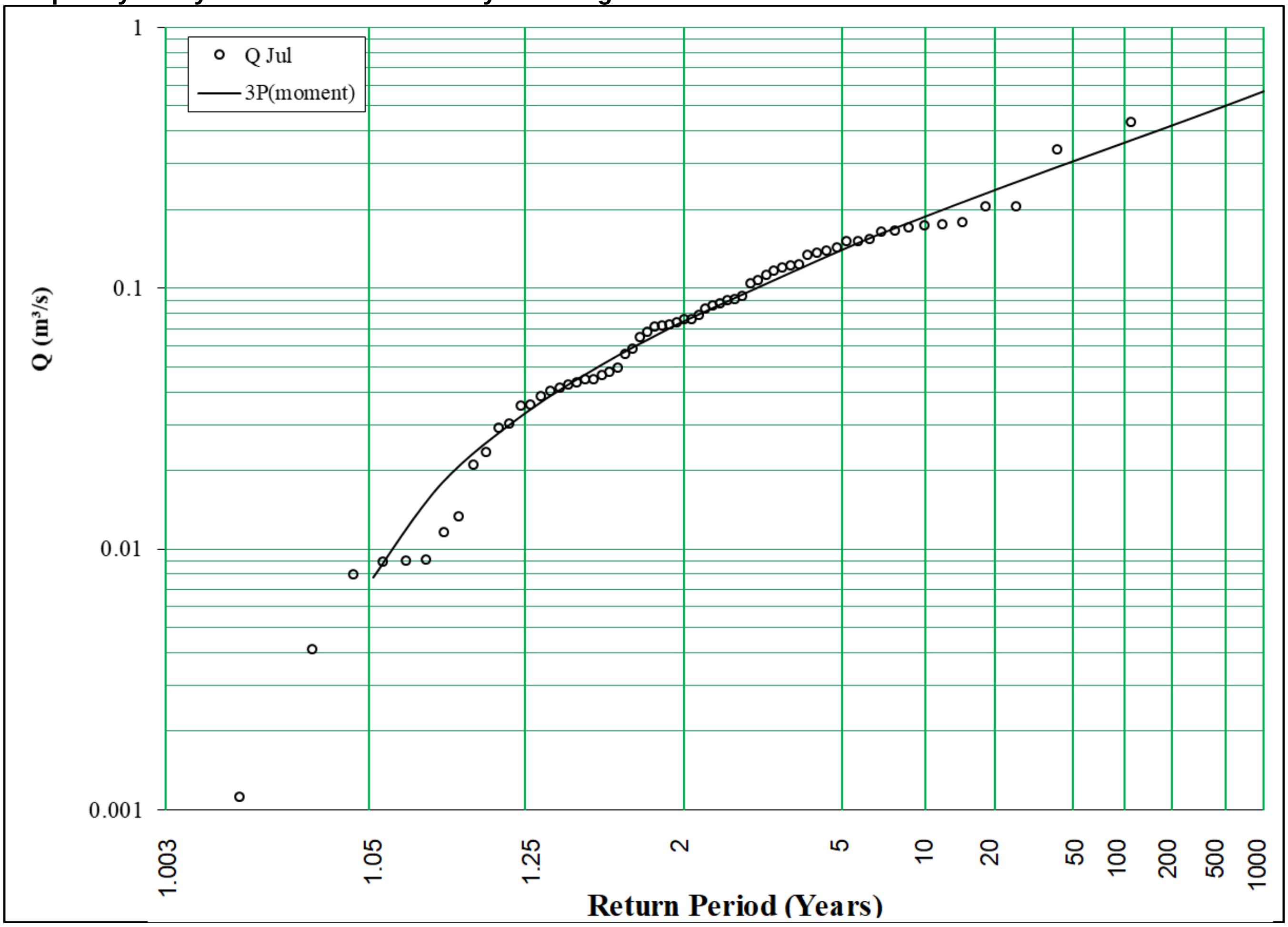


Figure A-3: Frequency Analysis Plot of Annual Mean July Discharges

Table A-4: Frequency Analysis Table of Annual Mean July Discharges

Return Period	Value (m^3/s)
2	0.075
10	0.189
20	0.238
50	0.307
100	0.362

One outlier (Q = 0.001 in 1973) was identified in the annual mean July discharge series.

Frequency Analysis of Annual Mean August Discharges

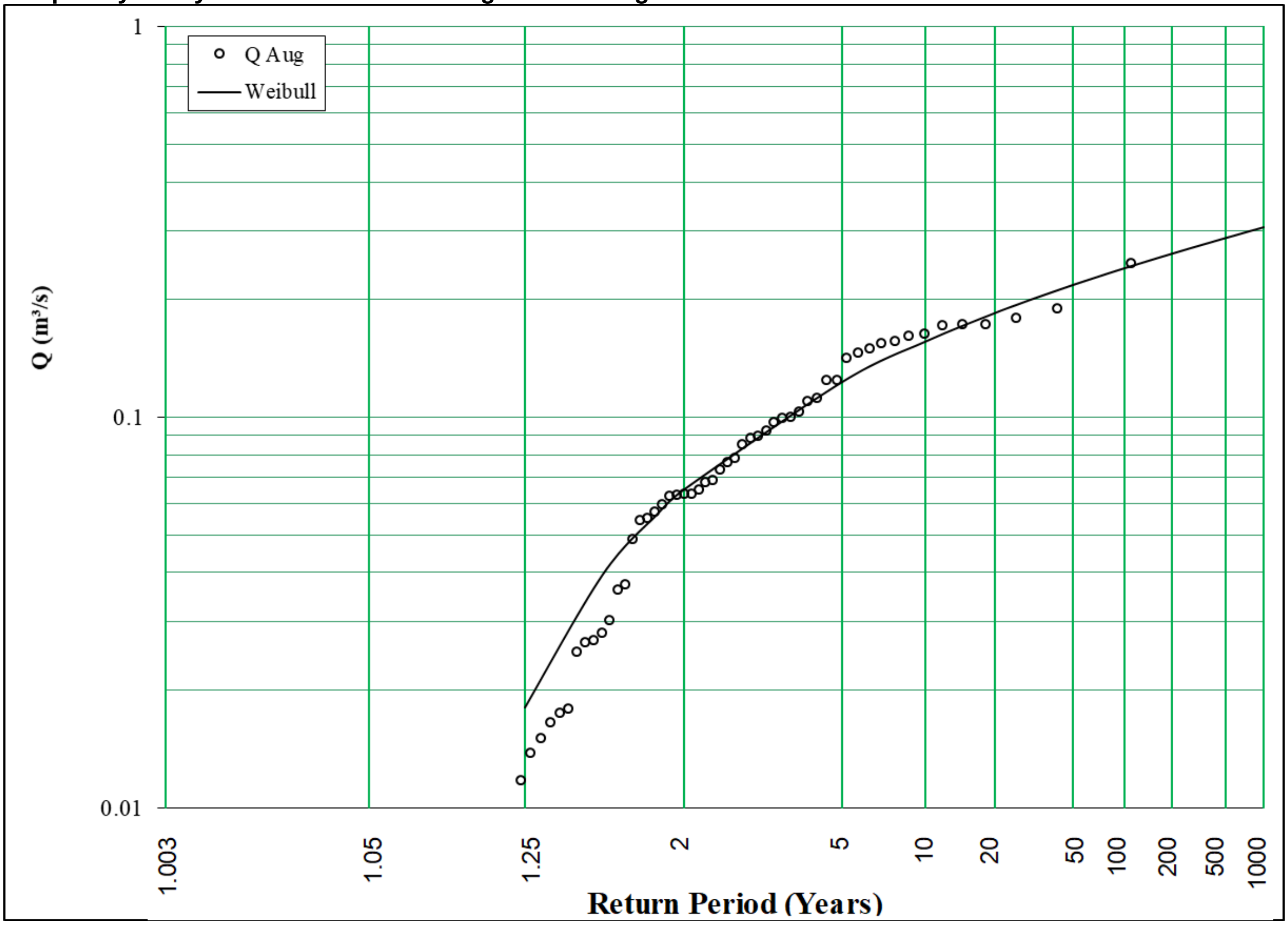


Figure A-4: Frequency Analysis Plot of Annual Mean August Discharges

Table A-5: Frequency Analysis Table of Annual Mean August Discharges

Return Period	Value (m^3/s)
2	0.065
10	0.156
20	0.185
50	0.218
100	0.241

Eight outliers (Q <= 0.001 in 1964, 1965, 1976, 1980, 1995, 2001, 2002, and 2010) were identified in the annual mean August discharge series.

Frequency Analysis of Annual Median Open Water (June through September) Discharges

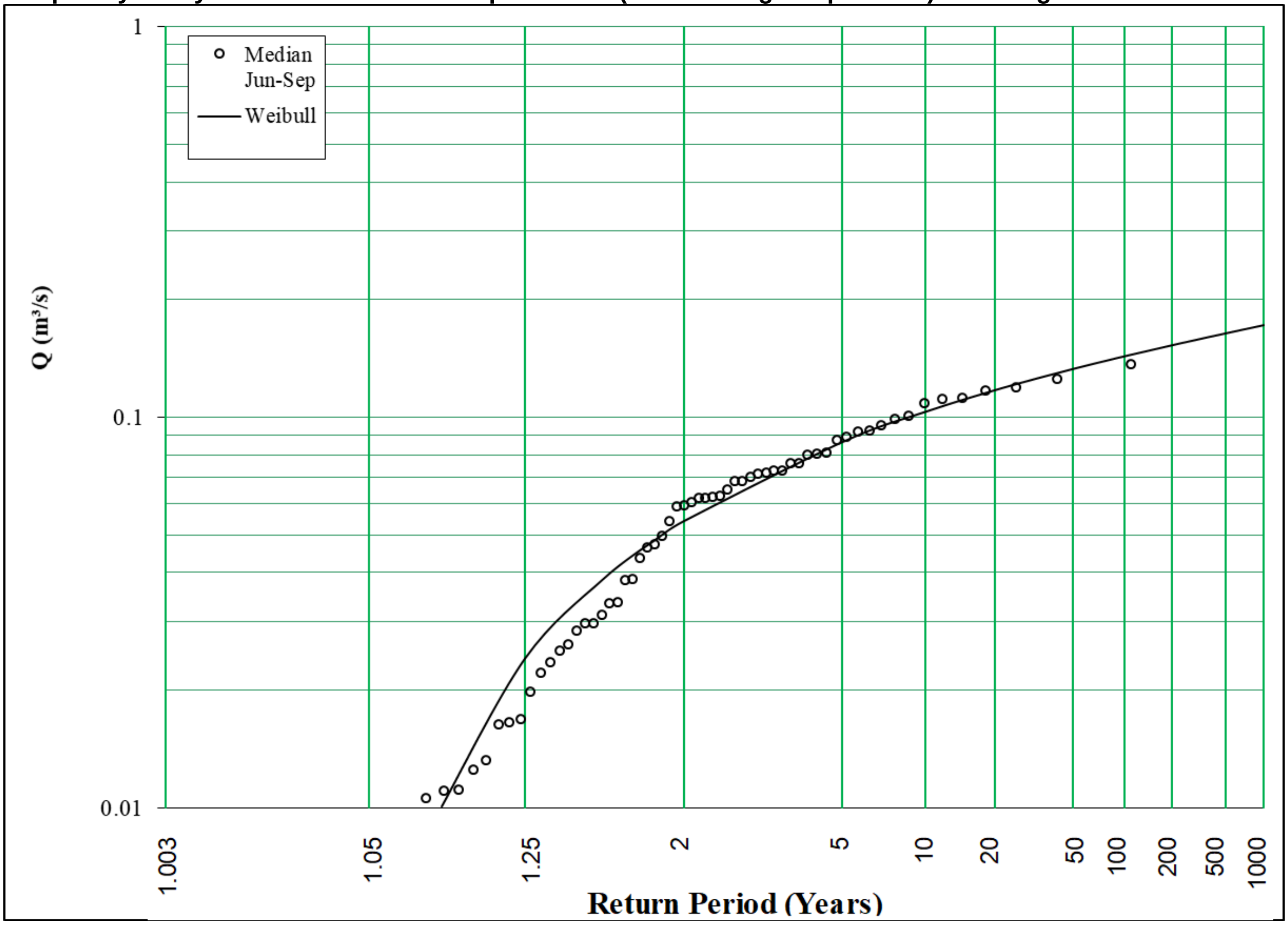


Figure A-5: Frequency Analysis Plot of Annual Median Open Water (June through September) Discharges

Table A-6: Frequency Analysis Table of Annual Median Open Water (June through September) Discharges

Return Period	Value (m^3/s)
2	0.054
10	0.103
20	0.117
50	0.133
100	0.143

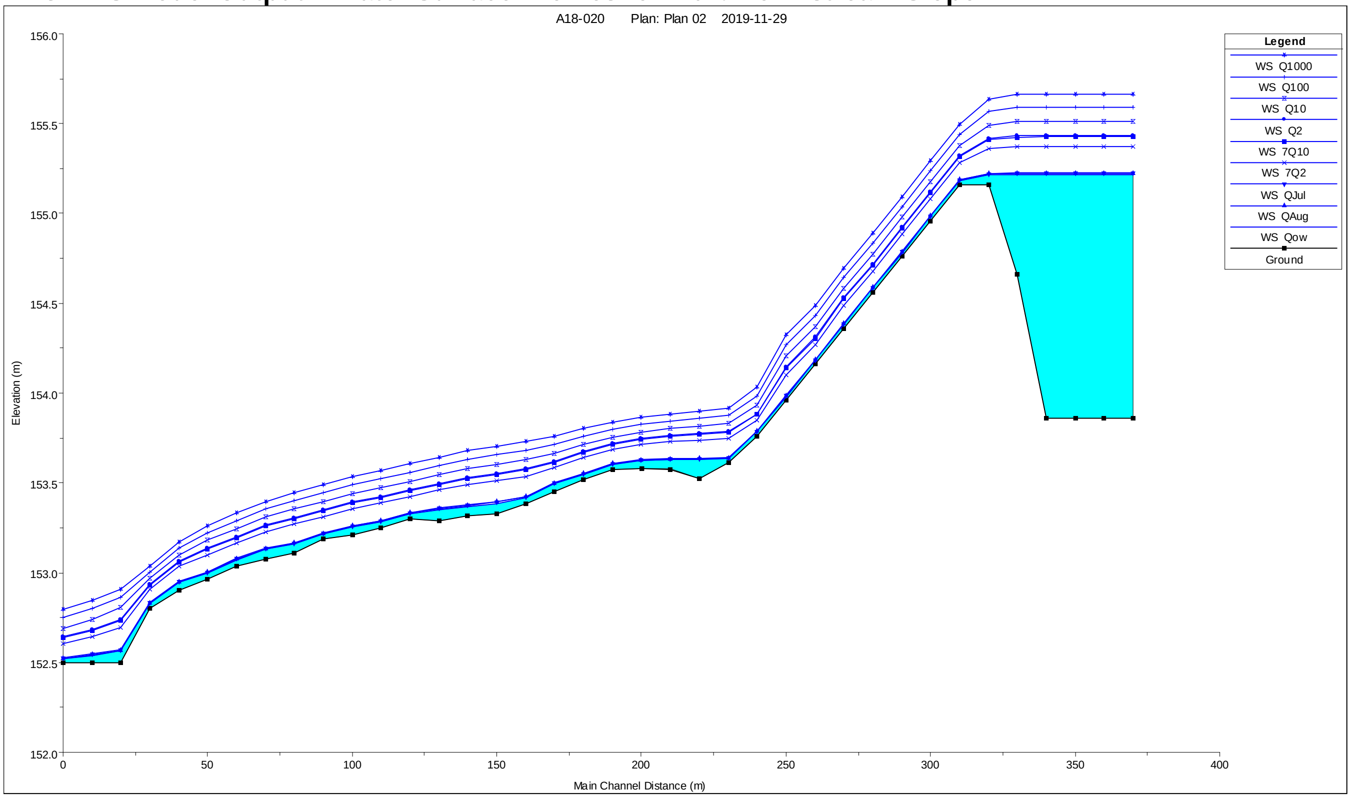
Three outliers (Q <= 0.003 in 1964, 1965, 2002) was identified in the annual median open water (June through September) discharge series.

APPENDIX B

Hydraulic Model Output

2.0% channel slope scenario

HEC-RAS Model Output – Water Surface Profiles for 2.0% Downstream Slope



HEC-RAS Model Output – Detailed Tables at each Cross-Section for 2.0% Downstream Slope

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
400	Qow	0.05	153.86	155.22	153.87	155.22	0.000000	0.00	232.33	200.00	0
400	QAug	0.06	153.86	155.22	153.87	155.22	0.000000	0.00	233.17	200.00	0
400	QJul	0.08	153.86	155.22	153.87	155.22	0.000000	0.00	234.01	200.00	0
400	7Q2	0.88	153.86	155.37	153.88	155.37	0.000000	0.00	263.81	200.00	0
400	7Q10	1.38	153.86	155.43	153.88	155.43	0.000000	0.01	274.28	200.00	0
400	Q2	1.47	153.86	155.43	153.89	155.43	0.000000	0.01	275.84	200.00	0
400	Q10	2.44	153.86	155.51	153.90	155.51	0.000000	0.01	291.12	200.00	0
400	Q100	3.76	153.86	155.59	153.91	155.59	0.000000	0.01	307.65	200.00	0
400	Q1000	5.20	153.86	155.67	153.92	155.67	0.000000	0.02	322.36	200.00	0
390	Qow	0.05	153.86	155.22		155.22	0.000000	0.00	213.86	193.65	0.00
390	QAug	0.06	153.86	155.22		155.22	0.000000	0.00	214.67	193.77	0.00
390	QJul	0.08	153.86	155.22		155.22	0.000000	0.00	215.48	193.89	0.00
390	7Q2	0.88	153.86	155.37		155.37	0.000000	0.00	244.68	197.96	0.00

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
390	7Q10	1.38	153.86	155.43		155.43	0.000000	0.01	255.08	199.38	0.00
390	Q2	1.47	153.86	155.43		155.43	0.000000	0.01	256.63	199.59	0.00
390	Q10	2.44	153.86	155.51		155.51	0.000000	0.01	271.91	200.00	0.00
390	Q100	3.76	153.86	155.59		155.59	0.000000	0.01	288.44	200.00	0.00
390	Q1000	5.20	153.86	155.67		155.67	0.000000	0.02	303.15	200.00	0.00
380	Qow	0.05	153.86	155.22		155.22	0.000000	0.00	178.43	187.01	0.00
380	QAug	0.06	153.86	155.22		155.22	0.000000	0.00	179.21	187.09	0.00
380	QJul	0.08	153.86	155.22		155.22	0.000000	0.00	180.00	187.18	0.00
380	7Q2	0.88	153.86	155.37		155.37	0.000000	0.00	208.12	190.25	0.00
380	7Q10	1.38	153.86	155.43		155.43	0.000000	0.01	218.12	191.79	0.00
380	Q2	1.47	153.86	155.43		155.43	0.000000	0.01	219.61	192.02	0.00
380	Q10	2.44	153.86	155.51		155.51	0.000000	0.01	234.37	194.27	0.00
380	Q100	3.76	153.86	155.59		155.59	0.000000	0.02	250.52	196.50	0.00
380	Q1000	5.20	153.86	155.67		155.67	0.000001	0.02	265.04	198.40	0.01
370	Qow	0.05	153.86	155.22		155.22	0.000000	0.00	142.79	179.99	0.00
370	QAug	0.06	153.86	155.22		155.22	0.000000	0.00	143.54	180.12	0.00
370	QJul	0.08	153.86	155.22		155.22	0.000000	0.00	144.30	180.26	0.00
370	7Q2	0.88	153.86	155.37		155.37	0.000000	0.01	171.54	185.42	0.00
370	7Q10	1.38	153.86	155.43		155.43	0.000000	0.01	181.30	187.33	0.00
370	Q2	1.47	153.86	155.43		155.43	0.000000	0.01	182.76	187.62	0.00
370	Q10	2.44	153.86	155.51		155.51	0.000000	0.01	197.20	190.23	0.00
370	Q100	3.76	153.86	155.59		155.59	0.000001	0.02	212.99	191.94	0.01
370	Q1000	5.20	153.86	155.67		155.67	0.000001	0.02	227.16	193.46	0.01
360	Qow	0.05	154.66	155.22		155.22	0.000000	0.01	8.65	21.12	0.00
360	QAug	0.06	154.66	155.22		155.22	0.000000	0.01	8.74	21.21	0.00
360	QJul	0.08	154.66	155.22		155.22	0.000001	0.01	8.83	21.29	0.00
360	7Q2	0.88	154.66	155.37		155.37	0.000080	0.05	18.51	135.07	0.04
360	7Q10	1.38	154.66	155.43		155.43	0.000083	0.05	26.89	179.93	0.04
360	Q2	1.47	154.66	155.43		155.43	0.000082	0.05	28.30	183.42	0.04
360	Q10	2.44	154.66	155.51		155.51	0.000059	0.06	42.42	186.32	0.04
360	Q100	3.76	154.66	155.59		155.59	0.000050	0.07	57.94	189.36	0.04
360	Q1000	5.20	154.66	155.67		155.67	0.000047	0.07	71.93	191.32	0.04
355	Qow	0.05	155.16	155.22		155.22	0.001061	0.09	0.59	11.11	0.13
355	QAug	0.06	155.16	155.22		155.22	0.001213	0.10	0.63	11.19	0.14

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
355	QJul	0.08	155.16	155.22		155.22	0.001290	0.11	0.68	11.28	0.14
355	7Q2	0.88	155.16	155.36		155.37	0.003299	0.36	2.46	14.08	0.27
355	7Q10	1.38	155.16	155.41		155.42	0.003805	0.44	3.17	15.05	0.30
355	Q2	1.47	155.16	155.42		155.43	0.003935	0.45	3.27	15.20	0.31
355	Q10	2.44	155.16	155.49		155.51	0.004511	0.55	4.41	16.62	0.34
355	Q100	3.76	155.16	155.57		155.59	0.005029	0.66	5.73	18.14	0.37
355	Q1000	5.20	155.16	155.63		155.66	0.005473	0.75	6.98	19.47	0.40
350	Qow	0.05	155.16	155.18		155.18	0.026627	0.25	0.22	10.43	0.55
350	QAug	0.06	155.16	155.19		155.19	0.021624	0.25	0.26	10.51	0.51
350	QJul	0.08	155.16	155.19		155.19	0.018634	0.25	0.30	10.58	0.48
350	7Q2	0.88	155.16	155.28		155.30	0.019473	0.64	1.37	12.44	0.62
350	7Q10	1.38	155.16	155.32		155.35	0.019591	0.75	1.84	13.17	0.64
350	Q2	1.47	155.16	155.32		155.35	0.019623	0.77	1.92	13.29	0.65
350	Q10	2.44	155.16	155.38		155.42	0.019516	0.91	2.68	14.39	0.67
350	Q100	3.76	155.16	155.44		155.50	0.020145	1.06	3.55	15.56	0.71
350	Q1000	5.20	155.16	155.49		155.56	0.019921	1.17	4.45	16.67	0.72
340	Qow	0.05	154.96	154.99		154.99	0.015053	0.21	0.26	10.51	0.42
340	QAug	0.06	154.96	154.99		154.99	0.018413	0.24	0.27	10.53	0.47
340	QJul	0.08	154.96	154.99		154.99	0.021384	0.26	0.28	10.55	0.51
340	7Q2	0.88	154.96	155.08		155.10	0.020947	0.66	1.34	12.39	0.64
340	7Q10	1.38	154.96	155.12		155.15	0.020716	0.77	1.80	13.12	0.66
340	Q2	1.47	154.96	155.12		155.15	0.020668	0.78	1.88	13.24	0.66
340	Q10	2.44	154.96	155.18		155.22	0.020213	0.92	2.65	14.35	0.68
340	Q100	3.76	154.96	155.24		155.30	0.019900	1.05	3.57	15.58	0.70
340	Q1000	5.20	154.96	155.29		155.36	0.020065	1.17	4.44	16.66	0.72
330	Qow	0.05	154.76	154.78		154.78	0.02824	0.25	0.21	10.42	0.56
330	QAug	0.06	154.76	154.79		154.79	0.021676	0.25	0.26	10.51	0.51
330	QJul	0.08	154.76	154.79		154.79	0.018334	0.25	0.3	10.58	0.48
330	7Q2	0.88	154.76	154.88		154.9	0.018804	0.63	1.39	12.47	0.61
330	7Q10	1.38	154.76	154.92		154.95	0.019059	0.75	1.85	13.19	0.64
330	Q2	1.47	154.76	154.93		154.96	0.019068	0.76	1.93	13.32	0.64
330	Q10	2.44	154.76	154.98		155.02	0.019542	0.91	2.68	14.39	0.67
330	Q100	3.76	154.76	155.04		155.1	0.019902	1.05	3.56	15.58	0.7
330	Q1000	5.2	154.76	155.09		155.16	0.019935	1.17	4.45	16.67	0.72

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
320	Qow	0.05	154.56	154.59		154.59	0.014230	0.20	0.26	10.52	0.41
320	QAug	0.06	154.56	154.59		154.59	0.018030	0.24	0.28	10.54	0.47
320	QJul	0.08	154.56	154.59		154.59	0.022274	0.27	0.28	10.55	0.52
320	7Q2	0.88	154.56	154.68		154.70	0.022768	0.67	1.30	12.34	0.66
320	7Q10	1.38	154.56	154.71		154.74	0.021883	0.78	1.77	13.07	0.68
320	Q2	1.47	154.56	154.72		154.75	0.021845	0.80	1.85	13.19	0.68
320	Q10	2.44	154.56	154.78		154.82	0.020891	0.93	2.62	14.31	0.69
320	Q100	3.76	154.56	154.84		154.89	0.020419	1.06	3.53	15.54	0.71
320	Q1000	5.20	154.56	154.89		154.96	0.020047	1.17	4.44	16.66	0.72
310	Qow	0.05	154.36	154.38		154.38	0.030721	0.26	0.21	10.41	0.58
310	QAug	0.06	154.36	154.38		154.39	0.022777	0.25	0.26	10.50	0.52
310	QJul	0.08	154.36	154.39		154.39	0.017718	0.25	0.30	10.59	0.47
310	7Q2	0.88	154.36	154.49		154.51	0.016111	0.60	1.46	12.58	0.57
310	7Q10	1.38	154.36	154.52		154.55	0.017362	0.72	1.91	13.28	0.61
310	Q2	1.47	154.36	154.53		154.56	0.017233	0.74	2.00	13.41	0.61
310	Q10	2.44	154.36	154.58		154.62	0.018398	0.89	2.73	14.47	0.66
310	Q100	3.76	154.36	154.64		154.70	0.018956	1.04	3.62	15.65	0.69
310	Q1000	5.20	154.36	154.70		154.76	0.019508	1.16	4.48	16.71	0.72
300	Qow	0.05	154.16	154.19		154.19	0.013514	0.20	0.27	10.52	0.40
300	QAug	0.06	154.16	154.19		154.19	0.017555	0.23	0.28	10.54	0.46
300	QJul	0.08	154.16	154.19		154.19	0.023211	0.27	0.28	10.54	0.53
300	7Q2	0.88	154.16	154.27		154.30	0.028436	0.72	1.21	12.19	0.73
300	7Q10	1.38	154.16	154.31		154.34	0.026559	0.83	1.66	12.90	0.74
300	Q2	1.47	154.16	154.31		154.35	0.026244	0.85	1.74	13.02	0.74
300	Q10	2.44	154.16	154.37		154.42	0.023739	0.97	2.51	14.16	0.74
300	Q100	3.76	154.16	154.43		154.49	0.022382	1.10	3.43	15.39	0.74
300	Q1000	5.20	154.16	154.49		154.56	0.021408	1.20	4.34	16.54	0.75
290	Qow	0.05	153.96	153.98		153.98	0.035054	0.27	0.20	10.39	0.62
290	QAug	0.06	153.96	153.98		153.99	0.023472	0.26	0.25	10.50	0.53
290	QJul	0.08	153.96	153.99		153.99	0.017200	0.25	0.30	10.59	0.46
290	7Q2	0.88	153.96	154.10	154.05	154.12	0.011792	0.55	1.61	12.83	0.49
290	7Q10	1.38	153.96	154.14	154.08	154.16	0.012418	0.65	2.13	13.61	0.52
290	Q2	1.47	153.96	154.15	154.08	154.17	0.012446	0.66	2.23	13.75	0.53
290	Q10	2.44	153.96	154.21	154.13	154.24	0.013271	0.80	3.05	14.90	0.56

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
290	Q100	3.76	153.96	154.27	154.18	154.31	0.013769	0.93	4.04	16.18	0.59
290	Q1000	5.20	153.96	154.32	154.23	154.38	0.014421	1.05	4.98	17.29	0.62
280	Qow	0.05	153.76	153.79		153.79	0.012102	0.19	0.28	10.54	0.38
280	QAug	0.06	153.76	153.79		153.79	0.016941	0.23	0.28	10.55	0.45
280	QJul	0.08	153.76	153.79		153.79	0.024088	0.27	0.27	10.54	0.54
280	7Q2	0.88	153.76	153.85	153.85	153.89	0.056138	0.90	0.98	11.79	1.00
280	7Q10	1.38	153.76	153.88	153.88	153.93	0.051308	1.03	1.34	12.40	1.00
280	Q2	1.47	153.76	153.88	153.88	153.94	0.051415	1.05	1.40	12.49	1.00
280	Q10	2.44	153.76	153.93	153.93	154.01	0.046956	1.22	2.00	13.42	1.01
280	Q100	3.76	153.76	153.98	153.98	154.08	0.043231	1.37	2.74	14.48	1.01
280	Q1000	5.20	153.76	154.03	154.03	154.15	0.040608	1.49	3.49	15.48	1.00
270	Qow	0.05	153.61	153.63		153.64	0.019311	0.17	0.31	20.41	0.44
270	QAug	0.06	153.61	153.64		153.64	0.013417	0.16	0.40	21.57	0.38
270	QJul	0.08	153.61	153.64		153.64	0.009506	0.15	0.49	22.68	0.33
270	7Q2	0.88	153.61	153.75	153.67	153.75	0.002609	0.20	4.48	53.01	0.22
270	7Q10	1.38	153.61	153.78	153.69	153.79	0.002425	0.22	6.34	61.07	0.22
270	Q2	1.47	153.61	153.79	153.69	153.79	0.002398	0.22	6.67	62.14	0.22
270	Q10	2.44	153.61	153.83	153.72	153.84	0.002274	0.26	9.54	68.66	0.22
270	Q100	3.76	153.61	153.88	153.75	153.88	0.002251	0.30	12.71	73.10	0.23
270	Q1000	5.20	153.61	153.92	153.77	153.92	0.002227	0.33	15.80	76.66	0.23
260	Qow	0.05	153.52	153.63		153.63	0.000165	0.03	1.60	33.68	0.05
260	QAug	0.06	153.52	153.63		153.63	0.000200	0.04	1.71	34.84	0.05
260	QJul	0.08	153.52	153.64		153.64	0.000217	0.04	1.85	36.22	0.06
260	7Q2	0.88	153.52	153.74		153.74	0.000744	0.13	6.83	59.56	0.12
260	7Q10	1.38	153.52	153.77		153.77	0.000900	0.16	8.80	65.90	0.14
260	Q2	1.47	153.52	153.77		153.78	0.000925	0.16	9.14	66.99	0.14
260	Q10	2.44	153.52	153.82		153.82	0.001138	0.20	12.13	74.62	0.16
260	Q100	3.76	153.52	153.86		153.86	0.001309	0.24	15.52	80.14	0.18
260	Q1000	5.20	153.52	153.90		153.91	0.001419	0.28	18.88	85.40	0.19
250	Qow	0.05	153.58	153.63		153.63	0.000331	0.04	1.33	35.89	0.07
250	QAug	0.06	153.58	153.63		153.63	0.000381	0.05	1.44	36.36	0.07
250	QJul	0.08	153.58	153.63		153.63	0.000384	0.05	1.57	36.96	0.07
250	7Q2	0.88	153.58	153.73		153.73	0.001107	0.15	5.98	57.62	0.15
250	7Q10	1.38	153.58	153.76		153.76	0.001338	0.18	7.79	65.34	0.16

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
250	Q2	1.47	153.58	153.76		153.77	0.001378	0.18	8.10	66.79	0.17
250	Q10	2.44	153.58	153.80		153.81	0.001668	0.22	10.96	77.08	0.19
250	Q100	3.76	153.58	153.85		153.85	0.001747	0.26	14.32	81.45	0.20
250	Q1000	5.20	153.58	153.88		153.89	0.001779	0.29	17.63	85.26	0.21
240	Qow	0.05	153.58	153.62		153.62	0.000806	0.06	0.97	31.20	0.10
240	QAug	0.06	153.58	153.62		153.62	0.000978	0.06	1.03	31.80	0.11
240	QJul	0.08	153.58	153.63		153.63	0.000939	0.07	1.15	32.98	0.11
240	7Q2	0.88	153.58	153.71		153.72	0.002041	0.17	5.15	62.56	0.19
240	7Q10	1.38	153.58	153.74		153.74	0.002088	0.20	6.95	68.75	0.20
240	Q2	1.47	153.58	153.75		153.75	0.002104	0.20	7.26	69.71	0.20
240	Q10	2.44	153.58	153.78		153.79	0.002222	0.25	9.95	74.94	0.21
240	Q100	3.76	153.58	153.82		153.83	0.002253	0.29	13.15	79.59	0.22
240	Q1000	5.20	153.58	153.86		153.87	0.002225	0.32	16.38	83.95	0.23
230	Qow	0.05	153.57	153.60		153.61	0.004962	0.10	0.53	27.19	0.23
230	QAug	0.06	153.57	153.61		153.61	0.004618	0.11	0.62	28.55	0.23
230	QJul	0.08	153.57	153.61		153.61	0.005091	0.11	0.66	29.18	0.24
230	7Q2	0.88	153.57	153.69		153.69	0.004229	0.22	4.00	57.46	0.27
230	7Q10	1.38	153.57	153.71		153.72	0.003737	0.24	5.77	66.79	0.26
230	Q2	1.47	153.57	153.72		153.72	0.003704	0.24	6.07	68.15	0.26
230	Q10	2.44	153.57	153.76		153.76	0.003374	0.28	8.75	74.45	0.26
230	Q100	3.76	153.57	153.80		153.80	0.003059	0.31	12.04	80.23	0.26
230	Q1000	5.20	153.57	153.84		153.85	0.002743	0.34	15.41	84.33	0.25
220	Qow	0.05	153.52	153.55		153.55	0.007457	0.13	0.42	20.37	0.29
220	QAug	0.06	153.52	153.55		153.55	0.006783	0.13	0.49	21.34	0.28
220	QJul	0.08	153.52	153.55		153.55	0.006641	0.14	0.54	22.05	0.28
220	7Q2	0.88	153.52	153.64		153.64	0.004958	0.26	3.34	41.35	0.30
220	7Q10	1.38	153.52	153.67		153.67	0.004811	0.30	4.64	46.73	0.30
220	Q2	1.47	153.52	153.67		153.68	0.004858	0.30	4.85	47.53	0.30
220	Q10	2.44	153.52	153.71		153.72	0.004977	0.36	6.86	54.22	0.32
220	Q100	3.76	153.52	153.76		153.77	0.004702	0.40	9.52	61.56	0.32
220	Q1000	5.20	153.52	153.80		153.81	0.004460	0.42	12.34	69.60	0.32
210	Qow	0.05	153.45	153.49		153.49	0.004405	0.12	0.46	17.94	0.23
210	QAug	0.06	153.45	153.50		153.50	0.004540	0.12	0.53	19.01	0.24
210	QJul	0.08	153.45	153.50		153.50	0.004668	0.13	0.58	19.87	0.24

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
210	7Q2	0.88	153.45	153.58		153.59	0.005984	0.28	3.11	39.84	0.32
210	7Q10	1.38	153.45	153.61		153.62	0.005592	0.31	4.39	45.67	0.32
210	Q2	1.47	153.45	153.62		153.62	0.005533	0.32	4.61	46.25	0.32
210	Q10	2.44	153.45	153.66		153.67	0.004790	0.36	6.81	51.73	0.32
210	Q100	3.76	153.45	153.71		153.72	0.004219	0.39	9.53	56.93	0.31
210	Q1000	5.20	153.45	153.76		153.77	0.003891	0.42	12.25	61.71	0.30
200	Qow	0.05	153.39	153.42		153.42	0.014456	0.19	0.29	13.44	0.41
200	QAug	0.06	153.39	153.42		153.42	0.012922	0.19	0.34	14.23	0.39
200	QJul	0.08	153.39	153.42		153.43	0.013463	0.20	0.37	14.66	0.40
200	7Q2	0.88	153.39	153.54		153.54	0.004062	0.25	3.57	42.01	0.27
200	7Q10	1.38	153.39	153.57		153.58	0.003370	0.27	5.20	47.52	0.26
200	Q2	1.47	153.39	153.58		153.58	0.003292	0.27	5.48	48.20	0.26
200	Q10	2.44	153.39	153.63		153.63	0.002872	0.30	8.05	53.56	0.25
200	Q100	3.76	153.39	153.68		153.69	0.002638	0.34	11.03	57.73	0.25
200	Q1000	5.20	153.39	153.73		153.74	0.002598	0.38	13.87	62.15	0.25
190	Qow	0.05	153.33	153.39		153.39	0.001384	0.08	0.70	20.63	0.14
190	QAug	0.06	153.33	153.39		153.39	0.001199	0.08	0.83	21.68	0.13
190	QJul	0.08	153.33	153.40		153.40	0.001171	0.08	0.92	22.38	0.13
190	7Q2	0.88	153.33	153.51		153.51	0.001729	0.20	4.47	38.78	0.19
190	7Q10	1.38	153.33	153.55		153.55	0.001920	0.23	5.97	44.09	0.20
190	Q2	1.47	153.33	153.55		153.56	0.001944	0.24	6.23	44.87	0.20
190	Q10	2.44	153.33	153.60		153.61	0.002135	0.28	8.67	51.63	0.22
190	Q100	3.76	153.33	153.66		153.66	0.002228	0.32	11.64	58.12	0.23
190	Q1000	5.20	153.33	153.71		153.71	0.002268	0.36	14.50	62.76	0.24
180	Qow	0.05	153.32	153.37		153.37	0.002484	0.11	0.51	14.92	0.18
180	QAug	0.06	153.32	153.37		153.38	0.002487	0.11	0.59	16.27	0.18
180	QJul	0.08	153.32	153.38		153.38	0.002469	0.11	0.67	17.90	0.18
180	7Q2	0.88	153.32	153.49		153.49	0.002661	0.23	3.90	38.17	0.23
180	7Q10	1.38	153.32	153.52		153.53	0.002739	0.26	5.30	42.63	0.24
180	Q2	1.47	153.32	153.53		153.53	0.002754	0.27	5.54	43.36	0.24
180	Q10	2.44	153.32	153.58		153.58	0.002812	0.31	7.77	48.29	0.25
180	Q100	3.76	153.32	153.63		153.64	0.002856	0.36	10.48	53.89	0.26
180	Q1000	5.20	153.32	153.68		153.69	0.002901	0.40	13.10	58.50	0.27
170	Qow	0.05	153.29	153.35		153.35	0.00147	0.09	0.62	15.90	0.14

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
170	QAug	0.06	153.29	153.36		153.36	0.001563	0.09	0.69	16.55	0.15
170	QJul	0.08	153.29	153.36		153.36	0.001551	0.10	0.77	17.64	0.15
170	7Q2	0.88	153.29	153.46		153.46	0.003341	0.25	3.50	34.44	0.25
170	7Q10	1.38	153.29	153.49		153.50	0.003526	0.29	4.70	38.22	0.27
170	Q2	1.47	153.29	153.50		153.50	0.003545	0.30	4.91	38.73	0.27
170	Q10	2.44	153.29	153.55		153.55	0.003714	0.36	6.84	43.25	0.29
170	Q100	3.76	153.29	153.60		153.61	0.003871	0.41	9.23	49.23	0.30
170	Q1000	5.20	153.29	153.64		153.65	0.003878	0.45	11.61	53.85	0.31
160	Qow	0.05	153.3	153.33		153.33	0.004574	0.11	0.51	23.21	0.23
160	QAug	0.06	153.3	153.33		153.33	0.004581	0.11	0.57	23.65	0.23
160	QJul	0.08	153.3	153.33		153.33	0.004600	0.12	0.63	24.03	0.24
160	7Q2	0.88	153.3	153.42		153.43	0.003991	0.26	3.43	37.42	0.27
160	7Q10	1.38	153.3	153.46		153.46	0.003903	0.29	4.68	40.81	0.28
160	Q2	1.47	153.3	153.46		153.47	0.003888	0.30	4.90	41.37	0.28
160	Q10	2.44	153.3	153.51		153.51	0.003784	0.35	6.95	45.65	0.29
160	Q100	3.76	153.3	153.56		153.57	0.003723	0.40	9.40	50.16	0.29
160	Q1000	5.20	153.3	153.61		153.62	0.003659	0.44	11.84	54.10	0.30
150	Qow	0.05	153.25	153.28		153.28	0.003993	0.11	0.51	21.33	0.22
150	QAug	0.06	153.25	153.29		153.29	0.003850	0.11	0.59	22.10	0.22
150	QJul	0.08	153.25	153.29		153.29	0.003758	0.11	0.65	22.75	0.22
150	7Q2	0.88	153.25	153.39		153.39	0.003374	0.25	3.57	36.48	0.25
150	7Q10	1.38	153.25	153.42		153.42	0.003401	0.29	4.82	39.53	0.26
150	Q2	1.47	153.25	153.42		153.43	0.003408	0.29	5.03	40.03	0.26
150	Q10	2.44	153.25	153.47		153.48	0.003504	0.35	7.02	44.18	0.28
150	Q100	3.76	153.25	153.52		153.53	0.003586	0.40	9.37	48.26	0.29
150	Q1000	5.20	153.25	153.57		153.58	0.003656	0.45	11.67	52.18	0.30
140	Qow	0.05	153.21	153.26		153.26	0.002196	0.08	0.64	23.53	0.16
140	QAug	0.06	153.21	153.26		153.26	0.002138	0.09	0.73	24.58	0.16
140	QJul	0.08	153.21	153.26		153.26	0.002186	0.09	0.8	25.16	0.17
140	7Q2	0.88	153.21	153.36		153.36	0.003004	0.24	3.73	37.42	0.24
140	7Q10	1.38	153.21	153.39		153.39	0.003194	0.28	4.98	41.06	0.25
140	Q2	1.47	153.21	153.39		153.40	0.003219	0.28	5.20	41.66	0.26
140	Q10	2.44	153.21	153.44		153.44	0.003318	0.34	7.22	45.53	0.27
140	Q100	3.76	153.21	153.49		153.50	0.003377	0.39	9.59	48.90	0.28

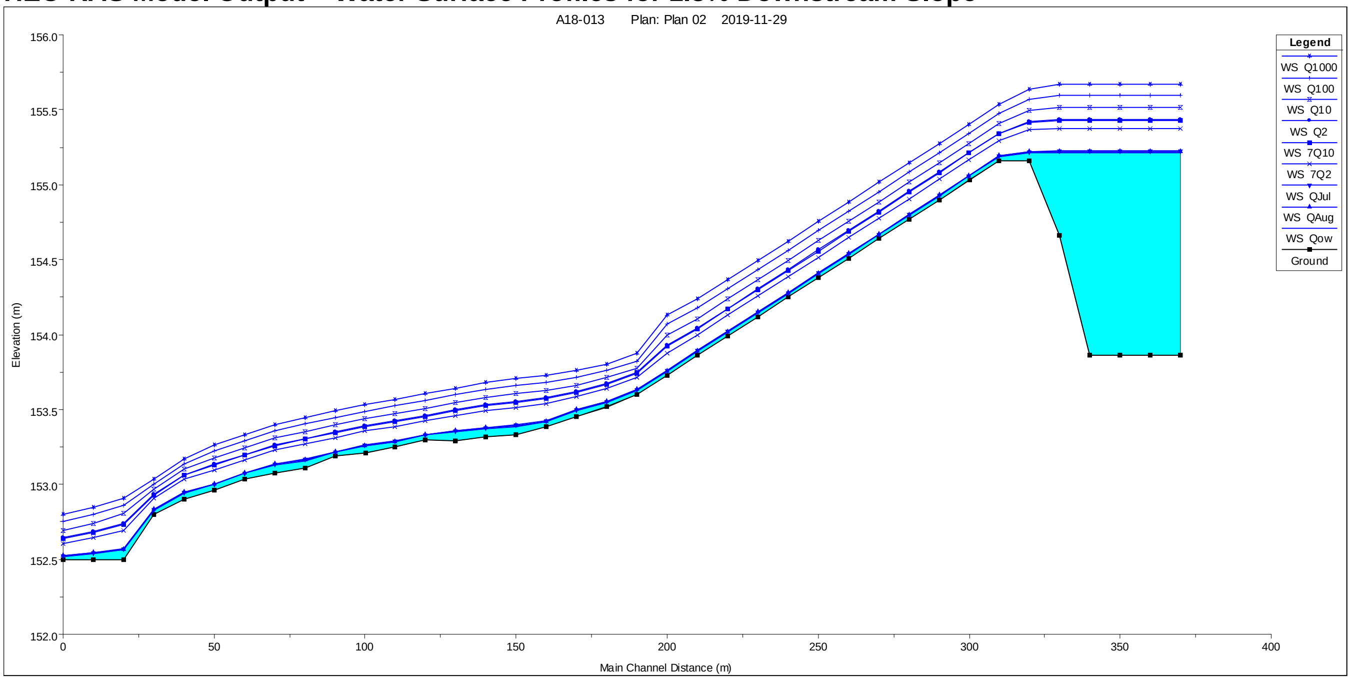
River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
140	Q1000	5.20	153.21	153.53		153.54	0.003434	0.44	11.86	51.85	0.29
130	Qow	0.05	153.19	153.22		153.22	0.009575	0.14	0.37	18.58	0.33
130	QAug	0.06	153.19	153.22		153.22	0.012095	0.17	0.39	18.78	0.37
130	QJul	0.08	153.19	153.22		153.22	0.012048	0.17	0.43	19.24	0.37
130	7Q2	0.88	153.19	153.31		153.32	0.005732	0.30	2.95	33.84	0.32
130	7Q10	1.38	153.19	153.34		153.35	0.005373	0.34	4.10	37.21	0.32
130	Q2	1.47	153.19	153.35		153.35	0.005332	0.34	4.30	37.71	0.32
130	Q10	2.44	153.19	153.40		153.40	0.005074	0.40	6.16	42.10	0.33
130	Q100	3.76	153.19	153.45		153.46	0.004830	0.45	8.40	46.01	0.33
130	Q1000	5.20	153.19	153.49		153.50	0.004698	0.49	10.54	48.83	0.34
120	Qow	0.05	153.11	153.16		153.16	0.003471	0.11	0.51	19.10	0.21
120	QAug	0.06	153.11	153.16		153.16	0.003220	0.11	0.60	19.93	0.20
120	QJul	0.08	153.11	153.17		153.17	0.003070	0.11	0.67	20.62	0.20
120	7Q2	0.88	153.11	153.27		153.27	0.003137	0.25	3.55	34.05	0.25
120	7Q10	1.38	153.11	153.30		153.31	0.003372	0.29	4.68	36.65	0.26
120	Q2	1.47	153.11	153.31		153.31	0.003407	0.30	4.88	37.03	0.27
120	Q10	2.44	153.11	153.35		153.36	0.003691	0.37	6.66	40.24	0.29
120	Q100	3.76	153.11	153.40		153.41	0.003963	0.43	8.75	43.84	0.31
120	Q1000	5.20	153.11	153.45		153.46	0.004208	0.48	10.76	47.31	0.32
110	Qow	0.05	153.08	153.13		153.13	0.002771	0.11	0.50	15.35	0.19
110	QAug	0.06	153.08	153.13		153.13	0.002981	0.12	0.56	16.51	0.20
110	QJul	0.08	153.08	153.14		153.14	0.003131	0.12	0.62	17.47	0.20
110	7Q2	0.88	153.08	153.23		153.23	0.004961	0.29	3.07	33.48	0.30
110	7Q10	1.38	153.08	153.26		153.27	0.005094	0.33	4.13	36.50	0.32
110	Q2	1.47	153.08	153.26		153.27	0.005111	0.34	4.32	36.96	0.32
110	Q10	2.44	153.08	153.31		153.32	0.005282	0.41	6.01	40.71	0.34
110	Q100	3.76	153.08	153.36		153.37	0.005320	0.47	8.03	44.22	0.35
110	Q1000	5.20	153.08	153.40		153.41	0.005439	0.52	9.94	47.07	0.36
100	Qow	0.05	153.04	153.07		153.07	0.017246	0.19	0.29	15.15	0.43
100	QAug	0.06	153.04	153.08		153.08	0.016191	0.19	0.34	16.33	0.43
100	QJul	0.08	153.04	153.08		153.08	0.014568	0.19	0.39	17.14	0.41
100	7Q2	0.88	153.04	153.16		153.17	0.008674	0.35	2.51	30.61	0.39
100	7Q10	1.38	153.04	153.19		153.20	0.008028	0.39	3.50	33.87	0.39
100	Q2	1.47	153.04	153.20		153.21	0.007957	0.40	3.67	34.30	0.39

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
100	Q10	2.44	153.04	153.24		153.26	0.007405	0.46	5.29	38.12	0.40
100	Q100	3.76	153.04	153.29		153.30	0.007354	0.53	7.14	41.98	0.41
100	Q1000	5.20	153.04	153.33		153.35	0.007469	0.59	8.89	45.13	0.42
90	Qow	0.05	152.96	153.00		153.00	0.004187	0.12	0.47	17.54	0.23
90	QAug	0.06	152.96	153.00		153.00	0.004246	0.12	0.53	18.08	0.23
90	QJul	0.08	152.96	153.00		153.01	0.004593	0.13	0.56	18.42	0.24
90	7Q2	0.88	152.96	153.10		153.10	0.005273	0.30	2.91	30.60	0.31
90	7Q10	1.38	152.96	153.13		153.14	0.005480	0.35	3.93	33.99	0.33
90	Q2	1.47	152.96	153.14		153.14	0.005503	0.36	4.10	34.42	0.33
90	Q10	2.44	152.96	153.18		153.19	0.005826	0.43	5.71	38.61	0.35
90	Q100	3.76	152.96	153.22		153.24	0.006419	0.50	7.49	42.67	0.38
90	Q1000	5.20	152.96	153.26		153.28	0.006815	0.57	9.14	45.12	0.40
80	Qow	0.05	152.9	152.94	152.93	152.95	0.006617	0.14	0.39	15.31	0.28
80	QAug	0.06	152.9	152.95	152.93	152.95	0.007121	0.15	0.43	15.95	0.30
80	QJul	0.08	152.9	152.95	152.93	152.95	0.007010	0.16	0.48	16.65	0.30
80	7Q2	0.88	152.9	153.03		153.04	0.008174	0.34	2.58	31.63	0.38
80	7Q10	1.38	152.9	153.06		153.07	0.009075	0.40	3.43	35.26	0.41
80	Q2	1.47	152.9	153.06		153.07	0.009193	0.41	3.58	35.86	0.42
80	Q10	2.44	152.9	153.10		153.11	0.009626	0.49	4.99	40.15	0.44
80	Q100	3.76	152.9	153.14		153.15	0.010277	0.57	6.54	43.34	0.47
80	Q1000	5.20	152.9	153.17		153.19	0.010681	0.65	8.04	45.91	0.49
70	Qow	0.05	152.8	152.83		152.83	0.025863	0.22	0.24	13.26	0.53
70	QAug	0.06	152.8	152.83		152.83	0.022328	0.22	0.29	14.04	0.50
70	QJul	0.08	152.8	152.83		152.84	0.023254	0.24	0.32	14.44	0.51
70	7Q2	0.88	152.8	152.91		152.92	0.019881	0.45	1.95	30.63	0.57
70	7Q10	1.38	152.8	152.93		152.94	0.018627	0.50	2.76	35.26	0.57
70	Q2	1.47	152.8	152.93		152.95	0.018108	0.51	2.92	35.80	0.57
70	Q10	2.44	152.8	152.97		152.98	0.017211	0.59	4.15	39.14	0.58
70	Q100	3.76	152.8	153.00		153.03	0.016408	0.66	5.66	42.85	0.58
70	Q1000	5.20	152.8	153.04		153.07	0.015519	0.72	7.20	46.12	0.58
60	Qow	0.05	152.5	152.56		152.57	0.02597	0.33	0.17	5.13	0.58
60	QAug	0.06	152.5	152.57		152.57	0.030531	0.36	0.18	5.34	0.63
60	QJul	0.08	152.5	152.57		152.58	0.028962	0.37	0.20	5.69	0.62
60	7Q2	0.88	152.5	152.69		152.71	0.020277	0.60	1.47	15.25	0.62

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
60	7Q10	1.38	152.5	152.73		152.76	0.018951	0.65	2.14	18.83	0.61
60	Q2	1.47	152.5	152.74		152.76	0.018978	0.65	2.27	19.81	0.61
60	Q10	2.44	152.5	152.81		152.83	0.015040	0.63	3.86	29.52	0.56
60	Q100	3.76	152.5	152.86		152.88	0.012711	0.65	5.76	37.04	0.53
60	Q1000	5.20	152.5	152.91		152.93	0.011602	0.69	7.52	41.30	0.52
50	Qow	0.05	152.5	152.54		152.54	0.001072	0.07	0.76	21.36	0.12
50	QAug	0.06	152.5	152.54		152.54	0.000953	0.07	0.89	21.61	0.12
50	QJul	0.08	152.5	152.55		152.55	0.001040	0.08	0.94	21.72	0.12
50	7Q2	0.88	152.5	152.64		152.65	0.002871	0.27	3.26	25.84	0.24
50	7Q10	1.38	152.5	152.68		152.68	0.003324	0.33	4.18	27.30	0.27
50	Q2	1.47	152.5	152.68		152.69	0.003408	0.34	4.33	27.53	0.27
50	Q10	2.44	152.5	152.74		152.75	0.004527	0.41	5.95	35.44	0.32
50	Q100	3.76	152.5	152.80		152.81	0.004340	0.45	8.45	43.00	0.32
50	Q1000	5.20	152.5	152.85		152.86	0.004555	0.50	10.49	47.16	0.34
43	Qow	0.05	152.5	152.52	152.51	152.52	0.005003	0.10	0.52	26.15	0.24
43	QAug	0.06	152.5	152.52	152.51	152.52	0.005002	0.11	0.58	26.29	0.24
43	QJul	0.08	152.5	152.52	152.51	152.53	0.005006	0.12	0.64	26.40	0.24
43	7Q2	0.88	152.5	152.61	152.55	152.61	0.005003	0.30	2.97	31.02	0.31
43	7Q10	1.38	152.5	152.64	152.57	152.64	0.005009	0.35	3.98	32.82	0.32
43	Q2	1.47	152.5	152.64	152.57	152.65	0.005007	0.35	4.16	33.12	0.32
43	Q10	2.44	152.5	152.69	152.60	152.70	0.005003	0.42	5.75	34.94	0.33
43	Q100	3.76	152.5	152.75	152.63	152.76	0.005002	0.45	8.28	45.55	0.34
43	Q1000	5.20	152.5	152.80	152.65	152.81	0.005001	0.50	10.39	49.35	0.35

1.3% channel slope scenario

HEC-RAS Model Output – Water Surface Profiles for 1.3% Downstream Slope



HEC-RAS Model Output – Detailed Tables at each Cross-Section for 1.3% Downstream Slope

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
400	Qow	0.05	153.86	155.22	153.87	155.22	0.000000	0.00	232.14	200.00	0.00
400	QAug	0.06	153.86	155.22	153.87	155.22	0.000000	0.00	232.93	200.00	0.00
400	QJul	0.08	153.86	155.22	153.87	155.22	0.000000	0.00	233.86	200.00	0.00
400	7Q2	0.88	153.86	155.37	153.88	155.37	0.000000	0.00	264.04	200.00	0.00
400	7Q10	1.38	153.86	155.43	153.88	155.43	0.000000	0.01	274.81	200.00	0.00
400	Q2	1.47	153.86	155.44	153.89	155.44	0.000000	0.01	276.50	200.00	0.00
400	Q10	2.44	153.86	155.51	153.90	155.51	0.000000	0.01	291.77	200.00	0.00
400	Q100	3.76	153.86	155.60	153.91	155.60	0.000000	0.01	308.42	200.00	0.00
400	Q1000	5.20	153.86	155.67	153.92	155.67	0.000000	0.02	323.44	200.00	0.00
390	Qow	0.05	153.86	155.22		155.22	0.000000	0.00	213.67	193.62	0.00
390	QAug	0.06	153.86	155.22		155.22	0.000000	0.00	214.44	193.74	0.00
390	QJul	0.08	153.86	155.22		155.22	0.000000	0.00	215.33	193.87	0.00
390	7Q2	0.88	153.86	155.37		155.37	0.000000	0.00	244.90	197.99	0.00
390	7Q10	1.38	153.86	155.43		155.43	0.000000	0.01	255.61	199.45	0.00
390	Q2	1.47	153.86	155.44		155.44	0.000000	0.01	257.29	199.68	0.00
390	Q10	2.44	153.86	155.51		155.51	0.000000	0.01	272.56	200.00	0.00

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
390	Q100	3.76	153.86	155.60		155.60	0.000000	0.01	289.21	200.00	0.00
390	Q1000	5.20	153.86	155.67		155.67	0.000000	0.02	304.23	200.00	0.00
380	Qow	0.05	153.86	155.22		155.22	0.000000	0.00	178.25	186.99	0.00
380	QAug	0.06	153.86	155.22		155.22	0.000000	0.00	179.00	187.07	0.00
380	QJul	0.08	153.86	155.22		155.22	0.000000	0.00	179.86	187.16	0.00
380	7Q2	0.88	153.86	155.37		155.37	0.000000	0.00	208.33	190.28	0.00
380	7Q10	1.38	153.86	155.43		155.43	0.000000	0.01	218.63	191.87	0.00
380	Q2	1.47	153.86	155.44		155.44	0.000000	0.01	220.24	192.12	0.00
380	Q10	2.44	153.86	155.51		155.51	0.000000	0.01	234.99	194.37	0.00
380	Q100	3.76	153.86	155.60		155.60	0.000000	0.02	251.28	196.60	0.00
380	Q1000	5.20	153.86	155.67		155.67	0.000001	0.02	266.11	198.54	0.01
370	Qow	0.05	153.86	155.22		155.22	0.000000	0.00	142.62	179.97	0.00
370	QAug	0.06	153.86	155.22		155.22	0.000000	0.00	143.33	180.08	0.00
370	QJul	0.08	153.86	155.22		155.22	0.000000	0.00	144.16	180.24	0.00
370	7Q2	0.88	153.86	155.37		155.37	0.000000	0.01	171.75	185.46	0.00
370	7Q10	1.38	153.86	155.43		155.43	0.000000	0.01	181.80	187.43	0.00
370	Q2	1.47	153.86	155.44		155.44	0.000000	0.01	183.38	187.74	0.00
370	Q10	2.44	153.86	155.51		155.51	0.000000	0.01	197.81	190.30	0.00
370	Q100	3.76	153.86	155.60		155.60	0.000001	0.02	213.73	192.02	0.01
370	Q1000	5.20	153.86	155.67		155.67	0.000001	0.02	228.21	193.57	0.01
360	Qow	0.05	154.66	155.22		155.22	0.000000	0.01	8.63	21.11	0.00
360	QAug	0.06	154.66	155.22		155.22	0.000000	0.01	8.72	21.18	0.00
360	QJul	0.08	154.66	155.22		155.22	0.000001	0.01	8.82	21.28	0.00
360	7Q2	0.88	154.66	155.37		155.37	0.000079	0.05	18.66	136.20	0.04
360	7Q10	1.38	154.66	155.43		155.43	0.000079	0.05	27.36	181.36	0.04
360	Q2	1.47	154.66	155.44		155.44	0.000076	0.05	28.91	183.55	0.04
360	Q10	2.44	154.66	155.51		155.51	0.000056	0.06	43.02	186.44	0.04
360	Q100	3.76	154.66	155.60		155.60	0.000048	0.06	58.66	189.50	0.04
360	Q1000	5.20	154.66	155.67		155.67	0.000045	0.07	72.96	191.44	0.04
355	Qow	0.05	155.16	155.21		155.22	0.001126	0.09	0.58	11.09	0.13
355	QAug	0.06	155.16	155.22		155.22	0.001298	0.10	0.62	11.17	0.14
355	QJul	0.08	155.16	155.22		155.22	0.001344	0.11	0.67	11.26	0.15
355	7Q2	0.88	155.16	155.37		155.37	0.003227	0.36	2.47	14.10	0.27
355	7Q10	1.38	155.16	155.42		155.43	0.003644	0.43	3.21	15.12	0.30

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
355	Q2	1.47	155.16	155.42		155.43	0.003733	0.44	3.33	15.27	0.30
355	Q10	2.44	155.16	155.49		155.51	0.004327	0.55	4.47	16.70	0.34
355	Q100	3.76	155.16	155.57		155.59	0.004824	0.65	5.81	18.23	0.37
355	Q1000	5.20	155.16	155.64		155.67	0.005197	0.73	7.11	19.60	0.39
350	Qow	0.05	155.16	155.19		155.19	0.012950	0.20	0.27	10.53	0.40
350	QAug	0.06	155.16	155.19		155.19	0.012325	0.21	0.31	10.60	0.39
350	QJul	0.08	155.16	155.19		155.19	0.013049	0.23	0.33	10.64	0.41
350	7Q2	0.88	155.16	155.30		155.31	0.013019	0.56	1.56	12.75	0.51
350	7Q10	1.38	155.16	155.34		155.36	0.012851	0.65	2.11	13.58	0.53
350	Q2	1.47	155.16	155.34		155.37	0.013248	0.68	2.18	13.68	0.54
350	Q10	2.44	155.16	155.41		155.44	0.012996	0.79	3.07	14.93	0.56
350	Q100	3.76	155.16	155.47		155.52	0.012971	0.91	4.13	16.28	0.58
350	Q1000	5.20	155.16	155.54		155.59	0.012984	1.01	5.16	17.50	0.59
340	Qow	0.05	154.96	155.06		155.06	0.013594	0.20	0.27	10.52	0.40
340	QAug	0.06	154.96	155.06		155.06	0.013801	0.22	0.30	10.58	0.41
340	QJul	0.08	154.96	155.06		155.06	0.013555	0.23	0.33	10.64	0.42
340	7Q2	0.88	154.96	155.17		155.18	0.012969	0.56	1.57	12.75	0.51
340	7Q10	1.38	154.96	155.21		155.23	0.012572	0.65	2.12	13.60	0.53
340	Q2	1.47	154.96	155.22		155.24	0.012803	0.67	2.21	13.72	0.53
340	Q10	2.44	154.96	155.28		155.31	0.013010	0.79	3.07	14.93	0.56
340	Q100	3.76	154.96	155.34		155.39	0.013037	0.91	4.12	16.27	0.58
340	Q1000	5.20	154.96	155.41		155.46	0.013021	1.01	5.16	17.50	0.59
330	Qow	0.05	154.76	154.93		154.93	0.012693	0.20	0.27	10.53	0.39
330	QAug	0.06	154.76	154.93		154.93	0.012730	0.21	0.31	10.59	0.40
330	QJul	0.08	154.76	154.93		154.93	0.012960	0.23	0.33	10.64	0.41
330	7Q2	0.88	154.76	155.04		155.05	0.012855	0.56	1.57	12.76	0.51
330	7Q10	1.38	154.76	155.08		155.10	0.013355	0.66	2.08	13.54	0.54
330	Q2	1.47	154.76	155.08		155.11	0.013166	0.67	2.18	13.69	0.54
330	Q10	2.44	154.76	155.15		155.18	0.013020	0.79	3.07	14.93	0.56
330	Q100	3.76	154.76	155.21		155.26	0.012968	0.91	4.13	16.28	0.58
330	Q1000	5.20	154.76	155.28		155.33	0.012983	1.01	5.16	17.50	0.59
320	Qow	0.05	154.56	154.80		154.80	0.013958	0.20	0.27	10.52	0.41
320	QAug	0.06	154.56	154.80		154.80	0.013786	0.22	0.30	10.58	0.41
320	QJul	0.08	154.56	154.80		154.80	0.013622	0.23	0.33	10.63	0.42

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
320	7Q2	0.88	154.56	154.91		154.92	0.013269	0.57	1.55	12.73	0.52
320	7Q10	1.38	154.56	154.95		154.97	0.012748	0.65	2.11	13.59	0.53
320	Q2	1.47	154.56	154.96		154.98	0.012872	0.67	2.20	13.71	0.53
320	Q10	2.44	154.56	155.02		155.05	0.012985	0.79	3.07	14.93	0.56
320	Q100	3.76	154.56	155.08		155.13	0.013040	0.91	4.12	16.27	0.58
320	Q1000	5.20	154.56	155.15		155.20	0.013022	1.01	5.15	17.50	0.59
310	Qow	0.05	154.36	154.67		154.67	0.012444	0.20	0.28	10.54	0.39
310	QAug	0.06	154.36	154.67		154.67	0.012584	0.21	0.31	10.60	0.40
310	QJul	0.08	154.36	154.67		154.67	0.012885	0.23	0.33	10.65	0.41
310	7Q2	0.88	154.36	154.78		154.79	0.012933	0.56	1.57	12.75	0.51
310	7Q10	1.38	154.36	154.82		154.84	0.013199	0.66	2.09	13.55	0.54
310	Q2	1.47	154.36	154.82		154.85	0.013115	0.67	2.19	13.69	0.54
310	Q10	2.44	154.36	154.89		154.92	0.013048	0.79	3.07	14.92	0.56
310	Q100	3.76	154.36	154.95		155.00	0.012961	0.91	4.13	16.28	0.58
310	Q1000	5.20	154.36	155.02		155.07	0.012984	1.01	5.16	17.50	0.59
300	Qow	0.05	154.16	154.54		154.54	0.01423	0.20	0.26	10.52	0.41
300	QAug	0.06	154.16	154.54		154.54	0.014041	0.22	0.3	10.58	0.42
300	QJul	0.08	154.16	154.54		154.54	0.013689	0.23	0.33	10.63	0.42
300	7Q2	0.88	154.16	154.65		154.66	0.013127	0.56	1.56	12.74	0.52
300	7Q10	1.38	154.16	154.69		154.71	0.012847	0.65	2.11	13.58	0.53
300	Q2	1.47	154.16	154.70		154.72	0.012917	0.67	2.2	13.71	0.53
300	Q10	2.44	154.16	154.76		154.79	0.012956	0.79	3.08	14.94	0.56
300	Q100	3.76	154.16	154.82		154.87	0.01305	0.91	4.12	16.27	0.58
300	Q1000	5.20	154.16	154.89		154.94	0.013021	1.01	5.16	17.5	0.59
290	Qow	0.05	153.96	154.41		154.41	0.011895	0.19	0.28	10.54	0.38
290	QAug	0.06	153.96	154.41		154.41	0.012440	0.21	0.31	10.60	0.39
290	QJul	0.08	153.96	154.41		154.41	0.012761	0.22	0.33	10.65	0.41
290	7Q2	0.88	153.96	154.52		154.53	0.012967	0.56	1.57	12.75	0.51
290	7Q10	1.38	153.96	154.56		154.58	0.013122	0.66	2.09	13.56	0.54
290	Q2	1.47	153.96	154.56		154.59	0.013083	0.67	2.19	13.70	0.54
290	Q10	2.44	153.96	154.63		154.66	0.013081	0.80	3.07	14.92	0.56
290	Q100	3.76	153.96	154.69		154.74	0.012943	0.91	4.13	16.28	0.58
290	Q1000	5.20	153.96	154.76		154.81	0.012985	1.01	5.16	17.50	0.59
280	Qow	0.05	153.76	154.28		154.28	0.015053	0.21	0.26	10.51	0.42

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
280	QAug	0.06	153.76	154.28		154.28	0.014086	0.22	0.3	10.58	0.42
280	QJul	0.08	153.76	154.28		154.28	0.013838	0.23	0.33	10.63	0.42
280	7Q2	0.88	153.76	154.39		154.40	0.012736	0.56	1.57	12.77	0.51
280	7Q10	1.38	153.76	154.43		154.45	0.012896	0.66	2.11	13.57	0.53
280	Q2	1.47	153.76	154.44		154.46	0.012917	0.67	2.20	13.71	0.53
280	Q10	2.44	153.76	154.50		154.53	0.012921	0.79	3.08	14.94	0.56
280	Q100	3.76	153.76	154.56		154.61	0.013076	0.91	4.11	16.27	0.58
280	Q1000	5.20	153.76	154.63		154.68	0.013019	1.01	5.16	17.50	0.59
270	Qow	0.05	153.61	154.15		154.15	0.011377	0.19	0.28	10.55	0.37
270	QAug	0.06	153.61	154.15		154.15	0.012097	0.21	0.31	10.60	0.39
270	QJul	0.08	153.61	154.15		154.16	0.012650	0.22	0.33	10.65	0.40
270	7Q2	0.88	153.61	154.26		154.27	0.013140	0.56	1.56	12.74	0.52
270	7Q10	1.38	153.61	154.3		154.32	0.012659	0.65	2.12	13.59	0.53
270	Q2	1.47	153.61	154.31		154.33	0.012673	0.67	2.21	13.73	0.53
270	Q10	2.44	153.61	154.37		154.40	0.013123	0.80	3.06	14.92	0.56
270	Q100	3.76	153.61	154.43		154.48	0.012901	0.91	4.13	16.29	0.58
270	Q1000	5.20	153.61	154.50		154.55	0.012990	1.01	5.16	17.50	0.59
260	Qow	0.05	153.52	154.02		154.02	0.016078	0.21	0.25	10.50	0.44
260	QAug	0.06	153.52	154.02		154.02	0.014746	0.22	0.29	10.57	0.43
260	QJul	0.08	153.52	154.02		154.02	0.013797	0.23	0.33	10.63	0.42
260	7Q2	0.88	153.52	154.13		154.14	0.012662	0.56	1.58	12.77	0.51
260	7Q10	1.38	153.52	154.17		154.19	0.012801	0.65	2.11	13.58	0.53
260	Q2	1.47	153.52	154.17		154.20	0.013130	0.67	2.19	13.69	0.54
260	Q10	2.44	153.52	154.24		154.27	0.012874	0.79	3.08	14.94	0.56
260	Q100	3.76	153.52	154.30		154.35	0.013154	0.92	4.11	16.26	0.58
260	Q1000	5.20	153.52	154.37		154.42	0.012971	1.01	5.16	17.51	0.59
250	Qow	0.05	153.58	153.89		153.89	0.010461	0.19	0.29	10.56	0.36
250	QAug	0.06	153.58	153.89		153.89	0.011562	0.21	0.32	10.61	0.38
250	QJul	0.08	153.58	153.89		153.90	0.011580	0.22	0.34	10.67	0.39
250	7Q2	0.88	153.58	153.99		154.01	0.014015	0.58	1.53	12.69	0.53
250	7Q10	1.38	153.58	154.04		154.06	0.013761	0.67	2.06	13.51	0.55
250	Q2	1.47	153.58	154.04		154.07	0.013701	0.68	2.16	13.65	0.55
250	Q10	2.44	153.58	154.11		154.14	0.013173	0.80	3.06	14.91	0.56
250	Q100	3.76	153.58	154.18		154.22	0.012726	0.91	4.15	16.31	0.57

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
250	Q1000	5.20	153.58	154.24		154.29	0.012499	0.99	5.23	17.58	0.58
240	Qow	0.05	153.58	153.75		153.76	0.017087	0.22	0.25	10.49	0.45
240	QAug	0.06	153.58	153.76		153.76	0.015954	0.23	0.29	10.56	0.44
240	QJul	0.08	153.58	153.76		153.76	0.015599	0.24	0.31	10.61	0.44
240	7Q2	0.88	153.58	153.88		153.89	0.010555	0.53	1.67	12.92	0.47
240	7Q10	1.38	153.58	153.92		153.94	0.009966	0.60	2.29	13.85	0.47
240	Q2	1.47	153.58	153.93		153.95	0.009918	0.61	2.40	14.00	0.47
240	Q10	2.44	153.58	154.00	153.90	154.02	0.009521	0.71	3.41	15.38	0.48
240	Q100	3.76	153.58	154.07	153.95	154.10	0.009693	0.82	4.56	16.80	0.51
240	Q1000	5.20	153.58	154.13	154.00	154.17	0.010144	0.93	5.62	18.02	0.53
230	Qow	0.05	153.57	153.63		153.63	0.009743	0.18	0.3	10.58	0.35
230	QAug	0.06	153.57	153.63		153.63	0.010560	0.20	0.32	10.63	0.37
230	QJul	0.08	153.57	153.63		153.64	0.010831	0.21	0.35	10.68	0.38
230	7Q2	0.88	153.57	153.72		153.74	0.022339	0.67	1.31	12.35	0.66
230	7Q10	1.38	153.57	153.74		153.78	0.028515	0.85	1.62	12.84	0.76
230	Q2	1.47	153.57	153.75		153.79	0.029370	0.88	1.68	12.93	0.78
230	Q10	2.44	153.57	153.78	153.77	153.85	0.040830	1.16	2.10	13.56	0.94
230	Q100	3.76	153.57	153.82	153.82	153.92	0.043257	1.37	2.74	14.48	1.01
230	Q1000	5.20	153.57	153.87	153.87	153.99	0.040706	1.49	3.49	15.47	1.00
220	Qow	0.05	153.52	153.55		153.55	0.007457	0.13	0.42	20.37	0.29
220	QAug	0.06	153.52	153.55		153.55	0.006783	0.13	0.49	21.34	0.28
220	QJul	0.08	153.52	153.55		153.55	0.006641	0.14	0.54	22.05	0.28
220	7Q2	0.88	153.52	153.64		153.64	0.004958	0.26	3.34	41.35	0.30
220	7Q10	1.38	153.52	153.67		153.67	0.004811	0.30	4.64	46.73	0.30
220	Q2	1.47	153.52	153.67		153.68	0.004858	0.30	4.85	47.53	0.30
220	Q10	2.44	153.52	153.71		153.72	0.004977	0.36	6.86	54.22	0.32
220	Q100	3.76	153.52	153.76	153.65	153.77	0.004702	0.40	9.52	61.56	0.32
220	Q1000	5.20	153.52	153.80	153.68	153.81	0.004460	0.42	12.34	69.60	0.32
210	Qow	0.05	153.45	153.49		153.49	0.004405	0.12	0.46	17.94	0.23
210	QAug	0.06	153.45	153.50		153.50	0.004540	0.12	0.53	19.01	0.24
210	QJul	0.08	153.45	153.50		153.50	0.004668	0.13	0.58	19.87	0.24
210	7Q2	0.88	153.45	153.58		153.59	0.005984	0.28	3.11	39.84	0.32
210	7Q10	1.38	153.45	153.61		153.62	0.005592	0.31	4.39	45.67	0.32
210	Q2	1.47	153.45	153.62		153.62	0.005533	0.32	4.61	46.25	0.32

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
210	Q10	2.44	153.45	153.66		153.67	0.004790	0.36	6.81	51.73	0.32
210	Q100	3.76	153.45	153.71		153.72	0.004219	0.39	9.53	56.93	0.31
210	Q1000	5.20	153.45	153.76		153.77	0.003891	0.42	12.25	61.71	0.30
200	Qow	0.05	153.39	153.42		153.42	0.014456	0.19	0.29	13.44	0.41
200	QAug	0.06	153.39	153.42		153.42	0.012922	0.19	0.34	14.23	0.39
200	QJul	0.08	153.39	153.42		153.43	0.013463	0.20	0.37	14.66	0.40
200	7Q2	0.88	153.39	153.54		153.54	0.004062	0.25	3.57	42.01	0.27
200	7Q10	1.38	153.39	153.57		153.58	0.003370	0.27	5.20	47.52	0.26
200	Q2	1.47	153.39	153.58		153.58	0.003292	0.27	5.48	48.20	0.26
200	Q10	2.44	153.39	153.63		153.63	0.002872	0.30	8.05	53.56	0.25
200	Q100	3.76	153.39	153.68		153.69	0.002638	0.34	11.03	57.73	0.25
200	Q1000	5.20	153.39	153.73		153.74	0.002598	0.38	13.87	62.15	0.25
190	Qow	0.05	153.33	153.39		153.39	0.001384	0.08	0.70	20.63	0.14
190	QAug	0.06	153.33	153.39		153.39	0.001199	0.08	0.83	21.68	0.13
190	QJul	0.08	153.33	153.40		153.40	0.001171	0.08	0.92	22.38	0.13
190	7Q2	0.88	153.33	153.51		153.51	0.001729	0.20	4.47	38.78	0.19
190	7Q10	1.38	153.33	153.55		153.55	0.001920	0.23	5.97	44.09	0.20
190	Q2	1.47	153.33	153.55		153.56	0.001944	0.24	6.23	44.87	0.20
190	Q10	2.44	153.33	153.60		153.61	0.002135	0.28	8.67	51.63	0.22
190	Q100	3.76	153.33	153.66		153.66	0.002228	0.32	11.64	58.12	0.23
190	Q1000	5.20	153.33	153.71		153.71	0.002268	0.36	14.50	62.76	0.24
180	Qow	0.05	153.32	153.37		153.37	0.002484	0.11	0.51	14.92	0.18
180	QAug	0.06	153.32	153.37		153.38	0.002487	0.11	0.59	16.27	0.18
180	QJul	0.08	153.32	153.38		153.38	0.002469	0.11	0.67	17.90	0.18
180	7Q2	0.88	153.32	153.49		153.49	0.002661	0.23	3.90	38.17	0.23
180	7Q10	1.38	153.32	153.52		153.53	0.002739	0.26	5.30	42.63	0.24
180	Q2	1.47	153.32	153.53		153.53	0.002754	0.27	5.54	43.36	0.24
180	Q10	2.44	153.32	153.58		153.58	0.002812	0.31	7.77	48.29	0.25
180	Q100	3.76	153.32	153.63		153.64	0.002856	0.36	10.48	53.89	0.26
180	Q1000	5.20	153.32	153.68		153.69	0.002901	0.40	13.10	58.50	0.27
170	Qow	0.05	153.29	153.35		153.35	0.001470	0.09	0.62	15.90	0.14
170	QAug	0.06	153.29	153.36		153.36	0.001563	0.09	0.69	16.55	0.15
170	QJul	0.08	153.29	153.36		153.36	0.001551	0.10	0.77	17.64	0.15
170	7Q2	0.88	153.29	153.46		153.46	0.003341	0.25	3.50	34.44	0.25

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
170	7Q10	1.38	153.29	153.49		153.50	0.003526	0.29	4.70	38.22	0.27
170	Q2	1.47	153.29	153.50		153.50	0.003545	0.30	4.91	38.73	0.27
170	Q10	2.44	153.29	153.55		153.55	0.003714	0.36	6.84	43.25	0.29
170	Q100	3.76	153.29	153.60		153.61	0.003871	0.41	9.23	49.23	0.30
170	Q1000	5.20	153.29	153.64		153.65	0.003878	0.45	11.61	53.85	0.31
160	Qow	0.05	153.3	153.33		153.33	0.004574	0.11	0.51	23.21	0.23
160	QAug	0.06	153.3	153.33		153.33	0.004581	0.11	0.57	23.65	0.23
160	QJul	0.08	153.3	153.33		153.33	0.004600	0.12	0.63	24.03	0.24
160	7Q2	0.88	153.3	153.42		153.43	0.003991	0.26	3.43	37.42	0.27
160	7Q10	1.38	153.3	153.46		153.46	0.003903	0.29	4.68	40.81	0.28
160	Q2	1.47	153.3	153.46		153.47	0.003888	0.30	4.90	41.37	0.28
160	Q10	2.44	153.3	153.51		153.51	0.003784	0.35	6.95	45.65	0.29
160	Q100	3.76	153.3	153.56		153.57	0.003723	0.40	9.40	50.16	0.29
160	Q1000	5.20	153.3	153.61		153.62	0.003659	0.44	11.84	54.10	0.30
150	Qow	0.05	153.25	153.28		153.28	0.003993	0.11	0.51	21.33	0.22
150	QAug	0.06	153.25	153.29		153.29	0.003850	0.11	0.59	22.1	0.22
150	QJul	0.08	153.25	153.29		153.29	0.003758	0.11	0.65	22.75	0.22
150	7Q2	0.88	153.25	153.39		153.39	0.003374	0.25	3.57	36.48	0.25
150	7Q10	1.38	153.25	153.42		153.42	0.003401	0.29	4.82	39.53	0.26
150	Q2	1.47	153.25	153.42		153.43	0.003408	0.29	5.03	40.03	0.26
150	Q10	2.44	153.25	153.47		153.48	0.003504	0.35	7.02	44.18	0.28
150	Q100	3.76	153.25	153.52		153.53	0.003586	0.40	9.37	48.26	0.29
150	Q1000	5.20	153.25	153.57		153.58	0.003656	0.45	11.67	52.18	0.30
140	Qow	0.05	153.21	153.26		153.26	0.002196	0.08	0.64	23.53	0.16
140	QAug	0.06	153.21	153.26		153.26	0.002138	0.09	0.73	24.58	0.16
140	QJul	0.08	153.21	153.26		153.26	0.002186	0.09	0.80	25.16	0.17
140	7Q2	0.88	153.21	153.36		153.36	0.003004	0.24	3.73	37.42	0.24
140	7Q10	1.38	153.21	153.39		153.39	0.003194	0.28	4.98	41.06	0.25
140	Q2	1.47	153.21	153.39		153.40	0.003219	0.28	5.20	41.66	0.26
140	Q10	2.44	153.21	153.44		153.44	0.003318	0.34	7.22	45.53	0.27
140	Q100	3.76	153.21	153.49		153.50	0.003377	0.39	9.59	48.90	0.28
140	Q1000	5.20	153.21	153.53		153.54	0.003434	0.44	11.86	51.85	0.29
130	Qow	0.05	153.19	153.22		153.22	0.009575	0.14	0.37	18.58	0.33
130	QAug	0.06	153.19	153.22		153.22	0.012095	0.17	0.39	18.78	0.37

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
130	QJul	0.08	153.19	153.22		153.22	0.012048	0.17	0.43	19.24	0.37
130	7Q2	0.88	153.19	153.31		153.32	0.005732	0.30	2.95	33.84	0.32
130	7Q10	1.38	153.19	153.34		153.35	0.005373	0.34	4.10	37.21	0.32
130	Q2	1.47	153.19	153.35		153.35	0.005332	0.34	4.30	37.71	0.32
130	Q10	2.44	153.19	153.40		153.40	0.005074	0.40	6.16	42.10	0.33
130	Q100	3.76	153.19	153.45		153.46	0.004830	0.45	8.40	46.01	0.33
130	Q1000	5.20	153.19	153.49		153.50	0.004698	0.49	10.54	48.83	0.34
120	Qow	0.05	153.11	153.16		153.16	0.003471	0.11	0.51	19.10	0.21
120	QAug	0.06	153.11	153.16		153.16	0.003220	0.11	0.60	19.93	0.20
120	QJul	0.08	153.11	153.17		153.17	0.003070	0.11	0.67	20.62	0.20
120	7Q2	0.88	153.11	153.27		153.27	0.003137	0.25	3.55	34.05	0.25
120	7Q10	1.38	153.11	153.30		153.31	0.003372	0.29	4.68	36.65	0.26
120	Q2	1.47	153.11	153.31		153.31	0.003407	0.30	4.88	37.03	0.27
120	Q10	2.44	153.11	153.35		153.36	0.003691	0.37	6.66	40.24	0.29
120	Q100	3.76	153.11	153.40		153.41	0.003963	0.43	8.75	43.84	0.31
120	Q1000	5.20	153.11	153.45		153.46	0.004208	0.48	10.76	47.31	0.32
110	Qow	0.05	153.08	153.13		153.13	0.002771	0.11	0.50	15.35	0.19
110	QAug	0.06	153.08	153.13		153.13	0.002981	0.12	0.56	16.51	0.20
110	QJul	0.08	153.08	153.14		153.14	0.003131	0.12	0.62	17.47	0.20
110	7Q2	0.88	153.08	153.23		153.23	0.004961	0.29	3.07	33.48	0.30
110	7Q10	1.38	153.08	153.26		153.27	0.005094	0.33	4.13	36.50	0.32
110	Q2	1.47	153.08	153.26		153.27	0.005111	0.34	4.32	36.96	0.32
110	Q10	2.44	153.08	153.31		153.32	0.005282	0.41	6.01	40.71	0.34
110	Q100	3.76	153.08	153.36		153.37	0.005320	0.47	8.03	44.22	0.35
110	Q1000	5.20	153.08	153.40		153.41	0.00544	0.52	9.94	47.07	0.36
100	Qow	0.05	153.04	153.07		153.07	0.017246	0.19	0.29	15.15	0.43
100	QAug	0.06	153.04	153.08		153.08	0.016191	0.19	0.34	16.33	0.43
100	QJul	0.08	153.04	153.08		153.08	0.014568	0.19	0.39	17.14	0.41
100	7Q2	0.88	153.04	153.16		153.17	0.008674	0.35	2.51	30.61	0.39
100	7Q10	1.38	153.04	153.19		153.20	0.008028	0.39	3.50	33.87	0.39
100	Q2	1.47	153.04	153.20		153.21	0.007957	0.40	3.67	34.30	0.39
100	Q10	2.44	153.04	153.24		153.26	0.007405	0.46	5.29	38.12	0.40
100	Q100	3.76	153.04	153.29		153.30	0.007354	0.53	7.14	41.98	0.41
100	Q1000	5.20	153.04	153.33		153.35	0.007470	0.59	8.89	45.13	0.42

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
90	Qow	0.05	152.96	153.0		153.00	0.004187	0.12	0.47	17.54	0.23
90	QAug	0.06	152.96	153.0		153.00	0.004246	0.12	0.53	18.08	0.23
90	QJul	0.08	152.96	153.0		153.01	0.004593	0.13	0.56	18.42	0.24
90	7Q2	0.88	152.96	153.1		153.10	0.005273	0.30	2.91	30.60	0.31
90	7Q10	1.38	152.96	153.13		153.14	0.00548	0.35	3.93	33.99	0.33
90	Q2	1.47	152.96	153.14		153.14	0.005503	0.36	4.10	34.42	0.33
90	Q10	2.44	152.96	153.18		153.19	0.005826	0.43	5.71	38.61	0.35
90	Q100	3.76	152.96	153.22		153.24	0.006419	0.50	7.49	42.67	0.38
90	Q1000	5.20	152.96	153.26		153.28	0.006816	0.57	9.14	45.12	0.40
80	Qow	0.05	152.9	152.94	152.93	152.95	0.006617	0.14	0.39	15.31	0.28
80	QAug	0.06	152.9	152.95	152.93	152.95	0.007121	0.15	0.43	15.95	0.30
80	QJul	0.08	152.9	152.95	152.93	152.95	0.007010	0.16	0.48	16.65	0.30
80	7Q2	0.88	152.9	153.03		153.04	0.008174	0.34	2.58	31.63	0.38
80	7Q10	1.38	152.9	153.06		153.07	0.009075	0.40	3.43	35.26	0.41
80	Q2	1.47	152.9	153.06		153.07	0.009193	0.41	3.58	35.86	0.42
80	Q10	2.44	152.9	153.10		153.11	0.009630	0.49	4.99	40.15	0.44
80	Q100	3.76	152.9	153.14		153.15	0.010275	0.57	6.54	43.34	0.47
80	Q1000	5.20	152.9	153.17		153.19	0.010683	0.65	8.04	45.91	0.49
70	Qow	0.05	152.8	152.83		152.83	0.025863	0.22	0.24	13.26	0.53
70	QAug	0.06	152.8	152.83		152.83	0.022328	0.22	0.29	14.04	0.50
70	QJul	0.08	152.8	152.83		152.84	0.023254	0.24	0.32	14.44	0.51
70	7Q2	0.88	152.8	152.91		152.92	0.019881	0.45	1.95	30.63	0.57
70	7Q10	1.38	152.8	152.93		152.94	0.018627	0.50	2.76	35.26	0.57
70	Q2	1.47	152.8	152.93		152.95	0.018115	0.51	2.91	35.80	0.57
70	Q10	2.44	152.8	152.97		152.98	0.017224	0.59	4.15	39.14	0.58
70	Q100	3.76	152.8	153.00		153.03	0.016411	0.66	5.66	42.85	0.58
70	Q1000	5.20	152.8	153.04		153.07	0.015519	0.72	7.20	46.12	0.58
60	Qow	0.05	152.5	152.56		152.57	0.02597	0.33	0.17	5.13	0.58
60	QAug	0.06	152.5	152.57		152.57	0.030531	0.36	0.18	5.34	0.63
60	QJul	0.08	152.5	152.57		152.58	0.028962	0.37	0.20	5.69	0.62
60	7Q2	0.88	152.5	152.69		152.71	0.020277	0.60	1.47	15.25	0.62
60	7Q10	1.38	152.5	152.73		152.76	0.018947	0.65	2.14	18.83	0.61
60	Q2	1.47	152.5	152.74		152.76	0.018968	0.65	2.27	19.81	0.61
60	Q10	2.44	152.5	152.81		152.83	0.015006	0.63	3.86	29.54	0.56

River Sta	Profile	Q Total (m^3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m^2)	Top Width (m)	Froude # Chl
60	Q100	3.76	152.5	152.86		152.88	0.012703	0.65	5.76	37.04	0.53
60	Q1000	5.20	152.5	152.91		152.93	0.011603	0.69	7.52	41.30	0.52
50	Qow	0.05	152.5	152.54		152.54	0.001072	0.07	0.76	21.36	0.12
50	QAug	0.06	152.5	152.54		152.54	0.000953	0.07	0.89	21.61	0.12
50	QJul	0.08	152.5	152.55		152.55	0.00104	0.08	0.94	21.72	0.12
50	7Q2	0.88	152.5	152.64		152.65	0.002871	0.27	3.26	25.84	0.24
50	7Q10	1.38	152.5	152.68		152.68	0.003292	0.33	4.19	27.32	0.27
50	Q2	1.47	152.5	152.68		152.69	0.003365	0.34	4.35	27.56	0.27
50	Q10	2.44	152.5	152.74		152.75	0.004505	0.41	5.97	35.53	0.32
50	Q100	3.76	152.5	152.80		152.81	0.004333	0.44	8.45	43.02	0.32
50	Q1000	5.20	152.5	152.85		152.86	0.004556	0.50	10.49	47.16	0.34
43	Qow	0.05	152.5	152.52	152.51	152.52	0.005003	0.10	0.52	26.15	0.24
43	QAug	0.06	152.5	152.52	152.51	152.52	0.005002	0.11	0.58	26.29	0.24
43	QJul	0.08	152.5	152.52	152.51	152.53	0.005006	0.12	0.64	26.40	0.24
43	7Q2	0.88	152.5	152.61	152.55	152.61	0.005003	0.30	2.97	31.02	0.31
43	7Q10	1.38	152.5	152.64	152.57	152.64	0.005009	0.35	3.98	32.82	0.32
43	Q2	1.47	152.5	152.64	152.57	152.65	0.005007	0.35	4.16	33.12	0.32
43	Q10	2.44	152.5	152.69	152.60	152.70	0.005003	0.42	5.75	34.94	0.33
43	Q100	3.76	152.5	152.75	152.63	152.76	0.005002	0.45	8.28	45.55	0.34
43	Q1000	5.20	152.5	152.80	152.65	152.81	0.005001	0.50	10.39	49.35	0.35

APPENDIX H APPROVED PROJECT FISH HABITAT OFFSETTING PLAN

AGNICO EAGLE

WHALE TAIL PIT

Fish Habitat Offsetting Plan

Prepared by:
C. Portt and Associates
&
Agnico Eagle Mines Limited – Meadowbank Division

Final:
Version 1
March, 2018

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

Appendix A – Lake Elevations and Summary of Fish Catches during Baseline Field Investigations

Appendix B – Habitat Areas and Habitat Units, by Habitat Type, for Baseline, Operations, and Post-closure Phases

Appendix C – Complementary Measures

EXECUTIVE SUMMARY

Agnico Eagle Mines Limited: Meadowbank Division (Agnico Eagle) is proposing to develop Whale Tail Pit, a satellite deposit on the Amaruq property, in continuation of mine operations and milling of the Meadowbank Mine. The Amaruq Exploration property is a 408 square kilometre (km^2) site located on Inuit Owned Land approximately 150 kilometres (km) north of the hamlet of Baker Lake and approximately 50 km northwest of the Meadowbank Mine in the Kivalliq region of Nunavut.

Baseline fisheries investigations were conducted in Mammoth Lake, Whale Tail Lake, and tributary streams and lakes in 2014, 2015, and 2016. Individuals of six fish species were captured in the primary study area. These were comprised of four large-bodied species (Lake Trout, *Salvelinus namaycush;* Arctic Char, *Salvelinus alpinus*; Round Whitefish, *Prosopium cylindraceum*; Burbot, *Lota lota*) and two small-bodied species (Slimy Sculpin, *Cottus cognatus*; Ninespine Stickleback, *Pungitius pungitius*).

The goal of this document is to characterize fish habitat in areas that will be directly affected by Whale Tail Pit mining operations under baseline conditions and predicted conditions during the operations and post-closure scenarios, and to describe habitat creation and enhancement along with complementary measures that will be used to offsetlosses to fish habitat. This document presents an approach to offsetting for the Whale Tail Pit that achieves a 1.66:1 ratio of habitat gains to habitat losses.

The habitat evaluation procedure (HEP) used to quantify habitat losses and offsets for Whale Tail Pit is based on the procedure used for the 2012 No Net Loss Plan (NNLP) for the Meadowbank Mine, and incorporates changes introduced between 2014 and 2016 based on DFO review of plans for Vault Lake, Phaser Lake, and the conceptual and draft offsetting plans for Whale Tail Pit (June, 2016; June, 2017)).

Changes to baseline fish habitat will occur during the operations and post-closure phases of Whale Tail Pit. During the operations phase there will be habitat losses due to dewatering or isolation of portions of Whale Tail Lake and some of its tributary lakes and connecting watercourses. Much smaller habitat losses will also occur in Mammoth Lake during operations as a result of diking and dewatering and in Nemo Lake due to the construction of a freshwater intake jetty. Habitat gains will occur from flooding of terrestrial areas south of the Whale Tail Dike. Overall, there is a 48.6 ha increase in the area of fish habitat and a 42.7 unit increase in the number of habitat units (HUs) during operations relative to baseline conditions. However, since flooding of terrestrial zones is only planned to occur over a 4-7 year period prior to drawdown, fish habitat availability during the operations phase is conservatively not considered a habitat offset, and calculations were performed for reference only. In the final net change calculation, only differences between baseline and post-closure conditions are compared.

Post-closure, in the absence of offsetting, most of the area affected during operations will revert to baseline conditions. The dikes will be breached, dewatered areas will be reflooded and isolated areas will be reconnected. The largest change between baseline and post-

closure conditions is the creation of Whale Tail Pit. For the purposes of offsetting calculations, and at the request of DFO, it has been assumed that the flooded pit and pit cap will have no fish habitat value. Therefore, although the excavation of the pit into terrestrial areas will increase the surface area of Whale Tail Lake by 27.4 ha after flooding, the number of habitat units present will decrease. There also remains a small decrease in the area and number of habitat units in Nemo and Mammoth Lakes. Following closure, without offsetting, there would be a net decrease of 14.45 HUs compared to baseline conditions.

As offsetting for these losses, it is proposed to construct a sill in the connecting channel between Whale Tail Lake and Mammoth Lake to raise the elevation of Whale Tail Lake by 1 m which will flood a band around the perimeter of Whale Tail Lake. This increase would convert land to aquatic habitat and modify much of the existing habitat by increasing its depth. It is also proposed to construct 8.77 ha of shoals in the portion of Whale Tail Lake that is dewatered during operations, and to scarify the roads within that area prior to reflooding, converting them from mixed to coarse habitat. The net result of all habitat creation and enhancement measures is an increase of 21.26 ha and 15.03 HUs relative to the post-closure condition with no offsetting. This results in an offsetting to losses ratio of approximately 1:1 (losses = 14.45 HUs, gains = 15.03 HUs).

DFO has indicated support for complementary measures to provide 60% of the required offsetting. Following discussions of suitable research topics with DFO, Agnico Eagle has worked with researchers to develop proposals for a suite of research activities to benefit local stakeholders and contribute to the understanding of aquatic systems. These complementary measures are valued at 60% of constructed offsets (9.02 HUs), providing a total offsetting ratio of 14.45 HUs lost to 24.05 HUs gained (1:1.66).

SECTION 1 • INTRODUCTION

Agnico Eagle Mines Limited: Meadowbank Division (Agnico Eagle) is proposing to develop Whale Tail Pit, a satellite deposit on the Amaruq property, in continuation of mine operations and milling of the Meadowbank Mine. The Amaruq Exploration property is a 408 square kilometre (km^2) site located on Inuit Owned Land approximately 150 kilometres (km) north of the hamlet of Baker Lake and approximately 50 km northwest of the Meadowbank Mine in the Kivalliq region of Nunavut (Figure 1-1).

1.1 GOAL

The goal of this document is to characterize fish habitat in areas that will be directly altered by Whale Tail Pit mining operations. Changes to fish habitat between baseline conditions and predicted conditions during the operations and post-closure scenarios are compared.

Options being considered to offset residual serious harm to fish that would occur as a result of mining activities at Whale Tail Pit were introduced in the Conceptual Fish Habitat Offsetting Plan (Agnico Eagle, 2016). In subsequent meetings to discuss offsetting for the project, DFO indicated that, given the need for knowledge regarding how fish populations and communities in the north respond to habitat changes, it would be acceptable for 60% of offsetting to consist of complementary measures. Those complementary measures would focus on funding scientific research that will improve the understanding of how aquatic systems in the far north respond to perturbations from human activities and/or the development of technologies to reduce impacts from human activities. The amount of research funding provided would be based on the predicted cost of achieving the desired offsets using typical offsetting methods that involve habitat alteration.

The approach used here to quantify harm and offsetting (previously termed compensation) builds upon methods developed for the Meadowbank mine site from 2012 through 2016. This offsetting approach was introduced in the 2012 Meadowbank no-net-loss plan (NNLP) after researching techniques and projects implemented at other northern mines, holding workshops and site visits with the local Hunter’s and Trapper’s Organization, Kivalliq Inuit Association and the DFO Habitat and Science & Research Departments, and reviewing the literature for information on effectiveness of compensation. Offsetting concepts specific to Whale Tail Pit were discussed with community groups during TK workshops initially held in Baker Lake in February 2016; follow-up workshops were held during the authorization phase of the project.

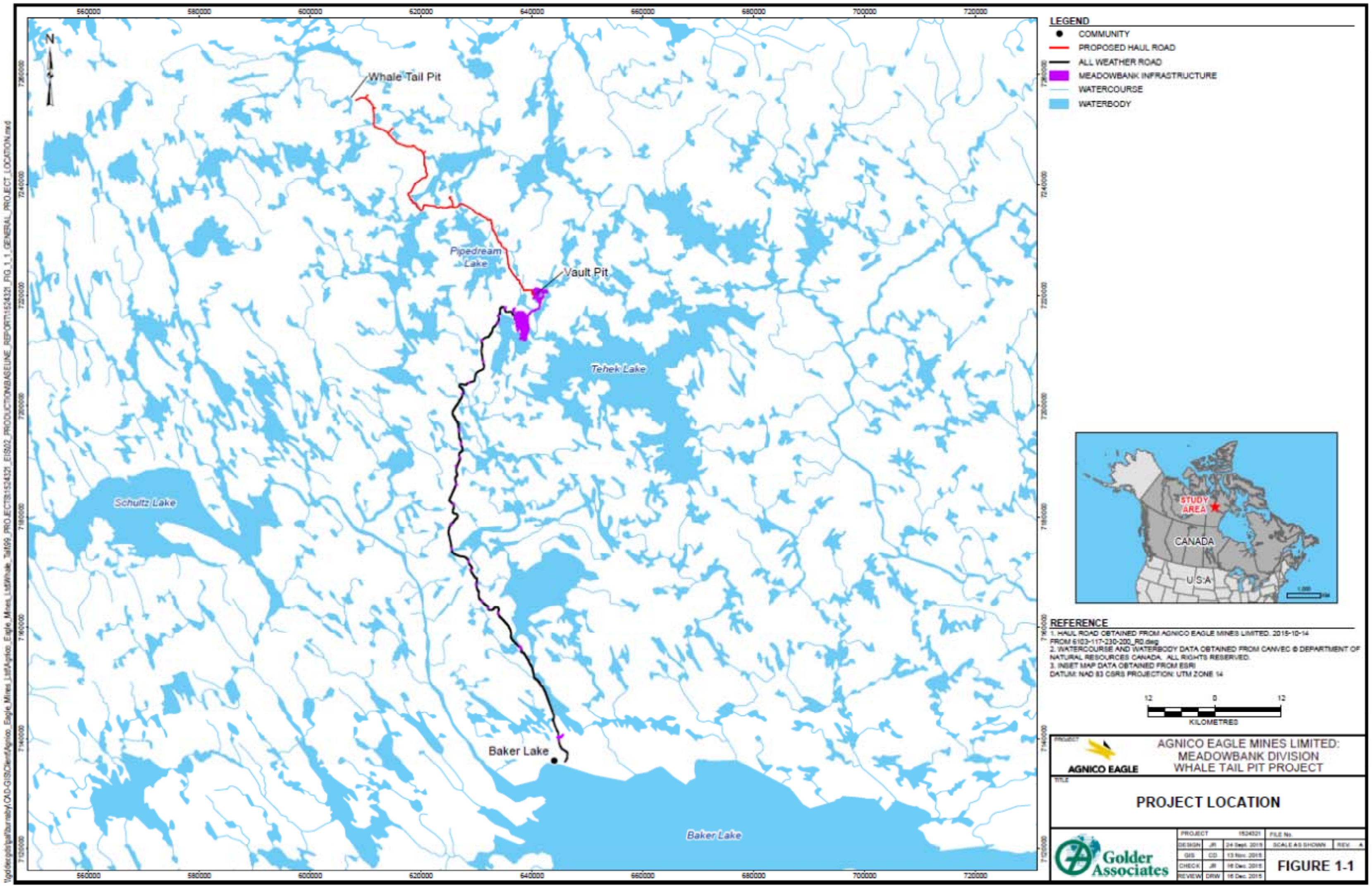


Figure 1-1. Location of the proposed Whale Tail Pit Study Area.

1.2 HYDROLOGIC SETTING

The hydrologic setting of Whale Tail Pit is shown in Figure 1-2. Lakes were assigned alpha-numeric codes to facilitate discussion, with the letter designating the subwatershed and, within each branch, the number increasing in an upstream direction. Lake A17 is referred to as Whale Tail Lake. Lake A16 is referred to as Mammoth Lake and lake C38, in the subwatershed immediately north of the Whale Tail Pit, is referred to as Nemo Lake.

The primary study area is in the headwaters of subwatershed A. All flow from the primary study area ultimately reaches lake DS1, but there are two pathways of flow downstream from Lake A12. The primary flow path, which conveys the majority of the flow, passes through lakes A11, A10, A9, A8 and A7, and then into Lake A32 before continuing through Lakes A6, A5, A4, A3, A2, A1 and into DS1. The secondary flow path is from Lake A12 to Lake A77 and then to Lake A76. Lake A76 has two outlets; with about half the outflow of the lake flowing to the east through Lake A41 to rejoin the primary flow path at Lake A10, while the other half flows west through Lakes A75, A74, A73, A72, A71, A70, A69 and into Lake DS1.

1.3 WATER ELEVATIONS AND LAKE SHORELINES

The shorelines used to determine baseline habitat areas in the Conceptual Fish Habitat Offsetting Plan (Agnico Eagle, 2016) were from CanVec mapping. Comparison of these shorelines to satellite imagery from July 21, 2011, indicated that the water levels represented by the CanVec shorelines were lower than those shown in the imagery. Water elevations were estimated by overlaying the digital elevation model for the study area and the July 21, 2011, satellite imagery for three lakes where actual water level data were available for 2015 and 2016 and the estimated elevations were compared to the field data1. The results (Table 1-1) were shared with DFO (meeting held in Winnipeg, March 23, 2017) and it was agreed that the water elevations and shorelines used to calculate habitat areas in the final offsetting plan would be determined using DEM and the July 21, 2011, imagery. Those elevations are provided in Appendix A.

[1] The following determination of shoreline elevations was provided in response to DFO IR 4 and 7. Agnico Eagle (January, 2017). DFO IR 4 – Freshwater Environment – Habitat Alteration; DFO IR 7 – Monitoring, Mitigation and Management Plans – Conceptual Offsetting Plan. January 20th, 2017 submission RE: NIRB File No 16MN056 Application No: 124683/NWB File No. 2AM WTP ----: Information Requests Received from Parties Regarding Agnico Eagles Mines Ltd's "Whale Tail Pit" Project.

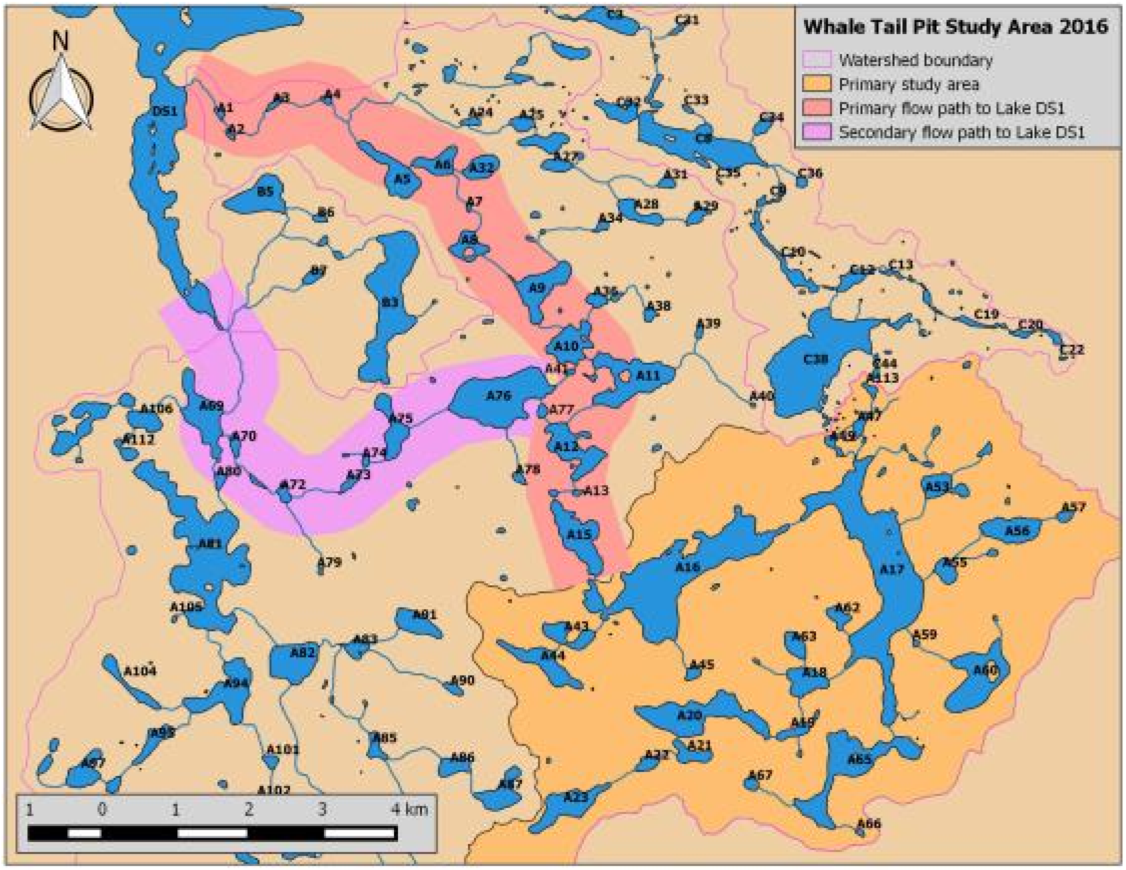


Figure 1-2. Hydrologic setting and lake identification codes. Mammoth Lake is A16. Whale Tail Lake is A17. Nemo Lake is C38.

Table 1-1. Water elevation estimated from the July 21, 2011, imagery, the minimum, maximum and range of water elevations recorded in the field in 2015 and 2016, the difference between the minimum and maximum water elevations recorded in the field and the water elevation estimated from the July 21, 2011, imagery, and the number of days each year that the recorded water elevation was higher than the water elevation estimated from the July 21, 2011, imagery, for 2015 and 2016.

Parameter	Whale Tail Lake (A17)		Lake A18		Nemo Lake (C38)	
Water elevation estimated from July 21, 2011 imagery (masl)	153.02		154.05		156.00	
Year	2015	2016	2015	2016	2015	2016
Maximum water elevation (masl)	153.31	153.11	154.20	154.10	155.98	156.04
Minimum water elevation (masl)	152.46	152.59	153.80	153.78	155.65	155.70
Range (m)	0.85	0.53	0.40	0.32	0.33	0.34
Difference between estimated water elevation and the recorded maximum (m)	0.29	0.09	0.15	0.05	-0.02	0.04
Difference between estimated water elevation and the recorded minimum (m)	-0.56	-0.43	-0.25	-0.27	-0.35	-0.30
# of days water elevation was higher than the water elevation estimated from shoreline elevation	10	5	11	5	0	11

1.4 WHALE TAIL STUDY AREA FISH COMMUNITY

Baseline fisheries investigations conducted in Mammoth Lake, Whale Tail Lake, and tributary streams and lakes in 2014, 2015 and 2016 are described in C. Portt and Associates (2018). The results are summarized here.

A total of six fish species are present in the primary study area, comprised of four large-bodied species (Lake Trout, *Salvelinus namaycush;* Arctic Char, *Salvelinus alpinus*; Round Whitefish, *Prosopium cylindraceum*; and Burbot, *Lota lota*) and two small-bodied species (Slimy Sculpin, *Cottus cognatus*; and Ninespine Stickleback, *Pungitius pungitius*).

Arctic Grayling occur further downstream in the watershed but upstream migration barriers prevent them from moving into the primary study area. The major barriers are a steep set of rapids on the primary flow path and a long section where there is only sub-surface, interstitial flow, even during spring freshet, on the secondary flow path. In addition to those primary barriers, there are connecting channels between a number of other lakes along these flow paths where there is only interstitial flow except during spring freshet. The absence of Arctic Grayling in the primary study area is consistent with the paucity of suitable spawning habitat and absence of riverine adult habitat in the tributaries to Mammoth and Whale Tail Lake.

Lake Trout was the most abundant species in gill net catches and the most widely distributed among the lakes, followed by Round Whitefish and Arctic Char (Table 1-2). Few Burbot were captured. Gill netting catch per unit effort was low for all species. In Mammoth, Whale Tail and Nemo Lakes combined, average catch per unit effort in gill nets, calculated as the number of individuals captured per hour of soak time using a standard Agnico Eagle gill net was 0.5, 0.1 and 0.01 for Lake Trout, Round Whitefish and Arctic Char, respectively. Lake Trout was the most frequently observed large-bodied species on underwater video recorded in Whale Tail Lake.

Electrofishing more than 3400 m of lake shoreline and pond habitat resulted in the capture of approximately 250 Ninespine Stickleback, 55 Slimy Sculpin, 2 juvenile Arctic Char and 3 juvenile salmonids, either Arctic Char or Lake Trout, which were not identified to species. Ninespine Stickleback was the most frequently observed small-bodied fish species on underwater video recorded in Whale Tail Lake.

No large-bodied fish were captured in Lake A45 or in Lake A113 and it is thought that none are present. Lake A45 is 2.9 ha in area and has a maximum depth of 4.5 m. There is no surface connection between Lake A45 and any other waterbody. No fish were captured in a 2 hour gill net set in Lake A45 in 2015 or in a 29.2 hour gill net set in 2016 using a standard Agnico index gill net gang comprised of 22.7 m long and 1.8 m deep panels of 126, 102, 76, 51, 38, and 25 mm stretched mesh (total gang length = 136.4 m). Lake A113 is 2.1 ha in area with a maximum depth of less than one metre and there is no defined channel connecting it to other waterbodies or watercourses downstream. There, no fish were captured in 3 panels of gill net (22.7 m long and 1.8 m deep panels of 38 mm, 51 mm and 76 mm mesh) set for 16.6 hours in 2015.

At least one large-bodied fish species was captured in eleven of the larger lakes, in addition to Whale Tail, Mammoth and Nemo and Ninespine Stickleback and Slimy Sculpin were also present in most of those. In three of the smaller waterbodies, only Ninespine Stickleback were captured. There were several isolated or nearly isolated small lakes and ponds in which no fish were captured. Most of these are located north of Whale Tail Lake.

All of the watercourses in the primary study area freeze during the winter. There are two broad categories of watercourses present. One type consists of connecting channels between larger lakes. These are generally wide and shallow with boulder and cobble substrate. Some of these connecting channels never have surface flow. Others have sufficient depth during spring freshet for adult large-bodied fish to pass through them but, as flow subsides, they become shallower and impassible to and unusable by large fish and, eventually, all of the flow is interstitial.

Based on the sampling conducted, there is little movement of large fish through the connecting channels that have sufficient depth to pass large fish during the spring. Hoop nets set in or immediately downstream from connecting channels in 2015 and 2016 during the freshet, when there was sufficient water present for large-bodied fish to move through the channels, did not capture any fish. Low numbers of juvenile Lake Trout and Round Whitefish, as well as Ninespine Stickleback and Slimy Sculpin, were captured by electrofishing in the connecting channels (Table A 2) before flow became totally interstitial.

The other type of watercourses present is small streams, most of which drain smaller catchments. These shallow streams often have multiple channels (i.e. are braided). The mean total wetted width of the Whale Tail Lake tributaries ranged from 0.7 m to 7.6 m and their mean depth ranged from 6 cm to 17 cm. Riffle and run habitat is dominant and there are few pools in these tributaries. Peat is the dominant substrate in most of these watercourses.

Electrofishing effort and catches in small streams in the primary study area during the 2015 and 2016 field seasons are summarized in Table A 3. Effort totalled 35,657 electroseconds and 6,330 m. Portions of the largest of these streams were fished on up to eight occasions. Ninespine Stickleback and Slimy Sculpin were the most widely distributed species in the Whale Tail Lake tributaries. Low numbers of juvenile Arctic Char were captured in five of the tributaries and juvenile Lake Trout were captured in two. Juvenile Burbot were captured in three tributaries and a juvenile Round Whitefish was captured in one.

One Lake Trout and one Arctic Char were captured in a hoop net set near the mouth of stream A55-A17 for 12 days in late June and early July of 2015. In the latter part of June and early July of 2016, gill nets were set across two of the smaller tributary streams to assess fish movement. A gill net set across stream A53-A17 near its mouth for a total 17 days caught one adult Arctic Char. A gill net set across stream A55-A17 near its mouth for a total of 16 days caught seven adult Arctic Char, five moving upstream and two moving downstream.

Table 1-2. Number of individuals of large-bodied fish species captured by gillnetting and the small-bodied fish species that were captured by electrofishing (X indicates that the species was captured) in the waterbodies that will be directly altered or have access affected during operations at the Whale Tail pit. Nemo Lake was not sampled for small-bodied fish.

Waterbody	Lake Trout	Arctic Char	Round Whitefish	Burbot	Ninespine Stickleback	Slimy Sculpin
A18	0	8	0	0	X	X
A19	0	2	0	1	X	X
A20	11	0	6	0		
A22	2	1	0	0	X	X
A45	0	0	0	0	X	
A47	0	1	0	0	X	
A49	3	0	0	0		X
A53	1	2	0	0	X	
A55	5	0	0	1		X
A62	3	0	0	0	X	
A63	1	0	0	0		X
A65	2	0	2	0	X	X
A113	0	0	0	0	X	
Mammoth Lake	49	0	20	0	X	X
Whale Tail Lake	34	2	5	0	X	X
Nemo Lake	22	0	0	0	ns	ns

SECTION 2 • HABITAT EVALUATION PROCEDURE

The habitat evaluation procedure (HEP) used to quantify habitat losses and offsets for Whale Tail Pit in this report is based on the procedure used for the 2012 NNL assessment for the Meadowbank Mine and incorporates refinements that have been introduced during subsequent work between 2014 and 2016 to develop offsetting measures for Vault and Phaser Lake. Various changes have also been incorporated as a result of DFO review of the conceptual (June 2016) and draft offsetting plans (June 2017) for Whale Tail Pit.

The HEP involves the classification of lake habitat into ten habitat types, based on depth and substrate. For the Whale Tail Pit HEP three additional habitat types have been incorporated to address connecting channels between lakes and small streams, as described in Section 2.1.1. Suitability of each habitat type is ranked between 0 and 1 for each of four life functions (spawning, nursery, foraging, overwintering) for each fish species that is (or is predicted to be) present. The area of each habitat type (in hectares) is multiplied by a habitat suitability index (HSI) and a series of weights (a species weight, a life-function weight and an access weight) and summed in order to derive a value in habitat units (HUs) that describes both the quality and quantity of habitat. These calculations are made for the pre-construction, or baseline, condition and for predicted conditions during the operations and post-closure phases of the project.

Net changes in HUs between phases depend on losses or gains in the area of each habitat types (1 - 13) that are present, and the suitability of each habitat type for each fish species. The HEP model is described in further detail below.

2.1 HEP MODEL

The HEP model used here can be described, for each fish species (spp 1-n) as:

$$\mathbf{HU}_{spp\ 1\text{-}n} = \sum_{HT\ 1\text{-}10} \left(\sum_{sp,nu,fo,ow}(\mathbf{HT}_{1\text{-}10} \times \mathbf{HSI}_{sp,nu,fo,ow} \times \textbf{life function weight} \times \textbf{species weight})] \right) \times \textbf{access factor x habitat co-factor}$$

Where $HT_{1\text{-}10}$ = area (ha) of habitat types 1 through 10
$HSI_{sp,nu,fo,ow}$ = habitat suitability index for each life function:
sp = spawning use
nu = nursery use
fo = foraging use
ow = overwintering use

2.1.1 Habitat Type Area (HT_{1-13})

The foundation of the HEP is the delineation of areas that provide certain "habitat types" based on depth and substrate (Table 2-1). Habitat types 1 – 9 are lake habitats and were components of the original Meadowbank HEP model. These habitats are delineated by intersecting depth and substrate polygons.

Habitat Type 10 was added to the HEP model during the development of the Phaser Lake offsetting plan at the request of DFO to address uncertainty with respect to fish utilization of the deep pit areas. At that time, DFO indicated that the uncertainty arises primarily because there are "no examples of successful re-establishment of self-sustaining fish populations in refilled pits in Canada's North upon which to base end pit lake design" and there is a possibility that the deep areas of flooded pit may become meromictic (i.e. permanently stratified) and therefore be unsuitable for fish (DFO letter to Agnico Eagle dated November 27, 2015). DFO requested that the deep areas of the pit be designated Habitat Type 10 and that zero habitat value be assigned to those deep areas. An earlier conceptual offsetting plan was prepared for Whale Tail using that approach, in which the portion of the pit that is shallower than 22 m was assigned a habitat type based on its depth and it being coarse substrate and the portion deeper that 22 m was assigned Habitat Type 10. After reviewing that conceptual offsetting plan, DFO requested that, at Whale Tail, the entire pit area, regardless of depth and including the pit cap, be designated Habitat Type 10. This has been done for the calculations in this report.

Habitat Type 11 was initially used in the 2012 NNLP for the Meadowbank site to denote pit areas with some level of assigned habitat value. However in this offsetting plan for Whale Tail Pit, the designation HT11 was assigned to the connecting channels that occur between several of the lakes in the Whale Tail Pit study area. These channels are wide and have predominantly boulder and cobble substrates. They have shallow surface flow over most or all of their length during spring freshet and only interstitial flow over most or all of their length later in the open-water season. They freeze during the winter. The edge of the water in the connecting channels was observed in the field to correspond closely to the edge of the tundra vegetation. Therefore, these channels were delineated by digitizing the edge of the tundra vegetation in the July 21, 2011, satellite imagery. The upstream and downstream limits of the connecting channels are defined by the intersection of the upstream and downstream lake elevations with the DEM. When an area that is Type 11 habitat under baseline conditions is flooded during the operations or post-closure phases it becomes the lake habitat type with coarse substrate that corresponds to its new depth.

Habitat types 12 and 13 are also specific to this study and represent small streams with fine and coarse substrate respectively. These streams were characterized from field measurements made using a point-transect method during the period July 5 through July 8, 2016 (C. Portt and Associates, 2018). Many of these small streams have multiple channels and the width of each of the channels was measured at transects across the watercourses and those widths were summed to determine the total wetted width at a transect. To facilitate GIS analysis, the primary flow path of each of these streams was digitized based on the July 21, 2011, satellite imagery and a 'stream polygon' was created by assigning the total wetted width to the digitized flow path at each transect location. This allows the areas of stream habitat to be visualized and calculated during baseline and subsequent stages using standard GIS techniques. The portion of stream habitat that is fine substrate (Habitat Type 12) or coarse substrate (Habitat Type 13) was calculated by multiplying the stream polygon area by the proportion of the points where substrate was fine or coarse based on the field measurements. In the operations and post-closure phases, when Type 12 or 13 habitat was flooded due to increased water levels it was considered converted to lake habitat and the habitat type was assigned based on depth and substrate.

Table 2-1. Physical characteristics of the habitat types used in the Whale Tail Lake HEP. Note that habitat type 10 is applied to all non-backfilled pit areas, independent of depth and substrate characteristics.

Habitat Type	Depth Zone	Substrate
1	0-2 m	Fine
2	0-2 m	Mixed
3	0-2 m	Coarse
4	2-4 m	Fine
5	2-4 m	Mixed
6	2-4 m	Coarse
7	>4 m	Fine
8	>4 m	Mixed
9	>4 m	Coarse
10	Pit and pit cap*	Pit and pit cap*
11	connecting channels	Coarse
12	small streams	Fine
13	small streams	Coarse

* Depth and substrate in pit and pit cap areas are not relevant to suitability, which is assigned 0 value (see Section 2.1.2).

In order to calculate the extents of each habitat type, bathymetry for each of the lakes was merged with the digital elevation model in GIS. Bathymetry for Whale Tail, Mammoth and Nemo Lakes was provided by Agnico. For the smaller lakes that were deep enough to operate a boat, bathymetry was determined using a Humminbird 798ci HD SI Sonar unit. The sonar unit recorded georeferenced standard and side-scan sonar data. Straight, parallel boat runs, orientated to best characterize the lake's features, were used to record slightly overlapping side-scan images of the lake bottom. Additional sonar recordings were then made to obtain standard sonar data for as much of the lake bottom as was practical. A stake was driven into the ground at the water's edge on the day that the Sonar data were collected and this elevation was later determined by a survey crew, so that the depth data could be converted to elevations and integrated with the digital elevation model. Visual point observations of the substrate were also made, either from the surface where the water was clear and shallow enough, or using an Aqua-Vu 740c underwater colour video system where the water was deeper. All visual substrate observations were georeferenced with a Garmin GPSmap76CSx gps unit.

The side-scan images were processed using ReefMaster software (ver. 1.8) to create a single georeferenced side-scan mosaic of the lake's bottom, and the standard sonar data were processed to create maps of bottom hardness and water depth. ReefMaster determines bottom hardness by analysis of the sonar output/input ratio, and lag, to calculate a unitless relative hardness and roughness value that is displayed as a colour-coded map. The georeferenced data (side-scan image, bottom hardness and water depth maps, and visual point observations) were layered using GIS software (QGIS version 2.8). In anticipation of the need to prepare substrate mapping, on September 2, 2014, oblique aerial photographs were taken, from a helicopter, of the shoreline and near-shore areas of Mammoth Lake, Whale Tail Lake, Nemo Lake and the adjacent smaller lakes and ponds. Additional oblique photographs were taken in June and August of 2016. Using the overlaid data, with reference to the oblique aerial photographs (n=229), the areas of the various substrate types were identified and hand digitized as polygons in GIS, creating substrate maps. With the exception of Nemo Lake this was done for each lake in its entirety. For Nemo Lake substrate mapping was only prepared in the area that would be impacted by the freshwater intake, as no other alterations of Nemo Lake are anticipated.

A few small, shallow ponds near the north end of Whale Tail Lake were too shallow to permit use of a boat and motor. The depths and substrates in these ponds were visually assessed from shore in 2015, and depth and substrate mapping was prepared based on those observations, aerial imagery, and the oblique aerial photographs taken in 2014 and 2015.

All habitat type area calculations and mapping were completed by Dougan and Associates using standard GIS methods consistent with mapping procedures used in AEM (2012) and Phaser Lake offsetting plan. The digital elevation model was used to determine depth and the depth information was overlain with the substrate layers, determined as decribed above, to delinate polygons with the characteristics of habitat types 1 through 9. The area of habitat types 1 – 9 was determined by summing the area of those polygons.

For the operations and post-closure phases, depths were determined using the water elevations proposed for each phase and the digital elevation model. The substrate under baseline conditions was left unchanged unless a physical change was made to the habitat (i.e. a dike was built or grid shoals were built). These alterations are described in the sections that describe the changes in habitat area during the operations and post-closure phases. If connecting channels were flooded so that they became lake habitat, their new habitat types was assigned based on their depth and their existing coarse substrate. If small streams were flooded so that they became lake habitat their new habitat type was based on depth and their existing substrate. The substrate for terrestrial areas that are flooded during operations or post-closure was assigned based on the ecological land classification community types, as shown in Table 2-2.

Table 2-2. Substrate category assigned to flooded terrestrial areas based on the terrestrial ecological land classification community types that are present under baseline conditions.

Substrate Category	ELC Community Type
Coarse	Boulder/gravel
	Lichen/rock
Fine	Graminoid tundra
	Wet graminoid
	Sand
Mixed	Graminoid/Shrub tundra
	Heath tundra
	Heath upland
	Heath upland/rock complex
	Lichen tundra
	Shrub tundra
	Shrub/heath tundra

2.1.2 Habitat Suitability Index ($HSI_{sp,nu,fo,ow}$)

The habitat suitability term represents the relative quality of each habitat type for each life function of each fish species present in the region. In the case of this HEP, the life functions spawning, nursery, foraging and overwintering were considered. Habitat suitability for each life function is indicated through a ranking of 0, 0.25, 0.5, 0.75 or 1. HSIs for all fish species[2] and habitat types used in this HEP are shown in Table 2-3. The HSIs for the lake habitats (habitat types 1 – 9) were developed through a series of consultations and workshops beginning in July 2011 with KivIA, HTO, and DFO in Baker Lake, and a series of workshops held with Golder Associates and DFO between November 2011 and December 2011 (by webex and in Ottawa). The process is further described in AEM (2012). Further review of the HEP by Dr. Ken Minns (August, 2017) recommended continued use of this method by Agnico Eagle. As stated previously, for the time being, it has been conservatively assumed that habitat type 10 will provide no fish habitat (i.e. all HSIs are zero) with the understanding that HSIs and the provision of habitat units will be re-evaluated if field investigations demonstrate that there is no stratification or that fish use the pelagic zone above a chemocline.

The HSIs for habitat types 11, 12, and 13 were assigned based on their habitat characteristics and the fish sampling conducted as part of the Whale Tail pit baseline

[2] Addresses, DFO 1- Freshwater Environment – Habitat Losses technical comment regarding consideration of all species, including bottom dwellers. Agnico Eagle (April, 2017). April 7th, 2017 submission NIRB File No. 16MN056 Application No: 124683/ NWB File No. 2AM WTP ---- : Receipt of Technical Review Comment Submissions for the NIRBs Review and NWB Consideration of Agnico Eagle Mines Ltd's " Whale Tail Pit" Project Proposal and associated Water License Application

investigations, taking into consideration the HSIs previously developed for lake habitats[3]. The connecting channels have primarily boulder and cobble substrate. There is shallow water above the substrate during the spring freshet in most of these channels but later in the summer there is only interstitial flow. No adult large-bodied fish have been observed or captured by electrofishing in these connecting channels and hoop nets set in or immediately downstream from these connecting channels in 2015 and 2016 captured no fish. A single Arctic Char was captured in a gill net set across the connecting channel between Lake A18 and Whale Tail Lake from June 22 – 28, 2016 and July 2-8, 2016. Based on these data, these connecting channels do not provide foraging habitat for large-bodied fish (foraging HSI = 0). Juvenile Lake Trout and juvenile Lake Whitefish have been captured by electrofishing in the connecting channels and it has been assumed that juvenile Arctic Char and juvenile Burbot can also use this habitat during the open-water season. Therefore, for all large-bodied species the connecting channels have been assigned the same nursery HSIs as coarse substrate in the 0 – 2 m lake depth stratum. The connecting channels freeze during the winter and therefore have been assigned HSIs of zero for overwintering for all species and zero for spawning for fall/winter-spawning species, which includes all of the large-bodied species that are present.

Slimy Sculpin and Ninespine Stickleback, the two small-bodied species that are present in the study area, have both been captured in the connecting channels and are likely to use the shallow areas and interstitial spaces in much the same way that they do in shallow areas with coarse substrate in lake habitats. Therefore, for these two species the HSIs for coarse substrate in the 0 – 2 m deep stratum has also been used for the connecting channels.

The dimensions of the small streams in the Whale Tail Pit primary study area are summarized in Appendix A, Table A 4. These streams typically have multiple channels and are shallow, with mean depths ranging from 6 cm to 17 cm. Peat is the dominant substrate in the majority of the watercourses and only watercourse A55-A17 is dominated by coarse substrates. These watercourses freeze in the winter and have been assigned HSIs of zero for overwintering for all species and zero for spawning for fall/winter-spawning species, which includes all of the large-bodied species that are present.

Electrofishing catches in these streams were dominated by Ninespine Stickleback and Slimy Sculpin and for these two species the HSIs for fine and for coarse substrates in the 0 – 2 m lake depth habitat (Habitat Types 1 and 3 respectively) were applied to Habitat Types 12 and 13 for spawning, nursery and foraging.

One or more juveniles of all of the large-bodied species were captured in the small streams, although the numbers were low. The nursery HSIs for fine and for coarse substrates in the 0

---

[3] The stream habitat types were developed in response to DFO 4 and 8 Information Request. Agnico Eagle (January, 2017). DFO- 4 and 8 – Freshwater Environment- Habitat Alteration. January 20th, 2017 submission RE: NIRB File No 16MN056 Application No: 124683/NWB File No. 2AM WTP ----: Information Requests Received from Parties Regarding Agnico Eagles Mines Ltd's "Whale Tail Pit" Project.

– 2 m lake depth habitat (Habitat Types 1 and 3 respectively) have been applied to Habitat Types 12 and 13 for the four large-bodied species.

The absence of adult large-bodied fish from the electrofishing catches in the small streams is consistent with them being so shallow, and confirms that, as would be expected, there is little if any foraging in these streams by adults of the large-bodied species. It is thought that the few individuals that were captured in gill nets or hoop nets set in these streams were moving between lake habitats. The small streams have been assigned a HSI of zero (0) for foraging by the four large-bodied species.

Table 2-3. HSI values for the Whale Tail fish species (sp=spawning, nu=nursery, fo=foraging, ow=overwintering). *Habitat type 10 is applied to all pit and pit cap areas regardless of depth and substrate.

Habitat Type	Depth	Substrate	Arctic Char				Lake Trout				Round Whitefish			
			SP	NU	FO	OW	SP	NU	FO	OW	SP	NU	FO	OW
1	<2 m	Fines	0	0.25	0.25	0	0	0.25	0.25	0	0	0.25	0.75	0
2	<2 m	Mixed	0	0.25	0.25	0	0	0.5	0.5	0	0	0.75	0.5	0
3	<2 m	Coarse	0	0.5	0.5	0	0	1	0.75	0	0	0.75	0.5	0
4	2-4 m	Fines	0	0.5	0.5	0.75	0	0.5	0.5	0.75	0	0.25	1	0.75
5	2-4 m	Mixed	0.5	0.75	0.75	0.75	0.5	0.75	0.75	0.75	0.5	0.75	0.75	0.75
6	2-4 m	Coarse	1	1	1	0.75	1	1	1	0.75	1	1	0.75	0.75
7	>4 m	Fines	0	0.25	0.5	1	0	0.25	0.5	1	0	0.25	1	1
8	>4 m	Mixed	0.5	0.5	0.75	1	0.5	0.5	0.75	1	0.25	0.25	0.5	1
9	>4 m	Coarse	1	0.5	1	1	1	0.5	1	1	0.75	0.5	0.5	1
10*	pit area	pit area	0	0	0	0	0	0	0	0	0	0	0	0
11	connecting channel	Coarse	0	0.5	0	0	0	1	0	0	0	0.75	0	0
12	stream	Fines	0	0.25	0	0	0	0.25	0	0	0	0.25	0	0
13	stream	Coarse	0	0.5	0	0	0	1	0	0	0	0.75	0	0
Habitat Type	Depth	Substrate	Burbot				Slimy Sculpin				Ninespine Stickleback			
			SP	NU	FO	OW	SP	NU	FO	OW	SP	NU	FO	OW
1	<2 m	Fines	0	0.25	0.25	0	0	0	0.25	0	1	1	1	0
2	<2 m	Mixed	0	0.75	0.5	0	0.25	0.25	0.5	0	0.5	0.5	0.75	0
3	<2 m	Coarse	0	1	0.5	0	1	1	1	0	0	0.25	0.75	0
4	2-4 m	Fines	0	0.25	0.25	0.75	0	0	0.25	0.75	0	0	0.5	0.75
5	2-4 m	Mixed	1	0.5	0.75	0.75	0.25	0.25	0.5	0.75	0	0	0.25	0.75
6	2-4 m	Coarse	0.75	0.5	1	0.75	0.75	0.75	1	0.75	0	0	0.25	0.75
7	>4 m	Fines	0	0	0.25	1	0	0	0	1	0	0	0	1
8	>4 m	Mixed	1	0	0.75	1	0	0	0.25	1	0	0	0	1
9	>4 m	Coarse	0.75	0.25	1	1	0.5	0.5	0.5	1	0	0	0	1
10	pit area	pit area	0	0	0	0	0	0	0	1	0	0	0	0
11	11	connecting channel	0	1	0	0	1	1	1	0	0	0.25	0.75	0
12	12	stream	0	0.25	0	0	0	0	0.25	0	1	1	1	0
13	13	stream	0	1	0	0	1	1	1	0	0	0.25	0.75	0

2.1.3 Life Function Weight

This HEP values all life functions equally, with a weight of 0.25 each assigned for spawning, nursery, foraging and overwintering.

2.1.4 Species Weight

The overall species weights used in the HEP method sum to 1 across species. The species weights for various Meadowbank offsetting plans are comprised of a biomass weighting and a fishery value weighting:

Species weight = (biomass weight/2) x (fishery weight/2)

In the conceptual Whale Tail pit offsetting plan (Agnico, 2016) the biomass weight was based on the relative biomass of the species determined during fish-outs of Meadowbank site lakes that have been drained, with one percent allocated to each of slimy sculpin and ninespine stickleback, as they are not susceptible to the gill nets used in the fish-outs. Also, in the conceptual Whale Tail pit offsetting plan (Agnico, 2016) a modification of this approach was proposed that included an aboriginal fishery value which would be determined through community consultations (as requested by DFO for the updated Vault Lake no net loss plan; February, 2016). However in subsequent discussions, DFO has indicated a preference for all species to be weighted equally[4]. Therefore, each of the six species that are present in the study area has a weight of 0.165 in the calculations presented in this document.

2.1.5 Access Factor

In a workshop conducted in February, 2012 (The Basic Concepts of No Net Loss Accounting - February, 2012) Dr. Charles K. Minns suggested the use of an access factor when fish assemblages are expected to change in the offsetting scenario. According to this concept, the access factor is 1 for any species present in the habitat area, and 0 for any species not present (Table 2-4). Each species receives an access factor in both the loss and gain calculations. Therefore, the opening of access to a habitat area for a species (that did not have access previously), results in an increase of habitat units. Similarly, the loss of access results in a loss of habitat units. These gains or losses may be complete (i.e. affect all species), or partial (only some species are affected). The presence or absence of a species in loss calculations is typically based on the observed presence/absence of each

---

[4] Agnico Eagle (January, 2017). KivIA – IR – Aquatic- Final fish habitat offsetting plan. January 20th, 2017 submission RE: NIRB File No 16MN056 Application No: 124683/NWB File No. 2AM WTP ----: Information Requests Received from Parties Regarding Agnico Eagles Mines Ltd's "Whale Tail Pit" Project. &

Agnico Eagle (April, 2017). DFO 5- Freshwater Environment – Changes to Lake Ecosystem Productivity. April 7th, 2017 submission NIRB File No. 16MN056 Application No: 124683/ NWB File No. 2AM WTP ---- : Receipt of Technical Review Comment Submissions for the NIRBs Review and NWB Consideration of Agnico Eagle Mines Ltd's " Whale Tail Pit" Project Proposal and associated Water License Application species during baseline monitoring studies (AEM, 2012, 2013, 2016). If a change in access is predicted for an offset scenario (i.e. due to the removal of a barrier to fish movement) the change would need to be confirmed as part of compensation monitoring.

Table 2-4. Access factor theoretically applied to each species for habitat loss and gain calculations, based on presence/absence (or anticipated presence/absence, for offsetting projects).

Scenario	Access Factor	
	Losses	Gains
Species Present	1	1
Species Not Present	0	0

Typically, the access factors applied are based on the observed presence/absence of each species during baseline monitoring studies (AEM, 2012, 2013, 2016). For the calculations in this report, an access factor of 1 has been applied for all six fish species that have been captured in the study area. The effect of isolating the north-east pond during operations has been addressed by conservatively estimating that habitat is temporarily 'lost' during that time period, but re-gained during post-closure.

2.1.6 Habitat Co-factor

The habitat co-factor represents any changes to non-mapped habitat quality (thermal, hydrological, biological or chemical regimes) that will occur as a result of impacts or offsetting. The use of this factor is suggested by Dr. Ken Minns, and his suggested values as presented in a workshop for DFO in February, 2012 are shown in Table 2-5. No habitat co-factor has been applied to the HEP calculations presented in this report

Table 2-5. Habitat co-factor for various pre- and post-compensation scenarios, according to Minns, 2012.

Change in regime	Description	Baseline conditions factor	Post-closure factor
Degradation (expected)	Thermal, hydrologic, chemical and/or biological regime shifts away from preferred state for fish habitat	1	> 0 and < 1
No change	-	1	1
Enhancement (anticipated or proposed)	Thermal, hydrologic, chemical and/or biological regime expected to shift towards preferred state for fish habitat	> 0 and < 1	1

SECTION 3 • HABITAT LOSSES

In order to mine Whale Tail Pit, a series of three dewatering dikes will be constructed to isolate the pit area. The area within those dikes will be dewatered to allow mining to occur (operations phase). When mining is completed, the dikes will be breached, allowing the pit and adjacent lake basin area to flood and water elevations to return to baseline conditions (post-closure phase). Site infrastructure during these operations and post-closure phases is shown in Figure 3-1 and Figure 3-2.

This section describes calculation of habitat losses occurring as a result of mining activities during both the operations and post-closure phases, compared to baseline conditions. Extents of losses and gains were calculated for all impacted areas using the HEP described in Section 2. However, since flooding of terrestrial zones is only planned to occur over a 4-7 year period prior to drawdown, fish habitat availability during the operations phase is conservatively not considered a habitat offset, and calculations were performed for reference only. In the final net change calculation, only differences between baseline and post-closure conditions are compared.

3.1 BASELINE CONDITIONS

3.1.1 Site Description

Baseline site conditions are described in Section 1.

3.1.2 Habitat Units Calculation

As calculated using the HEP described in Section 2, depth zones, substrate types (fines, mixed, coarse), and habitat types under baseline conditions throughout the primary study area are shown in Figure 3.3, 3.4 and 3.5, respectively.

Net change in habitat units between the baseline, operations, and post-closure scenarios are detailed in Sections 3.2 and 3.3, below

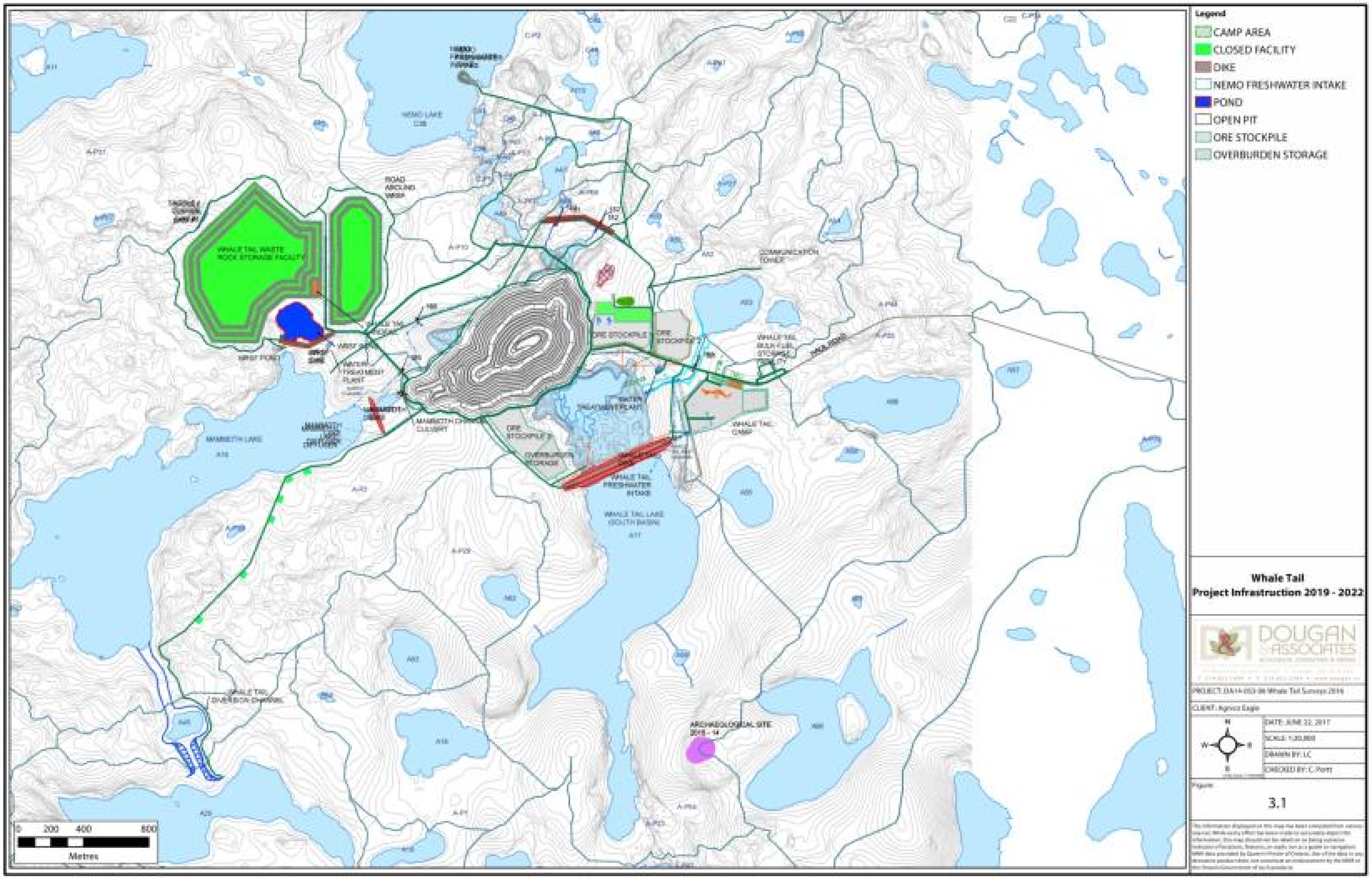


Figure 3-1. Whale Tail Project infrastructure during operations, 2019 to 2022 (does not show flooding that will occur in Whale Tail Lake – South Basin).

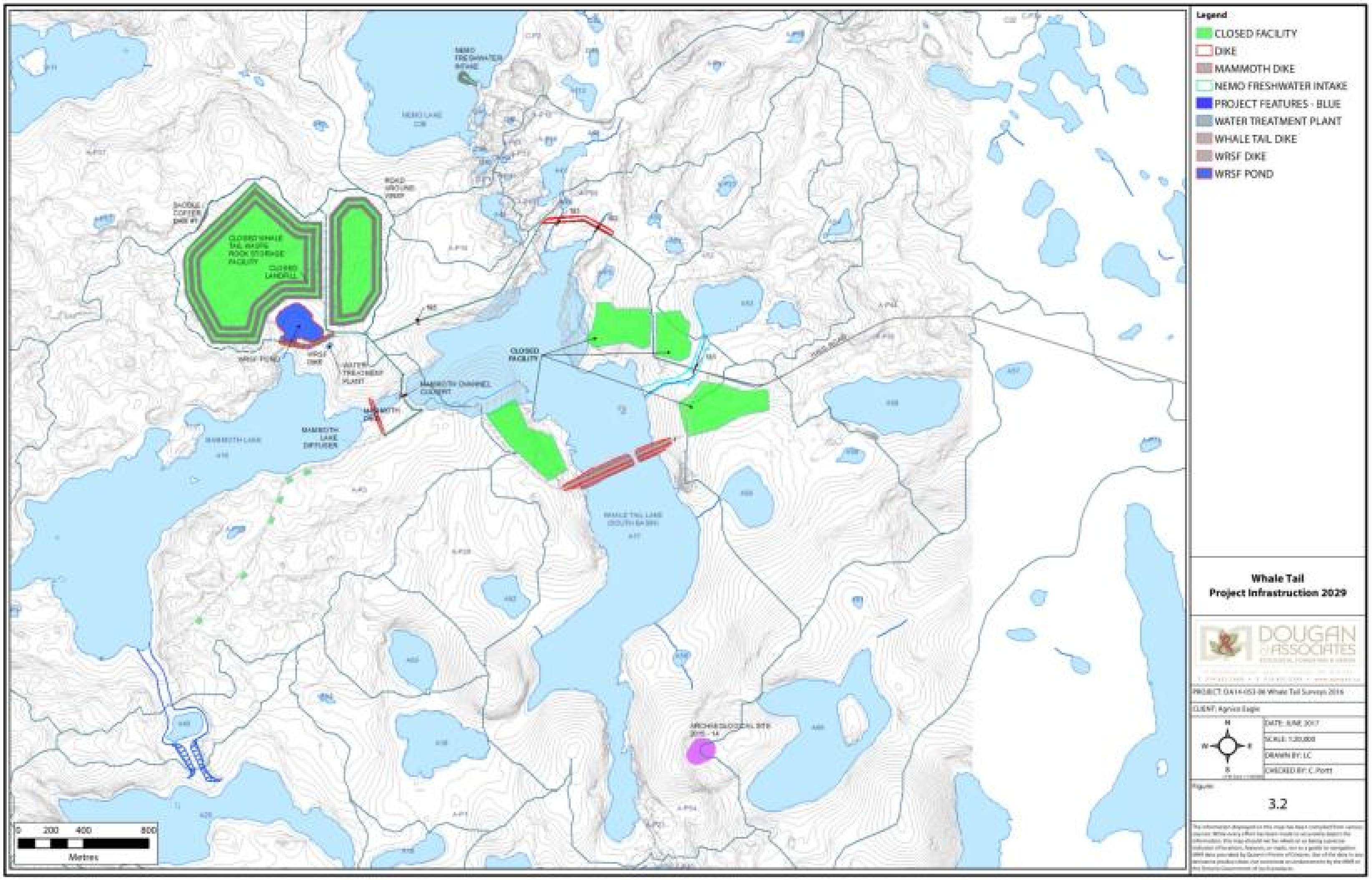


Figure 3-2. Whale Tail Project Infrastructure 2029 (post-closure phase).

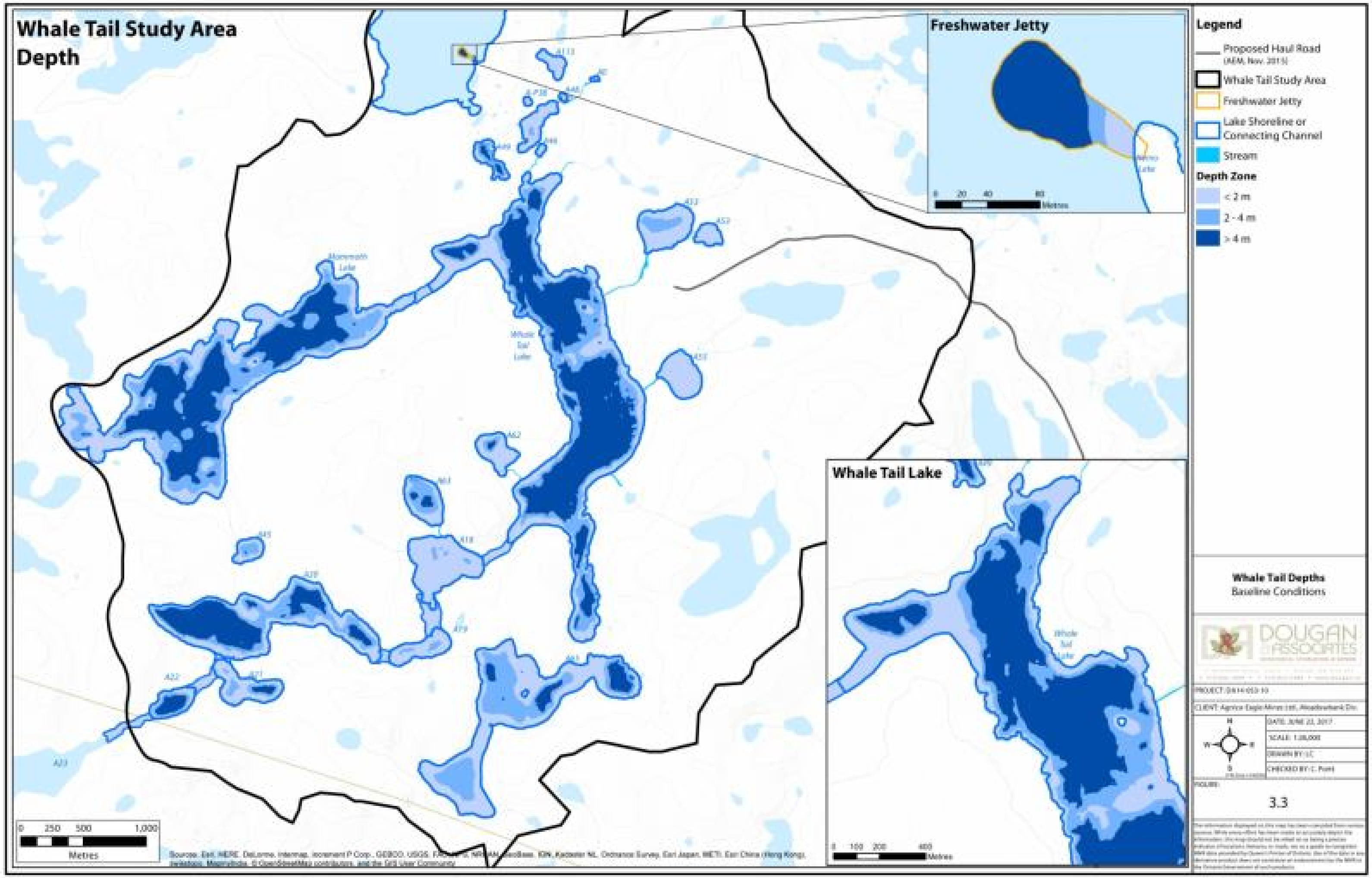


Figure 3-3. Whale Tail pit lake study area depths under baseline conditions.

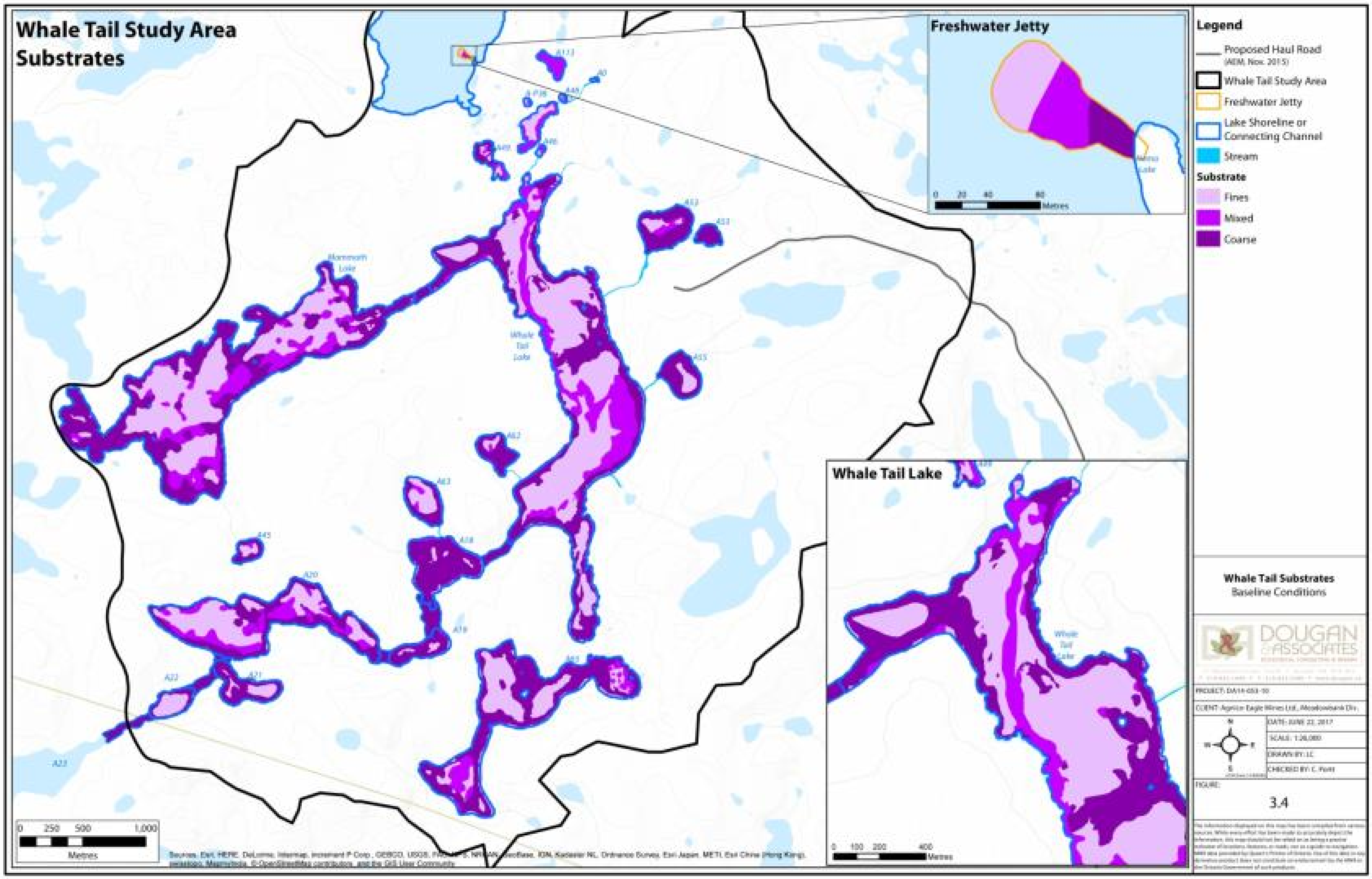


Figure 3-4. Whale Tail pit study area substrates under baseline conditions.

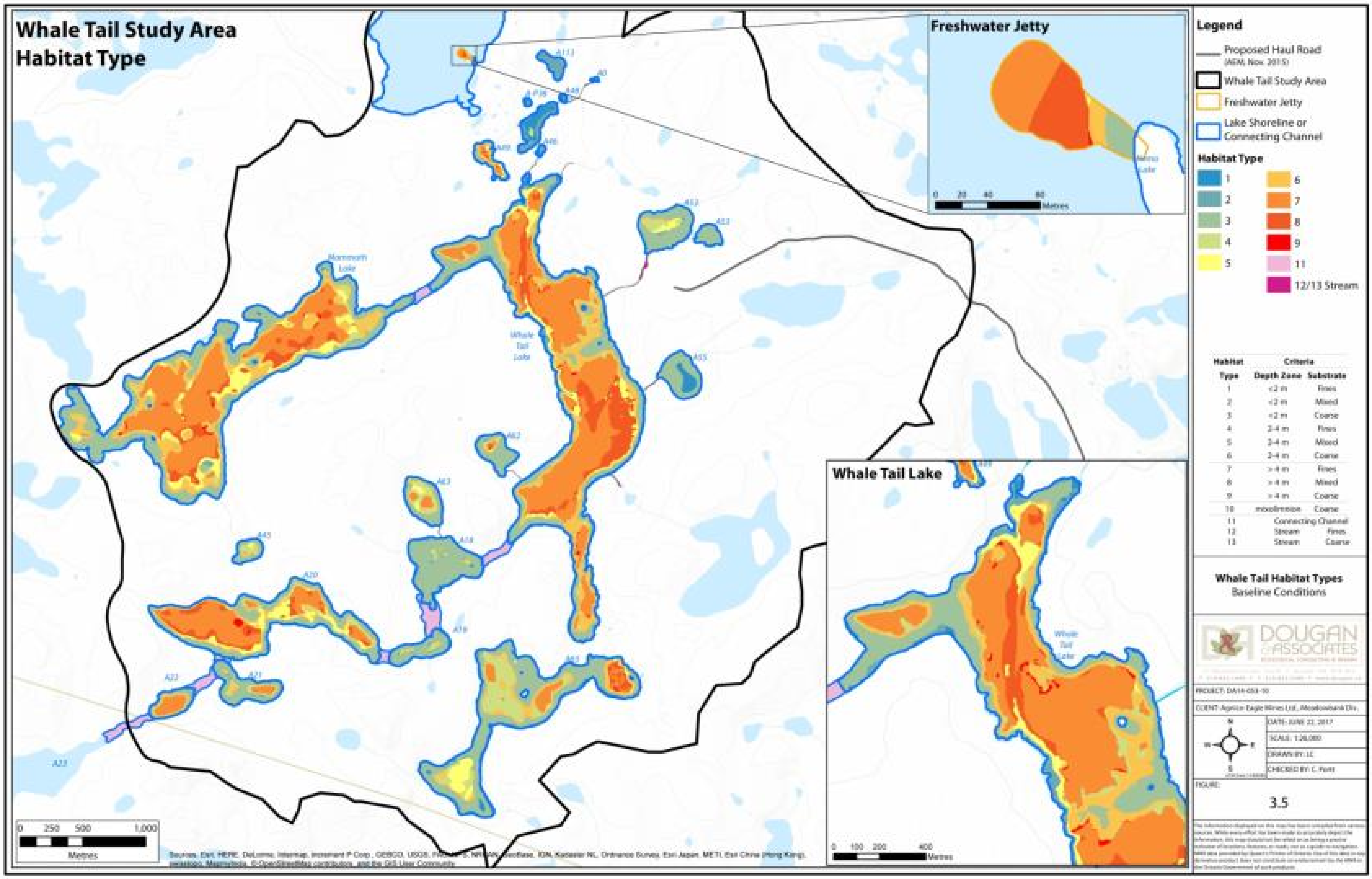


Figure 3-5. Whale Tail pit study area habitat types under baseline conditions.

3.2 OPERATIONS PHASE

3.2.1 Site Description

The area to be enclosed by dikes and dewatered during mine operations includes the northern basin of Whale Tail Lake and a small portion at the east end of Mammoth Lake, as well as the connecting channel between those two lakes. The exterior surface of the dikes will be coarse substrate.

An area to the north of Whale Tail Lake, that includes a number of small lakes and ponds which currently drain to Whale Tail Lake, would be isolated by the north dike. In this area, referred to as the north-east pond, the water level would rise to 156.47 masl, resulting in the flooding of some terrestrial areas. This area would drain to Nemo Lake. For the purposes of offset planning, it has been assumed that fish from Nemo Lake would not have access to the north-east pond and therefore it will be completely isolated. It has also been assumed that, due to the limited amount of deep habitat in the north-east pond, fish might not survive the winter there. Therefore the habitat present in the area occupied by north-east pond under baseline conditions is assumed to be 'lost' during the operations phase. If monitoring determines that fish survive there, an operations phase offsetting credit could be calculated.

The Whale Tail Dike will bisect Whale Tail Lake into north and south basins. South of the Whale Tail Dike the water level will rise from 153.02 (baseline; see Section 1.3) to 156 masl during operations. This will result in the flooding of terrestrial areas, so that a number of lakes now connected to each other or to Whale Tail Lake (South Basin) by connecting channels (lakes A18, A19, A20, A21 and A22) or small streams (lakes A55, A62, A63), or have no surface connection to Whale Tail Lake (lake A65), would become contiguous. This larger contiguous waterbody is referred to as the Whale Tail Lake (South Basin) and is an *expanded Whale Tail Lake*; fish salvaged during the fishout of Whale Tail Lake (North Basin) will be transferred to the Whale Tail Lake (South Basin) (Agnico Eagle, 2017a). The Whale Tail Lake (South Basin) will drain to Lake A45 via a constructed channel and Lake A45 will drain to Mammoth Lake via an existing boulder feature. The boulder feature between Lake A45 and Mammoth Lake does not exhibit surface flow under existing conditions, even during spring freshet. It has not yet been determined if it will be necessary to modify that connection, but for the purposes of the habitat calculations it has not been assigned any fish habitat value during any phase of the project.

Lake A53, east of Whale Tail Lake, currently drains to the portion of Whale Tail Lake that would be dewatered via a small stream. A new watercourse will be constructed to convey this flow to the south basin of Whale Tail Lake. The lower reach of the existing watercourse will be eliminated. The proposed route of this realignment is shown in Figure 3-1. It has been assumed that the width and the proportions of fine and coarse substrates of the realigned portion will be the same as those of the existing watercourse.

There will be a reduction in the flow to Mammoth Lake and downstream during the period when the expanded Whale Tail Lake is filling, before flow via Lake A45 occurs. Flow into Mammoth Lake approaches zero during the latter part of the ice-free season under baseline conditions. During the period when the expanded Whale Tail Lake is filling, the water level in Mammoth Lake is expected to be at or near what is its minimum elevation under baseline conditions. This will occur again during closure when the pit is refilling. This temporary condition has not been incorporated into the HEP calculations.

In addition to the alterations within the Whale Tail Lake and Mammoth Lake drainages, a water intake jetty would be constructed in Nemo Lake that will result in a change in depth and substrate, including an area that will be raised so that it is above the water surface and no longer fish habitat. The jetty will have coarse substrate.

3.2.2 Habitat Units Calculation

Changes in habitat area and habitat units between the baseline conditions and the operations phase as calculated using the HEP described in Section 2 are provided for each habitat type in Appendix B, Table B-1. At the request of DFO, the locations and areas of habitat losses and gains and habitat modified are presented in Appendix B, Table B-2. Change in habitat for each lake/stream system are provided in Appendix B, Table B-3. Overall, there is a 49.24 ha increase in the area of fish habitat and a 42.93 increase in the number of habitat units during operations.

As indicated previously, for the operations phase, the extent of flooding and the depths were calculated based on an elevation of 156 masl elevation for the expanded Whale Tail Lake and no change from baseline conditions to the elevation of Mammoth Lake. The dike side slopes and the freshwater jetty in Nemo Lake will have coarse substrate. The constructed channel connecting the expanded Whale Tail Lake to Lake A45 will be less than 2 m deep and have coarse substrate. It has been assumed that the connection between Lake A45 and Mammoth Lake will continue to be subsurface/interstitial during operations and that it will not provide fish habitat. The depth zones, substrate types (fines, mixed, coarse) and habitat types for the operations phase are shown in Figure 3.6, 3.7 and 3.8 respectively

There are relatively small decreases in the habitat area and habitat units in Nemo Lake as a result of the construction of the freshwater intake jetty. The area of Mammoth Lake is decreased due to the construction of the Mammoth dike and the dewatering of the portion of Mammoth Lake that is east of that dike, resulting in a concomitant number of habitat units.

The expanded Whale Tail Lake during operations (407.3 ha) includes the portion of Whale Tail Lake that is not dewatered or covered by the Whale Tail dike (plus the other existing lakes, connecting channels and streams that are within the flooded area (280.0 ha), land that is flooded (127.4 ha), and the portion of the south side of the Whale Tail dike that is below the water (0.4 ha). The total area of habitat lost, including the habitat that is isolated in the north-east pond, is 73.7 ha. In addition to the increase in habitat area, during the operations phase the habitat value increases in some of the existing habitats where depth increases, contributing to the overall increase in habitat units.

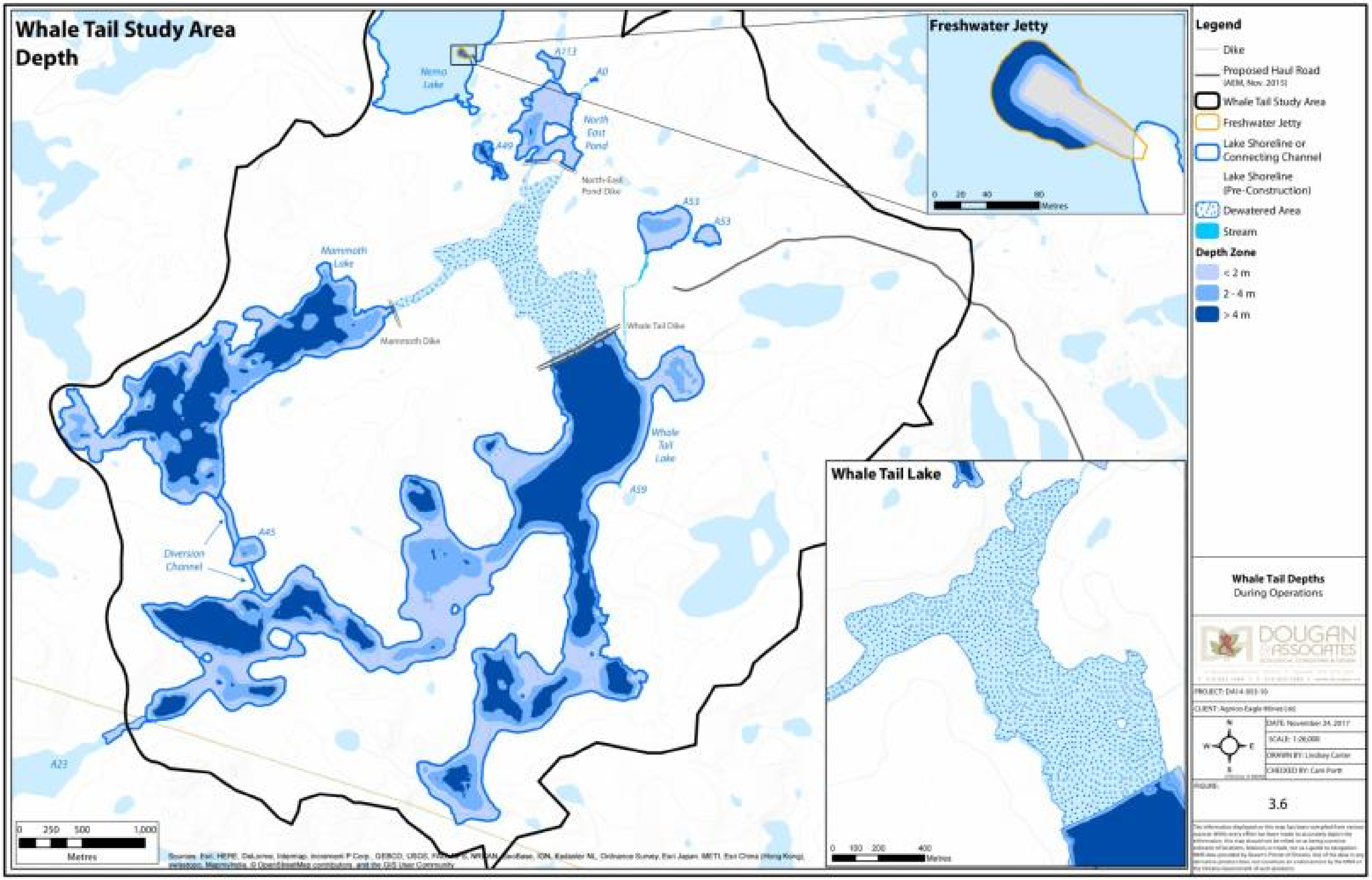


Figure 3-6. Whale Tail Pit study area depths during operations.

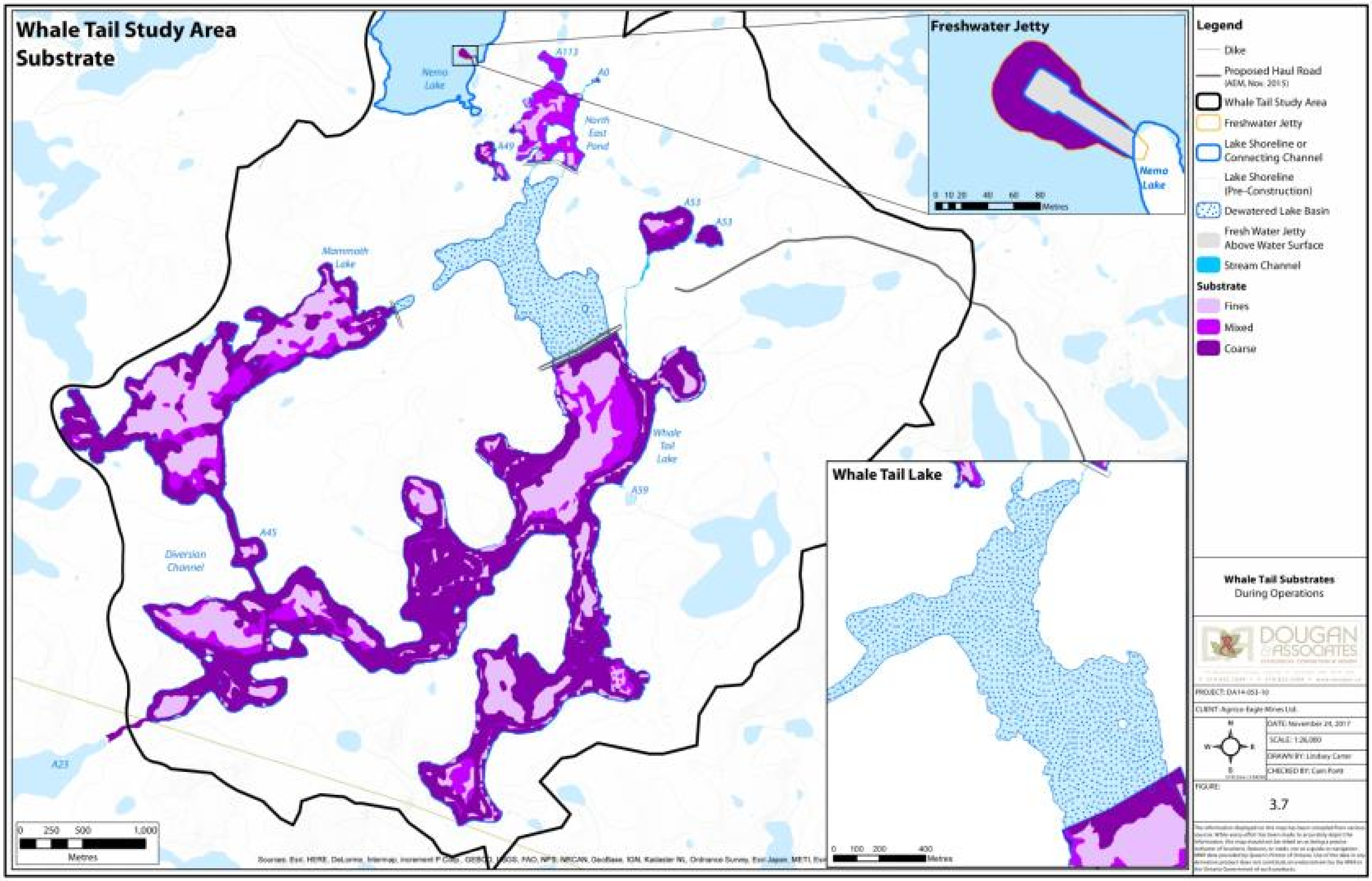


Figure 3-7. Whale Tail pit study area substrates during operations.

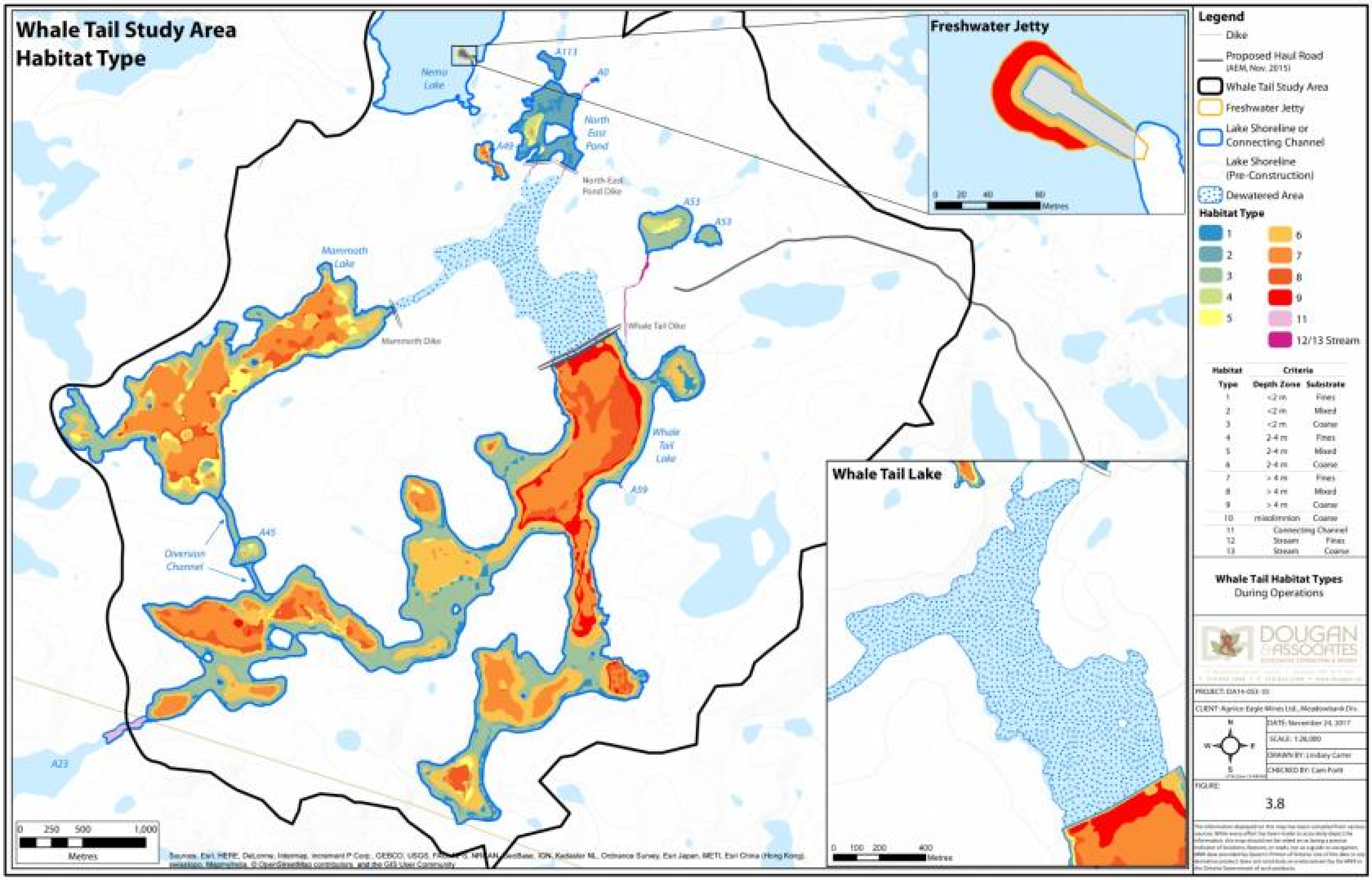


Figure 3-8. Whale Tail pit habitat types during operations.

3.3 POST-CLOSURE PHASE

3.3.1 Site Description

Consistent with approved closure plans reviewed during the NWB/ NIRB review, based on current water quality predictions and on the current mine plan for Whale Tail Pit, it is assumed that dewatering dikes would be breached and water levels would return to pre-mine elevations following mine closure by 2029 (refer to Figure 3-2). Therefore, aquatic habitats would revert to their pre-mine condition with the following exceptions:

1. The area of Whale Tail Lake will be increased by 26.17 ha as a consequence of terrestrial areas being excavated and becoming part of the flooded pit and pit cap, post-closure. This area has also been assigned Habitat Type 10.

2. The Whale Tail Dike that bisects Whale Tail Lake will be breached but not removed following mine closure. Therefore it will continue to occupy a portion of what was previously Whale Tail Lake and a portion of it will be above the water. For the purposes of habitat calculations, it has been assumed that a 100 m wide breach will be created in the Whale Tail Dike. This area has been assigned Habitat Type 3..

3. The Mammoth Dike that isolates the eastern end of Mammoth Lake will be reduced in height, so that it becomes shallow lake habitat with coarse substrate (Type 3 habitat).

4. The North-east Dike will be breached at the locations where two small watercourses existed pre-construction, so that the watercourses are re-established and the lakes and ponds are reconnected to Whale Tail Lake through the approved access road culverts.

5. The portion of the watercourse connecting Lake A53 to Whale Tail Lake that was re-aligned will be returned to its former channel.

6. Roads that are flooded post-operations will remain in their operations phase condition and have mixed substrate.

7. A jetty to the attenuation pond that is in the dewatered area during operations will remain in its operations phase condition and have coarse substrate.

8. The jetty for the freshwater intake in Nemo Lake will remain in its operations phase condition.

3.3.1 Habitat Units Calculation

Net changes in habitat area (ha) and habitat units (HUs) between the baseline and the post-closure phase, without offsetting (i.e. habitat losses), are summarized in Table 3-1 for each habitat type. The locations (lakes/steams) and areas of habitat losses and gains and habitat modified are presented in Appendix B, Tables B-4 and B-5.

Depth zones, substrate types (fines, mixed, coarse), and habitat types following closure and reflooding of the pit, in the absence of any measures to offset for harm to fish habitat, are shown in Figures 3.9, Figure 3.10 and 3.11 respectively. For these calculations it was assumed that the elevations of all lakes would revert to their pre-construction levels. It was also assumed that substrate within the area that was dewatered did not change from pre-construction conditions unless it was excavated as part of the pit or the pit cap (where substrate is irrelevant because these areas are assigned Habitat Type 10), or covered by infrastructure (dikes, roads, jetties).

There is the same small reduction in both habitat area and habitat units in Nemo Lake as during operations, due to the construction of the freshwater jetty which will remain in place post-closure. There is no reduction in either the habitat area or the habitat units in Mammoth Lake because the Mammoth Dike is lowered and is coarse substrate, thus becoming Type 3 habitat.

Post-closure, 27.9 ha of habitat is added to Whale Tail Lake due to the excavation of the pit. This includes 27.4 ha that was terrestrial habitat under existing conditions; the remainder was part of the connecting channel between Whale Tail and Mammoth Lakes. There is a loss of 1.7 ha from Whale Tail Lake because part of the Whale Tail dike remains above the water and another 0.1 ha is lost because a portion of the water attenuation pond ramp remains above the water. The result is a net increase of 26.2 ha in the area of Whale Tail Lake.

Although the area of Whale Tail Lake increases, the number of habitat units in Whale Tail Lake decreases by 14.2. This reduction is largely because the pit and pit cap occupy 30.3 ha that were part of Whale Tail Lake under baseline conditions. Post-closure, this area is assigned habitat type 10, which has been assigned zero fish habitat value.

The net change between baseline and post-closure conditions, or overall project related fish habitat losses in the absence of offsetting, is a loss of 14.5 habitat units.

Table 3-1. Net change in fish habitat during the post-closure phase, without offsetting (losses).

Habitat Type	Hectares			HUs		
	Baseline	Post-closure - no offsetting	Net Change	Baseline	Post-closure - no offsetting	Net Change
1	1.58	1.26	-0.32	0.38	0.30	-0.08
2	4.60	4.55	-0.05	1.29	1.28	-0.01
3	81.42	71.44	-9.99	32.23	28.28	-3.95
4	11.30	10.11	-1.19	4.24	3.79	-0.45
5	15.87	14.89	-0.98	9.26	8.68	-0.57
6	41.71	37.90	-3.82	31.72	28.82	-2.90
7	128.36	114.45	-13.91	48.14	42.92	-5.22
8	30.87	28.77	-2.10	16.08	14.99	-1.09
9	3.76	3.79	0.03	2.54	2.57	0.02
10	0.00	58.30	58.30	0.00	0.00	0.00
11	2.15	1.50	-0.65	0.65	0.45	-0.20
12	0.58	0.58	0.00	0.10	0.10	0.00
13	0.18	0.18	0.00	0.05	0.05	0.00
Total			**25.33**			**-14.45**

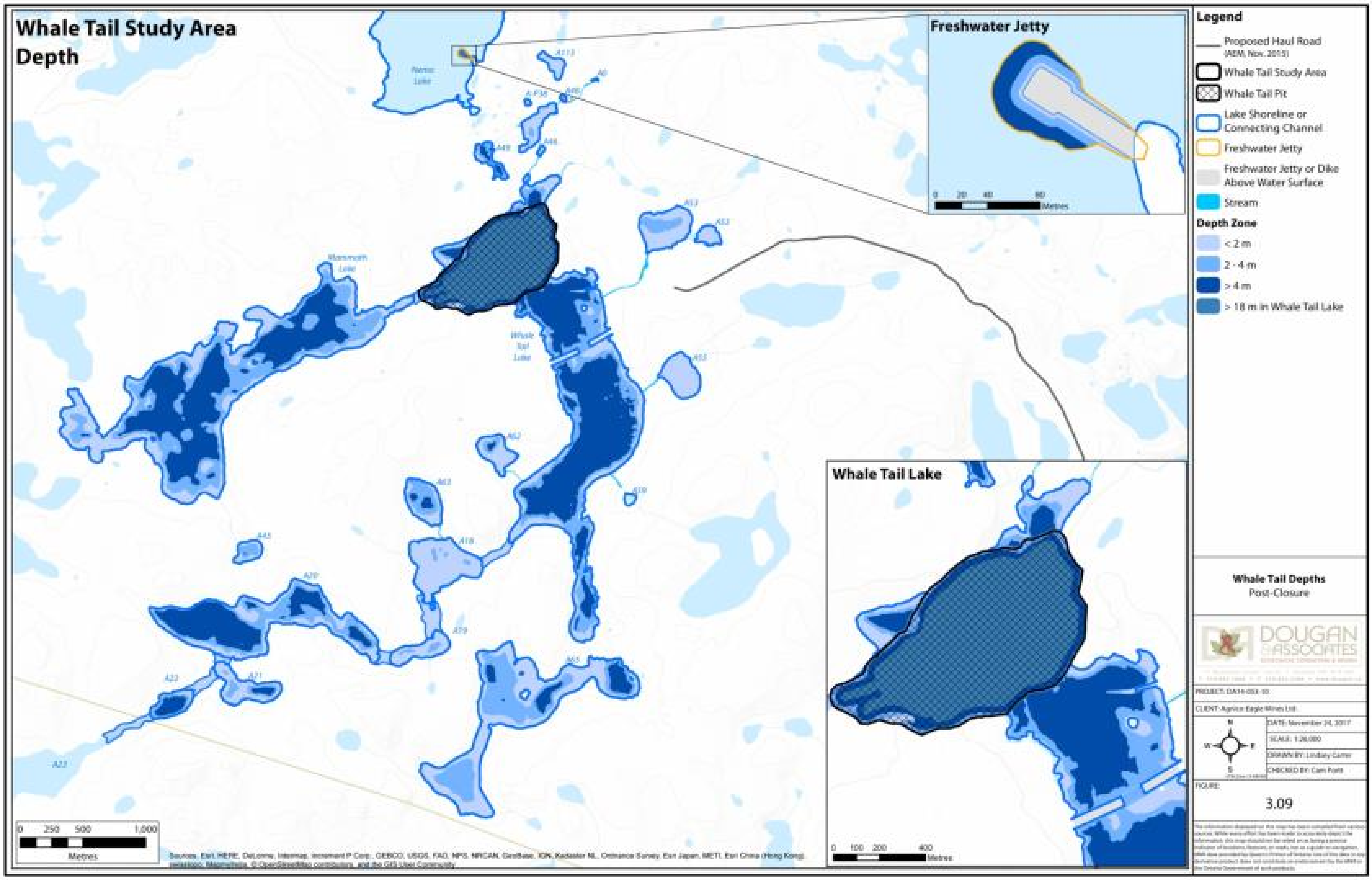


Figure 3-9. Whale Tail pit depths post-closure with no offsetting.

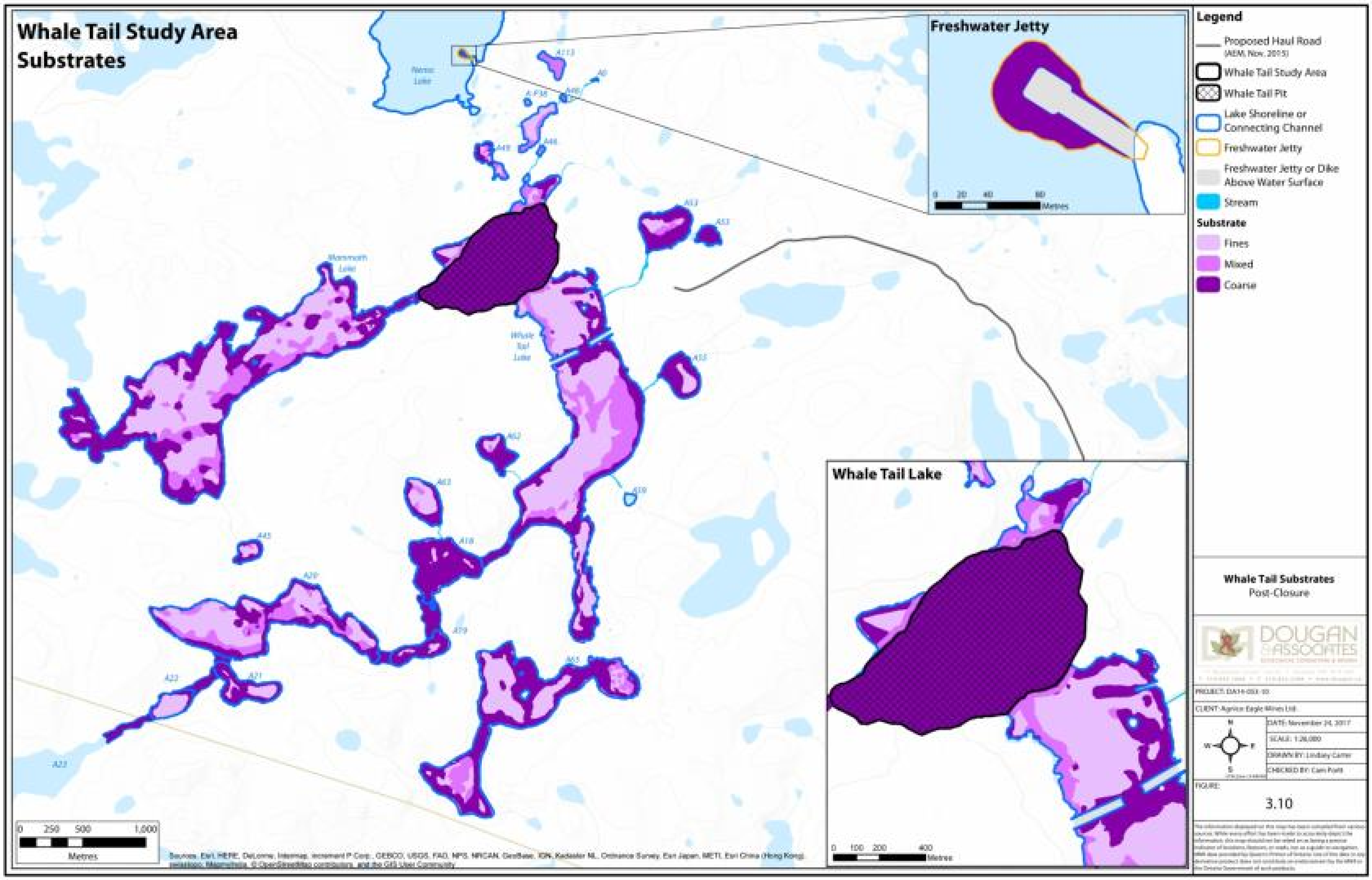


Figure 3-10. Whale Tail pit substrates post-closure with no offsetting.

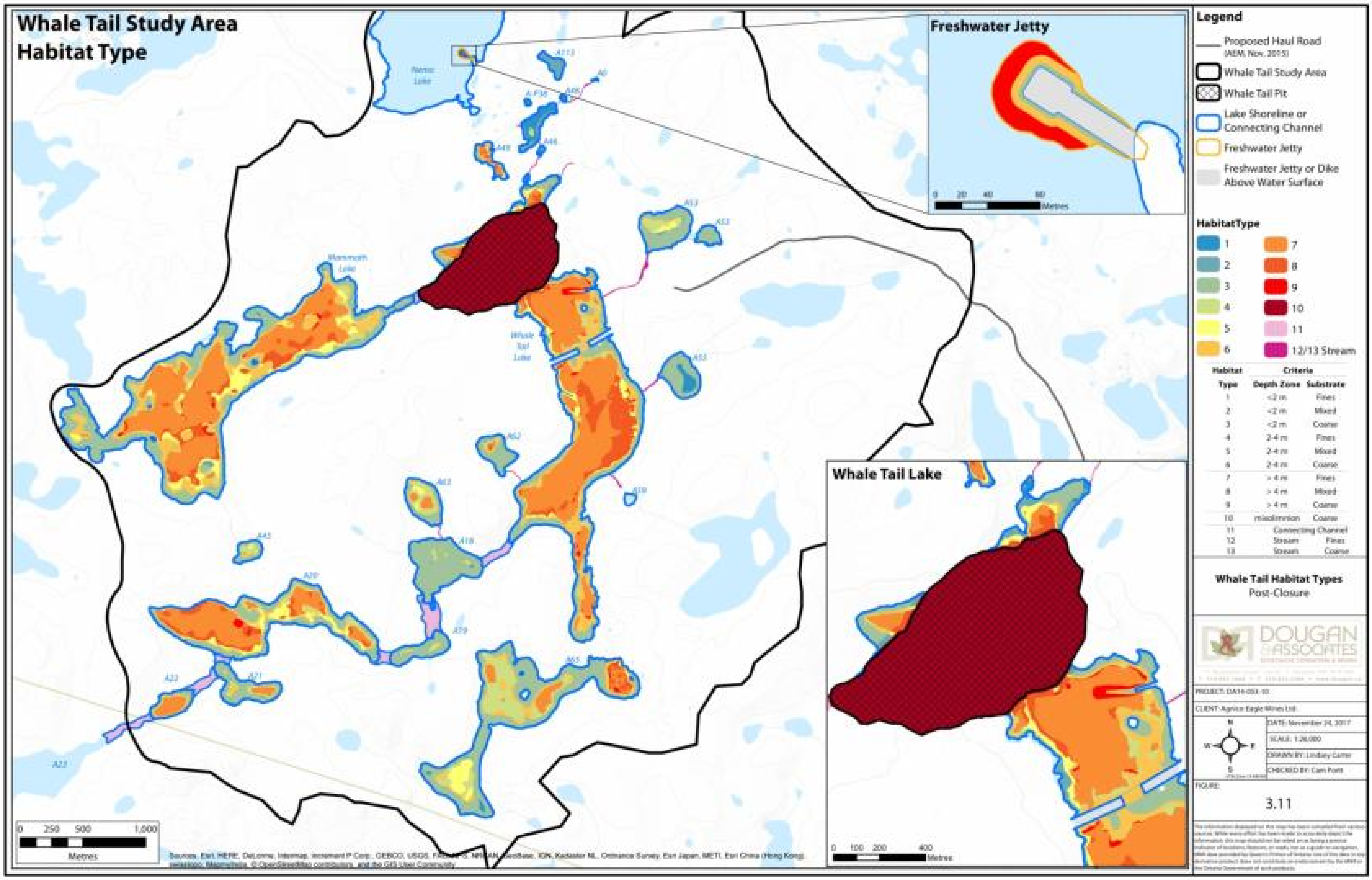


Figure 3-11. Whale Tail pit habitat types post-closure with no offsetting.

SECTION 4 • OFFSETTING MEASURES

The substantial increase in habitat area and habitat units in the expanded Whale Tail Lake during the operations phase is expected to result in an increase productivity of the aquatic system (Minns and Portt, 2017 pers. comm. June 14). Following closure, however, without offsetting, even though there will be an increase in the area of aquatic habitat due to the flooding of areas excavated as part of the pit, there will be a net decrease of 14.45 habitat units compared to baseline conditions. This occurs because no habitat value is attached to the pit or pit cap. Offsetting is required to address this loss.

Offsetting measures may be grouped into the following general categories (Fisheries and Oceans Canada, 2013):

- Habitat restoration and enhancement, which includes physical manipulation of existing habitat to improve habitat function and productivity;

- Habitat creation which is the development or expansion of aquatic habitat into a terrestrial area;

- Chemical or biological manipulation, which includes chemical manipulation of water bodies, and stocking of fish or shellfish, management or control of aquatic invasive species;

- Complementary measures, which are investments in data collection and scientific research related to maintaining or enhancing the productivity of commercial, recreational or Aboriginal fisheries.

A combination of habitat creation, by raising the water level of Whale Tail Lake, habitat enhancement, and complementary measures to offset the loss of habitat units is presented below.

4.1 HABITAT ENHANCEMENT AND CREATION

It is proposed that, as an offsetting measure, a sill is installed in the connection between Mammoth Lake and Whale Tail Lake that allows flow from Whale Tail to Mammoth Lake but maintains Whale Tail lake at an elevation of 154.02 masl, which is 1 m higher than its baseline elevation. This increase would create new habitat around the periphery of Whale Tail Lake and the connecting channel between Whale Tail Lake and Mammoth Lake, as well as around the portion of Mammoth Lake that is east of the sill (Figure 4.1). It will also create a small amount of additional habitat along the Whale Tail Dike due to the water level increase.

The 1 m increase in water elevation will also result in some habitat modifications. Small sections of the streams that are tributary to Whale Tail Lake will be converted to lake habitat, as will the remaining section of the connecting channel between Whale Tail Lake and Mammoth Lake and a portion of connecting channel A18-A17. Depth will increase in the portion of Mammoth Lake that is east of the Mammoth Lake dike and throughout Whale Tail Lake.

Coarse substrate has the highest habitat value and conversion of mixed or fine substrate to coarse substrate is a common habitat enhancement practice. Therefore, in addition to increasing the water level by 1 m east of connection between Whale Tail Lake and Mammoth Lake, the roads within the area that is flooded will be scarified to convert them from mixed to coarse substrate and 8.77 ha of rock shoals will be constructed in areas of fine substrate within the portion of Whale Tail Lake that is dewatered during operations (Figure 4.2). The shoal construction converts those areas to coarse substrate and was assumed to increase their elevation by 1 m. The elevation of the roads was assumed not to change due to scarification.

The depth zones, substrate types (fines, mixed, coarse) and habitat types for the post-closure phase with these offsetting features (a 1 m increase in the water level elevation east of the Mammoth dike, scarification of the roads and construction of 8.77 ha of grid shoals) are shown in Figures 4.3, 4.4, and 4.5, respectively. These offsets provide an increase of 21.26 ha and 15.03 habitat units over the post-closure scenario without offsets (Table 4-1) (Changes relative to baseline for each lake or stream are summarized in Appendix B Table B-6).

These planned offsetting features result in an offsetting gains to losses ratio of approximately 1:1 (gains of 15.03 HU and losses of 14.45 HU).

Table 4-1. Habitat area (ha) and habitat units (HUs) gained from the implementation of the proposed habitat enhancement and creation offsetting measures.

Habitat Type	Hectares			Habitat Units		
	Post-closure no offsets	Post-closure with offsets	Net Change	Post-closure no offsets	Post-closure with offsets	Net Change
1	1.260	4.176	2.916	0.302	1.001	0.699
2	4.552	11.021	6.470	1.280	3.100	1.820
3	71.436	69.026	-2.410	28.277	27.323	-0.954
4	10.113	6.353	-3.760	3.792	2.382	-1.410
5	14.887	12.433	-2.454	8.684	7.253	-1.431
6	37.897	49.292	11.395	28.817	37.482	8.665
7	114.451	109.449	-5.002	42.919	41.044	-1.876
8	28.774	30.607	1.833	14.987	15.941	0.955
9	3.791	17.016	13.226	2.567	11.521	8.955
10	58.298	58.667	0.370	0.000	0.000	0.000
11	1.499	0.232	-1.267	0.453	0.070	-0.383
12	0.577	0.546	-0.031	0.102	0.097	-0.006
13	0.176	0.155	-0.022	0.053	0.047	-0.007
Total			**21.264**			**15.027**

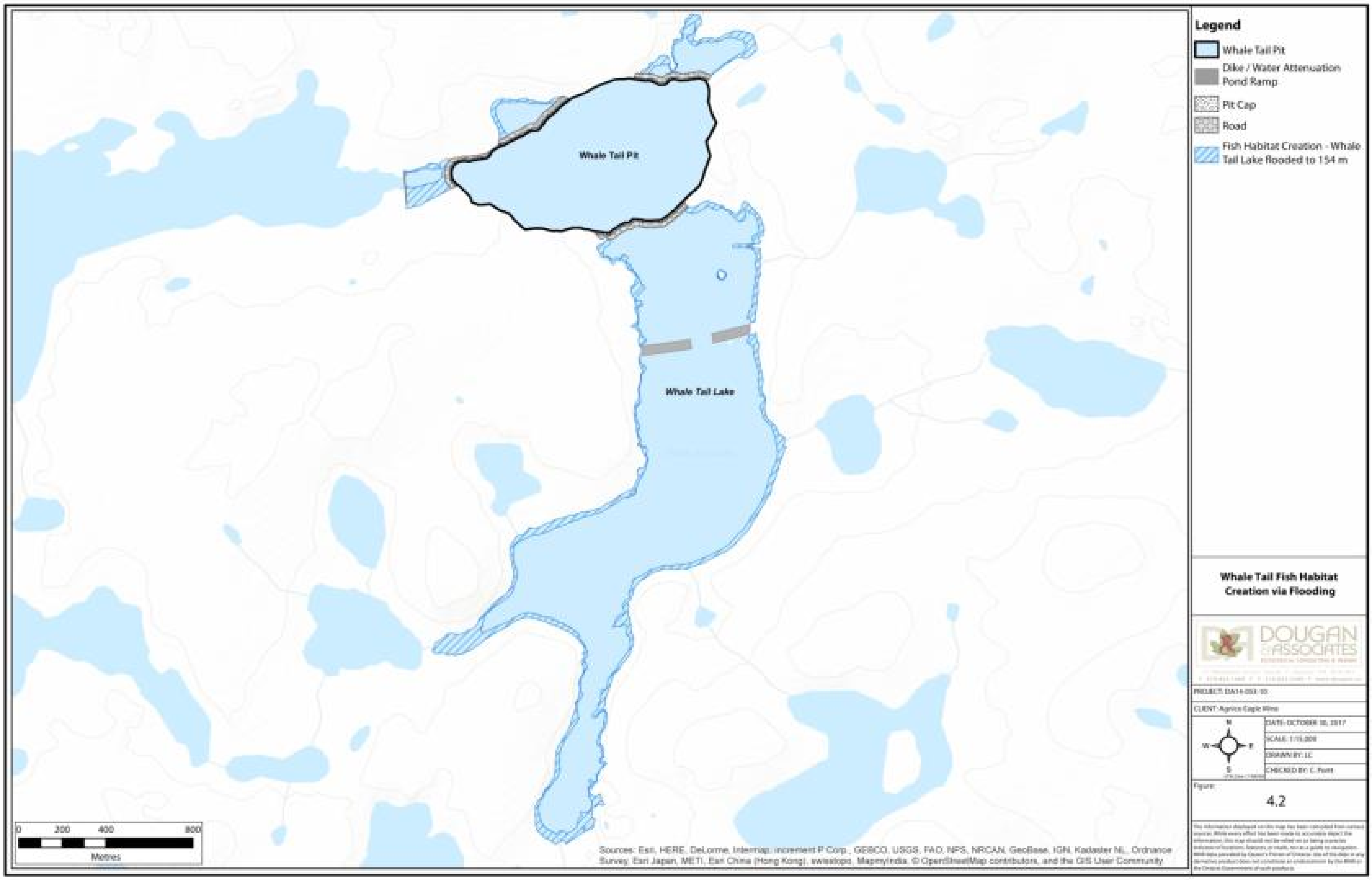


Figure 4-1. Habitat created by increasing the water elevation by 1 m east of the Mammoth Dike.

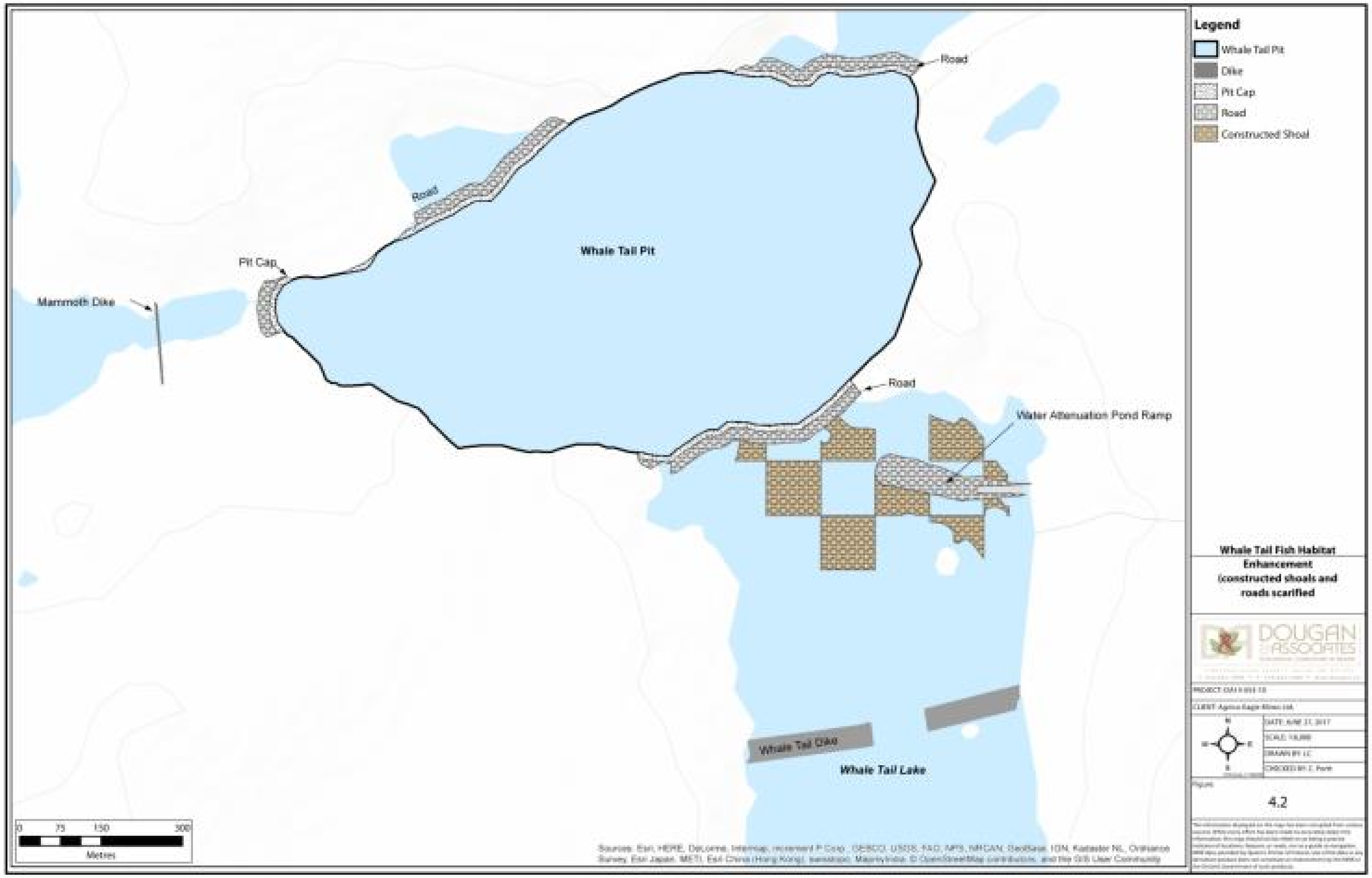


Figure 4-2. Proposed roads scarified and constructed rock shoals proposed as offsetting measures.

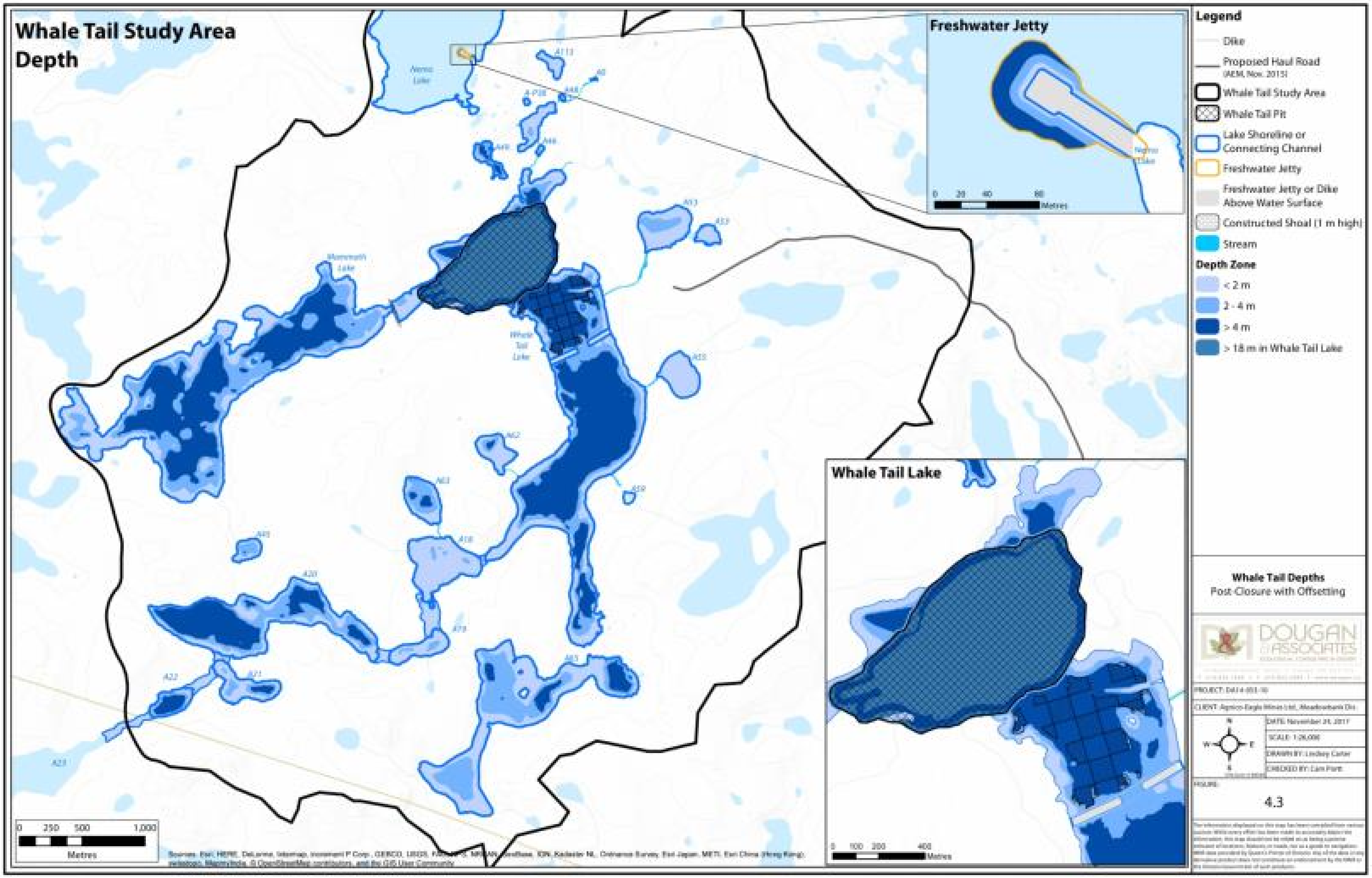


Figure 4-3. Whale Tail pit depths post-closure with a 1 m increase in water elevation east of Mammoth Lake sill, roads scarified and rock shoals constructed for offsetting.

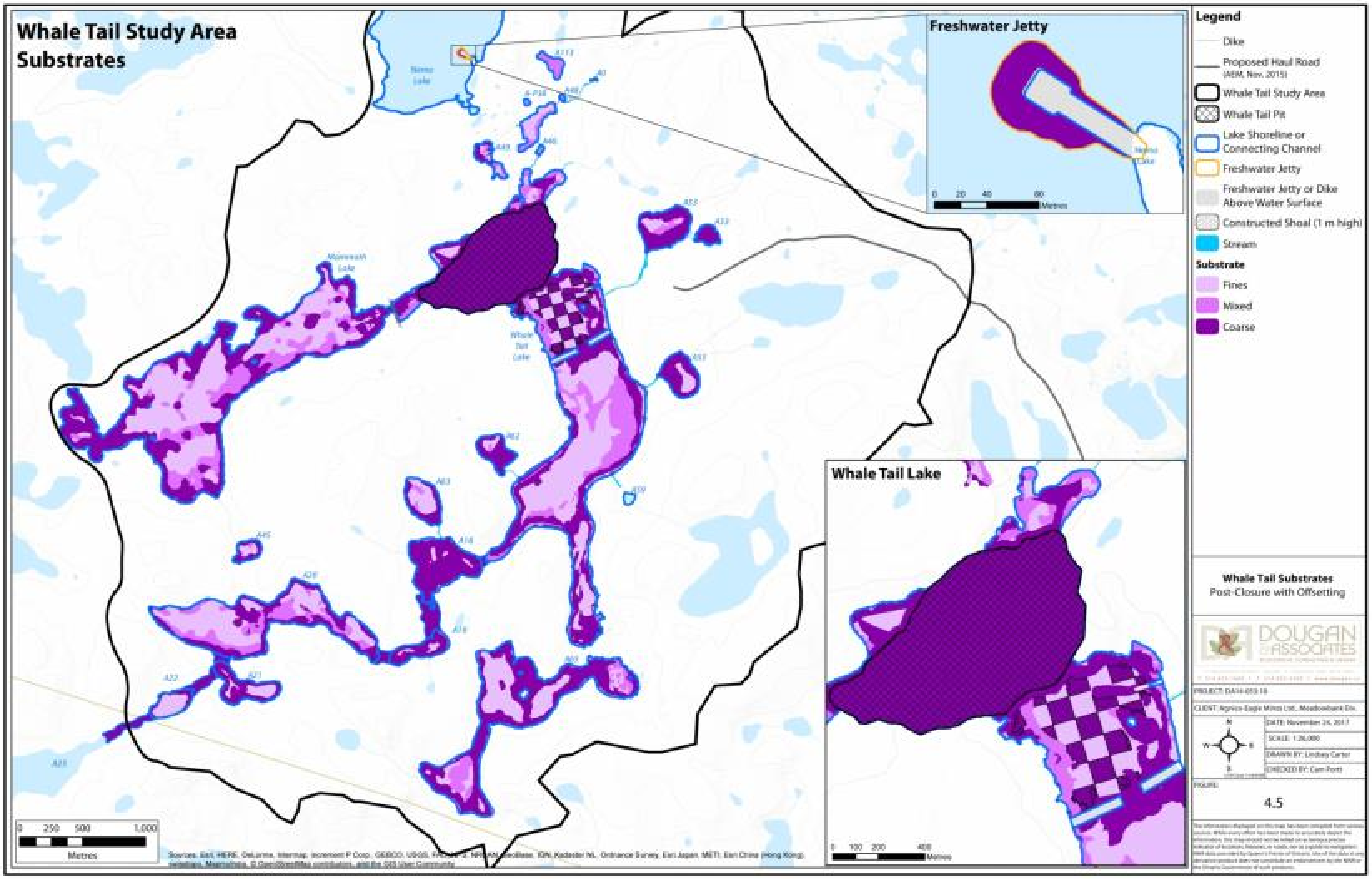


Figure 4-4. Whale Tail pit substrates post-closure with a 1 m increase in water elevation east of Mammoth Lake sill, roads scarified and rock shoals constructed for offsetting.

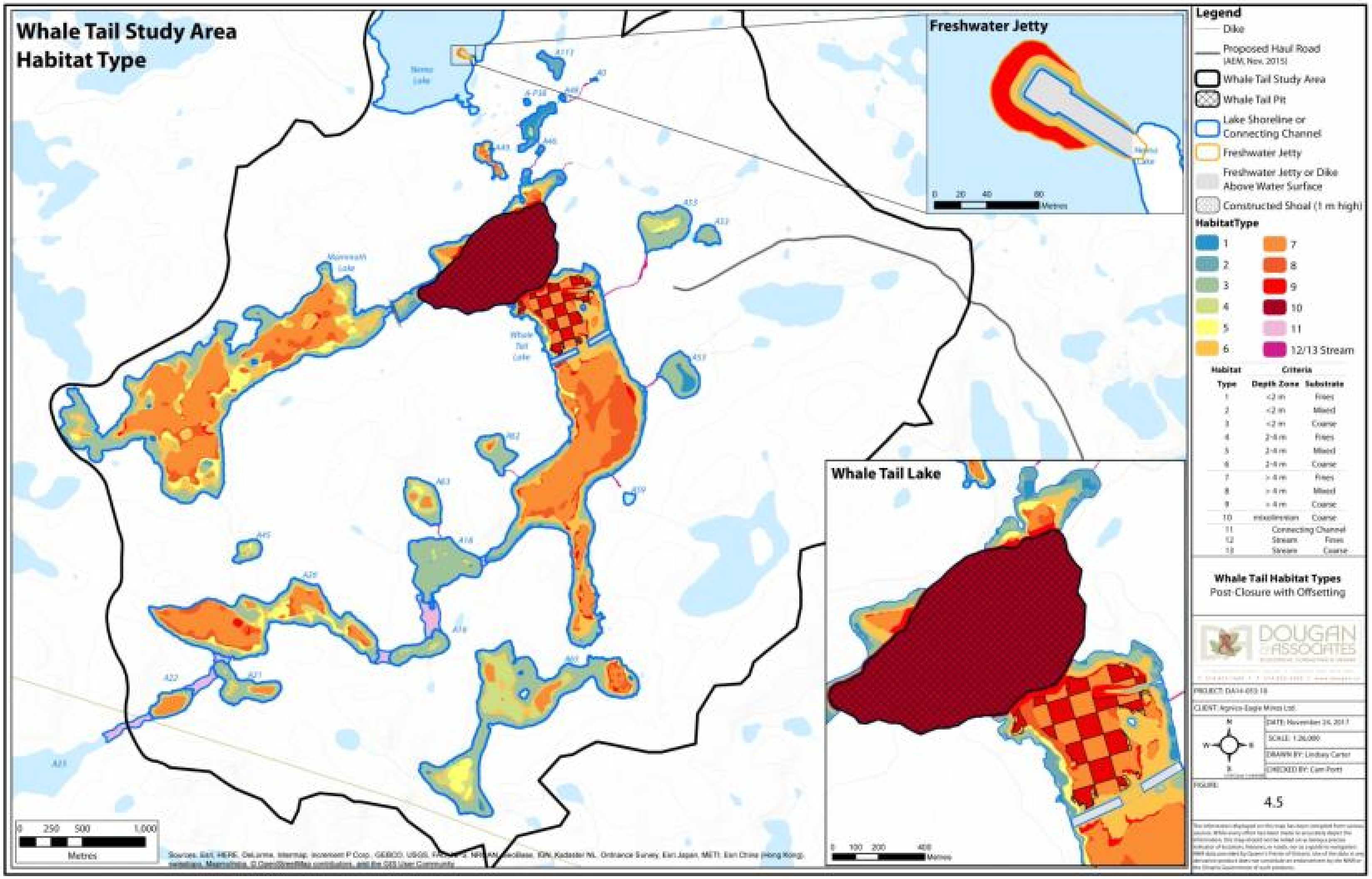


Figure 4-5. Whale Tail pit habitat types post-closure with a 1 m increase in water elevation east of Mammoth Lake sill, roads scarified and rock shoals constructed for offsetting.

4.2 COMPLEMENTARY MEASURES

As defined by Fisheries and Oceans Canada (2013), "complementary measures are investments in data collection and scientific research related to maintaining or enhancing the productivity of commercial, recreational or Aboriginal fisheries." As discussed in Section 1.1, for the Whale Tail pit, DFO has indicated support for complementary measures to provide 60% of the required offsetting. Agnico Eagle is supportive of funding research as a complementary measure to offset habitat losses resulting from the Whale Tail Pit and has provided to DFO for consideration project descriptions for a suite of research activities to benefit local stakeholders and contribute to the understanding of aquatic systems (Appendix C). These complementary measures are valued at 60% of constructed offsets (0.6 * 15.03 HUs = 9.02 HUs), providing a total offsetting ratio of 14.45 HUs lost to 24.05 HUs gained (1:1.66). Through this accounting method, the proposed complementary measures actually account for 38% of total offsets based on HUs (9.02 HUs / 24.05 HUs = 38%).

4.3 TIMELINE, DESIGN AND CONSTRUCTION OF THE OFFSETTING MEASURES

The following estimated timeline of water management activities is described in the Whale Tail Pit - Water Management Plan Addendum (FEIS, June, 2016). The exclusion of fish from available habitat in Whale Tail Lake – North Basin will extend from the initiation of dike construction (2018), dewatering and the fishout (2019), until re-flooding is complete (2025) and dikes are breached to allow fish re-entry (estimated 2029). Until the expanded Whale Tail Lake – South Basin is returned to baseline water levels (2022 – 2025), a large quantity of supplemental habitat will be available throughout that area due to flooding of terrestrial zones (see Section 3.2).

Construction timing of offsetting features is described in Table 4-2.

Table 4-2. Timing of construction and accessibility of offsetting features (habitat enhancements and creation).

Feature	Construction Complete	Offset Accessible to Fish
Scarification of roads	2022	2029
Construction of shoals	2022	2029
Sill	2025	2029
1-m Increase in Water Level	2025	2029

Preliminary engineering designs for the sill to raise water levels within Whale Tail Lake are provided in Figure 4-6.

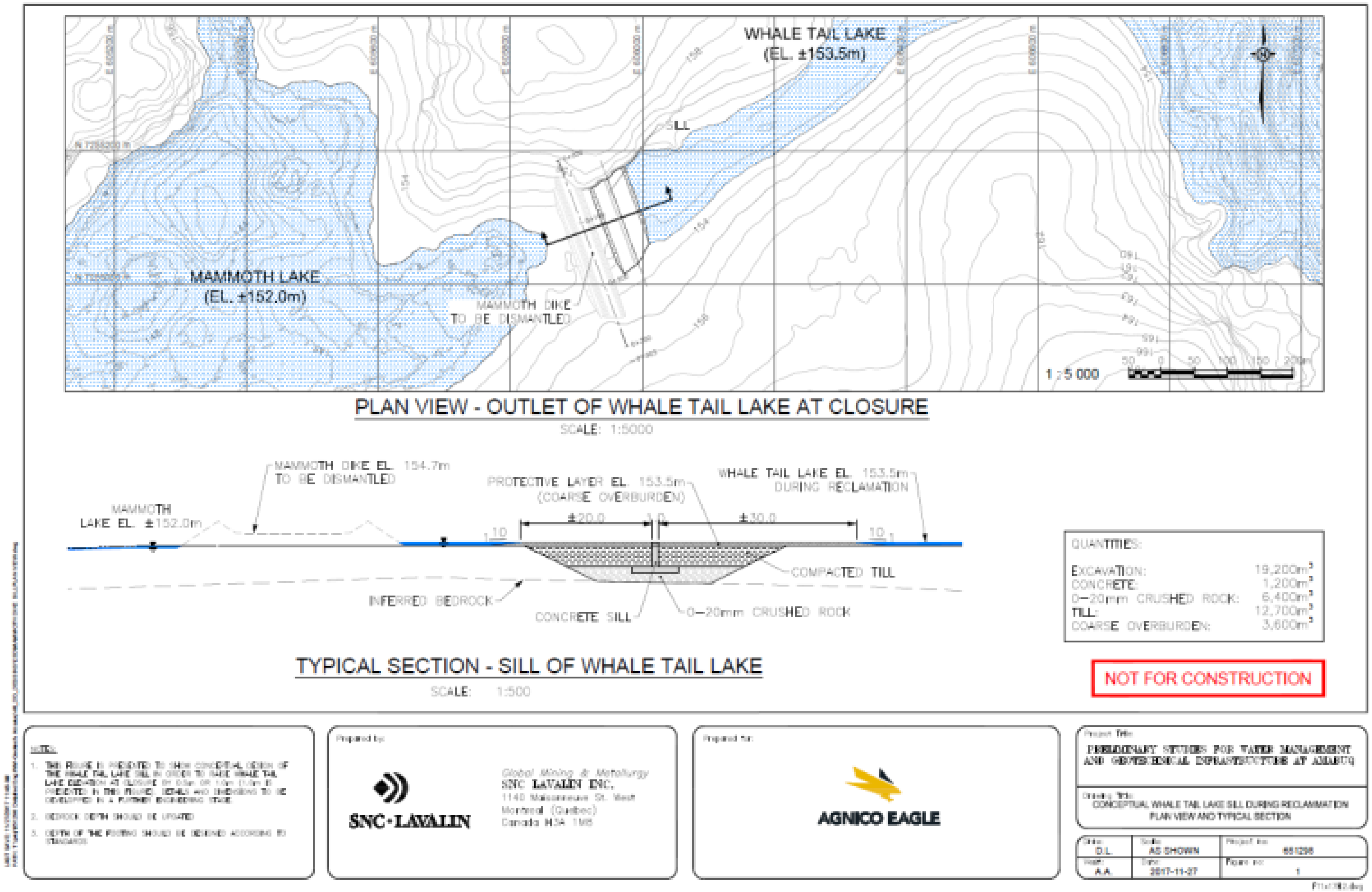


Figure 4-6. Preliminary engineering design for sill to raise water level of Whale Tail Lake by 1 m in the long term.

4.4 MONITORING

Monitoring to confirm that offsetting measures have been properly implemented and are effectively counterbalancing the serious harm to fish habitat occurring in Whale Tail Lake will be conducted as described in Agnico Eagle's Whale Tail Pit Fish Habitat Offset Monitoring Plan (March, 2018).

The planned duration and type of monitoring will allow for demonstration of full ecological functionality of the system (i.e. growth, reproduction and survival), with clearly identified criteria for success. Once criteria for success have been demonstrated, Agnico expects that there would be a reduction in the Letter of Credit (LOC) held by DFO in the amount corresponding to the successful offset.

SECTION 5 • CONTINGENCY OPTIONS

As a requirement in DFO offset planning Agnico Eagle recognizes uncertainty exists in all projections of future conditions. Therefore, Agnico Eagle is proposing three potential contingency options[5] that could be implemented in the case that the primary offsets are determined not to provide functional fish habitat (e.g. if conditions within the reflooded area do not permit breaching of the Whale Tail Dike to allow fish re-entry).

5.1 OPTION 1 – EXPANDED WHALE TAIL LAKE SOUTH BASIN

If deemed feasible, contingency option 1 could involve maintaining all or a portion of the flooded conditions south of the Whale Tail Dike. In concept, the Whale Tail Dike would not be breached to allow fish entry into Whale Tail Lake. As during the operations phase described in Section 3, water would continue to flow into Mammoth Lake through the southern diversion channel, rather than through Whale Tail Lake – North Basin. Based on preliminary planning to support DFOs requirements, habitat area (ha) and habitat units gained through this contingency offsetting option (i.e. maintaining habitat conditions as during operations in the long term) are summarized in Table 5-1. Provided this option is feasible, it could provide an increase over baseline conditions of up to 42.7 HUs, and would therefore provide more offsets than the primary option of habitat enhancement and creation (15.03 HUs). Agnico expects that these supplemental HUs could be banked or utilized towards future offsetting projects. Modifications of contingency option 1, such as a maintaining a lower level of flooding, could also be further investigated.

[5] These options are highly conceptual in support of the base case; as discussed with DFO, these concepts will require greater feasibility and engineering evaluation

Table 5-1. Increase in habitat area (ha) and habitat units (HUs) compared to baseline conditions provided by contingency option 1 (maintaining fish habitat conditions as during operations).

Habitat Location	Hectares	Habitat Units
Nemo Lake	-0.2	0.02
Mammoth Lake	-1.2	-0.47
Whale Tail Lake (South Basin) expanded during operations)	240.1	122.15
Other Lakes and Ponds[1]	-183.62	-77.01
Connecting channels	-8.0	-2.41
Streams	-0.3	-0.06
Diversion Channel A17-A45	1.8	0.54
Total	**48.6**	**42.72**

[1]Other lakes south of Whale Tail Lake become part of expanded Whale Tail Lake.

5.2 OPTION 2 – WHALE TAIL PIT BERM

As per NWB Type A requirements, water quality modeling will continue to be updated on an annual basis until closure. If it is determined that water quality within the flooded basin area could be deficient in nutrients required to support lower trophic levels and fish populations, this second proposed contingency option could aim to construct a berm or dike along the southern edge of Whale Tail Pit, in order to reduce the potential for the pit area to function as a nutrient sink. This feature may help to maintain nutrient supply within the basin area by preventing sediments from being washed into the pit. However further considerations of engineering design and water quality modeling would need to be explored to fully develop and understand the utility of this option.

Overall this contingency option may increase the potential for the primary offsetting option to function as intended as fish habitat, Assuming the berm is feasible and will function as fish habitat, change in habitat units over the primary offsetting scenario would be minimal, maintaining the originally proposed ratio of gains to losses. This contingency option would therefore provide approximately 15 HUs.

5.3 OPTION 3 – ADDITIONAL COMPLEMENTARY MEASURES

Based on the calculation method used here, the currently proposed complementary measures represent 38% of total offsets (9.03 of 24.05 HUs). DFO has previously indicated to Agnico Eagle (meeting March 15, 2017) that they would approve 60% of offsets as complementary measures for the Whale Tail Pit project. Thus, as a contingency option, an additional 5.4 HUs could be obtained through development and funding of supplemental research projects. This contingency option could be used in tandem with Option 2 to help to offset any small reduction in habitat gains that might occur as a result of berm construction.

SECTION 6 • CONCLUSION

There will be serious harm to fish habitat as a result of Whale Tail Pit development during both the operations and post-closure phases, resulting in a loss of 14.5 habitat units.

Accepted methods of habitat enhancement and habitat creation will be utilized, along with complementary measures, to offset the serious harm that will occur.

Offsets proposed for the Whale Tail Pit Project include:

- Construction of a sill in the connecting channel between Whale Tail Lake and Mammoth Lake that will increase the water level in Whale Tail Lake by 1 m;
- Conversion of roads to coarse substrate and construction of 8.77 ha rock shoals, together these represent 15.03 HUs; and
- Complementary measures consisting of a suite of research studies to benefit local stakeholders and contribute to the understanding of aquatic systems, representing 9 HUs.

Combined, this offsetting package achieves a ratio of habitat units lost to habitat units gained of 1:1.66.

SECTION 7 • REFERENCES

AEM, 2012. AEM Meadowbank Division – No Net Loss Plan. October 15, 2012.

AEM, 2013. Meadowbank Mine – Draft No Net Loss Plan Implementation Cost Estimate and Construction Schedule. Version 2. May 2013.

AEM, 2016. Meadowbank Gold Project – Habitat Compensation Monitoring Plan. AEM Meadowbank Division. Version 3. February, 2016.

Agnico Eagle. 2017a. Conceptual Whale Tail Lake (North Basin) Fishout Work Plan. Version 1. February 2017.

Agnico Eagle. 2017b. Fisheries and Offsetting Monitoring Plan Whale Tail Pit. Version 1. June 2017.

C. Portt and Associates. 2018. Whale tail pit 2014 - 2016 fish and fish habitat field investigations: Agnico Eagle Mines Ltd. - Meadowbank Division. xi +157 pp.

C. Portt and K. Minns. 2017. Personal Communication on June 14th, 2017. Toronto, Ontario. Discussion with Portt, Minns and DFO (by webex) regarding HEP model and conceptual offsetting plans including the flooding of Whale Tail Lake (South Basin).

DFO, 2013. Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting. Ecosystem Programs Policy, Fisheries and Oceans Canada. Ottawa, Ontario. November, 2013. ISBN: 978-1-100-22930-0

Appendix A –

Lake Elevations Used for Existing Conditions and Summary of Fish Catches during Baseline Field Investigations

Table A 1. Elevations used to represent baseline conditions for the determination of depths and shorelines.

Lake	Water elevation (masl) determined from the July 21, 2011 imagery
A113	156.47
A18	154.05
A19	154.85
A20	154.77
A21	154.83
A22	155.01
A45	156.47
A47	154.94
A49	159.28
A62	155.59
A63	154.62
A65	154.84
Mammoth Lake (A16)	152.57
Nemo Lake (C38)	156.00
Whale Tail Lake (A17)	153.02

Table A 2. Electrofishing effort and catches in connecting channels between lakes.

Connecting channel	Date	Distance (m)	Juvenile Lake Trout	Juvenile Round Whitefish	Ninespine Stickleback	Slimy Sculpin
A16-A15	8/25/2015	43	1		2	5
	6/21/2016	59				
	6/24/2016	23				
A16-A15 Total		**125**	**1**		**2**	**5**
A17-A16	7/9/2016	189	2	1	1	1
A18-A17	6/26/2015	100				1
	7/5/2015	112				5
	8/30/2015	30	1		6	
	6/22/2016	104				1
	6/25/2016	141				
	7/8/2016	113		16		
	8/20/2016	27			2	
A18-A17 Total		**627**	**1**	**16**	**8**	**7**
A19-A18	7/9/2015	32				
A19-A18 Total		**32**				
Grand Total		**1213**	**5**	**17**	**11**	**17**

Table A 3. Electrofishing effort and catches in small streams in the primary study area. All Arctic Char, Lake Trout, Salvelinus sp. (which are either Arctic Char or Lake Trout), Round Whitefish and Burbot are juveniles. Large catches of Ninespine Stickleback in A46-A17 occurred immediately downstream of a ledge that appeared to impede upstream migration.

Watercourse	Date	Electro-seconds	Distance (m)	Arctic Char	Lake Trout	*Salvelinus* sp.	Round Whitefish	Burbot	Ninespine Stickleback	Slimy Sculpin
A0-A48	8/1/2015	196	10						2	
A113-A47	8/1/2015	68	10						1	
	6/19/2016	160	191							
A113-A47 Total		**228**	**201**						**1**	
A46-A17	6/28/2015	579	201	1					11	8
	7/9/2015	925	148	1					153	8
	7/12/2015	85	na						100	
	8/30/2015	470	36							
	6/22/2016	110	36						20	
	6/24/2016	608	162	1					27	8
	7/7/2016	498	142	1					600	7
	8/19/2016	993	194					1	7	5
A46-A17 Total		**4268**	**919**	**4**				**1**	**918**	**36**
A47-A17	6/19/2016	500	348						1	
A47-A46	7/9/2015	136	17							1
	6/24/2016	77	13							
A47-A46 Total		**213**	**30**							**1**
A48-A47	7/6/2016	1403	147						6	
A49-A47	7/7/2016	290	59							
	8/20/2016	58	7							
A49-A47 Total		**348**	**66**							
A50-A17	6/28/2015	265	51						5	
	7/9/2015	1204	163	2	1				56	9
	8/30/2015	180	52	1				1	2	

Watercourse	Date	Electro-seconds	Distance (m)	Arctic Char	Lake Trout	*Salvelinus* sp.	Round Whitefish	Burbot	Ninespine Stickleback	Slimy Sculpin
	6/22/2016	208	37	1					20	
	6/24/2016	180	38						3	
	7/7/2016	1050	195	1					10	4
	8/19/2016	275	66							2
A50-A17 Total		**3362**	**602**	**5**	**1**			**1**	**96**	**15**
A53-A17	6/20/2015	1664	571						7	
	7/8/2015	2142	182	5					78	77
	8/30/2015	518	359		4					26
	6/18/2016	2565	563						4	4
	7/8/2016	2415	357	1					28	43
	8/26/2016	433	248	3					5	23
A53-A17 Total		**9337**	**2280**	**9**	**4**				**122**	**170**
A55-A17	6/21/2015	996	166						6	
	7/6/2015	3330	167	1		1			20	50
	8/30/2015	483	46				1		17	1
	6/19/2016	917	182	1					1	1
	6/26/2016	1482	159							8
	7/8/2016	676	141	1				1		31
	8/19/2016	758	22						59	7
A55-A17 Total		**8642**	**883**	**3**		**1**	**1**	**1**	**103**	**98**
A59-A17	6/27/2015	730	126	1						6
	7/9/2015	1444	97						2	21
	8/30/2015	535	181	1						7
	6/22/2016	766	126						4	6
	7/7/2016	1115	122			2				24
	8/20/2016	630	56	2					4	8
A59-A17 Total		**5220**	**708**	**4**		**2**			**10**	**72**

Watercourse	Date	Electro-seconds	Distance (m)	Arctic Char	Lake Trout	*Salvelinus* sp.	Round Whitefish	Burbot	Ninespine Stickleback	Slimy Sculpin
A62-A17	7/7/2015	1025	107						1	
	7/7/2016	707	129							
A62-A17 Total		**1732**	**236**						**1**	
A63-A18	7/5/2015	848	81							3
	7/7/2015	793	81							3
A63-A18 Total		**1641**	**162**							**6**
A-P23-A17	6/26/2015	582	95							2
Grand Total		**38702**	**6747**	**25**	**5**	**3**	**1**	**3**	**1260**	**403**

Table A 4. Maximum number of channels, mean total wetted width (sum of the width of all channels at a transect), and mean and maximum depth of small streams in the Whale Tail Study area.

Stream	Maximum number of channels	Mean total wetted width (m)	Mean depth (cm)	Maximum depth (cm)
A0-AP48	2	2.5	8	30
A47-A46	1	2.0	9	21
to A47	1	3.4	6	12
A50-A17	2	0.7	9	26
A53-A17	8	7.6	7	27
A55-A17	2	7.2	17	36
A59-A17	8	6.7	9	20
A62-A17	2	1.2	6	42
A63-A18	2	2.8	7	22
A46-A17	2	1.9	11	36

Appendix B

Habitat Areas and Habitat Units, by Habitat Type, for Preconstruction, Operations, and Post-closure Phases

Table B-1. Habitat areas (ha) and habitat units (HUs) for all habitats under baseline conditions and during operations phase.

Habitat Type	Habitat Area (ha)		Habitat Units (HUs)	
	Baseline	Operations	Baseline	Operations
1	8.39	13.65	2.01	3.27
2	11.27	2.90	3.17	0.81
3	175.40	201.11	69.43	79.61
4	33.11	14.08	12.42	5.28
5	25.09	13.51	14.64	7.88
6	53.63	101.24	40.78	76.98
7	157.88	145.73	59.21	54.65
8	37.97	43.71	19.77	22.77
9	4.90	26.79	3.32	18.14
10	0.00	0.00	0.00	0.00
11	9.38	3.18	2.83	0.96
12	0.70	0.39	0.12	0.07
13	0.19	0.18	0.06	0.06
Total	517.92	566.47	227.76	270.48
Change		**48.56**		**42.72**

Table B-2. Area of habitat that is lost, isolated in the north-east pond, unaltered, modified and created during the operations phase.

Changes to habitat	Area in hectares
Habitat lost during operations	
Lake habitat dewatered	
Nemo Lake filled and above water during operations	0.2
Whale Tail Lake dewatered or covered by dike and above water during operations	69.5
Mammoth Lake dewatered or covered by dike and above water during operations	1.2
Connecting channels dewatered	0.9
Small streams dewatered	0.03
Total habitat lost during operations	74.3
Habitat isolated in north-east pond during operations	
Existing lake and pond habitat	7.6
Existing stream habitat	<0.1
Total isolated in north-east pond (assumed not to be fish habitat, so effectively also a loss)	7.6
Habitat not altered during operations	
Mammoth Lake	150.5
Portion of connecting channel A23-A22	1.4
Portion of watercourse A53-A17	0.4
Total habitat not altered during operations	152.3
Existing Habitat modified during operations	
Existing Nemo Lake covered by freshwater jetty (that remains below water)	0.4
Existing Mammoth Lake covered by Mammoth dike (that remains below water)	0.0
Existing Whale Tail Lake (water level increased)	94.8
Existing Whale Tail Lake covered by Whale Tail dike (that remains below water)	0.4
Other existing lakes in expanded Whale Tail Lake (water levels increased)	177.8
Lake A45 water levels increased	2.9
Existing connecting channels converted to lake habitat	7.1
Existing streams converted to lake habitat	0.3
Total existing habitat modified during operations	283.8
Habitat created during operations	
Land flooded around expanded Whale Tail Lake	127.4
New channel alignment for stream A53-A17	0.2
Connecting channel constructed between expanded Whale Tail Lake and A45	1.8
Land flooded around Lake A45	1.6
Total habitat created during operations	130.9

Table B-3. Changes in habitat area and habitat units between baseline conditions and the operations phase for each lake/stream system.

Lake/Stream	Change from existing conditions to operations phase	
	Hectares	Habitat Units
Nemo Lake	-0.2	-0.02
Mammoth Lake	-1.2	-0.47
Whale Tail Lake	240.1	122.15
Other Lakes and Ponds	-183.6	-77.01
Connecting channels	-8.0	-2.41
Streams	-0.3	-0.06
Diversion Channel A17-A45	1.8	0.54
Net change	48.6	42.72

[1]Most become part of the expanded Whale Tail Lake

Table B-4. Areas of habitat that are lost, unaltered, modified or created during the post-closure phase with no offsetting.

Changes to habitat	Area in hectares
Habitat lost during post-closure phase	
Nemo Lake filled	0.2
Streams dewatered	none
Whale Tail Lake (covered by dike and water attenuation ramp and dry post-closure)	1.8
Mammoth Lake (covered by dike and dry post-closure)	none
Total habitat lost during post-closure phase	2.0
Habitat not altered during post-closure phase (includes areas reflooded)	
Mammoth Lake not modified	151.6
Whale Tail Lake habitat not modified	130.6
Connecting channel A17-A16 habitat not modified	0.3
Connecting channel A18-A17 – (a portion is altered in offsetting scenario so required for comparison)	1.3
Streams not altered - (but altered in offsetting scenario so required for comparison)	0.7
Total habitat not altered post-closure	284.5
Habitat modified during post-closure phase	
Existing Nemo Lake covered by freshwater jetty	0.4
Whale Tail Lake and connecting channel A16-A17 converted to pit or pit cap	30.9
Whale Tail Lake and connecting channel A16-A17 converted to roads	2.2
Whale Tail Lake converted to attenuation pond jetty	1.1
Whale Tail Lake converted to dike (portion that is below water)	1.2
Mammoth Lake - (covered by remains of dike, now lowered to become lake habitat)	0.1
Total habitat altered during post-closure phase	35.9
Habitat created during post-closure phase	
Whale Tail Lake habitat created post-closure (due to pit excavation)	27.4

Table B-5. Changes in habitat area and habitat units between baseline conditions and post-closure phase with no offsetting, for each lake/stream system.

Lake/Stream	Change from existing conditions to post-closure phase with no offsetting	
	Hectares	**Habitat Units**
Nemo Lake	-0.2	0.02
Mammoth Lake	0.0	0.00
Whale Tail Lake	26.2	-14.23
Connecting channel A17-A16[1]	-0.6	-0.20
Other connecting channels	0.0	0.00
Streams	0.0	0.00
Total	25.3	-14.45

1. Becomes part of the expanded Whale Tail Lake (South Basin)

Table B-6. Change in post-closure habitat areas and habitat units, relative to baseline, that will result from the proposed offsetting features, for each lake/stream system.

Lake/Stream	Changes resulting from a 1 m increase in the water level upstream from the Whale Tail Lake to Mammoth Lake sill, scarification of roads and construction of 8.77 ha rock shoals, compared to baseline conditions	
	Hectares	**Habitat Units**
Nemo Lake	-0.2	-0.02
Mammoth Lake[1]	-1.2	-0.47
Whale Tail Lake	50.0	1.67
Connecting channel A17-A16[1]	-0.9	-0.27
Connecting channel A18-A17[1]	-1.0	-0.31
Streams	<-0.1	-0.01
Total	46.6	0.58

1. Becomes part of the expanded Whale Tail Lake (South Basin)

APPENDIX C – COMPLEMENTARY MEASURES

SECTION 1 • INTRODUCTION

As suggested by DFO in 2017, a portion of fish habitat offsetting for Whale Tail Pit may be comprised of complementary measures in the form of fisheries-related research. Research projects will be aimed at closing knowledge gaps regarding the biology and habitat requirements of northern fish species, developing tools and validating methods to facilitate and advance ongoing monitoring, and/or characterizing responses of fish-bearing aquatic systems to direct anthropogenic manipulations.

The following research projects are proposed as complementary measures to offset fish habitat losses associated with the Whale Tail Pit project. Conceptual design of each project has been discussed with DFO over the past year. Details of projects that will occur in the nearer term have been established with interested academic partners but may evolve over the life of the project based on initial field experiences. This program will continue to be developed and coordinated by Agnico, in collaboration with academic partners, and reporting to the Meadowbank Fisheries Research Advisory Group (MFRAG; see Section 2.6).

While these projects are proposed as complementary measures, and Agnico will work towards achieving their criteria for success as identified in the Fish Habitat Offset Monitoring Plan (March, 2018), it should be recognized that total funding for complementary measures is detailed in the calculated Letter of Credit (LOC) held by DFO, and described in the Cost Estimate for Whale Tail Offsetting (March, 2018). Depending on the final chosen suite of research projects and their scope, additional studies or objectives may be feasible. Ultimately, projects will be chosen and their direction confirmed or updated annually based on interests of stakeholders including KIA, academic partners, Hunting and Trapping Organizations (HTO) and DFO, through the Meadowbank Fisheries Research Advisory Group (see Section 2.6).

Where appropriate, research projects are designed to work in tandem with existing monitoring programs such as the Core Receiving Environment Monitoring Program (CREMP) and monitoring for habitat enhancement/creation offsetting features. However, research studies are planned to collect supplementary data over and above regular monitoring programs, and to assess scientifically-driven hypotheses, independent of compliance monitoring.

A common goal will be to publish results in peer-reviewed literature to provide a tangible benefit for future assessments of northern fish populations. Outside of deliverables related to scientific publications, Agnico will emphasize and facilitate local community input and capacity building as a component of each study.

SECTION 2 • COMPLEMENTARY MEASURES

Four general topics are proposed as research study directions for Whale Tail Pit complementary measures, with one or more specific associated research projects. Topics include:

1. Assessment of changes in aquatic productivity and fish populations due to flooding of Whale Tail South and downstream lakes during operations

2. Assessment of impacts of the Baker Lake wastewater outflow on aquatic systems including fish and fish habitat

3. Characterization of northern fish species' habitat preferences

    - Literature review and field validation of northern lake fish habitat preferences
    - Arctic grayling occupancy modeling
    - Pit lake habitat use assessment

4. eDNA methods development

The objectives and methods of the associated research studies as planned at this time are described in detail below. Information on approximate total budgets and estimated levels of Agnico support for each project are described in Section 2.5, and role of the MFRAG is described in Section 2.6.

2.1 CHANGES IN AQUATIC PRODUCTIVITY

2.1.1 Introduction

Flooding of the Whale Tail South Basin and upstream lakes during operations will result in a release of nutrients from terrestrial sources into the aquatic system. Although a change in trophic status was also predicted in the EIS in relation to effluent discharge into Mammoth Lake, mitigative options are now being investigated to minimize those impacts, so research projects will focus on the flooded zone south of the Whale Tail dike.

Currently, relatively little information is available in the open literature to support development of productivity models for Arctic lakes. Not only is this information integral to environmental impact assessment, but understanding drivers of productivity will help inform future directions of HEP methods.

The following objectives and methods have been developed in consultation with the proposed lead researcher, Dr. Heidi Swanson (University of Waterloo).

2.1.2 Objectives

Specifically, this research study will aim to understand changes in fish population productivity and habitat use during and after flooding occurs, as determined through relative abundance and/or biomass and condition factor within the resident fish population.

Since flooding activities are planned to occur over a relatively short term (2-3 years), the study will specifically include a focus on small-bodied fish, which are expected to react first to changes in nutrient profiles. Nevertheless, methods will also include hydroacoustic surveys that can assess changes at the community level, and a substantial body of information for condition factor and abundance of large-bodied fish will be collected during the fishout of Whale Tail Lake – North Basin. If elevated water levels are maintained in Whale Tail Lake over a longer term (as proposed as a contingency offsetting measure), post-impact assessments could be carried out using that data.

Changes in productivity will be related to water quality variables and changes in lake morphometry (especially area). Use of newly flooded habitats will be assessed and related to habitat characteristics.

2.1.3 Methods

The following specific methods related to surveillance and analysis of fish populations are planned to be included as part of this study:

- Hydroacoustics surveys, both before and after flooding. Key variable investigated: kg fish/hectare

- Minnow trap/fyke net surveys, both before and after flooding. Key variable investigated: catch per unit effort

- Presence-only surveys, after flooding. Key variable investigated: fish presence in newly-flooded habitats, and relationships with habitat covariates.

- Collection of small-bodied fishes for trophic ecology and growth parameters, both before and after flooding. Key variables investigated: sources of carbon (pelagic or benthic, trophic position, growth rates).

Assessments of changes in fish populations will take into account relationships with the following water quality parameters, some of which are planned to be collected through compliance monitoring programs, and some of which are supplementary:

- Quantity and quality of dissolved organic carbon

- Total and dissolved concentrations of nitrogen

- Total and dissolved concentrations of phosphorus

- TSS

- Chlorophyll-a

- Major anions and cations

- Stable isotope ratios on dissolved inorganic carbon

2.1.4 Timeline

This study is planned to begin in Summer 2018 due to tight timelines related to dike construction and flooding of Whale Tail – South Basin. Based on current mine plans and offsetting measures, this study will occur over a 3 – 4 year time period.

See Section 2.5 for a summary of proposed timelines for each project.

2.1.5 Project Deliverables

As described in the Fish Habitat Offset Monitoring Plan (March, 2018), criteria for success (deliverables) of all research projects are centred around publication of one or more manuscripts per study in a peer-reviewed journal, such that research outcomes would be broadly available to the scientific community. However it is recognized that not all factors affecting outcomes of research projects and suitability of studies for such publication are within the control of Agnico, academic partners, or DFO. As a result, in certain instances, peer-reviewed publication may not be a viable route for dissemination of knowledge gained through these projects. In such cases, Agnico suggests discussions be undertaken between researchers, DFO, and Agnico to determine a mutually agreeable solution (e.g. conference presentations, inter-agency workshops).

Specifically, this study will improve scientific understanding of relationships between productivity of northern fish communities and nutrient inputs derived from natural sources. This information will be valuable for consideration by proponents and regulatory agencies during future assessments of impacts in aquatic systems due to flooding.

2.2 BAKER LAKE WASTEWATER ASSESSMENT

2.2.1 Introduction

Currently, wastewater from the hamlet of Baker Lake is released through a series of tundra ponds into Baker Lake, ultimately affecting fish and fish habitat. Since 2012, Agnico has maintained an interest in characterizing these impacts, and working with the hamlet to ameliorate their wastewater treatment, with significant support from the community. In the fall of 2017, Agnico presented the conceptual research project and potential associated wastewater upgrades to the Hamlet Council, and again received strong support. It was noted by an elder during consultation (Agnico Eagle, 2016)that Airplane Lake, which receives run-off from the wastewater lagoon and landfill was once used by locals for fishing and recreation, but is no longer fished due to concerns of contamination.

Having identified this project as a potential complementary measure for the Whale Tail Pit project, Agnico has begun working with a research team including Dr. Rob Jamieson (Dalhousie University), Drs. Mark Hanson and Charles Wong (University of Manitoba), and Drs. Brendan McConkey and Heidi Swanson (University of Waterloo) to tailor an appropriate research program.

Since this research will directly assess changes in the aquatic system related to fish and fish habitat, and will provide significant value to the local community, Agnico is proposing to partially fund this study as a complementary measure for Whale Tail Pit offsetting. Additional funding will be sought through application for an NSERC CRD, with Agnico acting as industrial partner.

The following objectives and methods have been developed by the research team indicated above.

2.2.2 Objectives

1. Validate passive wastewater treatment system design guidelines for Arctic regions

2. Develop and incorporate human health risk assessment into Arctic wastewater system design and planning process

3. Characterize microbial community structure in Arctic wastewater treatment systems and receiving waters and assess ARG transfer mechanisms

4. Characterize trace metal sources, transport pathways and environmental risks in Arctic wastewater systems

5. Quantify improvements in fish habitat and health associated with Arctic wastewater treatment system upgrades

2.2.3 Methods

Preliminary methods developed by the research team to address these objectives are described below.

1: The hydraulic performance and treatment kinetics of the current wastewater treatment system will be characterized during the 2018 treatment season. Initial field work would be conducted during the spring melt period. The current wetland treatment area would be instrumented with water level loggers to quantify flow rates at several points throughout the system (upstream of Lagoon Lake, outlet of Lagoon Lake, outlet of Finger Lake, inlet to Airplane Lake). Stage-discharge relationships would be developed for each location to relate water level to discharge rate. A rhodamine dye tracer study would also be conducted to characterize the hydraulic retention time and mixing behavior of the current treatment system. The ability of the current treatment system to meet effluent quality criteria for regulated parameters (CBOD5, TSS, etc) would be evaluated. A mass balance modeling approach would be used to derive treatment rate constants for the wetland, and the level of dilution occurring in the system. A similar assessment would be conducted in August to characterize the performance of the current system during the non-melt period.

2: A spatial analysis would be conducted to identify 2-4 alternative locations for a new passive wastewater treatment systems. For each site a conceptual design for a pond-wetland based treatment system would be developed and effluent quality would be predicted for each alternative site using performance models previously developed by our research group. The relative human health risks associated with each option would also be evaluated using quantitative microbial risk assessment (QMRA) approaches. A variety of participatory research approaches would be employed to engage the community and better understand concerns and risks associated with potential options for wastewater management, and to identify an appropriate location for the treatment facility.

3: Once the new facility is constructed and operational the hydraulic behavior and treatment performance would be evaluated using methods previously described in 1. This data would be used to validate the performance model predictions and treatment rate kinetics. Autonomous water quality sensors would also be installed in both the pond and wetland to continuously measure oxygen status, temperature and pH throughout the treatment season.

3: We hypothesize that otoliths provide a history of trace element exposure in fish via water and food pathways that can be used in ecological risk assessment. To test this hypothesis, we will sample for select trace elements in the proposed compartments along the wastewater release pathway (with a focus on Airplane and Baker Lake, plus reference sites), as well as reconstruct the trace element history through sediment coring. The exposures will be evaluated relative to water quality guidelines and hopefully partitioned by source (e.g., background vs landfill vs wastewater). We predict that the new treatment system will reduce trace element release, and that this will be associated with a decline in otolith concentrations. To this end, fish will be sampled pre- and post- construction and otoliths analyzed via laser-ablation ICP-MS.

4: Pathways of contaminant movement tend to focus on large-scale drivers in the Canadian Arctic. We hypothesize that aquatic insects represent a possible vector of metals and ARGs to pristine ecosystems not physically connected to wastewater flows. Emergent insects from the wastewater pathway and reference locations will be captured over the course of the off-ice season, identified, and their metals and ARGs quantified.

5: Standard toxicity bioassays have been developed for many cosmopolitan species, but rarely do their ranges include the Arctic. This element will seek to develop and validate a laboratory-based plant bioassay to screen for contaminants in water and sediments. The test will have two aspects that a user could select; a seedling germination phase and a full plant phase. The data can be then used to screen for the impacts of effluent release, design of treatment wetlands, as well as remediation and restoration efforts at contaminated sites.

6: Shifts in microbial community composition is one of the more rapid biological changes that may occur in response to changing environmental conditions. Microbial communities will be assessed both by 16S and rRNA gene analyses, providing a broad assessment of microbial populations. The researchers' current Polar Knowledge grant (C.Wong, PI) will collect data during and after the 2018 spring melt, and this data will be used to help establish a baseline for microbial community composition for sites near the Baker Lake wastewater treatment system, providing data for reference and potentially impacted sites. This work would be extended to a 'before and after' analysis linked to implementation of a new wastewater treatment system.

7: Antibiotic resistance genes (ARGs) are a type of environmental pollutant, and are associated with the spread of pathogenic drug resistance. ARGs are naturally occurring in the environment, but may increase in abundance through selection by antibiotics. ARGs may also be introduced to new environments through human activities and specifically though wastewaters. We will determine the presence and abundance of known ARGs at near-site and reference lakes and determine if there is a correlation with wastewater and wastewater treatment.

8: The microbial populations that are active in northern climates can differ significantly from populations in temperate climates. Based partly on the data from 6 and 7 we will target selected microorganisms for further characterization, to understand their role in nitrification, denitrification, and antibiotic resistance. A large majority of cold-climate bacteria remain uncultured and we will target these to provide insights into metabolic pathways and gene function. By characterizing the composition and functions of northern wastewater microbial communities, molecular analyses will provide baseline data for optimizing such processes, and evaluate potential risks from antibiotic resistance proliferation.

9: Arctic fishes are often energy-limited, and freshwater Arctic ecosystems can be quite sensitive to nutrient inputs. We hypothesize that fishes living in Airplane Lake will have relatively higher lipid content, growth rates, and condition than fishes living in Baker Lake (prior to the treatment upgrade). Indicators of exposure to contaminants, including GSI and LSI, will also be higher in Airplane Lake than in Baker Lake prior to treatment upgrade. We predict that the new treatment system will result in a decline in indicators of contaminant exposure in fishes in Airplane Lake. Fish growth rates and condition many also decline as nutrient inputs decrease.

2.2.4 Timeline

Initial field work is planned to commence in summer 2018, following further community consultations this spring. Field studies will continue over a five-year duration, including a pre- and post-construction monitoring period. Construction of a new water treatment facility is tentatively planned for 2020.

2.2.5 Project Deliverables

As a large scale, multi-faceted research study, a suite of publications is expected as an outcome of this project. Specifically, these will include guidelines for passive wastewater treatment system design in Arctic regions, assessments of microbial system functions, ARGs and trace metal sources, transport pathways and environmental risks associated with Arctic wastewater systems, development of a toxicity assay for Arctic macrophytes, and analysis of changes in resident fish at organism and population scales in response to upgrades in water treatment technologies. Ultimately, observed responses of fish communities can be related to changes in water chemistry and lower trophic levels, which are significant components of fish habitat quality.

Along with written publications, researchers will present their studies at scientific meetings, providing experience and developing skills of graduate students.

Outside of the traditional scientific arena, this project has received strong community support in its early stages, and Agnico is fully engaging their Community Relations department to assist researchers in developing a program for consultations and capacity building within the Baker Lake community in regards to this project.

Though costs are not included as a complementary measure, this work will facilitate construction of an optimal wastewater treatment system for the community, which is a clear tangible benefit.

2.3 CHARACTERIZATION OF FISH HABITAT PREFERENCES

In recent years, HEP models for northern species have commonly been based on HSIs developed from Richardson et al. 2001, which itself identified a significant data gap surrounding habitat preferences of these fishes. In order to develop this body of available information and help reduce uncertainty in future habitat assessments, Agnico will help to facilitate one or more research studies on habitat preferences of fish common to the Meadowbank area. Currently, three projects related to fish habitat preferences are proposed.

2.3.1 Lake Fish Habitat Preferences

2.3.1.1 Introduction

In order to work towards updating HSIs for northern lake fish species, Agnico is proposing to collaborate with a team of researchers from various academic institutions and DFO, to support a literature review and field assessment of northern fish species' habitat associations.

The research team would be lead by Dr. Susan Doka (DFO Central and Arctic Region), and would include Tom Hoggarth, Liz Patreau, Bev Ross and Martyn Curtis (DFO Fisheries Protection Program and Ecosystem Management), Drs. Mike Rennie & Nandakumar Kanavillil (Lakehead University), Dr. Ken Minns (DFO Science Emeritus & University of Toronto), Drs. Neil Mochnacz, Paul Blanchfield (DFO Science), as well as graduate students to be determined.

Initially, Agnico is proposing to provide in-kind support for travel and accommodations of field crews on their Meadowbank site for this project, but this involvement could be extended depending on evolution of the study and interests of the MFRAG. More details on initial proposed budgets and levels of support for each project are provided in Section 2.5.

The objectives and methods below were provided by Dr. Doka.

2.3.1.2 Objectives

1. To systematically review the literature and compile unpublished information on northern fish species and their habitat associations and environmental tolerances since the last compilation of data was generated for lakes (Richardson et al 2001). Rivers (last reviewed in Evans et al 2001) may be addressed at a later date. This compilation may include the fish-out database held by DFO Science Winnipeg (Hedges, unpub data).

2. To outline data gaps in our knowledge of northern species and their life-cycle habitat needs and environmental tolerances that would be related to impacts from mining and offset creation or improvements.

3. To sample northern fish communities of several lakes in Nunavut in natural, impacted and offset areas to compare to the literature and data findings above and fill data gaps locally required for an evidence-based approach to calibrating, validating and standardizing evaluation methods for habitat loss and offsets for major projects in the area.

4. To scope the area for a future telemetry project to address a known gap, namely overwintering habitat usage.

2.3.1.3 Methods

Literature review: Following closely the Centre of Environmental Evidence guidelines for systematic literature review, a graduate student with Lakehead University under the cosupervision of Dr. Mike Rennie and Dr. Susan Doka will review primary and grey literature sources as well as canvas for unpublished data (e.g. Golder & Associates 2016) on up to 40 northern species with current fish distributions in lakes of Nunavut and the Northwest Territories.

Meta-analysis and gap analysis: The data extracted from the review will be analyzed using appropriate statistical methods to synthesize the information by life stage (4 stages: spawning, nursery, juvenile and adult habitats) for 40 northern fish species with ranges in Nunavut and the Northwest Territories. Habitat variables of interest include: substrate associations, thermal tolerances and preferends, timing windows, depth associations at different seasons, turbidity tolerances, species-species associations, flows and lake order, cover associations, pH and dissolved oxygen tolerances. Data and information from northern areas will be compared with new and existing information from more southern locales in North America.

Field Sampling: Working with Agnico Eagle Mines – Meadowbank Division to coordinate existing scientific work and travel, the graduate student and DFO support staff will work with consultants to sample up to 6 lakes. Lakes may include Baker Lake (an intended impact site), a proposed offset area, and 4 natural lakes in the vicinity. If possible another impacted lake will be sampled if technically feasible for travel. Techniques used to sample fish distributions will include acoustics (likely BioSonics DTX), trap nets or minnow traps and gill nets, and will link to ongoing e-DNA results (from a separate study) if available. Habitat sampling methods will include bottom acoustics (BioSonics), sediment grabs, longterm logger deployments and multiprobe sonde surveys. We will focus on gap filling if information is already available from the proponent or DFO for certain lakes.

2.3.1.4 Timeline

Initial field assessments will commence in summer 2018, and as currently proposed the study will be conducted over a two- to three-year duration (2018 – 2020).

2.3.1.5 Project Deliverables

The following project deliverables were provided by Dr. Doka.

CSAS or technical document on northern fish species and their habitat associations at northern latitudes to complement Richardson et al 2001.

Also to be included in the above document or separate paper(s):

- Statistical or meta-analysis of data to guide offsetting and restoration in the north as well as updates to tools like HEAT (CSAS SAR 2017, Abdel-Fattah et al 2017a,b and Abdel-Fattah et al 2018, Minns et al 1999).

- Data and knowledge-gap identification to be addressed by future research.

2.3.2 Arctic Grayling Occupancy Modeling

2.3.2.1 Introduction

As a complementary measure for the Whale Tail Pit project offsetting, Agnico is proposing to work with Dr. Heidi Swanson (University of Waterloo) to validate Arctic grayling occupancy models for use in the Kivalliq region, in follow-up to work she has previously conducted in the Northwest Territories[1]. The following background information on occupancy models was provided by Dr. Swanson.

2.3.2.2 Background

Evaluating the effectiveness of habitat offsetting measures requires robust and accurate data on fish populations both before and after enhancements have taken place. Obtaining these data in northern, remote environments is difficult and expensive. As a result, there is often a great deal of uncertainty around the findings.

All methods of fisheries monitoring have advantages and disadvantages, but obtaining robust and reliable data on fish abundance from standard techniques (such as three-pass depletion surveys) is especially problematic in the Arctic, where studies are expensive, logistics (and thus, often timing of surveys) are constantly changing, and backpack or big boat electrofishing (standard in many abundance three-pass depletion surveys) requires trained and certified operators and specialized equipment (which has to be shipped up from the south). In addition, to meet the required intensity of sampling required for abundance estimates, the spatial scale of abundance surveys is often small.

Occupancy surveys and occupancy models are a relatively new (~15 years) method of monitoring technique for animals. Instead of focusing on the number of animals, occupancy models focus on presence/absence. For each study, the spatial scale is carefully considered and adapted to reflect how far fish are expected to move, the scale at which habitats might be being selected, and the presence of any disturbance (or enhancement). Presence/absence of fish is then related to habitat characteristics, such as water depth, velocity, bank type, substrate, etc. When stakeholders need information about abundance, the models can give broad information about ‘high,’ ‘medium,’ and ‘low’ “states” of occupancy if the study and sampling are set up to achieve this. Also, unlike any other model, occupancy studies also consider the probability of detection – that is, if no fish were captured or observed, what was the chance that the fish were there, but weren’t found? The probability of detection can then be related to habitat variables. For example, we might be less likely to find fish in a stretch of stream with large boulders – not because there are less fish, but simply because they are more difficult to catch. Probability of detection can also be related to factors that affect catchability such as the experience of the sampler, the substrate, and the weather. When we explicitly take into account how our ability to catch fish is affected by external factors, we are much better able to model the types of habitats that fish are using.

2.3.2.3 Objectives

Objectives of this work will be the development of occupancy models for Arctic grayling in the Meadowbank region, and a comparison of model fit and Arctic grayling habitat predictors in this area with those observed in the NWT.

2.3.2.4 Methods

[1] Baker, L.F., Artym, K.J., Swanson, H.K., 2017. Optimal sampling methods for modelling the occupancy of Arctic grayling (*Thymallus arcticus*) in the Canadian Barrenlands. Canadian Journal of Fisheries and Aquatic Sciences 74, 1564-1574.

Methods will involve characterizing occupancy of Arctic grayling in relation to habitat characteristics. Specifically this occurs through presence-absence surveys (visual, electrofishing) and assessment of habitat characteristics (stream width, depth, velocity, vegetation cover, bank formation, distance to overwintering habitat) for 30-m stream segments (number of replicates to be determined through initial field surveys). Study sites will include anthropogenically-impacted as well as reference systems in the Meadowbank and Baker Lake area.

As a component of previous No Net Loss Plans, Agnico has constructed habitat enhancement features for Arctic grayling spawning, and has been monitoring the success of these features over a number of years. In addition, Arctic grayling habitat may be impacted by wastewater treatment upgrades in the hamlet of Baker Lake, where changes in nutrient regimes and contaminants could affect use of this system by fish. Both of these habitat manipulations provide interesting opportunities to evaluate the use of occupancy models for the Kivalliq region, in comparison to reference systems.

2.3.2.5 Timeline

Initial reconnaissance and habitat characterizations for this study will begin in 2018, and the project is expected to be complete within three years.

2.3.2.6 Project Deliverables

The development and publication of occupancy models for this region will assist proponents and regulators in future assessments of potential new project impacts and design of offsetting measures for Arctic grayling habitat.

2.3.3 Pit Lake Habitat Assessments

2.3.3.1 Introduction

In recent years, significant uncertainty has arisen regarding the capability of pit lakes to act as fish habitat. While DFO previously accepted reflooded pit areas as habitat in offsetting plans, these areas are no longer considered habitat regardless of connectivity or modeled water quality. As a result, data regarding fish use in pit areas will no longer be regularly documented through standard monitoring programs. However, since multiple pits of various sizes at the Meadowbank site are planned to be reflooded in the relatively near term (2025 – 2029), there is an opportunity to thoroughly characterize fish use of pit lake habitat and population growth in re-flooded lakes through a research program.

Currently, monitoring for general fish presence using underwater camera or angling in lake basin areas adjacent to pits forms a component of Agnico's existing Habitat Compensation Monitoring Plan for the Vault pit. However, the proposed research program could intensify methods to document habitat preferences throughout the re-flooded basin and pit area through techniques such as telemetry and sonar, and further compare movements to reference lakes. This assessment could also be expanded to other pit areas (e.g. Phaser pit, Whale Tail Pit) which are not considered as fish habitat in offsetting plans and thus not planned to be monitored for fish use under compliance programs.

Due to the extended timeframe for this project compared to others (field work 2025+), specific researchers and methods have not been identified at this point. However, following approval of the study topic by DFO as a complementary measure, steps could begin to be taken towards preliminary project objectives to be completed in the years prior to commencement of field work, such as initial literature reviews and methods development.

2.3.3.2 Objectives

Characterize fish use of new pit lake habitat in relation to habitat and water quality variables, and particularly in relation to reference systems.

2.3.3.3 Methods

To be determined in consultation with the identified research team. Likely to include literature review and field assessment in multiple flooded pit areas at the Meadowbank site. Potential to collaborate across sites with other interested industry partners.

2.3.3.4 Timeline

Flooding of pits at the Meadowbank site is currently planned to be complete in between 2027 - 2029 (Phaser, Vault, and Whale Tail Pits), after which time field studies could begin. Initial literature reviews and methods development could occur in the years prior to pit reflooding, or Agnico could collaborate with other industry partners if appropriate sites are available in other locations in the nearer term.

2.3.3.5 Project Deliverables

Since significant uncertainty exists in the literature and between fisheries biologists regarding potential for fish use of habitat in flooded pit lakes, this research would help to provide a better foundation for assessing long-term impacts of development projects in the north on local fish populations.

2.4 EDNA METHODS DEVELOPMENT

2.4.1 Introduction

eDNA methods present a potentially useful tool for rapid and non-invasive assessments of fish communities, but have not been significantly developed or validated for Arctic systems. With their relatively low biodiversity and frequently isolated populations, Arctic lakes present a compelling location for eDNA research.

Since assessments of fish communities are conducted frequently for monitoring, fishout, or research purposes across the Meadowbank site, there are regular opportunities to pair eDNA analyses with data from traditional surveys, or to develop stand-alone research studies. Agnico is very interested in developing tools for estimating fish abundance and biomass, as well as furthering field tests for determining species presence/absence.

As a complementary measure for the Whale Tail Pit project, Agnico is proposing to provide partial support for the University of Manitoba COGRAD group's project on development and optimization of non-invasive monitoring tools based on DNA metabarcoding technology to measure fish species assemblage in Canada's Eastern Arctic Kivalliq Region of Nunavut. This project is currently being supported in part by the KIA, and in 2017 Agnico provided transit and accommodation onsite for two researchers to conduct an initial field reconnaissance and sample collection. The background, preliminary objectives, methods, and deliverables of this project as provided by the COGRAD research group are described below.

2.4.2 Background

It is necessary to efficiently monitor water quality and assess fish species distributions in aquatic ecosystem for their effective management and conservation. Traditional monitoring techniques which rely on physical identification of species remain problematic due to non-standardized sampling methods, cost, labour intensity, and their invasive nature. Traditional methods become even more difficult in remote Arctic areas. Hence, there is an urgent need for alternative, efficient and customized techniques for large-scale monitoring of fish populations.

Recently, the environmental DNA (eDNA) method for the direct detection of specific DNA from water has been recognized as a powerful tool for monitoring aquatic species. eDNA– defined as: genetic material obtained directly from environmental samples without any obvious signs of biological source material – is an efficient, non-invasive and easy-to-standardize sampling approach. Coupled with sensitive, cost/field time-efficient and ever-advancing DNA sequencing technology, it may be an appropriate candidate for the challenge of biodiversity monitoring in remote Arctic areas.

2.4.3 Objectives

The main goal of this project is to develop and optimize monitoring tools based on eDNA metabarcoding technology to assess fish species assemblages in in Canada's Eastern Arctic Kivalliq Region of Nunavut and population changes near the Amaruq mine site.

Objectives are:

1. Development and optimization of the eDNA metabarcoding technique adapted for arctic and mining environment aiming the Amaruq site and utilizing the method as a substitute for current fish species determination approaches.

2. Producing guidelines for handling and analyzing of samples and deliver the method and provide training to the local community.

3. Produce long-term reliable and precise baseline data on the distribution of aquatic associated fish species in the Amaruq mine site lakes using developed eDNA technology.

4. Producing data on the physiochemical properties of the lake water including dissolved mineral content to understand if any changes in stated parameters affect the eDNA/fish assemblage results.

5. Examine the impact of flooding Whale Tail Lake South Basin with the coincident changes in physiochemical properties of the aquatic area (e.g., increase in turbidity, dissolved solids) on the fish population using developed eDNA technique.

6. Collecting baseline eDNA and water quality data on lakes nearby Amaruq mine site outside the mining activity (potential candidates include B3 or DS1) and use them as a control for population changes.

2.4.4 Methods

We are proposing a 5-year plan that would involve development and utilizing eDNA metabarcoding approach in order to measure fish assemblage in the Amaruq areas. Environmental DNA metabarcoding technology will be developed and optimize to detect fish species including Arctic Char, Arctic Grayling, Lake Trout, Cisco, Round Whitefish, Burbot, Slimy Sculpin, Ninespine Stickleback, Hybridized Lake Trout/Arctic Char and analyze their relative abundances. For water quality data, temperature, pressure, dissolve oxygen, pH, salinity, conductivity, and dissolved metals including Cu/ Zn/ Cd/Fe/Hg/Mn will be measured (some metrics may be obtained through regular compliance monitoring programs).

Water samples for all parameters will be collected through three sampling period in each year; at melt, midsummer, and immediately prior to freeze up. First round of sampling was done before mining activity starts (July 2017). The second round of sampling will be done at the start and during mining operation and the final round of sampling will be done after mining operations have ceased. The result will be used to assess the influence of mining activity on changes in fish species populations, as measured through eDNA methods.

2.4.5 Timeline

This project is currently proposed to occur over an additional three year field study period (2017 – 2020), and a five-year total time frame.

2.4.6 Project Deliverables

Once optimized for mining restoration, eDNA metabarcoding could allow industry specialists to identify indicators of successful restoration and evaluate restoration with greater frequency and spatial resolution. In addition, biological recovery may be tracked over multiple mining sites to determine if there is a predictable trajectory. This opens up the possibility of effective adaptive management, informing researchers and industry specialists when intervention may be necessary to achieve restoration goals.

Education and training of the local community on collection, storage, shipment of samples to the U of M is a priority, and will be provided by members of the U of M. COGRAD commits to support, involve, or engage Indigenous organizations in this project. We intend to install a rigorous Field Sampling Protocol and to train and educate local people to assist in the project. In addition, we will establish a team at the U of M composed of fish experts (Department of Biological Science) in conjunction with Analytical Chemists (MCAL) and experts in remote sensing.

2.5 LEVEL OF SUPPORT, STUDY TIMELINES, AND DURATION

For each proposed project, the level of support provided by Agnico may differ. Based on initial consultation with each researcher and the funding available as determined by the cost estimate provided to DFO (March, 2018), the estimated value of Agnico's contributions for each study are shown in **Table *1***.

Table 1. Estimated value of direct monetary and in-kind support to be provided by Agnico Eagle for each complementary measure (research project) proposed as fish habitat offsetting for Whale Tail Pit[2].

Project	Researcher[3]	Type of Support	Study Start Date	Study Duration	Estimated Contribution (rounded)[4]
Changes in Aquatic Productivity	Dr. Heidi Swanson, University of Waterloo	Full funding	Summer 2018	3-4 years	$100,000
Baker Lake Wastewater Assessment	Dr. Rob Jamieson, Dalhousie University (et al.)	Partial funding – industrial partner in NSERC CRD (application to be submitted)	Summer 2018	5 years	$630,000
Lake Fish Habitat Preferences	Dr. Susan Doka, DFO Science (et al.)	Mainly in-kind support	Summer 2018	2 years	$50,000
Arctic Grayling Occupancy Modelling	Dr. Heidi Swanson, University of Waterloo	Full funding	Summer 2018	3 years	$150,000
Pit Lake Habitat Assessment	TBD	TBD	TBD	5 years	$450,000
eDNA Methods Development	University of Manitoba COGRAD group	Partial funding	Summer 2018/2019	3-5 years	$240,000
TOTAL Contributions (as calculated through LOC)					$1,618,046.22

2.6 MFRAG, PLAN REVIEW AND UPDATES

A Meadowbank Fisheries Research Advisory Group (MFRAG) will be established to review and approve any changes to research projects proposed under the Fish Habitat Offsetting Plan for Whale Tail Pit. This group will include DFO, Agnico Eagle, KIA, HTO and a third party research advisor. The MFRAG will meet annually to review project progress reports, propose and approve or reject new projects or project components, and assess whether criteria for success have been met.

[2] The contributions are based on the most current available information and may be subject to change. The total Agnico Eagle contribution will be prescribed by DFO, in accordance with agreed upon LOC calculations

[3] Partnerships with KIA, Baker Lake hamlet and DFO are established for respective projects.

[4] Funding is an estimate. Agnico Eagle expects funding to be leveraged by researchers and their respective institutions through additional grant applications. As a result, based on previous experience, it is possible that total project expenditures could double, benefiting the researchers and research projects.

This plan describing complementary measures for Whale Tail Pit fish habitat offsetting will be updated annually to reflect changes and progress in research projects and to track project funding to date.

AGNICO EAGLE

WHALE TAIL PIT

Fish Habitat Offset Monitoring Plan

Prepared by:
Agnico-Eagle Mines Limited – Meadowbank Division

Version 1
March, 2018

EXECUTIVE SUMMARY

General Information

This Fish Habitat Offset Monitoring Plan (FOMP) defines the sampling methods and criteria for success of the fish habitat offsetting features described in the Fish Habitat Offsetting Plan for Whale Tail Pit (March, 2018).

Record of Changes

A record will document all significant changes that have been incorporated in the FOMP subsequent to the latest review. The record will include the names of the persons who made and approved the change, as well as the date of the approval.

Distribution List

Agnico Eagle Mines Limited will maintain a distribution list for the FOMP, providing information about all parties that receive the plan including mine personnel, departments, and outside agencies.

IMPLEMENTATION SCHEDULE

The implementation schedule for this plan is effective immediately subject to any modifications proposed by DFO as a result of the review and approval process.

DISTRIBUTION LIST

AEM - Environmental Superintendent

AEM – Environmental Coordinator

AEM – General Mine Manager

AEM – Site Services Superintendent

AEM – Field Services Supervisor

AEM – Engineering Superintendent

DFO Arctic Region Representative

DOCUMENT CONTROL

Document Control

Version	Date (YMD)	Section	Page	Revision
Draft	2017/06/15	All	All	Initial document
1	2018/03/27	All	All	Update based on DFO consultation on offsetting concepts

Version 1

Prepared By: Meadowbank Environment Department

Approved By: ______________________________

Ryan Vanengen
Environmental Permitting Lead – Amaruq Project

TABLE OF CONTENTS

LIST OF TABLES

SECTION 1 • INTRODUCTION

1.1 BACKGROUND

Since 2010, Agnico Eagle Mines Limited (Agnico) has operated the Meadowbank Gold Mine, approximately 70 km north of the hamlet of Baker Lake, Nunavut. In 2016, Agnico submitted applications to the Nunavut Impact Review Board and Nunavut Water Board to permit the construction and operation of the Whale Tail Pit satellite deposit on the Amaruq site.

Since mining activities related to Whale Tail Pit are planned to result in serious harm to fish as described under Section 35 of the *Fisheries Act*, Agnico is applying to Fisheries and Oceans Canada (DFO) for an authorization under Subsection 35(2) of the Act. To support this application, a Fish Habitat Offsetting Plan for Whale Tail Pit has been developed, which quantifies losses to fish habitat that are expected to occur, and describes the habitat gains that will be achieved through fish habitat offsetting measures. Further, this Fish Habitat Offset Monitoring Plan has been developed to describe the specific monitoring program that will be implemented to determine the effectiveness of fish habitat offsetting features and confirm when offsets have reached full functionality.

Existing authorizations for the Meadowbank site under *Fisheries Act* Section 35 include NU-03-0190 (streams along the Meadowbank All Weather Access Road), NU-03-0191.3 (Second and Third Portage Lakes), NU-03-0191.4 (Vault Lake), NU-08-0013 (Western Channel), and NU-14-1046 (Phaser Lake). These authorizations are supported by the 2012 No Net Loss Plan for the Meadowbank Site, and the 2016 Fish Habitat Offsetting Plan for Phaser Lake, as well as the 2017 Habitat Compensation Monitoring Plan for the Meadowbank Site.

Overall, the monitoring approach for Whale Tail Pit offsets has been developed based on methods that are consistent with those used since 2009 on the Meadowbank site (as described in the 2017 Habitat Compensation Monitoring Plan) and to enhance regional understanding of fish, fish habitat, ecosystem function and productivity. These include structural assessments of constructed features, as well as monitoring of water quality, periphyton growth, and fish use. Further, these endpoints are consistent with Traditional Knowledge concerns related to protecting fish, fish habitat and ensuring clean water (Whale Tail Pit FEIS Appendix 7-A: IQ Baseline, Agnico Eagle 2016).

1.2 OBJECTIVES

The majority of required habitat gains for Whale Tail Pit offsetting are planned to be achieved through habitat creation and enhancement efforts. These include:

- re-flooding of the de-watered Whale Tail Lake - North Basin following construction of habitat enhancement features (shoals);

and

- maintaining an elevated water level in Whale Tail Lake compared to baseline conditions;

In order to ensure that offsets are functioning fish habitat as intended and projected through Traditional Knowledge workshops, assessment of the structure and successful utilization of these features by fish are the primary goals of the monitoring program for habitat enhancement/creation offsets.

The overall objectives of this plan are:

a. To describe physical and ecological monitoring methods for each feature
b. To describe the quality assurance and control measures to be included in the monitoring program
c. To define the criteria for success
d. To present the monitoring frequency and reporting schedule

In addition to the constructed habitat offsetting features to be monitored through this plan, a portion of offsetting for Whale Tail Pit will be provided through development and coordination of a suite of complementary measures (research projects). No physical monitoring is conducted in relation to research projects, so they are referred to minimally in this plan (refer to Fish Habitat Offsetting Plan for Whale Tail Pit, March, 2018 for full descriptions of complementary measures). However, progress monitoring will be incorporated in each research project to document annual activities, and that component is described here along with criteria for success.

SECTION 2 • SUMMARY OF OFFSETTING MEASURES

The following constructed features will create or enhance fish habitat to offset losses occurring in the North Basin of Whale Tail Lake. Complementary measures included in the offsetting plan area also summarized. Further details for each are provided in the Fish Habitat Offsetting Plan for Whale Tail Pit (March, 2018).

2.1 ROCK SHOALS

Placement of rock material to change lake basin substrate from fine or mixed to coarse (i.e. the creation of rock shoals) is the most commonly used enhancement technique. This offsetting measure will occur in the dewatered area of Whale Tail Lake – North Basin outside of the pit, with the work conducted prior to reflooding.

Roads, jetties and other features will be scarified or converted to coarse substrate as necessary, prior to closure. A pit sill cap of coarse rock material will also convert fine substrate to coarse in areas where coarse substrate did not already exist. In addition, a network of shoals (termed grid shoals based on their conceptual design pattern) will convert half of the southern area of the North Basin to higher-value habitat.

2.2 CONSTRUCTED SILL AND ELEVATED WATER LEVEL

During the operations period when Whale Tail Lake – North Basin is dry, a permanent water control structure (sill) will be constructed just upstream of Mammoth Dike. Once the Whale Tail Dike is breached and flows resume its natural direction through Mammoth Lake, this feature will ensure that water levels in Whale Tail Lake and connecting channels remain at 1 m higher than baseline conditions. It is estimated that a 1 m increase in water levels upstream of the Mammoth Dike would create approximately 46.6 ha of new aquatic habitat.

2.3 COMPLEMENTARY MEASURES

A suite of complementary measures (research projects) is proposed to include:

- Assessment of changes in aquatic productivity and fish populations due to flooding of Whale Tail South and downstream lakes during operations
- Assessment of impacts of the Baker Lake wastewater outflow on aquatic systems including fish and fish habitat
- Literature review and field validation of northern lake fish habitat preferences
- Arctic grayling occupancy modeling
- Pit lake habitat use assessment
- eDNA methods development

SECTION 3 • MONITORING METHODS

3.1 HABITAT ENHANCEMENT/CREATION FEATURES

As in the Habitat Compensation Monitoring Plan for the Meadowbank site, both physical and ecological components are included in the offset monitoring plan, to record whether each feature is constructed and is functioning as intended.

The assessment of habitat features incorporates monitoring methods with specific quantitative criteria for success (physical structure, interstitial water quality), as well as complementary “qualitative” tools (periphyton growth and fish use). All lines of evidence are then integrated in a weight-of-evidence approach to make the final determination regarding habitat feature functionality.

The proposed type and schedule of monitoring is described for each feature in Table 3 and 4, and details for each monitoring component are provided below.

3.1.1 Physical Structure Monitoring

Since the habitat evaluation procedure focuses on quantifying losses and gains to habitat, based on physical characteristics (area, depth and type of substrate), physical structure is arguably the most important component to monitor in cases where habitat offsets are derived from constructed features (such as reefs or boulder gardens).

All habitat structures constructed as offsets will be assessed post-construction to determine whether they meet the assumptions of the offsetting plan. These include area, depth and substrate characteristics. For each feature, a comparison will be made to the specifications described for these characteristics, to determine whether expected physical habitat gains are achieved in the as-built state (i.e. to confirm features were constructed as planned).

In addition to the analysis of depth, area, and substrate in the dry basins, structural integrity will be qualitatively assessed after re-flooding, to record any movement occurring during this process.

Methods of evaluation will depend on the specific offsetting feature, and are detailed in Tables 3 and 4. Depending on the feature, these methods may include:

On-the-ground photos – photos will be taken of the compensation feature pre-, during and post-construction.

Aerial photos or PhotoSat Imagery – will be taken of dry basin just prior to re-flooding, to compare areal extents of compensation features with offsetting plan predictions. Differences will be estimated visually or by GIS.

Visual observation – conducted to ground-truth substrate types for confirmation in air photos.

Field survey – conducted in the dry to determine depth-below-surface of offsetting features.

Underwater video – conducted post-flooding to qualitatively examine structural integrity of constructed features.

Results will be recorded for each feature and compared to the associated offsetting plan estimate, making use of the example provided in Table 3.

Analysis of the physical components will occur in the dry for features constructed in the de-watered basin, in order to facilitate ground-truthing of substrate and total area. This analysis will occur just prior to re-flooding, such that features are in their final condition. As-built reports will first be consulted to determine if the required information is available.

3.1.2 Ecological Monitoring

Ecological monitoring elements include interstitial water quality, open basin water quality, periphyton community biomass and fish use.

3.1.2.1 Interstitial Water Quality

Modeling during the EIA process did not indicate that metals leaching from quarried rock used to construct dikes and roads would significantly impact the aquatic environment. Nevertheless, interstitial water quality of constructed habitat offsetting features will be assessed to verify these predictions.

In order to collect a representative sample from the bioactive zone between the rocks, an electric diaphragm pump with food-grade silicon tubing is used. If possible, samples will be taken at depths between 1 and 4 m, and analyzed in an accredited laboratory for total suspended solids, and total and dissolved metals. Results will be compared to background concentrations, CCME guidelines where available, or CREMP threshold values. Locations and schedules for interstitial water quality sampling are described in Table 4.

3.1.2.2 Open Basin and Pit Water Quality

Modeling during the EIA process indicated that water quality in the re-flooded pit and lake basin would be suitable for aquatic life during the post-closure period. Although the pit area is not included as habitat, the re-flooded adjacent basin areas form part of habitat offsetting for Whale Tail Pit. Water quality within both the basin and the pit will be monitored as the pit re-fills and after breaching of the dike as part of NWB Type A Water License requirements under the site's Water Quality and Flow Monitoring Plan (during operation, closure and post-closure) and Core Receiving Environmental Monitoring Plan. Specific monitoring locations within the Whale Tail Lake North Basin will be determined by experienced field technicians.

According to the Water Quality and Flow Monitoring Plan, these assessments will occur 4x per year, and parameters to be monitored include:

Total and dissolved metals: aluminum, antimony, arsenic, boron, barium, beryllium, cadmium, copper, chromium, iron, lithium, manganese, mercury, molybdenum, nickel, lead, selenium, tin, strontium, titanium, thallium, uranium, vanadium and zinc

Nutrients: Ammonia-nitrogen, total kjeldahl nitrogen, nitrate nitrogen, nitrite-nitrogen, ortho-phosphate, total phosphorous, total organic carbon, total dissolved organic carbon and reactive silica

Conventional Parameters: bicarbonate alkalinity, chloride, carbonate alkalinity, conductivity, hardness, calcium, potassium, magnesium, sodium, sulphate, pH, total alkalinity, TDS, and TSS, turbidity;

Total cyanide and free cyanide: If CN total is detect above 0.05 mg/L in an analysis result for monitoring station in receiving environment; further analysis of CN WAD will be triggered.

In addition to the above monitoring under the Water Quality and Flow Monitoring Plan, supplemental monitoring that will inform fish habitat offsetting will be conducted as a component of the Core Receiving Environment Monitoring Plan (CREMP). This analysis will generally follow methods established in the CREMP: 2015 Update – Whale Tail Pit Addendum (May, 2016).

These supplemental analyses will include vertical depth profiles of temperature, DO and conductivity to a representative depth. Secchi depth and surface pH will also be determined at each sampling location. In addition to the list of water quality parameters above, water samples will be collected to assess organic parameters (chlorophyll-α, dissolved and total organic carbon).

Water samples will be collected from approximately 3 m depth by pumping lake water using weighted flexible (food-grade silicone) tubing, and a diaphragm pump connected to a 12 volt battery. An inline filter is connected to the end of the outflow tube when filling bottles for dissolved metals and dissolved organic carbon analyses.

Results of water quality monitoring will be compared to background concentrations, CREMP trigger or threshold levels, CCME guidelines where available, and any site-specific criteria. General locations and schedules for open basin water quality sampling are described in Table 4.

3.1.2.3 Periphyton Growth

The periphyton community consists of a collection of microorganisms, including algae, that grow attached to or in very close proximity to submerged substrate. Colonization of the community occurs over time, with rates depending on nutrient and light availability. Periphyton is an important food source for benthic invertebrates, so colonization will be monitored to ensure that quarried rock substrate provides habitat that is as suitable at this level of the food chain as natural substrate.

Periphyton sampling for habitat assessments will be carried out in the same manner as described in the Whale Tail CREMP (Azimuth, 2016), and Habitat Compensation Monitoring Plan for the Whale Tail Site.

Periphyton Samplers: Briefly, a specialized scrubber will be used to collect periphyton samples from a prescribed area of rock face, in order to calculate cell density and/or biomass (µg/cm^2). This method will be appropriate to assess growth of periphyton in the flooded littoral zone.

Underwater Video: For deeper areas (constructed shoals) underwater video will be used to make qualitative assessments of periphyton growth.

Results will be compared to reference sites, baseline data, and/or historical monitoring programs. Locations and schedules for periphyton sampling are described in Table 4.

3.1.3 Fish Use

In accordance with DFO's "Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting" (November, 2013), monitoring of fish use in the reflooded Whale Tail Lake will aim to demonstrate that the system has reached full ecological functionality (i.e. supports fish reproduction, growth, and survival). Since the use of gill nets has historically been found to result in elevated incidences of mortality, electrofishing, angling and underwater camera techniques were proposed in 2014 for the Meadowbank site, used during baseline data collection in 2016 and will continue to be used to establish fish presence around the constructed habitat features and in the open basin of Whale Tail Lake. Catch per unit effort and physical characteristics (species, length, weight, maturity, sex) will be recorded and compared to reference areas and/or historical results, as the dataset allows. Use of hydroacoustic surveys may also be employed to assess fish presence within the north basin of Whale Tail Lake.

If these techniques are not successful, a DFO representative will be contacted and the use of gill nets may need to be included. It is estimated to be likely that use of gill nets will be required to demonstrate that DFO's criteria for success related to full ecological functionality have been met, since catch through angling is typically low, and quantitative assessments of growth are not feasible using underwater camera work. Locations and schedules for monitoring of fish use are provided in Table 4.

3.2 COMPLEMENTARY MEASURES

Progress reports for each research project will be provided annually to DFO (see Section 7) from study initiation until criteria for success are met. Results of the offsetting monitoring will be shared on an annual basis with the Meadowbank Fisheries Advisory Group to further mutually inform research projects and future monitoring programs.

SECTION 4 • FREQUENCY

The initial planned sampling schedule and general locations of monitoring for each feature are described in Table 4. Specific sampling locations will be determined in the field by a qualified environment technician or biologist. Monitoring will be conducted at a minimum for the time period specified in Table 4, and may be continued if criteria for success are not met within this time frame.

SECTION 5 • QA/QC

The following QA/QC procedures are presented for general consideration, and primarily apply to assessments of habitat enhancement features. QA/QC procedures for research programs will be encouraged by Agnico but will ultimately be determined by academic partners based on individual project components.

5.1 LABORATORY QA/QC

Water Quality – Data Quality Objectives (DQOs) are numerically definable measures of analytical precision and completeness. Analytical precision is a measurement of the variability associated with duplicate analyses of the same sample in the laboratory. Completeness for this study is defined as the percentage of valid analytical results. Duplicate results will be assessed using the relative percent difference (RPD) between measurements.

The laboratory DQOs for this project are:

Analytical Precision = 25% RPD or less for concentrations that exceed 10x the method detection limit (MDL).

Completeness = 95% valid data obtained.

Periphyton Community – Laboratory analyses for periphyton samples will be conducted by experienced scientists following a standardized procedure (i.e., quality assurance). Internal quality control samples (e.g., duplicate counts) will be included to document analytical variability.

5.2 FIELD QA/QC

Water Sampling – Field QA/QC standards during water sampling will be maintained for every sample. The standard QA/QC procedures include thoroughly flushing the flexible tubing and pump to prevent cross-contamination between stations and thoroughly rinsing the sample containers with site water prior to sample collection. Trip blanks and field duplicates will be collected (approximately 1 per 10 samples). Field duplicates assess sample variability and sample homogeneity; a RPD of 50% or less for concentrations that exceed 10x the MDL is considered acceptable.

Periphyton Community – Standard procedures will be used to collect biota samples. All sampling gear will be thoroughly rinsed between sampling stations to ensure that there was no inadvertent introduction of biota from one station to another. A field duplicate will be collected for phytoplankton at one sampling station per sampling event to assess sampling variability and sample homogeneity. Due to large natural variability and the qualitative nature of this component, no specific RPD acceptability criterion is recommended for density and biomass.

Fish Use – These study components will be conducted in accordance to the general practices listed previously. All relevant spatial and depth information will be recorded. Fish biological data will be recorded as will reference spatial information. Field notebooks or field sheets will be used to compile notes and observations relevant to the studies. Fishing will be carried out by experienced technicians or biologists who are very familiar with this kind of work. Video/photo survey data will be conducted carefully to provide representative images of target communities. All relevant spatial and depth information will be recorded and identified by the time stamp (or photo number) and tape number (or memory card number).

SECTION 6 • CRITERIA FOR SUCCESS

6.1 HABITAT ENHANCEMENT/CREATION FEATURES

Criteria for success for habitat offsetting are aimed at demonstrating fish presence, survivorship and full ecological functionality of the system (i.e. reproduction, growth, survival of fish). Specific criteria have been established for physical structure, water quality, and fish use to determine whether these conditions have been met. However, as described in Agnico's 2008 HCMP, a weight-of-evidence approach will continue to be used to determine whether habitat offsetting features are functioning as intended overall, and to make decisions regarding offsetting achievements.

The following specific success criteria will be used prior to integrating data in a weight-of-evidence evaluation of habitat enhancement or habitat creation offsetting projects.

6.1.1 Physical Structure

In order to provide the required habitat gains, constructed features should meet the specifications described for area, depth and substrate in the offsetting plan. Where specifications are not met, the total habitat units afforded by the feature in its as-built state will be calculated. If there is a deficiency in habitat units site-wide, DFO will be consulted.

6.1.2 Interstitial Water Quality

Water chemistry results will be compared to reference locations and CCME water quality guidelines as available. If necessary, follow-up sampling will be conducted as soon as practical during ice-free conditions. If water quality criteria do not meet background or CCME guidelines after two monitoring events, risk-based toxicity reference values will be compared, and additional testing, such as laboratory toxicity tests will be considered. Because onsite experience and HCMP dike face monitoring results to date at Meadowbank indicate that adverse effects are unlikely, any additional testing would be determined in consultation with DFO if required. Criteria for success will be maintenance of acceptable water quality conditions for aquatic life according to the above comparisons throughout three sequential monitoring events.

6.1.3 Open Basin Water Quality

In post-closure, water quality in the fully flooded Whale Tail Pit and Whale Tail Lake (North Basin) are predicted to be relatively constant throughout the year, and there are no predicted exceedances of the CEQG-AL criteria or the site specific water quality objective (SSWQO) developed for arsenic during the FEIS phase. Water quality will be suitable for overflow to Mammoth Lake, assuming that diffusion from the pit wall rock will not occur, nor any exchanges between the Whale Tail Pit and above lake water. As per NWB Type A

Water Licence requirements, a site wide water balance will be updated as part of the annual water management plan and end pit water quality modelling will be conducted to update these predictions. Dikes will not be breached to allow fish entry until water quality in the flooded area meets CEQG-AL, baseline concentrations, or appropriate SSWQOs in accordance with the NWB Type A. Specific criteria for success related to water quality to allow breaching of the Whale Tail Dike and entry of fish into the North Basin area will be determined in consultation with NWB (including DFO) and KIA, upon submission of the final closure plan.

Water quality within the open basin following breaching of the dike will be monitored in accordance with NWB Water License requirements. The criteria for success from a fish habitat offsetting perspective will be maintenance of acceptable water quality conditions for aquatic life according to these programs throughout three sequential monitoring events.

6.1.4 Periphyton Community

Since lakes in the Meadowbank region are ultra-oligotrophic and ice-covered for the majority of the year, periphyton development is expected to be slow. Results from monitoring of habitat features at the Meadowbank site (East Dike) demonstrate that periphyton biomass is not fully established to baseline values within 5 years following construction, although year-over-year improvements are considerable. Since periphyton growth has been extremely variable in reference sites historically (Azimuth, 2008), no specific quantitative criteria for success for this metric are proposed. However, within the weight of evidence assessment, periphyton measurements should document increases in biomass between monitoring events, and a trend towards reaching baseline biomass density.

6.1.5 Fish Use

According to DFO's "Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting" (November, 2013), monitoring of offsetting measures must be designed to confirm that serious harm to fish has been effectively counterbalanced. As a result, criteria for success for fish use are aimed at demonstrating presence, survivorship and full ecological functionality of the system (i.e. fish reproduction, growth, survival). Specifically, to establish success for Whale Tail Lake – North Basin, fish of each expected species from baseline studies will be documented as present in a natural range of sizes (for large bodied fish) around habitat features within the re-flooded area. Comparisons will generally be made to appropriate reference sites. Reproduction will be determined through observations of fry or specific assessments of spawning activities within the reflooded area, such as night-time visual searches for spawning events. If used, hydroacoustic surveys will demonstrate that fish populations in the Whale Tail North basin area (i.e. not the pit area, as that is not considered habitat) have a similar abundance, biomass or otherwise appropriate endpoint to reference areas in Whale Tail South Basin or reference lake. Criteria for success for all metrics related to fish use will be demonstration of the above-described conditions for three sequential monitoring events.

6.2 COMPLEMENTARY MEASURES

The main goal for all complementary measures is publication of research or methods development studies in the peer-reviewed literature (one or more publications per study). However it is recognized that not all factors affecting outcomes of research projects and suitability of studies for such publication are within the control of Agnico, academic partners, or DFO. As a result, in certain instances, peer-reviewed publication may not be a viable route for dissemination of knowledge gained through these projects. In such cases, Agnico suggests discussions be undertaken between researchers, DFO, and Agnico to determine a mutually agreeable solution (e.g. conference presentations, inter-agency workshops). Criteria for success of complementary measures are thus considered to be submission of one or more manuscripts per study for publication in a peer-reviewed journal.

SECTION 7 • REPORTING AND PLAN REVIEW

Annual reports describing activities conducted under this Fish Habitat Offset Monitoring Plan will be submitted with Agnico's Annual Report to the NIRB by March 31 of the following year. These will include monitoring related to constructed habitat offsets as well as progress reports on complementary measures.

The FOMP will be reviewed as required by the Meadowbank Environment Superintendent, and updated as necessary based on changes to mine site designs. All changes will be provided to DFO for approval as a revised document in the Annual Report.

SECTION 8 • REFERENCES

Agnico Eagle. 2016. Inuit Qaujimajatuqangit Baseline Report. Whale Tail Pit FEIS Appendix 7-A. June 2016.

Azimuth, 2008. Habitat Compensation Monitoring Plan, Meadowbank Gold Project. Prepared by Azimuth Consulting Group Inc. for Agnico-Eagle Mines Ltd. May, 2008.

Azimuth. 2016. Core Receiving Environment Program: 2015 Update. Whale Tail Pit Addendum. Prepared by Azimuth Consulting Group Inc., Vancouver, BC for Agnico-Eagle Mines Ltd., Vancouver, BC. May, 2016.

TABLES

Table 1. Estimated timeline for the construction of fish habitat offsets. Offsets will be realized once reflooding of Whale Tail North Basin occurs (est. 2027), dikes are breached (est. 2029), and criteria for success are met.

Lake	Feature Name	Date of Construction
Whale Tail Lake	Grid shoals	TBD - Prior to reflooding
	Road augmentation/scarification (shoals)	TBD - Prior to reflooding
	Mammoth Dike Sill	TBD - Prior to reflooding
	Whale Tail South - Flooded area	2019 - 2021

Table 2. Estimated timeline for complementary measures (research projects).

Project	Study Start Date	Estimated Study Duration
Changes in Aquatic Productivity	Summer 2018	3-4 years
Baker Lake Wastewater Assessment	Summer 2018	5 years
Lake Fish Habitat Preferences	Summer 2018	2 years
Arctic Grayling Occupancy Modelling	Summer 2018	3 years
Pit Lake Habitat Assessment	TBD	5 years
eDNA Methods Development	Summer 2017/2018	3-5 years

Table 3. Example comparison of designs and as-built physical properties of habitat compensation features.

Feature	Assessment Metric*	Method	Design	As-Built
Boulder garden	Area	Air photo	2.97 ha	3.5 ha
	Substrate	Visual observation	Coarse	Coarse (indicate actual grain size)
	Depth	Field survey	> 4 m	> 4 m
	Stability	Underwater video	-	Minor movement

*Area, depth, substrate type or stability

Table 4. Summary of monitoring methods, analytical parameters, sampling frequency and number of samples for habitat offsetting features to be monitored. Reflooding (F) is estimated to be completed in 2028, and the dike breached in 2029 (B). Construction (C) dates vary by feature, according to Table 1.

Feature	Component	Reason	Method	Parameters	Number of Samples	Sampling Schedule
Mammoth Sill	Structure	Design intent met	As-built designs Air photos Field survey of flooded zone	Area (ensure flooded area meets offsetting requirements)	-	F+1
		Stability	Visual assessment of sill	Qualitative observations	-	C+1 F+1
Basin	Open basin water quality*	Possible metals leaching, anoxia	Tube sampler Grab samples Depth profiles	Metals, nutrients, conventionals, cyanide, organic parameters. See Section 4.1.2.2	1 location within Whale Tail North Basin	4x/year, according to Type A Water License requirements (Water Quality and Flow Monitoring Plan). Additional according to CREMP.

Feature	Component	Reason	Method	Parameters	Number of Samples	Sampling Schedule
	Structure	Design intent met	Air photos Field survey	Area, substrate, depth zone	-	Prior to flooding
	Fish use	To confirm the presence, survivorship, growth, and reproduction of fish	Angling Electrofishing Underwater motion camera Hydroacoustic survey Spawning surveys Gill nets if necessary	CPUE Physical characteristics Length-weight; meristics data on incidental mortalities Total abundance Presence of spawning	TBD by field staff and results	B+1, 3, 5, 10
Roads & Grid Shoals	Structure	Design intent met	Air photos Field survey	Area, substrate, depth zone	-	Prior to flooding
		Stability	Underwater camera	Qualitative observations	Representative transects TBD by field staff	F+2
	Interstitial water	Possible metals leaching	Tube sampler	TSS Total and dissolved metals	3 locations	B+1, 3, 5, 10
	Periphyton	Base of food chain	Underwater camera	Qualitative observations	Representative transect TBD by field staff	B+1, 3, 5, 10
	Fish use	To confirm the presence, survivorship,	Angling	CPUE	One location TBD by field staff	B+1, 3, 5, 10

Feature	Component	Reason	Method	Parameters	Number of Samples	Sampling Schedule
		growth, and reproduction of fish	Underwater motion camera Gill nets if necessary	Physical characteristics		
Flooded zone	Periphyton	Base of food chain	Periphyton sampler	Biomass	Four representative locations in flooded zone TBD by field staff – two in north basin and two in south basin	B+1, 3, 5, 10
	Fish use	To confirm the presence, survivorship, growth, and reproduction of fish (small bodied fish in new flooded littoral zone)	Minnow traps, if possible Visual assessments	Length/weight, relative abundance Presence/absence	Four representative locations in flooded zone TBD by field staff - two in north basin and two in south basin	B+1, 3, 5, 10

*Monitoring and sampling protocols will be further developed and conducted as a component of Water Quality and Flow Monitoring Plan and CREMP, and will be conducted throughout the post-closure period; this duration will be determined in the final Reclamation and Closure Plan, to be submitted to NWB 1 year prior to closure.

APPENDIX I TECHNICAL MEMORANDUMS DOWNSTREAM EFFECTS

GOLDER

TECHNICAL MEMORANDUM

DATE 24 October 2019 **Project No.** 19127573-403-TM-Rev1

TO Manon Turmel
Agnico Eagle Mines Limited

CC Cameron Stevens

FROM Jenna Pearse, Julien Lacrampe **EMAIL cameron_stevens@golder.com**

WHALE TAIL PIT EXPANSION PROJECT: RESPONSE TO TECHNICAL COMMENT DFO 3.4

1.0 BACKGROUND

The Department of Fisheries and Oceans (DFO) requested additional information from Agnico Eagle Mines Limited (Agnico Eagle) related to Agnico Eagle's response to Technical Comment DFO 3.4 submitted to DFO in May 2019 as part of the Whale Tail Pit Expansion Project (the Project) regulatory review (Agnico Eagle 2019a,b). During the NIRB public hearing in Baker Lake (August 26-29, 2019), Agnico Eagles commitment to provide the requested information was recorded as Commitment #33.

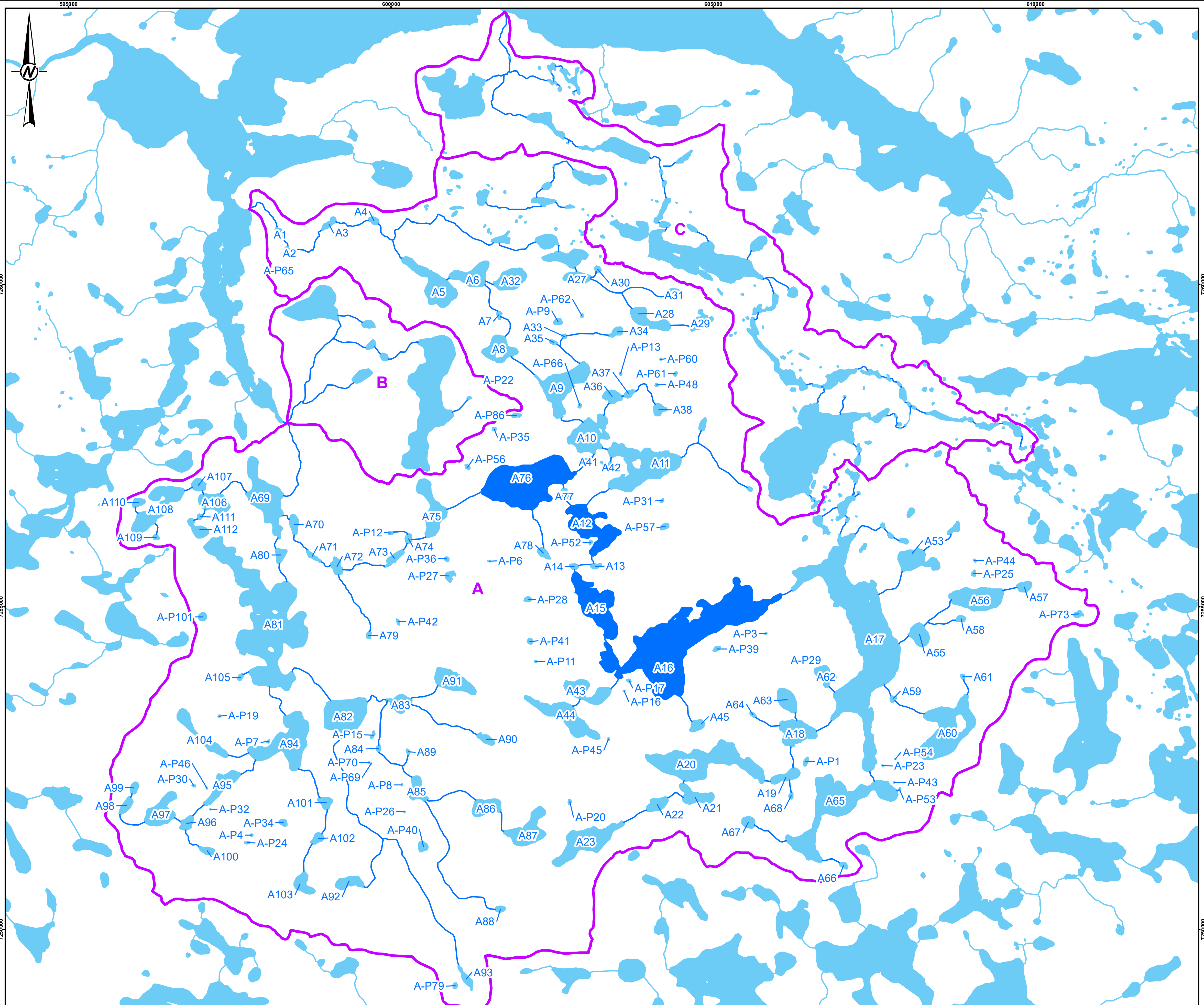
DFO specifically requested an estimate of the Project's potential impacts on the surface water areas and volumes of downstream lakes during closure when the Whale Tail Lake North Basin is being refilled (2026 to 2042). These impacts are further discussed in Volume 6 of the Project's Final Environmental Impact Statement (FEIS) Addendum (Agnico Eagle 2018). This technical memorandum summarizes the methods and results to address DFO's request. The expectation is that the results will be integrated as part of the final offsetting plan for the Project.

2.0 METHODS

The hydrological assessment was completed on the lakes immediately downstream of the Project, including Lake A16 (Mammoth Lake), Lake A15, Lake A12, and Lake A76, downstream of which, the potential impacts of the Project on surface water quantity are expected to diminish rapidly in the downstream direction (Agnico Eagle 2018). The present assessment does not consider potential mitigation to reduce the magnitude of downstream changes on hydrology during closure, if identified as a requirement for closure planning purposes. The assessed lakes are shown in Figure 1.

The hydrological assessment was completed using the following methods:

- The assessment considered the closure period, during which the impacts of the Project on surface water quantity are expected to be the greatest, from the Project's closed-circuited activities resulting in reduced contributing areas at downstream lakes.
- The potential impacts on mean monthly lake depths provided in the FEIS Addendum (Agnico Eagle 2018) were applied to the bathymetry of the assessed lakes, available from the FEIS (Lake A16 [Mammoth Lake]), or collected in September 2019 by Portt and Associates (Lake A15 and Lake A12) and by Azimuth Consulting Group (Lake A76). Bathymetric data were supplemented by Light Detection and Ranging (LiDAR) data.



LEGEND

- ASSESSED LAKE
- WATERSHED
- STREAM
- WATERCOURSE (CANVEC)
- WATERBODY (CANVEC)

0 1,200 2,400

1:60,000 METRES

REFERENCE(S)
1. HAUL ROAD OBTAINED FROM AGNICO EAGLE MINES LIMITED. 2015-10-14 FROM 6103-117-230-200_R0.DWG
2. WATERCOURSE AND WATERBODY DATA OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14

CLIENT
AGNICO EAGLE
AGNICO EAGLE MINES LIMITED: MEADOWBANK DIVISION

PROJECT
WHALE TAIL PIT - EXPANSION PROJECT

TITLE
STUDY LAKES FOR THE ASSESSMENT OF DOWNSTREAM IMPACTS ON LAKE SURFACE AREA DURING CLOSURE

CONSULTANT
GOLDER

YYYY-MM-DD	2019-10-17
DESIGNED	JL
PREPARED	CDB
REVIEWED	JL
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
19127573	2000/2020	0	1

3.0 RESULTS

The results are presented for the 2-year (median, representing both wet and dry conditions), 10-year dry, and 10-year wet return periods in the sub-sections below. The storage characteristics of each lake, derived from the bathymetric data to support this assessment, are provided in Attachment 1.

3.1 2-Year Return Period

The derived mean monthly water levels, surface areas, and volumes are shown for the months of June, July, August, and September for each lake under baseline and closure conditions, in Table 1 (Lake A16 [Mammoth Lake]), Table 2 (Lake A15), Table 3 (Lake A12), and Table 4 (Lake A76). The effects on water level, surface areas, and volumes are presented relative to the baseline value of the corresponding month.

Table 1: Lake A16 Baseline and Closure Water Level Conditions (2-Year Return Period)

Month	Baseline			Closure			
	Water Level (masl)	Area (m^2)	Volume (m^3)	Δ Water Level (m)	Water Level (masl)	Area (m^2) (Δ Area)	Volume (m^3) (Δ Volume)
June	152.48	1,474,405	5,799,059	-0.20	152.28	1,410,699 (-4.3%)	5,511,467 (-5.0%)
July	152.30	1,416,241	5,538,939	-0.20	152.10	1,360,868 (-3.9%)	5,263,495 (-5.0%)
August	152.21	1,391,108	5,414,358	-0.14	152.07	1,352,012 (-2.8%)	5,219,269 (-3.6%)
September	152.24*	1,398,819	5,452,582	-0.14	152.10	1,360,061 (-2.8%)	5,259,462 (-3.5%)

Note: * = baseline elevation based on the Project's LiDAR data, collected on 28 August 2015

Table 2: Lake A15 Baseline and Closure Water Level Conditions (2-Year Return Period)

Month	Baseline			Closure			
	Water Level (masl)	Area (m^2)	Volume (m^3)	Δ Water Level (m)	Water Level (masl)	Area (m^2) (Δ Area)	Volume (m^3) (Δ Volume)
June	151.61	332,428	725,470	-0.11	151.50	322,461 (-3.0%)	688,731 (-5.1%)
July	151.49	321,570	685,574	-0.12	151.37	311,221 (-3.2%)	648,924 (-5.3%)
August	151.44	317,377	670,727	-0.09	151.35	309,350 (-2.5%)	642,298 (-4.2%)
September	151.46*	319,072	676,729	-0.09	151.37	311,209 (-2.5%)	648,882 (-4.1%)

Note: * = baseline elevation based on the Project's LiDAR data

Table 3: Lake A12 Baseline and Closure Water Level Conditions (2-Year Return Period)

Month	Baseline			Closure			
	Water Level (masl)	Area (m^2)	Volume (m^3)	Δ Water Level (m)	Water Level (masl)	Area (m^2) (Δ Area)	Volume (m^3) (Δ Volume)
June	148.75	283,750	644,834	-0.10	148.65	271,272 (-4.4%)	615,509 (-4.5%)
July	148.64	271,116	615,144	-0.11	148.53	261,803 (-3.4%)	585,797 (-4.8%)
August	148.59	265,345	599,306	-0.08	148.50	259,860 (-2.1%)	578,388 (-3.5%)
September	148.61*	266,900	605,235	-0.08	148.53	261,476 (-2.0%)	584,549 (-3.4%)

Note: * = baseline elevation based on the Project's LiDAR data

Table 4: Lake A76 Baseline and Closure Water Level Conditions (2-Year Return Period)

Month	Baseline			Closure			
	Water Level (masl)	Area (m^2)	Volume (m^3)	Δ Water Level (m)	Water Level (masl)	Area (m^2) (Δ Area)	Volume (m^3) (Δ Volume)
June	147.70	700,261	3,967,752	-0.06	147.64	686,200 (-2.0%)	3,926,108 (-1.0%)
July	147.61	680,261	3,908,517	-0.08	147.53	666,022 (-2.1%)	3,855,794 (-1.3%)
August	147.56	668,000	3,872,204	-0.07	147.49	663,139 (-0.7%)	3,831,873 (-1.0%)
September	147.56*	668,000	3,872,204	-0.06	147.50	664,145 (-0.6%)	3,840,217 (-0.8%)

Note: baseline elevation based on the Project's LiDAR data

3.2 10-Year Wet Return Period

The derived mean monthly water levels, surface areas, and volumes are shown for the months of June, July, August, and September for each lake under baseline and closure conditions, in Table 5 (Lake A16 [Mammoth Lake]), Table 6 (Lake A15), Table 7 (Lake A12), and Table 8 (Lake A76). The effects on water level, surface areas, and volumes are presented relative to the baseline value of the corresponding month.

Table 5: Lake A16 Baseline and Closure Water Level Conditions (10-Year Wet Return Period)

Month	Baseline			Closure			
	Water Level (masl)	Area (m^2)	Volume (m^3)	Δ Water Level (m)	Water Level (masl)	Area (m^2) (Δ Area)	Volume (m^3) (Δ Volume)
June	152.60	1,517,180	5,970,754	-0.24	152.36	1,433,424 (-5.5%)	5,624,109 (-5.8%)
July	152.41	1,449,289	5,698,248	-0.22	152.19	1,385,462 (-4.4%)	5,386,304 (-5.5%)
August	152.33	1,423,498	5,574,911	-0.17	152.15	1,374,878 (-3.4%)	5,333,450 (-4.3%)
September	152.37	1,436,525	5,639,480	-0.18	152.19	1,384,391 (-3.6%)	5,380,957 (-4.6%)

Table 6: Lake A15 Baseline and Closure Water Level Conditions (10-Year Wet Return Period)

Month	Baseline			Closure			
	Water Level (masl)	Area (m^2)	Volume (m^3)	Δ Water Level (m)	Water Level (masl)	Area (m^2) (Δ Area)	Volume (m^3) (Δ Volume)
June	151.68	338,234	747,602	-0.13	151.55	327,096 (-3.3%)	705,145 (-5.7%)
July	151.57	328,839	711,788	-0.13	151.44	316,854 (-3.6%)	668,874 (-6.0%)
August	151.51	323,828	693,573	-0.10	151.41	314,782 (-2.8%)	661,537 (-4.6%)
September	151.54	326,225	702,062	-0.11	151.43	316,842 (-2.9%)	668,831 (-4.7%)

Table 7: Lake A12 Baseline and Closure Water Level Conditions (10-Year Wet Return Period)

Month	Baseline			Closure			
	Water Level (masl)	Area (m^2)	Volume (m^3)	Δ Water Level (m)	Water Level (masl)	Area (m^2) (Δ Area)	Volume (m^3) (Δ Volume)
June	148.81	291,455	662,941	-0.11	148.70	277,692 (-4.7%)	630,598 (-4.9%)
July	148.73	280,949	638,252	-0.13	148.60	266,279 (-5.2%)	602,868 (-5.5%)
August	148.66	273,029	619,639	-0.09	148.57	264,076 (-3.3%)	594,466 (-4.1%)
September	148.69	276,596	628,022	-0.10	148.59	265,682 (-3.9%)	600,592 (-4.4%)

Table 8: Lake A76 Baseline and Closure Water Level Conditions (10-Year Wet Return Period)

Month	Baseline			Closure			
	Water Level (masl)	Area (m^2)	Volume (m^3)	Δ Water Level (m)	Water Level (masl)	Area (m^2) (Δ Area)	Volume (m^3) (Δ Volume)
June	147.75	712,425	4,003,781	-0.07	147.68	696,625 (-2.2%)	3,956,984 (-1.2%)
July	147.66	692,843	3,945,782	-0.08	147.58	673,880 (-2.7%)	3,889,618 (-1.4%)
August	147.62	681,574	3,912,406	-0.06	147.56	668,123 (-2.0%)	3,872,567 (-1.0%)
September	147.62	682,944	3,916,464	-0.06	147.56	668,981 (-2.0%)	3,875,109 (-1.1%)

3.3 10-Year Dry Return Period

The derived mean monthly water levels, surface areas, and volumes are shown for the months of June, July, August, and September for each lake under baseline and closure conditions, in Table 9 (Lake A16 [Mammoth Lake]), Table 10 (Lake A15), Table 11 (Lake A12), and Table 12 (Lake A76). The effects on water level, surface areas, and volumes are presented relative to the baseline value of the corresponding month.

Table 9: Lake A16 Baseline and Closure Water Level Conditions (10-Year Dry Return Period)

Month	Baseline			Closure			
	Water Level (masl)	Area (m^2)	Volume (m^3)	Δ Water Level (m)	Water Level (masl)	Area (m^2) (Δ Area)	Volume (m^3) (Δ Volume)
June	152.35	1,430,288	5,608,565	-0.16	152.19	1,384,276 (-3.2%)	5,380,379 (-4.1%)
July	152.22	1,392,688	5,422,190	-0.17	152.05	1,345,466 (-3.4%)	5,186,581 (-4.3%)
August	152.09	1,356,958	5,243,970	-0.11	151.98	1,327,245 (-2.2%)	5,094,107 (-2.9%)
September	152.11	1,362,657	5,272,427	-0.11	152.00	1,331,983 (-2.3%)	5,119,008 (-2.9%)

Table 10: Lake A15 Baseline and Closure Water Level Conditions (10-Year Dry Return Period)

Month	Baseline			Closure			
	Water Level (masl)	Area (m^2)	Volume (m^3)	Δ Water Level (m)	Water Level (masl)	Area (m^2) (Δ Area)	Volume (m^3) (Δ Volume)
June	151.53	324,920	697,439	-0.090	151.44	316,915 (-2.5%)	669,090 (-4.1%)
July	151.45	318,262	673,861	-0.12	151.33	307,424 (-3.4%)	635,478 (-5.7%)
August	151.36	309,864	644,119	-0.08	151.28	303,202 (-2.1%)	620,826 (-3.6%)
September	151.37	310,856	647,633	-0.07	151.30	304,962 (-1.9%)	626,758 (-3.2%)

Table 11: Lake A12 Baseline and Closure Water Level Conditions (10-Year Dry Return Period)

Month	Baseline			Closure			
	Water Level (masl)	Area (m^2)	Volume (m^3)	Δ Water Level (m)	Water Level (masl)	Area (m^2) (Δ Area)	Volume (m^3) (Δ Volume)
June	148.66	273,326	620,336	-0.09	148.58	264,806 (-3.1%)	597,251 (-0.9%)
July	148.59	265,639	600,427	-0.11	148.48	258,672 (-2.6%)	573,858 (-1.3%)
August	148.51	260,617	581,273	-0.09	148.43	254,989 (-2.2%)	559,812 (-0.8%)
September	148.52	260,858	582,192	-0.07	148.45	256,270 (-1.8%)	564,696 (-0.7%)

Table 12: Lake A76 Baseline and Closure Water Level Conditions (10-Year Dry Return Period)

Month	Baseline			Closure			
	Water Level (masl)	Area (m^2)	Volume (m^3)	Δ Water Level (m)	Water Level (masl)	Area (m^2) (Δ Area)	Volume (m^3) (Δ Volume)
June	147.63	684,189	3,920,152	-0.05	147.58	672,470 (-1.7%)	3,885,442 (-0.9%)
July	147.57	670,079	3,878,361	-0.09	147.48	662,542 (-1.1%)	3,826,918 (-1.3%)
August	147.49	662,864	3,829,594	-0.05	147.44	659,384 (-0.5%)	3,800,718 (-0.8%)
September	147.48	662,313	3,825,019	-0.04	147.44	659,290 (-0.5%)	3,799,943 (-0.7%)

Closure

This technical memorandum was prepared and reviewed by the undersigned.

Prepared By:

Jenna Pearse

Jenna Pearse, B.Sc. Civil Engineering
Water Resources Specialist

REGISTERED PROFESSIONAL ENGINEER
J.C. LACRAMPE
LICENSEE
NT/NU
24-OCT-2019

Julien Lacrampe, P.Eng. (NWT/NU)
Senior Water Resources Engineer

Reviewed By:

Cam Stevens

Cameron Stevens, M.Sc., Ph.D.
Associate, Senior Fisheries Biologist

Nathan Schmidt, Ph.D., P.Eng. (NWT/NU)
Principal, Senior Water Resources Engineer

PERMIT TO PRACTICE
GOLDER ASSOCIATES LTD.
Signature
Date 24 OCTOBER 2019
PERMIT NUMBER: P 049
NT/NU Association of Professional Engineers and Geoscientists

References

Agnico Eagle (Agnico Eagle Mines Limited). 2018. Final Environmental Impact Statement Addendum, Whale Tail Pit – Expansion Project. December 2018.

Agnico Eagle. 2019a. Technical Comment Responses – Whale Tail Pit Expansion Project. Submitted to the Nunavut Impact Review Board. Submitted by Agnico Eagle Mines Limited – Meadowbank Division. May 29, 2019. 222 pages.

Agnico Eagle. 2019b. Final Written Statement Responses – Whale Tail Pit Expansion Project. Submitted to Nunavut Impact Review Board. Submitted by Agnico Eagle Mines Limited – Meadowbank Division. August 9, 2019. 105 pp.

Attachment 1: Lake Storage Characteristics

The derived lake storage characteristics are provided in the figures below. It is noted that the depth data of the bathymetric surveys were converted into elevation data by assuming that the Project's LiDAR data were representative of the water elevation on the day of bathymetric surveys.

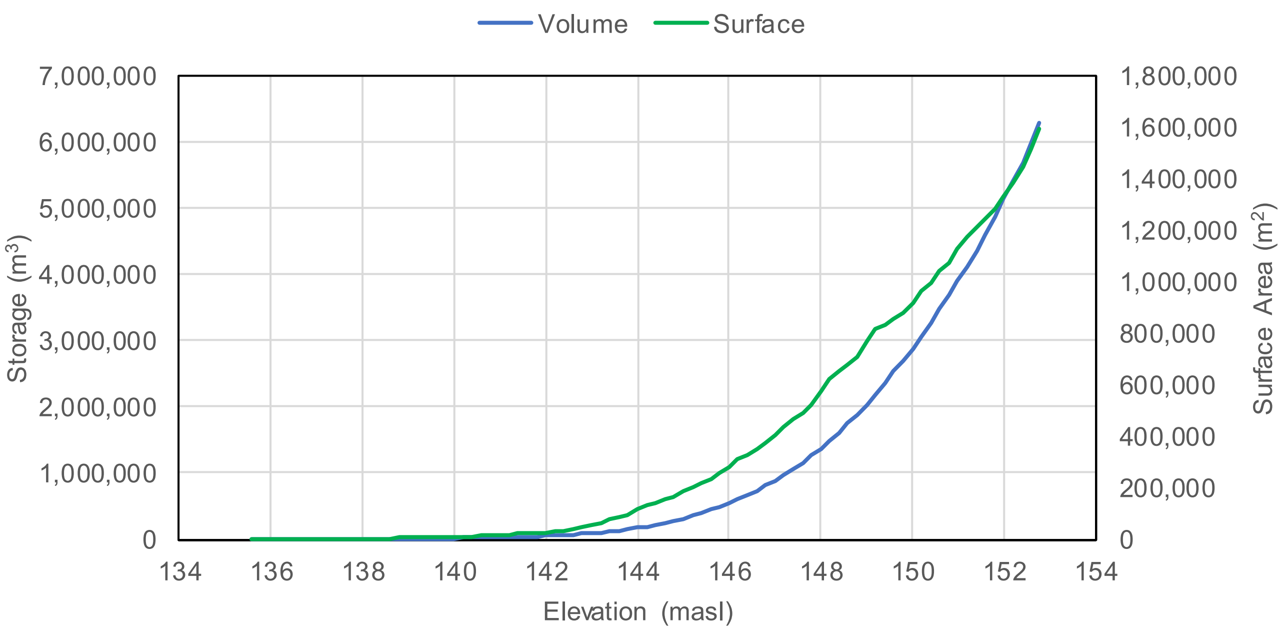


Figure 2: Lake Storage Characteristics (Lake A16 [Mammoth Lake])

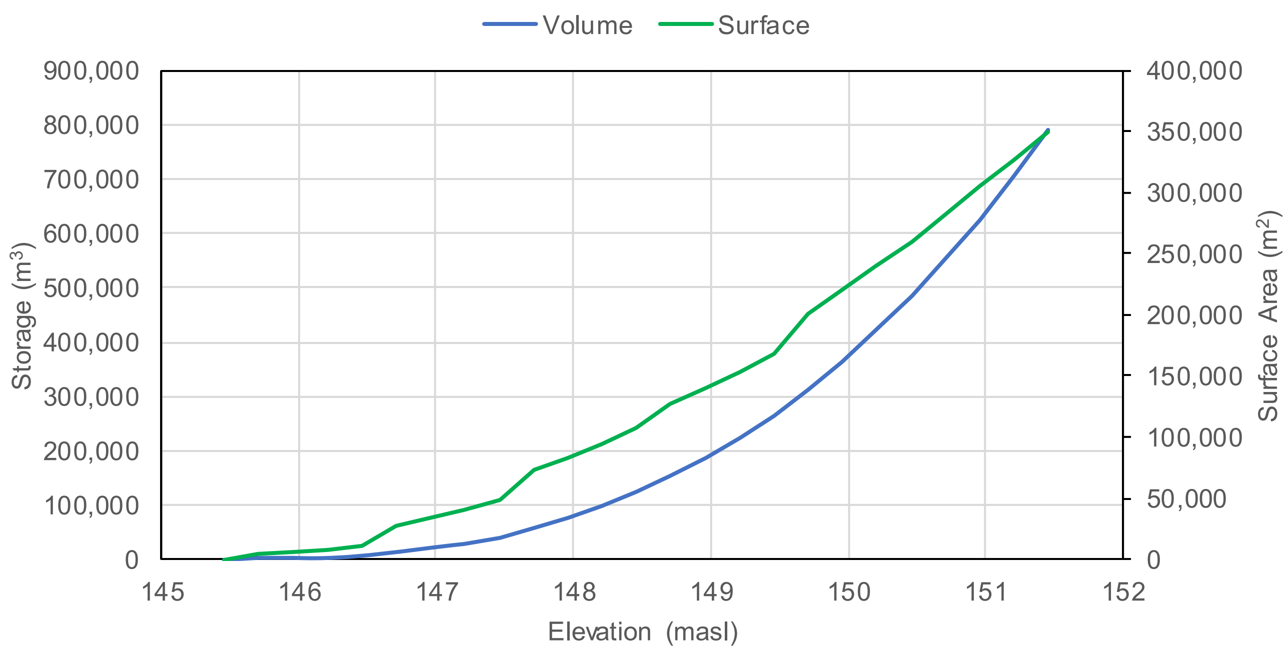


Figure 3: Lake Storage Characteristics (Lake A15)

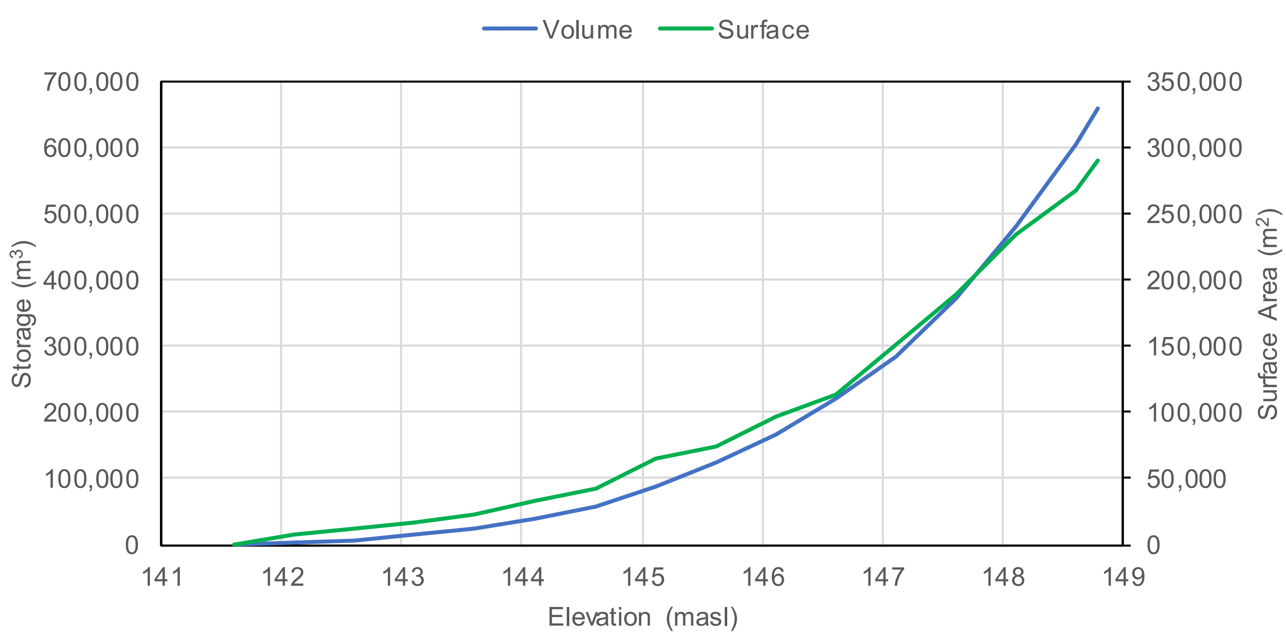


Figure 4: Lake Storage Characteristics (Lake A12)

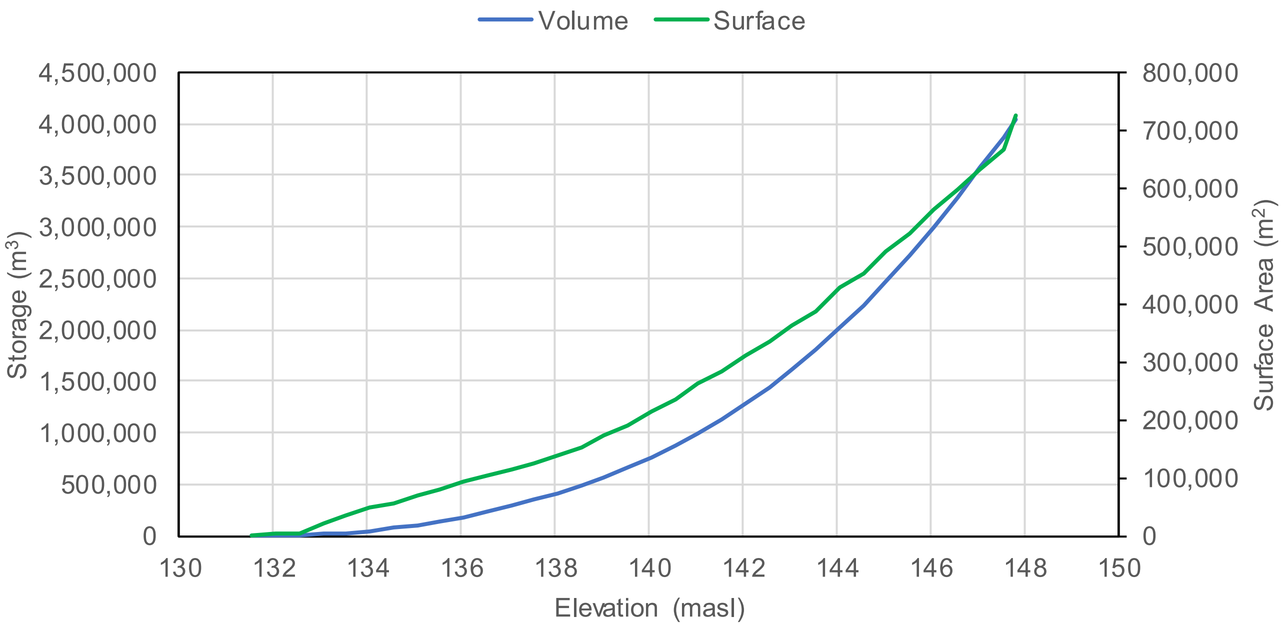


Figure 5: Lake Storage Characteristics (Lake A76)

TECHNICAL MEMORANDUM

DATE 4 December 2019 19122020-435-TM-Rev0

TO Manon Turmel
Agnico Eagle Mines Limited

CC Michel Groleau, Jamie Quesnel

FROM Cam Stevens and Julien Lacrampe **EMAIL cestevens@golder.com**

'WHALE TAIL PIT EXPANSION PROJECT: RESPONSE TO TECHNICAL COMMENT DFO 3.4' ADDENDUM

Introduction

The Department of Fisheries and Oceans Canada (DFO) requested additional information from Agnico Eagle Mines Limited (Agnico Eagle) related to the technical memorandum (memo) submitted to the Nunavut Impact Review Board (NIRB) titled 'Whale Tail Pit Expansion Project: Response to Technical Comment DFO 3.4' (Golder 2019). The previously submitted memo was provided as Commitment #33 for the environmental assessment of the Whale Tail Expansion Project (Expansion Project). DFO's information request was sent by email to Agnico Eagle on 19 November 2019, and included requests for the following information:

- A description of how predictions in hydrology will be monitored for the representative lakes, and lakes further downstream associated with Nodes 1 and 2 (as listed in DFO Technical Comment 3.4.7); and
- A description of how changes in water volumes/surface areas for lakes further downstream of the representative lakes are expected to fall within natural variation.

Monitoring commitments related to the first bullet will be included as part of the monitoring section in the final offsetting plan to be completed for the Expansion Project. This technical memorandum summarizes the methods and results to address DFO's second bullet, and is an extension of the previously completed study on downstream effects during closure. As done for the previously submitted memo (Golder 2019), the baseline characterization of the hydrology of Project lakes was completed using the hydrological model developed for the baseline study area for the Approved Project (Golder 2016), combined with available bathymetry (Golder 2019).

Assessment Approach

The assessment considered the closure period, during which the effects of the Expansion Project on surface water quantity are expected to be the greatest. As per the Approved Project, the closure phase will occur over the period of refilling of Whale Tail Lake and IVR Pit to its baseline level, prior to breaching of the Whale Tail Dike and Mammoth Dike. Refilling of the diked area (open Whale Tail Pit and Whale Tail Lake [North Basin]), including the IVR Pit will be accomplished by pumping water from Whale Tail Lake (South Basin). The Whale Tail Pit and IVR Pit will be filled with a combination of natural runoff and contact water from the entire site, and water pumped from Whale Tail Lake (South Basin). During the spring of 2026, the water accumulated in Whale Tail Lake (South Basin) over the years of operations will be pumped into the underground mine until it is filled and into the IVR Pit thereafter. Refilling of Whale Tail Lake (North Basin) to 153.5 masl is estimated to take from 2026 to 2042. During refilling, water levels and discharges are expected to be reduced in Lake A16 (Mammoth Lake) from 2026 to 2041 (2029 in the Approved Project) and effects on discharges and water levels diminish with increases in drainage area (i.e., at downstream locations) (as described in Section 6.5.4.3.2 in Agnico Eagle [2018]).

Using the hydrological model developed as part of the Approved Project (Golder 2016), combined with available bathymetry (Golder 2019), the baseline variability in hydrology was characterized for lakes immediately downstream of the Project, including Lake A16 (Mammoth Lake), Lake A15, Lake A12, and Lake A76, downstream of which, the potential impacts of the Project on surface water quantity are expected to diminish rapidly in the downstream direction (Agnico Eagle 2018). Baseline variability in the hydrology of Whale Tail Lake and Lake A18 were also characterized to supplement a general characterization of lakes in the Expansion Project study area for future monitoring. Hydrology characteristics included mean monthly water level or elevation (m), lake surface area (ha or m^2), and lake volume (m^3) per summer month (June, July, August, and September). The range of baseline variability of these characteristics was described for average to below average flow conditions as a suitable reference for comparison of Project effects during closure; where the average condition was the calculated median statistic of historical flows and the below average condition was the 1 in 10 year low-flow (dry) event statistic.

For the purposes of this memo, residual effects to fish habitat downstream of Whale Tail Lake during closure (specifically Lake A16 [Mammoth Lake], Lake A15, Lake A12, and Lake A76) were based on whether the hydrological model predictions for the closure (Golder 2019) period lie outside or beyond the normal below-average flow condition. In other words, if an average closure year is not similar to a below-average (dry) baseline year, then there is potential for effects to large-bodied fish species, such as Arctic Char, Lake Trout, Burbot, and Round Whitefish. However, hydrological alterations (measured using relative changes in depth, lake surface area or volume) beyond the baseline low-flow condition but within an alteration of less than 10% in amplitude was deemed as having a low probability of detectable residual impacts to the aquatic ecosystem as per technical guidance in DFO (2013). Another benchmark considered for determining whether residual effects are measurable was the water elevation change associated with a 10% under-ice withdrawal for each waterbody (DFO 2010), which was derived from storage-volume curves (Lake A16 = 0.34 m; Lake A15 = 0.15 m; Lake A12 = 0.17 m; Lake A76 = 0.58 m; also see methods in Golder 2018).

Results

Based on the mean of the calculated hydrological characteristics for all six lakes, the average to below average flow condition was characterized by values within 3.57% of the median volume, 2.64% of the median lake area, and 1.4% of the median lake depth (Tables 1 to 3). The low-water level condition was also described by a mean maximum decrease of 8.7 cm in water levels (where values range from a decrease of 11.9 cm in Whale Tail Lake to a decrease of 6.6 cm in Lake A76; n = 6). Under the low-water condition for all months combined, Lake A16 (Mammoth Lake) was described by a maximum decrease in surface area of 34,495 m^2, and by a maximum decrease in volume of 164,447 m^3; whereas the low-water condition for Lake A76, which is approximately half the size of Lake A16 (Mammoth Lake), was described by a maximum decrease in surface area of 9,269 m^2, and by a maximum decrease in volume of 41,888 m^3.

Seasonal effects on the variability in lake volume statistics were noted across the four study months (Table 3). Lake volumes were generally most variable in September, followed by August, June, and July. The variability of lake depths and variability of surface areas were generally consistent across the study months (Tables 1 and 2).

As per the results provided in the previously submitted memo by Golder (2019), the results presented in Table 1 show a longitudinal trend of diminishing effects on water levels during closure with the smallest effect predicted for Lake A76. Water levels are reduced, on average, during the summer months by 0.17 m in Lake A16 (Mammoth Lake), 0.10 m in Lake A15, 0.10 m in Lake A12, and 0.07 m in Lake A76. The results presented in Tables 2 to 3 also show a longitudinal trend of diminishing effects on surface areas and volumes during closure with the smallest effect sizes in Lake A76. Surface areas are reduced, on average, during the summer months by 3.45% in Lake A16 (Mammoth Lake), 2.80% in Lake A15, 2.98% in Lake A12, and 1.35% in Lake A76. Volumes are reduced, on average, during the summer months by 4.40% in Lake A16 (Mammoth Lake), 4.85% in Lake A15, 4.19% in Lake A12, and 1.08% in Lake A76.

Presented in adjacent columns to the 1 in 10 year low-flow statistics in the below Tables (1 to 3), the closure predictions for Lake A76 for water levels, surface area, and volume typically fall within the range of expected baseline conditions for Lake A76 (see shaded cells in Tables 1 to 3). Results for both Lake A15 and A12 also show that closure predictions fall within the baseline range of below average conditions, but only for the month of September; whereas the results for Lake A16 (Mammoth Lake) show that none of the closure predictions fall within the baseline range of below average conditions for any month. However, effects sizes for relative changes in depths, surface areas, and volumes remain well below the 10% criteria for all lakes through the summer months, suggesting a low probability of detectable residual impacts to the aquatic ecosystem. The potential for a measurable residual effect on fish habitat during closure was identified only for Lake A16 (Mammoth Lake) where water levels may change up to 20 cm during the summer months; however, this change meets the threshold derived from a guideline for the protection of fish habitat during water withdrawals.

Conclusion

Changes in hydrological characteristics of Lake A16 (Mammoth Lake) during closure are predicted to be the same for both the Approved and Expansion Projects, but closure will extend longer for the Expansion Project (Agnico Eagle 2018). Although the environmental assessment conservatively predicted that downstream changes during closure may result in measurable residual effects for the abundance and distribution of Arctic Char, Lake Trout, Burbot, and Round Whitefish (Golder 2018), the follow-up work presented in the memo removes some of the uncertainty underlying the conclusion in the previously submitted environmental assessment. Effects sizes for surface area and volume for all lakes remain well below the 10% criteria through the summer months, and absolute changes in water levels (e.g., up to 20 cm in Mammoth Lake) remain within criteria derived from available guidelines for the protection of fish habitat. Therefore, refilling activities during the closure period are expected to have a low probability of detectable residual impacts on the downstream aquatic ecosystem. Monitoring of water levels in Lake A16 (Mammoth Lake), and if required, in Lakes A12, A15, and A76 during closure is expected to provide a reasonable surrogate for detecting changes in surface areas and volumes during that time, and will be conducted to verify predictions provided in this memo and the environmental assessment.

Table 1: Baseline Average to Below Average Water Elevations Relative to Closure Predictions Per Summer Month.

Waterbody (Upstream to Downstream)		Median	Q10 (1 in 10 year low-flow event)			Closure Predictions (Median)		
	Month	Water Level (m)	Water Level (m)	∆ Water Level (m)	% ∆ versus Depth	Water Level (m)	Δ Water Level (m)	% ∆ versus Depth
Lake A18	June	153.96	153.92	-0.05	-2.72%	-	-	-
	July	153.87	153.80	-0.06	-3.66%	-	-	-
	August	153.84	153.75	-0.09	-5.43%	-	-	-
	September	153.86	153.78	-0.08	-4.76%	-	-	-
Lake A17 (Whale Tail)	June	152.72	152.59	-0.12	-0.70%	-	-	-
	July	152.55	152.47	-0.08	-0.46%	-	-	-
	August	152.46	152.33	-0.13	-0.76%	-	-	-
	September	152.50	152.36	-0.14	-0.77%	-	-	-
Lake A16 (Mammoth)	June	152.48	152.35	-0.13	-0.77%	152.28	-0.20	-1.18%
	July	152.30	152.22	-0.08	-0.49%	152.10	-0.20	-1.19%
	August	152.21	152.09	-0.12	-0.75%	152.07	-0.14	-0.86%
	September	152.24	152.11	-0.13	-0.79%	152.10	-0.14	-0.84%
Lake A15	June	151.61	151.53	-0.08	-1.45%	151.50	-0.11	-1.93%
	July	151.49	151.45	-0.04	-0.65%	151.37	-0.12	-2.04%
	August	151.44	151.36	-0.08	-1.49%	151.35	-0.09	-1.60%
	September	151.46	151.37	-0.09	-1.63%	151.37	-0.09	-1.56%
Lake A12	June	148.75	148.66	-0.09	-1.30%	148.65	-0.10	-1.56%
	July	148.64	148.59	-0.05	-0.83%	148.53	-0.11	-1.72%
	August	148.59	148.51	-0.07	-1.11%	148.50	-0.08	-1.29%
	September	148.61	148.52	-0.09	-1.42%	148.53	-0.08	-1.27%
Lake A76	June	147.70	147.63	-0.07	-0.43%	147.64	-0.06	-0.38%
	July	147.61	147.57	-0.04	-0.28%	147.53	-0.08	-0.51%
	August	147.56	147.49	-0.07	-0.47%	147.49	-0.07	-0.45%
	September	147.56	147.48	-0.08	-0.52%	147.50	-0.06	-0.36%

Note: Shaded cells represent changes that fall within defined baseline conditions

Table 2: Baseline Average to Below Average Lake Surface Areas Relative to Closure Predictions Per Summer Month

Waterbody (Upstream to Downstream)		Median	Q10 (1 in 10 year low-flow event)			Closure Predictions (Median)		
	Month	Area (m^2)	Area (m^2)	Δ Area (m^2)	% Δ versus median	Area (m^2)	Δ Area (m^2)	% Δ versus median
Lake A18	June	162,198	155,190	-7,008	-4.32%	-	-	-
	July	147,890	138,984	-8,906	-6.02%	-	-	-
	August	144,094	132,600	-11,494	-7.98%	-	-	-
	September	147,160	136,196	-10,964	-7.45%	-	-	-
Lake A17 (Whale Tail)	June	1,590,666	1,570,344	-20,322	-1.28%	-	-	-
	July	1,564,027	1,552,344	-11,683	-0.75%	-	-	-
	August	1,551,578	1,532,273	-19,305	-1.24%	-	-	-
	September	1,557,152	1,537,586	-19,565	-1.26%	-	-	-
Lake A16 (Mammoth)	June	1,474,405	1,430,288	-44,117	-2.99%	1,410,699	-63,706	-4.32%
	July	1,416,241	1,392,688	-23,554	-1.66%	1,360,868	-55,373	-3.91%
	August	1,391,108	1,356,958	-34,149	-2.45%	1,352,012	-39,096	-2.81%
	September	1,398,819	1,362,657	-36,162	-2.59%	1,360,061	-38,758	-2.77%
Lake A15	June	332,428	324,920	-7,508	-2.26%	322,461	-9,967	-3.00%
	July	321,570	318,262	-3,307	-1.03%	311,221	-10,349	-3.22%
	August	317,377	309,864	-7,513	-2.37%	309,350	-8,028	-2.53%
	September	319,072	310,856	-8,216	-2.57%	311,209	-7,863	-2.46%
Lake A12	June	283,750	273,326	-10,424	-3.67%	271,272	-12,478	-4.40%
	July	271,116	265,639	-5,477	-2.02%	261,803	-9,313	-3.44%
	August	265,345	260,617	-4,728	-1.78%	259,860	-5,485	-2.07%
	September	266,900	260,858	-6,042	-2.26%	261,476	-5,424	-2.03%
Lake A76	June	700,261	684,189	-16,072	-2.30%	686,200	-14,061	-2.01%
	July	680,261	670,079	-10,182	-1.50%	666,022	-14,239	-2.09%
	August	668,000	662,864	-5,136	-0.77%	663,139	-4,861	-0.73%
	September	668,000	662,313	-5,687	-0.85%	664,145	-3,855	-0.58%

Note: Shaded cells represent changes that fall within defined baseline conditions

Table 3: Baseline Average to Below Average Lake Volumes Relative to Closure Predictions Per Summer Month

Waterbody (Upstream to Downstream)		Median	Q10 (1 in 10 year low-flow event)			Closure Predictions (Median)		
	Month	Volume (m^3)	Volume (m^3)	∆Volume (m^3)	% ∆ versus median	Volume (m^3)	∆Volume (m^3)	% ∆ versus median
Lake A18	June	138,004	130,575	-7,429	-5.38%	-	-	-
	July	122,836	113,394	-9,442	-7.69%	-	-	-
	August	118,811	106,450	-12,361	-10.40%	-	-	-
	September	122,062	110,372	-11,690	-9.58%	-	-	-
Lake A17 (Whale Tail)	June	7,984,940	7,787,119	-197,821	-2.48%	-	-	-
	July	7,718,777	7,592,380	-126,397	-1.64%	-	-	-
	August	7,584,089	7,377,340	-206,750	-2.73%	-	-	-
	September	7,644,392	7,433,755	-210,637	-2.76%	-	-	-
Lake A16 (Mammoth)	June	5,799,059	5,608,565	-190,494	-3.28%	5,511,467	-287,592	-5.13%
	July	5,538,939	5,422,190	-116,749	-2.11%	5,263,495	-275,445	-5.08%
	August	5,414,358	5,243,970	-170,388	-3.15%	5,219,269	-195,089	-3.72%
	September	5,452,582	5,272,427	-180,155	-3.30%	5,259,462	-193,120	-3.66%
Lake A15	June	725,470	697,439	-28,031	-3.86%	688,731	-36,739	-5.27%
	July	685,574	673,861	-11,713	-1.71%	648,924	-36,650	-5.44%
	August	670,727	644,119	-26,608	-3.97%	642,298	-28,429	-4.41%
	September	676,729	647,633	-29,096	-4.30%	648,882	-27,847	-4.30%
Lake A12	June	644,834	620,336	-24,497	-3.80%	615,509	-29,325	-4.73%
	July	615,144	600,427	-14,716	-2.39%	585,797	-29,346	-4.89%
	August	599,306	581,273	-18,033	-3.01%	578,388	-20,919	-3.60%
	September	605,235	582,192	-23,043	-3.81%	584,549	-20,687	-3.55%
Lake A76	June	3,967,752	3,920,152	-47,601	-1.20%	3,926,108	-41,645	-1.06%
	July	3,908,517	3,878,361	-30,156	-0.77%	3,855,794	-52,724	-1.36%
	August	3,872,204	3,829,594	-42,610	-1.10%	3,831,873	-40,331	-1.05%
	September	3,872,204	3,825,019	-47,185	-1.22%	3,840,217	-31,987	-0.84%

Note: Shaded cells represent changes that fall within defined baseline conditions

Closure

This technical memorandum was prepared and reviewed by the undersigned.

Cam Stevens, MSc, PhD
Associate Senior Biology

Julien Lacrampe, PEng
Senior Water Resources Engineer

Kasey Clipperton
Principal, Senior Fisheries Biologist

CS/JL/KC/jr

https://golderassociates.sharepoint.com/sites/113014/project files/5 technical work/stage-2_tcs/01_working_responses/01_bathymetry/04_reporting/19122020-435-tm-goldermemowaterlevelswtpexpansion-rev0.docx

References

Agnico Eagle (Agnico Eagle Mines Limited). 2018. Final Environmental Impact Statement Addendum, Whale Tail Pit – Expansion Project. December 2018. Available on NIRB Public Registry Identification No. 321615 to 321762.

DFO (Fisheries and Oceans Canada). 2010. DFO Protocol for Winter Water Withdrawal from Ice-covered Waterbodies in the Northwest Territories and Nunavut.

DFO. 2013. Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2013/017.

Golder (Golder Associates Ltd.). 2016. Whale Tail Project 2015 Hydrology Baseline Report. Doc 037-1524321.1300 Ver 1. Prepared for Agnico Eagle Mines Ltd. 217 pages. Available at ftp://ftp.nwb-oen.ca/registry/2%20MINING%20MILLING/2A/2AM%20-%20Mining/2AM-WTP1826%20Agnico/1%20APPLICATION/2016%20New/2%20Individual%20Files%20(Volume%20and%20Appendices)/160630%202AM-WTP----%2003MN107%20App6%20C%20Hydrology%20Baseline-IAAE.pdf

Golder. 2018. Winter Ice Road Water Withdrawal Evaluation – Back River Project. Prepared for Sabina Gold & Silver Corp., submitted to the Nunavut Water Board. 56 pages. Available at ftp://ftp.nwb-oen.ca/registry/2%20MINING%20MILLING/2A/2AM%20-%20Mining/2AM-BRP1831%20Sabina/3%20TECH/E%20WATER%20USE/181203%202AM-BRP1831%202019%20Sabina%20WIR%20Technical%20Memorandum-IMLE.pdf

Golder. 2019. Whale Tail Pit Expansion Project: Response to Technical Comment DFO 3.4. Prepared for Agnico Eagle Mines Ltd. Submitted to the Nunavut Water Board. 11 pages

APPENDIX J COST ESTIMATE

AGNICO EAGLE

TECHNICAL MEMORANDUM

Date: February 28, 2020

To: Alasdair Beattie, Jose Audet-Lecouffe (DFO)

From: Manon Turmel (Agnico Eagle)

Re: Cost Estimate for Whale Tail Pit Expansion Project Fish Habitat Offsetting

---

1.1 INTRODUCTION

In support of development of the proposed Whale Tail Pit Expansion project, Agnico Eagle Mines Ltd. (Agnico Eagle) is seeking a Fisheries Act Authorization as the project will result in unavoidable harmful alteration, disruption or destruction of fish habitat. A Fish Habitat Offsetting Plan for the Whale Tail Pit Expansion Project (January 2020) has been submitted following consultations with the Department of Fisheries and Oceans Canada (DFO), the Kivalliq Inuit Association (KivIA) and Environment and Climate Change Canada (ECCC). Proposed offsetting includes habitat creation through flooding, and scarification of a road. There are no proposed complimentary measures. In order to provide an estimate of the total bonding (Letter of Credit; LOC) that will be held by DFO and ECCC, Agnico Eagle has calculated costs to construct the proposed fish habitat offsetting features.

This technical memorandum presents the estimated costs related to construction and monitoring of all offsetting features, and incorporates DFO comments from their review of the:

- No Net Loss Plan Implementation Cost Estimate and Construction Schedule for Phaser Lake (emailed June 14, 2016), and;
- Fish Habitat Offsetting Plan for the Whale Tail Pit project, including costs for construction, mobilization/demobilization, monitoring, inflation, and contingency.

All construction costs were estimated using unit costs from Reclaim V7.0, except where noted.

1.2 SUMMARY OF OFFSETTING FEATURES AND COSTS

Table 1 summarizes costs for construction of the proposed offsetting features, which are briefly described below. Full details of the calculation are provided in the associated Excel file “02282020 Cost Estimate for Whale Tail Pit Expansion Project Offsetting” and details of the offsetting features are provided in the Fish Habitat Offsetting Plan for the Whale Tail Expansion Project (January 2020).

Roads – a portion of the IVR road will be scarified to create habitat shoal features.

Sill – a sill will be constructed between Lakes A18 and A17 (Whale Tail Lake) to raise the water level of Lake A18 by 1.3 m. A conceptual sill design was completed by Golder & Associates and submitted as part of the Authorization application and total costs for the sill were determined by Agnico Eagle's Engineering Department using current contractor materials and labour rates for the Whale Tail Pit project.

Monitoring – A further breakdown of monitoring costs is provided in the associated Excel file "02282020 Cost Estimate for Whale Tail Pit Expansion Project Offsetting", the costs are based on the monitoring for relevant habitat offsetting features as proposed in the Fish Offsetting Plan for the Whale Tail Expansion Project (January 2020).

Mobilization/Demobilization – Mobilization and demobilization cost associated to the Lakes A18 and A17 sill construction was assessed to be nil as construction of the Mammoth Lake sill (Approved Project) will be completed at the same time. The mobilization and demobilization cost presented in Table 1 corresponds to the cost associated to the mobilization and demobilization of the Lakes A18 and A17 sill monitoring staff.

Inflation and Contingency – In previous LOCs held by DFO for the Meadowbank and Whale Tail Pit Approved projects, DFO has requested the addition of 5% inflation and 20% contingency on top of capital costs, and those components were maintained here for the Whale Tail Pit Expansion Project.

Table 1. Estimated costs for construction of Whale Tail Pit Expansion project fish habitat offsetting features.

Component	Construction Date	Estimated Cost ($)
Road scarification	Closure	2,577.83
Sill	Closure	1,500,000.00
Sub-total		*1,502,577.83*
Mobilization/Demobilization	-	-
Monitoring	-	132,690.00
Inflation (5%)	-	75,128.89
Contingency (20%)	-	300,515.57
Total		**2,010,912.29**

ERM has over 160 offices across the following countries and territories worldwide

Argentina
Australia
Belgium
Brazil
Canada
China
Colombia
France
Germany
Hong Kong
Hungary
India
Indonesia
Ireland
Italy
Japan
Kazakhstan
Kenya
Malaysia
Mexico
The Netherlands
New Zealand
Panama
Peru
Poland
Portugal
Puerto Rico
Romania
Russia
Singapore
South Africa
South Korea
Spain
Sweden
Taiwan
Thailand
UAE
UK
US
Vietnam

ERM's Toronto Office
120 Adelaide Street West, Suite 2010
Toronto, ON
Canada M5H 1T1

T: +1 416 646 3608
F: +1 416 642 1269

www.erm.com