Stog'er Tight Expansion Project – 278 Open Pit Mine

Environmental Registration

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Abbreviations

AC CDC	Atlantic Canada Conservation Data Centre
BBS	Breeding Bird Survey
CCME	Canadian Council of Ministers of the Environment
CNF	Central Newfoundland Forest
CNWA	*Canadian Navigable Waters Act*
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWQG-FAL	Canadian Water Quality Guidelines – Freshwater Aquatic Life
DA	drainage area
dBA	Decibel A Scale
DFO	Department of Fisheries and Oceans
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EPP	Environmental Protection Plan
ERP	Emergency Response Plan
FDP	final discharge point
ha	hectares
HADD	harmful alteration, disruption or destruction
km	kilometre
kV	kilovolt
LAA	Local Assessment Area
LSI	Langlier Saturation Index
m	metre
MAF	mean annual flows
MBCA	*Migratory Birds Convention Act*
MDMER	*Metal and Diamond Mining Effluent Regulations*
MMF	mean monthly flows
NL	Newfoundland and Labrador
NLDECC	Newfoundland and Labrador Department of Environment and Climate Change
NL EPA	Newfoundland and Labrador *Environmental Protection Act*
NL ESA	Newfoundland and Labrador *Endangered Species Act*
NRCan	Natural Resources Canada
POPC	Parameters of Potential Concern
RAA	Regional Assessment Area
RDL	reportable detection limit
ROM	Run of Mine
SAR	Species at Risk
SARA	*Species at Risk Act*

SOCC	Species of Conservation Concern
TSS	Total Suspended Solids
VC	Valued Component
WRSA	waste rock storage area
WSC	Water Survey of Canada

1.0 INTRODUCTION

1.1 NAME OF UNDERTAKING

278 Open Pit Mine (the Project)

1.2 PROPONENT INFORMATION

Name of the Corporate Body	Signal Gold Inc
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1.3 THE UNDERTAKING

1.3.1 Project Overview

Signal Gold Inc. (Signal Gold; formerly Anaconda Mining Inc.) currently operates gold mining and milling operations in Newfoundland and Labrador (NL) known as the Point Rousse Project, located approximately 6 kilometres (km) northeast of the town of Baie Verte, NL (Figure 1-1). The Point Rousse Project (Point Rousse) encompasses six mining leases and seven mineral licences, covering approximately 5,552 hectares (ha) (55.52 km^2). As part of the Point Rousse Project, there are three prospective gold trends which span approximately 20 km: Scrape Trend, Goldenville Trend, and Deer Cove Trend. Current mining and milling activities at the Pine Cove, Stog'er Tight, and Argyle deposits are part of the Scrape Trend.

Signal Gold is planning to expand operations at the Stog'er Tight Deposit and construct and operate an open pit mine, Pit 278 (the Project), located at the west end of the Stog'er Tight mining lease, over a 9.5-month period (for construction and operation phases) commencing in Q3 2023. The Project will use much of the existing infrastructure associated with previous and current operations at Stog'er Tight and Argyle deposits and milling of the ore will occur at Signal Gold's existing Pine Cove mill located approximately 3 km west of Stog'er Tight and connected by existing road networks. As a result, the estimated footprint of the Project is only 0.12 km^2 (12.02 ha).

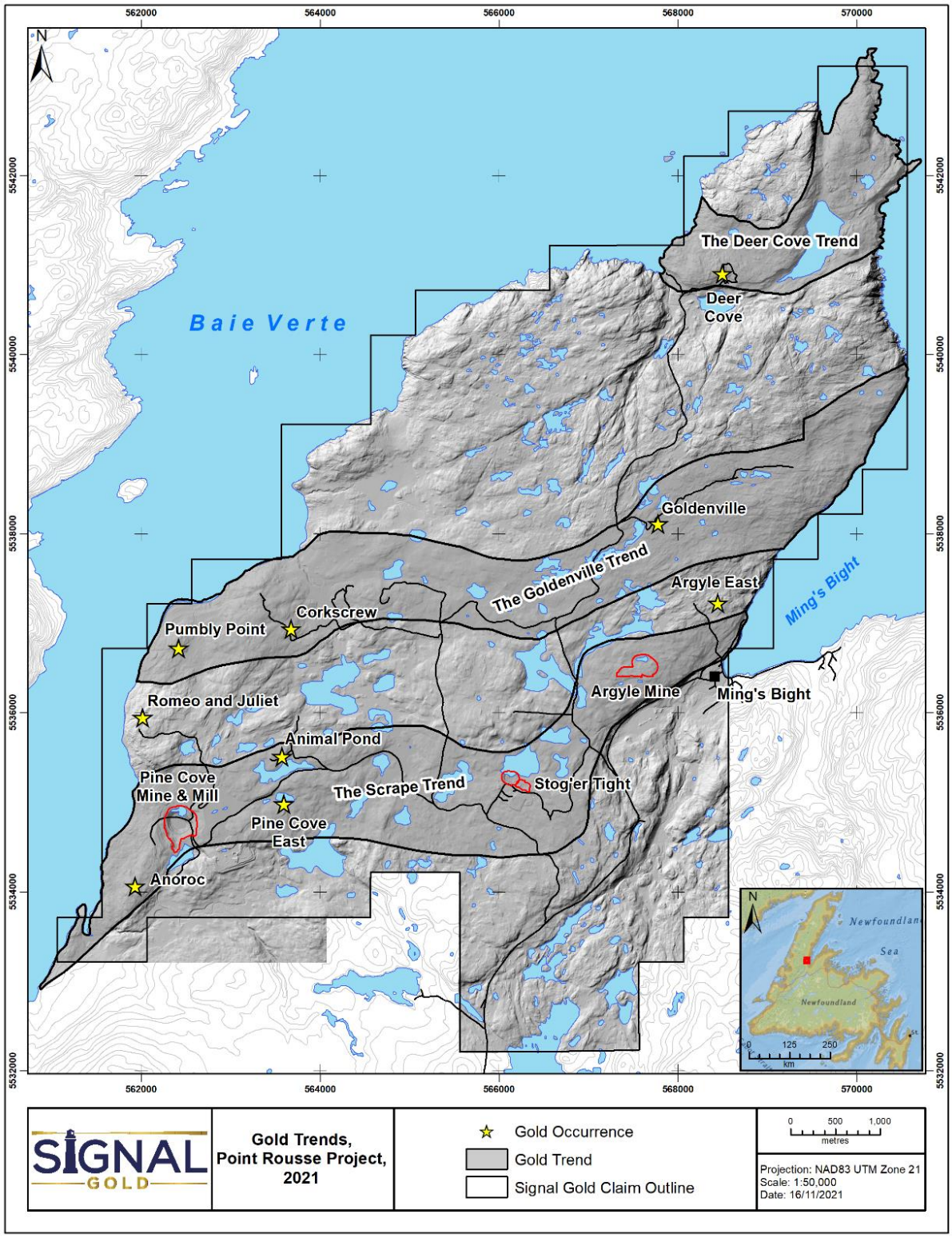

Figure 1-1 Signal Gold Claim Area

1.3.2 Purpose / Need / Rationale for the Project

Commercial mining and gold production has been ongoing at the Point Rousse project since September 2010. Signal Gold has been growing project infrastructure and mill capacity since that time, with production ranging between 12,000 to 20,000 ounces of gold per year from the Pine Cove mill. Beginning in 2020, just prior to the cessation of mining at the Pine Cove Deposit, drilling activities began focusing on mineral re-definition and expansion at the Argyle and Stog'er Tight deposits, as well as exploration programs targeting the Pine Cove East, Pumbly Point, and Deer Cove prospects. Information from over 690 drill holes sampled between 1988 to 2021 in the Stog'er Tight deposit revealed continuous mineralization over approximately 700 metres (m) of strike. The East and West Pits at Stog'er Tight were mined between 2015 and 2019, and staged re-development of the Stog'er Tight Deposit will begin at the Gabbro Pit in the fall of 2022 (under the existing Stog'er Tight West Pit Expansion environmental approvals), followed by development of Pit 278. Mining of the Argyle Deposit is also scheduled to be completed in the fall 2022. The grade and size of the Stog'er Tight mineral resource, combined with its proximity to the Pine Cove mill and existing road networks, and project economics provide the opportunity to expand the life of mining operations at the Point Rousse operation through the development of the 278 Zone while the Company continues to consider further exploration targets.

1.4 APPROVAL OF THE UNDERTAKING

Section 33(2) of the *Environmental Assessment Regulations* pursuant to the Newfoundland and Labrador *Environmental Protection Act* (NL EPA) requires the registration of "an undertaking that will be engaged in the mining, beneficiating, and preparing of a mineral as defined in the *Mineral Act* whether or not these operations are to be performed in conjunction with a mine or at mills that will be operated separately…". This document represents the Registration document and will be submitted to the Environmental Assessment (EA) Division of the Department of Environment and Climate Change (NLDECC) for review. Following a public review period, the Minister will make one of four decisions: the undertaking may be released; an Environmental Preview Report may be required; an Environmental Impact Statement may be required; or the undertaking may be rejected.

Applicable permits, approvals, or authorizations may only be issued after the Project is released from the EA process. The permits and authorizations, or amendments to existing permits and authorizations, that may be required for the Project are provided in Table 1.1.

Table 1.1 Permits, Authorizations, and Approvals that may be Required for the Project

Permit or Authorization	Agency
Newfoundland and Labrador Department of Industry Energy and Technology	
Mining Lease	Mineral Lands Division
Surface Lease	Mineral Lands Division
Application for Exploration Approval	Mineral Lands Division
Notice for Planned Mine	Mineral Development Division
Development and Operational Plan	Mineral Development Division
Reclamation and Closure Plan	Mineral Development Division
Newfoundland and Labrador Department of Environment and Climate Change (NLDECC)	
Release from Environmental Assessment	Environmental Assessment Division
Environmental Approval of Culverts	Water Resources Management Division
Permit to Alter a Water Body	Water Resources Management Division
Certificate of Approval for Site Drainage	Water Resources Management Division
Water Use Authorization	Water Resources Management Division
Certificate of Approval	Pollution Prevention Division
Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture	
Cutting Permit	Forestry Services Branch
Operating Permit	Forestry Services Branch
Federal Government	
Fisheries Act Authorization permitting serious harm to fish	Fisheries and Oceans Canada (DFO)
Initiate *Metal and Diamond Mining Effluent Regulations* (MDMER) process with ECCC including notification, identification of final discharge point, effluent monitoring, and environmental effects monitoring	Environment and Climate Change Canada (ECCC)
Approval of MDMER Emergency Response Plan	ECCC

2.0 PROJECT DESCRIPTION

2.1 LOCATION

The Stog'er Tight Deposit lies on the Point Rousse Peninsula, in the northern portion of the Baie Verte Peninsula in north-central Newfoundland (Figure 1-1). The deposit is located south-west of the community of Ming's Bight and within the municipal planning area of Baie Verte (zoned as Rural). Access to the site is via Route 418 (Ming's Bight Road), which is a spur of Route 414 (La Scie Highway). The total distance from the community of Baie Verte is approximately 24.5 km, which includes the 5 km of gravel access road, which also provides access to Signal Gold's Pine Cove mill. Figure 2-1 shows the location of the Stog'er Tight Deposit.

The Baie Verte Peninsula is sparsely populated with small towns, the largest of which is Baie Verte with an approximate population of 1,370 residents. In addition to several small commercial and local businesses, primary operations in the region include fishery and fish harvesters, logging and sawmill operations and mining (including Signal Gold's Point Rouse Project and Rambler Metals and Mining's Ming Copper Mine). The closest commercial centers are the Town of Grand Falls-Windsor (200 km) and the City of Corner Brook (230 km).

2.2 HISTORIC AND CURRENT MINING ACTIVITY

Historical work for the Point Rousse project includes exploration and mining at Pine Cove, Stog'er Tight, and Argyle deposits. The Pine Cove Deposit was discovered in June 1987 by South Coast Resources Ltd. following initial acquisition of the claims in 1985. In November 1988, Corona Corp. optioned the property and conducted detailed geological, geophysical and soil geochemistry surveys, followed by trenching and diamond drilling in 24 holes. In the fall of 1991, Nova Gold Resources Inc. optioned Corona's 70% interest in the Pine Cove property with the view to mine the deposit by open pit after definition drilling. Other work by Electra Mining Consolidated/Electra Gold/Raymo Processing in 1996, and New Island Resources Inc. in 2000 led to further definition of the resource.

In 2003, Signal Gold (formerly Anaconda) acquired an exclusive option from New Island to earn a 60% interest in the Pine Cove project. In the fall of 2004, a 5,000-tonne bulk sampling program was completed, and a feasibility study was published in 2005. Based on the positive feasibility study, construction was initiated in 2007 and production commenced in 2009. Start-up issues resulted in reconfiguring the mill with a flotation circuit to produce a gold-pyrite concentrate. Commercial production enabled Signal Gold to earn a total share of 60% of the Pine Cove project. In January 2011, Signal Gold acquired New Island's remaining 40% interest.

The Stog'er Tight area was staked in 1986 by Pearce Bradley and optioned to International Impala. Impala formed a 50/50 joint venture arrangement with Noranda Exploration Company Ltd. and in 1987, an extensive soil geochemistry survey and trenching resulted in the discovery of several mineralized zones. Noranda conducted geochemical, geological and geophysical surveys, trenching and an 8,000 m diamond drilling program, outlining more mineralized zones. In 1996, Ming Minerals Inc. purchased the

Stog'er Tight property from Noranda and extracted a 30,735 tonne bulk sample grading 3.25 grams per tonne ("g/t') gold from the Stog'er Tight deposit. The material was processed at the former Consolidated Rambler mill, located approximately 7.5 km south of Stog'er Tight. Due to lower-than-expected head grade and poor mill recoveries, no further work was completed at that time.

Tenacity Gold Mining Company began mining and toll milling Stog'er Tight material at the Rambler Metals and Mining PLC's Nugget Pond mill located 47 km by road to the east. A total of 29,695 tonnes of material with an estimated average grade of 4.80 g/t gold was trucked to the mill. The actual mill head grade was 1.92 g/t gold. The difference between the estimated grade and the actual head grade was attributed to mining dilution. No further work was undertaken, and the Stog'er Tight mining lease was subsequently acquired by 1512513 Alberta Ltd. and optioned by Signal Gold in 2012. Signal Gold has conducted mining, development, and exploration activities since assembling the entire Point Rousse project in 2012.

The Argyle deposit was discovered in 2014 during a trenching program that followed up on gold-in-soil anomalies. Drilling in 2015 to 2018 outlined a resource at Argyle and mining commenced in the fourth quarter of 2020 following development and permitting of the mine.

There has been continuous mining and gold production at the Point Rousse project since 2009, primarily from the Pine Cove Deposit but also from open pits at the Stog'er Tight and Argyle deposits. Commercial production began at Pine Cove on September 1, 2010, concluding in October of 2020 with a total of 154,540 ounces produced. At Stog'er Tight, Signal Gold continued exploration and mining intermittently from 2014 to 2016, delivering ore for processing at the Pine Cove mill. Stog'er Tight was mined in the fall of 2015 and ran through the winter and early spring of 2016 with 21,534 tonnes of ore mined grading 1.66 g/t from the East Pit. The West Pit at Stog'er Tight was mined between 2017 and 2019. Mining at Stog'er Tight produced 18,318 ounces from mining activity from 2016 to 2019. At the Stog'er Tight Deposit, further activity is planned to occur at the Gabbro Pit which is being developed under existing approvals and is estimated to overlap with the proposed Pit 278 by three months. From December 2020 through the end of August 2021, Argyle has produced 5,919 ounces. Total production from the Point Rousse Project since 2009 includes 178,778 ounces of gold (Anaconda Mining 2021).

2.3 PROJECT COMPONENTS AND ACTIVITIES

The Project includes the following main components:

- Establishment and operation of Pit 278 and associated haul roads
- Pumping infrastructure and dewatering of Camp Pond
- Water control structures (e.g., perimeter ditching)

The Project will use much of the existing infrastructure from the proponent's previous mining operations, including existing Stog'er Tight infrastructure, as well as that related to the Pine Cove mill. As a result, the total area affected by the current Project is estimated to be only 0.12 km^2 (12.02 ha). Existing infrastructure at Stog'er Tight includes a waste rock storage area (WRSA), overburden and organic material stockpiles, an ore pad, support buildings, and settling ponds. The existing infrastructure is further described in the updated Stog'er Tight Extension Development Plan and Rehabilitation and Closure Plans.

Existing supporting infrastructure in Pine Cove includes the Pine Cove mill, laboratory, warehouse, chemical reagent storage shed, and ore stockpile areas. The infrastructure is further described in the Pine Cove Environmental Assessment Registration document (Anaconda Gold Corp. 2005) and the 2022 Operational Plan for the Point Rousse Project (Anaconda Mining Inc. 2022).

Road access to the Project will be via the existing Point Rousse project access road, off Provincial Route 418, known as Pine Cove Road. This road was recently realigned and will continue to be used to transport ore to the Pine Cove mill. Figure 2-1 shows the proposed site layout for the Project and existing and proposed infrastructure associated with the Stog'er Tight Deposit.

Pending regulatory approvals, construction activities are scheduled to start in June 2023 with mining operations commencing in September 2023 for a 6.5-month life of mine.

The following sections provide a description of activities to be carried out during the construction, operations, and closure phases of the Project, including information on the location of each activity, expected outputs, and an indication of the magnitude and scale of each activity.

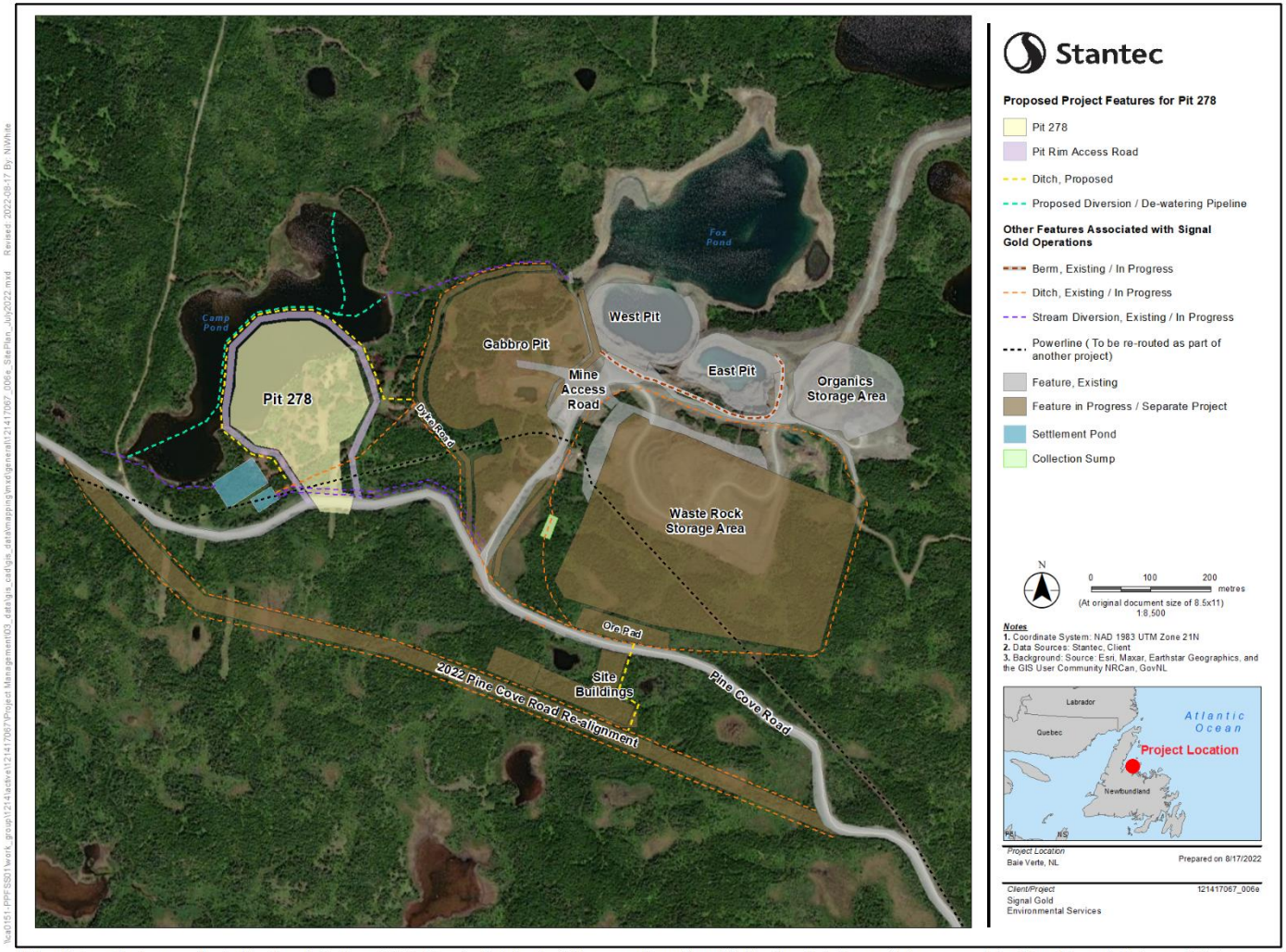

Figure 2.1 Proposed Site Layout for the Project and Existing Infrastructure associated with the Stog'er Tight Deposit

2.3.1 Construction

Pending regulatory approval, construction activities will commence in June 2023 and take approximately 3 months. Pre-stripping material from the pit will be part of the construction phase, however, there will be some overlap between the construction and operations phases. Waste rock from pit development may be used as a construction material for building roads and pit ramps. Organic material (overburden and vegetation) stripped during construction will be stockpiled and used to support progressive rehabilitation, where possible, and final reclamation at closure. This stockpiled material will be stored at the existing Stog'er Tight organics storage area to avoid moving it multiple times. This will have the least impact upon microorganisms within the soil and facilitate the regrowth of vegetation to stabilize the stockpiles.

Construction of water control structures, such as perimeter ditches, will also be required. Further detail on water management is provided in Section 2.3.2.8.

2.3.1.1 Site Preparation

Site preparation includes vegetation removal, organic material stripping and storage, excavation, grading, constructing drainage ditches, and finishing surfaces to provide slopes and collect surface water. Organic material cleared will be stockpiled for reclamation efforts. Aggregate construction material required will be acquired from existing local aggregate suppliers.

Camp Pond will be entirely de-watered and drawn down through its outlet and maintained in the dewatered state until Pit 278 is no longer active. De-watering of Camp Pond will be done using a barge with two inline 60 horsepower pumps. Water will be pumped out through the natural outlet of the pond with erosion control measures in place (e.g., baffles to slow flow). Water will be collected in an existing / natural deep pocket in the Pond which will serve as a sump, from which water will be pumped to the outlet of Camp Pond as needed to maintain the de-watered area. Visual safety barriers will be installed for protection of on-site workers. To reduce potential risks to fish and fish habitat, a fish screen will be installed on the pump intake as per DFO Guidelines (DFO 1995) and confirmed prior to installing the system is in place. Water discharging from Camp Pond will remain within the natural water drainage channel. Discharge will flow west, following the existing outflow of Camp Pond, flowing downstream in the chain of the tributaries and lakes that contribute to the South Brook and Green Cove Brook drainage areas and on into Baie Verte.

Signal Gold will seek to obtain a *Fisheries Act* Authorization prior to dewatering, and compensation will be provided for habitat loss. Dewatering is planned to begin in June 2023 once regulatory requirements have been met. Additional details on this aspect of the Project and associated environmental effects are discussed in Section 5.2.

2.3.1.2 Roads

Approximately 850 m of haul road will be constructed around the perimeter of the pit for the Project. This road will be built to withstand frequent heavy traffic between the proposed open pit and the existing road system. This road will be 20 m wide (wide enough to accommodate two passing trucks) and with a grade of no greater than 10%. This is the only road to be constructed as part of the Project.

2.3.1.3 Electrical Power Supply and Distribution

Power for the Project will be sourced from the existing 25 kV distribution line along the realigned Pine Cove Road. A main control centre will be used for power distribution.

2.3.1.4 Communication System

Communication for the Project will primarily consist of Very High Frequency two-way radios. Contractor equipment and essential personnel will have a radio for communication. Stog'er Tight also has cell-phone reception and will have wireless internet access.

2.3.1.5 Explosives Storage

There will be no explosive storage at the Project site. Explosives used for the drilling and blasting processes will be stored at the existing approved magazines at the Pine Cove site.

Blasting materials will be kept secured in the existing explosive magazines provided by the explosives' supplier. The magazines are located on surface, at a safe distance from buildings and other infrastructure, to comply with the blast materials storage permit limits. Delivery will be weekly or on an as needed basis and will comply with the supplier's permitting.

Management and use of the magazines will comply with the requirements of the existing explosives license. Only designated individuals are able to access the blasting materials. Designated persons have authority to carry and use the key and will have undergone the required background checks.

2.3.2 Operations

This Project will consist of an open pit, mined using conventional methods, with a total excavated volume of approximately 718,560 m^3. Waste rock generated from the pit will be transported to the existing WRSA for storage. Waste rock from Pit 278 will be non-potentially acid generating. Where possible, the non-potentially acid generating waste rock material will be used in road construction and other construction activities, therefore reducing the footprint required for storage. Where construction occurs in fish-bearing waters, appropriate materials will be sourced from local suppliers.

The Project will generate 1,699,507 tonnes of waste (including overburden and organics) and 240,606 tonnes of potential mill feed (i.e., ore) from Pit 278. The estimated ore production rate for Pit 278 is estimated to be 1,350 t/d, with the overall mining rate ranging between 5,500 to 11,000 t of material (waste and ore) per day. The expected duration of operations (i.e., life of mine) for Pit 278 is 6.5 months, beginning in September 2023, with the first ore mined in the same month, and ending in March 2024. The

approximate surface dimensions of Pit 278 are 250 m by 200 m with a maximum depth of approximately 70 m. Figure 2-1 illustrates the site plan for the Project within the existing Stog'er Tight facilities.

2.3.2.1 Open Pit Mining

Conventional open pit mining methods will be used for the Project, from which a total of 1,940,113 tonnes of combined potential mill feed, non-ore bearing waste rock, and overburden will be extracted. Open pit mining was selected considering the deposit's size, shape, orientation, and proximity to the surface. Drilling, blasting, loading, and hauling will be used to mine the open pit material.

Open pit mining will generally consist of the following processes:

- Stripping and stockpiling organic material from area to be mined
- Marking planned drill holes and requisite depths to reach planned bench
- Drilling marked drill plan
- Loading and blasting completed drill holes
- Mucking of completed blast via excavators loading haul trucks
- Hauling ore to the Stog'er Tight ore pad and Pine Cove stockpile, and waste rock to WRSA
- Preparing area for next blast

Clearing, grubbing, grading, and stockpiling of till and organic material in the pit area will be initiated during the construction phase and will be conducted progressively prior to accessing bedrock for mining purposes, to limit the potential for erosion. Till and organic material will be stored in stockpiles for use in reclamation and construction of berms, impoundments, roads, and/or general grading. Stockpile locations are shown on Figure 2-1. Once organic material and till have been removed, drilling and blasting will be used to mine ore and non-ore bearing waste rock, as well as establish benches along rock walls.

Drilling and blasting will be used to access the ore. Previous exploration drilling has mapped the location of ore-bearing material. Geotechnical investigations conducted in Summer/Fall of 2017, 2019, and 2021 formed the base for the open pit design. Further grade control drilling will be undertaken to confirm local variation in ore distribution allowing blast patterns to be executed to maximize production of ore and reduce dilution. Additional grade control will be completed by the use of borehole sampling in which each drillhole undergoes analysis via a leaching method, to confirm metal content for the purpose of refining delineation of ore zone contacts. Blasting activities will be conducted by a licensed contractor.

Ore and waste rock will be loaded into haul trucks for transport out of the pit and to the ore pad, located adjacent to the south side of WRSA for temporary storage. From there, ore will be transported to the Pine Cove mill for stockpiling and processing.

The current open pit design is displayed on Figure 2-1 and the design and operating details are presented in Tables 2.1 and 2.2.

Table 2.1 Total Material Mined

Rock Category	Tonnes
Waste Rock	1,632,464
Till	55,868
Organic Material	11,175
Total Waste	***1,699,507***
Potential Mill Feed (i.e., ore)	240,606
Total Material Mined	***1,940,113***

Table 2.2 Ultimate Pit Design (Approximate Pit Dimensions)

Item	Pit 278
Length	250 m
Width	200 m
Depth	70 m

2.3.2.2 Mine Equipment

Point Rousse plans to use their existing mining subcontractor and their existing fleet of equipment to construct and operate the Project. The mining equipment required for the Project is summarized in Table 2.3.

Table 2.3 Mining Equipment Required for the Project

Equipment	Number of Units	Capacity
670 GLC Hitachi Excavator	1	4.18 cu.yds (1)
410E JD Rock Truck	7	38 t (7)
Bell 40E Truck	2	38 t
CAT 740 Truck	1	38 t
400 JD Rock Truck	3	29 cu.yds
750J JD Dozer	1	-
Cat 349 Excavator	2	4.1 cu.yds
Cat 323 Excavator	1	1.56 cu.yds
Cat D6 Dozer	1	-
Rock Breaker	2	-
470 GLC JD Excavator	1	3.1 cu.yds
350 JD Excavator	1	1.9 cu.yds
Double Tandem Truck	5 to 7	27 t
Sandvik Ranger 900	2	n/a
Atlas Copco ECM - 590	1	n/a
Sandvik Ranger 800	2	n/a

2.3.2.3 Blasting

Blasting operations are provided by a licensed contractor which typically has five employees on site during blasting. Blasting will always be performed by qualified persons. Standard operating procedures will be followed for blasting to reduce risk to personnel and equipment. Existing standard operating procedures include: an area clearing procedure, posting of signage and barricades at all access points, pre-blast warnings, and verbal communication between the blaster and predesignated muster leaders accounting for all personnel prior to blasting occurring.

Appropriate blast designs for open pit mining will be developed to limit blasting impacts (vibration, fly rock and overpressure). Appropriate information for each blast will be documented (i.e., hole-depth, quantity of explosive used, blast timing, and monitoring data). Storage of explosives is described in Section 2.3.1.5.

For Point Rousse's on-going mining, production and pre-shear drilling is completed using an Sandvik Dxi900 Ranger, 4.5-inch top hammer drill. Production holes are typically drilled on a 3 by 3 m pattern with a bench height of 5 m (Plate 13). Explosives used include Titan XL 2000G bulk emulsion for production blasting and Dynosplit EX Dynamite for pre-shear blasting. DIGISHOT Plus 4G electronic detonators and Trojan Brand Cast boosters are used. Based on the planned production rate, there will likely be four blasts per week. Table 2.4 shows the anticipated noise levels expected from the anticipated activities at a 500 m distance (using the inverse square law for determining noise at various distances).

Table 2.4 Typical Construction and Operations Equipment/Activity Noise Levels

Equipment/Activity	Noise Levels at Source (dBA)	Estimated Noise Levels at 500 m (dBA)
Blasting	94	64
Chainsaw	84	54
Dozer	82	52
Dump Truck	76	46
Excavator	81	51
Front End Loader	79	49
Generator	82	52
Grader	85	55
Pickup Truck	75	45
Pneumatic Tools	85	55
Source: U.S. Department of Transportation 2017		

Blasting will result in the highest levels of noise, but for short durations. The blasting perimeter, used as a safe distance perimeter from the location of the blast for personnel at Point Rousse operations, is 500 m from the blast. The Construction Noise Handbook (US Department of Transportation 2017) states that at 15 m, blasting will result in a noise generation of 94 dBA. At 500 m, this will result in a noise generation of 64 dBA, using the inverse square law for determining noise levels at various distances. The nearest community is Ming's Bight which is approximately 2.5 km from Pit 278. The distance to the nearest non-mine structure is 1.5 km northeast of Pit 278, and the nearest residence is 2.62 km northeast of the pit. The prevailing wind directions are West during winter and West-Southwest during summer months.

According to the Model Noise Control By-Law guidance document, developed by the Newfoundland and Labrador Department of Environment and Labor in 1997, the maximum noise generation in a rural area between the hours of 7:00 a.m. and 7:00 p.m. is 65 dBA. Therefore, the blasting activities should result in lower noise generation than the maximum levels. Operations at the Project will be between the hours of 7:00 a.m. and 7:00 p.m. (typical day is 7:00 a.m. to 7:00 p.m.), meaning no activity should exceed the maximum noise generation levels. Blasting plans and procedures will be created with the aid of the local blasting contractor and will include means to reduce the potential adverse effects of both noise and vibrations. These include proper burden and spacing in blasting designs and the use of an acceptable stemming material.

2.3.2.4 Loading and Hauling

A hydraulic excavator is proposed for both waste rock handling and ore handling. Mucking operations will be supplemented with a haulage fleet of 40 tonne class articulated haul trucks. The sizes of the loading fleet and haul trucks have been estimated based on the operating hours required to achieve the production schedule, calculated by cycle times, and estimates of the equipment's rated capacities and productivities.

2.3.2.5 Stockpiles

Stockpiling of waste rock, ore, overburden, and organic material will use existing stockpiles at the Stog'er Tight site.

Waste rock from the pit will be stockpiled on WRSA, shown in Figure 2-1. The proposed mine plan includes generation of 1,632,464 tonnes of waste rock. The storage capacity of WRSA has been designed to accommodate the waste rock that will be generated from Pit 278.

Waste rock will be deposited from the haul trucks forming 6-meter lifts. Trucks will deposit near, and at a safe distance from, the edge of the lift. Lifts will be constructed such that the final WRSA has an overall slope angle that does not require rework at closure, as stated by the soil mechanics consultant's recommendation, therefore reducing reclamation costs (Gemtec 2018).

Overburden and organic material produced during the construction phase will be stockpiled at the Stog'er Tight Overburden/Organics Stockpile, shown in Figure 2-1.

Potential mill feed will be temporarily stockpiled on the ore pad, located adjacent to the south side of WRSA for temporary storage. From there, the material will be transported to the existing approved Pine Cove Mill for processing.

2.3.2.6 Hazardous and Dangerous Goods Management

Hazardous materials and dangerous goods used at Stog'er Tight will be managed under the applicable regulations, including the NL *Dangerous Goods Transportation Regulations* as well as in accordance with Signal Gold's existing Environmental Protection Plan (EPP). Persons / contractors involved in handling or use of hazardous materials and dangerous goods will be required to complete adequate training. Safety

data sheets will be available, and the locations of such materials will be identified in the Emergency Response Plan (ERP). Hazardous waste will be stored at existing facilities at the Pine Cove Mill.

2.3.2.7 Water Management

Water management infrastructure will include dewatering pumps for sumps necessary on the Project site as well as perimeter ditching. Existing infrastructure that will be used includes two sedimentation ponds, a freshwater intake used for purposes requiring clean but non-potable water, and a sewage system used in trailers in the office laydown. Potable water will continue to be supplied by a third party.

Contact Water Management

The primary objectives of mine water management are:

- Provide a mechanism to dewater and treat ponded water within the Project site to allow for development and excavation of mine infrastructure (e.g., pit, waste piles, haul road).
- Capture, treat and provide controlled discharge for mine contact water during construction and operations.
- Divert clean water away from the mine infrastructure to reduce the total volume of water entering the settling ponds for treatment.

During construction and operation, dust and fine material has the potential to mobilize into adjacent ponds and streams. To control silt and sediment runoff and prevent the release of potential contaminants, on-site drainage ditch channels, collection sumps, and settling ponds will be used. Figure 2-1 shows the infrastructure that will be used to direct water into the existing sedimentation ponds. Contact water ditches, which collect runoff from mine infrastructure, will be in place in applicable areas including around the WRSA. The sedimentation ponds were designed to accommodate anticipated pit inflow and surrounding contact water related to potential development of Pit 278. The settling ponds will discharge effluent at concentrations in accordance with MDMER requirements under the *Fisheries Act*.

Erosion and Sediment Control Measures

Erosion control measures in the contact water ditches and settling ponds will be maintained during operations including replacement of riprap, restoration of check dams if damaged, and general visual inspection of the ditches and settling ponds. Sediment build-up could occur in the ditches. Therefore, they will be inspected regularly and cleaned out as needed such that sediment does not build up or travel directly into the settling pond, reducing the available storage volume of the settling pond itself. These activities will be completed in accordance with Signal Gold's existing EPP.

2.3.2.8 Processing

Mined material will be transported to the Pine Cove mill for processing. The Pine Cove milling complex has a fully permitted in-pit tailings facility in which the process tailings from Pit 278 and Point Rousse's other operations will be deposited. For information on the design life of the mill and approved production rates, please refer to the Pine Cove Environmental Assessment Registration document (Anaconda Gold Corp. 2005) and the 2022 Operational Plan (Anaconda Mining Inc. 2022).

2.3.3 Closure and Decommissioning

Decommissioning of the Project will occur when Pit 278 has been exhausted. During decommissioning, water levels in Camp Pond will be restored following the operation phase, and Pit 278 will be reclaimed and flooded as a pit lake. Pit lakes are characterized by deep water depths, steep side walls and bedrock or coarse sediments. The natural water elevation for Camp Pond is 101.5 masl and will return to that elevation within approximately 2.4 years, while maintaining adequate downstream flows during flooding. Signal Gold is committed to progressive rehabilitation of mining operations, including use of organic stockpiles and native seed mixes, as described in the updated Stog'er Tight Extension Development Plan and Rehabilitation and Closure Plan. The existing Stog'er Tight Rehabilitation and Closure Plan will be updated to reference Pit 278 and infrastructure included for its development. The exhausted pit will be contoured where applicable, infrastructure will be removed from site, and the site will be re-vegetated.

2.4 ENVIRONMENTAL MANAGEMENT

2.4.1 General Environmental Management

Activities during the construction, operation and eventual decommissioning of the Project will be conducted in accordance with Signal Gold's existing EPP and ERP for the Stog'er Tight Deposit, which will be updated to include Pit 278. Project activities will adhere to best management practices and mitigation measures presented in these plans, as well as applicable regulatory requirements.

The Project will be monitored by the Environment Supervisor, with support provided by the corporate Environment, Compliance, and Social Responsibility Manager. Consistent with Signal Gold's existing operations, worksites and activities will be inspected for conformance with the EPP, government regulations, and permits. The purpose of this is to effectively implement and monitor the mitigation measures during construction and operation. A summary of mitigation measures and best management practices includes:

- Project footprint and disturbed areas will be limited to the extent possible.
- Construction activities will be scheduled in consideration of sensitive time periods for fish and wildlife.
- If timing is not ideal, alternative mitigation measures will be identified and implemented in consultation with applicable regulatory authorities.
- Disposal of cleared non-merchantable timber and slashing and cuttings from cleared areas will take place through mulching and/or piling to reduce the amount of slash. No burning of materials is permitted for this Project.
- Maintenance and refueling of vehicles will be restricted to designated areas.
- Fuel, hazardous and controlled product storage areas, including temporary fueling and fuel storage facilities, will be designed and operated in accordance with applicable codes and regulations.
- Hazardous wastes will be stored, removed, and disposed of in accordance with regulatory requirements.

- Mechanical equipment will be inspected regularly to prevent leakage of fuel, hydraulics, oils or other hazardous products. If problems are identified the equipment will be taken out-of-service and either repaired or replaced to prevent release of hydrocarbons into the environment. Spill kits will be on site and available in the case of an emergency.
- Safe driving practices including speed limits to avoid collisions with avifauna and other wildlife will be implemented.
- To control noise, applicable equipment will have exhaust systems which will be regularly inspected and maintained so that mufflers remain operating in accordance with manufacturer's recommendations.
- Dust from construction activities will be controlled where possible by using frequent applications of water. Waste oil will not be used for dust control, but other agents, such as wood chips, calcium chloride, matting, or revegetation may be considered on a site-specific or as needed basis.
- Pit access will be created using existing access and exploration roads where possible.
- Cutting activities will be limited to those areas that are required for construction of infrastructure and pit development. Natural vegetation will be left in place where possible.
- Buffer zones will be flagged prior to disturbance activities, as required.
- A minimum buffer zone of natural vegetation 20 m from the high-water mark of waterbodies, watercourses and ecologically sensitive areas will be maintained around work areas, where available space poses a constraint, except where specified otherwise. If space is available, then wider buffer zones of 100 m will be maintained between construction areas and watercourses, waterbodies and ecologically sensitive areas.
- Discharged water will be tested for compliance with MDMER prior to release into the environment.
- Erosion prevention and sediment control measures will be installed to reduce and control runoff soil erosion and transport of sediment laden water. These measures will be monitored regularly and cleaned / repaired as necessary to maintain their effectiveness.
- The timing of blasting activities will be conducted in consideration of potential environmentally sensitive periods. Use of explosives in or near water will be avoided, however, if required, will follow DFO blasting guidelines.
- The amount of on-site lighting will be reduced. Only the amount of lighting required for safe conduct of construction and operation activities will be installed, and exterior lights will be shielded from above (where the need is identified).
- Work activities will be conducted in a manner that does not deliberately harass wildlife, including avifauna.
- Project contractors and staff will be prohibited from fishing, hunting, or otherwise interacting with (e.g., harassment, feeding) wildlife at or near the site while working on the Project.
- Personal pets (domestic or wild) will be prohibited on site.
- The use of herbicides, if required, will be limited to non-residual herbicides and restricted to avoid buffer areas around watercourses. The requirements of applicable regulations will be met or exceeded, including their application by qualified, trained personnel following manufacturers' instructions and as per the *Pesticides Control Regulations, 2012* under the NL EPA.

2.4.2 Emergency Response

Signal Gold's existing ERP will be updated to reference Pit 278. The ERP provides clear and concise guidance for emergency support actions to be taken under emergency situations that could reasonably be expected to occur.

The purpose of the ERP is to reduce the probability of emergency events escalating to catastrophic proportions and to reduce losses. The ERP is intended to provide effective corporate response to emergency situations and execute necessary corporate emergency support actions. Accidental events that could occur during Project construction and/or operations include asset damage during extreme events, spills, and/or fire. In addition, the EPP will include contingency plans for fuel and hazardous material spills, wildlife encounters, discovery of historic and archaeological resources, and forest fires.

2.5 PROJECT ALTERNATIVES

Consideration has been given to alternative options regarding the proposed project. This has included pit design parameters, orientations, discharge locations, and water management. Pit 278 will use existing structures for the Sto'ger Tight Deposit (i.e., WRSA, stockpiles, laydowns, sedimentation ponds) to limit the amount of surface disturbance and haulage distance. The proposed location makes use of favourable topography and does not require changes to the current mining lease. Additionally, Pit 278 is being developed using Whittle; a pit optimization software.

Partial dewatering of Camp Pond was considered in Project planning, including the use of a cofferdam; however, this option was not considered technically, environmentally, or economically feasible.

2.6 PROJECT SCHEDULE

Pending regulatory approvals, construction activities are scheduled to start in June 2023 with mining operations commencing in September 2023. Construction activities will be undertaken in consideration of sensitive time periods for fish and wildlife. Where sensitive periods cannot be avoided, additional mitigation may be required, which would be identified in consultation with applicable regulators.

The proposed schedule for the Project is outlined in Table 2.5; the start and completion dates indicate the preferred window for the scheduled activity and are not intended to reflect the duration required for the activity.

Table 2.5 Proposed Project Schedule

Activity/Milestone	Planned Schedule
Construction	June 2023 (3 months)
Operation	September 2023 (6.5 months)
Closure	March 2024*
* It will take approximately 2.4 years post-closure for Pit Lake 278 (the combined Camp Pond and Pit 278) to fill, while maintaining adequate downstream flows	

2.7 EMPLOYMENT

2.7.1 Occupations

Project employment estimates are provided in Table 2.6. The Project is scheduled to commence operations in September 2023, to coincide with the cessation of other operations at the Stog'er Tight and Argyle deposits. It is expected that existing personnel, including contractors and current employees working at the Pine Cove mill facility and administration (a total of approximately 135 employees), would continue their employment to support the Project.

Table 2.6 Project Occupation and Personnel Requirements

Construction and Operational Phases		
Occupation	**Quantity**	**National Occupational Classification**
Health & Safety Supervisor	4	21120
Mine Superintendent	2	80010
Site Supervisor	1	72014
Geologist	5	21102
Planner/Engineer	5	21330
Environment	2	2263
Surveyor	2	21203
Heavy Equipment Operator	5	73400
Truck Drivers	10	73400
Heavy Equipment Mechanics	4	72401
Pit Operations Foreman	2	72021
Labourer/samplers	10	75110
Drillers	6	73402
Blasters	2	73492
Total	**58**	

2.7.2 Diversity and Inclusion

Signal Gold maintains a Women's Employment Plan and has developed the following commitments to advance gender equity in its workforce, including the transition of women into leadership roles:

- Establish senior executive responsibilities for gender equality, develop capabilities and lines of accountability among senior management
- Develop and communicate an executive-level vision statement to all staff and contractors, including commitments and goals
- Communicate policies and practices related to recruitment, orientation, hiring, remuneration, retention, promotion, complaint resolution and termination
- Establish targets and timeframes to increase the number of women in leadership roles and occupations where women are under-represented
- Provide training and other supports to develop an inclusive workplace culture
- Implement a monitoring system for gender equity as part of general human resources systems and project planning/implementation (Women's Employment Plan May 2022)

3.0 ENVIRONMENTAL SETTING AND POTENTIAL RESOURCE CONFLICTS

An overview of the biophysical and socio-economic setting is provided below. Additional information can be found in baseline studies appended to this report related to the aquatic habitat (Appendix A), rare plants (Appendix B), avifauna (Appendix C) and hydrology (Appendix D).

The Project is located near the border of the Central Newfoundland Forest (CNF) - Northcentral Subregion and North Shore Forest Ecoregions, two of nine ecoregions on the Island of Newfoundland (Meades 1990a). The North Shore Forest Ecoregion includes the coastal area of the Baie Verte Peninsula and is characterized by rugged terrain and elevations of up to 315 m asl (Meades 1990a). The Northcentral Subregion of the CNF is characterized by more rolling topography and elevations generally below 200 m asl.

3.1 ATMOSPHERIC ENVIRONMENT

The climate in the CNF and North Shore Forest Ecoregions is generally drier and warmer than in other ecoregions on the island. Summer conditions generally occur from late June through early September, with historical average temperatures ranging from 10 to 15 degrees Celsius (Environment Canada 2021). Winter conditions generally persist from November to late March, with historical (1984-2007) average temperatures below zero throughout this period (Environment Canada 2021). Spring and fall conditions are generally cool with frequent periods of rain. Average annual precipitation is approximately 900 mm to 1200 mm (Environment Canada 2021, Meades 1990b).

Project activities will generate localized air contaminant emissions due to use of equipment and vehicles during construction and operation, as well as dust during construction activities. Equipment and vehicles will be maintained in good working order to reduce emissions. Dust will be controlled, as necessary, by the application of water, calcium chloride, or other approved dust control compound. With the implementation of standard construction and operation measures as outlined in the EPP, potential conflicts with the atmospheric environment are anticipated to be temporary and localized in nature.

3.2 AQUATIC ENVIRONMENT

The Project is located in the Western Notre Dame Bay watershed (National Hydro Network ID - 02YM), which has a total area of approximately 18,550 km^2. Camp Pond provides 0.08 km^2 of lacustrine habitat with a maximum depth of 11.4 m. Camp Pond receives drainage from Fox Pond via stream SS-1 and drains into Baie Verte through the outlet stream SS-2 which flows into a series of streams and unnamed ponds (see Figure 3.1 in Appendix A). The substrates in Camp Pond contain a high proportion of fines and the littoral zone contains a low amount of aquatic vegetation (Stantec 2022, Appendix A). The inflowing and outflowing streams near Camp Pond contain a substantial amount of pooled habitat, with higher proportions of fines and gravel substrates (Stantec 2022). Riparian vegetation consists predominantly of shrubs and coniferous trees. There is a moderate amount of overhead cover provided

by shrub/tree and a low amount of instream cover provided by large and small woody debris and instream vegetation (Stantec 2022).

Fish sampling within Camp Pond confirmed the presence of brook trout (*Salvelinus fontinalis*) only; no other fish species were caught (Stantec 2022). Brook trout were also observed within the Camp Pond inflow (SS-1 and SS-7) and outflow (SS-2) streams. While fish were observed in the lower sections of SS-7, two barriers to fish passage were observed as shown on Figure 3-1. These barriers were determined to be complete and limit fish access to Gabbro Pit and the waste rock storage area upstream.

One fish Species at Risk (SAR), American eel (*Anguilla rostrata*), was documented during freshwater sampling in 2021, downstream of Camp Pond in SS-2. This species is listed as Vulnerable under the NL *Endangered Species Act* (NL ESA) (2006) and Threatened by the Committee on the Status of Endangered Wildlife Species in Canada (COSEWIC) (2012).

Project activities including vegetation clearing (e.g., removal of riparian vegetation), Camp Pond dewatering, and management of surface water run-off, will affect fish and fish habitat by altering the natural flow regimes and potentially altering surface water quality. The operation of equipment in or near watercourses could also result in sedimentation of watercourses or waterbodies. Potential effects on surface water resources and fish and fish habitat are described in Sections 5.1 and 5.2, respectively.

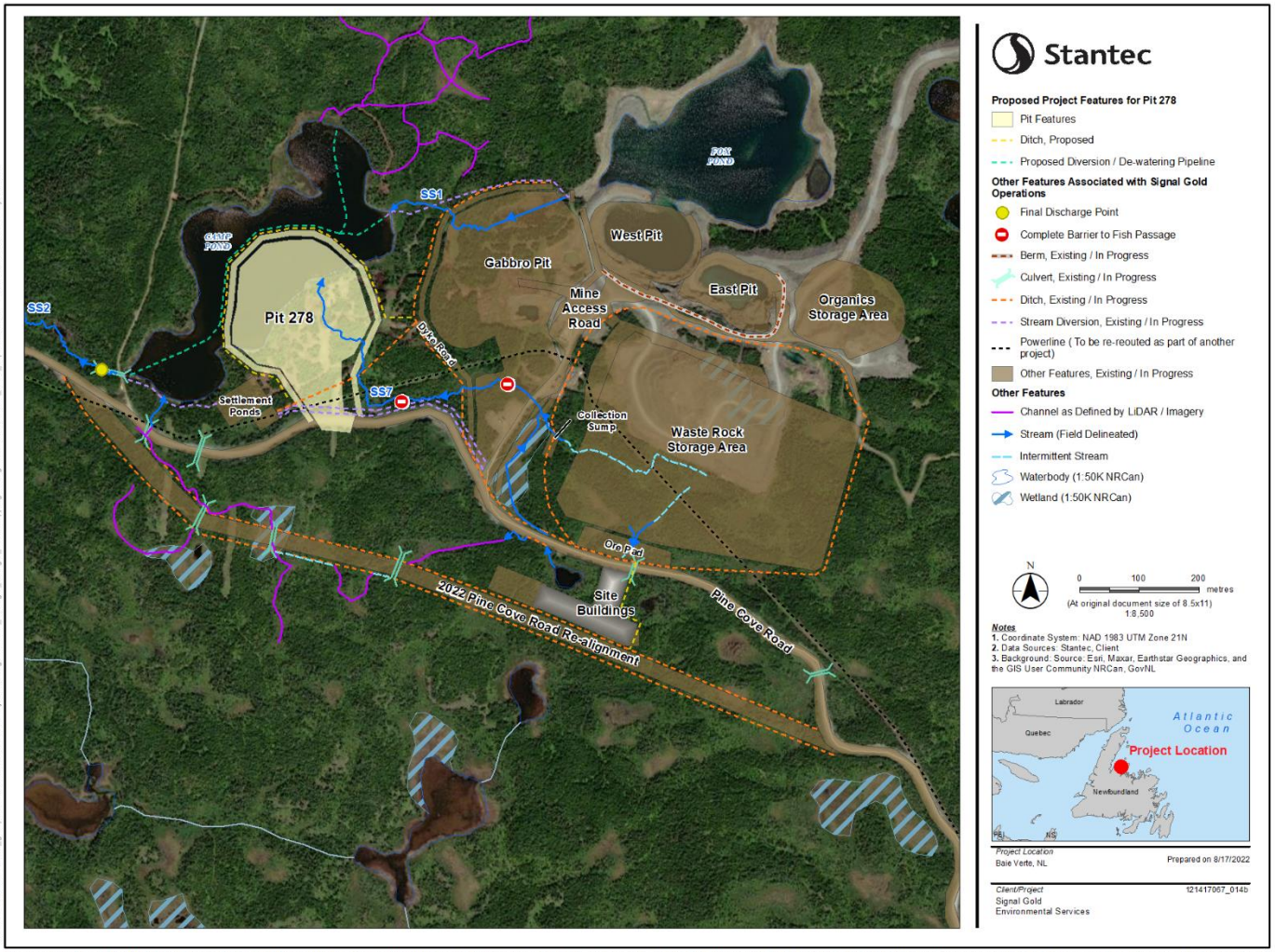

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Figure 3-1 Aquatic Environment

3.3 TERRESTRIAL ENVIRONMENT

The landscape in the general area of the Point Rousse Project is a mix of dense vegetation and small wetlands and ponds. Black spruce (*Picea mariana*), balsam fir (*Abies balsamea*) and, to a lesser extent, white birch (*Betula papyrifera*), are common (Medes 1990a). White spruce (*P. glauca*), trembling aspen (*Populus tremuloides*) and alders (*Alnus sp.*) also occur in some areas. Barrens dominate along coastal headlands (Meades 1990a).

Several avifauna and other wildlife species (e.g., large and small mammals, furbearers) are expected to occur near the Project site. Wildlife species confirmed during baseline studies, through visual observation or wildlife sign (e.g., tracks, scat, lodges/dams, etc.), include red fox (*Vulpes vulpes*), red squirrel (*Tamiasciurus hudsonicus*), snowshoe hare (*Lepus americanus*), southern red-backed vole (*Myodes gapperi*), moose (*Alces alces*), black bear (*Ursus americanus*), and coyote (*Canis latrans*). Other species that may occur near the Project site include beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), ermine (*Mustela erminea*), mink (*Neovison vison*), river otter (*Lontra canadensis*), Canada lynx (*Lynx canadensis*), northern myotis (*Myotis septentrionalis*), and little brown myotis (*Myotis lucifugus*) (Meades 1990b). Caribou (*Rangifer tarandus*) are unlikely to occur in the area, based on historical year-round caribou distributions on the Island of Newfoundland (GovNL 2015).

Thirty-six bird species were documented in the area during the Avifauna Baseline Study (Appendix C), including 33 species of migratory birds and three other avifauna species (e.g., species not protected under the *Migratory Birds Convention Act, 1994* (MBCA)). No raptors were observed in the area although osprey (*Pandion haliaetus*) and bald eagle (*Haliaeetus leucocephalus*) may occur in coastal areas.

For the purposes of this Registration, SAR and species of conservation concern (SOCC) encompasses species of fish, avifauna, and other species (including plants).

SAR are those species:

- Designated under Schedule 1 of the federal *Species at Risk Act* (SARA)
- Listed as Extirpated, Endangered, Threatened, Vulnerable under the NL ESA

SOCC are those species:

- Assessed by COSEWIC as Extirpated, Endangered, Threatened, Vulnerable, or Special Concern, or recommended for listing by the Species Status Advisory Committee as Endangered, Threatened, Vulnerable, or Special Concern, but not yet listed under NL ESA or SARA
- Considered provincially rare, i.e., those species with provincial status ranks (S-ranks) of S1 (Critically Imperiled), S2 (Imperiled), or combinations thereof (e.g., S1S2) upon review by the Atlantic Canada Conservation Data Centre (AC CDC) (AC CDC 2021)

Unlike SAR, SOCC are not protected by federal or provincial legislation. Rather, they are considered herein as a precautionary measure, reflecting observations and trends in their provincial population status.

There were no avifauna or other wildlife SAR / SOCC identified during baseline field surveys for the Project, or that have records within a 5 km radius of the Project (AC CDC 2021). While there are no records in the vicinity of the Project, critical habitat (i.e., hibernacula) for little brown myotis and/or northern myotis has been identified in the White Bay area (ECCC 2018), approximately 40 km west of the Project. As bats will disperse from and return to a hibernaculum from various summering locations, potentially traveling long distances, these species have the potential to interact with the Project. Both species of myotis are listed as Endangered under SARA.

As described in the Terrestrial Baseline Study – 2021 Rare Plants Survey (Appendix B), there are records of four native plant SOCC in the vicinity of the Project:

- Common wintergreen (*Chimaphila umbellata*)
- Large-leaf pondweed (Potamogeton amplifolius)
- White-stem pondweed (*Potamogeton praelongus*)
- Floating bur-reed (*Sparganium fluctuans*)

Floating bur-reed was indicated in the AC CDC database as occurring within a 5 km radius of the Project but was not recorded during the baseline field program. The three remaining species were confirmed during the baseline program, with common wintergreen only found in the Pumbly Point area (i.e., beyond the footprint of the Project).

There were no plant SAR identified during baseline field surveys for the Project, nor were there records of vascular plant SAR within a 5 km radius.

Project activities will result in the loss or alteration of 0.12 km^2 (12.02 ha) of terrestrial habitat in the Project Area, with the potential for indirect effects (e.g., sensory disturbances from noise and dust) to extend beyond the immediate footprint of the Project. To reduce potential effects on avifauna and other wildlife, surface disturbance for the Project will be reduced to the extent possible and activities related to the Project will adhere to best management practices and mitigation measures, as well as applicable regulatory requirements.

With the implementation of mitigation measures described in Section 2.4, potential direct and indirect effects on avifauna are anticipated to be temporary and localized in nature. This is based largely on the schedule of clearing activities for outside of the breeding season for most birds (e.g., mid-April to mid-August), the overall small size of the area of vegetation clearing (i.e., habitat loss), and that no avifauna SAR are expected to occur in the Project Area (based on timing and available habitats). Potential interactions between Project activities and avifauna species and their habitat are described further in Section 5.3.

Similarly, with the implementation of best management practices and mitigation measures described in Section 2.4, Project activities throughout the Project phases have a low potential to interact directly or indirectly with the quality and availability of habitats used by other SAR. There are no plant SAR predicted to occur in the Project Area, however, two bat SAR have the potential to occur. The potential for interactions between Project activities and SAR and their habitat is described further in Section 5.4.

Effects on regionally rare plants (i.e., SOCC) will be mitigated using standard mitigation and best practices.

3.4 SOCIO-ECONOMIC ENVIRONMENT

The Project is located in a rural region on the Baie Verte Peninsula where there is a long history of mineral exploration, including the discovery of asbestos and other ore bodies of copper, lead, zinc, and gold. Signal Gold's existing mining and milling operation employs approximately 135 people, most of whom reside in local communities. The Project will extend the overall life of Signal Gold's operations into 2024, providing continued employment. The nearest residential areas are Ming's Bight (3 km) and Baie Verte (8 km from Camp Pond), and the Project is within the municipal boundary of the community of Baie Verte. In addition to mining, other major occupations on the peninsula relate to working with the federal and provincial governments (e.g., Service Canada, healthcare), Royal Canadian Mounted Police, and senior and childcare services.

Past mining activities occurred in several communities on the Baie Verte peninsula. The Terra Nova mine, a copper and sulfur mine, operated in the town of Baie Verte from 1860 until 1864 and again between 1901 and 1915, and was the site of the first railway track and locomotive in the province. In 1955, asbestos was discovered in the town, and the first (and only) productive asbestos mine in the province opened in 1963. The Baie Verte Peninsula was also the location of the first ore smelter (Bett's Cove) and gold mine (Goldenville) in the province. Active mining also occurred in or near the towns of Tilt Cove, Ming's Bight, and King's Point. Current operations include the Rambler Metals and Mining gold mine and mill, in addition to those of Signal Gold. Maritime Resources Corp. has re-started the Hammerdown Gold Project near King's Point, which was released from the provincial EA process in 2021.

Other land and resource use activities in the area include boating and eco tours, camping, hiking, and off-road vehicle use (all-terrain vehicles, snowmobiles). There are few cabins in the vicinity of the Project, and hunting, trapping, and inland fishing activities are limited. The nearest protected areas (e.g., provincial and national parks, wildlife, ecological and wilderness reserves, protected water areas) include the Ming's Bight Protected Water Supply Area (approximately 1 km away), Waterway Provincial Park (approximately 65 km away) and Gros Morne National Park (approximately 125 km away). Flatwater Pond, a private campground, is approximately 60 km away.

Indigenous groups on the island include the Qalipu Mi'kmaq First Nation, with membership spread across 67 traditional Mi'kmaq communities and abroad, and the Miawpukek First Nation, with approximately 850 members living on-reserve in Conne River on the south coast of Newfoundland. The closest Qalipu community to the Project is Sop's Arm, located approximately 60 km from the Project. The Miawpukek Band Reserve in Conne River is approximately 475 km from the Project and there are currently no established traditional rights outside of the reserve boundaries.

The nearest protected area (Waterway Provincial Park) is approximately 65 km away. Given the Project is located entirely within the existing mining mill area, no different or additional interaction with, or effects on, Indigenous communities or their harvesting or other land use activities are likely to occur. Traffic may be minimally increased during Project construction and operation; however, dust and noise emissions will be reduced through the implementation of standard mitigation measures and best practices.

3.5 HERITAGE RESOURCES

The Project is considered to be situated in an area of low archaeological potential, and as such there are no concerns with potential historical resource conflict. If, however, historic resources are encountered, operations in the area of the discovery will stop and the proper authorities will be notified in accordance with the *Historic Resources Act, 1985* and as described in Section 3.3 of the EPP.

4.0 ENVIRONMENTAL EFFECTS METHODS AND APPROACH

The approach for this EA is based on methods developed by Stantec to fulfill requirements of the provincial NL EPA for an Environmental Registration document. The scope of assessment considers the proposed Project components and activities, knowledge of the existing conditions and sensitivities of the surrounding environment, other Registrations and Environmental Impact Statements that have been prepared for projects of a similar nature and/or occurring in the same region, applicable regulations, policies and guidelines, the influence of consultation and engagement, and professional experience. The approach assumes a precautionary, conservative approach with assumptions generally applied to overestimate potential adverse effects.

4.1 SCOPE OF THE ASSESSMENT

4.1.1 Scope of the Project

The scope of the Project to be assessed includes the components and activities described in Chapter 2 and includes the construction, operation and maintenance, and eventual decommissioning of the Project.

4.1.2 Regulatory and Policy Setting

Various federal and provincial legislation inform the scope of the assessment.

- SARA provides a framework to facilitate recovery of species listed under the Act as Threatened, Endangered or Extirpated and to prevent species listed as Special Concern from becoming Threatened or Endangered. SARA prohibits: 1) the killing, harming, or harassing of Endangered or Threatened SAR (sections 32 and 36); and 2) the destruction of critical habitat of Endangered or Threatened SAR (sections 58, 60 and 61).
- The MBCA provides protection for migratory birds as well as their nests and eggs. This act affords protection to most native bird species expected to occur in the vicinity of the Project, except some non-migratory groups, and some species, such as raptors, kingfishers and cormorants. Those species not protected under the MBCA but are afforded protection under provincial legislation described below.
- The NL ESA provides protection for terrestrial vegetation and animal species considered to be Endangered, Threatened or Vulnerable in NL. The Wildlife Division, within the NL Department of Fisheries, Forestry and Agriculture coordinates the assessment and listing of SAR and develops recovery and management plans, monitoring programs and research projects to promote conservation of species listed under the Act.
- The NL *Wild Life Act* affords protection of wildlife (including avifauna species) and prohibits the hunting, taking or killing of wildlife or classes of wildlife, whether in particular places or at particular times or by particular methods, except under license or permit. The Act, in combination with other provincial regulations and Acts including the *Wilderness and Ecological Reserves Act* and the NL ESA, protects the biodiversity and wildlife resources of NL from being compromised.

- The *Fisheries Act*, as amended in 2018, reintroduced provisions for the protection of fish and fish habitats, notably the prohibition against harmful alteration, disruption or destruction (HADD) of fish habitat. The Act also prohibits activities that cause the "death of fish" (other than permitted fishing activities), considers the cumulative effects of development activities, and provides improved protection of highly productive, sensitive, rare or unique fish and/or fish habitats. These prohibitions are limited through authorization of the project, compliance with all conditions established by the Minister, and/or other exceptions within the *Fisheries Act* and regulations. DFO regulates scheduled salmon rivers under the *Fisheries Act* and *Canada Wildlife Act*.
- The *Canadian Navigable Waters Act* (CNWA) came into force in August 2019, replacing the former Navigation Protection Act. This Act applies to anyone planning activities that will affect navigation in navigable waters. The CNWA has been developed to regulate major works and obstructions on navigable waters, even those not listed on the schedule of navigation, and creates a new category for "major" works (i.e., those likely to substantially interfere with navigation and which require approval from Transport Canada). Although the transmission line will span navigable waters, the construction and operation of the transmission line will not affect navigation and an approval under the CNWA is not required.

4.1.3 Consultation and Engagement

To date, engagement on the proposed Project has primarily occurred with the Town of Baie Verte, Town of Ming's Bight, and the Government of NL for the purposes of obtaining required permits. The ongoing discussions at multiple Ming's Bight Council meetings began in September 2021 and attendees included SGI General and Mill Managers, Ming's Bight Mayor, and other council members.

Engagement with the general public and Indigenous groups has not been undertaken to support the development of Pit 278 as the Project occurs within an existing mine site.

4.1.4 Selection of Valued Components

Four environmental or socio-economic attributes that may be affected by the Project, were selected as valued components (VCs) on which to focus the effects assessment: Surface Water Resources, Fish and Fish Habitat, Avifauna, and Other Species at Risk. These VCs were selected in consideration of the following:

- Regulatory guidance and requirements
- Preliminary discussions with regulatory agencies prior to Registration
- Technical knowledge of the Project
- Existing conditions for the physical, biological and socio-economic environments and potential resource conflicts (see Section 3.3)
- Lessons learned from previous similar EAs
- Professional judgement of the Study Team

For each selected VC, existing conditions are described, Project interactions and effects pathways identified, mitigation is proposed, and residual effects are evaluated. The significance of residual effects is determined based on pre-existing criteria. Follow-up and monitoring are proposed where necessary to validate EA predictions and/or confirm effectiveness of mitigation measures.

4.1.5 Spatial and Temporal Boundaries

The scope of the assessment is defined by spatial boundaries (i.e., geographic extent of potential effects) and temporal boundaries (i.e., timing of potential effects). The spatial boundaries reflect the geographic range over which potential environmental or socio-economic effects may occur, whereas temporal boundaries identify when an environmental or socio-economic effect may occur throughout all phases of the Project.

Spatial boundaries for the assessment are described below and presented on Figure 4-1.

- The Project Area represents the anticipated area of direct physical disturbance associated with construction, operation and decommissioning of the Project. The Project Area encompasses Pit 278 and associated ditching, Camp Pond and associated water management systems, and haul roads.
- The Local Assessment Area (LAA) encompasses the area within which Project-related environmental effects can be predicted or measured for assessment. For the purpose of this assessment, the LAA is the Project Area plus a 500 m buffer to account for the geographic extent of most prevalent effects on any given VC.
- The Regional Assessment Area (RAA) is the area established for context in determination of significance of Project-specific effects. It is also the area which informs the assessment of cumulative effects. For the purpose of this assessment, the RAA is the Project Area plus a 1,000 m buffer to account for downstream areas beyond mixing zones.

Temporal boundaries are based on the timing and duration of project activities and the nature of the interactions with the VC. Temporal boundaries for this assessment include the timelines associated Project construction, operations and closure:

- Construction: 3 months, beginning June 2023
- Operation: Estimated 6.5-month operation life, with commissioning slated to start September 2023
- Closure: March 2024

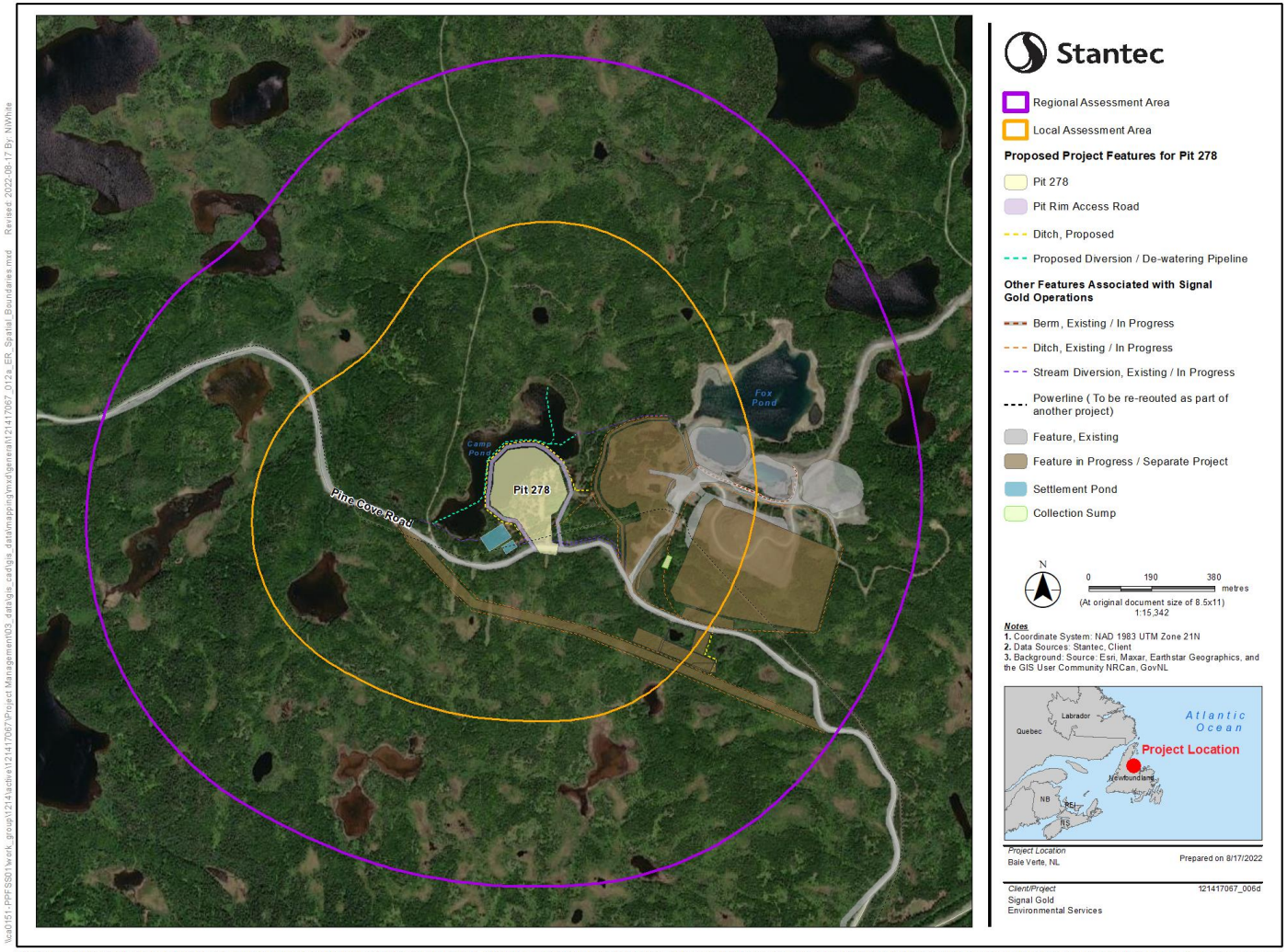

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Figure 4-1 Spatial Assessment Boundaries

4.2 RESIDUAL EFFECTS CHARACTERIZATION

Following the analysis of environmental effects pathways and mitigation measures, the residual environmental effects are characterized using the following criteria: direction, magnitude, geographic extent, timing, frequency, duration, reversibility, and ecological or socio-economic context. The descriptors used to characterize residual environmental effects for each VC are defined in Table 4.1.

Table 4.1 Characterization of Residual Environmental Effects

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The long-term trend of the residual effect	**Positive**—an effect that moves measurable parameters in a direction beneficial to the VC relative to baseline **Adverse**— an effect that moves measurable parameters in a direction detrimental to the VC relative to baseline **Neutral**—no net change in measurable parameters for the VC relative to baseline
Magnitude	The amount of change in measurable parameters relative to existing conditions	**No Measurable Change**— no measurable adverse effect anticipated **Low**— effect occurs that is detectable, but is within normal variability of baseline conditions **Moderate**— effect occurs that would cause an increase (or decrease) with regard to baseline, but is within regulatory limits and objectives **High**— effect occurs that would cause exceedances of objectives or standards
Geographic Extent	The geographic area in which an environmental effect occurs	**Project Area**—residual effects are restricted to the Project Area **LAA**—residual effects extend into the LAA **RAA** – residual effects extend into the RAA
Timing	Considers when the residual effect is expected to occur, where relevant to the VC	**No sensitivity -** Effect does not occur during critical life stage or timing does not affect the VC **Moderate sensitivity -** Effect may occur during a lower sensitive period of a critical life stage; for many species this is the start or end of the critical period **High sensitivity -** Effect occurs during a critical life stage
Duration	The period of time required until the measurable parameter returns to its existing condition, or the effect can no longer be measured or otherwise perceived	**Short-term**—residual effect occurs within the life of the Project **Medium-term**—residual effect extends beyond the life of the Project into Project closure **Long-term**—residual effect extends Project closure **Permanent** – recovery to baseline conditions unlikely

Table 4.1 Characterization of Residual Environmental Effects

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Frequency	Identifies how often the residual effect occurs and how often during the project or in a specific phase	**Single event** **Multiple irregular event** – occurs at no set schedule **Multiple regular event –** occurs at regular intervals **Continuous –** occurs continuously
Reversibility	Pertains to whether a measurable parameter can return to its existing condition after the project activity ceases	**Reversible**—the effect is likely to be reversed after activity completion and rehabilitation **Irreversible**—the effect is unlikely to be reversed

4.3 SIGNIFICANCE DEFINITIONS

For each environmental effect, threshold criteria or standards are identified beyond which a residual environmental effect is considered significant. The thresholds are defined in consideration of federal and provincial regulatory requirements, standards, objectives, or guidelines, as applicable to the VC. Where thresholds are not set by guidelines or regulations, a threshold is developed using the measurable parameters established for the VC, along with professional judgement of the assessors. The thresholds define the limits of a change in a measurable parameter or state of the VC beyond which it would be considered significant, based on resource management objectives, community standards, scientific literature, or ecological processes (e.g., desired states for fish or wildlife habitats or populations).

5.0 ENVIRONMENTAL EFFECTS ASSESSMENT

5.1 SURFACE WATER RESOURCES

Surface water provides habitat for fish, vegetation, and aquatic populations, and contributes to local socio-economic drivers such as drinking and industrial process water supply. It is an integral part of the hydrological cycle and effects of the Project will be considered for both surface water quantity and quality, and how changes in these two areas may influence human and ecological use.

Surface water is closely linked to the Fish and Fish Habitat VC. The potential environmental effects of changes to surface water quantity and/or quality on the Fish and Fish Habitat VC are discussed in Section 5.2.

5.1.1 Significance Definition

For the purposes of this environmental assessment, a significant adverse residual effect on surface water quantity is defined as a measurable change in hydrological regime that:

- Does not meet established instream flow needs (environmental flow thresholds); and/or
- Contravenes a watershed management target including:
- An uncompensated loss of fish habitat
- Changes to flow that increase sedimentation and erosion above regulatory guidance in waterbodies receiving surface water runoff
- Changes to flows that cause flooding downstream of the Project beyond existing conditions
- Changes to pond and lake levels outside the Project Area to a point that it affects their ability to support existing ecological functions

A significant adverse residual effect on surface water quality is defined as a measurable change in water quality that:

- Exceeds an implemented water quality requirement such as MDMER limits or a site-specific water quality guideline for the protection of aquatic life; and/or
- Contravenes a watershed management target including:
- Degrading water quality that causes acute or chronic toxicity to aquatic life
- Changes the trophic status of a lake or stream, or
- Exceeds the generally accepted Total Suspended Solids (TSS) monitoring guideline (the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines – Freshwater Aquatic Life (CWQG-FAL) applied for Project activities

5.1.2 Existing Conditions

A characterization of the existing conditions within the spatial boundaries is provided below. This includes a discussion of the influences of past and present physical activities on the VC, leading to the current conditions. An understanding of the existing conditions for the VC within the spatial area being assessed is a key requirement in the prediction of potential Project residual effects provided in Section 5.1.5.

5.1.2.1 Regional Hydrology

Assessment of the regional hydrology included completion of a regional flow assessment (mean monthly flows (MMFs) and mean annual flows (MAFs)), flow duration curves, specific return period flood flows, and the calculation of low and environmental flows.

A regional flow assessment was conducted to characterize hydrologic conditions in the LAA and RAA. As there are no streamflow monitoring stations with long or continuous historical data records available in the LAA, regional streamflow monitoring stations operated by the Water Survey of Canada (WSC) on the Island of Newfoundland were selected to characterize regional hydrologic conditions. Considering hydrology at a regional scale allows for many years of flow data to be included in analyses and allows for extreme (high and low) flow events to be captured, therefore providing more confidence in mean flow statistics.

Newfoundland is subdivided into four hydrologically homogeneous regions (northeast (NE), southeast (SE), southwest (SW), and northwest (NW)) and regional relationships for flows have been developed for each region (AMEC 2014). The Project is in the NE region which includes 23 stations. Return period peak flow relationships to watershed area have been developed for the Island of Newfoundland and were updated most recently by AMEC (2014). AMEC also attempted to establish additional regression equations for small watersheds (<50 km^2) and found that there was a poor statistical fit. For this regional assessment, stations located in the NE hydrologic region were further refined to exclude stations occurring in watersheds with areas >600 km^2 (five stations), gauging stations greater than 200 km of the Project site (six stations), and stations with heterogeneous unit flow data (one station). Eleven stations were carried forward in the regional hydrology assessment for the Project.

The MAFs for the 11 WSC stations located in the NE hydrologic region were plotted against drainage areas to establish regression relationships. The relationship between MAFs and watershed area suggests that 99% of the variability in the MAF can be explained by watershed area (Figure 5-1, Appendix D). The drainage areas, climate normal precipitations, low flows, environmental flows, and flood flows for the selected WSC stations are presented in Table 5.1. The climate normal precipitation for the Project site is 1,002.4 mm/yr.

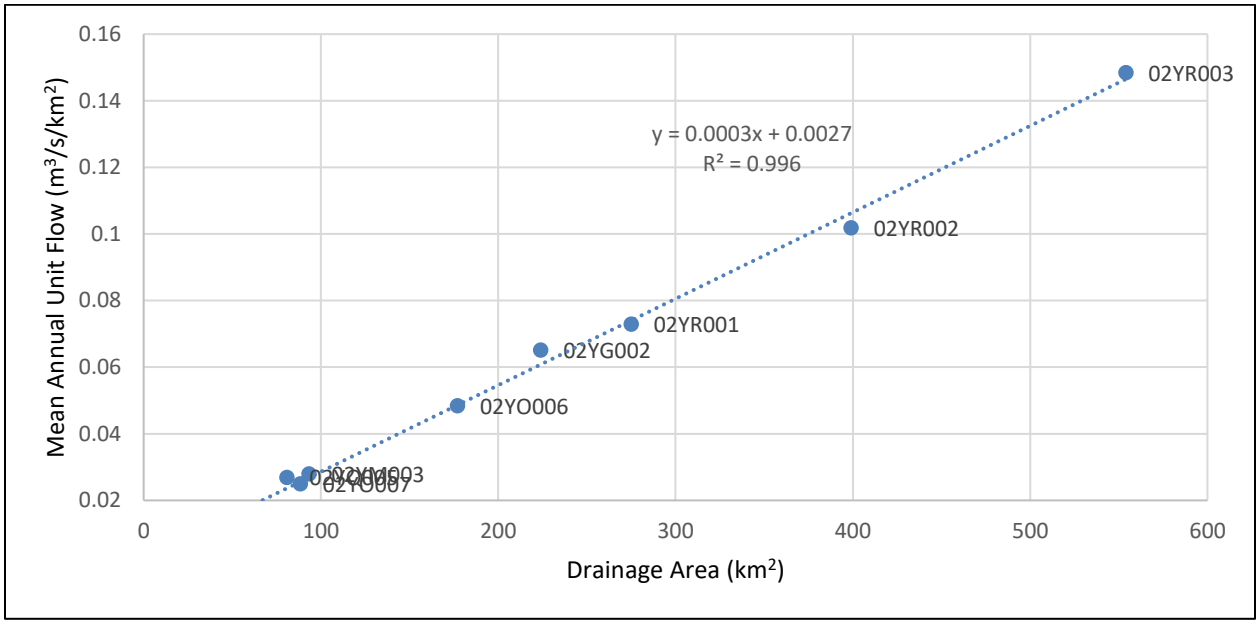

Figure 5-1 Mean Annual Unit Flow for 11 WSC stations in NE Region

Table 5.1 Water Survey of Canada Station Statistics used in the Regional Hydrology Assessment

	02YM003	02YO006	02YO012	02YP001	02YQ005	02YR002	02YG002	02YO007	02YO010	02YR001	02YR003
Drainage Area (km^2)	93.2	177.0	58.7	63.8	80.8	399	224	88.3	61.6	275	554
Climate Normal precipitation (mm)	1,002.4	1,139.6	1,139.6	1,092.1	1,270.2	1,043.1	1,002.4	1,098.9	1,098.9	984.4	984.4
Summer Environmental Flow (50% MAF) (L/s)	0.0084	0.0242	0.0084	0.0099	0.0135	0.0326	0.0074	0.0364	0.0742	0.0509	0.0124
Winter Environmental Flow (30% MAF) (L/s)	0.0140	0.0050	0.0050	0.0060	0.0081	0.0195	0.0045	0.0219	0.0445	0.0306	0.0074
1Q2	0.3	0.62	0.18	0.2	0.26	1.52	0.8	0.29	0.19	1.01	2.19
7Q2	0.35	0.71	0.21	0.24	0.3	1.72	0.92	0.33	0.23	1.15	2.45
1Q10	0.14	0.29	0.09	0.09	0.12	0.72	0.38	0.14	0.09	0.48	1.03
7Q10	0.17	0.34	0.1	0.11	0.15	0.83	0.44	0.16	0.11	0.55	1.18
1Q20	0.11	0.21	0.06	0.07	0.09	0.53	0.28	0.1	0.07	0.35	0.75
7Q20	0.13	0.25	0.08	0.08	0.11	0.61	0.33	0.12	0.08	0.41	0.87
1Q50	0.06	0.13	0.04	0.04	0.05	0.32	0.17	0.06	0.04	0.21	0.46
7Q50	0.08	0.16	0.05	0.05	0.07	0.39	0.21	0.08	0.05	0.26	0.55
1Q100	0.04	0.08	0.02	0.03	0.03	0.19	0.1	0.04	0.02	0.13	0.28
7Q100	0.05	0.10	0.03	0.03	0.04	0.24	0.13	0.05	0.03	0.16	0.35
Q2	$Q2 = 0.836 \times DA^{0.755}$										
Q5	$Q5 = 1.271 \times DA^{0.733}$										
Q10	$Q10 = 1.582 \times DA^{0.722}$										
Q20	$Q20 = 1.895 \times DA^{0.712}$										
Q50	$Q50 = 2.322 \times DA^{0.702}$										
Q100	$Q100 = 2.658 \times DA^{0.695}$										
Q200	$Q200 = 3.009 \times DA^{0.688}$										

The MMFs per unit drainage area (DA) for the selected WSC stations are presented in Table 5.2, and more information can be found in Appendix D. Streamflow tends to peak twice a year, first in April/May during spring melt and again in October/November due to fall rainfall events. Minimum flows are observed during January to February and late summer between July and August.

Table 5.2 Mean Monthly Flow Relationships

Month	Relationship	R^2
January	MMF = 1.1826(DA) - 2.1899	0.95
February	MMF = 1.1073(DA)-2.057	0.93
March	MMF = 1.0061(DA)-1.6671	0.92
April	MMF = 0.8888(DA)-0.95	0.97
May	MMF = 0.9043(DA)-1.0332	0.84
June	MMF = 0.9325(DA)-1.505	0.93
July	MMF = 0.9347(DA)-1.7911	0.97
August	MMF = 0.8669(DA)-1.7335	0.87
September	MMF = 0.8388(DA)-1.494	0.85
October	MMF = 0.9115(DA)-1.4631	0.96
November	MMF = 0.9636(DA)-1.4578	0.97
December	MMF = 1.0946(DA)-1.8367	0.98

5.1.2.2 Local Hydrology

The area of the Stog'er Tight Deposit generally drains into Fox Pond and Camp Pond. Fox Pond flows southwest into Camp Pond through SS-1. Fox Pond is currently in water level recovery due to previous mining operations. The main outflow of Camp Pond is SS-2, which converges with SS-3 approximately 400 m northwest of the outlet of Camp Pond into SS-4. SS-5 is a tributary of SS-4 that flows west into Pond 3, while SS-4 flows north into Pond 1. Pond 2 flows via SS-6 into SS-5 approximately 65 m from the outlet (Figure 5-2). Both tributaries flow into several other ponds and tributaries to eventually flow into South Brook and Green Cove Brook. South Brook and Green Cove Brook discharge into Baie Verte (Atlantic Ocean) approximately 5 km from the Project site.

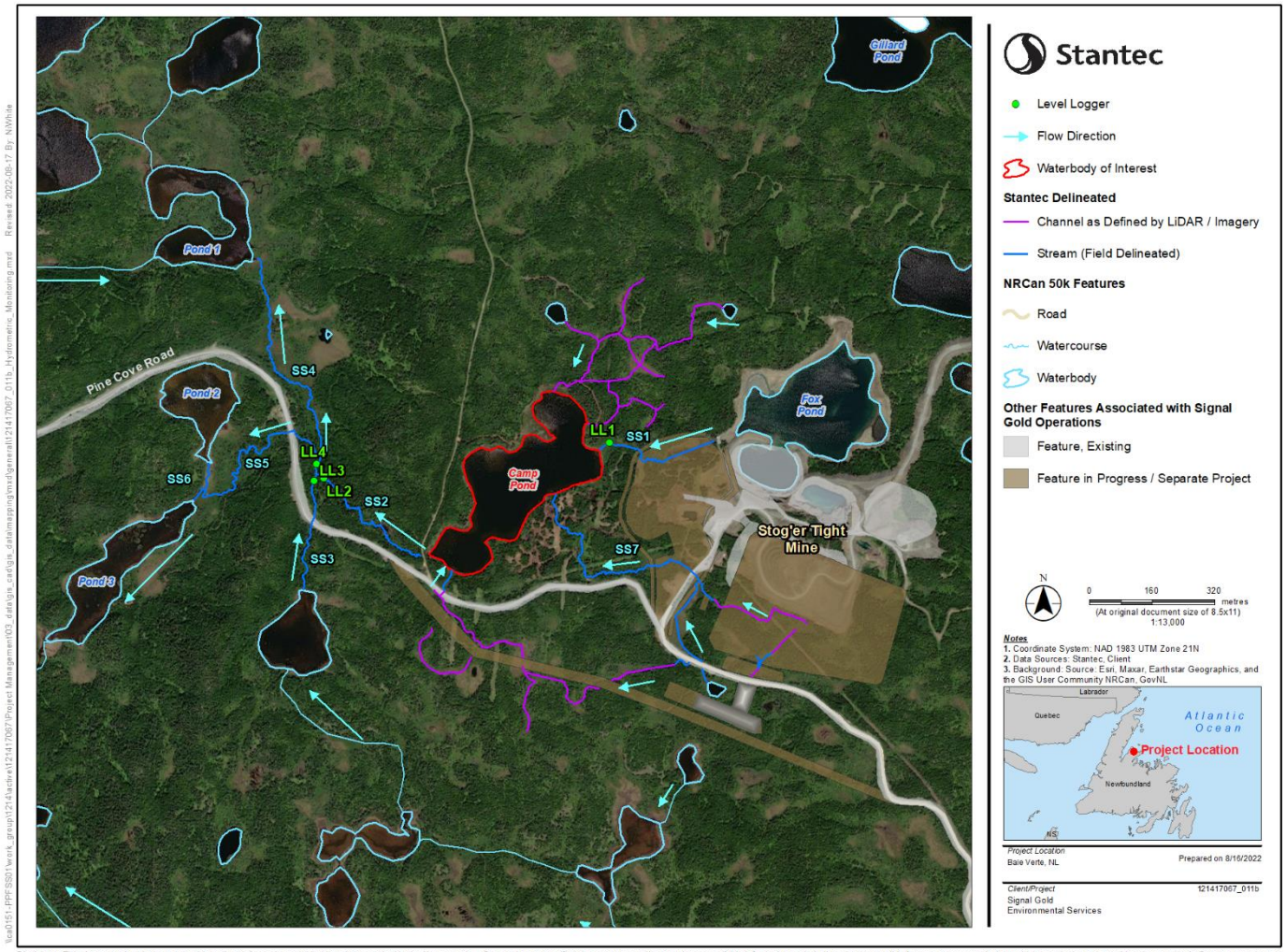

Figure 5-2 Hydrometric Monitoring Station Locations and Streams at the Stog'er Tight Site

Four water level logger stations (LL1, LL2, LL3, and LL4) and one barometric logging station (LL4) were established within Camp Pond Watershed between October 28 and 30, 2020 to provide data on baseline stream water levels and flows (Figure 5-3, Table 5.3). Each of the levelogger monitoring stations were equipped with a Solinst Levelogger Edge (M5/F-15), while one station (LL4) also included a Solinst Barologger Edge (M1.5/F5). The Leveloggers recorded the temperature and water level measurements within each watercourse at 5-minute intervals. Due to a logger firmware issue, no data was collected between February 2021 and mid-May 2021 when new loggers were installed at the site.

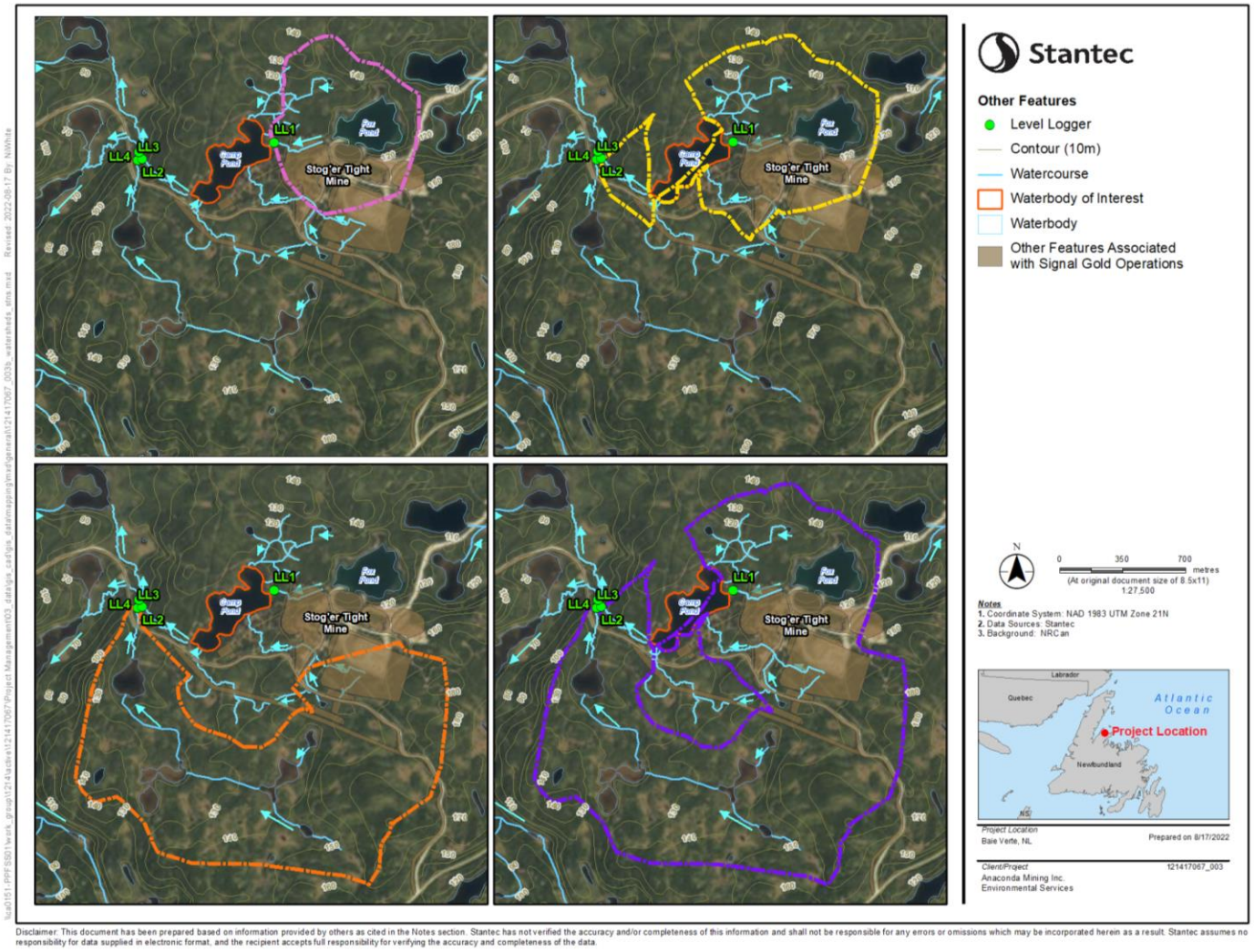

Figure 5-3 Hydrometric Monitoring Station Locations and Catchment Areas

Table 5.3 Hydrometric Stations at Signal Gold Project Site

Station	Coordinates	Period of Record	Watercourse	Drainage Area (km^2)	Location
LL1	49.96678°N, 56.08350°W	October 28, 2020- Present	SS-1	0.592	Downstream of Fox Pond
LL2	49.966033°N, 46.093726°W	October 30, 2020 - Present	SS-2	1.22	Downstream of Camp Pond
LL3	49.965978°N, 56.094067°W	October 30, 2020 - Present	SS-3	2.00	Downstream of Unnamed Pond
LL4	49.966361°N, 56.093975°W	October 30, 2020 - Present	SS-4	3.22	Most downstream station, RSA boundary

Rating curves were developed for the LL3 and LL4 hydrometric stations and were used to convert the levelogger water level readings into flow. Table 5.4 summarizes the rating curve equations and R^2 values for the hydrometric stations. Hydrometric station summaries including the station information, cross sections, spot measurements, photos, stage-discharge graphs, water temperature graph, and hydrograph is provided in Appendix D. A more detailed description of the existing conditions for local hydrology can be found in 2020/2021 Aquatic Habitat and Hydrologic Study Technical Data Report (Stantec 2022) (Appendix D).

Table 5.4 Rating Curves for Hydrometric Stations

Hydrometric Station	Number of Spot Measurements	Rating Curve Equation	R^2
LL3	6	$y = 3.7562(x)^{2.0405}$	0.79
LL4	9	$y = 12.237(x)^{3.5834}$	0.97

Flow statistics for MAF, MMF, and Return Period Flows for the LL1, LL2, LL3, and LL4 watershed areas have been calculated by applying the relationships developed in the Regional Hydrology Assessment (Section 5.1.2.1). Environmental flow statistics have also been calculated for each watershed area by applying the relationships developed in the regional hydrology assessment (Section 5.1.2.1). Table 5.5 presents the calculated flow statistics for each watershed area.

Table 5.5 Hydrometric Stations Calculated Flow Statistics for Watershed Areas at Signal Gold Site

Month	LL1	LL2	LL3	LL4
	Mean Monthly Flow (L/s)			
January	3.912	9.047	16.048	27.875
February	4.049	9.266	16.317	28.148
March	9.565	20.610	34.832	57.748
April	50.016	99.824	160.101	252.382
May	61.803	117.685	182.779	279.349
June	20.095	39.177	61.836	95.985
July	8.889	17.744	28.463	44.876
August	7.736	15.356	24.538	38.543
September	11.535	22.970	36.784	57.901
October	16.025	32.260	52.045	82.509
November	16.848	34.894	57.399	92.717
December	8.412	18.498	31.700	53.267
MAF	18.240	36.444	58.570	92.608
Catchment area (km^2)	0.592	1.22	2	3.22
Summer Environmental Flow (50% MAF) (L/s)	9.12	18.22	29.28	46.30
Winter Environmental Flow (30% MAF) (L/s)	5.47	10.93	17.57	27.78
Q2 (m^3/s)	0.563	0.971	1.41	2.02
Q5 (m^3/s)	0.865	1.47	2.11	2.99
Q10 (m^3/s)	1.08	1.83	2.61	3.68
Q20 (m^3/s)	1.30	2.18	3.10	4.36
Q50 (m^3/s)	1.61	2.67	3.78	5.28
Q100 (m^3/s)	1.85	3.05	4.30	5.99
Q200 (m^3/s)	2.10	3.45	4.85	6.73

As shown in Table 5.5, the environmental flows for July and August are consistently below the Summer Environmental Flow. In these circumstances, the MAF will be considered the Summer Environmental Flow.

5.1.2.3 Surface Water Quality

Assessments of regional and local surface water quality are provided in the following subsections.

Regional Water Quality

Regional water quality data was obtained from nearby sites – the federal ECCC-managed site (NF002YG0001), located 87 km west of the Project site, and provincial Water Quality Monitoring Agreement -managed site (NF02YG0020), located 62 km west of the Project site. Regional water quality parameters reported at the ECCC website includes metals, nutrients, and physical parameters, and have a longer period of record than those reported by the Water Resources Management Division.

Water quality data from regional monitoring locations were compared across select indicator parameters (Table 5.6). Table 5.6 shows aluminum and iron concentrations reasonably consistent across provincial / federal monitoring locations. Turbidity values vary across sites, with the results showing lower values in the stream site (NLENHM0002).

Table 5.6 Regional Water Quality for nearby Federal and Provincial Stations

Station ID	NL02YG0001	NF02YG0020
Station Type	**Provincial/Federal**	**Provincial**
Waterbody Type	River	River
Aluminum (µg/L)	195.7	138.2
Iron (µg/L)	393.2	275.6
pH	4.56 – 6.74	4.7 – 6.47
Turbidity (NTU)	1.48	0.86
Hardness (mg/L)	5.04	3.32
Alkalinity (mg/L)	1.81	Na

Local Water Quality

Local water quality was assessed as the Project is considered to have the potential to affect water quality referenced from baseline conditions. Local water is considered to be non-contact surface water that flows from within the Project Area to the receiving environments. Local water quality data have been collected at the Stog'er Tight site since 2009 with one Environmental Effects Monitoring sampling location located in the southwest corner of Camp Pond – 00644 (Figure 5-4). The following section presents historical water quality conditions at the Project site.

Source: Stoge'r Tight Water Quality Data

Figure 5-4 Sampling Locations

General Chemistry

Table 5.7 presents summary water quality statistics for the lab analytical general chemistry constituents. The lab results indicated that pH ranged from 6.89 to 8.05, within the CWQG-FAL guidelines (CCME 2019).

Total alkalinity (as $CaCO_3$) ranged from 26 to 52 mg/L with a mean of 41.2 mg/L. Alkalinity values are indicative of sufficient acid buffering potential in local waterbodies.

Hardness (as $CaCO_3$) values ranged 31 mg/L to 170 mg/L, with an average value of 51.3 mg/L. Hardness within the range of 0 to 60 mg/L is considered to be "soft" water. Concentrations of copper, cadmium, lead, and nickel are hardness-adjusted in the CWQG-FALs. For these metals, a lower hardness value results in lower CWQG-FALs thresholds.

The Langlier Saturation Index (LSI) values for most monitoring locations and events were negative, which is indicative of under-saturation and water that tends to dissolve $CaCO_3$. Therefore, water with negative LSI has limited scaling potential. The potential for scale formation is a necessary consideration in the selection and design of water infrastructure. A low LSI value and scaling potential align with the low hardness values also observed.

Electrical conductivity values for samples were generally low and ranged from 71 to 140 µS/cm with a mean of 124.8 µS/cm. Concentrations of major cations, such as calcium, sodium, potassium, magnesium, manganese, ammonium, iron, and aluminum, were low, as were concentrations of major anions, such as chloride, fluoride, sulphate, and nitrate, thus resulting in relatively weak ionic strength.

Nutrients

Table 5.8 provides a summary of lab analytical nutrient results.

Table 5.7 Summary of General Constituents in Camp Pond Water Quality Station

Calculated Parameters	UNITS	CWQG-FAL	Number of Samples	MIN	MAX	AVERAGE	75th Percentile	Number of Exceedances	Number of Non-detects
Anion Sum	me/L		9	0.75	1.42	1.240	1.41	-	
Bicarb. Alkalinity (calc. as CaCO3)	mg/L		9	26	49	41.111	45.5	-	
Calculated TDS	mg/L		9	41	80	68.222	79.5	-	
Carb. Alkalinity (calc. as CaCO3)	mg/L		9	0	0	ND	<1	-	9
Cation Sum	me/L		9	0.79	1.46	1.252	1.445	-	
Colour	TCU	Note A	17	12	65	19.333	31	-	
Conductivity	uS/cm		18	71	142.4	124.800	140	-	
Dissolved Chloride (Cl)	mg/L		17	5.1	8	5.933	7.7	-	
Hardness (CaCO3)	mg/L		10	31	170	51.333	59.25	-	
Ion Balance (% Difference)	%		9	0	2.83	1.149	2.005	-	
Langelier Index (@ 20C)	N/A		9	-1.53	-0.568	-0.847	-0.6015	-	
Langelier Index (@ 4C)	N/A		9	-1.78	-0.819	-1.098	-0.8525	-	
pH	pH	6.5-9.0	17	6.89	8.05	7.682	7.85	-	
Reactive Silica (SiO2)	mg/L		17	0.4	2.6	1.008	1.45	-	
Saturation pH (@ 20C)	N/A		9	8.4	8.91	8.529	8.645	-	
Saturation pH (@ 4C)	N/A		9	8.65	9.17	8.782	8.9	-	
Total Alkalinity (Total as CaCO3)	mg/L		18	26	52	41.222	45.25	-	
Total Suspended Solids	mg/L	Note B	12	DL	7	3.200	5	-	5
Turbidity	NTU	Note C	17	0.32	2.7	0.972	1.275	-	

Notes:
N/A - not applicable; ND - Non-detect, below laboratory detection limit; "-" indicates no data in cell
A - True Color: the mean absorbance of filtered water samples at 456 nm shall not be significantly higher than the seasonally adjusted expected value for the system under consideration
B - Maximum increase of 25 mg/L from background levels for any short-term exposure (e.g., 24-hour period). Maximum average increase of 5 mg/L from background levels for longer term exposures (e.g., inputs lasting between 24 hours and 30 days)
C - Maximum increase of 8 NTUs from background levels for a short-term exposure (e.g., 24-hour exposure). Maximum average increase of 2 NTUs from background levels for a longer exposure (e.g., 30-day period).

Table 5.8 Summary of Nutrients in Camp Pond Water Quality Station

Parameters	UNITS	CWQG-FAL	Number of Samples	MIN	MAX	AVERAGE	75th percentile	Number of Exceedances	Number of Non-detects
Total Ammonia-N	mg/L	Note A	18	0.013	0.14	0.14	0.043	-	9
Dissolved Organic Carbon (C)	mg/L		17	4.3	7.9	5.07	6.4	-	
Orthophosphate (P)	mg/L		17	<0.03	<0.03	<0.03	<0.03	-	17
Dissolved Sulphate (SO4)	mg/L		17	2.2	17	9.96	15	-	
Nitrite (N)	mg/L	0.06	18	0.93	0.95	0.94	0.95	-	16
Nitrate (N)	mg/L	Note B	18	0.01	0.79	0.48	0.63	-	5
Nitrate + Nitrite (N)	mg/L		18	0.07	0.96	0.71	0.73	-	5
Total Phosphorus (P)	mg/L	Note C	18	0.003	0.007	0.005	0.05	-	16

Notes:
ND - Non-detect, below laboratory detection limit; "-" indicates no data in cell
A - Ammonia concentration under different pH and temperature, please see table at http://st-ts.ccme.ca/en/index.html?chems=5&chapters=1
B - 550 mg/L for short term exposure and 13 mg/L for long term exposure
C - Ultra-oligotrophic < 4 µg/L; mesotrophic 10-20 µg/L; meso-eutrophic 20-35 µg/L; eutrophic 35-100 µg/L; hyper-eutrophic >100 µg/L.

Total ammonia-nitrogen ranged from below the reportable detection limit (RDL) to a maximum of 0.14 mg/L, with a mean of 0.023 mg/L. Nitrate concentration ranged from below the RDL to a maximum of 0.79 mg/L, with a mean of 0.48 mg/L. Orthophosphate levels were non-detect in all water quality samples. Total phosphorous values ranged from below the detection limit of 2.01 to 7 micrograms/litre (µg/L), with a mean of 5 µg/L. The CWQG-FAL indicate that a total phosphorous concentration below 10 µg/L to be ultra-oligotrophic.

Sulphate concentrations ranged from below the RDL to a maximum of 5.5 mg/L, which is lower than the dissolved sulphate guideline of 128 mg/L for the protection of aquatic life given in the British Columbia Ambient Water Quality Guidelines for sulphate (British Columbia Ministry of Environment and Climate Change Strategy 2017). No CWQG-FAL guideline exists for sulphate.

Metals

Table 5.9 presents summary statistics for lab analytical metals results. Aluminum concentration ranged from 17 to 125 µg/L, with a mean concentration of 53.9 µg/L. The CWQG-FAL for aluminum is 5 µg/L if pH is < 6.5 and 100 µg/L if pH > 6.5. The aluminum concentrations were found to exceed the CWQG-FAL during one sampling event (June 16, 2015).

Arsenic concentrations ranged from below the MDL to a maximum of 0.37 µg/L, with a mean of 0.3 µg/L and a 75th percentile of 0.31 µg/L. Arsenic concentrations were below the CWQG-FAL of 5 µg/L for all sampling events.

Cadmium concentrations ranged from below the RDL to a maximum of 0.01 µg/L, with a mean of 0.008 µg/L and a 75th percentile of 0.01 µg/L. Cadmium concentrations were below the CWQG-FAL of 0.37 µg/L. Copper concentration ranged from below the RDL to a maximum of 9.91 µg/L, with a mean of 1.99 µg/L and a 75th percentile of 1.27 µg/L. The CWQG-FAL for copper is based on hardness and is 2.0 µg/L when hardness is between 0 and 82 mg/L. 75th percentile water hardness for the water quality monitoring stations was 59.25 mg/L. Reported copper concentrations were below the CWQG-FAL during all but one sampling event (August 18, 2019, [Cu] = 9.91 µg/L).

Lead concentrations ranged from below the RDL to a maximum of 1.06 µg/L, with a mean of 0.49 µg/L and a 75th percentile of 0.74 µg/L. The CWQG-FAL for lead is based on hardness and is 1 µg/L when hardness is less than 60 mg/L. Reported lead concentrations were below the CWQG-FAL during all but one sampling event (July 2019, ([Pb] = 1.06 µg/L).

Iron concentrations ranged from 25 to 208 µg/L, with a mean concentration of 78 µg/L and a 75th percentile of 100 µg/L. There were no exceedances of CWQG-FAL for iron. Zinc concentrations ranged from 0.003 to a maximum of 0.0129 mg/L, with a mean of 0.0062 and a 75th percentile of 0.011 mg/L. Zinc concentrations were below the CWQG-FAL limit of 0.03 mg/L for all sampling events.

Concentrations of boron, molybdenum, selenium, silver, thallium, and uranium were consistently non-detect (below the RDL) and below the applicable CWQG-FAL. MDMER Parameters of Potential Concern (POPC) (Ar, Cu, Pb, Ni, Zn) are consistently well below the applicable MDMER criteria limit for all sampling events.

Table 5.9 Summary of Metals in Camp Pond Water Quality Station

Parameters	UNITS	CWQG-FAL	MDMER[I]	Number of Samples	MIN	MAX	AVERAGE[J]	75th Percentile[J]	Number of Exceedances[K]	Number of Non-detects
Total Aluminum (Al)	µg/L	Note A		18	17.00	125.00	49.49	65.48	1	
Total Antimony (Sb)	µg/L			18	ND	ND	0.50	0.50		18
Total Arsenic (As)	µg/L	5	600	18	0.25	0.37	0.30	0.31		10
Total Barium (Ba)	µg/L			18	1.50	5.20	2.78	3.45		
Total Beryllium (Be)	µg/L			18	ND	ND	0.00	0.00		18
Total Bismuth (Bi)	µg/L			18	0.08	0.08	0.08	1.00		17
Total Boron (B)	µg/L	1,500 [B]		18	3.00	5.00	3.70	4.50		13
Total Cadmium (Cd)	µg/L	Note C		18	0.01	0.01	0.01	0.01		15
Total Calcium (Ca)	mg/L			18	9.31	18.80	15.28	18.18		
Total Chromium (Cr)	µg/L			18	0.05	1.80	0.68	1.18		6
Total Cobalt (Co)	µg/L			18	0.03	0.13	0.07	0.12		11
Total Copper (Cu)	µg/L	Note D	600	18	1.00	9.91	2.00	1.28	1	6
Total Iron (Fe)	µg/L	300		18	25	208	78.07	100		3
Total Lead (Pb)	µg/L	Note E	200	18	0.05	1.06	0.49	0.75	1	12
Total Magnesium (Mg)	mg/L			18	1.88	3.60	2.87	3.22		
Total Manganese (Mn)	µg/L			18	5.50	42.00	16.41	20.08		
Total Molybdenum (Mo)	µg/L	73		18	0.11	1.00	0.37	0.42		10
Total Nickel (Ni)	µg/L	Note F	1000	18	0.20	0.60	0.41	0.54		10
Total Potassium (K)	µg/L			18	240.00	410.00	322.28	352.50		
Total Selenium (Se)	µg/L	1		18	0.10	0.11	0.11	0.50		16
Total Silver (Ag)	µg/L	0.25		18	0.00	0.00	0.05	0.05		18
Total Sodium (Na)	µg/L			18	3.42	5.92	4.87	5.30		
Total Strontium (Sr)	mg/L			18	20.30	59.70	43.69	53.88		
Total Thallium (Tl)	µg/L	0.8		18	0.00	0.00	0.05	0.05		18
Total Tin (Sn)	µg/L			18	0.11	0.11	0.11	1.00		17

Table 5.9 Summary of Metals in Camp Pond Water Quality Station

Parameters	UNITS	CWQG-FAL	MDMER[I]	Number of Samples	MIN	MAX	AVERAGE[J]	75th Percentile[J]	Number of Exceedances[K]	Number of Non-detects
Total Titanium (Ti)	µg/L			18	0.16	23.00	7.17	11.00		7
Total Uranium (U)	µg/L	Note G		18	0.03	0.04	0.03	0.05		16
Total Vanadium (V)	µg/L			18	0.09	0.42	0.19	0.27		10
Total Zinc (Zn)	µg/L	Note H	1000	18	3.00	12.90	6.21	11.00		14

Notes:
ND - Non-detect, below laboratory detection limit; "-" indicates no data in cell
A - varies depending on pH; 5 ug/L if pH <6.5 & 100 ug/L if pH ≥ 6.5
B - Short term: 29,000 ug/L, long term: 1,500 ug/L
C - Guideline Equation is based on hardness = 10{[0.83log(hardness)]-2.46} ug/L (minimum of 0.04 ug/L regardless of water hardness and maximum of 0.37 ug/L)
D - Guideline Equation is based on hardness = 0.2* e{0.8545[ln(hardness)]-1.465} ug/L (minimum of 2 ug/L regardless of water hardness and maximum of 4 ug/L)
E - Guideline Equation is based on hardness = e{1.273{ln(hardness)]-4.705} ug/L (minimum of 1 ug/L regardless of water hardness and maximum of 7 ug/L)
F - Guideline Equation is based on hardness = e{0.76{ln(hardness)]+1.06} ug/L (minimum of 25 ug/L regardless of water hardness and maximum of 150 ug/L)
G - Short term: 33 ug/L, long term: 15 ug/L
H - Guideline Equation is based on hardness = e{0.947{ln(hardness mg /L-1)]-0.815[pH] + 0.398[ln(DOC mg/L-1)] +4.625} ug/L (The CWQG-FAL equation is valid between hardness of 23.4 and 399 mg CaCO3 L-1, pH 6.5 and 8.13 and DOC 0.3 to 22.9 mg L-1)
I – Daily maximum allowable MDMER concentration for existing mines; MDMER Schedule 4, Table 2.
J – The statistical results here include water quality monitoring samples between 2009 and 2021. For statistical calculations, ½ of the ND value was used.
K – Parameter exceeded MDMER criteria if **bold**, parameter exceeded CWQG-FAL if <u>underlined</u>

In Situ Water Quality

Table 5.10 presents summary water quality statistics for the *in-situ* measurements collected on May 13, 2022 at Project hydrometric stations.

Table 5.10 *In Situ* Water Quality for Signal Gold Site May 13, 2022

Water Quality Parameter	LL1	LL2	LL3	LL4
Dissolved Oxygen (mg/L)	10.9	12.5	12.4	12.7
Dissolved Oxygen (%DO)	92	99	100	103
Conductivity (µS/cm)	59.3	48.5	26.4	34.1
Temperature (°C)	7.9	5.7	6.5	6.4

5.1.3 Project-Component Interactions and Effects Pathways

Table 5.11 lists the potential Project effects on surface water resources and provides a summary of the Project effect pathways and measurable parameters to assess potential effects. Potential environmental effects and measurable parameters were selected based on review of recent environmental assessments for similar projects in NL and other parts of Canada, and professional judgment.

Table 5.11 Potential Effects, Effect Pathways and Measurable Parameters for Surface Water Resources

Potential Effect	Effect Pathway	Measurable Parameters and Units of Measurement*
Change in surface water quantity	Project activities may have an effect or alter the natural flow regime through changes to surface vegetation cover, imperviousness, topography, and drainage divides, slopes, Camp Pond Dewatering, seepage from stockpiles, and management of surface water runoff	• Stream discharge (variety of flow statistics including mean annual, monthly, and event-based discharges) • Camp Pond water levels (mean and range of expected levels) • Stream morphology
Change in surface water quality	Project activities may have an effect or alter water quality through changes to the natural flow regime, contact water seepage and runoff, sedimentation and erosion rates, process water discharges, and spills of hazardous materials.	• Water quality parameter concentrations (local and regional means concentrations and expected ranges) • Sedimentation and erosion potential and TSS loads

Project activities that might interact with surface water resources for each potential effect are identified in Table 5.12. These interactions are indicated by check marks and are discussed in detail in Section 5.1.5.

Table 5.12 Project Interactions with Surface Water Resources

Physical Activities	Effects to be Assessed	
	Change in Surface Water Quantity	Change in Surface Water Quality
Construction		
Pre-Development Drawdown of Camp Pond	✓	✓
Site Development	✓	✓
Wastes, Discharges, Emissions	✓	✓
Operations		
Open Pit Mining	✓	✓
Hauling	✓	✓
Wastes, Discharges, Emissions	✓	✓
Decommissioning		
Dismantling and Removal of Equipment	✓	✓
Restoration of Camp Pond Water Levels	✓	✓
Wastes, Discharges, Emissions	✓	✓
Notes: ✓ = Potential interaction - = No interaction		

5.1.4 Mitigation

In addition to the standard mitigation measures to be implemented for Project construction, operation and decommissioning discussed in Section 2.4, the following specific measures will be implemented to reduce or eliminate adverse effects on surface water resources:

- On-site contact drainage ditches, channels, collection sumps, and sedimentation ponds will be used to control silt and sediment and prevent the introduction of contaminants into the receiving environment. As previously mentioned in Section 2.3.2.8, the sedimentation ponds were designed to accommodate anticipated pit inflow and surrounding contact water related to Pit 278 development.
- Contact water will be captured, treated in sedimentation ponds, and released using a controlled discharge during construction and operations.
- Non-contact water will be diverted away from the mine infrastructure to reduce the total volume of water entering the settling ponds for treatment.
- Water testing will take place regularly to ensure the water being released at the final discharge point (FDP) is of sufficient quality
- Sedimentation ponds will discharge effluent at concentrations below the federal MDMER regulations as per the *Fisheries Act*.
- Pumping rates to the outlet of Camp Pond are planned to be gradual (5,500 to 11,000 m^3/day) in consideration of the downstream flow capacity.

- During dewatering, water discharged from Camp Pond will remain within the natural water drainage pathway. Discharge will ultimately be released into Camp Pond's outlet.
- Where possible, contact water will be recycled for use on-site (e.g., dust suppression).

5.1.5 Assessment of Residual Effects

5.1.5.1 Change in Surface Water Quantity

Flows and water levels under pre-development conditions were used as the baseline against which Project-related changes during the construction, operation, and decommissioning phases were assessed.

Construction

During the construction phase, Camp Pond will be completely de-watered and drawn down through its outlet and maintained in the dewatered state until Pit 278 is no longer active. Water will be collected in a natural deep zone within the Camp Pond footprint which will be used as a sump, from which water will be pumped to the outlet of Camp Pond as needed to maintain the de-watered area. Water discharging from Camp Pond will remain within the natural water drainage channel. Discharge will flow west and to the outflow of Camp Pond which would flow downstream in the chain of the tributaries and lakes that make a part of the South Brook and Green Cove Brook drainage areas and out to sea. Flow rates at LAA/RAA boundary downstream in the chain of tributaries should remain above Environmental Flow Limits (0.0182 m^3/s). During construction, the drawdown of Camp Pond will temporarily increase flows downstream. Signal Gold will use two 60 hp pumps with a pumping rate of approximately 5,500 m^3/day over a 3-month period. This pumping rate is anticipated to be sufficient to completely dewater Camp Pond in a 3-month period (90 days). If necessary to meet construction schedules, pumping may be increased up to 11,000 m^3/day. The increased flow during drawdown and dewatering is well below the Q2 flood flow for the system (83,931 m^3/day). Therefore, the downstream system routinely does and can accommodate the increased flows.

Operation

The operations phase will extend over approximately 6.5 months. During this time, Camp Pond will be maintained in the dewatered state until Pit 278 is no longer active. Potential sources of pollution regarding surface water quantity are similar in the operations phase as in the construction phase. During the operations phase, ground and surface water entering the open pit will be pumped to existing sedimentation ponds currently servicing the Gabbro Pit where suspended solids will settle out prior to being re-introduced to the environment. The sedimentation ponds are sized to contain, at a minimum, 24 hours of maximum pumping capacity from the submersible pump being used in the pit.

Runoff from the surrounding area, water collected in the natural sump, and inflows to Camp Pond will be pumped and diverted through a channel to the outlet of Camp Pond. During this time, the MMFs are similar to baseline as there is no additional water being added to the system and the water levels in Camp Pond are being maintained at the dewatered state.

Decommissioning

Decommissioning and closure activities with the potential to affect surface water quantity include dismantling and removal of equipment and the restoration of Camp Pond water levels. After Pit 278 has been mined out the most critical surface water quantity task is to balance the maintenance of adequate downstream flows of Camp Pond with the filling of Pit 278 and Camp Pond. The plan is to provide the adequate seasonal downstream flows to the Camp Pond outlet and divert excess flows above these environmental flow thresholds to Pit 278 and Camp Pond, to create a pit lake. The excavated volume of Pit 278 below Camp Pond is 718,560 m^3 and the volume of Camp Pond below its outlet invert is 616,943 m^3 for a total of 1,335,503 m^3. It is estimated to take approximately 2.4 years to fill Pit 278 and Camp Pond, while maintaining adequate downstream flows.

Therefore, as predicted flow increases or decreases during construction, operation and decommissioning are within the surface water quantity significance thresholds no adverse residual effects for surface water quantity are predicted from the Project.

5.1.5.2 Change in Surface Water Quality

Construction

During construction and site development, dust and fine material may have the potential to mobilize into ponds and streams near the access road. To mitigate this, sediment trapping material such as approved filtration fabrics will be used in areas subject to siltation and erosion. Water trucks will be used for dust suppression on roads and stockpiles.

Mechanical equipment will be inspected regularly to ensure leakage of fuel, hydraulics, oils, or other hazardous products does not occur. Spill kits will be kept on site and available in the case of emergency.

Baseline surface water quality collected at the Camp Pond sampling station monthly during the summer period (June-September) was used as the baseline against which changes to surface water quality during Project phases were assessed. Water management infrastructure on site aims to keep non-contact water and contact water separated. Contact water is directed to sedimentation ponds prior to discharge to the environment at the FDP location, 25 m downstream of the Camp Pond outlet. Non-contact water is directed to the environment through collection ditches and has been assumed to be represented by baseline water quality. Contact water discharged at the FDP must meet environmental MDMER criteria. Sedimentation ponds proposed to accommodate the dewatering of Pit 278 and site contact water currently exist and service the Gabbro Pit expansion. No new FDPs are planned for Pit 278.

To estimate the maximum potential concentrations of MDMER constituents resulting from the Project, loading calculations were performed using a conservative approach, assuming water quality exiting the FDP was at the maximum allowable daily MDMER concentration (MDMER Schedule 4, Table 2) and non-contact water quality was at existing baseline conditions. Table 5.13 presents predicted water quality at the outlet of Camp Pond and the confluence with LL3 (just before the downstream LAA boundary). POPCs meet CWQG-FAL upon instantaneous mixing at the outlet of Camp Pond with the exception of copper and arsenic. Copper and arsenic require further assimilation than provided by instantaneous mixing at the FDP. Concentrations of copper and arsenic decrease below the CWQG-FAL at the

confluence with LL3 tributary following mixing between the Camp Pond outlet and the confluence with LL3. Therefore, all POPC mixing is completed within the LAA, and no adverse residual effects for surface water quality are predicted from the Project.

Table 5.13 Project Interactions with Surface Water Resources

Parameter	Units	MDMER[A] criteria	CWQG-FAL[B] criteria	Concentration at Camp Pond Outlet	Concentration at LL3 confluence
Arsenic	µg/L	600	5	10.59	4.21
Copper	µg/L	600	Note C	4.68	3.22
Cyanide	µg/L	1,000	5 (as Free CN)	-	-
Lead	µg/L	200	Note D	4.16	2.04
Nickel	µg/L	1,000	Note E	17.66	7.04
Zinc	µg/L	1,000	Note F	27.95	17.44
TSS	mg/L	30	-	5.42	5.16
Unionized Ammonia	mg/L	1	-	0.059	0.049
Radium 226	Bq/L	1.11	-	-	-

Notes:
A - MDMER - Metal and Diamond Mining Effluent Regulations, values presented in the table are maximum authorized concentrations in grab samples in Schedule 4 Table 2 (limits for existing metal and diamond mines)
B - CWQG-FAL - Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life
C - Guideline Equation is based on hardness = 0.2* e{0.8545[ln(hardness)]-1.465} ug/L (minimum of 2 ug/L regardless of water hardness and maximum of 4 ug/L)
D - Guideline Equation is based on hardness = e{1.273{ln(hardness)]-4.705} ug/L (minimum of 1 ug/L regardless of water hardness and maximum of 7 ug/L)
E - Guideline Equation is based on hardness = e{0.76{ln(hardness)]+1.06} ug/L (minimum of 25 ug/L regardless of water hardness and maximum of 150 ug/L)
F - Guideline Equation is based on hardness = e{0.947{ln(hardness mg /L-1)]-0.815[pH] + 0.398[ln(DOC mg/L-1)] +4.625} ug/L (The CWQG-FAL equation is valid between hardness of 23.4 and 399 mg CaCO3 L-1, pH 6.5 and 8.13 and DOC 0.3 to 22.9 mg L-1)

Operation

During the operations phase, dust and fine material may have the potential to mobilize into ponds and streams near the access road. As required, standard mitigation methods such as on-site drainage ditch channels, collection sumps, and sedimentation ponds will be used to control silt and sediment and prevent contaminants from leaving the Project site.

Contact water will be collected in sedimentation ponds through a system of ditches. Prior to discharge, collected water will be tested for compliance with MDMER criteria.

During operation, non-contact water associated with Camp Pond dewatering will be collected in a sump and pumped directly to the Camp Pond outlet. Pit 278 dewatering and site runoff (contact water) will be collected in the perimeter ditching and sedimentation pond(s) and pumped to the FDP, 25 m below the Camp Pond outlet.

Camp Pond and Pit 278 dewatering rates will vary in keeping with MMF draining to Camp Pond and the Pit 278 footprint. Contact water from sedimentation ponds will vary more based on precipitation and runoff events. However, as the Project site undertakes no mineral processing, the site water demand is relatively low and collected contact water can be returned to the environment after treatment via sedimentation ponds. Predicted water quality during the operations phase is similar to the construction phase and the applicable estimations of POPC concentrations can be seen in the previous section.

Decommissioning

Decommissioning and closure activities with the potential to affect surface water quality include dismantling and removal of equipment and the restoration of Camp Pond water levels including the filling of Pit 278 and the Camp Pond footprint, creating a pit lake (Pit Lake 278). Previously, the West Pit Expansion open pit at Stog'er Tight extended into Fox Pond and resulted in the drawdown of Fox Pond similar to the plan for Camp Pond and the Pit 278 expansion. The filling of Pit 278 with water will create deep water habitat in Camp Pond. The water quality of Pit Lake 278 is expected to be analogous with that of Fox Pond in water level recovery from the Stog'er Tight West Pit Expansion. Current water quality in Fox Pond meets MDMER limits.

5.1.6 Summary of Residual Effects

5.1.6.1 Change in Surface Water Quantity

As mentioned in section 5.1.5.1 *Construction*, to accommodate construction schedules, the pumping rate of Camp Pond will range from 5,500 m^3/day to 11,000 m^3/day over the 3-month construction period. Surface water quantity changes assessed at the downstream boundary of the LAA for the Camp Pond watershed are predicted to be less than the Q2 flood flows during the 3-month construction period. As the total flow rate is less than the Q2 return period peak flow rate, the downstream system has routinely experienced and can accommodate the increased flows.

During the operations phase, surface water quantity is predicted to return to baseline flow regimes with no change in MMFs. Non-contact water will be diverted to the Camp Pond outlet and water pumped from the pit to the sedimentation pond will be treated and released at the FDP, 25 m downstream of the Camp Pond outlet.

During the decommissioning phase, it is expected that non-contact water will continue to be pumped to Camp Pond outlet to maintain adequate downstream flows. Excess non-contact water not required for environmental flow maintenance will be diverted to filling the pit lake. The predicted timeframe to fill the Pit Lake 278, while maintaining adequate downstream flows, is approximately 2.4 years.

The predicted magnitude of residual adverse effects is low. Predicted changes in water quantity at the LAA boundary during construction, operation, and decommissioning are considered to be within the range of natural variability. The change in surface water quantity is predicted to extend to the boundaries of the LAA and extend until 2.4-years post-operation. Effects on water quantity for the watercourses assessed are considered reversible as conditions will return to predevelopment flow patterns in post closure.

5.1.6.2 Change in Surface Water Quality

Contact water discharged from the FDPs will comply with MDMER requirements prior to entering the receiving environment and non-contact water is expected to remain at baseline conditions.

POPCs meet CWQG-FAL upon instantaneous mixing at the FDP with the exception of arsenic and copper. Arsenic and copper concentrations decrease below the CWQG-FAL further downstream at the confluence with LL3, before the LAA boundary. Mixing is completed within the LAA. No adverse residual effects are predicted for surface water quality throughout the project phases.

Table 5.14 Project Residual Effects on Surface Water Resources

Residual Effect	Residual Effects Characterization							
	Project Phase	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility
Change in Surface Water Quantity	C	N	L	LAA	MS	ST	S	R
	O	N	L	LAA	MS	ST	C	R
	D	A	L	LAA	MS	LT	C	R
Change in Surface Water Quality	C	N	L	LAA	MS	ST	S	R
	O	N	L	LAA	MS	ST	C	R
	D	N	L	LAA	MS	ST	C	R

KEY
See Table 4.1 for detailed definitions

Project Phase
C: Construction
O: Operation
D: Decommissioning

Direction:
P: Positive
A: Adverse
N: Neutral

Magnitude:
NMC: No Measurable Change
L: Low
M: Moderate
H: High

Geographic Extent:
PA: Project Area
LAA: Local Assessment Area
RAA: Regional Assessment Area

Timing
NS: No sensitivity
MS: Moderate sensitivity
HS: High sensitivity

Duration:
ST: Short-term
MT: Medium-term
LT: Long-term

N/A: Not applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Reversibility:
R: Reversible
I: Irreversible

5.1.7 Determination of Significance

With mitigation, offsetting, and environmental protection measures, the effects on surface water resources are predicted to be not significant, as the residual environmental effects from the Project on surface water resources do not threaten the long-term flow regimes, quality, or recovery of watercourses in the RAA. Confidence in this prediction is high, based on the following considerations:

- The potential environmental effects and effect pathways for the Project are generally well understood
- The mitigation measures are well understood and align with industry best practices
- The understanding of existing conditions for surface water resources is based on existing literature and field surveys conducted in support of the Project

5.1.8 Follow-up and Monitoring

No follow-up and monitoring programs specific to surface water are recommended.

Construction activities will be undertaken in accordance with Signal Gold's existing EPP and ERP. The Project will have a full-time Environment Supervisor to inspect worksites and activities for conformance with the EPP, government regulations and permits. Compliance monitoring will be conducted to confirm that mitigation measures are properly implemented.

5.2 FISH AND FISH HABITAT

For the purposes of the assessment, the Fish and Fish Habitat VC includes fish and fish habitat, which are defined under the federal *Fisheries Act* as:

- Fish includes: (i) parts of fish, (ii) shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals, and (iii) the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals
- Fish habitat means waters frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas

Fish and fish habitat provide ecological, cultural, recreational, and economic value to Indigenous groups and stakeholders including the public, local businesses, and government agencies and has therefore been assessed as a VC. Fish and fish habitat occur within the Project Area and may be affected by planned Project activities. In Canada and in NL, fish and fish habitat are protected by federal and provincial legislation, as well as relevant policies and guidance. The Aquatic Habitat Study (Stantec 2022, Appendix A) was used to inform potential Project effects on fish and fish habitat.

5.2.1 Significance Definition

For the purposes of this environmental assessment, a significant residual environmental effect on fish and fish habitat is defined as a Project-related environmental effect that results in one or more of the following:

- A Project-related HADD of fish habitat or the death of fish, as defined by the *Fisheries Act*, that cannot be mitigated, authorized, or offset
- An unauthorized Project-related alteration of fish habitat which results in HADD
- A change to the productivity or sustainability of fish populations or fisheries within the LAA where recovery to baseline is unlikely

5.2.2 Existing Conditions

An overview of the environmental setting is provided in Section 3.1. To characterize the existing conditions for the Fish and Fish Habitat VC, aerial imagery was reviewed, and field data were collected to support the Project in 2021 and 2022. Lacustrine habitat classification in Camp Pond was conducted according to methods described in the Standard Methods Guide for the Classification/ Quantification of Lacustrine Habitat in Newfoundland and Labrador (Bradbury et al. 2001) and included classification based on water depth, substrate type, and amount of aquatic vegetation.

Stream habitat classification surveys were conducted according to methods outlined in Standard Methods Guide for the Classification of Riverine Habitats in Newfoundland and Labrador (McCarthy et al. 2007). Potential barriers to fish migration were noted, photographed and georeferenced during the habitat characterization surveys. Stream habitat was characterized in 50 m stream segments by recording stream velocity, depth, stream width, substrate type, meso habitat type, stream gradient, riparian vegetation, and cover.

To assess fish communities, fyke nets were used in lacustrine habitat, and backpack electrofishing was used in riverine habitats. Fishing was conducted according to methods described in the *Standard Methods Guide for Freshwater Fish and Fish Habitat Surveys in Newfoundland and Labrador: Rivers and Streams* (Sooley et al. 1998) and *A Review of Fish Sampling Methods Commonly Used in Canadian Freshwater Habitats* (Porter et al. 2006). The fishing effort and location were recorded. Captured fish were identified to species and released alive, and a representative number were measured and weighed prior to release.

Fish and fish habitat affected by the Project includes Camp Pond and streams SS-1, SS-2, and SS-7 (Figure 3-1), which are discussed in more detail below.

5.2.2.1 Ponds

Camp Pond covers an area of 0.085 km^2 and has a maximum depth of 11.4 m (Stantec 2022). Camp Pond receives drainage from Fox Pond via an unnamed stream (SS-1) and from overland drainage via SS-7. Camp Pond outlet stream (SS-2) flows through a series of streams and unnamed ponds eventually draining into Baie Verte, as shown in Figure 3.1 in Appendix A. Substrates in Camp Pond were observed to contain a high proportion of fines, with occasional areas of gravel and cobble. These gravel/cobble

areas were predominantly located along the shorelines and classified as medium substrates on Figure 3.1 (Appendix A). Aquatic vegetation was predominantly of the floating variety (e.g., water lilies) and localized to areas adjacent to the shoreline. Very little submergent aquatic vegetation was observed. Riparian vegetation was predominantly trees (i.e., spruce) and shrubs and provided minimal overhead cover for fish.

Fish sampling within Camp Pond confirmed the presence of brook trout (*Salvelinus fontinalis*), only; no other fish species were caught (Stantec 2022). In total, 96 hours of effort using fyke nets resulted in the capture of 230 brook trout. Brook trout ranged from 83 mm to 301 mm in length, with a mean length of 178 mm. Brook trout weighed between 5.6 g to 227.8 g with a mean weight of 56.8 g. Based on the size range of fish captured, Camp Pond supports juvenile and adult brook trout.

5.2.2.2 Streams

SS-1 flows from Fox Pond into Camp Pond over approximately 405 m. The lower 50 m of this stream, approximately 355 m to 405 m downstream of Fox Pond, contains rocky substrate in the range of gravel to small boulder, with an increasing proportion of fines near the confluence with Camp Pond. Water depths were shallow (< 0.2 m) at the time of the electrofishing survey in June 2021. Observations indicate this watercourse may become intermittent or ephemeral during the summer months. There is very little instream or overhead cover in the lower section of the SS-1 where it connects with Camp Pond.

SS-2 forms the outlet of Camp Pond prior to reaching the confluence of the outflows of other unnamed ponds (e.g., Pond 2 and 3). A portion of the habitat in SS-2 is located within the footprint of Pit 278. SS-2 was composed of primarily low gradient riffle/run and pool habitats. Within the habitat immediately downstream of Camp Pond, SS-2 substrates had a higher proportion of fines, when compared to the downstream reaches. This may be a result of the large amount of low gradient habitats present in this reach. Downstream of the flat-water habitats are a series of bedrock and boulder step pools and cascades.

SS-7 is comprised of overland drainage originating near the WRSA. There are two barriers to fish passage on SS-7, one 320 m upstream of Camp Pond and the second 505 m upstream of Camp Pond. Both of these barriers prohibit fish from ascending. Habitat from the confluence with Camp Pond up to the first barrier is a mix of run and riffle habitats. The riparian vegetation is predominantly shrubs, small conifers, and grasses. The banks are stable but there are sections which have been previously disturbed by fording from exploration or logging operations. The substrate is rocky, mostly cobble and boulder substrates with sections flowing through low gradient habitats that have a higher proportion of fines. During the development of Gabbro Pit (to be conducted under the existing Stog'er Tight West Pit Expansion environmental approvals) fish habitat within SS-7 will be permanently altered before the development of Pit 278, therefore the baseline habitat conditions described herein will not be representative of habitat conditions during the construction and operation of Pit 278.

Brook trout were observed within the Camp Pond inlets (SS-1 and SS-7) and outlet (SS-2) streams. Two 100 m^2 quantitative electrofishing sites (E1 and E2 (Figure 3.1 Appendix A) were established within the Camp Pond outlet (SS-2). An electrofishing effort of 4,095 seconds resulted in the capture of 118 brook trout and two American eel. Brook trout length at the Camp Pond outlet ranged 31 mm to 200 mm with a weight range from 0.2 g to 76.4 g.

Qualitative electrofishing was conducted intermittently along the Camp Pond Inlet SS-1 in 2021 and Camp Pond Inlet SS-6 in 2022. Shallow water depths, paired with boulder and cobble substrate and subterranean sections restricted electrofishing to sections with suitable depths. The results from the June 2021 electrofishing program resulted in the capture of 34 brook trout in the lower 50 m of SS-1. Brook trout from SS-1 ranged from 24 to 61 mm, with a weight range of 0.2 g to 28.7 g. The results from the June 2022 electrofishing program resulted in the capture of 18 brook trout in the lower 50 m of SS-7. Brook trout from SS-7 ranged from 18 to 58 mm, with a weight range of 0.2 g to 26.5 g. Substantial electrofishing effort (525 Seconds) performed upstream of the barriers to fish passage resulted in no fish capture, indicating that stream sections upstream of the barriers are not fish bearing.

5.2.2.3 Aquatic Species at Risk and Species of Conservation Concern

One fish SAR, American eel (*Anguilla rostrata*), was documented during freshwater sampling in 2021. American eel were noted downstream of Camp Pond in SS-2. This species is listed as Vulnerable under the NL ESA (2006) and Threatened by COSEWIC (2012).

5.2.3 Project-Component Interactions and Effects Pathways

Table 5.15 lists the potential Project effects on fish and fish habitat and provides a summary of the Project effect pathways and measurable parameters to assess potential effects. Potential environmental effects and measurable parameters were selected based on review of recent EAs for similar projects in NL and other parts of Canada, and professional judgment.

As a result of the Project, several activities will occur in the areas of Camp Pond and the associated tributaries (e.g., SS-1, SS-2, and SS-7[1]). The key Project interactions affecting fish and fish habitat are:

- The dewatering and development of Pit 278 in Camp Pond
- Water-based discharges to SS-2 as a result of de-watering Camp Pond

[1] Note: During the development of Gabbro Pit (scheduled to be conducted prior to the development of Pit 278 under the existing Stog'er Tight West Pit Expansion environmental approvals) SS-7 will be permanently diverted and fish habitat altered. Fish habitat will be offset, as required by the *Fisheries Act*, through the development and implementation of a Fish Habitat Offsetting Plan in consultation with DFO, therefore SS-7 will not be further discussed within this VC.

Table 5.15 Potential Effects, Effect Pathways and Measurable Parameters for Fish and Fish Habitat

Potential Effect	Effect Pathway	Measurable Parameters and Units of Measurement*
Change in fish habitat	• Alteration of freshwater habitat – Change in water level or flow • Alteration of riparian vegetation • Sedimentation • Release of deleterious substances • Obstruction or delay in fish passage	• Area of altered instream or lacustrine habitats (m^2) • Physical habitat characteristics (i.e., substrate) • Water quality – Total suspended solids (TSS) (mg/L) – Turbidity (NTU) – Trace metals (µg/L) – Nutrients (i.e., ammonia) – pH – Dissolved oxygen (DO) (mg/L) – Water temperature (°C)
Change in fish health and survival	• Changes in water quality (e.g., contaminants) • Change in water level or flow (e.g., stranding) • Water extraction causing impingement • Use of explosives near water	• Change in abundance (number of fish) • Change in mortality (number of fish) • Sublethal effects including reproduction, growth, and survival
*Considered qualitatively in the effect assessment		

Project activities that might interact with fish and fish habitat for each potential effect are identified in Table 5.16. While some Project activities may interact with fish and their habitat, standard mitigation measures and environmental protection practices will be implemented to effectively mitigate these interactions (discussed in Section 2.4 and 5.2.4). These interactions are indicated by check marks and are discussed in detail in Section 5.2.5. A justification is also provided for non-interactions (dash marks) in the text following the table.

Table 5.16 Project Interactions with Fish and Fish Habitat

Physical Activities	Effects to be Assessed	
	Change in Fish Habitat	Change in Fish Health and Survival
Construction		
Pre-Development Dewatering of Camp Pond	✓	✓
Site Development	✓	✓
Wastes, Discharges, Emissions	✓	✓

Table 5.16 Project Interactions with Fish and Fish Habitat

Physical Activities	Effects to be Assessed	
	Change in Fish Habitat	Change in Fish Health and Survival
Operations		
Open Pit Mining	✓	✓
Hauling	-	-
Wastes, Discharges, Emissions	✓	✓
Decommissioning		
Dismantling and Removal of Equipment	✓	✓
Restoration of Camp Pond Water Levels	✓	✓
Wastes, Discharges, Emissions	✓	✓
Notes: ✓ = Potential interaction - = No interaction		

During the operation phase, hauling and milling will occur in the areas beyond Camp Pond and the associated tributaries. These activities are entirely land-based and are not expected to result in a change in fish habitat, or fish health and survival. Indirect effects such as fugitive dust and noise will be mitigated using measures outlined in Section 2.4 and 5.2.4. Therefore, no interaction with fish and habitat has been identified.

5.2.4 Mitigation

In addition to the standard mitigation measures to be implemented for Project construction, operation and decommissioning discussed in Section 2.4, the following specific measures will be implemented to reduce or eliminate adverse effects on fish and fish habitat:

- Where possible, in-water works will be completed inside the appropriate fisheries timing windows (June 1 – September 30). Work outside the fisheries timing windows will be done in consultation with DFO and the NLDECC Water Resources Management Division. Work will follow DFO's best management practices.
- During dewatering, water discharged from Camp Pond will remain within the natural water drainage pathway. Discharge will ultimately be released into Camp Pond's outlet.
- During the early stages of the construction, prior to in-water work, reasonable efforts will be made to relocate the fish residing in Camp Pond to nearby suitable habitat within the same system.
- Banks and flood plains of watercourses will be adequately protected from erosion using an applicable erosion prevention method, as outlined in the EPP.
- Dewatering will comply with permits issued by the NLDECC Water Resources Management Division and will be undertaken in accordance with DFO requirements.
- Water intakes will be screened to avoid the entrainment or impingement of fish as per DFOs guidelines or tool (DFO 1995).

- Fuel and hazardous materials will be stored appropriately.
- Work will be performed in such a way that deleterious substances, such as sediment, fuel and oil are prevented from entering watercourses and waterbodies.
- Mulching and/or piling of cleared non-merchantable timber, slashing, cuttings and other organic material will be relocated to areas where it cannot enter watercourses. Excavated rock will be disposed of properly.
- Following the completion of mining, Pit 278 will be allowed to fill.
- Prior to connecting Pit 278 to Camp Pond a water quality assessment will be conducted to confirm pit water is of suitable water quality for fish habitat.
- Following the completion of mining, opportunities to enhance the lacustrine habitat created by Pit 278 will be investigated as part of the reclamation process.
- Where HADD of fish habitat cannot be avoided, the habitat will be offset, as required by the *Fisheries Act*, through the development and implementation of a Fish Habitat Offsetting Plan in consultation with DFO.

5.2.5 Assessment of Residual Effects

5.2.5.1 Change in Fish Habitat

Construction/Operation

The residual effects on fish habitat quantity and quality were considered together for construction and operation, as changes to fish habitat are anticipated to begin during construction activities and lead into the operation phase. Project component interactions in the construction/operation phases that affect fish habitat quality as outlined in 5.2.3 are related to the pre-development dewatering of Camp Pond, site development, open pit mining, and wastes, discharges, emissions. The Project has been designed to avoid these interactions to the extent practicable through the siting of infrastructure, locating activities away from waterbodies and maintaining flow to downstream watercourses. Where avoidance is not feasible, mitigation (Section 5.2.4) will be used to reduce the potential for effects.

The pre-development dewatering of Camp Pond will have a direct effect on fish habitat within Camp Pond, where approximately 79,000 m^2 of lacustrine habitat from Camp Pond will be temporarily unavailable to fish during dewatering and continued through operations. During dewatering, flow from SS-1 will be directed into a natural deep area (sump) in Camp Pond and pumped to the outlet (SS-2) to maintain surface water flow to fish habitat downstream. Once dewatered, the deepest area of Camp Pond will be used as a natural sump to collect surrounding surface water drainage, groundwater intrusion and the flow from Fox Pond. Water from the sump will be pumped, as needed, to the outlet of Camp Pond to maintain appropriate ecological flows downstream of Camp Pond. Section 2.3 contains additional information on water management and dewatering. The water which is pumped from Camp Pond will not be exposed to Pit 278 and is considered a diversion of natural water. Water levels in Camp Pond will remain dewatered for approximately 7 months during construction and operation of Pit 278.

Fish passage from SS-2 through Camp Pond to SS-1 will be temporarily suspended during the period of time when Camp Pond is drained. It is anticipated that there is sufficient habitat available within other waterbodies and watercourses in the Project area for fish to carry out their life processes during this time period.

During site development and open pit mining fish habitat within Camp Pond will be permanently altered in areas that overlap with the footprint of Pit 278. Site development and open pit mining will result in excavation that displaces the natural substrates, habitat morphology, and riparian vegetation. Pit 278 will be excavated to a depth of approximately 70 m, which will change the overall bathymetry within Camp Pond and result in an expansion of lacustrine habitats during the recharge of Camp Pond and Pit 278 during decommissioning.

An application for a *Fisheries Act* Authorization will be submitted for the HADD of fish habitat in Camp Pond associated with the Project. A habitat offsetting plan will be developed in consultation with DFO to mitigate the loss of fish habitat associated with the Project.

During construction of Pit 278 or ancillary structures (i.e., diversion channels, sedimentation ponds) discharges into the aquatic environment could affect fish habitat quality if suspended sediments and/or contaminants are released, which could affect the suitability of habitat for fish, SAR or fisheries (Sweka and Hartman 2001; Herbert and Merkens 1961; Kjelland et al. 2015). Once constructed, sedimentation ponds will capture runoff and release treated discharge to near Camp Pond Outlet (SS-2) through an approved final discharge point. The settling ponds will discharge effluent at concentrations below the federal MDMER as per the *Fisheries Act*.

Mined material will be stored on the existing ore pad and transported to the Pine Cove mill for processing under current operating approvals.

Decommissioning

Dismantling and removal of equipment could affect fish habitat quality as a result of use of industrial equipment near water, removal of riparian vegetation or topsoils, exposed soils and changing slopes or drainage patterns may alter water quality. The implementation of standard proven mitigation measures for sediment and erosion control and incorporation of DFO standards and best management practices as described in Section 5.2.4 are anticipated to mitigate these effects.

There will be a period of approximately 2.4 years following the completion of mining operations in Pit 278 when Camp Pond will be recharging, and water levels in Camp Pond will be rising, but lower than baseline. During this time, a portion of the water in Camp Pond will be discharged or pumped downstream to maintain a suitable ecological flow in stream SS2. Prior to connecting Pit 278 with Camp Pond, water quality in the pit lake will be monitored to confirm it is acceptable for fish. It is anticipated that fish will recolonize Camp Pond from adjacent tributaries and waterbodies, including Fox Pond upstream and SS-2 downstream.

Following recharge of Camp Pond, the overall area of lacustrine habitat will increase, and additional littoral zone habitat will be created around the perimeter of Pit 278. Pit lakes are characterized by deep water depths, steep side walls and bedrock or coarse substrates. Habitats in isolated pit lakes are typically low in nutrients which can limit aquatic macrophyte growth and macroinvertebrate community abundance and diversity. While Pit 278 will be allowed to recolonize naturally it will be supported by the direct connection to Camp Pond. Options for rehabilitating the upper benches of Pit 278 into productive littoral zone habitats will be investigated as part of the reclamation plan.

5.2.5.2 Change in Fish Health and Survival

Construction/Operation

The residual effects on fish health and survival were considered together for construction and operation, as changes to fish health and survival are anticipated to begin during construction activities and lead into the operation phase. Project component interactions in the construction/operation phases that affect fish health and survival as outlined in Section 5.2.3 are related to the pre-development dewatering of Camp Pond, site development, open pit mining, and wastes, discharges, emissions. The Project is anticipated to avoid these interactions to the extent possible through implementation of standard, proven mitigation measures for sediment and erosion control, incorporating of DFO standards and best management practices, conducting fish rescues prior to dewatering or in-water construction, screening water intakes in compliance with DFO criteria (DFO1995) and meeting applicable limits for water-based discharges.

During the construction phase, the dewatering of Camp Pond and site development has the potential to affect fish health and survival through the mortality of fish resulting from in-water works. Where possible, a fish relocation program will be completed inside the appropriate fisheries timing windows (June 1 – September 30) thereby protecting fish and avoiding direct mortality of fish larvae or eggs. Site development and dewatering of Camp Pond will occur following the fish relocation program which will reduce the risk to fish health and survival during dewatering.

Reasonable efforts will be made to relocate the fish residing in Camp Pond, prior to dewatering. Barrier nets will be installed to isolate Camp Pond habitats prior to the fish rescue commencing. Once fish have been removed from Camp Pond, more permanent barriers will be installed to isolate these habitats until reclamation.

During dewatering, water withdrawal structures (i.e., pumps and intakes) are not expected to result in residual effects to fish health and survival, as the fish screens associated with these structures will be designed to avoid the impingement and entrainment of fish. Intake and screen design will be based on site-specific parameters, including resident fish species and will be designed following the *Freshwater Intake End-of-Pipe Fish Screen Guideline* (DFO 1995).

Water-based discharges are not expected to result in direct mortality of fish as water will be managed and treated to meet authorized limits prior to discharge. Sublethal effects that could compromise fish health are not expected if parameters in the discharge meet the CWQG-FAL at the discharge point.

Blasting during open pit mining has the potential to affect fish survival indirectly through changes in fish behavior due to vibrations, which could affect activities such as spawning and fish migration (Wright 1982; Dunlap 2009, Faulkner et al. 2006). The impact of blasting on fish depends on the size and location of the blast, the timing of the blast in relation to the fish life history, the density of surfaces bounding the water (e.g., bedrock stream beds reflect the shockwave while organic stream beds would absorb some of the impact), the detonation method, and the species, size, and life history stage of the fish (Wright and Hopky 1998). Use of explosives in or near water will be avoided and, if required, will follow DFO blasting guidelines. As Camp Pond will be dewatered during mining operations and flow permanently redirected to Camp Pond, the effects to fish health and survival from blasting are anticipated to be negligible. SS-1 and SS-2 will support fish habitat during mining operations though these habitats will be isolated at distances of 100 and 225 m, respectively from Pit 278. Based on the implementation of DFO blasting guidelines and the distances from Pit 278 to fish bearing waters the potential effects to fish health and survival due to blasting are low and will end with the cessation of blasting at the end of operation.

Decommissioning

Dismantling and removal of equipment could affect health and survival as a result of the use of industrial equipment near or in-water water, removal of riparian vegetation or topsoil or exposed soils (i.e., changes in habitat quality). The implementation of standard, proven mitigation measures for sediment and erosion control and incorporating of DFO standards and best management practices as described in Section 5.2.4 are anticipated to mitigate these effects.

Following closure, Pit 278 and Camp Pond will be allowed to refill, based on groundwater, surface water and overland drainage. Prior to connecting Pit 278 with Camp Pond, water quality in the pit will be monitored to confirm it is acceptable for fish. Barriers constructed to isolate the in-water work areas will be removed and fish will be provided access to the combined Camp Pond and Pit 278 which will form Pit Lake 278.

5.2.6 Summary of Residual Effects

5.2.6.1 Change in Habitat

With mitigation, offsetting, and environmental protection measures in place, the residual adverse environmental effects on fish and fish habitat are predicted to be low in magnitude. Best management practices and the use of standard mitigation measures will be followed for work in or near water during construction. Adverse effects to fish habitat are anticipated to occur where habitat in Camp Pond will be altered (e.g., habitats within the footprint of Pit 278) during the construction and operation phases. During decommissioning water levels in Camp Pond will be restored, and Pit 278 will be reclaimed and flooded to generate additional fish habitat, forming Pit Lake 278. Fish habitat that is lost as a result of the Project will be counterbalanced through implementation of a Fish Habitat Offsetting Plan to be developed in consultation with DFO.

Residual effects to fish habitat are anticipated to be low in magnitude, as fish habitat that is lost as a result of the Project will be counterbalanced. The dewatering of Camp Pond and development of Pit 278 will result in a localized, short-term loss in fish habitat which will be offset under the *Fisheries Act*.

Although the temporary loss of habitat from dewatering Camp Pond during mining operations may change the quantity of habitat available for fish to complete their life cycle, these changes are not expected to affect the overall sustainability and productivity of the fish populations encountered within the PDA on a long-term basis. The duration of effects is predicted to be a single short-term event, assuming a 6.5-month mining operation. Temporary changes in fish habitat are considered reversible as water levels in Camp Pond will be restored to their original levels. Fish habitat within Pit 278 will be designed to enhance available fish habitat, to the extent practicable.

5.2.6.2 Change in Fish Health and Survival

Potential effects to fish health and survival are anticipated to be negligible as they can be mitigated, through standard erosion and sediment control mitigation, fish rescues, discharge limits and monitoring of WQ prior to the connection of Pit 278 and Camp Pond. Following decommissioning it is anticipated that additional habitat gained through offsetting and filling of Pit Lake 278 will result in a long-term neutral to positive effects to fish survival.

Residual effects to fish health and survival are anticipated to be negligible in magnitude, as reasonable efforts will be made to relocate the fish residing in Camp Pond, prior to dewatering. The duration of effects is predicted to be short-term, based on a 6.5-month mining operation, and irregular/continuous, given the water-based discharges and the dewatering of Camp Pond will occur across the construction and operation phases. Changes in fish health and survival are considered reversible as effects will cease following reclamation activities, which will restore natural drainage pathways and reduce or eliminate water-based discharges.

Table 5.17 Project Residual Effects on Fish and Fish Habitat

Residual Effect	Residual Effects Characterization							
	Project Phase	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility
Change in Fish Habitat	C	A	L	LAA	MS	ST	IR/C	I/R
	O	A	L	LAA	NS	ST	IR	R
	D	N	L	LAA	NS	ST	S	R
Change in Fish Health and Survival	C	N	L	PA	MS	ST	IR	R
	O	N	NMC	PA	MS	ST	C	R
	D	N	NMC	PA	NS	ST	C	R

Table 5.17 Project Residual Effects on Fish and Fish Habitat

Residual Effect	Residual Effects Characterization							
	Project Phase	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility

KEY
See Table 4.1 for detailed definitions

Project Phase
C: Construction
O: Operation
D: Decommissioning

Direction:
P: Positive
A: Adverse
N: Neutral

Magnitude:
NMC: No Measurable Change
L: Low
M: Moderate
H: High

Geographic Extent:
PA: Project Area
LAA: Local Assessment Area
RAA: Regional Assessment Area

Timing
NS: No sensitivity
MS: Moderate sensitivity
HS: High sensitivity

Duration:
ST: Short-term
MT: Medium-term
LT: Long-term

N/A: Not applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Reversibility:
R: Reversible
I: Irreversible

5.2.7 Determination of Significance

With mitigation, offsetting, and environmental protection measures, the effects on fish and fish habitat are predicted to be not significant, as the residual environmental effects from the Project on fish and fish habitat, including SAR, do not threaten the long-term persistence, viability or recovery of fish habitat or fish species in the RAA. Confidence in this prediction is high, based on the following considerations:

- The potential environmental effects and effect pathways for the Project are generally well understood
- The mitigation measures are well understood and align with industry best practices and DFO's "Measures to Protect Fish and Fish Habitat"
- The understanding of existing conditions for fish and fish habitat is based on existing literature and field surveys conducted in support of the Project
- Fish habitat that is lost as a result of the Project will be counterbalanced through implementation of a Fish Habitat Offsetting Plan to be developed in consultation with DFO. The Plan will include follow-up monitoring to confirm that the required offset is achieved, and contingency measures in the event that the offsetting is not as successful as planned.
- Fish will be relocated from areas of in-water work (e.g., Camp Pond) in consultation with DFO.
- Project activities will be scheduled to occur outside of the sensitive periods for fish and fish habitat, as is practically feasible.

5.2.8 Follow-up and Monitoring

Construction activities will be undertaken in accordance with Signal Gold's existing EPPs and ERP. The Project will have a full-time Environment Supervisor to inspect worksites and activities for conformance with the EPPs, government regulations and permits. Compliance monitoring will be conducted to confirm that mitigation measures are properly implemented.

- A monitoring plan will be developed as part of the *Fisheries Act* Authorization and Offsetting Plan. Should the monitoring program indicate that the offsetting objectives are not met, remedial actions or additional offsets as described in the Habitat Offsetting Plan would be considered following consultation with DFO.

5.3 AVIFAUNA

For this assessment, the term avifauna includes raptors, migratory birds (e.g., passerines, waterfowl / waterbirds) and other species of avifauna (e.g., upland game birds), including SAR and SOCC (refer to Section 3.1 for definitions).

Avifauna was selected as a VC because of the potential for interactions between Project activities and avifauna species and their habitat, as well as their importance to the public, Indigenous groups and resource managers. Avifauna are valuable for recreational viewing and hunting, as a domestic food supply, and provide economic benefits for residents of NL. The status of avifauna populations is generally indicative of the health of an ecosystem, because they feed on vegetation and at lower trophic levels in the food chain (e.g., insects, fish and small mammals). The protection of SAR is also a legal requirement for those species listed under Schedule 1 of SARA and the NL ESA; Avifauna are also regulated under the federal MBCA and the NL *Wild Life Act*.

The assessment of avifauna focused on key groups (e.g., migratory birds and SAR) confirmed in the RAA that have the most potential to be affected by the Project.

5.3.1 Significance Definition

For the purposes of this assessment, a significant residual environmental effect on avifauna is defined as one that threatens the long-term persistence, viability or recovery of an avifauna species population in the RAA, including effects that are contrary to or inconsistent with the goals, objectives or activities of recovery strategies, action plans and management plans for SAR and their habitats.

5.3.2 Existing Conditions

An overview of the environmental setting is provided in Section 3.1. A more detailed description of the existing conditions for avifauna can be found in Avifauna Baseline Study (Appendix C). Additional data sources consulted included relevant publicly available primary and secondary literature and databases [e.g., North American Breeding Bird Survey (BBS)] and provincial and federal databases (e.g., AC CDC).

Field studies in support of the Project confirmed the presence of 36 avifauna species, comprised of six waterfowl / waterbird species, 27 passerine species, one upland game bird species, and two other avifauna species (i.e., species not protected under the MBCA). Historical records exist for 38 other species of avifauna on the Baie Verte Peninsula, based on records from BBS route 57020, approximately 25 km south of the Project Area near Burlington, NL (the closest route to the Project). Note that the identification of a greater number of species south of the Project is likely attributable to the area covered during the baseline survey as well as that BBS route is located entirely within a different Ecoregion and would be expected to attract a different assemblage of birds. As such, the presence of a species on BBS route 57020 does not necessarily indicate the presence of the species in the Project LAA.

The following five main groups of avifauna were considered, based on general habitat requirements, trophic level and/or conservation status:

- **Raptors**: Birds of prey that use a variety of habitats for nesting, hunting and breeding. They are situated high in the food chain and therefore are indicators of ecosystem health. No raptor species were recorded during the Avifauna Baseline Study or incidentally during other investigations. The only record from BBS route 57020 was of four ospreys in 1995 (Pardieck et al. 2020).
- **Migratory Birds – Waterfowl and Other Waterbirds**: Primarily occupy shoreline, wetland and open water habitats during spring breeding, brood rearing and fall staging. Species documented during the Avifauna Baseline Study were common loon (*Gavia immer*), American black duck (*Anas rubripes*), greater yellowlegs (*Tringa melanoleuca*), spotted sandpiper (*Actitis macularius*) and wilson's snipe (*Gallinago delicata*).
- **Migratory Birds – Passerines**: Occupy diverse terrestrial habitats during the breeding season, including riparian areas, burns, mature forests, regenerating areas and other habitat types. The majority of species documented during the Avifauna Baseline Study were in this group, with ruby-crowned kinglet (*Regulus calendula*), American robin (*Turdus migratorius*), white-throated sparrow (*Zonotrichia albicollis*), yellow-bellied flycatcher (*Empidonax flaviventris*) and fox sparrow (*Passerella iliaca*) the most common species. Most species in this group are protected under the MBCA.
- **Other Avifauna –**species not protected under the MBCA including crows, ravens, jays, kingfishers, and starlings, and upland game birds (year-round residents that are often hunted for recreation and/or sustenance). Species documented during the Avifauna Baseline Study were spruce grouse (*Falcipennis canadensis*), Canada jay (*Perisoreus canadensis*) and common raven (*Corvus corax*).
- **SAR / SOCC:** SAR and their habitats are protected under SARA and the NL ESA. While not protected by federal or provincial legislation, SOCC may be important indicators of ecosystem health and regional biodiversity. No avifauna SAR / SOCC were observed vicinity of the Project during the Avifauna Baseline Study or during other baseline surveys, or were reported in the AC CDC database as occurring within a 5 km radius of the Project (AC CDC 2021).

Historical records of gray-cheeked thrush (*Catharus minimus*), listed as Threatened under the NL ESA, exist near Baie Verte (SSAC 2005) and this species was also recorded between 1982 and 1984 on BBS route 57020 (Pardieck et al. 2020), which is approximately 25 km south of the Project area. Historical records on BBS route 57020 also exist for four other SAR – olive-sided flycatcher (*Contopus cooperi*), red crossbill (*Loxia curvirostra*), evening grosbeak (*Coccothraustes vespertinus*) and rusty blackbird (*Euphagus carolinus*) – and four SOCC – Cape May warbler (*Setophaga tigrina*), least flycatcher

(*Empidonax minimus*), Nashville warbler (*Oreothlypis ruficapilla*) and veery (*Catharus* fuscesc*ens*) (Pardieck et al. 2020). In general, the breeding potential for species with specialized niche or life history requirements, including SAR, is considered low in the Project area, based on the small size of the Project footprint (0.12 km²) and knowledge of the existing habitats in the LAA. Furthermore, Project activities are scheduled to occur outside of the migratory bird breeding season and, as such, migratory species, including any SAR / SOCC, would not be expected in the Project RAA for the majority of the life of the Project.

5.3.3 Project-Component Interactions and Effects Pathways

Table 5.18 lists the potential Project effects on avifauna and provides a summary of the Project effect pathways and measurable parameters to assess potential effects. Potential environmental effects and measurable parameters were selected based on review of recent environmental assessments for similar projects in NL and other parts of Canada and professional judgment.

Table 5.18 Potential Effects, Effects Pathways and Measurable Parameters for Avifauna

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement*
Change in Habitat	• Direct and/or indirect loss or alteration of habitat due to vegetation clearing, dewatering of Camp Pond, and/or sensory disturbance.	• Amount (km^2) of habitat directly or indirectly (qualitative) lost or altered.
Change in Mortality Risk	• Direct change in mortality risk due to vegetation clearing activities, vehicle collisions, and indirect change in mortality risk due to predation and harvest pressure.	• Estimated change in mortality risk is assessed qualitatively through: – Change in traffic volumes during the life of the Project – Interactions with Project infrastructure, vehicles and equipment
*Considered qualitatively in the assessment		

Project activities that might interact with avifauna for each potential effect are identified in Table 5.19. These interactions are indicated by check marks and are discussed in detail in Section 5.3.5. Justification where no interaction is predicted is provided following the table.

Table 5.19 Project Interactions with Avifauna

Physical Activities	Effects to be Assessed	
	Change in Habitat	Change in Mortality Risk
Construction		
Pre-Development Dewatering of Camp Pond	✓	-
Site Development	✓	✓
Wastes, Discharges, Emissions	✓	-
Operations		
Open Pit Mining	-	✓
Hauling	-	✓
Wastes, Discharges, Emissions	✓	-
Decommissioning		
Dismantling and Removal of Equipment	✓	✓
Restoration of Camp Pond Water Levels	✓	-
Wastes, Discharges, Emissions	✓	-

Notes:
✓ = Potential interaction
- = No interaction

While some Project activities may interact with avifauna and their habitat, standard mitigation measures and environmental protection practices will be implemented to effectively mitigate these interactions (discussed in Section 2.4). During the brief construction phase, the pre-development dewatering of Camp Pond is expected to have a negligible effect on a change in avifauna mortality, as birds are expected to avoid the pond during the dewatering process due to ongoing sensory disturbance (e.g., noise, human presence). Wastes, discharges, and emissions (e.g., air, waste, noise, light, liquid and solid effluents) are also expected to have negligible effects on a change in mortality risk, as these are not anticipated to have serious or lethal effects on avifauna. However, wastes, discharges, and emissions throughout the 6.5-month life of the Project have the potential to result in sensory disturbance from noise and human presence causing an indirect change in habitat.

During the operation phase, several activities will occur in the areas cleared during construction or in areas within the existing mining site, and most avifauna will typically avoid areas of high activity and associated background noise. Furthermore, Project operations are scheduled to occur outside the breeding season for most birds (i.e., mid-April to mid-August) and therefore only a few, primarily resident birds are expected to be in the area. Therefore, in the assessment of a change in habitat, no interaction has been identified for physical activities that avifauna are expected to avoid, including:

- Open pit mining
- Hauling

Sensory disturbance (e.g., noise and dust) associated with the above activities, however, may have indirect effects on a change in habitat and are discussed further in Section 5.2.5.

During decommissioning, the restoration of Camp Pond water levels is also expected to have a negligible effect on a change in avifauna mortality as the birds are not expected to be in the Camp Pond area due to previous (i.e., during operations) and ongoing sensory disturbances.

The remaining physical activities associated with the Project are expected to have residual environmental effects on a change in avifauna habitat and mortality risk (discussed in detail in Section 5.2.5).

5.3.4 Mitigation and Management Measures

In addition to the standard mitigation measures to be implemented for Project construction, operation and decommissioning discussed in Section 2.4, specific measures will be implemented to reduce or eliminate adverse effects on avifauna.

- Vegetation removal will be conducted outside the breeding season for most birds (e.g., mid-April to mid-August). If work must be completed during this timing window, activities will be conducted in accordance with Signal Gold's EPP and standard operating procedures for nest sweeps, prior to clearing activities. Standard procedures for nest sweeps will be also implemented during operations.
- The discovery of nests by on-site personnel will be reported to the Environment Supervisor and appropriate action or follow-up will be guided by the EPP. Appropriate buffers will be established around active (or suspected active) nests (e.g., 30 m for passerines, 100 m for waterfowl/waterbirds, 200 m to 800 m for raptor nests). Project-related activities will be avoided within the established buffer until the birds have left the nest.
- Trees that provide actual or potential avifauna habitat will be retained to the extent feasible and where it is safe to do so.
- Collisions, near misses or observations of mortalities on site roads and/or involving Project vehicles will be reported to the Environment Supervisor and adaptive management measures implemented should any locations of high frequency interactions be identified.

5.3.5 Assessment of Residual Effects

5.3.5.1 Change in Habitat

Construction

Direct effects on a change in habitat will occur primarily during the construction phase when an estimated 0.12 km^2 (12.02 ha) of habitat will be lost or altered during site preparation activities. This includes approximately 0.08 km^2 (7.91 ha) of aquatic habitat that will be lost, from the dewatering of Camp Pond, and 0.04 km^2 (4.11 ha) of terrestrial habitat. Indirect effects on a change in habitat through sensory disturbance (e.g., noise, light, dust, and vibrations) are also expected to occur and will extend into the LAA. Mitigation measures listed in Section 5.3.4, in addition to standard mitigation measures presented in Section 2.4 will reduce the total amount of habitat lost or altered, directly and indirectly, during Project construction.

Much of the terrestrial habitat in the Project Area is already heavily disturbed by exploration drilling and the forest cover has largely been harvested. Combined with ongoing disturbance associated with exploration drilling and on-going mining activities at the nearby Stog'er Tight site, the area is less likely to be used by avifauna in general as they would be expected to move into more suitable adjacent habitats. This includes numerous ponds and wetlands available to the few waterfowl and other waterbird species observed in the general area during baseline surveys.

Site preparation during construction can also have indirect effects on habitat through sensory disturbances. Activities such as blasting, the use of heavy equipment, and increased traffic volumes result in increased noise, light, dust deposition, and other emissions (e.g., exhaust) that can have adverse effects on avifauna habitat that are expected to extend into the LAA or beyond. Light stimuli from vehicle traffic, heavy equipment, or other on-site equipment, has the potential to attract or disorient nocturnally migrating birds (Poot et al. 2008). However, Project activities are anticipated to occur between 7:00 a.m. and 7:00 p.m and thus will occur primarily, if not exclusively, during daylight hours for the spring and fall migration periods.

Noise levels that are more than 10 dB above ambient levels, or that are greater than 50 dB, have the potential to disrupt avifauna (Canadian Wildlife Service 2021). Chronic noise exposure can mask acoustic signals or reduce the area that a bird is able to detect these signals, which can have adverse effects on foraging, anti-predator behaviour, and reproductive success, as well as bird densities and distribution (Barber et al. 2010, Halfwerk et al. 2011). More pronounced effects may occur if Project-related disturbances occur during key sensitive periods, such as the early breeding season. Activities during construction are anticipated to generate noise levels exceeding 50 dB, both at the source and at 500 m (John A. Volpe National Transportation Systems Center 2017). However, noise events are anticipated to be of short duration and to occur outside of key sensitive periods.

As indicated, the area is already heavily disturbed with ongoing sensory disturbance and construction activities associated with the current Project are scheduled to occur outside the sensitive breeding period for most avifauna. As such, few avifauna species would be expected in habitats in the area in general, and any resident species would be expected to move (or have already moved) into available adjacent habitats. Additionally, mitigation measures will be implemented to reduce the amount of sensory disturbance (Sections 2.4 and 5.3.4). With mitigation, the amount of remaining potential avifauna habitat lost or altered due to Project construction will likely have a low measurable effect on habitat availability at the local scale and little effect, if any, at the regional scale.

Operations

Direct effects on a change in habitat will occur primarily, if not exclusively, during the construction phase, when habitats are lost / altered during vegetation clearing and the dewatering of Camp Pond. Indirect effects on habitat from sensory disturbance will continue throughout operations and will largely be the same as discussed for construction, with additional noise from drilling, blasting, and mucking of completed blast via excavators. Such noise events will be of short duration and will occur outside of the sensitive breeding period for most birds and primarily after migratory birds have left the area. As such, only a few resident bird species would potentially remain in the LAA, and most would be expected to move (or have already moved) into adjacent undisturbed habitats. In addition, mitigation measures

(Sections 2.4 and 5.3.4) will be implemented to reduce potential adverse effects of both noise and vibrations associated with blasting and other activities.

Decommissioning

Direct effects on a change in avifauna habitat during decommissioning will be primarily associated with the dismantling and removal of equipment and the restoration of Camp Pond water levels. Indirect effects on habitat during decommissioning will be sensory in nature and will be the same as described for Project construction. Upon closure of the Project, activities that result in sensory disturbance will cease and stockpiled organic material will be used as a base for revegetation once reclamation of an area is possible, however not all habitats are expected to re-establish to pre-existing conditions (primarily coniferous forest prior to exploration activities).

5.3.5.2 Change in Mortality Risk

Construction

The primary pathway for increased mortality risk to avifauna is a direct risk to eggs or young if clearing activities occur during the nesting period. To avoid this potential increased risk, clearing activities have been scheduled for outside of the general nesting period for birds in that area (mid-April through to mid-August). However, few birds would be expected to be nesting in the area in general, due to ongoing sensory disturbances (primarily noise that could mask mating calls) and the highly fragmented nature of potential suitable habitats in the Project Area in general. If not practicable to complete all vegetation clearing outside the nesting windows, additional mitigation measures will be developed and implemented including the use of non-intrusive monitoring methods and setbacks, consistent with standard guidance from Canadian Wildlife Service, to avoid adverse effects on migratory birds, including migratory bird that are listed species at risk.

Collisions with vehicles or other Project equipment (e.g., site lighting) may also directly affect mortality risk. However, due to the anticipated low volume of traffic during Project construction and mitigation to reduce site lighting, a change in avifauna mortality risk from collisions is expected to be minimal.

Overall, with mitigation, including timing Project construction activities to avoid the breeding season, the implementation of speed limits, limiting the amount of on-site lighting and prohibiting the hunting or harassment of avifauna and other wildlife by on-site Project personnel, the likelihood of increased mortalities will be low.

Operations

Potential direct effects on mortality risk to avifauna during the operation phase will be the same as during construction and includes the potential for collisions with Project vehicles and other infrastructure. Based on the schedule of Project activities (i.e., September to March), only a few resident birds have the potential to interact with Project infrastructure for the majority of the operations phase. Mitigation measures, including reducing speed limits and limiting the amount of on-site lighting will reduce the likelihood of mortalities.

Decommissioning

Project related traffic and equipment use during decommissioning are expected to be similar to, or less than, during construction and operations, however there would still be a mortality risk associated with collisions with vehicles or other equipment. Following decommissioning, the risk of mortality is expected to return to baseline conditions.

5.3.6 Summary of Residual Effects

The successful application of standard (Section 2.11) and specific (Section 5.2.4) mitigation measures is key to reducing the magnitude and duration of potential effects on a change in avifauna habitat and mortality risk. Potential residual environmental effects (i.e., effects remaining following application of mitigation measures) of the Project on habitat change and mortality risk to avifauna are discussed below.

5.3.6.1 Change in Habitat

Changes in avifauna habitat will be primarily adverse, as there will be a direct loss of habitat during the construction phase and there will be indirect effects on habitat that will extend into the LAA throughout the life of the Project. During decommissioning, the water levels in Camp Pond will be restored to their original levels and therefore the long-term trend of the residual effect on habitat is expected to be neutral for Camp Pond, relative to baseline conditions.

Residual effects on a change habitat are anticipated to be low in magnitude, as only 0.12 km^2 (12.02 ha) of habitat will be lost or altered and, in general, the number of birds that will likely be exposed to habitat changes and/or sensory disturbances will be low, given the spatial and temporal boundaries of the Project. Habitat changes will be short-term in duration and reversible at Camp Pond, however, are expected to be long-term in duration and irreversible in other areas (e.g., open pit) as habitat may not completely re-establish to pre-existing conditions upon closure. The frequency of residual effects on a change in habitat will be continuous throughout all Project phases due to ongoing sensory disturbance, but the duration of sensory disturbance effects will be limited to the specific Project phase within which they occur and geographically limited primarily to the LAA.

5.3.6.2 Change in Mortality Risk

Changes in the mortality risk of avifauna will be adverse throughout the life of the Project, primarily associated with the potential for vehicle collisions. While some species (e.g., passerines, upland game birds) may be more susceptible to vehicle collisions, the mortality risk to all avifauna groups and for all Project phases is anticipated to be low in magnitude because most bird species are expected to have already migrated from the area and only a few resident bird species would remain for most of the Project life. With mitigation, the number of direct mortalities resulting from the Project is expected to be small and not expected to affect regional populations. Avifauna mortalities are expected to occur irregularly in the Project Area and will be short-term in duration, and reversible following completion of the Project.

Table 5.20 summarizes the residual environmental effects of the Project on a change in avifauna habitat and mortality risk. The significance of residual effects is considered in Section 5.3.7.

Table 5.20 Project Residual Effects on Avifauna

Residual Effect	Residual Effects Characterization							
	Project Phase	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility
Change in Habitat	C	A	L	LAA	NS	ST/LT	C	I/R
	O	A	L	LAA	NS	ST	C	R
	D	A/N	L	LAA	NS	ST	C	R
Change in Mortality Risk	C	A	L	PA	NS	ST	IR	R
	O	A	L	PA	NS	ST	IR	R
	D	A	L	PA	NS	ST	IR	R

KEY
See Table 4.1 for detailed definitions

Project Phase
C: Construction
O: Operation
D: Decommissioning

Direction:
P: Positive
A: Adverse
N: Neutral

Magnitude:
NMC: No Measurable Change
L: Low
M: Moderate
H: High

Geographic Extent:
PA: Project Area
LAA: Local Assessment Area
RAA: Regional Assessment Area

Timing
NS: No sensitivity
MS: Moderate sensitivity
HS: High sensitivity

Duration:
ST: Short-term
MT: Medium-term
LT: Long-term

N/A: Not applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Reversibility:
R: Reversible
I: Irreversible

5.3.7 Determination of Significance

Project-related activities may result in adverse effects on a change in avifauna habitat and mortality risk, however the risk to avifauna is low in magnitude throughout all Project phases, based on the scheduling of Project activities outside of the migratory bird breeding season and the low number of birds in general that will likely be exposed to habitat changes and vehicle collisions. Overall, with mitigation and environmental protection measures, the effects on avifauna are predicted to be not significant, as the residual environmental effects from the Project on avifauna, including SAR, do not threaten the long-term persistence, viability or recovery of an avifauna species in the RAA. Confidence in this prediction is high, based on the following considerations:

- The overall small scale of the Project combined with the scheduling of activities to occur outside of the sensitive migratory bird nesting period
- Few avifauna species are expected to occur in the Project Area and LAA, as migratory species would be absent from the area for most of the life of the Project

- The potential environmental effects and effect pathways for the Project are common to mining operations and are generally well understood
- The mitigation measures are well understood and align with standard management practices
- The understanding of existing conditions for avifauna is based on existing literature and field surveys conducted in support of the Project
- A conservative approach was used in estimating the amount of habitat lost due to Project construction, in that it was assumed that the entire Project Area was suitable avifauna habitat that would be lost, and sensory disturbances were considered as if static over time and not influenced by other factors (e.g., season, weather conditions, surrounding vegetation)
- Mortality risk was also assessed using a conservative approach. Avifauna typically can move out of the way of danger and will typically avoid areas of high human activity and noise

5.3.8 Follow-up and Monitoring

No follow-up and monitoring programs specific to avifauna are recommended.

Construction activities will be undertaken in accordance with Signal Gold's existing EPP and ERP. The Project will have a full-time Environment Supervisor to inspect worksites and activities for conformance with the EPP, government regulations and permits. Compliance monitoring will be conducted to confirm that mitigation measures are properly implemented.

5.4 OTHER SPECIES AT RISK

Other SAR was selected as a VC because of the potential interactions between Project activities and SAR and their residences, as well as their ecological and cultural importance to the public, Indigenous groups, and resource managers. For the purpose of this assessment, SAR are defined as a species listed as Extirpated, Endangered, Threatened, Vulnerable, or Special Concern under the NL ESA, or SARA. Section 33 of SARA prohibits the damage or destruction of a residence of a SAR, defined as "the specific dwelling place, such as a den, nest or other similar area or a place that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding, or hibernating" (s.2[1]).

The Other SAR VC is focused on the following two wildlife species that have the potential to occur in the RAA: little brown myotis and northern myotis. No bats or other SAR species, including vascular plant species, were observed during field surveys or have been documented within 5 km of the Project (AC CDC 2021).

5.4.1 Significance Definition

For the purpose of this assessment, a significant residual environmental effect on other SAR is defined as one that threatens the long-term persistence, viability or recovery of a SAR species population in the RAA, including effects that are contrary to or inconsistent with the goals, objectives or activities of the federal Recovery Strategy for little brown myotis (*Myotis lucifigus*), the northern myotis (*Myotis septentrionalis*), and the tri-colored bat (*Perimyotis sublavus*) in Canada (ECCC 2018). Note that the Tri-

colored bat is not known to occur in Newfoundland (COSEWIC 2013; ECCC 2018) and is therefore not considered in the assessment of other SAR.

5.4.2 Existing Conditions

An overview of the environmental setting is provided in Section 3.1. Sources consulted related to little brown myotis and northern myotis included relevant publicly available primary and secondary literature and provincial and federal databases, including the AC CDC.

The little brown myotis and northern myotis are currently listed as endangered under SARA, following an emergency listing in 2014 "because of sudden and dramatic declines across the eastern portions of [their] ranges" due to white-nose syndrome (WNS) (ECCC 2018). Both species of myotis are also listed as Endangered under the NL ESA. In addition to WNS, other threats to these species include habitat loss and degradation, disturbance or harm, pollution and climate change (ECCC 2018).

The habitat requirements of the two myotis species include overwintering habitat (hibernacula), summering habitat (maternity roosts and day roosts) and swarming habitat, the latter of which is used in the late summer or early fall for mating and socializing and can be near their hibernacula (ECCC 2018). Currently, only winter hibernacula have been identified as critical habitat (i.e., habitat that is necessary for the survival or recovery of the species), however the importance of maternity colonies is recognized in the recovery strategy (ECCC 2018) and these locations would be protected under federal and provincial legislation.

The 2018 recovery strategy identified a 50 x 50 km grid square containing critical habitat for bats that overlaps White Bay and portions of the Baie Verte and Northern Peninsulas (Figure 4 in ECCC 2018). While the exact location of the hibernacula is not provided and the grid does not overlap with the Project, the presence of hibernacula in the region suggests an increased likelihood of bats being present in the RAA during the non-wintering season (March to October; CWHC 2018). Based on the 9.5-month Project schedule from June 2023 to March 2024 (for construction and operation), bats would be expected to be hibernating throughout most of the operations phase (November to February). However, bats would be active in September and October, after they have left their summer residence but are not yet hibernating, and again in March.

After bats emerge from their hibernacula, female bats generally roost together in maternity colonies, although female northern myotis may roost alone (ECCC 2018). Northern myotis roost almost exclusively in natural sites such as trees and caves, while little brown myotis will use either natural or manmade structures (e.g., buildings, woodpiles, under shingles, bridges) (CWHC 2018). Potential maternity roost sites primarily include relatively tall, large diameter trees, rock crevices, and any anthropogenic structures. Males of both species generally roost alone and follow the same preference of natural vs. manmade roost sites as their female counterparts. Roost sites for males include trees (cavities, crevices, under bark), rock crevices, under rocks, under sheet metal, woodpiles, and under shingles, amongst other locations, and the males will periodically switch roost sites (ECCC 2018). Foraging habitat for northern myotis is predominantly along and within forests, while little brown myotis tend to forage over open water (ECCC 2018).

5.4.3 Project-Component Interactions and Effects Pathways

Table 5.21 lists the potential Project effects on other SAR and provides a summary of the Project effect pathways and measurable parameters to assess potential effects. Potential environmental effects and measurable parameters were selected based on review of recent environmental assessments for similar projects in NL and other parts of Canada and professional judgment.

Table 5.21 Potential Effects, Effects Pathways and Measurable Parameters for Other SAR

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement*
Change in Habitat	• Direct and/or indirect loss or alteration of habitat due to vegetation clearing, dewatering of Camp Pond, and/or sensory disturbance (noise, vibrations, light).	• Amount (km^2) of habitat directly or indirectly (qualitative) lost or altered.
Change in Mortality Risk	• Direct change in mortality risk due to tree removal and/or collisions with vehicles or other infrastructure.	• Estimated change in mortality risk is assessed qualitatively through changes in traffic volumes and the potential for interactions with vehicles during the life of the Project.

Project activities that might interact with other SAR for each potential effect are identified in Table 5.22. These interactions are indicated by check marks and are discussed in detail in Section 5.4.5. Justification where no interaction is predicted is provided following the table.

Table 5.22 Project Interactions with Other SAR

Physical Activities	Effects to be Assessed	
	Change in Habitat	Change in Mortality Risk
Construction		
Pre-Development Dewatering of Camp Pond	✓	-
Site Development	✓	✓
Wastes, Discharges, Emissions	✓	-
Operations		
Open Pit Mining	-	✓
Hauling	-	-
Wastes, Discharges, Emissions	✓	-
Decommissioning		
Dismantling and Removal of Equipment	✓	✓
Restoration of Camp Pond Water Levels	✓	-
Wastes, Discharges, Emissions	✓	-
Notes: ✓ = Potential interaction - = No interaction		

While some Project activities may interact with other SAR and their habitat, standard mitigation measures and environmental protection practices will be implemented to effectively mitigate these interactions (discussed in Section 2.4).

During the construction phase, the pre-development dewatering of Camp Pond is expected to have a negligible effect on a change in bat mortality risk, as bats would not be using the water for foraging or drinking during the daytime hours when construction activities would be occurring. For the same reason, the restoration of Camp Pond water levels during decommissioning is also expected to have a negligible effect on bat mortality.

During the operation phase, several activities will occur in the areas already cleared during construction or other areas within existing mining facilities. Therefore, in the assessment of a change in habitat, no interaction has been identified for open pit mining, and hauling. Environmental effects on a change in mortality risk from hauling are also anticipated to be negligible, as these activities will occur during the daytime hours when bats are roosting or hibernating.

Wastes, discharges and emissions (e.g., air, waste, noise, light, liquid and solid effluents) are also expected to have negligible effects on a change in mortality risk, throughout all Project phases, as these are not anticipated to have serious or lethal effects on bats. However, wastes, discharges and emissions have the potential to result in sensory disturbance (primarily light), causing an indirect change in habitat.

The remaining physical activities associated with the Project are expected to have residual environmental effects on a change in bat habitat and mortality risk (discussed in detail in Section 5.2.5).

5.4.4 Mitigation

In addition to the standard mitigation measures to be implemented for Project construction, operation and decommissioning discussed in Section 2.11, specific measures will be implemented to reduce or eliminate adverse effects on other SAR.

- Vegetation removal is planned to occur outside of the general nesting period for migratory birds (mid-April to mid-August). In the event that vegetation removal needs to occur during the nesting period, Signal Gold's avifauna management procedures (i.e., nest sweep surveys) will be followed. This restricted activity period will also mitigate potential effects of the Project on a change in habitat or mortality risk for bats as it overlaps a sensitive period for bats (i.e., maternity roosting).
- If present, any large diameter trees (>30 cm) will be maintained to the extent possible, especially those that are dead or dying. These types of trees typically have peeling bark, crevices and cavities that provide important roosting habitats for bats.
- The discovery of roosts or hibernacula will be reported immediately to the Environment Supervisor and work will cease until appropriate action or follow-up is determined, guided by consultation with a qualified biologist and/or federal or provincial regulators.
- Observations of bat colonies, potential hibernacula sites, sick or dead bats will be reported to the provincial Wildlife Division at 709-637-2025 or through the toll-free bat hotline: 1-877-434-2287 (BATS).

- Caves, sinkholes, fissures, or other underground cavities that are identified as a result of Project activities will be inspected for signs of previously overwintering bats and reported to the Wildlife Division.
- If present, garbage bins or other containers will be kept covered whenever possible. Bats may be attracted to standing water in open containers and fly into them. As bats cannot climb slippery surfaces or fly straight up into the air, they can become trapped.
- Work activities will be undertaken in a manner that does not deliberately harass SAR and other wildlife.

5.4.5 Assessment of Residual Effects

5.4.5.1 Change in Habitat

Construction

Direct effects on a change in habitat will occur primarily during construction when the site is cleared of vegetation and water is removed from Camp Pond. Approximately 0.12 km^2 (12.02 ha) of habitat will be lost or altered during site preparation activities, including approximately 0.08 km^2 (79,122.56 m^2) of aquatic habitat from the dewatering of camp pond (potential foraging habitat for bats).

If present in the Project Area, there is the potential for important habitat features, such as maternity roost trees and hibernacula, to be altered or destroyed during site preparation. Currently, there are no known hibernacula in the RAA. However, if potential hibernacula are encountered during site preparation, work will immediately cease, and the Environment Supervisor and Wildlife Division will be contacted. Appropriate follow-up actions will be guided by consultation with a qualified biologist and/or federal or provincial regulators.

It is anticipated that existing potential habitats will be lost in the footprint of the proposed pit. This area is already highly disturbed, and the remaining vegetation consists of a relatively dense cover of herbaceous species and a sparse cover of shrubs. Other habitats in the vicinity of the Project are occupied primarily by second growth coniferous forest, estimated to be 30 to 40 years old, with several small wetlands and waterbodies (including Camp Pond) scattered throughout. In general, as the preferred natural summer roosting habitat for bats is in older forest stands, the magnitude of potential adverse residual effects on maternity roost sites is anticipated to be low. Furthermore, mitigation will be implemented to maintain any large diameter trees outside of the pit area, to the extend feasible, that are potential summer roost sites (e.g., dead or dying trees with peeling bark, crevices, and cavities).

Indirect effects on a change in habitat through sensory disturbance (e.g., noise and light) are also expected to occur and will extend into the LAA. Construction-related noise will involve the operation of vehicles, heavy machinery and chainsaws that have the potential for residual effects on bats. Research has suggested that traffic noise can negatively affect bat activity (e.g., Finch et al. 2020) although bats using higher frequency echolocation (>35 kHz), such as little brown and northern myotis (Humboldt State University Bat Lab 2011), may not exhibit the same response (Bunkley et al. 2014). Regardless, traffic and other noise generated during the construction phase will occur outside of the dusk and dawn periods, when bats would be active and echolocating. The presence of site lighting has the potential to benefit little

brown myotis, which are efficient aerial hawkers that may opportunistically feed on insects that become concentrated around light sources. Alternatively, because insects are attracted to light sources, there is evidence that this can have adverse effects on their biomass and therefore the food of bats (ECCC 2018). Overall, construction-related sensory disturbances are anticipated to be short-term in duration and will occur outside of sensitive periods for bats and, as such, indirect effects are expected to be limited.

Mitigation measures listed in Section 5.4.4, in addition to standard mitigation measures presented in Section 2.4, will reduce the total amount of habitat lost or altered, directly and indirectly, during Project construction. As previously noted, this includes ceasing activities and notifying the Environment Supervisor and Wildlife Division, should any key habitat features (e.g., hibernacula) be encountered during construction. Overall, the loss of habitat is expected to have a small measurable effect on habitat availability at the local scale and little or no measurable effect at the regional scale.

Operations

Direct effects on a change in habitat will occur primarily, if not exclusively, during the construction phase, when habitats are lost / altered during vegetation clearing and the dewatering of Camp Pond. Indirect effects on habitat from sensory disturbance (e.g., noise and light) will continue throughout operations and will largely be the same as discussed for construction, with additional sensory disturbance from drilling, blasting and mucking of completed blast using excavators.

Drilling, blasting and mucking activities during open pit mining will produce noise and vibrations that has the potential to disturb hibernating bats. While the Project is approximately 40 km away from the border of a 50 x 50 grid containing critical habitat for bats (i.e., contains a hibernaculum) (ECCC 2018), there may be other unknown hibernacula closer to the Project. Noise, light, and vibrations generated near hibernacula has the potential to disturb bats and cause them to arouse from torpor (ECCC 2018). Industrial activities, including mining, may also result in changes to the airflow and microclimatic conditions inside the hibernaculum (USFWS 2007), or potentially cause the entrance to collapse. Mitigation measures (Sections 2.4 and 5.4.4) and best practices will be implemented to reduce potential adverse effects of both noise and vibrations associated with blasting and other activities. This includes ceasing activities and notifying the Environment Supervisor and Wildlife Division, should any key habitat features (e.g., hibernacula) be encountered during operations.

Decommissioning

Direct effects on a change in habitat during decommissioning will be associated with the dismantling and removal of equipment and the restoration of water levels. Stockpiled organic material will be used as a base for revegetation once reclamation of an area is possible. However, not all habitats are expected to return to pre-Project conditions. Indirect effects on habitat during decommissioning will be sensory in nature and will be the same as described for Project construction. Upon closure of the Project, activities that result in sensory disturbance will cease (i.e., conditions are expected to return to baseline).

5.4.5.2 Change in Mortality Risk

Construction

Collisions with vehicles has the potential to result in direct mortality to bats (Medinas et al. 2013). The risk of bat-vehicle collisions is influenced by the season (e.g., whether bats are swarming), the presence of preferred habitat and the level of traffic (Medinas et al. 2013). The risk of vehicle collisions is expected to be low, as Project activities are scheduled to occur during the daytime and therefore outside of the primary dusk/dawn activity period of bats and their lack of observed presence at the site.

Site clearing activities could also result in mortality if any bats are roosting in trees or other features in the Project Area and the roost site is inadvertently destroyed. Few bats in general are expected to be in the Project Area during the construction phase, as activities are scheduled to occur outside of the maternity roosting period. If a day roost site is discovered, work will immediately cease until appropriate follow-up is determined.

Operations

As during construction, there is a potential but low mortality risk for bats from vehicle collisions, given that activities will be conducted during the daytime hours. Furthermore, for most of the operation phase (November to February), bats would be expected to be hibernating (CWHC 2018) and therefore not at risk of mortality from vehicle collisions.

Drilling and blasting activities have the potential to increase the risk of direct mortality to bats, in the unlikely event that an active hibernaculum is discovered in the Project Area during blasting. Blasting and associated vibrations also have the potential to result in the collapse of entrances to hibernacula or to arouse bats from torpor, which can lead to increased mortality risk. Repeated arousals could result in decreased fat reserves, which are required for successful hibernation (USFWS 2007), and that has the potential to affect reproductive success (ECCC 2018). This is particularly harmful if the hibernaculum has been exposed to WNS, as WNS results in more frequent arousals (ECCC 2018). As indicated, there are no known hibernacula in the RAA. However, if any active hibernacula are encountered during blasting, work will immediately cease, and the Environment Supervisor and Wildlife Division will be contacted.

Decommissioning

Decommissioning is currently scheduled to coincide with the emergence of bats from their hibernacula. As such, there would be a similar but low risk of mortality due to vehicle collisions. The dismantling and removal of equipment may also increase mortality risk if emerged bats are using the equipment as a day roost.

5.4.6 Summary of Residual Effects

The successful application of standard (Section 2.4) and specific (Section 5.4.4) mitigation measures is key to reducing the magnitude and duration of potential effects on a change in Other SAR (i.e., bats) habitat and mortality risk. Potential residual environmental effects (i.e., effects remaining following application of mitigation measures) of the Project on habitat change and mortality risk to Other SAR are discussed below.

5.4.6.1 Change in Habitat

Changes in habitat for Other SAR will be primarily adverse, as there will be a direct loss of habitat during the construction phase and there will be indirect effects on habitat that will extend into the LAA. Indirect sensory disturbance effects on habitat are expected to occur throughout the life of the Project. During decommissioning, the water levels in Camp Pond will be restored to their original levels and therefore the long-term trend of the residual effect on habitat for Other SAR is expected to be neutral for Camp Pond, relative to baseline conditions.

With mitigation, residual effects on a change for Other SAR habitat are anticipated to be low in magnitude. Habitat in the Project Area has a low potential to support bat maternity colonies, there are no known hibernacula in the RAA, and there is likely a low number of bats in general that will be exposed to habitat changes and/or sensory disturbances. Habitat changes will be short-term in duration and reversible at Camp Pond, however, are expected to be long-term in duration and irreversible in the Pit 278 area, as not all habitat is expected to return to pre-existing conditions upon closure. Residual effects on a change in habitat are expected to occur continuously throughout all Project phases due to ongoing sensory disturbance, however, will be limited to the specific Project phase within which they occur and to the LAA.

5.4.6.2 Change in Mortality Risk

Changes in the mortality risk of Other SAR will be adverse but low throughout the life of the Project. Project activities are scheduled to occur outside of the maternity roost period and primary activity periods (dusk and dawn) for bats. There is also a low risk for mortality to hibernating bats, are there are no known hibernacula in the RAA. With mitigation, the number of direct mortalities resulting from the Project is expected to be small and not expected to affect regional populations. Bat mortalities are expected to occur irregularly in the Project Area but have the potential to occur during important life stages (mating and swarming). The mortality risk will be short-term in duration, however, will be reversible following completion of the Project.

Table 5.23 summarizes the residual environmental effects of the Project on a change in Other SAR habitat and mortality risk. The significance of residual effects is considered in Section 5.4.7.

Table 5.23 Project Residual Effects on Other SAR

Residual Effect	Residual Effects Characterization							
	Project Phase	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility
Change in Habitat	C	A	L	LAA	MS	ST/LT	C	I/R
	O	A	L	LAA	MS	ST	C	R
	D	A/N	L	LAA	MS	ST	C	R
Change in Mortality Risk	C	A	L	LAA	MS	ST	IR	R
	O	A	L	LAA	MS	ST	IR	R
	D	A	L	LAA	MS	ST	IR	R

KEY
See Table 4.1 for detailed definitions

Project Phase
C: Construction
O: Operation
D: Decommissioning

Direction:
P: Positive
A: Adverse
N: Neutral

Magnitude:
NMC: No Measurable Change
L: Low
M: Moderate
H: High

Geographic Extent:
PA: Project Area
LAA: Local Assessment Area
RAA: Regional Assessment Area

Timing
NS: No sensitivity
MS: Moderate sensitivity
HS: High sensitivity

Duration:
ST: Short-term
MT: Medium-term
LT: Long-term

N/A: Not applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Reversibility:
R: Reversible
I: Irreversible

5.4.7 Determination of Significance

Project-related activities may result in adverse effects on a change in Other SAR habitat and mortality risk, however the risk to Other SAR is low in magnitude throughout all Project phases, based on the schedule of Project activities (occurring primarily during hibernation and outside of the dawn/dusk activity period for bats) that reduces the number of bats that will likely be exposed to habitat changes or increased mortality risk. Overall, with mitigation and environmental protection measures, the effects on other SAR are predicted to be not significant, as the residual environmental effects from the Project do not threaten the long-term persistence, viability, or recovery of bats in the RAA. Confidence in this prediction is high, based on the following considerations:

- The overall small scale of the Project and the low potential for bats to occur in the LAA based on the timing of Project activities and the availably of habitats
- The potential environmental effects and effect pathways for the Project are common to mining operations and are generally well understood
- The mitigation measures are well understood and align with standard management practices

- A conservative approach was used in estimating the amount of habitat lost due to Project construction, in that it was assumed that a) the entire Project Area was suitable bat habitat that would be lost, and b) sensory disturbances were considered as if static over time and not influenced by other factors (e.g., season, weather conditions, surrounding vegetation)
- The schedule of Project activities does not overlap with the maternity roosting period for bats or the primary activity period for bats (dusk/dawn), and there are no known hibernacula in the RAA

5.4.8 Follow-up and Monitoring

No follow-up and monitoring programs specific to other species at risk (i.e., bats) are recommended.

Construction activities will be undertaken in accordance with Signal Gold's existing EPP and ERP. The Project will have a full-time Environment Supervisor to inspect worksites and activities for conformance with the EPP as well as government regulations and permits. Compliance monitoring will be conducted to confirm that mitigation measures are properly implemented.

6.0 CUMULATIVE EFFECTS ASSESSMENT

6.1 CUMULATIVE EFFECTS SCOPING

The assessment of cumulative environmental effects is carried out where residual environmental effects of the Project overlap with residual environmental effects from other projects or activities. Other projects and activities that may result in cumulative environmental effects with the Project include ongoing mining and expansion activities by Signal Gold and other mineral exploration in the RAA (Table 6.1). As described in Section 2.2, the existing and expansion activities for Stog'er Tight is the primary resource development activity in the RAA.

The potential for interactions between other Project and the VCs are shown in Table 6.1.

Table 6.1 Potential Interactions between Other Projects and the VCs

Project Name or Physical Activity	Description	VC Interaction			
		Surface Water Resources	Fish and Fish Habitat	Avifauna	Other Species at Risk
Ongoing and expansion of mining activities	Refer to Section 2.2.	✓	✓	✓	✓
Forest harvesting activities	Much of the Baie Verte Peninsula has been subject to extensive pulp and paper forestry harvesting activity over the past 50 years. The land within the mining lease is covered with secondary growth trees and small spruce. Bedrock outcrop makes up approximately 2-3% of the area. Overburden ranges from 0.5 to 3 m thick. Isolated bogs located in valleys may see overburden exceed 5 m.	✓	✓	✓	✓
Commercial or recreational angling / hunting	Currently the area surrounding the property is used recreationally by local residents taking part in activities such as hunting and fishing, although the mine site does not have public access.	-	✓	✓	✓

Notes:
✓ = Potential interaction
- = No interaction

6.2 CUMULATIVE EFFECTS ASSESSMENT

Cumulative effects result from the interaction of effects of multiple past, present and future projects and/or activities on a particular component of the environment. This section describes the pathways of the cumulative effects resulting from the Project and other projects identified in Table 6.1, mitigation that could be implemented to reduce cumulative effects, and the nature of the cumulative effects in the context of the residual effects of other projects. These projects potentially have similar effect pathways as effects arising from the Project, including interactions with surface water resources, fish and fish habitat, avifauna and other SAR.

6.2.1 Surface Water Resources

Past, present, and future activities / projects that are predicted to contribute to cumulative effects on surface water resources include ongoing and expansion of mining activities and forestry (Table 6.1). These activities have the potential to overlap with Project activities temporally and/or spatially and have similar effect pathways as effects arising from the Project, including a change in water quantity and water quality. There is potential for residual effects from past and ongoing mining activities to overlap Project effects, including water management infrastructure built for past mining projects such as dams, ditches as well as changes in ground cover and runoff conditions. Forestry activities potentially have similar effect pathways as the Project, including vegetation clearing and ground disturbance in or near waterbodies affecting runoff and water quality (potential introduction of sediments and contaminants).

The contribution of Project-related residual adverse effects to cumulative effects on change in water quantity and water quality is anticipated to be limited in geographic area.

6.2.2 Fish and Fish Habitat

Past, present, and future activities / projects that are predicted to contribute to cumulative effects on fish and fish habitat include ongoing and expansion of mining activities, forest harvesting activities, and commercial or recreational angling. (Table 6.1). Ongoing mining activities will overlap with Project activities temporally or spatially and potentially have similar pathways as effects arising from the Project, including a change in habitat, or a change in fish health and survival. Forestry harvesting activities potentially have similar effect pathways as the Project, including vegetation clearing and ground disturbance in or near streams or lakes affecting runoff and water quality (potential introduction of sediments and contaminants). Commercial outfitting and recreational fishing activities can potentially cause a change in fish health and survival. However, given fisheries regulations, such as catch quotas and seasonal closures, cumulative effects are anticipated to be low, affecting only individual fish and not populations.

The contribution of Project-related residual adverse effects to cumulative effects on change in habitat and change in fish health and survival is anticipated to be limited in geographic area and temporary in nature. With the implementation of mitigation and management measures described in Sections 2.4 and 5.2.4, the residual environmental effects from the Project on fish and fish habitat, including SAR, do not threaten the long-term persistence, viability or recovery of fish habitat or fish species in the RAA. It is anticipated that similar mitigation measures would be implemented for other projects and activities.

6.2.3 Avifauna and Other SAR

Past, present, and future activities / projects that are predicted to contribute to cumulative effects on avifauna and other SAR include ongoing and expansion of mining activities, forestry and hunting activities (Table 6.1). These activities have the potential to overlap with Project activities temporally and/or spatially and have similar effect pathways as effects arising from the Project, including a change in habitat quality and change in mortality risk.

The proposed mine will be located within the existing surface lease, adjacent to current mining operations at the mine site. The mine site represents a past, current and ongoing future source of noise and light emissions for surrounding habitats. The contribution of Project-related residual adverse effects to cumulative effects on change in habitat quality and use and mortality risk is anticipated to be limited in geographic area. Pit 278 would result in incremental changes to sensory disturbances already occurring at the mine site. With the implementation of mitigation and management measures described in Sections 2.4, 5.3.4 and 5.4.4, the residual adverse effect on avifauna and other SAR for the Project is predicted to be within the normal variability of existing conditions and is not expected to affect the long-term persistence or viability of avifauna and other SAR in the RAA. It is anticipated that similar mitigation measures would be implemented for other projects and activities. This includes legal requirements to protect migratory birds, such as clearing outside the bird breeding season (or where this is not possible, performance of bird nest sweeps and monitoring where there exists the potential to disturb nesting and breeding habitat) and measures to protect bats and their habitats, such as surveys of large diameter trees and snags for roosts (or evidence thereof) prior to their removal.

6.2.4 Summary

With the implementation of proposed mitigation, it is unlikely that Project effects, in combination with effects from other projects and activities, would result in a cumulative reduction in the amount or composition of habitats within the RAA that would threaten the persistence or viability of fish, avifauna and other SAR. This prediction assumes that other projects and activities in the RAA will be required to comply with various mitigation measures and regulations. For the reasons listed above, along with the limited spatial scale of the Project activities, the Project is not predicted to have significant adverse cumulative environmental effects on surface water resources, fish and fish habitat, avifauna, and other SAR.

7.0 FUNDING

The funding for the project will be provided by Signal Gold.

8.0 PROJECT-RELATED DOCUMENTS

Field studies for the Project were conducted in 2020 and 2021, which included surveys for Avifauna and Vegetation. The results of these surveys were summarized in three baseline reports, which include:

- 2020 Aquatic Habitat Study (Stantec 2020)
- 2021 Aquatic Habitat Study (Stantec 2021)
- Camp Pond Development – 2021 Avifauna Survey (Stantec 2021)
- Camp Pond Development – 2021 Vegetation Survey (Stantec 2021)

Additional information can be found in baseline studies appended to this report related to the aquatic habitat (Appendix A), rare plants (Appendix B), avifauna (Appendix C) and hydrology (Appendix D). In addition, the following engineering studies are currently ongoing or have been completed as part of the overall Project development and design:

- Geotechnical investigation of waste dump
- Third party resource / Life of Mine review
- Hydrogeology Assessment
- Rare plant surveys / bird surveys / fish surveys
- ARD / PAG studies
- Condemnation program

9.0 CONCLUSION

Signal Gold is proposing to expand operations at the Stog'er Tight Deposit and construct and operate Pit 278 over a 9.5-month period (for construction and operation phases) commencing in June 2023. The Project will use much of the existing infrastructure associated with operations at the Stog'er Tight Deposit as well as the Argyle Deposit. Milling of the ore will occur at Signal Gold's existing Pine Cove mill located approximately 3 km west of the deposit and connected by existing road networks.

Four VCs were selected for this assessment: Surface Water Resources, Fish and Fish Habitat, Avifauna, and Other SAR. An environmental effects analysis was conducted, which determined that most effects will be low to moderate in magnitude, short to long-term in duration, and reversible. Overall, with mitigation, offsetting, and environmental protection measures, the effects on fish and fish habitat, avifauna and other SAR are predicted to be not significant, as the residual environmental effects from the Project, including SAR, do not threaten the long-term persistence, viability or recovery of fish habitat or fish species, and avifauna species and other SAR in the RAA.

Activities during the construction, operation and eventual decommissioning of the Project will be conducted in accordance with Signal Gold's existing EPP and ERP for their on-going mining activities in the region, which will be updated to include Pit 278. Project activities will adhere to best management practices and mitigation measures presented in these plans, as well as applicable regulatory requirements.

10.0 SIGNATURE

August 25, 2022	
Date	Signal Gold

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