New Nain Airport

Detailed Project Description

Nunatsiavut Government

August 30, 2024

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Acronyms and Abbreviations

ACCDC	Atlantic Canada Conservation Data Centre
AD	Anno Domini (the Christian era in the Gregorian calendar, starting from 1 AD)
Anorthosite	Mafic Intrusive and All Extrusive Igneous Rocks
ARU	Autonomous Recording Unit
ATV	All terrain vehicle
AU	Approach UNICOM
BCE	Before current era
BESS	Battery energy storage system
BGS	Below Ground Surface
CAAQS	Canadian Ambient Air Quality Standards
CALA	Canadian Association for Laboratory Accreditation Inc.
CAR	Canadian Aviation Regulations
CCME	Canadian Council of Ministers of the Environment
CD	Census division
CE	Current era
CFIA	Canadian Food Inspection Agency
CIRNAC	Crown Indigenous Affairs and Northern Affairs Canada
CNLOPB	Canada-Newfoundland and Labrador Offshore Petroleum Board
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2-eq	Carbon dioxide equivalent
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSD	Census subdivision
CWCS	Canadian Wetland Classification System
CWF	Canadian Wildlife Federation
CWS	Canadian Wildlife Service
DEM	Digital Elevation Model
DFO	Fisheries and Oceans Canada
DND	Department of National Defence
DPD	Detailed Project Description
DTM	Digital Terrain Model
EA	Environmental Assessment
EBSA	Ecologically and Biologically Significant Area

ECCC	Environment and Climate Change Canada
ECMWF	European Centre for Medium-Range Weather Forecasts
EDI	Equity, Diversity and Inclusion
EIS	Environmental Impact Statement (Government of NL)
ELC	Ecological land classification
EPA	Environmental Protection Act
ERA5	ECMWF Reanalysis v5
ESA	Endangered Species Act
ESC	Existing stream crossing
ESDC	Employment and Social Development Canada
ETC	Extra tropical cyclone
FA	Federal authority
FAFH	Fish and Fish Habitat
FAQ	Frequently Asked Questions
FEC	Field Electrical Center
FNL	Flora of Newfoundland and Labrador
FSC	Food, social and ceremonial
GHG	Greenhouse gas
HADD	Harmful alteration, disruption or destruction (of fish habitat)
HBC	Hudson’s Bay Company
HC	Health Canada
HPCR	High-Pressure Common-Rail
HVGB	Happy Valley-Goose Bay
IA	Impact Assessment (Government of Canada)
IAA	Impact Assessment Act
IAAC	Impact Assessment Agency of Canada
IBA	Important Bird Area
IFR	Instrument Flight Rules
IMTLR	Information and Management of Time Limits Regulations
INAC	Indigenous and Northern Affairs Canada
IOCC	Iron Ore Company of Canada
IPD	Initial Project Description
ISC	Indigenous Services Canada
KP	Kilometre Point

LIA	Labrador Inuit Association
LIL	Labrador Inuit Lands
LILCA	Labrador Inuit Land Claims Agreement
LIM-AT	Low-income measure after tax
LISA	Labrador Inuit Settlement Area
LSA	Local Study Area
MCP	Medical Care Plan
MF	Mandatory Frequency
N/A	Not applicable
NCAR	National Center for Atmospheric Research
NEPA	Nunatsiavut Environmental Protection Act
NFPA	National Fire Protection Association
NG	Nunatsiavut Government
NGC	Nunatsiavut Group of Companies
NICG	Nain Inuit Community Government
NL	Newfoundland and Labrador
NLECC	Newfoundland and Labrador Environment and Climate Change
NLFFA	NL Fisheries, Forestry and Agriculture
NL Hydro	Newfoundland and Labrador Hydro
NLMAPA	NL Municipal and Provincial Affairs
NLNR	Nunatsiavut Lands and Natural Resources
NLOIAR	NL Office of Indigenous Affairs and Reconciliation
NMI	Nunatsiavut Marine Inc.
NOx	Nitrogen oxides
NRCAN	Natural Resources Canada
OLS	Obstacle Limitation Surfaces
PAHs	Polycyclic Aromatic Hydrocarbons
PAO	Provincial Archaeology Office
PG	Pasquill-Gifford
PM	Particulate matter
Project	New Nain Airport Project
PSC	Proposed stream crossing
QA/QC	Quality Assurance/Quality Control
QNIHS	Qanuippitaa? National Inuit Health Survey

RCMP	Royal Canadian Mounted Police
RCP	Representative Concentration Pathway
Registration	Registration for Environmental Review / Registration Document
RERI	Regulations Regarding Environmental Reviews of Initiatives on Labrador Inuit Lands
RPA	Regional Planning Authority
RPD	Relative Percent Difference
RQD	Rock Quality Designation
RSA	Regional Study Area
SACC	Strategic Assessment of Climate Change
SAR	Species at risk
SARA	Species at Risk Act
SOCC	Species of Conservation Concern
SOx	Sulphur oxides
SPEI	Standardized Precipitation Evapotranspiration Index
SPI	Standardized Precipitation Index
SSALR	Simplified Short Approach Lighting System with Runway Alignment Indicator Lights
STIs	Sexually Transmitted Infections
TEK	Traditional Ecological Knowledge
TC	Transport Canada
TLU	Traditional Land Use
TSP	Total suspended particulates
UAV	Unmanned aerial vehicle
UTM	Universal Transverse Mercator
VC	Valued component
WAGE	Women and Gender Equity
WGS	World Geodetic System
WC	Watercourse crossing
WCnew	New watercourse crossings with a unique identifier
WMO	World Meteorological Organization
WQG	Water Quality Guidelines

Units and Symbols

‘	Minutes
“	Seconds
°C	Degree Celsius
%	Percent
<	Less than
>	Greater than
≥	Greater than or equal to
~	Approximately
#	Number
asl	above sea level
cm	Centimetre
ft	Feet
ha	Hectare
hr	Hour
k	Thousands
khz	Kilohertz
km	Kilometre
km^2	Square kilometre
ksps	Kilo samples per second
kt	Knot
kW	Kilowatt
kWh	Kilowatt hour
L	Litre
m	Metre
M	Million
m^2	Square metre
m^3	Cubic metre
mm	Millimetre
MW	Megawatt
MWh	Megawatt hour
NM	Nautical mile
s	Second
t	Tonne

1. Introduction

This document is the Detailed Project Description (DPD) for the New Nain Airport Project (Project), as required in the Planning Phase of the impact assessment process under the *Impact Assessment Act*. The Registration for Environmental Review / Registration Document / Initial Project Description (Registration / IPD) for the Project was submitted to satisfy the requirements for initiation of an environmental assessment (EA) for the three applicable regulatory regimes: Nunatsiavut Lands and Natural Resources (NLNR), Newfoundland and Labrador Environment and Climate Change (NLECC) and Impact Assessment Agency of Canada (IAAC) on December 4, 2023. IAAC provided a high-level summary of issues on February 27, 2024, requesting additional project information required in the DPD based on comments received during IAAC's public comment period. The main objective of the DPD is to assist IAAC in determining whether a federal impact assessment is required for the Project. This document will also facilitate the project review process for the NLNR and NLECC.

Since the submission of the Registration / IPD, the preliminary engineering design has progressed up to 60% design and as a result additional information regarding the project description has been added to the DPD. The Project footprint has also been more refined due to advancement of the preliminary design.

The DPD follows the format of the Registration / IPD with new information incorporated throughout the main document as requested in the summary of issues. Direct responses to the summary of issues are provided in Appendix A1 and plain language summary as been provided in Appendix A2. Table 1.0-1 indicates sections in the DPD that correspond to items in IAAC's Guide to Preparing an IPD and DPD (Government of Canada 2020).

Table 1.0-1: Table of Concordance

	Annex II Requirement	DPD Section
Part A: Updated General Information		
1	The project's name, type or sector and proposed location.	1.2 Name of Project 1.3 Project Overview 2.1 Project Location
2	The proponent's name and contact information and the name and contact information of their primary representative for the purpose of the description of the project. When naming the project, proponents are encouraged to include a unique identifier (i.e. "Moose Jaw", "Crow's Nest", "Victory"), the main resource or sector that is the focus of the project (i.e. "gold", "hydroelectric", "all season"), and the type of project (i.e. "mine", "marine terminal", "road").	1.1 Proponent Contact Information
Part B: Planning Phase Results		
3	A summary of and the results of any engagement undertaken with any jurisdictions or other party, including a description of how the proponent intends to address the issues raised in the summary referred to in subsection 14(1) of the Act (Summary of Issues). In preparing a response to the Summary of Issues, there may be some issues that, in the view of the proponent, are outside of its care and control. In these situations, a proponent may choose to identify the party or parties that may in a position to address the issue. Proponents are encouraged to provide meaningful responses to the issues raised in the Summary of Issues. For ease of reference, the Agency requests that the response to the Summary of Issues be provided in a table with reference to other parts of the Detailed Project Description, as warranted.	3. Consultation and Engagement Appendix A1
4	A summary of and the results of any engagement undertaken with Indigenous peoples of Canada, including: • A list of the Indigenous groups that may be affected by the project, including those groups that identified themselves during the planning phase as being potentially affected	3.2.1 Indigenous Consultation and Public Engagement

	Annex II Requirement	DPD Section
	• A description of how the proponent intends to address the issues raised in the Summary of Issues, including the perspective of Indigenous groups regarding any potential adverse impact that the project may have on the rights of the Indigenous peoples of Canada recognized and affirmed by section 35 of the Constitution Act,1982 The response to the Summary of Issues should indicate, where appropriate, any changes between the Initial and Detailed Project Description that were made as part of the response. In preparing a response to the Summary of Issues, there may be some issues that, in the view of the proponent, are outside of its care and control. In these situations, a proponent may choose to identify the party or parties that may be in a position to address the issue.	5.9 Potentially Impacted Communities Appendix A1
5	Any study or plan relevant to the project, that is being or has been conducted in respect of the region where the project is to be carried out, including any regional assessment that is being or has been carried out under section 92 or 93 of the Act, or by any jurisdiction, including by or on behalf of an Indigenous governing body, if the study or plan is available to the public. Proponents are advised to contact the Agency during the preparation of the Detailed Project Description for information regarding any regional studies that may be relevant.	1.7.4.2.3 Regional Assessment
6	Any strategic assessment, relevant to the project, that is being or has been carried out under section 95 of the Act. Proponents are advised to contact the Agency during the preparation of the Detailed Project Description for information regarding any strategic assessments that may be relevant.	1.7.4.2.1 Strategic Assessment 1.7.4.2.2 Strategic Assessment of Climate Change
Part C: Project Information		
7	An updated statement of the purpose of and need for the project, including any potential benefits. The purpose of the project is what is to be achieved by carrying out the project, including any objectives the proponent has in carrying out the project. The need for the project is the opportunity that the project is intended to solve or satisfy. That is, the “need for” establishes the fundamental justification or rationale for the project. The “purpose of” and “need for” the project should be established from the perspective of the project proponent and provide the context for the consideration of alternatives to and alternative means (below).	1.4 Project Need and Purpose
8	The provisions in the schedule to the *Physical Activities Regulations* describing the project, in whole or in part. Proponents must detail how the project meets the description, threshold (e.g. provide the length of new right of way) and the criteria of any of the other provisions. Indicate whether the designated project is a component of a larger project that is not listed in the Project List.	1.6 Environmental Assessment Regulations 1.7 Other Regulatory Compliance
9	A description of all activities, infrastructure, permanent or temporary structures and physical works to be included in and associated with the construction, operation, decommissioning of the project, including their purpose, size and capacity. Include existing structures or related activities that will form part of or are required to accommodate or support the designated project.	2.2 Project Components 2.3 Project Activities 1.7 Other Regulatory Compliance

	Annex II Requirement	DPD Section
	For example, activities during site preparation or construction might include, but are not limited to, land clearing, excavating, grading, de-watering, directional drilling, dredging and disposal of dredged sediments, infilling, and installing structures. This description should make a clear distinction between any ongoing activities or existing physical works (e.g. those associated with ongoing advanced exploration) and those that form part of the designated project. Include a description of the physical activities that are incidental to the designated project. In determining such activities, the following criteria shall be taken into account: • Nature of the proposed activities and whether they are subordinate or complementary to the designated project • Whether the activity is within the care and control of the proponent • If the activity is to be undertaken by a third party, the nature of the relationship between the proponent and the third party and whether the proponent has the ability to "direct or influence" the carrying out of the activity • Whether the activity is solely for the benefit of the proponent or is available for other proponents as well • The federal and/or provincial regulatory requirements for the activity Should an impact assessment be required for the designated project, the Agency will take these criteria into consideration in determining the activities that are incidental to the designated project. Should the proposed project include transportation activities, information must be provided on where transportation will join established transportation corridors (e.g. site access road connects to municipal road)	1.4 Project Need and Purpose
10	An estimate of the maximum production capacity of the project and a description of the production processes to be used. Capacity refers to the maximum capacity based on the project's design and operating conditions, not the planned capacity of the project. This information may not be relevant to all project types (e.g. highway, railway line), and the proponent should simply indicate where this is the case. The proponent may instead provide other relevant metrics of project size (e.g. area, length, usage).	2.2 Project Components
11	The anticipated schedule for the project's construction, operation, decommissioning, and abandonment, including any expansions of the project. This information should include the schedule for the key activities of the each of those phases. The schedule should also take into account the anticipated time required to conduct the impact assessment, should one be required.	1.5 Anticipated Project Schedule
12	A description of potential: a. Alternative means of carrying out the project that the proponent is considering and that are technically and economically feasible, including through the use of best available technologies; and, b. Alternatives to the project that the proponent is considering, that are technically and economically feasible and directly related to the project The Agency recognizes that a proposed project may be in the early stages of planning when a Detailed Project Description is being prepared. Proponents may not have made final decisions and several alternatives may exist for project components (e.g. placement of infrastructure, technologies to be employed). In these situations, proponents are strongly encouraged to identify the alternatives under consideration in the Detailed Project Description. Proponents should contact the Agency for further	1.4.3. Siting of the Project 2.4 Alternative Means of Carrying out the Project

	Annex II Requirement	DPD Section
	guidance in this area prior to the submission of the Detailed Project Description. Alternative means are the various ways, including through the use of best available technologies, that would allow a designated project and its physical activities to be carried out. Alternatives to the project are functionally different ways to meet the need for the project and achieve its purpose.	
Part D: Location Information and Context Provide a description of the designated project's proposed location including:		
13a	Its proposed geographic coordinates including, for linear development projects, the proposed locations of major ancillary facilities that are integral to the project, and a description of the spatial boundaries of the proposed study corridor. Coordinates should be provided in a form suitable for use in GIS (e.g. longitude/latitude) using international standard representation. Coordinates should be appropriate for the project type, for example, for the centre of a facility, for the boundaries of a proposed mine site, or for beginning and end points and path of a linear project. For linear projects under the Canadian Energy Regulator Act, proponents should also provide the extent of the consultation corridor, if it is different than the proposed study corridor. Indicate if you will be using an existing right of way that has been previously used for a different type of linear project.	2.1 Project Location
13b	Site maps produced of an appropriate scale in order to determine the project's proposed general location and the spatial relationship of the project components. Site maps are also to be provided to the Agency as electronic geospatial data file(s) compliant with the ISO 19115 standard.	Figure 1.3-1 Figure 2.1-1
13c	The legal description of land to be used for the project, including, if the land has already been acquired, the title, deed or document and any authorization relating to a water lot. The level of detail should be appropriate for the project type.	2.1 Project Location
13d	The project's proximity to any permanent, seasonal or temporary residences and proximity to the nearest affected communities.	Figure 1.3-1 Figure 2.1-1 5.7 Land and Resource Use
13e	The project's proximity to: • land used for traditional purposes by Indigenous peoples of Canada • land in a reserve as defined in subsection 2(1) of the Indian Act • First Nation land as defined in subsection 2(1) of the First Nations Land Management Act • land that is subject to a comprehensive land claim agreement or a self-government agreement • any other land set aside for the use and benefit of Indigenous peoples of Canada	1.6.1 Nunatsiavut Government 1.7.4.1 Federal Lands 5.7 Land and Resource Use
13f	The project's proximity to any federal lands.	1.7.4.1 Federal Lands
14	A description of the physical and biological environment of the project's location based on information that is available to the public.	4. Biophysical Environment
15	A description of the health, social and economic context in the region where the project is located, based on information that is available to the public or derived from any engagement undertaken.	5. Human Environment

	Annex II Requirement	DPD Section
Part E: Federal, Provincial, Territorial, Indigenous or Municipal Involvement and Effects		
16	A description of any financial support that federal authorities are, or may be, providing to the project.	2.6 Financial Information and Benefits
17	A description of any federal land that may be used for the purpose of carrying out the project.	1.7.4.1 Federal Lands
18	A list of the permits, licenses, or other authorizations that may be required by jurisdictions that have powers, duties or functions in relation to an assessment of the project's environmental effects. *If the project requires a federal authority to:* • *exercise a power or perform a duty or function to permit the project to be carried out, in whole or in part* • *provide financial assistance to a person, to enable the project to be carried out, in whole or in part* A description of any changes to the environment or to health, social or economic conditions that may occur in Canada that are directly linked or necessarily incidental to the involvement of a federal authority that would permit or enable the project to be carried out in whole or in part. The description should identify the specific power, duty or function of, or financial assistance from, a federal authority to which the effects are linked, and which should be identified as outlined in section 4.0 of this Annex. This should include of any greenhouse gas policies, legislative or regulatory measures applicable to the project.	1.6 Environmental Assessment Regulations 1.7 Other Regulatory Compliance
Part F: Potential Effects of the Project		
19	A description of any changes that, as a result of the carrying out of the project, may be caused to the following components of the environment that are within legislative authority of Parliament a. fish and fish habitat as defined in subsection 2(1) of the *Fisheries Act;* b. aquatic species, as defined in subsection 2(1) of *the Species at Risk Act* (marine plants); and c. migratory birds, as defined in subsection 2(1) of the *Migratory Birds Convention Act, 1994.*	6.8 Fish and Fish Habitat 6.7 Wildlife and Migratory Birds
20	A description of any changes to the environment that, as a result of carrying out the project, may occur on: • federal lands • in a province other than the province in which the project is proposed to be carried out • outside of Canada	Not applicable
21	With respect to Indigenous peoples of Canada, the description of any impact – that, as a result of carrying out the project, may occur in Canada and result from any change to the environment – on: • physical and cultural heritage • the current use of lands and resources for traditional purposes • any structure, site or thing that is of historical, archaeological • paleontological or architectural significance based on information that is available to the public or derived from any engagement undertaken with Indigenous Peoples of Canada.	6.9.5 Land and Resource Use 6.9.8 Physical and Cultural Heritage
22	A description of any change that, as a result of carrying out the project, may occur in Canada to the health, social or economic conditions of Indigenous peoples of Canada, based on information that is available to the public or	6.9 Human Environment

	Annex II Requirement	DPD Section
	derived from any engagement undertaken with Indigenous peoples of Canada.	
23	An estimate of any greenhouse gas emissions associated with the project. This should be calculated as the net GHG emissions associated with the project and estimated based on the information available to proponents. For guidance on the calculation of GHG emissions see the draft Strategic Assessment of Climate Change developed by Environment and Climate Change Canada: https://www.strategicassessmentclimatechange.ca/	2.3.2.7 Greenhouse Gas Emissions
24	A description of any waste and emissions that are likely to be generated – in the air, in or on water, and in or on land - during any phase of the project and a description of the plan to manage them.	2.3.2 Operations
Part G: Summary		
25	A plain-language summary of the information contained in parts A to F in English and in French.	Submitted under separate cover

1.1 Proponent Contact Information

The Project proponent is the Nunatsiavut Government (NG), which is a self-governing Inuit region in Newfoundland and Labrador (NL). The President of Nunatsiavut is Johannes Lampe.

Proponent Contact: Colin Gilbride, P.Eng.
Director of Infrastructure and Planning
Nunatsiavut Government

Address: P.O. Box 92, Makkovik, NL A0P 1J0

Telephone: Office: (709) 923-2007
Mobile: (709) 899-0935

Email: colin.gilbride@nunatsiavut.com

Web: www.nunatsiavut.com

1.1.1 Proponent Representative

AECOM Canada Ltd. is responsible for the Project environmental studies and development of the DPD.

Contact: Elaine Lee-Ho, M.Sc., P.Biol., P.Ag.
Associate Vice President, Department Manager
IAP Ecology and Permitting, Environment, Canada

Address: 300, 48 Quarry Park Boulevard SE
Quarry Crossing
Calgary, Alberta, Canada, T2C 5P2

Telephone: Office: 403-542-7031

Email: elaine.leeho@aecom.com

1.2 Name of the Project

The Project is called the New Nain Airport.

1.3 Project Overview

The NG is planning to build a new certified airport to replace the existing airstrip at Nain. The main components of the Project, shown on Figure 1.3-1, are as follows:

- Runway: new 2,133 m (7,000 ft) long gravel airstrip, with approach lighting and surrounding fence and service road.
- Airport: includes a multi-functional terminal building, aircraft (fixed wing and rotary) parking apron, taxiways, maintenance building, freight and storage warehouse, de-icing pad, and fuelling area
- Access road, a new gravel road approximately 12 kilometres (km) in length to connect the town of Nain to the new airport.

A complete description of all Project components is provided in Section 2. The New Nain Airport will operate 24 hours a day, seven days a week, to serve the local population and will be able to serve as the emergency response centre for the region. Moreover, the Project will be able to operate in all weather conditions which will facilitate the use of larger aircraft (cargo & passengers) and improve medical evacuation reliability. The new airport will follow instrument flight regulations instead of visual flight regulations, with instrument approach at 200 ft. and 0.5 mile visibility.

NUNATSIAVUT
kavamanga government

NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION

OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

Project Component
- Main Project Infrastructure

Labrador Inuit Lands
- Labrador Inuit Settlement Area (LISA)
- Labrador Inuit Lands (LIL)
- Nain Inuit Community Government / Municipal Planning Area

Other
- Existing airstrip

Magnetic North / True North
-22°

1:50 000
0 500 1 000 m
NAD 1983 UTM Zone 20N
2024-05-08 14:10

Figure 1.3-1
Project Location and Infrastructure

AECOM

1.4 Project Need and Purpose

The Government of NL owns and operates 12 airstrips in Labrador communities, including Nain (NL Transportation and Infrastructure. n.d.). For northern Labrador Indigenous communities, the airstrips are the only year-round connection to the rest of the province. Marine access is limited as the ferry only operates in ice-free seasons, roughly from June to early December. The airstrips are critical infrastructure as they facilitate movement of food, medical supplies and other essential goods, maintain access to necessary services such as healthcare, support attraction and retention of staff in important service areas (e.g., healthcare, education, policing), help to maintain in-person contact with family and friends, provide local employment, and support economic development in remote communities.

The existing Nain airstrip, an aerodrome certified in accordance with Canadian Aviation Regulations (CAR) 302, has operational complexities and is unsuitable for upgrading. Nain is a remote coastal community surrounded by islands and mountains. The location and alignment of the present airstrip and direction of prevailing winds result in delay or cancellation of nearly half of regular flights, which delays shipments of essential goods. Due to the surrounding mountainous environment and strong winds, the airstrip is not certified for night-flying operations. This is particularly challenging in medical emergencies when evacuation is often necessary due to limited local medical services.

The Nain airstrip is located on the coast with an official elevation of 21 ft. (6 metres; m) above mean sea level (MSL; Figure 1.4-1). During storm surges, such as one that occurred as recently as December 2022, the airstrip has been partially flooded by sea water. Storm surges result in erosion that can affect load-bearing capacity of the airstrip. This presents the possibility that the airstrip could become unusable on a short- or long-term basis.

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Figure 1.1-1

Project Location
and Infrastructure

1.4.1 Existing Nain Airstrip

Being one of the few links to the rest of the world, Nain's airstrip is an essential part of community infrastructure. The most frequent and only year-round transportation method for food, goods and people at Nain is air travel. The airstrip is necessary for facilitating external medical appointments and emergency evacuations. Residents of Nain who work outside the community (e.g., at Vale's mine in Voisey's Bay) rely on the airstrip for commuting. Likewise, NG personnel and technical / professional service providers rely on air transportation to travel to Nain.

Due to design of the airstrip along with mountainous terrain and strong winds, flights are frequently cancelled at Nain. The existing Nain airstrip will continue to result in cancellations and potential safety issues when unfavourable weather conditions and crosswinds do not allow aircraft to use the airstrip.

The existing airstrip experiences frequent flight delays and cancellations, which affect delivery of essential goods such as food and medical supplies and movement of people in and out of the community. The inability to maintain flight schedules results in delayed medical treatment in larger centres (e.g., Happy Valley – Goose Bay (HVGB) and St. John's) and affects attraction and retention of workers in important sectors such as health care and education. The existing airstrip does not have sufficient length to accommodate larger aircraft.

The current 605 m (1,986 ft) airstrip is located on the seashore, at about 6 m (21 ft) above MSL. Three edges of the airstrip are exposed to the sea. At high tide, water rises to approximately 1 m (3 ft) below the airstrip surface, infiltrating it and causing erosion. The airstrip was constructed in the early 1980s at a time when no precautions were taken to protect it from the impacts of climate change. Today, climate change is a serious threat that will aggravate the already deteriorating situation, resulting in premature degradation of the airstrip and compromising the future of aerial operations at Nain.

The Nain airstrip experiences numerous flight delays and cancellations due to poor site selection and adverse weather conditions. Night flying is also unauthorized due to the location of the Nain airstrip, since surrounding mountains impede approach visibility. The airstrip is also experiencing the combined effect of the rise of the sea level and increased occurrence of storms, which is accelerating erosion of the coast on which the airstrip was built. Emergency closure of the airstrip would be catastrophic for the community, especially in winter when the ferry is not operating.

Certified aerodromes in Canada are required to have an Airport Operations Manual, which includes procedures for maintaining safe runways, reporting incidents and responding to emergencies. The Operations Manual for the Nain airstrip, which is operated by Government of NL, includes an emergency response plan for incidents such as a plane crash. The Operations Manual does not include preparation for extended airstrip closure; equipment and materials presently on site at Nain are insufficient for major repairs or rehabilitation. Addressing this issue is of critical importance for public health and safety. A more reliable airport must be constructed away from the coast on the higher ground surrounding the community and oriented to address prevailing winds.

In Nain, fixed-wing aircraft remains the best and only means of year-round transportation of people, food and medical supplies and for emergency evacuations. The existing airstrip is precarious because of sea level rise, which is expected to worsen in the context of accelerating climate change. It is imperative that a new airport be constructed as soon as possible, as an analysis has concluded that the infrastructure cannot be upgraded at the current location.

1.4.2 Transportation in Northern Labrador

Labrador's northerly communities rely on air transportation year-round. In winter, residents also use snowmobiles to travel between communities (NL Transportation and Infrastructure 2022); however, this method is becoming more unreliable over time due to shorter and inconsistent ice freeze-up. Marine transport is available in summer when ports are ice-free. The HVGB marine route is served by one ferry, which is only available for about five months of the year and, when it is operating, it takes three days to reach Nain from HVGB. The 877 km trip from Goose Bay to Nain stops in each community for loading and unloading and completes one return trip to Nain each week. Long shipping times, combined with the short marine season, result in higher costs for food, increased spoilage of produce and less availability of food and goods than in other areas of the province.

The Government of NL has initiated a pre-feasibility study for a potential extension of the Trans-Labrador Highway into Nunatsiavut (NL Transportation and Infrastructure 2022). If constructed, the road would begin in the Lake Melville area and end at Nain with access to Postville, Hopedale, Makkovik, Rigolet and Natuashish. Due to its length / travel time and winter conditions, this road would not likely be a viable option for year-round travel or emergency transport for the most northernly communities.

1.4.3 Siting of Project

As a result of ongoing issues at the existing Nain airstrip, the NG has considered the several alternatives, which include:

- Upgrading the existing airstrip at the same location
- Constructing new airport infrastructure, including an access road

These alternatives are addressed below.

1.4.3.1 Upgrading the Existing Airstrip

In 2018, OCTANT Aviation Inc. and AECOM Consultants Inc. were engaged by the NG to identify opportunities for improvements at the existing airstrip that could be implemented to enable 24-hour operation and accommodation of larger aircraft, even in marginal weather conditions. For this purpose of this analysis, ground and flight operations on the airstrip were examined. The work included a site visit and interviews with the airstrip operator and airlines on August 7 and 8, 2018. A theoretical analysis was conducted to compare current aviation standards and regulations with those at the time when the airstrip was certified. OCTANT also assessed the risks and impacts of global warming and resulting sea level rise on the current airstrip. A summary of the results of this study follows.

The Potential Operational Improvements Assessment 2018 analysis concluded that the Nain airport infrastructure has reached the end of its service life and any improvements would be limited to a rehabilitation that would temporarily extend its usability (NG 2018a). The topography of the area is the primary constraint to potential improvements. Due to the coastal and mountainous environment (and the lack of adequate equipment and lighting), operations are restricted to day flights in accordance with Visual Flight Rules. Even with upgrades to equipment and lighting for night operations, the topography would prevent expansion of the airstrip and installation of instruments conducive to flight operations in poor weather due to poor alignment with prevailing winds in the area.

The existing airstrip, at 6 m MSL, is at risk of accelerated degradation due to climate change. Sea level rise has resulted in higher tides and increased intensity of storm surges at Nain. These conditions will lead to erosion of the coastal banks of the airstrip, further limiting potential expansion and instrument installation. In addition, thawing permafrost will result in heaving of the airstrip surface structure and loss of load-bearing capacity. These factors present further barriers to potential improvements, as sea level rise is expected to increase annually due to climate change. Construction of new airport infrastructure would provide a more reliable and resilient alternative to the existing airstrip.

1.4.3.2 Constructing a New Airport

Following the 2018 report, NG engaged OCTANT and ACI to prepare a preliminary master plan, including site evaluation for new airport infrastructure at Nain. This study considered three candidate sites that lie within a radius of approximately 15 km to the south and southwest of Nain (Figure 1.4-2). Two sites were selected based on a 2008 study conducted on behalf of the Government of NL and a third was identified by OCTANT through analysis of aerial photographs and a low-altitude helicopter flight over the Nain area. This study, which was completed in 2020, included an on-site evaluation of the three potential sites by ground and air conducted in September 2019. A summary of this pre-feasibility study follows.

The three candidate sites were evaluated according to the following:

- Operational considerations, including obstacles in the Obstacle Limitation Surfaces (OLS), orientation along prevailing winds and altitude of cloud cover
- Environmental and terrain features, including available space, topography, permafrost and shore erosion
- Accessibility, including land access from Nain, proximity to Nain and ease of access from the sea
- Future considerations, including the possibility of expansion
- Constructability, including ease of access during construction, source of granular materials and ease of construction of the access road

Additionally, the preferred site would require the following:

- An area of land that extends 720 m from each end of the runway and measuring up to 21 m in width is required to accommodate the Simplified Short Approach Lighting System with Runway Alignment Indicator Lights (SSALR) required for the airport's precision approach CAT I capability.
- The new airport requires two taxiways connecting the apron to the runway. The two taxiways are intended to reduce runway occupancy time and minimize congestion at the apron by providing separate taxi routes for outbound and inbound aircraft. They will also facilitate the manoeuvring of aircraft into a parked position facing winds to assist engine start up.
- Each taxiway will measure 23 m in width to serve the Q400 (outer main gear wheel span of 9.54 m) and the proposed 309 m separation between taxiway centrelines is compliant with the minimum separation distance not less than 44 m in accordance with TP312 5th Edition Aerodrome Standards and Recommended Practices requirement for AGN IIIB aircraft (standard 3.5.1.4).

Site 1 (west of Meta Cove) is located at the following coordinates (World Geodetic System (WGS) 1984): N 56°31'9.02", W 61°40'59.10". The pre-feasibility study determined that the area available on Site 1 is too narrow to offer sufficient surface area to develop the necessary facilities and provide standard clearances. The lack of usable area would also prohibit installation of an approach lighting system and room for potential future expansion. The configuration of Site 1 does not align with the prevailing winds for aviation purposes. The altitude would also require steep grades in sections of the 2.1-km access road, which could be problematic in winter conditions. In addition, Site 1 is above critical altitude for cloud cover, making it unsuitable for landing aircraft. Lastly, several existing antennas could present obstacles and impede runway approach procedures.

Site 2 (southeast of Trouser Lake) is located at the following coordinates (WGS 1984): N 56°31'42.06", W 61°44'23.28". The pre-feasibility study determined that this site presents topographic constraints similar to Site 1: it is situated in a narrow valley that may not have enough usable area to accommodate all required facilities. The slopes of the valley would require steep grades for the 2.5-km access road, which also could be problematic in winter. Site 2 is also above critical altitude for cloud cover. Like Site 1, several existing antennas could present obstacles and impede runway approach procedures. In addition, this site is within the Protected Public Water Supply Area for Trouser Lake, which is Nain's drinking water supply.

Site 3 (west of Delta, i.e., Kauk Brook delta) is located in a relatively flat area approximately 12 km southwest of Nain, located . It is bounded by the seashore at the following coordinates (WGS 1984):

- N 56 30'4.836", W 61 50'33.144" (west end of runway)
- N 56 29'51.173", W 61 48'30.888" (east end of runway)

The pre-feasibility study determined that Site 3 was selected as the most favourable location for new airport infrastructure due to its alignment with prevailing winds. This site would permit Instrument Flight Rules (IFR) GPS approach down to 200 ft. and 0.5 mile visibility 24 hours a day. The other site options do not fit these criteria. Site 3 is located on a plateau 2 km wide and 10 km long, generally level and offering 4,000 m of usable length; it is large enough to allow development of the planned infrastructure: a 1,800 m to 2,500 m runway, a taxiway, an apron and various buildings. For Site 3, the required access road may be the most limiting factor as the 12 km route would traverse steep terrain and require extensive construction effort to establish a stable roadway for safe travel.

For safe approach and landing, airplanes require a long time to descend and stabilize and a large space without obstructions (e.g., mountains) on each side of the aircraft to protect it and enable it to manoeuvre at low altitude. Flights are often cancelled at the existing Nain airstrip, as aircraft are unable to descend safely in poor weather.

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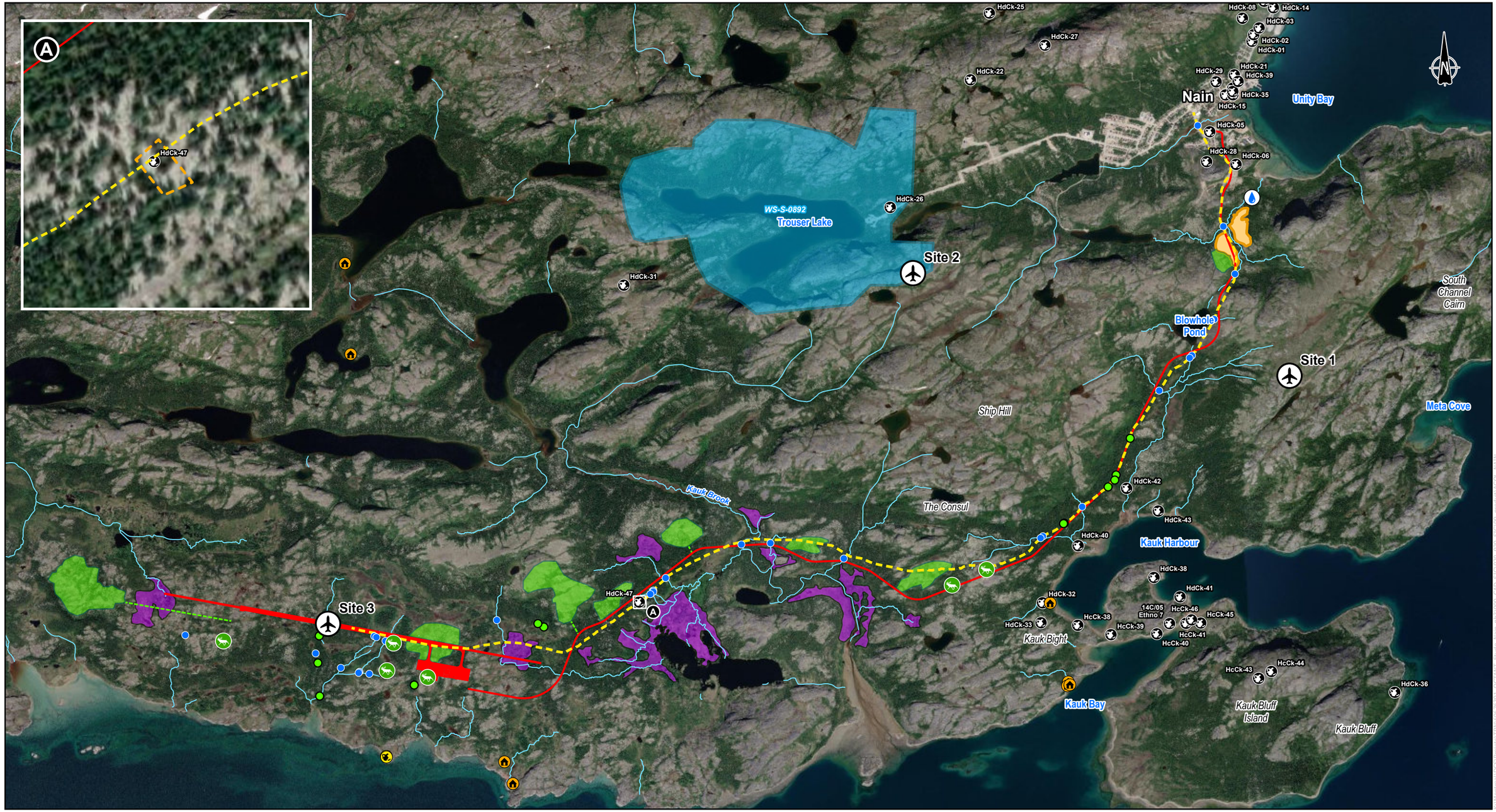

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Project Component

- Alternative airport site
- Original access road alignment
- Main Project Infrastructure
- Temporary road to rock borrow
- Rock borrow

Environmental Constraints

- Watercourse
- Watercourse crossing (desktop)
- Additionnal watercourse crossing (2023 field mapping)
- Potential permafrost
- Caribou track observation

Socio-Economic Constraints

- Cabin
- Archaeological site
- Archaeological site protection area
- Potential archaeological site
- Untreated drinking water source
- Protected Public Water Supply Area
- Quarry

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0 250 500 m

NAD 1983 UTM Zone 20N

Figure 1.4-2

Alternative Project Infrastructure and Environmental / Socio-economic Constraints

AECOM

1.5 Anticipated Project Schedule

The regulatory authorities (i.e., IAAC, NLECC and NG) have agreed to a collaboration of processes for this EA (a letter to this effect is included in Appendix A2). This agreement is expected to lead to a reduction in the overall timelines and provide better coordination for consultation, comment periods and decision-making. Without a harmonized or cooperative process, each regulatory agency would be required to adhere to schedule and timelines as outlined in their respective processes. In any case, each regulatory agency maintains their decision-making authority.

The preliminary engineering design and feasibility studies are scheduled to be completed by the end of 2024 and Project construction is expected to commence in 2027, with commissioning in 2030. The current estimated schedule for the Project is provided in Table 1.5-1. This table has been updated since submission of the Registration / IPD to include Project regulatory milestones.

Table 1.5-1: Project Milestones and Dates

Key Milestones	Completion Dates
Submission of Registration / IPD to IAAC, NG and NLECC	December 2023
Indigenous community and public comment period	December 18, 2023 and February 16, 2024
IAAC Public information sessions	January 17 and 18, 2024
NG Department of Lands & Natural Resources held community consultations on the proposed project	February 7 (virtual) and February 19, 2024 (in-person)
Issuing of Summary of Issues by IAAC	February 27, 2024
Proponent in-community open house	June 12, 2024
Submission of the Detailed Project Description	August 2024
Decision from IAAC, NG, and NLECC to determine if an EA is required	Q3 2024
Completion of feasibility studies report	December 2024
Completion of regulatory EA process (approval), if required	March 2026
Financing completed	April 2026
Development and construction phases	2025-2030
Detailed engineering, applications for certificates of authorization, obtaining certificates and construction work (in phases)	2026
Mobilization and construction	2027-2030
Commissioning and operational phase	End of 2030

1.6 Environmental Assessment Regulations

The NG, provincial and federal regulatory regimes outline requirements for the EA process, permits required for construction and operation of the Project, and conditions under which the Project will operate. Based on discussions with the three regulators and correspondence dated September 19, 2023 (Appendix A2), the regulators have undertaken a coordinated approach to the EA while maintaining legislative requirements of each jurisdiction. The following sections identify the current understanding of applicable EA legislation under the NG, provincial and federal governments. Discussions are ongoing with the relevant agencies regarding EA requirements for the Project.

1.6.1 Nunatsiavut Government

The Project is in the Labrador Inuit Settlement Area (LISA) and on Labrador Inuit Lands (LIL). Both land categories were created through the LILCA. The LILCA establishes Inuit fishing, hunting, trapping and gathering rights in the LISA and sets out specific provisions for those who live outside the LISA. The LISA extends eastward 12 NM offshore into the tidal waters of the Labrador Sea, encompassing a marine area referred to as the Zone in Schedule 2A of the LILCA.

Labrador Inuit have exclusive rights and ownership of LIL, which cover approximately 15,800 km^2. The *Labrador Inuit Lands Act* (Chapter 11) details many of the requirements for an Environmental Review on LIL. As per section 11.2.1 of LILCA, no project on LIL can commence until an Environmental Review has been completed and the required permits, licences or other authorizations under an Inuit law have been issued by the appropriate authority and the NG. The airport and runway are on a parcel of LIL (LIL-08). Along the access road two smaller parcels (LIL-03C and LIL-05C) have been avoided by the current road alignment.

Projects on LISA and / or LIL are also within the scope of the NEPA (NG 2012a). The Project triggers a detailed Environmental Review based on Section D of the RERI (“D.8: an airport or runway excluding an ice strip”) (NG 2012b). The NG’s RERI identify requirements for project registrations for summary and detailed reviews. Section 25 states the following:

> “25. A proponent must register the proponent’s initiative with the minister for purposes of both summary reviews and detailed reviews:
>
> (a) By delivering to the minister the same information as the proponent has provided to:
>
> (i) The government of Newfoundland and Labrador with respect to Environmental Assessment of the initiative pursuant to Provincial Law and
>
> (ii) The responsible authority of the Government of Canada with respect to Environmental Assessment of the initiative under federal Law; or
>
> (b) Where the initiative is not subject to federal or Provincial Law or has been exempted from Environmental Assessment under federal or Provincial law by delivering the information referred to in section 27.”

This means that a Registration prepared for the NLECC and / or IAAC could satisfy the needs of the NLNR. As this Project is on LIL, NLNR requires a Detailed Environmental Review.

1.6.2 Government of Newfoundland and Labrador

The Project is located in Labrador and a provincial Registration is required under the *Newfoundland and Labrador Environmental Protection Act* as per section 46 of the *Environmental Assessment Regulations*, which states that “An undertaking that will be engaged in the establishment and operation of permanent airports on land or water shall be registered.”

Following Registration and review of the information provided and receipt of comments by government agencies and the public, the Minister determines whether a project is released from EA (generally with conditions) and the project may move to the permitting stage. If not released, the project will be subject to either an Environmental Preview Report to address requirements for additional information or an EIS where the project is anticipated to result in significant potential adverse environmental effects, or the public has expressed a high level of concern. A project is sometimes considered unacceptable, and Cabinet may determine that the project will not proceed. More information is provided in the NLECC document *Environmental Assessment – A Guide to the Process*.

1.6.3 Government of Canada

The *Physical Activities Regulations* of the Canadian *Impact Assessment Act* (IAA) identify activities that constitute designated projects. Designated projects under these regulations include construction and operation of new

aerodromes that would meet specified thresholds or criteria. Specifically, item 46 of the *Physical Activities Regulations (*SOR/2019-285) inlcudes:

- "The construction, operation, decommissioning and abandonment of a new aerodrome with a runway length of 1,000 m or more
- "The construction, operation, decommissioning and abandonment of a new aerodrome that is capable of serving aircraft of Aircraft Group Number IIIA or higher

The *Information and Management of Time Limits Regulations* provide time limits for the IA process, establish required information to be provided by the proponent, criteria under which legislated time limits may be suspended, guidelines and plans that IAAC is to deliver as well as funding be available for designated projects.

Upon submission of an IPD to the IAAC, the proponent enters into a process that involves five phases (i.e., planning, impact statement, impact assessment, decision-making and post decision) based on the current IAA. However, based on a Supreme Court of Canada decision (October 13, 2023), the Government of Canada has confirmed its intention to amend the IAA.

1.7 Other Regulatory Compliance

The Project must be carried out in compliance with applicable NG, provincial, federal and municipal legislation. Legislative requirements include addressing potential adverse impacts and concerns raised by regulators, Indigenous Peoples and members of the public. The following section provides a preliminary list of potentially applicable requirements under acts and associated regulations. The list may not be exhaustive.

1.7.1 Nain Inuit Community Government

The Project is primarily on LIL, with a portion of the Project access road in the Municipal Planning Area governed by the Nain Inuit Community Government's (NICG) Land Use Plan and *Development Regulations*: 2016 to 2026 (NICG 2016). The Project is aligned with policy expressed in the Municipal Plan. Section 3.2 G) (b) of the Plan identifies the goal to "to pursue relocation of the airstrip to a location outside the built-up area of the community, and to encourage improvements to the airstrip, whether it be the existing facility or a new one, which would provide night time landings and improve passenger safety."

The NICG has the authority to permit development within its boundary in compliance with the Land Use Plan and *Development Regulations* but does not have authority over development on LIL unless exempted (NICG 2016). Maps in the *Development Regulations* illustrate the NICG boundary; where there is any difference between the *Development Regulations* and the legal boundary defined in the LILCA, the LILCA prevails.

Nain has designated land use zones: residential, mixed development, commercial / light industrial, industrial, recreational open space, environmental protection, rural, watershed, solid waste and transportation (NICG 2016). While the Project airport and runway are outside Nain, the portion of the access road that road runs through Nain's "Rural" zone, would be compatible with permitted or discretionary uses. It does not intersect Nain's provincially protected water supply of Trouser Lake, which is zoned as "Watershed" (Government NL 2023a; NICG 2016).

Conversations have been initiated with the NICG and NL Municipal and Provincial Affairs regarding land use planning and permitting related to the Project. Based on discussions to date, the NICG *Development Regulations* do not specify permitting "road construction". Any new roads could be constructed by a developer where the NICG would consent to construction while retaining ownership of the land on which the road is constructed. However, no new corridors are planned through Nain for re-routing of roads or installation of services and utilities for the Project.

1.7.2 Nunatsiavut Government

The *Nunatsiavut Constitution Act* is the overall legislation for implementation of the LILCA. The Project will comply with the *Nunatsiavut Constitution*, NEPA, RERI and all other applicable Inuit laws. This includes obtaining required permits for field studies on LIL (e.g., land access, harvesting, research, archaeological investigations). An application for access to and use of LIL may also be required for the Project.

Table 1.7-1 provides a list of NG Inuit laws that may be required in support of the Project. This list is preliminary, based on the Project as currently understood, and will be further refined as Project planning proceeds and / or as the NG may work cooperatively through legislation with provincial agencies or federal authorities (FAs) to achieve protection of the environment and the Rights of Inuit on LIL and in the LISA. The proponent will continue to consult with regulators to confirm applicable legislation and permitting. The NL *Environmental Assessment Regulations* are discussed in Section 1.6.2.

Table 1.7-1: Potentially Applicable Nunatsiavut Inuit Laws

Interest	Inuit Laws	Application to Project
Access to harvesting by non-Beneficiaries	Harvesting Access for Non-Beneficiaries	Presence of construction workers
Archaeology, burial sites and human remains Traditional tenures Private interests Land use plan Protected areas	Labrador Inuit Lands Act	Archaeological research and protection Easements, including rights of way for roads and utilities
Traditional tenures Private interests Labrador Inuit land titles registry Land use plan Mineral exploration and development	Labrador Inuit Land Titles Act	Ownership of private interests, including Aullâsimavet Traplines Easements Quarry materials
Environmental protection	Nunatsiavut Environmental Protection Act	Protection of water

In addition to approved legislation, the NG is developing a *Quarry Materials Act* and regulations for financial bonds for quarry closure and reclamation on LIL (Sheppard 2023). Quarrying standards are also under development for NG and these differ depending on whether a quarry is on LIL or Specified Material Lands. If a quarry is on LIL and greater than 0.5 ha, a petition of the Minister of Nunatsiavut Assembly and approval of NG Executive Council is required. If a quarry is in an IC and less than 0.5 ha, a petition is not required. NLNR will prepare a briefing note for petitions to the Nunatsiavut Assembly for quarry proposals.

Quarry developments are not subject to EA. In the absence of the Nunatsiavut Regional Land Use Plan, the *Labrador Inuit Lands Act* (Part 10: Mineral Exploration and Development) applies to quarries (Sheppard 2023). Under this Act, an application and workplan are required for review by various elected officials and staff; public consultation may be required. An approved workplan also requires a land use permit from NG for any activity (including quarrying) on LIL.

1.7.2.1 Nunatsiavut Regional Land Use Plan

The LILCA requires that a Regional Land Use Plan be developed to manage the use of land, water and resources in the LISA, including on LIL (NG 2023). A Regional Planning Authority (RPA) was organized to prepare a draft Regional Land Use Plan through consultation in each of the Inuit Communities, as well as HVGB, North West River, Mud Lake and St. John's (NG 2023). The draft Regional Land Use Plan was accepted in principle by the Nunatsiavut Executive Council but has not yet been approved by the Nunatsiavut Assembly. The draft plan, which was submitted to the Government of NL in March 2011, has not been accepted by the province and is currently unapplicable.

1.7.3 Government of Newfoundland and Labrador

Table 1.7-2 provides a list of permits, approvals and authorizations that may be required in support of the Project. This list is preliminary, based on the Project as currently understood. The NL *Quarry Materials Act* may not be applicable on LIL at the time of development but has been included as the corresponding Inuit law is in draft. The proponent is committed to regulatory compliance and best practices and will continue to consult with regulators to

confirm applicable legislation and permitting as the Project is further defined. The NL *Environmental Assessment Regulations* are discussed in Section 1.6.2.

Table 1.7-2: Potentially Applicable Provincial Legislation and Permitting

Interest	Legislation / Permit / Policy	Department
Air Quality	Approval of Diesel Generators Guidance Document	Environment and Climate Change
Building Accessibility	Buildings Accessibility Act Buildings Accessibility Regulations	Municipal and Provincial Affairs
Building Construction	Building Standards Act	Municipal and Provincial Affairs
Endangered Species	Endangered Species Act	Fisheries, Forestry and Agriculture
Environmental Protection	Environmental Protection Act, 2002 Air Pollution Control Regulations Certificate of Approval (e.g., diesel power generation) Storage and Handling of Gasoline and Associated Products Regulations, 2003 (registration is required) Used Oil and Used Glycol Control Regulations, 2018 (registration or approval is required) Waste Management Regulations	Environment and Climate Change Digital Government and Service NL
Food Safety	Food Premises Act Food Premises Regulations Food Establishment Licence	Health and Community Services Service NL
Forest Fires	Forestry Act Permit to Burn (during Forest Fire Season)	Fisheries, Forestry and Agriculture
Hazardous Materials	Dangerous Goods Transportation Act Dangerous Goods Transportation Regulations	Digital Government and Service NL
Public Safety	Public Safety Act Boiler, Pressure Vessel and Compressed Gas Regulations Fire and Life Safety and Building Accessibility Compliance	Digital Government and Service NL
Quarries	Quarry Materials Act Quarry Materials Regulations	Industry, Energy and Technology
Water Resources	Water Resources Act, 2002 Environmental Control Water and Sewage Regulations, 2003 Certificate of Approval for Sewage Disposal System Permit for Alterations to a Body of Water (e.g., culverts and bridges) Permit for Constructing a Non-Domestic Well (includes groundwater monitoring) Permit to Construct Drinking Water and Wastewater Infrastructure Section 48 Permit (for work in or within 15 m of a water body) Water Use Licence (use of water for any non-domestic purpose with an existing, new or planned water use from any water source)	Environment and Climate Change Digital Government and Service NL
Wildlife	Wildlife Act Wildlife Regulations	Fisheries, Forestry and Agriculture
Workplace Health and Safety	Occupational Health and Safety Act Occupational Health and Safety Regulations	Digital Government and Service NL

Conversations have been initiated by the proponent with the NG, NLNR and NL Municipal and Provincial Affairs regarding interests (e.g., land use planning, lands, quarries) related to the Project. Based on these discussions and a review of the legislation, the NL *Lands Act, 1991* does not apply to the Project, as these matters are under the jurisdiction of the *Labrador Inuit Lands Act*. The NL *Historic Resources Act* is not applicable on LIL, though it is in the LISA.

1.7.4 Government of Canada

Designated projects undergoing assessment under the IAA may also be subject to other federal regulatory processes and legislation. Authorizations under these processes cannot be issued until a project is released from the requirements of the IAA (IAAC 2023). Each designated project is required to have a permitting plan that outlines permits, licences and authorizations that may be required. During the IA Planning Phase, the IAAC develops the permitting plan in cooperation with federal regulators, including lifecycle regulators and other jurisdictions (if applicable) based on the information provided by the proponent. The permitting plan may be revised during the IA process, based on new information from the proponent, regulators or other jurisdictions. Various federal legislation has been identified at this preliminary stage in Table 1.7-3.

Table 1.7-3: Potentially Applicable Federal Legislation and Guidelines

Interest	Associated Regulation / Guideline	Agency
Aviation	Aeronautics Act Canadian Aviation Regulations	Government of Canada
Aviation and Airports	Canada Transportation Act TP 312 5th Edition Aerodrome Standard and Recommended Practices Last Edition 2020-01-15 Aeronautical Assessment for Obstacle Notice and Assessment Air Transportation Regulations Land Use in the Vicinity of Aerodromes Airport Zoning Regulations Application for Airport Certificate Advisory Circulars	Transport Canada
Fish and Fish Habitat	Fisheries Act Fisheries Act Authorization or Letter of Advice	Fisheries and Oceans Canada
Marine Navigation	Navigable Waters Act Minor Works Order	Transport Canada
Hazardous Materials	Transportation of Dangerous Goods Act Transportation of Dangerous Goods Regulations	Transport Canada
Runway Infrastructure	Manual of pavement structural design	Canadian Airfield Pavement Technical Group
Migratory Birds	Migratory Birds Convention Act (Damage or Danger Permit)	Canadian Wildlife Service
Species at Risk	Species at Risk Act	Environment and Climate Change Canada

While primary and secondary research and analyses along with consultation related to the IA may also be relevant to other federal regulatory processes, federal authorization processes may require more detailed and specific information (e.g., additional details on project design or activities, such as detailed drawings for river crossings or detailed habitat offset plans).

1.7.4.1 Federal Lands

In Canada, federal lands include national parks, Indian reserves, and military bases. The Project is on LIL and LISA, both established by the LILCA. The other nearest federal lands are First Nation communities, national parks / reserves and the military installation at HVGB (Table 1.7-4).

Table 1.7-4: Nearest Federal Lands

Federal Lands	Distance
Natuashish Indian Reserve 2	72 km
Torngat Mountains National Park	240 km
Akami−Uapishkᵘ−KakKasuak−Mealy Mountains National Park Reserve	346 km
Sheshatshiu Indian Reserve 3	348 km
Kawawachikamach Village	360 km
Matimekosh Indian Reserve 3 / Lac John Indian Reserve	365 km
Canadian Forces Base 5 Wing Goose Bay	367 km

1.7.4.2 Strategic and Regional Assessments

1.7.4.2.1 Strategic Assessment

No strategic assessments are currently underway in Nunatsiavut. The most recent study was the Labrador Shelf Offshore Area Strategic Environmental Assessment Update completed for the Canada-Newfoundland and Labrador Offshore Petroleum Board (CNLOPB) in December 2021 (CNLOPB 2021). That study provided current information on the existing environment to identify matters that should be considered in issuing exploration licences in the area. The process was co-chaired by the NG and CNLOPB Environmental Protection Department.

1.7.4.2.2 Strategic Assessment of Climate Change

The Environment and Climate Change Canada (ECCC) Strategic Assessment of Climate Change (SACC), under Section 95 of the IAA, requires the IA to consider the extent to which the effects of a designated project contribute to or hinder Canada's ability to meet its climate change commitments, such as the Paris Agreement, and objectives, such as the 2030 target and net-zero emissions by 2050 (ECCC 2020). An initial Project GHG estimate in accordance with the SACC guidelines is described in Section 6.1.

1.7.4.2.3 Regional Assessment

No Regional Assessment relevant to the Project is being or has been carried out under the IAA.

2. Project Description

The NG is planning to build the Project to replace the existing airstrip that is unreliable due to poor design and adverse conditions and is also under stress from the effects of climate change. The Project will operate 24 hours a day, 7 days a week, to serve the local population during all seasons and act as the centre for emergency response for the region. Project-specific details are provided described in the following sections.

2.1 Project Location

Nain, the northernmost Inuit Community in NL, lies on the west side of Unity Bay about 50 km from the Atlantic Ocean and 370 km north of HVGB. The Project is on LIL with a portion of the access road on Nain Inuit Community Lands. The airport is approximately 12 km from Nain and sits on a plateau, approximately 850 m from the coast at an elevation of roughly 60 m asl (Figure 1.3-1). Coordinates for the Project are shown in Table 2.1-1, and detailed Project components are presented on Figure 2.1-1.

Table 2.1-1: Project Coordinates

Project Component	UTM 20 NAD83		NAD83	
	Easting	Northing	Longitude	Latitude
Runway (west point)	571248.729301	6262480.1516	-61.842546	56.501343
Runway (east point)	573347.003503	6262093.51125	-61.808576	56.497548
Airport centre point	572344.116169	6262277.19189	-61.824811	56.499353
Access road starting point	580157.1391	6267013.6044	-61.696469	56.54063
Access road end point	573302.476691	6261736.26664	-61.809399	56.494346
Temporary construction access end point	572718.3991	6261053.7314	-61.819074	56.488306

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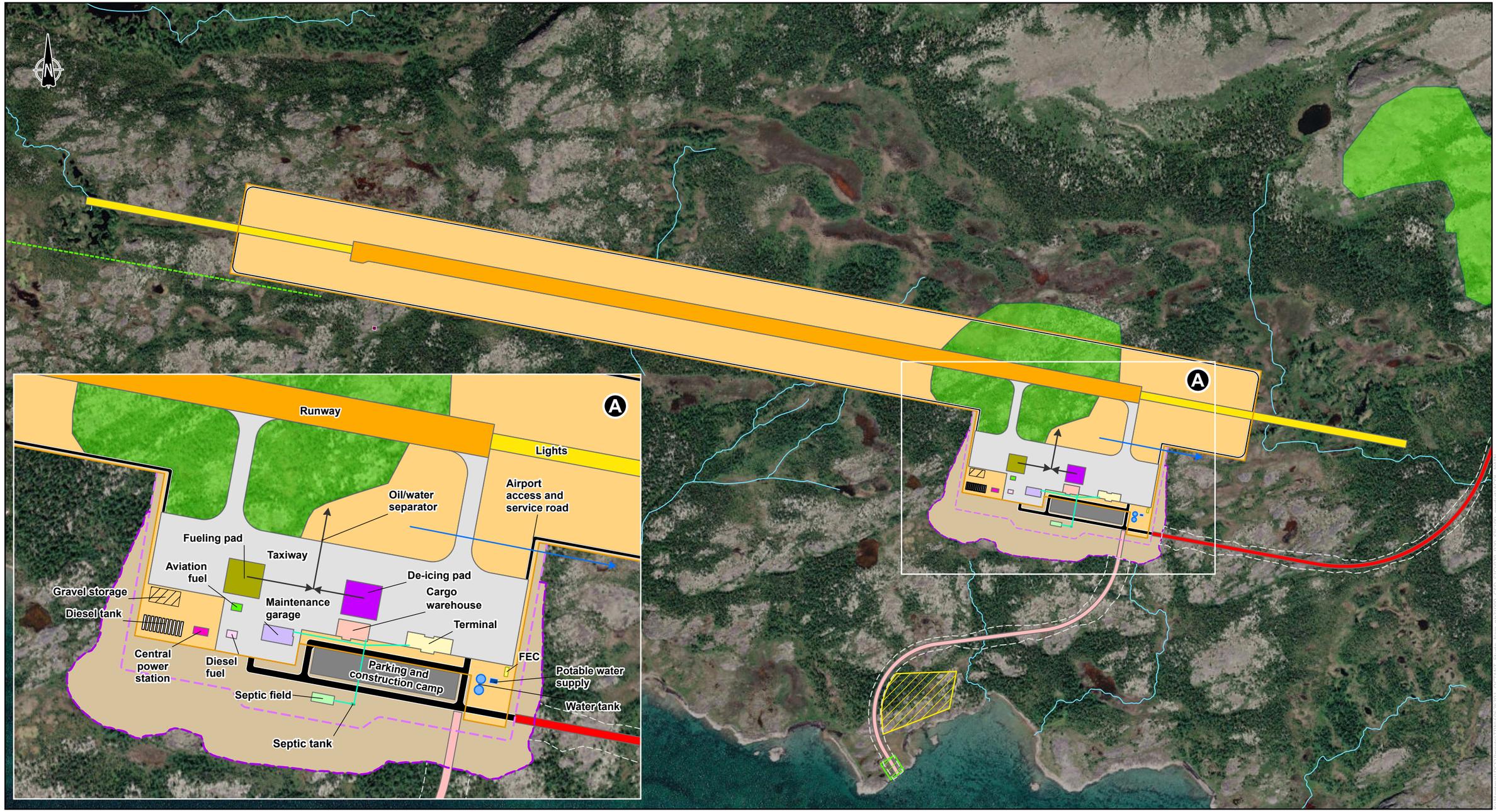

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Project Component

- Access road
- Temporary access road
- Construction limit
- Temporary road to rock borrow
- Rock borrow
- Potential construction laydown and equipment storage area
- Proposed barge landing site
- Fence
- Sewer pipe
- Top of embankment
- Bottom of embankment
- Culvert drainage
- Fuelling and de-icing pad drainage system
- Fencing and vegetation control
- Parking area and embankment
- Airport access and service road
- Aviation fuel
- Cargo warehouse
- Central power station
- De-icing pad
- Diesel fuel
- Diesel tank
- FEC
- Fueling pad
- Gravel storage
- Lights
- Maintenance garage
- Oil/water separator
- Parking and construction camp
- Potable water supply
- Runway
- Septic field
- Septic tank
- Taxiway
- Terminal
- Water tank
- Weather station

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NAD 1983 UTM Zone 20N

Figure 2.2-1
Airstrip and Airport Apron

AECOM

2.2 Project Components

The main components of the Project are described in the subsections below. While the Project facility may evolve over time, no future expansion is envisioned at this time. Spatial areas associated with the various Project components are provided in Table 2.2-1, and environmental and socio-economic constraints that informed footprint development were shown in Figure 1.4-2. A detailed view of the runway and airport is provided on Figure 2.2-1. 60% engineering design diagrams as developed under the R8: Preliminary Engineering Design feasibility study (Aivek Stantec 2024), for described Project components have also been included in Appendix B.

Table 2.2-1: Project Component Areas

Project component	Area (ha)
Runway (including approach lighting and fenced area)	63.3
Airport (including taxiways, apron, terminal and support buildings, parking area, and associated infrastructure)	15.9
Access road (including construction limit)	36.8
Rock borrow areas	79.1
Construction staging area and temporary access	5.6
Total	**200.7**

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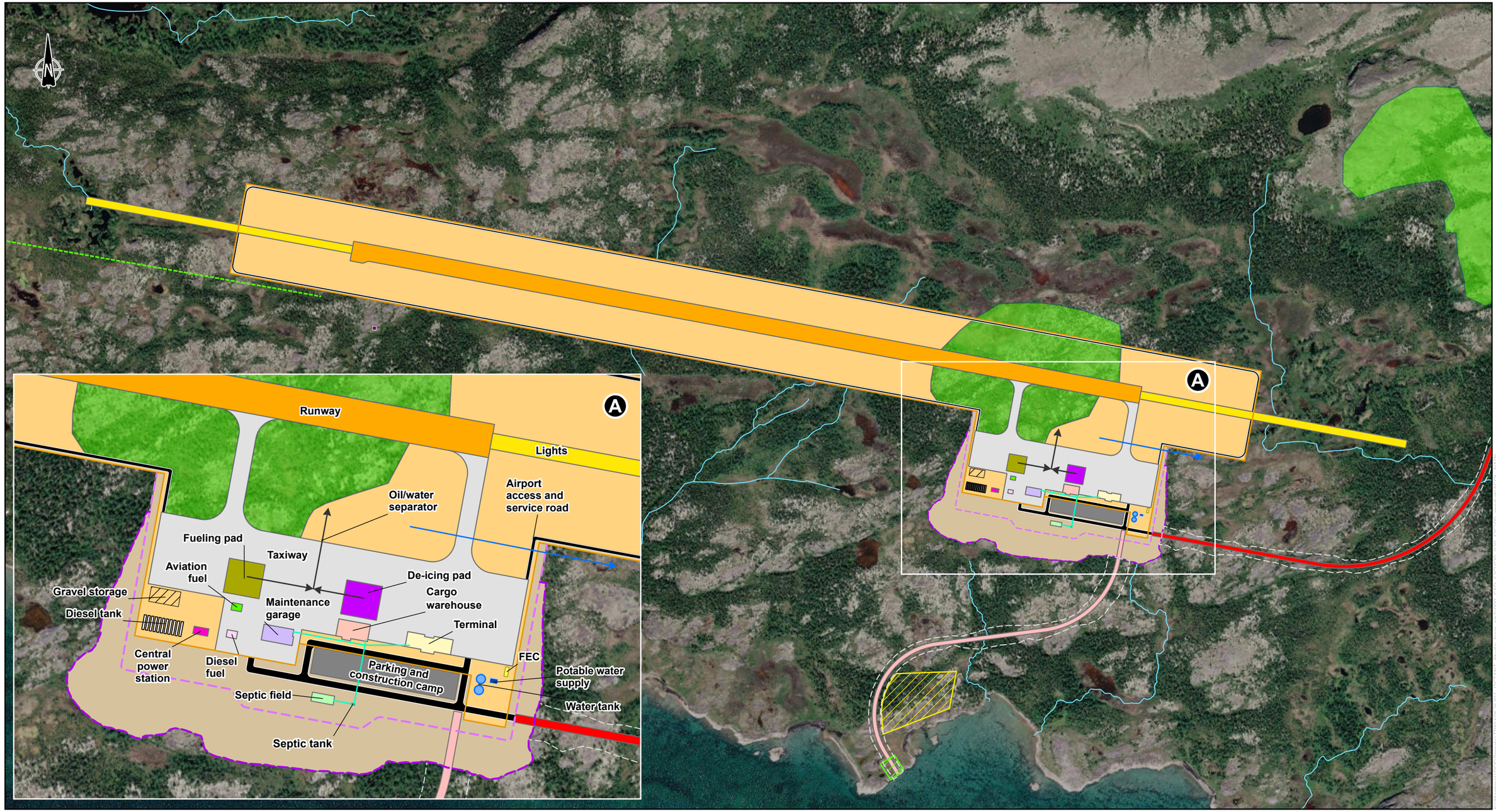
NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION



OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

Project Component

- Access road
- Temporary access road
- Construction limit
- Temporary road to rock borrow
- Rock borrow
- Potential construction laydown and equipment storage area
- Proposed barge landing site
- Fence
- Sewer pipe
- Top of embankment
- Bottom of embankment
- Culvert drainage
- Fuelling and de-icing pad drainage system
- Fencing and vegetation control
- Parking area and embankment
- Airport access and service road
- Aviation fuel
- Cargo warehouse
- Central power station
- De-icing pad
- Diesel fuel
- Diesel tank
- FEC
- Fueling pad
- Gravel storage
- Lights
- Maintenance garage
- Oil/water separator
- Parking and construction camp
- Potable water supply
- Runway
- Septic field
- Septic tank
- Taxiway
- Terminal
- Water tank
- Weather station

1:10 000
0 100 200 m
NAD 1983 UTM Zone 20N

Figure 2.2-1
Airstrip and Airport Apron

AECOM

2.2.1 Runway

The runway will measure approximately 2,133 m/7,000 ft in length to serve the Boeing 737-800. The runway orientation has been set at 120°/300° (magnetic) to optimize approaches and take-offs into prevailing winds. A runway usability assessment using the FAA wind analysis tool shows that this runway orientation achieves a runway usability of 95% for aircraft capable of operating in crosswinds of 20 knots as recommended by the International Civil Aviation Organization. A usability of 93.71% can be expected for aircraft capable of operating in crosswinds of 13 knots, including the DHC-6 Twin Otter and Beech King Air 200.

The runway will be 45 m wide, with 75 m safety buffer areas on either side. The final grade of the runway will be approximately 57 to 65 m asl.

Due to the topography of the selected runway area (low-lying wetlands with areas of exposed bedrock), the runway subgrade will be developed by blasting rock for fill to create a level surface. This option is preferable to using existing overburden soils as the subgrade, due to the following:

- Supply of materials: Overburden soils are not present in sufficient quality nor quantity to supply the material needed.
- Seasonal conditions: The overburden soils would need a substantial amount of moisture conditioning which would be impractical given the conditions in a region with an already short construction season. Blast rock is less susceptible to wet or cold placement.
- Pavement thickness: A thinner gravel surface can be used when compared to constructing the subgrade from the local silty sand and sandy silt materials encountered in the runway area.
- Frost Susceptibility: The site overburden soils are frost susceptible. The additional blast rock layer will reduce the impact from frost movements and help mitigate frost movement.

In total, the current grade plan involves approximately 2 million cubic metres (m^3) of material to cut and 3 million m^3 of fill for the runway. The majority of fill will be required in the southern-middle portion of the runway, with a maximum fill depth of 12 m.

The runway will be constructed primarily using local rock material at a variety of sizes and depths. The first layer will be a 680 mm thick granular subbase, followed by a 350 mm think granular base. The finished gravel surface will be 150 mm thick.

The runway will be graded with 2.5% slope on each side of the centreline to allow for runoff drainage. Ditches will be situated a minimum of 75 m from the runway centerline on either side of the runway. The ditches will be a minimum of 3 m wide to account for rock spalls and snow accumulation during the winter months. Reinforced concrete culverts will be installed to maintain drainage north to south across the runway and manage rainwater runoff and melting snow.

The runway surface will be gravel treated with EK35®, a durable non-toxic synthetic fluid enhanced with a natural rosin binder that stabilizes gravel runways and improves operational and safety conditions in cold remote regions (Midwest 2023). It has been proven at over 75 gravel runways in locations including northern Alaska. EK35® has been independently tested for performance (lab and field), longevity and environmental impact by agencies including the United States Army Corps of Engineers, US Environmental Protection Agency and the Bureau de normalisation du Québec. Its use will help to limit dust from take-off and landings, improve water quality in runoff due to limited sedimentation, reduce use of fossil fuels as it lowers resistance and improves efficiency during take-off and landings and lowers maintenance costs as the life of the surface is about 10 years.

A fence will be erected around the runway for safety and security reasons. The airport also requires a perimeter road to access all parts of the airfield and airport property for maintenance activities, such as servicing of visual aids (lighting and signage), while minimizing use of the runway. The perimeter road will be 4.5 m wide and single-laned. The area within the perimeter fencing that is disturbed during constructed will be revegetated.

Approach lighting will be installed 720 m from each end of the runway; these lighting areas will be up to 21 m wide. The lighting will accommodate the Simplified Short Approach Lighting System with Runway Alignment Indicator Lights (SSALR) required for the airport's precision approach CAT I capability. Each SAALR lighting crossbar will be fenced and be made accessible for maintenance.

2.2.2 Airport

The main airport area includes the supporting infrastructure for the airport. Due to the steep topography at the proposed Project area, an embankment will be created to create a level surface for infrastructure. This embankment will use approximately 1 million m^3 of fill sourced from rock borrow areas (Section 2.2.5). The embankment slope will be 1:3, and will be vegetated for erosion control. Details on the various components and infrastructure included in the airport is provided in the subsections below.

2.2.2.1 Apron and Taxiways

The apron is the area designated for aircraft parking, passenger and cargo loading, and servicing. The apron has been sized to allow for short-term parking for two Boeing 737-800 aircraft and long-term parking for three AGN II aircraft. Space is allocated to accommodate taxiing within the apron without conflicting with parked aircraft. The apron area includes a fuelling pad and de-icing pad (Sections 2.2.2.7 and 2.2.2.8).

Two helicopter parking stands are proposed at the west end of the apron. Each stand is sized for the AgustaWestland AW101/CH-149 Cormorant. In accordance with Heliport Standard 325,25(1)(h), the diameter of each stand measures 27.4 m (based on 1.2 times the 22.8 m/74.8 ft overall length of the CH-149 Cormorant). Separation between the two stands measures 4.5 m. The separation from each helicopter parking stand to fixed wing aircraft parking stands maintains a minimum 32.4 m as specified in Heliport Standard 325.25(4)(e), which is 1.5 times the 22.8 m/74.8 ft overall length of the AgustaWestland AW101/CH-149 Cormorant.

Helicopters are expected to make use of the runway for take-off and landing and taxiways for taxiing between the runway and helicopter parking stands. Helicopters equipped to operate in instrument meteorological conditions are expected to benefit from use of the runway, itself equipped with the required visual aids for operation during instrument meteorological conditions.

The new airport requires two taxiways connecting the apron to the runway. The two taxiways are intended to reduce runway occupancy time and minimize congestion at the apron by providing separate taxi routes for outbound and inbound aircraft. They will also facilitate the manoeuvring of aircraft into a parked position facing winds to assist engine start up.

Each taxiway will measure 23 m in width with 5 m safety buffer areas on either side. The proposed 309 m separation between taxiway centrelines is compliant with the minimum separation distance not less than 44 m in accordance with TP312 requirement for AGN IIIB aircraft (Standard 3.5.1.4).

Apron floodlighting shall be provided for the apron and configured to provide minimum glare to pilots of aircraft in flight and on the ground, and to aerodrome and apron controllers. The floodlight poles shall not penetrate the OLS. Red obstruction lights may be required if the pole heights are close to the OLS.

Construction of the apron and taxiways will involve the same rock materials (layers and particle size) as the runway described above. The apron and taxiway surface will also be stabilized with EK35®.Taxiways will be graded at a maximum of 1.5% slope towards the area in between the apron, taxiways and runway. This area will serve as a runoff collection area, with a low point culvert drain that directs water east away from the airport (Figure 2.2-1).

2.2.2.2 Terminal Building

The terminal building is the main space to welcome arriving and departing passengers, and the community members that accompany them to and from the airport. This building contains the passenger waiting area, check-in and boarding counter, baggage handling system, restaurant, cafeteria or vending machines area, offices for airport management, flight preparation and pilot rest room, multi-service room / offices, restrooms, mechanical, electrical and communication equipment room. The waiting room will be designed to accommodate approximately 96

passengers. The terminal will be located on the east-facing side of the apron, which is closer to the overall airport entrance and separates passenger related activities from fuel facilities, airport maintenance and cargo activities. The terminal building will be approximately 1,344 m^2.

2.2.2.3 Parking Area

The landside parking lot will be located adjacent to the air terminal building and will have a 200 mm gravel surface layered on a 500 mm granular subbase. Since the parking lot has a gravel surface and no parking lines will be applied, standard parking stalls and accessibility parking stalls will need to be identified using signage and/or curb stops to delineate each stall. The parking lot will be large enough to accommodate the minimum number of required stalls and will allow for over-sized parking stalls. During construction, this parking area will be the location for a temporary construction camp.

2.2.2.4 Cargo Warehouse

A two-storey,1,250 m^2 cargo warehouse will be used for the short-term storage and handling of freight goods and supplies transported through the airport. This building will be located west of the passenger terminal with direct access to the apron and runway. The warehouse will include the following main areas:

- General warehouse (270 m^2): dedicated to freight handling activities and will be directly adjacent to the freight storage area for easy handling of goods
- Freight storage (180 m^2): where goods are temporarily stored before being shipped or distributed. It is a space equipped with a standardized racking system for pallets
- Repair/maintenance garage (90 m^2): for the repair, adjustment and maintenance of warehouse machinery and vehicles.
- Vehicle parking garage (90 m^2): dedicated to parking warehouse's vehicles or machinery, keeping them safe and protected from the elements when not in use

The storage building will also include a small reception desk for customers, mechanical and electrical rooms, janitorial rooms, server room, offices, break rooms, meeting room, locker room, support spaces, and restrooms. A 60 m^2 frozen goods storage room (20^{o}C) and 70 m^2 cooler room (0 to -4^{o}C) will be included in the warehouse for storing food and medical supplies bound for Nain.

2.2.2.5 Maintenance Equipment Garage

The 1,008 m^2 maintenance equipment garage will be primarily used for maintenance and storage of machinery, vehicles, equipment and materials used for the general maintenance of the airport, such as clearing snow and spreading gravel and sand on the runway, apron, parking lots and pedestrian accesses.

A total of seven bays will be included in the garage:

- Two double service bays for heavy machinery, e.g. snow plow, grader, and loaders, and one double bay for smaller vehicles and equipment like vans, pick-ups, and all-terrain vehicles
- One distinct single bay will store sand for spreading during winter

The bays will be double-height to offer sufficient clearance for the most restrictive heavy machinery. The garage service bays will be accompanied by a repair workshop, as well as an adjacent tool storage room. The repair workshop comprises a workbench, and is equipped with various machines and tools, along with the required outlets (e.g. welding, compressed air, etc.). The perimeter of open garage space will be used to store miscellaneous equipment, e.g. winch, cantilever racks, service sink, barrels, aircraft de-icing product reservoirs, brushes, spreader, etc.

The maintenance garage will include an office space for employees to perform their administrative tasks, a washroom equipped with a shower, an employee room for breaks and meals, and storage space for various equipment, tools, parts, and supplies.

2.2.2.6 Field Electrical Center (FEC) building

The airfield electrical lighting power equipment and a backup power system will be stored in the FEC building located in the eastern portion of the apron. The FEC will have a monitoring station where electricians can review status of equipment and historical data related to the airfield lighting system. The backup power system will consist of a single 175 kW diesel-fired generator to support emergency airfield lighting system use. The generator will be operated by oil and a fuel tank located underneath the generator.

2.2.2.7 Aviation fuel station

An aircraft refueling pad will be located near the maintenance garage; it will be constructed with a concrete surface to prevent potential infiltration of fuel to the ground. An HDPE membrane will also be installed between the pad and subgrade, to further protect against potential contaminant infiltration. The fueling pad will be connected to a drainage runoff collection system; this system will consist of a PVC pipe with a concrete bedding that will convey spilled fuel to an oil/water separator. Waste oil/fuel collected from the separator will be transported to Nain for disposal, and clean surface water runoff from the fueling pad will be directed to the stormwater collection area (Section 2.2.6.5). The dispensing system for aviation fuel will be adjacent to the fueling pad; it will be equipped with a 30,000 L aboveground storage tank. This tank will be double-walled for secondary containment.

2.2.2.8 De-icing pad

A designated area will be established to de-ice aircraft in winter. This area will be a concrete pad designed to contain de-icing glycol fluid and water; it will have a central drain and sump to store waste glycol during de-icing be connected to the same drainage runoff collection system noted above. Waste glycol collected from the sump will be pumped out and transported to Nain for disposal. During summer, precipitation that accumulates in the pad and sump will be released to the stormwater collection area (Section 2.2.6.5).

2.2.3 Access Road

The access road joining the airport to Nain will be gravel and measure approximately 12 km long. The proposed alignment of the access road is presented in Figure 2.1-1. The width of the road surface be approximately 12 m wide. A total width of 36 m along the road alignment will potentially be impacted to account for the right-of-way and ditches on each side of the road surface. The access road width will accommodate larger maintenance and operations equipment such as single unit trucks and snowplows, as well as local passenger vehicles (half ton trucks, snowmobiles, ATVs) and passenger busses. Typical road cross sections are provided on Figure 2.2-2.

Pull off areas will be included to allow people to safely park and leave their vehicles a corridor for hunting, fishing, trapping, and accessing cabins. The typical pull off area will be 10 m in width and 50 m in length, with 50 m long tapers to transition the pull off areas to the main corridor.

The access road follows several design guidelines and manuals, including the Transportation Association of Canada’s Geometric Design Guide for Canadian Roads, 2019 Edition. The access road will be a low speed, low volume road that will be used all year round. The maximum speed limit will be 70 km/hr. The access road is not expected to be lit, unless required for safety or regulatory reasons. The access road will also be treated with EK35® to reduce dust and gravel loss.

In all areas where possible, with the exception of Mount Sophie, a maximum gradient not exceeding 9% has been achieved. Lengths of vertical curves were rounded up to the nearest 5 m increment and the minimum horizontal curve radius was increased by 20% to 230 m. The objective was to only utilize the maximum and minimum criteria when necessary. This improves driver comfort and overall safety of the access road.

The access road has been designed to avoid LIL, existing quarries, steep slopes, wetlands, potential permafrost, an archaeological feature, a second crossing of Kauk Brook, and the risk of deep snow accumulations and avalanches in winter (Figure 2.1-1; Figure 1.4-2). The design objective for the sensitive potential permafrost and other poor quality soil locations, such as in wetlands, was to avoid these locations to the extent practical by shifting the horizontal alignment. In the event that avoidance is not possible, measures will be taken during construction to minimize the permafrost impact on the access road embankment. These measures include using geosynthetic

materials such as geogrids and geotextiles, removing permafrost and replacing the material with rock fill, and/or using rock fill in the embankment construction to assist in the bridging/arching effect to reduce localized settlement.

2.2.3.1 Avalanche and Rock Slide Protection

Development of the access road will require cutting in to steep slopes of exposed bedrock to create the desired surface grade. This approach will create rock faces adjacent to the access road, which can create avalanche and rock slide hazards. The access road route has been realigned though the Mount Sophie pass to Blowhole pond to avoid an area of known avalanche risk (Figure 2.2-3). Protective measures will also be installed such as energy barriers and rockfall netting; specific design and placement of protective measures will be determined later in Project planning.

2.2.3.2 Watercourse Crossings

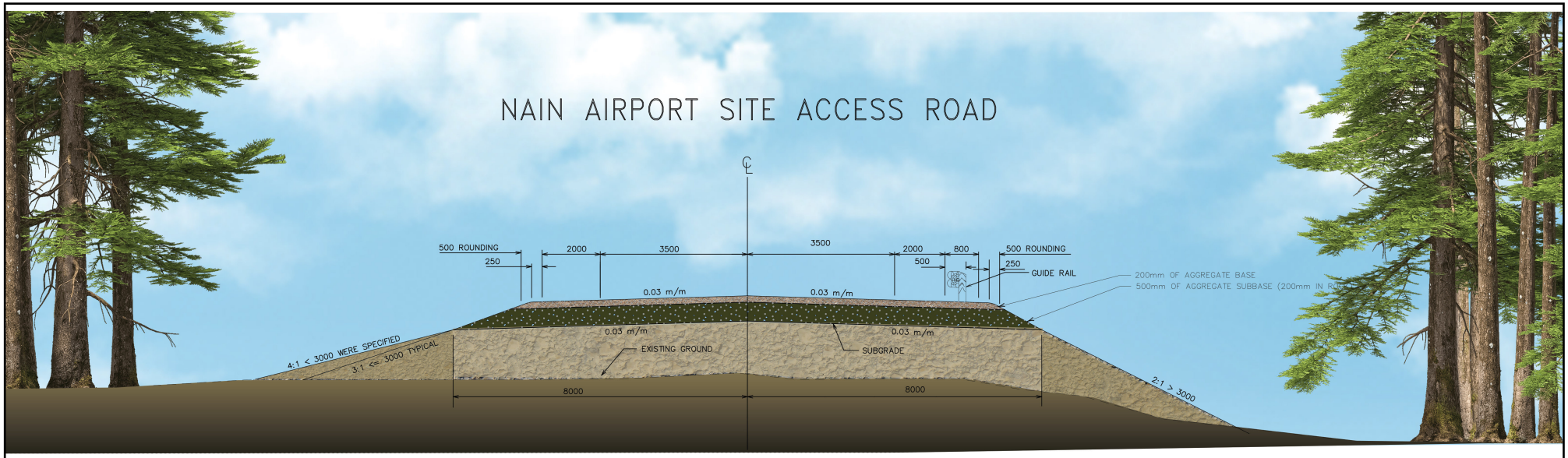
Over the length of the road alignment, there are 22 watercourse crossings identified through previous studies. A modular bridge and several culverts were used at crossings. Some watercourses contain only minor drainage from small catchment areas, which in some cases, have been diverted using ditches to larger watercourses to minimize the number of culverts needed. The largest watercourse, Kauk Brook, will have a modular bridge spanning its entire width.

A conceptual bridge diagram is provided on Figure 2.2-4. A modular bridge is more practical and economically feasible for this site since it can be easily shipped, assembled and launched on site, using traditional equipment (i.e., no large cranes). The permanent modular bridge structure will be founded on driven steel pipe piles, which are preferred over the conventional steel H-piles due to the soil characteristics and the resultant excessive down-drag forces.

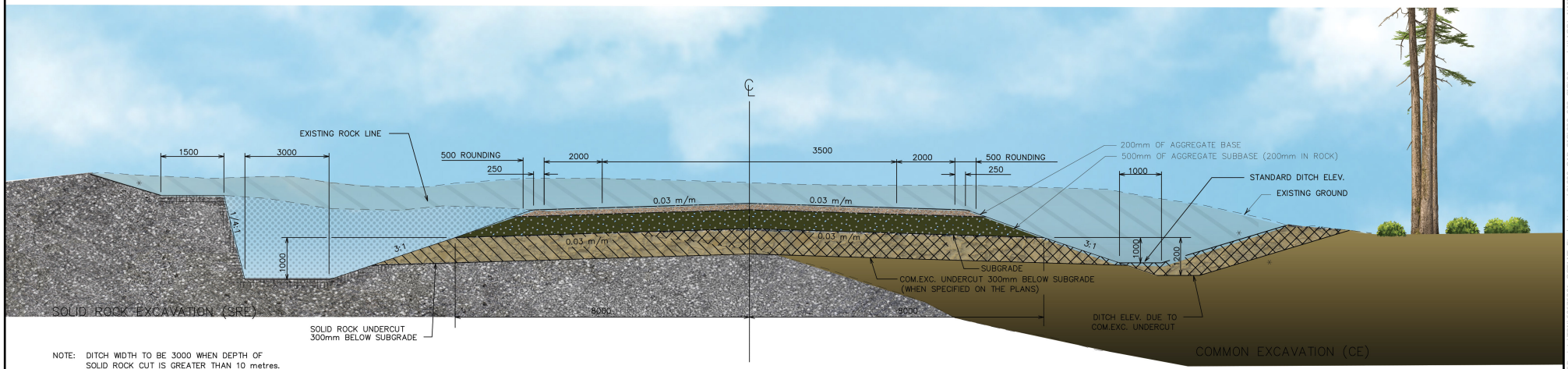
The modular bridge will span the entire watercourse; it will be a two-lane bi-directional configuration with 3.5 m wide lanes and 1.0 m shoulders. The modular bridge will be approximately 36 m long and set at an elevation that provides the minimum freeboard distance from the Q100 water surface elevation to the underside of the bridge, per the Canadian Bridge Code (CSA S6-19).

The remaining 21 watercourse crossings were combined into 13 culverts. Culverts will be developed using corrugated aluminized pipe, and designed in accordance with the Fisheries and Oceans Canada (DFO) Best Management Practices for the Protection of Freshwater Fish Habitat in Newfoundland and Labrador (DFO 2022a). Refer to section 6.5 for details on culvert sizing at each crossing.

In-stream boulders and fish weirs inside the culvert will be considered to provide resting areas for fish as they navigate upstream. Energy dissipation pools will also be used upstream of culverts to reduce water velocity. The preferred instream boulder configuration for inlet pools consists of three staggered boulders, ranging in size from 750 mm (for culverts with a diameter less than 1,500 mm) to 1,000 mm (for culverts with a diameter greater than 1,500 mm).



FILL SECTION



CUT SECTION

NOTE: * SLOPE TYPICALLY 3:1

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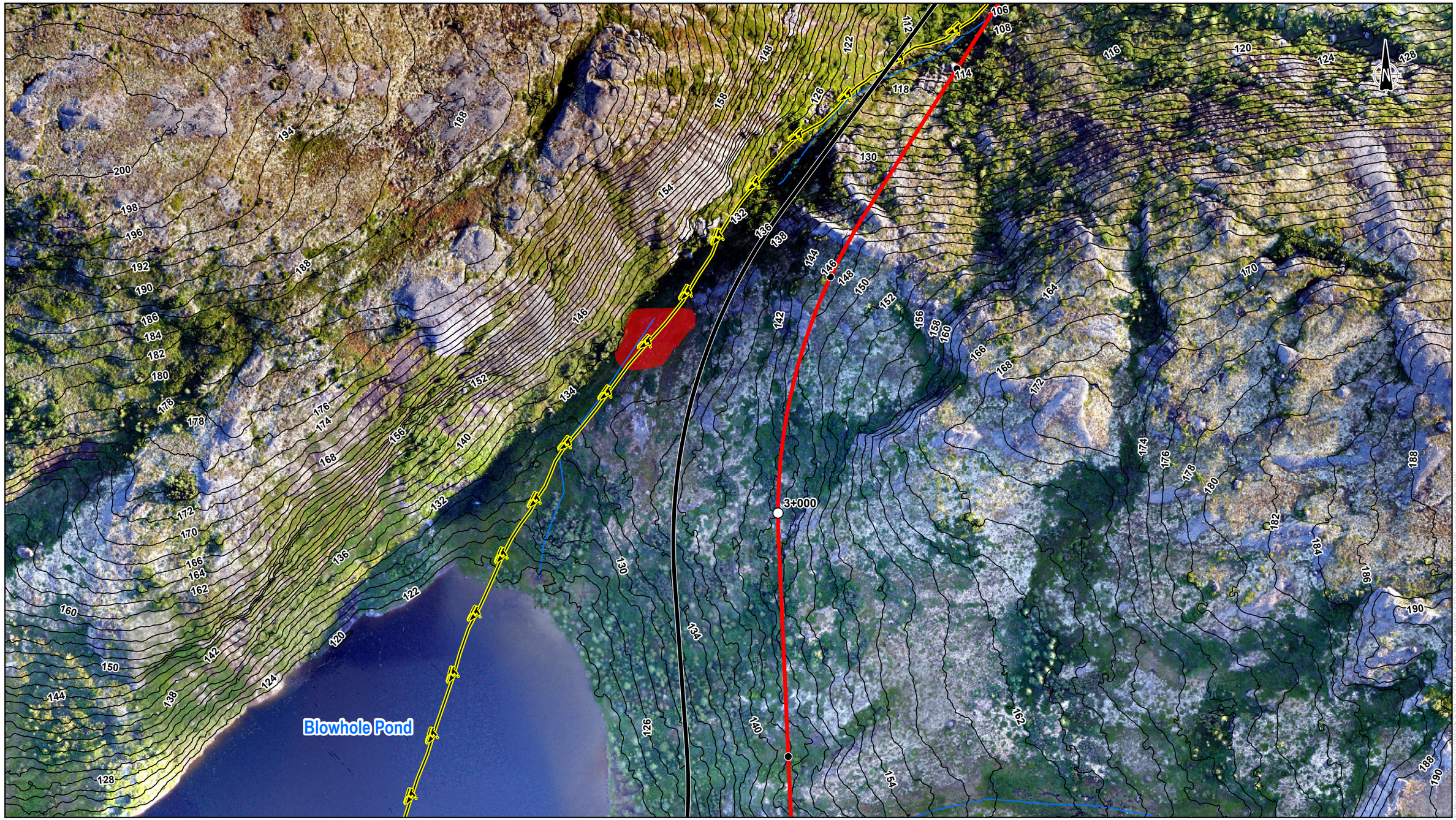

Project Component
- 2023 Access road alignment
- *2024 Access road alignment*
- Kilometer point
- Access road

Land use
- Snowmobile trail

Hydrography
- Watercourse

Other
- Potential avalanche area

1:1 500

0 20 40 m

NAD 1983 UTM Zone 20N

2024-05-06 15:56

Figure 2.2-3

Access Road Route Through Blowhole Pass

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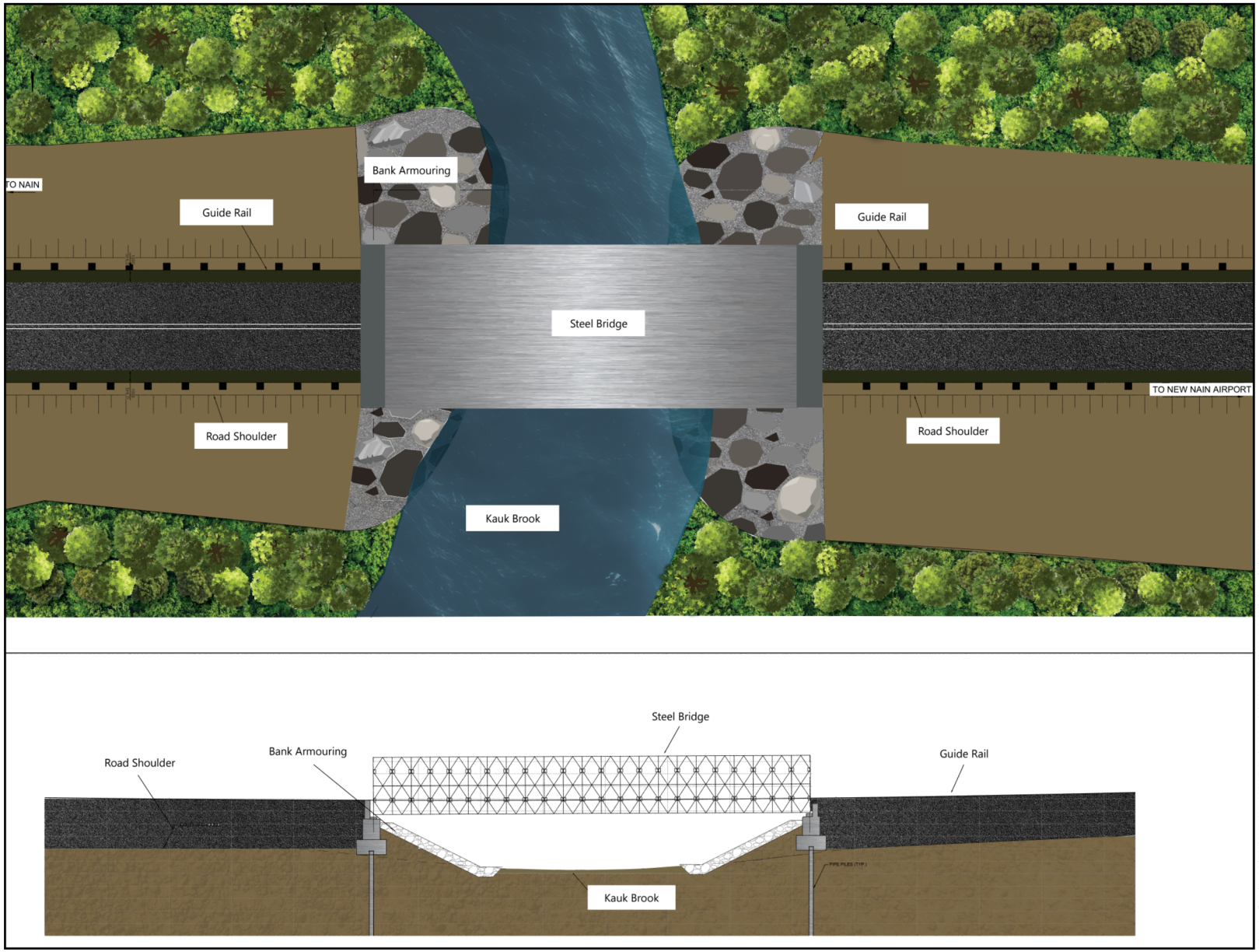

Figure 2.2-4
Kauk Brook Crossing Diagram

2.2.4 Construction Landing Area, Staging Area, and Temporary Access Road

All construction equipment and materials will be transported via cargo ship to Nain for storage in advance of construction. A closed quarry area within Nain is the area identified for storage.

Since there is no existing access to the proposed airport site, the initial stages of construction will require equipment and supplies to be ferried from Nain and offloaded using a roll-on/roll-off barge vessel. A coastal landing site will be set up to the south of the airport to facilitate the offload of large equipment where it will be transported to the airport site using a temporary access road. Minor preparatory work on shore (e.g., tree and brush clearing, removal of large rocks, placement of gravel) may be required to establish this area (Figure 2.2-5). A temporary access road will be constructed from the barge landing area to the airport area for equipment transportation. The temporary access road design criteria will be similar to the airport access road in terms of geometrics and cross section. The road will be cleared of vegetation, and the temporary access road alignment follows the topography avoiding steep grades, wetlands, and significant cuts and fills where possible cut and fill construction techniques may be used to create an appropriate grade for vehicle travel.

Following establishment of the coastal landing area and initial development of the temporary access road, a construction staging area will be established between the landing area and airport. This area will be cleared of vegetation and graded as needed to allow for equipment and materials (e.g., construction machinery, fuel, aggregate) storage. A temporary construction camp will also be set up at this location; this camp will be moved the airport site parking area once it is cleared and embankment built up. The construction laydown/storage area will maintain a minimum 30 m buffer from the coastline and any watercourses in the area.

The construction landing area, staging area, and temporary access road will be discontinued and reclaimed at the end of the construction phase.

NUNATSIAVUT
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NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION

Project Component

- Temporary access road
- Construction limit
- Potential construction laydown and equipment storage area
- Proposed barge landing site

1:2 000

0 20 40 m

NAD 1983 UTM Zone 20N

Figure 2.2-5

Construction Landing and Staging Area

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2.2.5 Rock Borrow Areas

The Nain region includes rough and mountainous topography, which requires extensive cut and fill material to develop stable subgrades for the runway and airport, and to a lesser extent, the access road. Material is also needed for backfill material and surface pavement. Multiple rock outcrops close to the Project infrastructure have been identified as good candidates to provide fill material. These borrow areas have been delineated on Figure 2.2-1 as the maximum expected extent where rock borrow material will be collected; however, the actual areas required will be subject to further investigation.

Temporary access roads will be developed to the rock borrow areas in the same manner as described in Section 2.2.4.

2.2.6 Associated Infrastructure

The airport will also have associated infrastructure to provide complete and secure services to airport users including but not limited to:

- Automated weather station with approach Unicom AU with Mandatory Frequency Zone
- Communication services
- Water supply, treatment, and storage
- Sewage collection and wastewater treatment
- Drainage and stormwater management
- Power generation
- Diesel fuel storage area
- Emergency equipment

2.2.6.1 Weather Station

The airport will not be controlled and will not be equipped with a Flight Service Station. The airport, however, will still be required to provide weather information essential to instrument procedures proposed at the airport. The airport's requirement for Approach UNICOM (AU) will provide IFR pilots with essential approach and landing information including altimeter settings and wind speed and direction. The use and siting of automated weather observations systems supporting AU will be in accordance with the Manual of Surface Weather Observations Standards. Accordingly, a site located at the midpoint of the runway outside of the runway strip and airport service road is proposed.

2.2.6.2 Communication Services

Telecommunications and electronic systems at the airport will support air-ground communications including the establishment of a Mandatory Frequency zone required at the airport. Transport Canada designates a mandatory frequency at selected uncontrolled airports. Aircraft operating on the ground or in the air within a Mandatory Frequency (MF) zone must be equipped with a functioning radio capable of maintaining two-way communication.

Telecom Rogers is the prime cell company in the Nain region. For telecoms at the airport a services agreement with Rogers will be considered, including erecting a network tower near the airport.

2.2.6.3 Water Supply, Treatment and Storage

The airport will require water to support airport buildings and fire suppression. Potable water will be needed for domestic use (kitchens, washrooms, water fountains) at the terminal, cargo warehouse, and maintenance garage. The average daily potable water demand is estimated to be 0.05 L/s and the peak hour potable water demand is estimated to be 0.22 L/s. These estimates are based on a total capacity of 96 passengers. Non-potable water would also be required in the event of an airport fire. The estimated 2-hour flow rate for non-potable water for fire suppression is estimated to be 7,275 L/min.

2.2.6.3.1 Potable Water Source Analysis

Multiple potential options have been evaluated to provide the Project potable water supply. Options considered include drilling wells to withdraw groundwater and surface water. The Registration / IPD indicated groundwater was the preferred source for Project water supply.

As described in Section 4.3, a preliminary groundwater investigation was undertaken in 2022 to understand the viability of groundwater resources at the airport location. This program yielded marginal results from the investigative wells. These results, in combination with the lack of successful groundwater wells completed historically in the region, have provided low confidence in the potential for groundwater as a potable water supply for the Project.

As described in Section 6.5, an evaluation of watercourses and surface water catchment areas was completed for identifying potential sources of surface water for potable water use at the airport. Options were assessed based on the following criteria:

- Quantity of water year-round, including during low flow periods
- Proximity to the airport (within 3 km) to reduce conveyance costs
- Preserving ecological flow
- Available locations with sufficient depth for an intake

Based on this criteria, Kauk Brook and the unnamed lake to the east of the airport are the main potential sources being considered, with Kauk Brook being the preferred option. Amongst watercourses within 3 km of the airport, Kauk Brook would be best able to sustain 12 months of water withdrawal. Kauk Brook is also advantageous since an intake could be placed at the proposed bridge location, facilitating construction and maintenance access. Additionally, a pipeline for transporting water to the airport would follow the proposed access road corridor, removing the need for new disturbance. Lastly, based on community feedback from the June 12 open house, the other proposed water source option is a shallow lake similar to wetlands, and does not have the characteristics needed for a consistent water supply. Further investigation will occur before Project development to confirm the proposed water supply, including bathymetric surveys to confirm lake depths.

2.2.6.3.2 Infrastructure

Water supply infrastructure will consist of an intake in the proposed surface water source, a raw water pump station and building, and a raw water transmission main from the water source to the airport site. A below-ground electrical line will be installed following the access road from the airport to the pumping station. A balancing raw water storage tank will also be required at the airport site, in addition to the treated water storage tanks noted below. Intake locations and water pipelines for all three potential options are shown on Figure 2.2-6. Because an option has yet to be selected and associated infrastructure are subject to further evaluation and design, they are only presented for visual purposes and are not included in the Project component areas listed in Table 2.2-1.

The water treatment building will house the pumps and water tanks for testing and adding treatment chemicals (sodium hypochlorite solution) for disinfection. The chemical tank containing the sodium hypochlorite will be within secondary containment within the building.

Two 510 m^3 storage tanks are proposed to hold water so that a large volume may be accessed during a fire event. The tanks will be constructed on concrete slabs and will be equipped with an active mixer system to mix the chlorinated water and to prevent freezing. Tanks will be initially filled via the potable water source, and their water level will be monitored and maintained through throughout Project operation. Collected stormwater from the airport may be considered as a non-potable water supply to maintain fire suppression tanks. This water will be diverted in a sustainable manner in accordance with applicable *Water Resources Act* requirements.

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Project Component
- Access road
- Temporary access road
- Airport footprint
- Runway

Hydrography
- Watershed
- Watercourse

Potential Water Supply Infrastructure

Water intake	*Pipeline*
Option 1	Option 1
Option 2	Option 2
Option 3	Option 3

1:10 000
0 100 200 m
NAD 1983 UTM Zone 20N

Figure 2.2-6
Potential Water Supply Infrastructure Options

AECOM

2.2.6.4 Sewage Collection and Wastewater Treatment

Domestic wastewater (sewage) will be generated from airport buildings during Project operation. The estimated average sewage flow rate is 3.13 L/min peak hour sewage flow rate is 13.1 L/min, based on a daily average of 70 passengers and 20 airport staff.

All domestic wastewater from the terminal, maintenance building, and warehouse will flow via gravity through PVC pipe to a septic tank. This tank will be concrete and approximately 7 m^3 in volume, which is 1.5 times the estimated average daily flow rate. Waste will be stored in the tank for a time to allow particles to settle out of the wastewater, and then it will be pumped into the septic field via dosing chamber and pump station. The septic tank will be buried a sufficient depth to prevent freezing.

A dosing chamber pump station is required because the total trench length to the septic field is greater than 150 m. The dosing chamber includes an above-ground pump station enclosure and an adjacent wet well chamber. The pumps are proposed to be above finished grade for ease of access and maintenance. The dosing chamber is sized to pump 70% of the total volume of the pipes in the septic field per cycle. The dosing chamber wet well will be a round concrete chamber with an internal diameter of 2.1 m.

The septic field will consist of six absorption trenches which allow the wastewater to infiltrate down into the surrounding soil. Each absorption trench consists of a 100 mm diameter perforated drainage pipe within a layer of crushed stone, which sits above a 1 m deep layer of soil. The absorption trenches will each be approximately 30 m long and will be covered with backfill.

2.2.6.5 Drainage and Stormwater Management

Stormwater management infrastructure will be required to effectively manage runoff during Project operations. The runway will be graded with 2.5% slope on each side of the centreline to allow for runoff drainage. Ditches will be situated a minimum of 75 m from the runway centerline on either side of the runway. The ditches will be 3 m wide to account for rock spalls and snow accumulation during the winter months. Reinforced concrete culverts will be installed to maintain drainage north to south across the runway and manage rainwater runoff and melting snow.

Taxiways will be graded at 1.5% slope towards the area in between the apron, taxiways and runway. This area will serve as a runoff collection area, with a low point culvert drain that directs water east away from the airport. Areas with the potential for chemical contamination, i.e., the fuelling pad and de-icing pad, have drains to direct clean stormwater to the runoff collection area. The pads will be equipped with mechanisms to contain spilled fuel and de-icing glycol for proper disposal; these chemicals will not be released to the environment.

Emergency roof drainage on Project buildings will be achieved using combination roof drain/overflow drains. These fixtures utilize a primary roof drain installed at roof level, plus a secondary emergency drain with an inlet 100 mm above the roof level. This will prevent water from accumulating upon a blockage of the primary drain. No emergency overflow scuppers will be provided for any of the buildings. Drains will also be installed around all foundations to facilitate water flow away from buildings.

Drainage ditches will be also installed alongside the access road, as well as culverts and a bridge to allow the natural watercourses to pass beneath the road.

2.2.6.6 Power Generation and Fuel Storage

The airport will be powered by two 1,125 kW diesel-fired generators, with a third, 1,125 kW generator on standby. These generators will be housed in a single building in the southwest portion of the apron. One generator will be adequately sized to supply enough power to maintain the airport's ancillary systems (HVAC, cooling, security) while the other generator will come online to meet increasing demand as operations require the load.

The generator building will be equipped with an exhaust stack approximately 6 to 10 m high to appropriately diffuse the exhaust fumes and avoid negative impacts on the airport operations and users.

The diesel energy source planned for the generators will be a modern efficient energy system with high-pressure common-rail fuel injection (Access Intelligence 2023). This system maximizes vaporization of the fuel and, thus, combustion rate. Generator engine specifications will be determined during future engineering design.

To provide fuel for the power generators, diesel storage tanks will be set up in the southwest portion of the apron. The tanks will be double-walled for secondary containment, and raised on skids. The capacity of the storage area will be approximately 1,000,000 L to fuel eight months of operation. The diesel tanks will be connected to power generation building through aboveground piping. This piping will also be connected to a diesel fuel dispensing system on the apron for maintenance equipment.

2.2.6.6.1 Alternative Power Supply

An alternative hybrid renewable-diesel option as a power supply option was evaluated based on the following criteria (CIMA+ 2023):

- Technical (power generation, active operation time, efficiency, energy system reliability and security, storability, location, safety and training)
- Environmental (air pollution, noise pollution, land usage, water pollution, gas emissions)
- Economic (return on investment, payback period, total annualized cost, taxes and tariffs, economic lifetime)
- Social (job creation, governmental support, social awareness, social trust, fairness)

Various hybrid solutions were explored to assess the effectiveness of the electrical supply, as well as necessary capital investment and resulting operational costs and greenhouse gas (GHG) generation. Budgetary estimates, equipment performance, fuel usage and fuel prices were determined based on past projects, experiences, current market prices and Project location.

The hybrid renewable-diesel option involves a combination of solar, wind, battery storage and diesel energy. Since the capital investment and fuel usage depend on the installed capacities of each energy source, multiple scenarios were simulated using typical renewable generation data. For diesel capacity, two 500 kW generators were considered. The generators would be able to supply the entire load in case of failure of renewable sources. Various installed capacities for solar, wind, and battery energy storage system were simulated. The costs provided for renewable sources include procurement, shipping and installation of the equipment.

The study concluded that alternative sources include many benefits related to operational savings and greenhouse gas reduction; however, the capital costs associated with developing these sources are substantial. Therefore, the current Project design has not incorporated alternative electricity sources. Consideration of alternative sources will continue to be evaluated as Project design progresses and into the operations phase.

2.2.6.7 Emergency Equipment

Measures for airport and public safety include:

- Airport fire and rescue compliance
- Zoning and land development complying with OLS regulations
- Airport fuel facilities and associated security and environment protection systems (separate refuelling areas for jet fuel and diesel)
- Fencing, access controls and security cameras
- Airfield signage
- Applicable Standards for fire protection at the airport include:
    - National Building Code of Canada
    - National Fire Code of Canada
    - United States National Fire Protection Association (NFPA) 10 Standard for Portable Fire Extinguishers

- NFPA 13 Standard for the Installation of Sprinkler Systems
- NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection
- NFPA 22 Standard for Water Tanks for Private Fire Protection

The purpose of the fire protection systems is to protect the people and equipment located in the facilities, as well as the facilities themselves. A code review completed by the architectural design team has determined that the current arrangement (size, height, and construction type) of all three airport buildings do not require sprinkler systems. Consideration for a future aircraft hangar will include a site water supply analysis.

Multipurpose portable hand-held fire extinguishers will be mounted in wall-recessed cabinets in accordance with NFPA 10 and wherever required for specific applications. CO_2 fire extinguishers will be wall-mounted in electrical equipment spaces.

2.3 Project Activities

Expected Project activities include the following: construction, operations and decommissioning. Construction is the initial phase of Project development, including site preparation activities, up until the start of operations and maintenance of the airport and access road. Construction is anticipated to take approximately 3 years to complete, with limited construction activity during the winter, since sea ice will prevent use of a marine barge to transport workers and equipment.

Operations represent day-to-day running of the airport, following construction and commissioning.

These activities are described further in the subsections below, and additional details will be established with engineering design progression and construction procurement. Operation of the Project is expected to be greater than 50 years. Decommissioning of the airport will occur when the airport reaches its end of life. The airport is planned to operate indefinitely; however, so there is no schedule for decommissioning.

2.3.1 Construction

2.3.1.1 General Activities

2.3.1.1.1 Site Preparation and Clearing

General site preparation will involve brush clearing / tree trimming using chainsaws. This activity is planned for winter, outside of sensitivity periods for wildlife and migratory birds. Clearing crews will access Project areas via snowmobile from Nain. Salvageable wood will be decked and left on site until it can be transported to the community for use. Brush, slash, branches and other non-salvageable materials will be mulched and burnt on-site if required, with the approval of the provincial Department of Fisheries, Forestry and Agriculture during forest fire season. This material may also be disposed of in defined waste disposal areas or at the bottom of deep embankment fills.

Grubbing of roots and stumps will be completed using a bulldozer and/or excavator in future construction phases when this equipment has been transported to site.

Organic debris disposal areas will be located where they are less visible from the access road but within a reasonable distance to minimize transportation costs. These areas shall be protected against erosion and sediment transport during construction using sediment control fence and other techniques and measures. The finished organic waste disposal area will be stabilized using mulch and hydroseeded to promote vegetation.

Open water wetland areas may require dewatering using pumps. Collected water will be released downstream of construction activities in a controlled manner that avoids erosion and sedimentation. During the construction phase, a construction drainage drawing will be developed by the contractor prior to work.

2.3.1.1.2 Civil Works

For infrastructure development, extensive rock blasting will be required to prepare subgrade for all Project components. Rock blasting will be completed by qualified contractor in accordance with the federal Explosives Act. Rock material from cut areas and borrow areas will be used as fill material, granular subbase, and granular base layers. This material will be crushed to the appropriate particle size, piled using bulldozers and excavators, and compacted to meet engineering specifications.

As described in Section 2.2, most backfill materials for the Project will come from the site with optimization of cut / fill balance. In some cases, a small amount of specialized fill may need to be imported by ship.

When encountered, topsoil material will be stripped and salvaged for reclamation of temporary disturbances.

A stormwater management plan will be developed for the airport site and the access road to account for the overall Project drainage. Temporary measures to control sedimentation and erosion during civil works (e.g., sediment barriers, sedimentation ponds) will be used to prevent release of sediment-laden water to watercourses and wetlands. During civil works temporary berms and/or drainage ditches may be established to manage stormwater disrupting construction and prevent erosion and sedimentation. Snow storage areas will be designated with appropriate drainage.

2.3.1.1.3 Waste Management

Domestic waste generated during construction will be stored in bear safe containers and hauled to Nain where it will be shipped out for disposal. All waste materials from construction will be evacuated, since the NICG disposal site has no capacity.

Hazardous materials and waste will be transported, stored and handled in accordance with regulatory requirements and shipped out for disposal at an approved facility.

Domestic sewage from construction areas (e.g., Porta Potties) will be periodically collected and transported to the Nain sewage treatment system.

2.3.1.2 Initial Phase and Staging Area

All construction equipment and materials will be transported to Nain (Unity Bay) for temporary storage in advance of construction. This process will include a large, initial cargo ship delivery, and potentially 3 or 4 barge loads from the St. Lawrence / Goose Bay area to Nain for three construction seasons when the Nain harbour is ice-free.

A closed quarry area within Nain is the area identified for storage. Most equipment and materials will be kept in shipping containers, with more sensitive materials (e.g., explosives) will be stored in prefabricated, heated buildings. The transportation and the management of explosives will follow provincial and federal regulations. These storage buildings will be locked and all storage areas will be fenced and kept under 24-hour surveillance for security and safety purposes.

Site preparation (tree and brush clearing) will take place in winter using local crews from Nain accessing the site via snowmobile. Following this activity, equipment, machinery, worker camp, fuel reservoir and other supplies (food, etc.) will be transported to the airport site via roll-on/roll-off barge vessel (Figure 2.3-1). Construction personnel will be transported to and from site using smaller boats. The coastal landing site will be set up to the south of the airport to facilitate the offload of large equipment where it will be transported to the airport site using a temporary access road. Minor preparatory work on shore (e.g., tree and brush clearing, removal of large rocks, placement of gravel) may be required to establish this area.

The roll-on/roll-off barge will be equipped with a hydraulic ramp that can be lowered onto the beach to permit vehicles, materials and equipment to be offloaded. The barge would access the beach at high tide so that there is sufficient water to keep the barge from bottoming out. As the tide goes out, the barge bottoms out at the shoreline, allowing the ramp to be lowered and contents offloaded. At high tide, the barge will float to allow the barge to leave the area. Figure 2.2-5 shows the locations of the landing and staging area.

No structures will be developed in the water for docking of marine vessels; this approach will limit disturbance to the shoreline and tidal area. No equipment or marine vessel will be fueled on or near the water. Fuel containers will be

offloaded along with the construction equipment and stored at the staging area (30 m from coast and watercourses). Equipment fuelling will only be conducted in designated areas away from watercourses and water bodies.

The current estimation of total barge trips for the construction phase of the Project is 244 (Table 2.3-1). Barge use will be discontinued following development of the Project access road to connect with Nain.

Table 2.3-1 Construction Barge Trip Frequency

Timeframe	Activity	Frequency	Total Barge Trips
Initial mobilization (1 month)	Fuel & Supplies Deliveries	Every Day	30
	Bulk Emulsion	Every 2nd Day	15
	Passenger Transport	N/A	0
General construction with no access (8 months)	Fuel & Supplies Deliveries	Every 2nd Day	120
	Bulk Emulsion	Once a Week	35
	Passenger Transport	N/A	0
General construction with tote road access (5 months)	Fuel & Supplies Deliveries	Once a Week	22
	Bulk Emulsion	Once a Week	22

The temporary access road will be constructed in the same manner as the main road (Section 2.3.1.4). The construction laydown and camp area will be established along the temporary access road (Section 2.2.4). This area will be used until a camp and storage areas are set up at the airport site. While construction activities commence at the main airport site, a separate crew will begin construction of the access road from the east (starting at the quarry area south of Nain). The intent is to have the two separate construction activities meet at the Kauk Brook crossing location and complete the access road with the bridge placement.

Following completion of the Project access road, any remaining required equipment for airport and runway civil works or building construction can be transported to site. The temporary access road will be removed and reclaimed when overall Project construction is complete. Demobilization of equipment will be similar to the initial stages of construction, with use of a cargo ship and 3 to 4 barge trips from Nain.

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Figure 2.3-1
Example Barge

2.3.1.3 Construction Camp

A temporary camp will be set up to accommodate construction workers. Initially, the camp will be placed within the construction staging area identified on Figure 2.2-1. As construction progresses, the camp will be moved to the future parking area at the airport, when that site is cleared and the embankment built up. The camp will consist of mobile trailers with bedrooms, restrooms, and a kitchen/cafeteria. Power and heat will be supplied by gas-fired generators, and a small modular wastewater treatment unit will be used to handle domestic effluent. Until the access road is fully built, workers and supplies (including potable water) will be transported to and from the construction camp via smaller marine barge vessel (and helicopter if needed).

2.3.1.4 Access Road

As described in Section 2.3.1.2, the access road will be developed from two directions; one starting at the eastern end (near Nain), and one from the airport area. Right-of-way preparation and civil works will be conducted as described in Section 2.3.1.1. Appendix B provides a series of typical cross sections demonstrating access road design in various circumstances.

During construction, dust will be controlled through the use of calcium chloride or the application of water, as needed. Following rock blasting and cutting in to steep slopes of exposed bedrock, protective measures will be installed to protect construction crews from rockfall hazards, where necessary.

Guard rails will be installed at sections of the road with steep slopes, and the gravel stabilizing agent EK35® will be applied to finished road. Road shoulder and construction limit areas will be revegetated using an approved seed mix, where practical.

2.3.1.4.1 Watercourse Crossings

The Kauk Brook crossing is designed as modular bridge (as described in Section 2.2.3.2). Bridge abutment areas will be graded using bulldozers and excavators, and steel pipe piles will be driven approximately 8 m deep to anchor the abutments to bedrock. The pre-fabricated bridge will be transported to the crossing, placed into position using a crane truck, and secured to the abutments. Adjustments will be made to the access road approach to the bridge to facilitate a smooth transitional surface. Additional stabilization products may be added to the access road surface base material on the approaches to the bridge to minimize loose aggregates from being transported onto the bridge deck.

Following bridge installation, clean riprap will be placed around the bridge abutments at a 2:1 slope to armour them from erosion (Figure 2.2-4; Appendix B). During all construction activity in proximity to Kauk Brook, control measures will be used to protect the water from erosion and sedimentation. These measures could include sediment fencing and check dams. An aquatic monitoring program will be developed to identify and respond to releases to the water.

Culverts will be installed at the remaining watercourse crossings. Different installation techniques may be considered depending on conditions at the time of construction, in accordance with the DFO Codes of Practice and Best Management Practices for the Protection of Freshwater Fish Habitat in Newfoundland and Labrador (DFO 2022a). Dry or frozen conditions are preferred to avoid potential impacts to water quality downstream. The crossing location will be excavated to the appropriate depth and salvaged soil material be stockpiled. Energy dissipation pools at the downstream portion of the culvert will also be excavated (Appendix B).

The corrugated aluminized pipe will be lowered into position using a crane truck, and additional earthworks will be required to secure the culvert in the correct position and angle. Fill will be built up around the culvert to prepare subgrade for the access road. Riprap and boulders will be placed in the energy dissipation pool for erosion protection and set up within the culverts to facilitate fish passage. If culvert installation takes place when flowing water is present, additional measures will be used to isolate the construction activity from the water. High volume pumps, dams, culverts, or other methods are used to temporarily divert the stream during installation. Methods will be determined at the time of construction, and will be in accordance with DFO Interim Code of Practice for In-water Isolation.

2.3.1.5 Runway and Airport

Construction of the runway and airport will involve site preparation and civil works as described in Section 2.3.1.1. However, construction of the runway and airport will require a large amount of cut and fill to create level surfaces for Project infrastructure (Section 2.2), including the build-up of a large fill embankment for the apron.

A small, temporary access road will be created to reach the furthest rock borrow area to the west; material from this area will be used to develop the airport embankment.

Following these earthworks, subsurface infrastructure (electrical and piping) will be installed and backfilled, and the gravel surfaces will be placed. Building foundations at the airport will be established using steel pipe piles and pouring concrete slabs. Groundwater wells will be drilled and tested in accordance with provincial *Water Resources Act* requirements to confirm water source viability. Project infrastructure (such as buildings, lighting and tanks) will then be installed and connected. The building sequence for each airport component will be determined at the time of construction.

Areas temporarily disturbed during construction within the airport fencing will be revegetated using an approved seed mix, where practical.

2.3.2 Operations

Unlike the existing airstrip, the airport will be capable of operating 24 hours per day, though weather conditions are increasingly intense due to climate change. The airport is expected to support between 130 and 140 scheduled domestic flights per month, including both arrivals and departures, based on existing schedules. However, given the longer runway, it is anticipated that use of larger airplanes will facilitate fewer flights. The favourable orientation of the runway in relation to prevailing winds and elevation below cloud ceiling will result in fewer delays and cancellations. The larger runway will be capable of landing De Havilland Canada-8 (100, 300 and Q400 series) turboprop aircraft and will also be capable of landing larger Boeing 737-700 and 737-800 series airplanes.

Typical operation of the airport will involve scheduled landing of aircraft on the runway, taxiing to the apron for passenger and cargo loading/unloading, refuelling and de-icing (if needed), and back to the runway for departure. Additional details on operation activities are provided in the following subsections.

A shuttle bus will be operated to transport passengers between Nain and the airport. Details such as the frequency of shuttle trips and pick-up locations in Nain will be determined when the owner / operator structure is established.

An overall environmental protection plan will be developed for Project operations that describe environmental management practices. Further details on operational activities are provided below.

2.3.2.1 De-icing

During the winter season aircraft may have ice build-up that requires removal. These aircraft will taxi to the de-icing pad (Section 2.2.2.8) where glycol-based de-icing fluid will be sprayed on the appropriate areas of the plane. Glycol contaminated water will drain into a sump beneath the de-icing pad. Collected waste glycol will be transported to Nain for disposal, and clean precipitation collected will be directed to the stormwater collection area.

Glycol will be stored at the airport in small/moveable drums within the warehouse. Aircraft personnel are expected to be responsible for de-icing activities, not airport staff.

2.3.2.2 Fuelling

All fuel required at the airport (aviation fuel and diesel) will be transported to the Nain wharf via tanker ship and offloaded to existing storage tanks in Nain twice per year, which is the current process for the existing airstrip. Fuel will be transferred periodically using tanker trucks to the new airport. Transport and storage of fuel will comply with regulations such as Canada *Transportation of Dangerous Goods Act* and *Regulations*, NL *Dangerous Goods Transportation Act* and *Regulations* and NL *Storage and Handling of Gasoline and Associated Products Regulations, 2003* and NL *Used Oil and Used Glycol Control Regulations, 2018*.

All fuel will be stored in tanks within designated areas. The tank will be double-walled for secondary containment, which will be outfitted with interstitial space monitoring sensors for leak detection. Routine visual inspections of tanks will also be conducted for integrity.

If aviation fuel is spilled during aircraft re-fueling, it will be conveyed to an oil/water separator. Waste hydrocarbons collected from this separator will be transported to Nain for disposal.

2.3.2.3 Maintenance

Periodic preventive maintenance will be conducted for all Project infrastructure, including:

- Filling, re-grading, and/or re-compacting gravel surfaces on the runway, apron, and access road
- Inspections of bridges and culverts in accordance with DFO Codes of Practice
- Repairing erosion and sedimentation control measures at applicable areas, such as along road shoulders, watercourse crossings, and the apron embankment
- Inspecting and repairing avalanche and rockfall protections along that access road, including removal of fallen rocks
- Tanks buildings, electrical and piping systems will be periodically inspected according to relevant codes

To maintain safe passage for travellers to the airport, regular snow clearing of the access road will be conducted using a snow plow. Dust control will be maintained through use of water trucks, as needed.

A maintenance garage will be included in the airport to service equipment and keep them in good working order.

Weed control will be conducted in accordance with provincial *Pesticides Control Regulations,* and vegetation within the airport fenced area (safety buffer areas surrounding the runway will be controlled.

2.3.2.4 Solid Waste Management

Municipal solid waste generated at the airport will consist of metal, glass, plastic, paper and cardboard products. This waste will be generated from three primary sources:

- Public areas and airport administrative offices in the terminal building
- Airplanes and airline offices
- Cargo operations

This operational waste will be consistent with waste generated from aircraft and the terminal building at the existing airstrip.

Waste management includes control of litter and debris. All waste material will be placed in suitable refuse containers and removed to an approved waste disposal site on a weekly basis, with the prior approval of the waste disposal site owner / operator. Derelict vehicles, scrapped equipment and other large debris will not to be stored on site, but will be disposed of at an approved waste disposal site or scrap yard on a regular basis, with the prior approval of the site owner / operator.

2.3.2.5 Liquid Waste Management

Waste fuel and glycol will be collected from the fuelling pad and de-icing pad via oil/water separator. Waste oils from maintenance garage floor drains will also be collected in sumps. These wastes will be periodically will be transported back to Nain, where they will be shipped out for disposal at an approved facility.

Other chemicals expected on site may include lubricants, solvents, cleaners, and pesticides. These chemicals and associated waste containers will be stored in designated areas within the airport buildings. Waste containers will be treated as hazardous and transported back to Nain, where they will be shipped out for disposal at an approved facility.

All hazardous materials and waste will be transported, stored and handled in accordance with regulatory requirements and disposed of at an approved facility. Plans will be prepared for managing hazardous materials and waste, as well as emergency response.

As described in Section 2.2.6, domestic effluent kitchen and restroom areas in various buildings at the airport will be connected to a sanitary sewage system. Effluent will drain via gravity to a septic tank for to allow solids to settle, and the liquid will be pumped to a septic field. Solids from the septic tank will be periodically removed and transported to Nain for disposal.

2.3.2.6 Wildlife

As per the CAR (Section 302.305), a wildlife management plan will be developed for the Project, which must be approved by Transport Canada as part of the airport certification process. This plan will include a variety of measures to protect both aircraft/passengers and wildlife; these can be passive measures (such as fencing, vegetation and habitat management or control) and active measures (such as scare devices, chemical usage, firearms). Firearm use may be included in the wildlife management plan for removal of or protection from wildlife or as last option for bird deterrents as per direction in Sharing the Skies: Guide to the Management of Wildlife Hazards (Transport Canada 2004). A Danger and Damage Permit under the *Migratory Birds Convention Act* will be obtained if firearms will be used to scare migratory birds potentially disrupting aircraft traffic and posing a risk to public safety. If firearms are determined to be necessary as part of the plan, the use of firearms are heavily restricted and special permits are required. Special training is also required before firearms are used in or around an airport. In the event wildlife management needs to occur (i.e., removal), it will be conducted by trained staff in accordance with the wildlife management plan and applicable legislation.

2.3.2.7 Health and Safety

Construction and operation of airports in Canada is guided by Transport Canada through its construction and certification standards. Each airport is required to have an Airport Operations Manual, which identifies the airport, dimensions of runways, buildings, lighting, training requirements, quality assurance system and procedures with references to detailed manuals as applicable (e.g., winter snow clearing, handling of dangerous goods, training, emergency response).

A health and safety plan will be prepared for construction and operations of the airport, runway and access road. This document will be in compliance with applicable legislation, such as the NL *Occupational Health and Safety Act / Regulations*, along with applicable federal legislation and guidance, such as the CAR, *Transportation of Dangerous Goods Regulations*, *Air Transportation Regulations*, *Airport Zoning Regulations*, Aerodrome Standards and Recommended Practices and Obstacle Limitation Surfaces.

2.3.2.8 Emergency Response

An Emergency Response Plan will be prepared for the Project in accordance with the CAR Recommended Practices. The Plan will include an inventory of spill response equipment and storage locations, a Spill Prevention and Response Plan to address potential fuel shipment incidents along the access road, as well as spills at the airport and runway, along with identifying the closest disposal sites for impacted soil and other hazardous materials. It will define the roles and responsibilities of stakeholders during emergencies, identify specific threats that could affect the Project and establish communication protocols for staff and relevant authorities.

For a quick and effective response during a spill event, spill response equipment (e.g., absorbents and open-ended barrels for collection of cleanup debris) will be readily available in an accessible location at the airport. Project personnel will be trained in response procedures. Any spill or leak of gasoline or an associated product will be immediately reported to Digital Government and Service NL by calling the Environmental Emergencies Telephone Line.

Existing conditions for soils and groundwater / surface water have been established for the Project through literature review and field work conducted in 2022 and 2023 (Section 4). The data and information can be used to determine the effects of an incident, such as a spill.

Fire suppression for the airport terminal will use water only. Two 510 L tanks to the east of the terminal building will be kept full of water in the event of a fire. In the event of an aircraft fire, specialized Aircraft Rescue and Firefighting vehicles are used. These vehicles are equipped with tanks containing firefighting foam certified under the CAR. The foam selected will meet all environmental criteria under the regulations, including maximum thresholds for toxicity, chemical oxygen demand, and biodegradability.

2.3.3 Decommissioning

Closure, decommissioning, and reclamation is not anticipated as the airport will be essential for Nain for the long-term. The proposed infrastructure is anticipated to have a life cycle of more than 50 years. If closure and decommissioning are required, these processes will be subject to appropriate regulatory regimes at that time.

Areas disturbed during construction but not required for the long-term operation of the Project, such as the construction staging area and temporary access road, will be reclaimed after construction. Gravel and fill material will be removed and used re-establishing pre-construction contours, or used for other Project purposes (e.g., road and apron maintenance), or hauled back to Nain. Salvaged topsoil will be replaced and the area the areas will be seeded with an approved seed mix. Seeding will follow as close as possible to machine clean-up and surface material replacement pending seasonal or weather conditions. Areas within the fenced airport will also be revegetated.

The closure and decommissioning of the existing airstrip is not included as a Project activity.

2.4 Alternatives Means of Carrying out the Project

Various design options have been considered in Project planning. Section 1.4 provides a discussion of alternatives for the Project overall, and the site selection process. Specific alternatives for development of specific Project components are included previously throughout Section 2. A summary of these alternatives considered are as follows:

- Water supply considerations (Section 2.2.6.3 and 6.5.1).
- Options analysis for power supply (Section 2.2.6.6).
- The access road route has been selected to account for the presence of other land uses, an archaeological feature, wetlands, potential permafrost, streams and potential fish habitat, as well as to have a strong geotechnical road foundation (Section 2.2.3).
- The access road will go through areas of steep terrain with avalanche potential. Construction will also require the creation of steep rock faces. Potential protection measures being considered to mitigate these hazards are discussed in Section 2.2.3.
- Routing the access road from the northern side of Nain was not considered due to having to pass through the Provincially protected Trouser Lake Watershed (domestic water supply for Nain).
- Given limited aggregate resources at Nain, optimized cut and fill techniques will be used for development of the runway, airport, and access road instead of using the community quarries or overburden soils (Section 2.2.1).
- Sewage will be treated in an on-site septic system instead of connecting to the community system.
- Most solid wastes from construction will be separated for reuse, construction and demolition disposal and removed from Nain for disposal elsewhere instead of using the community waste disposal site.

2.5 Employment and Procurement

2.5.1 Workforce

Information on the expected workforce will be determined as feasibility studies progress, and the ownership/operation structure of the Project is established. Projected workforce requirements are described below.

2.5.1.1 Construction

Currently it is anticipated a peak, on-site construction workforce of 120 people will be needed for the Project. The composition of this workforce will change as construction activities progress. The average number of workers will also change based on the construction timeframe. For example, construction activities will be reduced in the winter. Construction personnel will include:

- Engineering oversight and management
- Slash crews for site clearing
- Heavy equipment operators
- Construction camp staff
- Labourers for loading/unloading equipment
- Rock blasting crews
- Environmental monitors

2.5.1.2 Operations

It is estimated that approximately 10 employees will be required at the airport during operations for direction, administration, security and baggage handling, and aircraft direction. An additional 10 employees are required for garage and warehouse staffing. Other contractors will be required periodically on site for solid and liquid waste removal, major maintenance, vegetation and weed control, and dust control.

2.5.2 Procurement

Detailed information on procurement will be available as feasibility studies progress, and the ownership/operation structure of the Project is determined. In all stages of the Project, companies owned by the Nunatsiavut Group of Companies or Nunatsiavut Beneficiaries will be engaged in construction and operations wherever possible.

2.5.3 Equity, Diversity and Inclusion

The NG is an equal opportunity employer. As an Indigenous government, employment preference is given to Nunatsiavut Beneficiaries. The NG's employment policies and practices adhere to the *Nunatsiavut Constitution Act*, NL's *Human Rights Act* and *Accessibility Act*, as well as to the *Canadian Charter of Rights and Freedoms*, *Human Rights Act* and *Employment Equity Act*.

Equity, diversity and inclusion (EDI) address factors such as gender, age, ethnicity, physical ability and neurodiversity. EDI has many benefits for organizations and their employees. Various studies show that organizations with more workplace diversity were more likely to be high-performing (between 25% and 45% higher revenues) (Ideal 2023; McKinsey 2023; Together 2023). Inclusion is expected by workers (especially younger ones) who want to work for organisations that invest in EDI. Organizations with a diverse mix of employees are often more innovative and better able to adapt to change. When employees feel the workplace is fair, they are more engaged, perform better and less likely to leave, which reduces costly and inefficient employee turnover. The EDI Plan for the Project will consider business and employment access for members of underrepresented populations, including Indigenous persons and immigrants.

2.6 Financial Information and Benefits

Detailed information on Project capital and operating costs, funding, employment and procurement are still being determined as part of ongoing feasibility studies.

2.6.1 Funding

The NG has received $3.45 M from the Government of NL and $3.45 M from Transport Canada to conduct feasibility studies for replacement and relocation of the Nain airstrip. It is anticipated that the Project will be constructed using federal funding and other potential options, such as a public-private partnership model.

2.6.2 Taxation and Royalty Revenue

As construction and operation of the Project does not include natural resource extraction, royalty regimes are not applicable.

Beyond direct employment, airports and airlines provide indirect jobs through purchases of goods and services from companies in the supply chain. Spending by industry employees results in induced economic activity. Though it will be a small airport with limited activity, it is anticipated that the Project will contribute to taxation revenue through income tax and taxes generated by airport passenger fees, landing fees, cargo fees, fuel tax and sales tax on food and services.

2.6.3 Financial Security

Financial security is not applicable to the Project. No abandonment, closure or site restoration is anticipated.

3. Consultation and Engagement

This section summarizes the regulatory, public, and Indigenous community engagement conducted to date and presents the Proponent's (NG Infrastructure) consultation and engagement record for the Project. Consultation and engagement to date has been undertaken with the goal of forming meaningful, long-term relationships within the community and creating a collaborative environment where all perspectives are valued. To achieve this goal, engagement will continue to occur through multiple channels – email project updates, virtual meetings, in-community Open House sessions etc. - to ensure transparency and community involvement throughout the Project's life span. The approach involves sharing Project insights gained from ongoing conversations with community members and stakeholders, ensuring that consultation efforts remain responsive of community needs and that community input is ultimately reflected in the final design and delivery of the Project.

In addition, a summary of key issues and questions expressed from questions or concerns provided by the proponent team (NG Infrastructure, OCTANT, and AECOM), as well as any adjustments made to the Project in response to feedback or concerns raised. These activities are described below and in the supporting documentation (e.g. presentations, letters, information sheets, and full Record of Engagement) which can be found in the referenced Appendices.

3.1 Regulatory Engagement

Regulatory consultation for the Project began in 2023 during the desktop environmental review report for feasibility study which was prepared to determine potential Project-related regulatory requirements. Regulatory engagement is ongoing and has included the following government departments, agencies and their respective divisions:

- Impact Assessment Agency of Canada (IAAC)
- Nunatsiavut Government regulators / agencies:
  - Nunatsiavut Lands and Natural Resources (NLNR)
  - NLNR (re: camps and quarries)
- Newfoundland and Labrador Environment and Climate Change (NLECC)
  - NLECC: Pollution Prevention Division
  - NLECC: Pollution Prevention Division, Waste Management Section
  - NLECC: Pollution Prevention Division, Petroleum Storage & Management Section
  - NLECC: Pollution Prevention Division, Air Quality Monitoring Section
  - NLECC: Pollution Prevention Division, Impacted Sites Section
  - NLECC: Water Resources Management Division
- Newfoundland and Labrador Immigration, Population Growth and Skills
- Department of Digital Government and Service Newfoundland and Labrador
- Newfoundland and Labrador Fisheries, Forestry and Agriculture (NLFFA Wildlife Division)
- Newfoundland and Labrador Health and Community Services
- Newfoundland and Labrador Industry, Innovation and Technology
  - Mines Branch
- Newfoundland and Labrador Municipal and Provincial Affairs (NLMAPA)
- Newfoundland and Labrador Executive Council: Office of Indigenous Affairs and Reconciliation (OIAR)
- Other Federal Agencies
  - Fisheries and Oceans Canada (DFO)

- Canadian Wildlife Service (CWS)
- Transport Canada (TC)
- Health Canada (HC)
- Environment and Climate Change Canada (ECCC)
- Department of National Defence (DND)
- Natural Resources Canada (NRCAN)
- Employment and Social Development Canada (ESDC)
- Women and Gender Equality Canada (WAGE)
- Indigenous Services Canada (ISC)
- Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)

These stakeholders have been invited to engage in further consultation as appropriate. Since early 2023, NG Infrastructure has requested meetings to present the Project, receive feedback on the regulatory requirements for the Project.

An overview of regulatory consultation meetings and key correspondence completed in 2023 and 2024 is provided in Table 3.1-1. In addition to these activities, the proponent team has been in regular contact with EA regulators during this time. The proponent team has also contacted (or attempted to contact) other government departments to seek information related to the existing environment and potential permitting for the Project.

Table 3.1-1: Regulatory and Other Government Engagement

Date	Activity	Organizations	Purpose of Meeting / Communication
1/27/2023	Outgoing Email	NLECC	Provided a link to preliminary environmental review report and requested a meeting with NLECC.
1/27/2023	Outgoing email	NLNR	Provided a link to preliminary environmental review report and requested a meeting with NLNR.
1/27/2023	Outgoing email	IAAC	Provided a link to preliminary environmental review report and requested a meeting with IAAC.
2/3/2023	Meeting	NLECC	Discussed Project and potential exemption from EA. Regulator agreed to review draft Registration ToC and document.
2/9/2023	Meeting	NLNR	Discussed Project and potential exemption from EA. Regulator agreed to review draft Registration ToC and document.
2/15/2023	Meeting	IAAC	Discussed Project and potential exemption from EA. Regulator agreed to review draft Registration ToC and document.
2/23/2023	Outgoing email	IAAC	Shared Project overview and draft Registration ToC for input. Request to present at upcoming meeting of regulators.
2/23/2023	Outgoing email	NLECC	Shared Project overview and draft Registration ToC for input. Request to present at upcoming meeting of regulators.
2/23/2023	Outgoing email	NLNR	Shared Project overview and draft Registration ToC for input. Request to present at upcoming meeting of regulators.
2/28/2023	Meeting	NLNR, NLECC, IAAC	Presented the Project emphasizing its criticality and need. Requested harmonization of EA and any possible

Date	Activity	Organizations	Purpose of Meeting / Communication
			consideration for expedition and efficiencies given risks to the airstrip and the community.
3/13/2023	Incoming email	IAAC	Received comments on draft ToC for Registration.
3/22/2023	Incoming email	NLECC	Received comments on draft ToC for Registration.
4/5/2023	Incoming email	NLNR	Received comments on draft ToC for Registration.
4/27/2023	Outgoing email	Nunatsiavut Lands Division	Submission of land use permit for field studies.
5/30/2023	Outgoing email	IAAC	Provided a preliminary set of workplans for 2023.
6/8/2023	Meeting	NLNR	Discussed the Project, site selection, feasibility studies schedule, consultation, NG regulations, land use and sharing preliminary studies.
6/28/2023	Meeting	NLNR	Coordination and information sharing. Discussed NG regulations. Requested that the proponent team attend an upcoming meeting to present a Project update.
7/11/2023	Outgoing email	IAAC, NLECC, NLNR	Shared update on feasibility studies and 2023 workplans.
7/12/2023	Meeting	NLNR	Discussed EA harmonization, development process in Nain / on LIL and in Labrador Inuit Settlement Area (LISA), proposed marine protected area, waste management and consultation.
7/26/2023	Meeting	NLNR	Discussed cooperation agreement for the EA process, contents of Registration document, 2023 work plans and information on the marine environment.
8/2/2023	Meeting	NLNR	Discussed harmonization / cooperation process, planned public information session, community comments about the new airport, contents of Registration document and workplans for spring bird migration.
8/8/2023	Outgoing email	NLNR, NLECC, IAAC	Shared draft Registration in preparation for August 24 meeting.
8/9/2023	Meeting	NLNR	Discussed harmonization / cooperation process, contents of Registration document, comments on 2023 work plans, land use study, consultation, Project components and activities, effects of the existing airstrip and mitigations.
8/16/2023	Incoming email	NLNR	Received comments on 2023 workplans.
8/19/2023	Meeting	NLMAPA	Discussed land use planning and permitting in Nain and on LIL / LISA.
8/23/2023	Meeting	NLNR	Discussed land use study, consultation, draft Registration document, EA process and ongoing feasibility studies.
8/24/2023	Meeting	NLNR, NLECC, IAAC and FAs	Updated EA regulators and introduced the Project to FAs (ECCC, DND, TC, DFO, HC, ESDC, NRCAN, WAGE, ISC, CIRNAC). Discussed requirements of the IPD, cooperative EA process, timelines, deficiencies in the draft Registration document, temporary facilities / activities, review of work plans / draft documents, public information / consultation, community aspirations regarding the airport and land use study.
8/30/2023	Incoming email	NLNR	Received letter from regulators confirming the EA cooperation process and timelines.
8/30/2023	Incoming email	IAAC	Received comments on draft Registration document.

Date	Activity	Organizations	Purpose of Meeting / Communication
8/30/2023	Outgoing email	NLNR, NLECC, IAAC	Shared New Nain Airport Presentation from August 24 meeting.
9/13/2023	Meeting	NLNR	Discussed NLNR's conformity review process and applicable Inuit laws.
9/20/2023	Meeting	NLNR	Discussed Labrador Inuit Laws related to quarries, issues with quarries and upcoming plans, studies, regulations and standards for quarries.
10/5/2023	Meeting	NLFFA, Wildlife Division	Introduced wildlife division to the Project and outlined vegetation, wildlife, and fisheries field data collected to date and future field programs.
10/6/2023	Incoming email	IAAC	Received comments from IAAC and FAs on 2023 workplans.
10/13/2023	Meeting	IAAC, ECCC, TC	Discussed requirements for GHG estimates for IPD, DPD, and potential Impact Assessment.
10/23/2023	Outgoing email	NLNR, NLECC, IAAC	Informed regulators that draft Registration document was available on a SharePoint site for downloading.
10/24/2023	Incoming email	NLECC	Received comments on draft Registration document.
11/08/2023	Phone call	NLECC	Discussed comments to date on draft Registration document.
11/08/2023	Incoming email	NLECC	Received comments on draft Registration document.
11/09/2023	Incoming email	NLECC	Received comments on draft Registration document.
11/09/2023	Meeting	NLNR	Discussed particulars of Registration requirements.
11/14/2023	Incoming email	NLECC	Received comments on draft Registration document.
11/16/2023	Meeting	IAAC, NLNR	Discussed interim guidance from IAAC regarding IPD and processes.
11/16/2023	Incoming email	IAAC	Provided confirmation of interim measures for administration of the IAA pending legislative amendments.
11/17/2023	Incoming email	NLECC	Received comments on draft Registration document.
11/17/2023	Incoming email	IAAC	Received comments on draft Registration document.
11/20/2023	Incoming email	NLNR	Received comments on draft Registration document.
11/20/2023	Incoming email	IAAC	Sought information on whether the proponent will continue with federal assessment process.
11/21/2023	Outgoing email	IAAC	Responded to confirm the proponent will continue with federal assessment process.
11/21/2023	Meeting	NLECC, Pollution Prevention Division	Presented the Project and discussed questions (e.g., de-icing and approval of diesel generators) on draft Registration document.
11/21/2023	Outgoing email	NLNR	Forwarded copy of Notice of Registration for review to ensure compliance.
11/24/2023	Meeting	NL Immigration, Population Growth and Skills	Presented the Project and discussed requirements for reporting on employment needs for Project construction and operations.
11/27/2023	Outgoing email	IAAC, NLNR, NLECC	Notified regulators of the Registration submission date.
11/29/2023	Incoming email	IAAC, NLNR, NLECC	Provided guidance and directions for Registration.

Date	Activity	Organizations	Purpose of Meeting / Communication
11/29/2023	Meeting	NLNR	Discussed particulars of Registration requirements.
08/02/2024	Meeting	IAAC, NLNR, NLECC	Monthly update meeting. Regulators provided update on Registration review and next steps
08/02/2024	Meeting	NLNR	Proponent met with the NLNR Land Use Study consultant to discuss the study approach and timelines.
14/03/2024	Meeting	IAAC, NLNR, NLECC	Monthly update meeting. Proponent acknowledged receipt of the Summary of Issues and provided more details on Project design and activities
28/03/2024	Meeting	ECCC	Discussed expectations for wildlife and fish information in the DPD
03/04/2024	Meeting	Health Canada	Discussed expectations for human health information in the DPD
17/04/2024	Meeting	IAAC, NLNR, NLECC	Proponent provided update on rescheduling of community open house; received information on DPD submission standards
09/05/2024	Meeting	IAAC, NLNR, NLECC	Proponent provided update on DPD submission; received update from NLECC on Registration review
20/06/2024	Meeting	IAAC, NLNR, NLECC	Proponent provided update on DPD submission
11/07/2024	Meeting	IAAC, NLNR, NLECC	IAAC provided update on IAA amendments.
08/08/2024	Meeting	IAAC, NLNR, NLECC	Discussed draft DPD and proponent plans for final submission

To date, key topics of interest regarding the Project (from regulators) include the following:

- Project location (e.g., alternatives considered);
- Project schedule (e.g., timing of EA);
- Project benefits (e.g., employment);
- Consultation and engagement (e.g., Indigenous groups, stakeholders and the public);
- Temporary facilities (e.g., worker accommodations, road for marine access);
- Construction materials (e.g., aggregate sources);
- Site access (e.g., access road);
- Natural environment: fish (e.g., Arctic char), birds, wildlife, rare species (e.g., caribou, plants), aquatic environment;
- Land and resource use (e.g., permanent, seasonal or temporary residences and harvesting areas of Nunatsiavut Beneficiaries);
- Land use zoning in Nain;
- Regional land use study;
- Cultural heritage and archaeological sites;
- Management of hazardous materials, including transport of jet fuel;
- Air quality related to diesel generators;
- GHG emissions; and
- Use of the marine environment (e.g., frequency of marine vessel trips)

3.2 Proponent Consultation and Engagement

3.2.1 Indigenous Consultation and Public Engagement Overview

As the Proponent, NG Infrastructure is committed to early engagement and meaningful participation, collaboration, and partnership with Indigenous communities, interested and public stakeholders

Consultation and engagement aim provide clarity and predictability on how the Project both positively and adversely affect communities. NG Infrastructure is committed to maintaining and upholding early and meaningful engagement with Nain community members including from Indigenous communities and the public. Throughout the lifecycle of the project, the proponent will assess the potential impacts of the Project while recognizing the Constitutional rights of Indigenous peoples in the stewardship of natural resources and lands.

Before consultation activities began in late 2023, key issues and interests identified by Nunatsiavut Beneficiaries regarding the Project and the urgency of replacing the current airstrip with a better facility are noted as follows:

- The feasibility of a new airport and potential Project alternatives
- Airport access including travel time and parking considering the airstrip is no longer within walking for Nain residents
- Issues of Public safety and access including but not limited to:
    - The potential increase of break-ins at camps from increased road access
    - Snow-clearing on the access road
    - Avalanches around Blow Hold Pond on the access road

Table 3.2-1 provides an overview of the key consultation and public engagement activities that have occurred to date for the Project and any planned outstanding activities and/or deliverables associated with proponent-led consultation and engagement for the Project. The full Record of Engagement to date can be found in Appendix C1.

Table 3.2-1: Key Indigenous Consultation and Public Engagement Activities (AECOM Data)

Activity	Description	Timing
Proponent-led Project Information Meeting: New Nain Airport Project	Proponent (NG Infrastructure) held initial Project Information Meeting in Nain to describe the Project, the work to date, plans to continue work throughout 2023 and 2024, and answer questions from attendees. Questions asked during the session informed the development of a project FAQ sheet which was distributed to the broad list of stakeholders and community members in early 2024.	October 16, 2023
Consultation	AECOM established a contact list and shared information with a broad list of stakeholders and community members, including Indigenous communities and organizations (e.g., government staff, rights holders and Indigenous community leaders, stakeholders and residents and community members of Nain).	November 15, 2023
Information-Sharing (Information Sheet #1: Project Overview)	AECOM distributed Project Information Sheet #1 (Project Overview) to list of community members and stakeholders to present Project overview, work completed to date (2018-present) including the site-selection process, and work that was underway at that stage to progress the feasibility studies. Proponent (NG Infrastructure) and consultant contact information was shared with invitation to submit additional questions or comments.	November 15, 2023
Consultation	AECOM conducted outreach to Nain and Hopedale Inuit Community Governments as well as Natuashish and Sheshatshiu Innu Nations to provide information about the Project and inquire about their interest in the Project. Responses are described in more detail below.	January 2024
Broad Engagement: Interviews	AECOM conducted a series of interviews with Nain residents as part of the human-environment baseline study. Questions asked by interviewees were answered in the call or through follow up after the interview. Detailed questions and concerns related to the access road informed the development of a second project Information Sheet focused on the proposed plan and safety/access plans for the proposed access road connecting Nain to the airport site.	January - February 2024
Public Consultation Meeting (Regulatory)	As part of the IAAC regulatory process, IAAC held virtual public engagement sessions following the submission and posting of the project IPD to provide information about the Project, associated regulatory process, and for attendees to ask questions. The proponent team, including OCTANT and AECOM provided a Project update. The AECOM Consultation team attended these sessions on	January 17 & 18, 2024

Activity	Description	Timing
	behalf of the proponent to take notes to continue to gather information on key questions, concerns or interests related to the proposed new airport and access road.	
Information-Sharing (FAQ Sheet)	AECOM distributed a FAQ sheet that addressed questions frequently asked about the Project up to the date along with detailed responses. Information was shared with the selected list of community members and stakeholders. Proponent and consultant contact information was shared with invitation to submit additional questions or comments.	February 7 2024
Consultation	AECOM held a virtual consultation meeting with the Nain Inuit Community Government Mayor, Joe Dicker, to discuss the proposed Project. AECOM presented an overview of the Project and summarized the status of the feasibility studies. Representatives from Nain Inuit Community Government were able to ask questions and make comments. Meeting notes were shared with the Nain Inuit Community Government attendees for verification and subsequently shared with the proponent team (OCTANT and NG Infrastructure) for their awareness.	February 7, 2024
Public Consultation Meeting (Regulatory)	As part of the NLNR regulatory process, NLNR held a public engagement session on February 7, 2024 following the submission and posting of the project IPD to provide information about the Project, associated regulatory process, and for participants to ask questions. The proponent team, including OCTANT and AECOM provided a Project update. AECOM and OCTANT project team members attended these sessions virtually on behalf of the proponent to take notes to continue to gather information on key questions, concerns or interests related to the proposed new airport and access road.	February 7, 2024
Public Consultation Meeting (Regulatory)	NLNR held a hybrid public consultation meeting for Nain residents to provide information about the Project and to respond to any questions, concerns and/or comments. This meeting was attended virtually by the NLNR and representatives of the Proponent and IAAC were present. The proponent team, including OCTANT and AECOM provided a Project update. AECOM and OCTANT project team members attended these sessions virtually on behalf of the Proponent to take notes to continue to gather information on key questions, concerns, or interests.	February 19, 2024
Consultation	AECOM held a virtual consultation meeting with the Nain Inuit Community Government Ordinary Member, David Dicker. The	February 21, 2024

Activity	Description	Timing
	Consultation team presented an overview of the Project, summarized limitations and identified next steps. Representatives from Nain Inuit Community Government were able to ask questions and make comments. Meeting notes were shared with the Nain Inuit Community Government attendees for verification and subsequently shared with the proponent team for their awareness.	
Information-Sharing (Information Sheet #2: Access Road)	Distributed Information Sheet #2 (Access Road) to list of community members and stakeholders to share information, provide updates about, and address concerns expressed about the access road. Proponent and consultant contact information was shared with invitation to submit additional questions or comments.	April 1, 2024
Community Open House	AECOM collaborated with proponent team to plan an in-person, Community Meeting in Nain to provide an update on the project and answer any questions and/or concerns from Nain residents and community members. A series of promotional activities were undertaken to advertise the open Community Meeting and are described in detail below. This event was cancelled by the Proponent and that cancellation was communicated to the broad distribution list on April 8 2024.	April 10, 2024 *(CANCELLED and Rescheduled)*
Information Sharing (Email)	An email was sent to the Innu Nation informing them of AECOM as the Project consultant, inquiring whether Innu Nation would like to be involved in the consultation process. Responses are described in more detail below.	May 1, 2024
Nain Community Members and Stakeholders	A Meeting Poster was distributed to the broad Community and Stakeholder distribution list via email on May 16, 2024 and physical posters were mailed to a community member for posting around Nain to raise awareness of the meeting. Refer to Appendix C14B for the Meeting Poster.	May 16, 2024
Nain Community Members and Stakeholders	A reminder email was sent to the Community and Stakeholder distribution list via email on June 5th, 2024. The meeting time was updated to accommodate a preference for a later meeting. The email indicated the meeting time was updated to 5:30pm – 9:00pm.	June 5, 2024
The OKâlaKatiget Society Radio	The Community Meeting was advertised on the local radio, the OKâlaKatiget Society Radio, to promote the meeting purpose, time, and location. This was advertised again on June 12, 2024 ahead of the meeting time.	June 11, 2024

Activity	Description	Timing
Community Open House	AECOM collaborated with the proponent team and presented at the in-person, Community Meeting in Nain to provide an update on the project and answer any questions and/or concerns from the community members and representatives of several Nunatsiavut Government Departments and representatives from the Nunatsiavut Group of Companies who attended.	June 12, 2024
The OKâlaKatiget Society Radio	The Community Meeting follow-up session was advertised on the local radio. the OKâlaKatiget Society Radio, to promote a follow-up session for community members to ask additional questions or note any other concerns after the meeting concluded.	June 13, 2024
Community Open House Follow-up	AECOM provided the opportunity for follow-up conversations with community members about the Project. AECOM was available between 10:00am and 4:00pm to respond to questions and document community concerns. Community members had the ability to engage with maps and provided land use information about the Project.	June 13, 2024
Record of Engagement	AECOM has prepared final documentation of engagement activities and results on behalf of the Proponent. The final Record of Engagement will include records of consultation activities and supporting documentation, key identifiable participants, summary of input received and how it was used in the effects assessment and to identify mitigations.	August 2024.

The sections that follow describe in further detail the consultation activities undertaken by the proponent team (NG Infrastructure, OCTANT and AECOM) and present the Record of Engagement to date. Consultation activities and supporting documentation shared with the Project stakeholder and community member distribution list sought to address questions and concerns that had been raised prior to the submission of the Registration / IPD in late 2023 while also seeking additional feedback from the community of Nain and the public on the proposed Project. NG Infrastructure will continue to engage with the community of Nain, potentially impacted and interested Indigenous communities, and the public as the Project progresses.

3.2.3 Proponent-led Public Information Session in Nain

The Proponent (NG Infrastructure) held a public information session in Nain on October 16, 2023. A presentation describing the Project was provided to about 25 attendees, including community residents, NG elected officials and staff members. Refer to Appendix C2A for a copy of the presentation.

A thematic summary of the questions and concerns raised during the public information session are described in Table 3.2-2. A detailed record of all questions, comments and responses provided during the public information session, as well as any notes about opportunities to further respond to the feedback are provided in Appendix C2B.

Table 3.2-2: Questions and Concerns Raised on October 16, 2023, Public Information Session

Topic	Question/Concerns Expressed
Location	Concern that the new airport will be more distant from Nain, where people without vehicles are accustomed to walking to and from the airstrip.
Site Selection	Interest in why the proposed aiport site was selected as opposed to other potential sites.
Land Use	Interest in why the airport would be fenced, resulting in an exclusion area for harvesting. Interest in the upcoming land use study.
Airport Operations	Interest in who the airport owner and operator would be. Interest in whether Nain residents would be employed in airport operations. Interest in what type of aircraft would be used.
Air Cargo	Interest in timely delivery and safe storage of frozen and perishable food and other goods at the airport.
Access Road	Concern about heavy snow and potential avalanches along the access road, particularly at Blowhole Pond.
Existing Airstrip	Interest in potential uses of the old existing airstrip infrastructure.

3.2.1.1 Regulator Virtual Public Information Sessions (IAAC)

IAAC held two virtual public information sessions on January 17 and 18, 2024. These meetings involved a presentation by the Proponent that provided an overview of the project and status of the feasibility studies, including the environmental impact assessment (Appendix C3). Attendees included IAAC representatives, Indigenous Services Canada (ISC) representatives, Proponent representatives (from NG, OCTANT and AECOM) and members of the public.

Key discussion points raised at these meetings by the attendees included:

- Transportation to and from the airport
- Impacts of weather on the new airport
- 24/7 operations of the airport
- Medical evacuations
- Climate change projections and considerations for infrastructure in the region

- De-icing at the airport

3.2.1.2 Regulator Virtual Public Consultation Meetings (NG Land and Natural Resource)

On February 7, 2024, a virtual information session was hosted by NG Land and Natural Resource. Attendees included representatives from the NG Infrastructure (the Proponent), IAAC, representatives from OCTANT and AECOM (proponent team), and members of the public (two attendees). The meeting involved a presentation given by NLNR that summarized the key components of the project, including the status of the feasibility studies, information about the proposed access road, including avalanche mitigations. There was a question-and-answer period following the presentation from NLNR for the attendees to receive responses from the NG in real-time.

Key discussion points raised at this meeting by attendees included:

a) Safety related to the access road (avalanche risk and permafrost)
b) Access road design and maintenance
c) Transportation to and from the airport

On February 19, 2024, a hybrid meeting was held by NG Land and Natural Resource to provide a presentation that summarized the key components of the project, including the status of the feasibility studies, information about the proposed access road, including avalanche mitigations. Attendees included representatives from the NG Infrastructure, IAAC, representatives from Octant and AECOM, and at least six members of the public. Due to inclement weather, NG Infrastructure, NLNR, OCTANT and AECOM attended virtually. A question-and-answer period was held to facilitate questions and address concerns raised by residents about the project. Please refer to Appendix C4 regarding notes on the questions and answered provided during this meeting.

Key discussion points raised at this meeting by attendees included:

- Cost and funding for the project
- Power source and fuel transport/storage for the airport
- Experience of engineers designing the airport/access road
- Protection of Kauk Brook and archeological site
- Environmental impacts of de-icing
- Public traffic around the airport
- Compensation for harvesters/cabins around the airport

3.2.2 Information Sheets

Following the initial public information session in October 2023, it was recommended to the proponent that distribution of information related to the project and proactive answering of Frequently Asked Questions (FAQs) would be a valuable way of continuing to promote awareness and understanding related to the Project between broader, proponent-led Consultation sessions.

As such, the following Information Sheets and a FAQ sheet were developed and distributed to the broad community and stakeholder contact list in early 2024. These documents have been shared at individual consultation calls to support continued understanding of the project and proactively address common questions and concerns raised during project discussions. Please refer to Appendix C5 for the full community and stakeholder distribution list.

3.2.2.1 Information Sheet #1 – Project Overview

Information Sheet #1 was a document that provided a broad description of the Project and was shared on November 15, 2023 with the broad list of community and stakeholder contacts. The document included information regarding the need for the project, the current status of the project up to that point, next steps, and identified the mapping information up to that point. The information sheet also provided contact information for further

engagement through comment and/or feedback from the public. Refer to Appendix C6 for a copy of Information Sheet #1.

3.2.2.2 Frequently Asked Questions (FAQ) Sheet

A FAQ Sheet documenting and responding to frequently asked questions from the public was created and distributed on February 7, 2024 to the individuals listed on the community and stakeholder distribution list (Refer to Appendix C7 for a copy of the FAQ). This document provided detailed responses to questions that had been frequently asked about the project to date including outlining the need for the airport, the timeline and process for approving the project, safety, maintenance, and construction information.

3.2.2.3 Information Sheet #2 – Airport Access Road

Information Sheet # 2 focused on the Project access road was shared with the project community contact and stakeholder list on April 1, 2024, to address concerns associated with safety, use, and accessibility. This Information Sheet also provided contact information for further engagement regarding any potential comments or questions which may arise throughout the Project and was shared with interested stakeholders, members of the public and Indigenous communities and organizations. (Refer to Appendix C8 for a copy of Information Sheet #2).

3.2.2.4 Community Meeting: Questions and Concerns Summary

The questions and responses provided in the Community Meeting on June 12th, 2024, as well as the follow-up consultation session on June 13th, 2024, were summarized to be shared back with the community. This included questions about the airport feasibility, future socio-economic opportunities, the airport design, and more. This detailed record can be found in Appendix C18.

3.2.3 Consultation Activities

The Proponent (NG Infrastructure) carried out a series of targeted engagement activities to connect specifically with key community members, leadership and representatives, stakeholders, and Indigenous communities to discuss and determine their level of interest in being engaged with the Project. This outreach was conducted via email with different degrees of response as summarized in Table 3.2-3.

The Proponent reached out to the Nain Inuit Community Government, Hopedale Inuit Community Government, Sheshatshiu First Nation, Natuashish First Nation and the Innu Nation, the organization that formally represents the Innu of Labrador. The Hopedale Inuit Community Government Mayor advised that Hopedale does not need to be involved in the Project at this time but was interested in continuing to receive virtual Project updates. The Innu Nation organization responded that they have received the email and that the information was forwarded to the Innu Nation’s Environmental Office. No responses were received from Sheshatshiu Innu First Nation or Natuashish Innu First Nation. The Proponent has since had two meetings with members of the Nain Inuit Community Government who have indicated an interest in continued Project updates and meetings at Project milestones, further summarized in Table 3.2-3 below.

Table 3.2-3: Consultation Meetings (AECOM Data)

Nation/Community Government	Date of Key Communication(s)	Purpose/Outcomes
Nain Inuit Community Government	January 10, 2024	AECOM reached out to Nain Inuit Community Government, and they expressed interest in being engaged in the Project.
	January 10-11, 2024	A virtual meeting was coordinated.
	February 7, 2024	A virtual meeting was held between OCTANT and AECOM and the Nain Inuit Community Government representative (Mayor Joe Dicker) to summarize the Project and status and to discuss questions and concerned. Refer to Appendix C9 for a copy of the Presentation. Meeting notes were shared with Mayor Dicker following the meeting for verification and were distributed to the Proponent. Refer to Appendix C10
	February 7-12, 2024	A second virtual meeting was coordinated to share project information with additional members of the Nain Inuit Community Government, David Dicker and Roxanne Barbour.
	February 21, 2024	A second virtual meeting was held between the OCTANT and AECOM and a Nain Ordinary Member (Member David Dicker) from the Nain Inuit Community Government to provide an overview of the Project and to answer and record questions and concerns. Refer to Appendix C9 for a copy of the Presentation. Roxanne Barbour was unable to attend day of the meeting due to a last-minute conflict. Meeting notes were shared with Member Dicker following the meeting for verification and we distributed to the Proponent (See Appendix C11)
Hopedale Inuit Community Government	January 18, 2024	AECOM emailed the Hopedale Inuit Community Government to share an overview of the Project and inquire about whether they would like to be engaged. The Information Sheet #1 was also attached for additional information. Through emails exchanged on January 18, 2024, the Hopedale Inuit Community Government expressed that they do not want to be involved in the Project but would like to be provided virtual updates as it progresses. (See Appendix C12A)
Sheshatshiu Innu First Nation	January 18, 2024	AECOM emailed Sheshatshiu Innu First Nation's Chief to provide an overview of the Project and inquire about their interest in being engaged. The Information Sheet #1 was also attached for additional information. No response was received to date. The Sheshatshiu Innu First Nation contact continues to be on the Project distribution list and has received all the project Information Sheets, FAQs, and notice of the upcoming Community meeting and cancellation. (See Appendix C12B)
Natuashish Innu First Nation	January 18, 2024	AECOM emailed Natuashish Innu First Nation's Chief to provide an overview of the Project and inquire about their interest in being engaged. The Information Sheet #1 was also attached for additional information. No response was received to date. The Natuashish Innu First Nation contact continues to be on the Project distribution list and has received all the project Information Sheets, FAQs, and notice of the upcoming Community meeting and cancellation. (See Appendix C12C).
Nain Resident	January 2024	Following the human-environment baseline interviews, question from a Nain resident regarding the proposed Project was included. AECOM, in coordination with the Proponent, provided responses to each question with the best available information and knowledge to date to

Nation/Community Government	Date of Key Communication(s)	Purpose/Outcomes
		provide the most fulsome response to the resident. Responses to questions were sent on April 2, 2024. (See Appendix C13 for questions from Nain resident and responses from the Project Team).
Nain Community Members and Stakeholders	March 8, 2024	AECOM coordinated a Community Meeting to be held in Nain on April 10, 2024, to provide a project update on the feasibility studies progress, field-study results, and additional information about the proposed access road and airport site based on areas of interest raised by community members to date. A Meeting Poster was distributed to the broad Community and Stakeholder distribution list via email and physical posters were mailed to a community member for posting around Nain to raise awareness of the meeting. Refer to Appendix C14 for the Meeting Poster. A reminder email of the event was sent to the same distribution list one week prior, on April 3, 2024.
Nain Community Members and Stakeholders	April 8, 2024	On April 5 the Community Meeting scheduled for April 10, 2024, was cancelled by the Proponent. An email including a letter informing recipients of the cancellation was sent to all community and stakeholder contacts and stakeholder distribution list on April 8, 2024. Refer to Appendix C15 for the Letter of Cancellation.
Nain Inuit Community Government	April 9, 2024	A subsequent email was sent to the Mayor of Nain, Joe Dicker, to offer a meeting with AECOM/Octant if desired to discuss any concerns, questions, comments in lieu of the meeting. Also included in this follow-up email was an invitation to contact Colin Gilbride from the NG Infrastructure directly to discuss any concerns, questions, and/or comments.
Innu Nation	May 1, 2024	An email was sent to the Innu Nation to inform that AECOM has been contracted by the NG Infrastructure to complete an environmental assessment for the Project, including coordinating consultation activities with surrounding communities to Nain. The Innu Nation was contacted to let them know if the Innu Nation would like to express interest in being involved in the consultation process, and if so, in what way. The Innu Nation responded that they have received the email and confirming the receipt of three documents: New Nain Airport Project FAQs; New Nain Airport Information Sheet and New Nain Airport Information Sheet for the access road which were subsequently forwarded to the Innu Nation's Environmental Office. Refer to Appendix C16 for the outreach email and response.
Nain Community Members and Stakeholders	June 12, 2024	AECOM coordinated a Community Meeting to be held in Nain on June 12, 2024, to provide a project update on the feasibility studies progress, field-study results, and additional information about the proposed access road and airport site based on areas of interest raised by community members to date. A Meeting Poster was distributed to the broad Community and Stakeholder distribution list via email on May 16, 2024 and physical posters were mailed to a community member for posting around Nain to raise awareness of the meeting. Refer to Appendix C14B for the Meeting Poster. A reminder email of the event was sent to the same distribution list on June 5, 2024.

3.2.4 Broad Engagement: Interviews

As part of the human-environment baseline interviews conducted through the human-environment baseline studies for the feasibility studies for the Project in 2023, engagement with Nain community members and/or interested subject matter experts was conducted by AECOM. Refer to Section 5.8 for further information.

An outcome of these human-environment baseline interviews was a list of questions received from a resident of Nain. As such, these questions become part of the Consultation and Engagement work for the Project. Please refer to Appendix C13 for a summary of the questions and responses provided via email.

3.2.5 Project Changes Due to Consultation Input

In response to early engagement and consultation activities for the Project, the proponent has incorporated several changes in the proposed Project design in response to requests or concerns. The changes that have been made to the Project to date are summarized below:

- Cold storage/freezer capacity: NG Infrastructure changed the airport site design to include a frozen goods storage and cooler rooms within the cargo warehouse at initial commissioning, rather than as a future development. This change is in direct response to community input requesting safe storage of frozen and perishable food and other goods that are often shipped into and out of communities via air travel.
- Known potential avalanche risk area: The route of the access road has been realigned to be positioned at a greater distance from an area locally known as Blowhole Pond that is a known avalanche risk area. The route has now been designed to be on a flat plateau approximately 70 m east and 45 m higher than the Blowhole Pass area. This re-route was completed in response to concerns raised by community members about the risk of avalanches (Section 2.2.3).
- Kauk Brook and Arctic char: In response to the knowledge of the importance of Kauk Brook to the community of Nain and the presence of Arctic Char, mitigation measures were incorporated into the access road design to include mitigation measures that would reduce the impact of the road on the brook. Rather than constructing a culvert as originally planned, a bridge has been incorporated into the design to avoid impacting Kauk Brook.
- Dust suppression on gravel road: Community members raised concerns about the dust that would be produced from the establishment of a gravel road. In response, the Project team committed to applying a gravel stabilizer (originally limited to the runaway and apron areas) to the road to improve the operational and safety conditions (Section 2.2.1).
- Community drinking water source avoidance: There were concerns raised by community members regarding the access road's proximity to a local drinking water source known as Annainak's Brook. To address these concerns, the Project design team committed to avoiding upgrades to the access road near the brook.

3.2.6 Nain Community Meeting

An in-person Community Meeting was scheduled to be held on April 10, 2024, by the Proponent in the community of Nain. Due to unforeseen circumstances, this event was rescheduled to June 12, 2024 by the Proponent.

AECOM organized the Community Meeting by coordinating with various disciplines involved in the Project to collect and synthesize the latest updates and required materials for the presentation. This encompassed a range of items such as results from field studies and visual concept designs (such as project site maps, access road maps, terminal concepts, fueling maps, Kauk Bridge design, and avalanche mitigation plans).

To ensure community participation, AECOM used various outreach methods to notify community members in Nain and other interested parties about the upcoming Community Meeting scheduled for June 12th, 2024. Invitations via email to the community contact and stakeholder distribution list was sent on May 16th. 2024. In response to a request for a reminder closer to the event, a reminder email was sent on June 5th, 2024. In addition to this, physical copies of the Community Meeting invitation poster were sent to the Community Government office and displayed on community bulletin boards in Nain. Refer to Appendix C14 for a copy of the Community Meeting Poster. To accommodate a preference for a later Community Meeting, the meeting time was changed to 5:30pm-9:00pm. A

notice was shared with the community contact and stakeholder distribution list on June 5th, 2024 indicating the time change. The Community Meeting was also advertised on the local radio, the OKâlaKatiget Society Radio, to promote the meeting purpose, time, and location on June 11th, 2024 and June 12th, 2024. Prior to the meeting, AECOM shared the draft Community Meeting presentation with OCTANT and NG Infrastructure to receive feedback and Proponent (NG Infrastructure) approval. The objective of the presentation was to provide general updates on the Project, covering topics such as field studies, consultation activities to date, and provide information about any project changes. Refer to Appendix C9 for a copy of the presentation.

Approximately 26 people attended the Community Meeting on June 12th, 2024. During the facilitation of the event AECOM encouraged attendees to ask questions throughout the presentation. Questions were asked on a variety of topics including the airport design, the access road design, the accessibility of the airport, socioeconomic opportunities associated with the airport, and more.

Key concerns from the community were focused on the feasibility of the project and the timelines for commissioning. Community members note that a new airport is critical for community health. For a detailed record of the questions and concerns noted during the Community Meeting, refer to Appendix C18.

On June 13, 2024 AECOM provided the opportunity for follow-up conversations with community members about the Project. AECOM was available between 10:00 am and 4:00 pm to respond to questions and document community concerns. Community members had the ability to engage with maps and provided land use information about the Project.

4. Biophysical Environment

The biophysical environment near the Project has been characterized based on a review of publicly available data sources and field-collected data, where applicable. The description of the biophysical environment is needed to understand how Project development can impact current conditions, and subsequently design and implement measures to mitigate effects. Specific study areas, data collection methods, and descriptions of each biophysical component are described below.

4.1 Air Quality and Climate

The objective of the air quality and climate section is to characterize the baseline air quality and climate within the established study area for Project.

4.1.1 Study Area

The air quality and climate study area is 50 km by 50 km centred on the airport, as illustrated in Figure 4.1-1. Any significant potential air quality effects at ground level due to PM_{10}, $PM_{2.5}$, TSP, NO_2, SO_2, and CO emissions from the facility are expected to occur within this study area.

Five years of hourly air quality were used to develop background concentrations: from 1 January 2017 to 31 December 2021 for CO, from 1 January 2019 to 31 December 2023 for PM_{10}, $PM_{2.5}$, TSP, NO_2, and SO_2, and 1 January 2016 to 31 December 2020 for benzo(a)pyrene and benzene. Meteorological data were summarized from 1 January 2019 to 31 December 2022.

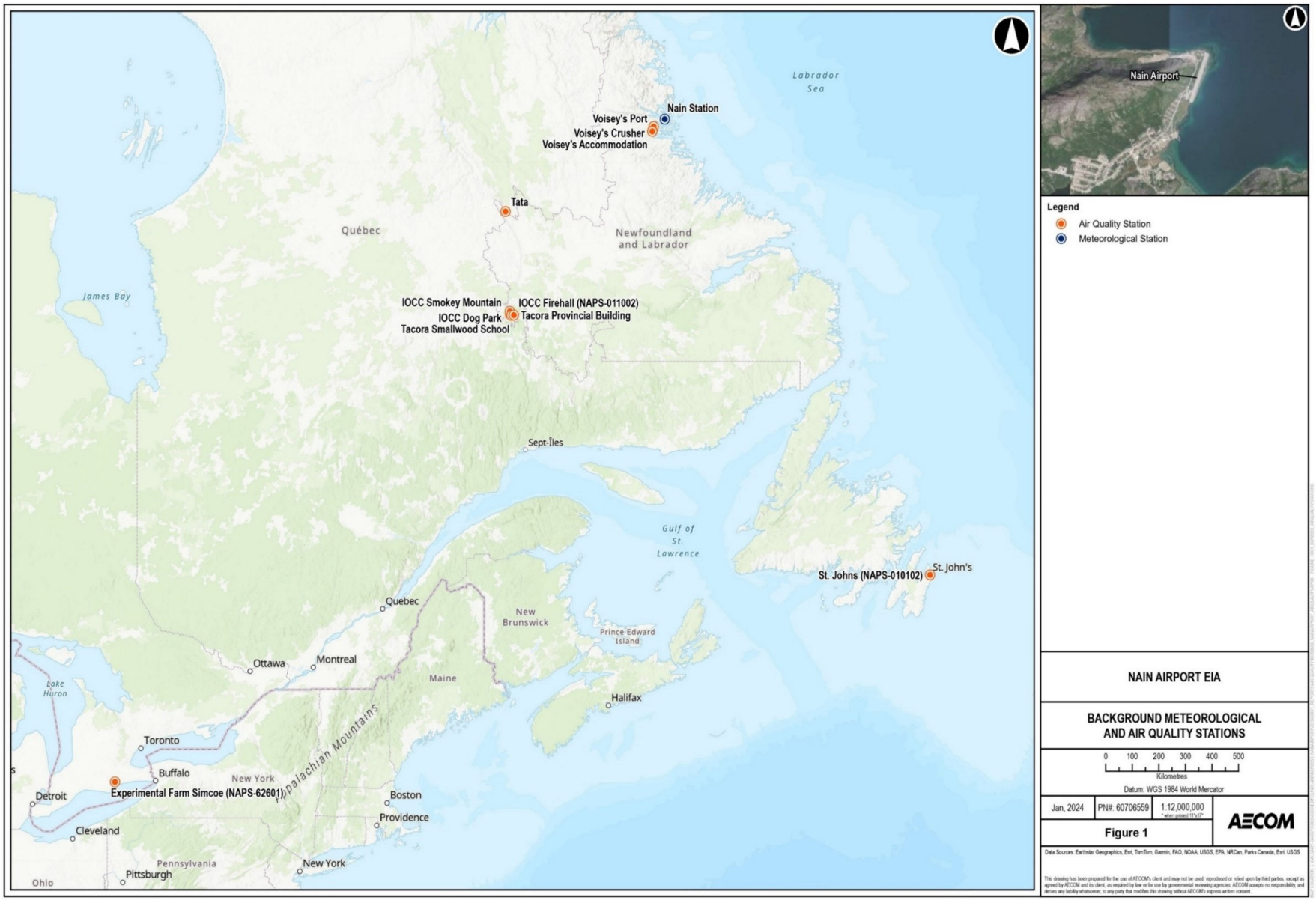


Figure 4.1-1
Air Quality and Climate Study Area
and Background Stations

4.1.2 Methods

4.1.2.1 Air Quality Indicators

Air contaminants of concern include particulate matter with an aerodynamic diameter of less than 10 µm (PM_{10}) and aerodynamic diameter of less than 2.5 µm ($PM_{2.5}$), total suspended particulate (TSP), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO), as well as benzene and benzo(a) pyrene.

The evaluation of ambient air quality typically relies on comparison of modelled concentrations to regulatory thresholds (standards/objectives/criteria). The regulatory thresholds are designed by the local, provincial, or federal authority to be conservative and protective of air quality. The *Air Quality Standards* provided by Newfoundland and Labrador Regulation 11/22 (DOEC 2022) were used in this assessment as listed in Table 4.1-1. Canadian Ambient Air Quality Standards (CAAQS; CCME 2017) are also provided.

Table 4.1-1: Ambient Air Quality Standards

Compound[1]	Averaging Period	Newfoundland & Labrador AQ Standard (µg/m^3)	2020-CAAQS (µg/m^3)	2025-CAAQS (µg/m^3)
Sulphur Dioxide (SO_2)	1-hour 3-hour 24-hour Annual	900 600 300 60	183 - - 13	170 - - 10
Nitrogen Dioxide (NO_2)	1-hour 24-hour Annual	400 200 100	113 - 32	79 - 23
Carbon Monoxide (CO)	1-hour 8-hour	30,582 13,107	-	-
Particulate Matter with a diameter of 2.5 micrometres and less ($PM_{2.5}$)	24-hour Annual	25 8.8	27 8.8	-
Particulate Matter with a diameter of 10 micrometres and less (PM_{10})	24-hour	50	-	-
Total Suspended Particulates (TSP)	24-hour Annual	120 60	-	-
Benzene	24-hour Annual	2.30* 0.45*	-	-
Benzo(a)pyrene	24-hour Annual	5E-05* 1E-05*	-	-

*Note: * Ontario's Ambient Air Quality Criteria (Ontario MECP 2020) as no standard is available from NL.*

4.1.2.2 Air Quality, Meteorological and Climate Data Sources

Table 4.1-2 and Figure 4.1-1 provide the locations of the air quality stations nearest the airport. The number of air quality parameters measured at these stations varies.

The parameters measured at each station are listed in Table 4.1-2 from a central repository for ambient air quality data collected in NL. Among the stations, IOCC Firehall and St. John are NAPS stations, while the remaining eight stations (Voisey's Port, Voisey's Accommodation, Voisey's Crusher, Tata, IOCC Dog Park, IOCC Smokey Mountain, Tacora Smallwood School, and Tacora Provincial Building) are air quality stations operated by industrial partners within the province.

Table 4.1-2: Summary of Air Quality and Meteorological Stations in the Region, 2016-2023

Station	Latitude (Degree)	Longitude (Degree)	Distance to Nain Airport (km)	Province	Location	Data Period	SO_2	NO_2	CO	$PM_{2.5}$	PM_{10}	TPM	Benzo(a)pyrene	Benzene
Voisey's Port	56.4209	-62.0557	~34	NL	Industrial	2019-2023						X		
Voisey's Accommodation	56.3394	-62.0973	~34	NL	Industrial	2019-2023		X		X				
Voisey's Crusher	56.3366	-62.1047	~34	NL	Industrial	2019-2023		X						
Tata	54.8756	-67.0615	~390	NL	Industrial/Remote	2019-2023		X		X				
IOCC Firehall (NAPS-011002)	52.9455	-66.9102	~520	NL	Residential	2019-2023	X	X		X	X	X		
IOCC Dog Park	52.9304	-66.9105	~520	NL	Residential	2019-2023	X	X		X		X		
IOCC Smokey Mountain	52.9768	-66.9211	~520	NL	Remote	2019-2023	X	X		X		X		
Tacora Smallwood School	52.8982	-66.8642	~520	NL	Residential	2019-2023				X		X		
Tacora Provincial Building	52.9084	-66.7809	~520	NL	Remote	2019-2023	X			X		X		
St. Johns (NAPS-010102)	47.56038	-52.71147	~1200	NL	Residential	2016-2021	X	X	X	X				X
Experimental Farm Simcoe (NAPS-62601)	42.85685	-80.26964	~2000	ON	Remote/Agricultural	2016-2020	X			X			X	X
Nain A Station (meteorology)	56.55056	-61.68222	0	NL	Airport	2019-2022	–	–	–	–	–	–	–	–

Note: "–" Not applicable

Data Source: Government of Newfoundland and Labrador, NL Air Quality (https://www.gov.nl.ca/ecc/)

4.1.3 Baseline Conditions

4.1.3.1 Air Quality

4.1.3.1.1 Sulphur Dioxide

The impact of fires and other upset sources of emissions have not been removed from the databases used to summarize ambient concentrations. It is expected that the 90th percentile, which has been identified as a reasonably conservative estimate of background is unlikely to be affected by occasional high values.

Table 4.1-3 is a compilation of SO_2 data statistics across the nearest stations. Situated in a remote area, like the proposed Nain airport, the Iron Ore Company of Canada (IOCC) Smokey Mountain was selected as the background station. Other nearby stations are in areas exposed to residential or industrial activity, making them unsuitable as a background station for a remote location.

Table 4.1-3: SO_2 (µg/m^3) Concentration Statistics

Station	Distance to Nain Airport (km)	Location	Min	Max	Median	90th Percentile
IOCC Firehall (NAPS-011002)	~520 km	Residential	0	138.0	0.4	0.8
IOCC Dog Park	~520 km	Residential	0	124.9	0.6	1.7
IOCC Smokey Mountain	~520 km	Remote	0	102.5	0.6	1.2
Tacora Provincial Building	~520 km	Remote	0	217.9	1.2	6.4

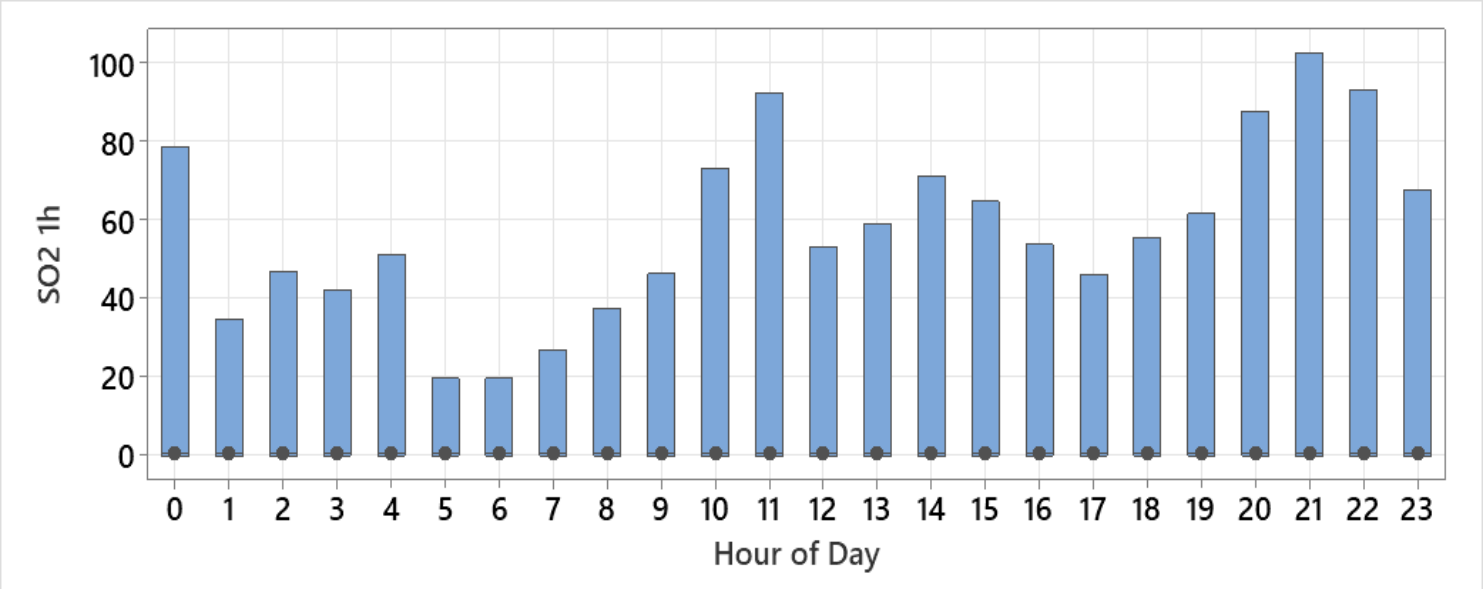
Table 4.1-4: summarizes SO_2 concentrations at IOCC Smokey Mountain station during 2019 to 2023. Diurnal and seasonal fluctuations in SO_2 concentration based on 1-h measurements are shown in Figure 4.1-2 and Figure 4.1-3, respectively. The results indicate the following:

- Maximum 1-h, 3-h, 24-h, and 90th percentile SO_2 concentrations are below the NLAQ over the period of five years (2019-2023)
- Annual SO_2 concentrations ranged from 0.5 to 0.8 µg/m^3 and were below the NLAQ of 60 µg/m^3. The average of the five years is 0.6 µg/m^3
- SO_2 median 1-hour average concentrations showed minor diurnal variations with peak concentrations in the mid-day to early afternoon and minimums after midnight (Figure 4.1-2)
- SO_2 median 1-hour average concentrations showed peak concentrations in April (Figure 4.1-3)

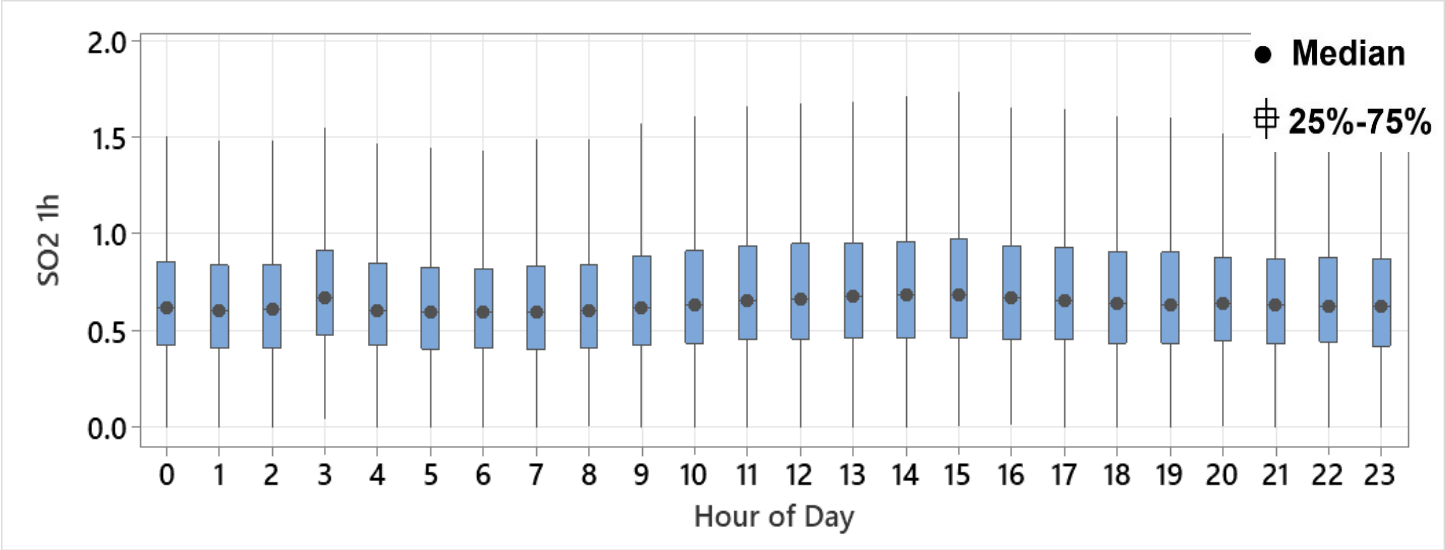
Table 4.1-4: SO_2 Concentrations (µg/m^3) Measured at the IOCC Smokey Mountain Air Quality Station, 2019-2023

Averaging Period	IOCC Smokey Mountain					Average	NLAQ[(a)]
	2019	2020	2021	2022	2023		
1-h Maximum	78.7	43.0	53.8	49.4	102.5	65.5	900
1-h 90th percentile	0.9	1.0	1.1	1.3	1.7	1.2	-
3-h Maximum	63.5	32.2	28.2	32.2	94.5	50.1	600
3-h 90th percentile	1.0	1.0	1.1	1.3	1.8	1.2	-
24-h Maximum	23.0	6.2	6.1	17.8	26.1	15.8	300
24-h 90th Percentile	1.5	1.2	1.2	1.8	2.4	1.6	-
Annual Average	0.5	0.6	0.7	0.7	0.8	0.6	60

Note: (a) Source: Newfoundland & Labrador AQ Standard



The Blue Bar Shows the Maximum Value in the Period, including Outliers. The Black Dot Represents Median Concentrations.



The Box Shows Data in the First and Third Quartiles, and Whiskers Represent the Minimum and Maximum, excluding Outliers. The Black Dot Represents Median Concentrations

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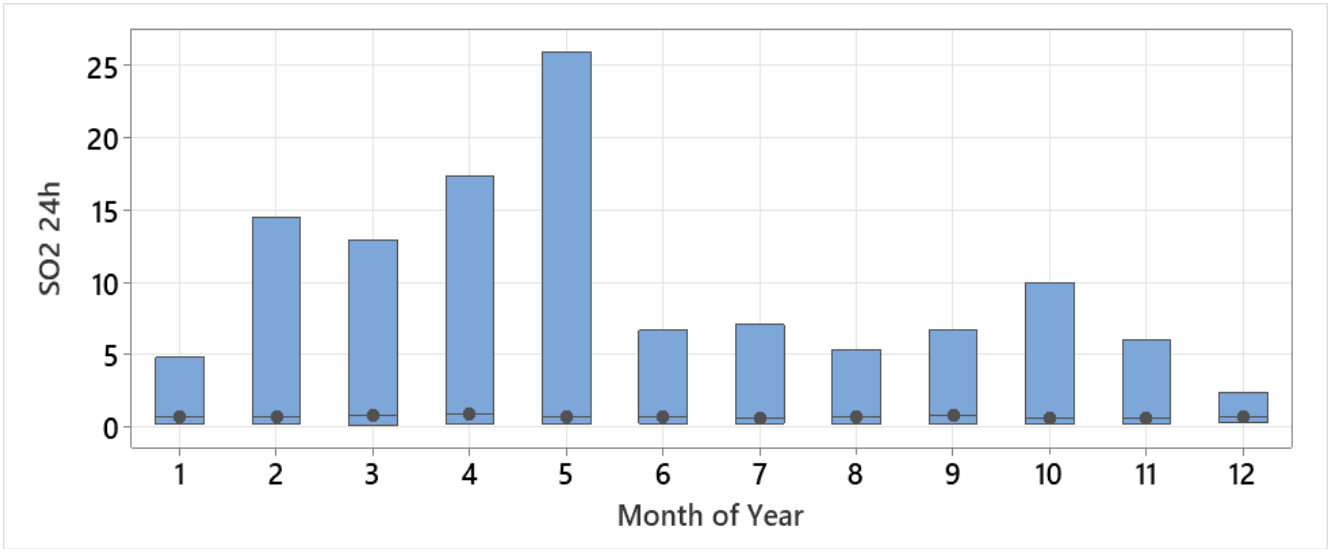
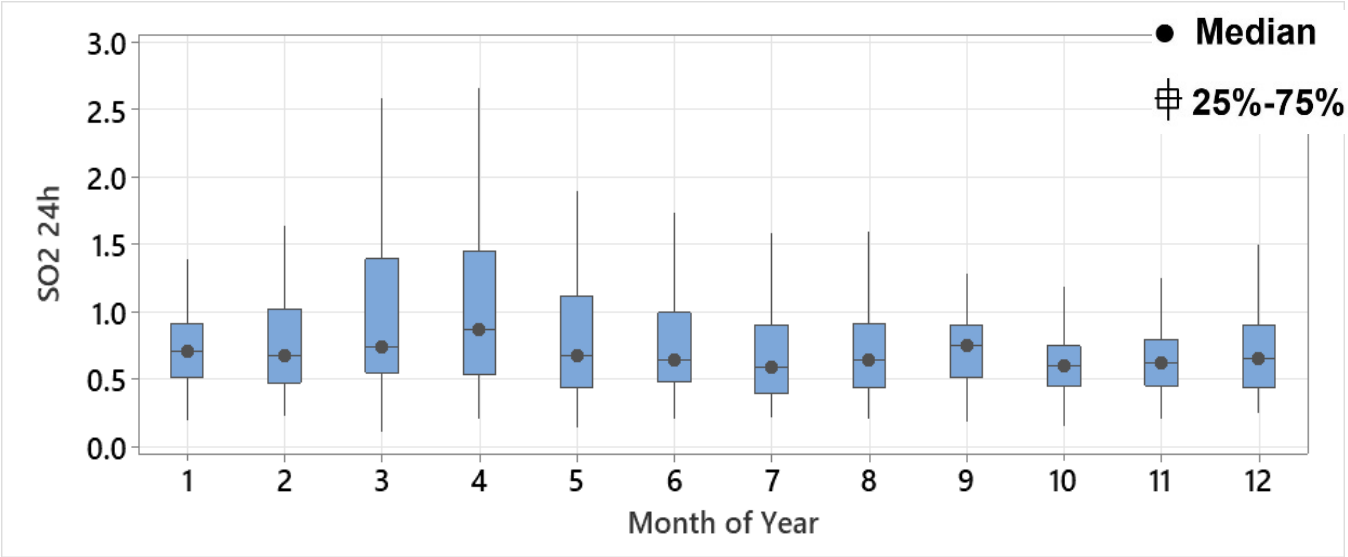
Figure 4.1-2

Diurnal Variation in Maximum 1-hour Average SO2 Concentration at the IOCC Smokey Mountain Air Quality Station, 2019-2023



The Blue Bar Shows the Maximum Value in the Period, including Outliers. The Black Dot Represents Median Concentrations.



The Box Shows Data in the First and Third Quartiles, and Whiskers Represent the Minimum and Maximum, excluding Outliers. The Black Dot Represents Median Concentrations

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Figure 4.1-3

Seasonal Variation in Maximum 1-hour Average SO2 Concentration at the IOCC Smokey Mountain Air Quality Station, 2019-2023

4.1.3.1.2 Nitrogen Dioxide

Table 4.1-5: is a compilation of NO_2 statistics across the nearest stations. Situated in a remote area, like the proposed Nain airport, the IOCC Smokey Mountain was selected as a conservative background station. Other nearby stations are in areas exposed to residential or industrial activity, making them unsuitable as a background station for a remote location.

Table 4.1-5: NO_2 (µg/m^3) Concentration Statistics

Station	Distance to Nain Airport (km)	Location	Min	Max	Median	90th Percentile
Voisey's Accommodation	~34 km	Industrial	0	141.2	10.0	42.1
Voisey's Crusher	~34 km	Industrial	0	156.4	4.4	21.9
Tata	~390 km	Industrial/Remote	0	420.5	0.9	8.4
IOCC Firehall (NAPS-011002)	~520 km	Residential	0	113.3	2.1	10.9
IOCC Dog Park	~520 km	Residential	0	71.6	1.8	10.0
IOCC Smokey Mountain	~520 km	Remote	0	102.9	1.3	7.8

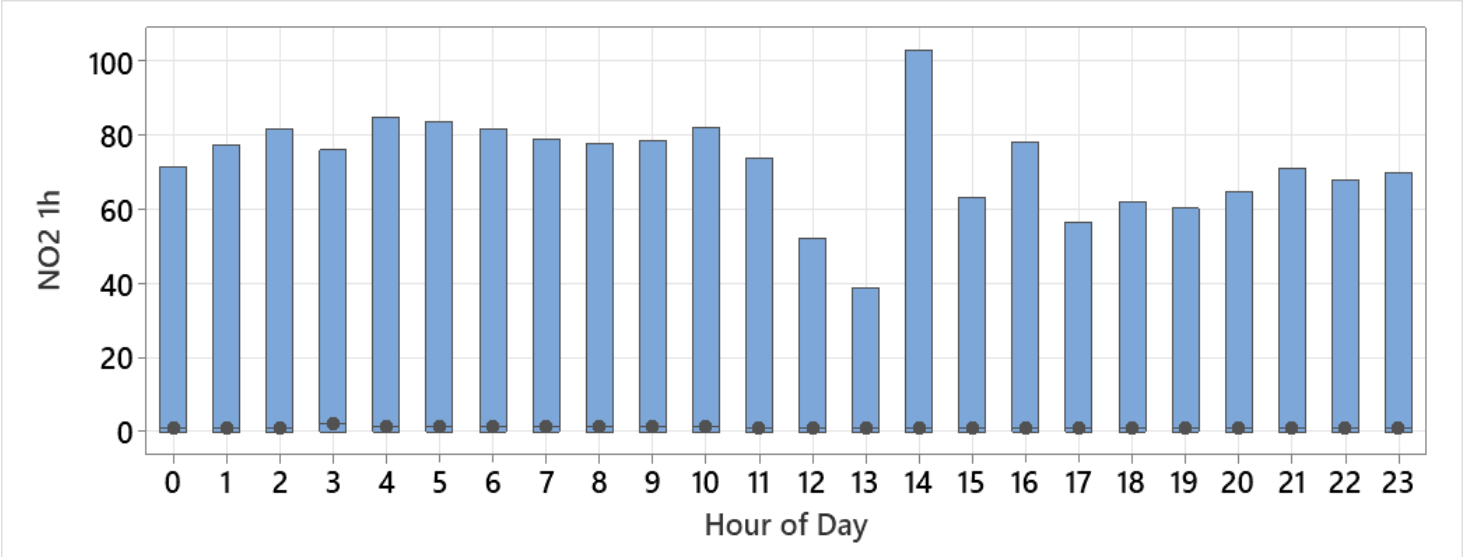
Table 4.1-6 summarizes measured NO_2 concentrations at the IOCC Smokey Mountain station during 2019 to 2023. Diurnal and seasonal fluctuations in NO_2 concentration based on 1-h measurements are shown in Figure 4.1-4 and Figure 4.1-5, respectively. The results of NO_2 observations indicate the following:

- Maximum 1-h, 24-h, and 90th percentile NO2 concentrations are below the NLAQ over the period of five years (2019-2023)
- Annual NO2 concentrations ranged from 1.0 to 1.5 µg/m^3 and were below the NLAQ of 100 µg/m^3. The annual average of the five years is 1.3 µg/ m^3
- NO2 median 1-hour average concentrations showed diurnal variations with peak concentrations after midnight and minimums in the afternoon (Figure 4.1-4)
- NO2 median 1-hour average concentrations showed seasonal peak concentrations in January (Figure 4.1-5)

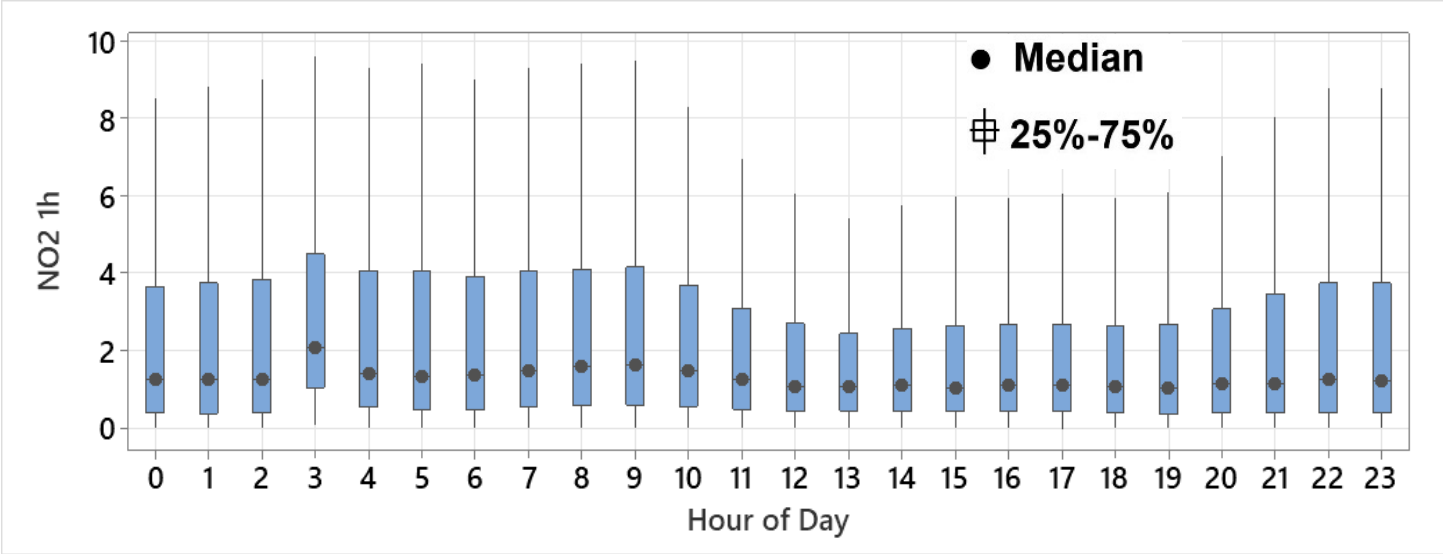
Table 4.1-6: NO_2 Concentrations (µg/m^3) Measured at the IOCC Smokey Mountain Air Quality Station, 2019-2023

Averaging Period	IOCC Smokey Mountain					Average	NLAQ[(a)]
	2019	2020	2021	2022	2023		
1-h Maximum	78.3	67.8	102.9	71.2	85.0	81.0	400
1-h 90th Percentile	8.4	5.8	8.8	7.0	8.7	7.8	-
24-h Maximum	31.0	28.7	34.9	41.0	47.7	36.7	200
24-h 90th Percentile	7.0	4.9	7.5	6.0	7.4	6.5	-
Annual Average	1.3	1.0	1.3	1.3	1.5	1.3	100

Notes: (a) Source: Newfoundland & Labrador AQ Standard



The Blue Bar Shows the Maximum Value in the Period, including Outliers. The Black Dot Represents Median Concentrations.



The Box Shows Data in the First and Third Quartiles, and Whiskers Represent the Minimum and Maximum, excluding Outliers. The Black Dot Represents Median Concentrations

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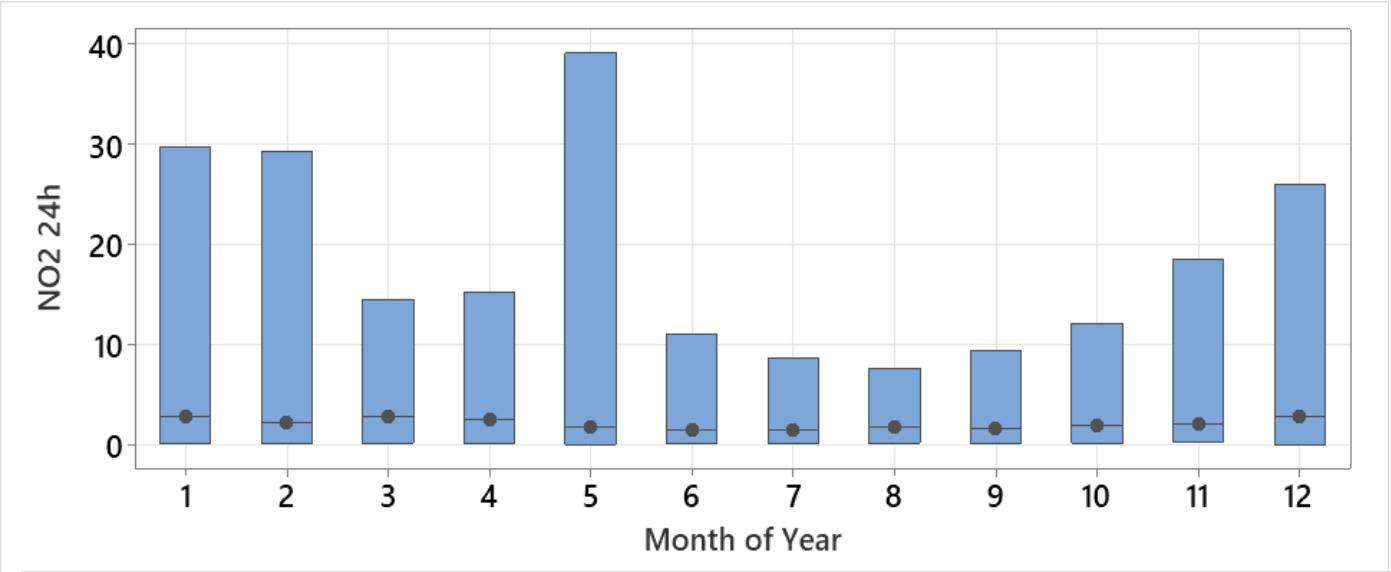
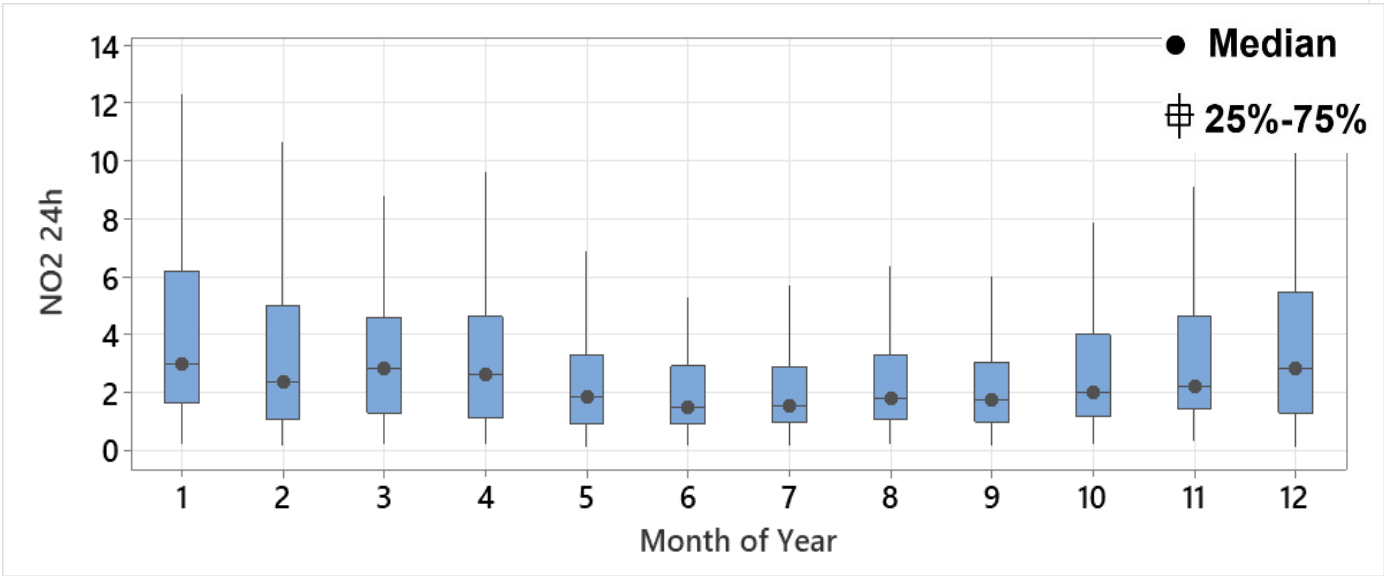
Figure 4.1-4

Diurnal Variation in 1-hour Average NO2 Concentration
at the IOCC Smokey Mountain Air Quality Station, 2019-2023



The Blue Bar Shows the Maximum Value in the Period, including Outliers. The Black Dot Represents Median Concentrations.



The Box Shows Data in the First and Third Quartiles, and Whiskers Represent the Minimum and Maximum, excluding Outliers. The Black Dot Represents Median Concentrations

Figure 4.1-5

Seasonal Variation in NO2 1-hour Average Concentration at the IOCC Smokey Mountain Air Quality Station, 2019-2023

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4.1.3.1.3 Carbon Monoxide

Table 4.1-7 presents a compilation of CO statistics at the only available station, St. Johns. Table 4.1-8 summarizes CO concentrations at the St. Johns station during 2017 to 2021. Diurnal variations in CO concentrations are presented in Figure 4.1-6. Seasonal fluctuations in CO concentration based on 1-hour measurements are shown in Figure 4.1-7.

Table 4.1-7: CO (µg/m^3) Concentration Statistics at St. Johns Station

Station	Distance to Nain Airport (km)	Location	Min	Max	Median	90th Percentile
St. Johns (NAPS-010102)	~1200 km	Residential	0	4329	172	252

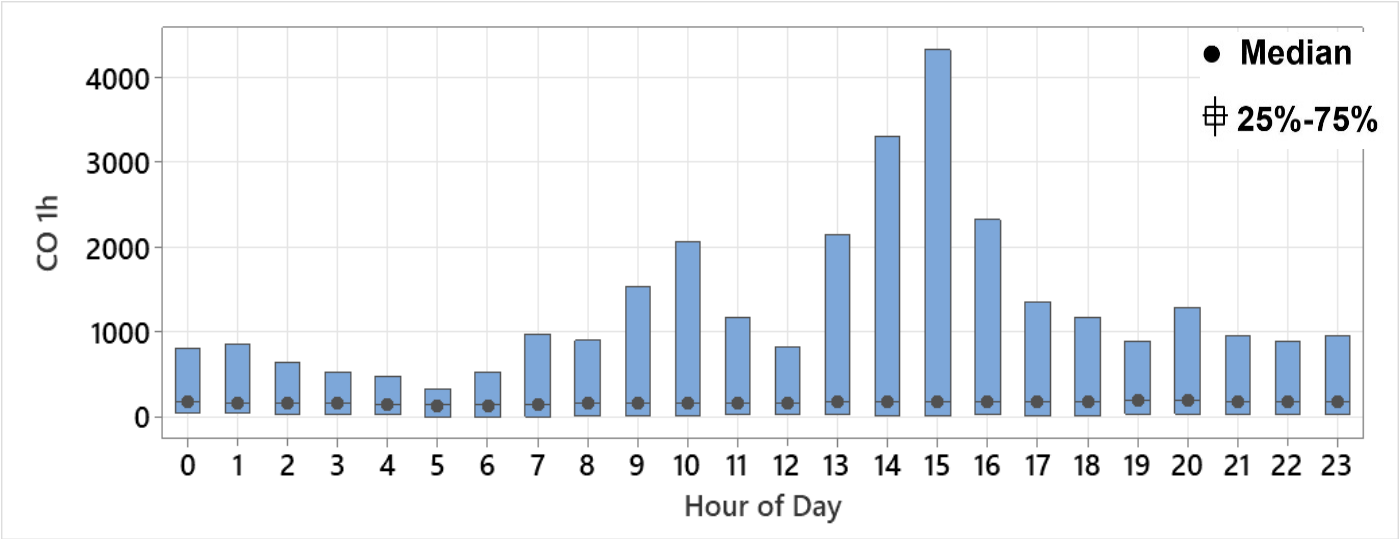
The results indicate:

- Over the period of five years, maximum 1-h, 8-h, and their 90th percentiles CO concentrations are below the NLAQ of 30,582 and 13,107 µg/m^3 of 1-h and 8-h, respectively
- Annual CO concentration ranged from 149 to 183 µg/m^3 with an average of 169 µg/m^3 over the period of five years (2017-2021)
- CO median 1-hour average concentrations showed diurnal variations with peak concentrations in early evening and minimums in early morning (Figure 4.1-6)
- CO median 1-hour average concentrations showed seasonal variations peak concentrations in September (Figure 4.1-7)

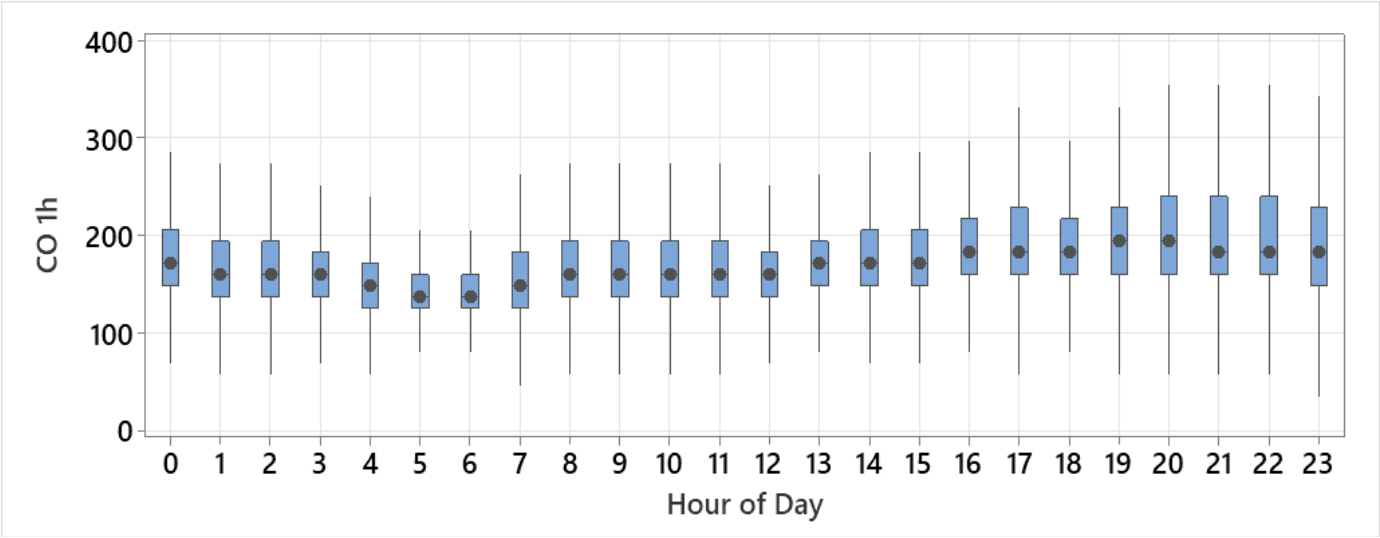
Table 4.1-8: CO Concentrations (µg/m^3) Measured at the St. Johns Air Quality Station, 2017-2021

Averaging Period	St. Johns					Average	NLAQ[(a)]
	2017	2018	2019	2020	2021		
1-h Maximum	1306	4329	1168	905	2061	1954	30,582
1-h 90th percentile	286	275	252	229	218	252	-
8-h Maximum	651	2053	676	575	721	935	13,107
8-h 90th percentile	269	271	242	226	212	244	-
Annual Average	183	183	172	160	149	169	-

Notes: (a) Newfoundland & Labrador AQ Standard



The Blue Bar Shows the Maximum Value in the Period, including Outliers. The Black Dot Represents Median Concentrations.



The Box Shows Data in the First and Third Quartiles, and Whiskers Represent the Minimum and Maximum, excluding Outliers. The Black Dot Represents Median Concentrations

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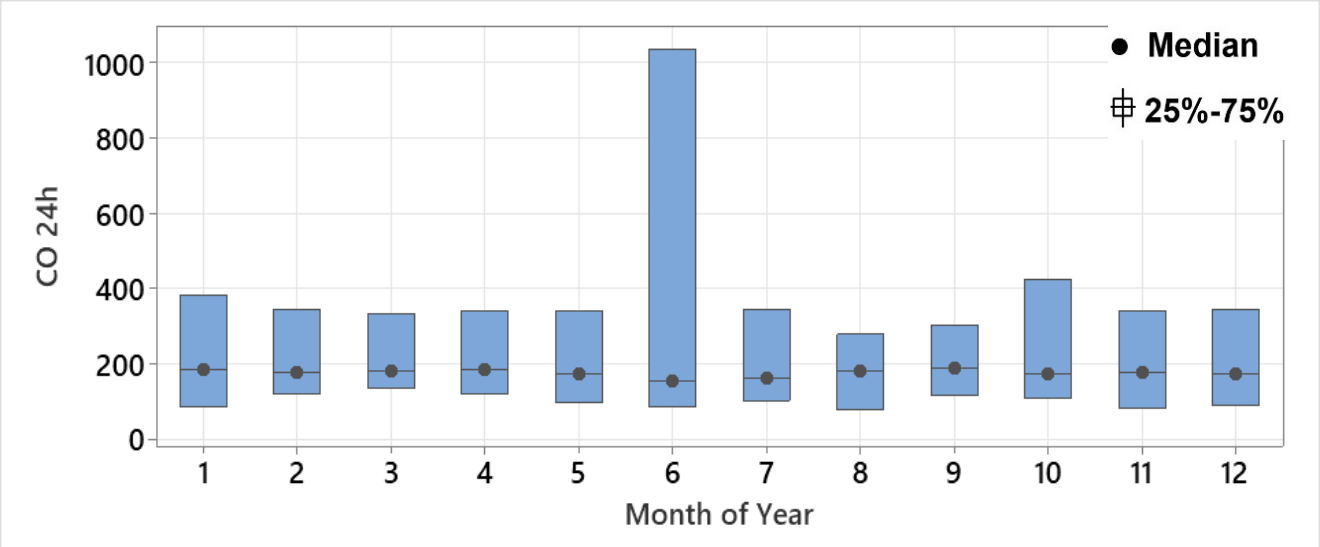
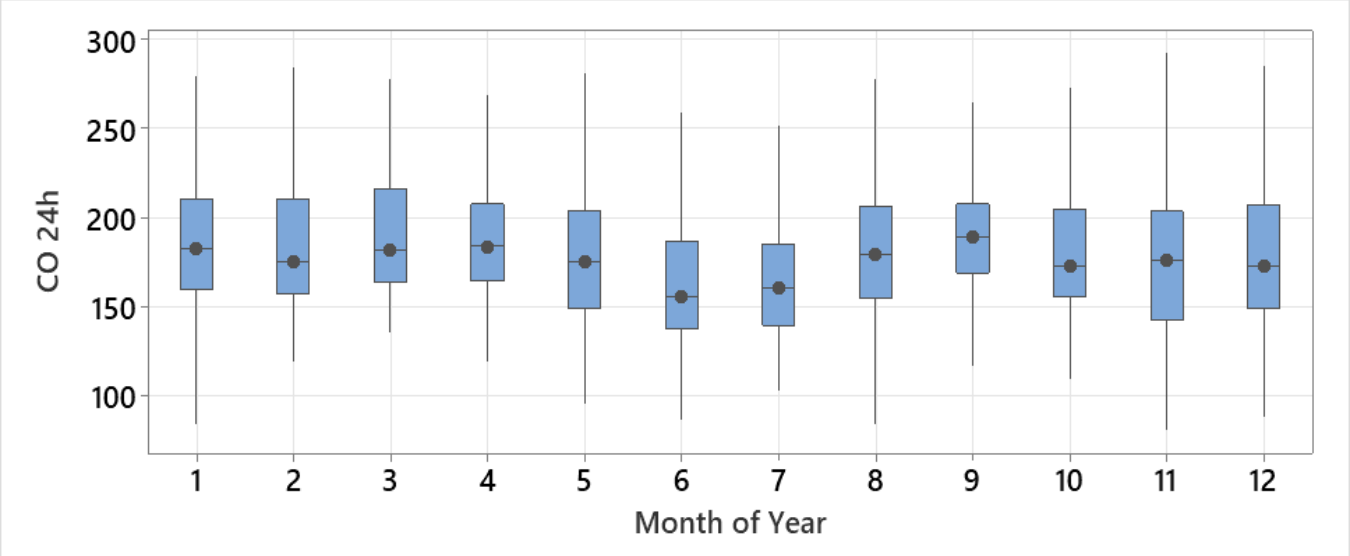
Figure 4.1-6
Diurnal Variation in Maximum 1-hour Average CO Concentration at the St. Johns Air Quality Station, 2017-2021



The Blue Bar Shows the Maximum Value in the Period, including Outliers. The Black Dot Represents Median Concentrations.



The Box Shows Data in the First and Third Quartiles, and Whiskers Represent the Minimum and Maximum, excluding Outliers. The Black Dot Represents Median Concentrations

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Figure 4.1-7
Seasonal Variation in Maximum 1-hour Average CO Concentration at the St. Johns Air Quality Station, 2017-2021

4.1.3.1.4 Particulate Matter Less than 2.5 µm – $PM_{2.5}$

Table 4.1-9 is a compilation of $PM_{2.5}$ data statistics across the nearest stations. Situated in a remote area, like the proposed Nain airport, the IOCC Smokey Mountain was selected as the background station. Other nearby stations are in areas exposed to residential or industrial activity, making them unsuitable as a background station for a remote location.

Table 4.1-9: $PM_{2.5}$ (µg/m^3) Concentration Statistics

Station	Distance to Nain Airport (km)	Location	Min	Max	Median	90th Percentile
Voisey's Accommodation	~34 km	Industrial	0	187	4	8
Tata	~390 km	Industrial/Remote	0	185	2	7
IOCC Firehall (NAPS-011002)	~520 km	Residential	0	393.5	2.3	7
IOCC Dog Park	~520 km	Residential	0	226	3	9
IOCC Smokey Mountain	~520 km	Remote	0	187	4	9
Tacora Smallwood School	~520 km	Residential	0	185	3	9
Tacora Provincial Building	~520 km	Remote	0	187	3	8

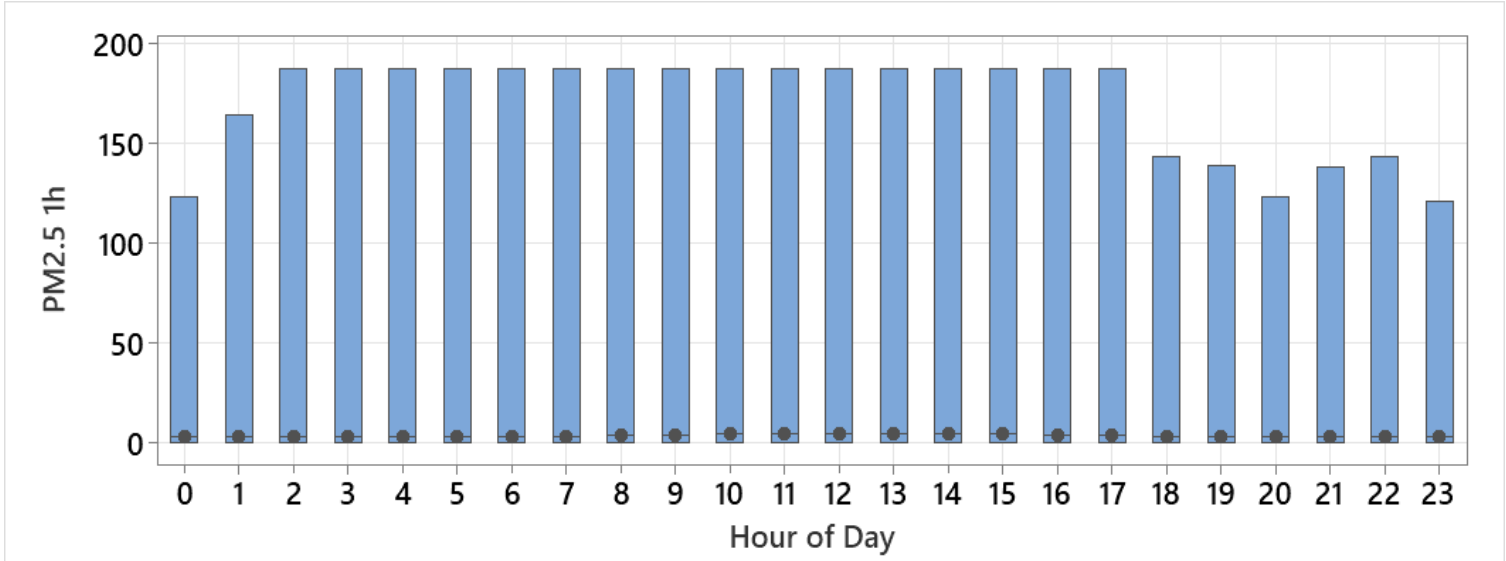
Table 4.1-10 summarizes $PM_{2.5}$ concentrations at the IOCC Smokey Mountain station during 2019 to 2023. Diurnal variations in $PM_{2.5}$ concentrations are presented in Figure 4.1-8. Seasonal fluctuations in $PM_{2.5}$ concentration based on 24-hour measurements are shown in Figure 4.1-9. The results indicate:

- Maximum 24-h $PM_{2.5}$ concentrations ranged from 20 to 160 µg/m^3 with an average of 58 µg/m^3. The maximum 24-h concentrations exceeded the NLAQ in all the studied years except in 2020
- Maximum 24-h 90th percentiles $PM_{2.5}$ concentrations ranged from 4 to 11 µg/m^3 and are below the NLAQ of 25 µg/m^3. The 24-h 90th percentile average of the five years is 7 µg/m^3
- Annual $PM_{2.5}$ concentration ranged from 2 to 5 µg/m^3 and were below the NLAQ of 8.8 µg/m^3. The annual average of the five years is 3.6 µg/m^3
- $PM_{2.5}$ median 1-hour average concentrations showed diurnal variations with peak concentrations from late morning to the afternoon and minimums from evening to the early morning (Figure 4.1-8)
- $PM_{2.5}$ median 24-hour average concentrations showed seasonal peak median concentrations in August (Figure 4.1-9)

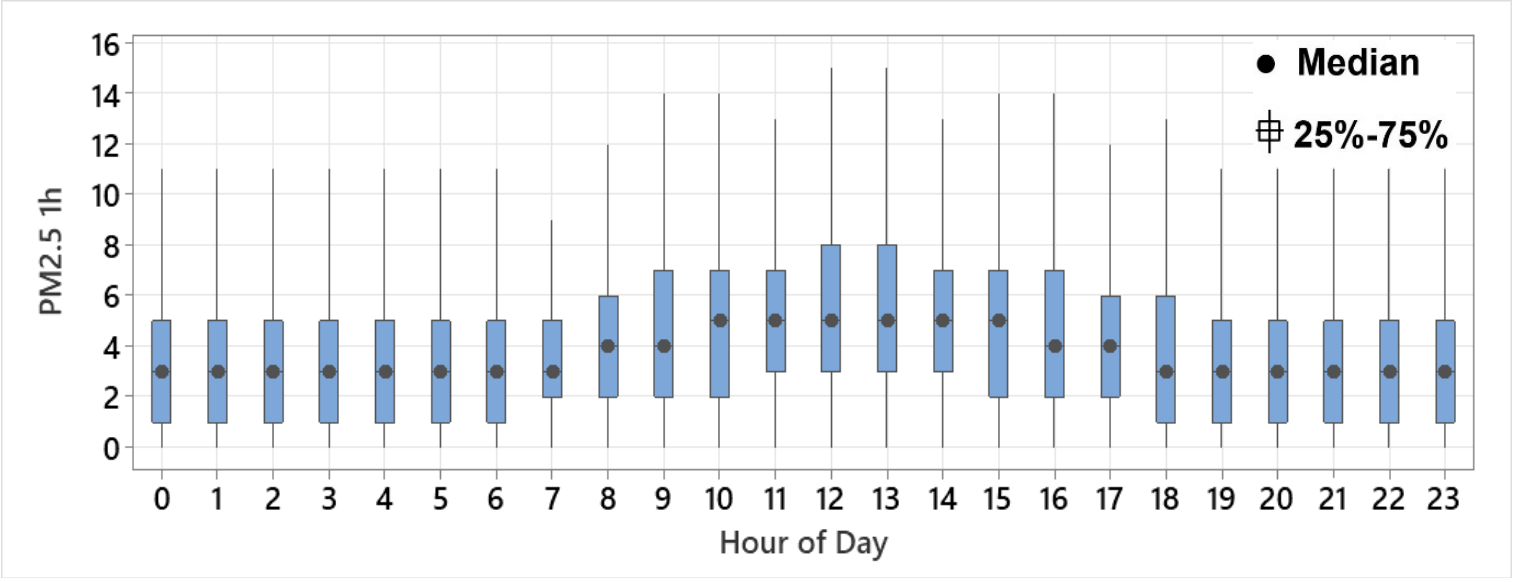
Table 4.1-10: $PM_{2.5}$ Concentrations (µg/m^3) Measured at the IOCC Smokey Mountain Air Quality Station, 2019-2023

Averaging Period	IOCC Smokey Mountain					Average	NLAQ[(a)]
	2019	2020	2021	2022	2023		
24-h Maximum	43.8	20.0	29.0	37.0	159.6	57.9	25
24-h 90th percentile	4.2	6.0	5.5	7.9	11.2	7.0	-
Annual Average	2.0	3.0	3.0	5.0	5.0	3.6	8.8

Notes: (a) Newfoundland & Labrador AQ Standard



The Blue Bar Shows the Maximum Value in the Period, including Outliers. The Black Dot Represents Median Concentrations.



The Box Shows Data in the First and Third Quartiles, and Whiskers Represent the Minimum and Maximum, excluding Outliers. The Black Dot Represents Median Concentrations

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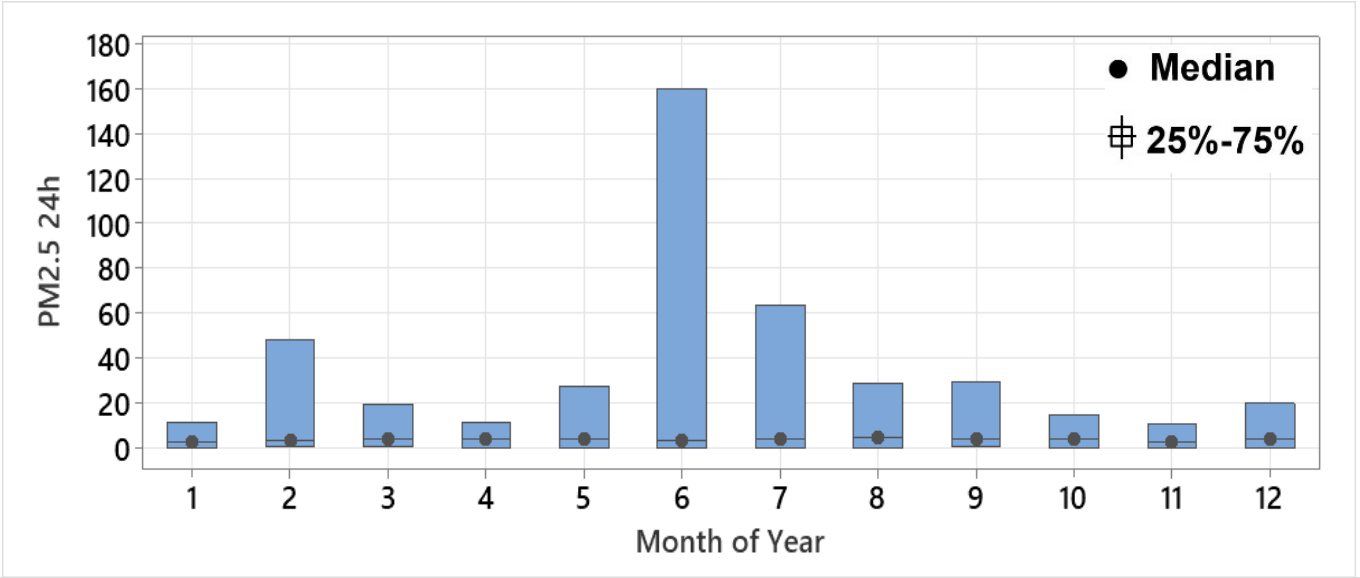
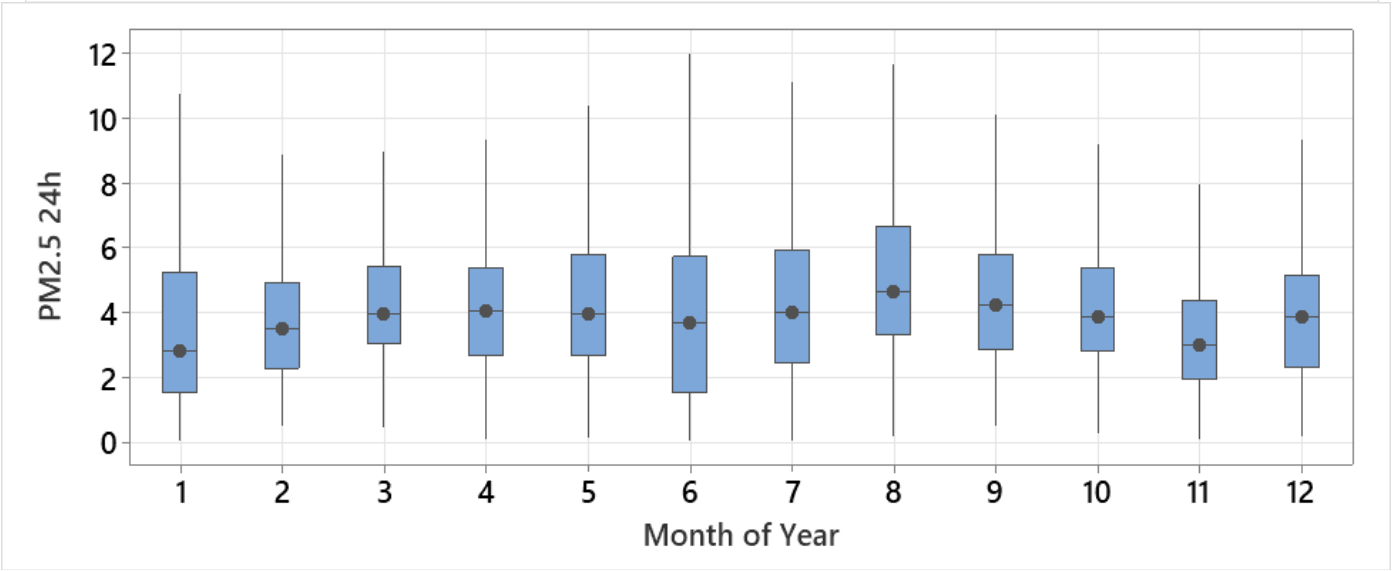
Figure 4.1-8

Diurnal Variation in 1-hour Average PM2.5 Concentration
at the IOCC Smokey Mountain Air Quality Station, 2019-2023



The Blue Bar Shows the Maximum Value in the Period, including Outliers. The Black Dot Represents Median Concentrations.



The Box Shows Data in the First and Third Quartiles, and Whiskers Represent the Minimum and Maximum, excluding Outliers. The Black Dot Represents Median Concentrations

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Figure 4.1-9

Seasonal Variation in 24-hour Average PM2.5 Concentration at the IOCC Smokey Mountain Air Quality Station, 2019-2023

4.1.3.1.5 Particulate Matter Less than 10 µm – PM_{10}

Table 4.1-11 presents PM_{10} statistics at the only available station, IOCC Firehall. Table 4.1-12 summarizes PM_{10} concentrations at the IOCC Firehall station during 2019 to 2023. Diurnal variations in PM_{10} concentrations are presented in Figure 4.1-10. Seasonal fluctuations in PM_{10} concentration based on 24-hour measurements are shown in Figure 4.1-11.

Table 4.1-11: PM_{10} (µg/m^3) Concentration Statistics at IOCC Firehall Station

Station	Distance to Nain Airport (km)	Location	Min	Max	Median	90th Percentile
IOCC Firehall (NAPS-011002)	~520 km	Residential	0	1091.2	7.8	27.2

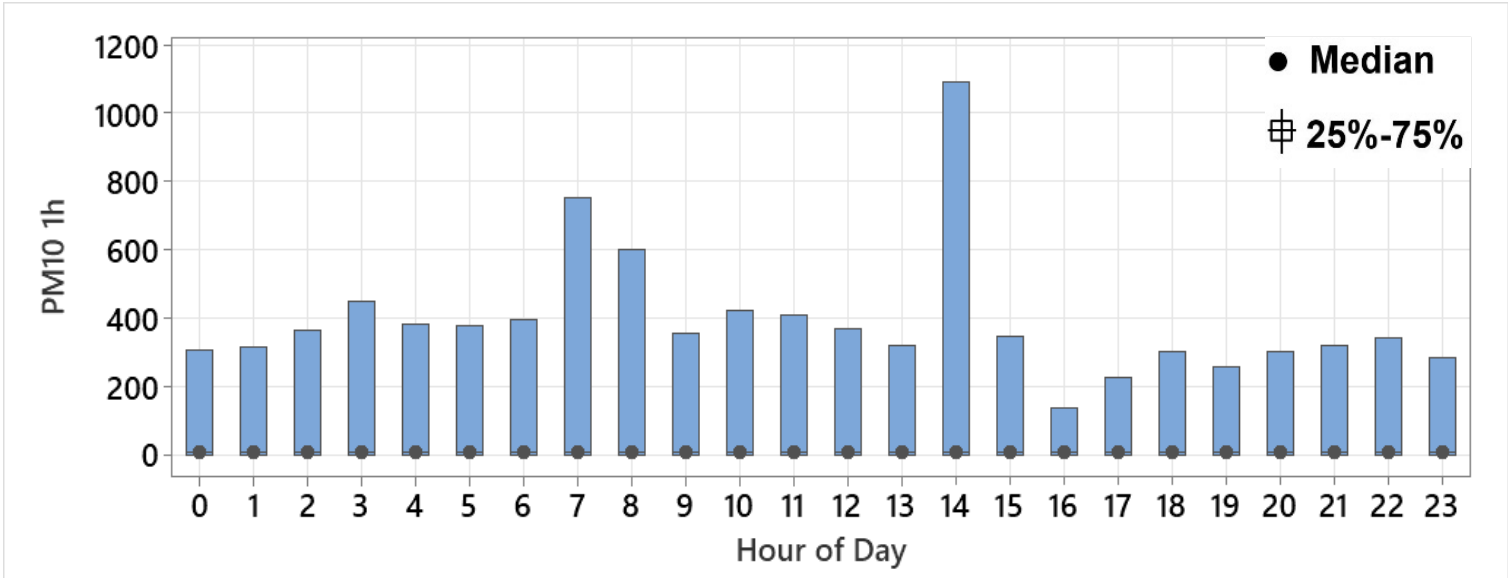
The results indicate:

- Maximum 24-h PM_{10} concentrations ranged from 27 to 296 µg/m^3 with an average of 143 µg/m^3. The maximum 24-h concentrations exceeded the NLAQ of 50 µg/m^3 in 2022 and 2023
- Maximum 24-h 90th percentiles PM_{10} concentrations ranged from 14 to 39 µg/m^3 with an average of 25 µg/m^3 are below the NLAQ of 50 µg/m^3
- Annual PM_{10} concentration ranged from 5 to 9 µg/m^3 with an average of 7 µg/m^3
- PM_{10} median 1-hour average concentrations showed diurnal variations with peak concentrations from afternoon to early evening and minimums after midnight (Figure 4.1-10)
- PM_{10} median 24-hour average concentrations showed seasonal peak concentrations in April and May (Figure 4.1-11)

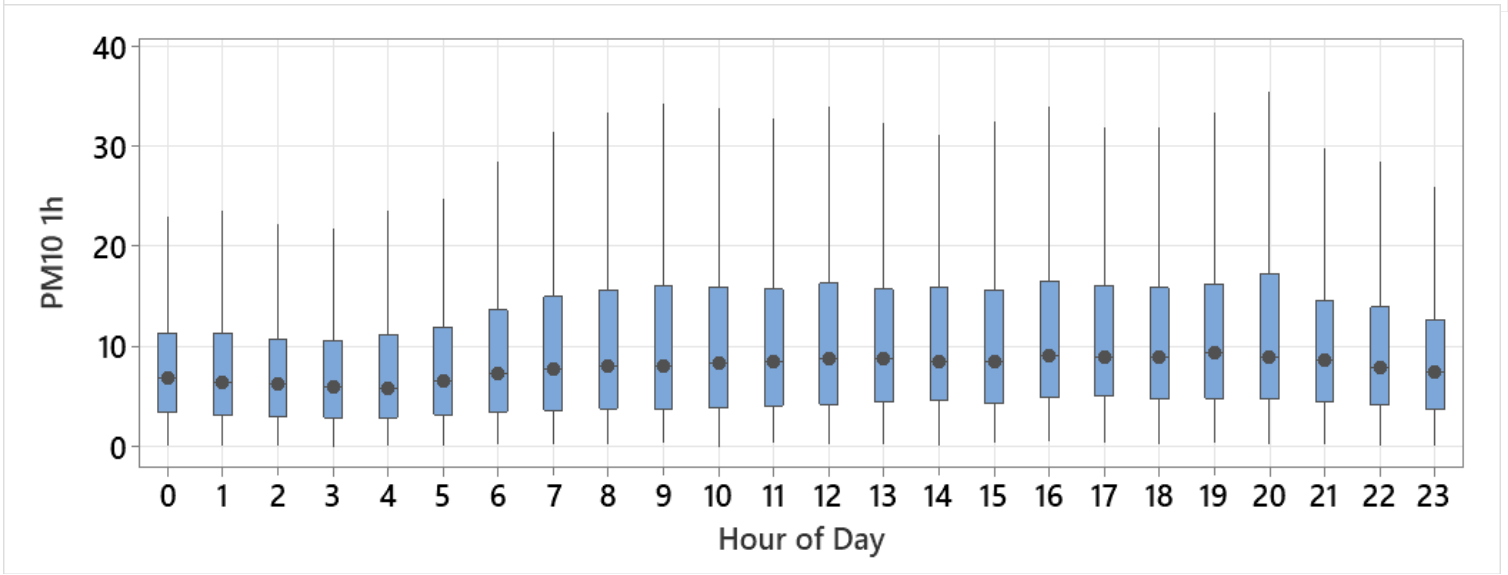
Table 4.1-12: PM_{10} Concentrations (µg/m^3) Measured at the IOCC Firehall Air Quality Station, 2019-2023

Averaging Period	IOCC Firehall					Average	NLAQ[(a)]
	2019	2020	2021	2022	2023		
24-h Maximum	-	-	26.6	106.0	295.9	142.9	50
24-h 90th percentile	-	-	14.2	22.0	38.8	25.0	-
Annual Average	-	-	5.0	7.4	9.3	7.2	-

Notes: (a) Newfoundland & Labrador AQ Standard

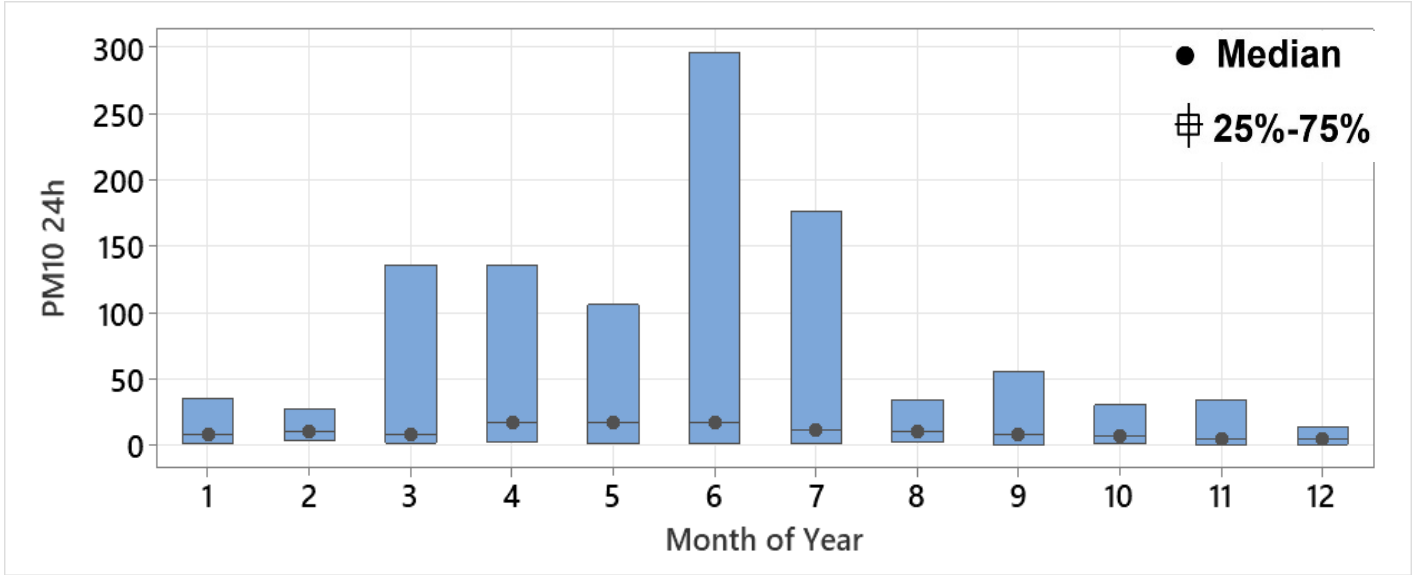


The Blue Bar Shows the Maximum Value in the Period, including Outliers. The Black Dot Represents Median Concentrations.

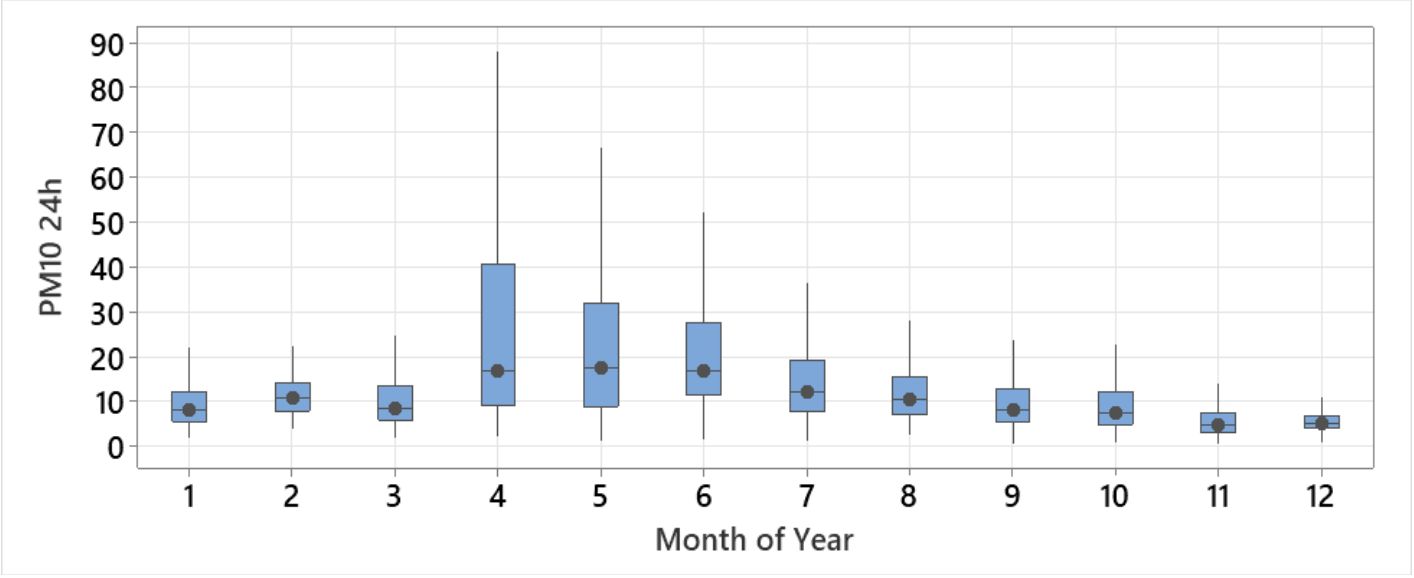


The Box Shows Data in the First and Third Quartiles, and Whiskers Represent the Minimum and Maximum, excluding Outliers. The Black Dot Represents Median Concentrations

Figure 4.1-10
Diurnal Variation in 1-hour Average PM10 Concentration at the IOCC Firehall Air Quality Station, 2019-2023



The Blue Bar Shows the Maximum Value in the Period, including Outliers. The Black Dot Represents Median Concentrations.



The Box Shows Data in the First and Third Quartiles, and Whiskers Represent the Minimum and Maximum, excluding Outliers. The Black Dot Represents Median Concentrations

Figure 4.1-11

Seasonal Variation in 24-hour Average PM10 Concentration at the IOCC Firehall Air Quality Station, 2019-2023

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4.1.3.1.6 Total Suspended Particulates

Table 4.1-13 is a compilation of TSP data statistics across the nearest stations. Situated in a remote area, like the proposed Nain airport, the IOCC Smokey Mountain was selected as the background station. Other nearby stations are in areas exposed to residential or industrial activity, making them unsuitable as a background station for a remote location.

Table 4.1-13 : TSP (µg/m^3) Concentration Statistics

Station	Distance to Nain Airport (km)	Location	Min	Max	Median	90th Percentile
Voisey's Port	~34 km	Industrial	0	987	5	29
IOCC Firehall (NAPS-011002)	~520 km	Residential	0	985	10	58
IOCC Dog Park	~520 km	Residential	0	1044	8	37
IOCC Smokey Mountain	~520 km	Remote	0	987	6	30
Tacora Smallwood School	~520 km	Residential	0	784	7	33
Tacora Provincial Building	~520 km	Remote	0	487	8	36

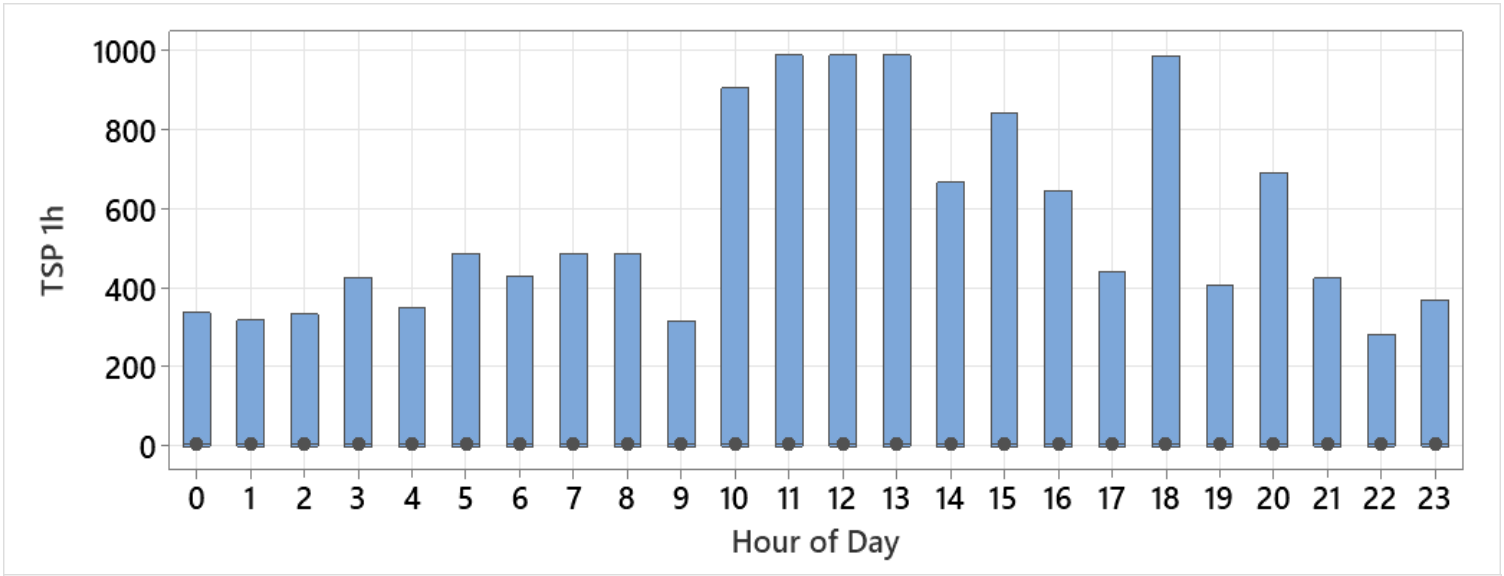
Table 4.1-14 summarizes TSP concentrations at the IOCC Smokey Mountain station during 2019 to 2023. Diurnal variations in TSP concentrations are presented in Figure 4.1-12. Seasonal fluctuations in TSP concentration based on 24-hour measurements are shown in Figure 4.1-13. The results indicate:

- Maximum 24-h TSP concentrations ranged from 110 to 597 µg/m^3 with an average of 264 µg/m^3. The maximum 24-h concentrations exceeded the NLAQ of 120 µg/m^3 in all the studied years except in 2021
- Maximum 24-h 90th percentiles TSP concentrations ranged from 21 to 40 µg/m^3 are below the NLAQ of 120 µg/ m^3. The 24-h 90th percentile average of the five years is 29 µg/m^3
- Annual TSP concentration ranged from 4 to 8 µg/m^3 and were below the NLAQ of 60 µg/m^3. The annual average of the five years is 6 µg/m^3
- TSP median 1-hour average concentrations showed diurnal variations with peak concentrations in the afternoon and minimums in early morning (Figure 4.1-12)
- TSP median 24-hour average concentrations showed seasonal peak median concentrations in June (Figure 4.1-13)

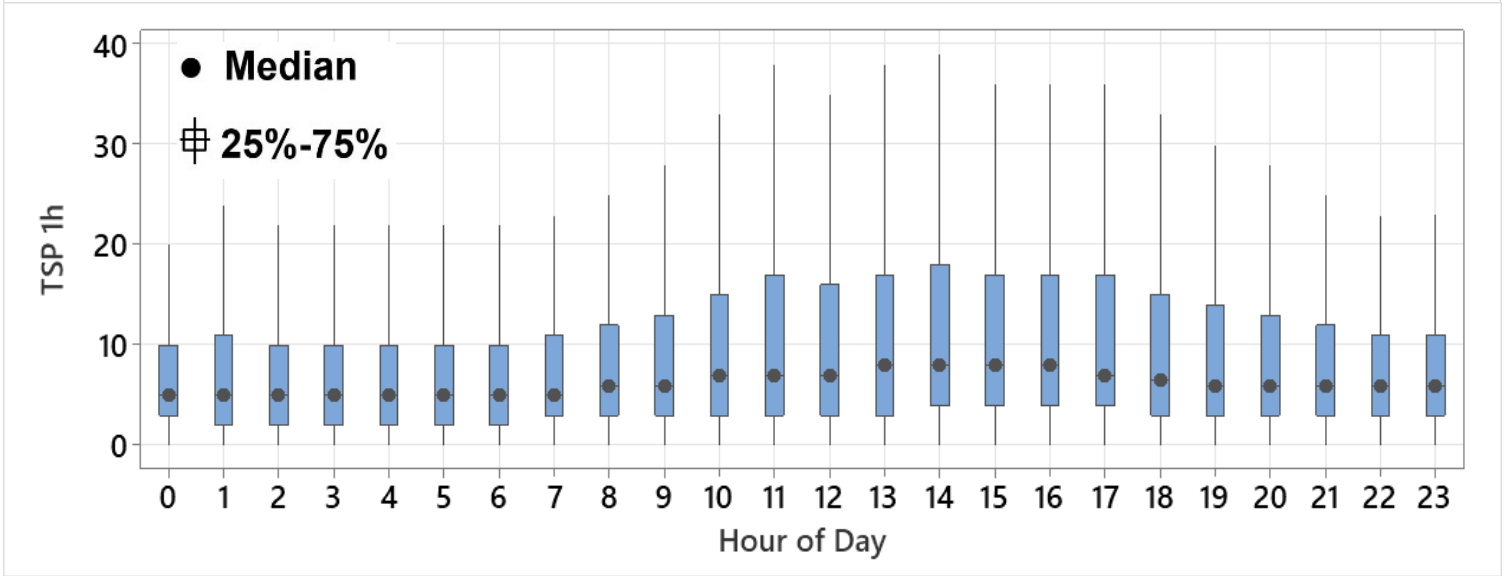
Table 4.1-14: TSP Concentrations (µg/m^3) Measured at the IOCC Smokey Mountain Air Quality Station, 2019-2023

Averaging Period	IOCC Smokey Mountain					Average	NLAQ[(a)]
	2019	2020	2021	2022	2023		
24-h Maximum	159.5	234.8	109.9	219.7	596.9	264.1	120
24-h 90th percentile	29.9	20.6	25.6	28.1	40.2	28.9	-
Annual Average	6.0	4.0	5.0	8.0	7.0	6.0	60

Notes: (a) Source: Newfoundland & Labrador AQ Standard



The Blue Bar Shows the Maximum Value in the Period, including Outliers. The Black Dot Represents Median Concentrations.



The Box Shows Data in the First and Third Quartiles, and Whiskers Represent the Minimum and Maximum, excluding Outliers. The Black Dot Represents Median Concentrations

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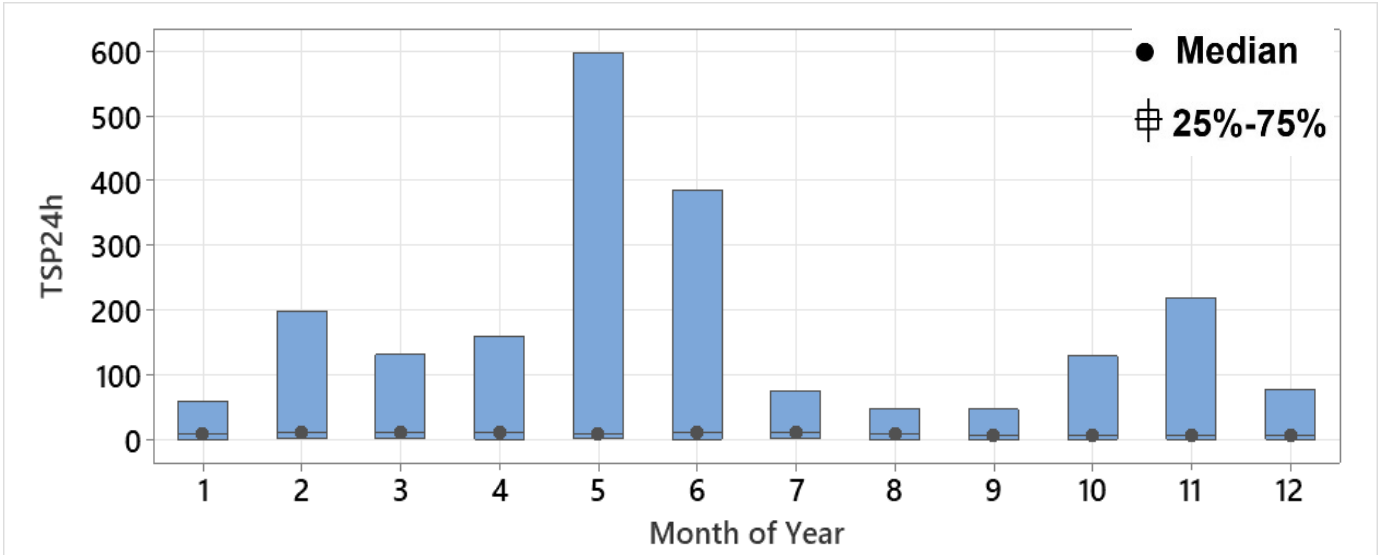
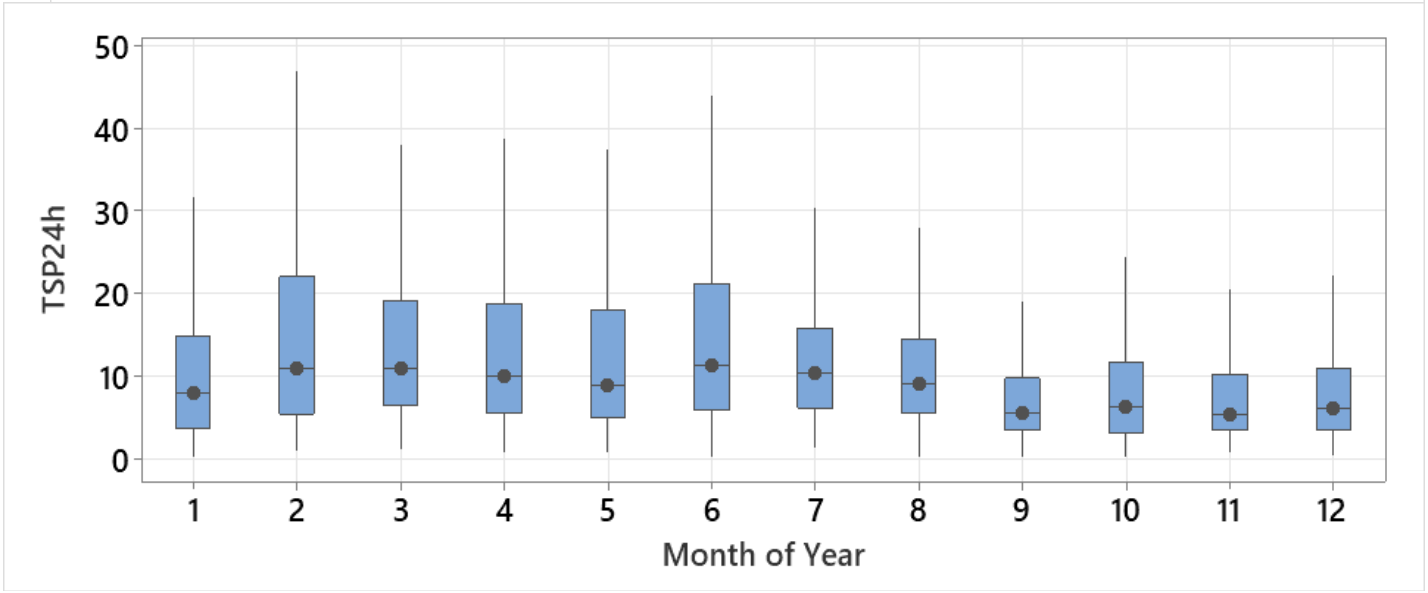
Figure 4.1-12
Diurnal Variation in Maximum 1-hour Average TSP Concentration at IOCC Smokey Mountain Station, 2019-2023



The Blue Bar Shows the Maximum Value in the Period, including Outliers. The Black Dot Represents Median Concentrations.



The Box Shows Data in the First and Third Quartiles, and Whiskers Represent the Minimum and Maximum, excluding Outliers. The Black Dot Represents Median Concentrations

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Figure 4.1-13

Seasonal Variation in Maximum 24-hour Average TSP Concentration at IOCC Smokey Mountain Station, 2019-2023

4.1.3.1.7 Benzo(a)pyrene

Benzo(a)pyrene is not monitored in Newfoundland and Labrador. Therefore, the data obtained from the Experimental Farm Simcoe (NAPS-62601) station in Ontario, situated within an agricultural area, is employed as a suitable representative of the project area. Table 4.1-15 presents a compilation of benzo(a)pyrene data statistics at the Experimental Farm Simcoe station. Table 4.1-16 summarizes benzo(a)pyrene concentrations at the Experimental Farm Simcoe station during 2016 to 2020. Seasonal fluctuations in benzo(a)pyrene concentration based on 24-hour measurements are shown in Figure 4.1-15.

Table 4.1-15: Benzo(a)pyrene (µg/m^3) Concentration Statistics

Station	Distance to Nain Airport (km)	Location	Min	Max	Median	90th Percentile
Experimental Farm Simcoe (NAPS-62601)	~2000	Remote/Agricultural	0	0.4	0.02	0.04

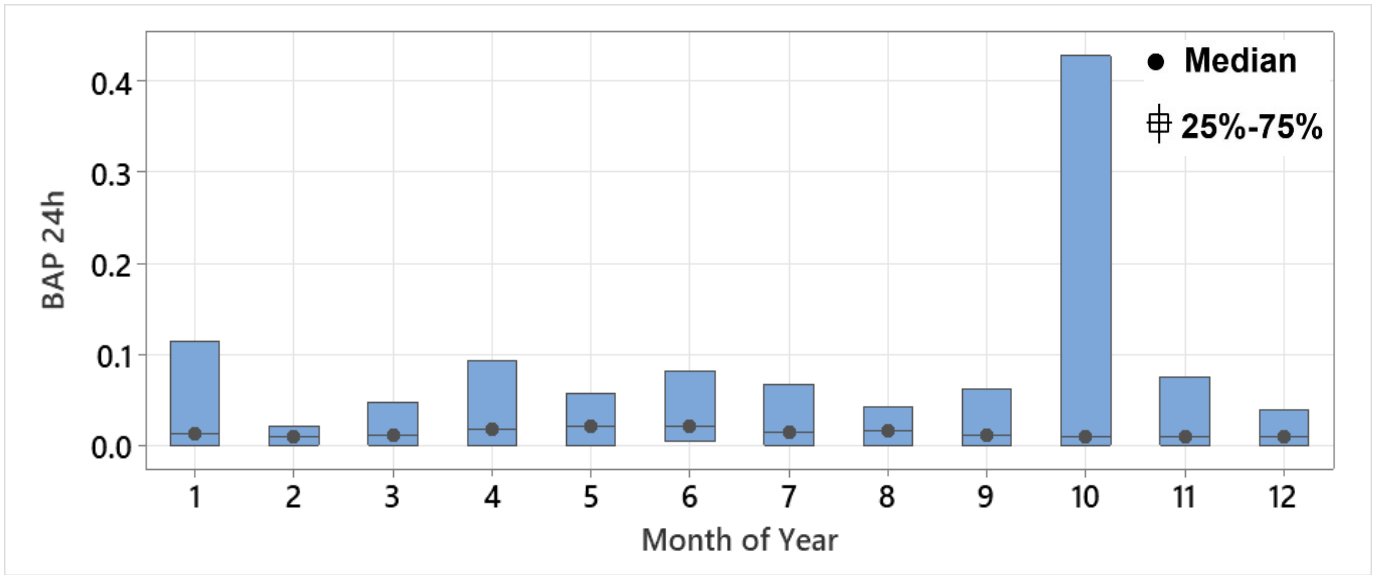
The results indicate:

- Maximum 24-h benzo(a)pyrene concentrations ranged from 0.04 to 0.4 µg/ m^3 with an average of 0.2 µg/m^3. The maximum 24-h concentrations exceeded the NLAQ of 5E-05 µg/m^3 in all studied years
- Maximum 24-h 90th percentiles benzo(a)pyrene concentrations ranged from 0.03 to 0.05 µg/m^3 with an average of 0.04 µg/m^3. The maximum 24-h 90th percentile concentrations exceeded the NLAQ of 5E-05 µg/ m^{3}in all the studied years
- Annual benzo(a)pyrene concentration ranged from 0.01 to 0.02 µg/m^{3}and were below the NLAQ of 1E-05 µg/m^3. The annual average of the five years is 0.01 µg/m^3
- Benzo(a)pyrene median 24-hour average concentrations showed seasonal peak concentrations in May and June (Figure 4.1-14), with maximum concentrations observed in October

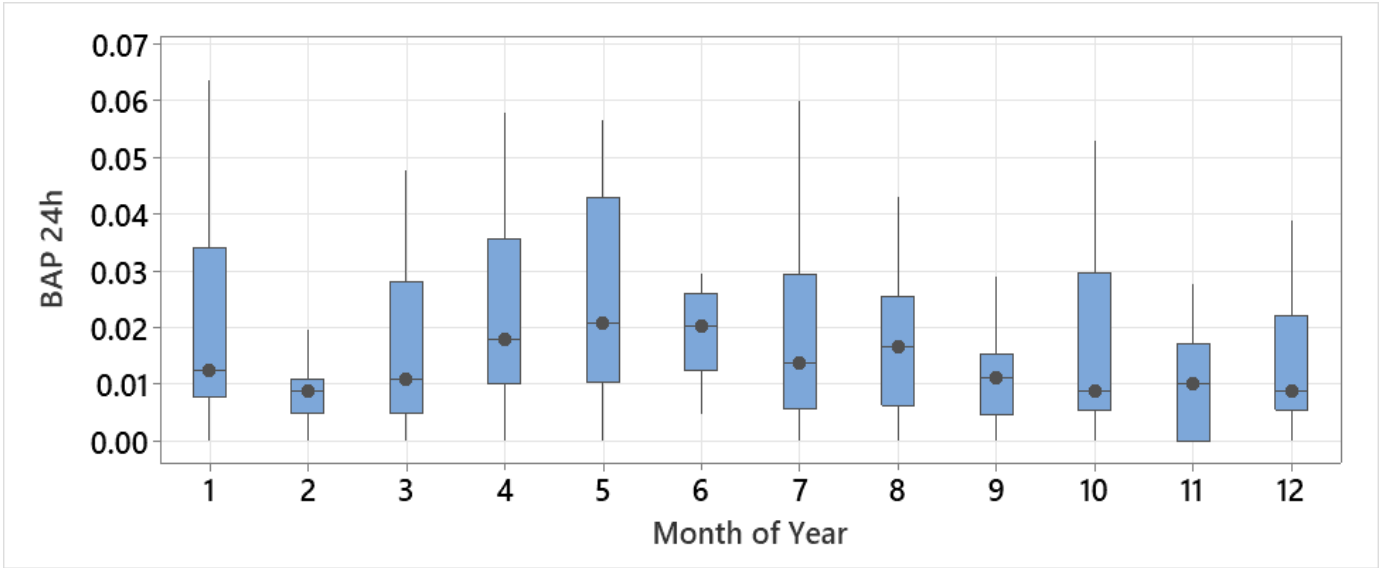
Table 4.1-16: Benzo(a)pyrene Concentrations (µg/m^3) Measured at the Experimental Farm Simcoe Air Quality Station, 2016-2020

Averaging Period	Experimental Farm Simcoe					Average	AAQC[(a)]
	2016	2017	2018	2019	2020		
24-h Maximum	0.4	0.09	0.1	0.08	0.04	0.2	5E-05
24-h 90th percentile	0.05	0.04	0.04	0.03	0.04	0.04	-
Annual Average	0.02	0.01	0.01	0.01	0.01	0.01	1E-05

Notes: (a) Source: Ontario's Ambient Air Quality Criteria (Ontario MECP, 2020) as no standard is available from NL.



The Blue Bar Shows the Maximum Value in the Period, including Outliers. The Black Dot Represents Median Concentrations.



The Box Shows Data in the First and Third Quartiles, and Whiskers Represent the Minimum and Maximum, excluding Outliers. The Black Dot Represents Median Concentrations

Figure 4.1-14

Seasonal Variation in Maximum 24-hour Average Benzo(a)pyrene Concentration at Experimental Farm Simcoe Station, 2016-2020

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4.1.3.1.8 Benzene

Table 4.1-17 presents a compilation of benzene data statistics at the only available station, St. Johns. Table 4.1-18 summarizes benzene concentrations at the St. Johns station during 2016 to 2020. Seasonal fluctuations in benzene concentration based on 24-hour measurements are shown in Figure 4.1-15.

Table 4.1-17: Benzene (µg/m^3) Concentration Statistics St. Johns Station

Station	Distance to Nain Airport (km)	Location	Min	Max	Median	90th Percentile
St. Johns (NAPS-010102)	~1200 km	Residential	0.10	1.57	0.39	0.64

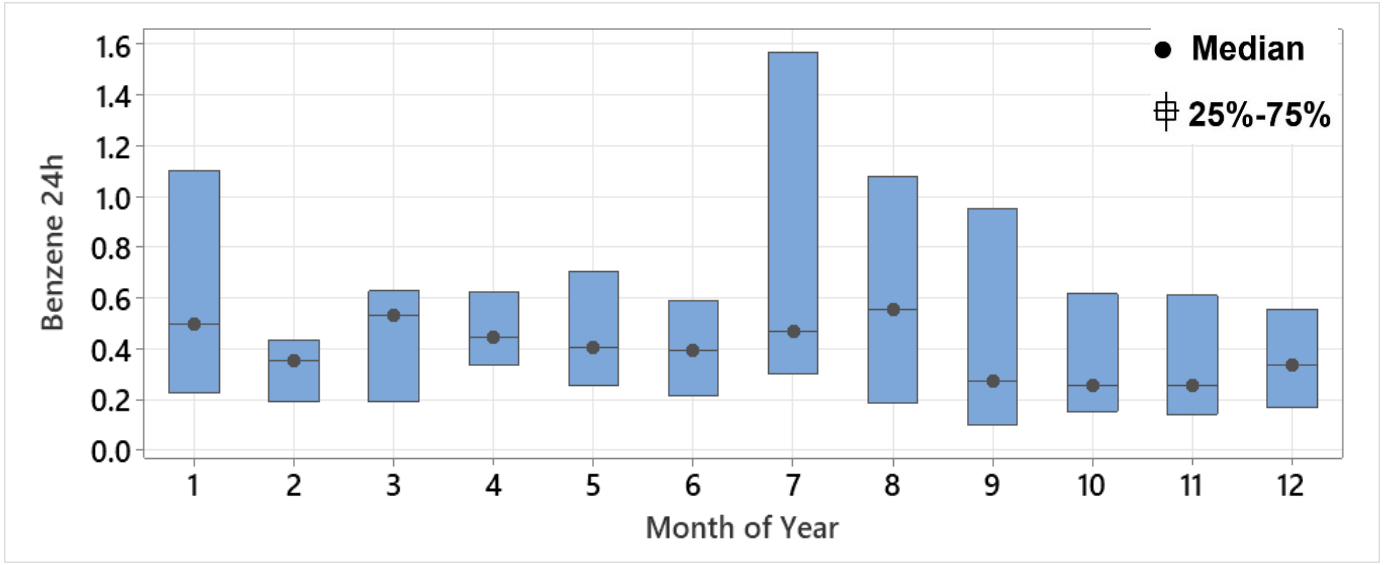
The results indicate:

- Maximum 24-h benzene concentrations ranged from 0.46 to 1.57 µg/m^{3}with an average of 0.85 µg/m^3. The maximum 24-h concentrations are below the NLAQ of 2.3 µg/m^3
- Maximum 24-h 90th percentiles benzene concentrations ranged from 0.46 to 0.74 µg/m^{3}with an average of 0.59 µg/m^3
- Annual benzene concentration ranged from 0.35 to 0.46 µg/m^{3}and were below the NLAQ of 0.45 µg/m^{3}except in 2018. The annual average of the five years is 0.4 µg/m^3
- Benzene median 24-hour average concentrations showed seasonal peak median concentrations in August (Figure 4.1-15)

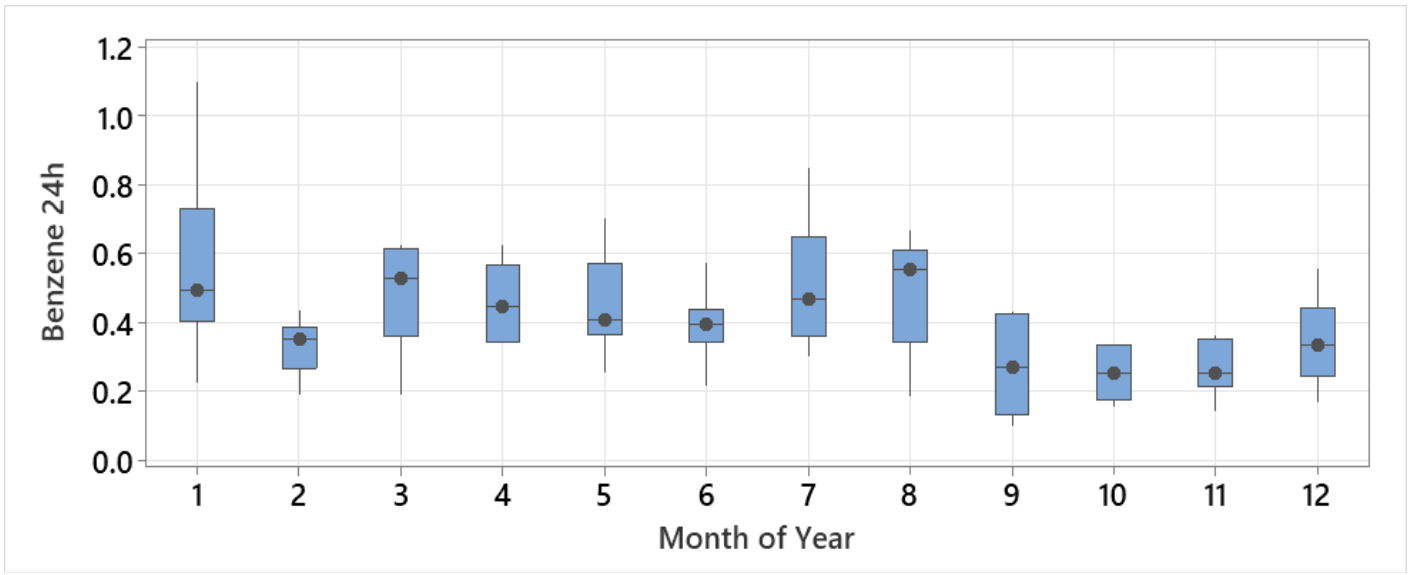
Table 4.1-18: Benzene Concentrations (µg/m^3) Measured at the St. Johns Air Quality Station, 2016-2020

Averaging Period	St. Johns					Average	AAQC[(a)]
	2016	2017	2018	2019	2020		
24-h Maximum	0.71	1.57	0.46	0.78	0.76	0.85	2.30
24-h 90th percentile	0.59	0.74	0.46	0.48	0.65	0.59	-
Annual Average	0.36	0.43	0.46	0.38	0.35	0.40	0.45

Notes: (a) Source: Ontario's Ambient Air Quality Criteria (Ontario MECP, 2020) as no standard is available from NL.



The Blue Bar Shows the Maximum Value in the Period, including Outliers. The Black Dot Represents Median Concentrations.



The Box Shows Data in the First and Third Quartiles, and Whiskers Represent the Minimum and Maximum, excluding Outliers. The Black Dot Represents Median Concentrations

Figure 4.1-15

Seasonal Variation in Seasonal Variation in Maximum 24-hour Average Benzene Concentration at St. Johns Station, 2016-2020

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4.1.3.2 Meteorology and Climatology

The Environment and Climate Change Canada (ECCC) station, Nain A Station, is located at 56°33’02" N and 61°40’56" W (Climate ID 8502810) on the shore of Unity Bay near Nain, Newfoundland and Labrador. Historical data at this station from 2019 to 2022 (ECCC, 2023a) is acquired for current meteorology evaluation. The same period from 2019-2022 is selected for the CALMET assessment. The winter season is defined as January 1 to May 31 and September 16 to December 31, with the remainder of the year being non-winter. Canadian Climate Normals 1991-2020 (ECCC, 2024a) and 1981-2010 (ECCC, 2024b) data are discussed and presented in the section below.

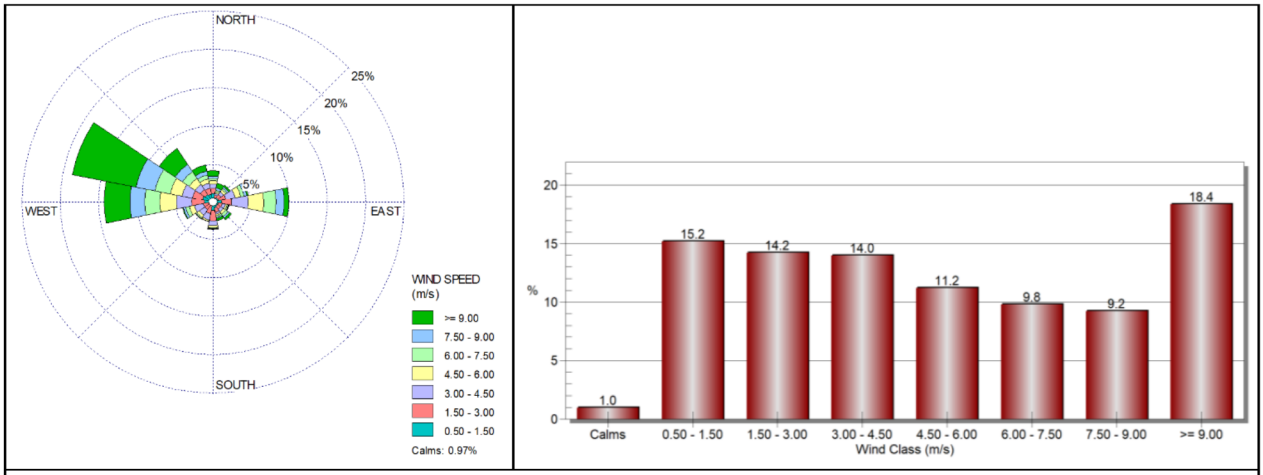
4.1.3.2.1 Winds

The wind roses and wind speed frequency distribution are presented in Figure 4.1-16**,** which are generated by using the historical meteorological data at the ECCC station (Nain A Station) from 2019 to 2022. In this period, the wind directions were predominately from the west-northwest and west at the ECCC station.

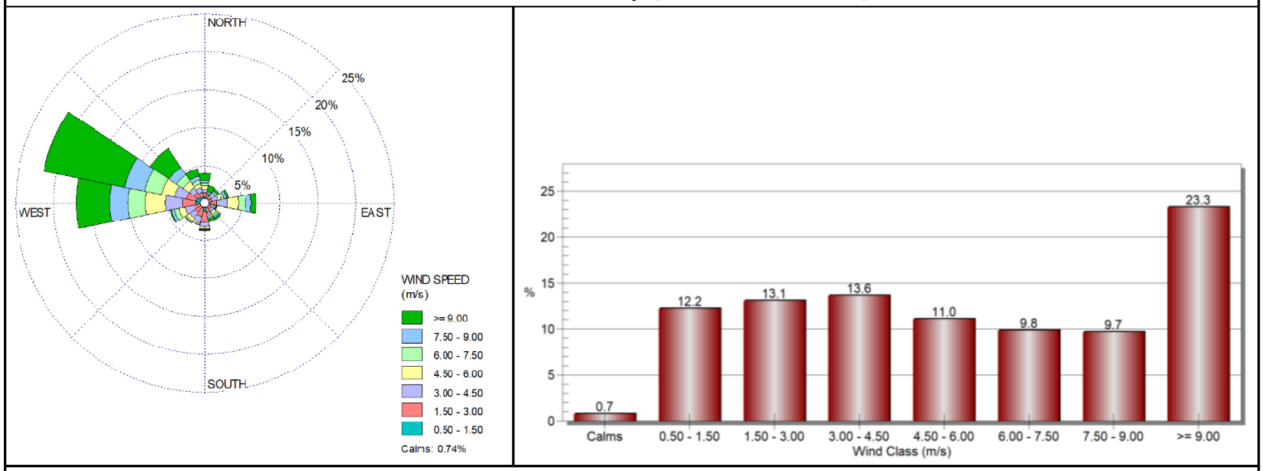
At the ECCC station, the recorded wind directions are expressed in tens of degrees (10s deg). Wind speeds are reported in kilometres per hour (km/h) with no decimal, which are observed at 10 metres (m) above the ground. Calms are defined as less than about 0.5 m/s (~1.8 km/h), which is the threshold speed of the anemometer. More frequent calms may result in high pollutant concentrations. The annual frequency of calms is 1.0% at the Nain Airport Station. Higher wind speed (greater than 9 m/s) were observed more in winter months (23.3%) than non-winter months (6.6%).

Figure 4.1-17 shows the diurnal variation of wind speeds at the ECCC station. The figure indicates the following:

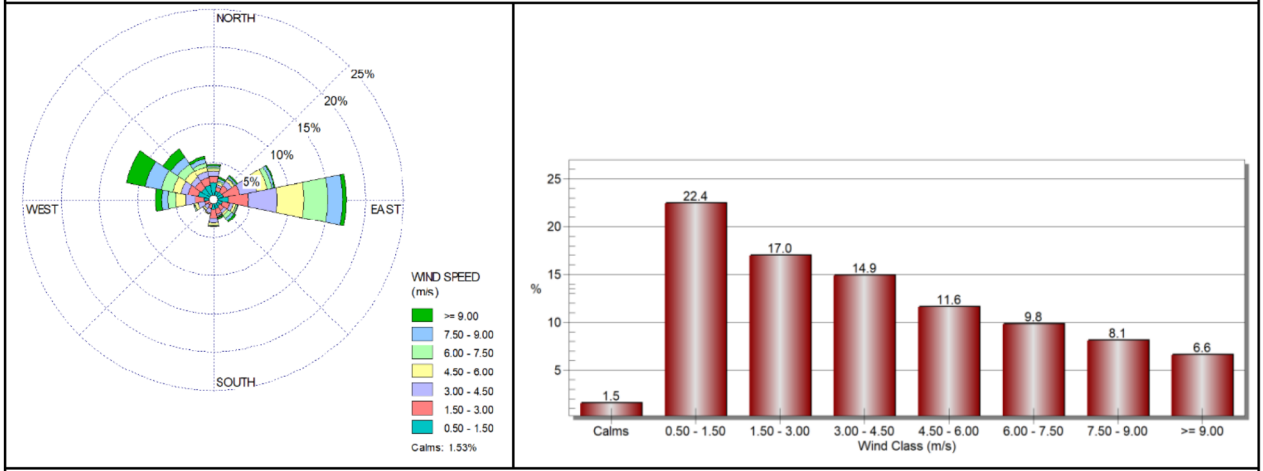
- Median wind speeds were higher during the afternoon, while maximum wind speed gusts occurred at any time
- The median wind speeds (5.3 ~ 5.6 m/s) of the afternoon hours between 1 pm and 4 pm were higher than the other hours of the day



Assessment Period from January 1, 2019 to December 31, 2022



Winter Months (Excluding Data from June 1 to September 15) from 2019 to 2022



Non-Winter Months (from June 1 to September 15 each year) from 2019 to 2022

Figure 4.1-16

Wind Roses and Wind Speed Frequency Distribution at Nain A Station, 2019-2022

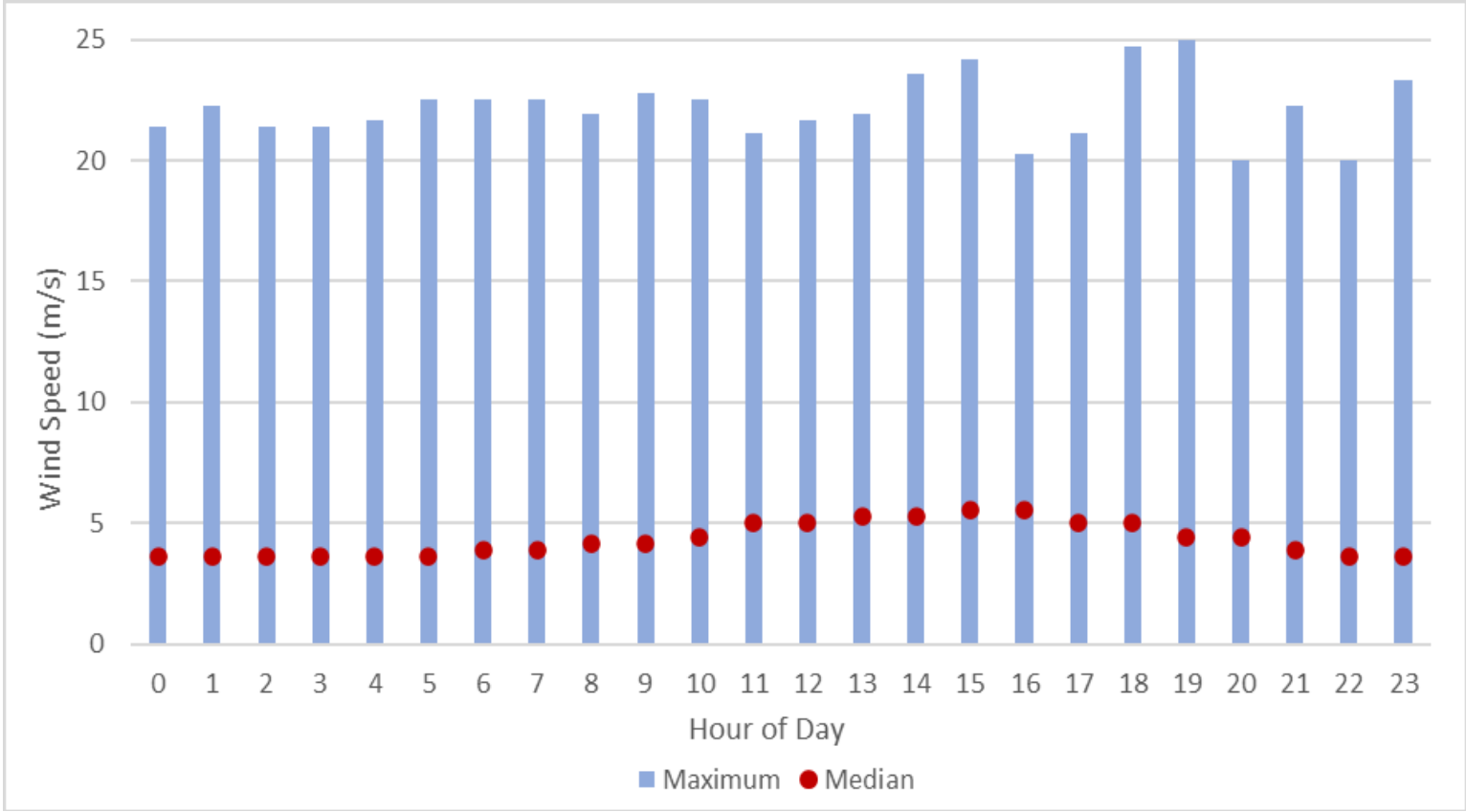


Figure 4.1-17

Diurnal Variation of 1-hour Average Wind Speeds
at the Project Site, 2019-2021

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4.1.3.2.2 Ambient Temperature

Daily and extreme temperature variations are summarized in Table 4.1-19 and Figure 4.1-18 by using Canadian Climate Normals 1991-2020 data at the Nain Station (ECCC, 2024a). Diurnal and seasonal variations of temperature at the Project site are presented in Figure 4.1-19.

The historical extreme temperatures were reported as -41.5°C in December and 33.3°C in June and July. In general, the extreme temperatures (>30 °C or <30 °C) were not common as there were only 4.1 days (98 hours) with minimum temperature lower than -30 °C and 0.5 day (12 hours) with maximum temperatures above +30 °C (ECCC, 2024a). As shown in Figure 4.1-18, the daily minimum temperatures were above 0°C from June to September, and winter season is defined from January 1 to May 31 and September 16 to December 31 from 2019 to 2022 for air modelling assessment.

Table 4.1-19: Summary of Daily and Extreme Temperatures at Nain A Station, 1991-2020 (ECCC, 2024a)

Month	Daily Maximum (°C)	Daily Minimum (°C)	Extreme Maximum (°C)	Extreme Minimum (°C)
January	-13.1	-21.1	10.5	-39.4
February	-13.2	-22	7.6	-38.3
March	-7.1	-16.8	12.1	-37
April	-0.3	-9.5	14.5	-31.1
May	5.5	-2.4	25.6	-17.5
June	11.2	2	33.3	-6.7
July	14.8	5.6	33.3	-2.8
August	15.8	6.5	32.7	-2.8
September	11.9	3.7	29	-6.7
October	5.6	-0.4	20.2	-19
November	-1	-7	11.7	-24.4
December	-7.7	-14.6	6.7	-41.5

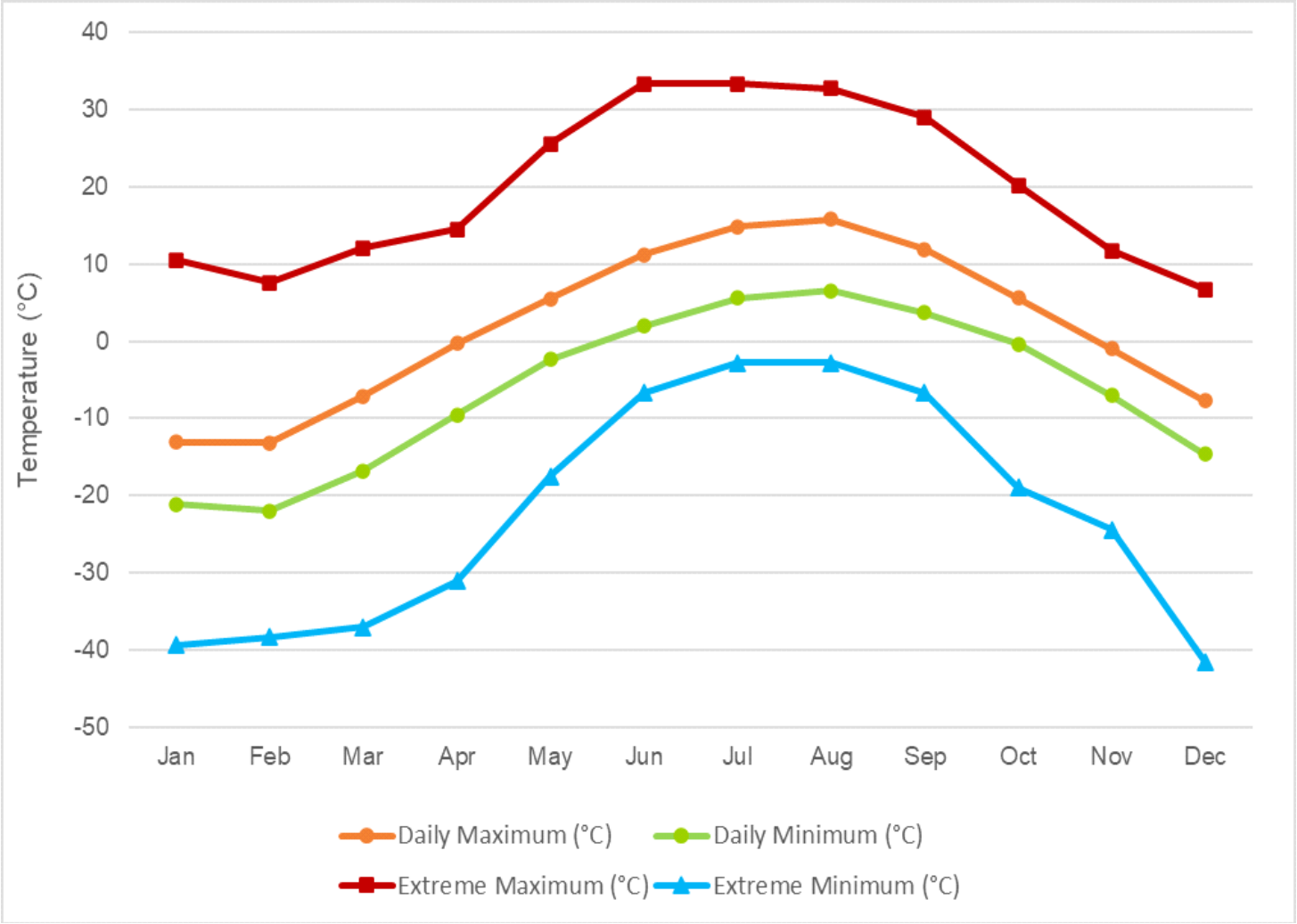

Figure 4.1-18

Daily and Extreme Temperature at Nain Station
from 1991 to 2020

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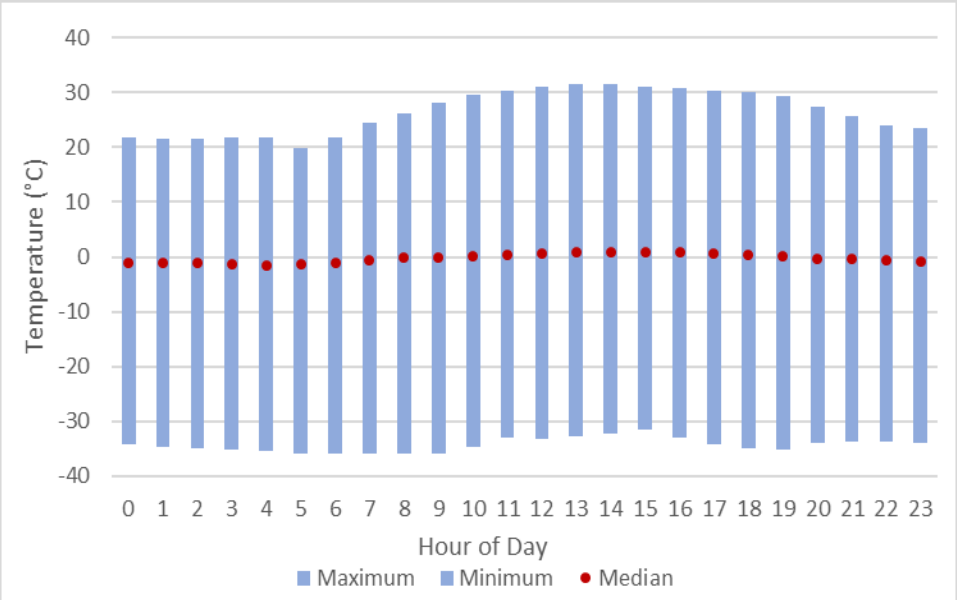

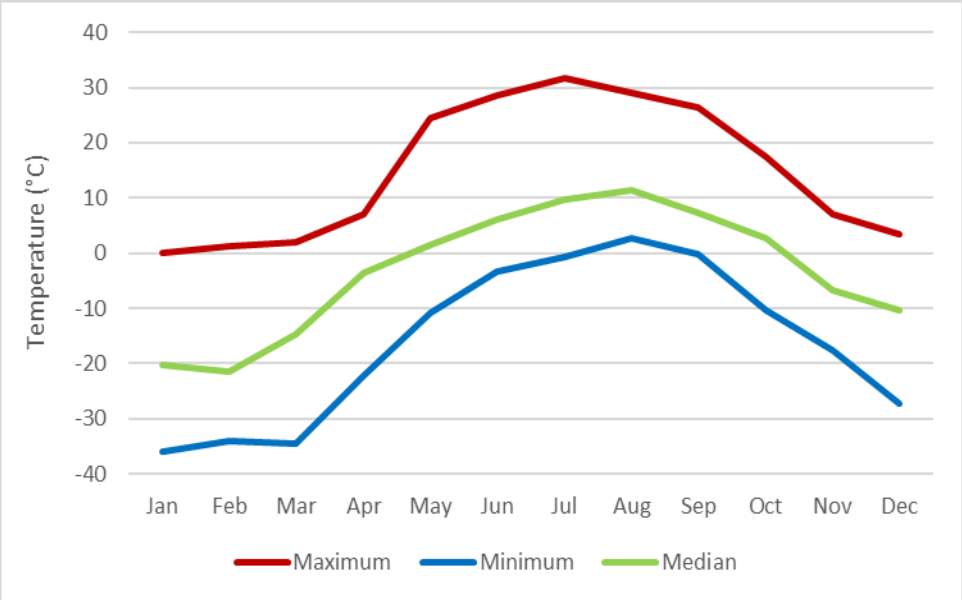

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Figure 4.1-19

Diurnal and Seasonal Variations of Temperature at
the Proposed Project Site, 2019-2021 (CALMET Time Series)

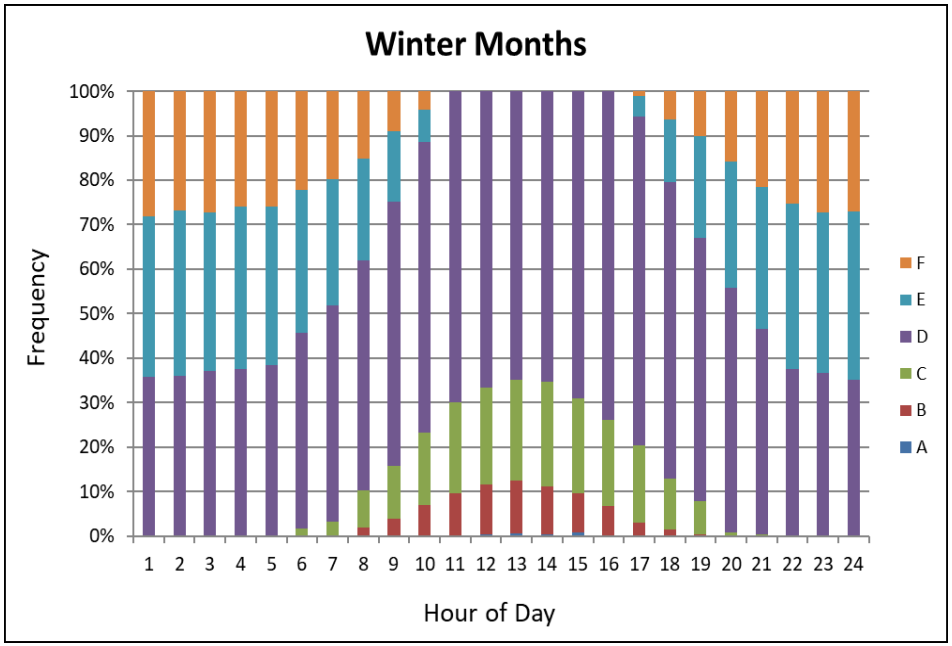
4.1.3.2.3 Atmospheric Stability

Pasquill-Gifford (PG) stability classifications are useful to describe the amount of turbulence present in the atmosphere. These classes range from unstable (classes A, B, C) through neutral (D) to stable (E, F). Unstable conditions are primarily associated with daytime heating conditions that result in enhanced turbulence. Stable conditions occur during night-time cooling and indicate suppressed turbulence. Neutral conditions occur in cloudy or windy conditions.

The stability class was derived following the approach of the U.S. EPA where the final stability class changes are limited to one category per hour. For this reason, the final PG stability classes can include a few hours with stable conditions occurring in daylight hours, and or unstable conditions in evening hours.

Figure 4.1-20 presents PG stability classes as functions of time of day for the period 2019-2022 (the period that corresponds with the CALMET data used for dispersion modelling) at the Project location. The information indicates:

- The most unstable Class A is very rare at the project site in the assessment period from 2019-2022. This class are only 0.1% or 0.2% of total count of stability classes in winter and non-winter months, respectively.
- Non-Winter months have the larger percentage of unstable stability Class B and C than Winter months. Winter has less stability Class B and C values which are associated with daytime heating.
- Neutral conditions (Stability Class D) occur at any hour of the day and occur more frequently than the other stability classes.
- The unstable stability classes (A, B, and C) form within daytime hours, while stable classes (E and F) occur more during night-time hours. There are more stable class (E) in winter months than non-winter months.



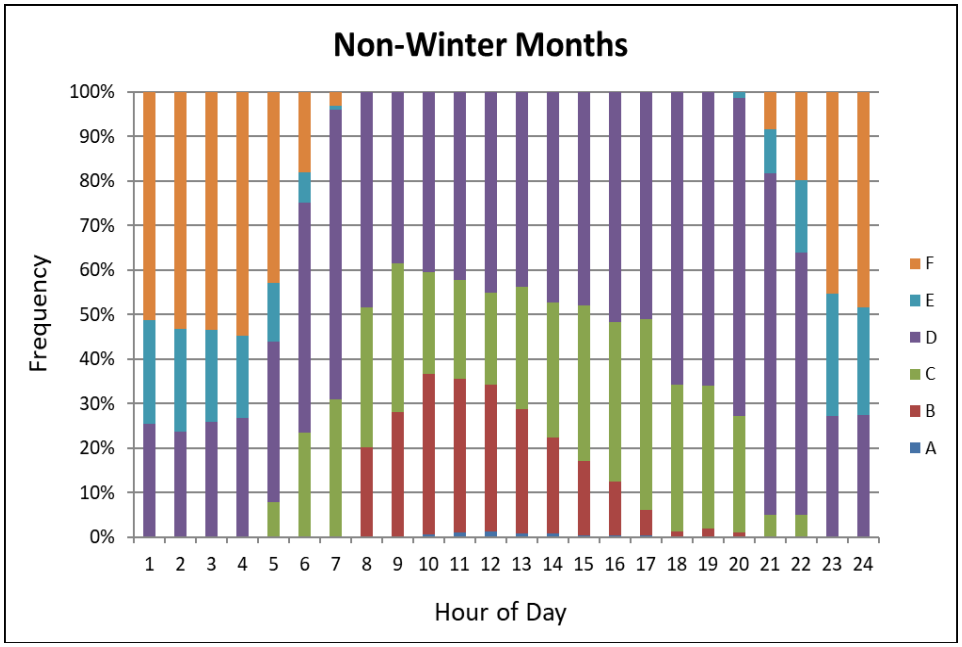


Figure 4.1-20

Seasonal Frequency of Hourly Mixing Heights
in the Project Area (CALMET Model Output, 2019-2022)

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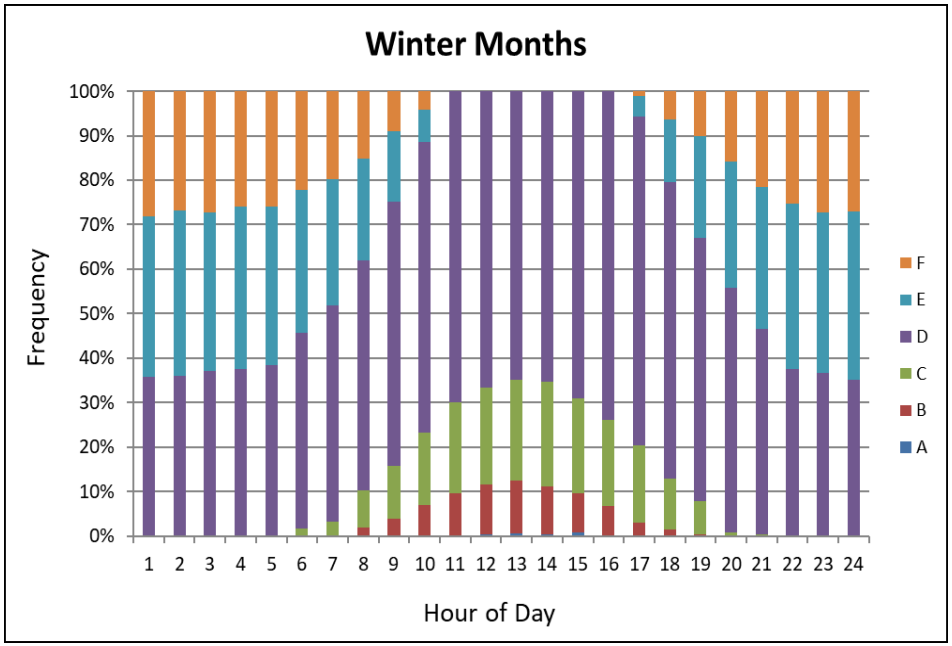
4.1.3.2.4 Mixing Height

A temperature increase with height is referred to as an inversion. The base of the temperature inversion may be ground-based or elevated. In the case of the latter, a two-layered atmosphere is created. The lower layer tends to be well mixed and is characterized by neutral or unstable conditions. The depth of this lower layer is referred to as the mixing height. The upper layer tends to be characterized by stable conditions. The vertical transfer of mass between these two layers is minimal. Mixing heights are not explicitly used as inputs to the CALPUFF model. However, an examination of them is useful to aid in understanding observed and predicted plume dispersion.

During the night, the mixing height is determined by the mechanical interaction of the wind with surface features. After sunrise, solar heating usually determines the depth of the mixing layer. Typical depths increase from the mechanical mixing height at sunrise to heights of up to a few thousand metres by mid-afternoon.

Median mixing depths (Figure 4.1-21) for the study area were obtained from CALMET model output for the 2019 to 2022 period at a grid cell near study area. Median afternoon mixing heights range from a few hundred metres in winter months to about 900 m in warm months. Night-time median mixing heights are typically in the range from 150 to 400 m.



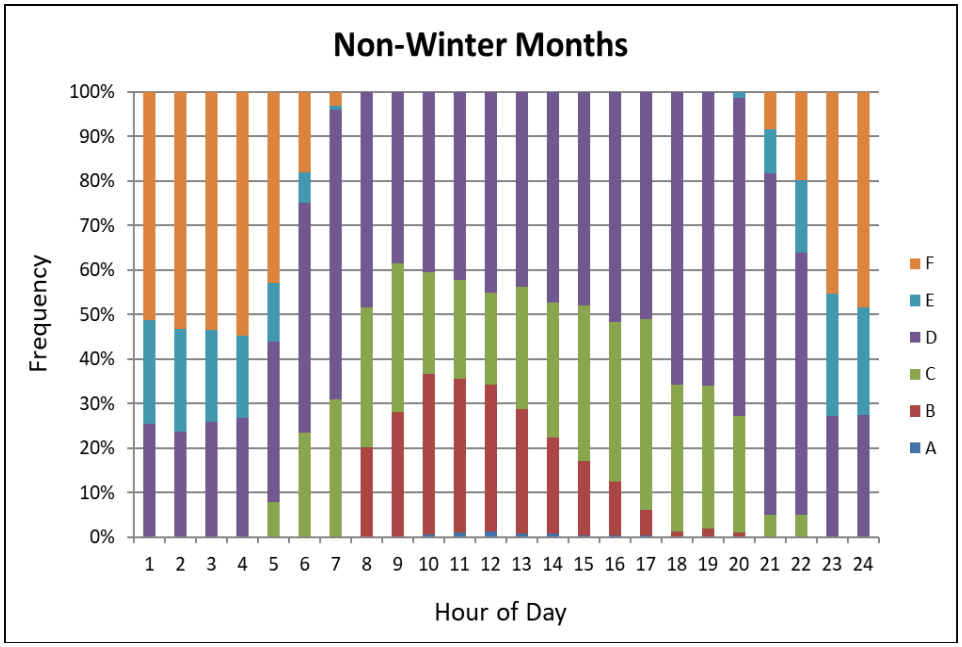


Figure 4.1-20

Seasonal Frequency of Hourly Mixing Heights
in the Project Area (CALMET Model Output, 2019-2022)

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4.1.3.2.5 Precipitation

The Canadian Climate Normals 1981-2010 Precipitation Data (ECCC, 2024b) at Nain A Station is summarized in Table 4.1-20 and Figure 4.1-22. In the period from 1981 to 2010, the monthly precipitations varied from 57 mm in May to 98.6 mm in December. The annual rainfall and snowfall contributed 49% and 51% of the annual total precipitation, respectively. Most of the rainfall occurred in the warm months from June to September while snows formed in the period from January to April, November and December. May and October are the transition periods when precipitations were in both rainfall and snowfall.

Table 4.1-20: Canadian Climate Normals 1981-2010 Precipitation Data at Nain A Station

Month	Rainfall (mm)	Snowfall (cm) or Water Equivalent of Snowfall (mm)*	Precipitation (mm)
January	3.1	80.9	83.8
February	5.1	65.9	70.9
March	5.5	68.2	73.6
April	14.1	56.9	71.1
May	30.2	26.7	57
June	70.1	13.3	83.4
July	98.6	0	98.6
August	71.5	0	71.5
September	79.9	2	81.9
October	49.7	24.5	74.2
November	14.1	63.5	77.6
December	8.4	73.4	81.9
Total	450.2	475.3	925.4

*Note: * As per ECCC (ECCC, 2023b), at most ordinary stations the water equivalent of snowfall is computed by dividing the measured amount by ten.*

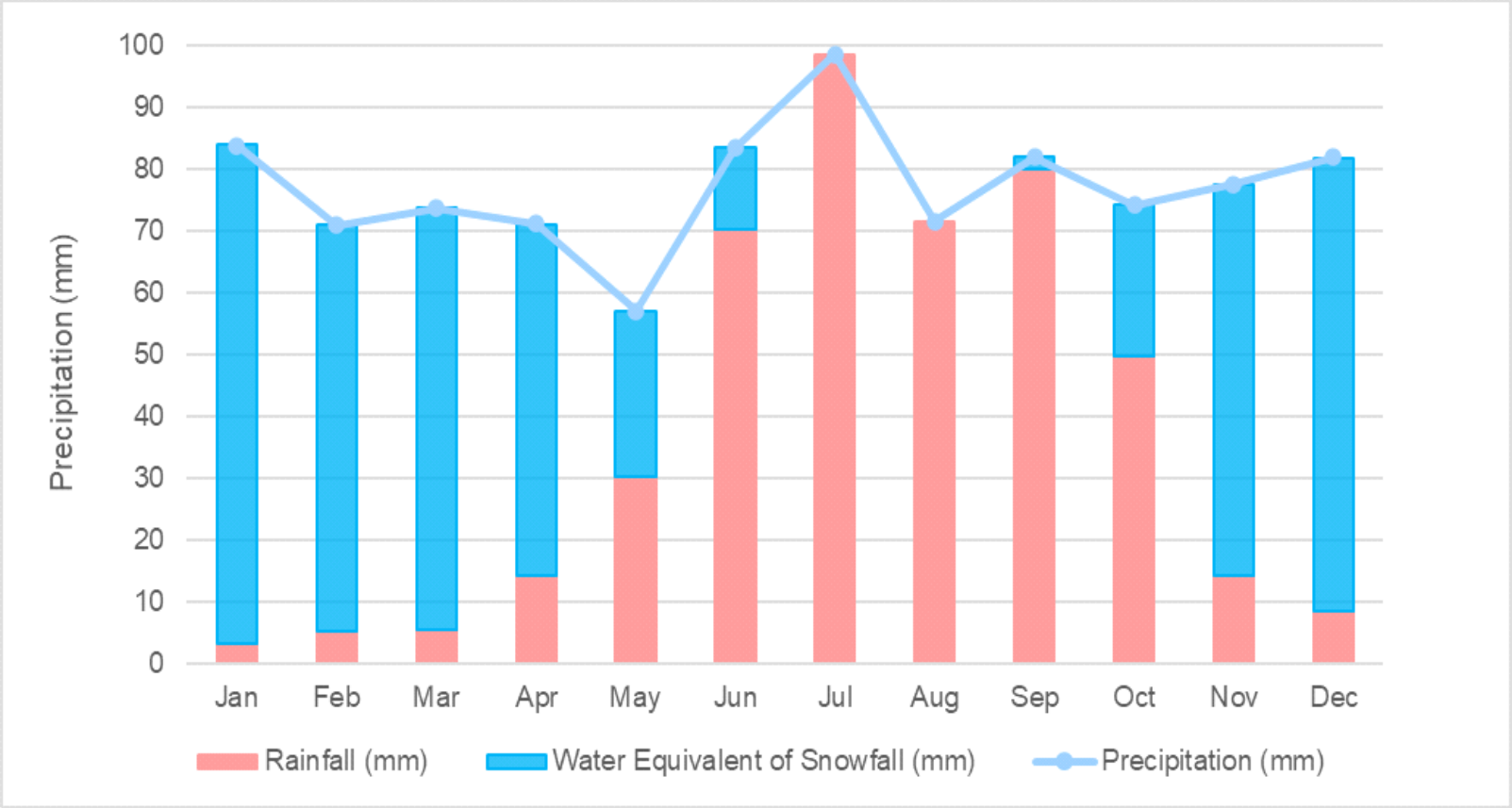

Figure 4.1-22

1981-2010 Canadian Climate Normals Monthly Average Precipitation, Rainfall and Water Equivalent of Snowfall at Nain A Station

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4.1.3.2.6 Visibility

Visibility is a useful parameter to evaluate smoke, heavy rain, fog and haze in the air. Visibility degradation is caused by the absorption and scattering of light by particles and gases in the atmosphere before it reaches the observer (California Air Resources Board, 2023). The period (number of hours) of recorded low visibility, which is defined by Environment Canada as visibility between 0 km and 10 km, is another indicator of the severity of wildfire smoke (CBC, 2023). The hours of visibilities through January to August from 1991 to 2020 (ECCC, 2024a) are presented in Table 4.1-21 and Figure 4.1-23. Through January to August in the period from 1991 to 2020, there were less low visibility hours in August and April while more low visibility hours in March.

Table 4.1-21: Canadian Climate Normals 1991-2020 Total Hours of Visibility Data at Nain Station

Month	Visibility < 1 km	Visibility 1 to 9 km	Visibility > 9 km	Low Visibility Percentage (with visibility <9 km)
January	0	83	654	11.2%
February	15	69	588	12.5%
March	27	171	542	26.6%
April	3	52	658	7.6%
May	5	110	618	15.5%
June	5	113	599	16.4%
July	17	109	609	16.9%
August	1	14	709	2.0%

Note: Data source is (ECCC, 2024a) and no data are available for September to December.

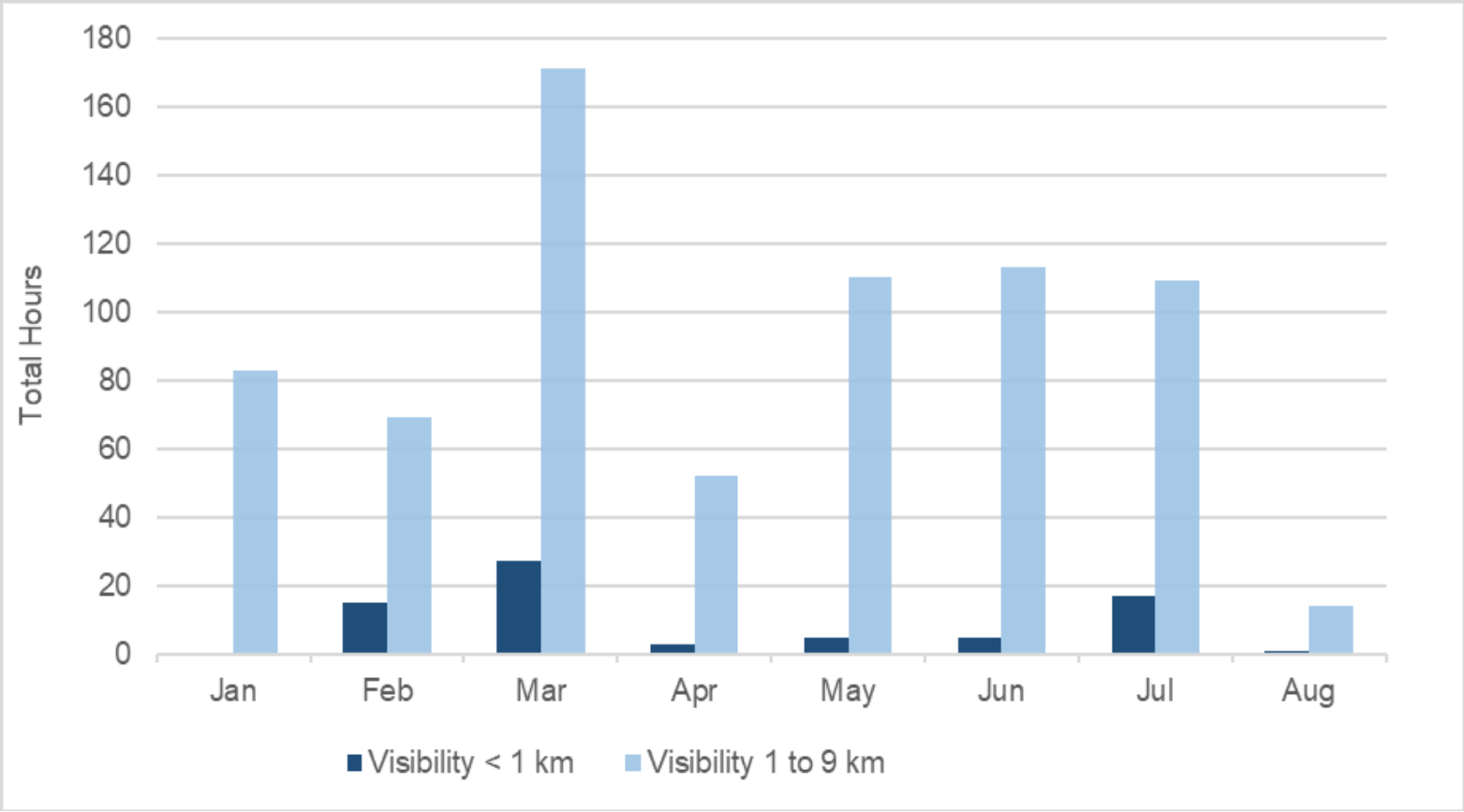

Figure 4.1-23

Total Hours of Visibility Data at Nain Station 1991-2020

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4.1.3.3 Climate Change

This section summarizes climate change predictions in Nunavut and more precisely in the Nain area. The main information sources are Stantec (2024) which is provided specifically in support of this project and Climatedata.ca which is a collaboration between ECC, the Computer Research Institute of Montreal, CLIMAtlantic, Ouranos, the Pacific Climate Impacts Consortium, the Prairie Climate Centre, and HabitatSeven.

The information from these sources is compared to a recent summary of regional climate projections (Barrette et al, 2020) which provides averaged over the entire Nunavik and Nunatsiavut region. The climate projections presented in this air quality background report are more specific to the climate model grid point nearest Nain.

A preliminary estimate of GHG emissions associated with the Project based on the SACC guidelines has been completed, and is provided in Appendix H.

4.1.3.3.1 Permafrost

Permafrost is vulnerable to temperature increase and other climate hazards, such as wildfires and changing hydrology and can thaw rapidly once it is disturbed. Permafrost thaw typically occurs through an increase in the depth of the active layer, which decreases the overall thickness of the permafrost, and could result in loss of permafrost entirely. Changes in permafrost affect most infrastructure of this project.

The Nain region is in the Sporadic permafrost zone (Wang et al 2023); however, it is expected the region including that of the new airport is better described as in the Extensive zone. The community is underlain with discontinuous permafrost and permafrost has been identified as a contributing factor to ground subsidence and structural damage to some buildings in the community (Way et al 2021).

Stantec (2024) summarized potential changes to permafrost in the Nain area from a warming climate as follows:

- Increase in active layer thickness as permafrost thaws
- With 2°C of global warming, permafrost is projected to become isolated patches in the Nain region
- With 3°C of global warming, permafrost is projected to no longer be present in the Nain region

The overall impact of climate-induced permafrost degradation is expected to be medium, due to a projected low physical and moderate thermal response of soil to warming. According to Cannon et al. (2020), there is very high confidence in the continued degradation of future near-surface permafrost extent over northern Canada. However, there is low confidence in projections of future locations and areal extents of the different permafrost zones.

4.1.3.3.2 Sea Ice

Sea ice extent and concentration have changed considerably along the Labrador coast near Nain. Mudryk et al. (2018) document a 5-10% per decade reduction in sea ice concentration since 1980 and a 15-20% per decade reduction in seasonal sea ice area along the coast since 1970. Barrette et al. (2020) document a 33% per decade decline in shipping season sea ice area from 1971 to 2016 along the coast of the Nunatsiavut North Region and no trend in winter ice extent in the Southern region.

In terms of future changes, Mudryk et al. (2018) estimate 5-10% per decade reductions in sea ice area during winter to 2050 during January to June and little to no change from current conditions to 2050 in the remainder of the year. Increased sea surface temperatures and reduced sea ice will likely contribute to the increasing potential for fog formation in the Nain region (e.g., during the autumn; Cannon et al. 2020).

4.1.3.3.3 Temperature

Air temperature is a key driver of climate and environment through its wide-ranging impacts on snow and ice cover, ground thermal regime, vegetation, and many other systems. Projected temperature is a function of climate scenario which are based on assumptions of population growth, prosperity and emission mitigation among other variables.

Several aspects of predicted temperature change are provided in this section from Climatedata.ca (2024). The hottest day describes the warmest annual daytime temperature and provides guidance on potential health effects like heat stroke on the elderly. The mean annual temperature is an indicator for long-term energy management and health. The coldest day of the year is related to building design, energy storage and safety. These variables are plotted in Figures 4.1-24 to 4.1-26 from the climate model grid nearest the community of Nain and demonstrate the increasing effects of climate scenario with time.

Barrette et al (2020) additionally note that the largest temperature increases occur in winter months, a slight increase in the number of days with above freezing temperatures, an increase in the number of growing degree days, an increased length of the summer season, and increased temperatures on the hottest and coldest days of the year. All predictions are scenario dependent.

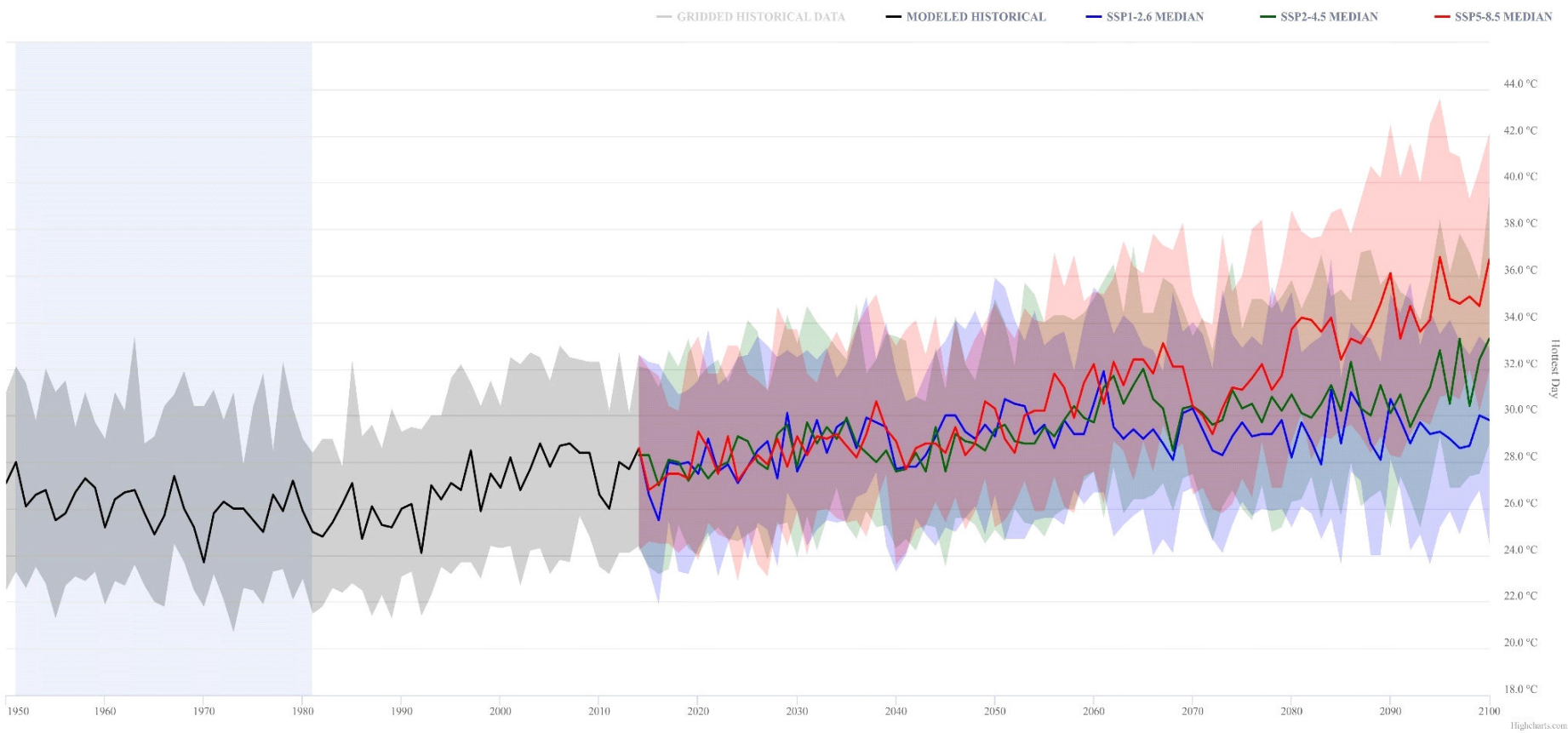

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Figure 4.1-24

Hottest Day Each Year

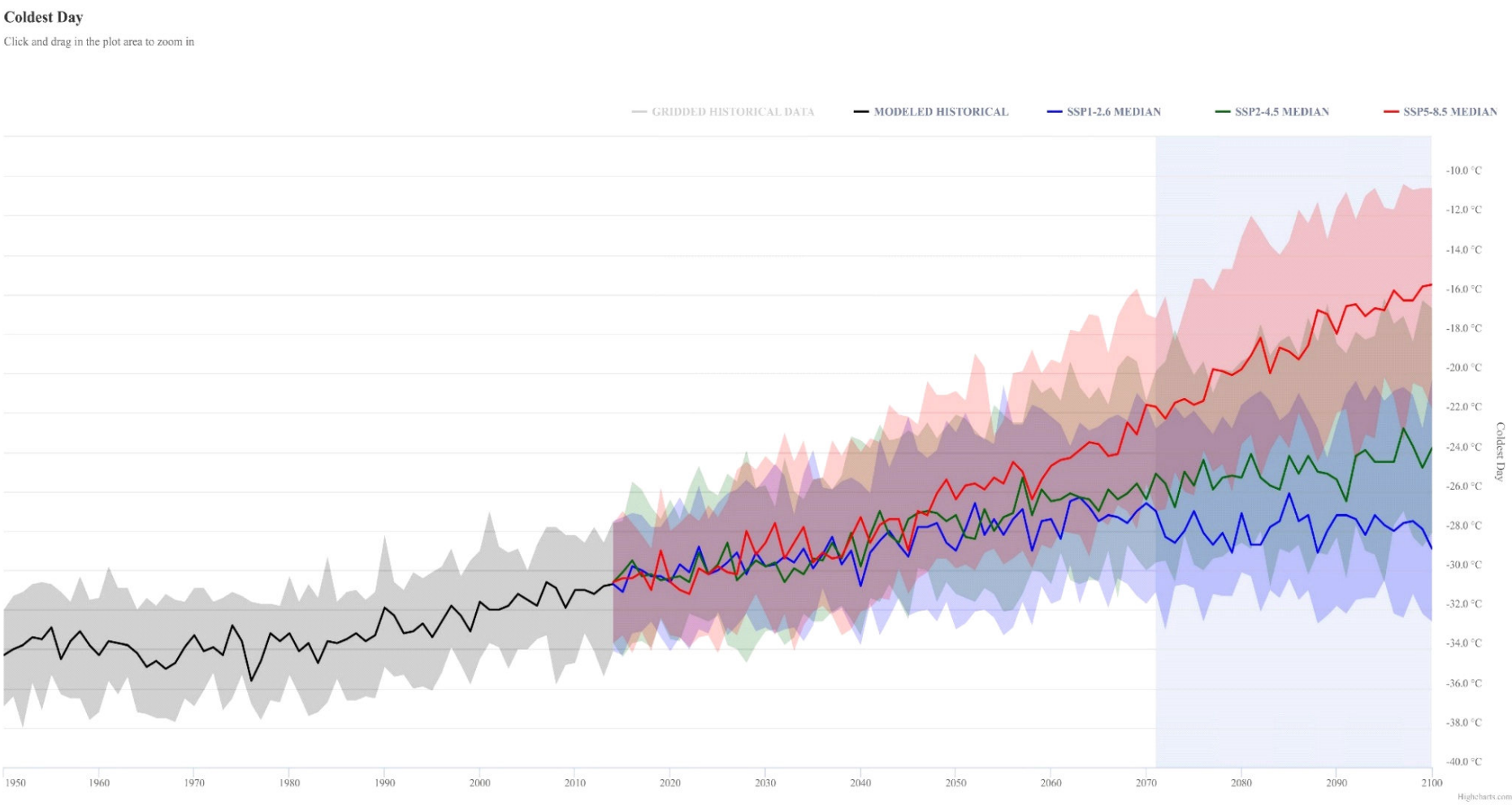

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Figure 4.1-25

Coldest Day Each Year

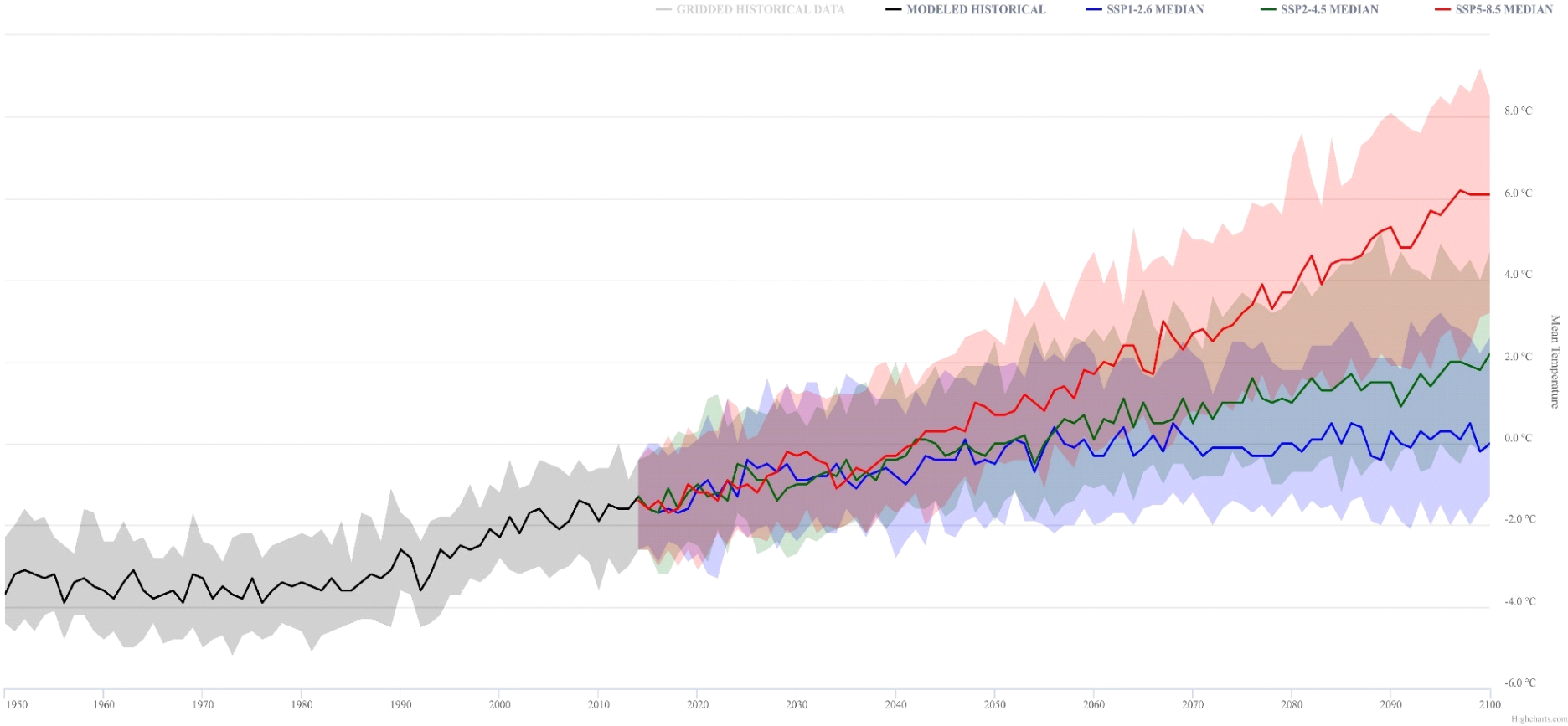

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Figure 4.1-26

Mean Annual Temperature

4.1.3.3.4 Precipitation

Figure 4.1-27 from Stantec (2024) shows the projected annual total precipitation at Nain for the current period and for future periods, with increases from about 920 mm to about 1040 mm beginning mid-century. Climatedata.ca projects somewhat lower rates of precipitation, with current values of 683 mm and median values of 873 mm in the 2080s.

Projections of precipitation extremes have higher uncertainty. Stantec (2024) applied the Clausius-Clapeyron relation, which relates projected temperature to the moisture carrying capacity of the atmosphere to augment 5-day maximum precipitation in climate model predictions. They found the total precipitation in 5 days increased from 86 mm currently to 136 mm in 2100 under RCP8.5.

Historical observations of annual snowfall show a decreasing trend in Nain (Figure 4.1-28). Snowfall is projected to decrease in the region under RCP8.5. Under RCP4.5, snowfall is projected to remain like historical periods.

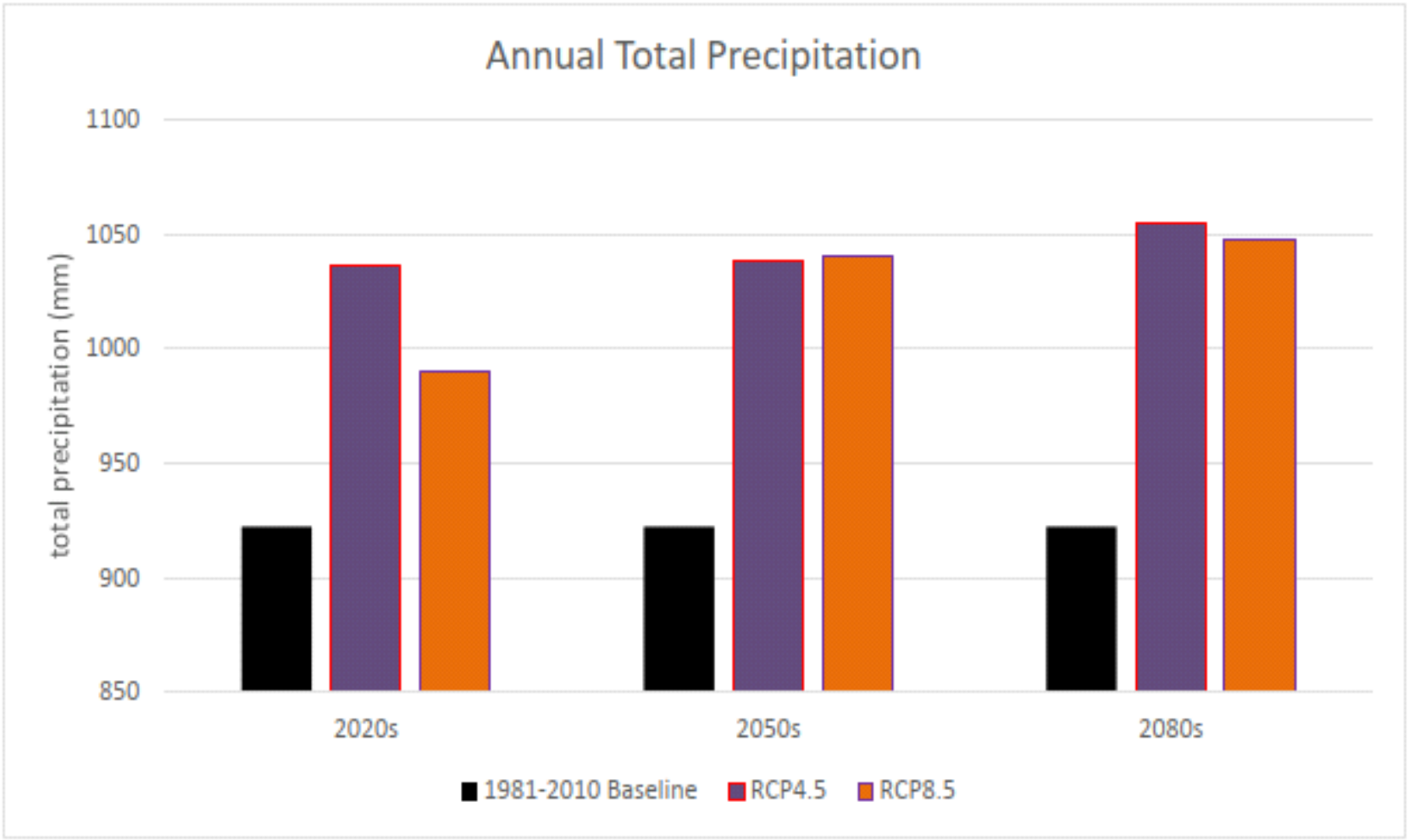

Figure 4.1-27

Projected Annual Total Precipitation, Nain

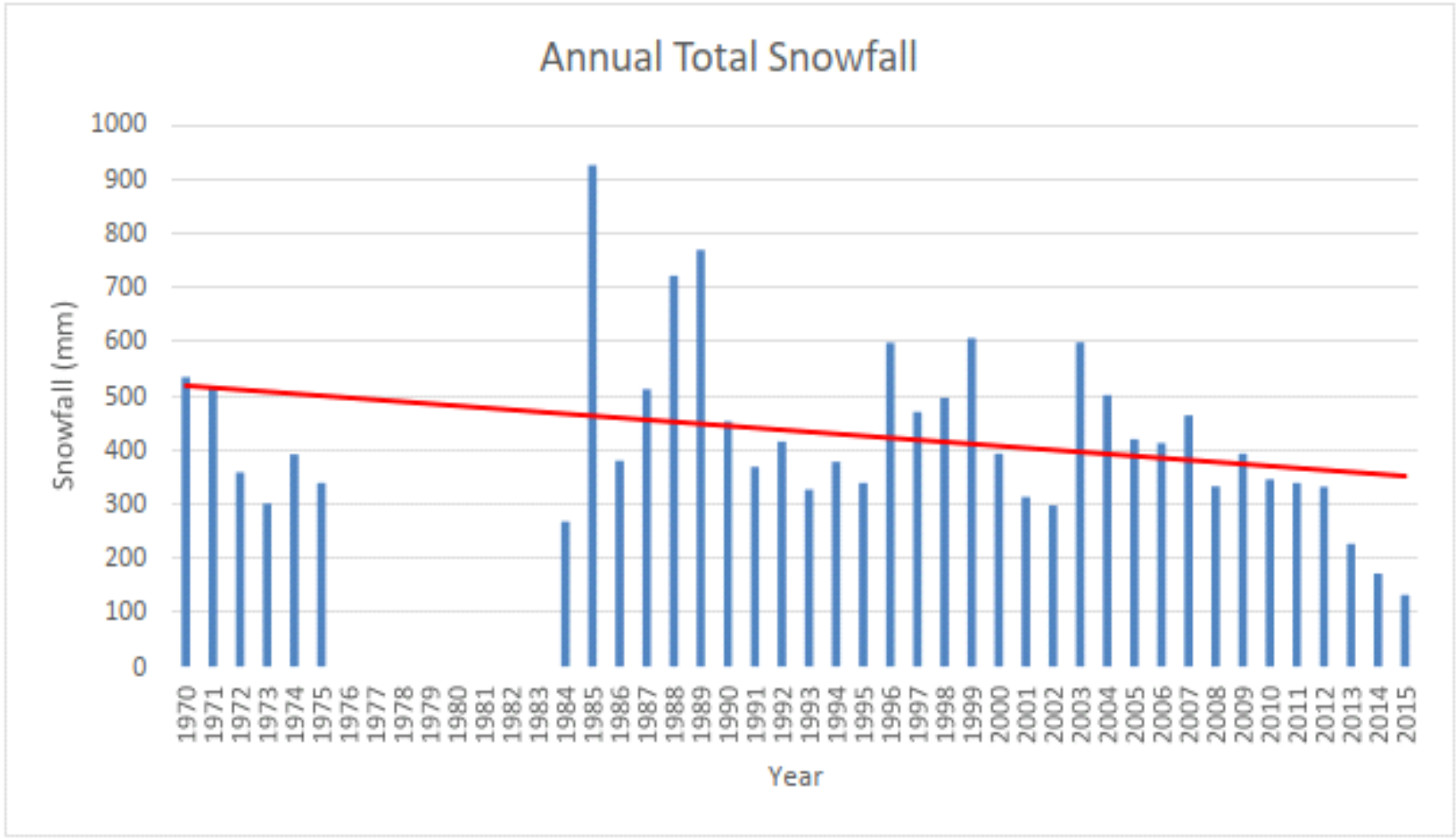

Figure 4.1-28

Historical snowfall, Nain

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4.1.3.3.5 Extreme Weather

Extreme weather projections based on downscaled CMIP-5 global climate models include: short-term rainfall, sustained winds, wind gusts, wave heights and storm surge, and lightning (Stantec 2024). A summary of climate change projections for these parameters in the Nain region is presented in Table 4.1-22. Projections are provided for the RCP8.5 scenario and can be summarized as follows.

Return periods for intense shorter-term rain decrease with climate change, and rainfall intensity increases. The trend is to increasing total rain accumulation for all durations. High intensity rainfall events will be more frequent. For example, the 100-year 1-hour precipitation event with 18.5 mm of precipitation will have a return period of approximately 6 years by 2100 and the 100-year 1-hour precipitation event in 2100 will increase from 18.5 mm/h to 29.5 mm/h under RCP8.5.

Climate models show a similar pattern in sustained winds to observed historical data, where most winds come from the west throughout the 2050s and 2080s. It is therefore expected that sustained wind patterns will follow historical trends in Nain.

The 50-year return period wind pressures near the new airport are projected to decrease slightly for future warming scenarios, which also suggests a slight decrease in the frequency of wind gust events at the airport.

As summarized by Stantec (2024), under climate change, extratropical cyclone (i.e., winter storm) frequency, characteristics, storm tracks, and impacts will change. IPCC (2021) indicates a decrease in intense extratropical cyclone frequency is projected under RCP8.5 in the North Atlantic. At the same time, as latent heating increases under a warming climate, more winter storms are expected to move farther north, and the speed and precipitation intensity will increase. Overall, these projected changes indicate the Nain region would experience more but somewhat less intense winter storms in the future. The caveats are these projections are highly uncertain and that finer-grid models may increase the projected intensity of winter storms.

Stantec (2024) summarized projected wave heights for Nain. Projections of future wave heights indicate that the maximum summer and winter wave heights in the 2050s (4.4 m in winter) will be higher than those measured in the past (1970-1999) (3.6 m in winter), implying an upward trend in wave impacts but only the beginning of the access road, within the Nain community.

Storm surge is also likely to increase in the future, mainly associated with sea level rise. Median relative sea level rise projections for 2050 are approximately 2 cm (relative to 1986-2005), increasing to 10 cm for 2100 under RCP8.5. Nain's relative sea level rise is lower than the global mean sea level rise projected due to the land uprising through glacial rebound. Storm surges may impact the beginning of the access road, within the Nain community.

Lightning activity is projected to increase across most of North America under a warming climate. ECCC reports lightning (thunderstorms) on average ~1 time per year during the 1985-2014 period and this is likely a conservative estimate for the Nain region. Projected changes would result in increases in lightening occurrence ranging from a doubling to a 100-fold increase under RCP8.5 by 2100.

Additional details and rationale for specific predictions are available in Stantec (2024).

Table 4.1-22: Summary of Climate Change Projections for Nain

Climate Parameter	Projected Change
Wind	• Slight decrease in wind speeds • Slight decrease in number of wind gusts
Winter storms / extra tropical cyclones (ETC)	• Decrease in intense ETC frequency but potential increase in total frequency • Substantial uncertainty due to complexity of formation of ETCs
Wave height / storm surge	• Increase in maximum wave heights

Climate Parameter	Projected Change
	• Increase in Higher High Water Level tide (related to increase in relative sea level)
Lightning	• Increased flash density rate (flashes / km^2 / year)

4.1.3.3.6 Evaporation and Evapotranspiration

Gridded historical data are available from ECCC's ANUSPLIN (McKenney et al 2011), beginning in the 1950s for northern stations. Climate models can also be used to present estimates of historical records and the figures here provide historical climate simulations from 24 different climate models. The historical period from these climate simulations varies. The historical simulations are shown in grey on the graphs.

According to NCAR (2024), the World Meteorological Organization (WMO) adopted the standardized precipitation index (SPI) to be used by national meteorological and hydrological services worldwide to characterize meteorological droughts (Hayes et al., 2011). SPI is based solely on precipitation data, not considering other variables that also determine drought conditions such as temperature, relative humidity, evapotranspiration, wind speed, etc. Thus, the SPI relies on two assumptions: (i) the variability of precipitation is much higher than that of other variables (e.g., the evaporative demand of the atmosphere); and (ii) the other variables are stationary (i.e., they have no temporal trend).

The period from the arrival of water inputs to availability of a given usable resource differs considerably. Thus, the time scale over which water deficits accumulate is important, and functionally separates hydrological, environmental, agricultural, and other droughts. For this reason, drought indices must be associated with a specific timescale to be useful for monitoring and management of different usable water resources. To overcome these limitations, the standardized precipitation evapotranspiration index (SPEI) is presented here that combines the sensitivity of PDSI to changes in evaporation demand caused by temperature with the multi-temporal nature of the SPI (Hayes et al., 2011). Positive SPEI values indicate wetter periods.

Figure 4.1-29 illustrates a slow annual trend to increasing wetness, with RCP8.5 presenting greater variability than more moderate climate change scenarios. On a monthly basis, the trends are quite different. The January trend is to more rapidly increasing wetness and a clearer increase for the RCP8.5 scenario than for other scenarios (Figure 4.1-30). The July trend is to gradually increasing dryness, with more pronounced drying for RCP8.5 (Figure 4.1-31).

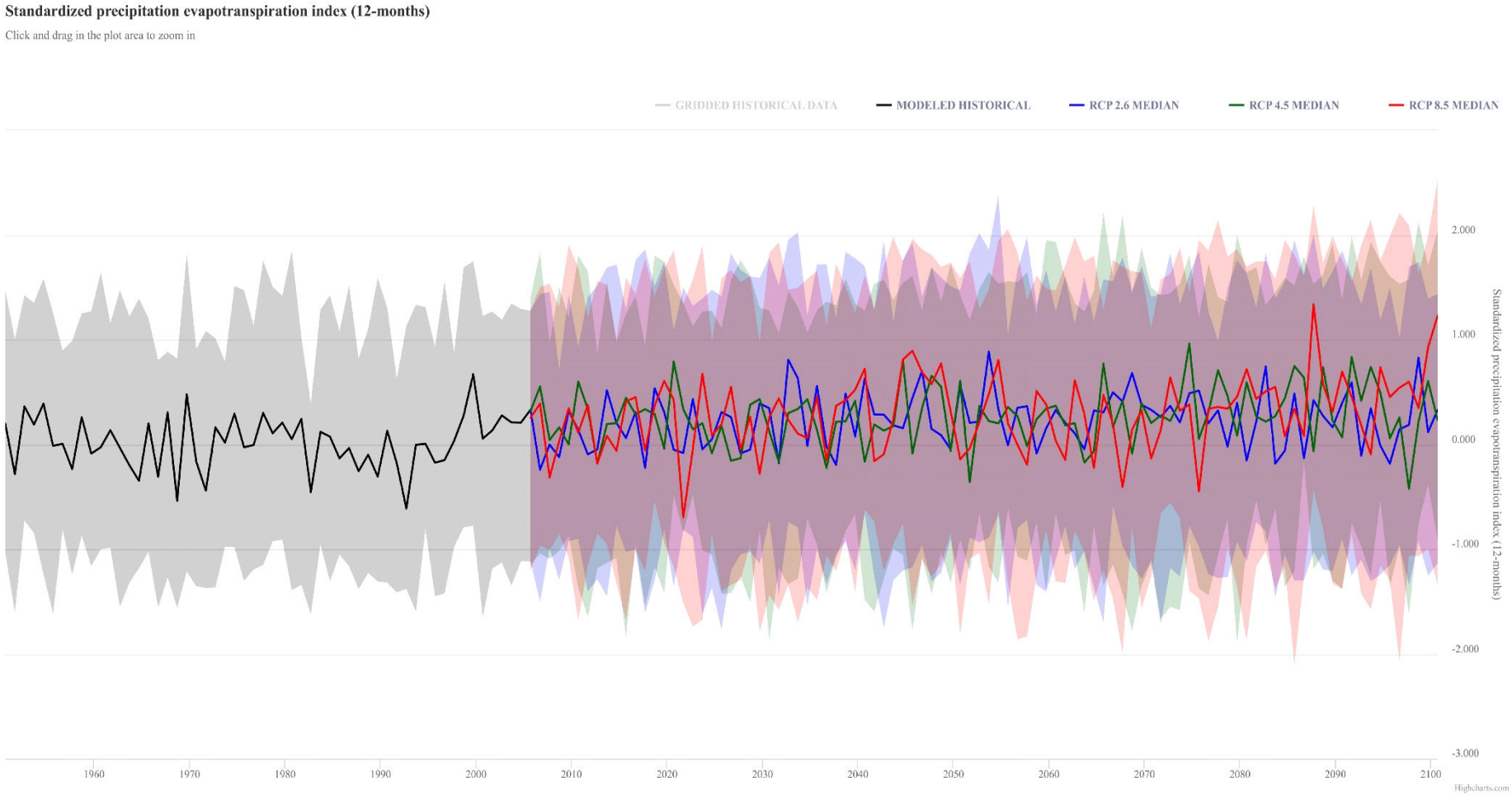

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Figure 4.1-29

Standardized Precipitation
Evapotranspiration Index - Annual

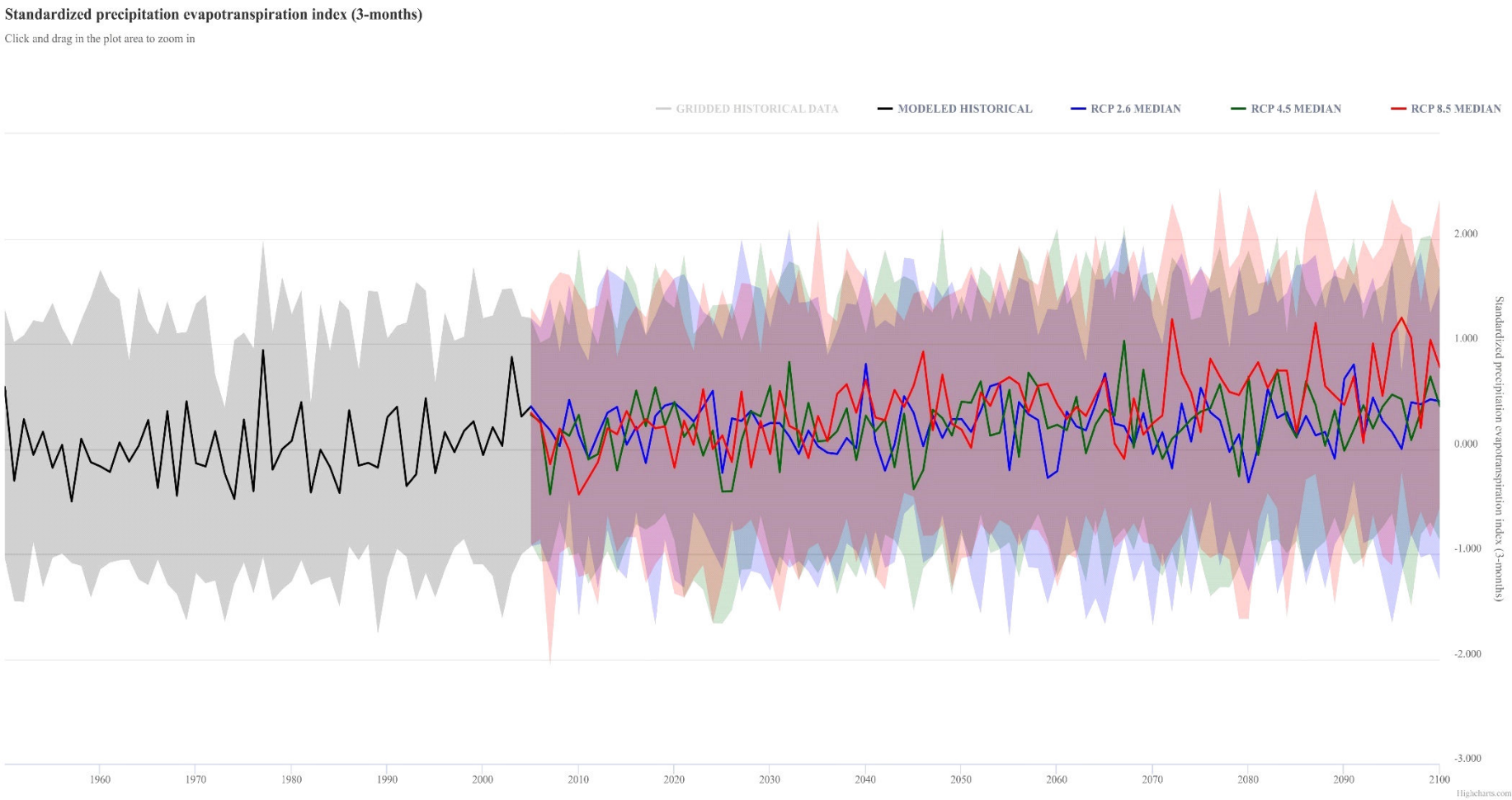

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Figure 4.1-30

Standardized Precipitation
Evapotranspiration Index - January

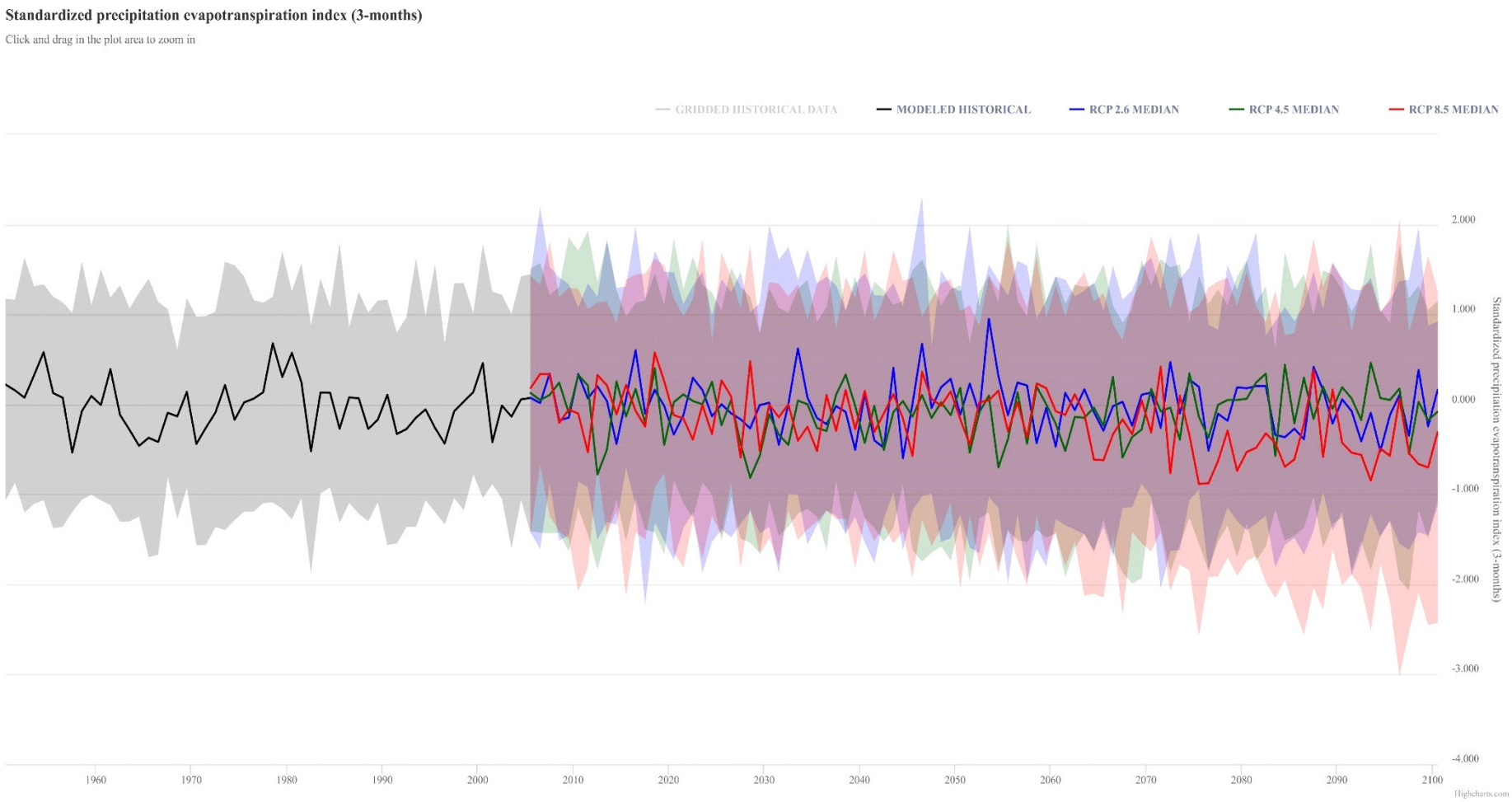

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Figure 4.1-31

Standardized Precipitation
Evapotranspiration Index - July

4.1.4 Noise and Vibration

There are no anthropogenic sources of noise and vibration in proximity to the airport, other than community land use such as hunting and plant gathering. Noise sources at Nain include general community activity (e.g., vehicular traffic), aircraft from the existing airstrip, and aggregate extraction form local quarries. A Project noise assessment will be completed before construction that will include estimation of current anthropogenic noise sources, as needed.

4.2 Soils and Terrain

The objective of the Soil and Terrain section is to characterize the baseline surface soil and topography within the established spatial boundaries for the Project.

4.2.1 Study Area

Spatial boundaries for characterizing soils and terrain baseline conditions are described in Table 4.2-1 and presented in Figure 4.2-1.

Table 4.2-1: Spatial Boundaries for Soils and Terrain

Study Area	Description	Rationale
Project Area	The footprint of the runway, airport, access road, rock borrow areas, construction staging area, temporary access road, and associated infrastructure.	Represents area of direct disturbance to soils created by the Project.
Local Study Area (LSA)	The Project Area plus a 100 m buffer	The LSA accounts for areas that may be directly affected by the Project development and can account for potential shifts in the road alignment.
Regional Study Area (RSA)	The Project Area plus a 1,000 m buffer	The RSA is of sufficient area to gather representative information on soil resources beyond the LSA; allows for establishing the indirect effects of the Project for cumulative effects.

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Project Component
- Access road
- Temporary access road
- Airport footprint

Study Area
- Regional study area (RSA)
- Local study area (LSA)

Hydrography
- Watercourse

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Figure 4.2-1
Soils Study Areas and Mapping

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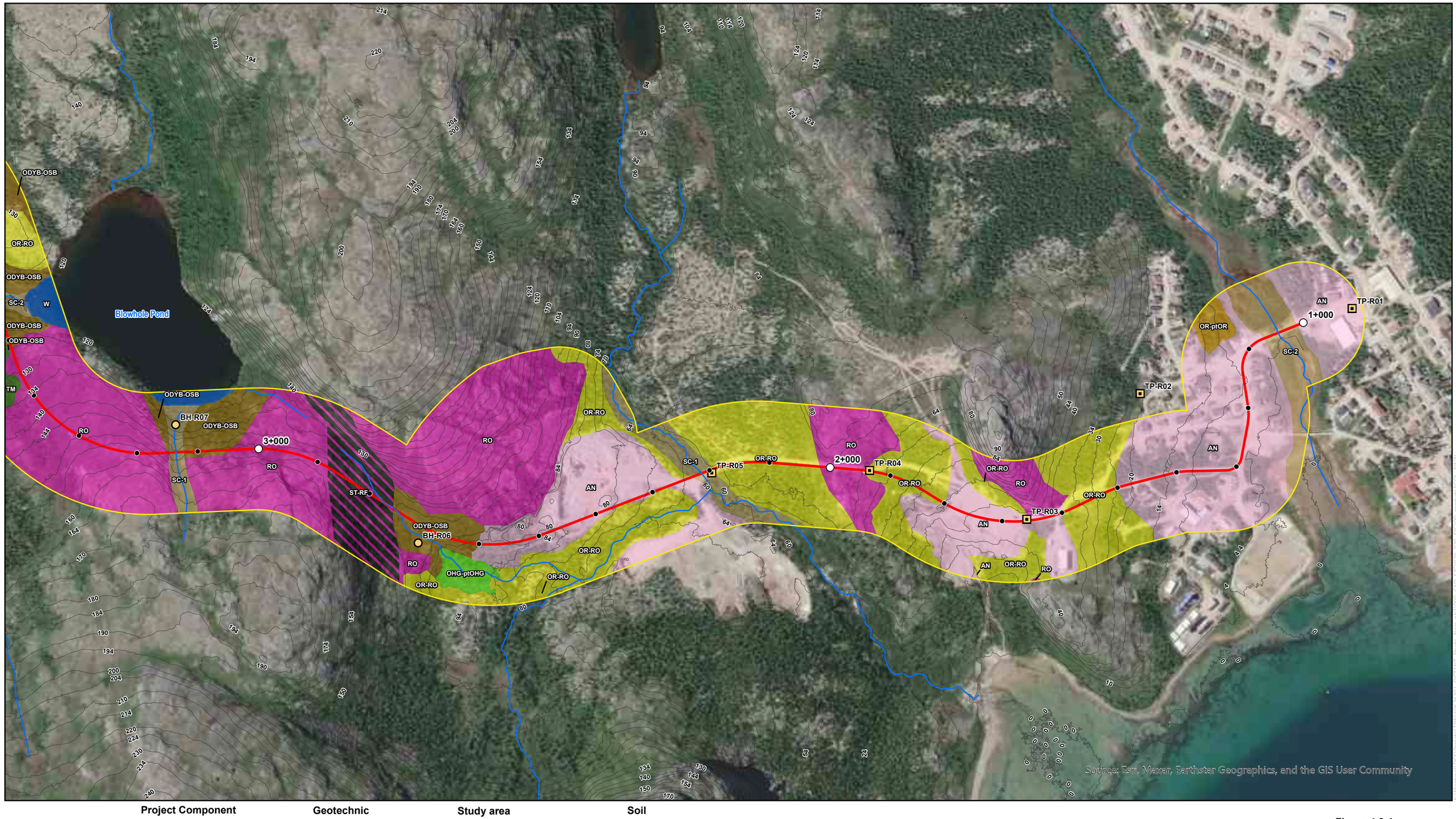

Project Component
- Kilometer point
- Access road
- Temporary access road

Geotechnic
- Borehole
- Test pit
- Proposed test pit

Study area
- Local study area

Hydrography
- Watercourse

Soil
- Anthropogenic (AN)
- Brunisolic (ODYB-OSB)
- Gleysolic (OHG-ptOHG)
- Organic soils (TM)
- Regosolic (OR-ptOR)
- Regosolic - Rock (OR-RO)
- Rock (RO)
- Steeply sloping rock face (ST-RF)
- Stream channel (SC-X)
- Water (W)

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NAD 1983 UTM Zone 20N

Figure 4.2-1

Sheet - 1

Soils Study Areas and Mapping

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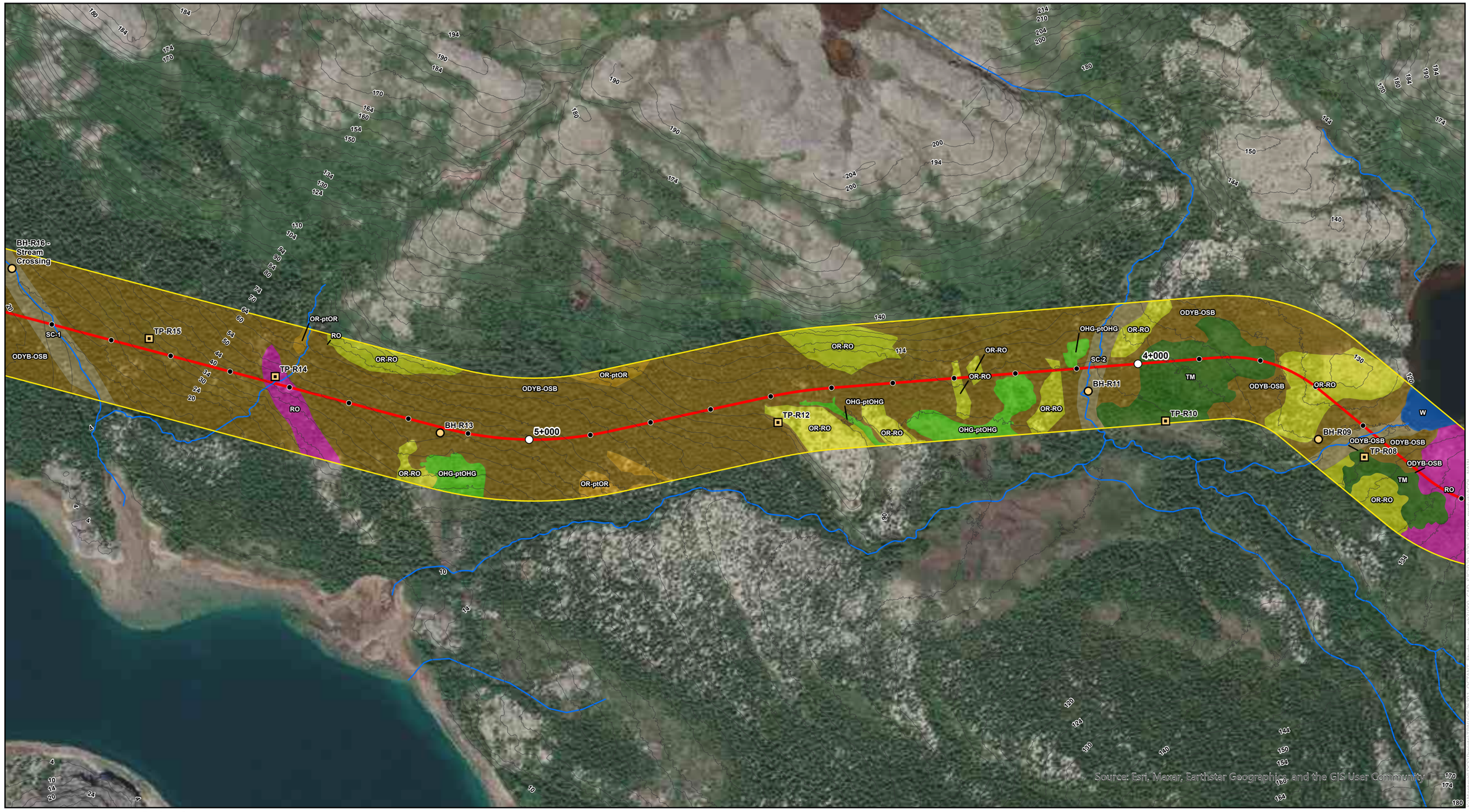

Project Component
- Kilometer point
- Access road
- Temporary access road

Geotechnic
- Borehole
- Test pit
- Proposed test pit

Study area
- Local study area

Hydrography
- Watercourse

Soil
- Brunisolic (ODYB-OSB)
- Gleysolic (OHG-ptOHG)
- Organic soils (TM)
- Regosolic (OR-ptOR)
- Regosolic - Rock (OR-RO)
- Rock (RO)
- Stream channel (SC-X)
- Water (W)

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NAD 1983 UTM Zone 20N

Figure 4.2-1

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Soils Study Areas and Mapping

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EXPERTS EN SOLUTIONS POUR L'AVIATION

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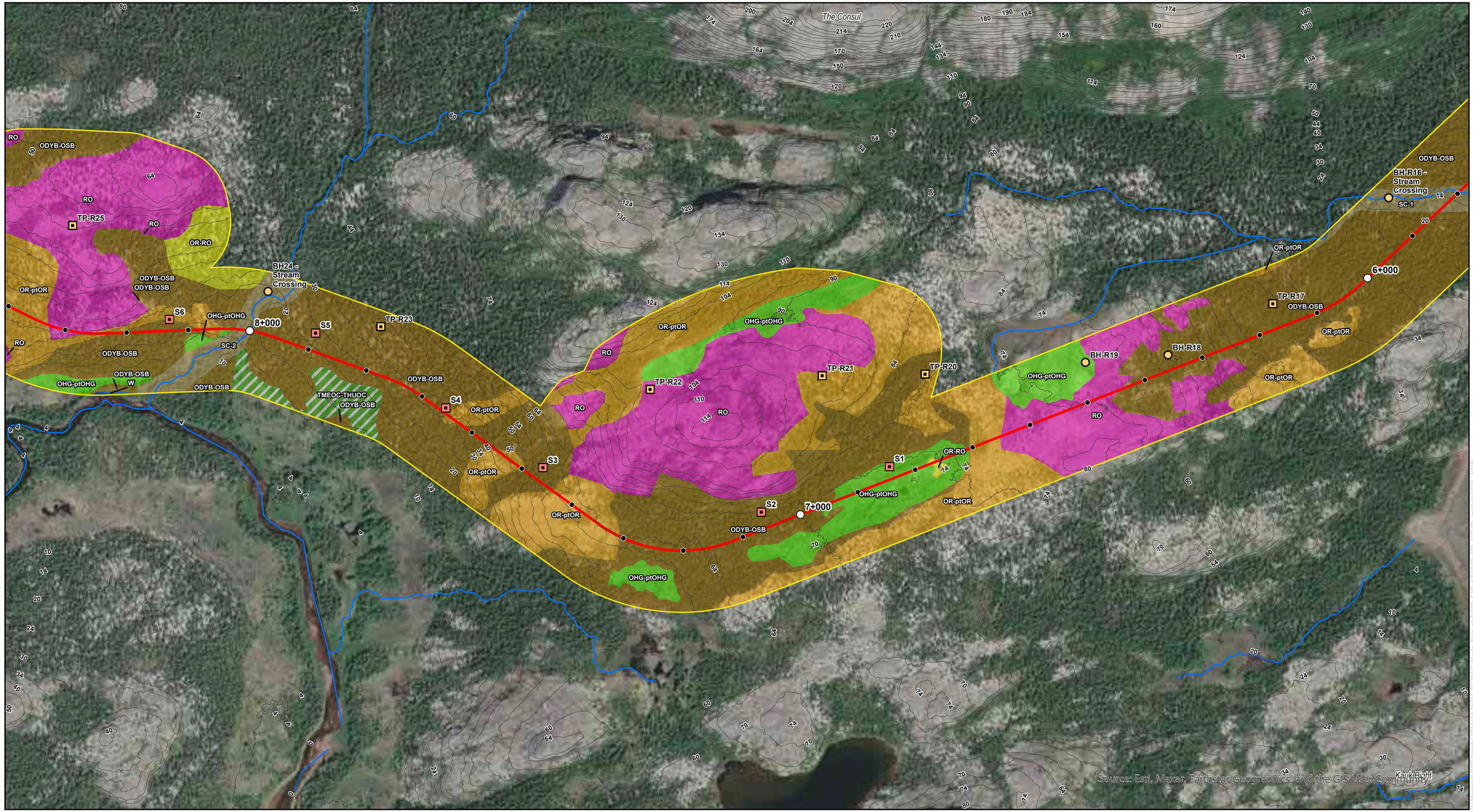

Project Component
- Kilometer point
- Access road
- Temporary access road

Geotechnic
- Borehole
- Test pit
- Proposed test pit

Study area
- Local study area

Hydrography
- Watercourse

Soil
- Brunisolic (ODYB-OSB)
- Cryosolic (TMEOC-THUOC)
- Gleysolic (OHG-ptOHG)
- Regosolic (OR-ptOR)
- Regosolic - Rock (OR-RO)
- Rock (RO)
- Stream channel (SC-X)
- Water (W)

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0 50 100 m

NAD 1983 UTM Zone 20N

Figure 4.2-1

Sheet - 3

Soils Study Areas and Mapping

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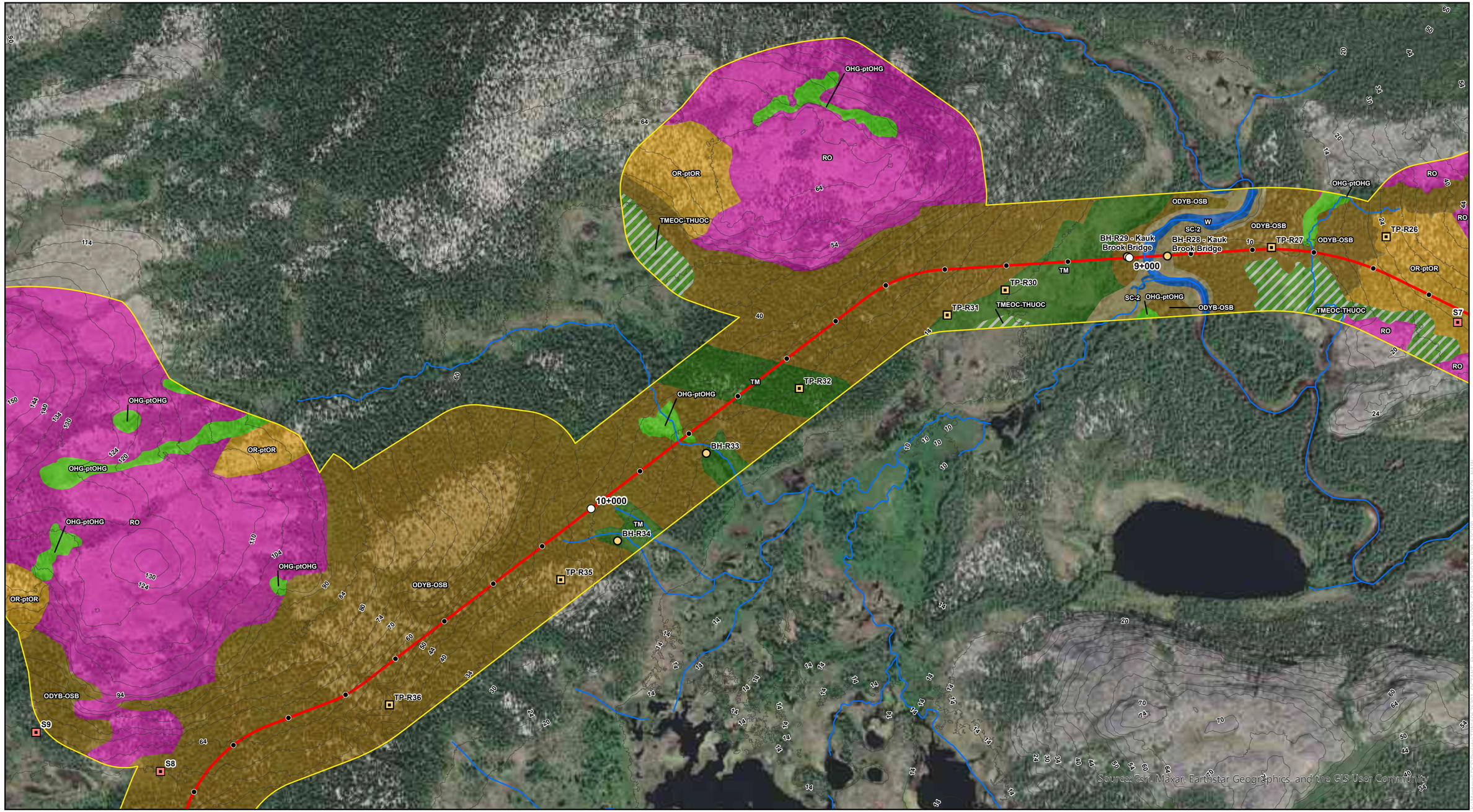
DETAILED PROJECT DESCRIPTION



Project Component
- Kilometer point
- Access road
- Temporary access road

Geotechnic
- Borehole
- Test pit
- Proposed test pit

Study area
- Local study area

Hydrography
- Watercourse

Soil
- Brunisolic (ODYB-OSB)
- Cryosolic (TMEOC-THUOC)
- Gleysolic (OHG-ptOHG)
- Organic soils (TM)
- Regosolic (OR-ptOR)
- Rock (RO)
- Stream channel (SC-X)
- Water (W)

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0 50 100 m
NAD 1983 UTM Zone 20N

Figure 4.2-1
Sheet - 4
Soils Study Areas and Mapping

OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

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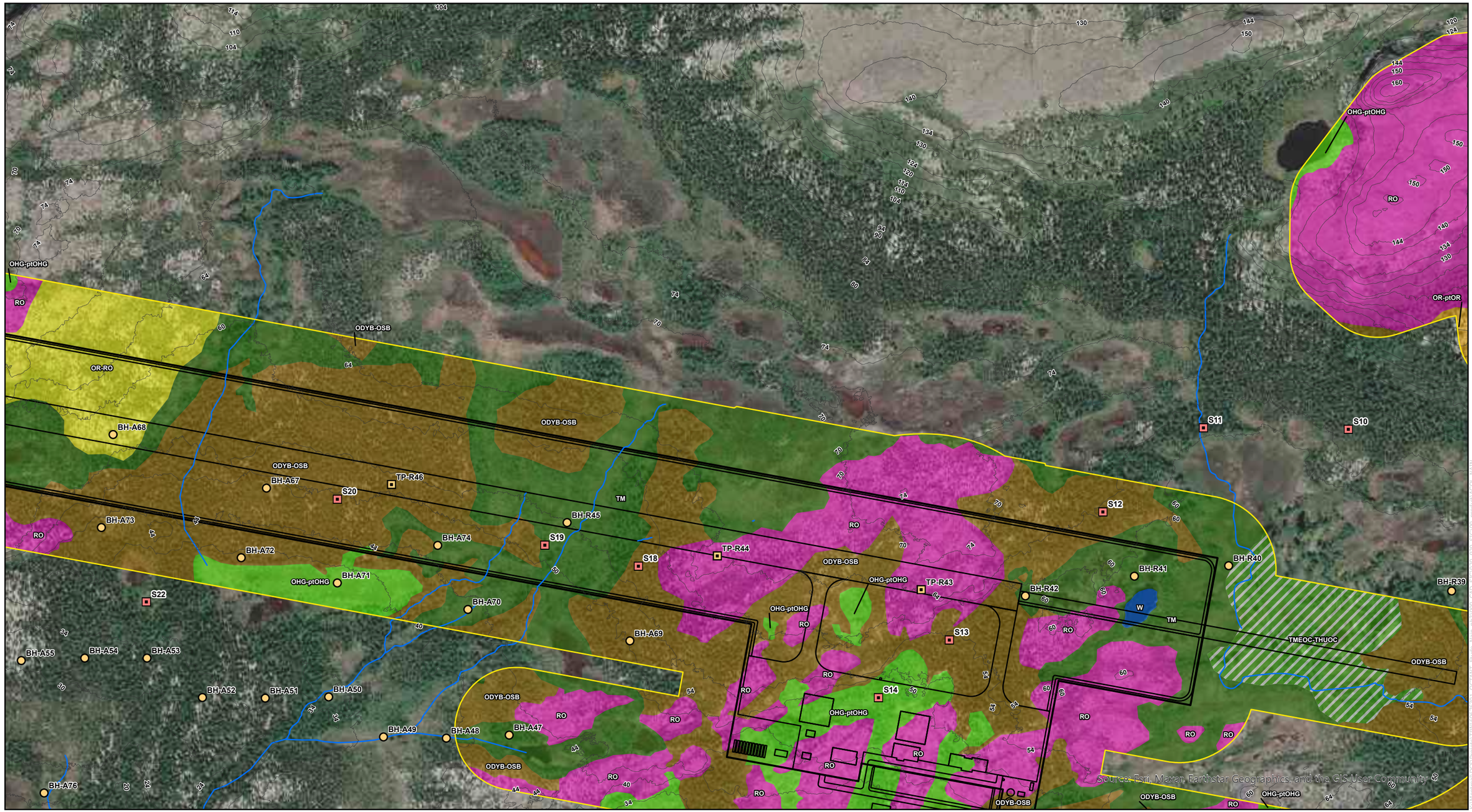
DETAILED PROJECT DESCRIPTION



Project Component
- Kilometer point
- Access road
- Temporary access road
- Airport footprint

Geotechnic
- Borehole
- Test pit
- Proposed test pit

Study area
- Local study area

Hydrography
- Watercourse

Soil
- Brunisolic (ODYB-OSB)
- Cryosolic (TMEOC-THUOC)
- Gleysolic (OHG-ptOHG)
- Organic soils (TM)
- Regosolic (OR-ptOR)
- Regosolic - Rock (OR-RO)
- Rock (RO)
- Water (W)

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NAD 1983 UTM Zone 20N

Figure 4.2-1

Sheet - 5

Soils Study Areas and Mapping

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EXPERTS EN SOLUTIONS POUR L'AVIATION

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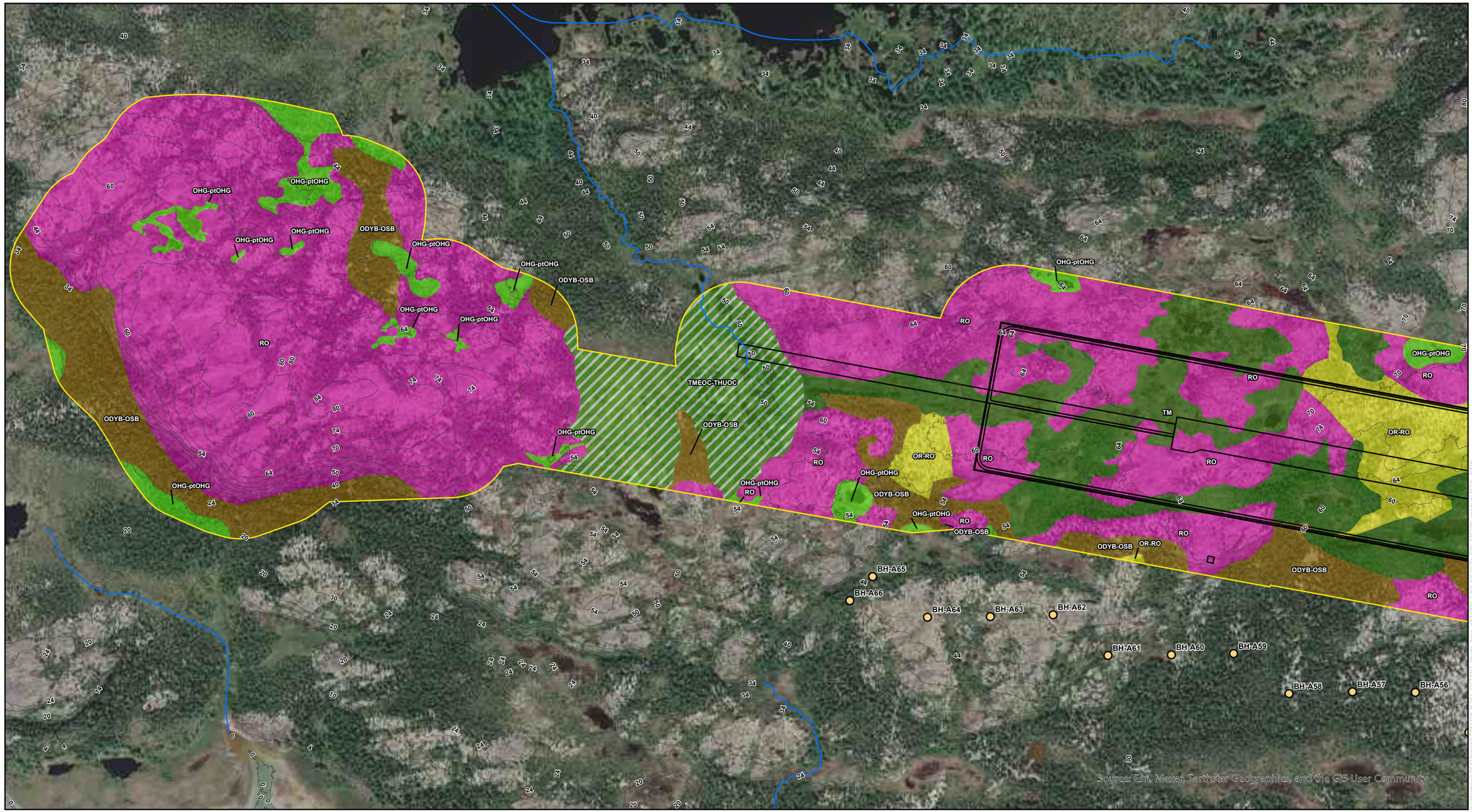

Project Component
- Kilometer point
- Access road
- Temporary access road
- Airport footprint

Geotechnic
- Borehole
- Test pit
- Proposed test pit

Study area
- Local study area

Hydrography
- Watercourse

Soil
- Brunisolic (ODYB-OSB)
- Cryosolic (TMEOC-THUOC)
- Gleysolic (OHG-ptOHG)
- Organic soils (TM)
- Regosolic - Rock (OR-RO)
- Rock (RO)

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0 50 100 m

NAD 1983 UTM Zone 20N

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Figure 4.2-1

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Soils Study Areas and Mapping

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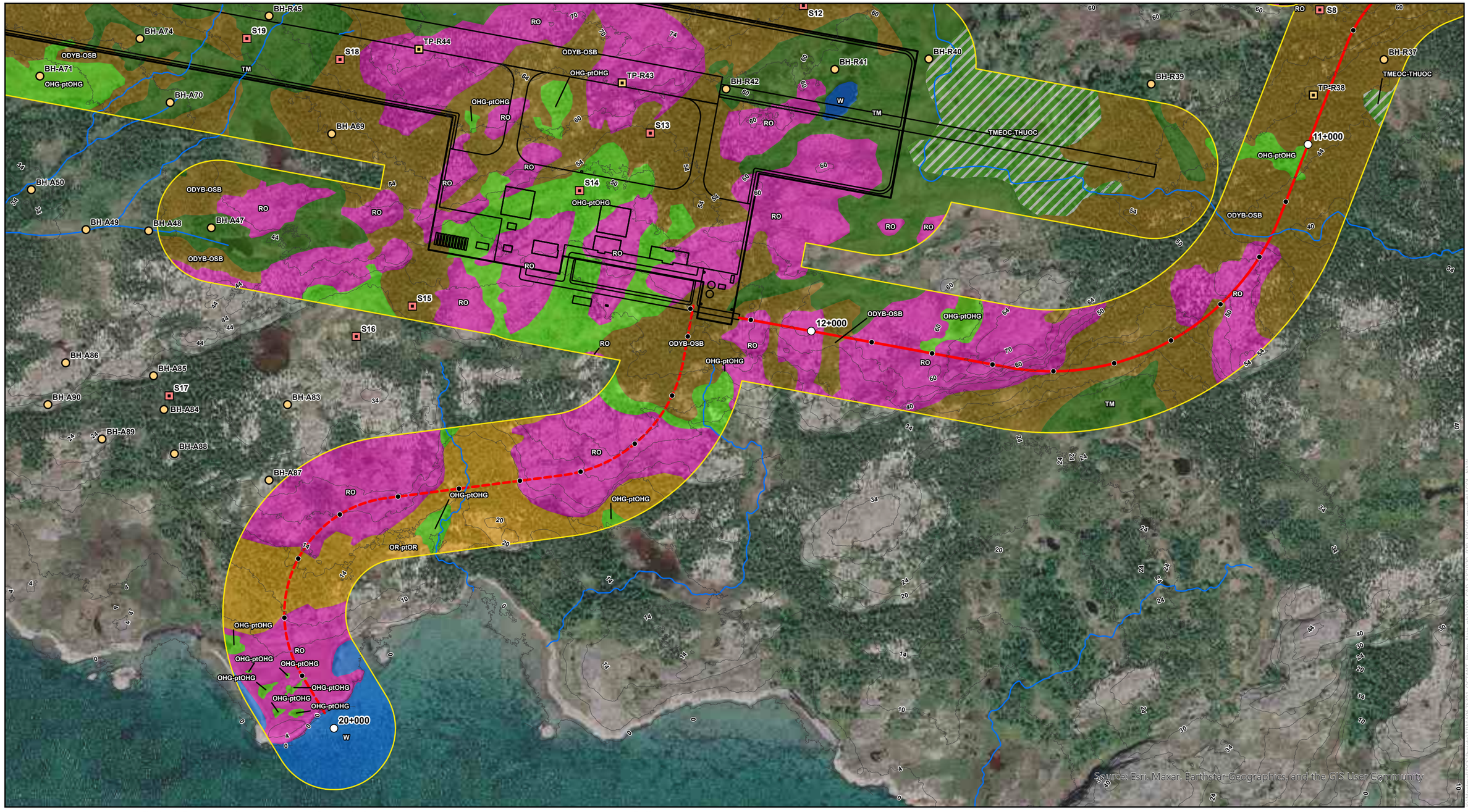
DETAILED PROJECT DESCRIPTION



Project Component
- Kilometer point
- Access road
- Temporary access road
- Airport footprint

Geotechnic
- Borehole
- Test pit
- Proposed test pit

Study area
- Local study area

Hydrography
- Watercourse

Soil
- Brunisolic (ODYB-OSB)
- Cryosolic (TMEOC-THUOC)
- Gleysolic (OHG-ptOHG)
- Organic soils (TM)
- Regosolic (OR-ptOR)
- Rock (RO)
- Water (W)

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0 50 100 m

NAD 1983 UTM Zone 20N

Figure 4.2-1

Sheet - 7

Soils Study Areas and Mapping

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4.2.2 Methods

4.2.2.1 Desktop Assessment

A compilation and review of previously collected baseline soils and terrain data in 2022 and 2023 was completed. Specific documents considered during the desktop review include:

- Stantec. 2023. New Nain Airport Feasibility Study (R4), Geotechnical Investigation Final Report.
- Aivek Stantec. 2023a. Nain Airport Feasibility Studies – Hydrological Study (R6)
- Overview Report for Nunatsiavut Government on permafrost conditions in the Nain area. University of Ottawa. Department of Geography. July 2, 2014.
- Hydrologic impacts of thawing permafrost—a review. Vadose Zone Journal. Vol. 15(6).

These reports were the primary source of information for characterizing quantity and quality of surficial materials to be potentially impacted during construction and used during reclamation activities. Stantec (2024b) included field studies for surficial materials conducted in the summer and fall of 2022. These test pit and borehole observations were interpreted to assist in the terrain mapping and used in coordination with the aerial photo mosaic to help determine likely soil types in the LSA.

Available imagery (Google Earth) and internal ArcGIS information for topography and slopes have also been reviewed.

4.2.2.2 Supplemental Field Work

Following the desktop review, AECOM conducted a field program in July 2023 to collect supplemental soils data in support of the baseline conditions assessment. A total of 22 soil inspection locations were completed; soil pits were dug using a shovel and profiles were characterized to a depth of 30 cm.

4.2.2.3 Soils Mapping and Landscape Mapping

Soil mapping is the use of soil development concepts of pedology and geomorphology, and determining how soil forming factors relate to terrain and landscape position and climate. Profile descriptions are used to determine soil classification with characteristic horizons within the soils profiles. The soil classification and soil development includes physical structure and chemical properties of the surficial materials and parent material.

Using the desktop and field information described above, the LSA area was mapped using surficial materials, test pits and boreholes, textural descriptions and visual descriptions of the top one meter of the surficial materials description. Textural descriptions, photos of the test pits and vegetation and wetland vegetation descriptions were all used to determine likely soil types found within the LSA.

Soil map units were determined using the principles of geomorphology and dominant terrain features found within the LSA along the proposed road alignment. Borehole and test pits conducted in 2022 and 2023 field seasons provided information for surficial materials, topsoil and organic surface materials and textural composition of different depths. The test pits and borehole also identified sand gravels and cobbles layers and content associated with different site inspections.

When determining baseline information for the LSA, landscape units were identified and included with differing soil types which were then delineated using topographic features, change in vegetation type, change in landform and then was confirmed with the visual aerial photo matrix and topographic lines.

4.2.3 Baseline Conditions

Table 4.2-2 presents the extent of soil and non-soil map units within the LSA. This table also identifies soil types found within each soil map unit, the number of polygons for soil types, area in hectares they cover, and percentage of total area of the LSA each map unit covers. The dominant classes are Brunisols and exposed bedrock, each comprising 33% of the LSA.

Table 4.2-2: Soil Map Units Within the LSA

Class	Soil Map Unit	Number	LSA (ha)	Area (Percent)
Anthropogenic	AN	5	15.66	2.5
Brunisolic	ODYM-OSB	41	205.88	33.3
Gleysolic	OHG-ptOHG-TM	54	34.79	5.6
Organic	TM	8	55.10	8.9
Regosolic	OR-ptOR	17	31.64	5.1
Regosolic- Rock	OR-RO	25	33.55	5.4
Rock	RO	53	204.94	33.1
Stream Channel	SC-1	3	3.48	1
	SC-2	5	5.79	1
Steeply sloping rock face	ST-RF	1	2.34	<1
Cryosolic	TMEOC-THUOC	6	21.29	3
Water	W	5	4.04	1
Total		223	618.51	100

4.2.3.1 Soil Map Units Found in the LSA

Brunisolic Soils – Map Unit label ODYB-OSB
These soils are the dominant soils found within the LSA. This soil map unit covers 205.88 ha of LSA area and makes up 33% of the soils map units found in the LSA.

Brunisolic soils are primarily found under Closed Black spruce vegetation type with gentle to moderate slopes. Organic rich surface horizons are common in this map unit and extend from the surface to 30 to 40 cm depth. These soils can be found to develop on coarse sands and gravels and finer textured surficial materials. These Brunisolic soils are characterized as having a brown Bm horizon which extends for a 10 cm in thickness. These soils can be acidic in the surface material and can have a build up of iron rich horizon and have an organic rich Ah horizon on the surface.

Brunisolic soils due to their organic rich topsoils are easy to construct through and, with the surface organic rich surface topsoils, are good candidates for reclamation regrowth of forested and shrub species.

Cryosolic Soils (Permafrost Organic soils) – Map Unit label TMEOC-THUOC
These soils are the found throughout the LSA area and are dominantly associated with sub surface frozen wetland and organic soils area. Cryosolic soils cover approximately 21.29 ha of LSA area and makes up 3% of the soils map units found in the LSA. Special building processes are typically required to ensure that permafrost is not impacted by infrastructure installation.

Cryosolic soils in the LSA are found under wetland vegetation species and are described as organic rich soils dominated by an organic rich peaty surface buildup of 60 to greater than 1.0 m depth. The Cryosolic soils are found in low-lying depressional landscapes which are connected to and fed by groundwater. These soils have groundwater at the surface or close to the surface within 40 cm of surface in some cases. The landform associated with the Cryosolic soils is one which is described as having Thermocarsts (circular water pools or small lakes) which help assist in identifying the Cryosols dominating in the area.

Cryosolic Organic rich surface horizons (Om, Omz or Oh or Ohz horizons) are common in these map unit and extend from the surface to 60 to 100 cm depth. These soils are classified as Terric Mesic Organic Cryosols or Terric Humic Organic Cryosols, The map unit label is TMEOC -THUOC.

These soils can be found with underlying coarse sands and gravels and finer textured surficial materials with high water table. These Cryosolic soils are characterized as having a frozen horizon (Omz, Ohz or Ahbz) which is found within a meter of the surface that is found to be below 0 degrees Celsius for most of the year. These soils can be acidic or basic pH in the surface material and can have an organic rich Ahbz horizon found below the organic rich surface layers.

Gleysolic Soils – Map Unit label OHG-ptOHG-TM
These soils are the third most dominant soils found in the LSA after Brunisolic and Organic soils, this soil map unit covers an area of 34.79 ha of LSA and makes up 5.6 % of the soils map units found in the LSA.

Gleysolic soils are found under wetland grasses and sedges vegetation type with depressional to nearly level slopes. Organic rich surface horizons are common in this map unit and extend from the surface to 30 to 40 cm depth and are described as a peaty phase of the gleysolic order. These soils can be found to develop on coarse sands and gravels and finer silt and clay textured soil materials. These Gleysolic soils are characterized as having a gleyed color and either a Bg or Btg horizon which extends for a 10 cm or more thickness. These soils can be acidic in the surface material and can have an organic rich Ahg at the surface or an Ahbg horizon located diresctly under the surface peat material. Most of the gleysolic soils are located in lowlying depressional slope positions and have a 30 to 40 cm buildup of peat on the surface, in some cases the surface peat can extend beyond 40 cm and are classified as an inclusion with this soil map unit and are classified as Terric Mesisolic soils.

These soils are difficult to construct in during the summer months as these soils easily succumb to soil admixing, soil rutting and soil compaction; therefore, they can benefit from construction during frozen or under dry conditions.

Organic Soils – Map Unit label TM
Organic soils are the second most dominant soils found within the LSA after Brunisolic soils. This soil map unit covers an area of 55.10 ha of LSA and makes up 8.9 % of the soils map units found in the LSA.

Organic soils, are similar to Gleysolic soil map unit. Organic soils differ from Gleysolic soil by having a deeper organic surface horizon, (>40 cm depth). Organic soils are found under similar vegetation as Gleysolic soils; wetland grasses and sedges in depressional landscapes with nearly level slopes. Organic rich surface horizons are common in this map unit and extend from the surface to 40 to 100 cm depth and are described as a organic soil order. These soils can be found to have deep organic deposits that develop over coarse sands and gravels and also can be found to overlie finer silt and clay textured soil materials within the LSA area.

These Organic soils are characterized as having a greater than 40 cm surface peat organic layer at the soil surface. These soils have an acidic surface pH (bog)or basic pH (fen) in the organic material and can also have an organic rich Ahbg horizon located in the surface or alternately found directly below the organic peat layer surface. This buried organic rich soil horizon is classified as an Ahbg horizon.

Organic soils found in this LSA are mainly located in the large low-lying depressional slope landscape positions and have a 40 to100 cm buildup of peat organic material or humic peat on the surface, in some cases the surface peat can extend beyond 100 cm. These deeper organic soils are classified as Terric Mesisols or Terric Fibrisols.

The Organic soils found in the LSA are difficult to construct in during unfrozen summer months and can easily succumb to soil admixing, soil rutting, soil compaction; soil subsidence and surface water ponding. In this respect Organic soils are similar to Gleysolic soils and therefore, these soil can also benefit from construction during frozen or dry conditions.

Regosolic Soils – Map Unit label OR-ptOR
The Regosolic soils are found underlying shrubland and deciduous shrubland vegetation in the LSA. These soil map units covers approximately 31.64 ha of LSA area and makes up 5% of the soils map units found in the LSA.

Regosolic soils are found in landscape positions with moderately sloping slopes to more steeply sloping erosional landscapes. Shallow rootmats and little organic surface matter build up are common in this map units. These soils are found to develop in steeper erosional areas where wind and water erosion dominate soil forming processes like colluvium and stream crossings. The Regosolic soils develop on coarse sands and gravels and finer textured surficial materials. These Regosolic soils are characterized as lacking an Ah horizon or having an AH horizon that is less than 10 cm thick and a BM horizon less than 5 cm thick. These soils can be acidic in the surface material.

Because of the lack of a developed organic rich surface layers these soils map units are difficult to construct through and reclaim after construction.

Regosolic Soils with Rock – Map Unit label RE-RO
The Regosolic rock soils map units are found associated underlying shrubland vegetation with little to sparse vegetation cover in the LSA, much of this map unit is either barren rock or sparse shrubland. These soil map units cover approximately 34 ha of LSA area and makes up 5% of the soils map units found in the LSA.

Regosolic soils are found in landscape positions with moderately steep slopes to more steeply sloping erosional landscapes. These soils are characterized with shallow rootmats and little organic surface matter build up. These soils are found to develop in steeper erosional areas where wind and water erosion dominate soil forming processes and form in areas that develop colluvium and depositional areas such as stream crossings. The Regosolic soils develop on coarse sands and gravels and finer textured surficial materials. These Regosolic soils are characterized as not having an AH horizon or, if an Ah horizon is present, it is less than 10 cm thick and also having a BM horizon less than 5 cm thick. These soils can be acidic in the surface material.

These soils are difficult to reclaim after construction due to the lack of a developed organic rich surface layer and exposed bedrock that discontinuously occurs throughout this soil map unit.

Stream Channels – Map Unit label SC-1 and SC-2
The Stream channel map units delineate active stream channels found in the LSA area and these map units are associated with riparian vegetation. The SC-1 stream channel map units is characterized by incised steeply sloping banks of the stream channel. The SC-1 map unit covers approximately 3.48 ha of LSA area and makes up <1% of the soils map units found in the LSA.

The SC-2 stream channel map units is different from the SC-1 map unit by having more gentle slopes associated with the stream channel and containing a flood plain more of a depositional land scape and associated with riparian vegetation. The SC-2 map unit covers approximately 3.48 ha of LSA area and makes up <1% of the soils map units found in the LSA. Watercourse characterization is provided in Section 4.4.

4.2.3.2 Non-Soil Map Units in the LSA

Anthropogenic – Map Unit label AN
The anthropogenic map units delineate areas of active human activity; these are found in the northern end of the LSA (Nain town site). These map units are associated with human activity and are often devoid of vegetation. The Anthropogenic map units covers approximately 15.66 ha of LSA area and makes up 3% of the soils map units found in the LSA.

Barren Rock – Map Unit label RO
The Barren Rock map units delineate areas of steep slopes devoid of vegetation and barren rock mountainous landform. The barren rock map unit is found throughout the LSA. The Barren rock map unit covers approximately 204.94 ha of LSA area and makes up 33% of the soils map units found in the LSA, making this map unit second most common just behind the Brunisolic soil map unit.

Steeply Sloping Rock Face – Map Unit label STRF
The Steeply Sloping Rock Face map unit delineate one specific area of extremely steep slopes devoid of vegetation and barren rock mountainous landform. The Steeply Sloping Rock Face map unit is found in

one location of the LSA: the slope of Mount Sophie to the south of Nain. The Steeply Sloping Rock face map unit covers approximately 2.34 ha of LSA area and makes up <1% of the map units found in the LSA.

The Steeply Sloping Rock Face map unit are found in one location along the proposed road comprising of 1% of the road length and 127.1 m in length. This map unit poses several safety issues for infrastructure development, including deep snow cover, icy steep slopes, avalanche and rock fall hazards amongst other issues.

Open Water – Map Unit label WA
The Open water map unit delineate areas of open lake water. The Open water map unit is found at 5 locations within the LSA. The Open Water map units covers approximately 4 ha of LSA area and makes up <1% of the soils map units found in the LSA.

4.2.3.3 Soil Reclamation Suitability

Soil quality for relative disturbance and reclamation has not been determined for topsoil lift (upper lift) and lower subsoil (lower lift), as no field soils classification with laboratory analysis has been completed. Soil salvage and reclamation suitability can and will be inferred to allow for salvaged of suitable (upper lift) surface materials to help ensure proper reclamation material and revegetation of disturbed lands associated with the stream channels, roadsides and ditches, associated facilities and airport runway and facility buildings surrounding areas.

4.2.3.4 Terrain - Landscape and Topography

The topography and landscape encountered along the LSA from the north end of the townsite to the proposed airport located along the southwestern end of the LSA varies considerably from extremely steep slopes on the northern portion just past the town site and anthropogenic areas (Figure 4.2-2). This area is very mountainous and has many areas of potential rockfall and possible avalanche hazards.

The central portion of the proposed Project Area within the hilly area has many inclined side hill slopes to more moderate slopes and low lying areas once you pass Kauk creek. The southwestern section is more gently sloping with level to nearly level organic areas. The proposed airport area has more moderate slopes with steeply sloping lands to the southern edge of the Project Area which borders on the southwestern coastline.

The topography along the LSA ranges from slope class 2 to 3 (0.5 to 5% slopes) within and around the townsite. As the Project Area continues south there are more extremely sloping lands and mountainous lands with slopes from Class 4 to 5 (6 to15 % slopes) to the most extreme slopes of Class 7 and 8 slopes (30 to 70 % slopes). Once past the mountainous areas the Project Area by Blowhole Pond there are more moderate slopes Class 3 to 4 (5 to 9 % slopes) associated with inclined side hills along this section of the LSA.

More moderate and gently sloping lands Class 3 (2 to 5 % slopes) dominate the LSA west of Kauk Brook and the proposed airport location. The proposed rock borrow areas are steeply sloping hills with Class 5 to 6 (9 to 30 % slopes). The area of the footprint southwest of the Project Area has steeply sloping lands to the coastline with Class 4 to 6 slopes (6 to 30% slopes).

Project Component
- Access road
- Temporary access road
- Airport footprint

Study Area
- Regional study area (RSA)
- Local study area (LSA)

Hydrography
- Watercourse

1:37 000

0 250 500 m

NAD 1983 UTM Zone 20N

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EXPERTS EN SOLUTIONS POUR L'AVIATION

Figure 4.2-2

Topography in the Local Study Area

AECOM

Project Component
- Access road

Study area
- Local study area

Topography
- Elevation contour

Hydrography
- Watercourse

1:6 000

0 50 100 m

NAD 1983 UTM Zone 20N

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Figure 4.2-2
Sheet - 1
Topography in the Local Study Area

AECOM

Project Component

Access road

Study area

Local study area

Topography

Elevation contour

Hydrography

Watercourse

1:6 000

0 50 100 m

NAD 1983 UTM Zone 20N

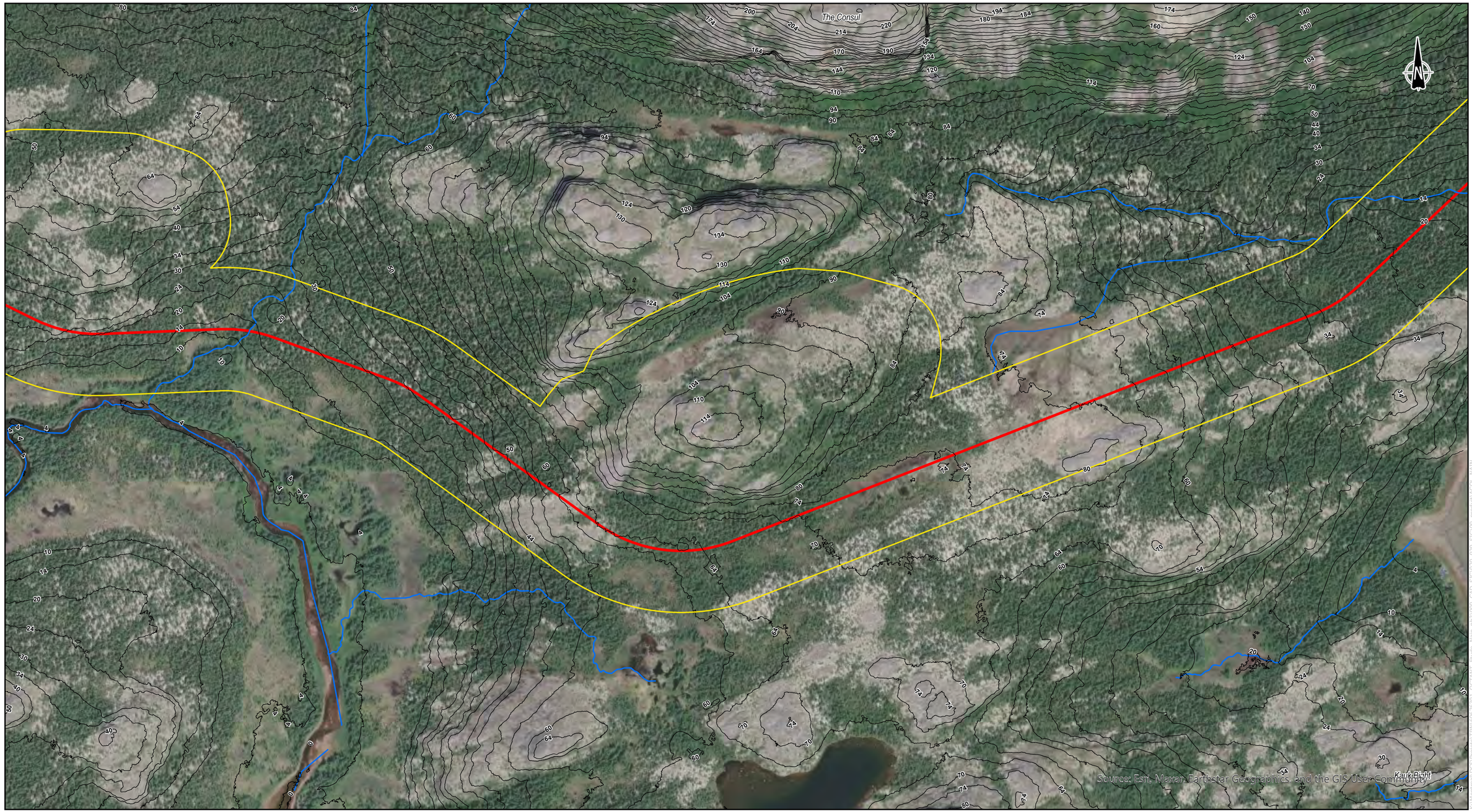
Figure 4.2-2

Sheet - 2

Topography in the Local Study Area

OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

AECOM



Project Component

Access road

Study area

Local study area

Topography

Elevation contour

Hydrography

Watercourse

1:6 000

0 50 100 m

NAD 1983 UTM Zone 20N

Figure 4.2-2

Sheet - 3

Topography in the Local Study Area

OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

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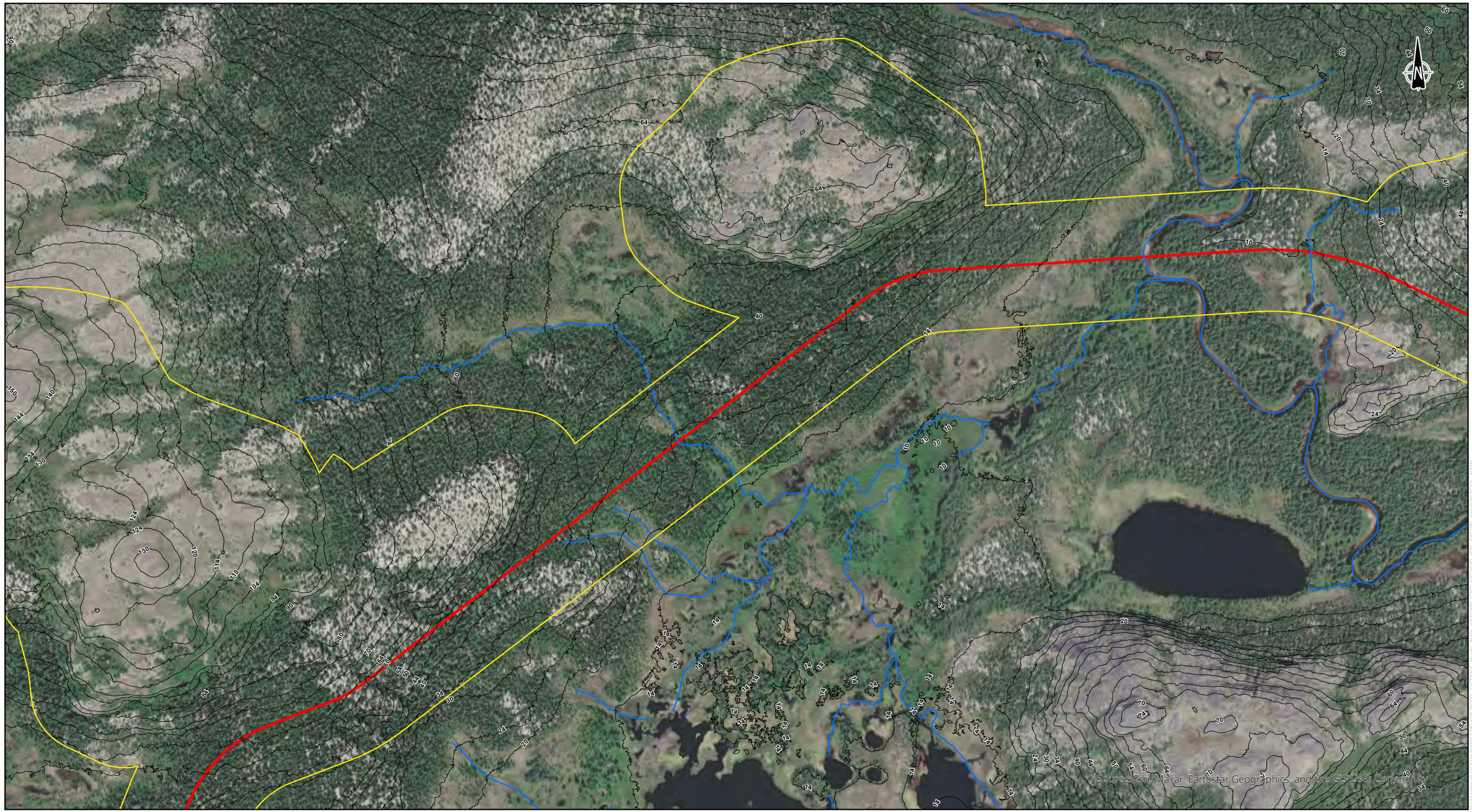

Project Component

Access road

Study area

Local study area

Topography

Elevation contour

Hydrography

Watercourse

1:6 000

0 50 100 m

NAD 1983 UTM Zone 20N

Figure 4.2-2

Sheet - 4

Topography in the Local Study Area

OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

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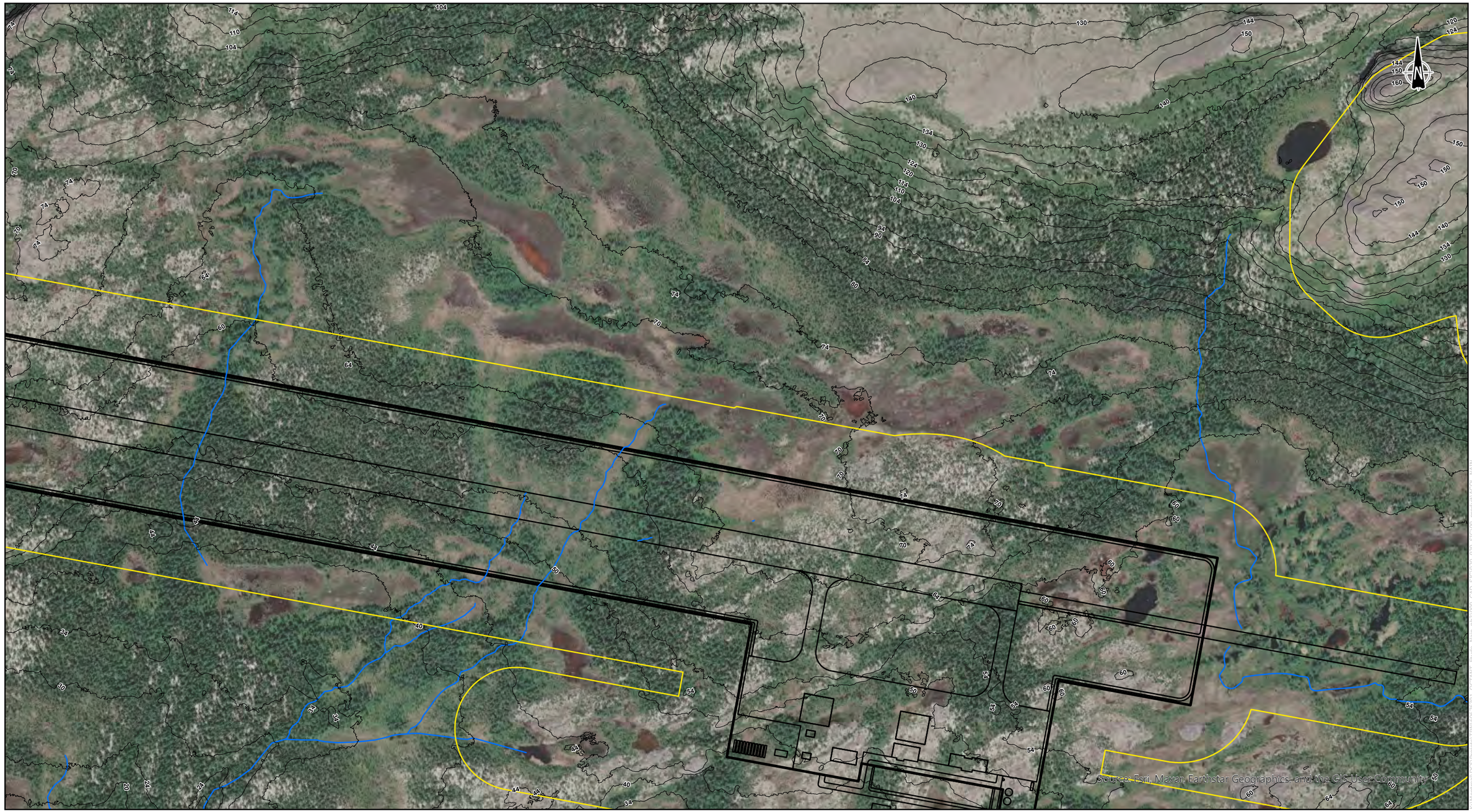


Project Component

Airport footprint

Study area

Local study area

Topography

Elevation contour

Hydrography

Watercourse

1:6 000

0 50 100 m

NAD 1983 UTM Zone 20N

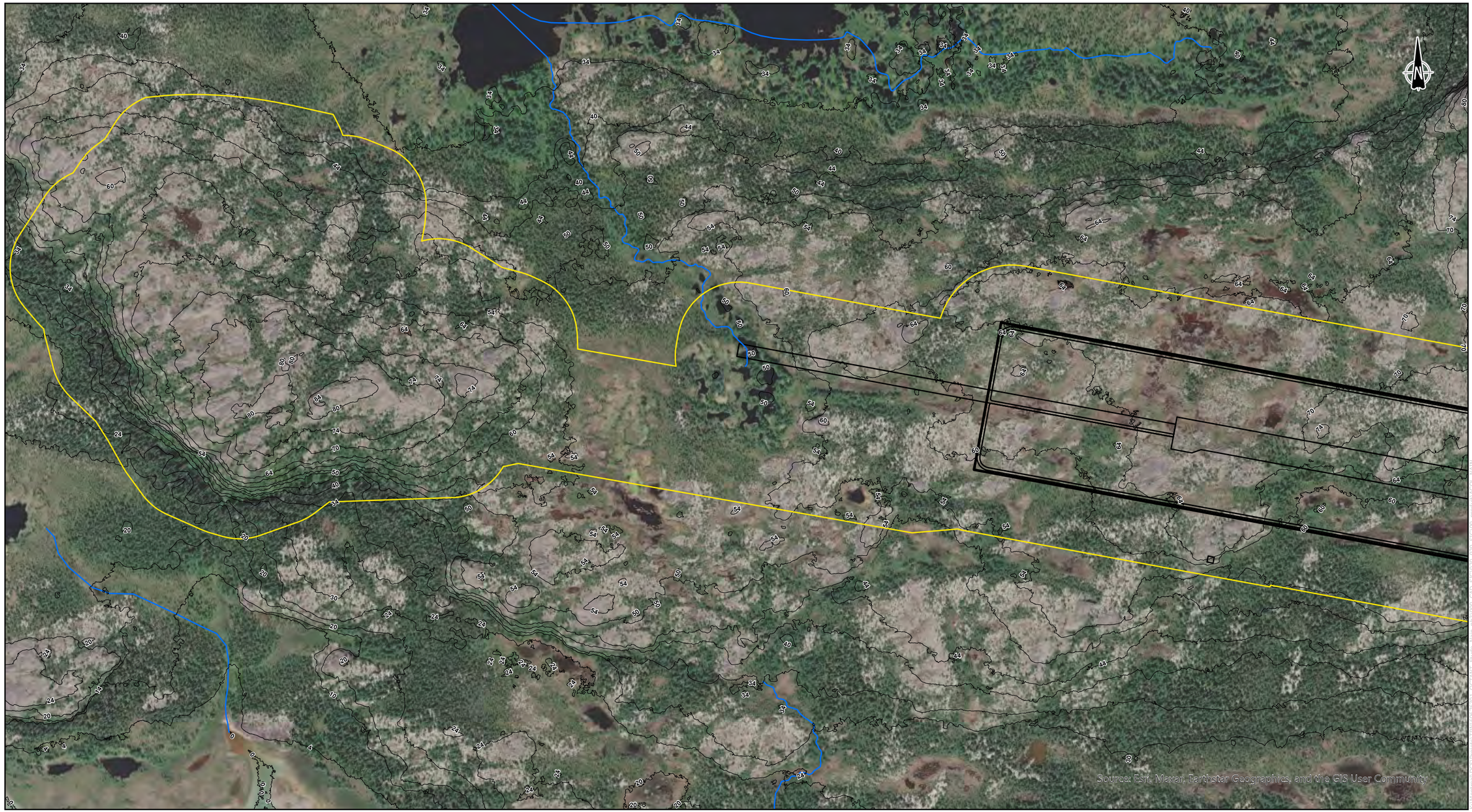
Figure 4.2-2

Sheet - 5

Topography in the Local Study Area

OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

AECOM



Project Component

Airport footprint

Study area

Local study area

Topography

Elevation contour

Hydrography

Watercourse

1:6 000

0 50 100 m

NAD 1983 UTM Zone 20N

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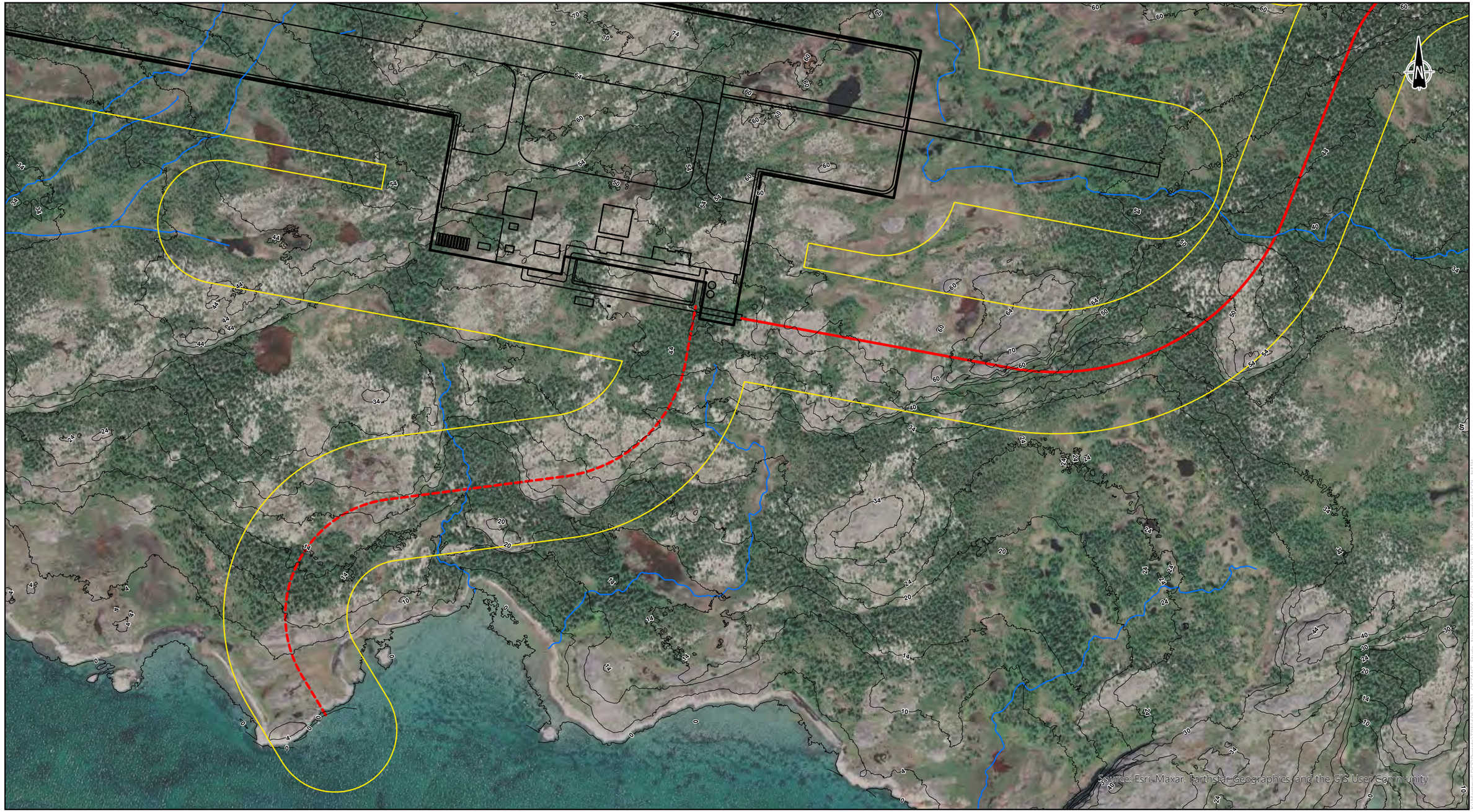
EXPERTS EN SOLUTIONS POUR L'AVIATION

Figure 4.2-2

Sheet - 6

Topography in the Local Study Area

AECOM



Project Component
- Access road
- Temporary access road
- Airport footprint

Study area
- Local study area

Topography
- Elevation contour

Hydrography
- Watercourse

1:6 000

0 50 100 m

NAD 1983 UTM Zone 20N

Figure 4.2-2
Sheet - 7
Topography in the Local Study Area

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4.3 Groundwater

The objective of the groundwater section is to characterize the baseline hydrogeological conditions within the established spatial boundaries for the Project.

4.3.1 Study Area

Spatial boundaries for characterizing groundwater baseline conditions groundwater are described below in Table 4.3-1.

Table 4.3-1: Groundwater Spatial Boundaries

Study Area	Description	Rationale
Project Area	The footprint of the runway, airport, access road, rock borrow areas, construction staging area, temporary access road, and associated infrastructure.	Represents area of direct disturbance created by the Project. Local subsurface investigations were focussed on this area.
Regional Study Area (RSA)	The RSA is made up of five surface watersheds. The RSA is located within the subdrainage area Kogaluk and Notakwanon (03NE), which itself is within the drainage area Northern Labrador (03N).	The RSA reflects the water catchment areas with water features intersected by the Project. The RSA was chosen to align with the surface water RSA since effects on these components are linked. The RSA is sufficient to characterize geology and hydrogeology conditions at a regional level.

4.3.2 Methods

4.3.2.1 Desktop Information

A desktop review of publicly available information was conducted to characterize groundwater resources in the LSA. Due to the remote location, limited information is available. Sources of information include:

- Government of Newfoundland and Labrador Geological Survey
- Newfoundland and Labrador Department of Environment and Conservation
- Geological Survey of Canada

4.3.2.2 Geotechnical Investigation

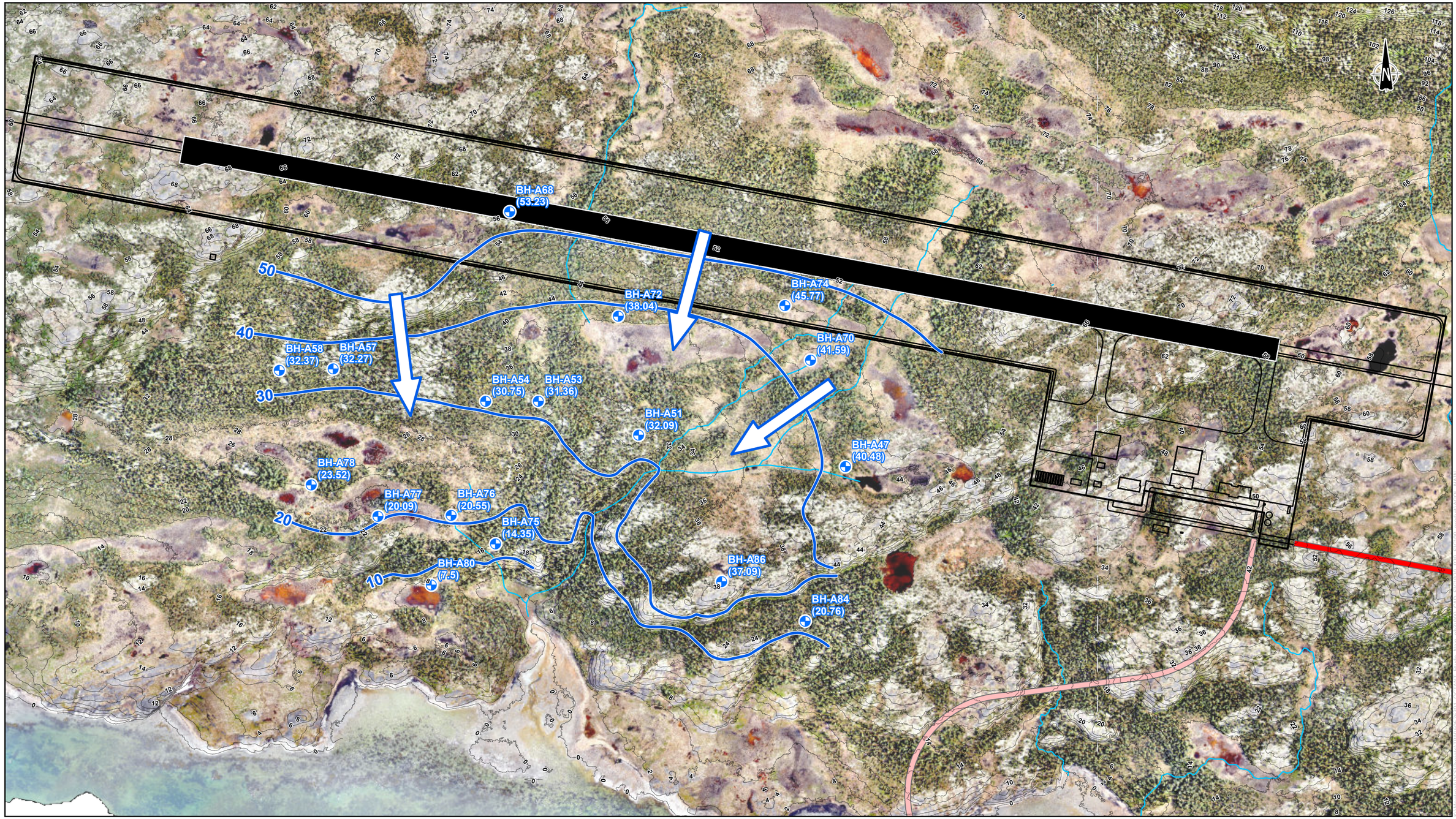
A geotechnical investigation was conducted in the 2022 summer months to support the Project. As part of this investigation, a combination of 48 mechanically excavated test pits, and 57 boreholes were completed with CME 55-6 drill rig at the 90 test locations. At some locations, a test pit was excavated in addition to a borehole. The boreholes were advanced using hollow stem augers in overburden and diamond drilling in bedrock to depths ranging from 5.1 m to 29.6 m below ground surface (bgs). Geotechnical soil samples were collected from the excavation spoil and were stored in moisture proof containers for selected laboratory testing or archived storage. Bedrock cores were stored in wood boxes at a local business (D and J Construction) in Nain for temporary storage (time length unknown). Test locations were established in the field by using a handheld GPS unit with ± 5 m accuracy.

4.3.2.3 Groundwater Wells

Groundwater investigations were conducted in August/ September 2022 to support the Project. As mentioned above, well drilling investigations were completed with a CME 55-6 drill rig using rotary washbore techniques and HQ size drilling equipment. 23 of the 57 boreholes had hand-slotted 25 mm diameter PVC standpipes installed that were backfilled with drill cuttings and sand (Figure 4.3-1). One of these twenty-three wells was installed as a nested monitoring well (BH-A70D and BH-A70S) to assess groundwater in the overburden layer (BH-A70S) and the bedrock unit (BH-A70D). An additional borehole (BH-A68) was completed with 50 mm diameter PVC monitor well materials. Groundwater level measurements were collected from all 24 borehole standpipe locations.

As part of the water quality investigations, samples were collected from both nested monitoring well locations associated with BH-A70. These groundwater samples were submitted to an analytical laboratory for general chemistry and dissolved metals analyses.

Water quantity investigations, where carried out through the installation of another monitoring well (BH-A68) that was installed to assess hydraulic conductivity of the shallow bedrock in the vicinity of this well location. Hydraulic conductivity (recovery) testing conducted at BH-A68 and the well was pumped until the water level was drawn down to the pump intake. Following pumping activities, water level measurements were recorded in the well at pre-determined time intervals.



Project Component
- Access road
- Temporary access road
- Airport footprint
- Runway

Groundwater
- (32.09) Monitoring well groundwater elevation
- Inferred groundwater contour (meters)
- Groundwater flow direction (Sept. 19, 2022)

Hydrography
- Watercourse

1:7 000

0 100 200 m

NAD 1983 UTM Zone 20N

2024-05-08 15:21

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Figure 4.3-1
Groundwater Sampling Locations

4.3.3 Baseline Conditions

4.3.3.1 Surficial Geology

Based on existing provincial documents, the most widespread surficial soils expected to be present near the Project Area consist of fluvio-glacial and glacial deposits. Fine-grained glaciomarine soils may be present; however, only at locations falling below the reported marine limit (i.e., 20 to 40 m asl). These fine-grained soils, wherever present, are likely to be overlaid by other materials (e.g., fluvial and/or organic deposits) (Stantec 2023).

Based on a review of geological maps of the area, the area generally consists of greater than 80% exposed bedrock or concealed bedrock. Overburden sediments, where present, have been described as consisting of till and other surficial materials generally less than one metre thick and discontinuous. On the northern Labrador Peninsula, these sediments are characterized by extensive boulder fields, dominantly felsenmeer (Klassen et. al. 1992)

Organic soil (peat, rootmat, topsoil) was encountered at surface at all of the test locations except those in the existing road and at the three exposed bedrock locations. The organic material was observed extending from the existing ground surface to depths ranging from 0.05 to 1.04 mbgs, with an average depth of about 0.25 mbgs (Stantec 2023).

Sand was encountered below fill, organic soil, silt, and clay in 56 test locations. Sand layers were 0.1 m to more than 9.7 m thick, with an average thickness of about 2.0 m. The sand layers were observed at depths ranging from 0.05 to 3.1 mbgs. At most locations, the sand extended to the underlying silt and/or clay, bedrock at 0.13 to 9.1 mbgs. Occasional cobbles and boulders were noted in the sand stratum (Stantec 2023).

Sandy silt and silty sand were encountered below the organic soil, sand, silt, and clay in eleven (11) test locations. Silty sand and sandy silt layers were 0.8 m to more than 12.8 m thick, with an average thickness of about 6.7 m, and were observed at depths ranging from 0.1 to 4.6 mbgs and extended to the underlying silt / clay or bedrock at 3.6 to 9.1 mbgs or beyond the 6.7 to 13.7 mbgs depth drilled. Occasional cobbles and boulders were noted in this stratum (Stantec 2023).

Silt was encountered below the organic soil, sand, and clay in 21 test locations. Silt layers were 0.8 m to over 9.9 m thick, with an average thickness of about 4.5 m, and were observed at depths ranging from 0.1 to 7.6 mbgs and extended to the underlying sand, clay, or bedrock at 1.5 to 10.9 mbgs or beyond the 8.4 to 11.1 mbgs depth drilled (Stantec 2023).

Silt and clay were encountered below the organic soil, sand, or silt in ten (10) boreholes. Silt and clay layers were 1.5 m to over 16.2 m thick, with an average observed thickness of about 7.0 m, and were observed at depths ranging from 0.6 to 6.1 mbgs and extended to the underlying silt or sand; or beyond the 15.3 to 22.1 mbgs depth drilled (Stantec 2023).

4.3.3.2 Bedrock Geology

Labrador is composed of segments of the Grenville, Makkovik, Nain, Churchill, and Superior structural provinces of the Canadian Shield, a region largely dominated by igneous and metamorphic bedrock terrain (Roberts et al., 2006). The RSA is located along the eastern part of the Precambrian Shield, more precisely within the Nain Plutonic suite (or Nain Province) where bedrock is mostly composed of igneous and metamorphic rocks (Green, 1974; Wardle et al. 1997), which consists of coarse-grained, massive to well foliated, grey to bluish grey and buff anorthosite and gabbroic anorthosite, locally cut by mafic dykes, layered gabbro and anorthositic gabbro, gradational with and related to anorthosite plutons (Wardle et al., 1997).

Bedrock was encountered at 63 test locations at depths ranging from 0 to greater than 22.0 mbgs (Stantec 2023). Recovered bedrock consisted of slightly weathered to fresh, blackish grey, medium to coarse grained, anorthosite. Rock Quality Designation (RQD) of 105 runs of bedrock core is generally described as predominantly good to excellent quality (i.e., RQD > 75%) with local zones described as very poor to fair quality (i.e., RQD 0 to 75%). Unconfined compressive strength testing results that were completed on 19 bedrock core samples indicated a strength range of 31 to 142 MPa, with an average of

102 MPa, classifying the bedrock as medium strong to very strong, in terms of its intact rock strength. The unit weight ranged from 2.70 to 2.90 g/cm³, with an average of 2.79 g/cm³, which is within the expected range.

4.3.3.3 Hydrogeology

As per 2011 (AECOM) hydrogeological mapping for surficial geology, Figure 4.3-2 illustrates the surficial geology (overburden) within the general Nain area including the vicinity of the proposed runway area consists of hydrostratigraphic unit of a combination of Exposed Bedrock and Drift-poor Area (Unit A) that is interpreted to have a relative very low yield with respect to groundwater development potential. However, overburden in the vicinity of the runway and northwest and northeast of the runway area are depicted (green) to consist of Glaciomarine and Marine Deposits and Glaciolacustrine Deposits (Unit D), which have relative low to moderate to high yield with respect to groundwater development potential. The typical hydraulic conductivity ranges for Unit D are as follows - Coarse Gravel: 10^5 to 10^3 m/d; Fine to Coarse Sand: 10^3 to 10^2 m/d; Silt: 1 to 10^{-4} m/d).

As per 2011 (AECOM) hydrogeological mapping for bedrock geology, Figure 4.3-3 illustrates the bedrock geology within the general Nain area including the vicinity of the proposed runway area fall within the category of Unit 1 – Mafic Intrusive and All Extrusive Igneous Rocks (Anorthosite), which is interpreted to have a low yield with respect to relative groundwater development potential. However, Unit 2 – Granitic and Gneissic Rocks, which located northeast of the eastern end of the proposed runway, is interpreted to have a low to moderate yield with respect to relative groundwater development potential. Based on pump rate test data collected from 40 wells within bedrock Unit 2, the mean achievable pump rate is 28.7 L/min. It should be noted that 2011 (AECOM) geological mapping provided for the Nain area appears to be similar to previous geologic mapping from Ryan (1990) (Figure 4.3-4).

More recent bedrock mapping of the Nain area is presented in Figure 4.3-5 (Ryan 2015); this figure the illustrates the bedrock geology within the general Nain area and partially within the vicinity of the proposed runway area (the province has conveyed that additional 2015 geological mapping to the south is currently not available). This more detailed geological mapping illustrates variances in bedrock types in the vicinity of the proposed runway; however, it should be noted that the bedrock suites depicted as: 1. Troctolitic Rocks 2. Anorthositic Rocks and 3. Mafic Ultramafic and Felsic Rocks would be considered as Unit 1 category type rocks in the 2011 (AECOM) hydrogeological mapping for bedrock (low yield with respect to relative groundwater development potential). The Granitic Rocks (orange) north of the proposed runway would be considered as Unit 2 category type rocks in the 2011 (AECOM) hydrogeological mapping for bedrock (low to moderate yield with respect to relative groundwater development potential).

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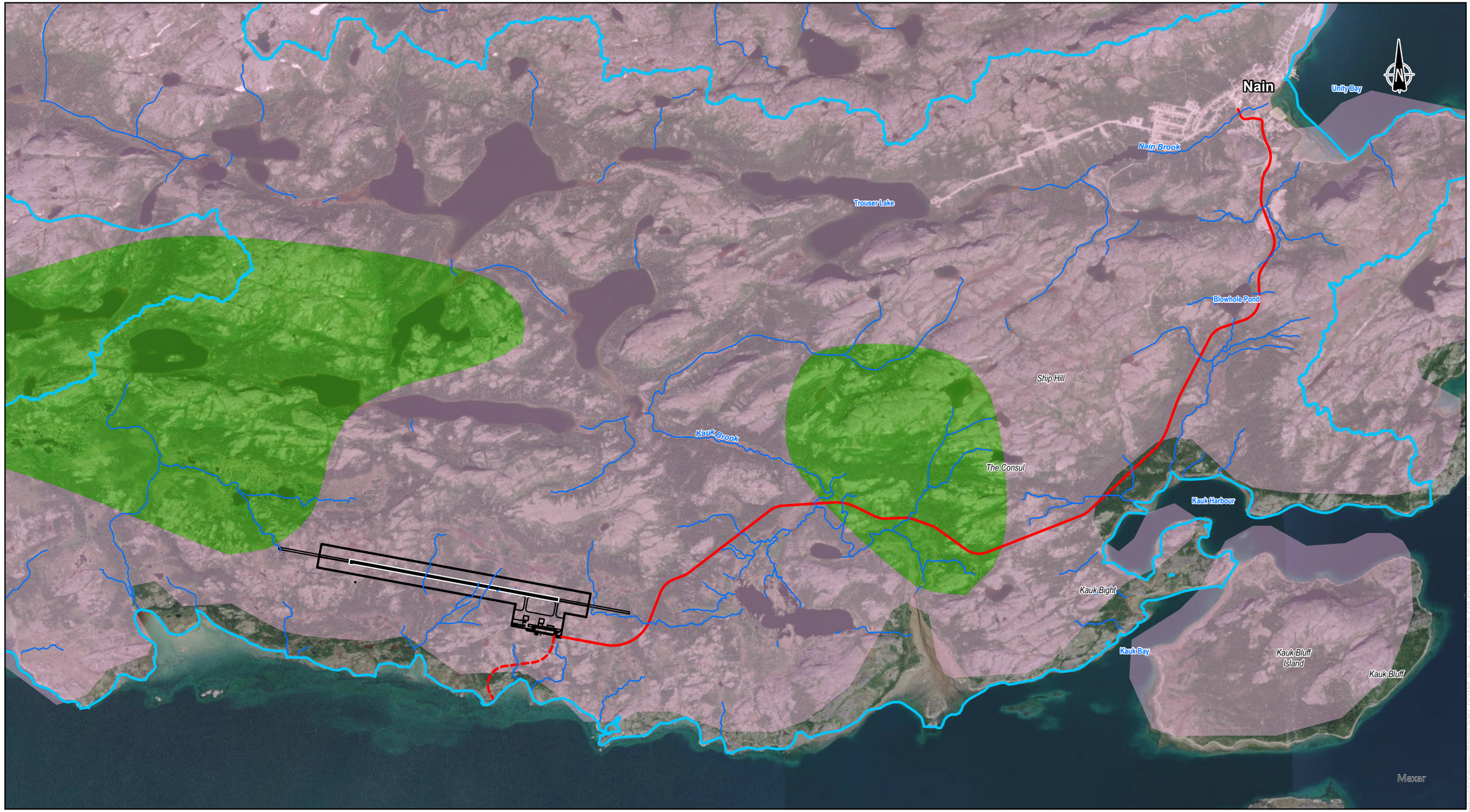
NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION



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Project Component
- Access Road
- Temporary Access Road
- Airport Footprint
- Runway

Hydrography
- Groundwater RSA
- Watercourse

Surficial Hydrostratigraphic Units

Hydrostratigraphic Unit	*Symbology*	*Interpreted Relative Groundwater Development Potential*	*Typical Hydraulic Conductivity Range(m/d)[1]*
Unit A - Exposed Bedrock and Drift-Poor Areas		Very Low Yield	-
Unit D - Glaciomarine and Marine Deposits and Glaciolacustrine Deposits		Low to Moderate to High Yield	Coarse gravel (10^5 to 10^3 m/d) to fine to coarse sand (10^3 to 10^{-2} m/d) to silt (1 to 10^{-4})

Reference: 1. Typical hydraulic conductivity values for consolidated and unconsolidated aquifers as presented in Driscoll (1986) after Davis, 1969; Dunn and Leopold, 1978; Freeze and Cherry, 1979.

1:37 000
0 250 500 m
NAD 1983 UTM Zone 20N

Source:
Newfoundland and Labrador Department of Environment and Conservation. 2011. Surficial Hydrogeology Labrador Region NL – Map 3 (Scale: 1:1,115,000). AECOM, March 23, 2011.

Figure 4.3-2

Surficial Hydrogeology

AECOM

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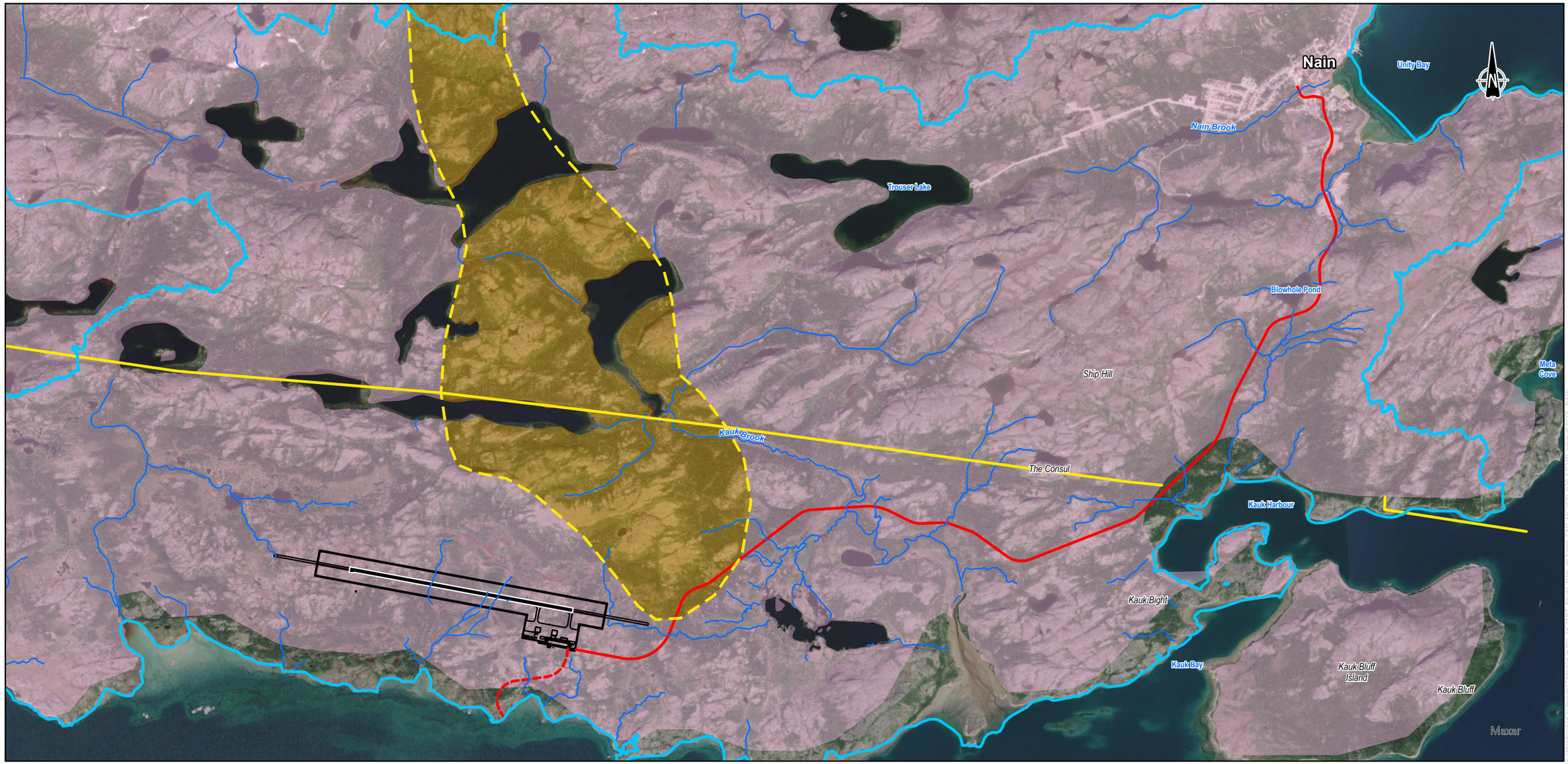
NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION



Project Component

- Access Road
- Temporary Access Road
- Airport Footprint
- Runway

Hydrography

- Groundwater RSA
- Watercourse

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Bedrock Hydrostratigraphic Units

Hydrostratigraphic Unit	Symbology	Interpreted Relative Groundwater Development Potential	Example Lithology	Well Characteristics Based on Available Well Logs in Labrador			
				Statistical Parameter	Total Depth (m)	Air Lift Yield (Lpm)	Pumping Rates Test (Lpm)
Unit 1 - Mafic Intrusive and All Extrusive Igneous Rocks		Low Yield	Anorthosite, gabbro, basalt, rhyolite	*Minimum*	13.4	0.1	-
				Maximum	118.5	204.6	-
				Mean	51	16.7	-
				Geomean	43	6.8	-
				Median	37.8	6.8	-
				No. of Wells	103	99	-
Unit 2 - Granitic and Gneissic Rocks		Low to Moderate Yield	Granite, gneiss	*Minimum*	13.4	0	0.6
				Maximum	177	300	315
				Mean	62.4	21.5	28.7
				Geomean	-	7.2	8.6
				Median	57.9	9	6.5
				No. of Wells	186	171	40

Notes: Mean = arithmetic average; STD = standard deviation of the population; Lpm = litres per minute; m= metres

- Geological Contact
- Fault

1:37 000

0 250 500 m

NAD 1983 UTM Zone 20N

Source:
Newfoundland and Labrador Department of Environment and Conservation. 2011. Bedrock Hydrogeology Labrador Region NL – Map 4 (Scale: 1:1,115,000). AECOM, March 23, 2011

Figure 4.3-3

Bedrock Hydrogeology

AECOM

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NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION

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Project Component
- Access Road
- Temporary Access Road
- Airport Footprint
- Runway

Nain Plutonic Suite
- Anorthositic members: Predominantly medium- to - coarse-grained norite, leuconorite and anorthosite, some gabbroic and troctolitic variants; locally contains iridescent plagioclase (labradorite)
- Quartzofeldspathic gneiss and migmatite derived largely from tonalitic to granite intrusive rocks
- Geological boundary
- Fault

Hydrography
- Groundwater RSA
- Watercourse

1:37 000
0 250 500 m
NAD 1983 UTM Zone 20N

Source:
Ryan, B. 1990. Preliminary Geological map of Nain Plutonic Suite and surrounding rocks (Nain – Nutak, NTS 14 S.W.) Scale 1: 500,000, Geological Survey Branc, Department of Mines and Energy, St. John's Newfoundland, Map 90-44

Figure 4.3-4
Geology of the Nain Area

AECOM

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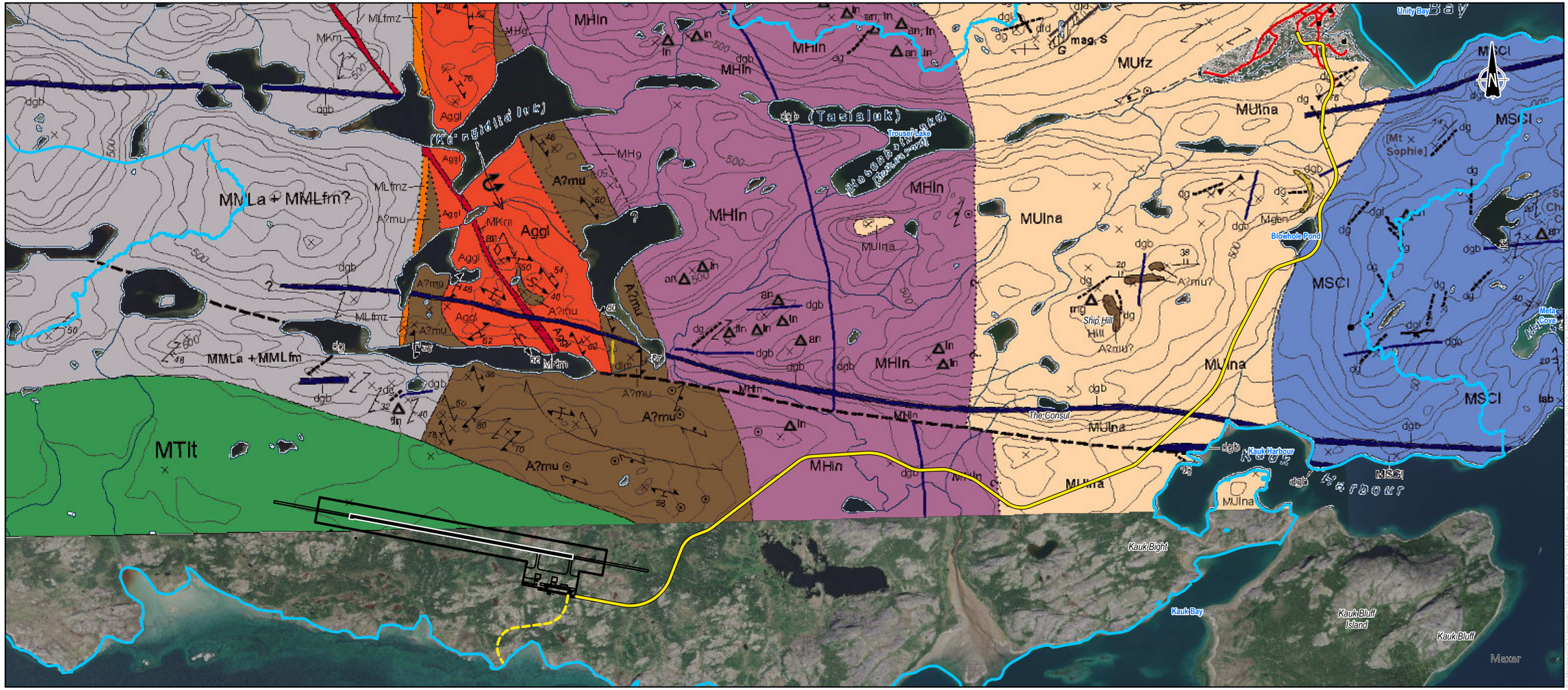

MINOR INTRUSIONS OF MESOPROTEROZOIC AGE
(may include rocks that pre-date and postdate the Nain Plutonic Suite)

- dgb; dp — Olivine gabbro and diabase; dp: feldsparphyric dykes
- dg — Granitic dykes; includes aplitic and pegmatitic varieties of several ages
- dgp — Olivine-bearing pegmatitic gabbroic or dioritic dykes
- dfd — Dioritic dykes, includes oxide- and pyroxene-rich dykes
- dc — Undeformed to strongly deformed composite basic –silicic dykes
- dgl — Black and dark-grey granular gabbronoritic (ferrodioritic ?) dykes, locally biotite- and hornblende-bearing
- MKm — Kaiktusuak dykes: Massive, slightly porphyritic , fayalite+augite monzonite
- Mgbn — Leucogabbronoritic sheet

GRANITIC ROCKS

- **MLfmz** — Massive to strongly foliated , locally layered , fayalite-bearing, porphyritic monzonite, quartz monzonite and syenite peripheral to the Mount Lister intrusion; locally mingled with oxide-apatite gabbronorite

TROCTOLITIC ROCKS

- **MTIt** — Tessiuyarsuk intrusion: Leucotroctolite, troctolite, and olivine-bearing leuconoritic rocks

ANORTHOSITIC ROCKS

- **MHIn, MHg, MHLno** — Hosenbein Lake intrusion: MHIn: Brownish-weathering leuconorite and grey-weathering clotted - to seriate-textured leuconorite and leucogabbro; MHg: Massive olivine gabbro; MHlno: Oxide-rich rocks of the northern part intrusion
- **MSCl** — South Channel Cairn intrusion: Massive to layered leucogabbro, leuconorite and anorthosite
- **MMLa; MMLfm** — Mount Lister intrusion: MMLa: Pegmatoid al anorthosite and leuconorite; MMLfm : Foliated leuconoritic and anorthositic eastern margin of the intrusion
- **MUlna; MUfz** — Unity Bay intrusion: MUlna: Medium to coarse-grained leuconorite, leucogabbro and anorthosite; MUlfz: Foliated leuconoritic and anorthositic northern zone of the intrusion

MAFIC, ULTRAMAFIC, AND FELSIC ROCKS OF ASSUMED ARCHEAN AGE

- **Aggl** — Migmatitic , granulite-facies, quartzofeld spathic gneisses; dispersed mafic , ultramafic and metasedimentary rafts
- **A?mu** — Layered ultramafic , mafic , mesocratic and pale-weathering leucogabbronoritic to anorthositic rocks; minor quartzofeld spathic gneiss

Project Component

- Access Road
- Temporary Access Road
- Airport Footprint
- Runway
- Groundwater RSA

1:37 000

0 250 500 m

NAD 1983 UTM Zone 20N

Source:
Ryan, B. 2015. Summary notes to accompany geological map (Map 2015-08) of the Nain area (NTS 14C/12). Government of Newfoundland and Labrador, Department of Natural Resources, Geological Survey,
Open File 014C/12/0154, 46 pages

Figure 4.3-5
Regional Geology

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4.3.3.4 Local Hydrogeology Conditions

Based on existing provincial documents, it is expected that the direction of local groundwater flow in the area follows topography, which would be generally towards the south with local flows towards local creeks, rivers, and wetlands (Stantec 2023). Regionally, the surrounding creeks, rivers, and wetland features flow towards the ocean to the south and further to the east. Groundwater will generally be recharged along the topographic highs and discharging along local streams and brooks and regionally to the coast. It is expected that the shallow groundwater system in the area is largely controlled by surface runoff and local recharge, while at moderate depths, the flow system may be influenced by lateral flow of groundwater from up-gradient areas located west and south of the site. Groundwater levels are generally assumed to be close to ground surface (~3 m) and to be a subdued reflection of the topography but may be deeper at higher elevations. The movement of groundwater through the underlying bedrock is expected to occur mainly within secondary openings, such as fractures and joints, and will be variable depending on the frequency and interconnection of these structural features.

Of the groundwater level measurements collected from standpipes that were installed in 24 boreholes in the airport area, 17 measurements were collected on the same day (September 19, 2022) in the vicinity of the proposed runway (Stantec 2023). In this area on September 19, 2022, the observed groundwater depths ranged from 0.05 to 3.87 m below grade, with an average depth of about 1.5 m below grade and the inferred groundwater flow direction was south to southwest as illustrated on Figure 4.3-1.

Groundwater Well – Quality
The monitoring well construction material information for the nested well location (BH-A70) was not provided; however, the monitoring well log record shows that the shallow overburden nested monitoring well (BH-A70S) was installed in sandy silt with occasional clay (0 – 3.1 mbgs) while the deeper bedrock nested monitoring well (BH-A70D) was installed in medium to coarse grained Anothosite (to a depth of 6.1 mbgs) (Stantec 2023). All analyzed groundwater parameters were compared to the applicable Guidelines for Canadian Drinking Water Quality (GCDWQ; Health Canada 2023). The laboratory analytical results for general chemistry and metal parameters indicate that concentrations of all parameters tested are within the respective GCDWQ with the exception of turbidity in one sample (BH-A70S), which exceeded the operational guideline for conventional and direct filtration systems of 0.3 NTU with a result of 0.72 NTU.

Groundwater Well – Quantity
BH-A68 was completed to a depth of 29.6 mbgs was the well was constructed by installing 51 mm (2”) diameter PVC well screen the entire length of the well and the borehole was backfilled with sand to the upper 0.9 m which was then filled with bentonite to ground surface (Stantec 2023). It was reported that bedrock fractures and/or water-bearing zones were not identified during the drilling or construction of this well and a high rock quality designation (RQD) was noted throughout drilling supervision which suggests highly competent rock with low water bearing capacity.

Hydraulic conductivity (recovery) testing conducted at BH-A68 and the well was pumped for a period of approximately 45 minutes until the water level was drawn down to the pump intake (Stantec 2023). Recovery monitoring lasted approximately 130 minutes, when nearly 90% recovery of the initial static water level had been achieved. The hydraulic conductivity of the bedrock aquifer near BH-A68, computed from the Theis analysis of the recovery versus time data for the pumping well, ranged from 2.5×10-9 m/s (low-Q) to 9.1×10-9 m/s (high-Q). The Bouwer-Rice solution indicated a hydraulic conductivity value of 3.9×10-8 m/s. Since seasonal recharge is likely to occur in the vicinity of the well, 100-day safe yield of 0.2 L/min was considered a representative estimate for the theoretical long-term safe yield potential of BH-68A (assuming an available drawdown of 15 m). It should be noted that groundwater quantity values are controlled by the local surficial and bedrock geology of the area. With respect to bedrock geology, the hydrogeological environment is further controlled by structural geology elements, which include faults, fracture density and their associated orientation with respect to groundwater flow directions.

4.3.3.5 Local Groundwater Wells

As shown on Figure 4.3-6, there are no known drilled wells within 500 m of the proposed airport location; however, there are two drilled wells located in Nain (AECOM, 2013). One drilled well was reported to be a bedrock well and the other well is considered to be an overburden well. The bedrock well is associated

with the RCMP building located on 35 Ikajuktauvik Road. Groundwater quality data is unavailable. Groundwater quantity data for this bedrock well when installed included the following information:

- Well Depth: 90 mbgs
- Casing Length: 45 mbgs
- Lithology: Brown Sand (0 to 45 mbgs) / White to Brown Granite (45 to 90 mbgs)
- Groundwater Depth: 50 mbgs
- Groundwater Yield: 9 L/minute

The location of the other drilled well installed in overburden material within the town of Nain is not precisely known. Groundwater quality data is also unavailable. Groundwater quantity data for this overburden well when installed included the following information:

- Well Depth: 27 mbgs
- Casing Length: 6 mbgs
- Lithology: Brown to Black Sand (0 to 27 mbgs)
- Groundwater Depth: 15 mbgs
- Groundwater Yield: 5 L/minute

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Project Component
- Access road
- Temporary access road
- Airport footprint
- Runway

Groundwater
- Vicinity of proposed groundwater well location (500m buffer surrounding runway)
- Nearest groundwater well location

Hydrography
- Watercourse

Other
- Trouser Lake protected public water supplies
- Groundwater RSA

1:30 000
0 500 1 000 m
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2024-05-14 13:33

Figure 4.3-6
Location of Groundwater Features

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4.4 Surface Water

The objective of the Surface Water section is to characterize the baseline surface hydrological processes within the established study areas. The following activities are covered by the Surface Water section:

- Low flow analysis for fish passage and natural barrier identification.
- Assessment of the natural processes in rivers (sediment transport, erosion, lateral mobility).
- Assessment of the existing water supply and drainage (wetlands, streams and lakes).
- Provide baseline for water quality at various locations.

4.4.1 Study Area

Surface water bodies and hydrological processes described in this section are located within the Local Study Area (Table 4.4-1).

Table 4.4-1: Surface Water Spatial Boundaries

Study Area	Description	Rationale
Project Area	The footprint of the runway, airport, access road, rock borrow areas, construction staging area, temporary access road, and associated infrastructure.	Represents area of direct disturbance created by the Project. Watercourse crossings created by the Project Area are a main focus of the surface water discussion.
Local Study Area (LSA)	The Project Area plus a 200 m buffer.	The LSA delineates areas that may be directly affected by the Project development, including watercourse crossings. The LSA is chosen to align with the fish and fish habitat assessment since effects on these components are linked.
Regional Study Area (RSA)	The RSA is made up of five watersheds. The RSA is located within the subdrainage area Kogaluk and Notakwanon (03NE), which itself is within the drainage area Northern Labrador (03N).	The RSA reflects the water catchment areas with water features intersected by the Project. This includes Trouser Lake (74 ha in size) which is Nain's current water supply source. The RSA delineates areas where the Project could influence drainage patterns in the broader area.

The RSA boundary includes five primary watersheds, intersected by the Project infrastructure (Figure 4.4-1). Watershed characteristics are described from east (Nain) to west (New airport):

- Watershed 1 extends from PK 1+000 to PK 2+930 and drains an area of approximately 11.6 km^2 towards Unity Bay. Two of the main permanent watercourses are located in the watershed (Nain and Annainak Brook) as well as four small lakes between 4 and 6 ha. These waterbodies include Annainak's pond, the former source of the community of Nain's water.
- Watershed 2 extends from KP 2+930 to KP 6+850 and drains an area of approximately 8.8 km^2 towards Kauk Harbour. The watershed's main drainage feature is Blowhole Pond (7 ha) and its outflow stream. The rest of the hydrographic network is mainly composed of intermittent features related to wetland extents.
- Watershed 3 extends from KP 2+930 to KP 12+750, and is the main watershed draining an area of around 60.4 km^2 from north to south. It includes Kauk Brook, the permanent main watercourse in the study area, as well as Nain's current water supply source Trouser Lake (74 ha). The watershed features a dozen other large lakes (10 to 108 ha) and numerous intermittent water bodies associated with wetlands and the basin's geological configuration.
- Watershed 4 has a surface area of 3.8 km² draining to the south, and does not feature a large hydrographic entity. However, it does feature many wetlands associated with a complex network of

intermittent drainage (ponds and watercourses). The majority of the proposed airport footprint is within this watershed.

- Watershed 5 also drains to the south and covers an area of 12.7 km². The hydrographic network is broadly similar to watershed 4, and the Project footprint is likely to impact only a very small area at the eastern end of the watershed (end of the runway).

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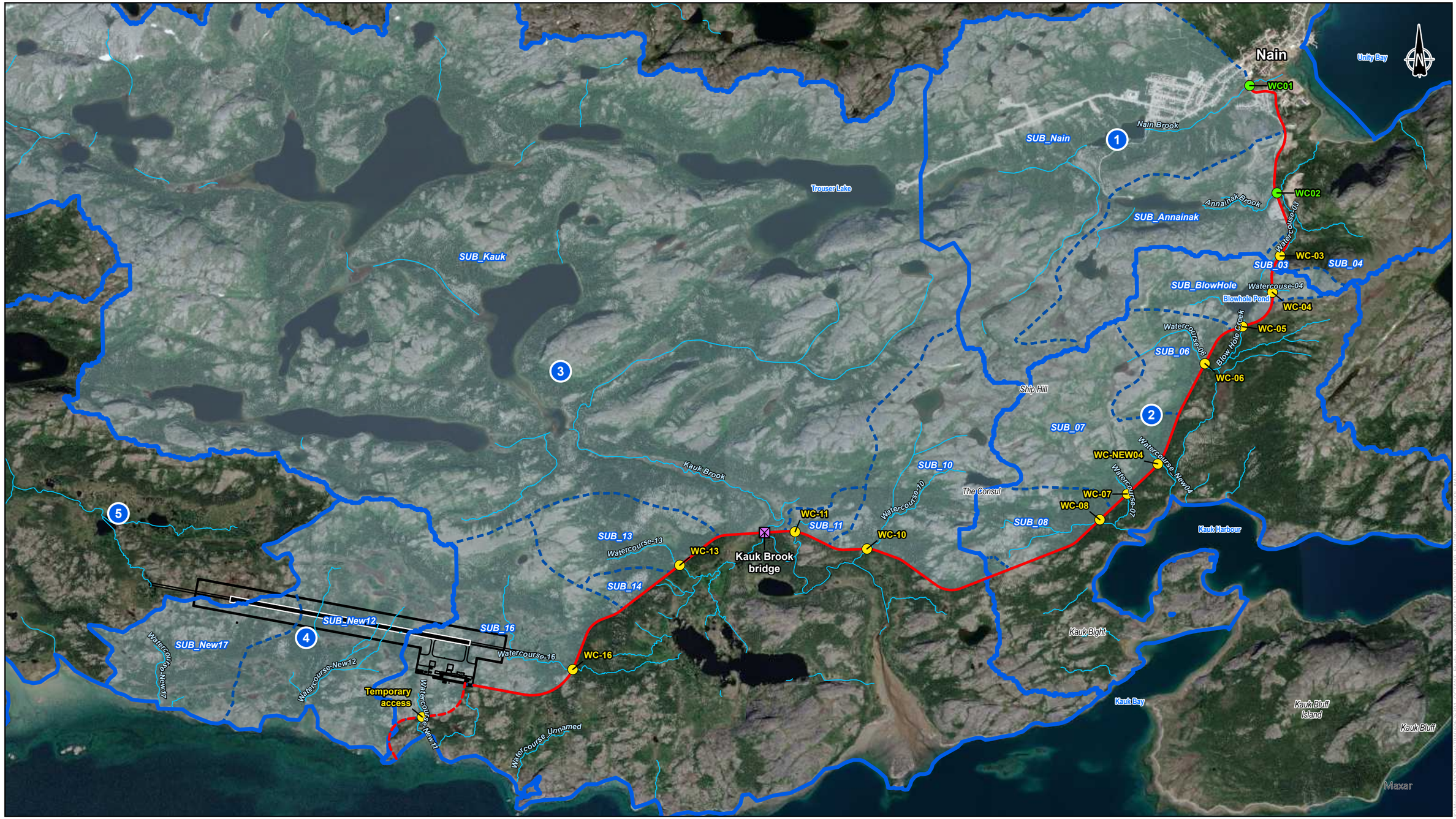

Project Component
- Access road
- Temporary access road
- Airport footprint
- Runway

Hydrography
- Primary catchment
- Sub catchment
- Watercourse

Watercourse Crossing
- Existing watercourse crossing (culvert)
- Project watercourse crossing (culvert)
- Project watercourse crossing (bridge)

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0 250 500 m

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Figure 4.4-1
Primary and Sub-Catchment

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4.4.2 Methods

4.4.2.1 Hydrology

4.4.2.1.1 Watercourse Sub-watershed

A desktop review and assessment for the baseline surface water environment were conducted to identify water features including streams intersecting the Project Area. These desktop analyses were conducted using multiple data sources such as previous background studies (Aivek Stantec 2022) and (Aivek Stantec 2023), high-resolution drone orthoimages, digital elevation models (provincial and drone derived), hydrographic vector data from the National Topographic Database as well as Project-specific geospatial data.

Sub-watershed boundaries were automatically delineated from DEM (provincial and drone derived), using ARGIS Pro. The resulting watershed polygons and drainage features were compared to topographic and aerial imagery datasets.

4.4.2.2 Natural Stream Processes

4.4.2.2.1 Historical Study and River Forms Analysis

In geomorphology, the assessment of watercourses lateral mobility requires a historical review to describe the past conditions of the watercourse and analyze the movement of the active channel over time. A historical review is generally conducted using old aerial images that are compared with contemporary aerial images (orthophotos). The number of images required depends on the dynamics of the watercourse, the evolution of processes, and human and natural interventions within a study area. However, a minimum of 2 images captured on distant dates (time interval > 10-15 years) is necessary to study the watercourse's mobility.

When aerial images due to the lack of data, dates being too close to each other, or the presence of dense vegetation on the riverbanks preventing the correct distinction of the active channel, an analysis of river forms can be considered using a DTM (Digital Terrain Model) derived from LiDAR data or photogrammetry. River forms may encompass erosion indicators (such as incised banks, alluvial terraces, steep slopes near the active channel, etc.) and sedimentation features (like alluvial cones, lateral and median bars, widening of the active channel, etc.). LiDAR-derived products enable this type of analysis and offer opportunity to study the morpho-sedimentary processes of watercourses.

For this Nain surface water assessment, an aerial set of photographs from 1949 was used for the morphological characterization of reach WC-12: Kauk Brook (Aivek Stantec 2023). Drone footage dated 2022 was used as the most recent aerial images. DTM derived from the photogrammetry from the drone images was used to complement the analyses for Project watercourse crossings (Aivek Stantec 2023), cases when images were poor due to high vegetation coverage, this prevented the extraction of variables such as channel slope and bankfull width.

4.4.2.2.2 Geomorphological Concepts

Homogenous Sections

- Homogeneous functional reaches are river sections that are relatively uniform in terms of river dynamics and sediment transport capacity. These reaches can be identified based on:
- The main controlling factors (topography, geology, surface geology, channel sinuosity, land use change, and anthropogenic modifications);
- Geomorphic features, especially if the river is confined, semi-alluvial, or alluvial;
- Data extracted from aerial images (historical photos or available satellite images) as well as photogrammetry from drone images, such as river width, slope, morpho-sedimentary type, etc.

Confined and Unconfined Systems

Sections of watercourses can be classified as confined or unconfined (Figure 4.4-2). In confined systems, the watercourse is located in a valley, and its path is constrained by the valley walls. In unconfined systems, the watercourse is not constrained by valley walls and can develop meanders while flowing on a relatively flat terrain. The understanding of these two types of systems is important because different approaches are used to define erosion risks that are applicable to the specific system. For unconfined systems, where river meanders are not influenced by valley walls, the concept of mobility space can be used to delimit areas at risk of fluvial erosion. Conversely, for confined systems, the interaction of the river with valley walls must be considered, along with the stability of these walls.

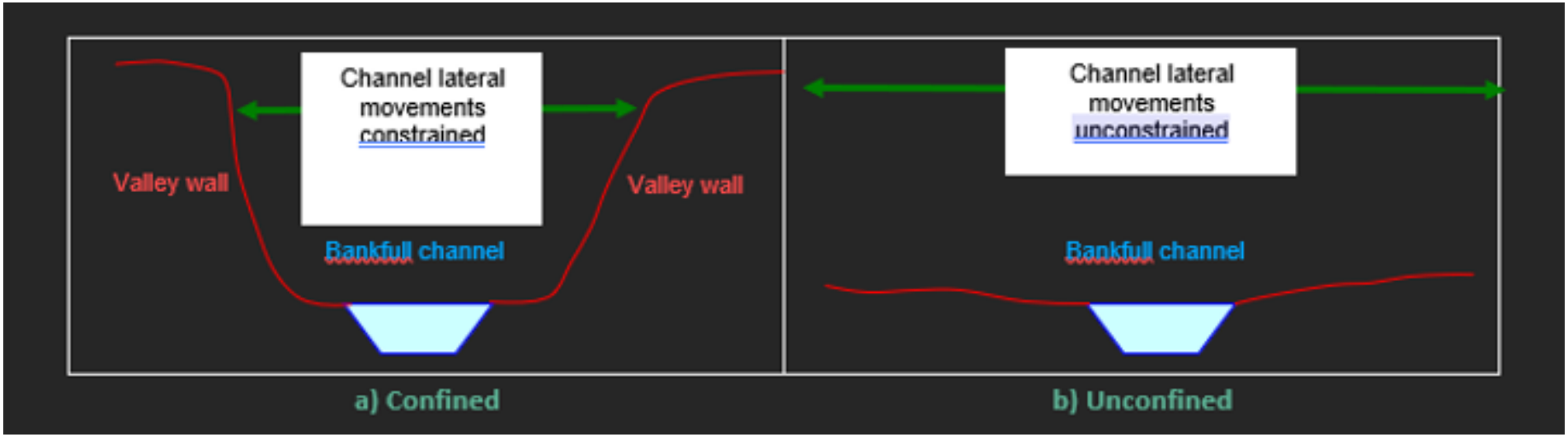

Figure 4.4-2
Confined and Unconfined Systems

Bankfull Water Level

The bankfull discharge is the maximum flow that a channel can contain before overflowing into the floodplain. This discharge is generally the one that maintains or alters the riverbed (effective sediment transport) and typically corresponds to a return frequency of 1:1 to 1:1.5 years for rural watercourses. The channel dimensions for bankfull stage are also useful for characterizing and understanding watercourses. The bankfull width and depth are illustrated in Figure 4.4-3. Field indicators used to define the bankfull flow level include erosion marks, changes in the bank slope, bank materials, and bankside vegetation.

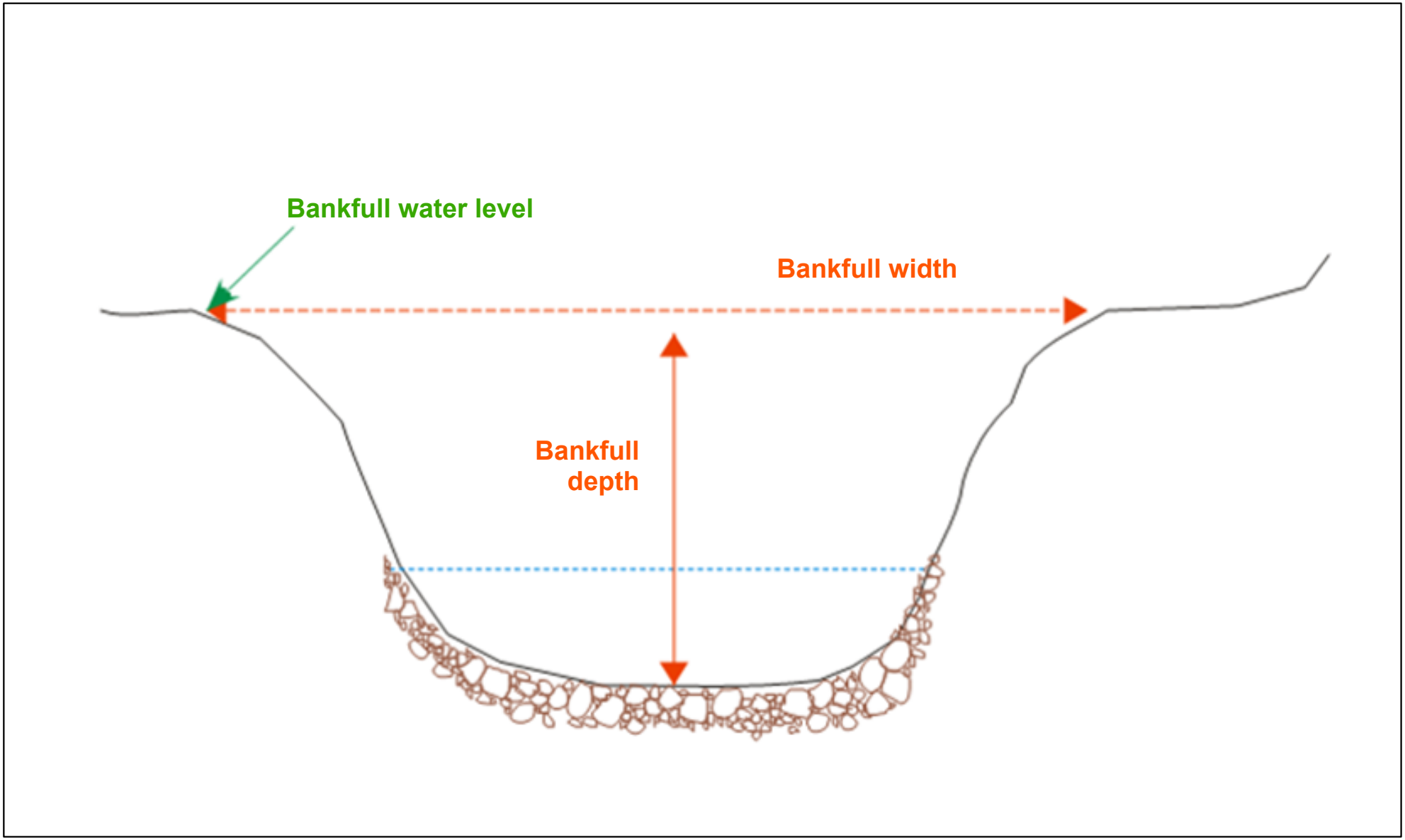

Figure 4.4-3
Stream Channel Features
at Bankfull Flow

4.4.3 Baseline Conditions

4.4.3.1 Hydrology

4.4.3.1.1 Surface Water Feature Delineation

Surface water features located within the LSA boundary include watercourses, waterbodies and seashore. To refine the preliminary desktop analysis, additional water level monitoring, precise drone imagery and field surveys were conducted in the summers of 2022 and 2023. As a result, 56 sites were investigated on over 33 surface water features. Watercourses located in the LSA are mainly ephemeral and often consist of small channels and poorly defined drainage where intermittent flows are expected to be related to groundwater and/or precipitation.

A total of 16 sub-watersheds with potential to intersect with the Project footprint were identified and delineated using DEM (provincial and drone derived) (Table 4.4-2).

Table 4.4-2: Sub-watershed Areas

Main Watercourse Name	Project Components	Subwatershed Name	Permanent Watercourses Located in the Watershed	Area (km^2)	Existing Watercourse Crossing
Nain Brook	Access road	SUB-Nain	Yes	5.65	Single culvert
Annainak brook	Access road	SUB-Annainak	Yes	1.70	
Watercourse-03	Access road	SUB-03	No	0.03	N/A
Watercourse-04		SUB-04	No	0.14	
Blowhole creek		SUB-BlowHole	Yes	0.67	
Watercourse-06		SUB-06	No	0.61	
Watercourse-New04 Watercourse-07		SUB-07	Yes	1.48	
Watercourse-08		SUB-08	Yes	0.64	
Watercourse-10		SUB-10	Yes	2.07	
Watercourse-11		SUB-11	No	0.19	
Kauk brook	Access road	SUB-Kauk	Yes	47.04	
Watercourse-13	Access road	SUB-13	No	0.88	
Watercourse-14		SUB_14	No	0.15	
Watercourse16 Watercourse_New11	Access road Temporary access road	SUB -16	No	1.87	
Watercourse-New12	Airport and runway	SUB_New12	No	2.65	
Watercourse-New17		SUB_New17	No	1.18	

4.4.3.1.2 Flow Measurements

In Labrador, river and stream flows are low from January until April or May when they increase substantially. Monthly stream flows peak in May or June and then gradually decline until August or September. A secondary peak of monthly discharge has been observed in October. Monthly discharges decline from October to December until the spring flow (Government of NL 1997). On average, groundwater recharge accounts for approximately 17% of the total water balance of Labrador, with surface runoff accounting for the remaining 83%.

On site hydrometric data are limited and the main active hydrometric stations available are located on the Reid Brook watershed (Table 4.4-3), outside of the RSA (Government of Canada 2024a).

Table 4.4-3: Reid Brook Hydrometric Station

Name	ID	Monitoring Period	Type	Watershed (km^2)	Distance from Nain and Coordinates
Reid Brook at outlet of Reid Pond	03NE001	1995 – 1999 2003 - 2024	Flow and water level	75.7	34 km 56°22'23"N / 62°09'41"W
Reid Brook below tributary	03NE011	2003 – 2024	Flow and water level	158	36 km 56°18'18"N / 62°05'33"W
Camp Pond Brook below Camp Pond	03NE002	1995-1999 2003-2024	Flow and water level	24.3	34 km 56°20'26"N / 62°06'37"W
Tributary to Reid Brook	03NE012	2003-2024	Flow and water level	15.1	36 km 56°18'21"N / 62°05'39"W

Flow measurements were collected on five different watercourse (Table 4.4-4) and water-level data loggers (Solinst levelogger) were installed at Kauk Brook (56.506257, -61.766097) and Blowhole Creek (56.521278, -61.698008) on September 2022 (Aivek Stantec 2022).

Table 4.4-4: Flow Measurements

Watercourse name	Date (dd/mm/yyyy)	Flow (m^3/s)
Blowhole Creek	02/09/2022	0.006
	26/07/2023	0.010
Kauk Brook	01/09/2022	0.308
	27/07/2023	0.589
Watercourse-06	26/07/2023	0.004
Watercourse-10	28/07/2023	0.029

4.4.3.2 Natural Stream Processes

A classification of the watercourses intersected by the Project footprint was firstly undertaken to identify primary watercourses that needed detailed analysis from the secondary watercourses for which only coarse information was described. Primary watercourses are composed of permanent streams with alluvial channels where sedimentary processes can occur. Any modification or interaction within these channels may result in modifications of the natural processes and can affect the sedimentary regimes (erosion and deposition). Secondary watercourses are composed of ephemeral streams, with constrained channels where natural processes are influenced by physiographic drivers such as bedrock or wetlands connectivity.

A summary of the geomorphological characteristics and processes of the main watercourses located in the LSA boundary is presented in Table 4.4-5.

Table 4.4-5: Main Watercourse Geomorphological Characteristics and Processes

Group	Geology	Channel Pattern	Channel Slope	Bankfull Channel Width	Sinuosity	Streambed Materials	Geomorphic Processes
Nain Brook	Confined fluvial plain with cohesive valley walls	Single channel (step pool) to wondering	Estimated : 1.1%	25.4 m to 85 m	Straight	Fine + coarse + boulders	Anthropogenic impacts Aggradation
Annainak brook	Confined fluvial plain with bedrock walls	Stable meanders (pool and riffles)	1.8 %	≈ 7.4m	Slightly meandering	Fine + coarse + boulders	Aggradation
Watercourse-03	Confined Bedrock	N.A.	8.8 %	≈ 1 m	Straight	NA	Surficial layer incision
Watercourse-04		Single channel (Cascade)	2.9 %			Boulders	Stable
Blowhole Creek	Mostly unconfined (Till with sporadic underlying bedrock)	Single channel (step pool)	3.0 %	≈ 3.5 m	Slightly meandering	Boulders + coarse	
Watercourse-06	Unconfined (Till)	Single channel (pool and riffles)	6.6 %	≈ 1 m		Fine + Boulders	
Watercourse-new04	Unconfined (Till)	Single channel	22.5 %	≈ 0.3 m	Straight	Fine	
Watercourse-07	Unconfined (Till with underlying bedrock)	Single channel (Cascade)	23.3 %	≈ 3 m	Slightly meandering	Bedrock	
Watercourse-08	Transitional (Till)	Single channel (pool and riffles)	2.7 %	≈ 1 m	Highly meandering	Coarse + fine	
Watercourse -10	Confined (Till associated with fluvial sediments)	Single channel (Cascade)	8.4 %	≈ 3 m	Slightly meandering	Boulders + coarse + fine	
Kauk brook	Unconfined fluvial plain	Dynamic meanders (Dune and ripples)	0.1 %	≈ 15 m	Highly meandering	Fine + boulders	Aggradation Lateral mobility
Watercourse -11 and 13	Unconfined Organic blanket (wetlands)	NA	WC-11: 1.6% WC-13: 6.1 %	≈ 0.5 m	NA	Organic	Hydrological wetland connection
Watercourse -16	Unconfined (Till)	Single channel (undefined)	2.4%	≈ 1 m	Straight	Undefined	Stable

4.4.3.2.1 Detailed Geomorphic Assessment for Primary Watercourses

A detailed analysis was performed on the primary watercourses within the LSA. The primary watercourses are composed of permanent rivers with alluvial channels where sedimentary processes may occur (erosion and deposition of sediments).

Nain Brook

Physiography context

Nain Brook is generally confined by topography. The watercourse flows in a narrow floodplain surrounded by valley walls composed of thick cohesive blanket of glaciomarine sediments with an underlying glaciofluvial blanket.

Hydromorphological reaches

The current road crossing has affected the morphology of Nain Brook. In fact, the crossing structure created a knickpoint in the longitudinal profile. A knickpoint is a cross-sectional control on a watercourse (generally formed by non-erodible material such as bedrock) which will drive the upstream and downstream sedimentary processes. It is possible that a natural knickpoint existed at the crossing exact location prior to the road construction, but the existing crossing may have modified the processes by changing the nature of the knickpoint (discharge control, channel width narrowing, weir elevation increase, etc.). The influence of the culvert is actually visible on both drone images (backwater upstream of the crossing; Figure 4.4-4) and on the DTM derived longitudinal profile of the watercourse (slope break with gentle slope upstream and profile discontinuity at the crossing; Figure 4.4-5).

Project Component

- Kilometer point
- Access road

1:3 500

0 20 40 m

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Figure 4.4-4

Section Locations at Nain Brook

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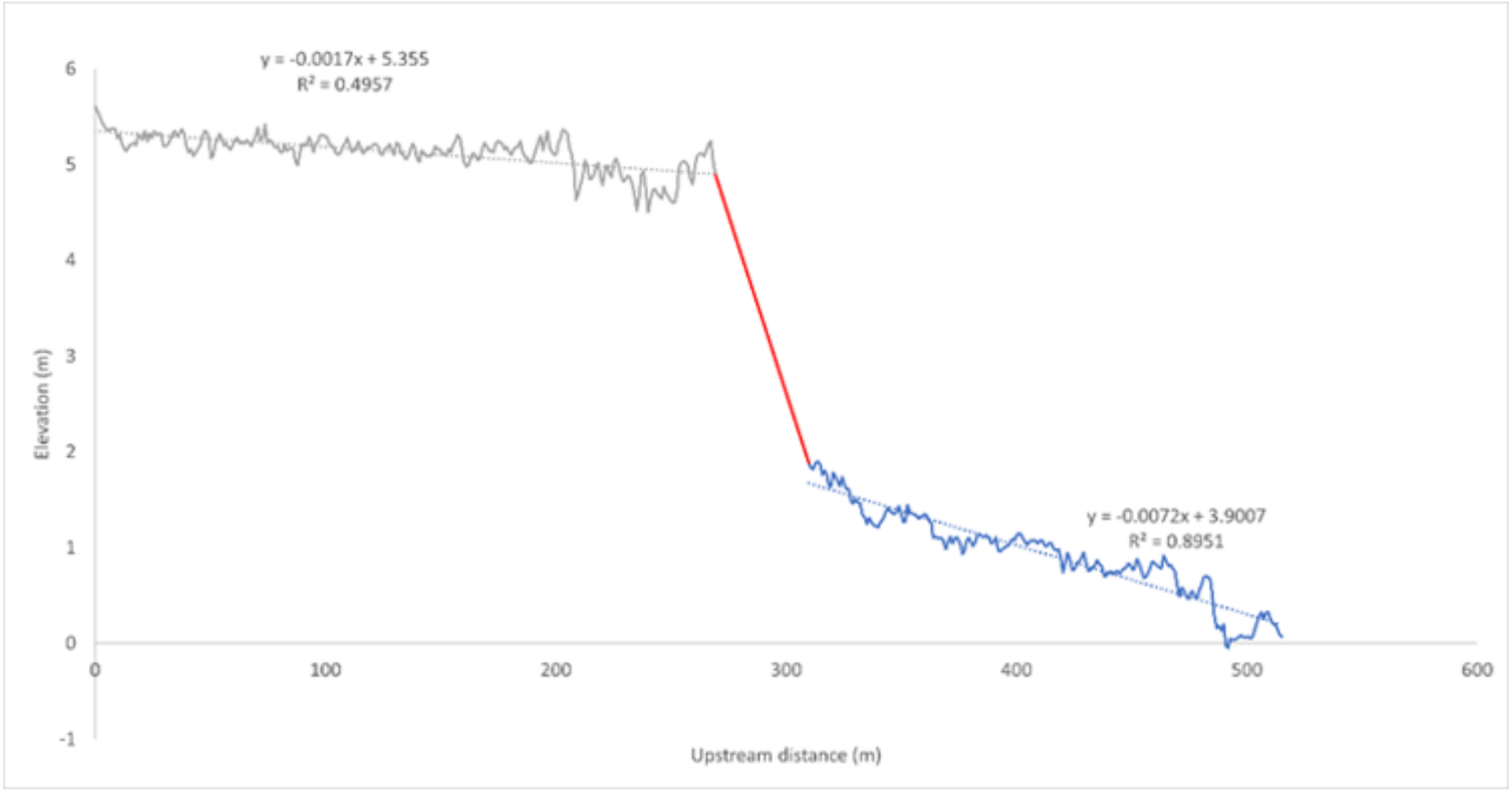

Nain-02 and Nain-03 longitudinal profile from 1m DTM and stream slope. Watercourse crossing location is highlighted in red

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Figure 4.4-5

Nain-02 and Nain-03 longitudinal profile from 1m DTM and stream slop

Consequently, three homogeneous morphological reaches were defined based on the current geomorphic conditions (Figure 4.4-4:):

- Nain-01: The upstream reach is not affected by the existing crossing;
- Nain-02: This reach is defined within the upstream influence of the existing crossing, where the hydraulic backwater is expending;
- Nain-03: The downstream reach of the existing crossing.

The reaches description and the longitudinal profile are outlined below. The overall slope of Nain-01 was estimated from the regional DEM (cell size 17.60 m) and morphological features were derived from both satellite and drone images.

According to the available data, Nain-01 is characterized by a confined reach. The channel slope was estimated around 3% which is considered steep, and the channel form is generally straight. Grain size was considered heterogeneous and primarily composed of boulders and coarser fractions. The combination of all of these elements suggests the fluvial formation should be classified as a step-pool within this reach.

As mentioned earlier, Nain-02 is influenced by the crossing's backwater effect (Figure 4.4-6). This reach exhibits a flat and wide bed profile which results in a significant loss of stream power, and thus promoting sediment accumulation (aggradation with fine sediments deposition). It is difficult to attribute the entire responsibility of the existing crossing on creating a knickpoint that acts as a control point in the longitudinal profile of the watercourse (Figure 4.4-7) or bedrock underlying beneath the crossing.

Nain-03 exhibits a multi thread-channel morphology. This fluvial style is generated by the formation of channels through fine sediments and a gentle slope.

Table 4.4-6: Nain Brook Geomorphic Reaches

Reach	Channel Pattern	Sinuosity	Channel Slope (m/m)	Bankfull Width (m)	Streambed Materials
Nain-01	Estimated: step pool	Estimated: < 1.08	0.029	Estimated: < 4 m	Estimated: Boulder, cobble, gravel and sand
Nain-02	Backwater	1.08	0.0018	85.4 m	Sand and silt
Nain-03	Wandering	1.12	0.0086	25.4 m	Sand and silt with few boulders

Geomorphic processes and hazards

On a large scale, the Nain Brook homogeneous reaches are bordered by cohesive valley walls, thus the meandering potential of the watercourse in the floodplain is limited. Stream power in Nain-02 and Nain-03 reaches were estimated to be lower than Nain-01, due to the slope reduction and the widening of the channel. The decrease of the stream power in the long profile suggests that aggradation (sediment accumulation) may occur in these two reaches. Moreover, the morpho-sedimentary processes may also be affected by the community water intake reservoir (1 km upstream of the existing crossing) which limits the sediment input from upstream.

The crossing backwater pond acts as a sedimentation basin, promoting the deposition of coarser material at the head of the pond in Nain-02 and fine particles closer to the crossing. In the current state of knowledge, it is difficult to properly estimate the amount of sediment accumulated upstream of existing crossing due to the lack of data. Assuming that no natural knickpoint is present at this location, the maximum theoretical equilibrium slope of section Nain-02 could reach up to 1.14%. As a result, around 3.20 m of sediment accumulation was estimated at the existing crossing.

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Figure 4.4-6

Nain brook upstream of
the current crossing

Figure 4.4-7

Grade control formed
by the current crossing

Annainak Brook

Physiography context

The crossing is located in a confined context due to local topography and geology. Annainak stream flows in a narrow fluvial plain controlled by apparent bedrock on the northern side of the valley (left bank). On the southern side (right bank), terrains are constituted by a thin cohesive layer of till with underlying bedrock. A small bog type wetland is located downstream of the crossing.

Hydromorphological reach

Annainak crossing is located within a homogeneous morphological section of approximately 500 m in length. The upstream limit is defined at the beginning of the fluvial plain (280 meters upstream of the existing crossing, where alluvial material is characterized and ends downstream at a slope break (waterfall or steep slope over bedrock visible from drone images). Table 4.4-7 presents the characteristics of the study reach of Annainak Brook.

Table 4.4-7: Annainak Brook Geomorphic Reach

Channel pattern	Sinuosity	Channel Slope (m/m)	Bankfull Width (m)	Streambed Materials
Stable meanders (pool and riffles)	1.17	0.018	7.4 m	Sand, Gravel, Boulder

Given that bedrock formation is persistent in the study reach, the channel exhibits a slightly sinuous path associated with stable meanders. Despite the poor DTM accuracy due to highly vegetated banks, the slope was considered constant along the section (1.8%) and a bankfull width of approximately 7.4 meters was estimated. Field photographs show the domination of fine substrate materials on the streambed, with the presence of some boulders embedded (Figure 4.4-8 and Figure 4.4-9). Banks are highly vegetated which contributes to the bank stability.

Geomorphic processes and hazards

On a large scale, the study reach is characterized by a lower slope compared to the upstream section (3.8%) and a wider bankfull width due to the less confined setup. As confirmed by the geology, the study reach is characterized by an aggradated streambed due to its locally low transport capacity. However, data resolution does not allow for the identification of recent local deposits. Deposits from the current road pavement runoffs are visible upstream of the current crossing (Figure 4.4-7). Given the confined geological context, the watercourse has limited space for meandering and lateral mobility migration. Furthermore, drone images, the derived DTM and field photographs suggest that the meanders are stable with fairly stable banks due to their composition and the presence of highly vegetated coverage.

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Figure 4.4-8

Upstream end of the crossing

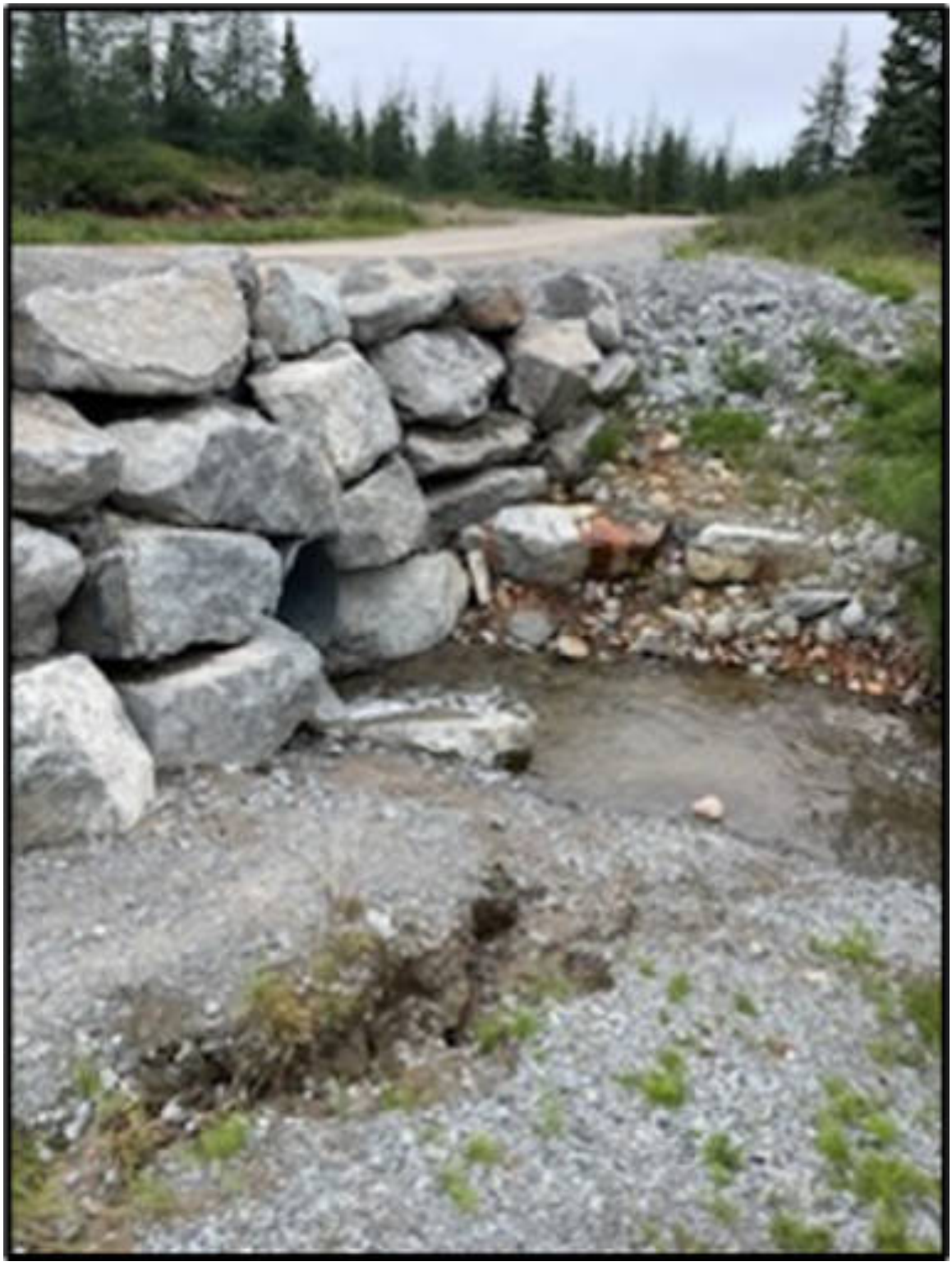


Figure 4.4-9

Downstream end of the crossing

Blowhole Creek

Physiography context

The local topography suggests that the watercourse flows within an unconfined valley. Superficial deposits are composed of a thick till blanket (>1m) without bedrock. Underlying bedrock is only located on the west side valley wall (right bank).

In the crossing vicinity, fen type wetlands are located on the left side of the watercourse. Based on topography, the wetland is likely to drain into the stream.

The crossing is located outside of a potential permafrost context.

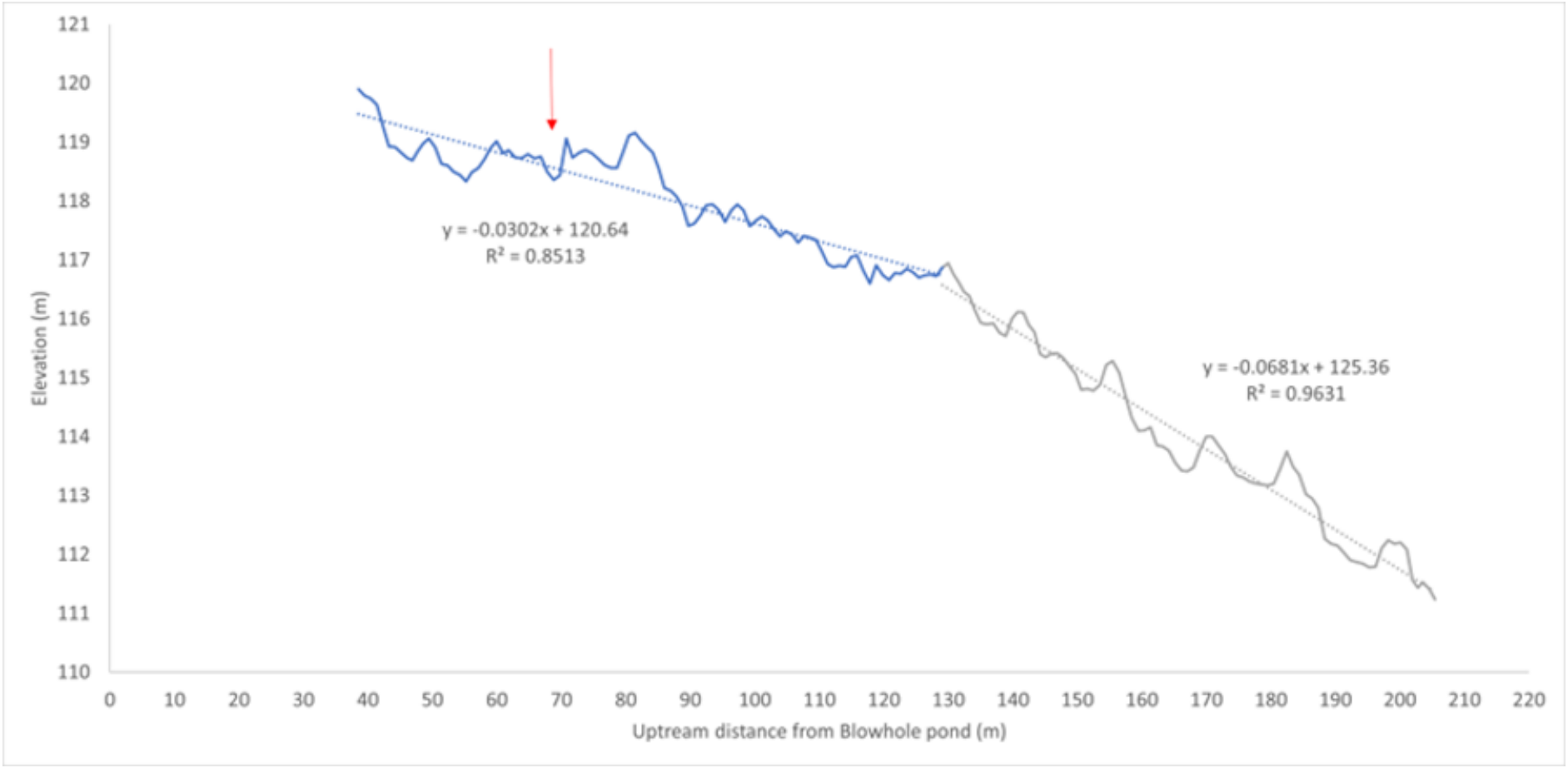
Hydromorphological reaches

A single homogeneous reach was delineated based between the Blowhole pond outlet and a slope break located 50 m downstream of the crossing (Figure 4.4-10). Table 4.4-8 presents the reaches characteristics.

Table 4.4-8: WC-05 Geomorphic Reach

Channel Pattern	Sinuosity	Channel Slope (m/m)	Bankfull Width (m)	Streambed Materials
Single channel (step pool)	1.12	0.030	3.5 m	Boulder : 70 % Cobble : 15 % Ruddle : 10 % Sand : 5 %

The watercourse is characterized by a single, well-defined channel (Figure 4.4-11 and Figure 4.4-12). Streambed materials consist of clustered boulders that occupy the entire channel. Despite low cohesive materials that compose the channel (boulders and fine materials), the banks appear to be stable. Their stability is strengthened by high vegetation cover, and there is very limited evidence of undercutting.



Blow Hole Creek longitudinal profile from 1m DTM and stream slope
Watercourse crossing location is highlighted red

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Geomorphic processes and hazards

The watercourse shows no visible signs of erosion and thus appears to be in a vertical and lateral stable situation. From a sedimentary perspective, the size of the materials exceeds the watercourses transport capacity, and sediment mobility is expected to occur only during major hydrological events for the smaller particles.

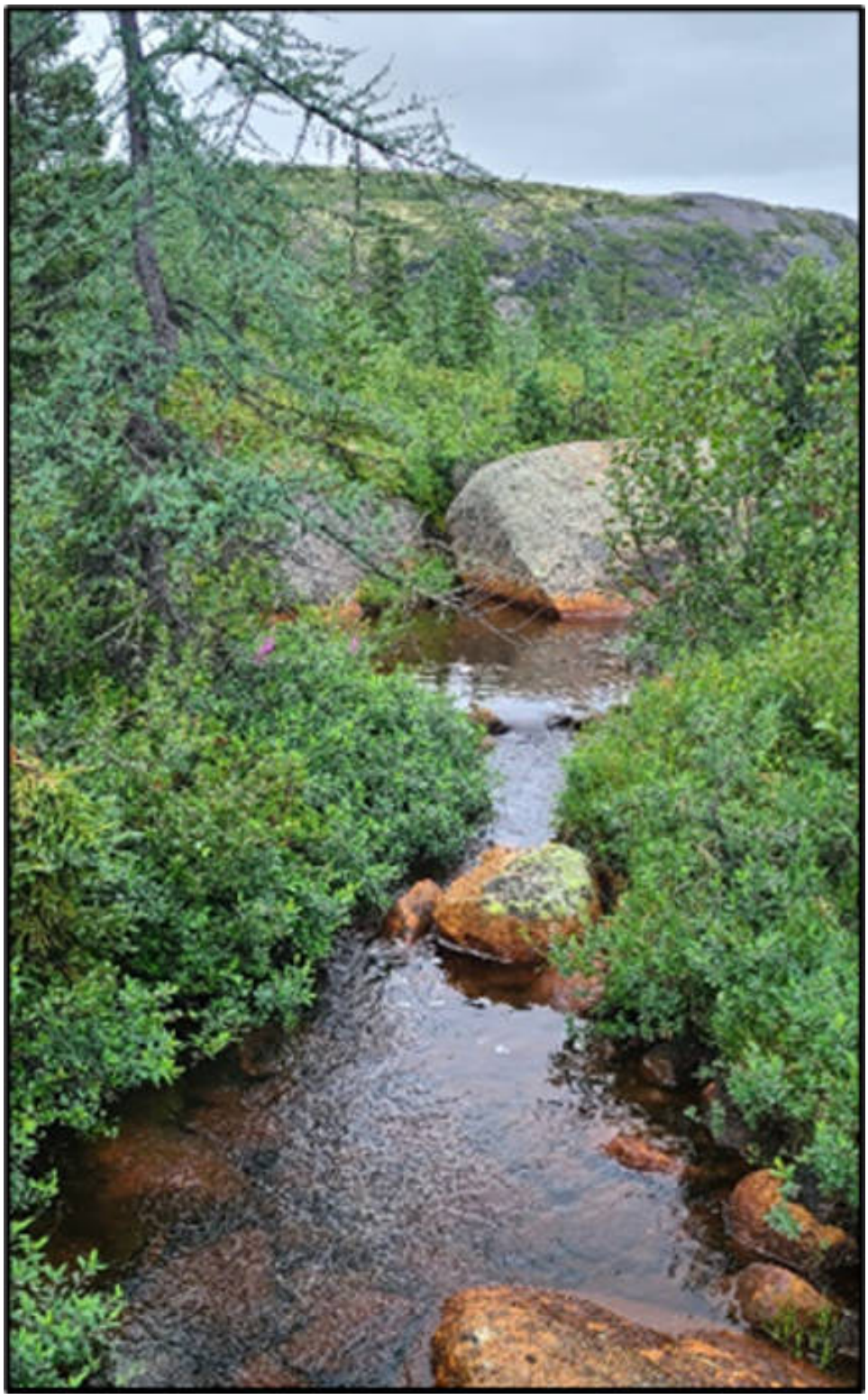


Figure 4.4-11

Blow Hole Creek watercourse
upstream of crossing

Figure 4.4-12

Blow Hole Creek watercourse
in the crossing vicinity

Watercourse-06

Physiography context

The local topography suggests that the watercourse flows within a semi-confined valley. Superficial deposits are composed of different formations of tills without underlying bedrock. An extensive bog type wetland is located downstream of the proposed road, associated with organic soils. The crossing is located outside of a potential permafrost context.

Hydromorphological reach

Table 4.4-9: Watercourse-06 Geomorphic Reach

Channel Pattern	Sinuosity	Terrains Slope (m/m)	Channel Width (m)	Streambed Materials
Single channel Pool and riffles	1.14	0.066	0.80 m	Murk/clay : 65 % Gravel : 25 % Boulder : 10 %

The watercourse-06 is located in a homogeneous reach (Table 4.4-9) characterized by a poorly defined channel which partially flows underneath the soil and vegetation coverage. Field measurements highlighted a narrow and deep channel (wetted channel < 1 m) dominated by a fine streambed material forming a homogeneous matrix (Figure 4.4-13 and Figure 4.4-14). Due to low cohesive materials, banks present undercut marks along the reach and results in slightly overhanging vegetation above the bed. Due to poor DTM quality and the configuration of the watercourse (high vegetation, small channel size, underground channel paths), an accurate GIS analysis appears to be impracticable. However, it was possible to identify that the watercourse flows in fairly steep channel and the bankfull channel width was estimated around 1 m, based on field photographs.

Geomorphic processes and hazards

The geomorphic configuration of the watercourse suggests that sediment transport may occur mainly through the wash load of fine particles originating from bank erosion during high hydrologic events. The watercourse exhibits extensive bank undercuts underneath the superficial layer of vegetation. Banks are highly vegetated, and the lateral mobility estimation was not possible from drone images. Overall, the morphological processes appear to be stable and do not present any particular issues for the watercourse crossing design.

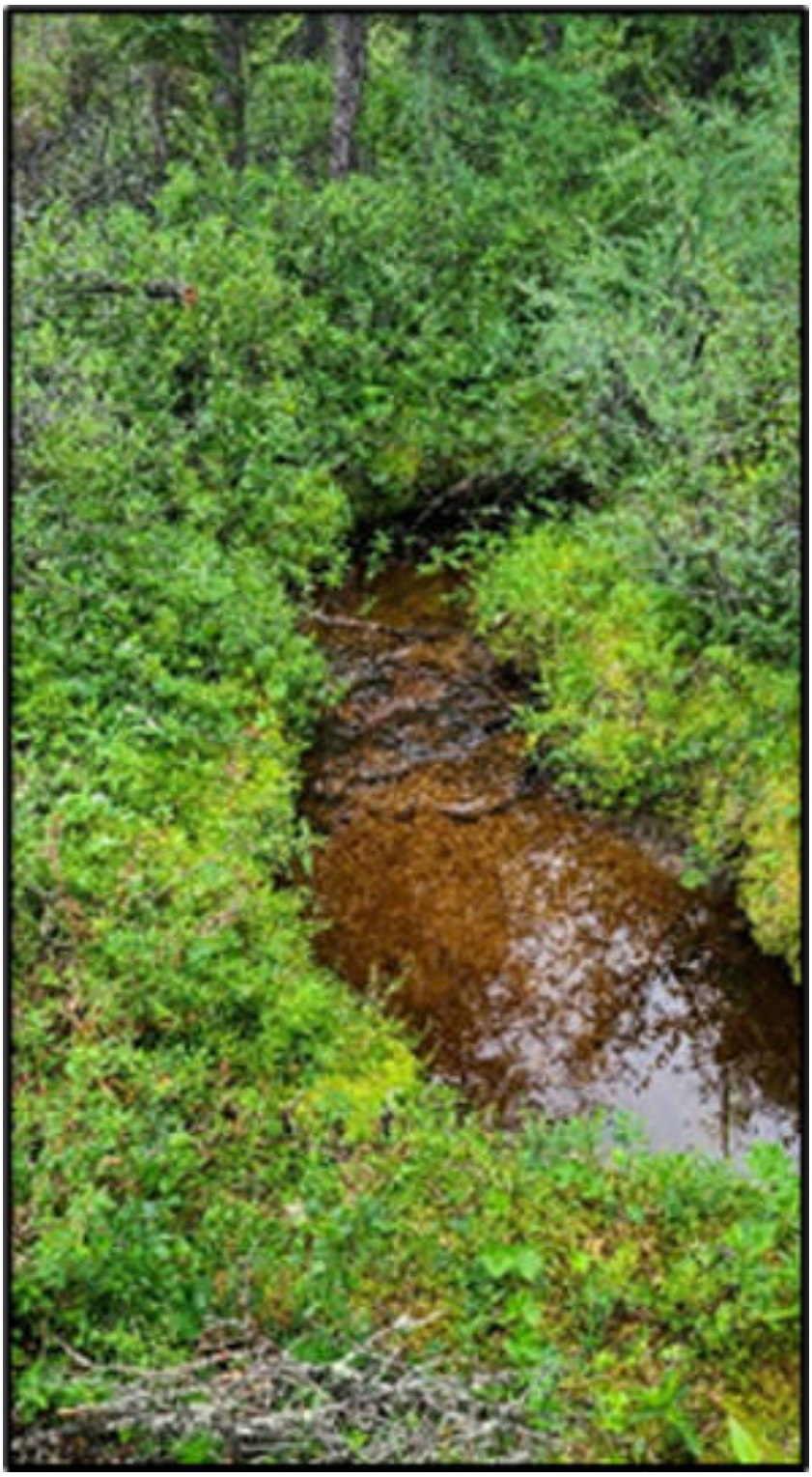


Figure 4.4-13

Watercourse-06
upstream of crossing

Figure 4.4-14

Watercourse-06
downstream of crossing

Watercourse-08

Physiography context

The local topography suggests that the watercourse flows within a transitional section with a confined valley upstream and an unconfined setup downstream. Superficial deposits are composed of different formations of tills without underlying bedrock. The crossing is located outside of a potential permafrost context and no wetlands were identified in the area.

Hydromorphological reach

While we identified a transition in the confinement setup from a confined river to an open valley, only one homogeneous reach is considered for the study site due to similar channel characteristics. It is important to note that the poor aerial images and the DTM prevents from performing an accurate GIS analysis for this watercourse.

Table 4.4-10: Watercourse-08 Hydrogeomorphic Reach

Channel Pattern	Sinuosity	Terrains Slope (m/m)	Channel Width (m)	Streambed Materials
Pool and riffles	1.33	0.027	1 m	Gravel sand

The watercourse is characterized by a meandering channel associated with the widening of the valley floor (Table 4.4-10). Field photography highlight a well-defined channel with a width of about 1 m, dominated by gravel size streambed materials (Figure 4.4-15 and 4.4-16). Banks seem to be composed of a mixture of gravel and fine sediment. Undercuts and erosion marks are visible, but meanders appear to be stable.

Geomorphic processes and hazards

The geomorphological characteristics of the watercourse suggest that sediment transport occurs mainly through bed load transport of coarse particles (gravels). The watercourse exhibits a stable meandering channel and multiple bank erosion marks. However, banks appear stable and lateral mobility does not appear extensive.

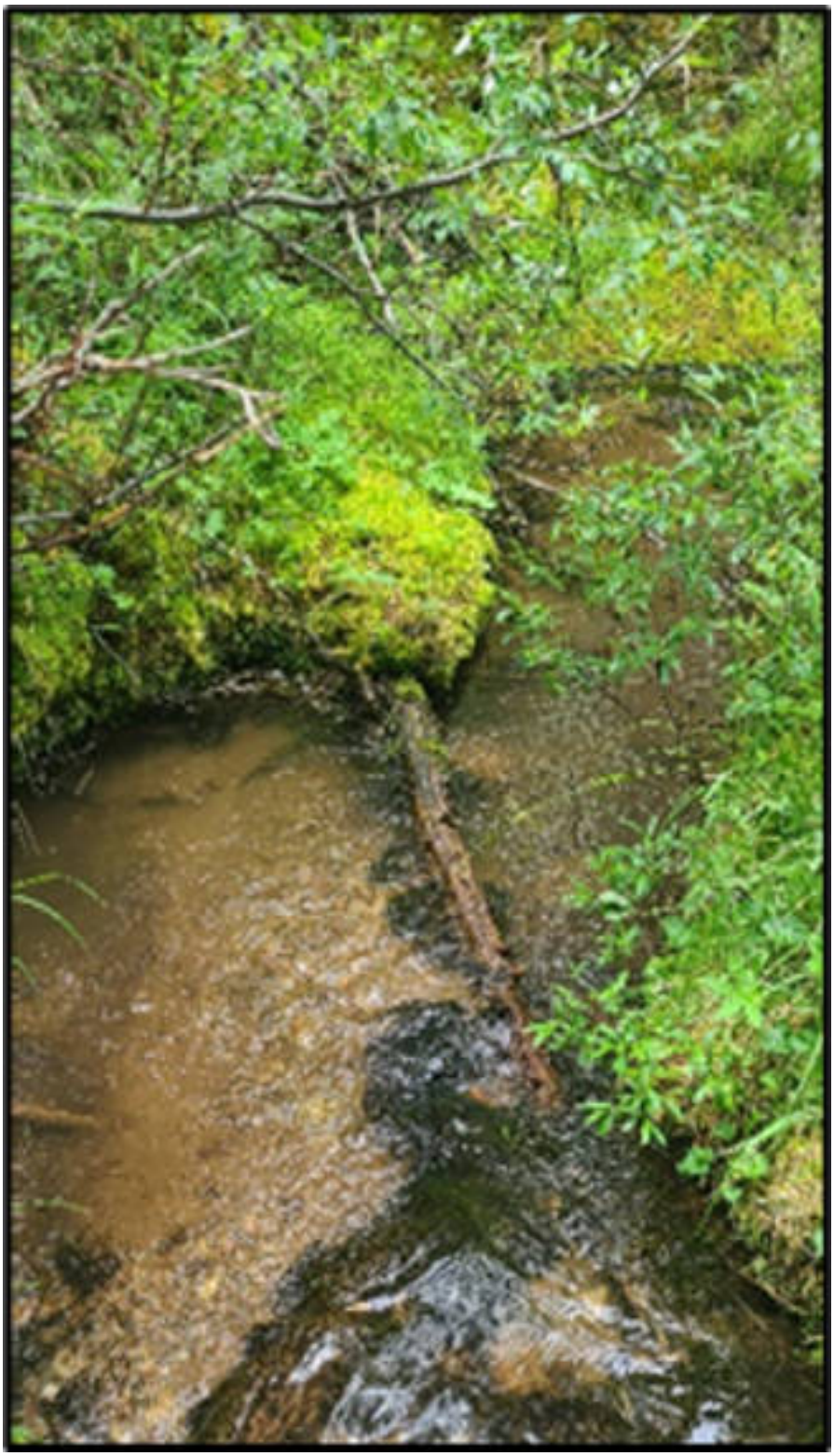


Figure 4.4-15

Watercourse-08
downstream of crossing

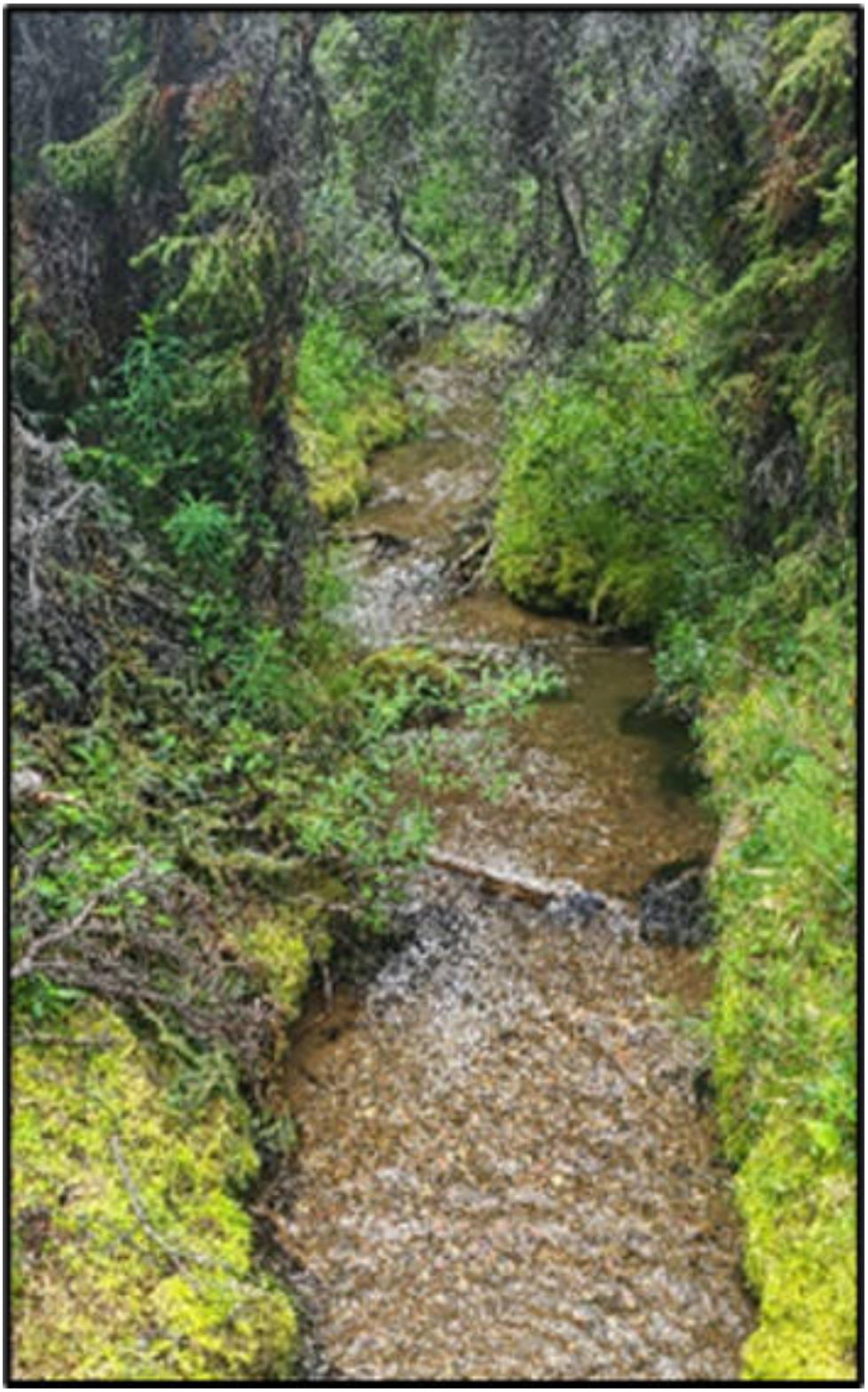


Figure 4.4-16

Watercourse-08
upstream of crossing

Watercourse-10

Physiography context

The local topography suggests that the watercourse flows in a confined and steep valley. Superficial deposits are composed of a till blanket (> 1 m) without underlying bedrock. Core samples from boreholes located in the vicinity showed that the dominant sediment material is composed of silt and occasional gravels. Wetlands (bogs and fens) distribution in the area and the potential permafrost extent approximately 30 m downstream of the crossing.

Hydromorphological reach

The watercourse reach is characterized by a single homogeneous reach. The downstream limit was chosen at a slope break from steep to flat, about 60 m from the crossing (location of the wetlands and the permafrost extent). Table 4.4-11 presents the reach characteristics and Figure 4.4-17 displays the longitudinal profile of the river reach.

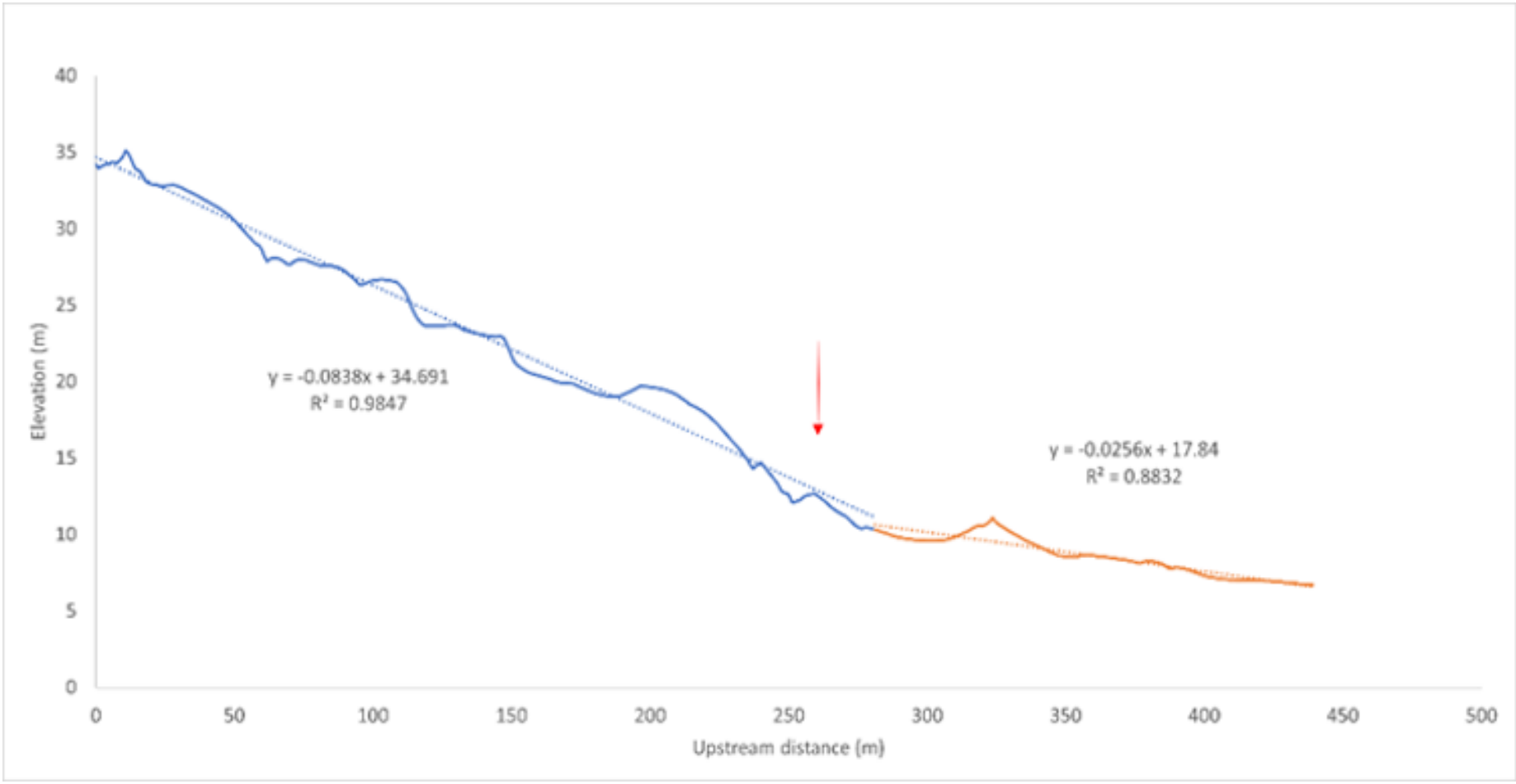
Table 4.4-11: WC-10 Geomorphic Reach

Channel Pattern	Sinuosity	Terrains Slope (m/m)	Channel Width (m)	Streambed Materials
Single channel (Cascade)	1.09	0.083	1.5 m to 3 m	Boulder : 80 % Cobbles : 15 % Sand : 5 %

The average width of the watercourse reach ranges between 1.5 to 3 m. The channel bed composition is dominated by boulders having the same size of the channel width itself, and by coarse sediments (Figure 4.4-18 and Figure 4.4-19). Field photographs suggest that channel banks are stable, composed of the same materials than the streambed and highly vegetated. Minors undercuts were observed in this reach. Due to poor DTM and the configuration of the watercourse (high vegetation, small channel size), an accurate GIS analysis appears to be impracticable. Therefore, the channel size was estimated to be no more than 3 m, based on the field photographs.

Geomorphic processes and hazards

From a sediment transport perspective, the bed materials size (boulder) exceeds the watercourses' transport capacity, and sediment mobility is expected to occur for major hydrological events only. The reach features a wide and steep homogeneous reach where aggradation or degradation processes are not expected to occur. The studied reach appears to be in a stable morphological situation.



WC-10 longitudinal profile from 1m DTM and stream slope
Watercourse crossing location is highlighted red

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Figure 4.4-18

Watercourse-10
upstream of crossing

Figure 4.4-19

Watercourse-10
upstream of crossing

Kauk Brook

Physiography context

Kauk Brook crossing is located approximately 650m downstream of a transition between confined and unconfined valley setups. Within the study reach limits, Kauk Brook flows on alluvial sediments, surrounded by non-cohesive sediments (till or organic thick blanket, fluvial terraces). Core samples from boreholes drilled in the vicinity of the water crossing show that no bedrock was found within the first 20 meters from the surface (R6 hydrological study, 2023).

With the natural valley opening, wetlands on both sides of the floodplain were identified. Wetlands located on the east side of the stream (left bank) are also prone to potential permafrost.

Hydromorphological reach

Kauk Brook watercourse crossing is located within a homogeneous morphological reach of approximately 2 kilometers. The upstream limit was chosen at the transition zone between the confined and unconfined system (650 meters upstream of the LSA), while the downstream limit marks the confluence between Kauk-Brook and watercourse-10 tributary. Table 4.4-12 presents the reach characteristics.

Table 4.4-12: Kauk Brook Geomorphic Reach

Channel Pattern	Sinuosity	Channel Slope (m/m)	Bankfull Width (m)	Streambed Materials
Dynamic meanders (dunes and ripples)	1.38	0,0013	15 m	Sand : 77 % Cobble : 15 % Gravel : 3% Boulder : 2%

Given the fine grain size of streambed materials, this reach exhibits dunes and ripples fluvial forms and its channel is characterized by a single thread channel with dynamic meanders. This reach has a relatively gentle slope (0.13%) and a highly sinuous channel path (sinuosity = 1.38). The bankfull width is variable in this reach due to the meandering fluvial style and is equal to 15 m on average (Figure 4.4-20). However, the bankfull width was measured at 25 m on average at the meander curvatures. Banks are highly vegetated which contributes to their stability. Scouring, root exposure and cutbanks are common in this reach but with low magnitude and extents (Figure 4.4-21). However, a steep erosion cutbank was observed in the left bank fluvial terrace (Figure 4.4-22).

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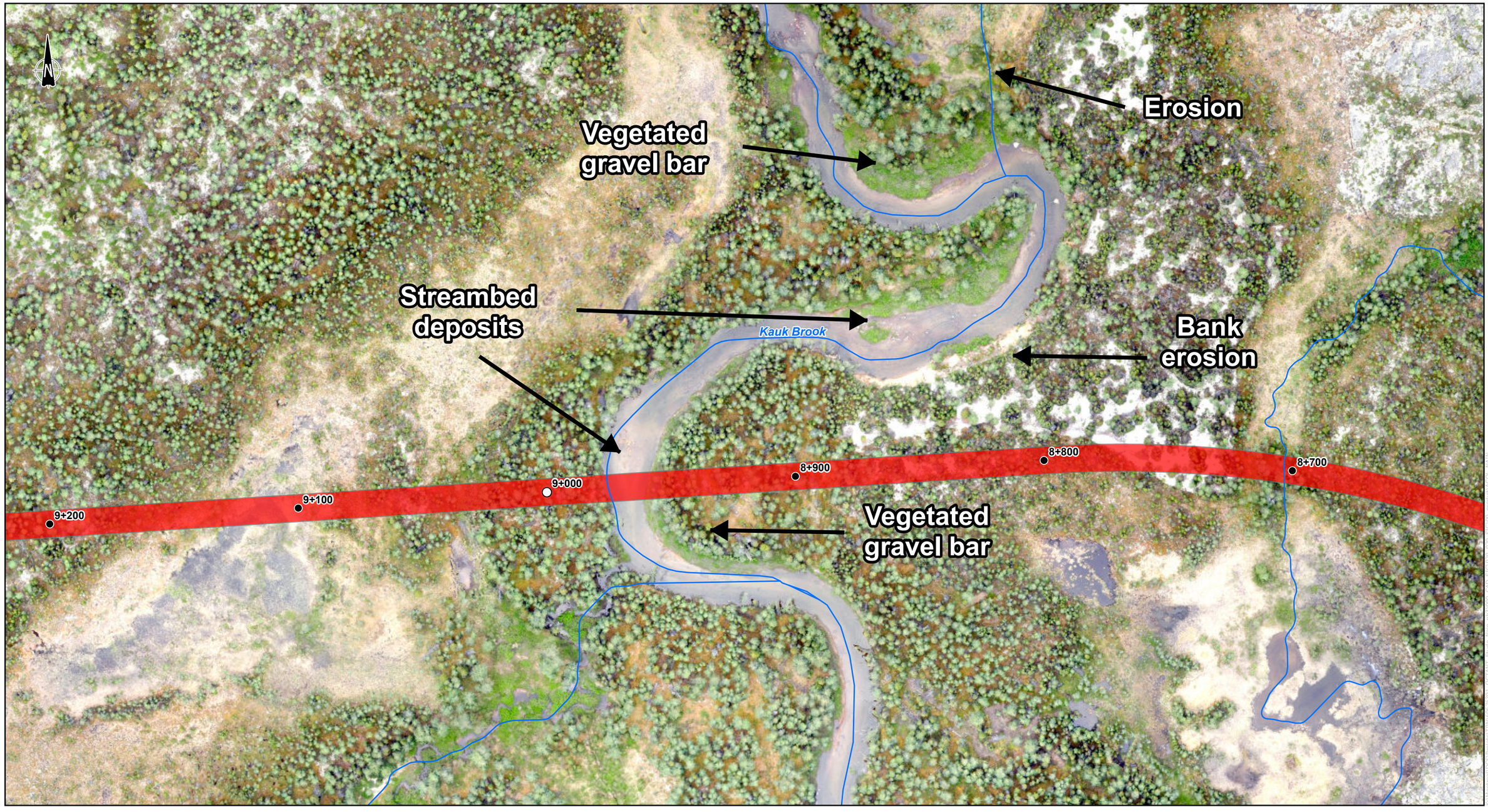
Figure 4.4-20

Kauk Brook

Figure 4.4-21

Streambed materials
and bank profile



Project Component

Access road

Kilometer point

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Figure 4.4-22

Geomorphic processes at Kauk Brook

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Geomorphic processes and hazards

On a large scale, this river reach is characterized by a gentle slope and a wide bankfull width compared to the upstream confined section. Thus, a decrease of the streampower is observed in this reach (sediment transport capacity), resulting in a general process of aggradation. Sediment deposits and fluvial forms associated with deposition were observed from the drone images (Figure 4.4-22). The section also exhibits lateral dynamics indicators (such as scour and erosion marks) which are resulting from the high sinuosity and the presence of non-cohesive bank materials. However, the analysis of historical photographs (R6 Hydrological study, 2023) does not indicate major changes in the channel planform in the crossing vicinity for the last 74 years, suggesting that the meanders are fairly stable. Point bars at the inside meander banks regained in vegetation, indicating that the channel is stabilizing over time. The oxbow channel (abandoned meander) in 1949 photography that is no longer visible (Aivek Stantec 2023).

While indicators suggest that the watercourse is stabilizing, erosion processes are important in this reach and can be local. For instance, a steep erosion cutbank of the alluvial terrace is visible on the outside of the meander belt (left bank; Figure 4.4-22). This erosion concerns approximately 75 meters of the bank and affects about 5 meters of bank materials in height, based on the DTM. Comparison with historical photographs suggests that this active erosion site occurred between 2020 and 2023, however data remains insufficient to estimate lateral migration. The cutbank migration towards the proposed road and the low cohesive nature of bank materials raise concerns about a potential long-term risk of meander cutoff.

4.4.3.2.2 Secondary Watercourse Analysis

A high-level analysis was conducted to identify natural processes for secondary watercourse, based on their physiographic context (bedrock, wetlands, etc.) and their hydrological context (ephemeral streams). Although, these watercourses are not subject to a detailed analysis in this chapter, a notice regarding the main crossings design constraints is presented in this section.

Watercourse-new04

Watercourse-new04 has an ephemeral flow regime flowing over steep terrain (22%) characterized by till blankets and veneers. The watercourse reach is defined by a single, narrow channel (<0.5m). The watercourse profiles and vegetation suggest significant morphological stability. There is limited risk for vertical degradation and lateral mobility (migration).

Watercourse-03 and Watercourse-04

These two small ephemeral watercourses (< 15 ha) and flow over steep terrain (≥ 20 %) characterized by superficial or underlying bedrock that confines the flow path. They both exhibit an active channel width smaller than 1 m.

The Watercourse-03 assessment was based on aerial imagery. This section of the stream typically refers to a zone of important sediment production (sediment sourcing) as suggested by the ravines and landslides marks visible on the relief. Upstream of the crossing, the main flow channel appears heavily incised into the till layer up to the underlying bedrock and a local slope break is located just upstream of the crossing location.

Watercourse-04 is located upstream Blowhole Pond in a steep reach (29%) is characterized by a slope break between two reaches, reducing from 29 to 18 %. The channel is composed of large sediment materials (boulders) for which sediment mobility is expected to occur during extreme hydrological events only.

Watercourse-07

Watercourse Watercourse-07 has a permanent flow regime but flows over steep terrain (23%) characterized by till blankets and veneers. Geology data and test pits identified underlying bedrock within 0.50 m in the vicinity of the crossing. At crossing location, the watercourse section is defined by a wide (3m) and shallow channel flowing on exposed bedrock, resulting in the presence of cascades and waterfalls, including crossing location.

This watercourse section is highly stable due to the bedrock context and steep slope of the watercourse suggest significant morphological stability. There is no risk of vertical degradation and no potential for lateral mobility (migration). From a sediment transport perspective, lack of fluvial streambed materials suggests that the section acts as a conveyance zone. The transport capacity is high due to the slope and low bed roughness, preventing sediment deposits.

Watercourse-11, Watercourse-13

Despite their geographic and topographic disparities, these ephemeral watercourses flow through terrain composed of organic matter. Watercourses in the vicinity of crossings flows through complex-fen and bog, associated with open-water area and permafrost (Watercourse-11 and Watercourse-13). These watercourses exhibit small or poorly defined channels, characterized by surficial flows over saturated soils.

Watercourse-16

Watercourse-16 has a permanent flow regime flowing over moderate-steep terrain (2.3%) characterized by till blankets and veneers. The watercourse reach is defined by a single, narrow channel (< 1m) that flows between two extensive wetlands complex.

The watercourse profiles and vegetation suggest significant morphological stability. There is limited risk for vertical degradation and lateral mobility (migration).

4.4.3.3 Water Resources and Quality

Nain's current municipal drinking water supply is Trouser Lake, which is located outside of the LSA. As described in Section 3.2.5, a local drinking water source known as Annainak’s Brook is also used by community members as a drinking water source. No other exploited water resources (drinking or non-potable) have been identified in the LSA. Baseline surface water quality information collected for watercourses in the LSA is presented in Section 4.7.

4.5 Vegetation and Wetlands

The baseline conditions will summarize the existing vegetation and wetlands conditions within the spatial boundaries by compiling the results of the desktop assessment and field assessments. The baseline conditions for vegetation and wetlands included the following:

- Biodiversity and biodiversity metrics including
  - Lists of plant, lichen and moss species per vegetation community
  - Lists of traditional use species per vegetation community
- Relative abundance and distribution of the ecological communities and vegetation species, including ecological communities or species of economic, human, or ecological importance
- Plant Species at Risk (SAR) and Species of Conservation Concern (SOCC)
  - Locations where these species were identified during field surveys, including details on habitat, population abundance and extent, and
  - Potential vegetation communities the SAR and SOCC may be found
- Critical habitat for species
- Baseline conditions including notes on disturbance (natural and anthropogenic) and fragmentation
- Vegetation community mapping and profiles of these communities
- The presence and amount of merchantable timber that may be removed for the development of the Project
- Source of country foods (described in Section 5.5)
- Presence of weed or invasive species

- Baseline conditions of shorelines, wetlands, and riparian areas
- Wetland will be quantified, delineated, and described including wetland class, functions, and wildlife presence

4.5.1 Study Area

Spatial boundaries for characterizing vegetation and wetland baseline conditions are described in Table 4.5-1 and illustrated in Figure 4.5-1.

Table 4.5-1: Vegetation and Wetlands Spatial Boundaries

Study Area	Description	Rationale
Project Area	The footprint of the runway, airport, access road, rock borrow areas, construction staging area, temporary access road, and associated infrastructure.	Represents area of direct disturbance to vegetation and wetlands created by the Project.
Local Study Area (LSA)	The Project Area plus a 100 m buffer	The LSA delineates areas that may be directly affected by the Project development and can account for potential shifts in the road alignment.
Regional Study Area (RSA)	The Project Area plus a 1,000 m buffer	The RSA is of sufficient area to gather representative information on vegetation resources found within the LSA; allows for establishing the indirect effects of the Project for cumulative effects.

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Project Component
- Access road
- Temporary access road
- Airport footprint

Study Area
- Regional study area (RSA)
- Local study area (LSA)

Hydrography
- Watercourse

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Figure 4.5-1

Vegetation Study Areas, Mapping, and Assessment Locations

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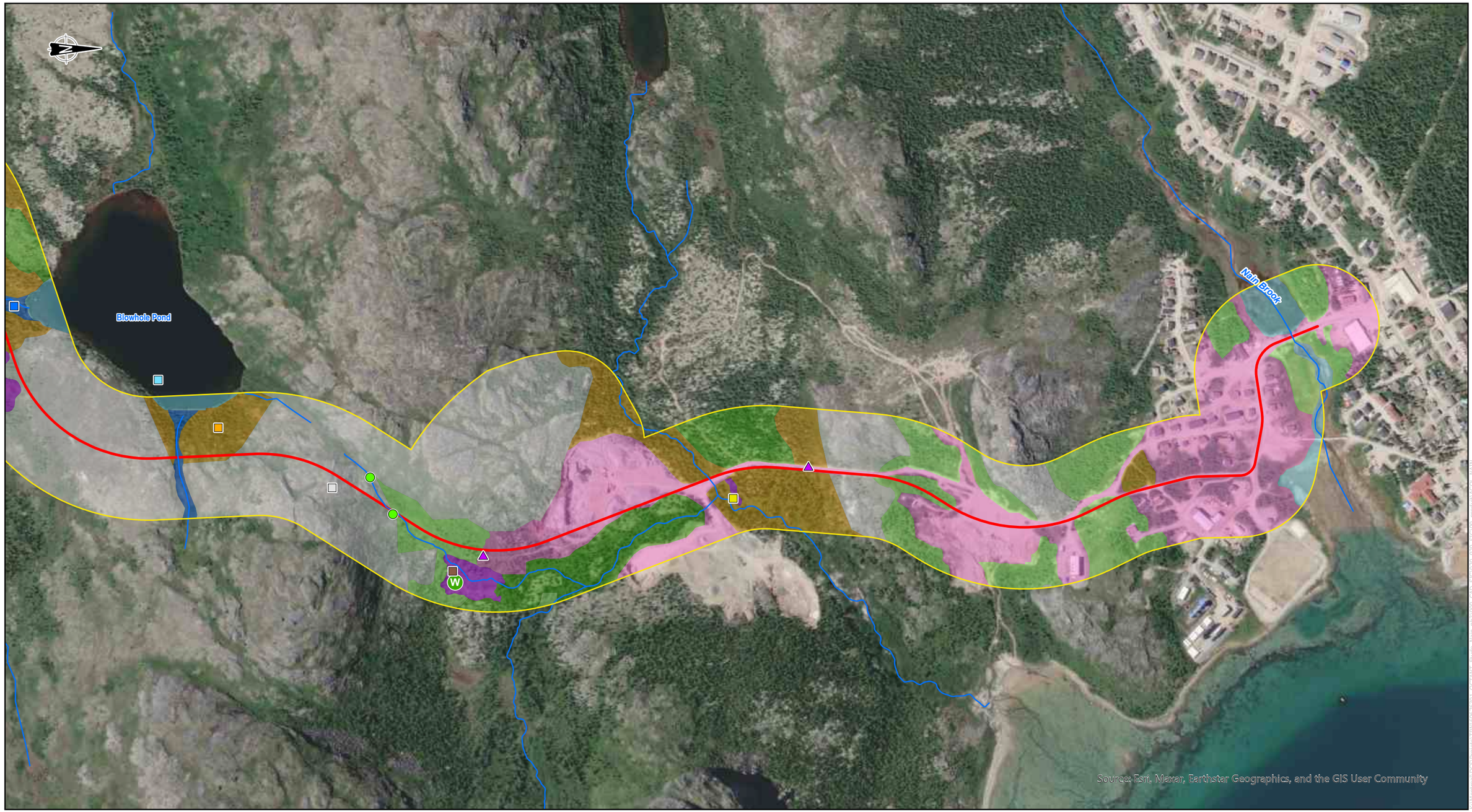

Project Component
- Local study area
- Access road
- Temporary access road

Rare Plant Locations
- Elephant's-head lousewort
- Scheuchzer's cottongrass

Field Assessment
- Wetland assessment point
- Closed black spruce/moss/lichen forest
- Deciduous shrubland
- Developed
- Open tamarack/lichen forest
- Riparian
- Unvegetated/barrens/bare rock
- Water
- Wetland

Vegetation Survey Station
- Bog
- Closed black spruce/moss/lichen forest
- Fen
- Riparian
- Unvegetated/barrens/bare rock
- Water

Hydrography
- Watercourse

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Figure 4.5-1

Sheet - 1

Vegetation Study Areas, Mapping, and Assessment Locations

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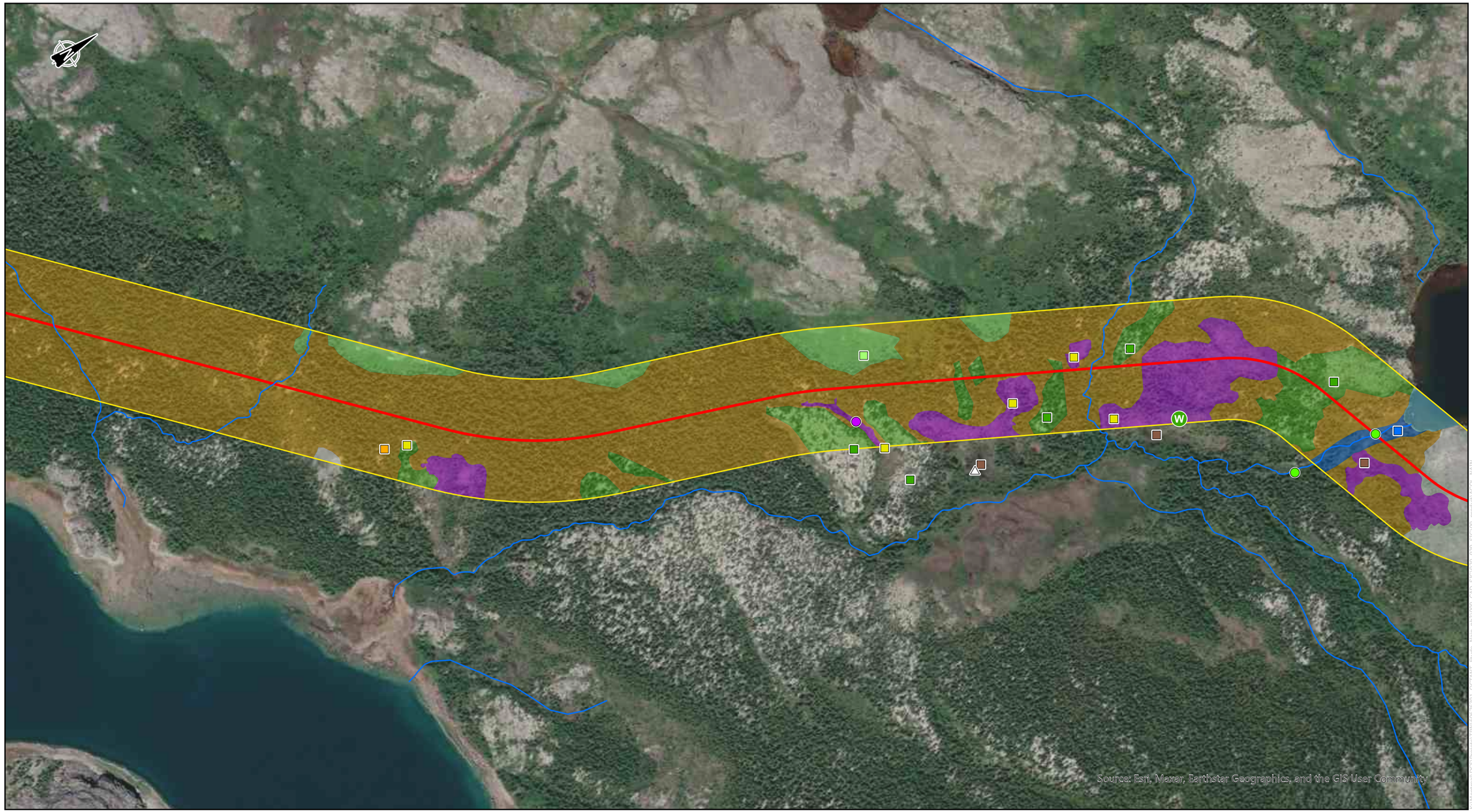

Project Component
- Local study area
- Access road
- Temporary access road

Rare Plant Locations
- Elephant's-head lousewort
- Hairy butterwort
- Small bur-reed

Field Assessment
- Wetland assessment point
- Closed black spruce/ moss/lichen forest
- Deciduous shrubland
- Open tamarack/lichen forest
- Riparian
- Unvegetated/barrens/ bare rock
- Water
- Wetland

Vegetation Survey Station
- Bog
- Closed black spruce/moss/lichen forest
- Deciduous shrubland
- Fen
- Open tamarack/lichen forest
- Riparian

Hydrography
- Watercourse

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Figure 4.5-1
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Vegetation Study Areas, Mapping, and Assessment Locations

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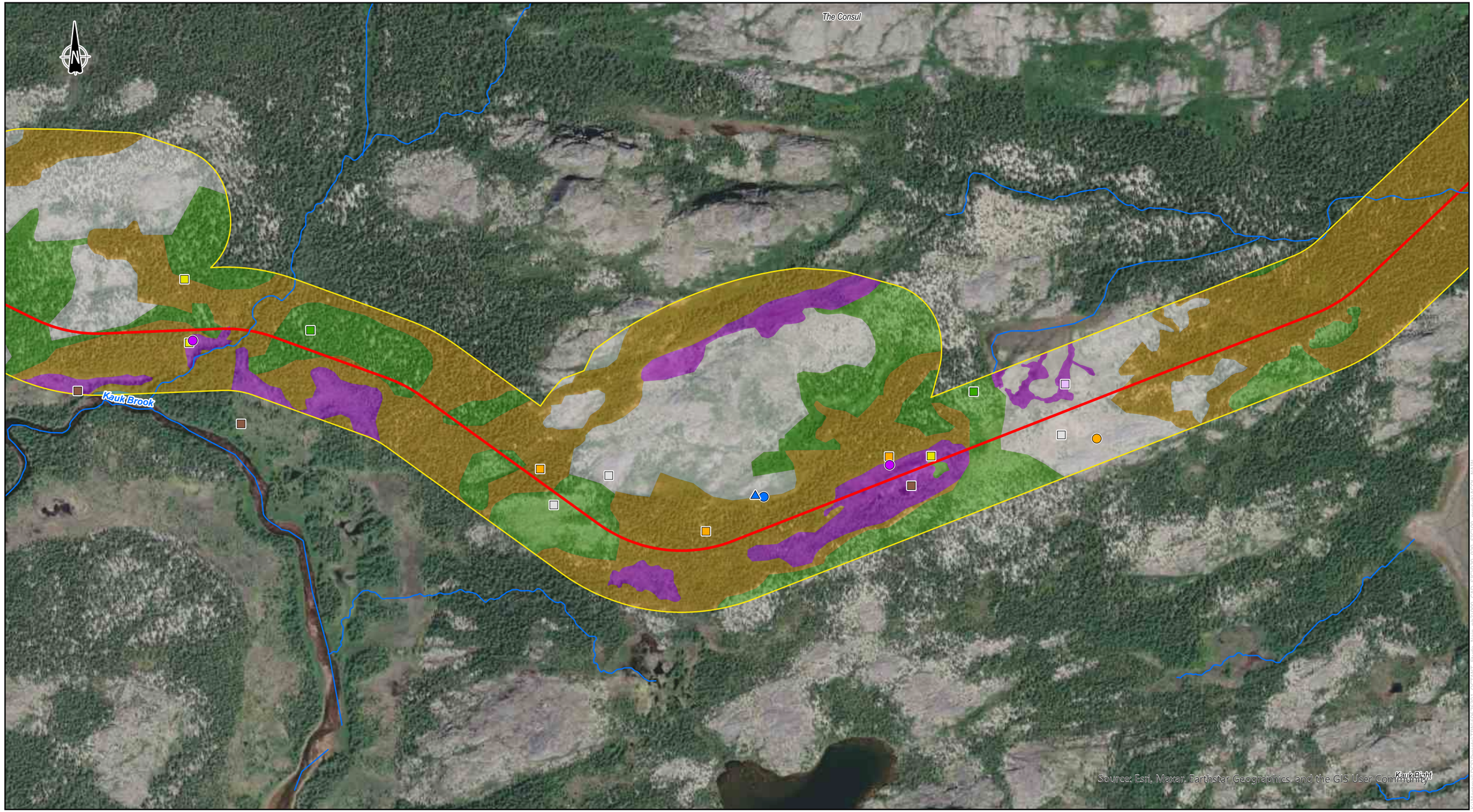

Project Component
- Local study area
- Access road
- Temporary access road

Rare Plant Locations
- Fragile fern
- Greenland stitchwort
- Hairy butterwort
- Multi-rayed goldenrod

Field Assessment
- Closed black spruce/ moss/lichen forest
- Open tamarack/lichen forest
- Unvegetated/barrens/ bare rock
- Water
- Wetland

Vegetation Survey Station
- Bog
- Closed black spruce/moss/lichen forest
- Fen
- Marsh
- Open tamarack/lichen forest
- Unvegetated/barrens/bare rock

Hydrography
- Watercourse

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Figure 4.5-1
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Vegetation Study Areas, Mapping, and Assessment Locations

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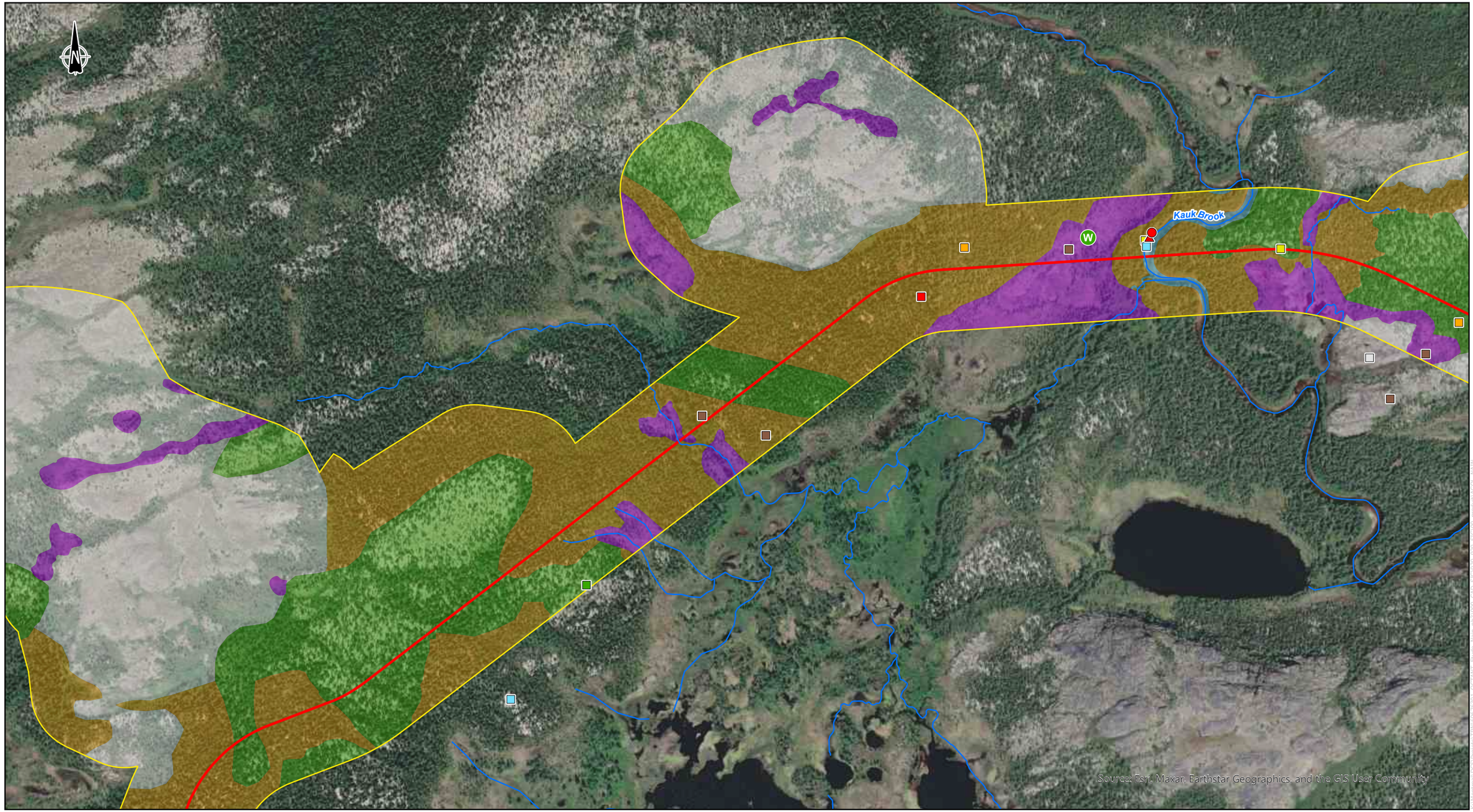

Project Component
- Local study area
- Access road
- Temporary access road

Rare Plant Locations
- Alpine pondweed
- Horned pondweed)

Field Assessment
- Wetland assessment point
- Closed black spruce/ moss/lichen forest
- Open tamarack/lichen forest
- Unvegetated/barrens/ bare rock
- Water
- Wetland

Vegetation Survey Station
- Bog
- Closed black spruce/moss/lichen forest
- Complex
- Fen
- Open tamarack/lichen forest
- Unvegetated/barrens/bare rock
- Water

Hydrography
- Watercourse

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Figure 4.5-1
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Vegetation Study Areas, Mapping, and Assessment Locations

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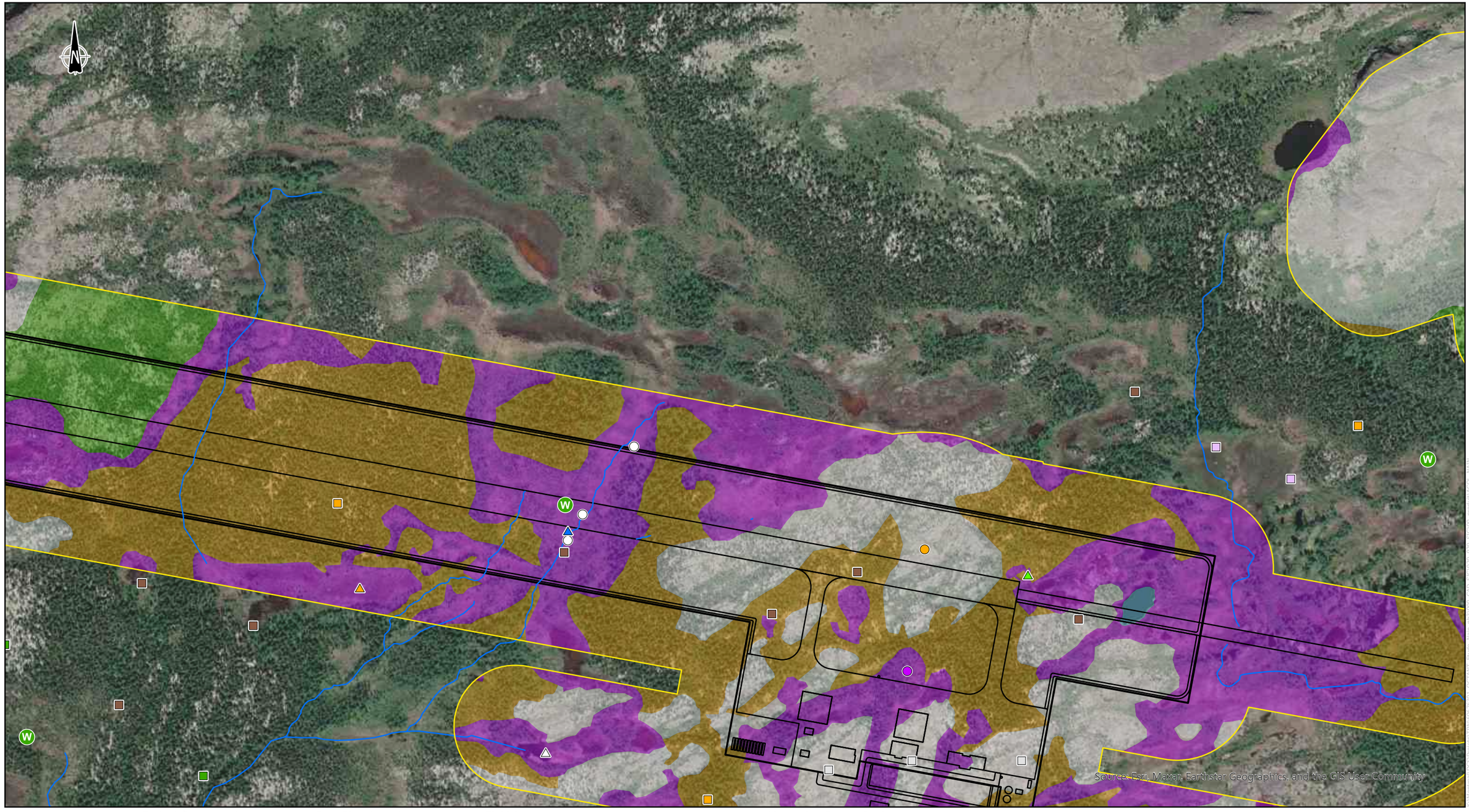

Project Component
- Local study area
- Access road
- Temporary access road
- Airport footprint

Rare Plant Locations
- Greenland stitchwort
- Hairy butterwort
- Hooded ladies'-tresses
- Moor rush
- Multi-rayed goldenrod
- Northern bog sedge
- Small bur-reed

Field Assessment
- Wetland assessment point
- Closed black spruce/ moss/lichen forest
- Open tamarack/lichen forest
- Unvegetated/barrens/ bare rock
- Water
- Wetland

Vegetation Survey Station
- Closed black spruce/moss/lichen forest
- Fen
- Marsh
- Open tamarack/lichen forest
- Unvegetated/barrens/bare rock

Hydrography
- Watercourse

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Figure 4.5-1

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Vegetation Study Areas, Mapping, and Assessment Locations

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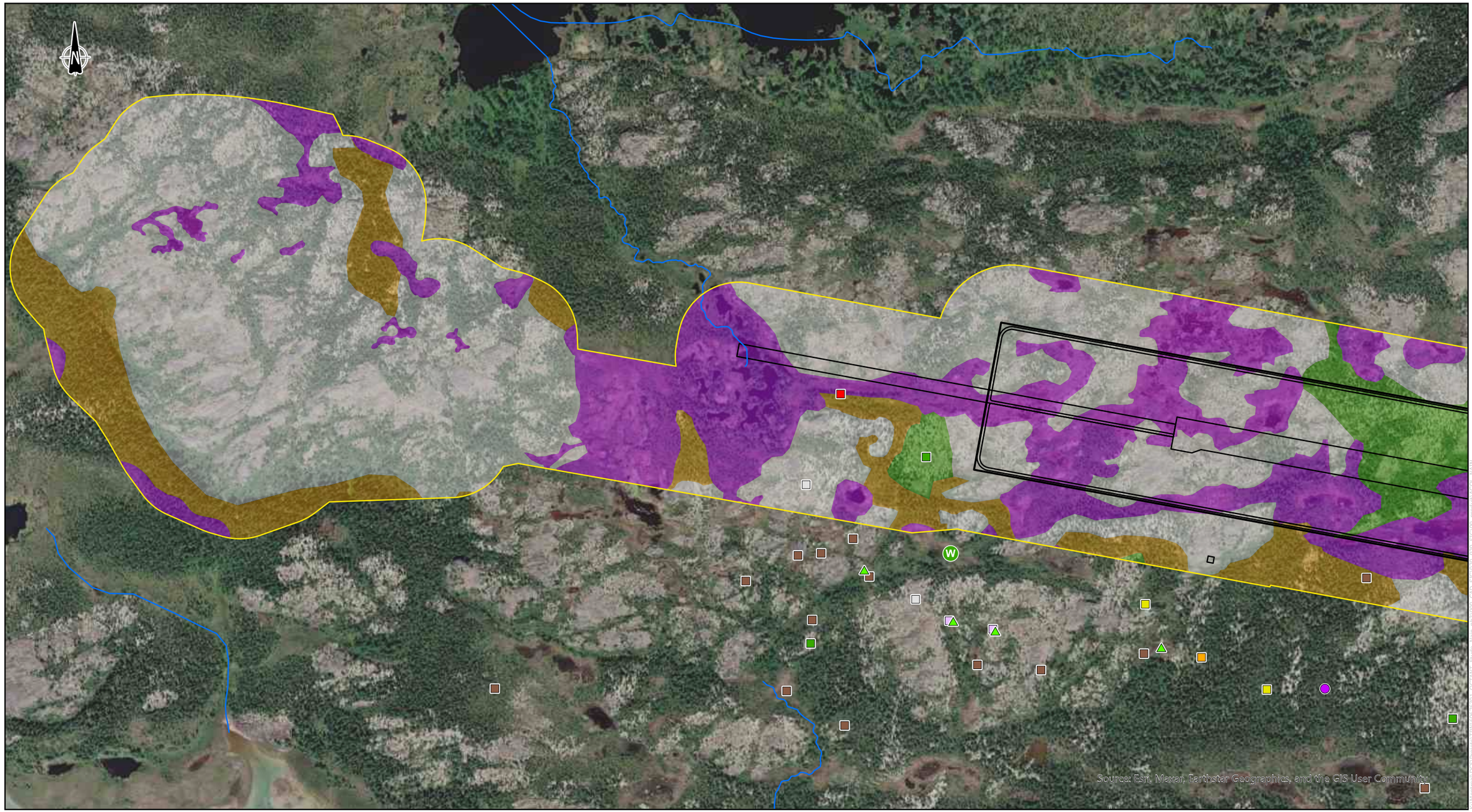

Project Component
- Local study area
- Access road
- Temporary access road
- Airport footprint

Rare Plant Locations
- Hairy butterwort
- Moor rush

Field Assessment
- Wetland assessment point
- Closed black spruce/ moss/lichen forest
- Open tamarack/lichen forest
- Unvegetated/barrens/ bare rock
- Wetland

Vegetation Survey Station
- Bog
- Closed black spruce/moss/lichen forest
- Complex
- Fen
- Marsh
- Open tamarack/lichen forest
- Unvegetated/barrens/bare rock

Hydrography
- Watercourse

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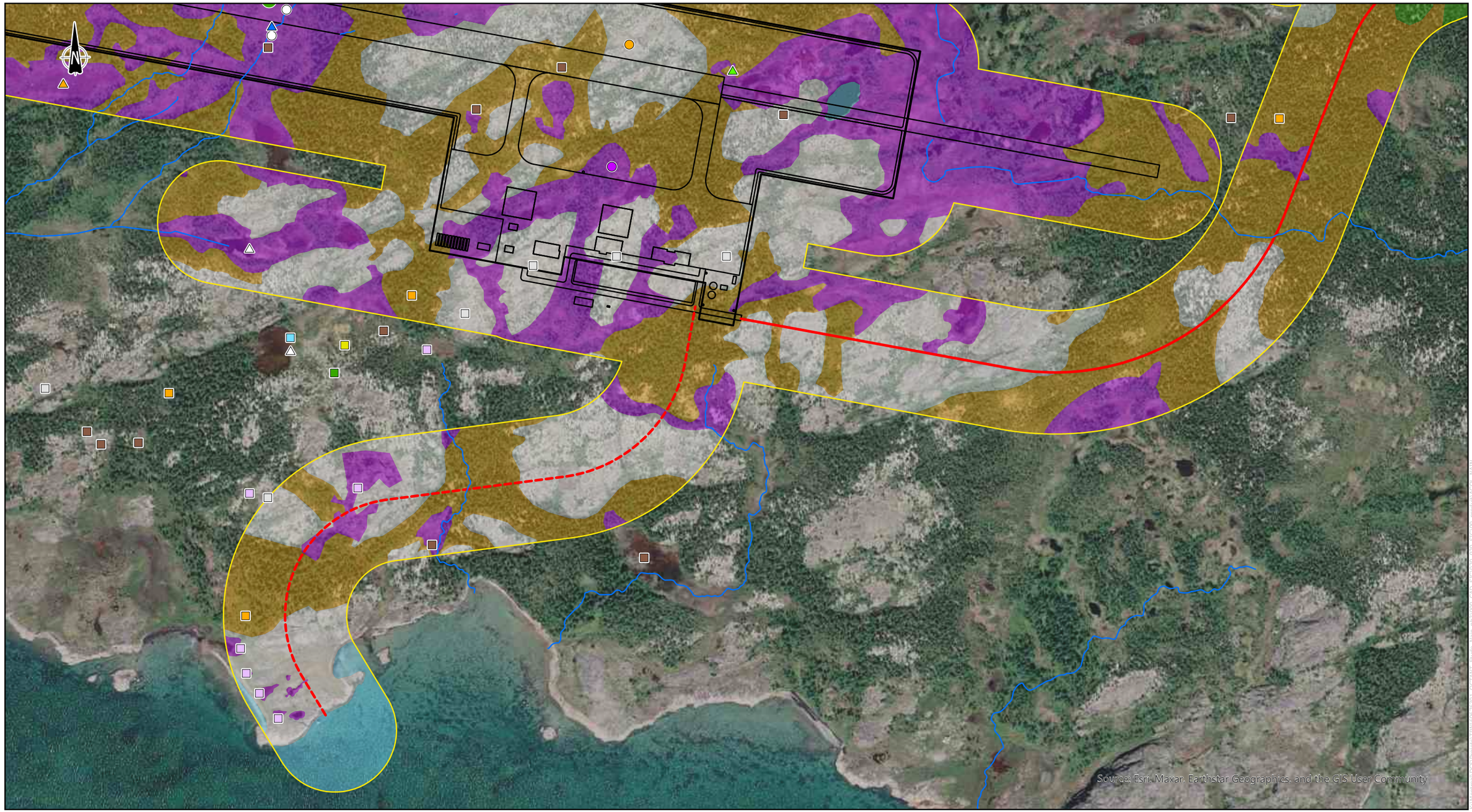
Figure 4.5-1

Sheet - 6

Vegetation Study Areas, Mapping, and Assessment Locations



Project Component
- Local study area
- Access road
- Temporary access road
- Airport footprint

Rare Plant Locations
- Greenland stitchwort
- Hairy butterwort
- Hooded ladies'-tresses
- Moor rush
- Multi-rayed goldenrod
- Northern bog sedge
- Small bur-reed

Field Assessment
- Wetland assessment point
- Closed black spruce/ moss/lichen forest
- Open tamarack/lichen forest
- Unvegetated/barrens/ bare rock
- Water
- Wetland

Vegetation Survey Station
- Bog
- Closed black spruce/moss/lichen forest
- Fen
- Marsh
- Open tamarack/lichen forest
- Unvegetated/barrens/bare rock
- Water

Hydrography
- Watercourse

1:6 000
0 50 100 m
NAD 1983 UTM Zone 20N

Figure 4.5-1
Sheet - 7
Vegetation Study Areas, Mapping, and Assessment Locations

OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

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4.5.2 Methods

4.5.2.1 Desktop Information

A desktop review of publicly-available data bases, including government databases and other recently published projects in Labrador was completed for the Project. The review included publicly available ecological data for the Project Area from provincial and federal data sources, available aerial imagery, LiDAR data, the Atlantic Canada Conservation Data Centre (ACCDC) database, previous environmental assessments (EAs) in the region and supporting documents, and applicable regulatory guidance. Other sources used for the desktop review included a preliminary review of imagery of the Project Area and mapping of the ecosystems including vegetation communities.

A review of databases was conducted to describe site conditions and used to plan field surveys. The following databases and literature were used:

- ACCDC Element Occurrence Search (ACCDC 2022) and Current Species Ranks – Labrador (ACCDC 2023)
- Canadian Wetland Classification System. Second Edition (National Wetlands Working Group 1997)
- Ecozones and Ecoregions of Canada (Ecological Framework of Canada 1999)
- Environment and Climate Change Canada (ECCC) Open Maps - Range Extents for SAR (ECCC 2024c), Critical Habitat for SAR (ECCC 2024d), and Land Cover (ECCC 2024e)
- Flora of Newfoundland and Labrador (FNL) (FNL 2024)
- Nain Airport R3 Study Report (Aivek Stantec 2022)
- Nain Wind Micro-Grid Project Environmental Registration Document (Natural Forces 2021)
- Newfoundland and Labrador Species at Risk Information Sheets (NL 2024)
- Newfoundland and Labrador Protected Areas and Ecoregion Maps
- SARA Public Registry (Government of Canada 2024b)
- Wetland Ecological Functions Assessment: An Overview of Approaches (Hanson et al. 2008)
- Wetlands of the Maritime Provinces: Revised Documentation for the Wetlands Inventory (Hanson & Calkins 1996)

For the purposes of this section, SAR and SOCC are defined as:

SAR:

- Any species listed under Schedule 1 of the federal Species at Risk Act, 2002 (SARA) as Threatened, Endangered, or Extirpated; and/or
- Any species listed under the Newfoundland and Labrador Endangered Species Act, 2001 (ESA) as Threatened, Endangered, or Extirpated

SOCC:

- Any species listed under Schedule 1 of SARA as Special Concern; and/or
- Any species listed under the Newfound and Labrador ESA as Vulnerable; and/or
- Any species with a subnational rank (SRank) of S1 – S3S4 in Labrador as designated by the ACCDC

4.5.2.2 Mapping

Pre-Field

In the absence of available ecophase or ecosite mapping or protocols for Labrador, an initial vegetation community mapping exercise was completed to identify the vegetation communities within the LSA. The mapping exercise was a high-level computer-based image classification method based on automatically categorizing image pixels into land cover classes (Aivek Stantec 2022). As a base of the vegetation

community mapping, Sentinel -2 imagery with a 10 m resolution was used and was further refined using imagery from the unmanned aerial vehicle flights and ground-truthing that occurred during an initial site visit in June of 2022 (Aivek Stantec 2022). Additionally, aerial imagery at a scale of 1:2,500 were also used to refine the vegetation communities.

The following six broad vegetation community types were identified during the desktop review:

- Forest
- Barren
- Developed
- Wetland
- Shrubland
- Water

These broad vegetation community types were based on similar projects in Newfoundland and Labrador and across Canada. The intent of the broad vegetation community mapping was to have the mapping at a scale that more extensive field investigation could further refine the vegetation communities into more site-specific vegetation communities.

As part of the desktop assessment, mapping of the proposed field assessment locations occurred. The location for the field assessment was determined to focus on the representative vegetation communities and wetlands from the broad vegetation community types created during the mapping exercise. Locations to assess representative vegetation communities were located within the forest, barren, and shrubland communities and were based on the number of vegetation communities and their locations and / or uncommon or underrepresented habitats. The locations for representative wetland locations were based on the desktop mapped wetland and water community types and were located in wetlands that appeared to be representative of each wetlands class (i.e., bog, fen, marsh, swamp, shallow open water) based on the initial vegetation community mapping.

Post-Field

The desktop mapped vegetation community boundaries and types and the wetland boundaries and classes were updated during and after the field assessments using the following methods outlined in Table 4.5-2.

Table 4.5-2: Methods for Mapping Updates

Methods	Description
Field assessments	• Vegetation community types were further refined based on vegetation species present and cover while completing the vegetation community assessments and wetland assessments and during the meandering rare plant transects within the LSA. The boundaries and types were updated using the digital mapping tool (ArcGIS Field Maps). • Wetlands were classed during the field assessment and any wetland boundary that was not correct the biologist walked to delineate the boundary and updated using the digital mapping tool (ArcGIS Field Maps).
Helicopter reconnaissance	• The biologist updated the boundaries of the vegetation communities and wetlands, to further refine the vegetation community types and wetlands classes in real-time, while the helicopter hovered over the vegetation communities and wetlands, using the digital mapping tool (ArcGIS Field Maps) during the helicopter reconnaissance. • Using photos and videos of the vegetation communities and wetlands that were taken of the LSA during the helicopter reconnaissance, the field biologist updated the boundaries of the vegetation communities and wetlands along with further refining the vegetation community types and wetland classes during the field program and part of the quality assurance and quality control program. .
Drone photos and orthophotos	• The field biologist used the vegetation community types, wetland classes, and boundaries that were confirmed during the field program to interpret the vegetation community types, wetland classes, and boundaries for any vegetation communities or wetlands that were not assessed or helicopter reconnaissance completed during the field program.

4.5.2.3 Vegetation

The vegetation field assessment was conducted from July 25 to 29, 2023 by two qualified biologists within the LSA. Data collection also occurred during the wildlife field program by qualified biologists (July 2 to 7 and September 26 to 30), broadening the temporal scope of vegetation field data collected.

The desktop vegetation communities created in the Aivek Stantec (2022) along with the imagery from the unmanned aerial vehicle flights were used to plan the field study programs (e.g., number of wetlands present and their locations, general habitat types to plan vegetation surveys, uncommon or underrepresented habitat to target for rare plant surveys). These field assessment locations were selected to confirm the habitat types present in the LSA and collect more detailed information on the habitat types present in the LSA. Representative vegetation communities of each type along the LSA were proposed visited to assess the characteristics of the habitat.

Two different types of vegetation community field surveys were completed; a vegetation community assessment or a verification of vegetation community type. The vegetation community assessments were conducted to gather more detailed information on the vegetation community. The vegetation community assessments were completed on representative vegetation communities, which were then used to compare, and refine the vegetation communities where the verification method was used or confirm the desktop-mapped vegetation communities. Field verification was used to complete a more rapid verification method to assess more of the vegetation communities in the LSA and were completed in areas where access was limited (remote site and variable helicopter landing sites available). Field verified vegetation communities were also used to confirm and refine the desktop mapped vegetation communities.

Additionally, during the assessments and the verifications of the vegetation community types, wildlife observations including signs (i.e., scat, tracks, browse), potential habitats were noted. If a wildlife SAR was observed, the location (UTM) and habitat was recorded. These observations were recorded in the digital mapping tool (ArcGIS Field Maps) to be used by the wildlife team.

Verification

Verification of vegetation community types and boundaries occurred during the helicopter reconnaissance and during the meandering rare plant transects or between vegetation community and / or wetland assessments. During the verification, general notes on location (Universal Transverse Mercator [UTM] coordinates), dominant vegetation present (in the case of the helicopter verified vegetation communities, trees and shrubs were visible and were used to confirm the vegetation community type), disturbances, and representative photos were collected using the digital mapping tool (ArcGIS Field Maps). These verification points were then compared to the vegetation community assessments to compare to the vegetation community type for the vegetation community polygons.

Assessment

At representative vegetation communities, a detailed vegetation assessment of the vegetation community type was completed. The data collected at the detailed vegetation assessment plot included information on dominant species and relative cover within the tree layer, shrub layer, dwarf shrub/herbaceous layer, and surface cover layer to characterize the vegetation community and habitat present (Table 4.5-3). Tree and shrub layers were assessed within a 10 m^2 plot; dwarf shrub/herbaceous and surface cover layers were assessed within a 1 m^2 plot. For the purposes of this assessment, the vegetation layers are defined as the following:

- Tree layer: woody vegetation >2.0 m tall, diameter at breast height (DBH) >5 cm
- Shrub layer: woody vegetation 0.5 m to 2.0 m tall, DBH <5 cm
- Dwarf shrub/herbaceous layer: woody and non-woody vegetation <0.5 m tall
- Surface cover layer: any vegetation growing at ground level (typically mosses and lichens)

Vegetation community types and delineations were further refined using data collected in the field (Table 4.5-3).

Table 4.5-3: Data Collected at Vegetation Community Assessed within the LSA

Descriptor	Information Collected
General information	• Location (UTM) of the vegetation community assessment • Assessor • Date • Vegetation community type • Representative photos • Wildlife observations • Notes on overall disturbances and surrounding landscape
Soils	• Soil composition (i.e., mineral or organic) of soil present within the majority of the wetland • If mineral soil was encountered soil texture and colour were determined. • Disturbances to the soils and amount of exposed soils, if present • If organic soil was encountered determination of composition and the von Post scale of decomposition. o Fibric – undecomposed and still identifiable plant materials with a von Post scale of class 1 to 4 (Kroetsch et al. 2011) o Mesic – weakly to strong decomposed with a von Post scale of class 5 to 6 (Kroetsch et al. 2011) o Humic – strongly to completely decomposed with unrecognizable plant materials with a von Post scale of class 7 to 10 (Kroetsch et al. 2011)
Vegetation	• Relative cover of the dominant species within the overstory and understory o Cover of the tree and shrub layers was determined using a 10 m^2 plot o Cover of the dwarf shrub/herbaceous and surface cover layers within a 1 m^2 plot • Presence of invasive species, SOCC and / or SAR species • Disturbances to the vegetation

Rare Plants

As there are no provincial guidelines for Newfoundland & Labrador, meandering transects for rare plants were conducted according to the Alberta Native Plant Council Guidelines for Rare Vascular Plant Surveys (2012). This survey technique focuses on a particular habitat at a time and the range of variation within; it involves purposefully walking through a sample site or plant association and noting each new species until no more new species are observed. It is well-suited to difficult terrain, irregularly-shaped areas, and large search areas (Alberta Native Plant Council 2012). Where a rare species is observed, similar habitats in the study area are then subsequently surveyed to further delineate population extents. Rare plant surveys target high-potential habitats and unique habitats (i.e., wetlands, seeps, barrens, rocky outcrops), as rare vegetation species typically occur in these unique or locally underrepresented habitats. A list of vegetation species encountered (floristic lists) during the targeted meander transect was created. Location, population extent and abundance, habitat notes, and photos were taken of any SAR or SOCC. All rare plant species observed will be reported to the ACCDC. If present, invasive or weeds species were noted.

The floristic lists were compiled into lists of plant species prevalent in each vegetation community type, providing details about biodiversity (Appendix D1). These floristics lists will be used during engagement and consultation to determine ecosystem value, and also the value of plant, lichen, moss resources with the LSA.

4.5.2.4 Wetland

Wetland mapping occurred during the vegetation community mapping; however, wetland classification was not determined at that time. Wetlands were delineated at a scale of 1:2,000.

Wetlands were characterized according to the Canadian Wetland Classification System (CWCS) into five classes: bog, fen, swamp, marsh, and shallow water wetlands (Table 4.5-4; National Wetlands Working Group 1997). If a wetland contained two or more wetland classes, the wetland was considered a complex and the wetland complex was assessed as one wetland but classified with the class of the dominant wetland classes. The goal was to target each wetland class within the LSA to collect data for each representative wetland classes and functions within the LSA.

Table 4.5-4: Canadian Wetland Classification System Classes

Wetland Class	Description
Bog	Peatland (accumulation of peat; greater than 40 cm in depth) which receives water exclusively from precipitation and the peat dominated by *Sphagnum*.
Fen	Peatland (accumulation of peat; greater than 40 cm in depth) which receives water, rich in dissolved minerals, from groundwater and precipitation and peat is usually dominated by brown mosses and graminoid species.
Marsh	Mineral soil wetland, a thin layer of muck or peat may be present (less than 40 cm in depth) and standing water may or may not be present. Vegetation is dominated by graminoids, forbs or emergent plants, some shrubs may be present (cover less than 25%).
Swamp	Mineral soil wetland, a thin layer of muck or peat may be present (less than 40 cm in depth) and standing water may or may not be present. Vegetation is dominated by woody species, shrub and / or tree (cover greater than 25%) taller than 1 m.
Shallow open water	Wetlands with surface water present for the majority or all year. Surface water that is less than 2 m deep and has less than 25% emergent vegetation or woody plants.
Complex	Wetlands with more than one wetland class, each class comprising of greater 25% of the wetland or greater than 1 ha, within the wetland.

Source: National Wetlands Working Group 1997

Two types of wetland field surveys were completed; a wetland assessment or a field verification.

Additionally, during the assessments and the verifications of the wetlands, wildlife observations including signs (i.e., scat, tracks, browse), potential habitats were noted. If a wildlife SAR was observed, the

location (UTM) and habitat was recorded. These observations were recorded in the digital mapping tool (ArcGIS Field Maps) to be used by the wildlife team.

Assessment

The wetland assessment were conducted to gather detailed information on the wetlands and their functions. The wetland assessment were completed on representative desktop mapped wetland and water communities, which were then used to compare, and refine the wetlands where field verification method was used. At representative wetlands, a detailed wetland assessment was conducted. The data collected at each wetland assessment point included photos of the wetlands, information on dominant species, hydrology, disturbances, wildlife use, soils, and wetland indicators to understand the baseline conditions of the landscape prior to changes associated with the Project (Table 4.5-4). A functional assessment was also completed on the wetlands (Table 4.5-5).

Verification

Field verification was used to complete a more rapid verification method to assess more of the desktop mapped wetlands in the LSA and were completed in areas where access was limited (remote site and variable helicopter landing sites available). Field verified wetlands were also used to confirm and refine the desktop mapped wetlands. Verification of wetland boundaries and classes occurred during the helicopter reconnaissance and the meandering rare plant transects. During the verification, general notes on dominant vegetation present, hydrology, disturbances, and representative photos were collected using the digital mapping tool (ArcGIS Field Maps). The wetland verification points were then used to compare to the wetland assessments to class the wetlands within the LSA.

Table 4.5-5: Data Collected at Wetlands Assessed within the LSA

Wetland Descriptor	Information Collected
General information	• Location (UTM) of the wetland assessment • Assessor • Date • Wetland Class • Representative photos • Notes on overall disturbances and surrounding landscape

Soils	• Soil composition (i.e., mineral or organic) of soil present within the majority of the wetland
	• If mineral soil was encountered soil texture and colour were determined, and any notes of gleying or mottling, oxidized rhizospheres, and hydrogen sulfide smell.
	• Disturbances to the soils and amount of exposed soils, if present
	• If organic soil was encountered determination of composition and the von Post scale of decomposition
	  ○ Fibric – undecomposed and still identifiable plant materials with a von Post scale of class 1 to 4 (Kroetsch et al. 2011)
	  ○ Mesic – weakly to strong decomposed with a von Post scale of class 5 to 6 (Kroetsch et al. 2011)
	  ○ Humic – strongly to completely decomposed with unrecognizable plant materials with a von Post scale of class 7 to 10 (Kroetsch et al. 2011)

Vegetation	• Relative cover of the dominant species within each stratum (i.e., tree, shrub, graminoid, lichen and moss)
	  ○ Cover of the tree and shrub stratum was determined using a 10 m^2 plot
	  ○ Cover of the graminoid, lichen and moss stratums within a 1 m^2 plot
	• Presence of invasive species, SOCC and / or SAR species
	• Disturbances to the vegetation

Hydrology	• Standing and / or open water cover and depth • Connectivity with other wetlands, open water and / or watercourses • Disturbances to the hydrology

Functional Assessment

The following guidance documents were used to create the wetland health assessment and functional assessment for the wetland present in the Project Area:

- Wetland Ecological Functions Assessment: An Overview of Approaches (Hanson et al 2008)
- Riparian Health Assessment for Lakes, Sloughs and Wetlands (Ambrose et al. 2009)
- Federal Policy on Wetland Conservation (Government of Canada 1991)
- Federal Policy on Wetland Conservation: Implementation Guide for Federal Land Managers (Environment Canada 1996)
- Manual for Wetland Ecosystem Services Protocol for Atlantic Canada (WESP-AC)

The *Wetland Ecological Functions Assessment: An Overview of Approaches* (Hanson et al 2008) outlines guidance and methods for assessing wetland functions (i.e., hydrology, habitat, biochemical) including outlining the data to be collected to assess the functions. For this Project a wetland function rapid assessment method was conducted on the wetlands during the field assessments within the LSA.

Based on the wetlands assessment conducted for the Project and based on the typical function of the different wetland classes provided in *Wetland Ecological Functions Assessment: An Overview of Approaches* (Hanson et al 2008), general wetland functions and the probability of the wetland providing the service was evaluated (Table 4.5-5). The following was considered when determining the function and the probability of the wetland providing the service:

- Surrounding land use types and existing disturbances
- Vegetation density (ability to slow downstream movement of water)
- Water storage and regulation
- Biodiversity
- Presence of SAR and / or SOCC or habitat suitability
- Habitat potential
- Landscape characteristics and integrity
- Hydrological connectivity (isolated vs complex, inlet, outlet)

The functional assessment's goal is to provide qualitative baseline conditions of the relative functions for the wetlands assessed within the LSA. The quantitative analysis of wetland function will provide a better understanding of the potential effects to wetlands as a result of the proposed Project. The functional assessments were based on the functions outline in Table 4.5-5.

Table 4.5-6: Wetland Function Assessments

Wetland Function	Data Collected
Hydrological	• Geomorphology of the wetland (i.e., depressional, riverine, lake fringe, extensive peatland, coastal marine) • Disturbance to hydrology (i.e., ditching, dams, culverts, diversion channels, water control structures) • Connectivity (isolated, complex, outlet, inlet) • Hydroperiod and hydrological indicators • Cover and depth of standing water • Direction of drainage
Habitat	• Presence or absence of invasive species, SOCC and / or SAR species • Habitat suitability, including standing and / or open water for amphibian, invertebrates, and waterfowl, shrubs and vegetation for forage for ungulates • Wildlife observations and evidence of wildlife use • Evidence of fish habitat • Dominant vegetation communities • Surrounding land cover and quality • Anthropogenic disturbances to the wetland • Vegetation diversity
Biochemical / Water Quality	• Potential nutrient and / or contaminant sources • Sediment Retention

Source: Hanson et al 2008, Government of Alberta 2015

4.5.3 Baseline Conditions

The Project is located in the Coastal Barrens Ecoregion of Labrador (Ecological Framework of Canada 1999). The ecoregion consists of sheltered inlets, islands, and coastal strips of exposed headlands from Napaktok Bay south to the Strait of Belle Isle. As this ecoregion is along the Atlantic Ocean, the climate is described as having an Atlantic low subarctic ecoclimate and is influenced by the ocean and has long cold winters and relatively short, cool, moist summers. The mean annual, summer, and winter temperatures are -3.5°C, 7°C, and -13.5°C, respectively. The mean annual precipitation ranges from 600 mm in the north to 800 m in the south of the ecoregion. On moist, sheltered upper and lower valley slopes, low open to closed spruce dominated forest with moss understories are common vegetation communities. Along headlands and ridges coastal heath vegetation communities dominate and on cliff summits, exposed bedrocks with mosses and lichens along small cracks and sheltered lee slopes are dominate. Wetlands are common in this ecoregion, on large marine terraces, salt marshes or plateau bogs area common, throughout the ecoregion scattered sizable peatlands are found (Ecological Framework of Canada 1999).

Vegetation Communities

The six vegetation community types (forest, barren, developed, wetlands, shrubland, and water) identified during preliminary mapping were confirmed and refined during the field program (Table 4.5-6). The Forest and Wetland habitat types were further split into subtypes based on dominant vegetation species and structure observed in the field. The LSA consists of 2% developed lands which are located within the first two kilometers of the access road which is located within the Nain townsite and the two existing quarries. The other vegetation communities are distributed throughout the LSA. The two dominate vegetation communities, closed black spruce/moss/lichen forest and the unvegetated/barrens/bare rock, cover approximately 67% of the LSA. Due to the sloping terrain along the access route between kilometer 3.5 to 5, the area is dominated by closed black spruce/moss/lichen forest, with little presence of wetlands. Of the vegetation communities observed in the LSA, the wetlands and the closed black spruce/moss/lichen forest had the highest floristic diversity (Appendix D1). Details of each vegetation community, along with total area within the LSA, are presented in Table 4.5-7. The vegetation communities identified within the LSA are shown on Figure 4.5-1.

The floristic list of the plant and lichen species observed within the LSA and the vegetation communities they were observed in is provided in Appendix D1. A total of 123 species of vascular plants, nonvascular

plants and lichens were identified during field surveys in the LSA. Of the 123 species, 92 are graminoid/forb species, 15 are tree/shrub species, 14 are moss or lichen species, and 2 are aquatic species.

Table 4.5-7: Observed Vegetation Communities

Vegetation Community	Description	Total Area (ha)	Proportion of LSA (%)	Number of Verifications	Number of Assessments
Unvegetated/barrens/ bare rock (BA)	Sparsely vegetated (<50% total cover) by lichen and/or ericaceous shrubs, largely devoid of trees (<20%), substrates consisting of bedrock or thin soil/organic matter over bedrock. Vascular plants are spares and restricted to small depressions, crevices or cracks. Includes cliff faces, barrens, and rocky outcrops. Typical plant and lichen species observed in this vegetation community are alpine bearberry (*Arctous alpina*), alpine bluegrass (*Poa alpina*), bog bilberry (*Vaccinium uliginosum*), boreal cup lichen (*Cladonia borealis*), easter foam lichen (*Stereocaulon paschale*), and fragile fern (*Cystopteris fragilis*).	205.75	33	12	1
Closed black spruce/moss/lichen forest (CF)	Predominantly black spruce (*Picea mariana*) forest with occasional balsam fir (*Abies balsamea*) and tamarack (*Larix laricina*). Canopy cover >50%. Understory composed of ericaceous shrubs and feather mosses/lichens which includes Arctic kidney lichen (*Nephroma arcticum*), Arctic raspberry (*Rubus arcticus*), bunchberry (*Cornus canadensis*), feather moss (*Hylocomium splendens*), knights plume moss (*Ptilium crista-castrensis*), and lesser pyrola (*Pyrola minor*).	207.82	34	8	6
Open tamarack/lichen forest (OF)	Predominantly tamarack forest with minimal canopy cover (<50%) and occasional black spruce. Understory mostly absent; ground cover consists mostly of Cladonia lichens. Typical ground cover consists of creeping snowberry (*Gaultheria hispidula*), easter foam lichen, Labrador lousewort (*Pedicularis labradorica*), mountain cranberry (*Vaccinium vitis-idaea*), reindeer cup lichen (*Cladonia rangiferina*), and star-tipped cup lichen (*Cladonia stellaris*).	63.35	10	12	2
Wetland (WL)	Areas influenced by a water table at, near or above the land surface and includes marshes,	110.14	18	See wetlands section	See wetlands section

	fens, bogs, and other shallow open water areas (government of Newfoundland and Labrador 2001). See Section 4.5.3.1 for further discussion on wetland communities.				
Deciduous shrubland (DS)	Untreed areas dominated by tall or short shrubs including green alder (*Alnus alnobetula*) and willows (*Salix* spp.*)*; may be sloped areas, but not associated with watercourses. Typical plant species observed in this vegetation community are alpine azalea (*Kalmia procumbens*), alpine bistort (*Bistorta vivipara*), alpine clubmoss (*Diphasiastrum alpinum*), glandular birch (*Betula glandulosa*), large-leaved goldenrod (*Solidago macrophylla*), and snowbed willow *(Salix herbacea*).	9.91	2	1	0
Riparian (RI)	Mostly shrubby areas adjacent to watercourses, which are influenced by the watercourse.	0.79	<1	2	1
Water (WA)	Open water; lentic or lotic, mostly consisting of watercourses, Blowhole Pond, and larger open water within wetlands.	5.35	1	See wetlands section	See wetlands section
Developed (DE)	Cleared and/or previously anthropogenically - disturbed areas. This includes roads, the community of Nain, and quarries.	15.40	2	1	0
Total		**618.50**	**100**	**36**	**10**

Assessments

A total of 10 vegetation community assessments were conducted. Assessments occurred at representative vegetation communities within the LSA during the helicopter reconnaissance, wetland assessments and verifications, and during rare plant meander surveys. A total of 10 vegetation community assessments were completed within the LSA (Table 4.5-7).

Verifications

Verifications were completed during the field program within the LSA at representative locations of all the vegetation community types. Verification occurred at representative vegetation communities within the LSA during the helicopter reconnaissance, wetland assessments and verifications, and during rare plant meander surveys. A total of 36 verifications were completed on the vegetation communities (Table 4.5-7).

4.5.3.1 Wetland

As a component of the vegetation communities, 2% of the habitat within the LSA was determined to be wetlands during the mapping exercise. After the field program, the portion of the vegetation communities classified as wetland is approximately 18% of the LSA.

A total of 60 wetlands, with a total area of 110.14 ha, were identified within the LSA, of these wetlands a total of 35 (58%) wetlands were either verified or assessed within the LSA during the field surveys conducted from July 25 to 29, 2023 and September 26 to 30, 2023. Of the 35 wetlands, 9 wetlands were field verified and 26 wetlands were assessed for a total of 58% of the wetlands were either assessed during the field surveys or were field verified during the helicopter reconnaissance, 43% and 15%

respectively. At each wetland assessed in the field, a wetland form and functional form were completed for the wetland, including one per wetland complex. The complete list of plant and lichen species observed in the wetland vegetation communities is provided in Appendix D1.

The dominant wetland classes within the LSA is fens and fen complexes comprising approximately 96% of the wetlands within the LSA. A breakdown of wetland class, number and area of the wetland class within the is provided in Table 4.5-8.

Table 4.5-8: Wetland Classes and Area (ha) Within the LSA

Wetland Class	Description	Number of Wetlands	Wetland Area in LSA (ha)	Percentage of Wetlands in LSA (%)
Complex: Fen and bog	These wetlands had portions of fen and bogs scattered throughout or in clusters within the wetlands. See descriptions below for fen and bog	3	50.08	45
Fen	Fens located within the LSA were either open or treed fens. Treed fens were dominated by black spruce and tamarack in the overstory with some birch and willow species in the understory and the graminoid and forb layer was dominated by sedges, including water and star sedge, russet conttongrass, and tufted clubrush. The ground layer was dominated by mosses, bog bilberry, bog rosemary, and creeping snowberry. Standing water was usually present and the moss layer was saturated. Open fens were dominated by sedges, including water and star sedge, russet conttongrass, and tufted clubrush with less than 10% of tamarack and black spruce. The ground layer was dominated by mosses, bog bilberry, bog rosemary, and creeping snowberry. Standing water was usually present and the moss layer was saturated.	32	27.41	25
Complex: Fen and marsh	These wetlands had portions of fens with pockets of marsh present. See descriptions of fen and marsh for more details.	2	17.03	15
Complex: Fen, bog, marsh	These wetlands had portions of fens and bogs with pockets of marsh present. See descriptions of fen and bog, and marsh for more details.	1	6.01	5
Complex: Fen, bog, open water	These wetlands had portions of fen and bogs, with open water areas scattered throughout or in clusters within the wetlands.	1	4.76	4
Bog	Bogs located within the LSA were either open bogs or treed bogs. Treed bogs were dominated by black spruces and lesser amounts of tamarack in the overstory, with Labrador tea and birch in the understory. Cottongrass with lesser amounts of sedge were present. Sphagnum moss with ericaceous shrubs including creeping snowberry, bilberries were dominate.	11	2.87	3
Marsh	Marshes located within the LSA were dominated by sedges, including water sedge, brown-fruited rush and tufted clubrush. Soils encountered were silty sandy loam or more sandy dominated soils due to the presence of the exposed bedrock.	6	1.11	1
Complex: Marsh and open water	These wetlands are marsh with open water areas within the wetland.	4	0.87	1
Totals		60	110.14	100

Of the wetlands that were visited during the field surveys, three of the 60 wetlands (5% of the wetlands visited) have been anthropogenically impacted. WL08 has been impacted by the development of the quarries in the Nain townsite, WL26 has been impacted by boreholes and the snowmobile trails, and WL 33 has been impacted by the road to the existing Nain quarries. See Appendix D2 for the summary of the functional assessment for the wetlands within the LSA.

4.5.3.2 Rare Plants

There are 29 plant and lichen SAR that are known to occur in Newfoundland and Labrador (SARA, NL SAR). There are no records of plant or lichen SAR within 50 km of the Project Area. These SAR, their habitat requirements, and the nearest known occurrence of each to the Project Area are summarized in Appendix D3.

Of the 354 plant SOCC in Labrador, two were previously reported within 5 km of the Project (ACCDC 2022). Mountain Sandwort (*Mononeuria groenlandica*) and Scheuchzer's Cottongrass (*Eriophorum scheuchzeri*) were both previously observed near the Nain townsite. Given the relative scarcity of information for the Nain region, the Project Area will be assessed in further detail to search for indicative habitat types for SAR/SOCC and a rare plant survey will be a component of the field program. This information was used to scope the field program described in Section 4.5.2.

A total of 123 species of vascular plants, nonvascular plants and lichens were identified during field surveys in the LSA. Of these, twelve species are SOCC, listed as rare to uncommon by the ACCDC (S1 to S3S4). These are summarized in Table 4.5-9 and shown on Figure 4.5-1. No plant or lichen SAR were observed. No exotic or invasive species were observed. A full inventory of all plant and lichen species observed during surveys is presented in Appendix D1.

Table 4.5-9: Rare Plant Species Observed in the LSA

Common Name	Scientific Name	Rank	SAR or SOCC	Number of Known Occurrences
Alpine Pondweed	*Potamogeton alpinus*	S2S4	SOCC	1
Elephant's-head Lousewort	*Pedicularis groenlandicum*	S3S4	SOCC	3
Fragile Fern	*Cystopteris fragilis*	S3S4	SOCC	1
Hairy Butterwort	*Pinguicula villosa*	S2S3	SOCC	4
Hooded Ladies'-tresses	*Spiranthes romanzoffiana*	S3S4	SOCC	3
Moor Rush	*Juncus stygius*	S3S4	SOCC	1
Mountain Sandwort	*Mononeuria groenlandica*	S3S4	SOCC	2
Multi-rayed Goldenrod	*Solidago multiradiata*	S3S4	SOCC	2
Northern Bog Sedge	*Carex gynocrates*	S3S4	SOCC	1
Scheuchzer's Cottongrass	*Eriophorum scheuchzeri*	S3S4	SOCC	2
Slender Pondweed	*Potamogeton pusillus*	S2S3	SOCC	1
Small Burreed	*Sparganium natans*	S2S4	SOCC	1

Source: ACCDC 2023

4.6 Wildlife and Migratory Birds

This section will summarize the existing wildlife and wildlife habitat baseline conditions within the established study areas by compiling the results of an existing desktop assessment (Aivek Stantec 2022), review of additional or updated information sources, field assessment, land use and vegetation mapping and Inuit knowledge from in-person consultation to be completed in 2024. The baseline conditions will provide a detailed discussion of wildlife valued components (VCs), SAR and SOCC.

4.6.1 Study Area

Spatial boundaries for characterizing wildlife and migratory bird conditions are described in Table 4.6-1 and Figure 4.6-1.

Table 4.6-1: Wildlife and Migratory Birds Spatial Boundaries

Study Area	Description	Rationale
Project Area	The footprint of the runway, airport, access road, rock borrow areas, construction staging area, temporary access road, and associated infrastructure.	Represents area of direct disturbance to vegetation and wetlands created by the Project.
Local Study Area (LSA)	The Project Area plus a 100 m buffer.	The LSA delineates areas that may be directly affected by the Project development including sensory effects and zones of influence for species with small home ranges.
Regional Study Area (RSA)	The Project Area plus a 1,000 m buffer.	The RSA delineates areas where Project effects may affect wide ranging species (e.g., birds of prey), indirectly affect a resource or affect resources in combination with other existing and planned projects or land uses

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Project Component
- Access Road
- Temporary Access Road
- Airport Footprint
- Runway

Study Area
- Regional Study Area (RSA)
- Local Study Area (LSA)

Hydrography
- Watercourse

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Figure 4.6-1

Wildlife Study Area Boundaries

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4.6.2 Methods

4.6.2.1 Desktop Assessment

Information collected for the baseline was obtained from reviews of published and unpublished scientific literature, government publications and databases; experience gained from inputs from Indigenous groups and stakeholders from comparable projects in the region, existing publicly available traditional land use (TLU) information, experience gained during previous projects with similar biophysical and socio-economic conditions, environmental assessment reports and regulatory applications for other projects in the area, and Project-specific field programs. Information sources on species occurrence reviewed include:

- Provincial or federal data sources (e.g., provincial wetland and forest inventories)
- Available aerial imagery
- Canadian Wildlife Service databases
- Atlantic Canada Conservation Data Centre (AC CDC)
- Newfoundland and Labrador Wildlife Division databases
- Online data obtained from Birds Canada NatureCounts
- Previous Environmental Assessments (EA) in the region and supporting documents
- Cornell University/Audubon Society databases
- Applicable regulatory guidance.

Together, these sources contain the vast majority of existing information on wildlife distribution and abundance including observations of species important to the Inuit, SAR and SOCC as defined by SARA and Newfoundland and Labrador *Endangered Species Act* (NL ESA).

The desktop information combined with the land cover classification mapping (Section 4.5) was used to identify the variety of habitats for wildlife and any potential habitats for species important to the Inuit, SAR, and SOCC that may potentially occur in the area. This information is incorporated into the baseline conditions and used to inform the effects assessment.

4.6.2.2 Field Surveys

Four wildlife field programs were completed for the assessment in 2022 and 2023:

- Spring and fall bird migration surveys in early June and late September, 2023
- Summer avian/SAR/terrestrial wildlife survey in early July, 2023
- Avian autonomous recording unit (ARU) survey in spring/summer 2022
- Bat Acoustic Survey in summer of 2022 and 2023

4.6.2.3 Spring and Fall Bird Migration Surveys

The Project is situated within the Atlantic Migratory Bird Flyway (Environment Canada 2014; Notzl, Greene, & Riley 2013). Migration pathways vary by bird guild and species, and they are affected by the presence of important habitat for each species. Some areas and habitats, such as large lakes and coastlines, may attract large numbers of migrating birds. Two Important Bird Areas (IBA) are located over 15 km east of the Project (IBA Canada 2024). These IBA's provide habitat for large numbers of waterfowl and seabirds. Although these IBA's are not near the Project, migratory birds using these IBA's may pass through the wildlife RSA during spring and fall migration. Airports present a risk to migrating birds during spring and fall when large numbers of birds may pass through specific areas.

The spring and fall migratory bird surveys were designed to determine if the LSA is within an important flyway or staging area for migrating birds including waterfowl, shorebirds, other water birds and raptors. The surveys incorporated methods and guidelines adapted from the Alberta Bird Migration Survey Protocol (GoA 2020) as the methods are applicable to the objectives of this assessment and there are no

specific protocols for bird migration surveys from the federal or provincial government. This protocol was developed to systematically obtain information on bird migration to assist in the evaluation of potential effects of proposed wind energy projects on migrating birds. The methods consisted of 20-minute point counts distributed across the LSA at locations with a wide view for visual scanning and areas with potential key stopover habitats. As the LSA is remote with no access, survey sites were also based on areas where a helicopter could land. A total of 18 bird migration points were surveyed during the spring and fall migration periods (Figure 4.6-2). The survey period was based on professional experience of biologists working on the Project and from information provided by Nunatsiavut Government biologists for another project in northern Labrador. Indigenous information on timing of surveys was not available in 2023 when surveys were conducted. Indigenous consultation is expected to be completed in 2024. The same bird migration points were surveyed 2 and 3 June, 2023 and 26 to 28 September, 2023.

During the 20-minute survey, all birds were recorded to the lowest taxonomic category (e.g., species, family) within defined distance classes: within 400 m of the surveyor, between 400 m to 800 m, or beyond 800 m. For each observation, the number of observed individuals, species and size of flock (e.g., > 2 birds of the same species) was documented. For flocks, a total count of individuals was taken if possible. For large moving flocks, block counting was used to estimate flock size. A block count includes an estimate of a flock size based on a smaller proportion or “block” such as 10, 20, 50, or 100 birds. Cardinal direction from the observer, direction of flight and behaviour were noted. Bird migration surveys were summarized as the number of individuals observed by species, survey station and season (spring and fall). The information obtained was analyzed for the birds observed per minute for each species guild (passerines, birds of prey, grouse and allies, shorebirds/waterbirds, and others [crow, raven].

In addition to the bird migration surveys, incidental wildlife observations were recorded during helicopter flights between survey points and between Nain and the LSA and RSA. The coastline between Nain and the southwest portion of the LSA was flown at least once during each bird migration survey and the summer avian survey. The objective was to identify concentrations of birds or species at risk along the coastline in the area.

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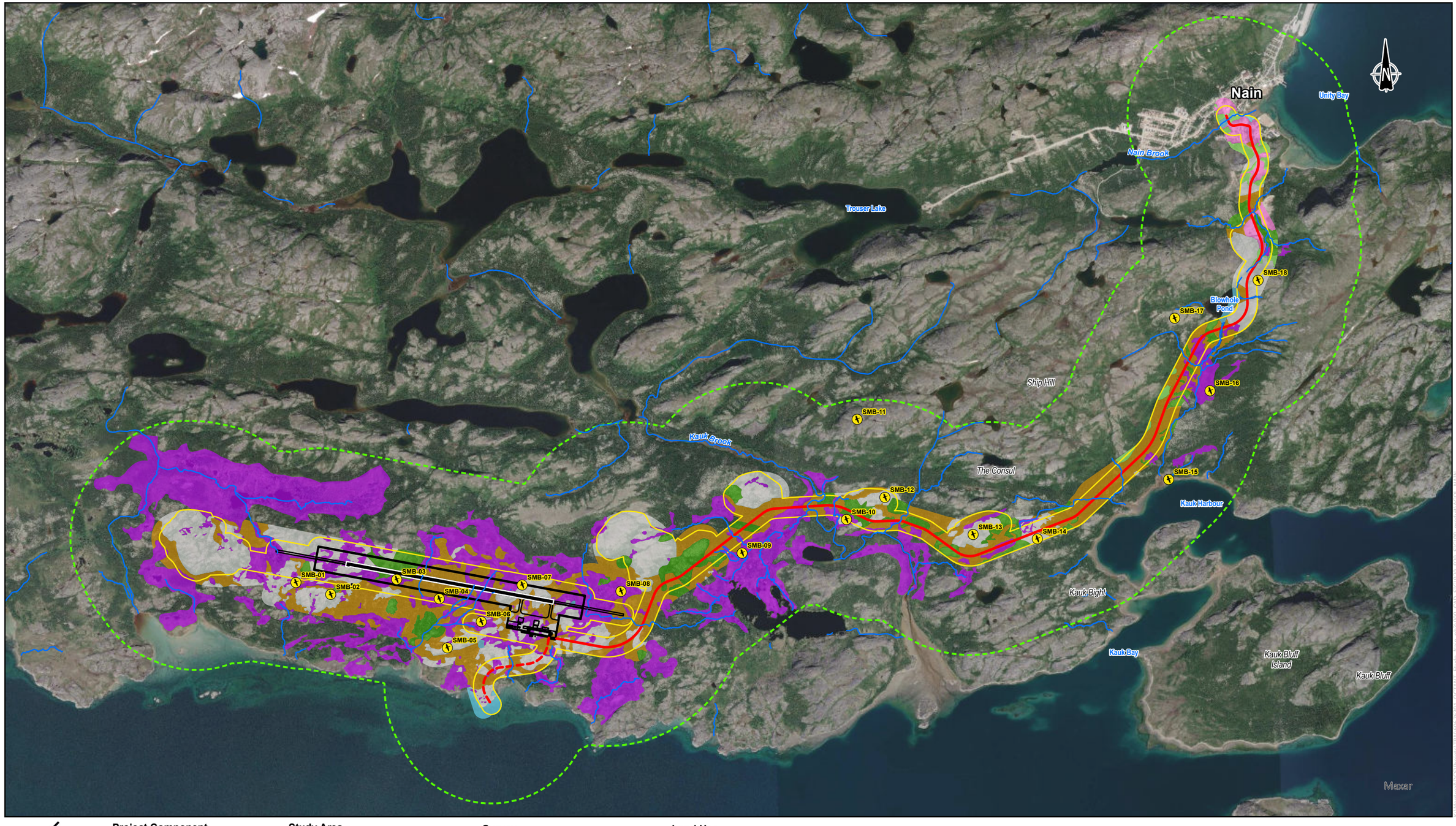

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EXPERTS EN SOLUTIONS POUR L'AVIATION

Project Component
- Access Road
- Temporary Access Road
- Airport Footprint
- Runway

Study Area
- Regional Study Area (RSA)
- Local Study Area (LSA)

Hydrography
- Watercourse

Survey
- Bird Migration Survey Point

Land Use
- Closed Black Spruce/Moss/Lichen Forest
- Deciduous Shrubland
- Developed
- Open Tamarack/Lichen Forest
- Riparian
- Shrubland
- Unvegetated/Barrens/BareRock
- Water
- Wetland

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Figure 4.6-2
Summer and Fall Bird Migration Survey Points

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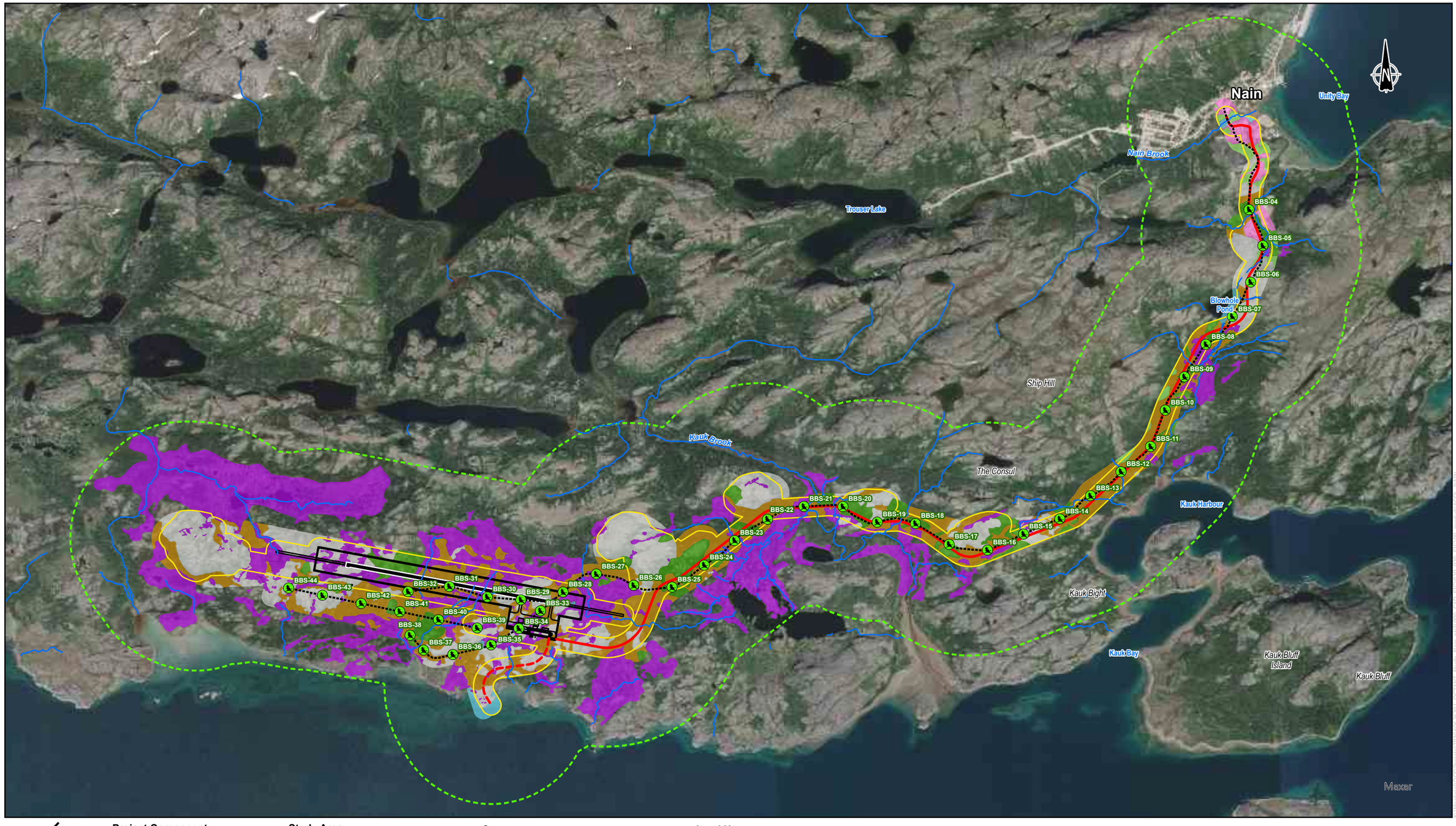
4.6.2.4 Summer Avian/SAR/Terrestrial Wildlife Survey

The summer avian/SAR/terrestrial wildlife survey was designed to obtain information primarily on birds during the breeding season and to collect incidental information on SAR and other wildlife groups. This survey provides information to supplement baseline information on birds and mammals in the LSA and RSA.

The survey was conducted from July 2 to July 7, 2023, which is within the optimal survey period for songbirds in this region (June 15 to July 15) based on professional experience and feedback from the Canadian Wildlife Service. The survey employed a combination of points counts and transects. A transect was established along the centreline of the entire proposed access road alternatives and through the centre of the airport infrastructure footprint (Figure 4.6-3). A total of 41 breeding bird point counts were established every 400 m along the transects (Figure 4.6-3). The transects and points covered a broad representation of habitat of both the airport footprint and access road. The transect was walked at a steady pace and point counts consisted of a 5-minute survey period preceded by a 2-minute quiet period to allow for the observer's disturbance to subside. The methods employed are adapted from various Tailored Impact Statement Guidelines and other EIS baseline assessments and are specific to this assessment. ECCC recommends completing two years of breeding bird surveys; however, the survey covered the entire proposed footprint, and the data provides adequate information to characterize baseline breeding bird conditions within the study areas. This is supported by professional experience and historical assessments completed for federally and provincially regulated impact assessments. The data obtained provides sufficient information to inform mitigation strategies and the impact statement. An additional year of bird surveys is not likely to significantly increase the number of species observed and importantly, any additional species observed is unlikely to change the mitigation to be implemented or change the conclusions of the EIS. The breeding bird survey data is also supplemented by ARU data obtained in 2022 (Section 4.6.2.5) and data obtain from Birds Canada NatureCounts.

The summer avian survey focussed on birds; however, other wildlife species detected were recorded as part of the terrestrial wildlife survey. The transects were walked in portions and the distance covered each day depended on factors such as the terrain, density of vegetation cover and the occurrence of species important to the Inuit, SAR and SOCC which needed to be documented. Transects were completed from approximately sunrise to between 10 am and 11 am each day, depending on helicopter flight restrictions and bird singing activity. On some days, birds were actively singing beyond 10 am. Given the remote nature of the LSA and lack of access, biologists were dropped off at the start point of the daily transect by helicopter and picked up upon completion each day. Birds were identified by sight and sound and mapped along the transect in 100 m segments. At point counts, birds were recorded at three distance categories: 0 m to 50 m, 50 m to 100 m and beyond 100 m and the cardinal direction was noted. Distances and direction were not recorded for birds observed on transects. Information such as species, sex, number, behaviour, were also recorded.

Observations of other wildlife species or sign not targeted by the breeding bird survey (e.g., raptors, caribou, bears) were collected and recorded incidentally during the survey as well as during helicopter flights at the start and end of the day. Observations of SAR and SOCC were recorded with a GPS reference and notes on habitat were obtained. A list of wildlife species recorded incidentally is reported in Appendix E.



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Project Component
- Access Road
- Temporary Access Road
- Runway
- Airport Footprint

Study Area
- Regional Study Area (RSA)
- Local Study Area (LSA)

Hydrography
- Watercourse

Survey
- Breeding Bird Survey Point
- Breeding Bird Survey Transect

Land Use
- Closed Black Spruce/Moss/Lichen Forest
- Deciduous Shrubland
- Developed
- Open Tamarack/Lichen Forest
- Riparian
- Shrubland
- Unvegetated/Barrens/Bare Rock
- Water
- Wetland

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Figure 4.6-3

Breeding Bird Survey Points and Transect Location

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Breeding bird surveys were summarized into breeding density calculated as the number of breeding territories per 100 ha. All survey records were reviewed to determine if they should be included in density calculations. Indicators of territoriality included:

- male singing or performing a territorial display
- female incubating, carrying food or performing a distraction display
- adult of either sex carrying food or fecal sac, building or entering a nest, displaying agitation and giving anxiety calls
- active nest (eggs or young), even if neither adult is present

If multiple individuals of a species were recorded at a survey station, total territories were calculated as the number of territorial males or if a sex is unknown, as half of the total number of adults observed.

For the purposes of this report, species abundance is the number of individuals detected and species richness is the number of species detected.

4.6.2.5 Avian ARU Survey

An ARU survey was completed during summer of 2022 to obtain preliminary information on bird and amphibian species presence in the LSA. Two ARUs were deployed in the LSA, one at the north end of the proposed access road (1D) and a second (3C) near the proposed airport site (Figure 4.6-4). However, ARU 1D malfunctioned and no data was obtained. ARU 3C was a Wildlife Acoustics Songmeter that recorded from 20 June, 2022 until 16 July, 2022. The ARU was set for the following recording program:

- Recording started 1 hour before sunset to one hour after sunset (as determined by the UTC offset and coordinate)
- Recording from midnight until 2 am
- Recording from 1 hour before sunrise to 3 hours after sunrise

ARU 3C was placed in a black spruce forest adjacent to areas of open black spruce, open tamarack and lichen, areas of bare rock and approximately 200 m from a water body. These areas would be suitable nesting and foraging habitat for the common nighthawk if present in the study area. The ARU survey supplements the bird survey with an additional year of breeding bird data and includes information over a longer time period from 20 June, 2022 to 16 July, 2022. The ARU data provides overall species presence at that site. An advanced classifier for the common nighthawk was developed from existing data for another project and was used to search recordings for common nighthawk using Kaleidoscope Pro Analysis Software by Wildlife Acoustics (Maynard, Massachusetts).

4.6.2.6 Bat Acoustic Survey

Bat acoustic surveys were conducted in the LSA to:

- Compile a bat species inventory (species present/not detected);
- Confirm presence in habitats identified during a desktop review;
- Document bat activity at potential maternity areas, foraging areas, travel and movement corridors, and hibernacula (if present),
- Quantify bat activity by habitat type to inform Project siting.

Bat species presence, distribution and relative abundance within and among seasons was determined through bat acoustic surveys. A desktop review of aerial imagery informed the location of a target maternity roost site near cliff faces in the eastern portion of the LSA. No potential hibernacula were identified in the LSA during various surveys conducted for the Project. A bat expert oversaw the study design and adjusted the sites in the field to be near potential foraging areas and a corridor for bat travel and movement.

Anabat Swift Passive Detectors (Titley Scientific, Queensland, Australia) and omni-directional ultrasonic microphones (Model US-O V3) were used for bat acoustic surveys. The bat detectors are sensitive up to

250 kilohertz (kHz) frequency with a sampling rate of 22 to 500 kilo samples per second (ksps). The ultrasonic microphones are sensitive from 10 to 140 kHz.

Two bat detectors were deployed in foraging habitats (i.e., adjacent to wetlands, open water bodies) in the LSA in 2022 on June 20 (Table 4.6-2; Figure 4.6-4) and collected at the end of September, 2022. A total of six bat detectors were deployed in the LSA on June 4, 2023, near one potential maternity roost site, near four potential foraging areas, and near one travel and movement corridor (Table 4.6-2; Figure 4.6-4). The general condition and battery life of bat detectors were checked from July 4 to 6, 2023 and the detectors were collected September 25 to 30 2023.

Table 4.6-2: General Information About Bat Detectors

Bat Detector	Easting[1]	Northing	General Habitat	Microsite
1D	579867	6264509	Wetland habitat consisting of scattered trees, shrubs graminoid habitat (possible foraging area)	Not available
3C	574926	6262450	Black spruce/moss/lichen forest (possible roost area)	Not available
1	571523	6261949	Next to a graminoid fen with two large pools of open water (possible foraging area)	Attached to a tamarack at 2 m height on the north side of the fen with the microphone facing southeast to open water
2	572532	6261843	Next to a graminoid fen with two large pools of open water (possible foraging area)	Attached to a tamarack at 2 m height on the west side of the fen with the microphone facing east to open water
3	575110	6262134	Next to a fen complex with a very large pool of open water (possible foraging area)	Attached to a tamarack at 2 m height on the west side of the fen with the microphone facing east to open water
4	577599	6263234	Next to a graminoid fen in a long narrow valley between two cliff faces (possible roost site)	Attached to a tamarack at 2 m height on the west side of the fen with the microphone facing east to open water
5	577037	6262477	Along the side of a graminoid fen next to a large watercourse (possible movement corridor)	Attached to a tamarack at 2 m height among a forest stand on the north side of the fen with the microphone facing northeast to the watercourse
6	579935	6265078	Next to a large waterbody (possible foraging area)	Attached to a tamarack at 2 m height on the west side of the fen with the microphone facing east to open water

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Project Component
- Access Road
- Temporary Access Road
- Airport Footprint
- Runway

Study Area
- Regional Study Area (RSA)
- Local Study Area (LSA)

Hydrography
- Watercourse

Survey
- 2023 Bat Detector Location
- 2022 Bat Detector/ARU Location

Land Use
- Closed Black Spruce/Moss/Lichen Forest
- Deciduous Shrubland
- Developed
- Open Tamarack/Lichen Forest
- Riparian
- Shrubland
- Unvegetated/Barrens/Bare Rock
- Water
- Wetland

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Figure 4.6-4

Location of 2022 and 2023 ARUs and Bat Detectors

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The Québec standardized protocol (MELCCFP 2023) was used as a reference as the methods are applicable to the objectives of this Project. There are no specific protocols for bats from the federal or provincial government. Following the Québec standardized protocol (MELCCFP 2023), bat detectors were programmed to begin recording 30 minutes after sunset (dusk) and record until 30 minutes before sunrise (dawn) during the breeding period between June 15 and August 14, 2023 and during fall migration between August 15 and September 25, 2023 (MELCCFP 2023).

The data analysis was modified from the Québec standardized protocol (MELCCFP 2023) due to the limited number of bat detections. All the data from deployment to take down was analyzed instead of subdividing the two sampling periods and randomly analyzing a minimum of 40 hours over at least five days for each of the four sampling periods. The objective of this approach was to maximize detection of SAR bats. Weather was verified at the Nain weather station (ECCC 2024) to meet a minimum temperature of 5°C. Historical data about wind speeds and precipitation was absent from this weather station.

A bat pass was defined as any ultrasonic scream recorded by the bat detector within 15 seconds (MELCCFP 2023). For the bat pass to be associated with a species, there were at least three ultrasonic screams of the same species within 15 seconds with each scream not more than 5 seconds apart, otherwise the ultrasonic scream was classified as an unidentified bat species. A bat expert trained in acoustic analysis used the Kaleidoscope Pro Analysis Software to automatically identify bat ultrasonic screams by species. A minimum of 30% of the bat ultrasonic screams were manually verified prioritizing bat SAR species.

Data was summarized by bat species and survey station as the number of bat passes per night (total and average) for each survey period (breeding, fall migration).

4.6.2.7 Valued Component Selection and Assessment

Valued components (VCs) were selected to be representative of broader groups of wildlife, since it is not feasible to assess every environmental or ecological parameter relative to wildlife.

VCs are identified with consideration from Indigenous communities, federal, provincial, territorial, or municipal authorities or entities, and the public. The following are criteria that were used to select wildlife VCs:

- VC presence in the LSA and RSA
- The extent to which the VC is linked to the interests or exercise of Aboriginal and Treaty Rights of Indigenous peoples, and whether an Indigenous group has requested the VC
- The extent to which the effects (real or perceived) of the Project and related activities have the potential to interact with the VC
- The extent to which the VC may be under cumulative stress from other past, existing or future undertakings in combination with other human activities and natural processes
- The extent to which the VC is linked to federal, provincial, territorial or municipal government priorities (e.g., legislation, programs, policies)
- The possibility that adverse or positive effects on the VC would be of particular concern to Indigenous groups, the public, or federal, provincial, territorial, municipal, or Indigenous governments
- Whether the potential effects of the Project on the VC can be measured and / or monitored or would be better ascertained through the analysis of a proxy VC

Based on the above criteria, the list of VCs include:

- Red-necked Phalarope
- Peregrine Falcon
- Short-eared owl
- Spruce Grouse

- Rusty blackbird
- Gray-cheeked thrush
- Little brown myotis
- Northern myotis
- Polar bear
- Eastern Migratory Caribou

The list of VCs includes federally listed species at risk and culturally important species (e.g., species that have significant value to the Inuit). However, four species meeting these criteria with the potential to occur in the region were not included as VCs. Willow and rock ptarmigan, Barrow's goldeneye and harlequin duck were not included as these species were not observed in the LSA or RSA during surveys conducted in 2022 and 2023 and habitat is limited for the two SAR, reducing the potential for them to occur interact with the Project.

The baseline conditions include a discussion on the habitat requirements of each wildlife VC including sensitive habitats or key wildlife features and a discussion on the species presence or potential presence within the study areas. The baseline assessment used the baseline vegetation information to describe the availability of habitat within the study areas.

4.6.3 Baseline Conditions

4.6.3.1 Field Surveys

4.6.3.1.1 Spring and Fall Bird Migration Surveys

The fall migration survey had a higher number of observations per minute than spring migration (Table 4.6-3). Only four guilds were observed during spring migration while six guilds were observed during fall migration. Passerines had the highest number of observations per minute during spring and fall migration. The others guild (Canada jay and common raven) had the second highest observations per minute during spring migration. The shorebirds had the second highest observations per minute during fall migration.

Table 4.6-3: Spring and Fall Migration Observations per Minute by Guild

Guild	Spring Migration	Fall Migration
Birds of prey	0.0056	0.0139
Grouse and allies	0.0000	0.0028
Others	0.2500	0.0556
Passerines	0.4611	0.4306
Shorebirds and waterbirds	0.0056	0.2556
Waterfowl	0.0000	0.0583
Total	0.4972	0.8167

Spring migration had greater species richness (24 species) compared to fall migration (17 species), but fall migration had higher species abundance (294 individuals) compared to spring migration (179 individuals) (Table 4.6-4). The difference in the number of individuals is primarily due to differences in flock size with no flocks larger than six individuals observed during spring migration and 10 flocks larger than six individuals (range of 6 to 50 individuals) observed during fall migration. Overall, the detection rate during spring and fall migration was quite low compared to other areas as detection rates, total numbers of birds and flock sizes were low. A large number of male songbirds observed were singing during spring migration surveys which may indicate these species had initiated breeding territorial displays in the LSA and RSA.

Table 4.6-4: Spring and Fall Migration Observations by Species

Common Name	Spring Migration	Fall Migration
American pipit	3	0
American robin	24	33
American tree sparrow	1	0
Blackpoll warbler	1	0
Boreal chickadee	0	4
Canada goose	0	18
Canada jay	6	8
Common loon	0	2
Common raven	3	12
Common redpoll	24	101
Dark-eyed junco	12	0
Fox sparrow	17	0
Gull species	0	85
Hawk species	0	1
Hermit thrush	1	0
Herring gull	0	6
Iceland gull	0	1
Killdeer	1	0
Lincoln’s sparrow	4	0
Mallard	0	1
Merlin	1	0
Northern hawk owl	1	0
Northern shrike	0	1
Northern waterthrush	5	0
Peregrine falcon	0	2
Pine grosbeak	5	16
Rough-legged hawk	0	2
Ruby-crowned kinglet	20	0
Savannah sparrow	1	0
Snow bunting	1	0
Spruce grouse	0	1
White-crowned sparrow	6	0
Wilson’s snipe	1	0
White-winged crossbill	13	0
Yellow-rumped warbler	26	0
Total	**179**	**294**

The spatial distribution of bird species in the RSA varied slightly between spring and fall migration. During spring migration, the highest number of observations per survey station were at the central portion of the RSA (survey stations 10, 12, 13, and 14) and at the western portion of the RSA (survey stations 1, 3, 4, and 5) (Table 4.6-5). During fall migration, the highest number of observations per survey station shifted slightly to the eastern (survey station 1, 2, and 3) and western portions (survey stations 15 and 17) of the RSA and to a site selected outside of the RSA (survey station 18) (Table 4.6-5).

Table 4.6-5: Spring and Fall Bird Observations by Survey Station

Survey Station	Habitat	Spring	Fall
1	Barren surrounded by coniferous forest and graminoid fen	18	34
2	Barren surrounded by coniferous forest	9	58
3	Graminoid fen surrounded by coniferous forest	10	24
4	Graminoid fen surrounded by coniferous forest	13	5
5	Barren surrounded by coniferous forest	10	17
6	Shrubby barren surrounded by graminoid fen	7	2
7	Shrubby fen next to graminoid fen and coniferous forest	9	5
8	Barren next to graminoid fen and coniferous forest	9	1
9	Graminoid fen next to coniferous forest	6	5
10	Barren surrounded by coniferous forest and graminoid fen	17	9
11	Barren next to coniferous forest and graminoid fen	8	1
12	Barren surrounded by coniferous forest	10	6
13	Barren surrounded by coniferous forest	11	7
14	Barren surrounded by coniferous forest and graminoid fen	12	6
15	Rocky beach	8	28
16	Shrubland	7	6
17	Shrubby barren	7	25
18	Barren	8	55

Only one SAR, the peregrine falcon (*Falco peregrinus anatum* - provincially Vulnerable, federally not at risk), was observed during bird migration surveys (Figure 4.6-5). There were no peregrine falcons observed during the summer avian survey and during helicopter flights near potential breeding sites on cliff faces suggesting that the species is not breeding in the LSA or RSA.

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NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION

Project Component
- Access Road
- Temporary Access Road
- Airport Footprint
- Runway

Study Area
- Regional Study Area (RSA)
- Local Study Area (LSA)

Species at Risk and Valued Components
- x—Number of individual: Gray-cheeked Thrush
- x—Number of individual: Peregrine Falcon
- x—Number of individual: Rusty Blackbird
- x—Number of individual: Woodland Caribou
- x—Number of screams: Little Brown Myotis
- x—Number of screams: Northern Myotis

Hydrography
- Watercourse

1:37 000

0 250 500 m

NAD 1983 UTM Zone 20N

2024-05-09 08:55

Figure 4.6-5

Species at Risk and Valued Components observed or detected in 2022 and 2023

OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

AECOM

4.6.3.1.2 Summer Avian/SAR/Terrestrial Wildlife Surveys

A total of 227 individual birds (species abundance) of 26 species (species richness) was observed during the breeding bird survey. The yellow-rumped warbler had the highest breeding density followed by ruby-crowned kinglet, dark-eyed junco and fox sparrow (Table 4.6-6). The Shannon-Weiner Diversity Index was 2.54.

Table 4.6-6: Species Density During Breeding Bird Surveys

Common Name	Density (# of territories/100 ha)
American robin	12.4
Black-backed woodpecker	1.6
Blackpoll warbler	3.1
Boreal chickadee	3.5
Canada jay	5.0
Common raven	1.2
Common redpoll	0.4
Dark-eyed junco	25.2
Fox sparrow	21.0
Gray-cheeked thrush	0.8
Hermit thrush	0.8
Lincoln's sparrow	5.0
Northern waterthrush	6.2
Orange-crowned warbler	0.8
Pine grosbeak	8.5
Ruby-crowned kinglet	27.2
Rusty blackbird	0.8
Spruce grouse	0.8
Swainson's thrush	1.6
Tennessee warbler	5.4
White-crowned sparrow	7.0
White-winged crossbill	0.8
Wilson's warbler	1.6
Winter wren	0.8
Yellow-bellied flycatcher	0.8
Yellow-rumped warbler	34.2

Three avian VC's were observed during breeding bird surveys: the gray-cheeked thrush (*Catharus minimus aliciae,* not at risk provincially and federally), the rusty blackbird (federally Special Concern and Vulnerable provincially) and spruce grouse. The gray cheeked thrush was observed at survey station 7 in open coniferous habitat (Figure 4.6-5). The rusty blackbird was observed at survey station 22, incidentally at station 15, and at ARU3 while checking ARU status. All three rusty blackbirds were observed in marsh/fen type habitat, typical for the rusty blackbird (Figure 4.6-5). The spruce grouse was observed in coniferous forest habitat.

4.6.3.1.3 Autonomous Recording Unit (ARU) Survey

A total of 27 bird species were detected at ARU 3C during June and July, 2022 (Table 4.6-7). The most common vocalizations from the Kaleidoscope cluster analysis were of the American robin followed by the common redpoll. Two VC's were detected including the gray-cheeked thrush and spruce grouse. The gray-cheeked thrush, was detected frequently at ARU 3C and a single spruce grouse was detected. ARU 3C is within a black spruce/moss/lichen forest with a water body located 250 m to the southeast and bordered by an open tamarack/lichen forest to the north. The proximity of open, shrubland and aquatic

habitat results in a wide range of species detected. Species detected by ARUs that were not detected during the breeding bird survey or bird migration survey included the bohemian waxwing, brown-headed cowbird, chipping sparrow, and pine siskin. There were no amphibians detected on ARU 3C in 2022.

Table 4.6-7: Species Detected on ARU 3C in 2022

Common Name	Number of Detections
American robin	229
Blackpoll warbler	3
Bohemian waxwing	7
Boreal chickadee	6
Brown-headed cowbird	4
Canada jay	9
Chipping sparrow	13
Common loon	4
Common raven	17
Common redpoll	135
Dark-eyed junco	88
Fox sparrow	25
Grey-cheeked thrush	76
Hermit thrush	5
Lincoln's sparrow	19
Northern waterthrush	6
Pine grosbeak	18
Pine siskin	1
Ruby-crowned kinglet	92
Spruce grouse	4
Tennessee warbler	1
White-crowned sparrow	29
White-winged crossbill	9
Wilson's warbler	3
Yellow-rumped warbler	38

Baseline avian data was augmented with presence information obtained from a Birds Canada NatureCounts query. Avian observation and collection data was obtained from a search area extending approximately 10 to 15 km from the Project. This area encompasses a wide range of habitat types and coastal areas and includes a search query from 1800 to 2024. Data included in the search came from the following sources:

- Denver Museum of Natural Science
- Field Museum of Natural History
- iNaturalist

- Canadian Museum of Nature
- Chicago Academy of Sciences
- Canadian Wildlife Service Waterbird Colony database
- EBird Canada
- GalliForm
- Museum of Comparative Zoology, Harvard University
- Museum of Vertebrate Zoology
- University of Michigan Museum of Zoology
- University of Washington Burke Museum
- Yale Peabody Museum
- Western Foundation of Vertebrate Zoology
- Naturalis Biodiversity Center
- Project Nestwatch Environment and Climate Change Canada
- Provincial Museum of Alberta
- Santa Barbara Museum of Natural History

The search resulted in observations of 90 bird species (Table 4.6-8). The data includes 49 additional species not recorded during fieldwork for the Project. As mentioned, the search area covers a much larger area with a higher diversity of habitat types. There were 11 species detected during Project surveys that are not included in the online databases. Many of the species in the online databases are coastal birds that are not expected to occur in the LSA (e.g., thick-billed murre), some species are accidental or sporadic breeders (e.g., great grey shrike, short-eared owl), or seasonal migrants (e.g., gyrfalcon, Lapland longspur). Given the habitat types available in the LSA, the species detected during various surveys conducted for the Project is fairly consistent with long term data records.

Concerns were raised by Environment and Climate Change Canada that surveys for the common nighthawk were not completed for the Project. The Project is in a remote location with no ground access (e.g., cutlines, trails) and therefore, nighttime surveys are not safe to conduct. Common nighthawks are known to occur in Labrador, but current range maps show the occurrence primarily within the southwestern portion of Labrador. There are no data records for the region of common nighthawk in the Birds Canada NatureCounts databases. A common nighthawk advanced classifier was used to search for common nighthawk vocalizations in the ARU 3C recordings. No common nighthawk vocalizations were detected despite potential open nesting habitat and open foraging habitat in the vicinity of the ARU.

Table 4.6-8: Long Term Avian Data from Birds Canada Nature Counts

Common Name[1]	Common Name	Common Name
American Black Duck	Golden-crowned Kinglet	Red-breasted Merganser
American Goldfinch	*Gray-cheeked Thrush*	Rock Ptarmigan
American Pipit	Great Black-backed Gull	*Rough-legged Hawk*
American Robin	Great Cormorant	*Ruby-crowned Kinglet*
American Three-toed Woodpecker	Great Grey Shrike	*Rusty Blackbird*
American Tree Sparrow	Greater Yellowlegs	*Savannah Sparrow*
Bald Eagle	Gyrfalcon	Semipalmated Plover
Barn Swallow	Harlequin Duck	Semipalmated Sandpiper
Barrow's Goldeneye	*Hermit Thrush*	Sharp-shinned Hawk
Black Guillemot	*Herring Gull*	Short-eared Owl
Black-legged Kittiwake	Horned Lark	*Snow Bunting*
Blackpoll Warbler	House Sparrow	Snow Goose
Bohemian Waxwing	*Iceland Gull*	Solitary Sandpiper
Boreal Chickadee	King Eider	Song Sparrow
Boreal Owl	Lapland Longspur	Spotted Sandpiper
Canada Goose	Lesser Black-backed Gull	*Spruce Grouse*
Canada Jay	*Lesser Scaup*	Surf Scoter
Common Eider	*Lincoln's Sparrow*	Swainson's Thrush
Common Loon	Little Auk	*Tennessee Warbler*
Common Merganser	Long-tailed Duck	Thick-billed Murre
Common Murre	Magnolia Warbler	Tree Swallow
Common Raven	*Merlin*	*White-crowned Sparrow*
Common Redpoll	Mourning Dove	White-rumped Sandpiper
Common Shelduck	*Northern Shrike*	White-throated Sparrow
Dark-eyed Junco	*Northern Waterthrush*	*White-winged Crossbill*
Eurasian Coot	Palm Warbler	White-winged Scoter
Eurasian Teal	*Peregrine Falcon*	Willow Ptarmigan
Evening Grosbeak	*Pine Grosbeak*	*Wilson's Warbler*
Fox Sparrow	*Pine Siskin*	*Yellow-rumped Warbler*
Glaucous Gull	Red Phalarope	Yellow Warbler

1 Species in italics were observed during 2022 and 2023 field surveys

4.6.3.1.4 Bat Survey

In 2022, bat acoustic data was recorded during 166 total detectors nights: 104 detector nights during the breeding season and 62 detector nights during fall migration. Two bat species were detected including the eastern red bat (under consideration federally for Endangered status) and little brown myotis (provincially

and federally Endangered). This is one of the first recorded observations of the eastern red bat in Newfoundland and Labrador. The remaining detections were categorized as myotis species, little brown myotis/eastern red bat and “No ID”.

A total of 75 bat passes were detected with slightly more bat passes observed during the breeding period (40 of 75 passes; Table 4.6-9). The little brown myotis had the highest number of detections during the breeding season (19 passes) and fall migration (18 passes) followed by “No ID” during the breeding period (11 passes) and little brown myotis/eastern red bat during fall migration (6 passes) (Table 4.6-9). There was a relatively small number of detections of the eastern red bat during the breeding season (2 passes) and fall migration (3 passes) at both detectors.

Bat Detector ID 3C, a possible roosting site, had the highest total number of detections (42 of 75 passes) (Table 4.6-9). Bat Detector ID 3C had the highest number of detections during the breeding season (33 of 40 passes) and Bat Detector ID 1D had the highest number of detections during fall migration (26 of 35 passes). The bat passes per detector night (detection rate) during the breeding period and fall migration (Table 4.6-10) was at the low end of the range compared to a recent study in Nova Scotia (Dillon 2022).

Table 4.6-9: Bat Species Passes by Detector ID and Period (2022)

Species	Period	1D	3C	Total
Eastern Red Bat	Breeding	1	1	2
	Fall Migration	3	0	3
Little Brown Myotis	Breeding	5	14	19
	Fall Migration	11	7	18
Myotis Species	Breeding	0	2	2
	Fall Migration	4	0	4
Little Brown Myotis/Eastern Red Bat	Breeding	0	6	6
	Fall Migration	4	2	6
No ID	Breeding	1	10	11
	Fall Migration	4	0	4
Total	Breeding	7	33	40
	Fall Migration	26	9	35

Table 4.6-10: Bat Species Passes Per Detector Night by Detector ID and Period (2022)

Species	Period	1D	3C	Total
Eastern Red Bat	Breeding	0.02	0.02	0.19
	Fall Migration	0.10	0.00	0.05
Little Brown Myotis	Breeding	0.10	0.27	0.18
	Fall Migration	0.35	0.23	0.29
Myotis Species	Breeding	0.00	0.04	0.02
	Fall Migration	0.13	0.00	0.06
Little Brown Myotis/Eastern Red Bat	Breeding	0.00	0.12	0.06
	Fall Migration	0.13	0.07	0.10

No ID	Breeding	0.02	0.19	0.11
	Fall Migration	0.13	0.00	0.06
Total	Breeding	0.13	0.63	0.38
	Fall Migration	0.84	0.29	0.56

In 2023, bat acoustic data was recorded over 504 total detectors nights: 312 detector nights during the breeding season and 192 detector nights during fall migration. Three bat species were detected including the little brown myotis, northern myotis (provincially and federally Endangered) and hoary bat (Table 4.6-9). A small number of bat passes could only be identified as a myotis species.

A total of 1,902 bat passes were detected with the majority of bat passes during the breeding period (1,756 of 1,902 passes; Table 4.6-11). The little brown myotis had the highest number of detections during the breeding season (1,707 passes) and fall migration (133 passes) followed by a myotis species (Table 4.6-11). There was a relatively small number of detections of the northern myotis during the breeding season (18 passes) and fall migration (10 passes) and only a single detection of the hoary bat during fall migration at Detector ID 3.

Bat Detector ID 3 had the highest number of detections during the breeding season (1,185 of 1,756 passes) followed by Bat Detector ID 5 (242 passes; Table 4.6-9). Bat Detector IDs 1 and 2 had a relatively low number of detections. Bat Detector ID 3 had the highest number of detections during the fall migration (66 of 146 passes) followed by Bat Detector ID 5 (57 passes). No detections were recorded at Bat Detector IDs 4 and 5 during fall migration.

Table 4.6-11: Bat Species Passes by Detector ID and Period (2023)

Species	Period	1	2	3	4	5	6	Total
Little Brown Myotis	Breeding	18	33	1,170	125	230	131	1,707
	Fall Migration	5	16	58	0	54	0	133
Northern Myotis	Breeding	0	0	10	1	2	3	16
	Fall Migration	0	0	1	0	1	0	2
Myotis Species	Breeding	2	1	5	7	10	8	33
	Fall Migration	0	2	6	0	2	0	10
Hoary Bat	Breeding	0	0	0	0	0	0	0
	Fall Migration	0	0	1	0	0	0	1
Total	Breeding	20	34	1,185	133	242	142	1,756
	Fall Migration	5	18	66	0	57	0	146

The bat passes per detector night (detection rate) was highly variable among bat detectors and between seasons (Table 4.6-12). During the breeding season, bat detector IDs 1 and 2 were at the low end of the range of the bat detection compared to a recent study in Nova Scotia while bat detector IDs 4, 5, and 6 are within the range of this recent study (Dillon 2022). In contrast, the detection rate at bat detector ID 3 exceeded the detection rate in the Nova Scotia study. The high bat detection rate at the potential foraging site at bat detector ID 3 is in line with relatively high detection rates associated with foraging at forest ponds at northern sites in the Yukon (Slough et al. 2023). During fall migration, bat detection rates at all detectors were at the low end of the range of bat detection for the recent study in Nova Scotia (Dillon 2022).

Table 4.6-12: Bat Species Passes Per Detector Night by Detector ID and Period (2023)

Species	Period	1	2	3	4	5	6	Total
Little Brown Myotis	Breeding	0.35	0.63	22.50	2.40	4.42	2.52	5.47
	Fall Migration	0.16	0.50	1.81	0.00	1.69	0.00	0.69
Northern Myotis	Breeding	0.00	0.00	0.19	0.02	0.04	0.06	0.05
	Fall Migration	0.00	0.00	0.03	0.00	0.03	0.00	0.01
Myotis Species	Breeding	0.04	0.02	0.10	0.13	0.10	0.15	0.11
	Fall Migration	0.00	0.06	0.19	0.00	0.06	0.00	0.05
Hoary Bat	Breeding	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Fall Migration	0.00	0.00	0.03	0.00	0.00	0.00	0.005
Total	Breeding	0.38	0.65	22.79	2.56	4.65	2.73	5.63
	Fall Migration	0.16	0.568	2.06	0.00	1.78	0.00	0.76

4.6.3.1.5 Incidental Observations

A total of 286 individuals were incidentally observed during wildlife surveys including 49 bird species and 7 mammal species (Appendix E). Many of the bird species were already observed during systematic wildlife surveys including two VCs, rusty blackbird and spruce grouse. Bird species not detected during systematic wildlife surveys include American black duck, American three-toed woodpecker, common goldeneye, double-crested cormorant, great black-backed gull, ptarmigan species, and swamp sparrow. The mammal species included arctic hare, black bear, red squirrel, snowshoe hare and caribou. Harp seals were the most numerous incidental observations with 60 individuals in two groups on pack ice south of the RSA and east of Nain. Eastern migratory caribou (provincially Threatened) was the only new SAR species detected with six observations of tracks including a female with a calf (Figure 4.6-5). Most of the tracks are in close proximity and may represent fewer than six animals. Consultation with Inuit has confirmed that caribou are rarely observed in the area over the past decade.

4.6.3.2 Valued Components

4.6.3.2.1 Red-necked Phalarope

The red-necked phalarope is listed in Schedule 1 of SARA as Special Concern (Government of Canada 2024b). This species breeds across the circumpolar sub-Arctic. In North America, breeding occurs from the Alaskan Peninsula to Labrador with an estimated North American population of 2.5 million (COSEWIC 2014). Breeding has been observed along the coast of Labrador as far south as Battle Harbour (COSEWIC 2014). Red-necked phalaropes breed in low- and sub-Arctic wetlands, near freshwater ponds, lakes, or streams, and they are a common breeder in northern Labrador (COSEWIC 2014). Nests are placed on mossy hummocks lined with sedges and grasses, typically close to standing water (CornellLab 2024). There were no red-necked phalaropes observed in the LSA during any surveys conducted for the Project in 2022 and 2023.

4.6.3.2.2 Peregrine Falcon

The anatum / tundrius subspecies of peregrine falcon was delisted federally in 2017 and is listed as Vulnerable provincially (Government of Canada 2024c; Government of Newfoundland and Labrador 2024). Peregrine falcons inhabit a range of habitats from arctic tundra to coastlines (COSEWIC 2017). In Labrador, preferred nesting sites are ledges on cliffs between 50 and 200 m in height and up to several kilometres long (COSEWIC 2017). At the landscape scale, suitable nest sites are patchily distributed but may be locally common. Breeding sites are selected based on access to sufficient food resources (COSEWIC 2017). Peregrine falcons are aerial hunters that dive on other birds including shorebirds, waterfowl, woodpeckers, jays, thrushes, ptarmigan, longspur and snow bunting (COSEWIC 2017).

Nesting sites in Labrador are mostly along coastal cliffs, with inland sites being on steep cliffs alongside rivers and lakes (COSEWIC 2017). Peregrine falcons show a high degree of nest site fidelity and will

often re-use nest sites for several successive seasons (COSEWIC 2017). Peregrine falcons nest on islands within the Nain Coastline IBA (IBA 2024) to the east of the RSA.

There is suitable cliff nesting habitat within the RSA, north and west of ARU4 and no nesting habitat within the LSA (Figure 4.6-4). During the avian survey in early July 2023, a helicopter was used to fly along the cliff and scan for signs of nesting (e.g., whitewash (feces) deposits, presence of adult falcons or young) and none were observed. Peregrine falcons were not observed in the RSA or LSA during the breeding season. Therefore, it is unlikely that peregrine falcons are currently nesting in the RSA. One peregrine falcon was observed in the RSA during the fall bird migration survey.

4.6.3.2.3 Short-eared Owl

The short-eared owl is listed as Special Concern federally (under consideration for a status change to Threatened) and Threatened provincially (Government of Canada 2024c; Government of Newfoundland and Labrador 2024). Short-eared owl use open terrain that support small mammal populations (Clayton 2000). They prefer open habitats such as those abundant along the south coast of Labrador, and above the treeline, where there are high densities of small mammals (COSEWIC 2021). They nest on the ground and use a wide variety of open habitats including grassland, graminoid and shrub wetlands, cropland, hayland, shrubland and recently cleared forests (Clark 1975; Clayton 2000; Johnsgard 1988; Semenchuk 1992; Holt and Leasure 2006). Preferred nesting sites include areas of dense grassland (COSEWIC 2008). Nests are usually on dry, raised ground, although wet areas may also be used (Holt and Leasure 2006). Prey availability is the primary factor that determines breeding areas and the distribution of nesting areas varies from year to year as a result (Clayton 2000). High quality short-eared owl nesting habitats are represented by the fen and marsh habitat types in the wildlife LSA (particularly during years when adequate prey is available).

Nests have been reported at Okak, in the Nain area including Port Manvers Run, Davis Inlet, and Hopedale (COSEWIC 2021). As stated, the short-eared owl prefers wide expanses of open land, such as the coastal barrens or meadows which exist in the vicinity of the Project. The potential occurrence of short-eared owl in the vicinity of the Project was raised as a concern during consultation with the NL Wildlife Division. As indicated, the distribution of short-eared owls varies greatly from year to year and depends on the presence of adequate rodent populations. There were no short-eared owls observed in the LSA, although systematic surveys were not conducted. Short-eared owl surveys are conducted from one hour before sunset to 30 minutes after sunset. Due to the remoteness of the LSA, lack of ground access and limitations on helicopter access after sunset, a short-eared owl survey was not completed. Short-eared owl vocalizations were not detected on ARU 3C during summer 2022. Short-eared owls may breed periodically in the region during years of high rodent abundance.

4.6.3.2.4 Spruce Grouse

The spruce grouse is found across Canada primarily in boreal forests north to the tree line and is not a species at risk federally or provincially. Populations appear to be increasing since the 1970's and currently there appears to be no pressing conservation concerns for the species (Government of Canada 2024c). Spruce grouse select coniferous forests throughout their range preferring habitats of spruce, jack pine, or spruce/tamarack mix (Anich et al 2013; Casabona et al 2021; Robinson 1969). Females tend to nest in areas with dense ground cover (Casabona et al. 2021). Habitats within the LSA that are likely to be used by the spruce grouse include closed black spruce/moss/lichen, bog and fen and bog complex. Spruce grouse were detected during the summer avian survey, the ARU survey and incidentally with all observations occurring within coniferous forest habitat.

4.6.3.2.5 Gray-cheeked Thrush

The northern gray-cheeked thrush (*Catharus minimus aliciae*) is not at risk federally or provincially. The Newfoundland subspecies (*C. m. minimus)* is listed under consideration federally and listed as Threatened provincially (Government of Canada 2024c; Government of Newfoundland and Labrador 2024). In 2009, the estimated population of gray-cheeked thrush in Labrador, based on expert opinion, was 2,500 to 100,000 (Species Status Advisory Committee). The gray-cheeked thrush is found throughout northern Canada from the Yukon to Labrador in boreal forest, taiga and adjacent tundra areas. In Labrador, there are records of the gray-cheeked thrush along the coast and in western Labrador; however, many parts of Labrador have not been surveyed.

The gray-cheeked thrush breeds in dense low coniferous and deciduous thickets (Godrey 1986; Lowther et al. 2001) including willow and alder thickets. Mature coniferous / lichen forests and shrublands are used for breeding (Lowther et al. 2001). Nests are usually constructed on the ground or in low shrubs (Lowther et al. 2001).

One gray-cheeked thrush was observed in the LSA during the summer avian survey and there were numerous vocalizations detected on ARU 3C in 2022 (Figure 4.6-5).

4.6.3.2.6 Rusty Blackbird

Rusty blackbird is listed as Special Concern federally and vulnerable provincially (Government of Canada 2024c; Government of Newfoundland and Labrador 2024). Rusty blackbirds occur in all Canadian provinces and territories and, in Labrador, Davis Inlet is reported to be the northern limit of its breeding range (COSEWIC 2017a) although provincial information suggests the species is found north to the treeline (Department of Fisheries, Forestry and Agriculture, Forestry and Wildlife Branch 2020). Data indicate rusty blackbird populations have declined in general over the last 40 years, and the breeding population in Labrador is ranked as S3 (Vulnerable). The breeding range of the rusty blackbird in Canada is almost entirely within the boreal forest. Breeding habitat there is characterized by coniferous-dominated forests adjacent to wetlands, such as slow-moving streams, peat bogs, sedge meadows, marshes, swamps and beaver ponds (COSEWIC 2017a). Such habitat exists within the vicinity of the Project.

The rusty blackbird was observed at survey station 22, incidentally at station 15, after the breeding bird point was completed and at ARU3 while checking ARU status in July 2023. All three were males observed in marsh/fen type habitat, typical for the rusty blackbird (Figure 4.6-5).

4.6.3.2.7 Little Brown Myotis

The little brown myotis is a common bat distributed across most of North America, where it inhabits a wide variety of habitats The little brown myotis and the northern myotis were both emergency-listed as Endangered under SARA in 2014 (Government of Canada 2024c) due to severe population declines largely caused by the deadly fungal infection known as White Nose Syndrome. Declines of both species are most noticeable in Ontario and Quebec with other areas primarily unaffected (COSEWIC 2013). Provincially, the little brown myotis is listed as Endangered (Government of Newfoundland and Labrador 2024). The little brown bat likely is the most common bat species in Canada and the most familiar to the public because they often use buildings as day-roosts and forage in areas where they are visible (e.g., over lakes, around streetlights) (COSEWIC 2013).

Roosting sites are important bat habitat. Little brown myotis roost sites typically consist of decayed trees with small cavities or peeling bark (Jung et al. 2004). These are usually found in large old-structured forests but other habitats are used provided these trees are available. Maternity roosts are found in warm sites required for rearing pups and include natural sites such as rock crevices or cavities of canopy trees in forests (Fenton and Barclay 1980; Coleman and Barclay 2011). Males will use a wider variety of habitats but still require cavities such as rock crevices, cavities of canopy trees, and under flaking bark (Fenton and Barclay 1980; Coleman and Barclay 2011). The little brown myotis also uses a wide variety of man-made structures but these are absent throughout most of the LSA except within Nain. During spring and fall, little brown myotis will seek out caves for hibernation, which may be hundreds of kilometers from their summering areas (COSEWIC 2013). No potential hibernating sites were found in the LSA during fieldwork conducted for the Project in 2022 and 2023.

Based on prior bat detector surveys of adjacent areas, such as the Nain Wind Micro-Grid EA (Nunatsiavut Government and Natural Forces Development Limited Partnership 2021) and Voisey's Bay Wind Energy Project (Vale Newfoundland & Labrador Limited 2021), the little brown myotis is known to occur in the Nain area. As a result, bat detectors were deployed at two locations within the LSA during the initial site visit in June, 2022 and six bat detectors were deployed in June 2023. Little brown myotis were detected at all bat detectors in 2022 and 2023 and were frequently detected at bat detectors 3, 4 and 5 (Figure 4.6-5).

4.6.3.2.8 Northern Myotis

The northern myotis was emergency-listed as Endangered under SARA in 2014 (Government of Canada 2024c) due to severe population declines largely caused by White Nose Syndrome. In Newfoundland and

Labrador, the northern myotis is listed as Endangered under the NL ESA (Government of Newfoundland and Labrador 2024).

The distribution of the northern myotis ranges from Newfoundland and Labrador west to British Columbia and the Northwest Territories. The distribution of the northern myotis includes the boreal forest south of the treeline, montane forests, and deciduous and mixedwood forests (Government of Canada 2023a).

The northern myotis overwinters in cold and humid hibernacula. Hibernacula sites include features such as caves, abandoned mines, wells, cellars, and tunnels and is deemed critical habitat under the Recovery Strategy in Canada. The northern myotis hibernacula is used when the ambient air temperature and insect availability declines (Government of Canada 2015). According to the Recovery Strategy, there is no critical habitat within the vicinity of the Project (i.e., no hibernacula has been identified; Government of Canada 2015). No potential hibernating sites were found in the LSA during fieldwork conducted for the Project in 2022 and 2023. In the summer, females will create summer maternity colonies in buildings, or large diameter trees if available (Government of Canada 2023a).

Main threats to the northern myotis include colony eradication, chemical contamination, changes in forest structures, and wind turbines in addition to the White Nose Syndrome (Government of Canada 2023a).

The northern myotis has been detected previously in the Nain area as part of surveys completed for the Nain Wind Micro-Grid EA (Nunatsiavut Government and Natural Forces Development Limited Partnership 2021) and Voisey's Bay Wind Energy Project (Vale Newfoundland & Labrador Limited 2021). Although detected much less frequently than the little brown myotis, the northern myotis was detected at all six bat detectors deployed in the LSA in 2023 and none were detected in 2022 (Figure 4.6-5). Similar to the little brown myotis, the highest numbers were detected at bat detector 3.

4.6.3.2.9 Polar Bear

Polar bears are listed on Schedule 1 of SARA as Special Concern and are listed as Vulnerable under the provincial *Endangered Species Act* (Government of Canada 2024b, Government of NL 2024). Polar bears require both marine (sea-ice) and terrestrial habitat (COSEWIC 2018). They are highly specialized carnivores and are strongly dependent on sea-ice to access marine mammal prey. Polar bears may use terrestrial habitat seasonally and most females den on land (COSEWIC 2018). They are typically only present inland from March to August, arriving on the coast with the drifting ice packs, and then travel north (COSEWIC 2018). Polar bears of the Davis Straight population are present seasonally along the northern Labrador coast, including in Nain (COSEWIC 2018).

Qualitative observations from elders with considerable knowledge of polar bears in Nain, have indicated that their abundance has become higher now than in the past (COSEWIC 2018). The elders also reported that their distribution has changed from primarily outer coast and offshore areas to now including the inner bays (which freeze first), and farther inland (COSEWIC 2018). Given this information, it is reasonable to expect that polar bears will be present seasonally near the coast adjacent to the Project.

The concentration of sea -ice is the most important factor affecting polar bear habitat selection (COSEWIC 2018). However, terrestrial habitat becomes important for polar bears during the ice-free period. Polar bears do not appear to have any strong preference for terrestrial habitat types, and females will often select ephemeral features such as snow and ice for maternal den sites (COSEWIC 2018). Denning sites are also highly variable and typically occur on the leeward side of topographical features where sufficient snow accumulates. As polar bears do not have specific habitat requirements that can be associated with the habitat mapping, data on baseline habitat availability were not calculated.

A single polar bear was identified within a 5 km radius of the Project by the AC CDC in June 2018. Given the low probability of interaction with the Project, specific surveys for polar bears were not conducted. According to the bear guard assisting with the summer avian survey, polar bears are typically found north of Nain (Henry Dicker, pers.comm. July 2023).

4.6.3.2.10 Eastern Migratory Caribou

Caribou are of great importance to the people of Nain. Caribou are an essential northern herbivore and the only vertebrate grazer on lichen in boreal, taiga and tundra habitats. Caribou are also a primary food

source for many predators and an important food source for northern residents (COSEWIC 2017; Notzl, Greene, & Riley 2013).

Caribou in Labrador are divided into the Torngat Mountains Population, the Eastern Migratory Population, and the Boreal Population. Of the Eastern Migratory Population, the migratory forest-tundra ecotype dwellers (George River and Leaf River herds) are present in Quebec and Labrador. Of the Boreal Population, the sedentary, forest-dwelling type (Lac Joseph, Red Wine Mountains, and Mealy Mountains herds) occur in southern Labrador. The entire Eastern Migratory Population is not on Schedule 1 of the SARA; however, they are under consideration for addition (COSEWIC 2017), and the George River and Leaf River herds are not listed by the NL ESA (Government of Newfoundland and Labrador 2024). The principal caribou species present in Nain is the George River caribou, which do not carry legislative protection through SARA or NL ESA at this time, but it may be listed prior to anticipated Project construction in 2026 (COSEWIC 2017; Government of NL 2024).

Historically, migratory caribou travelled thousands of kilometers annually, from their calving and summering grounds above the tree line, to wintering areas in the taiga or boreal forests to the south (COSEWIC 2017; Notzl, Greene, & Riley 2013). Migratory caribou “space away” by undertaking long-distance migrations to spring calving grounds where they give birth in large groups (Notzl, Greene, & Riley 2013). They breed during the fall migration, disperse into smaller groups during the winter, and reassemble into large groups, sometimes tens of thousands of individuals, on their way back to their calving grounds (Notzl, Greene, & Riley 2013).

Caribou populations face variable threats, such as habitat loss and predation, the latter in part a function of human activities. Populations have decreased and ranges have contracted across most of Canada (COSEWIC 2017; Notzl, Greene, & Riley 2013). In 2013, the decline of caribou forced the Government of NL to initiate a ban on all caribou hunting in Labrador, for conservation purposes. NG and the NunatuKavut Community Council also made recommendations to cease caribou hunting in Labrador (NLDFFA 2022). As previously stated, COSEWIC has recommended listing of the Eastern Migratory caribou as Endangered. The Government of NL decided not to list the George River herd provincially as per the request of Indigenous governments and communities in Labrador, who established the Ungava Peninsula Caribou Aboriginal Roundtable to develop a compelling management strategy for the George River and Leaf River caribou herds, which also includes a long-term management regime (Torngat Wildlife and Plants Co-Management Board 2017). The approximate size of the George River herd was estimated to be 5,500 in 2018 (a decrease of 38% since the previous survey in 2016 and 99% since 1993) (COSEWIC 2017c; Government of NL 2022). The George River caribou herd was last surveyed in 2020, with approximately 8,100 animals enumerated – an increase of 2,600 from the 2018 Survey (NLDFFA 2022). Based on the survey, 35 per cent of the herd is now made up of calves (NLDFFA 2022). The historic range of the George River herd was almost 100,000 km^2, from the eastern shore of Hudson Bay in northern Quebec and the Atlantic coastline in Labrador (COSEWIC 2017). That range shrank by about 85% from the late 1990s to the 2010-14 range. It is now almost entirely in Labrador year-round, and partially overlaps with the Torngat Mountains population for part of the year (COSEWIC 2017).

Caribou tracks were observed in the LSA at six locations during surveys conducted in 2023 (Figure 4.6-5). One observation consisted of tracks of a cow and calf. The observations represent a very small number of caribou. Information from the community indicates that caribou are typically found north of Nain with only small numbers encountered in the Nain area.

4.7 Fish and Fish Habitat

The objective of the fish and fish habitat section is to summarize the fish and fish habitat within the established study areas including both freshwater and marine environments by compiling the results of the desktop assessment and field assessments.

4.7.1 Study Area

Spatial boundaries for characterizing fish and fish habitat baseline conditions are described in Table 4.7-1 and Figure 4.7-1.

Table 4.7-1: Fish and Fish Habitat Spatial Boundaries

Study Area	Description	Rationale
Project Area	The footprint of the runway, airport, access road, rock borrow areas, construction staging area, temporary access road, and associated infrastructure.	Represents area of direct disturbance created by the Project. Watercourse crossings created by the Project Area are a main focus of the FAFH discussion.
Local Study Area (LSA)	The Project Area plus a 100 m buffer either side of the Project Area.	The LSA for freshwater is as defined by Fisheries and Oceans Canada (DFO 2022b) and strategically chosen to as align with the LSA for the Surface Water discipline since effects on these components are linked. The LSA includes both freshwater and marine. The LSA delineates areas that may be directly affected by the Project development.
Regional Study Area (RSA) – Freshwater FAFH sub-component	The RSA is made up of five watersheds. The RSA is located within the subdrainage area Kogaluk and Notakwanon (03NE), which itself is within the Northern Labrador (03N) drainage area.	The RSA in the freshwater environment reflects the water catchment areas with water features intersected by the Project. The RSA delineates areas where Project effects may affect wide ranging species (e.g., migratory fish species), indirectly affect a resource, or affect resources in combination with other existing and planned projects or land uses. Baseline conditions in the marine environment have been explored for the general region of near-shore coastal Labrador.

NUNATSIAVUT
kavamanga government

NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION

Project Component
- Access road
- Temporary access road
- Airport footprint
- Runway

Hydrography
- Catchment
- Watercourse

Study Area
- Local study area (LSA)
- Regional Study Area (RSA) - Project intersecting catchment

1:54 000

0 500 1 000 m

NAD 1983 UTM Zone 20N

2024-06-19 14:39

Figure 4.7-1

Fish and Fish Habitat Study Areas

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EXPERTS EN SOLUTIONS POUR L'AVIATION

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4.7.2 Methods

4.7.2.1 Desktop (Freshwater and Marine)

A desktop review was undertaken to assess and summarize the fish species and fish habitats potentially occurring within the LSA and RSA. The desktop review of the baseline aquatic environment focused on the identification of watercourses that intersect the proposed Project Area, and the identification of fish (including marine mammal and invertebrate) species, including SAR and habitat features that have the potential to overlap the Project Area, LSA, and RSA. For fish species known or likely to occur in the watersheds in the region, desktop investigation included habitat associations, key aspects of the life history, and temporal windows for migration and spawning. SAR identified were investigated with regards to their federal conservation status, as well as habitat preferences, to determine the likelihood of occurrence in the LSA. Only SAR species determined to have 'Low' to 'High' likelihood of occurring in the LSA were listed in Table 9; species determined to have negligible likelihood of occurring in the LSA were excluded. SAR species identified to have 'Moderate' to 'High' likelihood of occurring within the LSA were further described. Field surveys were not conducted for the marine FAFH subcomponent.

The following key information sources were reviewed:

- *Nain Airport Project R3 Report: Environmental Review - Desktop Assessment* (Aivek Stantec 2022)
- *Nain Airport Project R6 Report: Hydrological Study* (Aivek Stantec 2023)
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Assessment and Status Reports
- Government of Canada *Species at Risk Public Registry*
- Published literature on general ecology and population dynamics of relevant species and habitat
- Newfoundland and Labrador Fisheries, Forestry and Agriculture *Species at Risk* (Government of Newfoundland and Labrador, 2024)
- Newfoundland Labrador Fisheries, Forestry and Agriculture *Inland Fish* (Government of Newfoundland and Labrador, 2024)
- Nain Wind Power Micro-Grid Registration Document (Natural Forces, 2021)
- Identification of Additional Ecologically and Biologically Significant Areas (EBSAs) Within the Newfoundland and Labrador Shelves Bioregion (DFO 2013a)
- DFO *Aquatic Species* collection (DFO 2020)
- DFO *Aquatic Species at Risk Map* (DFO 2022b)

4.7.2.2 Traditional Ecological Knowledge and Community Engagement

Fisheries throughout Nunatsiavut have a long and culturally important history with the northern Labrador Inuit for cultural preservation and knowledge sharing (Snook et al., 2022, Cadman et al., 2023). The information shared by community members through Project engagement has been recorded and included in this baseline assessment.

4.7.2.3 Field (Freshwater)

A dedicated FAFH field program was implemented in July 2023, for the purposes of ground truthing desktop information and collecting empirical data to characterize the baseline conditions for FAFH in the freshwater environment. The FAFH field program was conducted from July 26 through July 29, 2023, by two biologists (a field lead and assistant) and a local bear guard from Nain. Nain acted as the base camp for the field program, with daily access to the field either on foot (using the existing road within Nain) or by helicopter. A DFO Section 52 permit was obtained for the fish collection component of the field surveys.

The field surveys focused on watercourse crossings (WCs) within the Project Area (proposed access road and airport footprint) and included assessment of the LSA, where deemed important to characterize fish

habitat (i.e., investigations of barriers to fish passage).[1] Assessment of the LSA and RSA was opportunistically conducted during helicopter travel. The primary components of the surveys were fish presence/absence surveys, fish habitat surveys, and supporting environmental media sampling (benthic invertebrates, surface water).

In addition to the dedicated FAFH field program, a wildlife field program and a wetland and vegetation field program opportunistically collected watercourse information, which included photos and field notes, within the Project Area and LSA.

Thirty-nine (39) watercourse crossings and a waterbody (Blowhole Pond) were identified prior to the FAFH field program as having the potential to interact with the Project Area (Figure 4.7-1) using desktop sources identified above, which used open-source satellite imagery (Bing, Google Earth Pro), provincial digital elevation model (DEM), 2022 drone-derived DEM, Project-specific geospatial data, and used high resolution orthoimagery and allowed for significant improvements to the delineation of watercourse line features previously obtained from the National Topographic Data Base hydrology vector datasets. Additionally, information from the Avian Field Survey Team's prior visit in early July, was utilized. Not included in the 39 watercourse crossings, the wildlife field program conducted in early July, 2023, before the FAFH field program, documented additional watercourse crossings not already identified by the desktop investigation, and noted them as new watercourse crossings with a unique identifier (WCnew). To support the assessment of FAFH, watercourses within the Project Area and downstream of the Project Area were visually assessed during the wetland and vegetation field programs (September 2023) and documented several more watercourse crossings. The watercourse and waterbody identification nomenclature differs between FAFH and Wetland surveys, utilizing WC and WS, respectively. GPS locations of watercourse crossing locations were recorded and photographs were obtained.

To optimize available field time, prior to the FAFH field program, watercourse crossings identified during desktop assessment and the Avian Field Survey, were prioritized for assessment, based on the following approach:

- Watercourse crossings were ranked by potential to support FAFH and were visited in prioritized order. Watercourse crossings were not prioritized if notes or photos from the Avian Field Study indicated watercourse crossings were ephemeral, non-channelized, no flow, or subsurface, as these watercourses are unlikely to support fish or provide fish habitat, seasonally or year-round;
- Watercourse crossings were deemed high priority for field assessment if they were identified as a relatively large watercourse, with no obvious fish movement barriers downstream (i.e., <20% grade);
- Watercourse crossings without field photos were prioritized for visiting (in some cases, strictly to collect field photos);
- If assessed in the field as having the potential to provide FAFH, then a detailed assessment was conducted (Table 4.7-2);
- If assessed in the field as having low potential to support FAFH, then an abbreviated assessment was conducted in the form of fish presence/absence assessment (only where practical to electrofish) and stream flow measurements;
- Watercourse crossings on the existing access road (WC-01 – Nain Brook and WC-02 – Annainak Brook) were not prioritized for field assessment, as it is assumed the road and crossing structures will remain unaltered for the Project; and
- Blowhole Pond was not prioritized, as it is assumed it is fish bearing and due to community concerns, will be avoided by the Project.

Surface water samples were collected by hand at watercourse crossings receiving a detailed assessment (WC-05, WC-10, and WC-12) into laboratory provided bottles and shipped to a Bureau Veritas laboratory for analysis of metals and conventional parameters. Lab results were screened against Canadian Council of Ministers of the Environment's (CCME) Water Quality Guidelines for the protection of Aquatic Life, where available.

[1] Project Area and LSA, as defined at the time of the field program.

Benthic invertebrate samples were collected by Surber sampler at watercourse crossings receiving a detailed assessment (WC-05, WC-10, and WC-12) and were preserved. Samples were shipped to the laboratory (Jack Zolty Ltd., Summerland, BC) for analysis of community to lowest practical taxonomic level.

Field standard operating procedures were developed and implemented for the program. Fish presence/absence assessments were conducted non-lethally and in accordance with the DFO Section 52 permit. Habitat assessments followed McCarthy *et al.*, (2007) for lotic habitat.

Table 4.7-2: Detailed Assessment Components for Watercourse crossings within the Project Area with the Potential to Support Fish and Fish Habitat

Description	Field Work Description
Fish	• Fishing effort to confirm fish presence • Fish catch field measurements: species ID, length, weight, maturity • Fish scale sampling for ageing (non-lethal) • Photos of representative specimens
Fish Habitat and Supporting Media	• Benthic community sampling • *In situ* water quality sampling • Water chemistry sampling (conventional parameters and metals) • Depth, flow, and bankfull width • Classification of meso-habitat type (riffle, run, etc.) • Classification of substrate type • Classification of cover type, including vegetative cover • Identification of potential obstruction to fish movement • Photos of representative habitat types • Evaluation of salmonid habitat

A separate fish presence assessment collecting fish by gill net, was completed in the Kauk Brook Estuary during the 2023 FAFH field program. Various fish data were collected, including species, weight, fork length, gutted length, mercury concentration, and age (scales and otoliths were collected for laboratory analysis). Age structure samples were shipped to the Canadian Rivers Institute laboratory for analysis of age in years.

4.7.2.4 Data Management and Quality Assurance/ Quality Control

The data management program for FAFH included systematic data record keeping for both the desktop and field components. In the field, data were collected on hardcopy datasheets and field notes were recorded in field notebooks and subsequently transcribed and/or scanned into electronic format and uploaded to the AECOM network at the end of the field program. Additionally, georeferenced photos were collected in the field, downloaded to a secure hard drive at the completion of each field day, and uploaded to the AECOM network at the end of the field program. All relevant field information that could be georeferenced was entered in the Project's GIS platform.

Protocols for quality assurance/quality control (QA/QC) were followed to validate the integrity of the field data collection and results. Field QA/QC procedures employed during the field program, included:

- Using experienced and trained staff in the field to conduct the sampling and record keeping
- Using standardized field datasheets, tailored to the field program
- Changing nitrile gloves between each sampling location
- Using clean sample containers supplied by the analytical laboratory
- Labelling, storing, and shipping samples in coolers supplied by the laboratory

- Submitting samples with chain of custody forms
- Submitting duplicate samples at an approximate frequency of 10% of the total number of samples
- Using a Canadian Association for Laboratory Accreditation Inc. (CALA)-accredited laboratory for sample analyses and that incorporates QA/QC techniques to aid in accuracy of results
- Reviewing the completed laboratory certificates for pertinent QA/QC data

For the water chemistry samples, one duplicate sample was collected to assess the overall reliability of the field procedures performed by AECOM and the laboratory analysis for the sampling program. The relative percent difference (RPD) between duplicate sample results was used to assess overall sampling precision. The RPD is a measure of the variability between two duplicate analyses and is calculated by the following equation:

$$RPD = 100 \times \frac{(x - y)}{(x + y)/2}$$

Where x is the primary result and y is the duplicate result.

The duplicate results for water are generally considered acceptable if the RPD is less than 40%. Due to the uncertainty of results near the laboratory detection limit, RPD values are considered acceptable if the difference between the results is less than three times the laboratory detection limit.

4.7.3 Baseline Conditions

4.7.3.1 Freshwater Fish

4.7.3.1.1 Desktop Information

This regional area of interest lies between geographic latitudes 56° 28’ 26” N and 56° 35’ 52” N, and longitude 61° 38’ 35” W and 62° 08’ 55” W and encompasses ground surface elevations ranging from sea level to approximately 270 metres (m) above sea level (asl). Five primary watersheds, or catchment areas, are intersected by the Project infrastructure.

Watercourses in this region generally flow toward the east and south, often through deep valleys. Bottom substrates consist of a high percentage of sand and gravel, and tributaries are often inaccessible to migrating fishes in some of the steep-walled canyons that parallel the main stems of rivers (Anderson, 1985). Some minor watercourses are related to the drainage of small ponds (e.g., an unnamed creek at the outlet of Blowhole Pond near kilometre post (KP) 2+600), while other minor features are related to the drainage of wetland complexes (e.g., stream channels located between KP 10+000 and 11+700). Most of these wetland-related drainages consist of ephemeral (seasonal or intermittent) flow, with channel configuration ranging from narrow troughs (i.e., often under 1 m wide), to poorly detectable seepage paths. Several small streams conveying water from upland rocky terrain were also identified.

Three major watercourses intersecting the proposed Project Area include Nain Brook, Annainak Brook and Kauk Brook, which are located at approximately KP 0+100, KP 1+300, and KP 7+800, respectively (Aivek Stantec 2023). Crossing structures are currently present at the existing road crossings for Nain Brook and Annainak Brook but not at Kauk Brook. Detailed morphological descriptions for the three major watercourses intersecting the proposed road alignment are provided in Table 4.7-3. The LSA also overlaps Blowhole Pond and is the only lotic waterbody intersecting the LSA.

Table 4.7-3: Major Watercourses Intersecting the Proposed Project Area.

Water-crossing Number	Stream Name	Channel Width	Sub-catchment area (ha)	Crossing Type	Description
WC-01	Nain Brook	5 m	562.3	Existing Bridge	• Second order stream, irregularly sinuous, stream gradient < 1% at crossing location • Streambed materials size range: sand to boulders. • Small pond present immediately upstream from the road crossing. Some silt and sand expected to be accumulating in that area. • At approximately 1.3 km upstream, there is a small dam and lake reservoir. • Floodplain is 3 m below the existing road surface at the proposed road crossing. • Sub-catchment area approximately 5.6 km^2.
WC-02	Annainak Brook	3.6 m	170.2	Existing Culvert	• Second order stream, irregularly sinuous channel, poorly defined floodplain, stream gradient < 1% at crossing location • Drains Annainak Brook - potential community freshwater water source. • Bordered by bedrock on the northern side of the valley and a thin cohesive layer of till underlain with bedrock on the southern side of the valley. • The streambed material type is currently unknown. • Sub-catchment area approximately 1.7 km^2.
WC-12	Kauk Brook	22 m	4,703.7	Bridge to be constructed as component of proposed Project	• Second order stream, meandering profile and perennial flow, stream gradient < 2% at crossing location. • The channel varies in width from approximately 15 to 25 m. The channel width at the proposed road crossing location is approximately 22 m. • The flood plain at proposed road crossing approximately 140 m wide, flows within a channel cut 2-3 m into the floodplain, includes both confined and unconfined segments. • Evidence of slope failures and erosion at the proposed road crossing, considered susceptible to fluvial erosion.

Many of the watercourses that intersect the Project Area have the potential to provide habitat to fish populations known to be found in the Nain-Okak region of Labrador. Among freshwater fish species that may overlap with the Project Area or LSA, none are federal or provincial SAR freshwater or anadromous fish species.[2]

From consultation with residents in Nain that are familiar with the fish in the region, there is low potential for Atlantic salmon (*Salmo salar*) or Arctic char in the watercourse crossings within the LSA, except for Kauk Brook. However, it was noted that there is high potential for brook trout (*Salvelinus fontinalis*), a salmonid, to occur throughout the LSA, which was confirmed during the FAFH field program.

Freshwater and anadromous fish species that have the potential to interact with the Project are listed in Table 4.7.4, with brief summaries for each below.

Table 4.7-4: Freshwater Fish Species with Potential to Occur within the Vicinity of the Project Area.

Common Name	Scientific Name
Arctic char	*Salvelinus alpinus*
Brook trout	*Salvelinus fontinalis*
Atlantic salmon (Labrador population)	*Salmo salar*
Lake trout	*Salvelinus namaycush*
Three-spine stickleback	*Gasterosteus aculeatus*
Nine-spine stickleback	*Pungitius pungitius*
Burbot	*Lota lota*
Lake chub	*Couesius plumbeus*
Round whitefish	*Prosopium cylindraceium*
Lake whitefish	*Coregonis clupeaformis*
Northern pike	*Esox Lucius*
Longnose sucker	*Catostomus Catostomus*
White sucker	*Catostomus commersoni*

Arctic char exists in both anadromous (migratory) and landlocked (resident) forms and eat a variety of invertebrates and fish which are distributed throughout the region (Bradbury, Roberge, & Minns, 1999). The anadromous forms of Arctic char use a freshwater environment for spawning, rearing, and overwintering before returning to the marine environments to feed over the summer. The anadromous form of Arctic char normally spawns between October and November, peaking in mid-October, within water temperatures of 1-3°C. Most spawning takes place in streams over a variety of substrates, from fine sand and mud to gravel and cobble. Hatching occurs from mid-April to mid-June and migration to sea typically happens in the second or third year. Ocean migrations generally last one to four months, at which time they return to their natal stream from early July to late September. Upstream migration generally occurs during high tide or periods of elevated water level. Landlocked forms of Arctic char spend their entire life cycle in lakes and ponds. Spawning for landlocked Arctic char generally occurs from early October to mid-November, over a variety of substrates from mud and gravel to boulders (Bradbury, Roberge, & Minns, 1999).

Brook trout exist in both anadromous and landlocked forms. Upstream spawning migrations for both forms occur in July and spawning normally occurs between late September and early November (Bradbury, Roberge, and Minns, 1999). Preferred spawning habitat includes cool, clear headwater

[2] The Government of Newfoundland and Labrador have designated two freshwater fish species as SAR; the American eel (*Anguilla rostrata*) and branded killifish (*Fundulus diaphanous*), which have been listed as vulnerable. However, these species do not occur within the vicinity of the Project Area (Government of Newfoundland and Labrador 2024).

streams approximately 60 cm deep with gravel substrates. Larvae brook trout remain in the gravel area until diminishing their yolk sac resource, and will then seek out calm, shallow edge habitat of streams and brooks. Brook trout have a varied diet, and may consume things such as insects, fish eggs, worms and even mice (Government of Newfoundland and Labrador, 2024). Preferable habitat for brook trout includes cool, spring-fed streams with equal abundance of pools and riffles, rocky bottom substrates and stable banks with mature vegetation (Vermont Government 2024).

Atlantic salmon similarly exist in both anadromous and landlocked forms (Bradbury, Roberge, and Minns 1999). Certain populations of Atlantic salmon are listed under the Species at Risk Act (SARA); however, the Labrador population is excluded from this. Anadromous forms of Atlantic salmon migrate upstream for spawning from July to August. Spawning sites typically comprise gravel-bottomed riffle sections of streams. Adults may return immediately back to sea after spawning or overwinter in freshwater habitats, before migrating back to sea in the spring. Hatching occurs between mid-April to mid-June and the young remain in freshwater for two to five years, before migrating to sea. Landlocked freshwater forms of Atlantic salmon, remain in freshwater and spawn along rocky shorelines of lakes. Spawning typically occurs between mid-September and October, over gravel substrate. Hatching generally occurs between mid-May to mid-June and young remain within tributary streams for two to three years before moving into lakes. Atlantic salmon's range has only been documented as far north as the Fraser River to the south of the Project Area.

Lake trout (*Salvelinus namaycush*) inhabit shallow lakes and large rivers in northern Labrador (Bradbury, Roberge, and Minns, 1999). Spawning occurs in shallow inshore areas of lakes, and rarely in streams. Spawning substrate is usually large gravel, cobble, and interspersed boulders. Juveniles remain within 0.3 m of the bottom over a cobble/boulder substrate and seek shelter among boulders and woody debris.

Three-spine (*Gasterosteus aculeatus*) and nine-spine sticklebacks (*Pungitius pungitius*) are found in both freshwater and marine environments (Bradbury, Roberge, and Minns, 1999). Spawning normally occurs in shallow, gravel-bottomed streams and occasionally in lakes, and is enabled by groundwater upwelling which carries dissolved oxygen to the developing embryos and provides protection from freezing.

Burbot (*Lota lota*) are native to Newfoundland and Labrador, normally found in deep water at temperatures between 15.6 and 18.3 °C. Burbot are night predators and eat young fish, or smaller fish species. Spawning occurs in shallow water on gravel shoals in about 5 to 10 ft of water under ice in midwinter, typically between January to March (Government of Newfoundland and Labrador, 2024).

Lake chub (*Couesius plumbeus*) are found in all Canadian provinces; however, are only found in Labrador of Newfoundland and Labrador, and are rare in occurrence. Lake chub typically migrate from lakes to tributary streams for spawning in early spring along rocky substrate and grow to roughly 23 cm in length once matured. Diet is primarily comprised of insects (Government of Newfoundland and Labrador, 2024).

Round whitefish (*Prosopium cylindraceium*) also inhabit ponds and streams in Labrador but have not been reported north of the Fraser River, located west of Nain (Bradbury, Roberge, and Minns, 1999). Spawning occurs in November and December, in inshore areas of lakes, and river mouths. Spawning substrate is generally composed of gravel or rubble bottom, in shallow water (< 1 m in depth). After hatching, young remain on the bottom of the spawning area and disperse within two to three weeks.

Lake whitefish (*Coregonis clupeaformis*) are a schooling species found in cool water, often near the bottom of deep lakes. Lake whitefish eat mollusks, insect larvae, amphipods, leeches, and sometimes small fish. Lake whitefish are also a source of food for Northern pike, lake trout, and burbot. Spawning occurs in November-December when waters reach roughly 7.8 °C, which may only occur ever few years. Spawning substrate is normally rocky bottom or shoals (Government of Newfoundland and Labrador, 2024).

Northern pike (*Esox Lucius*) occur in all provinces; however, do not occur on the island of Newfoundland. Northern pike prefer clear, warm, slow-moving, heavily-vegetated rivers, or warm, weedy bays, or lakes. Spawning occurs in spring after first ice melt and within heavily vegetated bays, lakes and inlets; often, spawning continues for several days. Northern pike have a generalist diet (Government of Newfoundland and Labrador, 2024).

White suckers (*Catostomus commersoni*) cover a wide range of habitat types, from rocky pools, to riffles of headwaters, to larger lakes. They normally occupy small, clear, cool creeks and small to medium-sized rivers. As nocturnal feeders, white suckers feed on insect larvae, mollusks, and other invertebrates. Spawning occurs in spring in gravelly streams when stream temperatures reach 10 °C (Government of Newfoundland and Labrador, 2024).

It should be noted that the introduced brown trout (*Salmo trutta*) presence is documented as being restricted to the Avalon Peninsula and Central Region of Newfoundland (Government of Newfoundland and Labrador, 2024); therefore, it is unlikely to be present within the LSA. Spawning conditions for brown trout are similar to those for brook trout. Brown trout can also be anadromous or non-anadromous).

4.7.3.1.2 Field Surveys

A total of 57 watercourses and waterbodies were assessed for fish and fish habitat during the 2023 field surveys (Figure 4.7-2; Table 4.7-5). Field assessments included three detailed assessments, nine abbreviated assessments, Blowhole Pond minnow trapping, and the remaining watercourses had channel width (where applicable) and photos collected[3]. Samples were collected from select watercourses receiving detailed assessments (WC-05, WC-10, and WC-12), for surface water quality, benthic invertebrate community, and fish age. A field photo log, habitat assessment reach information, laboratory analysis results, and fish age data are provided in Appendix F.

[3] WC = Data collection during the FAFH field program; WC-new = data collected during the wildlife field program; WS = data collected during the wetland survey field program.

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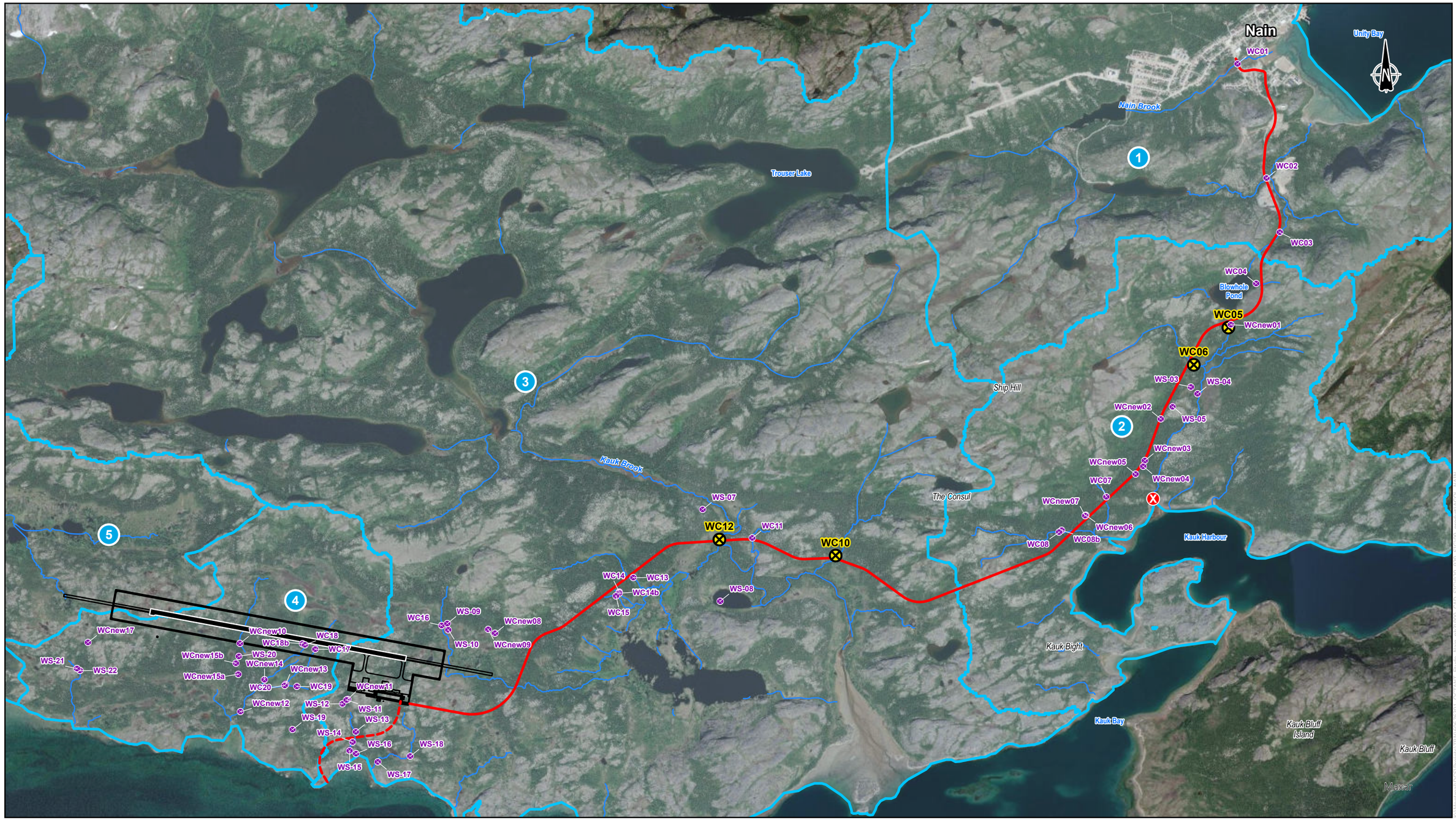
kavamanga government

NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION



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Project Component
- Access road
- Temporary access road
- Airport footprint
- Runway

Field Assessed Watercourses
- Watercourse crossing detailed survey
- Visited watercourse - fish habitat survey (WC) and Wetland survey (WS)
- Fish barrier

Hydrography
- Watercourse
- Regional Study Area (RSA) - Project intersecting catchment

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Figure 4.7-2

Visited Watercourse -
fish habitat survey (WC) and Wetland survey (WS)

AECOM

Table 4.7-5: Assessment of Watercourses and Waterbodies (Blowhole Pond) in the LSA

Feature ID	Assessment Type	Rationale for Limited Assessment	Data Collected
WC-01 (Nain Brook)	Visual	Existing road with existing crossing structure.	-
WC-02 (Annainak Brook)	Visual	Existing road with existing crossing structure.	-
WC-03 (Annainak Brook Tributary)	Abbreviated (no electrofishing)	Likely seasonal flow. Fish barrier documented downstream of crossing (waterfall > 1 m)	Flow data
WC-04	Visual	Draining to Blowhole Pond. Gradient > 30%	-
Blowhole Pond	Baited minnow traps	Understood to be non-fish bearing (TEK) but Project avoidance and mitigation measures will ensure no Project impacts to waterbody.	Fishing effort
WC-01-new	Visual	Flooded fen feeding to WC-05 or Blowhole Pond.	-
WC-05 (Blowhole Pond Outlet)	Detailed	-	Habitat info, surface water chemistry, benthic invertebrate community, fishing effort
WC-06	Abbreviated	Began detailed survey. Assessed for downstream barrier and found gradient >30%. No further assessment.	Habitat info, flow data, fishing effort
WC-new-02	Visual	Small channel/poor channel definition or intermittent channel, drains into wetland.	-
WC-new-03	Visual	Small channel/poor channel definition or intermittent channel, drains into wetland.	-
WC-new-04	Visual	Small channel/poor channel definition or intermittent channel, drains into wetland.	-
WC-new-05	Visual	Small channel/poor channel definition or intermittent channel, drains into wetland.	-
WC-07	Visual	Waterfall over bedrock, possible fish barrier.	-
WC-new-06	Visual	Small channel/poor channel definition or intermittent channel, gradient ~20%.	-
WC-new-07	Visual	Small channel/poor channel definition or intermittent channel.	-
WC-08	Abbreviated (combined with WC-08b)	Small channel, potentially predominantly groundwater fed stream (cold), no fish captured.	Flow data, surface water chemistry, fishing effort
WC-08b	Abbreviated (combined with WC-08)	-	-
WC-10 (Kauk Brook Tributary)	Detailed	-	Habitat info, flow data, surface water chemistry, benthic invertebrate community, fishing effort, fish age

Feature ID	Assessment Type	Rationale for Limited Assessment	Data Collected
WC-11 (Kauk Brook Tributary)	Visual	Small channel/poor channel definition or intermittent channel, draining into wetland complex.	-
WC-12 (Kauk Brook Mainstem)	Detailed	-	Habitat info, flow data, surface water chemistry, benthic invertebrate community, fish capture, fish age
WC-13	Visual	Small channel/poor channel definition/intermittent channel, drains into wetland	-
WC-14	Visual	Wet seep going through fen	-
WC-14b	Visual	Wet seep going through fen	-
WC-15	Visual	Wet seep going through fen	-
WC-new-08	Visual	Small channel/poor channel definition/intermittent channel	-
WC-new-09	Visual	Small channel/poor channel definition/intermittent channel	-
WC-16	Visual	Intermittent watercourse	-
WC-new-10	Visual	Small channel/poor channel definition/intermittent channel. Drains to wetland.	-
WC-new-11	Abbreviated (no electrofishing)	Approx. 400 m from ocean. Drains to wetland complex, close proximity to watercourse that drains to ocean. Channelized but shallow in places.	Flow data
WC-new-12	Visual	Small channel.	-
WC-new-13	Visual	Fen	-
WC-new-14	Visual	Small channel/poor channel definition/intermittent channel	-
WC-new-15a	Visual	Small channel/poor channel definition/intermittent channel.	-
WC-new-15b	Visual	Small channel/poor channel definition/intermittent channel.	-
WC-19	Visual	Fen	-
WC-new-17	Abbreviated (no electrofishing)	Small channel/poor channel definition/intermittent channel.	Flow data
WC-17	Abbreviated (no electrofishing)	Small channel/poor channel definition/intermittent channel.	Flow data
WC-18	Abbreviated (no electrofishing)	Small channel/poor channel definition/intermittent channel.	Flow data
WC-18b	Abbreviated (no electrofishing)	Small channel/poor channel definition/intermittent channel.	Flow data
WC-20	Visual	Fen	-
Wetland Survey Observations for FAFH			

Feature ID	Assessment Type	Rationale for Limited Assessment	Data Collected
WS-03 through 05, WS-07 through 20	Visual	Poor channel definition/intermittent channel.	-

Note: WC = collected during FAFH field program; WC-new = collected during wildlife field program; WS = collected during wetland survey field program.
Watercourses that were indeterminant of being unique or part of another nearby watercourse were denoted as 'a' and 'b' of that watercourse ID.

Fish Sampling

Fish sampling effort was expended at five locations, information for which is provided in Table 4.7-6. No captures were recorded in Blowhole Pond, WC-05, and WC-06, despite fish habitat presence. For these watercourse crossings, downstream fish passage barriers were observed by the field crew (gradient >30%), suggesting the reaches at the watercourse crossings are potentially non-fish bearing. Additionally, no fish were captured at WC-08; however, field crews initially assessed the watercourse crossing as likely fish bearing, as no downstream barrier to fish passage was observed and suitable fish habitat was believed to be present at the crossing. Following fish sampling effort, WC-08's reach at the proposed watercourse crossing is classified as potentially non-fish bearing.

Fish were captured at two WCs, WC-10 and WC-12, confirming fish bearing status. Fish data collected during the FAFH field program is summarized in Table 4.7-6 below. Scales from a sample of captured brook trout were submitted to the Canadian Rivers Institute for ageing; results are presented in Appendix F4. WC-12 is on Kauk Brook mainstem and WC-10 is a tributary of Kauk Brook. The fish species captured were brook trout and three-spine stickleback. Brook trout captured were all young-of-year (0+) or older. Stickleback were not aged. All captured fish were returned to the reach they were captured from.

In addition to confirmed fish-bearing WCs (WC-10 and WC-12), two WCs are assumed fish-bearing, WC-01 and WC-02. WC-01 and WC-02 were not field assessed due to existing road and crossing structures being present, which do not require upgrading for the Project. With WC-01 and WC-02's flow volume, width, and naturalized condition, proximity to the ocean, and presence of no fish barriers, it is assumed that these watercourses provide fish habitat; therefore, fish presence is expected.

Notable species that were not caught at the watercourse crossings, include the culturally important Arctic char and Atlantic salmon. Arctic char could reasonably be expected to inhabit in the major waterbodies of the LSA and adults may have still been in the marine environment at the time of the 2023 FAFH field program (not yet begun their upstream migration for spawning). However, it should be noted that Arctic char were captured in the Kauk Brook Estuary, 1 km west of Kauk Brook's terminus. Collected data, including results of ageing structures, are available in Appendix F4. Regionally, Atlantic salmon have not been documented any further north than the Fraser River to the south of the Project, and therefore, lack of catch in the LSA for this species is expected.

Table 4.7-6: Fish and Fish Habitat Field Survey Summarized Data

Watercourse crossing	Capture Method	Effort	Species	Number Caught	Fork Length Range (mm)	Weight Range (g)	Age Range (yrs)*	Maturity
Blowhole Pond	Minnow trapping	1 day	No fish captured	-	-	-	-	-
WC-05	Electrofishing	487 sec	No fish captured	-	-	-	-	-
WC-06	Electrofishing	421 sec	No fish captured	-	-	-	-	-
WC-08	Electrofishing	576 sec	No fish captured	-	-	-	-	-
WC-10	Electrofishing	1,540 sec	Brook trout	15	39-140	2-28	0-1+	Juvenile
WC-12	Electrofishing	1,020 sec	Brook trout	33	32-144	<1-35	0-1+	Juvenile

			Three-spine stickleback	2	52-58	<1-1	Unknown	Unknown

* Ageing determined by laboratory analysis of scales.

Fish Habitat and Supporting Media

Watercourse crossing habitat (Table 4.7-7), water quality (Table 9 and Appendix F3) and benthic invertebrate community (Appendix F3) were collected for select watercourse crossings receiving detailed assessments, including WC-05, WC-0, and WC-12.

Cover type, substrate type and habitat types varied, providing a range of habitats (Table 4.7-7) outlines habitat features at the time of the FAFH field survey. The highest water flow recorded was at WC-10 (0.668 m/s).

Table 4.7-7: Watercourse crossing Field Fish Habitat Characteristics Data

WC ID	Section Length (m)	Bankfull Width (cm)	Max. Depth (cm)	Flow (m/s)	% Cover Type	% Substrate Type	% Habitat Type[1]	Vegetative Cover
WC-03	NA	NA	NA	0.031-0.361	NA	NA	NA	NA
WC-05	98	190	30	0.013-0.098	60% Overhanging 5% Instream 4% Instream vegetation 7% Canopy	70% Boulder 10% Rubble 15% Cobble 5% Sand	30% Pool 30% Run 35% Riffle 5% Mini-falls	Overhanging: *Myrica gale*, graminoid spp., glandular birch (*Betula glandulosa*) Canopy: eastern larch (*Larix laricina*), green alder (*Alnus alnobetula*) Instream: aquatic moss spp.
WC-06	43	80	6	0.097-0.278	70% Overhanging 90% Canopy	10% Boulder 25% Gravel 65% Clay/Silt	25% Pool 70% Run 5% Riffle	Overhanging and canopy species
WC-08	NA	NA	NA	0.062-0.540	NA	NA	NA	NA
WC-10	NA	NA	NA	0.001-0.668	98% Canopy	80% Boulder 15% Cobble 5% Sand	10% Pool 75% Rapids 15% Falls	Canopy: green alder
WC-11-new	NA	NA	NA	0.042-0.086	NA	NA	NA	NA
WC-12	54	880	62	0.009-0.309	70% Overhanging 2% Instream vegetation 10% Canopy	2% Boulder 15% Cobble 3% Gravel 77% Sand 3% Clay/Silt	10% Riffle 90% Steady	Overhanging: *Myrica gale*, willow (*Salix*) spp. Canopy: eastern larch, black spruce (*Picea mariana*) Instream: aquatic moss spp.
WC-17-new	NA	NA	NA	0.060-0.326	NA	NA	NA	NA
WC-17*	NA	NA	NA	0.062-0.163	NA	NA	NA	NA

WC ID	Section Length (m)	Bankfull Width (cm)	Max. Depth (cm)	Flow (m/s)	% Cover Type	% Substrate Type	% Habitat Type[1]	Vegetative Cover
WC-18a*	NA	NA	NA	0.009-0.145	NA	NA	NA	NA
WC-18b*	NA	NA	NA	0.021-0.120	NA	NA	NA	NA

Note: % represent percent of section surveyed

NA denotes Not Assessed

** denotes wetland drain flow data*

[1]as characterized by McCarthy et al. 2007

Water Quality Sampling Results

Results from water samples collected at four WCs (WC-05, WC-08, WC-10 and WC-12) are shown in Table 4.7-8 (field pH and temperature), and Appendix F3. Results were screened under the CCME Water Quality Guidelines (WQG) for the protection of Aquatic Life.

All values met CCME Water Quality Guidelines (WQG).

Table 4.7-8: Field *In-situ* Water Quality Measurements

Measurement	Unit	WC-08	WC-05	WC-12	WC-10
pH	-	6.78	6.88	7.40	7.24
Temperature	^{0}C	7.80	16.6	15.7	9.50

Benthic Invertebrate Sampling Results

Benthic Invertebrates community information helps to inform of the food source presence for fish as well as provide an indication of disturbance or harsh conditions (which may be natural or due to disturbance). Benthic invertebrate summary statistics are provided in Table 4.7-9. WC-05 had a different community composition to WC-10 and 12. WC-10 and WC-12 are part of the same watershed, whereas WC-05 is in a watershed that is suspected to be non-fish bearing (while WC-10 and WC-12 are confirmed fish bearing).

Table 4.7-9: Benthic Invertebrate Summary Statistics

Water Crossing	Total Richness (number of taxa at family level)	Total Abundance (number of individuals collected)	% EPT (proportion of EPT to all individuals)*
WC-05	10	349	18.6
WC-10	13	179	43.0
WC-12	13	127	22.0

*Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trihoptera (caddisflies).

Evaluation of Salmonid Habitat

Based on the above fish habitat characteristics, water quality sampling, and benthic invertebrate sampling conducted, evaluations for salmonid (brook trout, Arctic char) habitat suitability have been provided below for WC-05, WC-10, and WC-12:

- WC-05: Although WC-05 provides suitable habitat for salmonids, including sufficient hydraulic capacity, adequate water quality, presence of food (benthic invertebrates), favourable instream habitat types (e.g., riffle, pool) and cover, including undercut banks, a barrier to fish passage (gradient >30%) was identified below the road alignment, being the potential cause of no fish captured during sampling effort and no fish being documented by the community upstream in Blowhole Pond.
- WC-10: This watercourse at the sampling location provides suitable habitat for salmonids, including hydraulic conditions, water quality, food, pool and cover habitat, including undercut banks. Juvenile brook trout were captured, confirming presence of adequate rearing habitat. With the presence of no gravel at this location, it likely limits the potential for notable spawning by salmonids.
- WC-12: This watercourse at the sampling location provides suitable habitat for salmonids, including hydraulic conditions, water quality, food, riffle and steady habitat, and cover, including undercut banks. Juvenile brook trout were captured, confirming presence of adequate rearing habitat. Suitable hydraulic conditions and gravel presence allows for the potential for overwintering and spawning by brook trout. Although not detected, suitable conditions are present for all life stages of Arctic char.

4.7.3.1.3 Quality Assurance and Quality Control

From the lab water sample duplication analysis (WC-08), none of the measured parameters exceeded the QC limit. From the field water sample duplication analysis (WC-12), two measured parameters did not meet the data quality objective (i.e., RPD greater than 40%): ion balanced percent difference, and total potassium (Appendix F3). The potassium result is less than three times the laboratory detection limit, and therefore meets the data quality objectives.

4.7.3.2 Marine Fish

4.7.3.2.1 Desktop Information

The proposed Project is adjacent to the Labrador marine coastline (Figures 4.7-3 and 4.7-4). The distance separating the proposed runway centerline to the shoreline ranges from a minimum of approximately 350 m to a maximum of 750 m. The ground surface elevation along the proposed runway centerline ranges from a minimum of approximately 30.6 m above sea level (asl) to a maximum of 55 m asl. In Nain, close to KP 1+500, the proposed access road comes to within 50 m of the ocean (Figure 4.7-3). The maximum distance separating the proposed access road to the marine shoreline is 2.2 km, where the proposed road crosses Kauk Brook. The ground surface elevation along the proposed access road ranges from a minimum of approximately 8.3 m asl in Nain and 0 m asl at the road terminus, to a maximum of 52.8 m asl on the hillside running along Blowhole Pond (Aivek Stantec 2023). Near the terminus of the proposed access road at approximately KP 12+000, an approximately 1 km long temporary access road, is proposed to connect the airport to the coastal staging area during construction (Figure 4.7-4).

The Project site is located within the Coastal Barrens ecoregion, which spans three-quarters of the Labrador Coast and is characterized by long, sheltered inlets along the coast, short and cool summers, long and cold winters, and landscape dominated by exposed bedrock and sparse deposits of soil (Riley, Notzl, & Greene, 2013). The coastal area in the vicinity of Nain comprises moderate to steep sloping bedrock and intermittent intertidal flats. These landforms have been shaped largely by sea ice action, as well as waves and wind over time (Gilbert *et al*., 1984; PAA 2008).

Coastal Marine Habitat Features

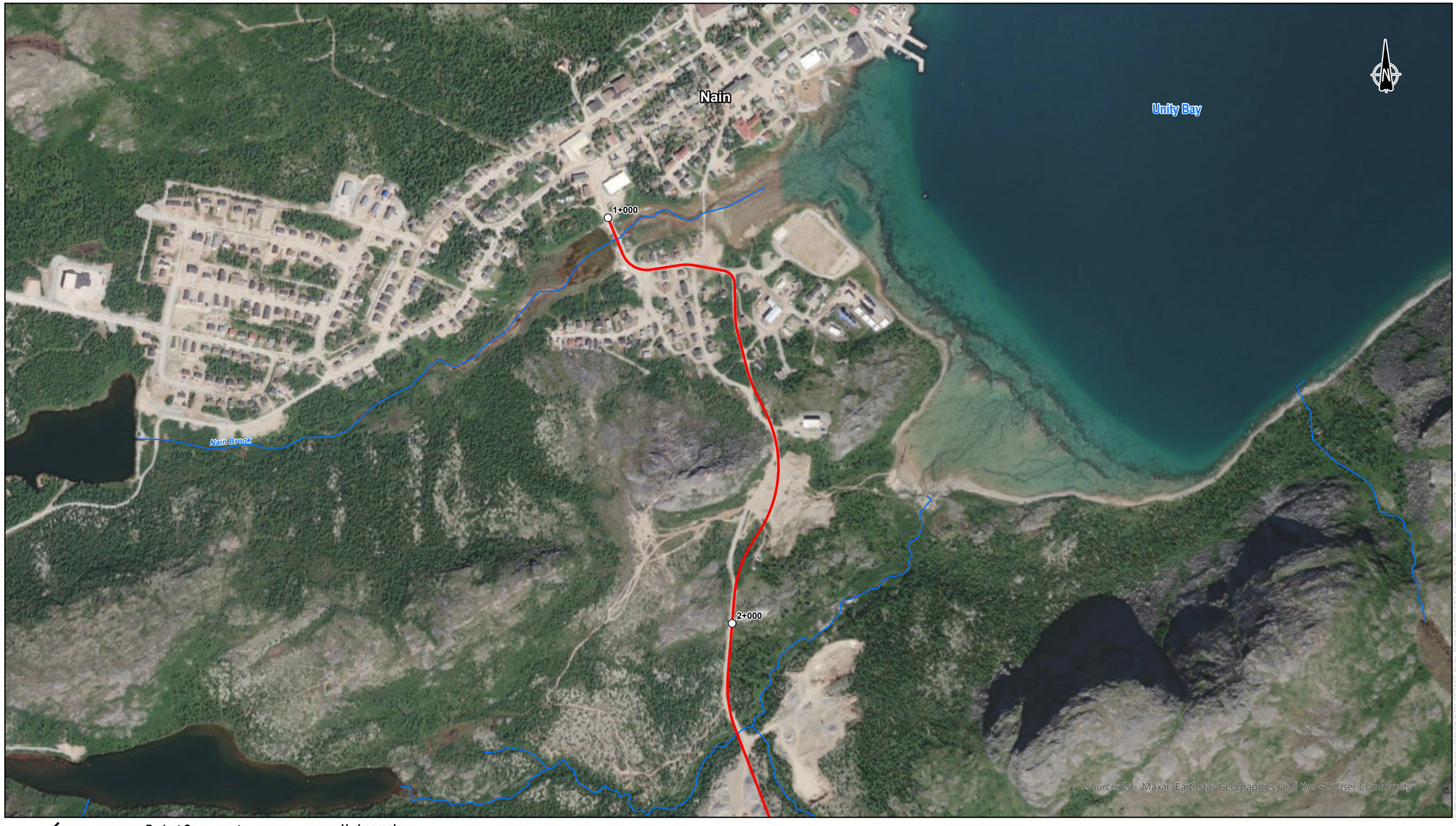
The coastal marine habitat is largely a function of sea ice action and interaction with the shoreline. There are various marine species which occur along the shorelines and further offshore along the coasts of the

Project alignment. The exposed bedrock shores above high water is considered the ‘barren zone’ where few species may colonize due to the substrate type, and the disturbance caused by waves, wind and ice (Gilbert et al., 1984).

The shoreline environment of the proposed barge-landing site comprises a bedrock surface which extends eastward; the shoreline west of the proposed barge-landing site comprises a beach with finer sediments as well as scattered boulders and backshore vegetation (Appendix F1). A brief inspection of the bedrock at the proposed barge-landing site appeared largely void of intertidal algae species and displayed limited intertidal habitat components (i.e. limited algae, smooth continuous bedrock with little complexity).

The beach intertidal habitat to the west of the barge-landing site; however, showed evidence of greater potential habitat for marine species by way of accumulated algae and/or kelp on the shoreline, more diverse substrates, and mature backshore vegetation. Some species of encrusting calcified algae may be found in this zone. Intertidal flat areas, as observed adjacent to the proposed coastal access point for the Project, are considered more biologically productive due to the variation in substrate types. Ice action results in the movement of post-glaciation boulders throughout the mid-intertidal zone, typically averaging 1-2 m in diameter, which may be deposited on intertidal flats and serve as substrate for anchoring organisms.

The high intertidal zone on the flats is largely comprised of muddy substrate and devoid of biota; however, occasional gastropods have been reported, such as *Littorina* spp., as well as encrusting algal species (Gilbert et al., 1984). The boulders within the mid to low intertidal zone of the intertidal flats are well colonized with green and brown algal species (e.g., *Fucus* sp.), barnacles, gastropods and blue mussels. Larger kelps, such as *Laminaria*, and echinoderms, such as sea stars and sea urchins, occur deeper into the subtidal zone (Gilbert et al., 1984).



Project Component

- Kilometer point
- Access road

Hydrography

- Watercourse

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Figure 4.7-3

Project Alignment and Marine Context - Start of Alignment

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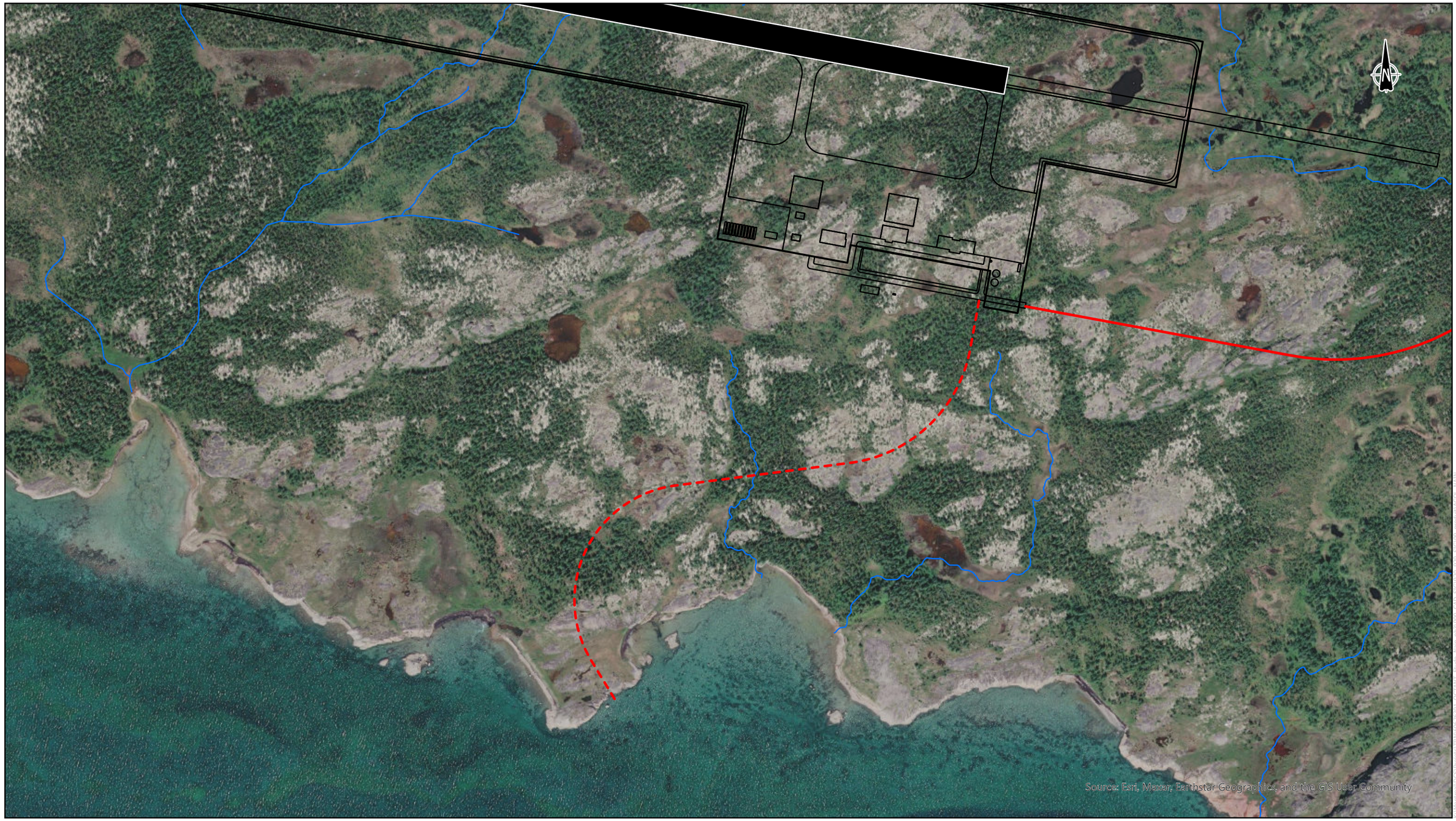

Project Component
- Access road
- Temporary access road
- Airport footprint
- Runway

Hydrography
- Watercourse

1:6 000

0 100 200 m

NAD 1983 UTM Zone 20N

Figure 4.7-4

Project Alignment and Marine Context -
End of Alignment and Temporary Access Road

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4.7.3.2.2 Nain Area Ecologically and Biologically Significant Area

Beyond the RSA, Nain and the surrounding area fall with the 'Nain Area' Ecologically and Biologically Significant Area (EBSA), one of 15 EBSA's identified in the Newfoundland and Labrador Shelves Bioregion study area (DFO, 2013a).[4] The Nain Area EBSA includes five bays (Webb Bay, Tikkoatokak Bay, Unity Bay, Akpiksai Bay and Voisey's Bay) that converge in an area along the Labrador coastline, and is the drainage basin for the Fraser River. Community-based Coastal Resource Inventory data identified a number of areas where aggregations of groundfish, pelagic fish, shellfish, marine mammals and aquatic plants occur within the boundaries of this EBSA. A capelin spawning beach was identified at an unspecified beach in the Nain Area EBSA based on both scientific data and Traditional Ecological Knowledge (TEK) (DFO, 2013a).

Unity Bay and surrounding areas are also noted to be highly productive for Arctic char, contributing significantly to juvenile rearing, as well as juvenile and adult feeding. Additionally, a population of spawning Atlantic salmon occurs in this EBSA. The land-fast ice habitat in the Nain area is relatively unique and important to overall productivity of the EBSA. The many coastal islands anchor and protect the land-fast ice from excessive compression by pack ice while the pack ice itself protects the coast from winter and early spring storm surges (DFO, 2013a). This land-fast ice habitat is an important overwintering and breeding area for ringed seals and hunting grounds for polar bears. Geomorphological features, known as boulder flats and boulder barricades, are also common in this area and are a result of ice transporting boulders from the shore into the intertidal zone. Voisey's Bay also has the largest sand delta in the area, which is an important feature for seabirds (DFO, 2013a).

Potential Species Occurrences

A desktop search of marine and anadromous SAR species with the potential to occur in marine environments within the Project LSA are included in Table 4.7-10. Listed species have been sourced from the DFO *Aquatic Species at Risk* collection, the DFO *Aquatic Species at Risk Map*, as well as from published literature (DFO, 2013a; DFO, 2020; DFO 2022b).

[4] Ecologically and Biologically Significant Areas (EBSAs) are geographically or oceanographically discrete areas that provide important services to one or more species/populations of an ecosystem or to the ecosystem as a whole, compared to other surrounding areas or areas of similar ecological characteristics.

Table 4.7-10: Marine Species with Potential to Occur in the Vicinity of the Project Area

Common Name	Scientific Name	Conservation Status	Likelihood of Species Occurrence within Project Area
Cetaceans			
Orca (Northwest Atlantic population)	*Orcinus orca*	Special Concern (COSEWIC, 2008)	Low
Minke whale	*Balaenoptera acutorostrata acutorostrata*	Not at Risk (Government of Canada 2024b)	Moderate
Blue whale (Atlantic population)	*Balaenoptera musculus*	Endangered (COSEWIC, 2012; Government of Canada 2024b)	Low
Harbour porpoise	*Phocoena phocoena*	Special Concern (COSEWIC 2022)	Moderate
Fin whale (Atlantic population)	*Balaenoptera physalus*	Special Concern (COSEWIC 2019)	Low
Beluga whale – Eastern Hudson Bay population	*Delphinapterus leucas*	Threatened (Government of Canada 2021)	Moderate
Pinnipeds			
Ringed seal	*Pusa hispida*	Special Concern (Government of Canada 2023b)	Low
Fish			
Acadia redfish	*Sebastes fasciatus*	Threatened (COSEWIC 2010a)	Low
Atlantic cod	*Gadus morhua*	Endangered (COSEWIC 2010b)	Low
Atlantic sturgeon (St. Lawrence populations)	*Acipenser oxyrinchus*	Threatened (COSEWIC 2011)	Moderate
Northern wolffish	*Anarhichas denticulatus*	Threatened (COSEWIC 2012a)	Low
Spotted wolffish	*Anarhicas minor*	Threatened (COSEWIC 2012b)	Low
White hake	*Urophycis tenuis*	Threatened (COSEWIC 2013)	Low
Capelin	*Mallotus vilosus*	NA	**notable species
Arctic char*	*Salvenlinus alpinu*	NA	Moderate **notable species
Atlantic salmon*	*Salmo salar*	Not at Risk (Government of Canada 2013)	Moderate ** notable species
Invertebrates			
Blue Mussel	*Mytilus edulis*	NA	High

Source: DFO 2021; DFO 2022b

NA = Not Active.

** Refer to Section 4.7.3.1 for more information.*

4.7.3.2.3 Cetaceans

The northwest Atlantic population of orca (*Orcinus orca*) is federally listed as Special Concern (COSEWIC 2008). The distribution of orcas in the northwestern Atlantic and eastern Canadian Arctic have been observed feeding on marine mammals and fish. There is a relative lack of information regarding northwestern Atlantic and eastern Canadian Arctic orcas compared to Pacific populations, including information on feeding patterns and distribution ranges (COSEWIC 2008).

Minke whales (*Balaenoptera acutorostrata acutorostrata*) prefer temperate to boreal waters but are also found in tropical and subtropical areas. They feed most often in cooler waters at higher latitudes and can be found in both coastal/inshore and oceanic/offshore areas. Minke whales migrate seasonally; however, some animals and stocks have resident home ranges and are not highly migratory. The distribution of minke whales varies by age, reproductive status, and sex. Older mature males are commonly found in the polar regions in and near the ice edge—often in small social groups—during the summer feeding season. Mature females will also migrate farther into the higher latitudes, but generally remain in coastal waters. Immature animals are more solitary and usually stay in lower latitudes during the summer. Minke whales are usually sighted individually or in small groups. Minke whales feed by side-lunging into schools of prey and gulping large amounts of water, feeding on crustaceans, plankton and small schooling fish (NOAA 2022).

The white-beaked (*Lagenorhynchus albirostris*) dolphin is found only in the north Atlantic, in temperate and subarctic waters. The Atlantic white-sided dolphin (*Lagerhynchus acutus*) is also observed commonly along the western coast of Labrador (DFO 2021).

The harbour porpoise (*Phocoena phocoena*) tends to be sighted on continental shelves in cold temperate and sub-polar waters of the Northern Hemisphere. This species has a conservation designation due to the species' particular susceptibility to bycatch in fishing gear, despite the population's current abundance (COSEWIC 2022). The harbour porpoise has a small, triangular dorsal fin mid-back, with flanks coloured mottled greyish white, fading to almost white ventrally. A black "cape" extends over the dorsal and lateral surfaces. Harbour porpoises are sometimes found in bays and harbours, particularly during the summer. They range across the entire continental shelf and occur in deep offshore water beyond the shelf break (Government of Canada 2023c).

The Atlantic population of the fin whale (*Balaenoptera physalus*) is listed as Special Concern Coby COSEWIC (COSEWIC 2019). Northern hemisphere animals reach about 23 m long and 45 t and are dark grey or brownish-grey dorsally and on the sides, shading to white ventrally. Some individuals have a V-shaped chevron on the dorsal side, behind the head (COSEWIC 2019). On the Canadian east coast, fin whales are found in coastal, on-shelf and off-shelf waters, and are associated with a wide variety of bathymetric features (COSEWIC 2019). Almost 90% of caught fin whales in Atlantic Canada were taken off Labrador and the northeast coast of Newfoundland (COSEWIC 2019). Fin whale occurrence is often associated with productive oceanic fronts that contain high densities of euphausiid crustaceans and herring (COSEWIC 2019). Fin whales appear to move offshore and possibly southward in winter; however, they are not completely absent from Canadian waters in winter. Calls have been recorded year-round as far north as the mid-Labrador coast (COSEWIC 2019). This suggests that courtship, mating and potentially calving take place in Canadian waters (COSEWIC 2019). Fin whales may be present in the marine area that is adjacent to the Project Area at various times of year.

Three distinct populations of beluga whale (*Delphinapterus leucas*) have the potential to occur in waters adjacent to the Project: Western Hudson Bay, Eastern Hudson Bay, and James Bay. Of these, the Western Hudson Bay and the James Bay populations are federally considered to have healthy stock numbers and robust communities; however, the Eastern Hudson Bay population is federally listed as Threatened (Government of Canada 2021). It is theorized that harvesting, reduced sea ice and noise from increased vessel traffic in the Labrador Sea and the Hudson Strait have contributed to population declines. These beluga populations winter and migration ranges extend to the marine environment adjacent to the Project Area. The Hopedale Saddle EBSA offshore from the Project Area is considered a unique overwintering area for the Eastern Hudson Bay beluga population (DFO 2013a). Beluga whales can be highly mobile and exploit a variety of habitat types. They can be found in various offshore, coastal or estuarine environments at varying depths and with varying ice cover conditions. Beluga diets are

similarly generalized, comprising a variety of fish, crustaceans, cephalopods, worms, and gastropods (Government of Canada 2021).

Humpback whales (*Megaptera novaeangliae*) of the Atlantic occur from the West Indies to Greenland. Their summertime distribution commonly brings them to the east and south coasts of Newfoundland, off southeastern Labrador, adjacent to Grand Banks and into the Gulf of St. Lawrence for productive feeding grounds (Government of Canada 2023d). Their fall migration takes them south to tropical waters for breeding. Humpback whales form distinct populations and often occupy areas to coastlines. They have one of the greatest migration routes of any mammal, some populations swimming 8,000 km between summer and winter habitats. Humpbacks feed on krill and small fish, feeding through baleen lates (NOAA 2024).

4.7.3.2.4 Pinnipeds

Of all global harp seal (*Phoca groenlandica*) populations, the northwest Atlantic harp seal population is the largest. The Front herd of this population is known to breed off the coast of southern Labrador and northern Newfoundland. Harp seals have a generalist diet, consisting of shrimp, crustaceans, prawns and various fish species (Government of Canada 2022).

Ringed seals (*Pusa hispida*) are federally listed as Special Concern. Ringed seals have a circumpolar distribution over Arctic and subarctic waters, relying on sea ice as habitat. Prime breeding habitats occur on stable ice, which tends to be land-fast ice occurring over relatively shallow waters. Ringed seals have a varied diet; however, most common prey include pelagic schooling fish such as Arctic cod, as well as amphipods and other crustaceans (Government of Canada 2023b).

Bearded seals (*Erignathus barbatus*) have a circumpolar distribution, and generally inhabit areas of relatively shallow water that are at least seasonally ice-covered, typically occupying ice habitat that is broken and drifting with natural areas of open water. Bearded seals primarily feed on or near the sea bottom on a variety of invertebrates and some fish. Foraging depths generally do not exceed 150 m (NOAA 2023).

4.7.3.2.5 Fish

The Newfoundland and Labrador population of Atlantic cod (*Gadus morhua*) is federally listed as Endangered (COSEWIC 2010b). The historical population size has been reduced by 99% since the 1960s, with little indication for recovery. The cause for the population reduction is believed to be the result of overfishing, natural predation, and ecosystem changes (COSEWIC 2010b). Atlantic cod inhabit waters of the continental shelves of the Northwest and Northeast Atlantic Ocean. Juveniles prefer nearshore waters with alga and kelp for avoiding predation before diversifying habitat requirements with age, likely linked to food availability and water temperatures (COSEWIC 2010).

The distribution of the St. Lawrence populations of Atlantic sturgeon (*Acipenser oxyrinchus*) primarily extends from the Gulf of St. Lawrence into the Atlantic Ocean and north until Ungava Bay, and along the northeastern coast of Newfoundland in the south (COSEWIC, 2011). Atlantic sturgeon spawn in fresh water and forage in marine environments, feeding primarily on benthic invertebrates and occasionally smaller fish. The St. Lawrence estuary provides important habitat for Atlantic sturgeon for breeding and feeding juveniles. Atlantic sturgeon have been recorded to grow up to 148 kg, and begin migrating out to sea once they reach approximately 80 cm to 120 cm in length, and can live for several decades (COSEWIC, 2011). Atlantic sturgeon have the potential to forage in the Project Area, however, are unlikely to be impacted by Project activities.

Northern wolffish (*Anarhichas denticulatus*) is listed as Threatened federally. Wolffish are large marine fishes characterized by the prominent, canine-like teeth in the front of the jaws, the elongate body and the lack of pelvic fins (COSEWIC 2012a). The northern wolffish is a thick heavy-set fish with a heavy head, pointed snout and small eyes. It is greyish to dark chocolate in colour with a light violet sheen, often with several indistinct dark spots or bars. It can reach 145 centimetres (cm) in length and weigh almost 20 kilograms (kg) (COSEWIC 2012a). Northern wolffish are found offshore in cold (lower than 5°C), continental shelf waters at depths varying between the surface to 900 m, but most often at depths greater

than 100 m (COSEWIC 2012a). The northern wolffish is a benthopelagic fish, meaning that it feeds mainly on benthic (bottom-living) crustaceans and invertebrates, and occurs in the open sea. The species is non-schooling, non-migratory and somewhat territorial, as they make nests and generally guard the eggs (COSEWIC 2012a). Due to these specific habitat preferences, it is unlikely that the northern wolffish would be found in the coastal marine area adjacent to the Project Area.

Spotted wolffish (*Anarhicas minor*) is listed as Threatened federally. The spotted wolffish has a large head and a rounded snout and a long dorsal fin. It is yellowish or greyish brown to dark brown in colour, with several distinct spots on its body (COSEWIC 2012b). The species can be distinguished from the other two species that occur in the Atlantic by its dark spots on the body, and its firm musculature. It may reach a length of 150 cm (COSEWIC 2012b). Spotted wolffish occur in cold (lower than 5°C), open continental shelf and slope waters between 50 and 600 m deep, over sand or mud bottoms with big boulders close by (COSEWIC 2012b). The spotted wolffish is a bottom-dwelling predatory fish that feeds mainly on echinoderms such as starfishes, but also eats crustaceans, molluscs and other fish (COSEWIC 2012b). Due to these specific habitat preferences, it is unlikely that the spotted wolffish would be found in the coastal marine area adjacent to the Project Area.

Capelin (*Mallotus vilosus*) have a circumpolar distribution and along the northwestern Atlantic, range from western Greenland to the Hudson Bay area (Government of Canada 2017). Capelin are considered small fish with a typical length of 13-20 cm and serve as key forage species for various marine animals, such as for salmon, belugas, dolphins and seals. A capelin spawning beach has been reported within the Nain Area EBSA. Capelin have not been assessed by COSEWIC, nor listed under SARA (Oceana n.d.).

4.7.3.2.6 Invertebrates

Blue mussels (Mytilus edulis) are the predominant mussel species along the coast of Labrador and Nunatsiavut and were the subject of discussion during Community Engagement (date and time needed from engagement, or x-ref to report that documents this engagement). Blue mussels have a circumpolar distribution and occur in waters between 0-20 degrees Celsius, and are commonly found in intertidal and shallow subtidal zones (<20 m of depth) (DFO 2010). Ecological associations are inherent between the Nunatsiavut Inuit and marine habitats, knowing for example that rocky beaches harbour mussels, and that harvesting should not occur in August, when they are thought to be carrying toxins (Cuerrier et al. 2021). For the Nunatsiavut Labrador Inuit, mollusks, and more specifically mussels, make up a small portion of the harvesting catch, as there are various barriers to harvesting ranging from a lack of knowledge and equipment, to the intensive effort required for harvesting (Finner 2015). It is possible blue mussels could be located along the coastal adjacent to the existing airstrip and proposed new airport location.

4.7.3.3 Traditional Ecological Knowledge

Nain's marine ecosystems provide critical benefits to residents. For example, the estuaries in Nain are highly productive, providing a variety of marine and anadromous fish to residents (e.g., salmon, arctic char, trout, capelin, and snow crab) (Fisheries and Oceans Canada, 2021).

The Inuit in northern Labrador have a long history of fishing throughout Nunatsiavut. Fisheries serve as an important mechanism for cultural continuity as well as supporting livelihoods (Snook et al., 2022). Today, the Nunatsiavut Government grants licenses to Inuit households for commercial purposes (North Atlantic Salmon Conservation Organization [NASCO], 2012). Each Inuit household in Nain is granted one license with seven tags granted for salmon.

The Inuit in Nain and northern Labrador more broadly govern their traditional fishing practices through Labrador Inuit Food, Social and Ceremonial (FSC) fisheries. Though the FSC system is not a traditional Inuit governance system, the fisheries remain to be culturally significant for knowledge sharing and Inuit cultural preservation (Cadman et al. 2023). Nain’s FSC fishery mainly focuses on fishing arctic char though community members also fish other marine life such as rock cod (Dombrowski et al., 2013; NASCO, 2012). Fishing is typically carried out with gillnets and occurs between May and August (NASCO, 2012). Some community members take boats and establish camps on the islands north of Nain to spend weeks fishing. Though some of these fish are sold commercially, a significant portion of the catch is put into community freezers to support the local food system (Dombrowski et al., 2013).

5. Human Environment

The Human Environment section offers insight into how the Project might affect aspects of the environment directly relevant to human interaction within the study area. To comprehend these potential impacts, the Human Environment assessment examined population demographics, employment dynamics, housing conditions, community health and well-being, and the broader built environment. Understanding these factors is essential for evaluating current community conditions and predicting the Project's potential net effects on the human environment. In cases where negative consequences could arise, supplementary considerations were explored.

This section delineates these characteristics using data obtained through desktop research and insights garnered from human-environment interviews. These interviews, conducted with local community members and regional subject matter experts, validated existing conditions, the vision of the community, and evaluated the alignment or misalignment of the Project with future aspirations. By integrating perspectives from these diverse sources, we aim to identify potential impacts stemming from the Project on the human environment.

To effectively understand positively and negatively effect the human environment of affected communities, a variety publicly available data and information sources were used to understand and describe the human environment. These include the environmental desktop assessment, publicly available land claims documentation, government documents and data, community organization websites, and traditional resource use reports and studies completed for other projects and their EAs. Primary data was collected through interviews with Nain residents and subject matter experts to gather insights into existing community conditions and potential Project effects. Demographic data were sourced from Indigenous and Northern Affairs Canada (INAC) and Statistics Canada. However, it should be noted that data collection among Indigenous communities may be lower and inconsistent, leading incomplete statistical findings on Indigenous community profiles in Canada Additionally, some data from the 2021 census and 2012 Aboriginal Peoples Survey have been rounded or suppressed for confidentiality due to low response rates. Where information on Nain was limited, more general information on Nunatsiavut, Labrador North, Labrador Rural Secretariat Region, Royal Canadian Mounted Police (RCMP) Labrador District, or the Inuit of Canada has been provided, if available.

5.1 Project Parameters

Nain, nestled in the heart of Nunatsiavut, serves as a vital cultural cornerstone for the Inuit community. However, its remote location poses significant transportation challenges. Presently, Nain's future is at risk due to the deterioration of its current airstrip infrastructure. The urgency to replace these failing structures cannot be overstated, as the New Nain Airport is more than just a convenience; it is a critical lifeline for the community's survival. With climate change intensifying the vulnerabilities of the current airstrip, the need for a dependable transportation hub becomes increasingly urgent. The Human Environment assessment conveys the profound impact of unreliable air service on fundamental community needs like sustenance, employment, shelter, and healthcare. In the absence of a viable alternative, the Project is pivotal for community resilience.

This new airport not only increases capacity but also introduces advanced features, ensuring Nain's connectivity with neighboring regions and beyond. To support alignment with efficiency and community needs, the Human Environment assessment also addresses concerns voiced by Nain residents and Nunatsiavut stakeholders.

Human Environment includes Socio-Economic conditions, Indigenous Peoples and Human Health conditions, as described in Sections 5.4, 5.5, and 5.6.

5.2 Key Guiding Assumptions

The following guiding assumptions provide a framework for understanding the effects of the Project on the community and its surrounding environment.

The current airstrip will become non-functional in the near future, possibly within the 20 years because of rising sea levels resulting from the effects of climate change. Without a replacement airport, all aviation links to the community will be severed.

The Project represents a strategic initiative aimed at replacing the existing airstrip, thereby ensuring the uninterrupted provision of connectivity to the region.

Given the limited transportation options available in Nain, the absence of a viable airport alternative would severely restrict access leaving boat travel as the sole means of travel, rendering the region inaccessible in winter months when waterways are frozen.

Due to existing airstrip site limitations, there is currently no opportunity to update the existing infrastructure. Therefore, a new location is mandatory to enhance reliability and promote the safety of air travel within the region.

The proposed airport location, situated 12 km outside of town, represents the sole feasible option for the Project. Transport to and from the airport will be facilitated by the NG, minimizing logistical challenges associated with accessibility.

The Project will have a different flight path when compared to the existing airport; it will involve flights flying from the ocean east and west rather than over the community of Nain. It is presumed that decommissioning will only occur when a functional alternative is in place, thereby mitigating concerns related to the Human Environment during the decommissioning process.

The influx of construction workers accompanying the Project will be managed to prevent undue strain on community resources, as is typically the case for all major infrastructure projects elsewhere in Canada involving the influx of construction trades. A self-contained construction camp will be established, equipped with comprehensive provisions for water supply, waste management, energy consumption, and worker accommodations, including essential services such as food, recreation, and medical care, all mitigating the need to travel into town.

These guiding assumptions establish the boundaries for this section. By acknowledging the fundamental significance of maintaining connectivity, resolving logistical complexities, and mitigating associated risks, these assumptions inform the understanding of the Project's potential implications. They display the importance of meticulous planning and management to promote the successful implementation of the Project while safeguarding the well-being of the community and its surroundings.

5.3 Study Areas

Study areas for various components of the human environment study are presented on Figures 5.3-1 and 5.3-2. The community of Nain, NL is the focus area for this study. Nain is an Inuit community situated within the autonomous region of Nunatsiavut in northern Labrador, Canada. Nain is more broadly located within Inuit Nunangat, which is the Inuit homeland across Canada, and covers over 40% of Canada’s land mass and 72% of its coastline). This region is distinct from other parts of Canada since it is governed through modern treaty negotiations that have resulted in different governance for the Inuit in their territory. Within Nunatsiavut, there are five Inuit communities that include Nain, Hopedale, Makkovik, Postville, and Rigolet (Nunatsiavut Government, n.d.-a). For the purposes of this study, only the Inuit community of Hopedale was assessed for impacts in addition to Nain, given its proximity to Nain. In addition, the Innu Nations of Sheshatshiu and Natuashish were also assessed for impact.

NUNATSIAVUT
kavamanga government

NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION

Project Component
- Access road
- Temporary access road
- Airport footprint
- Runway

Study Area
- Land use study area

Labrador Inuit Lands
- *Parcel number*
- 0X-00X Labrador Inuit Lands (LIL)
- Nain Inuit Community Government

Hydrography
- Watercourse

Other
- Cabin
- Snowmobile trail

1:37 000

0 250 500 m

NAD 1983 UTM Zone 20N

2024-05-09 11:51

OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

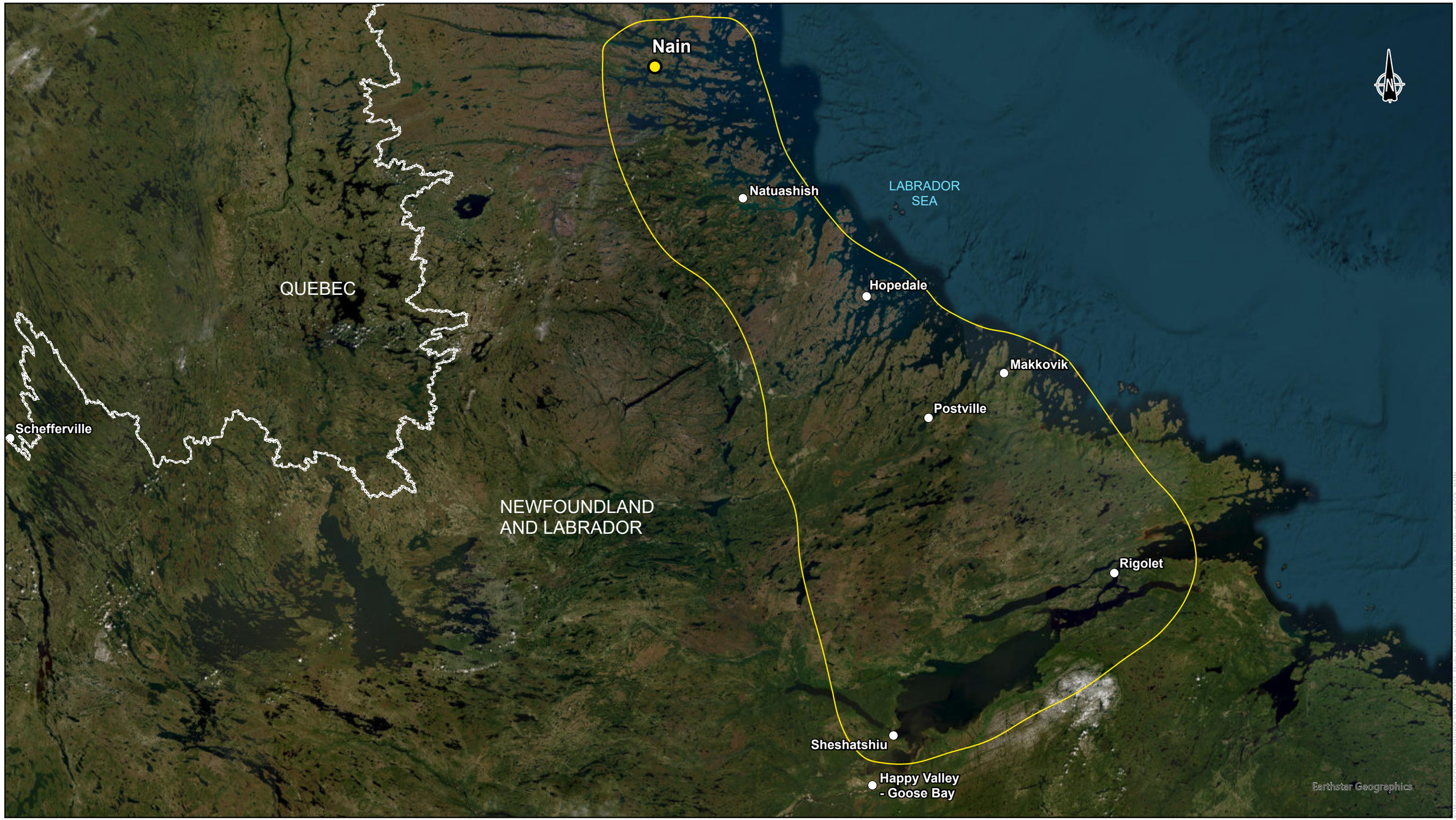
Figure 5.3-1

Land Use Local Study Area

AECOM

NUNATSIAVUT
kavamanga government

NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION



OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

New Nain airport project

Regional project area (RSA)

1:1 800 000

0 20 40 km

NAD 1983 UTM Zone 20N

Figure 5.3-2

Human Regional Study Area

AECOM

5.4 SocioEconomic Conditions

5.4.1 Transportation and Delivery of Goods and Services in Nain

In the region of Nain, the transportation of goods and services faces considerable constraints. Presently, the sole means of transportation to and from Nain are by sea and air. These modalities are subject to the unpredictability of weather patterns inherent to northern climates. Air travel is the only method in and out of the community year-round. Sea transportation is only available during months when the surrounding water remains unfrozen. During winter months, residents rely on air travel to transport goods since ferry services are unavailable.

The advent of a new airport promising 24-hour operational capacity, capable of accommodating larger aircraft, and strategically located in a less weather-affected area, holds promise for transformative effects on the accessibility of goods and delivery services to Nain such as food, business materials, and emergency repair materials. For instance, the utilization of larger aircraft with increased cargo capacity may potentially mitigate the cost burden associated with large air freight services, such as materials to make emergency repairs to housing, which has been noted as a concern for Nain residents throughout interviews. Moreover, the prospect of more frequent and dependable air services to the community could open avenues for private delivery enterprises to serve Nain. A pertinent illustration is the case of Amazon, the e-commerce company, which has demonstrated its ability to furnish goods and services to northern locales like Iqaluit, Nunavut, with greater expediency and cost efficiency compared to conventional postal services (Quesnel, 2017). Subscription models such as Amazon Prime further display the potential for Nain residents to access a broader array of products at more favorable price points should an enterprise like Amazon discern an opportunity to extend its services to the area, leveraging the expanded capabilities of air transportation.

5.4.1.1 Air Service

Residents of Nain and tourists to the area have access to the existing Nain airstrip. However, the current airstrip is insufficient and is not capable of operating 24 hours a day, seven days a week. Additionally, the airstrip is located approximately 3 feet from the ocean, compromising the integrity of the air strip. Residents cite concerns with the frequency, cost, and reliability of the current air strip (Jugol, 2022). The communities of Nunatsiavut are connected through an air travel route known locally as “the milk run”, which goes from Happy Valley-Goose Bay to Nain with stops at the other Nunatsiavut communities. There is also a direct flight route from Happy Valley-Goose Bay to Nain. Some of the communities have a fully operational airport while others just have an airstrip for basic travel purposes (Figure 5.4-1).

The flights between these communities runs daily though there are limitations to when and if flights can reach communities based on the conditions of their airport infrastructure and the weather. For Nain, the conditions of the existing airstrip infrastructure pose a significant limitation to reliability of flights into the community. Each community in Nunatsiavut has a gravel airstrip and a terminal building that is managed by Transport Canada (Nunatsiavut Government, n.d.-i). The airstrip is small which restricts the size of the aircrafts able to use the airstrip. As the airstrip continues to degrade, it is possible that air travel to the region will be heavily restricted. If travel is restricted, there may be a significant decline in the availability of flights in and out of the region.

There are typically three flights that run each day with consistent scheduled flights from Monday to Friday as displayed in Table 5.4-1 at time of writing. During weekdays, two flights depart in the morning and one flight departs in the afternoon. Since there are no lights at the Nain airstrip, evening travel is not possible. The flights between Nain and Happy-Valley Goose Bay are staggered so that travelers can plan their trips as needed. Weekend and holiday travel may be more limited and less frequent.

Figure 5.4-1

Airports and Airstrips in Nunatsiavut Communities

Table 5.4-1: Typical Flight Schedule During Weekdays between Nain and Happy-Valley Goose Bay (Air Borealis)

Travel Direction	Morning Flight #1		Morning Flight #2		Afternoon Flight	
	Departure	Arrival	Departure	Arrival	Departure	Arrival
Nain - Goose Bay	10:10 am	11:30 am	11:35 am	12:55 pm	2:25 pm*	5:40 pm
Goose Bay - Nain	8:00 am*	11:15 am	8:30 am	9:50 am	12:45 pm	2:05 pm

**Indicates flights that follow the milk run route*

5.4.1.1.1 Air Service Providers

Provincial Airlines which operates through Air Borealis is the only airline that services this region. The planes that travel through Nunatsiavut are Twin Otter passenger aircrafts that can hold 19 passengers (Nunatsiavut Government, n.d.-i). Air Borealis operates flights daily with flights following the “milk run” route that stops at each community as well as a direct flight between Happy Valley-Goose Bay and Nain. The stopovers at each community on the milk run route are between 10 and 15 minutes in length – enough for passengers to get on and off the aircrafts.

5.4.1.1.2 Cost of Air Travel

The cost of air travel throughout Nunatsiavut is expensive. Prices for round-trip flights between Nain and Happy Valley-Goose Bay can cost around $1,000 (based on pricing in December 2023). There have been efforts on the part of the Nunatsiavut Government to call for subsidized air travel in the region pointing to the responsibilities of the provincial government to ensure Labrador Inuit have reliable and affordable air service (Nunatsiavut Government, 2023b). With the ongoing deterioration of the airstrip and a decrease in flight frequency, there is a potential for flight prices to rise to offset the challenges of landing. When the existing airstrip becomes inoperable, air travel will be heavily limited to potential alternatives such as helicopters and pricing will likely be impacted.

5.4.1.2 Ferry Service

Nain residents have access to a ferry out of the region during warm months when the sea ice has melted. Issues of reliability include significant time delays, high costs of travel, and long travel times. Residents have indicated that significant investment to make this a more accessible option is needed. As air transportation becomes less reliable, additional strain may be placed on the ferry infrastructure in Nain during operational months to provide critical services and supplies to the community. Boat and Ferry charters in Nunatsiavut can be viewed on Figure 5.4-2.

Figure 5.4-2

Boat and Ferry Charters in the Nunatsiavut Communities

5.4.1.2.1 Ferry Service Provider

There is one ferry service provider that runs throughout the Nunatsiavut region which is called the Nunatsiavut Marine Inc. (NMI). The NMI is 100% Inuit-owned and provides both freight and passenger services along the northern coast of Labrador. The NMI's port facilities are in several northern Labrador communities including in Nain. The NMI provides freight, passenger, and stevedoring services to this region.

5.4.1.2.2 Ferry Vessel: M/V Katmutik

The M/V Kamutik is the vessel used to travel along the Labrador coast to each of the Inuit communities. The vessel has space for 30 automobiles, 125 teus for freight, and the capacity to house 240 passengers. There are 23 cabins that can accommodate 82 people. Reservations are required to book passage for freight or as a passenger on the ferry.

Table 5.4-2: Cross Times and Distance via Ferry in Nunatsiavut (Government of Newfoundland and Labrador, n.d.-c).

Crossing	Time (Hours)	Distance (km)
Goose Bay - Rigolet	6.5	167
Rigolet - Makkovik	11.5	274
Makkovik – Postville	3	69
Postville – Hopedale	5	132
Hopedale - Natuashish	4.5	102
Natuashish – Nain	5.5	133

5.4.1.2.3 Frequency and Time for Ferry Service

The coastal ferry service throughout Nunatsiavut operates from June to December, depending on when sea ice melts in the spring and begins to freeze in the fall. The ferry route from Happy Valley-Goose Bay to Nain stops at each of the five Inuit communities on its travels to Nain, weather permitting (Government of Newfoundland and Labrador, n.d.-c) In Addition, the Hopedale to Nain ferry stops at the Innu community of Natuashish before Nain for a 14.5-hour layover.

Travelling via ferry is a long journey and not nearly as convenient as air travel since it takes much longer, as displayed in Table 5.4-2. Delays and cancellations at the beginning and end of the season are common and this makes ferry travel less reliable as well. Bookings can be over the phone or in-person at the ticket office.

The ferry trip that departs from Happy Valley-Goose Bay travels from Sunday to Thursday and vice versa for the trip from Nain to Happy Valley-Goose Bay. The approximate Ferry schedule can be viewed in Table 5.4-3. The layovers in each town can vary and are dictated by the weather and wind conditions. Though there can be delays, there is a standard schedule for departure times that depart from Happy Valley-Goose Bay on Sundays at 2:00pm towards Nain and departing from Nain at 9am towards Happy Valley-Goose Bay (Government of Newfoundland and Labrador, 2022).

Table 5.4-3: Goose Bay – Rigolet – Ports North to Nain Ferry Service Schedule (as of May 2022) (Government of Newfoundland and Labrador, 2022).

Departure Point	Sunday	Monday	Tuesday	Wednesday	Thursday
Happy Valley – Goose Bay	2:00pm for Rigolet 11:00pm for Makkovik	3:00pm for Postville 8:00pm for Hopedale	10:00am for Natuashish 6:00pm for Nain		
Nain				9:00am for Natuashish 4:00pm for Hopedale 11:00pm for Postville	8:00am for Makkovik 1:00pm for Rigolet 11:59pm for Goose Bay

Overall, ferry travel is an important means of travel for the community of Nain though it is significantly limited in terms of its seasonality and inconsistency due to weather conditions in the region.

5.4.1.2.4 Cost of Ferry Travel

The cost of travel by ferry for passengers is dependent upon the age of the passenger and whether they would like to book in a cabin. Based on ferry rates on the Newfoundland and Labrador provincial website as of 2023, the voyage one-way for an adult travelling from Happy Valley-Goose Bay is $99.00 and an economy cabin is $253.00. If an adult wishes to travel with their vehicle, the ferry ticket price is $297.00. There are senior's discounts as well as discounts for youth and children. As the airstrip continues to degrade leading to reduced possibility for air travel in the region, it is possible that the cost of transporting on the ferry may increase with an influx in demand.

In terms of the cost for shipping packages, a small package being transported from Goose Bay to Nain as of 2023 costs $0.30 per cubic feet with a minimum charge of $9.95. For transporting larger goods such as a pallet in a temperature-controlled environment, the base fee is $0.37 per cubic feet with a base fee of $20.00. These costs were last updated on the provincial website in 2020.

5.4.1.3 Public Highways and Roadways

Residents of Nain have access to a series of publicly funded roads which connect critical infrastructure in the town such as the airstrip, school, community center, and Touser Lake (water supply). These roads are confined to the community, and do not permit access from outside of the region.

5.4.1.4 Ice Travel

Ice paths in Nain have been used to access the lands surrounding Nain in late fall to spring months. However, climate change has caused the ice travel capability to have shorter seasons, melting earlier in the year and freezing later in the year. Transportation over ice is becoming increasingly dangerous with unexpected ice melts leading to thinner ice to travel on.

5.4.2 Demographic Characteristics

The following section provides an examination of the demographic characteristics of the Nain community, encompassing aspects such as population dynamics, age distribution, gender composition, household and family structures, educational attainment, literacy levels, and income distribution. These demographic factors serve as foundational pillars for understanding the socio-economic landscape of Nain and are instrumental in contextualizing how the Proposed Project may intersect with and effect the community. For instance, insights into Nain's status as a youthful and expanding population can inform projections regarding future infrastructure needs and service demands. By comprehensively assessing these demographic characteristics, the section aims to provide an understanding of the community's socio-

economic fabric, facilitating informed decision-making and stakeholder engagement throughout the Project's development and implementation phases.

5.4.2.1 Population, Age, and Gender

According to a 2021 census data amendment, the population of Nain is 1,204 (Statistics Canada, 2021). It is important to note, however, that Indigenous communities may have lower rates of participation in census surveys resulting in reported population totals lower than reality. It was noted that Indigenous communities, on average, had an 85% participation rate when compared to the overall response rate of 98% for the 2021 census (Taylor, 2022).

Table 5.4-4: Nain Population Change from 2016-2021 (Statistics Canada, 2021).

Town	Population		%Change
	2021	2016	2016-2021
Nain	1,204*	1,125	7%
Hopedale	596	574	4%
Postville	188	177	6%
Makkovik	365	377	-3%
Rigolet	327	305	7%

** Nain population data for 2021 was revised from 847 to 1,204 in an amendment by Statistics Canada.*

Nain is one of five towns within Nunatsiavut, including Nain, Hopedale, Postville, Makkovik, and Rigolet. Nain is the most populous of the five towns and maintains a growing population, as displayed in Table 5.4-4. Nunatsiavut is primarily home to Inuit peoples; however, the population also includes other settler groups, including those of European, South Asian), Scottish, Irish, English, and Canadian descent (Statistics Canada, 2021).

The population of Nain is characterized by its youthfulness, likely indicating a high birth rate, and it is steadily increasing, as shown in Table 5.4-5. Comparatively, the median age of Nain residents in 2021 was younger than that of both Nunatsiavut and Newfoundland and Labrador, despite the latter two experiencing declines in population (Statistics Canada, 2021).

Table 5.4-5: Population median age comparison; Nain, Nunatsiavut, and Newfoundland and Labrador (Statistics Canada, 2021).

Town	Population		% Change	Median Age
	2021	2016	2016-2021	
Nain	1204	1125	7%	29
Nunatsiavut	2,558	2323	-9%	33
Newfoundland & Labrador	519,716	510,550	-2%	48

Based on Census data from Statistics Canada (2021), Nain exhibits a higher proportion of residents aged 0-64 compared to the national average, as illustrated in Table 5.4-6. The average age of Nain residents is 30.6 years, notably lower than the national average of 41.9 years. A significant portion of Nain's population, approximately 30%, falls within the age bracket of 0-14, contrasting with the national average of 16%. These demographic indicators suggest a youthful and expanding population, potentially indicative of elevated birth rates in the region. In 2021, Nain's total birth rate stood at 14.6 per 1000, surpassing the provincial rate of 7.6 per 1000. Furthermore, the gender distribution among Nain residents appears almost equal between males and females, according to Statistics Canada (2021) data.

Table 5.4-6: Ratio of Age Groups in Nain, NL (Statistics Canada, 2021).

Age	Total Population 2021*, Nain NL	% of Total	% of Total, Canada	Men +, Nain NL	% of Total (men)	Women +, Nain NL	% of Total (women)
0-14	255	30%	16%	120	29%	125	29%
15-64	545	64%	64%	270	65%	280	64%
65+	50	6%	18%	25	6%	30	7%
85+	0	0%	2%	0	0%	0	0%

**Population reflected is pre-amendment; therefore, totals do not reflect the full population (1,204 residents)*

5.4.2.1.1 Language and Language Continuity

Language within Indigenous communities serves as a core pillar of society, connecting people to their ancestral lands and lifestyle, where often, oral transfer provides the means of transmission for Traditional Indigenous Knowledge (Nunatsiavut Government Department of Language, Culture, and Tourism, 2021). The Inuttitut language is unique and specific to Labrador Inuit because it is derived from their unique environment and learned through interactions with the land and water in the area (Anderson & Johns, 2006). Learning the language is therefore also tied to identity, values, and understanding Labrador Inuit relationships to their lands and waters (Degawan, 2019).

Though English is now predominantly spoken throughout Nunatsiavut, Inuttitut, the dialect of the larger family of Inuktitut languages, is the region's traditional language. English is the primary language for more than 80% of Nain residents, followed by Inuktitut, at approximately 15% (Statistics Canada 2023. For communities who retain close ties to their lands and waters, such as in Nain, loss of language can affect community understanding and knowledge of navigation as well as harvest and hunting practices, which can then impact health, food security, and safety for community members (Cuerrier, Clark & Norton, 2019). The loss of Inuktitut in Inuit communities, therefore, has a significant impact on cultural continuity.

In Nain, retention of Inuktitut was strong up until Newfoundland and Labrador joined the Canadian federation, and the Department of Education took over schooling from the Moravian missionaries (Mazurkewich, 1991). This change led to Inuit youth being forced to attend school in English rather than in Inuttitut. With youth of the community increasingly communicating in English, a communication barrier between youth and Inuit Elders emerged which reduced over all transference of knowledge through the Inuttitut language.

5.4.2.1.2 Indigenous Identity and Language

Nain's population is predominantly Inuit representing 94% of the total population (Table 5.4-7). The community has a small proportion of people who identify as non-Indigenous or First Nations (Statistics Canada, 2023). In contrast, more than half of the population of the whole of Labrador identifies as non-Indigenous, with Inuit being the second most represented group.

Table 5.4-7: Indigenous Identity in Nain, NL (Statistics Canada, 2023)

Indigenous Identity	Nain		Labrador		NL	
	#	%	#	%	#	%
Inuk	790	94%	5,070	19%	7,330	2%
First Nations	15	2%	2,600	10%	28,435	6%
Metis (NunatuKavut)	0	0%	3,255	12%	7335	2%
Non-Indigenous	35	4%	14,915	57%	455,550	91%
Registered or Treaty Indian Status	10	1%	2,680	10%	22,720	5%
Not a Registered or Treaty Indian Status	830	99%	23,520	90%	479,375	96%

English is the dominant language for more than 80% of Nain residents, followed by Inuktitut at approximately 15% (Statistics Canada, 2023). English is also the dominant language in Labrador and NL (Table 5.4-8) (Statistics Canada, 2023).

Table 5.4-8: Dominant Language in Nain, NL (Statistics Canada, 2023)

Dominant Language	Nain		Labrador		NL	
	#	%	#	%	#	%
English	685	81.1%	22,925	86.9%	486,560	96.4%
French	0	0%	385	1.5%	2,215	0.4%
Inuktitut	130	15.4%	215	0.8%	245	0%
Innu (Montagnais)	10	1.2%	1,560	5.9%	1,575	0.3%
Multiple Responses	15	1.8%	465	1.8%	3,375	0.7%

5.4.2.2 Household and Family Composition

According to Statistics Canada, the average household size is 3.4 people in Nain, exceeding the national average of 2.4 persons. The distribution of household size in number of persons in Nain is displayed in Table 5.4-9 along with Canadian averages. In the town of Nain, 44.9% of households have four or more residents, compared to 21.8% of Canadian households. It can be noted that the larger average household size in Nain may correspond to community reports suggesting there is an insufficient supply of adequate housing (Howitt, 2023; Moore, 2022). However, there should be considerations of whether the choice to reside in multi-generational homes is due to cultural preference or due to a lack of supply.

Table 5.4-9: Average Household Size in Nain, NL (Statistics Canada, 2021)

Household Size	% of population, Nain	% of population, Canada
1 Person	12	29
2 Persons	20	34
3 Persons	22	15
4 Persons	27	13
5+ Persons	18	8

5.4.2.3 Education and Literacy

Access to air travel plays a pivotal role in fostering education and literacy within remote regions such as Nain. The existing airstrip serves as a lifeline for ensuring the staffing and retention of educators in schools, enabling the region to maintain a robust educational system. Moreover, air travel provides essential access to post-secondary education opportunities, which are not locally available, thereby broadening horizons and facilitating academic advancement. Additionally, the existing airstrip's role in facilitating recreational activities is crucial, particularly in fostering camaraderie and competition among coastal schools, such as those in Hopedale, where air access is imperative for participating in sports events and fostering community engagement. The following section describes the education and literacy conditions that exist in the region.

5.4.2.3.1 Educational Institutions

Residents of Nain have access to one educational institution providing elementary and secondary level education within the town, displayed in Table 5.4-10. For Kindergarten to Grade 12 education, students have access to Jens Haven Memorial School. The school is accessible only to local students since there is no school bus system and students must go home for lunch. There are three provincial colleges and universities: Memorial University in St. John’s, Kevin College Adult Learning Centre in Springdale and Lewisporte, and College of North Atlantic (CAN) in Stephenville. All three colleges are approximately a 4.5-hour flight away from Nain. Overall, post-secondary education is much lower for Nain residents than provincial averages, compare 13.2% to 32%, and is likely to centres of post-secondary education being located outside Nain.

Table 5.4-10: Educational Institutions Available Within Closest Proximity to Nain, NL

Institution Type	Institution Name	Location	Distance
Publicly funded school, grades K-12	Jens Haven Memorial School	Nain	Within Town
Post-secondary education and skill training center	College of the North Atlantic	Happy Valley Goose Bay	Approx 370 km by air
University	Memorial University of Newfoundland	St. Johns	Approx 1,200 km by air

With fly-in and seasonal ferry options presenting obstacles to year-round and reliable transportation, there is limited access to out-of-province education for Nain residents. It is possible that increased reliability of flights could encourage residents to consider education opportunities outside of the community, though this would require a shift in community preferences.

5.4.2.3.2 Educational Attainment

Educational attainment is higher in Nain than provincial averages (Statistics Canada, 2023) but is lower than the national average (Statistics Canada, 2021). In Nain, 32.5% of the population aged 25-64 year has a high school degree or its educational equivalent, and 34.9% percent of the population has no certificate, diploma, or degree (Statistics Canada, 2023). The provincial average has a lower percentage of the population with a high school degree or equivalent, at 24.4%, but lower percentage overall of individuals with no certificate, diploma, or degree (Table 5.4-11). Reasons for this discrepancy are likely due to the availability of post-secondary institutions throughout the province.

Gendered differences also occur in educational attainment and uptake, with more women+ possessing a higher level of educational attainment. Compared to provincial averages, the percentage of Nain residents with a post-secondary education is lower than the provincial average, with Nain at 27.1% versus the Newfoundland Labrador average at 51.9% (Statistics Canada, 2023). There are noted differences in gender identity as well, with women+ experiencing greater rates of completion of a high-school or equivalent education; compare 26.8% and 38.1% for men+ and women+ respectively. Coupled with the inter-generational trauma experienced through residential school systems, it is important to note that there is a growing demand for Nain residents to access Indigenous-focused education at elementary, secondary, and post-secondary levels. There are initiatives for the Nain community and Nunatsiavut government to increase Inuit content and Inuktitut-language education opportunities for students and adults (White, 2016).

Table 5.4-11: Post-Secondary Education by Gender (for population 25-64 years) (Statistics Canada, 2023)

Highest Certificate, Diploma or Degree	Nain			Newfoundland and Labrador		Canada			
	Total	Men+	Women+	Total	Men+	Women+	Total	Men+	Women+
No certificate, diploma, or degree	35%	46%	26%	13%	15%	11%	10%	11%	8%
High (secondary) school diploma or equivalency certificate	33%	27%	38%	24%	24%	25%	23%	24%	22%
Apprenticeship or trades certificate or diploma	8%	10%	5%	11%	17%	6%	910%	13%	6%
Bachelor's degree or higher	5%	0%	7%	21%	17%	24%	33%	30%	36%
Post-Secondary Education)	%27%	22%	32%	52%	52%	52%	67%	64%	70%

5.4.2.4 Income and Social Status

5.4.2.4.1 Individual and Family Income

Based on 2021 census data for Nain, the average annual personal income in 2020 was $44,200, which falls below the national average of $54,450 per annum (Table 5.4-12). In Nain, men+ earn approximately

$2,800 (or 6%) more per year than women+, whereas across Canada, men+ earn an average of $16,090 (or 26%) more than women+. This suggests a narrower income gap between genders in Nain compared to the Canadian average. Notably, in Nain, men+ constitute the majority of income earners above $90,000 (60%), while women+ dominate income earners in the $50,000 - $79,000 bracket (64%) (Statistics Canada, 2021). This pattern may reflect the prevailing gender roles within the community.

Table 5.4-12: Total income groups in 2020 for the population aged 15+ in private households in Nain, NL (Statistics Canada, 2021)

Income Bracket	Men+	Women+
$10,000 - $19,999	30	40
$20,000 - $29,999	40	40
$30,000 - $39,999	40	45
$40,000 - $49,999	40	25
$50,000 - $59,999	10	35
$60,000 - $69,999	15	25
$70,000 - $79,999	15	10
$80,000 - $89,999	10	15
$90,000 - $99,999	10	5
$100,000 - $149,000	25	15

5.4.2.5 Social Determinants of Health

The following section will delve into the social determinants of health pertinent to the Nain community, encompassing factors such as access to healthcare, food security, housing conditions, and labor force dynamics. Evaluating these determinants is imperative for the Project as it enables an understanding of the existing contributions of the airstrip. By identifying areas where the current airstrip infrastructure meets community needs and where it falls short, the Project can be tailored to address any deficiencies and enhance overall health outcomes. This holistic approach supports airport development that aligns with broader community health objectives, thereby fostering improved well-being and resilience within the Nain community.

Social determinants of health refer to a specific group of social and economic factors within the broader determinants of health (Health Canada 2018). They include income and social status; social support networks; education; employment / working conditions; social environments; physical environments; personal health practices and coping skills; healthy child development; gender; and culture (PHAC 2016). Various social determinants of health have been identified as particularly important for Inuit (Statistics Canada 2012). These include access to health care, food security and adequate housing. Health care access affects the maintenance of health and treatment of illness. Food insecurity and lack of adequate housing are directly linked to income, which is a critical determinant of health for most populations. For Inuit and other Indigenous Peoples, cultural practices of language, social support, and traditional activities are also related to health.

The Inuit community of Nain receives limited health resources due to its remote location and limited financial resources. The community has several concerns around health that are tied to issues such as food security, access to resources and medical professionals, as well as climate change. The information summarized in this section is limited by information uncovered during the desktop study. Much of the information is not specific to Nain but more general data collected about the Inuit in Nunatsiavut. Currently, there is a survey being conducted through the Qanuippitaa? National Inuit Health Survey (QNIHS) program to collect information about Inuit health. The program is an Inuit-owned and Inuit-led program that will involve the Nunatsiavut region, including Nain. The survey will likely provide more up-to-date information about the community's health profile that possesses health metrics rooted in both Inuit knowledge and health sciences research.

5.4.2.6 Access to Health Care

Newfoundland and Labrador's healthcare system is publicly funded and overseen by the Newfoundland and Labrador Medical Care Plan (MCP). In Nain, essential routine healthcare is provided by the Nain Community Clinic, which operates with limited resources and is staffed by Nurses and Nurse Practitioners. Additionally, the community receives periodic visits from physicians to complement the services offered at the clinic. However, in cases of emergencies beyond the clinic's capacity, patients may need to be airlifted or travel by ferry to other hospitals. Currently, such evacuations may face delays of multiple days due to weather and other logistical challenges associated with flight grounding. As the existing airstrip infrastructure continues to degrade, the effectiveness of emergency air evacuations may further diminish, exacerbating existing healthcare access issues in the region.

5.4.2.7 Food Security

Food security can be defined as a state where "…all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (Bowers et al., 2020, p.3).Inuit communities are faced with significantly greater socio-economic inequities than the rest of Canada which impacts their overall wellbeing (Bowers et al., 2020). Food security is one key issue that affects Inuit health and livelihoods and Labrador Inuit who live in Nunatsiavut are much less food secure than the rest of Canada (Bowers et al., 2020).

Based on a 2014 household survey in Nunatsiavut, only 40.7% of respondents were identified as food secure compared to 88% in the general Canadian population (Bowers et al., 2020). In Nain, a 2017 survey administered by the NG found that 79.4% of households experiencing food insecurity (Nunatsiavut Government, 2017).

Understanding issues of food security in Nain is important for recognizing the significance of the Nain airstrip to the community. The airstrip currently delivers the majority of perishable food to the region. If airstrip conditions worsen to the point where planes can no longer land, the community will be at an extremely high risk of critical food insecurity. Three key elements of food security include availability, access, and stability which are helpful identifiers for understanding food security issues in Nain.

5.4.2.7.1 Food Availability

Food availability is related to the quantity of safe and nutritious foods that meet the tastes and cultural traditions of the community (Bowers et al., 2020). In Nain, there are many traditional or country foods that are hunted and harvested, though, according to community members, store-bought foods are a key staple in most homes. Perishable foods are shipped by air year-round, while non-perishable goods may also be shipped by boat in summer months, pending sufficient storage in community. Deliveries are largely dictated by weather (air travel) and seasonality (boat travel). Community members note that a lack of food storage facilities leads to reduced food availability in the region.

5.4.2.7.2 Food Access

The accessibility of food in Nain, whether country foods or grocery store items, is hindered by various factors such as hunting bans, access expenses, and climate change impacts (Bowers et al., 2020; Food First NL, n.d.). Initiatives by the Nunatsiavut Government aim to mitigate some of the impacts of hunting bans on food security (Bowers et al., 2021; Hancock et al., 2022; Government of Canada, n.d.). Though, Nain residents often resort to food from local grocery stores due to barriers restricting access to country food. High transportation costs to the community are reflected in elevated prices in grocery stores.

Additionally, flight delays and cancellations, compounded by airstrip limitations, exacerbate food insecurity in the community. Deteriorating airstrip conditions further exacerbate the issue, raising doubts about the feasibility of food delivery without reliable air connectivity (Bowers et al., 2020; Bowers et al., 2021).

In addition to the financial strain imposed by purchasing food from stores, the unreliability of flights exacerbates the community's food insecurity. Frequent flight delays and cancellations resulting from adverse weather conditions, compounded by limitations inherent in the existing airstrip infrastructure, may lead to untimely arrivals of food shipments essential for residents. As the condition of the current airstrip deteriorates, the issue of food security becomes increasingly pressing. Without reliable air connectivity to the region, transportation costs for food may escalate significantly, casting doubt on the feasibility of delivery.

5.4.2.8 Food Stability

Food stability is another concern for residents of Nain, which is directly tied to the Nain airstrip. Perishable food can only be shipped into the community by plane. In Nain, the airstrip's capacity is limited, resulting in limits on shipment size. The ability to harvest country foods is being impacted by climatic changes that are affecting travel conditions, the seasonality of harvested plants and animals (Organ et al., 2014), and the costs associated with being on the land (e.g., gas to operate snowmobiles).

5.4.2.9 Water Quality

Understanding the intricate relationship between the Nain community and its water sources is essential for designing effective mitigation strategies to address water security challenges. These challenges encompass various facets including access, availability, perception, and water quality issues. Despite the availability of alternatives, the traditional practice of gathering water and ice from natural sources remains deeply ingrained in Nunatsiavut's history (Goldhar et al., 2013). Furthermore, the impacts of climate change are exacerbating these challenges, with decreased water source availability attributed to increased rainfall. This phenomenon can result in heightened turbidity and fluctuating temperatures, which in turn can damage water infrastructure. In light of the community's preferences for water collection practices, adjustments have been made to the Project access road. Specifically, a modular-designed bridge has been implemented instead of a culvert to mitigate potential impacts on the drinking water source at Kauk Brook, recognizing its significance as a vital water source for the community.

5.4.2.9.1 Preferred Drinking Water Sources

Drinking water options in Nain include freshwater, chlorinated tap water, and store-bought water. However, freshwater gathering, rooted in Nunatsiavut-Inuit tradition, is preferred by many locals. Yet, the availability and accessibility of these water sources, such as running brooks, lakes, ice melts, and watersheds, are constrained by diminishing surface water levels. Residents typically collect freshwater in plastic buckets from surrounding Nunatsiavut communities and transport it back to Nain either on foot or by snowmobile, ATV, or other vehicles (Goldhar et al., 2013). In Nain, harvesting brook water can heighten exposure to pathogens, especially after heavy rainfall or rapid snowmelt, which elevates water turbidity levels (Harper et al., 2011).

It's noteworthy that tap water is the least preferred drinking water source in Nain and is often viewed negatively. Many Nunatsiavut residents base their expectations of ideal drinking water on their experiences with water consumption in natural settings (Goldhar et al., 2013). Concerns have been raised about tap water, with residents expressing dissatisfaction over the taste and smell of chlorinated water, as well as aesthetic issues such as browning and yellowing, especially during the spring and summer seasons (Goldhar et al., 2013).

5.4.2.9.2 Indicators of Water Quality

Waterborne contaminants such as total coliforms and E. coli can stem from untreated water consumption and inadequate water storage practices, heightening the risk of infectious gastrointestinal illnesses. Climate change may exacerbate these challenges, as contaminant levels tend to peak during warmer seasons. To address these hazards, Nain residents employ various strategies to safeguard freshwater quality. These include prioritizing water sourced from clear inflow and outflow, avoiding stagnant water, monitoring weather patterns and water levels, filtering water through cloth to reduce turbidity, and conducting sensory assessments of water properties such as color, opacity, taste, and odor (Goldhar et al., 2013).

5.4.2.9.3 Water Supply Infrastructure

Nain is serviced by a municipal water system, where chlorination is used as a disinfectant to prevent gastrointestinal illnesses. Residents are responsible for connecting their homes to the municipal water system, however, not all homes in Nain are connect due to the inhibitive costs of fixing frozen pipes or inability to pay utility bills (Goldhar et al., 2013). Ageing water infrastructure in various Nunatsiavut regions has caused pipes to freeze, cutting households off from community-accessed water supplies and preventing access to water for washing, bathing, and plumbing (ITK, 2020).

Water supply infrastructure was updated between 2009 and 2010 with the infrastructure project including the development and construction of approximately 2.9 km of water transmission lines in 2009. The construction of a chlorination building/pump was completed at the shore of Trouser Lake in 2010, as well as a water storage tank that is approximately 1 km from the Town of Nain (Newfoundland & Labrador Consulting Engineers Ltd., 2009). While tap water is available to residents and is the primary source of

drinking water, it is also restricted due to limited/seasonal public infrastructure, high private repair costs, and inadequate servicing (Goldhar et al., 2013).

5.4.2.10 Housing

Statistics Canada (2021) conducted a housing survey in Nain, revealing concerning findings. Among 245 respondents, 100 reported unsuitable housing conditions, including overcrowding or major repair needs, representing approximately 40% of properties. This surpasses the Canadian average, where only about 9% face similar issues. Notably, none of the Nain respondents reported housing costs exceeding 30% of their income, contrasting with 18% nationwide.

The town's housing stock is notably aged, with 135 of 245 houses built before 2000, according to Statistics Canada. While these figures may not fully capture the community's housing situation, they emphasize the severity of the problem. Without intervention, the deterioration of aging housing stock is expected to persist, potentially exacerbated by high shipping costs and limited investment in the area.

Given the region's critical housing situation, the continued deterioration of the existing airstrip could worsen housing challenges. Reduced air infrastructure access may impede the acquisition of goods and services for housing maintenance, potentially escalating costs and exacerbating housing issues. The anticipated influx in population during construction may create an additional strain on housing stock in the region. To address these concerns, the Project has introduced mitigative measures to alleviate housing strain by utilizing self-contained housing solutions.

5.4.2.10.1 Forced Relocation

Prior to Confederation, Inuit retained substantial autonomy in northern Labrador and had consistent and mutually beneficial working relationships with settlers in the region (Hirsch et al., 2016). After Confederation, Labrador Inuit were not recognized as separate entities from the province of Newfoundland and Labrador by Canada and therefore were not seen as priority for resourcing or being involved in the economy. Driven by the lack of recognition, trading operations and Moravian stores were closed in the 1950s in the most northerly Inuit communities leading to further isolation. Relocation of residents of Hebron, Nutak, and Okak followed soon afterwards to the communities of Nain, Makkovik, and Hopedale.

The relocation was tied to the desire by the federal and provincial governments to consolidate government services and push for assimilation across northern communities (Dombrowski et al., 2016). It also was argued that the relocation would result in improved health conditions and economic benefits (Hirsch et al., 2016). The relocation of these residents resulted in significant harm to community members who were separated from their lands (including their traditional hunting and harvesting grounds) as well as each other.

This traumatic experience was only heightened by the lack of housing available in the communities that they were forced to live in. The impact of this relocation therefore continues to be felt by communities in Nunatsiavut and may have only exacerbated the housing insecurity in the region today (Canadian Human Rights Commission, 2022; Hirsch et al., 2016; Norton, Cuerrier & Hermanutz, 2021).

5.4.2.11 Labour Force and Employment Characteristics

This section focuses on labor force and employment attributes in Nain, NL, encompassing labor participation rates, unemployment rates, occupational classes, and composition of the labor force. This data is pertinent for comprehending the Project's effect on the region. The Project has the potential to facilitate more dependable air commuting for individuals to access work opportunities. Moreover, the construction phase of the Project may stimulate the creation of supplementary employment opportunities in the area.

5.4.2.11.1 Employment Status

According to Statistics Canada (2021) the Town of Nain has a lower labour participation rate when compared to Canada. Labour participation and unemployment rates can be viewed in Table 5.4-13. However, Nain has a slightly higher participation rate and a lower unemployment rate than the province of Newfoundland and Labrador. When compared to Canada, the Town of Nain has a higher unemployment rate than the Canadian average, while the town has a lower unemployment rate when compared to the province of Newfoundland and Labrador.

Table 5.4-13: Labour Participation in Nain, NL Compared to Canada (Statistics Canada, 2021)

Labor Participation Rate			
Year	**Nain**	**NL**	**Canada**
2021	59%	56%	68%
Unemployment Rate			
Year	**Nain**	**NL**	**Canada**
2021	10%	15%	10%

Census data from Statistics Canada was used to characterize the labour force composition in in Nain. It is important to note a potential bias may result from an incomplete overview of community employment given the lower response rate in Indigenous communities. Statistics Canada breakdown of the different classes of workers in Nain and Canada can be viewed in Table 5.4-15. Nain residents (over 15) typically work in permanent positions and have a higher permanent position rate than the average across Canada as displayed in Table 5.4-14.

Table 5.4-14: Distribution of Worker Classes in Nain, NL Compared to Canada (Statistics Canada, 2021)

Class of Worker (aged 15 years+)	Class of Worker, Nain, NL	Class of Worker, Canada
Permanent position	80%	70%
Temporary position	19%	14%
Self-employed	3%	14%

5.4.2.11.2 Labour Force Characteristics

Residents of Nain often work in public administration, health care and social assistance, and construction. Industry sectors in Nain are noted in Table 5.4-15 per Statistics Canada data from 2021. Nain has higher employment rates for these industries when compared to the average across Canada. These rates suggest that since the Nain labour force primarily operates in fewer industries and consequently might lack labour market security.

Table 5.4-15: Distribution of Worker Industries in Nain, NL Compared to Canada (Statistics Canada, 2021)

Industry Sectors (15 years+)	Nain, NL	St. John's, NL	Canada
Public administration	30%	11%	6%
Healthcare and social assistance	16%	16%	13%
Construction	9%	5%	8%
Mining, quarrying, and oil and gas extraction	7%	2%	1%
Manufacturing	6%	3%	8%
Retail Trade	6%	12%	11%
Transportation and warehousing	4%	4%	5%
Administrative and support, waste management and remediation services	4%	4%	4%
Accommodation and food services	4%	8%	6%
Arts, entertainment, and recreation	3%	2%	2%
Educational services	3%	9%	7%

5.4.3 Built Environment in Nain

Nain's built environment comprises public infrastructure, cultural spaces, community centers, art shops, and historical and tourist sites, all designed to reflect Inuit culture and the Arctic environment's distinctiveness. Recent efforts have focused on enhancing capacity-building development projects, although demand remains high for improved servicing of existing sites. During a visit by Prime Minister Justin Trudeau in May 2023, Nain's infrastructure deficiencies were acknowledged, highlighting the need for attention to these issues (Moore, 2022). With potential improvements in air travel reliability, increased visitor traffic may strain local infrastructure and potentially lead to tensions with residents. However, enhanced air travel reliability could also facilitate further regional development and improve access to essential services like healthcare and recreational facilities.

Large-scale infrastructure projects can impose additional strain on regional infrastructure and services. Understanding the community's existing infrastructure capacity is crucial to assessing potential externalities arising from this strain. Recognizing the limitations of current infrastructure, the Project has incorporated avoidance measures. Project construction will be self-contained, covering water supply, wastewater management, energy, solid waste, worker accommodations, and essential services such as housing, food, and basic medical care.

5.4.3.1 Infrastructure and Services

The NG provides services in cooperation with Inuit Community Governments and other agencies (NG 2023). Community services and areas of concentration include education, economic development, health, social development, language, culture, housing development and home repair programs. Nain also has a variety of commercial enterprises, including accommodations and food services.

5.4.3.1.1 Municipal Services

5.4.3.1.1.1 Water and Wastewater

The NICG provides a variety of community infrastructure and services, such as providing drinking water (Trouser Lake water supply), collecting, and treating wastewater and managing solid waste. The waste disposal site is near Nain on Akpiksai Bay, approximately 500 m from the airstrip. Residents are also known to collect untreated drinking water from a stream located between the community and the quarries. The NICG is investing in drinking water and wastewater infrastructure. Current and recent improvements include a new water supply system, upgrades to the water system and replacement of the Sandbanks Road water main, along with upgrades to the sewerage and sewage treatment system.

5.4.3.1.1.2 Solid Waste

Each of the Inuit Communities has its own landfill and waste is collected between two and five times weekly, depending on the community and season, mainly due to wildlife issues. Waste is delivered to local landfills where it is burned during winter, except in Nain where waste is burned year-round. Other landfill issues include lack of capacity and cover material as well as being too close to communities, airports and / or open water. Due to access limitations, it is expected that these communities will continue to manage waste locally, though practices should be improved to manage hazardous waste, eliminate open burning and optimize landfill space through waste diversion, site upgrades or developing new sites.

5.4.3.1.2 Energy

In Newfoundland and Labrador, Newfoundland Power and Newfoundland and Labrador Hydro oversee electricity generation and distribution. In remote Labrador communities, power is supplied by diesel generators managed by Newfoundland and Labrador Hydro. Collaborating with Indigenous governments and communities, explores renewable energy options. Notably, four solar installations, including a 24-kW system at the Nain JS Community Centre, have been installed in northern Labrador. Wind turbines and batteries are under consideration in Nain to decrease diesel usage, air emissions, and associated costs (NRCAN 2021; VOCM News 2022). Additionally, the installation of 240 high-efficiency wood stoves and a pilot project to transport firewood from Newfoundland to Nain and Hopedale are being pursued (NRCAN 2021). The Nain Wind Micro-Grid Project, slated to begin construction in 2024, aims to reduce diesel consumption at the Newfoundland and Labrador Hydro power plant in Nain. As the first project of its kind in an Inuit Community, it is expected to serve as a renewable energy development pilot project in Nunatsiavut, with commercial operation projected for 2025.

5.4.3.1.3 Media and Communications

Nain residents have access to two radio services, one of which also provides television. The OKalaKatiget Society operates CKOK-FM (99.9), a Nunatsiavut-based news agency that provides Inuktitut and English language programming to Inuit in northern and central Labrador (NG 2023; OKalaKatiget Society 2023). The Society is mandated to promote cultural identity, increase use of Inuktitut, enhance communication by and between people of northern Labrador, increase awareness and discussion of social issues in northern Labrador and encourage awareness and understanding of Labrador Inuit culture outside northern Labrador. Also, CBNZ-FM (95.1) rebroadcasts HVGB's CBC Radio One feed.

In February 2022, the Governments of NL and Canada announced funding to connect all remaining households in NL to reliable high-speed Internet by 2030 (NLEC and IET 2022). This program includes an allocation of over $22 M to the NG to connect more than 1,000 households in Rigolet, Postville, Makkovik, Nain, Hopedale and Natuashish to high-speed Internet. Bell Canada will build and operate the network.

5.4.3.2 Cultural, Historic, and Recreational Sites

An important aspect of the Human Environment is to understand the cultural, historic, and recreational sites around Nain to assess if the Project will interact with such sites. This section identifies potential sites for consideration. It is noted that the Project site will not directly interact with any of the identified sites.

5.4.3.2.1 Historic Sites

Many buildings in Nain serve as essential sites for community building, tourism, and history reflection. In 1936, a residential school was built in Nain by the Hudson's Bay Company and the Moravian Church, which operated until 1973 and was abandoned until 2022 (Atter, 2022). As part of a community request to have this residential school building removed, in 2022, the site was demolished by the Moravian Church. The Nain Moravian Church, which was founded in 1771, serves as a community center space today and is a registered Heritage Site. It is located near the shore and community dock in Nain and is quite iconic due to its dominant structure, low-pitch gable roof, and square bell tower.

Many special events and traditional performances occur at the church, such as performances by the local brass band during special celebrations and events like the Love Feast and New Year's Eve. Services at the Moravian Church are conducted entirely in Inuktitut. The Moravian Church has a long-established history of cultural dispossession and trauma associated with residential schools.

5.4.3.2.2 Cultural Sites

An important site is the newly built Illusuak Centre, which provides events and activities for tourists, but, importantly, it is a cultural centre for local Nain residents. The Illusuak Cultural Centre is a stand-out 1,200 m^2 building at the shoreline of Nain and acts as a "living room for the community" (Illusuak Cultural Centre, n.d.). The building opened in 2020 and hosts administrative offices for the Nunatsiavut Government and Parks Canada, language classes, a museum exhibition area, a café, a craft shop, studio space, and a 75-seat theatre.

5.4.3.2.3 Community Recreational Facilities and Services

Nain boasts several recreational facilities, including an indoor ice rink, an arts and crafts community, boat tours, a brass band group, and restaurants. Additionally, outdoor physical activities such as snowmobiling, backcountry skiing, and hiking trails are available. The Nain Husky Centre provides an indoor ice rink, accommodating hockey leagues, open skating times for novice skaters, and children's skating activities. Various outdoor sports and activities, such as snowmobiling, dogsledding, boat tours, snowshoeing, skiing, and ice-fishing, are popular in Nain. However, the extent to which Nain residents engage in these activities, as opposed to tourists in the area, remains unknown.

5.4.3.3 Local Businesses

Many of Nain's local businesses are operated through the Nunatsiavut Group of Companies (NGC) which are the businesses operated by the Nunatsiavut Government. NGCs cites its mission as “to create wealth in trust for Nunatsiavut Beneficiaries by owning profitable, sustainable businesses.” Many of the NGCs operate within Nain, while others are accessible by flight or ferry, though they still support needs in the region. These businesses operate in the areas of construction, real estate, air transportation, and more. Nain has several other small businesses that are not owned or operated by the NGC. These businesses provide critical goods and services in the region. Currently, the industries of operation include recreation,

lodging, finance, and retail businesses. Additional detail about the local economy and businesses can be found in Section 5.4.4.

5.4.4 Economy, Employment, and Business

This section offers an overview of the primary economic sectors, key employers, and tourism activities within the region, all essential elements of the Human Environment profile in Nain. These factors are intricately linked to the Project, as the airstrip serves as a critical conduit for sustaining local business operations by expediting the transportation of goods and services. The absence of airstrip infrastructure would confine businesses to seasonal transportation during the summer months exclusively. Furthermore, this section describes the airstrip's pivotal role in bolstering tourism, highlighting its significance in facilitating access to the region for tourists eager to partake in distinctive cultural and recreational pursuits.

5.4.4.1 Main Economic Sectors

Some of the main employers in Nain are the NG, NICG and other industry sectors as identified in Table 5.4-16. In 2021, more than 50% of the Nain workforce was employed in "Public Administration", "Health Care and Social Assistance" and "Construction" (Statistics Canada 2023). Women were dominant in "Educational Services", "Health Care and Social Assistance" and "Retail Trade", while men dominated in other categories such as "Agriculture, Forestry, Fishing and Hunting", "Arts, Entertainment and Recreation", "Construction", "Mining, Quarrying and Oil / Gas Extraction" and "Transportation and Warehousing".

Table 5.4-16: Labour Force by Industry (Statistics Canada, 2023)

North American Industry Classification System 2012	Nain			NL		
	Total	Male	Female	Total	Male	Female
All Industries	345	48%	52%	236,405	51%	49%
Public administration	105	43%	57%	21,725	50%	50%
Health care and social assistance	55	27%	82%	40,245	17%	83%
Construction	30	83%	33%	19,380	89%	11%
Mining, quarrying and oil/gas extraction	25	80%	40%	9,715	84%	16%
Manufacturing	20	50%	50%	11,670	68%	32%
Retail trade	20	0%	75%	29,955	44%	56%
Transportation and warehousing	15	67%	0%	11,815	76%	24%
Administrative and support, waste management and remediation services	15	0%	67%	7,470	60%	40%
Accommodation and food services	15	0%	67%	15,310	39%	61%
Agriculture, forestry, fishing and hunting	10	100%	0%	9,425	76%	24%
Information and cultural industries	10	0%	0%	2,740	55%	45%
Educational services	10	0%	100%	17,205	32%	68%
Arts, entertainment and recreation	10	100%	0%	3,765	50%	50%
Other Services (except public administration)	10	0%	0%	9,885	48%	52%
Utilities	0	0%	0%	2,795	75%	25%
Wholesale trade	0	0%	0%	4,780	75%	25%
Finance and insurance	0	0%	0%	4,610	33%	67%
Real estate and rental and leasing	0	0%	0%	2,125	60%	40%
Professional, scientific and technical services	0	0%	0%	11,525	58%	42%
Management of companies and enterprises	0	0%	0%	260	52%	50%

5.4.4.2 Key Employers in Nain

5.4.4.2.1 Nunatsiavut Group of Companies

In 2006, the NG established the Labrador Inuit Capital Strategy Trust to enable Beneficiaries to gain from the socio-economic opportunities (e.g., education, training, employment, business) arising from self-governance (NGC 2021). Five Trustees (Beneficiaries appointed by the NG) provide independent oversight for business interests through the holding company NGC. The NGC is involved in wholly owned or partnership ventures in fisheries, air and marine transportation, commercial real estate, construction and heavy civil, logistics and the Torngat Mountains Base Camp (NGC 2021). These companies provide employment opportunities in Inuit communities, including Nain. Profits from NGC are also invested in programs and services for Labrador Inuit.

5.4.4.2.2 Seafood Harvesting and Processing

The economy of Inuit Communities includes both seafood harvesting and processing. Nuluak Fisheries, NGC's fishing operation, holds commercial-communal licences for species such as shrimp, turbot and crab (NGC 2021). The shrimp and turbot quotas are fished by third parties, which provide royalties to NGC. Torngat Fish Producers Co-Op Society operates seafood processing facilities Inuit communities. The Nain plant is licenced for groundfish species, wild salmonids (Arctic char) and scallops (Government of NL 2022a). In 2020, 28 employees per shift processed char and scallops (OKalaKatiget Society 2020). At that time, there were five licenced commercial char fishermen and a three-person scallop fishing crew in Nain.

5.4.4.2.3 Mining

The mining industry is a key economic driver in NL. In 2022, 500 mineral exploration applications were approved with an estimated $189 M to be spent on exploration activities (Government of NL 2022b). This, the largest exploration investment since 2012, is driven by the search for gold, iron ore and critical minerals. The Mineral Incentive Program provides $1.7 M annually, including financial support for prospectors and junior exploration companies.

5.4.4.2.4 Nunatsiavut Construction Inc.

Quarries in NL are governed by the Mining Act, Quarry Materials Act and Quarry Materials Regulations. A Quarry Permit may be issued for up to one year and allows the permit holder the right to excavate, remove and sell quarry materials from the permit area. Exploration Approval is required in order to explore for quarry materials on a Quarry Materials Exploration Licence. Quarry resources are identified within Nain's Municipal Planning Area (Figure 1.4-2). One Quarry Permit is listed as being 1 ha and under a current permit to Nunatsiavut Construction Inc. (NL Mining and Mineral Development n.d.). Nunatsiavut Construction Inc., a subsidiary of NGC, has three divisions, including aggregate production (NGC 2021).

5.4.4.2.5 Voisey's Bay Mine

Vale NL's Voisey's Bay nickel-copper-cobalt mine is located approximately 35 km southwest of Nain with a processing plant in Long Harbour, NL. The project, which includes an open pit mine that began producing in 2005, presently has reserves to operate until 2034 (Government of NL 2022b). The Voisey's Bay underground expansion project, commissioned in 2021, resulted in an annual production capacity of 40,000 tonnes of nickel concentrate, with by-products of approximately 20,000 tonnes of copper and 2,600 tonnes of cobalt. Vale NL has impact benefits agreements with the NG and Innu Nation, on whose traditional lands the mine is located (Vale NL 2021a). Inuit and Innu employees together represent approximately 50% of Vale NL's workforce, while 65% of procurement contracts are awarded to Indigenous businesses or partnerships (Vale NL 2021a; Canadian Mining Journal 2021). Voisey's Bay is a fly-in / fly-out worksite, where Vale employees typically work in two-week rotations (Vale NL 2021a).

5.4.4.2.6 Scientific Research

The Nunatsiavut Research Centre in Nain supports research programs that contribute to local knowledge and enhancing the health and well-being of Inuit (NG 2021b). It also focuses on increasing local capacity of the Labrador Inuit by providing opportunities to participate in field and laboratory research. The NG leads or co-leads various research projects and the Nunatsiavut Research Centre provides a shared space for staff and research partners.

5.4.4.3 Tourism

This section describes tourist sites/attractions that contribute to the economy of the Nunatsiavut region. Tourism is an area in which the NG is currently seeking opportunities to expand upon. Some notable sites

include national parks, Arctic cruises, and cultural sites. The opportunities and interest within the community of Nain to expand upon the tourism industry in the region may indicate that the increased reliability of flights to the region through the Project may contribute positively to the local economy.

The NG has developed a revised tourism strategy focussed on Labrador Inuit culture, deriving economic benefits from visitors, engaging communities, leveraging partnerships, and offering excellent experiences and service. Nain offers local activities and experiences such as hiking and learning about Inuit culture and practices. Nain is the gateway to the Torngat Mountains National Park, a stopping point for small cruise ships that travel along coastal Labrador and Greenland and a stop-over for a long-distance snowmobile race.

5.4.4.3.1 Torngat Mountains National Park

The primary administrative offices for Torngat Mountains National Park are located in Nain. The park offers scenic opportunities to explore dramatic mountains, fjords, icebergs, and observe wildlife including polar bears, whales, and seals. Each summer, the Inuit-owned Torngat Mountains Base Camp and Research Station operates near Saglek, supporting visitors and serving as an administrative hub for Parks Canada. Inuit Elders and youth from Nunatsiavut and Nunavik join visitors, researchers, and Parks Canada staff at the Base Camp. With logistical support from the Base Camp, Parks Canada offers a range of activities, including day hikes, interpretive walks, camping trips, kayaking, rock-climbing, and visits to other park sites.

5.4.4.3.2 Cain's Quest Snowmobile Race

Cain's Quest considered one of the longest snowmobile endurance races in the world roughly 3,500 km across Labrador). The 2023 event included a 12-hour layover in Nain.

5.4.4.3.3 Cultural Interpretation

The NG has constructed the Illusuak Cultural Centre, which opened in 2019 in Nain. This building's curved design is inspired by the layout of Inuit sod houses (Illusuaks) found in Nunatsiavut. Exhibits include Inuit-made soapstone pots and lamps and whalebone and ivory tools, some of which have been repatriated from the Smithsonian Institution. The cultural centre, which houses the NG and Parks Canada offices, supports tourism through a café, craft shop, studio space and 75-seat theatre. The building is also used as a gathering site for cultural events, school visits, public presentations and meetings and weddings.

5.4.5 Safety and Emergency Services

In the Town of Nain there is limited safety and emergency services due to the remote location and small population. Efforts are being made to improve emergency response in the region. The RCMP provides policing in the region as necessary. Emergency shelters, search and rescue, and volunteer fire response are maintained in the region.

5.4.5.1 Emergency Response Plan

Efforts are underway to enhance emergency planning protocols in Nain and the broader Nunatsiavut region, with the Nunatsiavut Government actively investing in emergency infrastructure. Current emergency planning includes a focus on refining emergency response systems, encompassing justice, natural disaster preparedness, evacuation, and 911 services tailored to isolated Labrador communities.

5.4.5.1.1 Emergency Shelters

The Federal Government funds an emergency shelter in Nain through Reaching Home. The Nain Safe House also extends emergency services for individuals facing domestic abuse. Additional resources are available outside of the community.

5.4.5.1.2 Search and Rescue and Fire Response

Currently in Nain, the Newfoundland and Labrador Search and Rescue maintains a trained volunteer search and rescue team. The community also maintains a volunteer fire department to respond to emergencies (OKalaKatiget Society 2022).

5.4.5.2 Climate Change Emergency Planning

Indigenous and Northern Affairs Canada (CIRNAC) has initiated the Climate Change Preparedness in the North (CCPN) program to assist Indigenous and northern communities in adopting emergency planning measures to address climate change impacts.

5.5 Human Health Conditions

This section provides an overview of the human health conditions prevalent in the Nain region. This includes an examination of physical health conditions, mental health aspects encompassing cultural influences, and the implications of climatic factors on health. Furthermore, specific attention is given to the considerations surrounding Country Foods, commonly referred to as Traditional foods. Changes to the environment which may affect human health are linked to the technical studies related to the biophysical determinants of health.

An understanding of the existing health landscape within the region is imperative for assessing the potential interactions of the Project with these health conditions. The analysis primarily relied on desktop research to gain insights into health conditions, albeit acknowledging its inherent limitations. In addition, primary data pertaining to Country Foods was gathered, with numerous samples subjected to testing for metals and PAHs (Polycyclic Aromatic Hydrocarbons). Furthermore, insights gleaned from interviews conducted with community members served to enrich our understanding of the potential health impacts of the Project within the region.

It is known that the lands around the community and proposed Project site are used for recreation and the procurement of country foods including hunting, fishing, and harvesting. Following from early engagement and consultation activities, an NG led Regional Land Use Study began in October 2023. Information will be collected from hunters and fishers from the local community. Additional information from this study related to the frequency and duration of land use for each purpose and if there is any seasonality associated with each use will be used as data inputs for development of human exposure estimates.

Preliminary land use information as it relates to human health is provided on Figure 5.5-1.

NUNATSIAVUT
kavamanga government

NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION

OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

Project Component
- Access road
- Temporary access road
- Airport footprint
- Runway

Study Area
- Land use study area

Hydrography
- Watercourse

Labrador Inuit Lands
- Parcel number
- OX-00X Nain Inuit Community Government

Human Feature
- Country food
- Potential fishing area
- Cabin
- Snowmobile trail
- Trouser Lake protected public water supplies

1. Lynx and ptarmigan are trapped/ hunted here
2. Geese are hunted in the Bay
3. Salt Water Pond: A significant area for hunting in the region. Geese are hunted in this area.
4. Firewood is gathered in this area
5. Firewood is gathered in this area. Ptarmigan are hunted in this area
6. Mussels are gathered in this area
7. A fox trap is present here
8. This area is a significant location for hunting

1:44 000
0 250 500 m
NAD 1983 UTM Zone 20N
2024-06-25 09:14

Figure 5.5-1
Preliminary Land Use Information related to Human Health

AECOM

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Community engagement has been conducted throughout Project planning including leading a Public Project Information Meeting in Nain on October 16, 2023. Further telephone interviews with various community members and stakeholders occurred in January and February 2024. Health Canada was consulted on the Initial Project Description through IAAC and provided comment on January 24, 2024, and April 3, 2024. Details of the engagement activities have been included in Section 3. Information collected from these activities which relate to human health impact are detailed below.

5.5.1 Physical Health

This section details the physical health conditions in the Nain region. This includes general health and wellness, including perceived health, as well as communicable diseases, acute illnesses, and common chronic health issues. Chronic health issues are common, and overall, people tend to report declining health. This trend aligns with findings related to mental health and the impact of changing climate conditions, as discussed in Section 5.5.2.

General Health and Wellness

In 2012, Statistics Canada gathered data on the general perceived health of Inuit residents of Nunatsiavut from 2100 respondents, as published in 2015. However, it's essential to exercise caution with this data due to its limited nature and notably low census participation rates (Statistics Canada, 2015). Excluded from analysis were inconclusive data points, such as those for unspecified age brackets and participants aged 55 and over. Among the total respondents, 53% reported very good or excellent perceived health in 2012 (Table 5.5-1). Comparing data from 2001, 2006, and 2012 revealed a general decline in perceived health (Table 5.5-1). Future studies led by the Inuit community may offer more consistent participation and provide a more holistic understanding of health determinants relevant to the communities.

Table 5.5-1: Data for Perceived Health of Inuit in Nunatsiavut* (Statistics Canada, 2016)

Age Bracket (in years)	Perceived General Health	Percentage of Respondents within Age Bracket by Year		
		2001	2006	2012
6-14	Excellent perceived general health	48%	43%	44%
	Very good perceived general health	32%	30%	34%
	Good perceived general health	15%	24%	16%
	Fair or poor perceived general health	Insufficient data	Insufficient data	Insufficient data
15-24	Excellent perceived general health	32%	27%	23%
	Very good perceived general health	32%	38%	34%
	Good perceived general health	Insufficient data	29%	30%
	Fair or poor perceived general health	Insufficient data	Insufficient data	9%
25-55	Excellent perceived general health	24%	10%	13%
	Very good perceived general health	41%	44%	35%
	Good perceived general health	30%	33%	37%
	Fair or poor perceived general health	6%	13%	14%

**Much of the collected data should be "used with caution" as participation in census was low.*

In Inuit communities of Nunatsiavut, human health concerns are closely intertwined with access to traditional lands and waters, as well as necessities. Traditional activities like hunting and harvesting not only provide physical activity but also effect various dimensions of health, including physical, mental, and emotional well-being. Moreover, challenges related to food and housing security exacerbate health

concerns across Nunatsiavut, including in Nain. While media reports highlight issues such as housing shortages, food insecurity, and limited healthcare access in the community, there is a lack of published studies providing specific statistics for Nain. Nevertheless, these factors are likely significant contributors to the overall health status of the community.

Healthcare access in the region is limited to the Nain Community Clinic which is staffed by Nurses and Nurse Practitioners and is supplemented by periodic visits from physicians. The existing airstrip plays a key role in connecting residents to health care outside of the region. As the existing airstrip continues to degrade, the Project will play an important role in ensuring continued access to health care. Further, by improving the reliability of air travel in the region, residents may have improved access to healthcare in emergencies.

5.5.1.1.1 Communicable Disease and Acute Illness

Rates of communicable diseases may be high in Nunatsiavut (Nunatsiavut Government Department of Health and Social Development, 2013). Sexually transmitted infections (STIs) and tuberculosis are two of the top communicable and acute illnesses in Nunatsiavut. In Nunatsiavut the rate of active tuberculosis per 100,000 people between 2006 and 2016 was 248.4 compared to the Canadian average of 0.6 (ISC, 2018).

5.5.1.1.2 Chronic Health Issues

Chronic illnesses in Nunatsiavut are a common issue within the region and place the biggest strain on the local health system (Nunatsiavut Government Department of Health and Social Development, 2013). Based on the 2006 Aboriginal Peoples Survey, the most common chronic conditions reported in Nunatsiavut Inuit communities of individuals 15 years of age and over included high blood pressure, arthritis and/or rheumatism, and asthma (Nunatsiavut Government Department of Health and Social Development, 2013). Smoking is quite common among Inuit community members in Nunatsiavut which may exacerbate some of these chronic issues (Nunatsiavut Government Department of Health and Social Development, 2013). It is anticipated that the current study being completed by Inuit leadership will be able to provide more updated data about chronic health within Nunatsiavut and within Nain more specifically.

5.5.2 Mental Health

This section provides an in-depth examination of the Mental Health conditions prevalent in the Nain region. It encompasses an understanding of the factors influencing mental health conditions, the availability of mental health services, cultural health considerations, and the impact of climatic factors on health.

The significance of Inuit culture cannot be overstated in relation to Inuit health, as Inuit identities are closely intertwined with their land. The ramifications of climate change on their ability to access and inhabit their territories can profoundly affect their way of life and health. Various factors contribute to the mental health landscape in the region, including cultural loss, socioeconomic challenges such as poverty, and inadequate housing conditions, among others.

5.5.2.1.1 Mental Health Care

According to the Inuit Tapariit Kanatami (2011; 2016), mental health is a significant health issue for Inuit communities. Multiple factors contribute to mental health including cultural loss, poverty, poor housing, abuse, and intergenerational trauma. There is a shortage of mental health staff in remote communities as well as retention of these staff which puts a strain on access to mental health resources for community members, especially resources that are in line with cultural values and social determinants of health that align with Inuit worldviews (ITK, 2016; Nunatsiavut Government Department of Health and Social Development, 2013).

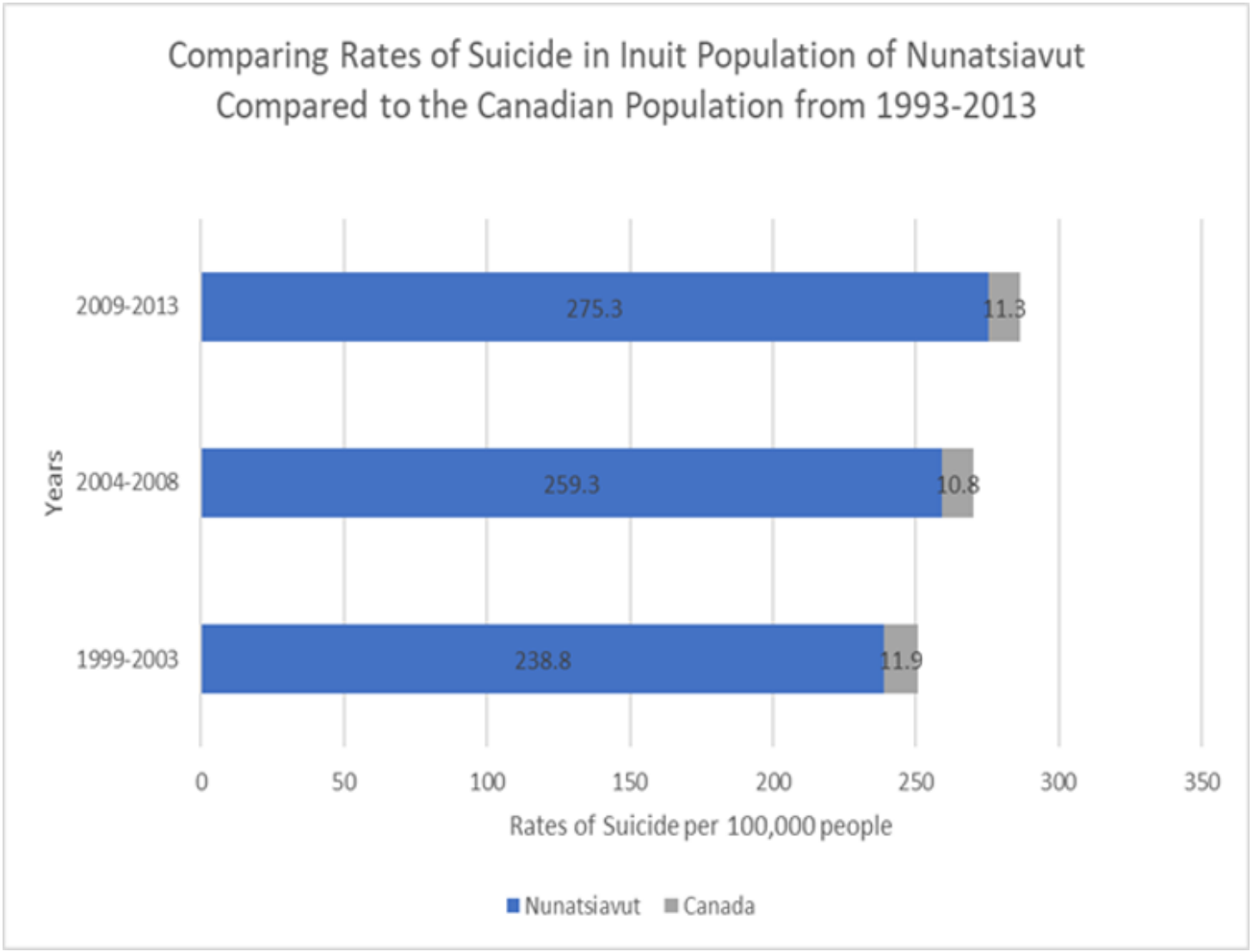

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Figure 5.5-2

Comparing rates of suicide in Inuit population compared to the Canadian population from 1993-2013

Suicide is a particular concern when it comes to mental health. In a study done by ITK, suicide rates in Nunatsiavut seem to have increased from 2003 when compared to 2013 and were significantly higher than rates observed across Canada (Figure 5.5-1) (ITK, 2016). Based on previous studies, rates of suicide are higher in Inuit males when compared with females. Key factors contributing to suicide risk in Inuit communities include early childhood experiences and trauma, mental health within the family, education, substance use, abuse, poverty, and housing instability (ITK, 2016). More recent data is needed to determine how suicide rates have changed since this study was completed.

5.5.2.1.1.1 Mental Health Care Services

The Mental Wellness and Healing division of the Nunatsiavut Government offers a range of services aimed at prevention, intervention, and support (NG, 2023). These services address mental health, addictions, and related issues through various programs. Mental health and addictions workers are available in each Inuit Community, while certain programs are delivered regionally. All initiatives prioritize the integration of evidence-based clinical practices within the context of Inuit culture and community values.

For Nain Youth, a dedicated Youth Administrator coordinates various initiatives, including participation in community, regional, and national events, as well as facilitating training, educational, and employment opportunities. Additionally, youth outreach workers in Nain and Hopedale deliver programs aimed at providing essential support, including food, shelter, and social connections, to at-risk children and adolescents. The Nain Youth Centre provides a safe environment for youth aged 13-30 seeking support (NG, 2023).

The Nunatsiavut Justice Services assists community members involved in or at risk of involvement in the justice system, including those incarcerated at correctional facilities like the Labrador Correctional Centre in HVGB. These services also extend to providing sexual violence prevention and outreach counseling support for individuals affected by such offenses.

5.5.2.1.2 Cultural Health

Inuit culture plays a crucial role in Inuit health, as highlighted by studies conducted by organizations such as ITK (ITK, 2016). In Nain, efforts to preserve Inuit culture, including language and cultural programming, are substantial. Cultural continuity is closely linked to access to the land and engagement in cultural activities (ITK, 2016; Harper et al., 2015). The establishment of the Cultural Centre in Nain reflects the NGs commitment to maintain cultural vitality within the community.

5.5.2.1.3 Climatic Impacts on Health

Inuit identities are intricately linked to their land, and the effects of climate change on their ability to access and inhabit their territories can significantly affect their way of life and health (Harper et al., 2015). The ability of Inuit communities to maintain their health, encompassing physical, mental, and cultural aspects, is closely tied to their connection to and engagement with their environment (Harper et al., 2015).

Rapid climatic changes in northern regions are heightening vulnerability to the impacts of climate change on communities' daily lives and overall well-being (Macdonald et al., 2015). In northern Labrador, climate change is already affecting Inuit communities' ability to engage in traditional cultural practices like hunting and fishing, crucial for intergenerational connection and community identity (Macdonald et al., 2015). For example, the melting ice highways in Nain, a primary transportation route, hinder access to the land and participation in seasonal cultural activities, posing safety risks due to inconsistent freeze-thaw cycles (Harper et al., 2015; Macdonald et al., 2015). These changes not only impact cultural health but also disrupt residents' mental well-being by affecting their identity connection and social relationships.

Moreover, climate change poses risks to the physical health of community members when travel becomes limited and traditional food sources, obtained through hunting and harvesting, become inaccessible (Harper et al., 2015; Macdonald et al., 2015). Focused research on the specific impacts of climate change in Nain could help identify and address the community's unique risks and challenges.

5.5.3 Country Foods

This section describes the existing conditions for Country Foods in the region of Nain. Country Foods are those foods which are procured from activities including hunting, fishing, and harvesting in the region. Country foods are central to culture, way of life, and are the food preference for Inuit (ITK, 2021). In the region of Nain, the top ten country foods include Fish, Caribou, Partridge (Ptarmigan), Seal, Berries, Char, Mussels, Rabbits, Porcupine, and Ducks – additional information on country foods can be found in

Table 52. Sharing of country foods resources is widespread and is an important strategy for distribution that attempts to support as many members of the community as possible (Dombrowski, 2014). Though, the accessibility of country foods is hindered by various factors such as hunting bans, access expenses, and climate change impacts (Bowers et al., 2020; Food First NL, n.d.).

As country foods have become more difficult to access, residents have cited the need to supplement country foods with foods sourced from grocery stores in the region. However, Nain has the highest grocery costs of any community under the Nutrition North Canada federal government program.

Notably, climate change presents additional hurdles for acquiring country foods. The adverse effects of climate change have impeded community members' mobility across the land, consequently limiting their access to traditional foods. This restriction has been observed to pose potential risks to physical health within the community (Harper et al., 2015; Macdonald et al., 2015).

It is known that lands around the community and potentially near the proposed Project site are used for the procurement of country foods. Additional information related to the frequency and duration of land use for each purpose and if there is any seasonality associated with each use will be used as data inputs for development of human exposure estimates. Preliminary Land Use information as it relates to human health is provided on Figure 5.5-1.

During preliminary interviews with the community, it was noted that the proposed Project site was primarily used as an area that is travelled through, rather than used for the procurement of country foods. One community member noted that there may be partridge hunting in the area. It was also suggested by that the construction of the access road may support improved access to fishing spots nearer the airport. Further information on land use will be received and considered following the NLNR Regional Land Use Study.

Of the ten respondents that were interviewed only three currently live in Nain and consume country foods. Of these, it was estimated that 20-50% of their diet was made up of country foods. It was also noted during the community interviews that generally wild meats take longer to prepare and are difficult and costly to access and are distributed through community sharing.

The new Project site would lead to a different flight path in and out of Nain. Planes would travel from the ocean, east and west, and not over the community of Nain. Emissions from the air travel may be reduced in the community and increase around the proposed Project site. More information is needed on how this may impact food sources, pending the completion of the NLNR Regional Land Use Study.

Preliminary information related to country foods is presented in Table 5.5-2. Figure 5.5-1 also details areas of country food sampling, potential land use areas, and drinking sources in the region. All information on land use is preliminary.

Table 5.5-2: Country Foods in Nain: seasonality and important considerations

Food Type	Seasonality	Notes
Fish (Arctic Char, salmon, trout)	Throughout the year	NG holds FSC fishing licences for Arctic char, salmon and trout throughout the LISA. Beneficiaries can harvest at any of the year throughout the LISA for quantities needed for FSC purposes.
Sea food (Scallops) and mussels	To be confirmed in Land Use Study.	In 2020 there was a three person scallop fishing crew in Nain. The local Nain Processing Plant is licensed for Scallops. No data for mussels currently identified.
Small Game (Ptarmigan, geese, hare, porcupine)	Winter	Harvesters have access to small game in all of Labrador and northern Labrador Management Zones. Hunted in the area of the proposed airport (AECOM interviews)
Berries (red berries and Bakeapples)	August/ September	Red Berry Samples co-located with soil samples were collected and analysed as part of the baseline country foods assessment
Labrador Tea	Spring/ Summer	Labrador Tea samples co-located with soil samples were collected and analysed as part of the baseline country foods assessment
Moose	By permit only. Fall/ Winter	Moose Management Area 92 licenses are issued to NG by the Government of NL.
Caribou	N/A	The Labrador Inuit Development Corporation hunted caribou for export since 1986 and operated a caribou meat processing facility since 1988 in Nain. Structural issues with the facility and changes in migration patterns led to closing the plant.
Seal (harp, ringed, harbour, grey, bearded)	To be confirmed in Land Use Study	Tissue data available through the ECCC Northern Contaminants program will be reviewed as part of a baseline human health risk assessment.
Bird Eggs	To be confirmed in Land Use Study	Tissue data available through the ECCC Northern Contaminants program will be reviewed as part of a baseline human health risk assessment. Consumption advisories for seabird eggs have been published by Health Canada in 2023 related to an oil spill for Nain and Postville.
Black Bear	Spring/ Fall To be confirmed in Land Use Study	Hunters may harvest Black Bear in Black Bear Management Area 200
Fur Trapping (Beaver, muskrat, otter, mink, coyote, fox, lynx, wolf, weasel, squirrel, marten, fisher and wolverine)	Spring/ Fall To be confirmed in Land Use Study	Trapping is permitted in the Labrador North Fur Zone. Traditional use in foods, medicinal and other purposes may inform the human health risk assessment.

Country Foods and country foods harvesting are important to the culture and livelihood of Nain and nearby communities. As part of field studies for the biophysical environment, samples of red berries and labrador tea, co-located with soil samples were collected from areas around the Project Area. These samples can be used to identify the potential for baseline conditions of concern. They will also be used for comparison of baseline conditions with conditions after the new airport has operated for some time. Additionally, samples of Arctic Char were obtained from a local Nain fisher. All of these samples were analyzed for metals including mercury and polycyclic aromatic hydrocarbons (PAHs) to determine the baseline conditions of country foods. The preliminary results are included in Appendix G1. As there are no standards for animal (fish) or plant tissue, for pre-screening purposes, the samples were compared to CCME soil standards. A summary of the results is provided in Table 5.5-3.

Table 5.5-3: Summary Results of Country Food Analysis

Media	Analysis	Number of samples	Comment
Soil	Metals	12	An exceedance of the CCME Residential/Parkland standard of Nickel was present in one soil sample.
	PAHs	12	No detectable PAHs in any of the soil samples analyzed
Arctic Char	Metals	10	No fish tissue screening guidelines readily available; will be further evaluated in a human health exposure and risk assessment evaluation as per HC guidance and inconsideration of CFIA guidance.
	PAHs	10	No detectable PAHs in any of the fish tissue samples analyzed
Labrador Tea/Red Berries	Metals	10	No exceedances of soil standards were noted. Detectable concentrations of Alumimum (22/22 samples), Barium (22/22 samples), Boron (19/22), cobalt (1/22). Copper (22/22), Iron (1/22), Manganese (22/22), Nickel (11/22), Strontium (12/22), and Zinc (20/22)
	PAHs	10	No detectable PAHs in any of the plant tissue samples analyzed

5.6 Indigenous Peoples

5.6.1 Historical Setting and Indigenous Inhabitation of the Nain and Nunatsiavut Region

This section provides insight into the Inuit culture and identity that has been present in the Nunatsiavut Region since time immemorial. According to the Nunatsiavut Government, the Inuit are the descendants of the Thule peoples, a hunter-gatherer society which migrated across the Bering Strait to modern-day Labrador to harvest and hunt the abundant food sources found within the region. The Nunatsiavut Government describe their earliest ancestors living predominantly along the North Coast of Labrador which is believed to have included modern-day Nain. These early ancestors of the Inuit communities utilized the coast for harvesting. Inuit people had no contact with European settlers until the 16th century when Basque whalers migrated to the area and began to trade with the local Inuit communities (Pederson, 2006). Prior to this contact with settlers, Inuit people lived more nomadically; this gradually transitioned towards more sedentary lifestyles once European contact had been established.

Early contacts include the Moravian Brethren in 1752, missionaries of a German Protestant-based church, which attempted to build a station near Makkovik but ceased due to conflict with the Inuit (Rivet 2020a). In 1771, following three exploratory visits to Labrador, the Moravians established a mission at Nuneingoak, which they called Nain. The Moravian Brethren founded seven other missions using Nain as their operational headquarters: Okak (1776-1919); Hopedale (1782-present); Hebron (1830-1959); Zoar (1865-1890); Ramah (1871-1907); Makkovik (1896-present) and Killinek (1904-1924) (Brice-Bennett, 1977). Using these missions, the Moravians proselytized Christianity to the Inuit and engaged in trade, exporting goods such as oil, sealskins, furs, dried fish and handicrafts to Europe. During this period, the Hudson's Bay Company (HBC) also established fur-trading posts in Labrador beginning in 1836.

After Confederation, the province of Newfoundland and Labrador ceased to provide resources and engage with several northern Labrador Inuit communities which resulted in the residents of some of these communities (Hebron, Okak and Nutak) to be resettled and dispersed among the five remaining Inuit communities in northern Labrador. Consequently, Inuit communities began to live more sedentary lifestyles and engaged in trade with settlers across Newfoundland and Labrador. Inuit identity and lifestyles were also significantly impacted by the residential schools ran by the Moravian missionaries in northern Labrador, which were also in Nain.

In Nain, Inuit culture exerts a significant influence on both governance and cultural initiatives. Approximately 93.5% of the population identifies themselves as Inuk (Inuit pl.) in Nain, with approximately 31.6% possessing conversational-level fluency in Inuktitut (Statistics Canada, 2021). Being the administrative center of the Nunatsiavut Government, Nain also houses many important Inuit institutions. Examples include the OKâlaKatiget Society, the Illusuak Culture Centre, as well as additional language and cultural. Nain remains a crucial hub for Inuit culture and administration within the Nunatsiavut Region, emphasizing the need to prioritize its connectivity with other Inuit regions.

5.6.2 Labrador Inuit Land Claims Agreement

The Labrador Inuit Association (LIA) was formed in 1973 to advance land claims and address other issues (NG 2023). In 1977, the LIA filed a statement of claim with the Government of Canada seeking rights to the land and sea ice in northern Labrador. The Labrador Inuit Land Claims Agreement (LILCA) was signed in December 2005 and the transitional government began preparations for the first elections. The first elected Nunatsiavut Assembly was sworn in on October 17, 2006.

Inuit in Labrador have established Aboriginal rights under section 35 of the Canada Constitution Act, 1982; Nunatsiavut Beneficiaries also have treaty rights, including the right to harvest throughout the Labrador Inuit Settlement Area (NG 2005). The Labrador Inuit Land Claims Agreement (LILCA) outlines the rights of the Labrador Inuit to domestic harvest in their territory which also dictates that Inuit in Labrador are the only individuals with the right to harvest wildlife and plants in Labrador Inuit Lands. The LILCA outlines conditions for hunting, trapping, and fishing in the LIS and non-Beneficiaries must obtain a permit from the NG to pursue any activities on Labrador Inuit Lands.

5.6.3 Nunatsiavut Government

The Nunatsiavut Government (NG) was the first Inuit entity in Canada to attain self-governance, a milestone accomplished after several decades using a modern land claim process. In 1973, the Labrador Inuit Association (LIA) was formed to protect and promote Inuit lifeways and advance Labrador Inuit rights through the land claims process. The Labrador Inuit Land Claims Agreement (LILCA) was signed in 2005, which established the NG. The region of Nunatsiavut remains a part of the province of Newfoundland and Labrador. Still, it is autonomous in that it can make laws and holds authority over important parts of the region including health, education, governance, culture, and language. For example, through the LILCA, the NG has the power to establish its own justice system and laws to govern matters such as land and resource management, education, health, housing, culture and language (NG 2023). Self-governance enables the Inuit to better protect their land and resources, including benefiting from developments. It can also ensure Inuit culture and Inuktitut are taught in schools. The NG continues to strive for more autonomy and plays a critical role supporting, providing services to, and protecting the rights of Labrador Inuit.

5.6.4 Electoral Process

In October 2005, Inuit community members across Labrador elected their first representatives of Nunatsiavut, marking a significant milestone in Inuit self-government in the region. The election formed the basis of a nine-member government for the NG. All levels of government within the Nunatsiavut area are democratically elected and responsible. The NG Assembly includes an elected President, the elected representatives and AngajukKâks (mayors) of each Community Government, as well as Inuit living outside of Nunatsiavut.

5.6.5 Physical and Cultural Heritage

Labrador Inuit are descendants of the Thule, a pre-European contact hunting society that lived across northern Canada and Alaska (PAO n.d.). This culture, which was centred around capturing bowhead whales, was adapted to the Arctic and sub-Arctic conditions of Labrador. The Inuit had also occupied the Northern Peninsula of Newfoundland in the early post-contact period.

The early Inuit hunted game throughout the year for food and to gather materials to create required items (Brice-Bennett 2012). Single-person kayaks and larger umiaks (open boats) were made from wood frames

wrapped in seal skins. Clothing was made from seal pelts in summer and caribou skins in winter. The Inuit constructed skin tents for the milder seasons, and during winter they lived in sod houses (earthen huts built using sods, timber and / or stones with a roof supported by the ribs and shoulder blades of whales) or snow houses built from blocks of hard snow (Brice-Bennett 2012; Pedersen 2016). Large winter houses were usually shared by several families (Pedersen 2016).

Prior to European contact, the Labrador Inuit held their own spiritual beliefs centred around the most powerful Inuit spirit, Torngarsoak (Parks Canada 2022). AngajukKât (leaders) and shamans would communicate with Torngarsoak in hopes of good weather and bountiful hunting. Non-adherence to rules and practices associated with spiritual beliefs would result in consequences, such as storms, winds or unsuccessful hunting. Though many of the Labrador Inuit were converted to Christianity by the Moravians, the people still hold strong spiritual connections to ancient beliefs and to Torngait as the place where spirits dwell. The Inuit continue to travel north from their communities to the Torngat Mountains area for hunting, fishing and travelling throughout the year. Special places include Sallikuluk (Rose Island) in Saglek Bay, where there are more than 600 known traditional Inuit graves and two areas that have a number of traditional Inuit sod house foundations.

5.6.5.1 Historic, Archaeological and Paleontological Resources

Archaeological resources (i.e., archaeological materials, archaeological sites, Inuit cultural materials) provide a record of Inuit prehistory, history and use and occupancy of Nunatsaivut (LIA 2005). These resources are of ethnological, spiritual, cultural, historic, religious and educational importance to Inuit. The NG is responsible for investigation and protection of archaeological resources on LIL and in Inuit Communities.

The Labrador Inuit Lands Act (Part 2, Division 3: Archaeology, Burial Sites and Human Remains) provides protection of archaeological resources on LIL along with related information. The NG works with the NL Provincial Archaeology Office (PAO), which is responsible for heritage resources in the LISA outside of LIL through the Historic Resources Act (LIA 2005, Government of NL 2019). The PAO maintains a database of archaeological sites, but limited information is made public to protect the integrity of cultural and heritage resources (PAO n.d.). Many artefacts have been identified in coastal Labrador, with a high concentration of sites around Nain and in surrounding rivers and coastal areas. Nain sites are identified as Inuit, Intermediate Period, Innu, Maritime Archaic, Recent Period and European.

Nearly 800 Thule and Inuit archaeological sites have been identified in NL (PAO n.d.). The area now known as the Torngat Mountains National Park has been important to the Thule and / or the Inuit for thousands of years (Parks Canada 2022). Hundreds of archaeological sites have been identified in the Park, some nearly 7,000 years old. Along with the Thule culture, these sites show evidence of other prehistoric cultures. Artefacts include tent rings, stone caribou fences, food caches and burial sites. The chert quarry at Ramah was a source of glass-like tool material used by Indigenous Peoples for thousands of years.

Various places have been identified in northern Labrador for their importance to Indigenous Peoples past and present (Parks Canada 2022). The Torngat Mountains National Park provides general protection to sites within the Park, including:

- Sallikuluk (Rose Island), located in Saglek Bay at the southern boundary of the park, where more than 600 known traditional Inuit graves and two areas of traditional Inuit sod house foundations have been identified.
- Silluak (North Arm), a fjord at the western end of Saglek Bay that has been used for thousands of years by Inuit and their predecessors and where an archaeological inventory is underway.
- Upingivik, a traditional whale hunting area located in the northerly reaches of the park where Inuit who lived on Killiniq Island in the past travelled to Upingivik during the spring and fall migrations to hunt whales, walruses and eider ducks, and where Inuit, mostly from Nunavik, still travel to Upingivik to hunt whale and other animals for sustenance and to meet and share with other Inuit.
- Ramah, rich in natural and cultural resources such as chert quarries, and located in the southern region of the park, about 50 km from the boundary.

- PitukKik (Nakvak Brook), a small cove in Saglek Fjord in the southern region of the park, where Nakvak Brook flows into the sea and access to a traditional Inuit travel route between the Labrador Sea and Ungava Bay.

More recent history of European and Canadian presence in the Torngat Mountains National Park includes the remains of the Moravian Missions, HBC trading posts, a World War II German remote control meteorological station and Saglek Radar Station, part of the American distant early warning line system remaining from the Cold War (Parks Canada 2022). The Moravian Church recalled its last remaining missionary from Labrador in 2005 (Rivet 2020a). The Inuit maintain and administer the Moravian churches in the various communities.

Four sites in northern Labrador have been designated as national historic sites (Table 5.6-1). They include ancient archaeological sites and the remains of the Moravian missions (Parks Canada n.d.).

Table 5.6-1: National Historic Sites in Northern Labrador

Name	Description
Okak	Okak shows evidence of first human occupation around 5550 before current era (BCE) (about 6,000 years ago) and has been occupied by Maritime Archaic, Pre-Dorset, Intermediate Indian, Dorset and present Labrador Inuit. Sixty archaeological sites, dating from that time onwards, are representative of habitation of Maritime Archaic to Labrador Inuit. Okak is also the location of the second oldest Moravian mission in Labrador (1776 to 1919). Designated as a national historic site in 1978.
Kitjigattalik - Ramah Chert Quarries	The Ramah chert quarries were active from 3000 BCE to 1400 AD (between 600 and 5,000 years ago). The chert found at Ramah is a visually distinctive and important stone type used by several ancient cultures to manufacture tools and other objects. Ramah chert objects are found in burial complexes from northern Labrador to New England, and Ramah chert has been linked to Late Archaic burial complexes and belief systems throughout this large region. Designated as a national historic site in 2015.
Hopedale Mission	Established in 1782 by the Moravian Church, Hopedale includes the earliest surviving Moravian mission structure in Labrador. The site includes a complex of large, wooden buildings representative of Moravian mission architecture in Labrador and commemorates the interaction between Labrador Inuit and missionaries. Designated as a national historic site in 1970.
Hebron Mission	Established in 1829 as a Moravian church for conversion of the Inuit and served commercial and medical purposes. The complex consists of linked buildings, including a church, a mission house and a store, constructed in a Germanic-influenced architectural style. Designated as a national historic site in 1976.

Limited archaeological studies have been conducted in Nain (Fitzhugh in LIA 1977). The remains of Inuit winter sod houses have been identified throughout Nunatsiavut along the Labrador coast from Hamilton Inlet north to Saglek. Where more extensive investigation has been undertaken on islands near Nain (including the Dog Islands), various sites hold historical resources mainly consisting of tent rings and sod houses, but also other items, including a small number of burial cairns and stone fox traps. Tent rings and other evidence of Inuit occupation have been identified around Nain and the Kauk Bight / Kauk Bluff Island area east of the airport site.

A desktop Stage 1 AA was conducted for the Project that, based on the interpretation of landforms and previous research, divided the Project footprint into areas of high, moderate, and low potential for the presence of yet unrecorded archaeological sites. The Stage 1 AA recommended a Stage 2 AA that included examining all areas with archaeological potential and revisiting the previously recorded site HdCk-47 that lies within the Project footprint (Figure 1.4-2).

The Stage 2 AA for the Project was conducted between the 3rd and the 7th of July 2023. The field assessment included the participation of Nain residents Richard Sanugak and Dennis Merkuratsuk who assisted with the survey and landform interpretation, and Ryan Merkuratsuk who accompanied the crew as wildlife monitor. The assessment included the excavation of 164 shovel test pits; all 164 test pits were negative for cultural material.

The assessment included an overflight of the entire Project area followed by pedestrian survey and shovel testing of selected landforms. Areas of potential identified in the Stage 1 AA were initially verified through aerial and pedestrian surveys. Landforms that were interpreted as having high archaeological potential were visually inspected and subject to subsurface shovel testing. Low potential areas included those that were low and wet. Since the Stage 1 AA report was prepared, 8 quarries were added to the Project footprint and are included in the present study.

The revisit of site HdCk-47 included further assessment of the site boundaries and it was determined to be restricted to a small area of less than 200 m^2 around the original positive tests. Although several lithic

flakes were observed on the ground by the original tests, six additional shovel tests were negative for cultural material.

All AA results have been provided to the Nunatsiavut Department of Language, Culture, and Tourism.

5.7 Land and Resource Use

The Labrador Inuit have established Aboriginal rights under section 35 of the Canada Constitution Act, 1982; Nunatsiavut Beneficiaries also have treaty rights, including the right to harvest throughout the LISA (NG 2005). Indigenous Peoples' right to fish for food, social and ceremonial (FSC) purposes is collective rather than individual, and catches may not be sold (DFO 2022c). Designated Indigenous harvesters may catch what is needed for themselves and / or their community for FSC purposes. The NG holds FSC fishing licences for Arctic char, salmon and trout throughout the LISA and licences for salmon, trout, Arctic char, smelts and seals in Upper Lake Melville (DFO 2019). Beneficiaries have the right to harvest at any time of the year throughout the LISA for any species or stock of fish or aquatic plants, up to the quantity needed for FSC purposes (NG 2005).

Overlap Agreements were established with Innu Nation and the Nunavik Inuit to allow harvesting by Labrador Inuit for FSC purposes beyond the LISA (CNLOPB 2021). Labrador Inuit travel north from Nain each summer to fish Arctic char, which is also a source of income (Pedersen 2016).

The LILCA outlines conditions for hunting, trapping and fishing in the LISA. Non-Beneficiaries must obtain a permit from the NG to pursue any activities on LIL (NLDFFA 2022). The following NL small and large game hunting and trapping management areas apply to the Nain area (NLDFFA 2022; NG 2020c)):

- Harvesters have access to small game in all of Labrador (i.e., ptarmigan, snowshoe hare, Arctic hare and porcupine) and northern Labrador (ruffed and spruce grouse) Management Zones.
- Licences to hunt in Moose Management Area 92 are issued to the NG by the Government of NL.
- In Black Bear Management Area 200 (Labrador), hunters may harvest black bears.
- In 2013, the Government of NL enacted a prohibition on hunting the George River caribou.
- Nunatsiavut Beneficiaries may hunt caribou within the Torngat Mountains National Park.
- Trapping beaver, muskrat, otter, mink, coyote, white / coloured fox, lynx, wolf, ermine (weasel), squirrel, marten, fisher and wolverine is permitted in the Labrador North Fur Zone.

5.7.1 Current Use of Land and Resources for Traditional Purposes

Indigenous Peoples, including the Inuit, have historically lived nomadic lifestyles, travelling seasonally throughout large territories harvesting a variety of fish, birds, terrestrial and marine mammals, and plants and other materials for food, medicines, clothing, tools, and spiritual and cultural practices. The traditional territory of the Labrador Inuit extends from Cape Chidley in the north to south of Groswater Bay; it also extends west to the Labrador-Québec border and includes a portion of the offshore area adjacent to northern Québec (LIA 1977).

Inuit use of land and resources included extensive exploitation of coastal and marine zones from the edge of land-fast ice to the head of the bays (Fitzhugh in LIA 1977). Despite major changes in settlement patterns and subsistence, Inuit people have continued to live off the land and occupy their territory. The main exception is that, due to relocation of the Inuit from Nutak and Hebron, Nain is now the most northernly settlement.

The most extensive study to date of Inuit land and resource use in Labrador was completed in 1976. An anthropologist along with local fieldworkers conducted interviews and prepared maps of land use in Labrador Inuit communities (LIA 1977). Mapping around Nain identified spring, summer, fall and / or winter Aullâsimavet in coastal locations on islands, including Satosoak Island, Akuliakatak Peninsula, Kauk Bight, Kauk Bluff Island and on Tasiyuyaksuk Brook and Anaktalik Brook that drain into marine waters (Brice-Bennett in LIA 1977). At that time, no Aullâsimavet were identified on the land proposed for the airport and the runway. Camps were identified in Nain, but the mapping is not sufficiently detailed to understand the spatial relationship with the access road.

Historic and current Inuit land use is primarily driven by the presence or absence of sea ice (NG 2018c). A 2008 report discussed resource harvesting around Nain, identifying key resources from spring to fall as Canada geese, migratory ducks, seabirds, eggs, seals (i.e., harp, ringed, harbour, grey and bearded), Arctic char, Atlantic salmon and polar bears (Hood 2008). During freeze-up and in the winter months, the Inuit were also known to harvest Canada geese (fall migration), harp and ringed seals and walrus. Caribou was the only species identified as being harvested year-round, though the preferred time to harvest caribou hides for clothing was September and October. The geographic range of caribou was known to vary over time; core winter concentration areas nearest to Nain were in the Kiglapait Mountains near Kingurutik Lake and between Tasisuak Lake and Anaktalik Brook. Prior to the mid-1960s, caribou hunting had required lengthy trips up the Fraser Valley to the inner plateau about 80 km inland from Nain.

Many Inuit still undertake traditional land and resource use activities, including hunting, fishing and trapping, in the LISA. Key harvested resources, identified by at least 50% of households in 2007, included Atlantic salmon, Arctic char, caribou, eider ducks and eggs (Felt et al. 2012). Caribou are currently under a hunting ban, but each year a quota is approved by the Government of NL for sharing among Indigenous groups. For the Inuit, traditional food has important value beyond market criteria due to its cultural, social and nutritional qualities. In a 2012 health survey, 90% of Labrador Inuit (15 years of age and older) indicated that, in the previous 12 months, they had participated in hunting, fishing, trapping or gathering plants (Statistics Canada 2015). In coastal and marine environments, the Labrador Inuit harvest plants, berries, wood, animals, birds, marine mammals, fish and shellfish. Harvesters often return to the same areas year after year and many Inuit have Aullâsimavet outside their communities that they use for hunting, fishing, harvesting and recreation (NG 2018c).

Residents of Nain have a long and rich history of fishing, hunting, trapping and foraging from the land. The general area surrounding the airport site has been historically used for berry picking, fox trapping and ptarmigan and spruce grouse hunting. In the past, the area was also used for caribou hunting, primarily from the George River Herd (LIA 1977).

No prior or current developments or Aullâsimavet are in the Project area. Aullâsimavet identified within the general area presented on Figure 5.3-1.

Community members noted the importance of Salt Water Pond, located approximately 5.5 km southwest of the proposed airport location, which is used by residents for hunting and fishing during months which the pond is thawed. It was noted that residents typically hunt ptarmigan along the coast near the proposed airport location, and geese to the southwest of the proposed airport location, near Salt Water Pond.

Gathering, trapping, and hunting activities occur along the proposed access road location. This includes trapping for lynx and fox, hunting for ptarmigan, and the gathering of firewood and mussels.

The traditional uses near the airport noted to date are included in Figure 5.5-1. This land use information is not comprehensive, and all conclusions will be drawn after completing the Land and Resource Study described in Section 5.7.1.1.

5.7.1.1 Land and Resource Use Study

A land and resource use study will be conducted by NLNR, independently of the proponent (a letter to this effect is included in Appendix G2). The study is expected to be a comprehensive accounting of current land use activities in the broader region surrounding the community of Nain, independent of the Project. This will be achieved through various activities, including interviews and mapping exercises with Elders, leaders and harvesters (e.g., trappers), to understand activities and identify land users practising traditional and / or recreational activities. Relevant information obtained from the NLNR-led land and resource use study, if available, will be incorporated in the land use assessment in the EIS.

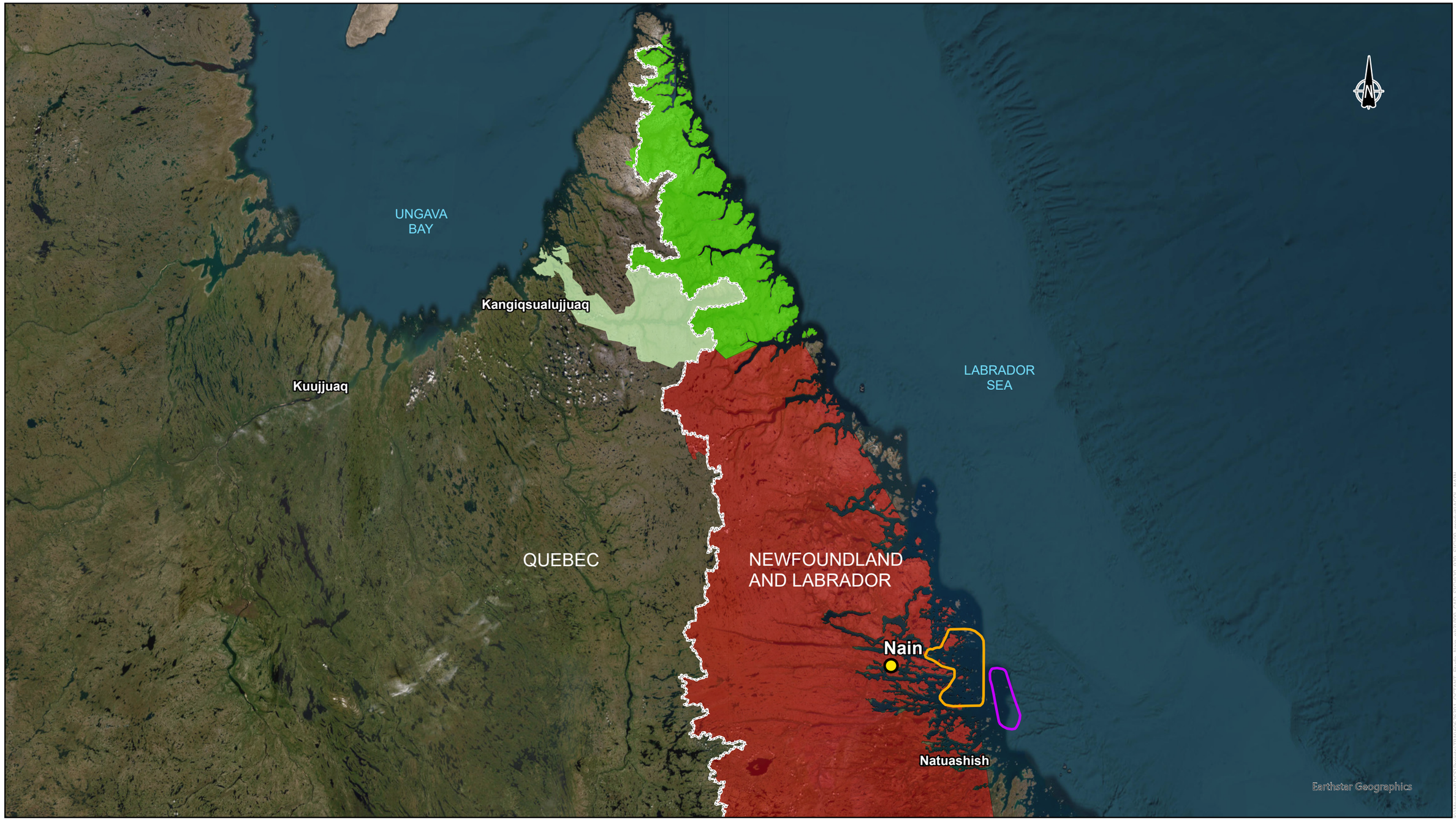
5.7.2 Protected and Special Areas

The Project intersects the George River Caribou Herd Sensitive Wildlife Area (Figure 5.7-1). More information on caribou is available in Section 4.6.3.2. The Sensitive Wildlife Area designation does not prohibit development, but development proposals are referred to the Provincial Wildlife Division. Since 2013, the George River Caribou Herd has been under hunting moratorium due to population decline

(NLDFFA 2022). Its population is presently not protected under SARA or the ESA, but it may be listed prior to Project construction (COSEWIC 2017c).

Two IBAs are in the Nain area: Nain Coastline; and Offshore Islands Southeast of Nain (Figure 5.7-1). IBAs are discrete areas that support specific groups of birds, including threatened birds, large groups of birds and birds restricted by range or habitat (Aivek Stantec 2021). The Nain Coastline IBA supports pre-moulting harlequin ducks and a high density of nesting peregrine falcons. The Offshore Islands Southeast of Nain IBA has large numbers of colonial seabirds, including Atlantic puffins, razorbills and glaucous gulls. More information on bird species in the region is included in Section 4.6.3. Designation as an IBA does not provide protection, though some IBAs are legally protected through other mechanisms; the Nain sites are not protected.

The Torngat Mountains National Park is located approximately 240 km northwest of the Project (Figure 5.7-1). The park, 9,600 km^2 in area, was established in 2008 as part of the Labrador Inuit and the Nunavik Inuit Land Claims Agreements (Parks Canada 2010). The area is the traditional homeland of the ancestors of the Inuit of Labrador and Nunavik, who have travelled and lived in this area for thousands of years, following the migratory paths of species such as whale, polar bear and caribou (Parks Canada 2022). As a National Park of Canada, the area is protected.



New Nain airport project

Protected Areas
- Kuururjuaq National Park (Québec)
- Torngat Mountains National Park of Canada

Sensitive Wildlife
- George River Caribou Herd

Important Bird Areas (IBAs)
- Nain Coastline
- Offshore Islands Southeast of Nain

1:2 500 000

0 20 40 km

NAD 1983 UTM Zone 20N

Figure 5.7-1
Protected and Special Areas

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Kuururjuaq National Park is located approximately 257 km northwest of the Project (Figure 5.7-1). The park was established in 2009 and covers 4,460 km^2, stretching east towards the Québec-Labrador Peninsula (Sepaq 2023) with the Torngat Mountains as its eastern border. Kuururjuaq is protected by the Government of Québec.

The Imappivut (our oceans) Marine Management Plan is being developed by the NG with support from the Government of Canada (NG 2018b). It will provide a framework for using Inuit knowledge in decision-making in the coastal waters of the LISA. This planning initiative covers the entire 17,000 km coastline of Nunatsiavut, 12 nautical miles (NM) out along the shoreline and an additional 188 NM out to sea (Dives 2017). The Plan will use Inuit traditional knowledge to govern matters such as resource extraction and species management over the coastal waters on the eastern edge of the Northwest Passage. Imappivut is proposed to be Canada's first Indigenous-Led Protected Area.

The Project is in the Taiga Shield conservation region (Bird Conservation Region 7NL, Taiga Shield and Hudson Plains) and along the Atlantic Migratory Bird Flyway (Environment Canada 2014; Riley, Notzl and Greene 2013). The Taiga Shield conservation region encompasses eastern Northwest Territories, southern Nunavut, northern Manitoba and Ontario, as well as north-central Québec and Labrador (Environment Canada 2014). Bird Conservation Region 7NL encompasses most of Labrador. The Atlantic Americas Flyway is a large area extending along the eastern edge of the Americas from the Canadian Arctic Archipelago to Tierra del Fuego, the southern tip of South America (BirdLife International n.d.). Neither of these areas is protected.

5.8 Summary of Feedback in Nain

Primary data was collected from Nain residents and community leaders related to the existing community conditions and the potential effects of the proposed airport plan. This included a set of ten key informed interviews from anonymous participants who live in or have a direct relationship with the region of Nain. This section highlights key feedback from community members as it relates to the broader Project, and the Human Environment workplan more specifically. Findings from the interviews were analyzed and coded into 15 topics which communities believed may result in positive or negative impacts in the region.

5.8.1 Key Themes

Interview participants were generally in-favor of the construction of a new airport due to the recognized importance of continued goods and services delivery, particularly during winter months when alternatives are limited. However, participants still had some concerns and recommendations that should be considered throughout the Project phases. Key interview themes also inform the mitigations proposed in Section 6.9.

Current flight reliability and the ability to stay connected to Labrador and beyond were key concerns mentioned in interviews. Current flight reliability impacts the ability to import goods as required and has made it challenging to coordinate travel plans outside of the community. One participant noted that this has led to a loss of work, as flights were cancelled due to weather and by the time the flights were rescheduled, the job was complete. Other participants noted that shipments of fresh produce are often delayed significantly leading to increased food waste and higher food costs in the community. Individual travel is also impacted by existing flight reliability. One participant noted that they have a child living outside of the community for school, who is often unable to travel home during school breaks due to the reliability and cost issues. Though the experience of how airport reliability impacts community members is different, the issue of reliability was consistently mentioned, highlighting these are common issues plaguing community members.

Food security was a top concern for all interview participants. Participants noted that the current reliability of flights leads to increased food costs, increased food waste, and decreased food security. By improving the reliability of flights, food security may generally improve. Interview participants noted several other potential impacts from constructing a new airport on food security including the ability to share food via air to other coastal communities (i.e. Rigolet, Makkovik, etc.) and the potential to improve grocery store selection. Additionally, one participant noted that the location of the airport access road may make it easier for community members to fish in key areas. Interview participants also noted that the new infrastructure should consider improved food storage, to improve food security between air shipments.

The health and safety of the community was of key concern for interview participants. As the airport is the only way out of the community for emergency evacuation, especially in the winter, residents are concerned with the current lack of night flights and general lack of reliability of the existing airstrip. Participants believed that the increased reliability of flights, especially in the evening, may improve the ability to access scheduled and emergency medical appointments and would enable community members to evacuate if required.

The new location of the proposed airport is a potential issue for the community, driven by several concerns around the access road. Participants noted that the community has a strong preference to keep the airport location as is but recognize that improvements cannot be made to the existing infrastructure. Participants noted that because the airport is located further from community than the existing airstrip, that it is necessary to provide transportation to and from as required. Interview participants also noted increased safety and maintenance requirements on the road due to avalanche and other safety risks in the area.

The environmental impacts of constructing and maintaining a new airport was a key concern for several interview participants. It was noted that there may be disturbances to animal and plant life in the area. Participants noted that design and mitigation feature to reduce the effect on animal and plant life are of the utmost importance.

Overall, interview participants were in support of the Project and recognized that it could lead to key positive impacts on the health of residents, food security, emergency preparedness, and the reliability of transportation. Other benefits that were mentioned was the possibility of improved housing conditions from emergency repairs, improved economic conditions, increased recreational activities along the Labrador coast, and improved connectivity with other regions.

Though participants often saw the benefit of constructing a new airport, there were many notable considerations. Potential negative impacts include the potential impacts to the environment including plant and animal life, the safety of travelling the access road due to avalanche risk and the distance required to travel, the temporary increase in foreign workers during construction, and the potential for service to remain inconsistent due to a lack of influence over airlines.

5.9 Potentially Impacted Communities

The following section describes the Human Environment conditions of the communities closest to the Project site. This includes an overview of conditions in Hopedale, and the two Innu Nations of Sheshatshiu and Natuashish.

5.9.1 Hopedale

This section provides background information on the community of Hopedale, NL, which is the closest Inuit community to Nain. It also provides a high-level overview of consultation that has occurred to date with the community with respect to the Project.

In addition to being the closest Inuit community to Nain, Hopedale is the legislative capital of Nunatsiavut (Nunatsiavut Government, n.d.). Hopedale spans 2.18 square kilometers. Hopedale was originally known by its Inuktitut name of “Arvertok” which has been translated to mean “the place of the whales”. It was renamed following the settlement of Moravian missionaries from Germany in 1782 (Nunatsiavut Government, n.d.-d). Inuit settlement in the Hopedale region began around 1600 CE where the Inuit lived seasonally to access seal and other game (D.W. Knight Associates, 2005).

5.9.1.1 Demographics

Hopedale has a population of approximately 640 people (Nunatsiavut Government, n.d.-d). Based on 2021 census data which surveyed 595 people, the average age in Hopedale was 32.6 years of age and the median age was 31.4 years of age (Figure 5.9-1; Statistics Canada, 2021). Most of the surveyed population (66.4%) were aged between 15 and 64 years of age (Statistics Canada, 2021).

The population density based on the 2021 Canadian census was 273.7 people per square kilometer (Statistics Canada, 2021). The population from 2016 to 2021 increased by 3.8% based on the collected census data (Statistics Canada, 2021).

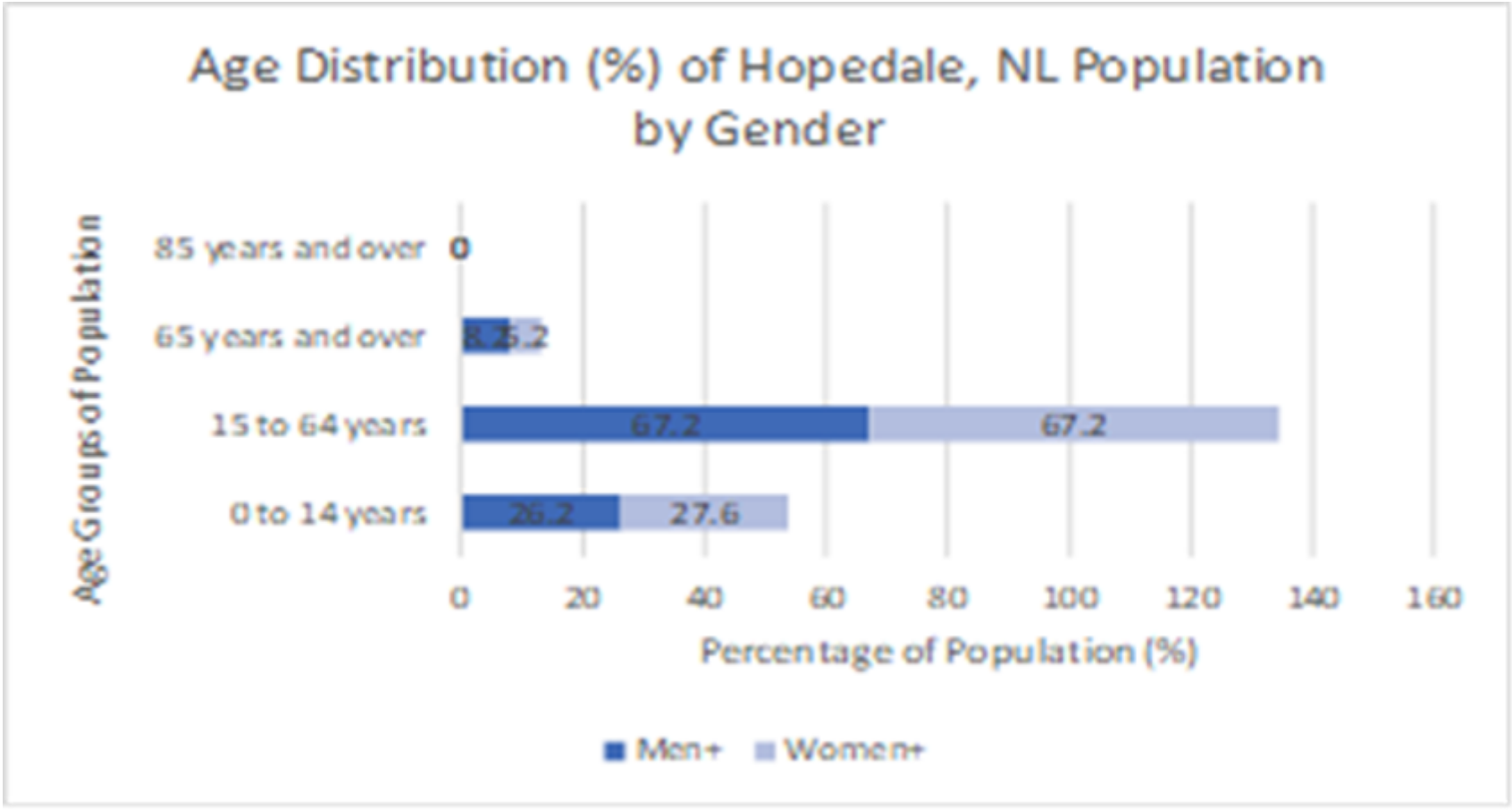

Figure 5.9-1

Age Distribution (%) of Hopedale, NL Population by Gender

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5.9.1.2 Housing Security

There are 208 private dwellings in Hopedale and 190 that are occupied (Statistics Canada, 2021). Most of these homes are single-detached houses (150), and the remainder of dwellings include semi-detached, apartments in a duplex, apartments in a building with five or more floors or moveable dwellings (Table 5.9-1) (Statistics Canada, 2021).

Table 5.9-1: Number of Occupied Private Dwellings by Type in Hopedale, NL (Statistics Canada, 2021)

Occupied Private Dwelling by Type	Total
Single-detached house	150
Semi-detached house	5
Row house	0
Apartment or flat in a duplex	20
Apartment in a building that has fewer than five storeys	5
Apartment in a building that has five or more storeys	0
Other single-attached house	0
Movable dwelling	10

Like many other communities in Nunatsiavut, housing security in Hopedale is a long-standing concern. The quality and availability of housing has been an issue in the community that has required government action from the Nunatsiavut Government in the absence of sufficient funding and support from the Federal Government (Canadian Human Rights Commission, n.d.). There was a joint action by the Nunatsiavut Government to tackle housing issues in both Nain and Hopedale in 2017 through the “Housing Initiatives Act” which was focused on building housing for Inuit youth and Elders. There is additional housing that was built by the Nunatsiavut Government to support single mothers in both Hopedale and Nain who struggle to find housing which puts them at risk of losing custody of their children (Canadian Human Rights Commission, n.d.).

5.9.1.3 Employment

In terms of employment, based on a 25% sample of census respondents (435 people) aged 15 years of age and over, there were 170 employed individuals, 45 unemployed and 220 individuals who were not in the labour force. The employment rate based on this sample was 39.1% and the unemployment rate was 20.9%. Based on a sample of 215 respondents, there was approximately 155 individuals who were employed in permanent positions and 40 individuals who were employed in temporary positions (Statistics Canada, 2021).

5.9.1.4 Land Use

Recent publicly available information about land use in Hopedale is limited. A fishery owned and operated by Torngat Fisheries plays an important role in generating fishery activities in the community (D.W. Knight Associates, 2005). Community members in Hopedale rely on the land and water for food both in terms of food access but also in terms of food preparation (Norton, Cuerrier & Hermanutz, 2021). Berries of many varieties have been recorded as very important for community members. In addition, berry sods, wood, and rotten wood are also harvested to support the preparation of smoked fish. It has been noted that harvesting food from the land is significant to cultural continuity and healing within the community of Hopedale. In addition, community gardening is another way that residents in Hopedale engage with the land and is an important food source for the community members that ties back to the history of gardening in Hopedale that extends to the 1700s (Food First NL, n.d.). In this way, much of the community land use is tied to cultural identity and food security. Given the distance between Hopedale and Nain, it is unlikely that the Project in Nain will have any affect on land use in the community of Hopedale.

5.9.1.5 Built Environment

The town of Hopedale has a road system within the community though there are no roads that connect Hopedale to the rest of Newfoundland and Labrador or the rest of Nunatsiavut, including Nain. The

infrastructure within the town is simple and consists of a few locations that are important to the community that include grocery and general stores, an airport, an inn for visitors, as well as government buildings and a museum for tourists. A volunteer-run community garden is also an important food source for the community (Chen & Natcher, 2019). There is one community clinic that provides basic health services to the community as well.

The Hopedale airport is located 1 nautical mile west of the community of Hopedale. It was built in the 1960s to provide military support and is now used for community members to get in and out of the community as well as to transport goods and services. The Hopedale airport is limited – it contains an airstrip and one terminal building.

5.9.1.6 Project Engagement and Consultation

Given that Hopedale is the closest Inuit community to Nain, the Project team reached out to the Hopedale Inuit Community Government to inquire as to whether they would be interested in being involved and/or engaged. Outreach was conducted via email on January 18, 2024. The Hopedale Inuit Community Government Mayor indicated their interest in being informed about updates as the Project progresses but did not wish to be involved with the Project at this time. Given the significant distance between Hopedale and Nain as well as the fact that the communities are only connected via ferry or air travel, it is unlikely that there will be any concerning impacts on the community of Hopedale from the establishment of the new airport. Despite this, updates and communications related to the project will continue to be shared with the Hopedale Inuit Community Government to provide an opportunity for the community to express concerns, ask questions, and engage more actively should they see a need or interest in the Project beyond having general awareness.

5.9.2 Innu Nation

The Innu Nation is made up of 3,200 Innu, who predominately live on reservation lands within the two Innu communities of Sheshatshiu and Natuashish (Innu Nation, n.d.). Within these regions, Sheshatshiu Innu live within Sheshatshiu Innu First Nation reservation lands while the Mushuau Innu live within the Natuashish Innu First Nation reservation. These communities are distinct from one another but are collectively represented from a political standpoint by the Innu Nation for land claims and other government-to-government negotiations (Government of Newfoundland & Labrador, n.d.).

The Innu Nation and Nunatsiavut Government have an “Overlap Agreement” regarding areas of both Labrador Inuit and Innu Nation’s overlapping interests in the Voisey’s Bay Area. The Innu communities and five Labrador Inuit communities are close to one another – in particular Natuashish Innu First Nation is located between Nain and Hopedale. Natuashish Innu First Nation is also a stop on the “milk run” prior to the stop in Nain. Sheshatshiu Innu First Nation is located near Lake Melville, closest to the Inuit community of Rigolet and very close to Happy Valley-Goose Bay.

5.9.2.1 Demographics

The total population of the Innu Nation is approximately 3,200 people. Based on census data from 2021, 1,225 residents live in Sheshatshiu and 856 live in Natuashish (Statistics Canada, 2021). The average age of individuals in Sheshatshiu is 29.6 years old with the average age of individuals in the men+ category being 31.1 and the average age of individuals in the women+ category being 28.4. In Natuashish, the average age is 25.1 with the average age of individuals in the men+ and women+ categories being 25.2 and 25 respectively. In terms of age distribution, the populations of both communities are very young with the highest proportion of the population in both communities being under 25 years of age (Statistics Canada, 2021). Further, most adults in both communities are aged between 25 and 64 years of age (Figures 5.9-2 and Figure 5.9-3).

In Sheshatshiu Innu First Nation, the population density was recorded as 144.5 people per square kilometre in 2021 (Statistics Canada, 2021). Sheshatshiu Innu First Nation experienced an 18.3% decline in overall population from 2016 to 2021. The population density of Natuashish Innu First Nation was 19.5 people per square kilometre. Natuashish Innu First Nation experienced an 8.7% population decline between the 2016 and 2021 (Statistics Canada, 2021).

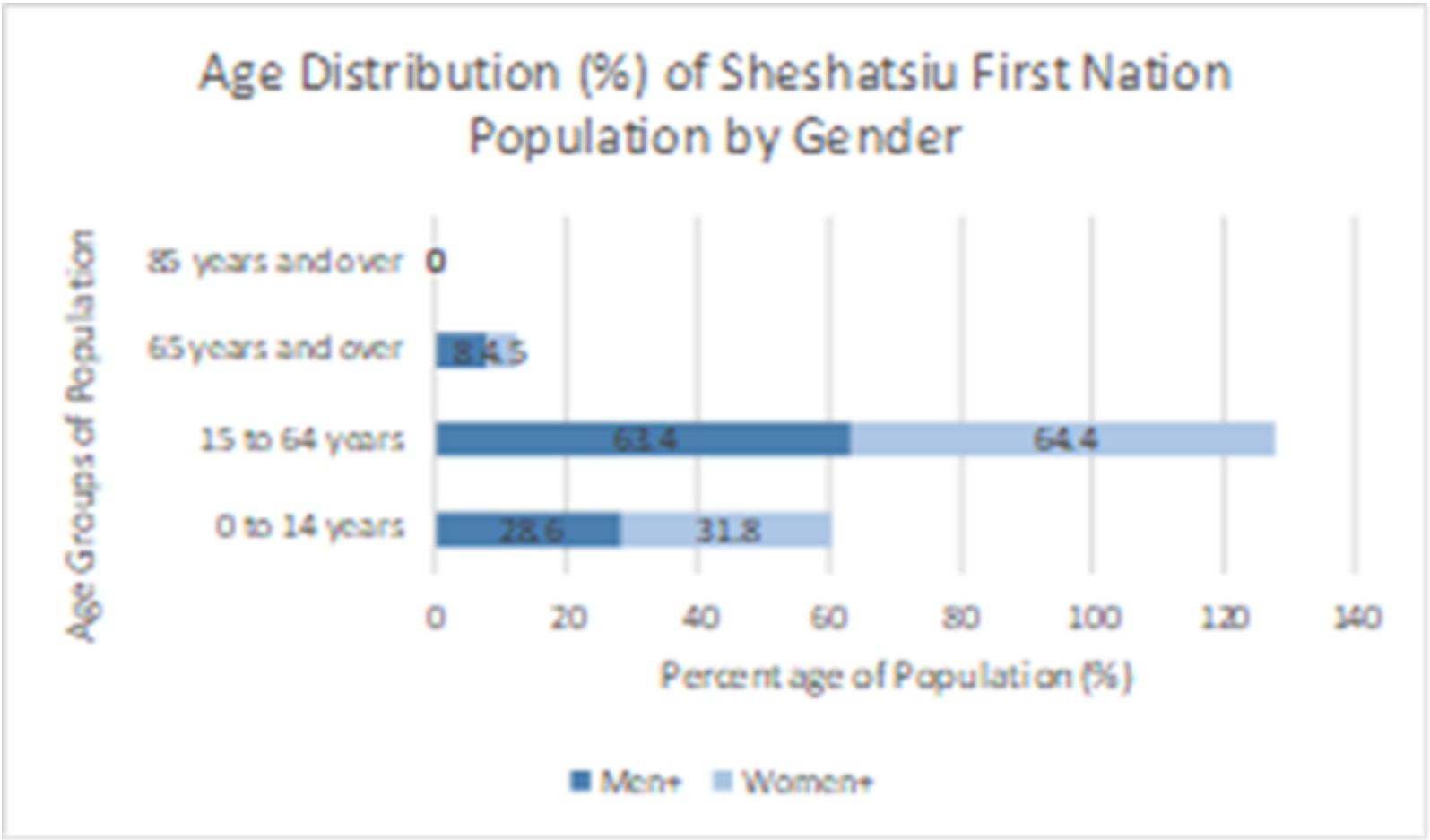

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Figure 5.9-2

Age Distribution (%) of
Natuashish First Nation Population by Gender

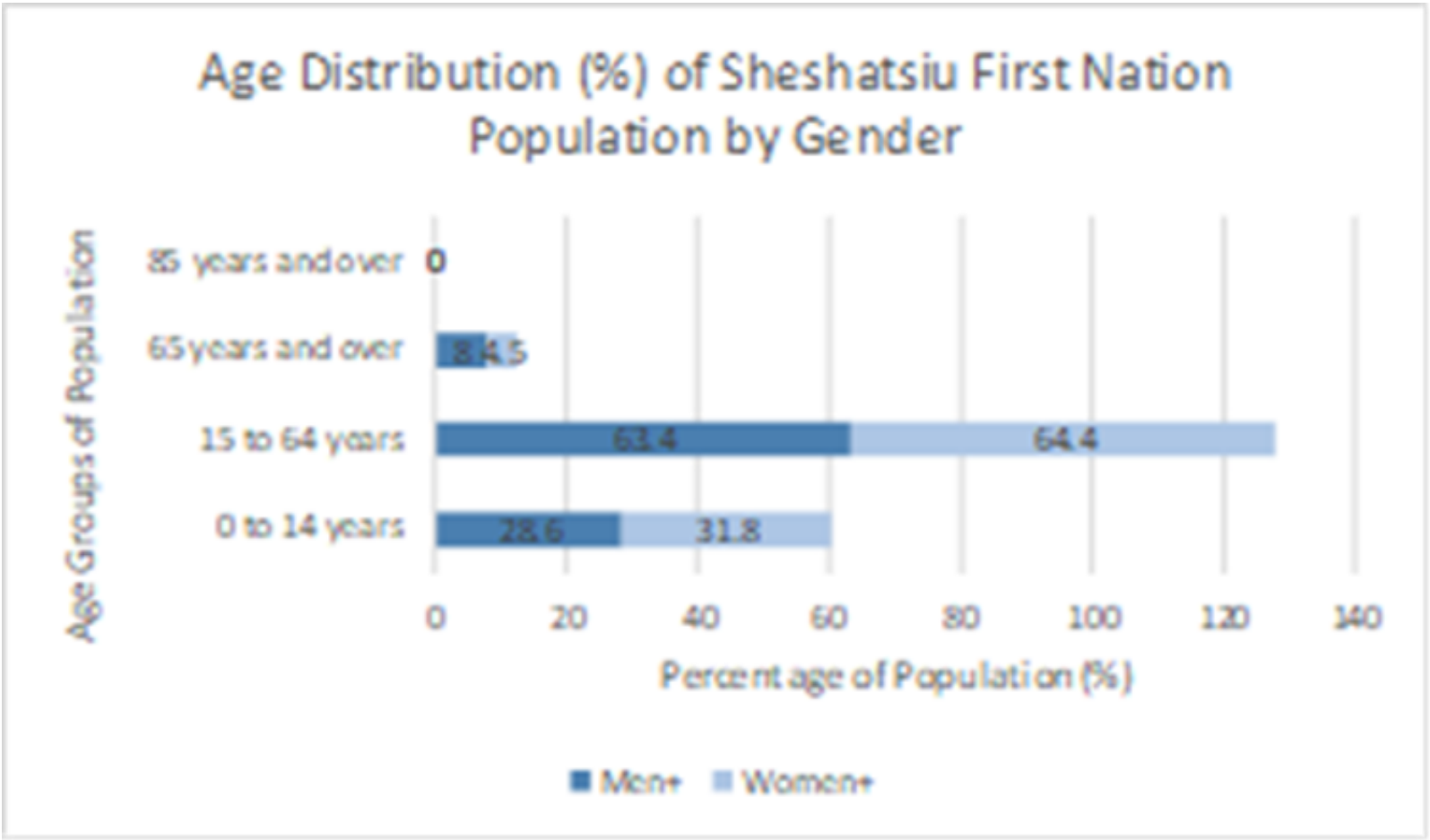

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Figure 5.9-3

Age Distribution (%) of
Sheshatsiu First Nation Population by Gender

5.9.2.2 Housing Security

In the community of Sheshatshiu, there are a total of 373 private dwellings with 340 of these dwellings housing usual residents (Statistics Canada, 2021). Of these dwellings, 325 of these are single-detached houses and 5 are semi-detached. There are also 10 row houses in Sheshatsiu. There is a growing demand for housing in Sheshatshiu and announced that a new subdivision is being developed in the community.

In Natuashish, there are a total of 239 dwellings with 196 of these dwellings housing usual residents. There are 155 single-detached homes and 10 semi-detached homes. In addition, 25 apartments or flats in a duplex can be found in the community as well as 10 moveable dwellings.

5.9.2.3 Land Use

The Innu communities of Sheshatshui and Natuashish have close relationships with the land and retain much of their traditional practices. Hunting is an important cultural practice that typically occurs in the spring and autumn – caribou is of particular importance to these communities both as a food source but also spiritually (Ward et al., 2021). Hunting is done often in groups – either as households or whole communities - and shared amongst the two Innu communities (Castro, 2015). Fishing is also important to these communities though concrete data is limited. In general, harvesting and hunting remains important in all northern Labrador Indigenous communities (Schiff & Bernard, 2018). The Innu communities have identified that use of their lands is tied with community well-being, cultural continuity, and spirituality.

5.9.2.4 Built Environment

Both Sheshatshui and Natuashish have basic infrastructure to provide residents with their basic needs. There are grocery stores in each community, a community clinic, as well as schools. Natuashish is a fly-in community with no road access to surrounding communities. There is an airstrip that allows community members to enter and exit when needed for medical reasons and to receive supplies. For Sheshatshui, the community is much more connected with the rest of Labrador. There is a highway that connects Sheshatshui with Happy Valley-Goose Bay and North West River which makes it much easier to enter and exit the community.

5.9.2.5 Project Engagement and Consultation

Both the Natuashish Innu First Nation and Sheshatshui Innu First Nation leadership were contacted to inquire as to whether they would be interested in being involved and/or engaged in the Project. Outreach was conducted via email on January 18, 2024. Natuashish Innu First Nation, in particular, was important to connect with given that it is the closest community to Nain as well as one of the communities along the “milk run” route. The Project Team did not receive a response from either the Sheshatshui or Natuashish Innu communities. Despite this, updates and communications related to the Project will continue to be shared via email to ensure that there is a continued opportunity for the communities to express concerns, ask questions, and engage more actively should they see a need or interest in the Project in the future.

6. Potential Projects Effects and Mitigations

Activities associated with the Project have the potential to adversely and / or positively affect the environment and the community (health, social and economics). A preliminary assessment of the interactions of Project activities with the surrounding environment and the community is detailed in this section along with associated mitigation measures. Identified effects are based on the current Project design and activities described in Section 2, and within the spatial boundaries described for each component in Sections 4 and 5. Where applicable, Valued Components have been selected to focus the preliminary assessment on key representative resources. Table 6.1-1 provides a preliminary list of biophysical and human environment components and the potential Project activities at construction and operations that may interact with them. The following subsections will describe the potential effects and list how these effects can be avoided or mitigated.

Table 5.9-1: Summary of Potential Project Interactions with the Environment

Sources of Potential Interaction	Biophysical Environment								Human Environment							
	Air Quality and Climate Change	Noise and Vibration	Soils and Terrain	Groundwater	Surface Water	Vegetation and Wetlands	Wildlife and Migratory Birds	Fish and Fish Habitat	Travel and Connectivity	Emergency Preparedness and Health Access	Food Security	Airport Logistics	Land and Resource Use	Health and Well-being	Accidents and Malfunctions	Physical and Cultural Heritage
Construction																
Site preparation (e.g., vegetation clearing, soil stripping, excavation, rock blasting)	X	X	X		X	X	X				X		X	X	X	X
Construction of infrastructure including temporary and permanent facilities	X	X			X		X	X			X		X	X	X	X
Vehicle and heavy machinery transportation, use and maintenance of equipment	X	X	X	X	X	X	X	X					X	X	X	
Purchase of goods and services											X					
Presence of workforce									X	X	X				X	
Operations																
Operation of the airport and runway	X	X	X	X	X		X	X	X	X	X	X	X	X	X	
Use and maintenance of the access road	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Potable water withdrawal					X			X		X						
Waste and wastewater management and treatment	X		X	X	X	X			X	X	X					
Purchase of goods and services											X			X		
Presence of workforce											X					

6.1 Air Quality and Climate

Project activities have the potential to affect air quality and GHG emissions through a range of sources, including:

- Combustion of aviation fuel, gasoline, and diesel produces NOx, CO, SOx, hydrocarbons, GHGs, and particulates.
- Aircraft tires release particulate as they are worn and burnt during take-off and landing, and dust can be generated during take-off and landing on gravel runways.
- Vehicles travelling to and from the airport, as well as ground service equipment on-site, generate air pollutants through the combustion of gasoline and diesel fuel. Power generation, and backup power generation, will also result in air emissions.
- Project construction activities will generate dust and equipment exhaust emissions.

GHG considerations for Project design to date included the following:

- The airport will require energy generation for heating and lighting at the terminal. Due to the high cost of non-renewable energy sources and requirement for diesel back-up, a diesel generation system will be used at this time (Section 2.2.6). However, the airport's diesel generation system will be modern and efficient.
- The airport will be independent of the current diesel system in Nain and, following decommissioning of the existing airstrip, the NG anticipates it will be possible to remove one of the existing generators from service.
- Operation of the airport is not anticipated to result in an increase in GHG emissions from flights when compared with operation of the existing airstrip. For instance, the airport will accommodate larger aircraft with increased loads, resulting in fewer flights.
- The runway will be a gravel surface treated with a polymer that improves efficiency of aircraft on take-offs and landings.
- A more effective airport will result in reduction of fuel usage and wastage due to aborted flights (~50% of flights at Nain are cancelled). A more efficient airport will decrease the number of flights diverted from Nain. Flight diversions result in additional fuel consumed to fly to another airport and / or transport passengers to their original destination. Through reducing flight diversions, it may be possible for the operation of the airport to have a net benefit to GHG emissions and climate change.
- Fossil fuels will be used to operate mobile equipment during construction and operations.
- Use of the access road will result in increased GHG emissions from vehicles, but emissions are not expected to be greater than the reduction in emissions from flight diversions.
- The NG will follow all requirements for long-term mitigation measures to offset carbon use. Carbon neutral energy sources such as wind / solar will be considered in future as these become more effective and feasible in northern climates. The airport will be net-zero GHG by 2050.

These considerations will be confirmed as the Project design progresses. It is also important to note that the NG is implementing carbon neutral energy projects to reduce reliance on fossil fuels. These include the Nain Wind Micro-Grid Project and a 24-kW solar system at the Nain JS Community Centre, which is one of four solar installations in Nunatsiavut (NL Hydro 2023).

An initial estimate of GHG emissions associated with the Project based on the SACC guidelines is provided in Appendix H. The GHGs assessed for the Project are carbon dioxide, methane and nitrous oxide, based on expected construction and operation activities as detailed below:

- Use of diesel-combustion construction equipment;
- Rock blasting;
- Land cover changes (deforestation and wetland loss);

- Operation of diesel-powered generators;
- Incoming and outgoing aircraft flights;
- Use of vehicles and equipment for general airport operation; and
- Transportation to the airport along the access road.

Direct emissions from construction of the Project are currently estimated to be 12,746 tonnes (t) CO_2 equivalent (CO_2-eq) and the direct emissions from Project operations (based on a 50-year Project lifespan) are 1,005,820 t CO_2-eq. For the purpose of the DPD, decommissioning emissions are assumed to be equivalent to construction emissions (12,746 t CO_2-eq).

It should be noted that the available data at this stage of the Project are insufficient to provide an accurate emission estimate; the current emission calculation has been developed using data currently available and professional judgement. The downstream and upstream GHG emissions were not included as per the SACC guidelines due to lack of information. As an example, emissions related to potential transport of equipment / materials / fuel to the site by barge were not included in the assessment. Also, the development of a temporary construction camp was not included in this assessment due to the lack of available data. This initial assessment focused on the new airport's construction, operations and decommissioning activities.

During construction, the existing airstrip will still be in operation. The existing airstrip's GHG emissions are not part of this assessment. Similarly, emissions from decommissioning the existing airstrip, overlapping with the start of operation of the new airport are also not included. More detailed GHG estimates will be prepared as Project engineering design progresses and more information is available.

A summary of potential Project effects related to air quality and climate is presented in Table 6.1-1.

Table 6.1-2: Potential Project Effects on Air Quality and Climate

Project Activity	Project Effect	Mitigation Measures
Construction: Site preparation (e.g., vegetation clearing, soil stripping, excavation, rock blasting)	• Small amounts of dust and combustion emissions are expected to have marginal effects on air quality and deposition. • All activities associated with ground preparation will generate low levels of combustion and dust emissions. • Blasting is expected to generate large volumes of dust and NO_2 over very short periods.	• Machinery and vehicles will be used that minimize air emissions (e.g., low fuel consumption) according to the latest ECCC standards, or zero-emission vehicles (for on-road and off-road vehicles). • Initial and regular inspections of machinery will be performed to ensure good operational condition. • A preventive maintenance program will be implemented and equipment will be inspected to ensure proper functioning. • Dust control measures will be used according to conditions (meteorology) and development activities that generate dust (e.g., construction / use of access road, use of the runway). • Gravel runway and access road surface will be treated with a stabilizing agent to control dust. • Air conditioning, ventilation, and heating units will be inspected to ensure proper operation of equipment and limit the risk of refrigerant leaks, if necessary. • Passenger trips to the terminal will be limited by implementing public transportation.
Construction: Construction of infrastructure including temporary and permanent facilities	• Facility construction will generate dust and emissions from equipment use. • Proposed construction camp will generate emissions from heating and cooling. • In initial stages of construction, the workforce may be helicoptered in each day; this will generate additional combustion emissions in the vicinity of the work area, and	

Project Activity	Project Effect	Mitigation Measures
	near-ground at both ends of the flight path.	• De-carbonizing measures will be considered at the airport (considering its latitude and weather) including rooftop solar, LED lights, etc. An appropriate decarbonization plan will be developed to guide project design. •
Construction: Vehicle and heavy machinery transportation, use and maintenance of equipment	• Vehicle and equipment operation will generate dust and combustion emissions that will locally reduce air quality. • Some of the emissions will deposit near construction and operations site which may affect wildlife, soils, vegetation, and surface water.	
Operation: Operations of the airport and runway	• The new Nain airport will be located approximately 12 km from Nain, while the existing airstrip is located within the community. From this perspective, the effects of air emissions on community receptors resulting from Project operations are anticipated to be lower than from the existing airstrip. • Emissions from combustion of aviation fuel, and gasoline and diesel from passenger and maintenance traffic on site could lead to poorer air quality and odour on and off the airport site. • Hydrocarbon odour could be experienced at the terminal; these odours are associated with aviation emissions, and potentially emissions from on-site auxiliary vehicles. • Aircraft tires release small amounts of particulates as they are worn and burnt during take-off and landing. This material can contribute to poorer air quality and could be deposited in vegetated areas beyond the airport confines. Similarly, dust can be generated during take-off and landing from the gravel runway.	
Operation: Use and maintenance of the access road	• Use and maintenance of the road will generate dust and combustion	

Project Activity	Project Effect	Mitigation Measures
	emissions that may reduce air quality in adjacent non-developed lands.	
Operation: Waste and wastewater management and treatment	• The handling and disposal of waste may generate odour that could affect individuals downwind of the airport waste collection point or at the location of disposal. • Solid waste handling could result in particulate emissions.	

6.2 Noise and Vibration

The airport will be located approximately 12 km from Nain, while the existing airstrip is located in the community. From this perspective, the operation of the airport is anticipated to result in significantly lower noise levels at residential receptors in Nain when compared to the existing airstrip. Similar to air emissions, the most significant noise sources during Project construction are expected to be generators and mobile construction equipment, such as trucks and excavators. During construction, the existing airstrip will still be in operation. The existing airstrip's noise emissions are not considered as part of the Project.

Construction vibration is expected from the operation of mobile equipment during the construction phase of the Project in the areas surrounding new infrastructure (terminal building, parking, access roads, runway, and grading).

The most significant source of noise during Project operations will be aircraft take-off and landing. Other sources of noise during operations include taxiing aircraft, the application of reverse-thrust (an optional braking aid on landing), engine tests, vehicle traffic at the airport and along the access road, and airport building mechanical systems. As with emissions, the aviation industry has been successful in developing relatively quieter aircraft. Every new aircraft must comply with noise standards developed by the International Civil Aviation Organisation. Project operations are not expected to be a significant source of vibration.

The effects of noise pollution on human health can include loss of concentration, sleep disturbance and, in cases of prolonged or excessive exposure, hypertension and ischaemic heart disease. Potential effects to wildlife from Project activities vary greatly from species to species. Changes to ambient noise levels and presence of periodic vibrations have the potential to adversely affect wildlife migration patterns and behaviour. Potential effects to wildlife and migratory birds resulting from noise are further discussed in Section 6.7.

Before construction, the effects of noise and vibration will be assessed through an internal study using inputs obtained from Project sources. The study will identify Project activities and infrastructure that may adversely affect noise and vibrations and exceed accepted criteria. If criteria are exceeded, mitigation measures will be identified to meet criteria and general recommendations will be made to minimize potential effects. Depending on the source of noise and vibrations and applicable criteria, predictions at sensitive receptors are conducted differently (modelling) for facility noise, road transportation and aircraft noise.

A summary of potential Project effects related to noise and vibration is presented in Table 6.2-1.

Table 6.2-1: Potential Project Effects on Noise and Vibration

Project Activity	Project Effect	Mitigation Measures
Construction: Site preparation (e.g., vegetation clearing, soil stripping, excavation, rock blasting)	• Localised noise and vibration emissions in the areas surrounding the active construction equipment. Effects will only occur during the operation of the construction equipment, and will cease when the equipment is not active. • During rock blasting, there is the potential for temporary higher noise and vibration from the blasting event (a few seconds) in comparison with typical construction operations (several hours per day).	• Initial and regular inspections of machinery will be performed to ensure good operational condition. • A preventive maintenance program will be implemented and equipment will be inspected to ensure proper functioning. • Light vehicles with effective mufflers will be used to reduce noise level at the source. • Where practical, trees and other vegetation will be left in place or encouraged to grow to muffle nuisance noise. • Construction activities will be scheduled during daytime where feasible. • Low vibration tools and equipment will be used during construction activities, where feasible. • Design of facility buildings will adopt applicable noise criteria, including various mitigation measures such as: • Low noise specifications • Noise enclosures or silencers for mechanical equipment • Scheduling operations (standby power testing, waste disposal) to daytime • Site planning – use airport buildings as shielding for noise emissions
Construction: Construction of infrastructure including temporary and permanent facilities	• Facility construction will cause temporary noise and vibration emissions from the use of equipment. Emissions will cease while the equipment is not operating. • Proposed construction camp will create noise through temporary power generation and HVAC equipment.	
Construction: Vehicle and heavy machinery transportation, use and maintenance of equipment	• Vehicle and equipment operation will generate noise emissions in proximity to their operations. The noise emissions from vehicles transiting on public roadways will be insignificant in comparison with the noise from typical vehicular traffic. • Vibration can be caused by the operation of heavy machinery. However, while transiting on smooth paved surfaces, vibration is expected to be insignificant. • Noise and vibration will cease while equipment is not in use.	
Operation: Operations of the airport and runway	• The new Nain airport will be located approximately 12 km from Nain, while the existing airstrip is located within the community. From this	

Project Activity	Project Effect	Mitigation Measures
	perspective, the effects of noise on the existing Nain community from Project operations are anticipated to be lower than from the existing airstrip. • Noise from passenger and maintenance vehicles is expected to cause a localized effect in the area surrounding the airport. Vibration of normal passenger and maintenance vehicles is expected to be insignificant.	
Operation: Use and maintenance of the access road	• Use and maintenance of the access road will generate noise emissions perceptible in adjacent non-developed lands. Maintenance activities (e.g. snow clearing, grading, re-applying gravel) are expected to be infrequent, temporary, short duration • Vibration of normal passenger and maintenance vehicles is expected to be insignificant.	

6.3 Soils and Terrain

Project activities, specifically during construction, have the potential to directly affect soils and terrain During construction, the uppermost surface soil mineral and organic topsoil will be stripped to provide a stable surface for Project infrastructure. The salvaged surface soil and organic material will be stored and protected from disturbance during Project construction until it can be replaced for reclamation activities. Rock blasting will also occur to level out slopes for the access road and airport, and to access fil material for subgrade material.

Potential Project effects could include:

- Degradation of topsoil and upper organic soils from construction equipment operations and activities, admixing, rutting, compaction and wind and water erosion.
- Wet weather impacts and wet soil conditions resulting in soil compaction and soil rutting
- Dry windy conditions, due to landscape valleys can result in wind erosion and topsoil loss
- Low lying depressional areas and sensitive organic soils which can affect moisture regimes and surface water flow over the landscape.
- Permafrost areas, mineral and organic permafrost areas resulting in loss of ice layers and lenses and melting of subsoils leading to unstable land surfaces and reclaimed surfaces.
- Disturbance of rock faces and rock walls especially the map unit steeply sloping rock face, making these steeply sloping areas unstable and susceptible to rock falls and landslides and avalanches in winter.
- Alteration to exposed rock landforms through rock blasting for borrow fill material

Soil units were mapped within the LSA in Section 4.2. Table 6.3-1 provides a summary of the direct disturbance to soil map units by the Project footprint.

Table 6.3-1: Soil Map Units and Project Footprint Disturbance

Soil Map Unit	Area of Direct Disturbance (ha)	Proportion of Project Footprint (%)
Anthropogenic	1.21	0.6
Brunisolic	56.71	28.3
Gleysolic	9.51	4.7
Organic	25.61	12.8
Regosolic	7.17	3.6
Regosolic- Rock	7.56	3.8
Rock	90.51	45.1
Stream Channel	1.05	0.5
Steeply sloping rock face	0.48	0.2
Cryosolic	0.667	0.3
Water	0.27	0.1
Total	**200.75**	**100.0**

The salvaged surface soil horizons will be placed in clearly marked and protected in soil storage (stockpiled) locations. These soil storage locations will be protected from further construction impacts and prepared to manage water and wind erosion. The mineral topsoil and upper organic soils will be stored to ensure surface water drainage is not impeded and that soil storage areas do not pond surface water around the soil stockpiles. Stockpiles will not collect water or interrupt surface water flow or drainage. A professional environmental monitor or inspector will be on site in the field during surface stripping operations to help guide soil striping operations to ensure all suitable soil materials are salvaged. Soils stripping and topsoil depths will be placed on construction alignment sheets used during construction, identifying topsoil depth and colour of surface soils to be salvaged.

Surface soil stripping operations (i.e. topsoils and surface organic horizons) will be conducted under dry soil conditions as much as feasible which will protect soils against, rutting, compaction and soil admixing. Stripped surface soils will stored in assigned soil storage areas which will are set up and located to protect soils against further degradation (i.e. wind and water erosion, water seepage and water saturation).

As described in Section 2.3.3, the airport is expected to be in operation for greater than 50 years, and therefore details regarding decommissioning have not been developed. A decommissioning and reclamation plan will be developed as the airport nears end of life; it will be subject to appropriate regulatory regimes at that time. This plan will involve replacing salvaged surface soil material over disturbed lands to create reclaim lands similar to preconstruction soils suitable for revegetation of native vegetation and reclamation of the affected sites.

Areas disturbed during construction but not required for the long-term operation of the Project, such as the construction staging area and temporary access road, will be reclaimed after construction. Gravel and fill material will be removed and used re-establishing pre-construction contours, or used for other Project purposes (e.g., road and apron maintenance), or hauled back to Nain. Salvaged topsoil will be replaced and the area the areas will be seeded with an approved seed mix. Seeding will follow as close as possible to machine clean-up and surface material replacement pending seasonal or weather conditions. Areas within the fenced airport will also be revegetated.

A summary of potential Project effects and proposed mitigation measures is provided in Table 6.3-2.

Table 6.3-2: Potential Project Effects on Soils and Terrain

Project Activity	Project Effect	Mitigation Measures
Construction: Site preparation (e.g., vegetation clearing, soil stripping, excavation, rock blasting)	• Loss of salvaged topsoil from Project site preparation and erosional loss over time. • Degradation of physical or chemical characteristics of salvaged topsoil through disturbance, and soil mixing • Disturbance of sensitive organic or permafrost soils, which can interrupt surface water drainage patterns. • Disturbance of rock wall faces and steeply sloping terrain; landform stability is important for safe travel along the access road. • Alteration of topography in exposed rock areas used for borrow fill	• Locations and routing for Project infrastructure will be selected to minimize the need for rock blasting, maximize cut and fill construction, and potential permafrost areas will be avoided. • A surface soil handling plan will be developed for construction, which will establish topsoil stripping depths and delineate protected soil stockpile locations. Topsoil and surface organic soil materials will be salvaged for the construction of the temporary access road as it is an important step to ensure successful reclamation. • Wind and water erosion and sedimentation control measures will be implemented on salvaged soils (e.g., seeding, placement of straw bales and straw) to preserve salvaged topsoil materials for reclamation. • Wet weather shutdown will be implemented to prevent soil degradation during wet weather or wet soil conditions, which can result in rutting, compaction and degradation of soils for future use. • Rocks will be removed from the area that will have salvage topsoil materials replaced for reclamation. • Subsoil materials (15 to 30 cm depth) will be ripped before topsoil is replaced to ensure no compaction of subsoil materials exist before topsoil replacement. • Surface water drainage disturbed by construction will be re-established before topsoil replacement operations occur, and there will be no evidence of surface water ponding or pooling across the site. • Facilities will be rerouted to minimize and avoid organic, permafrost, rock faces, where practical. • Soil storage stockpile areas will be located to minimize water ponding, surface water flow drainage areas. • Soil stripping and stockpiling operations will be restricted to dry
Construction: Vehicle and heavy machinery transportation, use and maintenance of equipment	• Potential for soil rutting and compaction from construction equipment. • Potential for soil contamination through fuel spills from vehicles, equipment, or tanks	
Operation: Operations of the airport and runway	• Potential for soil contamination from aircraft fuel spills, re-fuelling, tank leaks, and de-icing	

Project Activity	Project Effect	Mitigation Measures
Operation: Use and maintenance of the access road	• Potential for soil contamination from fuel/oil releases from vehicles and equipment travelling along the access road	weather and sunny conditions with low wind conditions. • Erosion control measures will be used to minimize topsoil loss (proper soil storage location placement, straw cover, straw bales, erosion control silt fences by rivers and stream, straw blankets and seeding stockpiles. • Disturbed lands for topsoil replacement, cross ripping of the receiving subsoil to alleviate sub soil compaction, and rock picking prior to topsoil replacement operations will all be prepared. • Protective measures will be installed along the access road, such as energy barriers and rockfall netting, where steep rock faces are created. • Appropriate regulations, guidelines and proposed Project approvals will be complied with, including treatment of contaminated water to approved discharge limits. • Fuel storage and handling guidelines and best practices will be complied with, including personnel training, storage setbacks, secondary containment, and regular storage inspection. • All fuelling, servicing and staging of machines will be restricted to designated areas. • Regular inspections of all machinery will be performed to reduce the risk of a spill by identifying and correcting potential equipment failures. • Aircraft re-fueling and de-icing areas will be concrete pads with a subsurface geosynthetic membrane to prevent infiltration of potential spills. These areas will have drains and sumps to contain spilled fuel and glycol for collection and disposal offsite. • A spill contingency plan will be developed and implemented as part of the Emergency Response Plan, in accordance with the Canadian Aviation Regulations (Section 2.3.2). • Spill kits will be available in key areas on site. • Domestic effluent will be treated to acceptable standards prior to release to the environment (construction camp, septic tank and field). • Preventive inspections will be conducted for fuel storage areas and supply vehicles, machinery, and
Operation: Water and waste management and treatment	• Potential for soil contamination from release of domestic effluent	

Project Activity	Project Effect	Mitigation Measures
		worksite facilities with emergency kits for recovery of petroleum products and hazardous materials.

6.4 Groundwater

As described in Section 4.3, a preliminary groundwater investigation was undertaken to understand the viability of groundwater resources at the airport location. This program yielded marginal results from the investigative wells. These results, in combination with the lack of successful groundwater wells completed historically in the region, have indicated low confidence in the potential for groundwater as a potable water supply for the Project. Impacts to groundwater quantity from direct withdrawal have not been evaluated. In addition, an analysis of potential surface water sources indicates the expected peak potable water demand will not represent a substantial change in flow or water levels for those sources. Therefore, surface water withdrawal is not expected to influence groundwater recharge. Overall, no impacts to groundwater quantity are expected as a result of the Project.

For groundwater quality, potential effects are related to the risk of accidental spills or releases during construction and operation, which could contaminate shallow groundwater. Sources of contamination could include vehicles, aircraft and equipment, fuel storage, transportation, and dispensing, and de-icing activities. A summary of potential Project effects and proposed mitigation measures is provided in Table 6.4-1.

Table 6.4-1: Potential Project Effects on Groundwater Quality

Project Activity	Project Effect	Mitigation Measures
Construction Vehicle and heavy machinery transportation, use and maintenance of equipment	• Potential for groundwater contamination through fuel spills from vehicles, equipment, or tanks	• Appropriate regulations, guidelines and proposed Project approvals will be complied with, including treatment of contaminated water to approved discharge limits. • Fuel storage and handling guidelines and best practices will be complied with, including personnel training, storage setbacks, secondary containment, and regular storage inspection. • All fuelling, servicing and staging of machines will be restricted to designated areas. • Regular inspections of all machinery will be performed to reduce the risk
Operation: Operations of the airport and runway	• Potential for groundwater contamination from aircraft fuel spills, re-fuelling, tank leaks, and de-icing	
Operation: Use and maintenance of the access road	• Potential for groundwater contamination from fuel/oil releases from vehicles and equipment travelling along the access road	

Project Activity	Project Effect	Mitigation Measures
Operation: Water and waste management and treatment	• Potential for groundwater contamination from release of domestic effluent	of a spill by identifying and correcting potential equipment failures. • Aircraft re-fueling and de-icing areas will be concrete pads with a subsurface geosynthetic membrane to prevent infiltration of potential spills. These areas will have drains and sumps to contain spilled fuel and glycol for collection and disposal offsite. • A spill contingency plan will be developed and implemented as part of the Emergency Response Plan, in accordance with the Canadian Aviation Regulations (Section 2.3.2). • Spill kits will be available in key areas on site. • Domestic effluent will be treated to acceptable standards prior to release to the environment (construction camp, septic tank and field). • Preventive inspections will be conducted for fuel storage areas and supply vehicles, machinery, and worksite facilities with emergency kits for recovery of petroleum products and hazardous materials.

6.5 Surface Water

Project activities have the potential to affect surface water in the area via several pathways. There is also the potential for effects to surface water to indirectly affect other environmental resources, including soils and sediments, vegetation and wetlands, fish and fish habitat, and wildlife and migratory birds. The main indicators of potential Project effects to surface water are:

- Changes to hydrology (via local drainage modifications and water withdrawal),
- Changes to watercourse processes
- Fish Passage, and changes to water quality.

6.5.1 Hydrology

6.5.1.1 Drainage Modifications

Transport infrastructure can directly modify the drainage network in the LSA by intercepting flow path and routing it to surface water feature through ditches. This process can contribute to changes in the timing and extent of runoff and floods. These modifications may cause stream process modifications and alter both aquatic habitat and fauna. By altering surface or subsurface flow, road development can also lead to a modification of the hydrological functioning of wetlands and eventually result in a change in wetland composition and class (Trombulak, 2000).

For the main permanent and ephemeral watercourses identified, the Project includes the implementation of watercourse crossings (bridge and culverts) to ensure the continuity of flows under the access road. The watercourses crossed and design specifics are described in Sections 2.2.2 and 4.4.

As described in Section 2.2.3, all airport components will be graded to allow for runoff drainage. Ditches will be situated a minimum of 75 m from the runway centerline on either side of the runway. The ditches

will be 3 m wide to account for rock spalls and snow accumulation during the winter months. Reinforced concrete culverts will be installed to maintain drainage north to south across the runway and manage rainwater runoff and melting snow. The area in between the apron, taxiways and runway will serve as a runoff collection area, with a low point culvert drain that directs water east away from the airport.

Additional culverts and drainage channels will be created to facilitate overall flow of surface water across the runway and access road. Details on locations of these features will be determined at a future stage of design.

A preliminary assessment of potentially impacted wetlands was performed based on the Project footprint areas (Table 6.5-1). To assess the impact of the Project on wetlands, the watersheds that feed them have been assessed using the same methodology outlined above. Wetland outlets were delineated at the junction between the wetlands features and flow accumulation using a 1 ha threshold.

The drainage area potentially modified by the Project depends on the wetland location. If the wetland is located downstream of the project footprint, modified drainage area is defined upstream of the Project footprint. If the Project footprint encroaches on the wetland, the drainage area affected is defined downstream.

Impacts would mainly result from runoff and small ephemeral watercourse being routed outside of wetland drainage areas. The most affected location would be the airport since it has the highest density of wetlands. As described above, additional design considerations will be dedicated to runoff management in the runway vicinity to maintain hydrological functioning and class of wetlands.

Table 6.5-1: Potential Wetland Drainage Modifications

Wetland ID and Area (km^2)	Current Drainage Area (km^2)	Infrastructure Footprint Location	Potential Watershed Modification (km^2)
WL29 (0.0035)	0.078	Upstream (Access road)	0.052 (67%)
WL32 (0.0099)	0.062		0.047 (76%)
WL25 (0.0122)	0.075		0.010 (13%)
WL24 (0.0222)	0.084		0.061 (73%)
WLId32 (0.0317)	0.371		0.061 (16%)
Wl35 (0.0043)	0.062		0.040 (65%)
WL34 (0.096)	0.984		0.294 (30%)
WL60 (0.274)	0.674		0.051 (8 %)
WL20 (0.644)	4.625		1.83 (40 %)
WL56 (0.0187)	0.235	Upstream (Access road & temporary access road)	0.112 (56%)
WL46 (0.0231)	0.316		0.131 (41%)
WL17 (0.276)	0.964	Within wetland delineation (airport & runway)	0.212 (22%)
WL13 (0.947)	2.58		0.853 (33%)
WL16 (0.091)	0.338		0.249 (74%)
Wl12 (0.0330)	0.468	Upstream (airport & runway)	0.420 (90%)
WL11 (0.0061)	0.798		0.773 (97%)
WL06 (0.192)	2.614		1.57 (60%)
WL01 (0.0177)	0.166		0.079 (48%)
WLId6 (0.0045)	0.281		0.079 (28%)

6.5.1.2 Water Supply and Distribution

As described in Section 2.2.6, airport will require approximately 13 L/min (or 0.22 L/s) of potable water for domestic use at peak hour demand for the terminal and maintenance garage (e.g., washrooms) and fire suppression., Watercourses within a 3 km radius were evaluated as potential candidates for to supply the Project's water demand. The watercourses within 1 km have catchments less than 1 km^2 (Table 6.5-2 and Figure 6.5-1).

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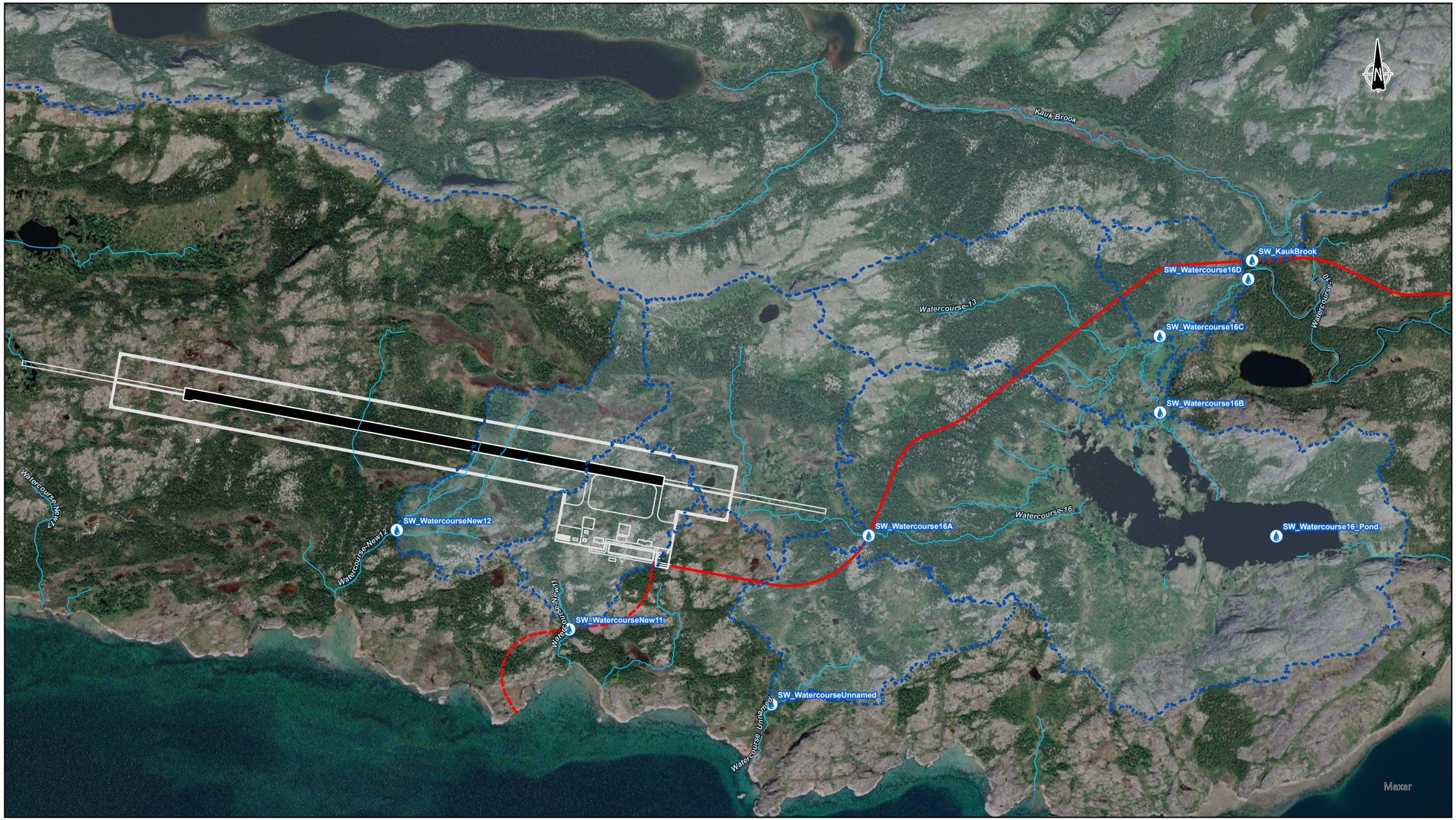
NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION



Project Component
- Access road
- Temporary access road
- Airport footprint
- Runway

Hydrography
- Surface water source option
- Surface water sampling catchment
- Watercourse

1:16 000

0 250 500 m

NAD 1983 UTM Zone 20N

Figure 6.3-1

Evaluation of Surface Water Withdrawal

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Table 6.5-2:Watercourses Within 3 km of the Airport

Name	Catchment (km^2)	X (UTM20)	Y (UTM20)	Distance from airport (m)
SW_WatercourseNew11	0.38	572933.31	6261445.1	474
SW_WatercourseUnnamed	0.52	573818.3	6261117.13	809
SW_Watercourse16A	0.84	574244.37	6261855.15	947
SW_WatercourseNew12	0.55	572179.37	6261879.16	1,132
SW_Watercourse16B	3.32	575519.4	6262394.06	2,316
SW_Watercourse16C	4.16	575518.31	6262728.13	2,436
SW_Watercourse16D	4.42	575905.26	6262977.15	2,880
SW_Kauk Brook	47.03	576002.51	6263011.33	2,930

A low-flow analysis was conducted based on minimal monthly value to determine if identified watercourses could meet the estimated demand while preserving ecological flow. As recommended by DFO (2013b), withdrawal should not exceed 10% of the instantaneous flow and cumulative flow 0.25 mean annual discharge (0.25QMA)

A catchment transfer methodology has been applied using a reference Environment Canada hydrometric station with the following formula:

$$Q_{T1} = (\frac{A_1}{A_2})^{\propto} * Q_{T2}$$

Where :

A_1 = Area of catchment 1

A_2 = Area of catchment 2 (Hydrometric station)

Q_{T2} = Discharge at the hydrometric station

$\propto$ = Regional exponent establishment at 1.2 for a more conservative estimate of low flow

Station 03NE004 (Headwater stream above pond 55) located 30 km to the south of Nain has been used as the reference hydrometric station for the low-flow analysis of small catchments in the airport vicinity. This station is the only regional station that can be representative with a catchment size of 4.88 km^2. Station 03NE001 (Reid Brook at the outlet of Reid Pond) was used as representative of Kauk Brook, with a catchment size of 75.70 km^2.

The analysis of monthly discharge has demonstrated that watercourse headwaters occasionally freeze between February and April. In the RSA, all watercourses are likely to follow the same patterns except Kauk Brook (Table 6.5-3). Smaller watercourses such as SW_WatercourseNew12, SW_WatercourseNew11, SW_WatercourseUnnamed, SW_Watercourse16A are likely to freeze also in December, January and May as well.

Table 6.5-3: Monthly Mean and Minimum Discharge at Headwater Stream (03NE004) and Reid Brook (03NE001)

	Headwater stream		Reid Brook	
Month	Mean Discharge (l/s)	Min Discharge (l/s)	Mean Discharge (l/s)	Minimum Discharge (l/s)
January	12.00	6	638.97	60
February	4.45	0	564.14	41
March	2.08	0	536.92	30
April	7.73	0	590.64	28
May	368.42	7	3452.14	40
June	841.45	187	5945.86	1670
July	310.16	53	3223.75	1010
August	90.86	26	1816.31	338
September	93.83	22	1549.27	243
October	153.91	27	1716.85	127
November	132.09	22	1115.99	280
December	60.52	10	793.52	118

The computation of 0.25QMA for all water course demonstrates that all watercourses except SW_WatercourseNew11 would be able to meet peak hour demand of 0.22 L/s while preserving the ecological flow (Table 6.5-4). Analysis of minimum discharge during the ice-free season (Table 6.5-4) suggests that the yield would be sufficient for SW_Watercourse16A, SW_Watercourse16B, SW_Watercourse16C, SW_Watercourse164D during periods of severe drought. WatercourseNew12, WatercourseNew11, WatercourseUnnamed are likely intermittent streams and, based on the 0.25QMA peak hour demand fraction, would provide sporadic water interruption if considered as a Project source.

Table 6.5-4: Low Flow Analysis for Identified Watercourses

Name	0.25QMA (l/s)	Peak Hour Demand Fraction (%)
SW_WatercourseNew11	1.87	11.8
SW_WatercourseUnnamed	2.72	8.1
SW_Watercourse16A	4.84	4.5
SW_WatercourseNew12	2.91	7.6
SW_Watercourse16B	25.20	0.9
SW_Watercourse16C	33.03	0.7
SW_Watercourse16D	35.52	0.6
SW_Kauk Brook	320.55	0.1

Based on this analysis, Kauk Brook and the lake within catchment SW_Watercourse16B are considered the primary options for Project potable water. Amongst the watercourses in the vicinity of the airport, Kauk Brook would be able to sustain 12 months of water withdrawal. Kauk Brook is also advantageous since an intake could be placed at the proposed bridge location, facilitating construction and maintenance access. Additionally, a pipeline for transporting water to the airport would follow the proposed access road corridor, removing the need for new disturbance. If Kauk Brook is selected, additional investigation will occur to locate a trench sufficiently deep to position the water intake and avoid freezing in winter.

The lake within the catchment of SW_Watercourse16 (SW_Watercourse16_Pond in Figure 6.5-1) is also an acceptable candidate for water supply, since the analysis has demonstrated that the yield would be sufficient in the ice-free season. This lake is also reasonably close to the proposed access road, allowing for more feasible transport options. Based on community feedback from the June 12 open house, the other proposed water source options are shallow lakes similar to wetlands, and do not have the characteristics needed for a consistent water supply. If this option is selected, further analysis would be conducted to demonstrate sustainable yield during 4 months of winter withdrawal. Design modifications would also be considered such as additional water storage at the airport, so water could be withdrawn and stored during the ice-free season, and this additional capacity would be used during winter.

The NG will obtain a water use licence under the *Water Resources Act* before withdrawing water for the Project. The licence application will include an evaluation that demonstrates the sustainability of the proposed surface withdrawal for both construction and operations.

6.5.2 Watercourse Processes and Fish Passage

6.5.2.1 Guidelines

Construction of the access road will require the installation of either culverts or bridges to allow natural watercourses to pass beneath the road. The morphological study of the watercourses showed overall low potential for lateral mobility and sediment transport, especially for the ephemeral watercourses. Culverts are to be designed and installed appropriately to allow for sediment transparency and fish passage, primarily for permanent watercourses.

New watercourse crossings will allow for an unaltered passage of sediments, from upstream to downstream, to maintain the balance of the morpho-sedimentary processes. To avoid adverse impacts on the physical and ecological function of the watercourse, the location and design of an appropriate crossing will consider several hydraulic, geomorphological, ecological, and economic factors.

This approach shares many common criteria with fish passage design, allowing these themes to be addressed simultaneously. Except for bridges, open bottom structures are one of the best solutions to ensure free fish passage. The structure can maintain, natural water flow conditions by conserving watercourses' physical features such as substrate roughness, slope and width, if footings are installed outside the wetted perimeter of the stream (Fisheries and Oceans Canada, 2022). Design of stream simulation culverts are based on the same principles.

The guides mentioned below provide reliable resources for better watercourse crossing design, considering geomorphic and fish passage principles:

- Fisheries and Oceans Canada (2022)
- Fisheries and Oceans Canada (2016)
- Parish Geomorphic and Dougan & Associates (2004),
- Credit Valley Conservation Authority (2011).
- Water Resource Division, Newfoundland and Labrador (2018)

6.5.2.2 Potential Impacts

Potential impacts linked to watercourse crossings can occur during the construction and operation of infrastructure. Temporary effects to surface water are possible during the construction process as watercourses are altered or diverted from their natural streambed. On the long-term aspect, improper design (diameter and slope) or routing of runoffs (timing and extent of floods), can lead to changes in morphological processes (aggradation, incision) and the need to design corrective measures. Flow through culverts can also modify the structure of surrounding soils by promoting heat exchange through culvert walls (Hua, 2014). In permafrost conditions these exchanges can increase the risk of structural deformation (L'Hérault E., 2014).

WC-10 and WC-12 were identified as containing fish and therefore fish passage design at these watercourse crossings is required. WC-10 culvert will be fitted with baffles and energy dissipation pool to accommodate fish passage in accordance with DFO guidelines (DFO 2022a). No impacts on geomorphic processes and fish passage are expected at WC-12 (Kauk Brook) as the modular bridge will span the entire watercourse width.

Considering permanent watercourses, crossing design at WC-05 (diameter), WC-07 (slope) and WC-08 (internal culvert bed sizing and slope) will be adapted to match reaches characteristics and prevent detrimental morphological processes (Table 6.5-5). Despite lower mobility potential of temporary watercourses, complying with these recommendations is likely to limit maintenance costs (WC-04, WC04-new, WC-11, New culvert unidentified).

Table 6.5-5: Comparison of Geomorphic Characteristics and Watercourse Crossing Design

Infrastructure sitting	Watercourse crossing	Flow Regime	Watercourse Crossing Design			
			Ø (mm)	Bankfull width ratio (*)	S (%)	Slope ratio (*)
Access road	WC-01: Nain Brook	Permanent	No modifications of the existing crossings			
	WC-02: Annainak Brook	Permanent				
	WC-03 (Watercourse-03)	Intermittent	700	70%	7.61	0.86
	WC-04 (Watercourse-04)	Intermittent	1400	140%	5.96	2.05
	WC-05 (Blowhole Creek)	Permanent	1800	51%	3.49	1.16
	WC-06 (Watercourse-06)	Intermittent	2000	200%	8.78	1.33
	WC-new04 (Watercourse-New04)	Intermittent	1200	400 %	10.74	0.48
	WC-07 (Watercourse-07)	Permanent	2400	80 %	28.02	1.20
	WC-08 (Watercourse-08)	Permanent	2000	200%	1.37	0.51
	WC-10 (Watercourse-10)	Permanent	2400	80 %	8.19	0.98
	WC-11 (Watercourse-16)	Intermittent	1200	240 %	3.36	2.1
	WC-12 (Kauk Brook)	Permanent	35 m (bridge)	Unconstricted	N.A.	N.A
	WC-13 (Watercourse-13)	Intermittent	2000	400 %	8.55	1.40
Access road Temporary access road	New culvert unidentified (Watercourse-16)	Intermittent	1000	100 %	2.38	0.52

(*) Bankfull width and slope ratios are equal to the culvert characteristics divided by the natural characteristics of the watercourse.

Potential impacts from the Project could also be realized from surface water withdrawal. Water withdrawal from Kauk Brook is a primary option for Project potable water. The installation of a water intake could lead to obstruction of fish passage and entrainment or impingement of fish-on-fish screens. Best practice provided by Fisheries and Oceans Canada (2022) notes that water withdrawal should be planned with consideration for maintenance of downstream flows and intakes will be equipped with fish screens (screening, netting or mesh) designed and installed in such a manner as to prevent potential losses of fish due to entrainment or impingement.

6.5.3 Water Quality

6.5.3.1 Sediment

Construction activities may produce sediment-laden runoff and suspended solids in aquatic environments, which can degrade both water quality and aquatic habitats (clogging) of nearby watercourses. Sediment production can result from sediment-laden runoff during precipitation events if erosion and sedimentation control measures are not implemented areas of exposed soil (stripped land, exposed embankments). The use of construction equipment in or near watercourses has also the potential to disturb sediments.

During Project operation, most sediment enters waterbodies from mass failure (Gilbert, 2021) and overflow from improper watercourse crossing design. However, surfaces of unpaved roads can drain fine sediments to surface water features and impact aquatic organisms and habitats.

6.5.3.2 Wastewater and Pollutants

During construction, the use of mechanical equipment can release other deleterious substances, including fuel or oil in the event of a spill.

Several potential contaminants will also be in use during Project operation, including maintenance and painting chemicals and domestic effluent from airport building washrooms and kitchens. Fuel could also be released from the on-site fuel tanks and refuelling stations in the event of an accident or spill. Road operation (vehicular traffic) can alter the surface water environment. Heavy metals derived from gasoline additives and road de-icing salts can be washed into watercourses and wetlands during rainfall. These contaminants have the potential to be leached into groundwater or contaminate stormwater runoff, which can pollute nearby watercourses.

Airport wastewater will be treated on site using a septic tank and septic field (Section 2.2.6). This system has been designed according to NL Private Sewage Disposal requirements and will be located at a minimum distance of 30 m from any watercourse.

6.5.4 Potential Project Effects and Mitigation Measures

A summary of potential Project effects and proposed mitigation measures is provided in Table 6.5-6.

Table 6.5-6: Potential Project Effects on Surface Water

Project Activity	Project Effect	Mitigation Measures
Construction: Site preparation (e.g., vegetation clearing, soil stripping, excavation, rock blasting)	• Reduction in vegetation, changes to topography, and compaction of surfaces can alter local drainage flows. • Reduction in water quality from site preparation activities adjacent to watercourses.	• Infrastructure has been sited to avoid potential permafrost, wetlands and watercourses. • Water withdrawal will respect environmental flow (withdrawal below 10% of instantaneous flow and cumulative withdrawal lower than the 0.25 QMA). • Work will be prioritized during low-water periods and ensure flow continuity (by-pass). • Infrastructure footprint will be optimized (stream crossing). • Culverts will be sufficiently sized to prevent narrowing of flow sections, according to the following: • (80%< ø < 120%) • Culvert slope adjusted to the watercourse gradient to prevent aggradation / degradation (slope ratio = 1) • DFO standards will be followed: Intakes will be equipped with fish screens (screening, netting or mesh) designed and installed in such a manner as to prevent potential losses of fish due to entrainment or impingement. • Free fish passage will be maintained at watercourse crossing during construction work period (e.g., temporary diversions, cofferdams, etc.). • Specific fish passage will be designed at watercourse crossing (e.g., baffles or bridge). • Sediment barriers will be installed around the edges of aquatic environments to prevent transport of fine particles during work (filter berm, sedimentation basins, worksite runoff diverted to vegetation area). • A geomembrane downstream of crossings and around work areas will be installed to intercept surface material particles. • Dust control measures will be applied according to conditions (meteorology) and development activities that generate dust (e.g., construction / use of access road).
Construction: Construction of infrastructure including temporary and permanent facilities	• Road and runway infrastructure can create obstructions to fish passage at watercourses. • Watercourse crossings can potentially increase the chance of erosion and sedimentation, which may reduce water quality. • Project infrastructure can modify local drainage patterns.	
Construction: Vehicle and heavy machinery transportation, use and maintenance of equipment	• Release of fuel or oil could reduce surface water quality due to physiochemical alterations.	
Operation: Operation of the airport and runway	• Release of fuel, de-icing glycol, or other chemicals could reduce surface water quality due to physiochemical alterations.	
Operation: Use and maintenance of the access road	• Potential for surface water contamination from vehicles and equipment travelling along the access road.	
Operation: Potable water withdrawal	• Water withdrawal can reduce overall quantity in waterbodies and watercourses, particularly during periods of low flow. • Intake presence could alter watercourse flow.	
Operation: Water and waste management and treatment	• Release domestic effluent could reduce surface water quality due to physiochemical alterations.	

Project Activity	Project Effect	Mitigation Measures
		• The runway, apron, and access road gravel will be treated with a polymer to control sedimentation (runoff). • Embankment stabilization measures will be applied (vegetation, riprap, geotextile, etc.) • Storage of machinery and maintenance operations will be in specific areas isolated from the drainage network (watercourses and ditches). • Appropriate regulations, guidelines and proposed Project approvals will be complied with, including treatment of contaminated water to approved discharge limits. • Fuel storage and handling guidelines and best practices will be complied with, including personnel training, storage setbacks, secondary containment, and regular storage inspection. • All fuelling, servicing and staging of machines will be restricted to designated areas. • Regular inspections of all machinery will be performed to reduce the risk of a spill by identifying and correcting potential equipment failures. • Aircraft re-fueling and de-icing areas will be concrete pads with a subsurface geosynthetic membrane to prevent infiltration of potential spills. These areas will have drains and sumps to contain spilled fuel and glycol for collection and disposal offsite. • A spill contingency plan will be developed and implemented as part of the Emergency Response Plan, in accordance with the Canadian Aviation Regulations (Section 2.3.2). • Spill kits will be available in key areas on site. • Domestic effluent will be treated to acceptable standards prior to release to the environment (construction camp, septic tank and field). • Preventive inspections will be conducted for fuel storage areas and supply vehicles, machinery, and worksite facilities with emergency kits for recovery of petroleum products and hazardous materials.

6.6 Vegetation and Wetlands

Desktop-derived data along with baseline data collected during field assessments were and will be used to determine the quantity and quality of wetlands and vegetation communities, potential habitat for rare

plants and rare plant populations. Although Project activities may affect wetlands and vegetation communities to varying degrees, considerations are primarily related to potential effects on:

- Reduction of wetland areas and vegetation communities that include habitat for culturally important plants and SAR and SOCC plants and wildlife;
- Reduction of biodiversity and traditional, SAR or SOCC plant populations; and
- Reduction in wetland function.

Based on AC CDC data, two SOCC had been recorded within a 5-km radius of the Project. During the field assessments in 2023, twelve species are SOCC, listed as rare to uncommon by the ACCDC (S1 to S3S4) were observed within the LSA and no plant or lichen SAR were observed.

Project activities have the potential to affect vegetation and wetlands both directly and indirectly. Construction activities with the potential to impact vegetation and wetlands include vegetation clearing, laydown areas, excavation, stockpiling of material. Table 6.6-1 provides a summary of the potential direct disturbance to the wetlands and vegetation communities by the Project infrastructure.

Potential effects to wetlands as a result of regional hydrology modification are discussed in Section 6.5.

Table 6.6-1: Vegetation Communities and Project Footprint Disturbance

Vegetation Community	Area of Direct Disturbance (ha)	Percentage of Project Footprint (%)
Closed black spruce/moss/lichen forest	51.51	26
Deciduous shrubland	0.60	<1
Developed	1.22	<1
Open tamarack/lichen forest	21.19	11
Riparian	0.25	<1
Unvegetated/barrens/bare rock	89.62	45
Water	0.27	<1
Wetland	35.80	18
Total	**200.46**	**100**

A summary of potential Project effects and proposed mitigation measures is provided in Table 6.6-2.

Table 6.6-2: Potential Vegetation and Wetlands Interactions with Proposed Project

Project Activity	Project Effect	Mitigation Measures
Construction: Site preparation (e.g., vegetation clearing, soil stripping, excavation, rock blasting)	• Loss or disturbance of portions of the wetlands and vegetation communities. • Changes to community diversity, including wildlife use (i.e., migratory birds and species at risk), traditional use plants, and species at risk. • Changes to local hydrology/alteration of surface water flow patterns, resulting in wetting or drying of wetlands, such as	• Construction activities, equipment and vehicles to construction footprint will be restricted. Vegetation disturbance will be minimized, as maintaining terrestrial, riparian and wetland ecosystems plays a role in supporting biodiversity, hydrology, wildlife habitats and traditional use of resources. • Construction methods that reduce the potential to drain or flood surrounding wetlands will be implemented (e.g., appropriately sized / spaced culverts, no unpermitted pilling of soil / grubbing,

Project Activity	Project Effect	Mitigation Measures
	inadvertent drainage or impoundment and groundwater drawdown associated with water withdrawal. • Spread or introduction of invasive species into upland habitats and wetlands through construction equipment, vehicles or runoff from. Increased traffic during the construction and operations phases can elevate this risk. • Potential sedimentation within wetlands or upland habitats because of up-gradient activities (e.g., earth moving, removal of vegetation, soil stockpiling). Depending on the degree, a sedimentation event may suffocate wetland vegetation and increase nutrient levels. • Dust deposition, which can, similarly to sediment, also introduce minerals and nutrients into wetlands and stress wetland vegetation (particularly non-vascular species). • Changes to wetland microclimate and habitat functions because of proximity to Project infrastructure and edge effects.	no unnecessary ditching / artificial channelization). • Erosion of wetland soils will be minimized by limiting flow velocities using hydraulic dissipation techniques and directing runoff through natural upland vegetation, wherever practical. • Temporary erosion and sediment control measures will be installed (e.g., rig matting, geotextiles, vegetated buffer zones, berms, fibre rolls or silt fencing) in appropriate locations to reduce or contain erosion or sedimentation. The type of control (if applicable) is dependent on topography. • Erosion and sediment controls will be inspected on a regular basis and correct deficiencies (e.g., inadequate control, damage, ineffectiveness) in a timely manner. • Measures to reduce the spread of invasive species will be employed (particularly by vehicles) into the surrounding landscape including wetlands and retain habitat integrity. • Equipment and vehicles will arrive to site clean and free of soil or vegetation debris. Vehicles will be inspected regularly, particularly vehicles arriving from outside the Nain area. • There will be proper installation and proper placements of culverts or other measures to allow flow under the airport access road. • Drainage across any temporary workspace will be maintained during construction. Construction will not cause ponding of water or unintentional channelization of surface water flow. • Boundaries of the construction footprint, access roads, and wetlands will be staked/flagged. Disturbance will not be allowed beyond the stakes or flagging. Boundaries where warranted will be restaked/flagged following clearing and prior to the commencement of subsequent construction activities. • Construction equipment will be cleaned and free of soil or vegetative debris before its arrival on the Project to reduce the risk of weed introduction. Any equipment that arrives dirty, will not be permitted on the construction footprint. • For areas that will only be partially disturbed, efforts will be undertaken
Construction: Vehicle and heavy machinery transportation, use and maintenance of equipment	• Potential for contamination of vegetation and wetlands through fuel spills from vehicles, equipment, or tanks • Vehicle and equipment operation may generate dust that can stress vegetation and wetlands	
Operation: Use and maintenance of the access road	• Potential for vegetation and wetlands contamination from fuel/oil releases from vehicles and equipment travelling along the access road • Vehicle and equipment travel may generate dust that can stress vegetation and wetlands	

Project Activity	Project Effect	Mitigation Measures
Operation: Water and waste management and treatment	• Potential for vegetation and wetlands contamination from release of domestic effluent	to minimize grading related effects to the remaining wetland areas (e.g. increases or decreases in hydrological inputs resulting in the subsequent flooding or drying of the wetland). Grading effects will be minimized by maintaining the pre-construction topography where possible. • Restoration and re-vegetation of the temporary disturbed portions of the wetlands will be done in a timely manner. • Appropriate regulations, guidelines and proposed Project approvals will be complied with, including treatment of contaminated water to approved discharge limits. • Fuel storage and handling guidelines and best practices will be complied with, including personnel training, storage setbacks, secondary containment, and regular storage inspection. • All fuelling, servicing and staging of machines will be restricted to designated areas. • Regular inspections of all machinery will be performed to reduce the risk of a spill by identifying and correcting potential equipment failures. • Aircraft re-fueling and de-icing areas will be concrete pads with a subsurface geosynthetic membrane to prevent infiltration of potential spills. These areas will have drains and sumps to contain spilled fuel and glycol for collection and disposal offsite. • A spill contingency plan will be developed and implemented as part of the Emergency Response Plan, in accordance with the Canadian Aviation Regulations (Section 2.3.2). • Spill kits will be available in key areas on site. • Domestic effluent will be treated to acceptable standards prior to release to the environment (construction camp, septic tank and field). • Preventive inspections will be conducted for fuel storage areas and supply vehicles, machinery, and worksite facilities with emergency kits for recovery of petroleum products and hazardous materials.

6.7 Wildlife and Migratory Birds

6.7.1 Valued Component Selection

Project activities have the potential to affect wildlife and migratory birds both directly and indirectly. Project effects may be temporary or permanent in nature as there are no plans to decommission the airport. As noted in Section 4.6.2.7, it is not feasible to assess every environmental or ecological parameter relative to wildlife and therefore the assessment is focussed on VCs selected to be representative of broader groups of wildlife. VCs are identified with consideration from Indigenous communities, federal, provincial, territorial, or municipal authorities or entities, and the public. Based on the criteria described in Section 4.6.2.7, the list of VCs include:

- Red-necked Phalarope
- Peregrine Falcon
- Short-eared owl
- Spruce Grouse
- Rusty blackbird
- Gray-cheeked thrush
- Little brown myotis
- Northern myotis
- Polar bear
- Eastern Migratory Caribou

6.7.2 Potential Project Effects and Mitigation Measures

Potential effects on wildlife VCs may occur during Project construction and operations as identified in Table 6.7-1. Project-related effects to wildlife and migratory birds are possible via several pathways, including:

- Reduction in the type and extent of habitats and habitat fragmentation
- Disturbance from human activity, noise and light pollution
- Bird strikes, vehicle collisions, incidental take, increased hunting

Habitat loss occurs when infrastructure is constructed within previously undisturbed areas, destroying, fragmenting or degrading the habitat of flora and fauna. Habitat fragmentation occurs when a larger area of habitat is divided by roads, fencing or other infrastructure, creating barriers to foraging and migration. Habitat degradation reduces the attractiveness of the habitat for migratory birds and may result from the removal of wetlands or vegetation, the introduction of invasive species, or contamination of surface water, sediment or soil. Habitat loss and fragmentation cannot be fully mitigated as the airport and access road will be permanent. To reduce effects of habitat loss, the airport footprint will be minimized to the extent possible. Temporary footprint areas (e.g., camps and quarries), will be reclaimed as soon as possible once construction is complete. The Project is in a remote location with no other disturbances currently on the landscape. Habitat availability is not a limiting factor for most species of wildlife in the area, including the VCs selected for the assessment. Mitigation to reduce the effects of habitat loss and fragmentation is provided in Table 6.7-1. Based on a preliminary review of habitat availability and Project details, impacts on wildlife due to habitat loss and fragmentation are anticipated to be negligible.

Project-related noise may result in reduced habitat effectiveness for wildlife and migratory birds adjacent to the airport and during construction. Studies indicate negative responses by some songbirds to anthropogenic noise (Bayne et al. 2008; Brumm 2004; Habib et al. 2007; Slabbekoorn and Peet 2003; Swaddle and Page 2007). The specific intensity threshold at which noise affects songbirds is unknown, although a study by Bayne et al. (2008) indicated that one third of species were significantly affected at noise levels averaging 48 dBA near a source of chronic noise. Infrequent or periodic noise may have

lesser effects. Another study suggested that sound levels above 50 dBA may impact songbirds (Kaseloo 2005) and Environment and Climate Change Canada (2023) indicates that noise levels greater than 50 dBA or 10 dBA above ambient levels can negatively affect birds. During construction, localized noise levels may exceed 50 dBA in the medium term and it's possible that some bird and other wildlife species may avoid areas adjacent to high levels of noise. However, this effect is medium term (e.g., occurs during construction) and will not affect all migratory birds and wildlife to the same extent. Similarly, the low frequency of flights arriving at the airport and operations of the airport are not anticipated to alter use of adjacent habitat by most species of wildlife. Once construction is complete, it is expected that wildlife will continue to use habitat adjacent to the airport and access road and residual effects are predicted to be negligible. Mitigation measures to reduce potential effects of noise are provided in Table 6.7-1.

Increased light levels due to the Project may result in reduced habitat effectiveness adjacent to facilities for migratory birds and other wildlife and may also affect birds during migration as they may be disoriented by lights (Longcore and Rich 2004; Navara and Nelson 2007; Poot et al. 2008). Lighting will be required for construction purposes; it will be directed away from the sky and activated only during working hours when there is insufficient daylight (early morning and evening). Airport operations must involve a minimum amount of lighting to adhere to Transport Canada regulations. Approach and runway lighting will only be activated when an aircraft is approaching and departing. Buildings and other obstructions will have red lights as per aviation standards. All operational lighting will be directed downwards in compliance with regulations which will reduce potential effects on migratory birds. Additional mitigation measures for light effects are provided in Table 6.7-1. With the mitigation measures implemented, , residual effects as a result of light on wildlife are expected to be minimized and negligible.

Aircraft operation may result in bird strikes during take-off and landing and wildlife collisions with construction and operations traffic on the access road may occur. Approximately 85% of bird strikes involve aircraft below 800 ft and up to 40% of bird strikes take place beyond the airport perimeter (CAA 2001). Collisions with vehicles may occur; however, collisions tend to occur on roads with high levels of traffic. The airport will be required to develop a Wildlife Management Plan as per Transport Canada regulations (GoC 2024a). The airport will also consider mitigation and guidelines documented in the Sharing the Skies - Guide to Management of Wildlife Hazards – TP 13549 (GoC 2024b). The access road will have posted speed limits during construction and operations and traffic is expected to be low during operations (e.g., 100 vehicles per day) reducing the potential for collisions with vehicles. With mitigation in place including recommended airport guidelines implemented, low frequency of aircraft landing at the airport, low vehicle traffic and speed limits on the access road, impacts from aircraft and vehicle collisions are expected to be negligible.

Of the VCs, red-necked phalarope, peregrine falcon and short-eared owl were not observed nesting in the LSA and RSA. Polar bears appear to occur infrequently in the area and based on discussions with a local hunter, are typically found further north. Eastern Migratory Caribou are also infrequently observed in the area around Nain and are typically found further north. Potential effects on these species, therefore, are anticipated to be negligible. Potential effects on the remaining VCs (spruce grouse, rusty blackbird, gray-cheeked thrush, little brown myotis and northern myotis) are also anticipated to be negligible as the loss of habitat is expected to be low relative to habitat available for these species in the RSA and potential effects of mortality and sensory disturbance are also predicted to be negligible.

Table 6.7-1: Potential Project Effects on Wildlife and Migratory Birds

Project Activity	Project Effect	Mitigation Measures
Construction: Site preparation (e.g., vegetation clearing, soil stripping, excavation, rock blasting)	• Tree and vegetation clearing can lead to: • reduction in wildlife habitat availability resulting from habitat loss and fragmentation, • less habitat connectivity caused by barriers to wildlife movements; • decreased wildlife populations resulting from increased levels of direct and indirect mortality risks;	• Project footprint will be minimized to the extent possible to reduce effects on habitat. • Vegetation disturbance will be minimized, as maintaining terrestrial, riparian and wetland ecosystems plays a role in supporting biodiversity,

Project Activity	Project Effect	Mitigation Measures
	• less wildlife diversity resulting from changes in wildlife habitat availability, reduced habitat patch size (e.g., effects of fragmentation), and changes in rare species occurrence.	hydrology, wildlife habitats and traditional use of resources. • Activities will be suspended if caribou are observed within 500 m of work areas. Activity will resume once caribou have left the area. • Construction activities will be scheduled to avoid the ECCC D6 bird nesting period from 1 May to 15 August (Government of Canada 2024d). • If clearing is required during the nesting period, non-intrusive pre-clearing nest surveys will occur within seven days of the clearing and no activity buffers will be established around each nest. • Speed limit will be imposed on the access road to reduce potential for wildlife collisions. • Develop and implement an Airport Wildlife Management Plan with consideration of guidelines provided by Transport Canada. • Bear management plan and garbage management plan will be implemented to minimize bear / human interactions. • Cross-road movements will be maintained during access road construction (e.g., provide breaks in any soil berms or slash pile rows). • Leave natural areas adjacent to Project development to reduce sensory disturbance effects to wildlife from light and allow passage of wildlife around the development. • Restrict construction traffic to designated areas. • Equipment will be fitted with factory-installed noise-reducing components, where feasible, and will be maintained. • Forest buffers will be retained around quarries to reduce noise, where feasible. • Multi-passenger vehicles (e.g., buses) will be used to
Construction: Construction of infrastructure including temporary and permanent facilities	• Construction of the access road will allow for public all-weather access to previously inaccessible areas; this may increase hunting pressures on wildlife and decrease populations	
Construction: Vehicle and heavy machinery transportation, use and maintenance of equipment	• Noise from vehicles and equipment can reduce habitat effectiveness in areas around the Project. • Construction-related light sources may reduce habitat effectiveness adjacent to facilities for migratory birds.	
Operations: Operation of the airport and runway	• Noise from aircraft, vehicles, and equipment can reduce habitat effectiveness in areas around the airport and runway. • Use of facility lights and runway approach lighting can also lead to reduce habitat effectiveness in areas around the airport and runway. • Both of these effects can also lead to less wildlife diversity resulting from changes in wildlife habitat availability and changes in rare species occurrence.	
Operations: Use and maintenance of the access road	• Reduction in wildlife habitat availability resulting from reduced habitat effectiveness (e.g., from noise, human presence); • Vehicles travelling the access road Less habitat connectivity caused by barriers to wildlife movements; • Potential for aircraft and vehicle collisions along the access can increase mortality risk and decrease wildlife populations	

Project Activity	Project Effect	Mitigation Measures
		transport workers to site when practicable. • Use fully shielded lights to illuminate required areas only. • Lower mast heights to reduce light emissions off site or away from target areas. • When using directional lights, ensure they are aimed at a target requiring this type of light and that they are fully shielded to prevent spill light. • Lighting required for construction and operations, including direction and timing will be controlled to avoid effects on migratory birds while meeting operational health and safety requirements.

6.8 Fish and Fish Habitat

There is potential for fish to occur within the freshwater watercourses within the LSA. Of note, two watercourses (WC-10 and WC-12) intersected by the access road alignment, were confirmed as fish bearing during the 2023 FAFH field program, as fish (brook trout and three-spine stickleback) were captured during sampling efforts. Several other watercourses were determined to have value as potential fish habitat. The remaining waterbodies at the proposed access road crossings and runway, were assessed as likely not fish bearing due to lack of fish habitat and/or physical barriers to fish use (e.g., steep gradient, ephemeral, poor channelization, no flow). No SAR were identified in the freshwater environment and therefore are not expected to interact with the Project.

Three marine SAR (i.e., fin whale and two species of wolf eel) were identified as having the potential to interact with the Project. However, if mitigation measures are followed, the Project is not expected to affect these SAR. The single barge landing for Project use will be part of a broader set of marine traffic already existing in the Nain area (marine /commercial vessels, ferry, community navigation smaller boat use).

6.8.1 Potential Project Effects and Mitigation Measures

Project activities have the potential to affect fish and fish habitat (FAFH) of the freshwater and marine environment both directly and indirectly; effects may be temporary or permanent in nature. Project activities and physical works may affect different FAFH components to varying degrees. Issues are primarily related to potential effects on SAR or species of conservation concern, and death of fish and harmful alteration, disruption, or destruction of fish habitat (HADD), as prohibited by Sec. 34.4(1) and 35(1) of the *Fisheries Act*. Potential direct and indirect effects to freshwater and marine fish and fish habitat are provided below:

Freshwater

Direct effects to freshwater FAFH may occur by alteration, disruption, or destruction of fish habitat through dewatering, infilling, installing structures in water, aquatic and terrestrial vegetation removal, or excavating watercourses, or death of fish may also occur by direct impact from impacts by equipment or materials.

Indirect effects to freshwater FAFH may occur by several pathways, including:

- Flow reductions in watercourses by changes in corresponding catchment areas or water extraction;
- Release of deleterious substances, including sediment-laden water caused by excavation and grading works, to watercourses;
- Creating fish passage issues;
- Transport and use of construction equipment in or near water; and
- Impingement or entrainment of fish through water management activities.

Marine

Direct effects to marine FAFH may occur by disruption or destruction of fish habitat, including plant species, or death of fish through barge grounding, presence of the barge in the tidal area, and the barge ramp be lowered at the temporary barge landing facility. During the initial phases of construction, equipment will be transported from Nain to the airport site via boat and coastal landing/staging area. A roll-on/roll-off barge will be used to ferry and offload equipment and supplies (Section 2.2). Minor preparatory work on shore (e.g., removal of large rocks, placement of gravel) may also be required to facilitate the offload of large equipment. No in-water works will occur in the marine environment as part of the Project (i.e., no infrastructure or disturbance below the natural water boundary); therefore, impacts in the marine environment will be minimized.

Detailed potential Project interactions, effects and associated mitigation measures related to FAFH are described in Table 6.8-1.

Table 6.8-1: Potential Project Effects on Fish and Fish Habitat

Project Activity	Project Effect	Mitigation Measures
Construction: Site preparation (e.g., vegetation clearing, soil stripping, excavation, rock blasting). Construction of infrastructure, including temporary and permanent facilities.	• Site preparation and construction of the access road and airport infrastructure (non in-water works) can indirectly impact fish and fish habitat through: • Runoff of sediment-laden water or other deleterious substances (e.g., spills) during construction. • Clearing of riparian areas for access road watercourse crossings. • Initial barge landings to deliver equipment and materials to site, site preparation of the marine area above the natural boundary for and construction of the temporary barge landing can disturb the aquatic marine environment through: • Grounding of barges and propeller wash disturbance of the substrate. • Riparian area clearing.	• Direct contact with aquatic areas will be avoided (e.g., barges will conduct deliveries during high tide to avoid grounding below the natural boundary and propeller wash disturbance) on site. • Vessel beach/anchor locations will be planned and re-positioning events will be minimized. • Vessels will be operated at low speeds. • BMPs for fueling vessels will be used on or near water. • BMPs will be used for operating motorized/non-motorized marine vessels. • Marine mammal monitoring will be implemented during barge trips to observe for and avoid marine mammals. • Federal Marine Mammal Regulations will be adhered to for operation of vessels near marine mammals. • Any work within 50 m of freshwater sources will utilize appropriate mitigation (e.g., monitoring, sedimentation, and erosion control).

Project Activity	Project Effect	Mitigation Measures
	• Runoff of sediment-laden water or release of other deleterious substances (e.g., spills).	This setback will be adapted to be 50-100 m for quarries and borrow pits. • An aquatics monitoring program will be developed to identify and respond to direct releases to the water. • On-site personnel will be informed about avoiding and minimizing impacts to the aquatic areas of work sites. • If required, erosion and sediment control (ESC) measures (i.e., sediment fence) will be implemented between the edge of disturbance and any watercourses. The ESC measures will be maintained and inspected during the construction activities to check they are working properly. • Appropriate regulations, guidelines, and BMPs will be followed, including applicable water quality guidelines. All appropriate in-water work permits will be obtained and works will adhere to their conditions. • Fuel storage and handling guidelines and best practices will be complied with, including personnel training, storage setbacks, secondary containment, and regular storage inspection. • All fuelling, servicing and staging of machines will be restricted to designated areas. • Regular inspections of all machinery will be performed to reduce the risk of a spill by identifying and correcting potential equipment failures. • Aircraft re-fueling and de-icing areas will be concrete pads with a subsurface geosynthetic membrane to prevent infiltration of potential spills. These areas will have drains and sumps to contain spilled fuel and glycol for collection and disposal offsite. • A spill contingency plan will be developed and implemented as part
Construction: Construction of infrastructure, including temporary and permanent facilities.	• In-water works for constructing watercourse crossing infrastructure can directly impact fish and fish habitat, including HADD of fish habitat, restriction of fish movement, or death of fish or indirectly impact fish and fish habitat through: • Runoff of sediment-laden water or other deleterious substances (e.g., spills) during construction. • Barge landings to deliver equipment and materials to site via the temporary barge landing can disturb the aquatic marine environment through: • Grounding of barges and propeller wash disturbance of the substrate. • Runoff of sediment-laden water or release of other deleterious substances (e.g., spills).	
Construction: Vehicle and heavy machinery transportation, use and maintenance of equipment. **Operation:** Operation of the airport and runway. Use and maintenance of the access road.	• Vehicle, aircraft, and heavy machinery transportation, use, refuelling, and maintenance during construction could cause the release of deleterious substances (e.g., spills). • Exposed soil could cause the generation and release of sediment-laden water. • Vehicle and road use could cause the release of deleterious substances (e.g., spills, sediment-laden water).	

Project Activity	Project Effect	Mitigation Measures
Operation: Potable water withdrawal	• Surface water withdrawal from Kauk Brook could lead to obstruction of fish passage, reduced flow that may be harmful to aquatic life, and entrainment or impingement of fish on fish screens.	of the Emergency Response Plan, in accordance with the Canadian Aviation Regulations (Section 2.3.2). • Spill kits will be available in key areas on site. • Domestic effluent will be treated to acceptable standards prior to release to the environment (construction camp, septic tank and field). • Preventive inspections will be conducted for fuel storage areas and supply vehicles, machinery, and worksite facilities with emergency kits for recovery of petroleum products and hazardous materials. • Environmental compliance monitoring will be conducted for construction works. • The FAFH Restricted Activity Period for any in-water work will be respected. Restricted Activity Periods refer to windows of time where certain species groups are more vulnerable due to seasonal behaviours, and in which mitigation measures should be implemented to ensure these groups are not adversely impacted by Project-related activities. Restricted Activity Periods, include: • Estuaries and main stems of scheduled salmon rivers (migrating period): May 1 to September 30. • Tributaries and headwaters of scheduled salmon rivers in Labrador (spawning, incubating, hatching period): September 15 to June 15. • Freshwater aquatic habitat offsetting will be conducted for impacts caused by construction of access road watercourse crossings, as required. • Fisheries and Oceans Canada's Interim Code of Practice: End-of-Pipe Fish Protection Screens for Small Water Intakes in Freshwater (2020) notes that water withdrawal should be planned with consideration for maintenance of downstream flows and intakes will be equipped with fish screens (screening, netting or mesh) designed and installed in such a manner as to prevent potential losses of fish due to entrainment or impingement.
Operation: Water and waste management and treatment	Release of untreated wastewater or improper management of wastes could reduce surface water quality and impact freshwater fish populations and/or marine aquatic life.	

6.9 Human Environment

The Project will interact with several key Human Environment aspects in Nain. The key considerations in this section are supported and validated by stakeholders from Nain, to identify valued components align

with community priorities for the Project. Key considerations within the Human Environment includes the way individuals travel and stay connected with others, emergency preparedness and healthcare access, food security, and broad airport logistics including how individuals will work at and use the airport.

This assessment investigated key aspects of the Project to understand how it impacts the local community. Evidence was gathered through desktop searches and community interviews to analyze existing conditions. These conditions were then compared with the expected changes from the improved airport infrastructure to see if they would have positive, neutral, or negative effects. Table 6.9-1 summarizes the evidence supporting these effects. The following sections will further describe the potential effects of the Project in more detail and discuss ways to address concerns raised.

Table 6.9-1: Overview of Potential Project Impacts on the Human Environment

Valued Component	Potential Effects		
	Baseline Condition	Future with New Airport	Supporting Evidence
	Negative −	Neutral ●	Positive +
Travel and Connectivity			
Flight Reliability	−	+	The new airport location and infrastructure upgrades proposed for the Project provide a unique advantage of accommodating 24-hour flights due to increased space and apron. This means improved reliability and reduced downtime, resulting in increased efficiency.
Commutable Employment Opportunities	●	+	Community members note that improved flight reliability would enable them to fly to additional employment opportunities.
Delivery of Goods and Services	−	+	Deliveries are often delayed in transit. Perishable goods often expire in transit due to landing delays at the current airstrip. More reliability of flights shortens shipping times.
Emergency Preparedness			
Health Service Access	−	+	Community members cite having to wait multiple days for healthcare evacuations due to flight delays. More reliable service, less influenced by adverse weather, shortens this wait.
Emergency Evacuation	−	+	Existing infrastructure conditions prevent planes from landing at night (e.g. no lights on the strip). New airport would have night landing infrastructure.
Food Security			
Grocery Store Availability	●	+	Larger planes and less delays may enable more frequent grocery deliveries. Onsite airport storage may improve availability in the region.
Cold and Dry Food Storage	●	+	Improved infrastucture at the airport will enable cold and dry food storage.
Airport Logistics			
Safety of Travel to Airport	●	●	Proposed access road is further from community and will require vehicle access. Road is located near avalanche risk areas but mitigation measures limit risk.
Employment Opportunities	●	+	Proposed airport construction and operations would generate new employment opportunities. Potential for entreprenuership tied to the airport (e.g. shuttle).
Human Health Impacts			
Community Health and Well-being	−	+	Airport activities can impact air quality, water quality, noise, and vibration. By relocating the airport outside of the community, impacts on residents may improve. Construction may result in additional temporary negative impacts on air quality.
Accidents and Malfunctions	−	+	Existing airstrip is degrading which may result in airstrip closures. The proximity from the community, altered flight path, and improved landing conditions may reduce likelihood of aviation incident in the community.

Relative to the baseline existing conditions with the current airstrip, the Project effectively pivots most negative conditions to positive outcomes. The following subsections detail the evidence, logic and rationale for this conclusion.

The plan for the new airport includes features, services, and infrastructure that address concerns about distance, food storage, emergency and healthcare access. These factors are described as “enabling considerations”.

6.9.1 Travel and Connectivity

The current airstrip in Nain has served as a crucial hub for regional travel and connectivity, albeit with concerns raised by community members regarding its reliability based on weather delays. Various factors, including the airport's location, infrastructure, and restriction on night flights, have contributed to frustrations stemming from flight delays within the community. These delays have repercussions on personal travel, connectivity, the perceived viability of commuting to work by air, and the timely delivery of goods and services.

The proposed Project is positioned to bring improved travel and connectivity reliability, increased import of goods and services, and local employment opportunities. Stakeholder consultations have indicated several key potential impacts, including:

- Enhanced flight reliability facilitated by the capacity for night flights, increased plane size, and reduced effects of crosswinds.
- Improved connectivity with neighboring Inuit territories, fostering greater social interaction and facilitating the exchange of country food resources among coastal communities.
- Potential for accessing temporary employment opportunities via air travel, which might otherwise be challenging to plan for due to flight cancellations.
- Streamlined import and export processes for goods and services, encompassing emergency repair supplies, medical resources, school staff, and more.

A more dependable airport infrastructure is anticipated to yield positive effects on community services and infrastructure, given that fixed-wing aircraft remain the primary and sole year-round mode of transportation. Community members have highlighted the challenges associated with air travel, characterized by frequent cancellations necessitating a high degree of flexibility, particularly for workers commuting to neighboring mines. Enhanced air service reliability is expected to facilitate access to temporary job opportunities via air travel, while also addressing challenges in maintaining connections with family members residing temporarily or permanently outside the community.

Moreover, the airport serves as the sole year-round conduit for importing fresh food and medical supplies. Community feedback has emphasized that reliability issues with flights often result in imported food arriving past its expiration date, leading to increased costs and heightened food waste. The proposed expansion of the new airport runway, with its increased length to accommodate larger aircraft, is positioned to reduce these challenges by ensuring timelier deliveries of essential goods.

6.9.2 Emergency Preparedness and Health Access

The existing airstrip infrastructure in Nain has played a vital role in facilitating healthcare access outside the community, primarily by transporting medical personnel, such as doctors and dentists, and by facilitating patient travel to other regions for treatment. However, operational limitations of the current airstrip infrastructure have resulted in delays for community members seeking essential services. Nighttime flight restrictions and adverse weather conditions near the site frequently impede aircraft operations, leading to prolonged wait times for emergency medical evacuations.

The Project offers important improvements in access to healthcare services that would not be realized with the existing airstrip. Community members stand to benefit from enhanced access to healthcare services, particularly during emergency situations. Improved airport reliability is expected to expedite

evacuation procedures, potentially leading to better health outcomes for residents. Emergency evacuations may also become more efficient in scenarios such as large-scale fires within the community.

Community feedback has highlighted several positive outcomes for emergency preparedness resulting from the Project:

- Enhanced flying conditions, attributed to the airport's strategic location, may facilitate swifter emergency evacuations.
- The ability to conduct nighttime flights could expedite evacuation processes during nocturnal emergencies.

However, community members have also raised concerns regarding potential drawbacks associated with the new airport location, particularly regarding healthcare access:

- Increased travel distance to reach the airport may deter some individuals from attending regularly scheduled medical appointments, especially those lacking access to private transportation.
- Individuals may consider walking to the airport, which can be a dangerous path to travel by foot.

Despite the anticipated benefits of improved airport reliability bolstering community resilience and response to emergencies, mitigation measures need to be considered to support continued accessibility of the airport to residents, to prevent potential negative impacts.

6.9.2.1 Enabling Considerations

Community members have expressed apprehension regarding the distance to the airport, citing it as a potential deterrent for residents contemplating travel. This concern is driven by the limited availability of transportation options for many residents.

To address these concerns and support the accessibility of air travel, a regularly scheduled shuttle service will be available, providing transportation to and from the airport for all residents. This initiative, proposed by the Nunatsiavut Government, aims to mitigate transportation-related obstacles, promoting safe and direct access to airport facilities for all community members.

6.9.3 Food Security

The existing airstrip infrastructure plays a crucial role in facilitating food security in Nain. Community members emphasize that virtually all perishable food items, such as fruits, vegetables, dairy, and eggs, are imported by air throughout the year. Maintaining connectivity through the airport is imperative to ensure that grocery stores are adequately stocked to meet the nutritional requirements of the population. However, the reliability of air travel leads to uncertainties regarding the timely delivery of food supplies. Frequent instances of planes being unable to land exacerbate food security concerns, resulting in spoilage of perishable goods before reaching the community.

Community members noted several potential benefits of the proposed Project:

- Possibility that the grocery store availability improves, in quality, diversity, and quantity, by increasing the reliability of flights into the community, and potentially flying larger aircrafts with additional capacity.
- Flight reliability at the existing airstrip creates additional food waste due to extended travel delays. Often expired food is sold at a discount in the community, though it is not preferred. Improved reliability could lead to less food waste and improved food quality.
- Improved food storage capacity at the airport may result in improved availability of food within the community, especially during weather events that prevent travel.

Despite the current airstrip’s role in food importation, its degradation due to flooding and climate change calls for its replacement to maintain food security. Project enhancements could also reduce food waste, cut costs, and improve food availability and quality. By expanding food storage, the community could better withstand flight disruptions during extreme weather.

6.9.3.1 Enabling Considerations

Ensuring the continued operation of the existing airstrip is imperative until the new airport can match or exceed its flight capacity. The maintenance of airport infrastructure is paramount for safeguarding food security in the area.

The addition of food storage facilities, including cold storage and dry storage, will be proposed for the Project to improve food security conditions in the region.

6.9.4 Airport Logistics

The current airstrip, situated within the community, supports convenient access for all community members. It is evident that the maintenance of airport infrastructure in the Nain region is vital for sustaining the continuous delivery of goods and services and enhancing overall community resilience. However, potential negative externalities associated with the new airport location warrant consideration.

Community stakeholders have highlighted several concerns regarding the broader logistics of the proposed airport:

- Safety considerations pertaining to travel to the Project location are paramount among community concerns. The proximity of the access road to avalanche-prone areas has prompted concerns regarding travel safety, prompting calls for additional safety measures to mitigate associated risks effectively.
- The extended travel distance required to reach the airport exceeds that of the existing airstrip infrastructure in the region by a significant margin. This disparity in proximity may dissuade individuals from utilizing the proposed airport due to perceived inconveniences associated with increased travel distance.
- Potential impacts of transient workers within the community, including impacts to women and girls.

The potential impacts of construction on a remote Indigenous community, particularly regarding transient workers, are complex and require careful consideration. One major concern is the risk of gender-based violence, which disproportionately affects women and girls in such communities. To mitigate these risks, implementing a totally autonomous construction camp is proposed, aiming to minimize interaction between transient workers and the local population. This approach seeks to create a safer environment for community members, reducing the likelihood of incidents. Additionally, imposing restrictions on alcohol and other substances can further minimize the potential for escalated situations. Furthermore, there's a risk of cultural insensitivity from transient workers, highlighting the importance of cultural awareness and sensitivity training to promote interactions between workers and the Indigenous community that are respectful and harmonious. Overall, these measures aim to address the unique challenges posed by construction activities in remote Indigenous communities and prioritize the safety and well-being of their residents.

The relocation of the airport involves increased travel times for access, potentially eliciting negative perceptions within the community. Nevertheless, community members acknowledge the significance of maintaining access to air travel. Additionally, they have identified several positive impacts associated with the construction of the Project:

- The need for 24/7 maintenance for the Project presents opportunities for additional employment.
- Community members envision the potential for establishing small businesses within the airport premises, such as coffee shops or food vendors. Furthermore, the requirement for an airport shuttle service may foster entrepreneurship within the region.
- The construction phase of the Project may prioritize employing residents, thus generating temporary construction employment opportunities.
- Post-construction, the Project is anticipated to place reduced strain on community infrastructure compared to the existing airstrip. The Project will be less reliant on community services and infrastructure, boasting its own power supply, water supply, and energy generation systems.

The Project holds significant promise for the Nain community, offering opportunities for economic growth, employment generation, and enhanced infrastructure. The establishment of the new airport presents avenues for entrepreneurship, increased accessibility to air travel, and reduced strain on community resources post-construction. However, it is imperative to address and mitigate the potential negative impacts associated with the Project, particularly regarding safety concerns and increased travel distance. By carefully navigating these challenges and leveraging the Project's positive aspects, the overall effect of the Project can be optimized to promote long-term prosperity and resilience within the community.

6.9.4.1 Enabling Considerations

To successfully relocate the airport away from the community, prioritizing the safety and convenience of accessing the Project is paramount. This necessitates comprehensive deliberation on access road safety, where numerous mitigation measures have been proposed to safeguard travelers.

Proposed access road considerations include:

- A shuttle service will be provided from Nain to and from the airport to support the continued accessibility of air transport.
- The access road route has been selected to avoid steep slopes and narrow passes wherever possible. It will be designed for existing conditions using wind and snow deposition modelling to predict avalanche locations so these areas may be avoided.
- The sides of the road will be terraced and specialized infrastructure will be installed around known avalanche areas (i.e., pass through Mount Sophie) to reduce potential for snow avalanches.
- Speed limits will be controlled to reduce the potential of wildlife collisions or accidents due to vehicular circulation along the access road.

The construction of large infrastructure developments can create increased demand for services and infrastructure. To prevent effects from an influx of individuals in the community relying on resources, it is important for the Project to be self-contained to the extent possible. This includes providing all the necessary resources for construction staff. To mitigate the effect of an increased population during construction, the following mitigation measures are proposed:

- Project construction will be self-contained in terms of water supply, wastewater, energy, worker accommodations and services (i.e., use of a construction camp to the extent practical), including housing, food services and basic medical services.
- During construction, solid waste will be separated for reuse, recycling and / or disposal at an approved site with suitable facilities and programs.
- Further Project planning and evaluation will determine best methods of transporting workers to limit impacts on community transportation.
- During operations, the airport will also be self-contained in terms of water supply, wastewater and energy.

6.9.5 Land and Resource Use

Developments have the potential to result in land use conflicts where resources overlap with lands used for traditional purposes by Indigenous Peoples and / or used by residents.

The Project will result in changes in the landscape and access. Construction will result in direct disturbance to natural areas, leading to the loss (quantity / quality) of available resources (e.g., vegetation, wildlife habitat) related to land use activities, such as hunting, trapping and traditional plant gathering. Airport operation (e.g., vehicular traffic, aircraft noise) may also displace wildlife and further affect hunting and trapping in the area. Development of the access road will extend all-weather access into previously remote areas west of Nain; this may benefit land users who use conventional vehicles. However, the improvement in access may lead to an increase in land use activities in these areas, which

may reduce resources and negatively affect current users. Some residents have expressed concerns that increased access may result in break-ins at camps.

A land use study led by the NLNR will seek information from Labrador Inuit / Nain residents on land use activities within the broader region surrounding the Project. Information obtained from this study will be used to further refine understanding of potential Project effects and identify mitigation measures. In addition, data have been requested from the NLNR on the location of Aullâsimavet (leased to Nunatsiavut Beneficiaries through the *Labrador Inuit Land Titles Act*) for identification of these locations.

6.9.5.1.1 Mitigation Measures

- Project components have been, and will continue to be, sited to avoid where possible features known to be environmental sensitive and / or of cultural importance to the Inuit.
- Mitigation measures for Project effects on resources related to land use activities, such as vegetation, wildlife, fish and fish habitat, are described above.
- The Project will be developed in accordance with NG regulations and any applicable local and provincial land use regulations.

6.9.6 Community Health and Well-being

The Project will be less convenient to access from Nain, but the location will serve to reduce potential adverse effects (e.g., noise, air quality) on the community. The establishment of the Project carries the potential for generating waste products or emissions that may pose environmental hazards and impact human health and well-being. Information collected from biophysical and human environment components will be leveraged to assess the likelihood of such impacts, including the identification of potential exposure pathways and receptors.

Table 6.9-2 describes the potential determinants for human health and well-being impacts, including baseline conditions and potential Project effects.

The air quality assessment predicted air quality concentrations of specific pollutants associated with construction and operations. These pollutants represent the effects of fuel combustion from aviation, diesel and gasoline powered vehicles and the effects of fugitive dust which are most prevalent during short-term construction of the airport and access road. Air quality standards are established by federal and provincial agencies and are designed to be protective of human health and the environment. A summary of potential health effects of these pollutants are as follows:

- According to ECCC, in sufficiently high concentrations, SO_2 and NO_2 can irritate the lungs, reduce lung function, and aggravate respiratory conditions especially in people with asthma. Long-term exposure to NO_2 may lead to the development of allergies and asthma and can cause adverse health effects at low concentrations. Both SO_2 and NO_2 can contribute to odours.
- The most common effects of CO exposure are fatigue, headaches, confusion, and dizziness due to inadequate oxygen delivery to the brain.
- Exposure to $PM_{2.5}$ can lead to onset or development of respiratory and cardiovascular adverse effects, such as asthma attacks, chronic bronchitis, heart attacks and may lead to the development of lung cancer. $PM_{2.5}$ is largely emitted by vehicle exhaust.
- PM_{10} and TSP are largely the result of mechanical dust generation during construction or travel on the access road. $PM_{2.5}$ is a better indicator of health effects than PM_{10}. TSP is largely an indicator of nuisance dusting on nearby surfaces.
- Benzene and benzo(a)pyrene are components of diesel exhaust. According to the CDC, people who breathe in high levels of benzene may develop the following signs and symptoms within minutes to several hours: drowsiness, dizziness, rapid or irregular heartbeat, headaches, tremors, confusion, unconsciousness or even death (at very high levels). Long-term exposure (years) to high concentrations of benzene can lead to cancer. Benzo(a)pyrene is a probable cancer-causing agent in humans.

Table 6.9-2: Community Health and Well-being Determinants, Baseline, and Potential Project Effects

Determinant	Baseline	Project Activity	Potential Effects	Comment	Mitigation Measures
Air Quality	Proposed site location is currently an undisturbed northern environment	Construction: site preparation, construction of infrastructure, vehicle and heavy machinery use Operation: operation of airport and runway, and use and maintenance of the access road.	Dust and other emissions during construction activities and operation of the airport have the potential to affect air quality. Deposition of airborne particles can impact vegetation, soil and surface water quality which in turn can impact country foods.	As the airport location is more remote from the community, air quality impacts from the operation of the airport are potentially reduced. Based on information obtained to date, the nearest residential receptor is approximately 1,000 m from the airport.	Dust suppression measures will be implemented during construction and operation, including application of a gravel stabilizing agent, and use of water trucks as required.
Drinking Water Quality and Recreational Water Quality	Main drinking water source is Trouser Lake, which is outside the Project Area and biophysical study areas. Based on conversations with community members, Annainak's Brook is also a local drinking water source. The existing road crossing of this watercourse will be used by the Project.	Construction: site preparation, construction of infrastructure, vehicle and heavy machinery use Operation: operation of airport and runway, and use and maintenance of the access road.	Impacts from deposition of particles associated with air quality as well as impacts from spills or leaks directly into the surface water environment can impact surface water quality which in turn will impact country foods.	Once surface water is impacted, there is the potential for migration either into the groundwater or through the surface water system resulting in more wide spread impacts.	Upgrades to the watercourse crossing at Annainak's Brook will be avoided to mitigate impacts on the drinking water source. Machinery and vehicles will be used that minimize air emissions (e.g., low fuel consumption) according to the latest ECCC standards, or zero-emission vehicles (for on-road and off-road vehicles). Inspections of vehicles and machinery will be performed to ensure good operational condition.
Noise, vibration and light	Proposed site location is currently an undisturbed northern environment	Construction: site preparation, construction of infrastructure, vehicle and heavy machinery use Operation: operation of airport and runway, and use and maintenance of the access road.	The addition of noise, vibration and/or light effects to the environment can have effects on human receptors near to the new airport.	As the airport location is more remote from the community, noise, vibration and light impacts from the operation of the airport are potentially reduced. Based on information obtained to date, the nearest residential receptor is approximately 1,000 m from the airport.	Noise modelling using Project design inputs will be conducted to determine noise levels at identified residential receptors near the Project. Inspections of vehicles and machinery will be performed to ensure good operational condition. Design of facility buildings will adopt applicable noise criteria, including various mitigation measures such as: low noise specifications noise enclosures or silencers for mechanical equipment scheduling operations (standby power testing, waste disposal) to daytime. site planning – use airport buildings as shielding for noise emissions.

6.9.7 Accidents and Malfunctions

The Project will serve to reduce the likelihood of an aviation incident in the community, driven by the new location away from the community. Damage from sea level rise and storm surges on the existing air strip pose additional threats in the community. The timely development of the Project may also eliminate the potential of airstrip delays and closure, as the existing airstrip continues to degrade.

Table 6.9-3 presents examples of type of accidents and malfunctions that may be anticipated for the new airport and the potential to impact human health. Further consideration of these will be addressed during future Project design phases and leading up to construction, when an Emergency Response Plan will be developed in accordance with the relevant Acts and Regulations.

Table 6.9-3: Potential Accidents and Impact on Community Well-being

Project Activity	Potential Accident	Potentially Impacted Biophysical Environment	Potential Contaminants of Concern	Potential Impacts to Human Health	Mitigation Measures
Operations: Operation of the airport and runway	Plane crash	Soil, Surface Water, Air, Sediment, Groundwater	Petroleum Hydrocarbons, Combustion Byproducts	Potential for widespread impacts to surface water, surficial soils and country foods; access to emergency response and medical services.	• The establishment of the airport at its designated location will effectively address community safety concerns associated with aircraft take-off and landing procedures. By relocating aircraft operations away from the vicinity of the community, the new airport configuration supports a safer environment for residents. This strategic relocation not only mitigates potential safety risks posed by aircraft activities but also enhances overall safety standards within the community. • The Airport will be fenced for aviation and public safety purposes in accordance with TC's Aerodromes Standards and Recommended Practices – TP 312 to minimize incidents with residents. • Firefighting equipment and suppression water will be kept on site in accordance with the CAR (Section 2.3.2). • Construction and operation of airports in Canada is guided by TC
Construction: Vehicle and heavy machinery transportation, use and maintenance of equipment **Operations:** Use and maintenance of the access road	Tanker Spill land or water	Soil, Surface Water, Air, Sediment, Groundwater	Petroleum Hydrocarbons	Potential for immediate localized impacts to surface water and surficial soils followed by impacts to groundwater and deeper soils. Potential for illness in exposed population.	
Construction: Construction of infrastructure including temporary and permanent facilities Operations: Operation of the airport and runway	Tank or Fuel Spill	Soil, Surface Water, Air, Sediment, Groundwater	Petroleum Hydrocarbons	Potential for immediate localized impacts to surface water and surficial soils followed by impacts to groundwater and deeper soils.	
Operations: Operation of the airport and runway	Aircraft Fire	Soil, Surface Water, Air, Sediment, Groundwater	Foam Components, Combustion Byproducts	Potential for widespread impacts to surface water, surficial soils and country foods; access to emergency response and medical services.	
Operations: Operation of the airport and runway	Glycol Pad Malfunction	Soil, Surface Water, Air, Sediment, Groundwater	Glycols	Potential for immediate localized impacts to surface water and surficial soils followed by impacts to groundwater and deeper soils. Potential for impact to surface water and groundwater used for drinking water.	
Operations: Operation of the airport and runway	Glycol spill (De-icing)	Soil, Surface Water, Air, Sediment, Groundwater	Glycols	Potential for immediate localized impacts to surface water and surficial soils followed by impacts to groundwater and deeper soils. Potential for impact to	

Project Activity	Potential Accident	Potentially Impacted Biophysical Environment	Potential Contaminants of Concern	Potential Impacts to Human Health	Mitigation Measures
				surface water and groundwater used for drinking water.	through its construction and certification standards. Each airport is required to have an Airport Operations Manual, which identifies the airport, dimensions of runways, buildings, lighting, training requirements, quality assurance system and procedures with references to detailed manuals as applicable. • Appropriate regulations, guidelines and proposed Project approvals will be complied with, including treatment of contaminated water to approved discharge limits. • Fuel storage and handling guidelines and best practices will be complied with, including personnel training, storage setbacks, secondary containment, and regular storage inspection. • All fuelling, servicing and staging of machines will be restricted to designated areas. • Regular inspections of all machinery will be performed to reduce the risk of a spill by identifying and correcting potential equipment failures.
Operations: Waste and wastewater management and treatment	Sanitary sewer release	Soil, Surface Water, Air, Sediment, Groundwater	Fecal Coliforms, Escherichia coli, Enterococci, Pseudomonas aeruginosa	Potential for immediate localized impacts to surface water and surficial soils followed by impacts to groundwater and deeper soils. Potential for impact to surface water and groundwater used for drinking water.	
Operations: Use and maintenance of the access road	Vehicle fuel spill	Drinking water supply and quality	Chemical and biological contaminants	Illness or other health effects, lack of access to safe drinking water, and need for alternative source water supply. Access to emergency and medical services.	

Project Activity	Potential Accident	Potentially Impacted Biophysical Environment	Potential Contaminants of Concern	Potential Impacts to Human Health	Mitigation Measures
					• Aircraft re-fueling and de-icing areas will be concrete pads with a subsurface geosynthetic membrane to prevent infiltration of potential spills. These areas will have drains and sumps to contain spilled fuel and glycol for collection and disposal offsite. • A spill contingency plan will be developed and implemented as part of the Emergency Response Plan, in accordance with the Canadian Aviation Regulations (Section 2.3.2). • Spill kits will be available in key areas on site. • Domestic effluent will be treated to acceptable standards prior to release to the environment (construction camp, septic tank and field). • Preventive inspections will be conducted for fuel storage areas and supply vehicles, machinery, and worksite facilities with emergency kits for recovery of petroleum products and hazardous materials.

6.9.8 Physical and Cultural Heritage

A stage 2 AA (AECOM 2024) was conducted for the Project footprint and submitted to Nunatsiavut Department of Language, Culture, and Tourism under the *Historical Resources Act* (RSNL 1990, C H-04 and the Labrador Inuit Land Claims Agreement (SNL 2004, C L-3.1). One site (HdCk-47) was confirmed within the Project footprint, and based on this information the access road was slightly rerouted to avoid the site. During construction the site area will be fenced and buffered by 30 m to avoid potential impacts.

A Project-specific “Chance Find Protocol" will be prepared and implemented in case that archaeological or contemporary land use sites, not previously identified, are discovered during Project construction. The protocol will include instructions for Project personnel such as:

- Do not disturb the site in any manner;
- Report the site to the site supervisor;
- Report and provide to your supervisor the location, a description of the artifact or features, photos (i.e. general views, close ups, different angles, and items for scale), and GPS recording of location if possible;
- The supervisor will then report the discovery to the Project archaeologist who may then notify the Nunatsiavut Heritage Division;
- All construction personnel will await further instruction. The Project Archaeologist or staff of the Nunatsiavut Heritage Division may need to visit the site and document and recover the item (s);
- If grave site or human remains are encountered, immediately stop work and report it your manager.

7. Cumulative Effects

Cumulative effects result from the combined effects of a project and those of other activities (past, current or future) occurring in the same spatial and temporal boundaries. Potential cumulative effects could include: combined emissions/noise effects that cumulatively exceed thresholds, multiple project land disturbances interact which impact vegetation communities and wildlife habitat, and overlapping construction periods put pressure on the local community's services and infrastructure. The airport is expected to be under construction in 2027 and commissioned by the end of 2030. The airport is anticipated to operate for at least 50 years and remain in operation indefinitely with upgrades and renovations as required. Table 7.0-1 provides a list of known projects in the Nain region that could interact with the Project.

Table 7.0-1: Projects with the Potential for Cumulative Effects with the Project

Project	Location	Phase and Timeline	Description	Potential for Cumulative Effect
Vale NL Mine (CMJ 2021)	Voisey's Bay	Operations: 2005-2034	Operating mine site in the Voisey's Bay Area	Vale NL Mine is over 20 km to the southwest of the Project. Potential for minor cumulative increases in maritime vessel traffic.
Nain Wind Micro-Grid (Natural Forces 2023)	Nain	Construction : 2024-2026 Operations: 2026-2056	One to two turbine, 2.3 to 4.6 MW wind power project with battery storage.	Construction of the wind power project is due to begin in 2024, limiting the potential for construction workforce overlap. Terrestrial disturbance from the Project footprint will not occur in Nain (starting at quarries to the south of Nain), and potential for footprint overlap or interaction with the wind project is not expected.
Strange Lake Rare Earth Project: Mine Road (Torngat Metals 2023)	Voisey's Bay or Annaktalak Bay	Pre-feasibility study stage	Construction of a road from the mine site port facilities in either Voisey's Bay or Anaktalak Bay (multiple options being considered)	Both options are over 20 km to the southwest of the Project, and will not physically interact with the Project. Potential for strain on available workforce personnel due to overlapping construction schedules. Potential for minor cumulative increases in maritime vessel traffic.
Road to Northern Labrador (Government of NL. 2023b)	Central Labrador to Nain	Pre-feasibility study stage	Road connecting Happy Valley Goose Bay with northern communities, including potentially Nain	Road planning is still in pre-feasibility stage, and construction scheduling is unknown. Potential for overlapping construction timeframes is low. Both projects would be beneficial for increasing access to the community
Nain quarry development	South of Nain	Ongoing	Aggregate quarries are being developed to the south of Nain	Project access road route selection has been selected to avoid future quarry development (based on available plans). Project aggregate and fill requirements will be met from on-site rock blasting, and will not use local quarries which may impact local community use.

Based on Table 7.0-1, there are limited identified potential cumulative effects as a result of the Project. Development of projects in the region with roughly the same construction timeframes may lead to increased maritime vessel traffic, particularly if equipment and materials are travelling from the same location. Overall, the development of the Project is expected to support other projects in the region by providing a more reliable source of air travel.

8. Conclusion

Air travel to and from Nain is critical for connecting the community to the rest of the world; it facilitates movement of food, medical supplies and other essential goods, maintains community access to necessary services such as healthcare and emergency services, and helps to maintain in-person contact with family and friends. The current Nain airstrip is inadequate due to its location and alignment. Issues from climate change (i.e., sea storm surges inundating the airstrip) result in erosion that presents risk the airstrip could become unusable on a short- or long-term basis.

Additionally, the New Nain airport will serve as a strategic mobilization point for the various exploration and mining projects in the future. Travel of staff for this regional development necessarily involves the use of air transport.

Development of the Project will provide Nain the critical infrastructure it needs to maintain and grow the community. A new, larger airport in a more advantageous position will:

- Remove surrounding mountains which allows for safer aircraft approaches
- Accommodate Simplified Short Approach Lighting System with Runway Alignment Indicator Lights (SSALR) which will allow for night flights
- Meet the requirements for instrument-based aircraft approaches, which will provide for more consistent and safer landings during inclement weather
- Allow for flexibility to use larger aircraft if needed

Given these characteristics the Project will increase the reliability of flights to Nain significantly, which will alleviate many of the concerns expressed by the community related to food security and medical evacuation capability.

Baseline environmental conditions have been characterized for the biophysical and human environment for within established study areas for each component. Project activities during construction and operation were evaluated to understand their potential of affecting baseline conditions. Decommissioning of the Project is not currently planned, and was therefore not considered in the evaluation of potential Project effects. A summary of the main identified effects are as follows:

- An environmental review was conducted in advance of road route selection. Identified archaeological sites were avoided and set back from the Project footprint, and potential permafrost areas and watercourse crossings were avoided to the extent practical.
- The airport will have similar air and noise emissions as the current airstrip. In general, the re-location of the airport 12 km away from Nain will reduce the air quality and noise impacts from airport operation on human receptors (e.g., residences).
- The access road will cross Kauk Brook, which is a key Arctic char fishing area for the community. A modular, clear-span bridge will be installed at the crossing location which will represent the lowest potential disturbance to fish habitat in Kauk Brook, and allow for complete fish passage. An aquatics monitoring program will be implemented during construction to identify and respond in the event of a sediment release. Operational monitoring of watercourse crossings may also be considered to maintain the aquatic environment.
- The main option being considered for airport potable water is Kauk Brook. An intake and pipeline that follows the proposed access road corridor would be constructed to convey water to the airport. Preliminary analysis indicates Project peak hour water demand will be a fraction (0.1%) of Kauk Brook's 0.25 mean annual discharge.
- The new airport location to the west of Nain will require a 12 km access road, portions of which will be through steep terrain with rock fall and avalanche hazards. An evaluation of the road route at each of these areas will be conducted before construction, and protective measures such as energy barriers and rockfall netting will be considered for installation to reduce safety hazards.

Further environmental and regulatory permits will be obtained as Project design progresses. A regional Land Use Study conducted by the NLNR will also be reviewed and incorporated into Project planning.

Overall, the identified environmental and socio-economic effects will be mitigated through the site selection process by avoiding sensitive areas where practical and adheres to regulatory requirements. As such, based on the environmental and socio-economic perspective this Project is feasible and should proceed with the mitigation measures and best practices during the construction and operations phases of this Project.

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Appendix A

Supporting Regulatory Documents

Project activities have the potential to affect wildlife and migratory birds both directly and indirectly. Project effects may be temporary or permanent in nature as there are no plans to decommission the airport. This discussion is focussed on VCs selected to be representative of broader groups of wildlife. VCs are identified with consideration from Indigenous communities, federal, provincial, territorial, or municipal authorities or entities, and the public. The preliminary list of VCs for wildlife include:

- Red-necked phalarope
- Peregrine falcon
- Short-eared owl
- Spruce grouse
- Rusty blackbird
- Gray-cheeked thrush
- Little brown myotis
- Northern myotis
- Polar bear
- Eastern migratory caribou

Potential effects on wildlife VCs may occur during Project construction and operations. Project-related effects to migratory birds are possible via several pathways, including:

- Reduction in the type and extent of habitats and habitat fragmentation;
- Bird strikes, vehicle collisions, incidental take, increased hunting; and
- Disturbance from human activity, noise and light pollution

Habitat loss occurs when infrastructure is constructed within previously undisturbed areas, destroying, fragmenting or degrading the habitat of flora and fauna. Habitat fragmentation occurs when a larger area of habitat is divided by roads, fencing or other infrastructure, creating barriers to foraging and migration. Habitat degradation reduces the attractiveness of the habitat for migratory birds and may result from the removal of wetlands or vegetation, the introduction of invasive species, or contamination of surface water, sediment or soil. Habitat loss and fragmentation cannot be fully mitigated as the airport and access road will be permanent. To reduce effects of habitat loss, the airport footprint will be minimized to the extent possible (Table 6). Temporary footprint areas (e.g., camps and quarries), will be reclaimed as soon as possible once construction is complete. The Project is in a remote location with no other disturbances currently on the landscape. Habitat availability is not a limiting factor for most species of wildlife in the area, including the VCs selected for the assessment. Based on a preliminary review of habitat availability and Project details, impacts on wildlife due to habitat loss and fragmentation are anticipated to be negligible.

Project-related noise may result in reduced habitat effectiveness for migratory birds adjacent to the airport and during construction. Studies indicate negative responses by some songbirds to anthropogenic noise (Bayne et al. 2008; Brumm 2004; Habib et al. 2007; Slabbekoorn and Peet 2003; Swaddle and Page 2007). The specific intensity threshold at which noise affects songbirds is unknown, although a study by Bayne et al. (2008) indicated that one third of species were significantly affected at noise levels averaging 48 dBA near a source of chronic noise. Infrequent or periodic noise may have lesser effects. Another study suggested that sound levels above 50 dBA may impact songbirds (Kaseloo 2005) and Environment and Climate Change Canada (2023) indicates that noise levels greater than 50 dBA or 10 dBA above ambient levels can negatively affect birds. During construction, localized noise levels may exceed 50 dBA in the medium term and it's possible that some bird species may avoid areas adjacent to high levels of noise. However, this effect is medium term (e.g., occurs during construction) and will not affect all migratory birds to the same extent. Similarly, the low frequency of flights arriving at the airport and operations of the airport are not anticipated to alter use of adjacent habitat by most species of migratory birds. Once construction is complete, it is expected that migratory birds will continue to use habitat adjacent to the airport and access road and residual effects are predicted to be negligible. Mitigation measures to reduce potential effects of noise are provided in Table 6.

Increased light levels due to the Project may result in reduced habitat effectiveness adjacent to facilities for migratory birds and may also affect birds during migration as they may be disoriented by lights (Longcore and Rich 2004; Navara and Nelson

2007; Poot et al. 2008). Lighting will be required for construction purposes; it will be directed away from the sky and activated only during working hours when there is insufficient daylight (early morning and evening). Airport operations must involve a minimum amount of lighting to adhere to Transport Canada regulations. Approach and runway lighting will only be activated when an aircraft is approaching and departing. Buildings and other obstructions will have red lights as per aviation standards. All operational lighting will be directed downwards in compliance with regulations which will reduce potential effects on migratory birds. Additional mitigation measures for light effects are provided in Table 6. With the mitigation measures implemented, residual effects as a result of light on migratory birds are expected to be minimized and negligible.

Aircraft operation may result in bird strikes during take-off and landing and collisions with construction and operations traffic on the access road may occur. Approximately 85% of bird strikes involve aircraft below 800 ft and up to 40% of bird strikes take place beyond the airport perimeter (CAA 2001). Collisions with vehicles may occur; however, collisions tend to occur on roads with high levels of traffic. The airport will be required to develop a Wildlife Management Plan as per Transport Canada regulations (GoC 2024a). The airport will also consider mitigation and guidelines documented in the *Sharing the Skies - Guide to Management of Wildlife Hazards – TP 13549* (GoC 2024b). The access road will have posted speed limits during construction and operations and traffic is expected to be low during operations (e.g., 100 vehicles per day) reducing the potential for collisions with vehicles. With the recommended airport guidelines implemented, low frequency of aircraft landing at the airport, low vehicle traffic and speed limits on the access road, impacts from aircraft and vehicle collisions are expected to be negligible.

Of the VCs, red-necked phalarope, peregrine falcon and short-eared owl were not observed nesting in the LSA and RSA. Polar bears appear to occur infrequently in the area and based on discussions with a local hunter, are typically found further north. Eastern migratory caribou are also infrequently observed in the area around Nain and are typically found further north. Potential effects on these species, therefore, are anticipated to be negligible. Potential effects on the remaining VCs (spruce grouse, rusty blackbird, gray-cheeked thrush, little brown myotis and northern myotis) are also anticipated to be negligible as the loss of habitat is expected to be low relative to habitat available for these species in the RSA and potential effects of mortality and sensory disturbance are also predicted to be negligible.

Table 6: Potential Project Effects on Wildlife and Migratory Birds

Project Activity	Project Effect	Mitigation Measures
Construction: Site preparation (e.g., vegetation clearing, soil stripping, excavation, rock blasting)	• Tree and vegetation clearing can lead to: o Reduction in wildlife habitat availability resulting from habitat loss and fragmentation, o Less habitat connectivity caused by barriers to wildlife movements; o Decreased wildlife populations resulting from increased levels of direct and indirect mortality risks; o Less wildlife diversity resulting from changes in wildlife habitat availability, reduced habitat patch size (e.g., effects of fragmentation), and changes in rare species occurrence.	• Project footprint will be minimized to the extent possible to reduce effects on habitat. • Vegetation disturbance will be minimized, as maintaining terrestrial, riparian and wetland ecosystems plays a role in supporting biodiversity, hydrology, wildlife habitats and traditional use of resources. • Activities will be suspended if caribou are observed within 500 m of work areas. Activity will resume once caribou have left the area. • Construction activities will be scheduled to avoid the ECCC D6 bird nesting period from 1 May to 15 August (GoC 2024c). • If clearing is required during the nesting period, non-intrusive pre-clearing nest surveys will occur within seven days of the clearing and no activity buffers will be established around each nest. • Speed limit will be imposed on the access road to reduce potential for wildlife collisions.
Construction: Construction of infrastructure including temporary and permanent facilities	• Construction of the access road will allow for public all-weather access to previously inaccessible areas; this may increase hunting pressures on wildlife and decrease populations	
Construction: Vehicle and heavy machinery transportation, use and maintenance of equipment	• Noise from vehicles and equipment can reduce habitat effectiveness in areas around the Project. • Construction-related light sources may reduce habitat effectiveness adjacent to facilities for migratory birds.	

Project Activity	Project Effect	Mitigation Measures
Operations: Operation of the airport and runway	• Noise from aircraft, vehicles, and equipment can reduce habitat effectiveness in areas around the airport and runway. • Use of facility lights and runway approach lighting can also lead to reduce habitat effectiveness in areas around the airport and runway. • Both of these effects can also lead to less wildlife diversity resulting from changes in wildlife habitat availability and changes in rare species occurrence.	• Develop and implement an Airport Wildlife Management Plan with consideration of guidelines provided by Transport Canada. • Bear management plan and garbage management plan will be implemented to minimize bear / human interactions. • Cross-road movements will be maintained during access road construction (e.g., provide breaks in any soil berms or slash pile rows). • Leave natural areas adjacent to Project development to reduce sensory disturbance effects to wildlife from light and allow passage of wildlife around the development. • Restrict construction traffic to designated areas. • Equipment will be fitted with factory-installed noise-reducing components, where feasible, and will be maintained. • Forest buffers will be retained around quarries to reduce noise, where feasible. • Multi-passenger vehicles (e.g., buses) will be used to transport workers to site when practicable. • Use fully shielded lights to illuminate required areas only. • Lower mast heights to reduce light emissions off site or away from target areas. • When using directional lights, ensure they are aimed at a target requiring this type of light and that they are fully shielded to prevent spill light. • Lighting required for construction and operations, including direction and timing will be controlled to avoid effects on migratory birds while meeting operational health and safety requirements.
Operations: Use and maintenance of the access road	• Reduction in wildlife habitat availability resulting from reduced habitat effectiveness (e.g., from noise, human presence); • Vehicles travelling the access road Less habitat connectivity caused by barriers to wildlife movements; • Potential for aircraft and vehicle collisions along the access can increase mortality risk and decrease wildlife populations	

18. Need for information on baseline conditions for terrestrial species at risk (birds, caribou, bats), such as species distribution, habitat availability and use, and annual/seasonal variation of species that are known or have the potential to occur in the project area. Also require information on the survey methodologies used to support the description of baseline conditions[5,6,7].

Response:

Methods for bird surveys are provided in Summary of Issues response #17.

In addition to surveys conducted for migratory birds, a bat acoustic survey was completed in 2022 and 2023. Information on other wildlife groups (e.g., caribou) were collected incidentally during other surveys. Anabat Swift Passive Detectors (Titley Scientific, Queensland, Australia) and omni-directional ultrasonic microphones (Model US-O V3) were used for bat acoustic surveys. Two bat detectors were deployed in foraging habitats (i.e., adjacent to wetlands, open water bodies) in the LSA in 2022 and six bat detectors were deployed in the LSA on June 4, 2023, near one potential maternity roost site, near four potential foraging areas, and near one travel and movement corridor.

The Québec standardized protocol (MELCCFP 2023) was used as a reference as the methods are applicable to the objectives of this Project. There are no specific protocols for bats from the federal or provincial government. Following the Québec standardized protocol (MELCCFP 2023), bat detectors were programmed to begin recording 30 minutes after sunset and record until 30 minutes before sunrise during the breeding period between June 15 and August 14, 2023 and during fall migration between August 15 and September 25, 2023 (MELCCFP 2023).

Bat acoustic data was recorded over 166 total detectors nights in 2022 and 504 total detectors nights in 2023: 104 and 312 detector nights during the breeding season and 62 and 192 detector nights during fall migration in 2022 and 2023. Four bat species were detected including the little brown myotis and northern myotis, which are provincially and federally Endangered, and eastern red bat and hoary bat. The eastern red bat is under consideration for Endangered status federally (GoC 2024d). The little brown myotis had the highest number of detections during the breeding season (1,707 passes) and fall migration (133 passes) followed by a myotis species. There was a relatively small number of detections of the northern myotis during the breeding season (18 passes) and fall migration (10 passes) and only a single detection of the hoary bat during fall migration. There was a relatively small number of detections of the eastern red bat during the breeding season (2 passes) and fall migration (3 passes) at both detectors.

Two avian species at risk (SAR) were observed during surveys completed in 2022 and 2023. One peregrine falcon (*anatum* subspecies - provincially Vulnerable, federally not at risk), was observed during bird migration surveys in 2023. There were no peregrine falcons observed during the summer avian survey and during helicopter flights near potential breeding sites on cliff faces suggesting that the species is not breeding in the LSA or RSA.

The rusty blackbird (Special Concern federally and Vulnerable provincially) was observed once during the breeding bird survey and incidentally at two locations. All three were observed in marsh/fen type habitat, typical for the rusty blackbird.

Eastern migratory caribou (provincially Threatened) tracks were detected at six locations, primarily at the west end of the access road and proposed airport location. Most of the tracks are in close proximity and may represent fewer than six animals. Consultation with Inuit has confirmed that caribou are rarely observed in the area over the past decade.

19. Need for a greater description of potential direct and indirect effects, mitigation measures, and potential residual effects on terrestrial species at risk known to or that have the potential to occur in the project area during all phases of the Project[5,6,7].

Response:

Five provincially or federally listed SAR were detected during various surveys conducted for the Project including the peregrine falcon, rusty blackbird, little brown myotis, northern myotis and eastern migratory caribou. The eastern red bat was detected in 2022. This species is currently under consideration for federal listing as Endangered. This is one of the first recorded observations of the eastern red bat in Newfoundland and Labrador.

The peregrine falcon was observed during the bird migration survey and no evidence of nesting was observed on potential cliff nesting habitat within or adjacent to the LSA during surveys completed during the breeding season. Potential effects of

noise and light on migratory birds and mitigation measures to reduce or eliminate potential effects is described in Summary of Issues response #17. Impacts on the peregrine falcon, including potential effects of noise and light, are expected to be negligible.

The rusty blackbird was observed at three locations during the summer avian survey in July 2023. All observations were within marsh/fen habitat. The most effective mitigation to reduce impacts to the rusty blackbird and other migratory birds is through timing restrictions on clearing activities (Table 6, Response #17). Clearing activities will be completed outside the breeding season for migratory birds between August 15 and May 1 (GoC 2024c) to the extent possible. Mitigation measures to reduce effects on wetlands, that will subsequently reduce effects on the rusty blackbird, are provided in response to #54 and Table 6 (Response #17). An example list of mitigation measures, including mitigation for light and noise, to reduce or eliminate effects on the rusty blackbird are provided in Table 6 (Response #17).

The little brown myotis and northern myotis were detected on bat detectors in 2022 and 2023. Important habitat for these species include maternity roost sites and winter hibernacula. Maternity sites typically consist of decayed trees with small cavities or peeling bark in trees usually found in large old-structured forests, but other habitats are used provided these trees are available. Hibernacula sites include features such as caves, abandoned mines, wells, cellars, and tunnels and is deemed critical habitat under the Recovery Strategy in Canada. There were no caves found during various fieldwork conducted for the Project. The entire access road alignment was walked during the summer avian survey and no caves were found indicating that winter hibernacula are likely not present. With mitigation measures, including mitigation for light and noise and clearing outside the bird nesting period, when bats will be present in the LSA, residual impacts on the little brown and northern myotis are expected to be negligible.

Few eastern migratory caribou were observed in the LSA during surveys conducted for the project and comments received to date from residents of Nain indicate that caribou are infrequently observed in the area. Caribou are more frequently observed north of Nain. With mitigation measures identified in Table 6, effects on eastern migratory caribou are anticipated to be negligible.

20. Importance of including Species at Risk Act (SARA) permitting to the list of potentially applicable federal legislation.

Response:

The Project is planned to be constructed in the Labrador Inuit Settlement Area (LISA) and on Labrador Inuit Lands (LIL) established by the Labrador Inuit Land Claims Agreement (LILCA). As the Project is not on federal land, the conditions of the *Species at Risk Act* (SARA) do not apply unless there is an emergency order for a species at risk. Currently, there are no emergency orders that would affect the Project. Aspects of SARA may apply if the Project is subject to a federally regulated environmental assessment under the IAA.

If permits are required, as stated under Section 73 of SARA, they will be applied for as needed. Currently, permits would be required if the Project has the potential to affect a listed species at risk. Federally listed species at risk observed in the LSA or which have the potential to occur in the LSA include the following:

- Barrow's goldeneye - Not detected in 2022 or 2023
- Harlequin duck – Not detected in 2022 or 2023
- Red-necked phalarope – Not detected in 2022 or 2023
- Rusty blackbird – Detected at three sites in 2023
- Short-eared owl – Not detected in 2022 or 2023
- Little brown myotis – Detected in the LSA in 2022 and 2023
- Northern myotis – Detected in the LSA in 2023
- Polar bear – Not detected in 2022 or 2023
- Eastern Migratory caribou – Detected at six locations in 2023

21. Concerns about the requirement for a “wildlife control agent” at an airport to hold a firearm permit. Request that wildlife management be done in a humane, cruelty-free no-kill manner, by an animal protection organization rather than a trapper, hunter, or exterminator.

Response:

As per the Canadian Aviation Regulations (Section 302.305), a wildlife management plan is required for all airports in Canada, which must be approved by Transport Canada as part of the airport certification process. These plans are unique to individual airports and can include a variety of passive measures (such as fencing, vegetation and habitat management or control) and active measures (such as scare devices, chemical usage, firearms). Firearm use may be included in the wildlife management plan for removal of or protection from wildlife such as bears, or as a last option for bird deterrents as per direction in Sharing the Skies: Guide to the Management of Wildlife Hazards (GoC 2024a). A Danger and Damage Permit under the *Migratory Birds Convention Act* will be obtained if firearms will be used to scare migratory birds potentially disrupting aircraft traffic and posing a risk to public safety.

If firearms are determined to be necessary as part of the plan, the use of firearms are heavily restricted and special permits are required. Special training is also required before firearms are used in or around an airport. In the event wildlife management needs to occur (i.e., removal), it will be conducted by trained staff in accordance with the wildlife management plan and applicable legislation. . Due to the remote location of the airport, and the potential need to quickly deal with wildlife situations to protect both the public and wildlife, it is not feasible to engage animal protection organizations for wildlife management at the new airport.

Engagement with Indigenous Peoples

22. Importance of ensuring engagement with Innu First Nation includes identification of potential impacts

Response:

Ensuring engagement with the Innu First Nation is paramount, given their proximity to the Project area and potential impacts. On May 1st, 2024, an email was sent to the Innu Nation inquiring about whether they would like to be engaged on the project. The Innu Nation confirmed receipt of the email; a response regarding preferred involvement on the project has yet to be confirmed.

Of particular significance is the location of Natuashish Innu First Nation, situated between Nain and Hopedale, making it the closest potentially affected community. As a community directly on the air flight path from Happy Valley Goose Bay to Nain, air travel between these communities is common, emphasizing the importance of understanding and addressing any potential impacts on flight reliability and frequency. Additionally, Sheshatshiu Innu First Nation, located near Lake Melville, also warrants engagement due to its proximity to Nain and its close proximity to Happy Valley-Goose Bay. Engaging with both Natuashish and Sheshatshiu Innu First Nations will be essential in that their perspectives are considered, and their concerns are addressed throughout the Project's development and implementation.

Indigenous Peoples’ Physical and Cultural Heritage and Sites of Historical or Archaeological Importance

23. Importance of implementing plans to protect identified archaeological sites.

Response:

As part of the Stage 2 archaeological assessment completed in support of the project, one site (HdCk-47) was identified within the access road footprint. To mitigate impacts to this site, the road route was diverted around the archaeological site. A 30 m buffer will be kept between the road and the archaeological site, and the site will be marked with flagging to prevent encroachment during construction. Similar mitigation will be implemented if any additional sites are identified during future field work.

Indigenous Peoples' Current Use of Lands and Resources for Traditional Purposes, and Exercise of Aboriginal and/or Treaty Rights

24. Need for further information about the location of lands and resources used for traditional purposes (e.g., hunting, trapping, country foods). Include the location of temporary/permanent/seasonal residences potentially impacted by the Project.

Response:

NG Infrastructure has received community feedback on land and resource use through a variety of means to date: conversations with local bear guards during field data collection programs, interviews with community members, and comments made during public information sessions. Concerns raised during consultations, such as disturbances to wildlife and plant life, shows the significance of implementing design and mitigation features to minimize adverse effects. Participants highlighted the importance of understanding how the airport location may affect traditional activities like fishing and hunting, particularly in areas frequented by wildlife such as ptarmigan. It was noted that the new airport location is primarily used as a transportation corridor i.e. the area is passed through during travel rather than being a destination for hunting, trapping, or country foods. Figure 4 provides the current understanding of residences in proximity to project infrastructure. Continued consultation with fishers and harvesters in the region will be integral to gaining insights into the potential impacts of the Project and ensuring that the concerns of the community are adequately addressed.

Understanding the importance of further information regarding the location of lands and resources used for traditional purposes, ongoing consultation efforts will be supplemented by the Nunatsiavut Government's detailed Regional Land Use Study. This study is focused on establishing community land use for a broad region around Nain. However, the results of the study, when available, are expected to be used to inform project planning. Through these efforts, we are committed to preserving and respecting the traditional practices and resources essential to the well-being of the community.

25. Concerns about Arctic char and partridge not being observed during field studies. Importance of using Indigenous knowledge of lands and resources for traditional purposes to determine the appropriate months to collect baseline data for fish and fish habitat, country foods (e.g., berries), and wildlife.

Response:

A discussion of baseline data collected for fish and fish habitat and wildlife is provided in Summary of Issues responses #12 and #18, respectively. Arctic char and partridge were not observed during field surveys; however, based on reviewed desktop information and community feedback they are understood to occur within the study areas. During field programs conducted in support of the project, Arctic char habitat was observed. Therefore, these species are considered in the development of project mitigation measures.

Information obtained through communication with the community has been incorporated into project field programs where possible:

- The field program for fish and fish habitat was planned based on desktop information indicating Arctic char presence from the beginning of July to late September. Feedback from local field assistants during spring surveys indicated that Arctic char are not usually present for fishing past the first week of August. The fish and fish habitat field program was completed from July 26th to 30th, which aligns with the local feedback.
- Berries were collected to support the country foods program in late September.
- Work plans describing baseline data collection methods were provided to NG Environment in 2023; feedback received indicated the timing of fall migratory bird surveys should be later in fall. As a result, this survey was postponed to late September.

26. Identification of any harvesting exclusion areas surrounding the airport.
    Comments on whether there would be potential compensation for two harvesters who use their cabins, in proximity to the airport, on a regular basis.

Response:

The public, including local harvesters, will be excluded from the fenced airport area for safety purposes. Compensation for local harvesters will be determined as part of the Nunatsiavut Government's Assembly decision with respect to the Project.

27. Importance of considering all drinking water sources in the local project area and near the access road, through community engagement.

Response:

Trouser Lake is the main water supply for Nain; this lake is over 2 km from the Project access road and over 4 km from the airport; no impacts to the water source are expected. It is also understood that some community members use Annainak Brook as a drinking water source. The existing road that crosses Annainak Brook to the south of Nain will be used for the Project. No construction activities will occur at this creek crossing location, and impacts to the water source are not expected.

Indigenous Peoples' Health and Well-Being

28. Need for information on human health risks in areas used for traditional purposes by describing the potential pathways of effects between project activities and humans.

Response:

The land around the proposed airport site may be used for the procurement of country foods and drinking water. A detailed regional land use study will be conducted by NG Lands and Natural Resources to determine any additional insights about traditional uses in the area. During preliminary interviews with the community, it was noted that the proposed Project site was primarily used as an area that is travelled through, rather than used for the procurement of country foods. One community member noted that there may be partridge hunting in the area. Additional information related to the frequency and duration of land use for each purpose and if there is any seasonality associated with each use will be used as data inputs for development of human exposure estimates. Potential pathways of effects are summarized below:

Air quality: Proposed site location is currently undisturbed. Dust and other emissions during construction activities and operation of the airport have the potential to affect air quality. Deposition of airborne particles can impact vegetation, soil and surface water quality which in turn can impact country foods. As the new airport location is located outside of the community, air quality impacts from airport operation in the town of Nain may be reduced.

Drinking and Recreational Water Quality: Surface water quality is important for recreational purposes, as well as the fishing industry and for the procurement of country foods. Impacts from deposition of particles associated with air quality as well as impacts from spills or leaks directly into the surface water environment can impact surface water quality which in turn could impact country foods.

Noise, Vibration, and Light: the proposed airport location is currently undisturbed. The addition of noise, vibration and/or light effects to the environment may have effects on wildlife behaviour, which could impact country food accessibility. Noise and vibration concerns associated with the current airstrip are closer to the community of Nain and are expected to have greater impact on humans in the area.

29. Importance of including a discussion on gender-based violence (GBV) risks as it relates to transient workers and potential effects to the local community.

Response:

The potential impacts of construction on a remote Indigenous community, particularly regarding transient workers, are complex and require careful consideration. One major concern is the risk of gender-based violence, which disproportionately affects women and girls in such communities. For the first stage of construction, the majority of the construction workforce will be staying in the construction camp located at the new airport and isolated from Nain due to the lack of access. However, following completion of the access road, project workers staying in camp will be prohibited from visiting Nain as a condition in their employment contract (with exception of travelling in and out) to minimize interaction between transient workers and the

local population. This approach seeks to create a safer environment for community members, reducing the likelihood of incidents.

It is acknowledged that a portion of the construction workforce will stay in Nain, which is beneficial for the local economy. Cultural awareness and sensitivity training will be a component in the construction contractor procurement process, to help ensure that interactions between workers and the community are respectful and harmonious. Additionally, imposing restrictions on alcohol and other substances at camp can further minimize the potential for escalated situations.

30. Need for information on airport accessibility from the hospital, especially during inclement weather.

Response:

Airport accessibility, especially during inclement weather, is a critical concern, particularly considering the relocation of the airport in Nain. While the project will provide improved reliability and operational hours, the increased distance from the community raises valid concerns about transportation access to the hospital. To address the access challenges, several measures have been put in place. Firstly, a dedicated shuttle service will operate between the town of Nain and the airport, ensuring reliable transportation even in adverse weather conditions. Additionally, the access road route has been designed to avoid steep slopes and narrow passes, with careful consideration given to avoiding known avalanche locations. Ongoing road maintenance will also be provided to facilitate clear and safe passage to and from the airport. Importantly, the relocation of the airport is expected to significantly enhance flight reliability, especially during inclement weather, as the new airport will operate 24/7. This may positively impact residents' ability to access the hospital via air travel. While there can be no guarantee that flights will always be able to land or takeoff in adverse weather conditions, the improved location and operational capabilities of the new airport should lead to enhanced reliability overall and therefore, improved access to hospitals.

31. Need further details on project activities/sources that may result in the release of dust and potential contaminants of concern during all phases of the Project and the associated risk of impacts to human health. Include an inventory of those potential project pollutants, a description of potential effects on key valued components (e.g., fish), and measures to mitigate dust and accidental release of pollutants with potential impacts to human health.

Response:

During the construction of the airport and access road, an increase in dust is expected. Throughout the operation of the airport, dust is expected to be generated through landing and take-off, and while using the access road. To mitigate some of these concerns, EK35®, a nontoxic synthetic fluid, will be used to stabilize the gravel and reduce dust.

Dust and other emissions during construction activities and operation of the airport have the potential to affect air quality and the community members living in Nain. Dust particles can lead to human health concerns. The dust ingestion and inhalation pathway will be considered in human health risk assessment, with data provided from air quality modelling and monitoring.

Combustion of aviation fuel, gasoline, and diesel produces NOx, CO, SOx, hydrocarbons, and particulates. A summary of potential health effects of these pollutants are as follows:

- According to ECCC, in sufficiently high concentrations, SO_2 and NO_2 can irritate the lungs, reduce lung function, and aggravate respiratory conditions especially in people with asthma. Long-term exposure to NO_2 may lead to the development of allergies and asthma and can cause adverse health effects at low concentrations. Both SO_2 and NO_2 can contribute to odours.
- The most common effects of CO exposure are fatigue, headaches, confusion, and dizziness due to inadequate oxygen delivery to the brain.
- Exposure to $PM_{2.5}$ can lead to onset or development of respiratory and cardiovascular adverse effects, such as asthma attacks, chronic bronchitis, heart attacks and may lead to the development of lung cancer. PM2.5 is largely emitted by vehicle exhaust.
- PM_{10} and TSP are largely the result of mechanical dust generation during construction or travel on the access road. $PM_{2.5}$ is a better indicator of health effects than PM_{10}. TSP is largely an indicator of nuisance dusting on nearby surfaces.

- Benzene and benzo(a)pyrene are components of diesel exhaust. According to the CDC, people who breathe in high levels of benzene may develop the following signs and symptoms within minutes to several hours: drowsiness, dizziness, rapid or irregular heartbeat, headaches, tremors, confusion, unconsciousness or even death (at very high levels). Long-term exposure (years) to high concentrations of benzene can lead to cancer. Benzo(a)pyrene is a probable cancer-causing agent in humans

As the airport location is more remote from the community, human health impacts due to release of pollutants from airport operation are potentially reduced.

Deposition of airborne particles can impact vegetation, soil, and surface water quality which in turn can impact country foods. This could lead to impacts for fish and other wildlife in the surrounding area. A detailed Land Use study will provide additional information on potential impacts to country foods in the area.

32. Importance of including health and medical practitioners and/or health administrators in the Engagement Plan to better understand the current baseline information on medical emergency flights and primary health care services at the existing airport, and how the Project may positively affect the number of medical emergency flights and access to health care.

Response:

To capture healthcare perspectives from engagement to date, an interview was conducted with a member of Nain Safe House, a domestic violence shelter in Nain. As part of ongoing consultation, it will be a top priority to engage directly with Nain clinic staff to understand how the airport will facilitate healthcare access for residents and healthcare staff access to Nain. Instances of prolonged wait times for medical evacuation due to flight limitations and the airport's unreliability have been communicated by residents. Additionally, understanding the airport's role in transporting medical personnel may improve understanding of how the airport enables health care access. We are committed to continuing consultations with Nain clinic staff, whose insights will be invaluable in understanding current healthcare challenges and formulating strategies to enhance medical emergency services. These consultations not only enrich our understanding of baseline healthcare services but also contribute to tailoring Project initiatives to better meet community healthcare needs.

33. Importance of considering the long-term impacts of the Project (both positive and negative) to the health of Indigenous peoples.

Response:

The existing airstrip is located within the community of Nain. Airport activities can impact air quality, water quality, noise, and vibration, as described in Summary of Issues response #31 and the DPD. By relocating the airport outside of the community, there may be positive health impacts for Indigenous peoples and residents in the long-term. The proposed location of the New Nain Airport may also lead to improved landing conditions, reducing the likelihood of aviation incidents and any associated health impacts.

Improved flight reliability may result in faster evacuations during medical emergencies which may lead to better health outcomes.

The Project may impact traditional land uses. Construction will result in disturbance to natural areas, leading to the loss of available resources related to land use activities, such as hunting, trapping and traditional plant gathering. Airport operation may also displace wildlife and further affect hunting and trapping in the area. The ability of Inuit communities to maintain their health, encompassing physical, mental, and cultural aspects, is tied to their connection with their environment. The Project may impact health as it relates to traditional land use in the area.

34. Consider expanding on the positive impacts the Project will have on food security (e.g., less cancelled/delayed inbound flights, cold storage and freezer building) within the community and region.

Response:

The existing airport infrastructure plays a crucial role in facilitating food security in Nain. Community members emphasize that virtually all perishable food items, such as fruits, vegetables, dairy, and eggs, are imported by air throughout the year.

Community members also noted that shipment delays at the existing airport often lead to spoiled foods arriving in the community. Sustaining connectivity through the airport is crucial for ensuring that grocery stores have enough supplies to meet the nutritional needs of the population. However, the reliability of air travel leads to uncertainties regarding the timely delivery of food supplies. Frequent instances of planes being unable to land exacerbate food security concerns, resulting in spoilage of perishable goods before reaching the community.

Community members noted several potential benefits of the Project:

- Possibility that the grocery store availability improves, in quality, diversity, and quantity, by increasing the reliability of flights into the community, and potentially flying larger aircrafts with additional capacity.
- Flight reliability at the existing airport creates additional food waste due to extended travel delays. Often expired food is sold at a discount in the community, though it is not preferred. Improved reliability could lead to less food waste and improved food quality.
- Community members indicated a desire for improved cold and dry food storage to improve food security, which has been integrated into the project plan. By expanding food storage, the community may be better positioned to withstand flight disruptions during extreme weather.

Indigenous Peoples' Social and Economic Conditions

35. Importance of considering all users and potential transportation methods in Project design (e.g., space for snowmobile traffic, pull-offs prior to high-risk avalanche zones, parking for snowmobiles and qamutiik/sleds).

Response:

Several key factors have been incorporated into the Project design to consider all users and potential transportation methods. The proposed access road traverses Blowhole Pass, a known avalanche risk zone, has been strategically designed to mitigate the potential risk of avalanches that historically occurred in this area. risk. By situating the road on a flatter plateau area approximately 70 m east and 45 m higher from the snowmobile route through Blowhole Pass, the potential for avalanche incidents is minimized. To further facilitate safe travel, road construction will involve grading a flat surface in steep areas to meet authorized slope levels (Figure 5). The access road will also be widened at various points to facilitate safe stopping and navigation, particularly around curves and sharp turns. Incorporating these measures will help facilitate the safety of travelers utilizing various transportation methods. Additionally, designated parking areas, including space for vehicles such as snowmobiles, will be available at the airport. the Nunatsiavut Government Infrastructure is committed to prioritize the safety and accessibility of transportation infrastructure for the community of Nain.

36. Importance of including a description of the construction workforce, and employment and procurement opportunities in Nain and Nunatsiavut.

Response:

At this stage of project planning, the construction workforce is expected to peak at approximately 50 people. While specific details regarding the construction workforce and employment and procurement opportunities have not yet been finalized, they will be further understood and articulated as the project plan progresses. Selection criteria for construction contractor procurement will include consideration to hiring from the local community.

This process will be informed through engagement with stakeholders, including local communities, businesses, and Indigenous organizations, to identify potential opportunities for employment, skills development, and economic growth.

43. Importance of applying gender-based analysis plus (GBA+) and consider subpopulations in the local community (i.e., men vs. women, Indigenous vs. non-Indigenous, youth vs. elderly) to better understand how they may be differently impacted by the Project.

Response:

Ongoing consultation efforts aim to engage a diverse range of stakeholders, including government employees, business owners, community service workers, elders, youth, and current airport/road maintenance employees. These consultations are

crucial for gaining insights into potential project impacts from various perspectives, including stakeholders across different age ranges, gender, and income brackets. By incorporating GBA+ principles, we recognize the importance of understanding how different subpopulations may be differently impacted by the Project.

Initial findings highlight potential impacts on women during the construction phase, particularly concerning gender-based violence risks associated with transient worker populations. To address this concern, specific mitigations have been proposed, such as the implementation of a construction camp and employment conditions minimizing the time employees can spend in the community, with the goal of limiting interaction between transient workers and the community. However, further consultation with the community is essential to fully understand the impacts across different subpopulations in Nain and to define appropriate mitigations and accommodations that address the specific needs of individuals within these groups. Through ongoing engagement and consideration of GBA+ principles, we are committed to ensuring that the Project's impacts are thoroughly understood and addressed in a manner that respects the diversity of experiences and perspectives within the community.

44. Importance of including a cost estimate for the construction and operation of the project, including the source of funds and consideration of any potential increases in future costs.

Detailed information on Project capital and operating costs, funding, employment and procurement are still being determined as part of ongoing feasibility studies.

Social and Economic Conditions (Non-Indigenous)

39. Importance of considering GBA+ and equality, diversity, and inclusion (EDI) proactively as a part of early workforce planning and mitigation measure development.

Response:

NG Infrastructure acknowledges the importance of considering gender-based analysis plus (GBA+) and equality, diversity, and inclusion (EDI) proactively in early workforce planning. These concepts will be included in selection criteria during the procurement process for the construction contractor.

40. Comments on how the self-sufficient working conditions during the construction phase will be implemented and the plans for dealing with workplace accidents in a remote setting.

Response:

A robust emergency response plan will be developed for construction following completion of feasibility studies, when the ownership/operation structure of the Project is determined, and procurement of construction contractors occurs. The ERP will include contingency planning for administering medical aid on site and for transporting workers to medical facilities for care.

41. Importance of outlining a human resources plan to operate the airport (and facilities) once the Project is completed.

Response:

An overall operational plan will be developed by the airport owner. Ownership of the airport will be determined once the proposed airport site is deemed feasible and project funding is secured. The operational plan will include human resources elements such as staffing requirements, training programs, recruitment strategies, and community engagement initiatives.

42. Need for information on the availability of the local workforce for construction in the short-, medium-, and long-term and how labour/skills shortages will be addressed.

Response:

At this stage of Project planning, the construction workforce is expected to peak at approximately 50 people. While specific details regarding the construction workforce and employment and procurement opportunities have not yet been finalized,

they will be further understood and articulated as the project plan progresses. Selection criteria for construction contractor procurement will include consideration to hiring and providing training opportunities from the local community.

Atmospheric Environment (e.g., air quality, light, etc.)

Response:

Air monitoring requirements will be based on results of further air quality assessment following more detailed Project design, where predicted air quality will be compared to provincial and federal ambient air quality standards. Based on a preliminary understanding of aircraft types, vehicle usage, and electricity generation requirements, impacts from emissions from Project operations are expected to be less than the Canadian Ambient Air Quality Standards (CAAQS). Impacts are also expected to be less than Newfoundland and Labrador Air Quality Standards, and according to the Government of Newfoundland and Labrador 2012 guidance document "Determination of Compliance with Ambient Air Quality Standards", monitoring during airport operations would not be required. Emissions of dust during construction of the airport and access road may exceed standards for short periods of time. Mitigation measures related to controlling dust are provided in Summary of Issues response #31.

43. Need for information on the amount of light pollution expected during all phases of the Project and for all Project infrastructure. Where feasible, consider alternative lighting options to mitigate light emissions from the Project.

Response:

Lighting will be required for construction purposes; it will be directed away from the sky and activated only during working hours when there is insufficient daylight (early morning and evening). Airport operations must involve a minimum amount of lighting to adhere to Transport Canada regulations. Approach and runway lighting will only be activated when an aircraft is approaching and departing. Buildings and other obstructions will have red lights as per aviation standards.
All operational lighting will be directed downwards in compliance with regulations to prevent potential blinding of pilots and ground crews.

44. Request to use new 1991-2020 climate normals for Nain which are currently available (except for rainfall or snowfall), to complement the 1981-2010 climate normals for Nain

Response:

The description of current air quality conditions in the DPD summarizes 1991-2020 climate normals for temperature and visibility. Climate normals from 1981-2010 are used for precipitation.

45. Importance of using the Nunatsiavut Government's climate change projection models for the community of Nain.

Response:

Climate change projections used for the Project and discussed in the DPD references Barrette et al. (2020), which is a recent and comprehensive summary of regional climate projections averaged over the entire Nunavik and Nunatsiavut region. These projections are presented specifically for the climate model grid point nearest Nain.

46. Comments on whether the Nain weather station would remain in Nain or be moved to the new airport location.

Response:

A new weather station was installed at the new airport for collecting baseline data; this station will continue to be used for the Project. The need for the continued operation of the existing weather station will be determined at a future date.

Water (Surface and Ground)

47. Request for information on potential groundwater-surface water interactions and expected impacts where groundwater may interact with surface water (e.g., at Kauk Brook and Blow Hole Creek). Concern that groundwater use for potable water supply and construction activities may impact other groundwater users, and/or aquatic/wetland habitat.

Response:

Potential impacts to both surface water and groundwater are discussed in the DPD. Groundwater is no longer being considered as potential potable water source. The primary option for water supply being considered is Kauk Brook, based on a comparison between the estimated Project water demand and calculated mean annual discharges for watercourses within 3 km of the airport. The analysis of Kauk Brook indicates that the Project peak hour potable demand (0.22 L/s) is 0.1% of the calculated discharge at low flow periods (0.25 mean annual discharge). This small fraction is not expected to impact surface water flows, and subsequently would not impact groundwater recharge.

NG Infrastructure will obtain a water use licence under the *Water Resources Act* before withdrawing water for the Project. The licence application will include an evaluation that demonstrates the sustainability of the proposed surface withdrawal.

Potential impacts to watercourses e.g., Kauk Brook and Blowhole pond due to the access road crossings, are related to water quality due to erosion and sedimentation and spills. Mitigation measures to prevent against sediment deposition and spills into watercourses include:

- Avoidance of direct contact with aquatic areas onsite, where possible. Minimize disturbance, where avoidance is not possible.
- Erosion and sediment control measures (i.e., silt fences) will be implemented between the edge of disturbance and any water bodies, as required. These measures will be maintained and inspected daily during the construction activities to make sure they are working properly.
- Development of a spill response plan, and implementation of spill prevention and response protocols.
- Emergency spill kits will be kept with all working machinery during all proposed Project phases.

48. Need for more information on the characterization of the marine environment that was collected for other initiatives to determine its adequacy for baseline. Include how the baseline data was gathered, including but not limited to, sampling locations, methods and effort; media sampled (e.g., water, sediment, fish); guidelines to which sampling was compared (e.g., water quality guidelines, sediment quality guidelines, fish toxicity); sample timing (e.g., seasonal and/or yearly) and duration (e.g., multi-year sampling plan).

Response:

A desktop review was undertaken to assess and summarize the fish species and fish habitats potentially occurring within the study area. The review included the identification of fish (including marine mammal and invertebrate) species, including SAR and habitat features that have the potential to overlap the study area. The following key information sources were reviewed:

- *Nain Airport Project R3 Report: Environmental Review - Desktop Assessment* (Aivek Stantec, 2022)
- *Nain Airport Project R6 Report: Hydrological Study* (Aivek Stantec, 2023)
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Assessment and Status Reports
- Government of Canada *Species at Risk Public Registry*
- Published literature on general ecology and population dynamics of relevant species and habitat
- Newfoundland and Labrador Fisheries, Forestry and Agriculture *Species at Risk* (Government of Newfoundland and Labrador, 2024)

- Newfoundland Labrador Fisheries, Forestry and Agriculture *Inland Fish* (Government of Newfoundland and Labrador, 2024)
- Nain Wind Power Micro-Grid Registration Document (Natural Forces, 2021)
- Identification of Additional Ecologically and Biologically Significant Areas (EBSAs) Within the Newfoundland and Labrador Shelves Bioregion (DFO 2013).
- DFO *Aquatic Species* collection (DFO 2020)
- DFO *Aquatic Species at Risk Map* (DFO 2022)

The desktop information reviewed and presented is considered sufficient to understand the current environmental conditions that may interact with the Project at this stage. Project activity in the marine environment (barge traffic transporting equipment and materials from Nain), will be limited spatially to single marine vessel route and relatively small offloading area on the shore.

49. Need for more information on the proposed methodology to assess potential impacts on water quality at stream crossings along the airport access road.

Response:

Potential impacts to water quality are assessed through identifying potential interactions between the Project activities and the watercourse crossings. Expected interactions are sediment deposition from construction activity and erosion, as well as accidental releases of chemicals/fuel from equipment or vehicles. Mitigation measures related to preventing releases to watercourses are presented in Summary of Issues response #48. Construction activities within and near watercourses will be monitored, and in the event of a release it will be assessed and cleaned up as part of a spill contingency plan.

50. Need for additional details on the proposed de-icing activities and potential impacts to the surrounding freshwater environment. Provide more information on mitigation measures that will be utilized to manage potential impacts to surface water quality.

Response:

A concrete de-icing pad with an HDPE membrane/liner will be constructed in the centre of the airport apron. The de-icing pad will include a drain and sump where it will be collected and then transported to Nain for disposal. Glycol contaminated water will not be discharged to surrounding area, and therefore impacts to surface water quality are not expected. During the summer season, runoff from the de-icing pad will be directed to the overall stormwater collection and conveyance system.

De-icing glycol will be stored in secure containers within the maintenance garage.

Soils and Geology

51. Need for information on field methodologies and data for determining potential (or known) permafrost areas, with a map of said areas, which will help assess where permafrost bodies could impact the Project activities. Areas of ice-rich permafrost should also be considered in the mapping.

Response:

Potential permafrost areas were established from preliminary terrain mapping in support of the project geotechnical investigations. Background data relevant to the local geomorphic and geologic conditions was compiled and reviewed. This review included preliminary identification and geomorphological mapping of key physiographic conditions (soil and bedrock), surficial deposit units, and periglacial features. Areas identified to be developed through thermokarst geomorphological processes were designated as potential permafrost areas; these were considered during access road planning and avoided where possible.

A geotechnical investigation was completed in summer/fall 2022. During this investigation 48 mechanically excavated test pits and fifty-seven 57 boreholes were completed at the 90 test locations. No permafrost was encountered at these locations, Additionally, thermistor cables (temperature probes) were installed at five of the borehole sites. These thermistors were used

to monitor subsurface temperatures to further understand the potential presence of permafrost . Temperatures recorded were above 0°C during the summer months at all five locations.

The potential for permafrost will continue to be evaluated during future site investigations before construction.

52. Need for information on baseline permafrost characteristics (active layer and permafrost thicknesses) and ground thermal regime which are essential to assess the climate change impacts on infrastructure and projected changes to permafrost conditions.

Response:

As described in Summary of Issues response #52, permafrost have been observed in areas planned for project development. The current project design involves avoiding areas with permafrost potential, and this information will be supplemented with future site investigations. If encountered during construction of the runway, taxiways, apron, and/or parking area, it will be excavated to prepare the appropriate subgrade and avoid impacts from climate change. If the permafrost area is extensive, slight modifications to the access road will also be considered to avoid impacts.

53. Need to include proposed alternative mitigation measures and techniques for embankment and pavement approaches over permafrost in cases where it would not be possible to avoid permafrost areas.

Response:

Project planning and infrastructure siting considered potential permafrost and other poor quality soil locations, as these areas have been avoided to the extent practical. If permafrost is encountered through further site investigation or during construction, additional construction techniques will be considered including: removing permafrost and replacing the material with rock fill, using geosynthetic materials such as geogrids and geotextiles, and/or using rock fill in the embankment construction to assist in the bridging/arching effect to reduce localized settlement. If the permafrost area is extensive, slight modifications to the access road will also be considered to avoid impacts.

Wetlands

54. Need for a description of any potential direct or indirect effects of the Project activities on wetlands and wetland functions during all Project phases as it relates to migratory birds, species at risk, and species of conservation concern. Include information regarding the amount of wetland loss, and any measures that will be implemented to avoid, mitigate or offset potential effects[7].

Response:

Potential direct or indirect effects of the Project activities (i.e., clearing and construction activities) on wetlands and wetland function and the proposed mitigation measures that will be implemented to avoid, mitigate, or offset potential effects are outlined in Table 7 below.

Table 7: Wetland Interactions with the Proposed Project and Mitigation Measures

Potential Project Effect	Mitigation Measures
• Loss or disturbance of portions of the wetlands. • Changes to wetland community diversity, including wildlife use (i.e., migratory birds, species of conservation concern, and species at risk), traditional use plants and species at risk. • Changes to local hydrology/alteration of surface water flow patterns, resulting in wetting or drying of wetlands, such as inadvertent drainage or impoundment and groundwater drawdown associated with water withdrawal. • The spread or introduction of invasive species into upland habitats and wetlands through construction equipment, vehicles or runoff from. Increased traffic during the construction and operations phases can elevate this risk. • Potential sedimentation within wetlands due to up-gradient activities (e.g., earth moving, removal of vegetation, soil stockpiling). Depending on the degree, a sedimentation event may suffocate wetland vegetation and increase nutrient levels. • Dust deposition, which can, similarly to sediment, also introduce minerals and nutrients into wetlands and stress wetland vegetation (particularly non-vascular species). • Changes to wetland microclimate and habitat functions because of proximity to Project infrastructure and edge effects. • Accidental release or spill of contaminants.	• Restrict construction activities, equipment and vehicles to construction footprint. Minimize vegetation disturbance, as maintaining terrestrial, riparian and wetland ecosystems plays a role in supporting biodiversity, hydrology, wildlife habitats and traditional use of resources. • Implement construction methods that reduce the potential to drain or flood surrounding wetlands (e.g., appropriately sized / spaced culverts, no unpermitted pilling of soil / grubbing, no unnecessary ditching / artificial channelization). • Minimize erosion of wetland soils by limiting flow velocities using hydraulic dissipation techniques and directing runoff through natural upland vegetation, wherever practical. • Install temporary erosion and sediment control measures (e.g., rig matting, geotextiles, vegetated buffer zones, berms, fibre rolls or silt fencing) in appropriate locations to reduce or contain erosion or sedimentation. The type of control (if applicable) is dependent on topography. Inspect erosion and sediment controls on a regular basis and correct deficiencies (e.g., inadequate control, damage, ineffectiveness) in a timely manner. • Employ measures to reduce the spread of invasive species (particularly by vehicles) into the surrounding landscape including wetlands and retain habitat integrity. Equipment and vehicles will arrive to site clean and free of soil or vegetation debris. Inspect vehicles regularly, particularly vehicles arriving from outside the Nain area. • Maintain equipment and ensure equipment and vehicles are free of leaks. • Proper installation and proper placements of culverts or other measures to allow flow under the airport access road. • Do not wash equipment or machinery in any water body (e.g., watercourse, drainage, wetland). It is recommended to wash equipment or machinery at least 100 m from any water body. Control wastewater from construction activities such as equipment washing to avoid discharge directly into any water body (e.g., watercourse, drainage, wetland). • Prohibit fuel storage, refuelling, or servicing of equipment within 100 m of any water body (e.g., watercourse, drainage, wetland), except where secondary containment and/or tertiary containment is provided. • Ensure no fuel, lubricating fluids, hydraulic fluids, methanol, antifreeze, herbicides, biocides, or other chemicals are release on the ground or into any water body (e.g., watercourse, drainage, wetland). • Maintain drainage across any temporary workspace during construction. Ensure construction does not cause ponding of water or unintentional channelization of surface water flow. • Stake/flag boundaries of the construction footprint, access roads, and wetlands. Do not allow disturbance beyond the stakes or flagging. Restake/flag the boundaries where warranted following clearing and prior to the commencement of subsequent construction activities. • Construction equipment must be clean and free of soil or vegetative debris before its arrival on the Project to reduce the risk of weed introduction. Any equipment that arrives dirty, will not be permitted on the construction footprint. • For areas that will only be partially disturbed, efforts will be undertaken to minimize grading related effects to the remaining wetland areas (e.g. increases or decreases in hydrological inputs resulting in the subsequent flooding or drying of the wetland). Grading effects will be minimized by maintaining the pre-construction topography where possible. • Timely restoration and re-vegetation of the temporary disturbed portions of the wetlands.

Table 8 presents the potential direct disturbance to the wetlands from the development of the different of the Project.

Table 8: Wetland and Project Infrastructure Impacts

Project Footprint	Direct Disturbance to Wetlands (ha)	Percentage of the Project Footprint (%)
Runway (including approach lighting and fenced area	23.09	12
Airport (including taxiways, apron, terminal and support buildings, parking area, and associated infrastructure)	4.81	2
Access Road (including construction limit)	3.16	2
Construction Staging Area and Temporary Access	0.38	<1
Rock Borrow Areas	4.35	2
Total	**35.79**	**18**

56. Need more information on the development and implementation of spill prevention, preparedness, and response measures and systems to minimize the risk of accidents and malfunctions arising from construction and operation activities[23,24]

Response:

The *Canadian Aviation Regulations* have extensive requirements for emergency response planning. An emergency response plan will be prepared that before construction that aligns with the regulations. The plan must address:

- aircraft accident or incident within the airport boundaries, and within a critical rescue and fire-fighting access area that extends 1,000 m beyond the ends of a runway and 150 m at 90° outwards from the centreline of the runway, including any part of that area outside the airport boundaries
- an aircraft emergency declared by either air traffic services or a pilot
- a fuel spill that spreads at least 1.5 m in any direction or exceeds 12 mm in depth
- a medical emergency
- a fire in which airport operations or passenger safety is threatened
- an emergency that is related to a special aviation event and that might have an impact on airport operations,
- a natural disaster
- any other emergency that is a threat or is likely to be a threat to the safety of persons or to the operation of the airport

The plan will include:

- identification of organizations and resources capable of providing emergency assistance, including contact information
- identification of roles and responsibilities for airport and aircraft service personnel,
- establishment of emergency response training requirements for on-site personnel
- description of potential emergency situations and outline of procedures for each

All tanks will be double-walled, and will undergo routine integrity inspections. Fuel storage areas will be established greater than 30 m for any water body or watercourse. Emergency spill kits will be kept with all working machinery and fuel storage areas during all proposed Project phases.

57. Importance of including other topics in the Emergency Response Plan (e.g., fire, extreme weather events, emergency evacuation, power failure, injury and illness, workplace violence).

Response:

The emergency response plan described in Summary of Issues response #56 will be developed to address all topics requiring emergency response, including fires, extreme weather events, emergency evacuation, power failure, injury and illness, and workplace violence. This plan will be developed following the completion of project feasibility studies, securing project funding, and establishment of project ownership / operation.

58. Importance of developing a Communication Plan to communicate information on driving and road conditions for the access road.

Response:

NG Infrastructure understands the importance of maintaining safe and reliable transportation between the airport and Nain. A plan to communicate information on driving and road conditions for the access road will be developed following the completion of project feasibility studies, securing Project funding, and establishment of project ownership / operation.

59. Need a description of the potential impacts of accidents and malfunctions on migratory birds4 and species at risk, and mitigations and response plans to address these potential impacts, including information related to the development of a Wildlife Response Plan.

Response:

Potential accidents and malfunctions associated with the Project include:

- Aircraft crash and/or fire
- Marine craft fuel spill
- Spills to land or water from diesel or aviation fuel, de-icing glycol, domestic effluent

Construction and operation of airports in Canada is guided by Transport Canada through its construction and certification standards. Each airport is required to have an Airport Operations Manual, which identifies the airport, dimensions of runways, buildings, lighting, training requirements, quality assurance system and procedures with references to detailed manuals as applicable. Management plans based on best management practices will be developed based to address potential accidents or malfunctions, including a spill contingency plan; these will help to protect wildlife in and adjacent to the Project Area. As per the Canadian Aviation Regulations, a wildlife management plan is required for all airports in Canada. These plans are unique to individual airports and will be developed for this Project.

Potential effects on migratory birds and species at risk occurring or potentially occurring in the LSA and RSA would be short term effects that could impact habitat availability and quality. Potential mortality risk from contact with contaminants could also occur. The potential effects are unlikely to occur and, with mitigation, would be short term in duration and primarily localized in extent (i.e., mostly within the airport footprint). Potential effects on habitat could occur through spills along the access road or from tankers in marine habitat. With a spill contingency plan, the potential effects are anticipated to be short-term and low in magnitude.

Climate Change and Greenhouse Gas Emissions

60. Need for further information on how it was determined that GHG emissions from decommissioning would be half of the construction emissions

Response:

The Project is expected to be in operation for greater than 50 years. Due to the uncertainty in timing regarding project decommissioning, GHG emissions for that project activity are a rough estimate. The “half” factor was based on AECOM’s experience in estimating decommissioning and reclamation emissions from other industrial facilities, and the assumption that

the access road would remain in place following closure of the airport. An updated GHG emissions report has been prepared for the DPD which includes the assumption that decommissioning emissions are equivalent to construction.

61. Need to clarify annual GHG emissions estimates, in addition to total emission estimates from each phase of the Project. Include any new information on GHG estimates, such as emissions related to the temporary construction camp.

Response:

Annual GHG emissions estimates are provided in the DPD, and a summary is provided in Table 9. Information on new sources associated with the Project is not available at the current level of design. Emissions from the temporary construction camp are expected to be small compared to overall construction emissions.

Table 9: New Nain Airport Emissions (tCO_2-eq) for Construction, Operation for 50 years, and Decommissioning

Year	Source	tCO_2-eq
1	Construction of Airport and Access Road – Deforestation and Sequestration	7,356
2	Construction of Airport and Access Road	5,390
3-52	Operation of Airport (each year)	20,282
53	Decommissioning of Airport	6,373

Effects of the Environment on the Project

62. Importance of including a discussion on the potential impacts of climate change projections on groundwater availability as it relates to the supply of potable water[20].

Response:

Groundwater is no longer being considered as source for Project potable water. An assessment of Project water withdrawal on the primary source option, Kauk Brook, was completed in the DPD. The results indicate that the peak hour potable demand (0.22 L/s) is 0.1% of the calculated discharge at low flow periods (0.25 mean annual discharge). This analysis shows that much lower estimates could be used for Kauk Brook mean annual discharge to account for climate change, and Project water withdrawal would still be within the DFO recommendations for preserving ecological flows (10% of the instantaneous flow and cumulative flow 0.25 mean annual discharge).

NG Infrastructure will obtain a water use licence under the *Water Resources Act* before withdrawing water for the Project. The licence application will include an evaluation that demonstrates the sustainability of the proposed surface withdrawal.

63. Concerns about how the location and design of the new airport will account for increased visibility and fog challenges in the future, due to a changing climate.

Response:

A pre-feasibility was conducted to evaluate potential airport location options, as described in the DPD. The study determined that the selected location was the most favourable due to its alignment with prevailing winds. Further, an important consideration for mitigating visibility issues and fog is instrumentation-based approaches, and the selected location is the only option that provides that capability. Lastly, the fog at the existing airstrip is primarily due to low-lying clouds. The new airport, which opens to the south, is expected to have favourable microclimate differences compared to the existing site. NG Infrastructure acknowledges climate change can alter conditions in the region over time which poses a challenge for site selection; however, the selected airport location represents the best option for ensuring consistent air travel into Nain, given the current information available.

64. Importance of including a terrain stability assessment to help understand landslide and avalanche hazards and the potential impacts to the Project.

Response:

Selection of the access road route considered many different factors, including avoidance of potential permafrost areas and wetlands. In avoiding these areas, the route overlaps other areas of exposed bedrock, which is advantageous since it provides a stable base for road construction. However, development of the access road will require cutting in to steep slopes of exposed bedrock to create the desired surface grade, which in turn will create rock faces adjacent to the access road. NG Infrastructure understands creation of the rock faces will increase the risk of landslide and avalanche risks. Further evaluation of the road route at each of these areas will be conducted before construction, and protective measures such as energy barriers and rockfall netting will be considered for installation to reduce safety hazards.

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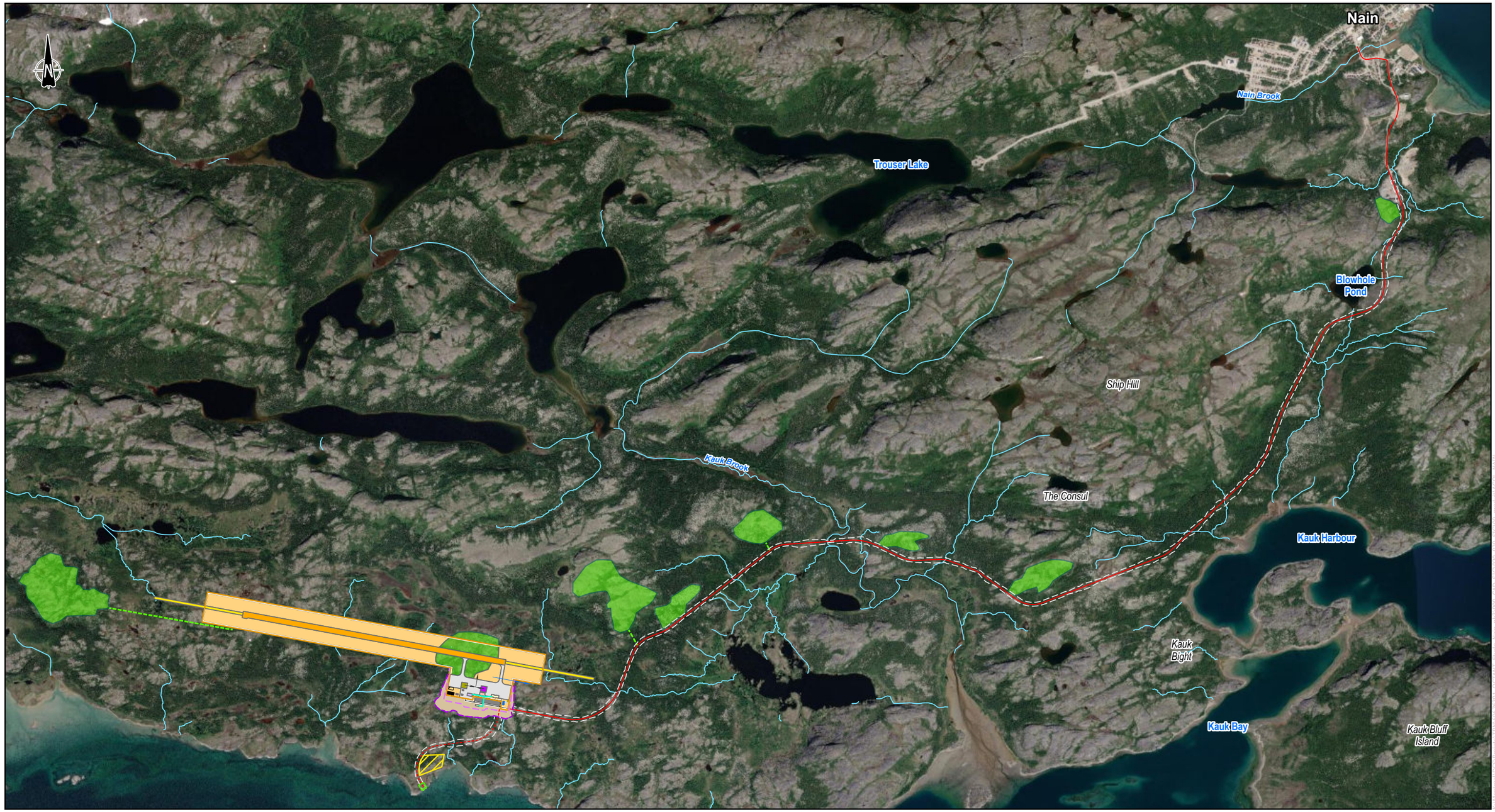
Attachments

NUNATSIAVUT
kavamanga government

NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION



Project Component

- Access road
- Temporary access road
- Construction limit
- Temporary road to rock borrow
- Rock borrow
- Potential construction laydown and equipment storage area
- Proposed barge landing site
- Fence
- Sewer pipe
- Top of embankment
- Bottom of embankment
- Culvert drainage
- Fuelling and de-icing pad drainage system
- Fencing and vegetation control
- Parking area and embankment
- Airport access and service road
- Aviation fuel
- Cargo warehouse
- Central power station
- De-icing pad
- Diesel fuel
- Diesel tank
- FEC
- Fueling pad
- Gravel storage
- Lights
- Maintenance garage
- Oil/water separator
- Parking and construction camp
- Potable water supply
- Runway
- Septic field
- Septic tank
- Taxiway
- Terminal
- Water tank
- Weather station

1:30 000
0 250 500 m
NAD 1983 UTM Zone 20N

OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

Figure 1
Project Components

AECOM

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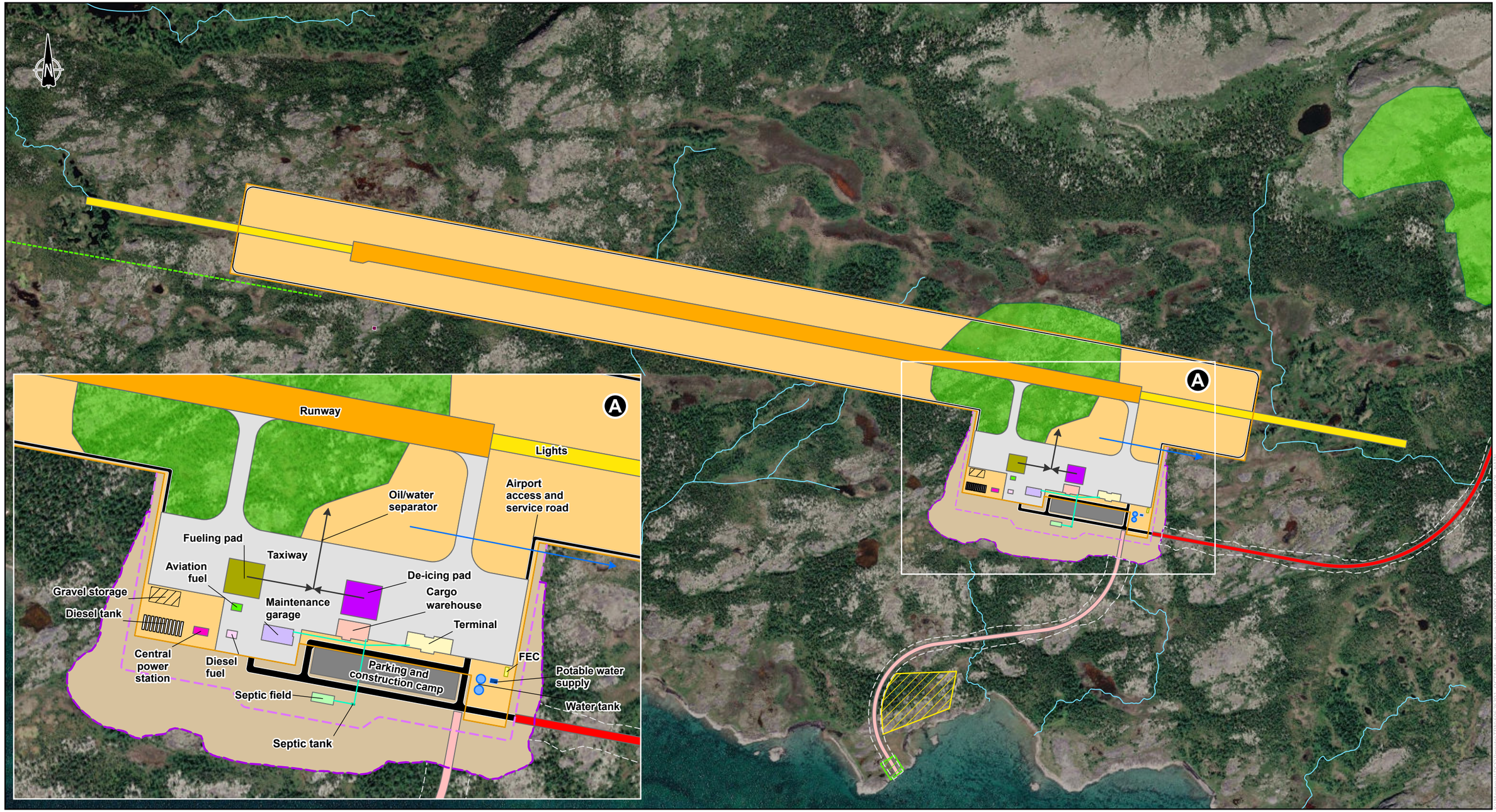
NUNATSIAVUT
kavamanga government

NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION



OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

Project Component

- Access road
- Temporary access road
- Construction limit
- Temporary road to rock borrow
- Rock borrow
- Potential construction laydown and equipment storage area
- Proposed barge landing site
- Fence
- Sewer pipe
- Top of embankment
- Bottom of embankment
- Culvert drainage
- Fuelling and de-icing pad drainage system
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- Diesel tank
- FEC
- Fueling pad
- Gravel storage
- Lights
- Maintenance garage
- Oil/water separator
- Parking and construction camp
- Potable water supply
- Runway
- Septic field
- Septic tank
- Taxiway
- Terminal
- Water tank
- Weather station

1:10 000
0 100 200 m
NAD 1983 UTM Zone 20N

Figure 2
Airstrip and Airport Apron

AECOM

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NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION

Project Component

- Temporary access road
- Construction limit
- Potential construction laydown and equipment storage area
- Proposed barge landing site

1:2 000

0 20 40 m

NAD 1983 UTM Zone 20N

Figure 3

Construction Landing and Staging Area

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NEW NAIN AIRPORT
DETAILED PROJECT DESCRIPTION

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EXPERTS EN SOLUTIONS POUR L'AVIATION

Project Component
- Access road
- Temporary access road
- Airport footprint
- Runway

Study Area
- Land use study area

Hydrography
- Watercourse

Labrador Inuit Lands
- Parcel number
- OX-00X Nain Inuit Community Government

Human Feature
- Country food
- Potential fishing area
- Cabin
- Snowmobile trail
- Trouser Lake protected public water supplies

1. Lynx and ptarmigan are trapped/ hunted here
2. Geese are hunted in the Bay
3. Salt Water Pond: A significant area for hunting in the region. Geese are hunted in this area.
4. Firewood is gathered in this area
5. Firewood is gathered in this area. Ptarmigan are hunted in this area
6. Mussels are gathered in this area
7. A fox trap is present here
8. This area is a significant location for hunting

1:44 000
0 250 500 m
NAD 1983 UTM Zone 20N
2024-06-25 09:14

Figure 4
Preliminary Land Use Information related to Human Health

AECOM

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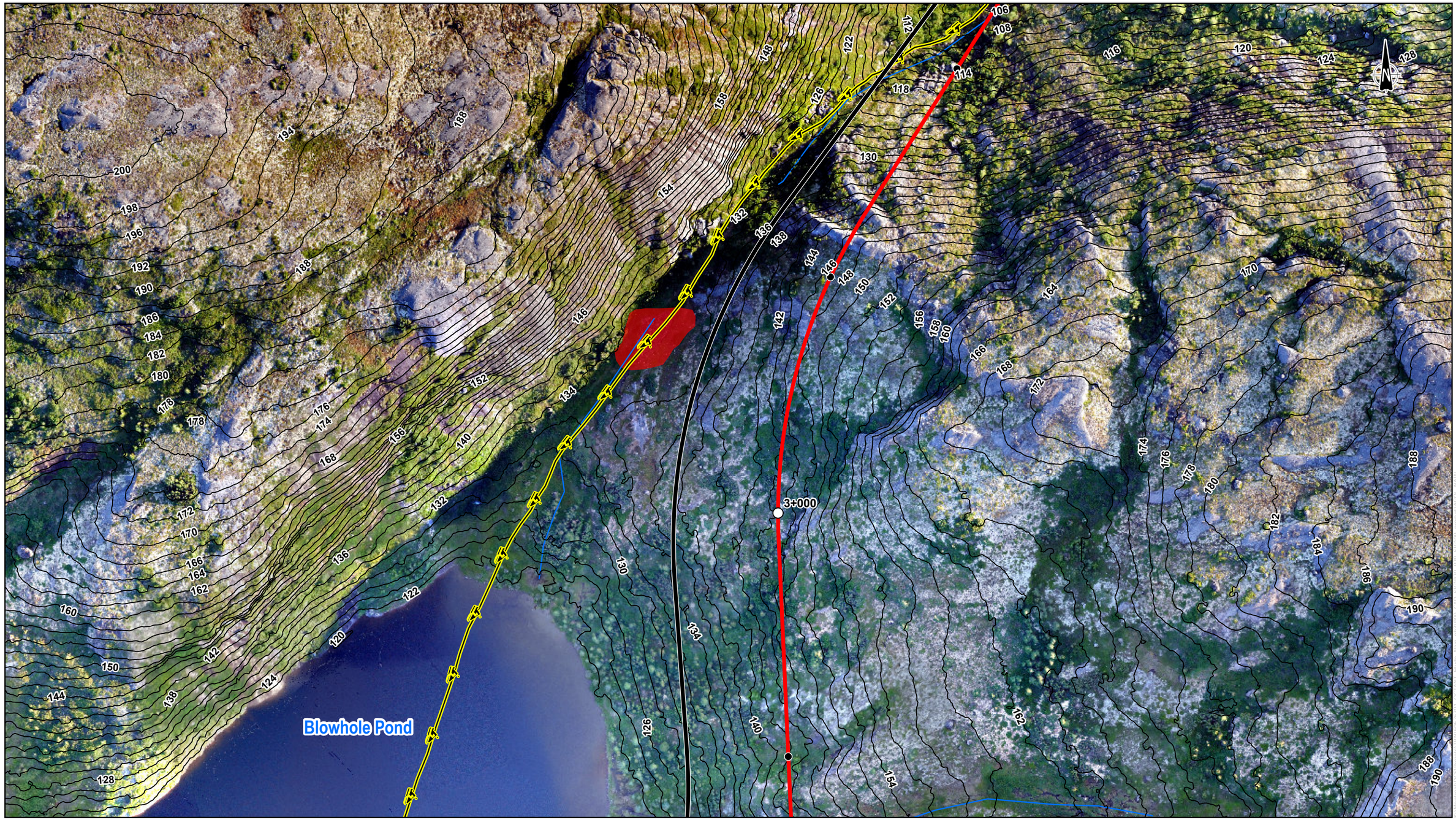


Project Component
- 2023 Access road alignment
- *2024 Access road alignment*
- Kilometer point
- Access road

Land use
- Snowmobile trail

Hydrography
- Watercourse

Other
- Potential avalanche area

1:1 500
0 20 40 m
NAD 1983 UTM Zone 20N
2024-05-06 15:56

Figure 5
Access Road Route Through Blowhole Pass

OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

AECOM

Jim Oswell Ph.D., P.Eng

Senior Geotechnical Engineer
36 years of experience · Calgary, Alberta

Dr. Oswell has worked on numerous geotechnical projects in western and northern Canada, and internationally for over 30 years. Many of these projects involved site investigations, laboratory testing, extensive analysis and evaluation. He has undertaken numerous forensic investigations for a variety of projects including pipelines, slope stability, building foundations and excavations. He has supervised technical and junior engineering personnel in the field, laboratory and office. He has experience in deep foundations and excavations for high-rise office structures, large industrial foundations, pipelines, permafrost, and slope stability. He has provided expert witness testimony in public hearings, NEB and environmental joint review panel hearings and in civil litigation.

Dr. Oswell has wide experience in many aspects of pipeline design, construction and operations. He is an expert on geotechnical issues related to pipelines in permafrost and an expert in geotechnical input to pipeline stress analyses. He was involved in assessing the geotechnical performance of the Enbridge Pipelines (NW) Inc. Norman Wells oil pipeline for over 15 years. In addition, he provided senior and expert-level engineering on the Mackenzie Gas project, the Alaska Pipeline Project, the Alaska North Slope Gas Project and the Denali Gas Pipeline Project. In western Canada, Dr. Oswell provided geotechnical support and input to the Prince Rupert Gas Transmission project (B.C.), Pacific Trails Pipelines project (B.C.), Grand Rapids pipeline project (Alberta), Coastal Gas Link pipeline project (B.C.) and others. He has consulted to pipeline companies in China, Ecuador, Colombia and Alaska.

EDUCATION

B.Eng, Civil Engineering, Lakehead University, Thunder Bay, Ontario, 1982

Master of Science in Geotechnical Engineering, University of Manitoba, Winnipeg, Manitoba, 1984

Ph.D., Geotechnical Engineering, University of Manitoba, Winnipeg, Manitoba, 1991

MEMBERSHIPS

Member, Association of Professional Engineers and Geoscientists of Alberta

Member, Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists

Member, Canadian Geotechnical Society

PROJECT EXPERIENCE

GEOTECHNICAL ENGINEERING

Pacific Trails Pipeline System | Chevron Canada | British Columbia | Senior Geotechnical Advisor & Technical Reviewer

Senior geotechnical advisor and technical reviewer for the design of a NPS 42 high pressure gas pipeline of approximately 650 km length. Geotechnical and geological issues include avalanche, debris flow, liquefaction and lateral spreading, glaciomarine clays and other issues. Participated in route reconnaissance and selection. Responsible for providing technical input to field studies and technical review of consultant reports.

Pembina Pipelines Fox Creek to Namao Liquid Pipelines | Pembina Pipelines | Alberta | Senior Geotechnical Engineer

Senior geotechnical engineer responsible for assessing in-situ soil strength at selected horizontal bends and HDD over bends as part of a soil-pipeline interaction study. Soil strengths were used in pipeline stress models to assess thermal expansion effects arising from a proposed increase in operating temperature. Also responsible for assessing in-situ soil strength of trench backfill to facilitate use of heavy tracked equipment for RoW clean up and reclamation. Program entailed the development of a field testing tool and novel assessment criteria to confirm the bearing capacity of the ground, including a thin frozen surface crust so that sections of the RoW could be safely accessed.

Nanisvik Naval Facility | Baffin Island, Nunavat | Review Engineer

Review engineer assisting geotechnical consultant on issues related to permafrost for the proposed redevelopment and enlargement of a decommissioned deep water port in northern Baffin Island.

Hay River Airport | Hay River, Northwest Territories | Senior Geotechnical Review Engineer

Senior geotechnical review engineer for geotechnical investigation into subsurface conditions at Hay River airport to provide foundation recommendations for a new antenna array and glide path facility structure.

** denotes projects completed with other firms*

Enbridge Pipeline Communications Tower | Enbridge | Fort Simpson, Northwest Territories | Senior Permafrost Engineer

Senior permafrost engineer for the design of a foundation to support a communications tower at a remote valve site on the Norman Wells pipeline.

Aurora Pipeline Project* | Universal Pegasus Inc. | British Columbia | Geotechnical Engineering Specialist

Geotechnical engineering specialist providing preliminary geotechnical and geological hazard assessments for proposed high pressure natural gas pipeline from northeast B.C. to Prince Rupert. Provided input to assessment of several potential routing corridors and review of potential geological hazard and geotechnical-related construction issues to selected corridors.

Grand Rapids Pipeline* | TransCanada Pipelines Ltd. | Alberta | Geotechnical Specialist Advisor

Geotechnical specialist advisor to TCPL. Provided expert geotechnical input to geotechnical field programs, consultant/contractor report review, and preparation of soil-pipeline interaction parameters for pipeline stress analysis.

Prince Rupert Gas Transmission* | TransCanada Pipelines Ltd. and Universal Pegasus Inc. | British Columbia | Senior Geotechnical Advisor and Technical Reviewer

Senior geotechnical advisor and technical reviewer for the design of a NPS 48 high pressure gas pipeline of approximately 750 km length. Geotechnical and geological issues include seismic fault rupture, volcano, debris flow, liquefaction and lateral spreading, glaciomarine clays and other issues. Responsible for providing technical input to field studies and technical review of consultant reports.

Oleoductos de Crudos Pesados (OCP) Pipeline* | Ecuador | Senor Geotechnical Engineer and Project Manager

Senior geotechnical engineer and Project Manager for a geological hazard assessment of the Oleoductos de Crudos Pesados (OCP) pipeline. Examined LiDAR imagery to identify geological hazards (landslides, earth flows, slumps, seismic fault ruptures) along the pipeline route that were presently not identified by OCP. Developed a semi-quantitative geohazard assessment to rate the identified hazards along the route to help set priorities for mitigations and interventions.

Alaska Gas Project* | Alaska, Yukon, British Columbia | Permafrost and Geotechnical Engineer

Permafrost and geotechnical engineer within the strain based design team responsible for characterization of route soils and determination of strain demand on the pipeline arising from frost heave and thaw settlement. Geotechnical coordinator for Project Management Team responsible for interaction and technical support to project engineering consultant. Responsibilities included coordination with environmental and regulator teams in Alaska and Canada, evaluation of geotechnical contractors to conduct intrusive field investigations, selection of field testing sites, documentation of permafrost disturbance and consultations with regulatory agencies.

Norman Wells Pipeline* | Norman Wells, Northwest Territories | Senior Project Engineer

Senior project engineer with over 15 years of active involvement in geotechnical issues. Responsible for ongoing review and evaluation of thermal, piezometric and slope stability instrumentation. Conducted annual field reconnaissance and inspections, and installed monitoring points. Many of the slopes are experiencing thawing of the permafrost under the pipeline, and an assessment of the stability of the pipeline is necessary. Responsible for preparation of annual stability assessments to be submitted to the NEB.

Frozen Muskeg Loading Study* | Alberta

Undertook a study to determine the permissible loading of frozen muskeg by drill rigs in northern Alberta. Organized field sampling of muskeg, ground temperature collection, laboratory testing and numerical modeling to provide estimates of required frozen muskeg thickness and development of a prototype field tool.

Mackenzie Gas Project* | Northwest Territories | Senior Permafrost Engineer, Project Manager, Expert Witness, Senior Reviewer

Responsible for the slope design of the pipeline through continuous and discontinuous permafrost. Work involves coordination of multi-disciplinary team (geothermal modeling, geotechnical engineering, GIS) to identify, catalogue slopes and develop design strategies to ensure long-term stability. Other project work included senior permafrost engineer and project manager for planning of geotechnical drilling program for pipeline section south of Norman Wells, and Senior Reviewer for permafrost aspects of EIA. Expert witness in National Energy Board and Joint Review Panel hearings.

** denotes projects completed with other firms*

Coastal Gas Link* | TransCanada Pipelines Ltd. | Alberta, British Columbia | Geotechnical Specialist Advisor

Geotechnical specialist advisor to TCPL. Provided expert geotechnical input to geotechnical field programs, routing and siting, consultant/contractor report review, and preparation of internal geotechnical engineering guidance documents. Prepared geological hazard risk assessment report for submission to the B.C. Oil and Gas Commission. Participated in technical meetings to B.C. Oil and Gas Commission, including presentations on geological hazards.

Alaska LNG Pipeline* | ExxonMobil/Worley Parsons | Alaska | Senior Geotechnical and Permafrost Engineering Advisor

Senior geotechnical and permafrost engineering advisor to Project Management Team on issues related to the design of a large diameter, high pressure pipeline to transport natural gas from Prudhoe Bay to Cook Inlet in Alaska for LNG export. Provide input relative strain-based design issues, review of field investigation program, preparation of documents regarding incorporating climate change into the pipeline design, assessment of conservatism in the pipeline design, and erosion control plans for construction and operations. Made presentations to the U.S. Federal Energy Regulatory Commission in Washington, D.C.

EcoPetrol* | Colombia | Senior Geotechnical Engineer

Senior geotechnical engineer and member of international multi-disciplinary team examining the root causes of two pipeline ruptures in mountainous regions of Colombia. In case, the rupture resulted in an explosion with over 30 fatalities. Services included site reconnaissance, preparation of a preliminary assessment report, development of scope of work and specifications for geotechnical investigations and instrumentation, supervision of the geotechnical program and assessment of data, and reporting.

Husky Energy North Saskatchewan River Pipeline Crossing | Husky Energy | Saskatchewan | Senior Geotechnical Engineer

Senior geotechnical engineer for geotechnical issues related to soil-pipeline interaction assessment, and senior review engineer for geotechnical issues related to slope instability and mitigation to address creep slopes on pipeline route.

PUBLICATIONS & WHITEPAPERS

Dr. Oswell has authored or co-authored over 30 papers published in journals and conference proceedings. He is author of the textbook "Soil mechanics for pipeline stress analysis". He a member of the International Standards Association, Technical Committee (TC) 67/SC 2 - Pipeline transportation systems; Member of Working Group (WG) 23 - Geological hazards risk management of oil and gas pipelines., 2018.

** denotes projects completed with other firms*

Lorne Boone M.Eng., P.Eng., P.Geo, FEC

Geotechnical Engineer
38 years of experience · St. John's, Newfoundland and Labrador

Mr. Lorne C. Boone, M.Eng., P.Eng., P.Geo., is a senior geotechnical engineer and Principal of the firm. His academic background and experience includes assessment of site conditions for geotechnical and hydrogeological projects. From 1995–2007 he was project manager for geotechnical investigations for INCO's Voisey's Bay mine (Ni-Co-Cu) development in Labrador and the Hydromet Facility in Argentia, NL. The project included geotechnical investigations and engineering for planning: Process Plant/Mill Site, Temporary Airstrip, Docking Facilities, Tailings Basin Site Selection Studies, and development of an Open Pit. Mr. Boone has managed geotechnical investigations for the Mile One Stadium, St. John's Convention Centre, and Riverhead Wastewater Treatment Project (St. John's Harbour Clean-up Project); all in St. John's, NL. He managed geotechnical investigations for the 27 MW St. Lawrence Wind Energy Project. He recently conducted significant project management assignments and technical support for the Lower Churchill project, including the Strait of Belle Isle Geotechnical Investigation for a proposed sub-sea tunnel for HVDC transmission lines from the LCP in Labrador, as well as Marine Geotechnical Investigations of the Shore Line Electrodes components of the HVDC line within the Province; Geotechnical Investigation for Ore Pass and Tunnel for Quinde Marble Quarry, Ecuador; rail line and mine infrastructure geotechnical investigations for new Bloom Lake Iron Mine, Western Labrador (includes concentrator, crusher, bridges, thickener and electrical sub-stations); geotechnical investigations in support of DSO proposed iron mines for Tata Steel Minerals Canada.

EDUCATION

B.Sc. (Earth Science), Memorial University of Newfoundland and Labrador, St. John's, NL, Canada, 1985

B.Sc.Eng. (Geological Engineering), University of New Brunswick, Saint John, NB, Canada, 1987

M.Eng. (Geotechnical Engineering), University of Alberta, Edmonton, AB, Canada, 1992

REGISTRATIONS

Professional Engineer #02162, Professional Engineers and Geoscientists Newfoundland and Labrador

Professional Geologist #02162, Professional Engineers and Geoscientists Newfoundland and Labrador

MEMBERSHIPS

Eastern Chapter, Past Chair, Professional Engineers and Geoscientists Newfoundland and Labrador

Member, Newfoundland Environmental Industry Association

Member, Canadian Geotechnical Society

Newfoundland and Labrador Section, Past President (2005/2006), Geological Association of Canada

PROJECT EXPERIENCE

BRIDGES

Geotechnical Investigation, Rail Underpass | Cliffs Natural Resources | Wabush, Newfoundland and Labrador | Project Manager

Geotechnical Investigation, Bridge Abutments | Consolidated Thompson C/O Rail Cantech | Bloom Lake, Newfoundland and Labrador | 2009 | Project Manager

Crabbe's River Bridge Replacement | Bridger Design | Crabbe's River, Newfoundland and Labrador | 2010 | Project Manager

CONDITION ASSESSMENT

Condition Evaluation, Wells/Pumps, Muskrat Falls, Lower Churchill Project | Newfoundland and Labrador Hydro | Muskrat Falls, Newfoundland and Labrador | 2009 | Project Manager

GEOTECHNICAL ENGINEERING FOR MARINE FACILITIES

Marine Geotechnical Investigation, Proposed Infill Project for Waste Water Treatment Plant | CBCL Limited | Corner Brook, Newfoundland and Labrador | Project Manager

NLRC Geotechnical Investigation - Marine Component | SNC Lavalin Inc. | Newfoundland and Labrador | 2009 | Project Manager

Geotechnical Investigation, Proposed Sub-Sea Tunnel | SNC Lavalin Inc. | Strait of Belle Isle, Newfoundland and Labrador | 2009 | Project Manager

Marine Geotechnical Investigations, Lower Churchill Project - Shoreline Pond Electrode Sites | Nalcor Energy | L'Anse au Diable and Dowden's Point, Newfoundland and Labrador | Project Manager

Marine Geotechnical Investigation, Cooper Cove Infill and Fleet Dock Expansion Project | Port of Argentia | Argentia, Newfoundland and Labrador | Project Manager, 2023

Marine Geotechnical Investigation, Aquaculture Facility Dock | Port of Argentia | Argentia, Newfoundland and Labrador | 2022 | Project Manager

Marine Geotechnical Investigation, Wharf Replacement and Extension Project | CBCL Limited | Port au Choix, Newfoundland and Labrador | 2022-2023 | Project Manager

Marine Geotechnical Investigation, Ro-Ro Ramp Caissons, Oceanex Expansion Project | St. John's, Newfoundland and Labrador | 2004 | Project Manager

Marine borehole investigation from floating plant for assessment of subsurface conditions and geotechnical recommendations for caisson design.

Marine Geotechnical Investigation, Wharf and Breakwater, Lark Harbour, NL | Lark Harbour, Newfoundland and Labrador | 2024 | Project Manager

Boreholes completed from floating plant for design of breakwater and wharf.

Geotechnical Investigation, Proposed Marine Terminal for Strange Lake Rare Earth Elements Deposit | Quest Rare Minerals Canada | Anaktalak Bay, Newfoundland and Labrador | Project Manager

Geotechnical Investigation, Proposed LNG Terminal | NL LNG Ltd. | Placentia Bay, Newfoundland and Labrador | Project Manager

Geotechnical Investigation, Fabrication Dock Expansion for White Rose FPSO Project | Kiewitt | Marystown, Newfoundland and Labrador | Project Manager

Offshore Marine Geotechnical Investigation, Hibernia Field | Mobil Oil Canada | Grand Banks, Newfoundland and Labrador | Project Engineer

GEOTECHNICAL ENGINEERING

Geotechnical Investigation, Johnson Geoscience Center | Johnson Family Foundation | St. John's, | Project Manager

Menihek Generating Station, Bedrock Quarry Assessment for Armour Stone and Blast Vibration Analysis on Control Structure | CFLCo. (Nalcor) | Menihek, Newfoundland and Labrador | 2018 | Technical Lead and Project Manager

Vibration Analysis for Bedrock Removal at Tank Farm | Irving Oil Limited | St. Johns, Newfoundland and Labrador | 2019 | Technical Lead and Project Manager

Exploits River Field Investigation and Testing | BAE-NewPlan Group Ltd. | Exploits, Newfoundland and Labrador | 2005 | Project Manager

Proposed Phase II Expansion, Humber Valley Resort | CBCL Ltd. | Corner Brook, Newfoundland and Labrador | 2005 | Project Management

Geotechnical Investigation, Deer Lake Runway Extension | Hatch Mott MacDonald Ltd. | Deer Lake, Newfoundland and Labrador | 2009 | Project Manager

Geotechnical Investigation, Building Flooding | John Hearn Architect Inc. | Paddy's Pond, Newfoundland and Labrador | 2009 | Project Manager

Geotechnical Investigation, Proposed Box Store Developments, Kelsey Drive | Kent Building Supplies | St. John's, Newfoundland and Labrador | 2009 | Project Manager

Geotechnical Investigation, Menihek Generating Station | AMEC Americas Limited | Schefferville, Newfoundland and Labrador | 2009 | Project Manager

Geotechnical Investigation, Ocean Sciences Center | Hatch Mott MacDonald | St. John's, Newfoundland and Labrador | 2010 | Project Manager

Geotechnical Investigation, New Mount Pearl Square Store | TDL Group | Mount Pearl, Newfoundland and Labrador | 2009 | Project Manager

Geothermal Testing / Earth Resistivity | Various Clients | Various Sites including Gander, Clarenville, and St. John's, Newfoundland and Labrador | Project Manager

Geotechnical Investigations, Various Buildings at Memorial University including Core Sciences Building, School of Pharmacy, Earth Sciences Building, Parking Garage, and Clock Tower | Memorial University of Newfoundland | St. John's, Newfoundland and Labrador | Project Manager

Geotechnical Investigation, The Rooms - NL Museum and Archives | PHB Group | St. John's, Newfoundland and Labrador | Project Engineer

Earth Resistivity Measurements Related to Existing or Proposed Power Generation at Various Sites | NL Hydro and Alstom Grid Inc. | Churchill Falls, Muskrat Falls, Wabush, Forteau Point, Shoal Cove, and Wiltondale, Newfoundland and Labrador | 2014 | Project Manager

Geotechnical Investigation, Nain Airport and Access Road | Nunatsiavut Government | Nain, Newfoundland and Labrador | 2022-Present | Project Manager

Project Manager for geotechnical site investigation of new runway, air terminal building and 12 km access road from the community of Nain, NL. Work was located at a remote site and accessed by helicopter, including movement of drill rigs.

Geotechnical Investigation, Renewstable Barbados Solar Photovoltaic Energy Facility | Renewstable Barbados | Harrow Plantation, Saint-Philip, Barbados | 2022 | Geotechnical Project Manager

MINING

Geotechnical Investigation for Return Air Raise, Shaft, Paste fill Plant and Substation, Thompson Mine Expansion Phase 1, FEL-3 Study Refresh | Vale Canada Limited | Thompson, Manitoba, Canada | 2018 - 2019 | Project Manager, Geotechnical Investigations

Geotechnical Investigation, New Pods Area Crusher, Carol Lake Project | Iron Ore Company of Canada (Rio Tinto) | Labrador City, Newfoundland and Labrador, Canada | Project Manager

Geotechnical Investigation, New Mine Maintenance Shop and Concentrate Storage Building | Canada Fluorspar Inc. | St. Lawrence, Newfoundland and Labrador, Canada | 2018 | Project Manager

Geotechnical Investigation, Quinde Limestone Quarry Project, Glory Hole Shaft and Transportation Tunnel | Lafarge Canada | Otavalo, Ecuador | Project Manager

Dam Safety Inspections for Vale 's Feta, Stobie and Frood Tailings Dams and Associated Control Structures | Vale Canada Limited | Sudbury, Ontario | 2019 | Geotechnical Engineer

Mine Reclamation and Closure Plan Updates for Vale's Voisey's Bay Mine and the Long Harbour Processing Facility | Vale Canada Limited | Newfoundland and Labrador | Project Manager

Geotechnical Investigation, DSO Iron Mine | Tata Steel Minerals Canada | Schefferville, Quebec & Newfoundland and Labrador | Project Manager

Geotechnical Investigation, Duck Pond Mine Infrastructure | SHG Group | Newfoundland and Labrador | Project Manager

Geotechnical Investigation, Mine Infrastructure | Vale Inco | Voisey's Bay, Newfoundland and Labrador | Project Manager

Geotechnical Investigation, Bloom Lake Rail Line and Mine | Consolidated Thompson Iron Mines Ltd. | Western Labrador, Newfoundland and Labrador | 2009 | Project Manager

Geotechnical Investigation, Tailings Pond, Fluorspar Mine | SNC Lavalin Inc. | St. Lawrence, Newfoundland and Labrador | 2009 | Project Manager

Geotechnical Investigation, Tailings and Waste Rock Assessment for Alderon Kami Project - Proposed Iron Ore Mine | Alderon Iron Ore Corp. | Labrador West, Newfoundland and Labrador | Project Engineer

Blast Vibration Monitoring and Analysis, Limestone Quarry | Atlantic Minerals Limited | Lower Cove, Newfoundland and Labrador | 2017 - 2019 | Technical Lead and Project Manager

Rehabilitation and Closure Plan, Limestone Quarry | Atlantic Minerals Limited | Lower Cove, Newfoundland and Labrador | 2015-Present | Project Manager

Rehabilitation and Closure Plan, Voisey's Bay Mine | Vale Canada Limited | Anaktalak Bay, NL, Canada | 2021-2022 | Project Manager

Rehabilitation and Closure Plan, Hydromet Processing Facility | Vale Canada Limited | Long Harbour, NL, Canada | 2021-2022 | Project Manager

Geotechnical Investigation, Bloom Lake Iron Mine Concentrator | Quebec Iron Ore | Fermont, QC, Canada | 2021-2022 | Project Manager

OIL & GAS

Geotechnical Investigation, Bull Arm Construction Site | PASSB | Bull Arm, Newfoundland and Labrador | Project Engineer

Various structures including Top Sides Quay, Nodeco Quay, and various fabrication and office buildings.

Hibernia Drill Cuttings Sampling/Processing and Disposal | Hibernia Management and Development Company | St. John's, Newfoundland and Labrador | 2006 | Project Manager

Hebron Bund Wall (Dry Dock) Geotechnical Investigation | ExxonMobil | Bull Arm, Newfoundland and Labrador | Project Manager

WIND POWER

St. Lawrence 27MW Wind Project, Geotechnical Investigations | Northland Contracting Inc. | St. Lawrence, Newfoundland and Labrador | 2007 | Project Manager

Geotechnical Investigation, Lamberts Wind Project | Barbados Light and Power Company Ltd. | Saint Lucy, Barbados | 2020-2021 | Project Manager

PUBLICATIONS & WHITEPAPERS

Field Performance of Thin Wall Foundations. *Boone, L.C., Sego, D.C., and Dozzi, S.P., Canadian Journal of Civil Engineering, Vol. 23, No.2*, 1996.

Packer Permeability Testing in Deep Inclined Boreholes - Feasibility Study for Subsea Tunnel, Nalcor Energy Strait of Belle Isle Program, Newfoundland and Labrador. *Parsons, S., Boone, L.C., Peddle, M., and Guðmundsson, A., Pan-Am CGS Geotechnical Conference, March, 2011*, 2011.

Appendix A2 Letter of Regulator Collaboration

NUNATSIAVUT
kavamanga Government
Nunaliginikmik amma Nunamiutanik Ujaganik Imaniklu
Lands and Natural Resources

September 19th, 2023

Good afternoon,

As discussed in previous meetings, the three jurisdictions potentially requiring an impact/environmental assessment of the Nain Airport Project (the Project) have discussed a coordinated approach for the registration and planning phases of their respective processes that would maintain the legislated requirements of each jurisdiction. A coordinated approach would enhance efficiency of the assessment processes, reduce duplication, facilitate stakeholder engagement, and achieve the high-level goal of one project – one review. As you know, a single registration document/initial project description (RD/IPD), one set of guidelines, and a single impact statement document could help achieve this goal.

To this end, the first option is to coordinate the planning phase and comment periods. Nunatsiavut Infrastructure (the Proponent) has expressed its intent to submit one RD/IPD. In order to facilitate a coordinated comment period on the RD/IPD, we encourage your cooperation with the timing of its submission to each jurisdiction. This approach would consider submitting your document to Nunatsiavut Government and the Impact Assessment Agency first and then to Newfoundland and Labrador. This staggered approach would assist the three jurisdictions in completing their legislated requirements and facilitating one comment period for all three jurisdictions.

In terms of the specific timing of registration, we encourage you to consider two factors. First, the length of each jurisdiction's process before the first comment period and, second, the scheduling of the Nunatsiavut Assembly sessions (around 105 days into the process). The Nunatsiavut Assembly sessions establish the Assembly committee, which is required for the next phases of the review process for the Nunatsiavut Government. As you are aware, the Nunatsiavut Assembly meets a limited number of times each year, with meeting dates currently scheduled for January and March 2024. Registration in time for the January Assembly would require submission of the RD/IPD in early October 2023. Submission should be to both the Nunatsiavut Government and the Agency, to allow the Agency to do its conformity review and for the Nunatsiavut Minister of Lands and Natural Resources to notify the proponent of alternative/additional publication requirements. Once these steps have been completed, you can then submit the final version of your registration document to the province. Should submission in early October not be possible, we would suggest registering your project towards the end of November in order to meet the March Assembly meeting. Regulators encourage you to plan ample time for the submission and review of an updated draft RD/IPD, before registration.

This coordinated approach would involve each jurisdiction working toward aligning steps in their respective EA processes, especially in terms of comment periods. Adjustments to the Nunatsiavut Government environmental review process would be within existing leeway, while adjustments that would extend the planning phase of the federal process requires a request from the other jurisdiction. The three jurisdictions are committed to work together to align their EA processes to help facilitate one project – one review.

We will be happy to answer questions on these elements during our next regulators-proponent meeting, as well as provide details on each of the processes under this coordinated approach.

Thank you,

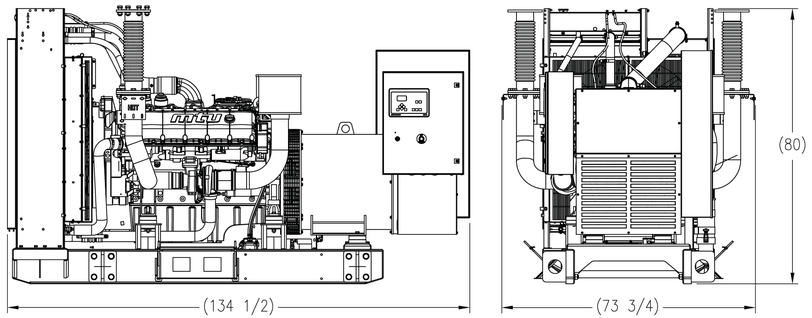
<Original signed by>

Rodd Laing
Director of Environment

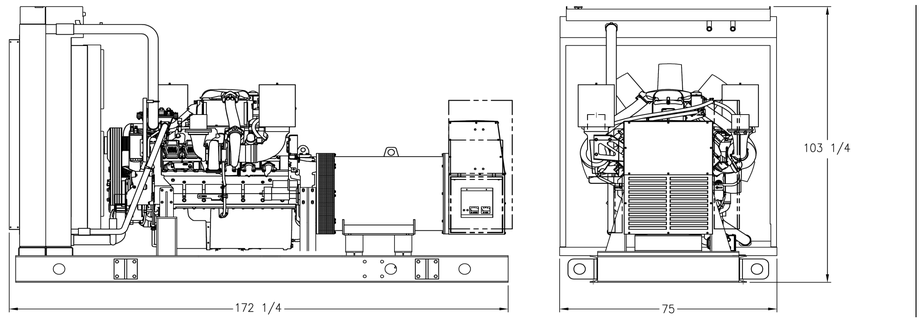
Cc: Impact Assessment Agency of Canada
Environmental Assessment Division, Government of Newfoundland and Labrador

Appendix B

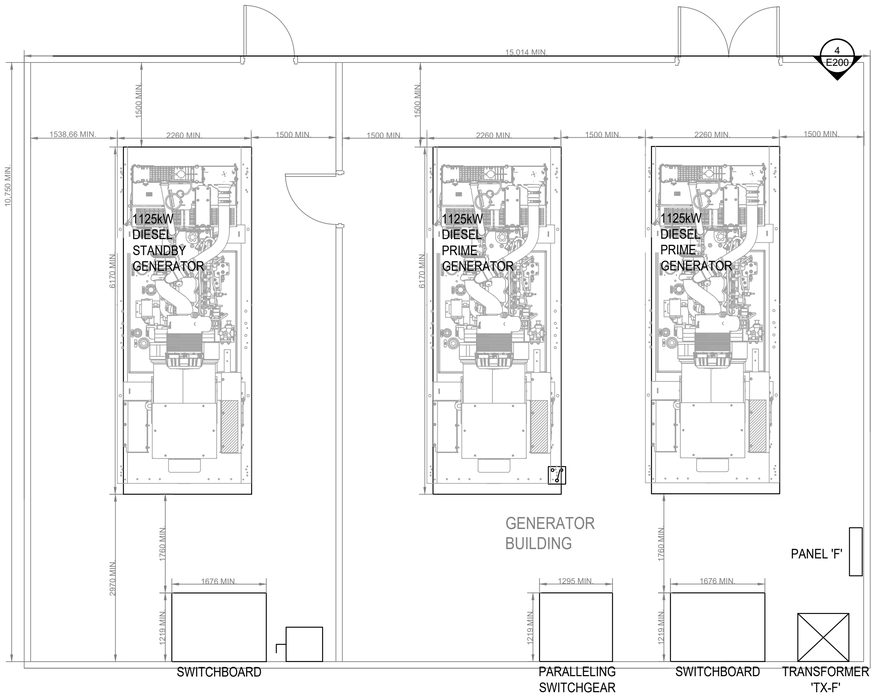
Engineering Diagrams



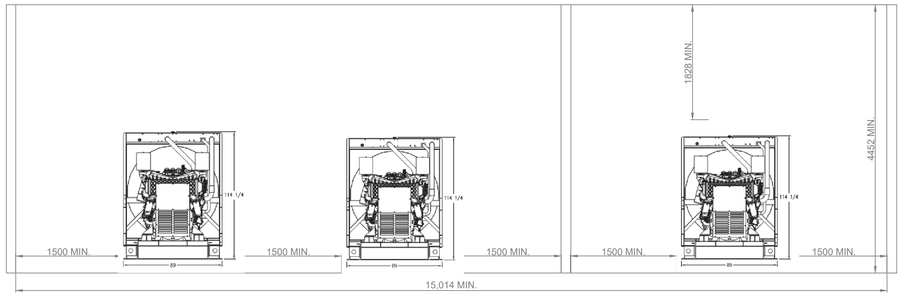
1 E400 PRIME GENERATOR DETAILS
N.T.S.



2 E400 BACKUP GENERATOR DETAILS
N.T.S.



3 E400 CENTRAL POWER STATION LAYOUT
1:50



4 E400 CENTRAL POWER STATION SECTION
N.T.S.

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1100-111 Dunsmuir Street
Vancouver, BC V6B 6A3
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Notes

Issue/Revision	YYYY.MM.DD
1 ISSUED FOR PRELIMINARY DESIGN REVIEW	2024.03.25

Permit/Seal

Stantec Permit: 1002862

Client/Project Logo

NUNATSIAVUT kavamanga Government

Client/Project
NUNATSIAVUT GOVERNMENT

NNAFS R8 Preliminary Engineering Services

Nain, Nunatsiavut / Canada

Title
CENTRAL POWER STATION DETAILS

Project No.	Scale
115823110	As Noted
Revision	Drawing No.

E400

ORIGINAL SHEET - ARCH D

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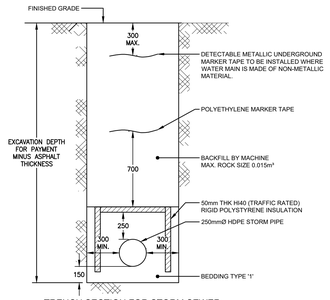
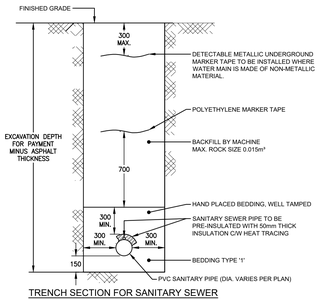


TRENCH SECTION FOR STORM SEWER

NOTES:

1. MEASUREMENT FOR PAYMENT AS PER PROJECT SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.

5A — STORM SEWER PIPE TRENCH DETAIL
SCALE 1:20

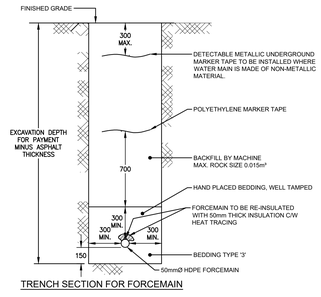


TRENCH SECTION FOR SANITARY SEWER

NOTES:

1. MEASUREMENT FOR PAYMENT AS PER PROJECT SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.

5B — SANITARY SEWER PIPE TRENCH DETAIL
SCALE 1:20



TRENCH SECTION FOR FORCEMAIN

NOTES:

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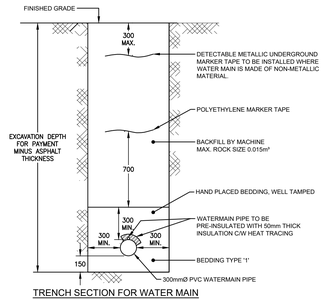
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.

5C — SANITARY FORCEMAIN PIPE TRENCH DETAIL
SCALE 1:20



TRENCH SECTION FOR WATER MAIN

NOTES:

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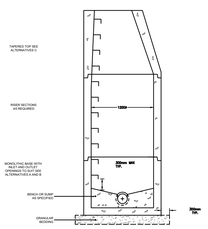
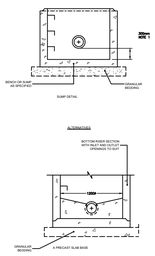
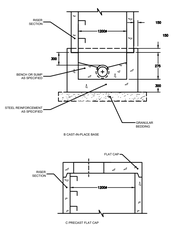
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.

5D — WATER PIPE TRENCH DETAIL
SCALE 1:20



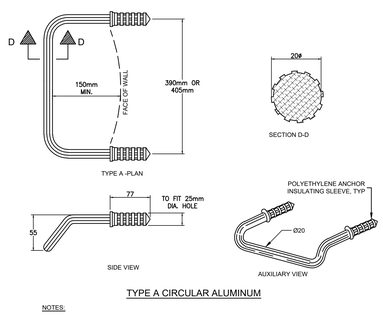




NOTES:

1. THE SUMP IS MEASURED FROM THE LOWEST INVERT.
2. GRANULAR BACKFILL SHALL BE PLACED TO A MINIMUM THICKNESS OF 300mm ALL ROUND THE MAINTENANCE HOLE.
3. PRECAST CONCRETE COMPONENTS SHALL BE ACCORDING TO DRAWING 04220, NL MUNICIPAL SPECIFICATIONS.
4. STRUCTURES EXCEEDING 5.0m IN DEPTH SHALL INCLUDE SAFETY PLATFORM ACCORDING TO DRAWING 04270, NL MUNICIPAL SPECIFICATIONS.
5. PIPE SUPPORT SHALL BE ACCORDING TO DRAWING 04260, NL MUNICIPAL SPECIFICATIONS.
6. BENCHING AND PIPE OPENING DETAILS SHALL BE ACCORDING TO DRAWING 04320, NL MUNICIPAL SPECIFICATIONS.
7. FOR ADJUSTMENT UNIT AND FRAME INSTALLATION, REFER TO DRAWING 04250, NL MUNICIPAL SPECIFICATIONS.
8. ALL DIMENSIONS ARE NOMINAL.
9. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
10. FOR FRAME AND COVER REFER O DRAWING 04330, NL MUNICIPAL SPECIFICATIONS.

6 / 023–2 — PRECAST CONCRETE MANHOLE 1200 mmø
SCALE 1:100

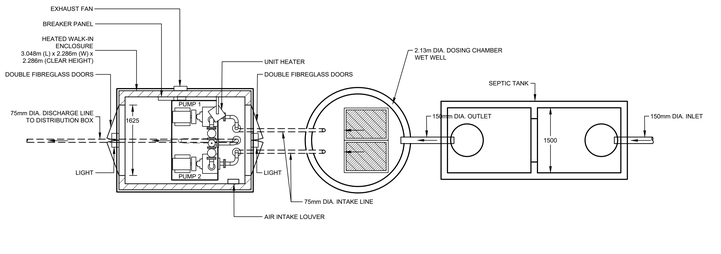


TYPE A CIRCULAR ALUMINUM

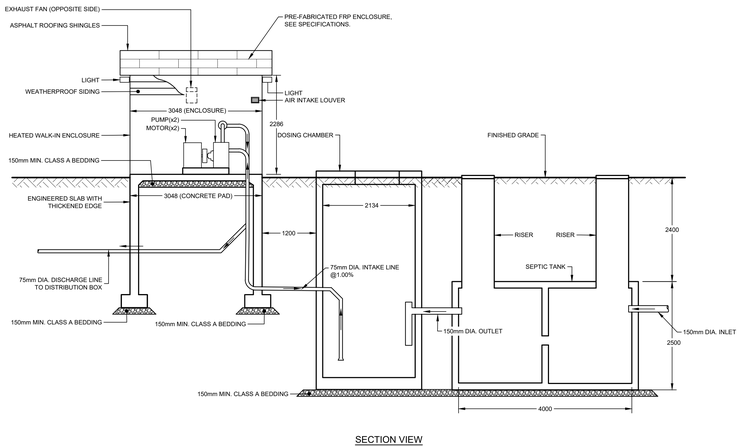
NOTES:

1. ALL ALUMINUM COMPONENTS SHALL BE 6000 SERIES STRUCTURAL ALUMINUM.
2. ALL ALUMINUM IN CONTACT WITH CONCRETE SHALL BE THOROUGHLY COATED WITH ASPHALT PAINT.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.

7 / – — MANHOLE STEPS – SOLID
SCALE 1:50

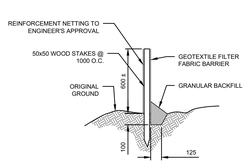


PLAN VIEW



SECTION VIEW

– / – — SEPTIC TANK AND DOSING CHAMBER
SCALE 1:50



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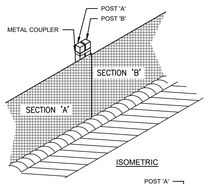

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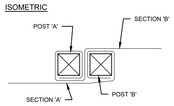

PLAN AT POST

SILT FENCE INSTALLTION:

1. EXCAVATE 150 x 150 TRENCH WHERE INDICATED.
2. UNROLL SILT FENCE ONE SECTION AT A TIME AND POSITION POSTS AGAINST THE DOWNSTREAM WALL OF THE TRENCH. REINFORCEMENT NETTING MUST BE ON THE DOWNSTREAM SIDE OF FLOW DIRECTION.
3. DRIVE POST INTO THE GROUND UNTIL THE REINFORCEMENT NETTING IS APPROXIMATELY 50mm FROM THE TRENCH BOTTOM.
4. LAY THE TOE-IN FLAP OF THE FABRIC IN THE BOTTOM OF THE TRENCH. BACKFILL THE TRENCH AND TAMP THE SOIL.
5. JOIN SILT FENCE SECTIONS AS SHOWN ABOVE.

4 / 023–2 — SILT FENCE INSTALLATION
NTS

Stantec

Stantec Consulting Ltd
1200, Saint-Martin Blvd West, suite 300
Laval (Quebec) H7S 2E4
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Notes

Issued/Revision	By	Appd	YYYY.MM.DD
A PRELIMINARY DESIGN	BG	CF	2024.03.28

File Name: 115823110_C-303-304.DWG — 2023.12.04 YYYY.MM.DD

CLD/GSC Prepared — CLD/GSC Drawn

MARCO ROCHA, P.Eng Project Manager

Permit-Seal

Client/Project Logo

NUNATSIAVUT kavamanga Government

Client//Project
NUNATSIAVUT GOVERNMENT

NNAFS R8 Preliminary Engineering Services

Nain, Nunatsiavut / Canada

Title
CIVIL DETAILS

Project No. 115823110 — Scale AS SHOWN

Iss./Rev. A — Sheet 3 of 8 — Drawing No. C-303

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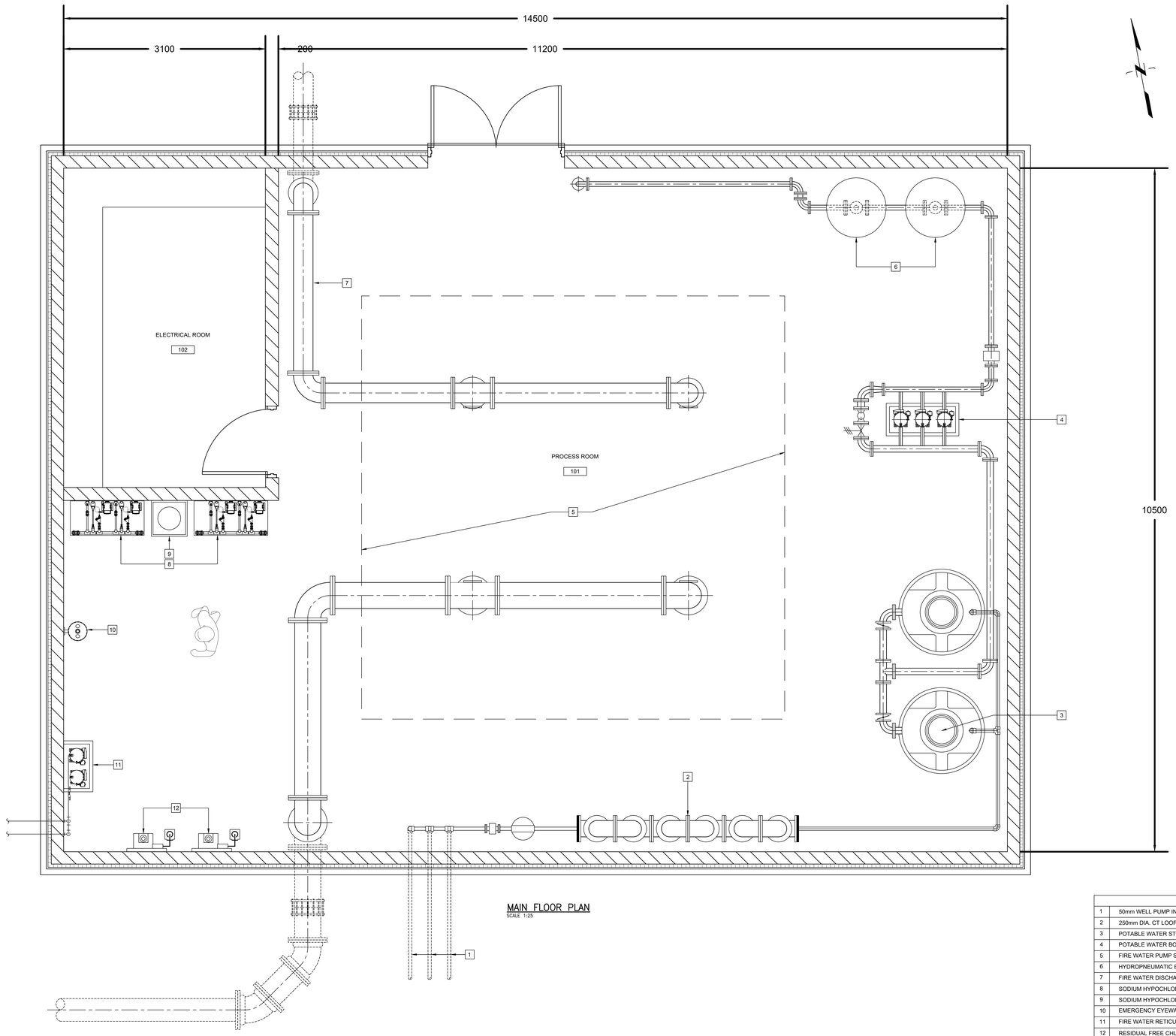
ISO A0



MAIN FLOOR PLAN
SCALE 1:25

EQUIPMENT LIST			
1	50mm WELL PUMP INLET LINES		
2	250mm DIA. CT LOOP		
3	POTABLE WATER STORAGE TANKS		
4	POTABLE WATER BOOSTER PUMP SKIDS		
5	FIRE WATER PUMP SKIDS		
6	HYDROPNEUMATIC BUFFER TANKS		
7	FIRE WATER DISCHARGE HEADER		
8	SODIUM HYPOCHLORITE DOSING PUMP SKIDS		
9	SODIUM HYPOCHLORITE CHEMICAL TANK AND CONTAINMENT		
10	EMERGENCY EYEWASH STATION (WALL MOUNT)		
11	FIRE WATER RETICULATION PUMPS		
12	RESIDUAL FREE CHLORINE ANALYZER PANELS		

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Notes

1. CONTRACTOR TO REFER TO P&IDS FOR ALL CHEMICAL SYSTEM PIPING & SIZING.

Issued/Revision	By	Appd	YYYY.MM.DD
A PRELIMINARY DESIGN	SH	WM	2024.03.28

File Name: 115823110_C-308.DWG — 2024.03.13 YYYY.MM.DD

MB Prepared — DC Drawn

MARCO ROCHA, P.Eng. Project Manager

Permit-Seal

Client/Project Logo

NUNATSIAVUT kavamanga Government

Client/Project
NUNATSIAVUT GOVERNMENT

NNAFS R8 Preliminary Engineering Services

Nain, Nunatsiavut / Canada

Title
WATER TREATMENT PLANT
PROCESS LAYOUT

Project No. 115823110 — Scale NOT TO SCALE

Iss./Rev. A — Sheet 8 of 8 — Drawing No. C-308

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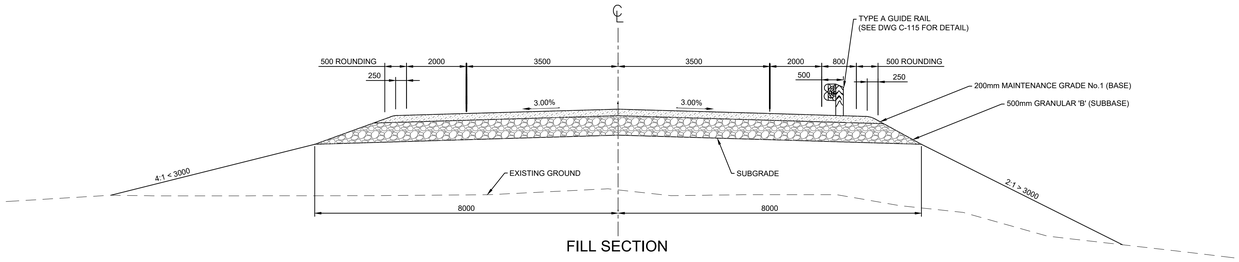
ISO A0

NAIN AIRPORT SITE ACCESS ROAD

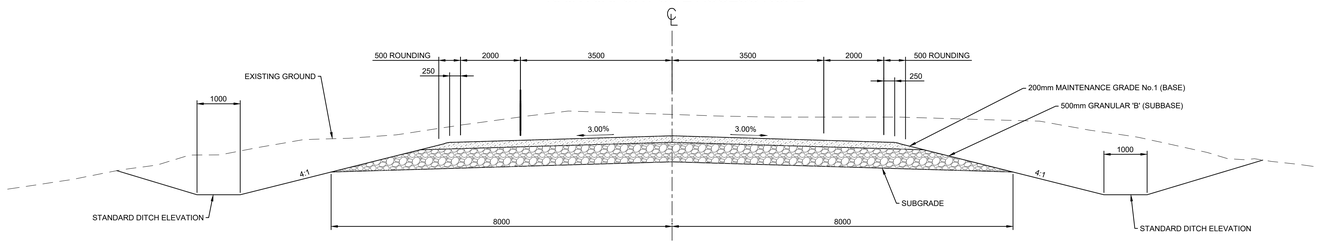


FILL SECTION

NAIN AIRPORT SITE ACCESS ROAD

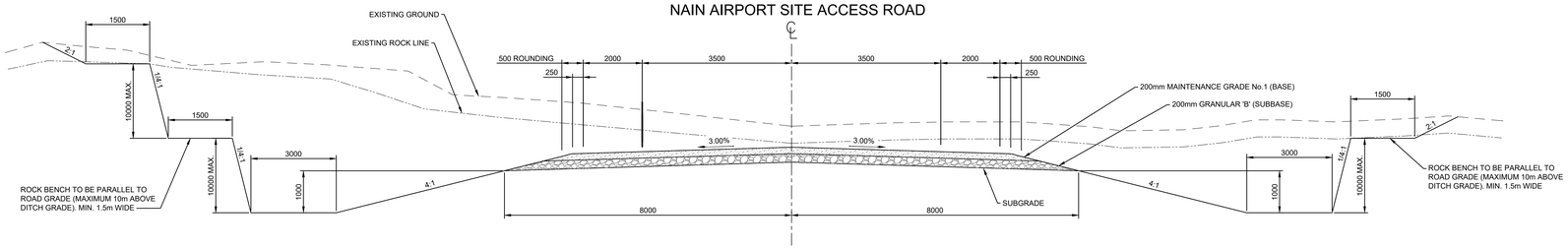
NOTE:

GEOTEXTILE AND/OR GEOGRID REQUIRED AT SUBGRADE AND/OR ON ORIGINAL GROUND BASED ON SITE CONDITIONS AT THE TIME OF CONSTRUCTION, AS DIRECTED BY THE ENGINEER.



CUT SECTION IN COMMON

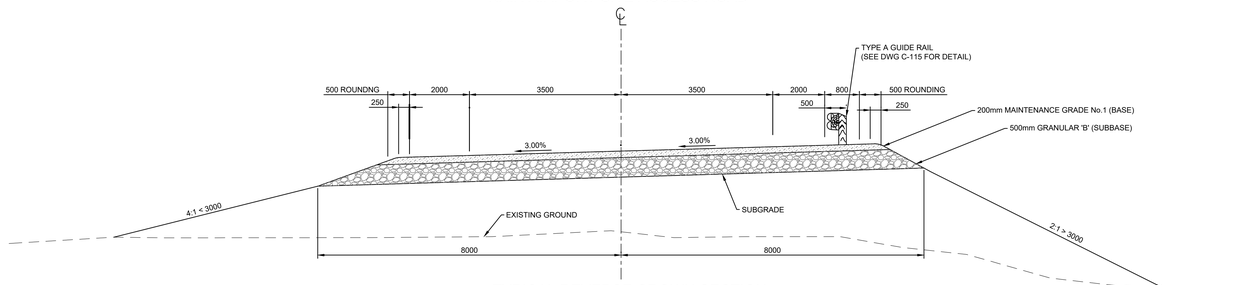
NAIN AIRPORT SITE ACCESS ROAD



SOLID ROCK EXCAVATION (SRE)

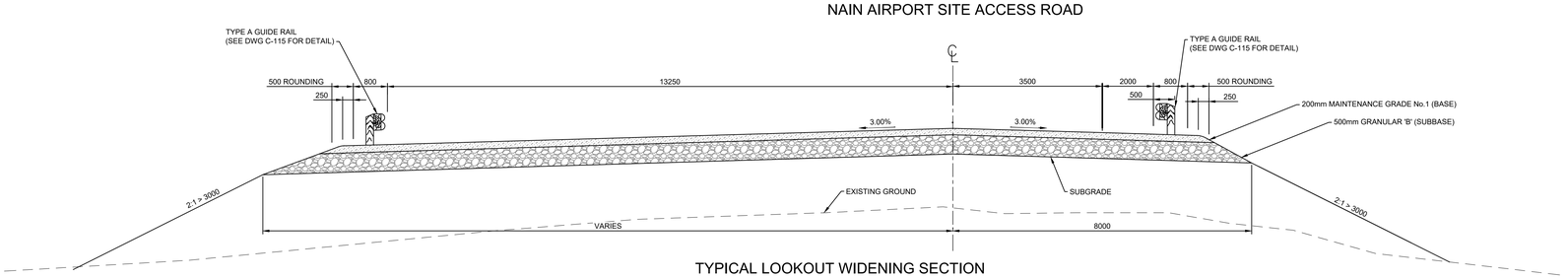
CUT SECTION IN ROCK

NAIN AIRPORT SITE ACCESS ROAD



TYPICAL REVERSE CROWN SECTION

NAIN AIRPORT SITE ACCESS ROAD



TYPICAL LOOKOUT WIDENING SECTION

THE BASIC UNIT OF DIMENSIONING IS MILLIMETRES

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C PRELIMINARY DESIGN	CLD	PJF	2024.03.15
B PRELIMINARY DESIGN	CLD	PJF	2024.02.16
A CONCEPT DESIGN	CLD	PJF	2024.01.18

File Name: TITLEBLOCK-A0.DWG — 2023.12.04 YYYY.MM.DD

CLD/GSC Prepared — CLD/GSC Drawn

MARCO ROCHA, P.Eng. Project Manager

Permit-Seal

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Nain, Nunatsiavut / Canada

Title
TYPICAL SECTIONS

Project No.	Scale
115823110	NTS
Iss./Rev. D	Sheet 14 of 17
	Drawing No. C-114

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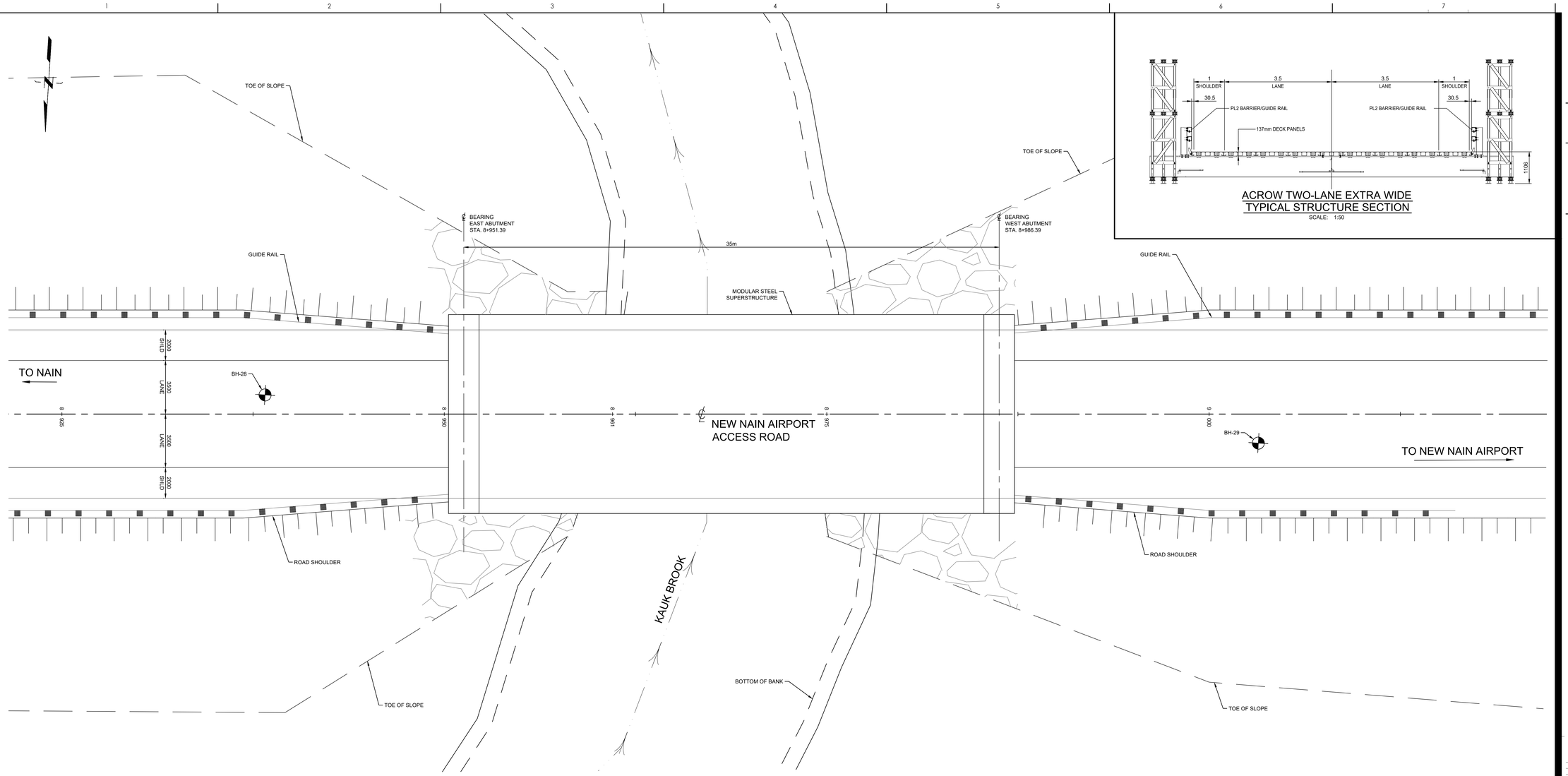
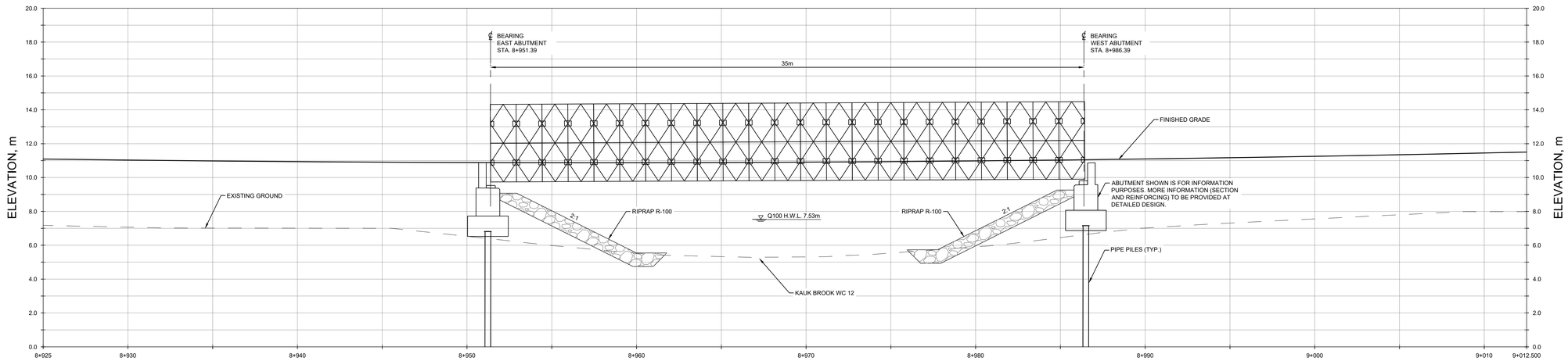
ISO A0



ACROW TWO-LANE EXTRA WIDE
TYPICAL STRUCTURE SECTION
SCALE: 1:50

STRUCTURE PLAN
SCALE: 1:100



STRUCTURE CL PROFILE
SCALE: 1:100

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A CONCEPT DESIGN	CLD	PJF	2024.01.18

File Name: TITLEBLOCK-A0.DWG — 2023.12.04 YYYY.MM.DD

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MARCO ROCHA, P.Eng — Project Manager

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Title
KAUK BROOK BRIDGE
GENERAL ARRANGEMENT

Project No. 115823110
Scale AS NOTED
Iss./Rev. D
Sheet 17 of 17
Drawing No. C-117

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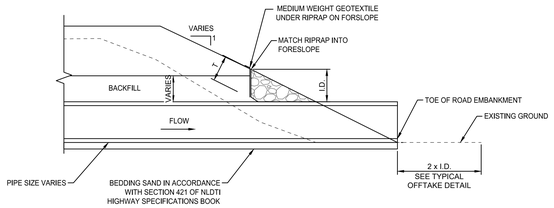
RIP RAP SIZING	
VELOCITY	A MINIMUM OF 70% OF RIP RAP SIZE (mm)
UP TO 3 METERS PER SECOND	200 TO 450
3 METERS PER SECOND TO 4 METERS PER SECOND	300 TO 760
4 METERS PER SECOND TO 4.5 METERS PER SECOND	500 TO 1200

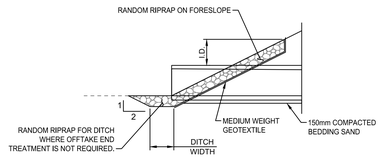


TYPICAL CULVERT CHANNEL END TREATMENT RIPRAP PROTECTION DETAILS

SCALE: 1:50

NOTES:

1. I.D. REFERS TO THE INNER DIAMETER OF THE PIPE
2. OFF TAKE END TREATMENT FOR EXISTING SLOPES >2%.
3. MEDIUM WEIGHT GEOTEXTILE AS PER MANUFACTURER SPECIFICATIONS.
4. RANDOM RIPRAP SIZE TO BE SPECIFIED ON CULVERT PROFILE IN DETAILED DESIGN.

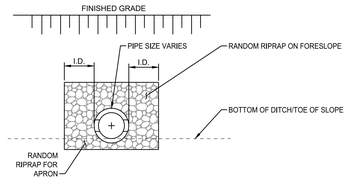


SECTION OF CULVERT RIPRAP INLET/OUTLET APRON

SCALE: 1:100

NOTES:

1. I.D. REFERS TO THE INNER DIAMETER OF THE PIPE
2. OFF TAKE END TREATMENT FOR EXISTING SLOPES <2%.
3. MEDIUM WEIGHT GEOTEXTILE AS PER NSTIR STANDARD SPECIFICATION (1997) DIVISION 6, SECTION 12.4.0.
4. RANDOM RIPRAP SIZE IS BASED ON CULVERT DIAMETER AS NOTED IN TABLE OR WILL OTHERWISE BE SPECIFIED ON CULVERT PROFILE IN DETAILED DESIGN.

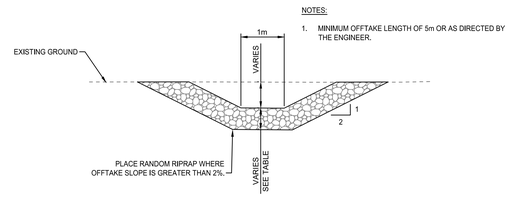


ELEVATION OF CULVERT RIPRAP INLET/OUTLET APRON

SCALE: 1:100

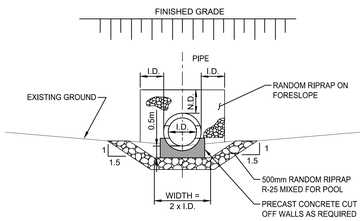
NOTES:

1. MINIMUM OFFTAKE LENGTH OF 5m OR AS DIRECTED BY THE ENGINEER.



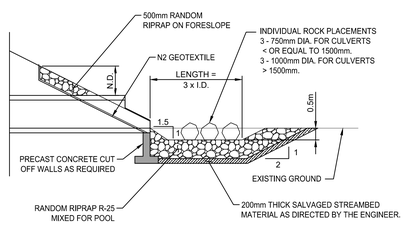
TYPICAL CULVERT FORESLOPE / OFFTAKE CHANNEL SECTION RIPRAP PROTECTION DETAILS

SCALE: 1:50



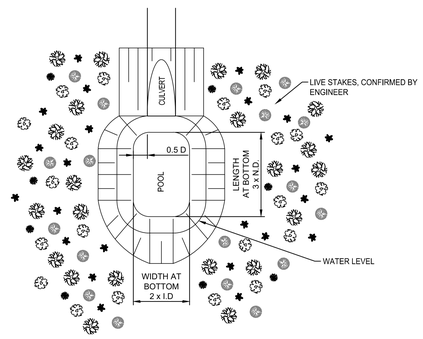
ELEVATION OF WC CULVERT RIPRAP OUTLET POOL

SCALE: 1:100



SECTION OF WC CULVERT RIPRAP OUTLET POOL

SCALE: 1:100



PLAN OF WC CULVERT RIPRAP ENERGY DISSIPATION POOL

SCALE: 1:100

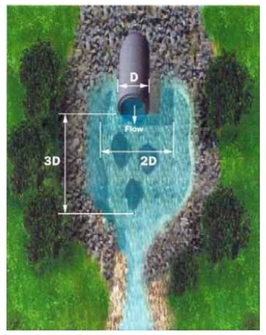
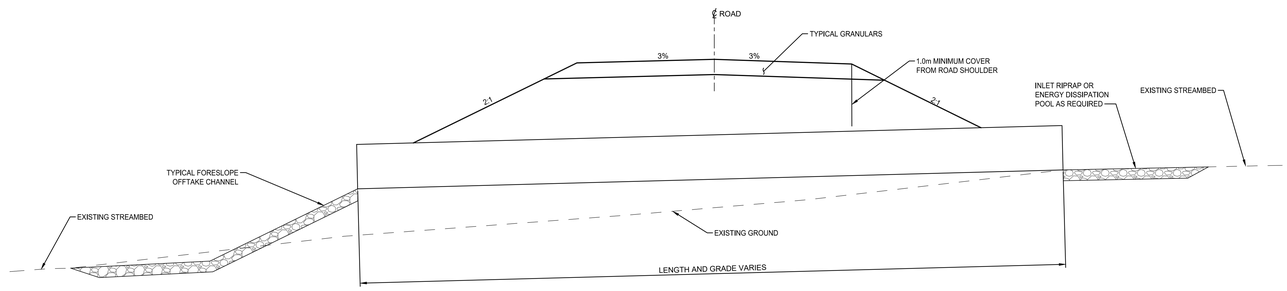


ILLUSTRATION OF ENERGY DISSIPATION POOL

SCALE: NTS

SOURCE: GUIDELINES FOR THE DESIGN OF FISH PASSAGE FOR CULVERTS IN NOVA SCOTIA, FISHERIES AND OCEANS CANADA, FEBRUARY 2015



NOTES:

1. CULVERTS TO HAVE A MINIMUM SLOPE OF 0.5% AND A MAXIMUM SLOPE OF 10%.
2. CONTRACTOR TO INSTALL RIP-RAP HEADWALLS AT CULVERT INLETS AND OUTLETS.
3. IF DEPTH TO STABLE SUBGRADE EXCEEDS 1.2m, CONTRACTOR TO EXCAVATE TO DEPTH OF 1.2m AND INSTALL MIRAFI RS580i GEOTEXTILE OR EQUIVENT AND GEOGRID. BACKFILL WITH 70mm MINUS CLEAR STONE.

TYPICAL CULVERT INSTALLATION

SCALE: 1:100

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B PRELIMINARY DESIGN	CLD	PJF	2024.02.16
A CONCEPT DESIGN	CLD	PJF	2024.01.18

File Name: TITLEBLOCK-A0.DWG — 2023.12.04 YYYY.MM.DD

Prepared: CLD/GSC — Drawn: CLD/GSC

Project Manager: MARCO ROCHA, P.Eng

Permit-Seal

Client/Project Logo

NUNATSIAVUT kavamanga Government

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NUNATSIAVUT GOVERNMENT

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Title

TYPICAL CULVERT DETAILS

Project No. 115823110

Scale AS NOTED

Iss./Rev. D

Sheet 16 of 17

Drawing No. C-116

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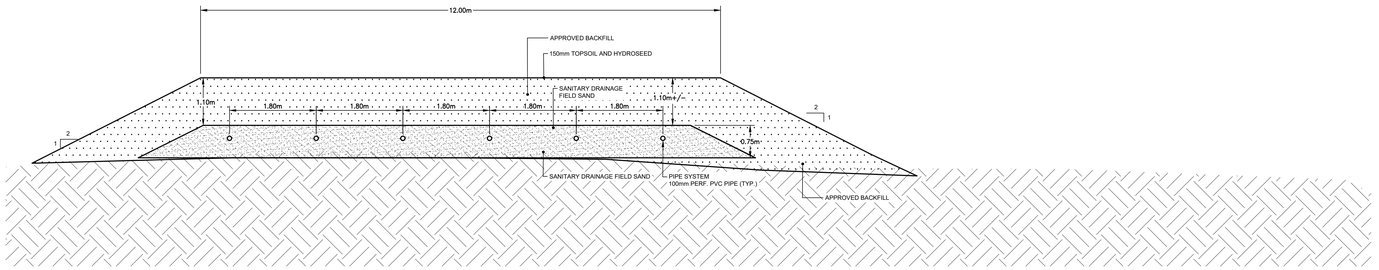
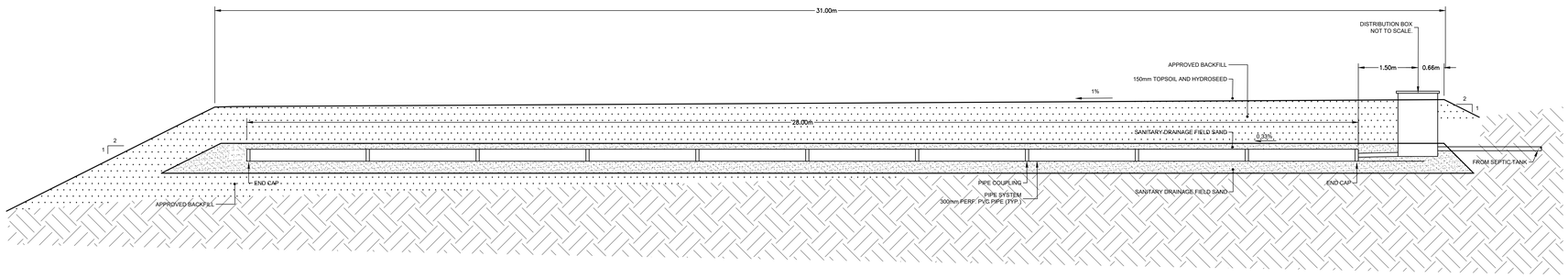


A
C–301

SECTION A – SEPTIC FIELD (S–N)

1:50



B
C–301

SECTION B – SEPTIC FIELD (W–E)

1:50

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A PRELIMINARY DESIGN	BG	CF	2024.03.28

File Name: 115823110_C-303-304.DWG — 2023.12.04 YYYY.MM.DD

Prepared	Drawn
CLD/GSC	CLD/GSC
	MARCO ROCHA, P.Eng. — Project Manager

Permit-Seal

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Title

DISPOSAL FIELD SECTIONS

Project No.	Scale
115823110	AS SHOWN
Iss./Rev. A	Sheet 4 of 8
	Drawing No. C-304

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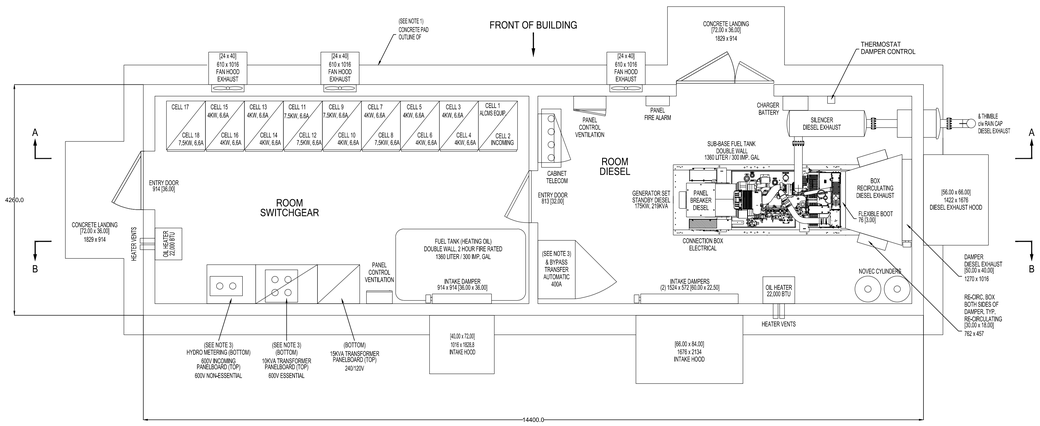
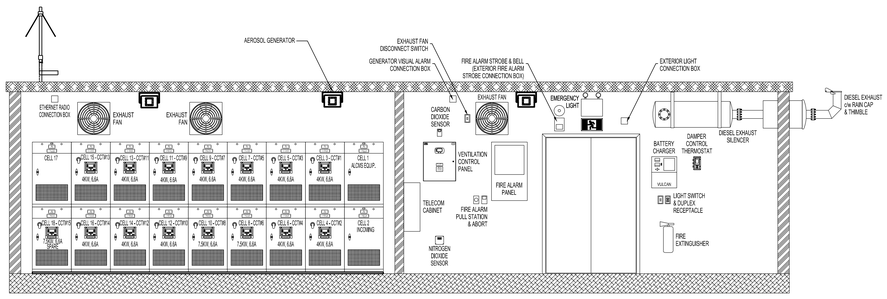


01 E507 FEC - PLAN VIEW
SCALE: 1:40



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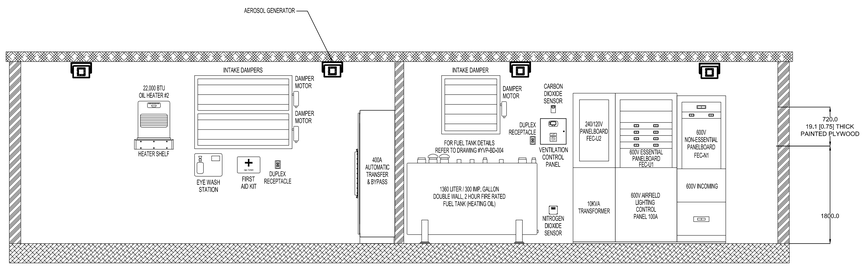

SECTION B-B

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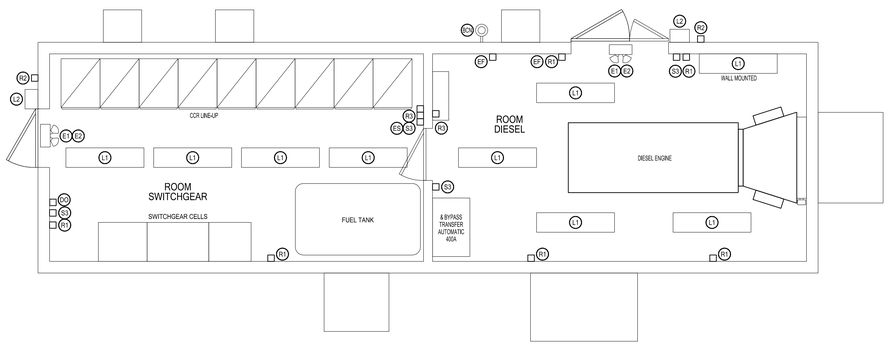
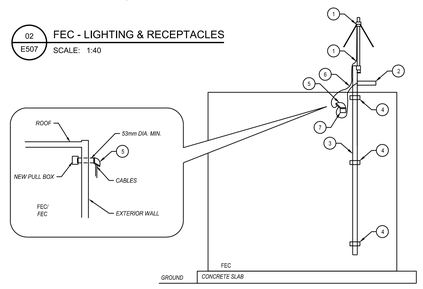


LEGEND:

- (L1) - 1219.2 [48.00] DOUBLE TUBE LED LIGHT FIXTURE - ITEM #104
- (L2) - OUTDOOR LED LIGHT FIXTURE - ITEM #101
- (E1) - DUAL HEAD EMERGENCY LIGHT - ITEM #102
- (E2) - EMERGENCY EXIT LIGHT, BILINGUAL - ITEM #103
- (EF) - EXHAUST FAN DISCONNECT SWITCH - ITEM #47
- (ES) - GENERATOR EMERGENCY STOP - ITEMS #117, 118
- (R1) - DUPLEX RECEPTACLE - ITEM #112
- (R2) - EXTERIOR DUPLEX RECEPTACLE (GROUND FAULT) - ITEMS #113, 114, 115
- (R3) - ISOLATED SURGE RECEPTACLE - ITEM #114
- (S3) - 3 WAY LIGHT SWITCH - ITEM #119
- (S5) - ROTATING BEACON (YELLOW) - ITEM #105
- (D) - DATA OUTLET

02 E507 FEC - LIGHTING & RECEPTACLES
SCALE: 1:40



DESCRIPTION

1. NEW OMNIDIRECTIONAL ANTENNA FOR ARCAL RECEIVER
2. EXISTING RADIO ANTENNA TO BE REINSTALLED FOR COMMUNICATION WITH FSS
3. ALUMINUM CONDUIT 53MM MOUNTED ON FEC WALL FOR ANTENNA SUPPORT
4. STAINLESS STEEL CANTRUSS TO SUPPORT THE NEW CONDUIT
5. PVC WEATHER/SERVICE HEAD ON 53mm CONDUIT FOR RADIO COMMUNICATION CABLES
6. HELIAX CABLE FOR ARCAL ANTENNA, TO NEW ARCAL PANEL
7. EXISTING OPENING FOR RADIO CABLES,TO BE REUSED. EXISTING JUNCTION BOX TO BE REPLACED.

03 E507 FEC - ANTENNA DETAILS
SCALE: 1:40

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A PRELIMINARY DESIGN	M.B.	M.T.	2024.03.28

File Name: 115823110_E_E507-E510_DETAILS.DWG — 2023.09.11 YYYY.MM.DD

Mie Takahashi, P. Eng, M. Eng. — Prepared
Menour Kahina, tech. — Drawn
Mahmoud Benadada, Ing. — Prepared
Marco Rocha, P.Eng. — Project Manager

Permit-Seal

Client/Project Logo

NUNATSIAVUT kavamanga Government

Client/Project
NUNATSIAVUT GOVERNMENT

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Title
FEC - INTERIOR CONSTRUCTION LAYOUT

Project No.	Scale
115823110	N.T.S.
Iss./Rev. 0	Sheet 08 of 20
	Drawing No. E507

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ISO A0

Appendix C

Consultation and Engagement

Appendix C1 Record of Engagement

Engagement Type	Community/ Participants	Date	Overview	Summary	Detailed Record?
Meeting (In-person)	Nain Residents	16-Oct-23	Introductory meeting for Nain Residents hosted by Nunatsiavut Government.	* The Proponent (NG Infrastructure) held an initial Project Information Meeting in Nain to describe the Project, its work to date, and its plans to continue throughout 2023 and 2024 and answer attendees' questions. Questions asked during the session informed the development of a project FAQ sheet, which was distributed to a broad list of stakeholders and community members in early 2024. * The meeting was approximately 1 hour long and allowed for a Question and Answer session. * Q&A questions were answered in real-time by a Nunatsiavut Government employee.	Yes
Information Sharing (Email)	Communication List Participants	15-Nov-23	Broad project information sheet sharing.	* AECOM distributed Project Information Sheet #1 (Project Overview) to a list of community members and stakeholders to present the Project overview, work completed to date (2018-present), including the site-selection process, and work that was underway at that stage to progress the feasibility studies. Proponent and consultant contact information was shared with an invitation to submit additional questions or comments. * Information was shared with key individuals identified from a desktop search in the region.	No
Information Sharing (Online)	Public	04-Dec-23	Initial Project Description and Summary of Initial Project Description.	* The Nunatsiavut Government submitted the Initial Project Description (IPD) and Summary of the IPD to the Impact Assessment Agency of Canada (IAAC) on December 4, 2023. * IAAC posted this online (https://iaac-aeic.gc.ca/050/evaluations/proj/87156?culture=en-CA) for public comment between December 18, 2023, and February 16, 2024, to support IAAC's preparation of a summary of issues.	No
Interview Request/ Information Sharing (Email)	Human-Environment Consultation/communication List Participants	08-Jan-24	Email shared soliciting interest in interview participation to hear perspectives from Nain residents and community leaders about the potential (positive or negative) impacts of the Project	* On January 8, 2024, an email was sent to residents of Nain and community leaders to solicit interest in participating in interviews. The "Nain Info Sheet - Nov 2022" was included in the email to provide additional information about the Project.	No
Interview Request/Confirmation (Email & Phone)	Human-Environment Consultation/communication List Participants	09-Jan-24 to 06-Feb-24	Emails and phone calls were made to request and confirm interviews with (potential) interviewees.	*Between January 9, 2024, and February 6, 2024, the project team corresponded with potential interviewees to confirm interview schedules. While emails were the preferred method of choice, phone calls were made if email addresses were unavailable and if (potential) participants preferred to be contacted by phone.	No
Information Sharing and Engagement Interest (Email)	Nain Inuit Community Government	10-Jan-24	Sharing of broad project information sheet and enquiring about Nain Inuit Community Government's interest in being engaged for a project discussion/meeting.	* On January 10, 2024, the project team emailed the Nain Inuit Community Government (Nain Mayor and Ordinary Nain Member), re-sharing a broad project information sheet and enquiring about the government's interest in being involved in the new Nain Airport Project consultation process (e.g., in participating in an initial Project meeting). The team suggested dates and times for an initial meeting (January 30, 31, or February 6 or 7).	No
Virtual Meeting Coordination (Email)	Nain Inuit Community Government	10-Jan-24 to 11-Jan-24	Exchanges with Nain Inuit Community Government representatives to coordinate an initial meeting.	* Between January 10 and 11, 2024, several emails were exchanged with Nain Inuit Community Government representatives to determine a February 7 meeting date.	No
Consultation Interview (Phone)	Nain Community Leader	15-Jan-24	Human-Environment interview to discuss Nain residents and community leader's insights on the potential impacts of the New Nain Airport	*The project team conducted a pre-scheduled interview to discuss the project's potential (positive and adverse) impacts from the New Nain Airport Project	No
Consultation Interview (Phone)	Nain Community Leader	15-Jan-24	Human-Environment interview to discuss Nain residents and community leader's insights on the potential impacts of the New Nain Airport	*The project team conducted a pre-scheduled interview to discuss the project's potential (positive and adverse) impacts from the New Nain Airport Project	No
Virtual Meeting Coordination (Email)	Nain Inuit Community Government	17-Jan-24	Meeting invite sent.	* On January 17, 2024, the project team sent a meeting invite to Nain Inuit Community Government representatives (Mayor and Ordinary Nain Member) for a 2-hour February 7, 2024 meeting at 1 p.m. AST. * Meeting invite included a proposed agenda and re-attached the previously shared broad project Information sheet. * The project team committed to sharing a meeting presentation in advance of the February 7 meeting.	No
Meeting (Virtual)	Public	17-Jan-24	First of two virtual public information sessions held by IAAC about the project.	* As part of the harmonized regulatory process, IAAC held virtual public engagement sessions following the submission and posting of the project IPD to provide information about the Project and associated regulatory process and for attendees to ask questions. The AECOM Consultation team attended these sessions on behalf of the proponent to take notes and continue to gather information on key questions, concerns, and interests related to the proposed new airport and access road. Attendees included IAAC representatives, Indigenous Services Canada (ISC) representatives, Proponent representatives (from Nunatsiavut Government, OCTANT and AECOM) and members of the public (one attendee). * A key component of the meeting was a presentation by the Proponent (OCTANT), which provided an overview of the project (including the need for the airport, site selection, and project phases) and the current status of the feasibility studies, including the environmental impact assessment. * A Q&A period followed the Proponent's presentation, during which the proponent (OCTANT) provided answers in real time.	Yes

Engagement Type	Community/ Participants	Date	Overview	Summary	Detailed Record?
Meeting (Virtual)	Public	18-Jan-24	Second of two virtual public information sessions held by IAAC about the project.	*As part of the harmonized regulatory process, IAAC held virtual public engagement sessions following the submission and posting of the project IPD to provide information about the Project and associated regulatory process and for attendees to ask questions. The AECOM Consultation team attended these sessions on behalf of the proponent to take notes and continue to gather information on key questions, concerns, and interests related to the proposed new airport and access road. Attendees included IAAC representatives, Indigenous Services Canada (ISC) representatives, Proponent representatives (from Nunatsiavut Government, OCTANT and AECOM) and members of the public (one attendee). * A key component of the meeting was a presentation by the Proponent (OCTANT), which provided an overview of the project (including the need for the airport, site selection, and project phases) and the current status of the feasibility studies, including the environmental impact assessment. * A Q&A period followed the Proponent's presentation, during which the proponent (OCTANT) provided answers in real time.	Yes
Information Sharing and Engagement Interest (Email)	Hopedale Inuit Community Government	18-Jan-24	Sharing of broad project information sheet and enquiring about Hopedale's interest in being engaged for a project discussion/meeting.	* On January 18, 2024, the project team emailed the Hopedale Inuit Community Government Mayor, re-sharing a broad project information sheet and enquiring about the government's interest in being involved in the new Nain Airport Project consultation process (e.g. in participating in an initial Project meeting). * In emails exchanged on January 18, 2024, the Hopedale Inuit Community Government Mayor advised that Hopedale does not need to be involved in the Project at this time but was interested in continuing to receive virtual Project updates. The project team confirmed that Hopedale Inuit Community Government would continue to receive virtual updates/communications and was welcome to share any feedback about the project as it progressed and/or to reach out if they would like to meet for a discussion at a later date.	No
Information Sharing and Engagement Interest (Email)	Sheshatshiu Innu First Nation	18-Jan-24	Sharing of broad project information sheet and inquiring about Sheshatshiu Innu First Nation's interest in being engaged for a project discussion/meeting.	* On January 18, 2024, the project team emailed the Sheshatshiu Innu First Nation Chief, re-sharing a broad project information sheet and enquiring about the community's interest in being involved in the new Nain Airport Project consultation process (e.g. in participating in an initial Project meeting). * No response was received.	No
Information Sharing and Engagement Interest (Email)	Natuashish Innu First Nation	18-Jan-24	Sharing of broad project information sheet and enquiring about Natuashish Innu First Nation's interest in being engaged for a project discussion/meeting.	* On January 18, 2024, the project team emailed the Natuashish Innu First Nation Chief, re-sharing a broad project information sheet and enquiring about the community's interest in participating in the new Nain Airport Project consultation process (e.g., in an initial Project meeting). * No response was received.	No
Information Request (Email)	Nain Resident	22-Jan-24	Follow-up questions after Human Environment Baseline Interview.	*Resident participated in the Human Environment Baseline Interview conversations. *Resident followed up for additional information about the airport project.	Yes
Consultation Interview (Phone)	Nain Resident	22-Jan-24	Human-Environment interview to discuss Nain residents and community leader's insights on the potential impacts of the New Nain Airport	*The project team conducted a pre-scheduled interview to discuss the project's potential (positive and adverse) impacts from the New Nain Airport Project.	No
Consultation Interview (Phone)	Nain Resident	23-Jan-24	Human-Environment interview to discuss Nain residents and community leader's insights on the potential impacts of the New Nain Airport	*The project team conducted a pre-scheduled interview to discuss the project's potential (positive and adverse) impacts from the New Nain Airport Project.	No
Consultation Interview (Phone)	Nain Resident	23-Jan-24	Human-Environment interview to discuss Nain residents and community leader's insights on the potential impacts of the New Nain Airport	*The project team conducted a pre-scheduled interview to discuss the project's potential (positive and adverse) impacts from the New Nain Airport Project.	No
Consultation Interview (Phone)	Nain Community Leader	25-Jan-24	Human-Environment interview to discuss Nain residents and community leader's insights on the potential impacts of the New Nain Airport	*The project team conducted a pre-scheduled interview to discuss the project's potential (positive and adverse) impacts from the New Nain Airport Project.	No
Consultation Interview (Phone)	Nain Resident/Community Leader	30-Jan-24	Human-Environment interview to discuss Nain residents and community leader's insights on the potential impacts of the New Nain Airport	*The project team conducted a pre-scheduled interview to discuss the project's potential (positive and adverse) impacts from the New Nain Airport Project.	No
Consultation Interview (Phone)	Nain Resident/Community Leader	31-Jan-24	Human-Environment interview to discuss Nain residents and community leader's insights on the potential impacts of the New Nain Airport	*The project team conducted a pre-scheduled interview to discuss the project's potential (positive and adverse) impacts from the New Nain Airport Project.	No

Engagement Type	Community/ Participants	Date	Overview	Summary	Detailed Record?
Consultation Interview (Phone)	Nain Community Leader	31-Jan-24	Human-Environment interview to discuss Nain residents and community leader's insights on the potential impacts of the New Nain Airport	*The project team conducted a pre-scheduled interview to discuss the project's potential (positive and adverse) impacts from the New Nain Airport Project.	No
Consultation Interview (Phone)	Nain Community Leader	31-Jan-24	Human-Environment interview to discuss Nain residents and community leader's insights on the potential impacts of the New Nain Airport	*The project team conducted a pre-scheduled interview to discuss the project's potential (positive and adverse) impacts from the New Nain Airport Project.	No
Event Space Booking (Phone & Email)	Nain Inuit Community Government	02-Feb-24 to 02-Apr-24	Correspondence to book the large meeting room and prepare for the community meeting.	*A series of phone calls and emails were made to book the large meeting room space for the community meeting.	No
Vendor Bookings (Phone & Email)	Atsanik Hotel, Atsanik Restaurant, Hotel North Two	05-Feb-24 to 02-Apr-24	Correspondence to book hotels and refreshments for the project team's trip to Nain to lead the community meeting.	*A series of phone calls and emails were made to book hotels and refreshments for the project team's trip to Nain to lead the community meeting.	No
Consultation Interview (Phone)	Nain Community Leader	06-Feb-24	Human-Environment interview to discuss Nain resident's and community leaders' insights on the potential impacts of the New Nain Airport.	*The project team conducted a pre-scheduled interview to discuss the project's potential (positive and adverse) impacts from the New Nain Airport Project	No
Information Sharing (Email)	Communication List Participants	07-Feb-24	Broad FAQs shared with individuals on the communication list.	* AECOM distributed a FAQ sheet that addressed questions frequently asked about the Project up to the date along with detailed responses. Information was shared with the selected list of community members and stakeholders. Proponent and consultant contact information was shared with invitation to submit additional questions or comments.	No
Meeting (Virtual)	Public	07-Feb-24	Virtual information session about the project held by Nunatsiavut Government, Environment department.	* As part of the harmonized regulatory process, NG Environment held a public engagement session on February 7, 2024, following the submission and posting of the project IPD to provide information about the Project and associated regulatory process and for participants to ask questions. The AECOM and OCTANT project team members attended these sessions virtually on behalf of the proponent to take notes and continue to gather information on key questions, concerns, and interests related to the proposed new airport and access road. * Attendees included representatives from the Proponent (Nunatsiavut Government, OCTANT, AECOM) and members of the public (two attendees). * A key component of the meeting was a presentation by the Proponent (OCTANT), which provided an overview of the project, the current status of the feasibility studies, and information about the proposed access road, including avalanche mitigations. * A Q&A period followed the Proponent's presentation, during which the proponent (OCTANT) provided answers in real time.	Yes
Information Sharing (Email)	Nain Inuit Community Government	07-Feb-24	February 7 meeting presentation updated.	* The project team shared an updated meeting presentation with Nain Inuit Community Government on February 7, ahead of the initial project meeting.	No
Meeting (Virtual)	Nain Inuit Community Government	07-Feb-24	Meeting to discuss the proposed New Nain Airport project.	*The AECOM Consultation team held a virtual consultation meeting with the Nain Inuit Community Government Mayor, Joe Dicker, to discuss the proposed New Nain Airport Project. The Consultation team presented an overview of the Project and summarized the status of the feasibility studies. Representatives from Nain Inuit Community Government were able to ask questions and make comments. Meeting notes were shared with the Nain Inuit Community Government attendees for verification and subsequently shared with the proponent team (OCTANT and NG Infrastructure) for their awareness.	Yes
Information Sharing (Email)	Nain Inuit Community Government	07-Feb-24	Shared information about two upcoming meetings re: the Nain Airport Project.	* Per a commitment made during the initial project meeting with the Nain Inuit Community Government on February 7, the project team sent the Nain Inuit Community Government representatives (Nain Mayor and Ordinary Nain Member) information (including access links) about the upcoming Nain Airport Project information sessions, specifically a virtual February 7 event being held by Nunatsiavut Government, Environment department, and an in-community meeting scheduled for February 19, 2024.	No
Virtual Meeting Coordination (Email)	Nain Inuit Community Government	07-Feb-24 to 12-Feb-24	Exchanges with Nain Inuit Community Government representatives to coordinate another meeting, further to the February 7 meeting.	* Between February 7 and 12, 2024, several emails were exchanged with Nain Inuit Community Government representatives to determine a second meeting on February 21. * Through one of these exchanges, the Nain Ordinary Member identified an additional Ordinary Member to be included in consultation reachouts.	No

Engagement Type	Community/ Participants	Date	Overview	Summary	Detailed Record?
Virtual Meeting Coordination (Email)	Nain Inuit Community Government	12-Feb-24	Meeting invite sent.	* On February 12, 2024, the project team invited Nain Inuit Community Government representatives (Mayor, 2 Ordinary Nain Members) for a 1.5-hour February 21, 2024 meeting at 1 p.m. AST. * The meeting invite included a proposed agenda and re-attached the meeting materials (broad project information sheet, meeting presentation) previously shared for the February 7, 2024, meeting, as well as broad FAQs previously shared with all individuals on the communication list.	No
Information Sharing (Email)	Nain Inuit Community Government	13-Feb-24	Meeting summary of October 16, 2023 meeting shared.	* On February 13, 2024, a Nain Ordinary Member contacted the project team for a meeting summary of the October 16, 2023, in-community consultation. * The project team replied and indicated that a summary of that meeting was included in the Initial Project Description (IPD) that was submitted to the Impact Assessment Agency in December 2023 and shared the link to the IPD (https://iaac-aeic.gc.ca/050/documents/p87156/154772E.pdf) and indicated the pages of the IPD where the summary could be found. * The project team also shared the broad FAQ sheet, which was disseminated on February 7, 2024, to all individuals on the communication list.	No
Information Sharing (email)	Nain Inuit Community Government	13-Feb-24	Summary of Feb 7 meeting discussion.	* The project team shared a draft Meeting Summary with the Nain Inuit Community Government for any revisions or concerns with how the shared discussion on the New Nain Airport Project on Feb 7, 2024, was reflected.	No
Meeting Coordination (Email)	Nain Inuit Community Government	19-Feb-24	Exchanges with Nain Inuit Community Government representatives about attendance at Feb 19 in-community meeting.	* On February 19, 2024, several emails were exchanged between the project team and Nain Inuit Community Government representatives confirming that the February 19 in-community meeting was going ahead and who would attend in person.	No
Meeting (In-Person and Virtual)	Nain Residents	19-Feb-24	Project update meeting for Nain residents hosted by Nunatsiavut Government.	*NG Environment held a hybrid public consultation meeting for Nain residents to provide information about the Project and to respond to any questions, concerns and/or comments. This meeting was attended virtually by the Nunatsiavut Environment Division, and representatives of the Proponent and IAAC were present. The AECOM and OCTANT project team members attended these sessions virtually on behalf of the proponent to take notes and continue to gather information on key questions, concerns, or interests. *A question and answer period was held to allow residents to ask questions about the project.	Yes
Virtual Meeting Coordination (Email)	Nain Inuit Community Government	20-Feb-24	Reminder sent about Feb 21 meeting.	* On February 20, 2024, the project team sent a reminder email about the follow-up meeting with the Nain Inuit Community Government on February 21 at 1 p.m. AST; a Nain Ordinary Member replied on the same day and confirmed attendance.	No
Meeting (Virtual)	Nain Inuit Community Government	21-Feb-24	Second meeting to discuss the proposed New Nain Airport project.	* The AECOM Consultation team held a virtual consultation meeting with the Nain Inuit Community Government Ordinary Member, David Dicker. The team presented an overview of the Project, summarized limitations, and identified the next steps. Representatives from the Nain Inuit Community Government were able to ask questions and make comments. Meeting notes were shared with the Nain Inuit Community Government attendees for verification and subsequently shared with the proponent team (OCTANT and NG Infrastructure) for their awareness. * Representatives from the Nain Inuit Community Government asked questions and/or commented about construction safety and employment opportunities, flooding risk, field studies findings, fuel storage and energy options. Responses were provided by the project team.	Yes
Information Sharing (Email)	Nain Inuit Community Government	26-Feb-24	Follow-up on any revisions to a Summary of Feb 7 meeting discussion.	* The project team shared a draft Meeting Summary with Nain Inuit Community Government on February 13 for any revisions or concerns with how the shared discussion on the New Nain Airport Project on Feb 7, 2024 was reflected, and followed up on February 26.	No
Information Sharing (Email)	Nain Inuit Community Government	01-Mar-24	Exchanges to finalize Feb 7 and Feb 21 Meeting Summaries.	* On March 1, 2024, the project team reshared the February 7th Meeting Summary to confirm no revisions and shared a draft Feb 21 Meeting Summary for review. Through exchanges with an Ordinary Member for Nain, small adjustments were made to meeting attendee titles in both Meeting Summaries, and the final versions of the Summaries were confirmed and shared on the same day.	No
Invitation/Information Sharing (Email)	Nain consultation/communication list	08-Mar-24	Invitation to the April 10, 2024, community meeting was emailed to the Nain consultation/communication distribution list	On March 8th, 2024, the distribution list was emailed an invitation to the community meeting. The email contained all the necessary details, including the nature of the meeting, the time, location, and refreshments. Additionally, a PDF attachment of the meeting event poster was included.	No
Invitation/Information Sharing (Mail)	Nain Inuit Community Government	08-Mar-24	The project team mailed physical copies of the community meeting poster and arranged for the posters to be posted on community bulletin boards	*The project team mailed ten physical copies of the community meeting poster to the Nain Inuit Community Government building and arranged for the posters to be posted on community bulletin boards and other high-trafficked areas around Nain (at the discretion of the recipient).	No
Information Sharing (Email)	Nain consultation/communication list	01-Apr-24	The project team distributed the Nain Airport Info Sheet #2 regarding the access road.	*The project team distributed Information Sheet #2 (Access Road) to a list of community members and stakeholders to share information, provide updates, and address concerns about the Nain Airport access road. The team also shared the contact information of the Proponent and consultant and an invitation to submit additional questions or comments.	No

Engagement Type	Community/ Participants	Date	Overview	Summary	Detailed Record?
Information Sharing/Follow-Up (Email)	Nain Resident	02-Apr-24	Follow-up questions after Human Environment Baseline Interview.	*A resident of Nain participated in the Human-Environment Baseline Interview conversations. *In January 2024, a resident followed up for additional information about the airport project. *The project team provided a PDF with detailed responses to the resident's questions.	Yes
Information Sharing (Email)	Nain consultation/communication list	03-Apr-24	Reminder sent about the community meeting on April 10 meeting.	* On April 3, 2024, the project team sent a reminder email about the April 10th Community Airport meeting.	No
Information Sharing (Email)	Nain Community Leader	04-Apr-24	Reminder sent about the community meeting on April 10 meeting.	* The project team resent the April 3, 2024, reminder email about the April 10th Community Airport meeting to one contact who wasn't included on the Nain communication/consultation list.	No
Vendor cancellation (Phone)	Atsanik Hotel, Atsanik Restaurant, Hotel North Two	05-Apr-24 to 09-Apr-24	As the community meeting was cancelled, the project team made numerous phone calls to various vendors in Nain to cancel bookings and orders made for the meeting.	*Phone calls were made to various vendors in Nain to cancel hotel bookings and refreshment orders due to the cancelled meeting. All vendors were notified that the community meeting on 05-Apr-24 was cancelled. Due to the last-minute nature of the cancellation, the project team made numerous phone calls to Atsanik Hotel Restaurant to ensure a proper cancellation protocol was met. The project team suggested absorbing the cost of the food that had already been prepared. However, Atsanik Hotel Restaurant preferred to cancel the order altogether.	No
Meeting cancellation (Email)	Nain consultation/communication list	08-Apr-24	An email was sent to cancel the April 10th New Nain Airport community meeting.	*AECOM collaborated with proponent team OCTANT and NG Infrastructure to plan an in-person community meeting in Nain to provide an update on the project and answer any questions and/or concerns from Nain residents and community members. A series of promotional activities were undertaken to advertise the open community meeting and are described in detail below. *This event was cancelled by the Proponent, and the news was shared with the project team on April 5th. *On April 8th, the project team informed the contacts on the communication/consultation distribution list that the April 10th New Nain Airport community meeting was cancelled. A letter from OCTANT was attached to the email, which provided brief details about the cancellation. However, the reason for the cancellation was not provided, but the project team assured that community engagement on the project would continue.	Yes
Event Space Cancellation (Phone)	Nain Inuit Community Government	08-Apr-24	The project team cancelled the event space booking.	*The project team cancelled the event space booking and suggested that the meeting posters (posted on the community bulletins) could be removed.	No
Meeting cancellation (Email)	Mayor Joe Dicker	09-Apr-24	An email was sent to Mayor Dicker to confirm their awareness of the cancelled project meeting and potentially schedule a one-on-one meeting (between the project team and Mayor Dicker).	*On April 9th, the project team emailed Mayor Dicker to confirm that the New Nain Airport community meeting on April 10th was cancelled. A letter from OCTANT was attached, providing details about the cancellation. However, the reason for the cancellation was not provided, but the project team assured that community engagement on the project would continue. The project team inquired if Mayor Dicker would like to arrange a private virtual meeting to discuss questions that would have been addressed during the April 10th community meeting.	No
Information Sharing (Email)	Indigenous Services Canada (ISC) Representative	24-Apr-24	A representative of Indigenous Services Canada (ISC) asked to be included on the distribution list for future Project meeting invites and materials.	*A representative of Indigenous Services Canada (ISC) responded to an email sent from the project team regarding the Access Road Info Sheet (sent on 01-Apr-24). The representative asked to be added to the distribution list for future meeting invites and materials. The project team responded and said they would be included in future correspondence.	No
Vendor Bookings (Phone & Email)	Atsanik Hotel, Hotel North Two	25-Apr-24	Correspondence to book hotels for the project team's trip to Nain to lead the community meeting in May or June 2024.	*A series of phone calls and emails were made to book hotels for the project team's trip to Nain to lead the community meeting.	No
Information Sharing (Email)	Innu Nation	01-May-24	An email was sent to the Innu Nation informing them of AECOM as the Project consultant, inquiring whether Innu Nation would like to be involved in the consultation process.	*An email was sent to Innu Nation to inform that AECOM has been contracted by the Nunatsiavut Government to complete an environmental assessment for the New Nain Airport Project, including coordinating consultation activities with surrounding communities to Nain. Innu Nation was contacted to inquire if Innu Nation would like to express interest in being involved in the consultation process, and if so, in what way. The Innu Nation responded that they had received the email and confirmed the receipt of three documents: New Nain Airport Project FAQs, New Nain Airport Information Sheet, and New Nain Airport Information Sheet for the Access Road, which was subsequently forwarded to the Innu Nation's Environmental Office. A response on Innu Nation's preferred engagement/involvement process has not yet been confirmed.	No
Invitation/Information Sharing (Email)	Nain consultation/communication list	16-May-24	An invitation to the rescheduled June 12, 2024, community meeting was emailed to the Nain consultation/communication distribution list.	*On May 16th, 2024, the distribution list was emailed an invitation to the rescheduled community meeting. The email contained all the necessary details, including the nature of the meeting, the time, location, and refreshments. Additionally, a PDF attachment of the meeting event poster was included.	No
Invitation (Email)	Nain Resident/Previous Interviewee	23-May-24	An email was sent to a previous interviewee to provide an invitation to the New Nain Airport Community Meeting on June 12, 2024. An additional invitation was made to schedule time before and/or after the meeting to discuss the Project	*An email has been sent to a previous interviewee inviting them to the New Nain Airport Community Meeting on June 12, 2024. They were also invited to discuss the Project with the Project Team before and after the Community Meeting.	No

Engagement Type	Community/ Participants	Date	Overview	Summary	Detailed Record?
Invitation/Information Sharing (Email)	Nain consultation/communication list	05-Jun-24	A reminder email for the rescheduled June 12, 2024, community meeting was sent to the distribution list.	*On June 5th, 2024, the distribution list was emailed a reminder for the rescheduled community meeting. The email contained all the necessary details, including the nature of the meeting, the time, location, and refreshment details. Additionally, a PDF attachment of the meeting event poster was included.	No
Invitation/Information Sharing (Email)	Nain consultation/communication list	05-Jun-24	A follow-up email for the rescheduled June 12, 2024, community meeting was sent to the distribution list to confirm a new meeting time.	*On June 5th, 2024, the distribution list was emailed a notice that the time had changed for the rescheduled community meeting. The email contained all the necessary details, including the nature of the meeting, the time, location, and refreshment details. Additionally, a PDF attachment of the meeting event poster was included.	No
Invitation/Information Sharing (Email)	Minister of Education and Economic Development/Ordinary Member - Nain	11-Jun-24	An email was shared to provide the invitation and information regarding the New Nain Airport Community Meeting to solicit attendance.	*On June 11th, 2024, an email was shared to provide the invitation and information regarding the New Nain Airport Community Meeting to solicit attendance.	No
Information Sharing (Email & Phone)	Community Liason Officer in Nain	11-Jun-24	Information was provided to confirm the timing of the New Nain Airport Community Meeting .	*On June 11th 2024, information was shared to the Community Liason Officer to confirm the time for the June 12, 2024, meeting.	No
Radio Broadcast Request (Email & Phone)	Ok Society Radio	11-Jun-24	A request was made to Ok Society Radio to broadcast the Nain Airport Community Meeting to the Community on June 11th and June 12th.	*On June 11th, a request was made to Ok Society Radio to broadcast notice about the Airport Community Meeting that would take place on June 12, 2024.	No
Radio Broadcast Request (Email & Phone)	Ok Society Radio	13-Jun-24	A request was made to Ok Society Radio to broadcast notice that the New Nain Airport's Project Team would be meeting one-on-one with interested parties.	*On June 13th, a request was made to Ok Society Radio to broadcast notice that the New Nain Airport's Project Team would be meeting one-on-one with interested parties.	No
Community Meeting (In Person)	Nain Distribution List & Nain Community At-Large	12-Jun-24	AECOM's Consultation Team for the New Nain Airport Project led a community meeting with 26 participants to provide Project updates	*AECOM's Consultation Team for the New Nain Airport Project led a community meeting with 26 participants to provide Project updates.	Yes
Community Engagements (In Person)	Participants who attended the Nain Community Meeting & Nain Community At-Large	13-Jun-24	AECOM's Consultation Team held an all-day drop-in session for Nain community members to share Project insights and provide feedback	*AECOM's Consultation Team held an all-day drop-in session for Nain community members to share Project insights and provide feedback. One individual attended and provided land-use information to the project team.	No
Information Sharing (Email)	Requested Community Meeting Participants	19-Jun-24	AECOM's Consultation Team shared the presentation material to participants who requested it.	*AECOM's Consultation Team shared the presentation material to three participants who requested it, via email.	No
Information Sharing (Email)	Nain Distribution list & Community Meeting Attendees	19-Jun-24	An email was shared to the Nain distribution list and attendees of the Community Meeting to provide the presentation used during the in-person Community Meeting that occurred on June 12, 2024. Nain Airport Community Meeting to solicit attendance.	*An email was shared to the Nain distribution list and attendees of the Community Meeting to provide the presentation used during the in-person Community Meeting that occurred on June 12, 2024.	No
Information Sharing (Email)	Nain Distribution list & Community Meeting Attendees	06-Aug-24	An email was shared to the Nain distribution list and attendees of the Community Meeting to provide a summary of the questions asked during the Community Meeting.	*An email shared to participants of the Nain Community Meeting and interested parties. A document was attached to the email with the questions and answers asked during the Community Meeting.	No

Appendix C2 October 16, 2023, Proponent Presentation and Q&A

Nain Airport: Public Information Session

Nunatsiavut Government
10/16/2023

Feasibility Studies

Project Timeline

Disscussion

Creation of Implementation Plan

Review of Existing Airstrip

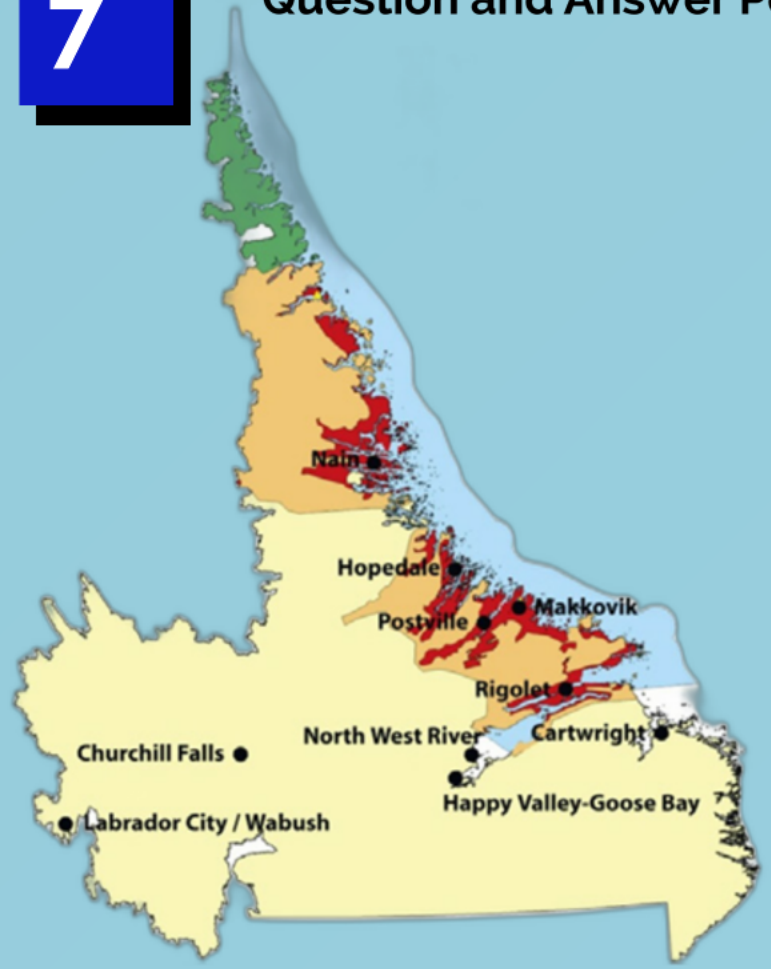
Introduction

NUNATSIAVUT
kavamanga Government

Project Objectives and Approach
Project Phases
Introduction to the New Nain Airport Project
Agenda
Why?

Agenda

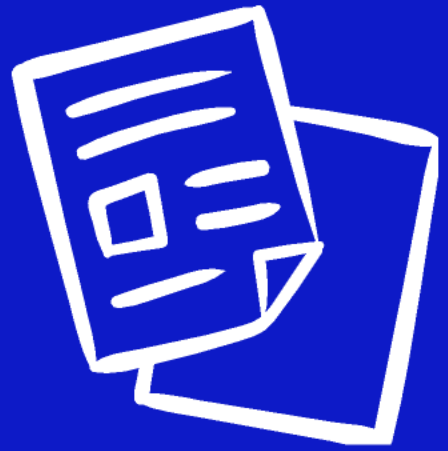
1. About the project
2. Nain Airport Project Phases
3. Review of Existing Airport
4. Implementation Plan Development
5. Feasibility Studies
6. Project Timeline
7. Question and Answer Period



Project Objectives and Approach
Project Phases
Introduction to the New Nain Airport Project
Agenda
Why?

Why is this project Required?

- Existing Airport is not addequate to provide necessary services to the community
- Construction of new airport is of critical importance and in the public interest to ensure public safety and health
- Climate Change is affecting the existing airport
- No night access due to lack of lighting system
- Poor weather conditions and lack of instrument approach facilities result in frequent flight interruptions and cancellations



Project Objectives and Approach
Project Phases
Introduction to the New Nain Airport Project
Agenda
Why?

Project Objectives

01 To build a new certified airport for Nain to replace existing infrastructure currently under stress from the effects of climate change.

02 Be able to Operate 24/7

03 Create an airport that can provide better services to the community (Food security, travel, health, Economic Development)

04 Create an airport that can land larger aircrafts to better connect Nunatsiavut to the rest of Canada and other Inuit regions

Project Approach

Project Approach

01 Construct an Airport that has the best interest of the Labrador Inuit in mind

02 Complete Detailed Feasibility Review

03 Coordinated and collaborated stakeholder engagement (Environmental Assessment)

04 Engagement with Inuit Businesses

05 Detailed Land Use Mapping and Archeology Assessments

Project Objectives

01 To build a new certified airport for Nain to replace existing infrastructure currently under stress from the effects of climate change.

02 Be able to Operate 24/7

03 Create an airport that can provide better services to the community (Food security, travel, health, Economic Development)

04 Create an airport that can land larger aircrafts to better connect Nunatsiavut to the rest of Canada and other Inuit regions

Project Approach

Project Objectives and Approach
Project Phases
Introduction to the New Nain Airport Project
Agenda
Why?

Project Phases

Phase 0: Review of Existing Airport

Phase 1: Develop Implementation plan for New Airport

Phase 2: Secure Financing for feasibility studies

Phase 3: Conducting Feasibility Studies

Phase 4: Securing Financing for Construction Phase

Phase 5: Detailed design, specifications and construction of New Airport

Phase 6: Certification of the Facilities and Commissioning

Project Objectives and Approach
Project Phases
Introduction to the New Nain Airport Project
Agenda
Why?

Nain Airport: Public Information Session

Nunatsiavut Government
10/16/2023

Feasibility Studies

Project Timeline

Disscussion

Creation of Implementation Plan

Review of Existing Airstrip

Introduction

NUNATSIAVUT
kavamanga Government

Review of Existing Airport

Improve the existing airstrip to enable 24-hour operation and landing larger aircraft, even in marginal weather conditions.

Phase 0

Phase 0: Review of Existing Airport

Project Scope

- Analysis, including the evaluation of ground and flight operations
- Completion of site visits and interviews operator, airlines conducted on August 2018
- Theoretical analysis conducted
- Study to assess risks, impacts of global warming

Outcome

- No improvements can be made
- Operations restricted to day flights
- Erosion already present in the runway's safety areas will worsen, requiring increasingly significant investments
- Due to impact of climate change, Nain Airport must be considered a temporary infrastructure

Existing Airport

Alternative location required, with commissioning taking many years.

Things that need to be considered:

- Investigations
- studies
- financing
- consultations
- certification
- preparation of plans and specifications
- aeronautical approaches
- construction time

Review of Existing Airport

Improve the existing airstrip to enable 24-hour operation and landing larger aircraft, even in marginal weather conditions.

Phase 0

Nain Airport: Public Information Session

Nunatsiavut Government
10/16/2023

Feasibility Studies

Project Timeline

Disscussion

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kavamanga Government

Creation of Implementation Plan

Complete Implementation Plan to submit to governments with a solution on location of new airport, and scope the feasibility studies.

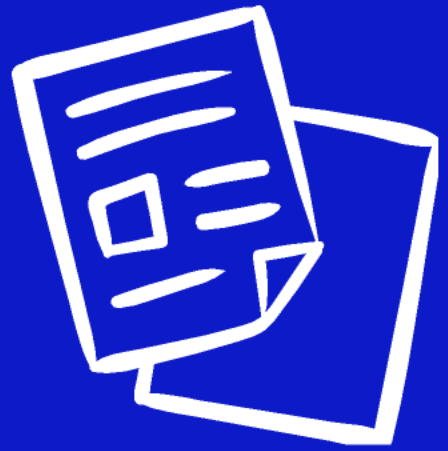
Project Scope

Proposed Sites

Selection of Site

Project Scope

- **Needs Analysis:** Evaluates future needs and opportunities.
- **Selection of a New Airport Site:** provide Nain with a site for a new airport.
- **Reference Project:** Third section outlines the reference project based on the preferred site recommendation. (Details)
- **Planning of Phase 3:** feasibility Studies: Defines data that must be collected and the technical analyses to be completed.
- **Project Execution Modes:** brief discussion of the different contract execution modes available for major projects.



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Project Scope

Proposed Sites

Selection of Site

Proposed Site #1

Site 1 is on a plateau constituted mainly of bedrock at an altitude of 900 ft, south of the community.

- The proposed area is narrow.
- Would not accommodate approach lighting system
- Does not correspond to prevailing winds

Proposed Site #2

Site 2 is on a plateau, southwest of Nain. This plateau extends in an east-west valley that is skirted on both sides by a rocky crest.

- The proposed area is narrow.
- High altitude
- Limited Space

Proposed Site #3

Site 3 lies along the shore, approximately 13 km southwest of the community of Nain, on a plateau that is 2 km wide and 10 km long.

- Uneven Terrain
- Concerns with morning/winter fog
- Remote from the Community

Creation of Implementation Plan

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Project Scope

Proposed Sites

Selection of Site

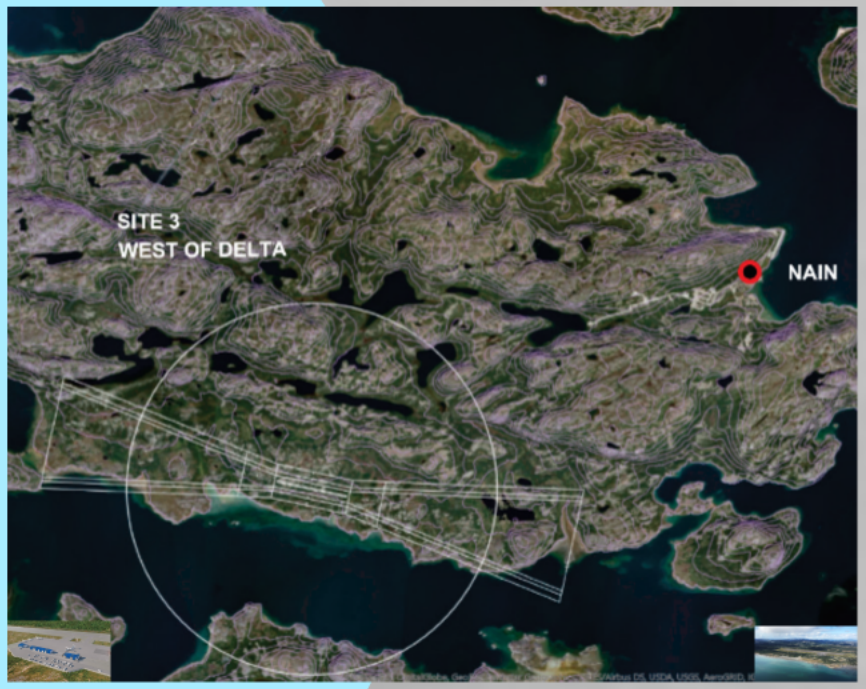
Access Road

Selection of Best Site

We need to select a site that will improve operations.

Site 3—West of Delta: Allows a longer airstrip and instrument approaches with 24/7 all-weather operations.

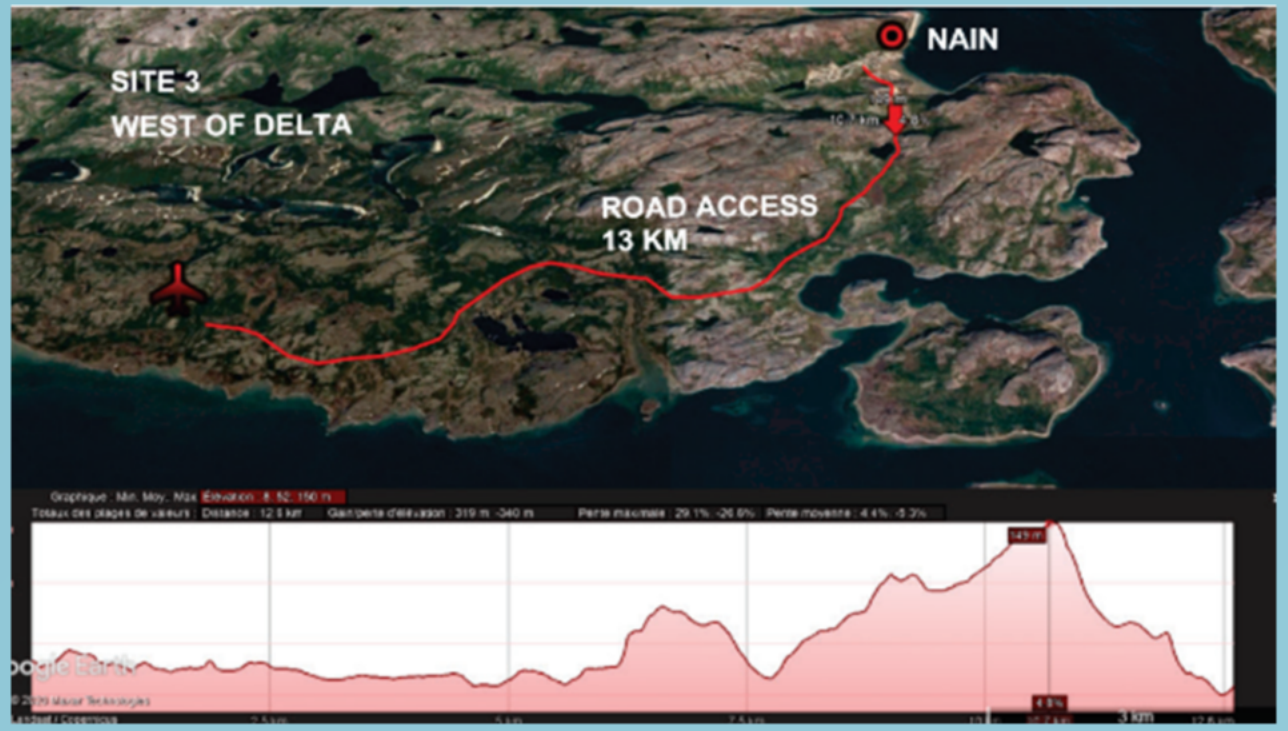
This site is the optimum location, even if it requires the construction of several kilometers of access road, a challenge by itself.



Proposed Access Road for the New Airport Site

A proposed road alignment was developed. The design of this road for the transportation of passengers, cargo and medical evacuation cases is challenging.

- Mountainous Environment
- Snow accumulation
- Known Permafrost in areas
- Critical Water Crossings
- Geological Properties



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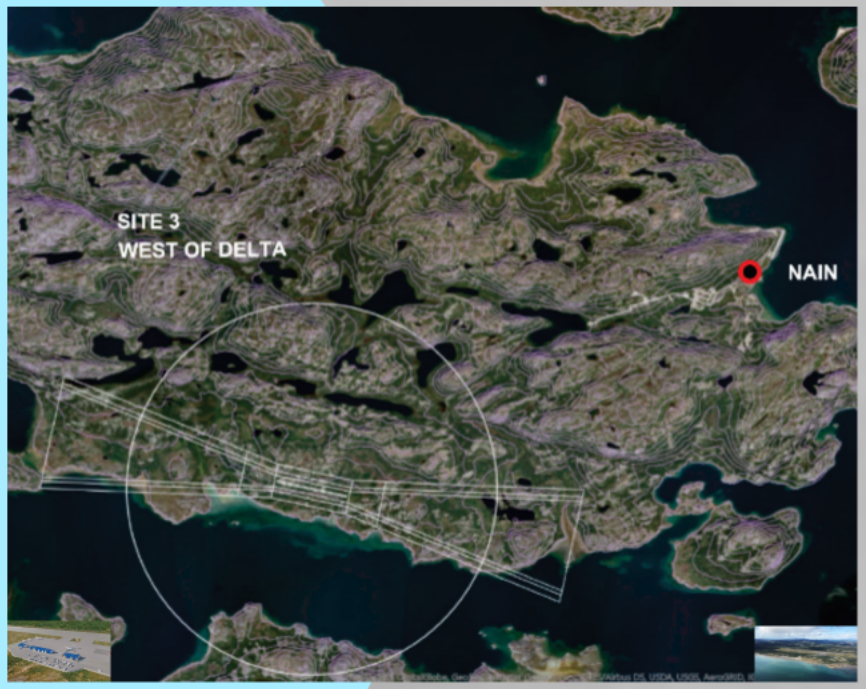

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Project Scope

Proposed Sites

Selection of Site

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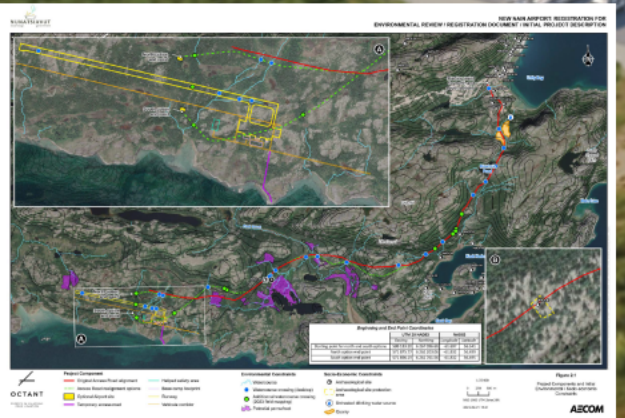
Feasibility Studies

This phase will consist of collecting data and technical studies to refine the design of the airport facilities and access road.

Environmental Assessment

Project Scope



Feasibility Studies

As part of this stage, data will be collected and the following feasibility studies will be carried out:

R1 – Weather Station and collect data (phase 1) Complete
R2 – Topographic survey Complete
R3 – Environmental Review – Desktop Assessment Complete
R4 – Surficial geology, geomorphology, permafrost and hydrogeological investigations In Progress
R5 – Weather studies and report (phase 2) In Progress

Feasibility Studies

Continued

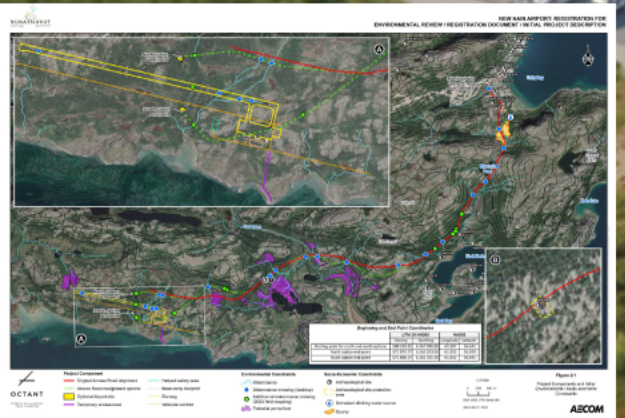
- R6 Hydrological study Complete
- R7 Electrical Power Supply Alternatives Complete
- R8 Preliminary engineering services In Progress
- R9 Preliminary architectural design services In Progress
- R10 Construction and supply strategy RFP Issued
- R11 Cost estimation RFP Issued
- R12 Environmental Impact Assessment In Progress

Feasibility Studies

This phase will consist of collecting data and technical studies to refine the design of the airport facilities and access road.

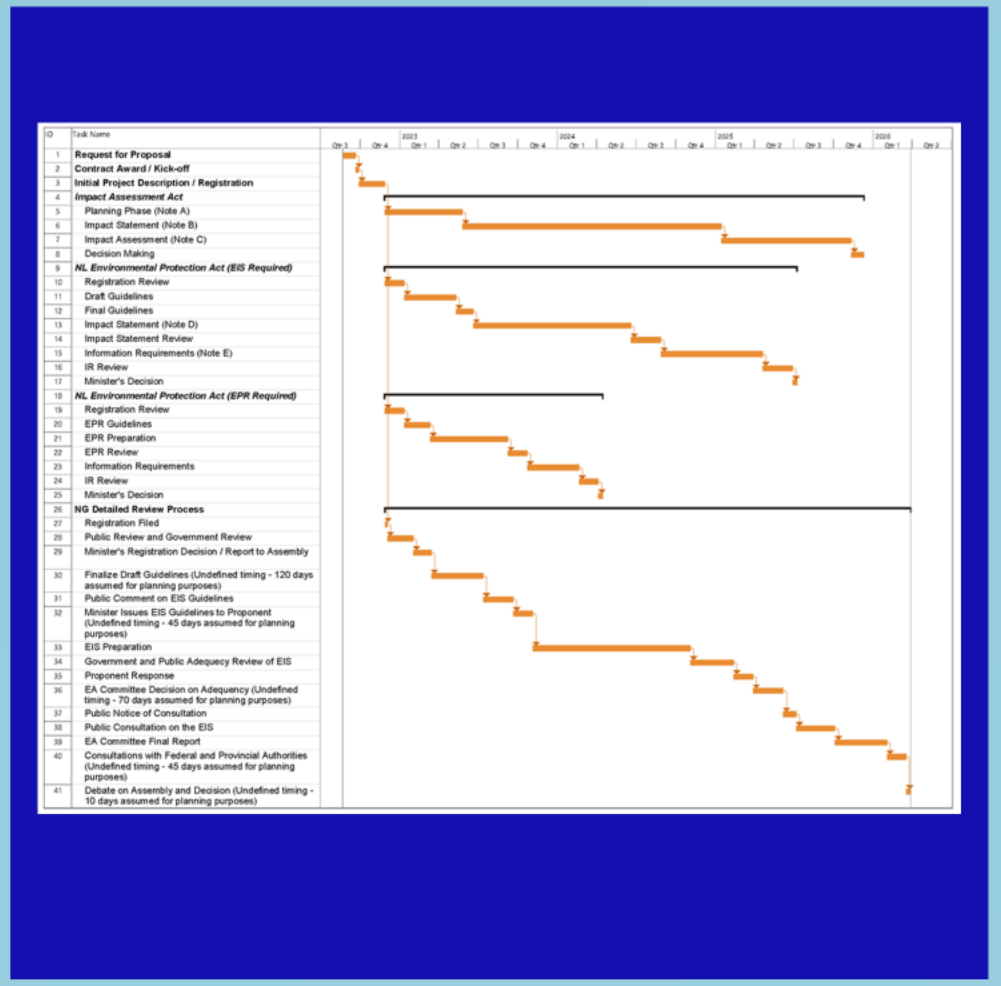
Environmental Assessment

Project Scope

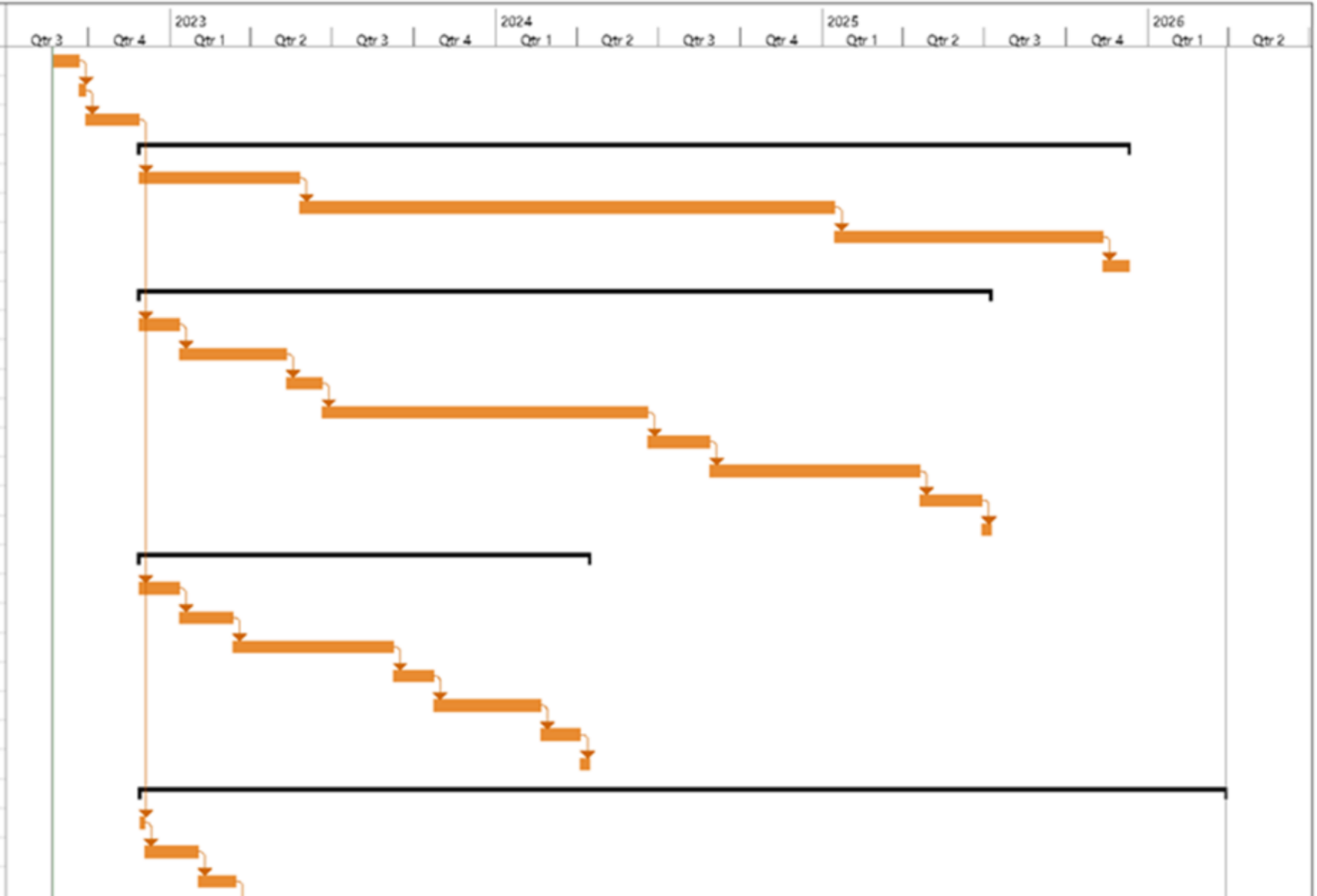


Environmental Impact Assessment

- Multiple reglatory bodies involved
- Ecological data monitoring and assessments
- Community consultations
- Detailed land use mapping
- Completion is scheduled for March 2026



ID	Task Name
1	**Request for Proposal**
2	**Contract Award / Kick-off**
3	**Initial Project Description / Registration**
4	***Impact Assessment Act***
5	Planning Phase (Note A)
6	Impact Statement (Note B)
7	Impact Assessment (Note C)
8	Decision Making
9	***NL Environmental Protection Act (EIS Required)***
10	Registration Review
11	Draft Guidelines
12	Final Guidelines
13	Impact Statement (Note D)
14	Impact Statement Review
15	Information Requirements (Note E)
16	IR Review
17	Minister's Decision
18	***NL Environmental Protection Act (EPR Required)***
19	Registration Review
20	EPR Guidelines
21	EPR Preparation
22	EPR Review
23	Information Requirements
24	IR Review
25	Minister's Decision
26	**NG Detailed Review Process**
27	Registration Filed
28	Public Review and Government Review
29	Minister's Registration Decision / Report to Assembly



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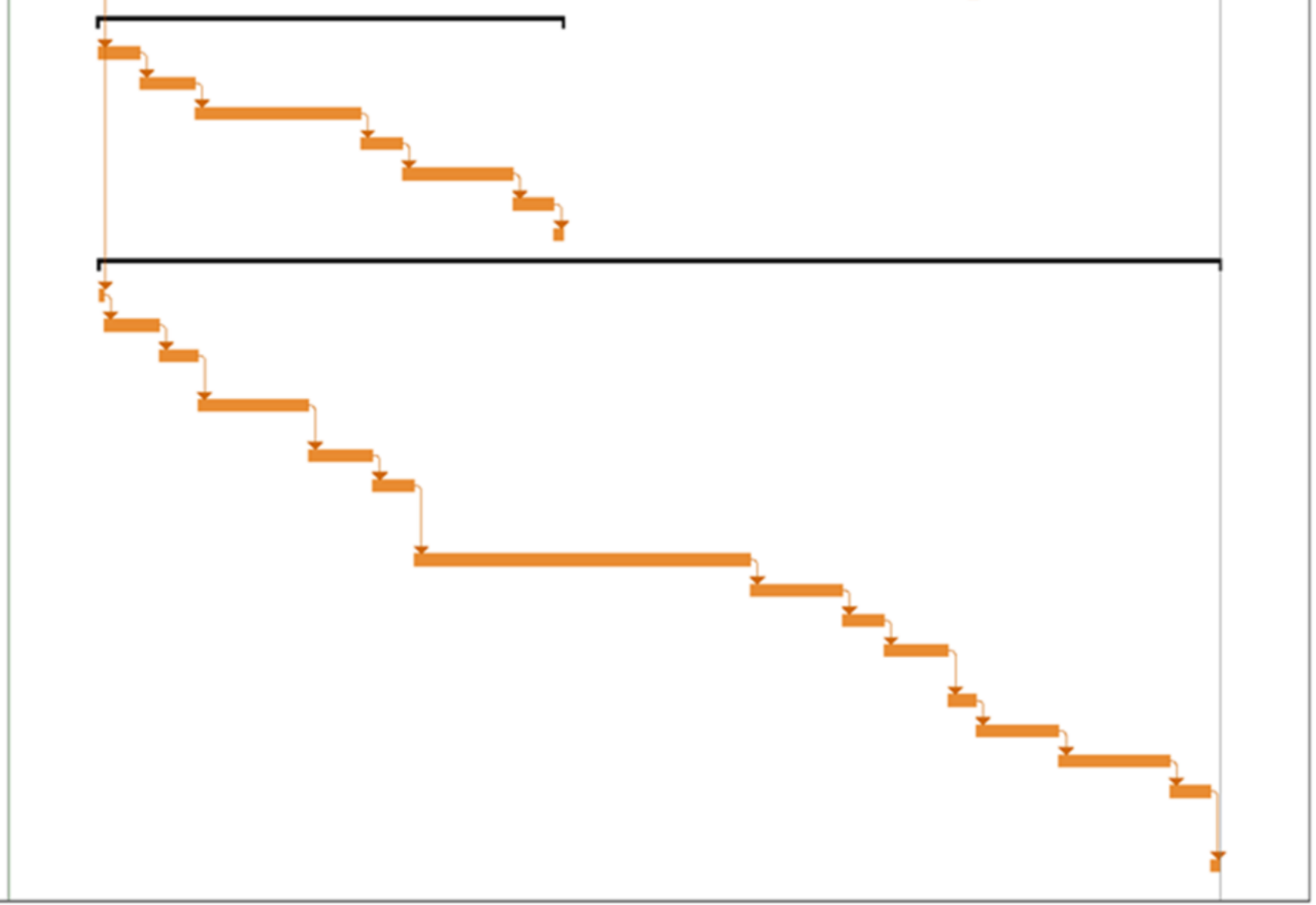
21	EPR Preparation
22	EPR Review
23	Information Requirements
24	IR Review
25	Minister's Decision
26	**NG Detailed Review Process**
27	Registration Filed
28	Public Review and Government Review
29	Minister's Registration Decision / Report to Assembly
30	Finalize Draft Guidelines (Undefined timing - 120 days assumed for planning purposes)
31	Public Comment on EIS Guidelines
32	Minister Issues EIS Guidelines to Proponent (Undefined timing - 45 days assumed for planning purposes)
33	EIS Preparation
34	Government and Public Adequecy Review of EIS
35	Proponent Response
36	EA Committee Decision on Adequency (Undefined timing - 70 days assumed for planning purposes)
37	Public Notice of Consultation
38	Public Consultation on the EIS
39	EA Committee Final Report
40	Consultations with Federal and Provincial Authorities (Undefined timing - 45 days assumed for planning purposes)
41	Debate on Assembly and Decision (Undefined timing - 10 days assumed for planning purposes)



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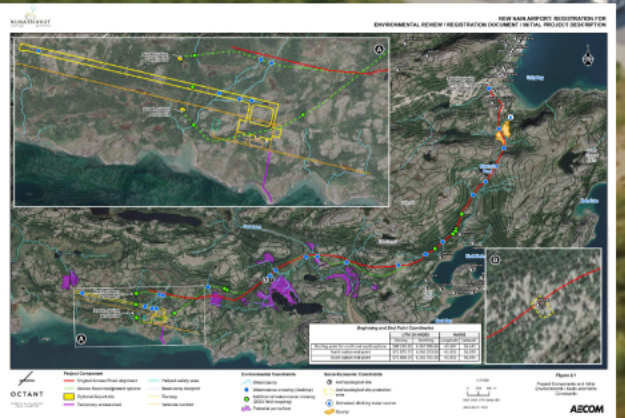
Project Scope



Project Component
- Alternative airport site
- Runway
- Original Access Road alignment
- Access Road realignment options

Labrador Inuit Lands
- Labrador Inuit Settlement Area (LISA)
- Labrador Inuit Lands (LIL)
- Nain Inuit Community Government / Municipal Planning Area

Other
- Existing airstrip

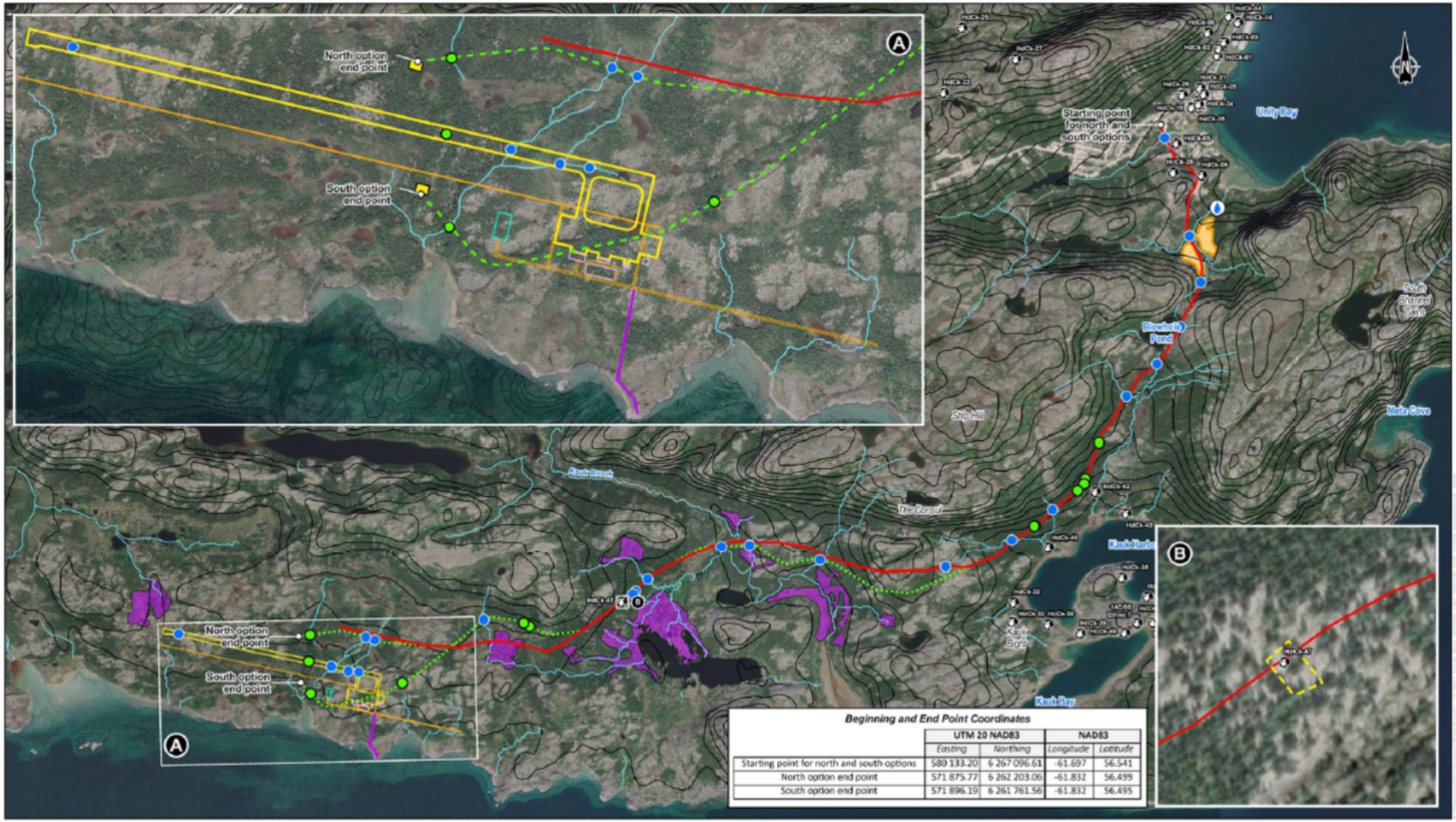
Magnetic North / True North

1:50 000
0 500 1 000 m
NAD 1983 UTM Zone 20N
2023-09-21 15:03

Figure 1.1
Project Location and Alternative Airport Sites

OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

AECOM



Beginning and End Point Coordinates

	UTM 20 NAD83		NAD83	
	Easting	*Northing*	*Longitude*	*Latitude*
Starting point for north and south options	580 133.20	6 267 096.61	-61.697	56.541
North option end point	571 875.77	6 262 203.06	-61.832	56.499
South option end point	571 896.19	6 261 761.56	-61.832	56.495

OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

Project Component
- Original Access Road alignment
- Access Road realignment options
- Optional Airport site
- Temporary access road
- Helipad safety area
- Base camp footprint
- Runway
- Vehicule corridor

Environmental Constraints
- Watercourse
- Watercourse crossing (desktop)
- Additionnal watercourse crossing (2023 field mapping)
- Potential permafrost

Socio-Economic Constraints
- Archaeological site
- Archaeological site protection area
- Untreated drinking water source
- Quarry

1:35 000
0 250 500 m
NAD 1983 UTM Zone 20N
2023-09-21 15:41

Figure 2.1

Project Components and Initial Environmental / Socio-economic Constraints

AECOM

Nain Airport: Public Information Session

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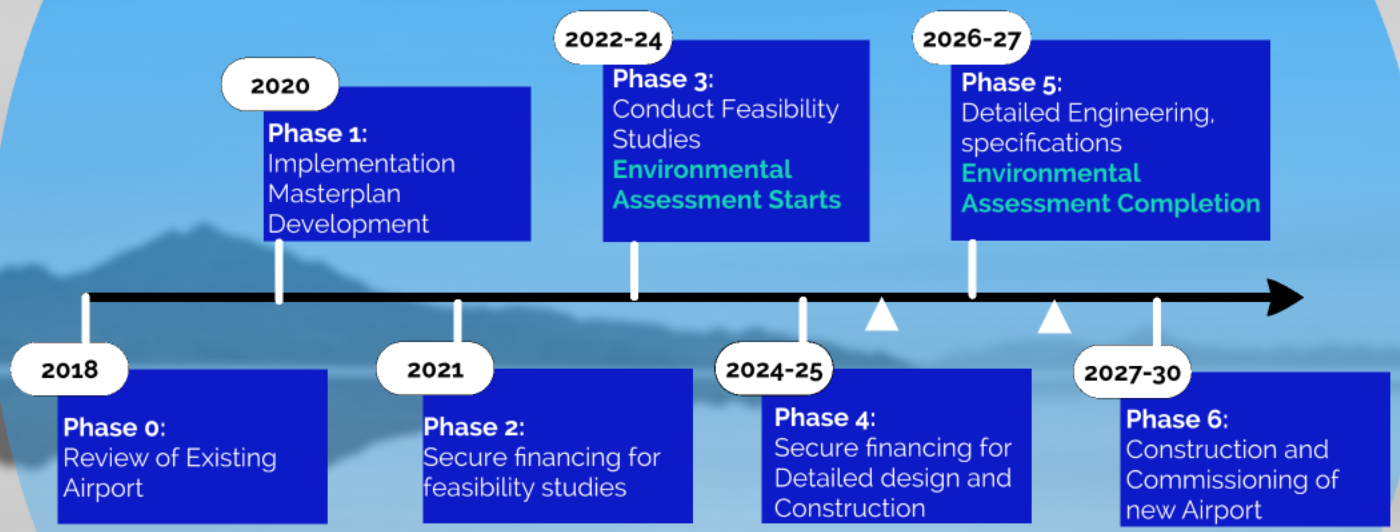

2018
Phase 0:
Review of Existing Airport
2020
Phase 1:
Implementation Masterplan Development
2021
Phase 2:
Secure financing for feasibility studies
2022-24
Phase 3:
Conduct Feasibility Studies
Environmental Assessment Starts
2024-25
Phase 4:
Secure financing for Detailed design and Construction
2026-27
Phase 5:
Detailed Engineering, specifications
Environmental Assessment Completion
2027-30
Phase 6:
Construction and Commissioning of new Airport

2018
Phase 0:
Review of Existing
Airport

2020

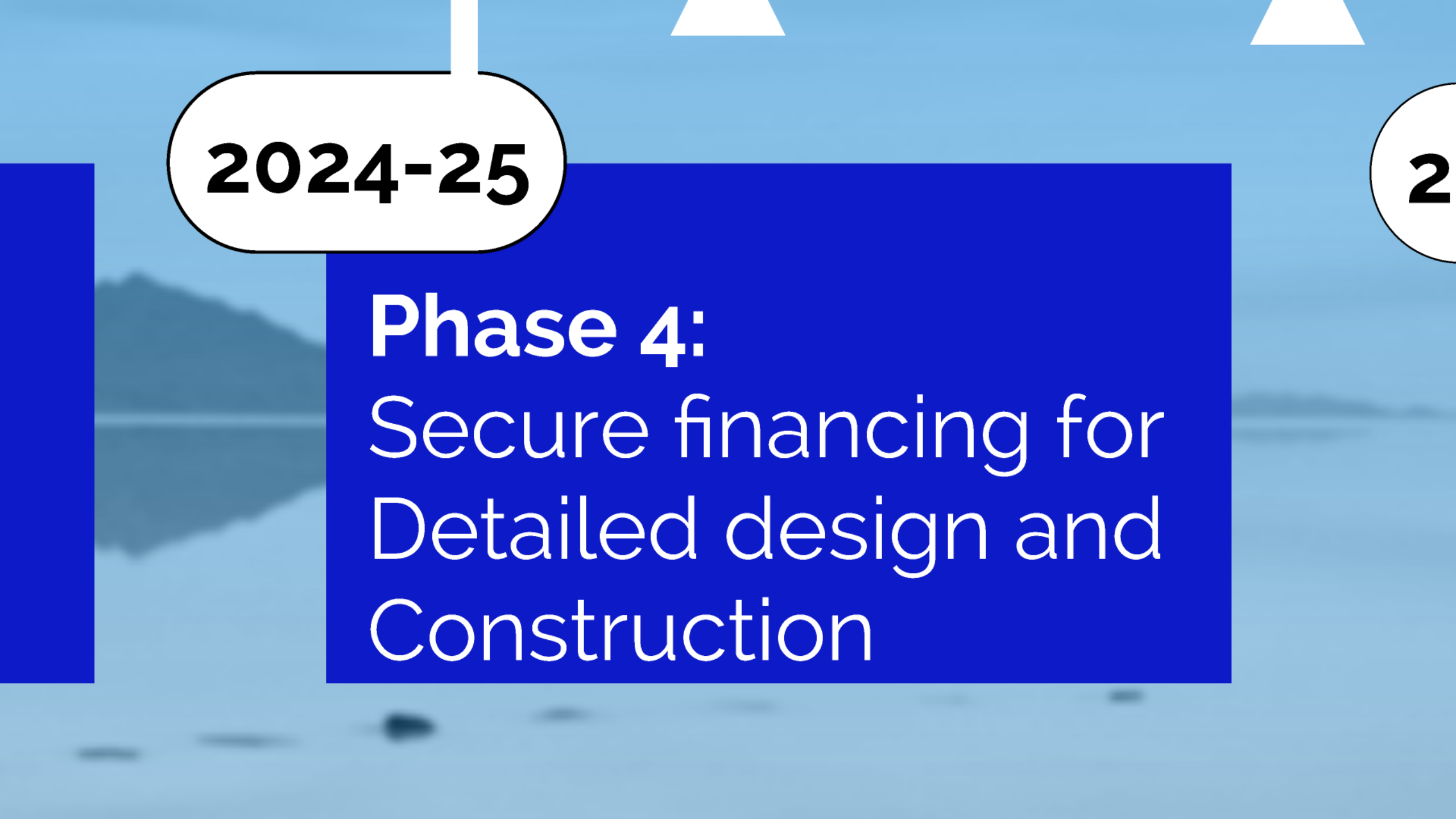
Phase 1: Implementation Masterplan Development

2021

Phase 2:
Secure financing for feasibility studies

2022-24

Phase 3:
Conduct Feasibility Studies
Environmental Assessment Starts


2024-25
Phase 4:
Secure financing for
Detailed design and
Construction

2026-27

Phase 5:
Detailed Engineering, specifications
Environmental Assessment Completion

2027-30
Phase 6:
Construction and
Commissioning of
new Airport

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Thanks!

Discussion Topics?

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colin.gilbride@nunatsiavut.com
(709) 923-2007

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Record of Questions and Answers

Nain New Airport Public Information Session Oct 16 2023

Question of Comment	Response Provided	Opportunity for Additional Follow-up
On the map, that when constructed, the road will go through the Blowhole area?	Confirmed the proposed alignment does go through the mountain pass towards Blowhole Pond. There are significant risks of avalanches and steep terrain. The R8 feasibility study is underway, and engineers are reviewing design options for protecting the public from any risk of avalanche along that road. There have been roads developed in mountainous terrain like through the Rocky Mountains and the Alps, and there are different options to consider for cutting slopes back or creating avalanche protection structures. The pass would be monitored for avalanches during operation, and snowpack management (i.e., setting off controlled avalanche) would be considered for public safety as well.	FAQs Future Consultation Meetings
Have you looked at an alternate road alignment?	Yes, this alignment route was considered, but it had more water crossings and more potential for snow accumulation, so it was ruled out based on those factors.	Information Sheet
Who will take ownership of the new airport?	Not decided yet, because right now all the airports are provincially owned and operated. The size of the new airport and length of the road make it significant operation. There's a lot of job opportunities for snow clearing and maintenance on the road. Ownership may be decided when the funding model is developed, and later during the construction phase.	FAQs
Does that mean we will be looking for an owner of the project after it's built, to keep it going? Currently difficult to get roads cleared within Nain. Icy roads through the mountains.	It's on the project team's mind to consider the type of ownership/operational structure, e.g., hiring a company full time to maintain operate to the road.	FAQs
A question was asked about Dash 8 planes.	It's large enough to land Dash.	FAQs
A question was asked about de-icing larger aircraft.	Right now, do have any plans for constructing de-icing, but that doesn't mean it can't be a future project.	Future Consultation Meetings
A question was asked about length of runway.	The runway is proposed to be 6000 feet with extension of 1000 feet for larger aircrafts; lots of room in this location for expansion and development	FAQs
Bigger airport and Dash-8s – this is the only community so far? Are you looking further into	It is proposed to look at extending the other communities' runways to be able to land larger aircrafts. This runway could install appropriate equipment to land	Future Consultation Meetings

other communities along northwest? There's an issue everywhere for flights in and out no matter what; bigger flights which can land more traffic, more people – is this proposed down the line for other communities as well?	in very harsh weather. Will be GPS units – different instruments etc. The other communities we are looking at expanding the runways but again, it's going to be a feasibility study reviewing to see what options we have because it will become an issue that every other Community will be landing to twin otter still, and here has the Dash-8.	
Comment about access to things like healthcare. More traffic, more people and, you know, yeah, just the time moving forward, just the future.	This is something we have raised with the province as well. They are responsible for the airport, so they are moving forward with the airport, but they need to think about their other duties as well.	Future Consultation Meetings
Have you guys considered possibilities and infrastructure that's going to come from this? Because all of a sudden, the airport may open up some opportunities? With bigger airport in North. Housing more people? Hotels?	I don't know the answer to that one because right now, like if the focus has been on just the airport, we haven't looked at the possibility of expansion along that and it is on Labrador Inuit land.	Future Consultation Meetings
Question about airport impact on hydro and if need to upgrade.	The airport is self-sufficient, so taking the existing airport off will alleviate some of the stress on the existing plant. Right now, we're conducting a feasibility study on how we're going to power this. Potentially will have own diesel generator or use solar power. An operational plan will have to be developed for this project (not there yet) but will need it for snow clearing, how we will access, how people will get back and forth from site because it's a long way to go. That will have to come once if we determine it's feasible and/or if we get the funding	FAQs
A question was asked about offloading fuel.	How to offload fuel is part of the current environmental assessment. There will be fuel tanks over there. Future expansion may involve a wharf of some sort, but right now it's going to be like how they fill up fuel here in the harbor	FAQs
A question was asked about water and sewage.	It's all going to be self-sufficient so there's different options e.g., sea can units. Sewage water will be from a supply in the near area.	FAQs
If something goes wrong, you will need someone to come in, if you make it too complicated.	Agreed.	Future Consultation Meetings

This airport here has problems. Question about crosswinds in this new location.	General direction of the prevailing winds in the selected Site area is from the west (almost standard in Canada), orientation of the new runway is 300 degrees west/west north and opposite 120 degrees east / east east south. The actual runway in Nain is 22, and it is tail crosswind and tail front wind, and this is why the twin otters when they take off towards the mountains are turning over Nain so they can get into the upwind position of 270. This new plateau, the orientation is very important – all information about winds has been confirmed with a weather station we installed and have been monitoring winds every hour for 2 years. We have a lot of information on this, it is part of the feasibility study. You can see the existing strip [orientation], and here is the new proposal.	Information Sheet FAQs
What if feasibility study says site is a no?	If this site is not deemed reasonable, we start process again and find a new site, potentially further away from community. Something may come up in the environmental assessment or something that we hear, or through some of these other geotech investigations that say it's not feasible. We must wait for all these studies to be done to determine whether it can proceed.	FAQs
A question was asked about plowing the road and where snow will go.	With this airport and once deemed feasible, will be operational plan. Plowing road not ideal for Nain e.g. where does snow go, where to truck it? We may a parking area for parking skidoo, then get on bus or other transportation. Will not know until we develop operational plan.	FAQs
Who chose the site?	The project team are aviation experts. These were the only three sites with possibility of 24-hr access for landing – that is main goal to connect the community to Goose Bay etc. This [selected] site was only option that allowed that and was in predominant wind direction, so we did not have cross wind and had favourable weather conditions as well.	Information Sheet FAQs
What would hinder it (24-hour access to the site)?	The main reason Sites 1 and 2 could not allow 24-hour access was because the elevation of these other plateaus is around 900 feet. The issue we have with this is not only the prevailing winds but that they are very narrow. The other point that was very important is, in Nain you can have weather with low ceiling which can often be around 400 feet. So, if we picked a plateau at 900 feet, they would have been in bad weather, they would have been in the clouds. The capacity of landing in that situation with the commercial aircraft in areas like that, is not possible. Also, the alignment and the plateau were too narrow for construction of the infrastructure and construction of the operational buildings, etc.	FAQs Future Consultation Meetings

	There were prior studies done around 2008 of different areas – most looking at plateau and altitude. The site we have picked now is confirming that in Nain there is low altitude clouds; what we wanted to give you as a good performance is to be able to have approaches to the airport that the aircraft can come down to 200-250 feet and ½ mile visibility. You will be well equipped with this type of airport – no comparison with current airport. To find a place like that, needed to have long plateau at lower altitude than 900 ft; elevation of the plateau at this site is 195 ft – these are reasons that are very important for implementation of an airport.	
As long as ½ mile on both ends, should be good. Landed once in small town called Sandpoint Alaska with a big hill beside it. Is that possible in this case?	I don't have an answer for that. There were more than just these three sites through the evaluation and these ones had the best opportunity. So, I don't know if there just wasn't that type of opportunity to develop an airport in the area that allowed that type of access that was in the correct direction.	FAQs Future Consultation Meetings
Pointed at different area on the map - a northern shoreline. Closer to community, which still has to get to airport. They are currently walking to airport. Not everyone has means to get there. Why was that coastal area north of selected site was not explored?	At the beginning, we looked at the northern shoreline. There were some elevation circles at lower levels that were unacceptable. That area is not a plateau, it is steep with angled walls. First thing for Nain, we can't be in plateau that is elevated (due to weather). Second, we cannot build a runway on the side of a big slope like on that shore. Aircraft need a long time to start descending and stabilize for landing; these surfaces we need to calculate can't have obstructions in it. In existing runway in Nain, aircraft are unable to come down lower than 800ft – that's why they cannot get to Nain in bad weather. Airplanes need lot of space on each side to protect the aircraft and manoeuvre at low altitude.	Information Sheet FAQs Future Consultation Meetings
Comment: Not saying it's a bad idea; wonderful idea that should've been done 50 years ago.		Future Consultation Meetings
Comment: Traveling the road in the winter is trek in itself. Concern with road winter – keep road running – money and operations more than just airport forever.		Future Consultation Meetings
Will road be paved or gravel?	The roadway will be gravel; the runway – looking at different options. Maybe not concrete, there are new technologies and surfaces we can put on. If gravel runway will limit types of aircrafts.	FAQs

Will the road have lighting? Running fuel or off energy supplied to airport?	Yes. Different options for lighting; some solar technologies for street lighting.	FAQs
What about access in/out of town? Maybe if feasible something built on edge of town for people to access e.g., a shuttle to get them rest of the way to airport? Or is it only trucks and cars that go through?	Will need to figure out in operational plan if this is feasible location. Know road is going to be challenge for everyone; big concern of us; distance of road, where it's going to go and how people will access the airstrip; we're thinking about e.g., a bus service, shuttle service that goes back and forth between certain locations. We know a lot of people do not have access and we need to provide some way for people to get back and forth. Will be figured out after we know this site/airport is feasible	Information Sheet FAQs Future Consultation Meetings
Will the road be kept clear for emergency situations?	The road – we have team of engineers finalizing road design. When you look at area, it looks up and down/curving, but engineers done lots of work. Other roads in other provinces in same type of area as Nain – those are wide enough, large curves, speed limit of 70 km/hr. In our recommendation, that road will be open year-round. Snow will have to be plowed. It is not a difficulty. Could look at small bus to transport to and out of the airport. People will be working at airport their homes will be in Nain. Road is connection. It will be important for road to be maintained for emergency. To offer you airport with capacity you need. Need to be confident that what we are doing is to high standards.	FAQs Future Consultation Meetings
Have you asked community members if there is hunting or fishing in that area?	Starting at end of month, part of impact assessment is the consultation with public on land use, mapping, cultural activities along the axis road	Future Consultation Meetings Land Use Study
What happens to existing airport?	Do not know yet.	FAQs Future Consultation Meetings
Question about how often planes is not able to land in existing airport or there are disruptions to landing.	For existing airport, almost 50% of cancelations due to weather, fog. At night (no possible evacuation from Nain). New airport provides 24hour service. Approach/design for new one – same design as Halifax/St John.	FAQs Future Consultation Meetings
Would the airport have airport check? Go 1.5 hr beforehand etc.	Unlikely.	FAQs Future Consultation Meetings
What kind of infrastructure buildings are you planning to build? How many?	There will be a terminal to accommodate certain # of passengers – 40-50 people at same time. In main terminal, you will have the notification area (not security but option if expanded). Main terminal will have electricity controls for the airport, place for luggage,	FAQs Future Consultation Meetings

	communication systems, washrooms. The other building that will be in the infrastructure is the operations/maintenance building for the airport operation, meaning you can enter snowplough equipment (for maintenance of airport). Building for generators at the airport – plan is to have 3 generators – 2 for operations and other as back up. Other building eventually (but not likely constructed in first phase) is cold storage and food fridge – for goods coming in for transfer to Nain or transfer to other places from Nain. Eventually another building for aircraft flight maintenance. Also predicting for future – what can happen? Mining industry in area is growing. Possible that even own transporters might be talking to them – could leave aircraft at airport and leaving with smaller aircraft to another destination. Will have parking, including for skidoos, trucks, cars, pickups. Working on this in feasibility study right now.	
Need to add a freight shed and fridge/freezer needs to open together with airport and not phased approach. Times when the weather is bad, freight builds up and passengers cannot fit into the building. Frozen meat fits in the airstrip and gets spoiled because and people who ordered those items have gone out of town and do not get anyone else to pick up food – food gets spoiled.	Yes, agree should be part of initial phase. Working closely with food security staff – acknowledged we need to have reefer storage (frozen and full storage) as well as for all the parcels that come in as well. ***Note: Following this comment, in response to community input, the proponent has changed the Project design to include the fridge and freezer structure at initial commissioning, rather than future phases.***	FAQs Future Consultation Meetings
Question about land use mapping. If land use and harvesting impacts are identified, will there be compensation for those users?	Will have to wait until land use studies come back and say and what potential impacts are.	Land Use Study
Comment: Looking at pictures, that is a big area where wildlife is. Wildlife will move elsewhere and start cycle over. Question about fencing the entire area.	There will be around terminal and airstrip/runway to keep wildlife off, too dangerous for your own safety.	FAQs
Open to possibility for Air Borealis to make a hanger for equipment to be left 24/7?	This area (Site 3) allows a lot of opportunity for expansion; biggest benefit over other two sites. Other two we could barely get runway in. This site big plateau, it is flat, a lot of room for expansion in future.	FAQs

Question about possibility of leasing land.	Labrador Inuit land and need to follow protocol to acquire land.	
What year do you think, if this feasibility passes, when will first plane land?	If we hit all the timelines, 2030. Environmental assessment to be completed by 2026. At that point, will make decision to go/not go on this airport.	FAQs
You've done some work but blowhole issue, road issue – what do you perceive as major drawbacks?	That is the whole point of the feasibility study and pulling it all together. We did the geotechnical investigation last year; results favourable all the way through. Toughest spots will be section of the road as it will be heavily engineered and built for all the avalanche events and steepness of it, that will create potential impacts.	Information Sheet FAQs Future Consultation Meetings
Comment about another area for consideration – side of hill? Nice and level.	They did evaluate going that route, I cannot speak to the exact reason, but it was to do with the amount of river crossings in that area. For the development of the runway, there is a significant amount of rock, so the selected Site 3 alignment allows for better opportunities. I can talk to the project team and get a better response to exactly why they turned down going that way.	FAQs
This is why information to the public is so important; we haven't heard this – important to inform people.	Agree. Exploring having a Facebook page for updates, upcoming events, whatever is going on with the airstrip project.	Proponent is exploring options for Facebook page for project updates.
Proponent Asked Questions of Participants		
What is the best way for us to get the information about this project and upcoming sessions to the public?	Understanding harvest population, important, it is a vibrant area, creating rules for those knowledge holders and traditional knowledge. They will need to be compensated for that invaluable knowledge. Being able to identify area of common use, and hunting area – not use the area anymore. There could be another area where harvesting can happen. Around or near in replacement of that. Lots of harvester here tonight – create a key group.	Future Consultation Meetings
We, the infrastructure team, has developed a public engagement portal for other projects and we're launching soon. Trying to get here as a group was difficulty. Could do smaller sessions with myself and project team on mapping.	Facebook page just for the new airport, allows people to add comments and questions. Opportunity for project updates and upcoming events. ***Note: Following this feedback at the Information session, the proponent is exploring options for setting up a Facebook page for project updates.***	Future Consultation Meetings

How often do you want information session on whole project and status?	Right now would prefer more information and to improve understanding	Information Sheet FAQs Future Consultation Meetings Land Use Study

Appendix C3 Impact Assessment Agency of Canada Presentation (January 17th and 19th, 2024)

NEW NAIN AIRPORT

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kavamanga Government

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FEASIBILITY STUDY

IACC Meeting
January 17 and 18, 2024

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NAIN, NUNATSIAVUT

- Nain is the largest northernmost Inuit community in Labrador
- Administrative capital of Nunatsiavut Government
- Accessible by marine ferry about 5 months / year and takes 3 days from HV-GB
- Fixed-wing aircraft is available year-round
- No night access due to lack of lighting system
- Poor weather conditions and limited instrument approach facilities result in frequent flight interruptions and cancellations
- Effects of accelerating climate change / sea level rise / storm surges on airstrip
- The health, wellbeing and safety of Nain residents are at risk

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CURRENT AIRPORT SITUATION

<u>An analysis of the existing airstrip in 2018 concluded:</u>

"*The existing airport infrastructure has reached the end of its service life, and that any improvements would be limited to a rehabilitation that would temporarily extend its usability*"

- Proximity to the sea and lack of available space makes expansion impossible
- Topography limits safe low-altitude instrument approaches
- Accelerating climate change and sea level rise / storm surges put the airstrip at risk
- Amplified low-pressure systems increase wave action and bank erosion on the airstrip

NUNATSIAVUT
kavamanga Government

Potential Sites

Pre-Feasibility study for a new airport was conducted in 2019

- Review of studies conducted prior to 2018 (e.g., Government of NL 2008)
- Identification of three potential sites
- Initial evaluation primarily by aviation criteria and accessibility

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PREFERRED SITE

- Southwest of Nain
- On a plateau with 4 km of usable length
- Approx. 60 m elevation ASL
- 12 km access road

The site is suitable in terms of:

- Elevation
- Prevailing winds
- Protection from northeast winds during storms
- Can accommodate a larger runway
- Instrument flight rules approaches: 200 ft, ½ mile visibility
- 24 hour operation

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FUTURE AIRPORT SITE DESIGN

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FUTURE AIRPORT TERMINAL DESIGN

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PROJECT PHASES

COMPLETED

Phase 1 – Implementation process master plan

COMPLETED

Phase 2 – Securing financing for feasibility studies

Phase 3 – Conducting feasibility studies

Phase 4 – Securing financing for construction phase

Phase 5 – Drawings, specifications and construction of the new airport

Phase 6 – Certification of facilities and commissioning

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PHASE 3 – CONDUCTING FEASIBILITY STUDIES

This phase will serve to confirm the final concept in preparation for the drawings and specifications needed in the subsequent construction phase. This phase will consist in collecting data and completing the preparatory technical studies in order to refine the design of the airport facilities and the alignment of the access road.

R1 - Weather Station and collect data
Completed

R2 - Topographic survey
Completed

R3 - Preliminary environmental review – Desktop assessment
Completed

R4 - Surficial geology, geomorphology, permafrost and hydrogeological investigations
Completed

R5 – Meteorological Studies and Report
Completed

R6 - Hydrological study
Completed

R7 - Electrical Power Supply Alternatives
Completed

R8 - Preliminary engineering services
March 2024

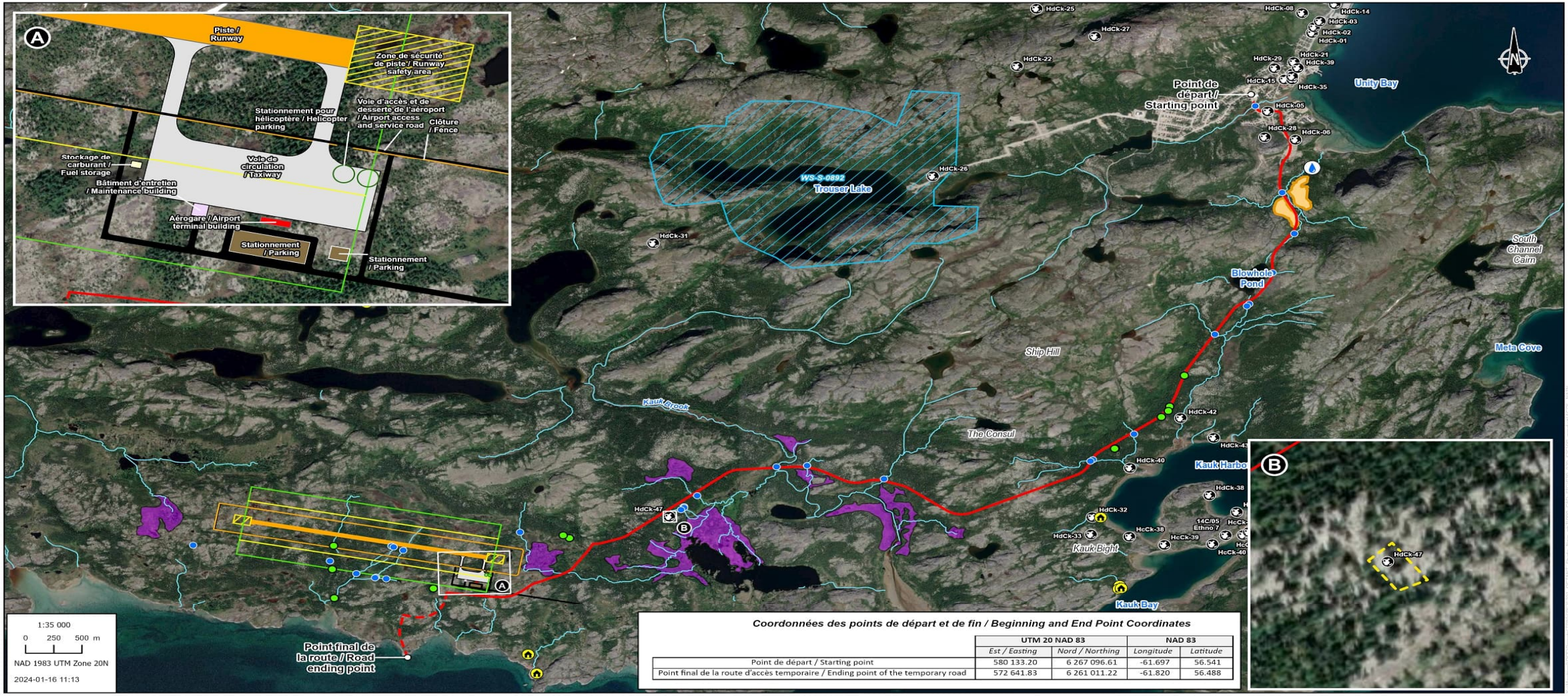
R9 - Preliminary architectural design services
February 2024

R10 - Construction and supply strategy
Start January 2024

R11 - Cost estimation
Start January 2024

R12 - Environmental Impact Assessment
July 2024

FINAL REPORT DECEMBER 2024



Coordonnées des points de départ et de fin / Beginning and End Point Coordinates

	UTM 20 NAD 83		NAD 83	
	Est / Easting	*Nord / Northing*	*Longitude*	*Latitude*
Point de départ / Starting point	580 133.20	6 267 096.61	-61.697	56.541
Point final de la route d'accès temporaire / Ending point of the temporary road	572 641.83	6 261 011.22	-61.820	56.488

Composante du projet / Project Component

- Route d'accès / Access road
- Route temporaire proposée / Proposed temporary road
- Clôture / Fence
- Surface de transition (23 m) / Transitional surface (23 m)
- Surface de transition (45 m) / Transitional surface (45 m)
- Stationnement pour hélicoptère / Helicopter parking
- Zone de sécurité de piste / Runway safety area
- Aérogare / Airport terminal building
- Voie d'accès et de desserte de l'aéroport / Airport access and service road
- Stockage de carburant / Fuel storage
- Bâtiment d'entretien / Maintenance building
- Stationnement / Parking
- Piste / Runway
- Voie de circulation / Taxiway

Contraintes environnementales / Environmental Constraints

- Cours d'eau / Watercourse
- Traversée de cours d'eau / Watercourse crossing (desktop)
- Traversée additionnelle de cours d'eau (terrain 2023) / Additionnal watercourse crossing (2023 field mapping)
- Pergélisol potentiel / Potential permafrost

Contraintes socio-économiques / Socio-Economic Constraints

- Camp / Cabin
- Site archéologique / Archaeological site
- Zone de protection du site archéologique / Archaeological site protection area
- Source d'eau potable non traitée / Untreated drinking water source
- Zone publique protégée d'approvisionnement en eau / Protected Public Water Supply Area
- Carrière / Quarry

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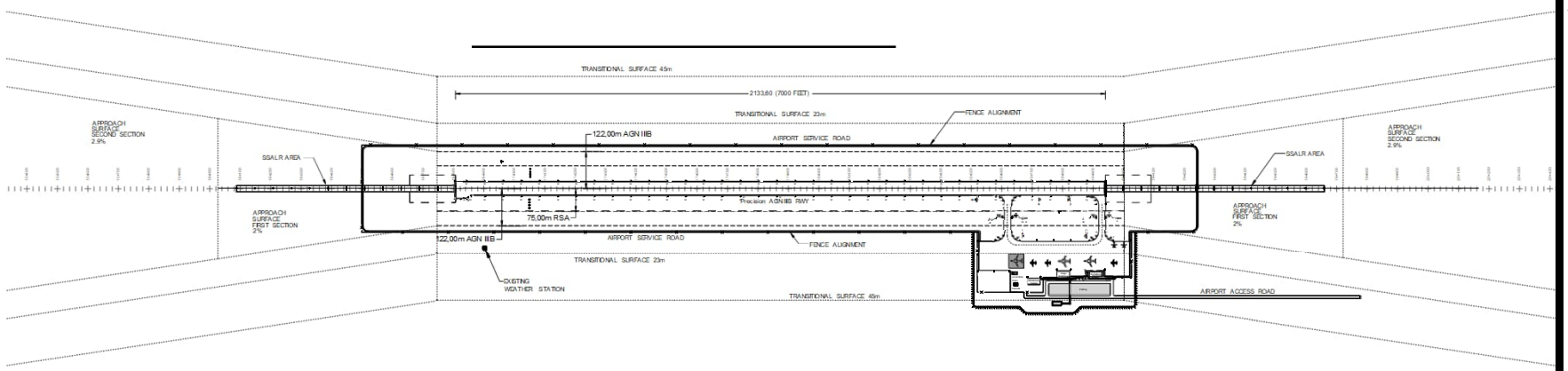
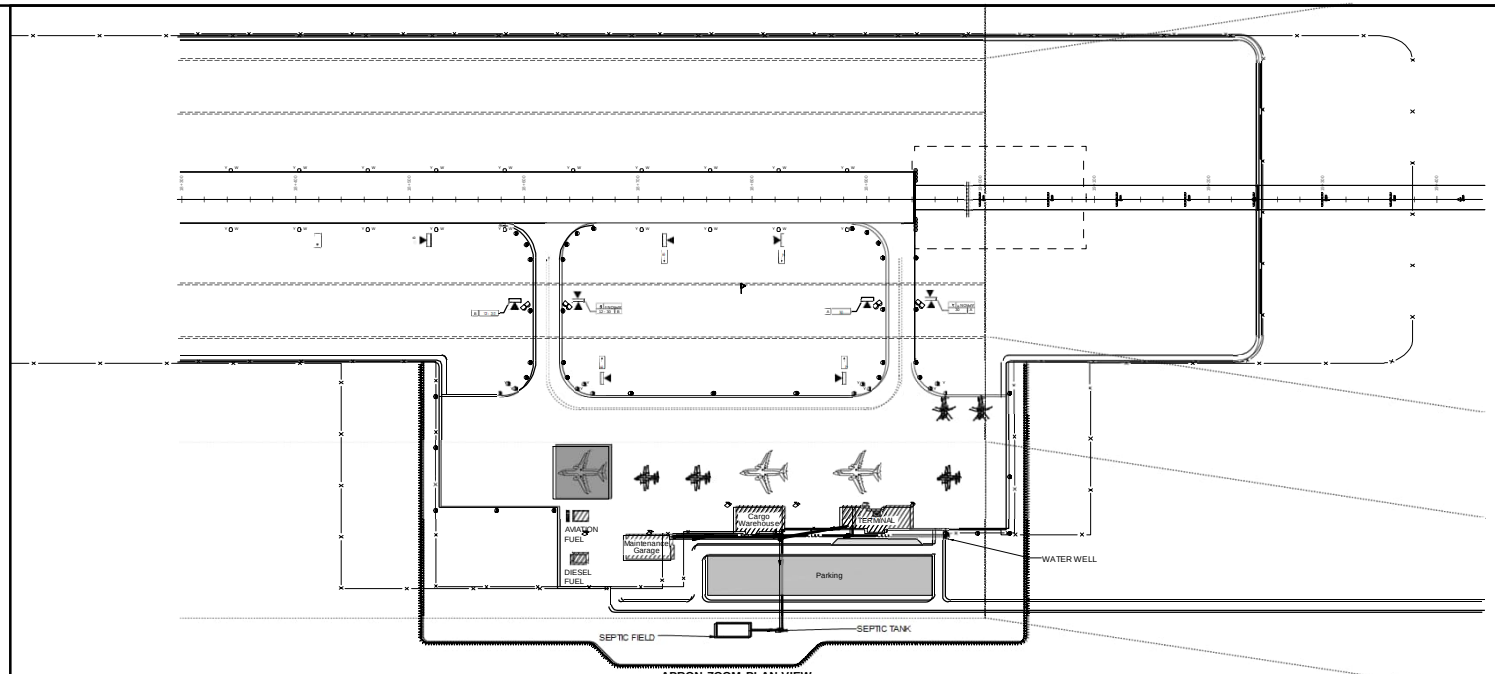
Figure 2.1
Composantes du projet et contraintes environnementales et socio-économiques initiales

Figure 2.1
Project Components and Initial Environmental – Socio-economic Constraints

AECOM

UNIDIRECTIONAL APPROACH LIGHT
APPROACH THRESHOLD LIGHT
SEQUENCED FLASHING LIGHTS
END AND THRESHOLD LIGHT
RUNWAY EDGE LIGHT WHITE
RUNWAY EDGE LIGHT WITH YELLOW AND WHITE LENS
TURN PAD LIGHT BLUE
PRECISION APPROACH PATH INDICATOR (PAPI)
RUNWAY GUARD LIGHT
TAXIWAY EDGE LIGHT
APRON EXIT LIGHTS (YELLOW)
ILLUMINATED SIGN LIGHT
WIND DIRECTION INDICATORS
APRON FLOODLIGHTS
AERODROME BEACOM





APRON ZOOM PLAN VIEW

SCALE : 1:1500

Stantec

Stantec Consulting Ltd.
1200, Saint-Martin Blvd West, suite 300
Laval (Québec) H7S 2E4
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www.stantec.com

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Consultant

Notes

THRESHOLD 12:
061°50'33.22" N56°30'04.79" Z=210.923ft

THRESHOLD 30:
061°48'30.83" N56°29'51.10" Z=198.503ft

ARP (ARPORT REFERENCE POINT)
061°49'32.07" N56° 29' 57.95" Z=190.035ft

ISSUE/Revision	No.	By	Appd.	YYYY-MM-DD
File Name: RUNWAY_CONCEPTUAL_DESIGN_ELECT.DWG				2023-09-01
Tom Kaumuk, Tech.		Tyl Kaumuk, Tech.		YYYY-MM-DD
Processed		Dsgn.		
		Mario Racine, P.Eng.		
		Project Manager		

Permit-Seal

Client/Project Logo

Client/Project
NUNATSIAVUT GOVERNMENT

NNAFS R8 Preliminary Engineering Services

Nain, Nunatsiavut / Canada

Title
RUNWAY CONCEPTUAL
ELECTRICAL DESIGN

Project No.	Scale
115823110	1 : 1500
Iss./Rev.	Sheet / of
	Drawing No. 01

Title

Project No. 115823110
Iss./Rev. 0
Sheet 01 of XX

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kavamanga Government

Environmental Impact Assessment

- Registration/Initial Project Description (IPD) submitted Dec 2023
- This public information session is the next step

Activity	Timeline
Consultation and Engagement	Open House planned for Spring 2024
Regional Land Use Study (NG)	Started Dec 2023
Environmental Field Surveys • Archaeology • Spring Migratory Bird and Bat ARU Deployment • Summer Avian / SAR / and Terrestrial Wildlife • Wetlands, Vegetation and Soils • Fish and Fish Habitat • Fall Migratory Bird and Country Foods	Completed in 2023
Reporting • Baseline assessment including air and noise modeling • Impact assessment – potential impacts and mitigations	Fall 2023 to Summer 2024

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Preliminary Field Results

Archaeology	• Stage 1 overview/background Archaeological Assessment completed in May 2023. 12 potential archaeological sites are located within 5 km of Project Area. • A Stage 2 Archaeological Assessment field survey was completed in June 2023 to verify sites • 164 shovel test pits were completed – all were negative • Recommended 1 archaeological site area be avoided by rerouting the access road and fencing off during Project construction
Wildlife	• Mammal signs observed included caribou tracks, black bear, snowshoe hare and short-tailed weasel • 35 songbird species typically found in the region were observed • One federally listed species at risk, the rusty blackbird, was detected in open bog/fen habitats.
Wetlands, Vegetation, Soils	• Over 130 vegetation species were identified • No federally listed vegetation species were observed • 13 Species of conservation concern (SOCC*) were also identified, including Scheuchzer's Cottongrass and Greenland Stitchwort.
Fish and Fish Habitat	• 40 water crossings have been documented in the field within the project footprint. Select water crossings have been surveyed. • Two water crossings (WC 10 and WC 12) confirmed to be fish bearing (Brook trout and Stickleback) • No Arctic char were collected nor observed. • No SAR identified in the freshwater Brook trout Three-spine stickleback
Country Foods	• Ten Arctic char were collected from the local community and sent to a lab for analysis (contamination prior to project) • Traditional use plants, including Labrador tea and berries, and soil were collected for lab analysis

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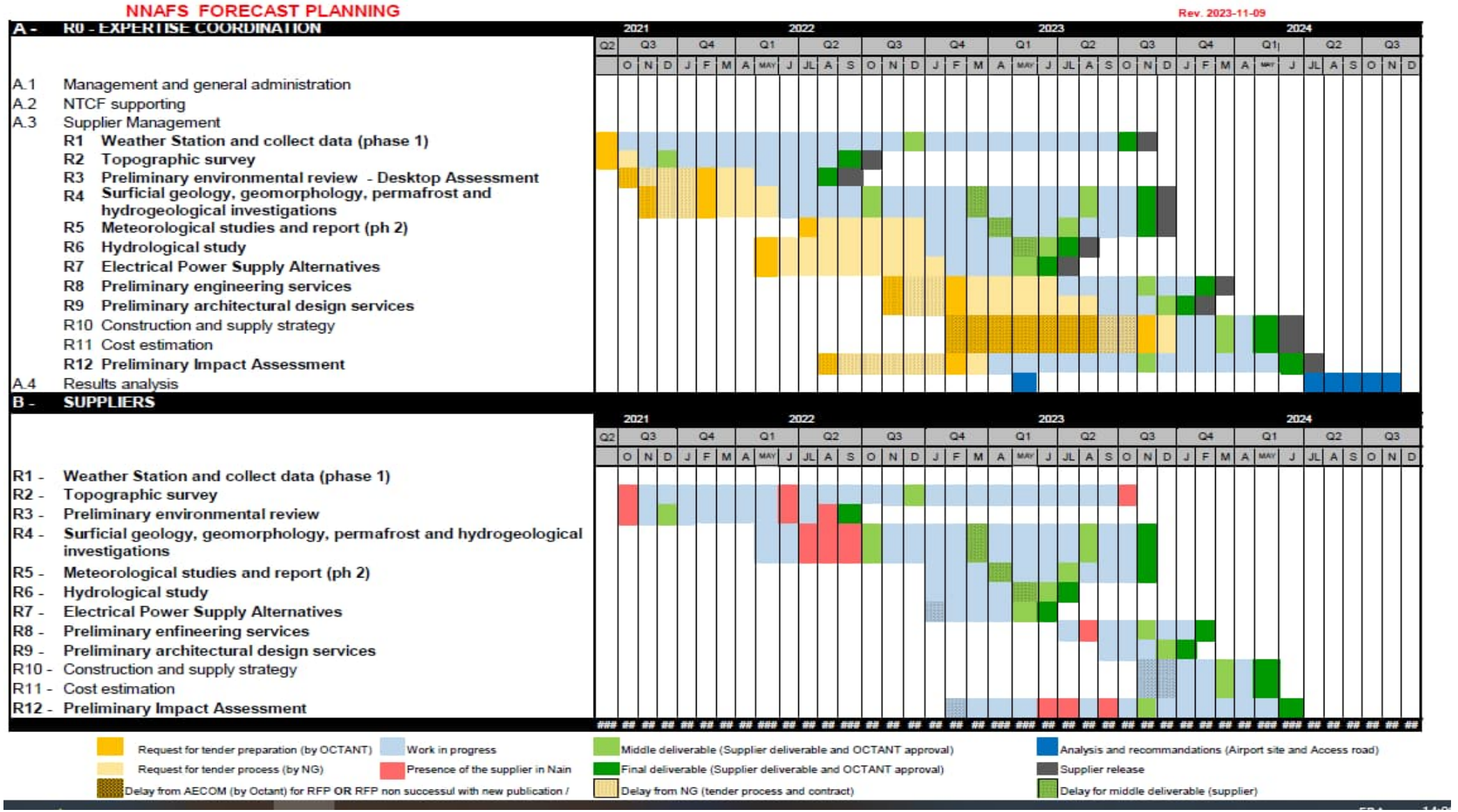
NNAFS FORECAST PLANNING rev 2023-11-09



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General Project Schedule

Activity	Timeline
Feasibility Studies	End of 2024
Project Financing	2024-2025
Final Design	Late 2026
Tendering	Late 2026
Construction Start	2027
Certification and Commissioning	Late 2030

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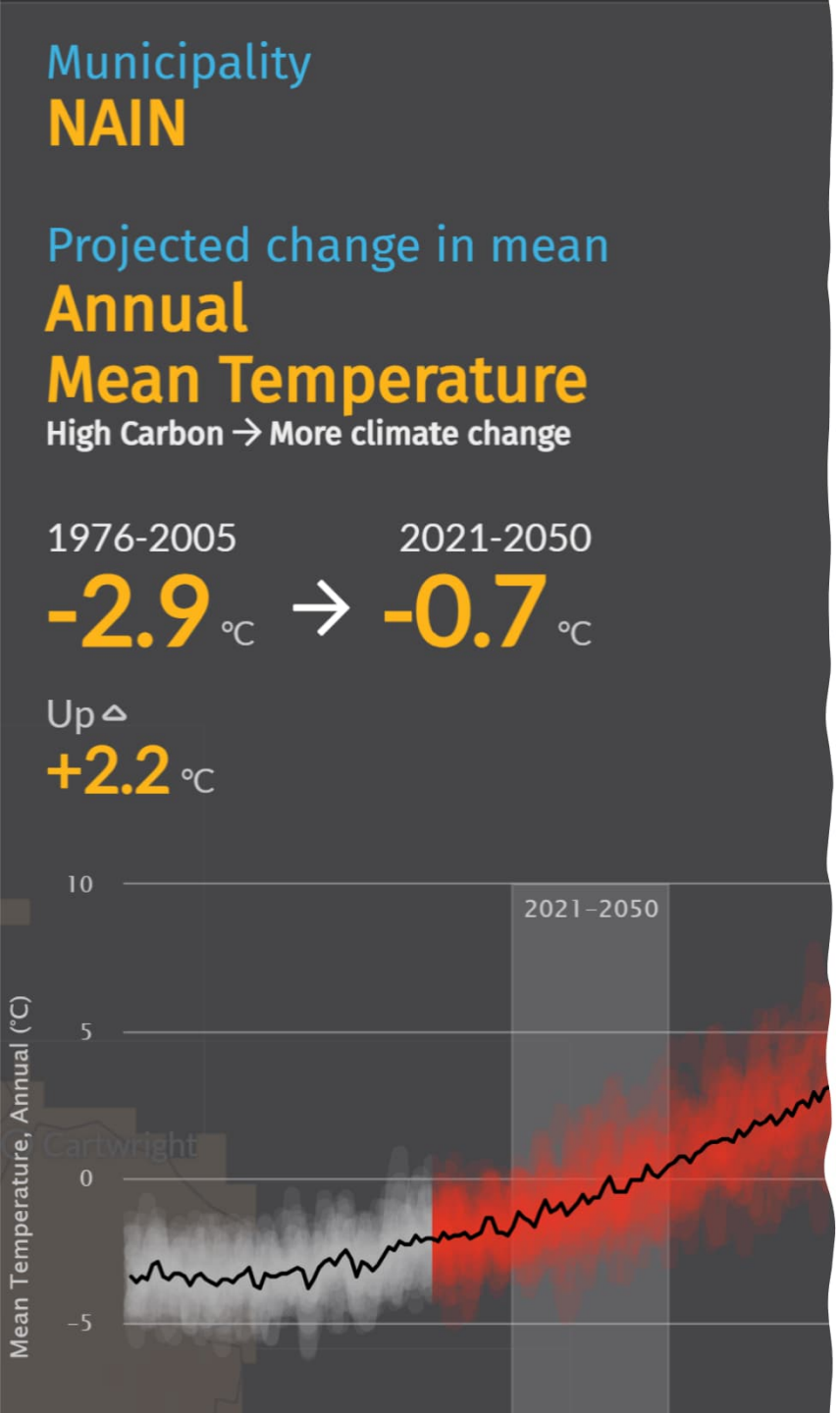

- Accelaration of Climate Change
- Sea Level raising
- Actual runway flooding

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QUESTIONS

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CONTACT INFORMATION

Nunatsiavut Government
Colin Gilbride, NG INFRA Director
25 Ikajuktauvik Road, Nain NL
(709) 922-2942

OCTANT Aviation
Marie-Helene Simard,
NNAFS Project
514-237-3015

Appendix C4 Nunatsiavut Land Resources Engagement Meeting Notes (February 19, 2024)

Proposed New Nain Airport Project

Meeting Notes – NG Environment Regulatory Engagement

February 19, 2024

Project Discussion Question and Answer

Attendance and Meeting Description: Members of the Nain public attended and asked questions while representatives from the NG Infrastructure, IAAC, Octant and AECOM attended and answered questions as appropriate. AECOM recorded the following questions and answers.

Q: Torngat Strange Lake has a road as well? Are these similar projects?

A: Separate projects with different access roads.

Q: What is the cost estimate?

A: Cost estimation feasibility study is just starting; we don't have a $ value yet

Q: Julius – will the cost estimation account for increases for future?

A: Yes, costs will be considered in 2030 dollars

Q: Torngat presentation indicated schedule was subject to approval; is that true for this project?

A: Feasibility studies are outside the regulatory process and not subject to approval

Q: What about power? Consideration of solar? Even 1 or 2 panels?

A: Diesel-fired generators at first. No solar or wind at commissioning, to be incorporated in future phases.

Q: Are the R8 engineers experienced with permafrost and harsh climates?

A: Yes. Conducted an extensive drilling program for data collection.

Q: Architectural design - includes Inuit design?

A: Yes, considering lots of natural light and spaces for murals. Still only at the preliminary conceptual stage.

Q: R11 – will project costs be pulled from 10-year infrastructure plan? Or external
A: 10-year Plan didn't consider a project of this size; mostly using that money for housing, utilities. We're going to lobby for funds for this project

Q: Fuel for generators – will there be fuel pipeline from Nain, or re-fueling from the coast?

A: Woodward won't do floating transfer near the airport location. Fuel will be unloaded in Nain, using reserve tanks currently in Nain, then transferred by truck to airport

Q: Environmental – what is the plan for de-icing. Chemicals could impact the surroundings
A: Adhering to federal aviation standards for de-icing. Will involve construction of a de-icing pad that controls de-icing fluid and manages waste.
Will not the same as large airport.

Large aircraft will not stay in Nain, so there will not be the same need to de-ice.
If airport is used more as a hub, space to build hangars in Nain for storage and expansion of de-icing.

Q: How much fuel storage?

A: About 30,000 to 40,000 L will be stored on site, with additional reserves in Nain. 737 aircraft won't refuel here, relatively short flight to Happy Valley Goose Bay.

Q: For the road routing, was it done just by computer? Or was it viewed by helicopter?
A: Extensive helicopter and on-the-ground field surveys were conducted, sorry

Q: Will the archaeological site be protected?

A: The site will be fenced during construction

Q: Kauk brook is a prime fishing spot for the community, what are the plans for protecting it from road impacts, e.g., dust?

A: No need for dust control directly on bridge, since it will be metal
Applying a chemical to the gravel to keep dust down

(Not satisfied with answer)

Looking at different rock qualities of the road to limit dust. Further mitigations will be developed for construction.

Q: will a water truck be needed?

A: Will evaluate if needed, further down the road

Q: Surprised no Arctic char were found during field studies?

A: (Lots of back and forth about timing of surveys for both fish and berry sampling)

Q: What is length of airstrip?

A: 7000 ft

Q: How does the project schedule compare to Torngat, which had timelines all subject to approval?

A: The airport project will require approval from the NG and is also subject to the review of the other regulators

Q: What are next steps for consultation, when is next meeting?

A: Proponent open house in April. Preferable to wait until more information from R8 is available for us to present to the community.

Q: Are NG Env and NG Infrastructure working closely together on this project?
A: Actually intentionally separate, so NG Env can conduct an impartial review

Q: Is this a harmonized process?
A: Technically no, that requires a years-long process of finalizing a harmonized agreement. The regulators are doing a collaborative process

Q: Compensation for the harvesters? Two cabins near the airport?
A: Not yet, will be based on the NG assembly decision

Q: Will there be a radius around airport for public traffic
A: Fence around airstrip, but not road. Road will be widened for parking and harvesting

Q: Who from province is represented here?

A: No one; their process of reengagement hasn’t started yet

Appendix C5 Community and Stakeholder List

Category of interest	Code (primary)	Organization	Contact Name
Govt Employee	Government	Nunatsiavut Government, Nunatsiavut Secretariat	Isabella Pain
Govt Employee	Government	Nunatsiavut Government, Department of Lands and Natural Resources	Rodd Laing
Govt Employee	Government	Nunatsiavut Government, Department of Lands and Natural Resources	Frederic Dwyer-Samuel
Govt Employee	Government	Nunatsiavut Government, Department of Lands and Natural Resources	Mary Denniston
Govt Employee	Government	Nunatsiavut Government, Department of Lands and Natural Resources	Claude Sheppard
Govt Employee	Government	Nunatsiavut Government, Department of Language, Culture and Tourism	Lena Onalik
Govt Employee	Government	Government of Newfoundland and Labrador, Department of Environment and Climate Change	Joanne Sweeney
Govt Employee	Government	Government of Newfoundland and Labrador, Department of Environment and Climate Change	Paul A. Carter
Govt Employee	Government	Government of Newfoundland and Labrador, Department of Environment and Climate Change	Vicki Ficzere
Govt Employee	Government	Government of Newfoundland and Labrador, Department of Environment and Climate Change	Mohammad Khayer
Govt Employee	Government	Government of Newfoundland and Labrador, Department of Fisheries, Forestry and Agriculture	Jana Fenske
Govt Employee	Government	Government of Newfoundland and Labrador, Department of	Sean McGrath

Category of interest	Code (primary)	Organization	Contact Name
		Municipal and Provincial Affairs	
Govt Employee	Government	Government of Newfoundland and Labrador, Department of Indigenous Affairs and Reconciliation	Mark Bugden
Govt Employee	Government	Government of Canada, Environment and Climate Change Canada	Michael Hingston
Govt Employee	Government	Government of Canada, Environment and Climate Change Canada	Jerry Pulchan
Govt Employee	Government	Government of Canada, Transport Canada	Jason Flanagan
CS Health	Government	Government of Canada, Environmental Health Program, Health Canada	Lachlan Maclean
CS Health	Government	Government of Canada, Health Canada	Kevin Ferris
CS Health	Government	Government of Canada, Health Canada	Jeremie Allain
Govt Employee	Government	Government of Canada, Fisheries and Oceans Canada	Kimberley Keats
Community Service (CS)	Government	Government of Canada, Employment and Social Development Canada	Jason Maurice
Govt Employee	Government	Government of Canada, Natural Resources Canada	Sophia St. Lawrence
Govt Employee	Government	Government of Canada, Natural Resources Canada	Clarisse Fiset
Govt Employee	Government	Government of Canada, Women and Gender Equity Canada	Megan Kirby
Govt Employee	Government	Government of Canada, Indigenous Services Canada	Julia Gregory
Govt Employee	Government	Government of Canada, Crown-Indigenous Relations and Northern Affairs Canada	Michael Rowan

Category of interest	Code (primary)	Organization	Contact Name
Govt Employee	Government	Government of Canada, Crown-Indigenous Relations and Northern Affairs Canada	Claire Murphy
Govt Employee	Sheshatshiu Innu First Nation	Sheshatshiu Innu First Nation	Chief Etienne Rich
Govt Employee	Government	Natuashish (Mushuau Innu First Nation)	Chief John Nui
Business Owner or Rep	Services	Northern Coalition Corporation	Alastair O'Rielly
Business Owner or Rep	Economy	Atsanik Lodge	Andrew Flynn
Youth/Youth Sector	Community	Community Youth Network - Nain	Bradley Lampe
Business Owner or Rep	Economy	Labrador Ferry (freight)	Dwayne Canning, Operations Manager
Community Service (CS)	Services	AnanauKatiget Tumingit Regional Inuit Women's Association (ATRIWA)	N/A
Govt Employee	Government	Hopedale Inuit Community Government	Marjorie Flowers
Business Owner or Rep	Services/ Culture	Tasiujak Lake Fishing Lodge	N/A
Business Owner or Rep	Community	Nipavut (Our Voices) - Nain	N/A
Business Owner or Rep	Services	Nunatsiavut Group of Companies	N/A
Business Owner or Rep	Services	Labrador Hunting and Fishing Association Inc.	N/A
Business Owner or Rep	Services/ Culture	Torngat Fish Producers Cooperative	N/A
Govt Employee	Community	Nain Inuit Community Government	N/A
Govt Employee	Community	Nain Inuit Community Government	Julius "Joe" Dicker

Category of interest	Code (primary)	Organization	Contact Name
Community Service (CS)	Resource Availability	Nain Safe House	N/A
Govt Employee	Government	Naskapi Nation of Kawachikamach (Quebec)	Stella Pien
Community Service (CS)	Food Security	TaKuaKautik-Nain Food Bank	Brenda Jararuse
CS Health	Research	Inuit Tapiriit Kanatami	Tedoff, Pauley
Business Owner or Rep	Culture	Torngat Arts and Crafts	N/A
Govt Employee	Provincial, Economic	Government of Canada, Parks Canada/Torngat Mountains National Park	N/A
Business Owner or Rep	Economy	Tourism Nunatsiavut	N/A
Govt Employee	Government	Nunatsiavut Government, Inuit Community Government (Nain)	Roxanne Barbour
Business Owner or Rep	Entertainment	YouTube Entertainment	Spencer Remple
Youth/Youth Sector	Community	Nain Youth & Youth Leader	Megan Dicker Nochasak
Govt Employee	Government	Nunatsiavut Government, Nunatsiavut Assembly & Inuit Community Government	Marjorie Flowers
Business Owner or Rep	Economy	SmartICE	Rex Howell
Business Owner or Rep	Services/Culture	Torngait Services Inc (TSI)	Wyman Jacque
Business Owner or Rep	Business/ Services	Torngat Fish	Keith Watts
Youth/Youth Sector	Education	Jens Haven Memorial School	Julie Dicker
Govt Employee	Nunatsiavut Government	Department of Lands and Natural Resources	Patricia D'Souza
Business Owner or Rep	Community	Rigolet Safe House	Desiree Wolfrey
Business Owner or Rep	Economy	Kashkuan Communications & Consulting	Donna Ludlow Paddon

Category of interest	Code (primary)	Organization	Contact Name
Govt Employee	Government	Nunatsiavut Government	David Dicker Jr.
Business Owner or Rep	Business/ Services	Nunatsiavut Group of Companies	Erin Everard
Govt Employee	Government	Indigenous Services Canada	Danielle Jeddore
Govt Employee	Government	Nunatsiavut Government	Melva Williams
Govt Employee	Government	Nunatsiavut Government	Darryl Shiwak

Appendix C6 Information Sheet #1

NEW NAIN AIRPORT PROJECT

INFORMATION SHEET

PROJECT OVERVIEW

The current Nain airport falls short of meeting the transportation needs of the local community. The current airport is operated by the Newfoundland and Labrador Government, who is leading the project to create the New Nain Airport. The current airstrip alignment causes frequent delays or cancellations for nearly half of all regular flights, hampering essential services and goods delivery. Sea level changes due to climate change have led to flooding the airstrip, which could cause damage and impact its load-bearing capacity. Furthermore, takeoff and landing at the current airport are not authorized at night because of the surrounding mountains, worsening the existing transportation issues. The current airport is unfit for upgrades due to worsening climate change impacts on the airstrip. To secure current and future generations' access to goods and services, constructing a new airport is essential.

PROJECT DESCRIPTION

The Nain Airport Project, led by the Nunatsiavut Government, aims to build a new airport to replace the existing one, stressed by climate change. This project comprises three main components:

(1) The Airport: Includes the terminal, equipment maintenance hangar, cargo terminal (frozen, cooled, regular), apron, groundside parking, and related facilities. The airport will also serve as the emergency response centre for Nain.

(2) The Runway: A new airstrip approximately 1,830 m in length and 40 m in width.

(3) The Access Road: A new road approximately 12 km in length joining the Airport to Nain.

The core objective is to enhance transportation, health, and wellness needs in the Nain community by increasing reliability, maintaining round-the-clock operation, and enabling larger aircraft landings. This can improve connections with Inuit regions and Canada.

Improving air travel reliability facilitates the arrival of essential goods, bolstering food security. In emergencies, faster access to healthcare can enhance regional health outcomes. Additionally, enhanced transportation reliability may increase the availability of previously inaccessible economic development opportunities outside of the community.

PROJECT PHASES

The Nain Airport Project is currently in **Phase 3 of 6**, of which are summarized below:

Phase 0: Review of Existing Airport (2018) ☑

After assessing the current airport, it was deemed unsuitable for upgrades due to climate change effects on infrastructure, rising sea levels, its proximity to water, suboptimal site selection regarding weather, and limited available space for upgrades.

Phase 1: Implementation Plan for New Airport (2020) ☑

The Nunatsiavut Government engaged consulting firms to conduct a site evaluation for new airport infrastructure. Considerations included weather and wind patterns, environmental and terrain features, accessibility to residents, ability to construct in the area, and other key considerations. Three potential sites were selected:

Site 1: The first identified site was west of Meta Cove (N 56°31'9.02", W 61°40'59.10"). The site was identified as inadequate due to the available width, which would result in a lack of night access. Additionally, the access road would require steep grading creating problems in the winter.

Site 2: The second identified site was southeast of Trouser Lake (N 56°31'42.06", W 61°44'23.28"). Site 2 presented similar challenges to Site 1, resulting in the site being deemed as inadequate for development.

Site 3: The third identified site is west of Delta approximately 13 km southwest of Nain, bound by seashore surrounding the area to the south. This site was identified as the most favourable location. Although the access road is the most limiting factor, the proximity to a marine site for barge landing would alleviate some construction concerns. Site 3 was the only site identified which can accommodate 24-hour flights 7 days per week and does not have space as a limiting factor.

Phase 2: Secure Financing for Feasibility Studies (2021) ☑

Phase 2 fundraising for the feasibility study began in 2019. Funding from the National Trade Corridor Fund-Transport Canada (NTCF) fund was authorized in September 2021. The financial contribution is divided equally between the Government of Canada and the Government of Newfoundland and Labrador.

The feasibility study comprises 12 separate studies, collectively referred to as New Nain Airport Feasibility Studies (NNAFS).

These studies include surveys of site meteorology, topography, hydrology, permafrost, surface water. Analyses were also completed of various engineering specialties, meteorology, hydrology, electricity, architecture and environment.

Phase 3 *(Present):* Conducting Feasibility Studies (2022-2024)

The Nunatsiavut Government is currently in Phase 3, conducting feasibility studies related to project development. Site 3 has been identified as the likely site for the Proposed New Nain Airport. The access road is the primary constraint at Proposed Site 3. Its alignment is challenging due to the mountainous terrain, snow accumulation, permafrost, critical water crossings, and geological characteristics. Nevertheless, it offers the best access under diverse weather conditions.

Phase 3 involves various studies to understand the feasibility of undertaking this project, including an Environmental Assessment of the area which will be completed by AECOM Canada. Environmental field studies were conducted in summer 2023 and the final NNAFS report is scheduled for late summer 2024. The project is required to adhere to regulations from the Nunatsiavut Government, Newfoundland and Labrador Government, and Government of Canada. Approvals from the three governments is anticipated by March 2026.

Future Project Phases Include:

- Phase 4: Securing Financing for Construction Phase (2024-2026)
- Phase 5: Detailed Design, Specifications, and Construction, of New Airport (2026-2027)
- Phase 6: Certification of the Facilities and Commissioning (2027-2030)

Stay Involved:

The Nunatsiavut Government and AECOM will be undertaking various consultation activities in the next year. As part of those consultation efforts, you can expect to receive project updates by email, community consultation meetings, or invitation to discuss your thoughts on the project in a phone or virtual interview with the NNAFS AECOM Consultation team.

Questions, Comments, or Concerns:

If you have questions or comments please contact NNAFSProjectFeedback@aecom.com or Colin Gilbride (Nunatsiavut Government) at colin.gilbride@nunatsiavut.com.

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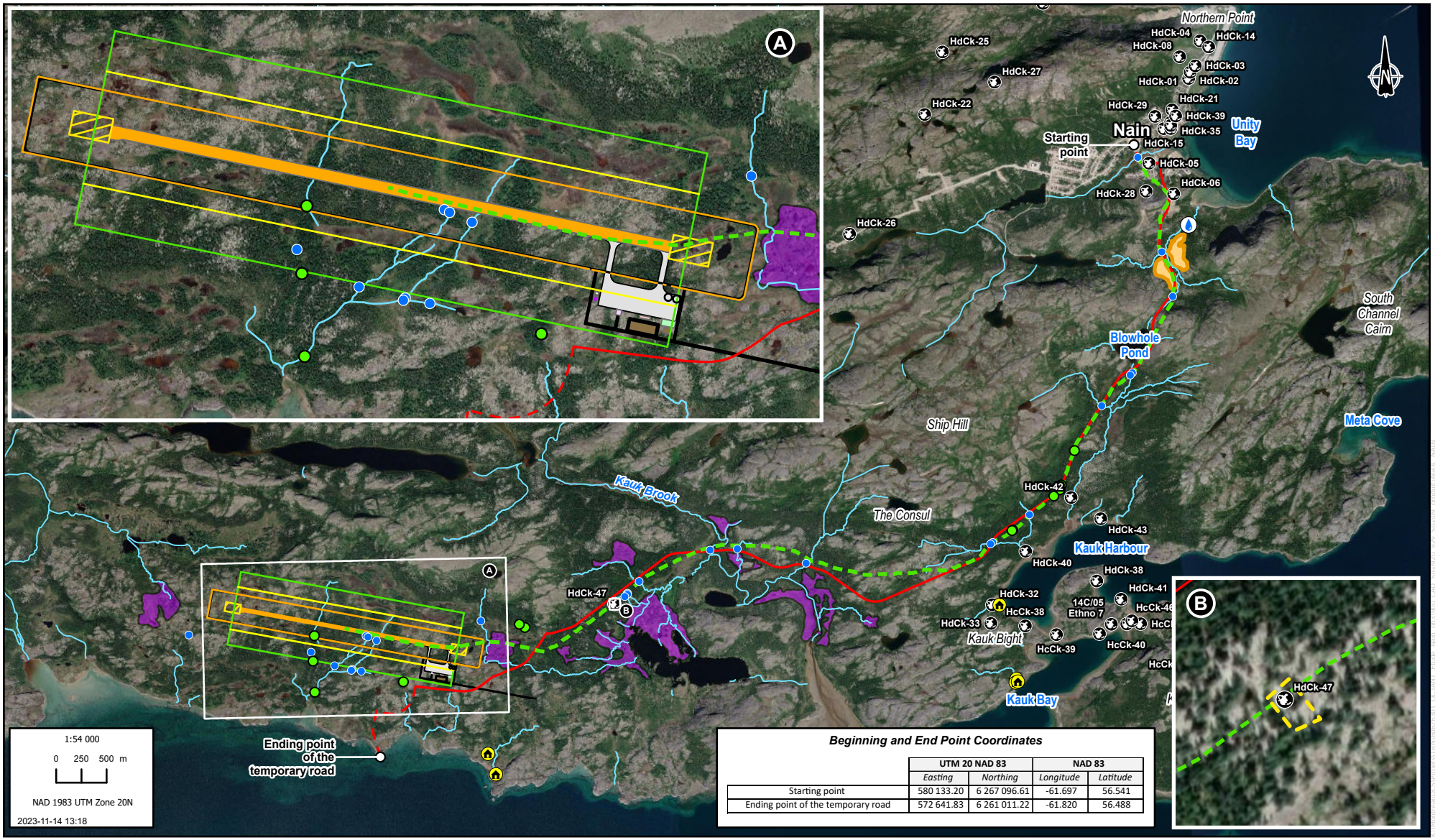
Figure #1: Proposed Project Site 3 and Proposed Access Road



Beginning and End Point Coordinates

	UTM 20 NAD 83		NAD 83	
	Easting	*Northing*	*Longitude*	*Latitude*
Starting point	580 133.20	6 267 096.61	-61.697	56.541
Ending point of the temporary road	572 641.83	6 261 011.22	-61.820	56.488

Project Component

- Original access road alignment
- Access road
- Proposed temporary road
- Fence
- Transitional surface (23 m)
- Transitional surface (45 m)
- Helicopter helipad
- Runway safety area
- ATB
- Aircraft hangar
- Airport access and service road
- De-icing fluid
- Fuel
- Maintenance building
- Parking
- Runway
- Taxiway

Environmental Constraints

- Watercourse
- Watercourse crossing (desktop)
- Additionnal watercourse crossing (2023 field mapping)
- Potential permafrost

Socio-Economic Constraints

- Cabin
- Archaeological site
- Archaeological site protection area
- Untreated drinking water source
- Quarry

Project Components and Initial Environmental / Socio-economic Constraints

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Figure #2: Proposed New Airport Project Rendering

Appendix C7 Frequently Asked Questions

NEW NAIN AIRPORT PROJECT

FREQUENTLY ASKED QUESTIONS

1. Why is the New Nain Airport necessary?

- The current airstrip alignment causes frequent delays, with almost half of all regular flights delayed or cancelled. This impacts essential goods and access to services.
- The current infrastructure does not allow for flights 24 hours per day, which can further delay delivery of essential goods, or ability to access or receive services, such as medical treatment for community members.
- The current airstrip alignment results in frequent delays or cancellations and is also unfit for upgrades due to worsening climate change impacts on the airstrip.

2. Why can't the current airport site be upgraded? What will happen to the existing airport?

- The current airport is unfit for upgrades due to worsening climate change impacts on the airstrip. Sea level changes have led to flooding the airstrip, which could cause damage and impact its load-bearing capacity.
- The current airstrip alignment also causes frequent delays or cancellations for nearly half of all regular flights, hampering essential services and goods delivery.
- Additionally, as takeoff and landing at the current airport are not authorized at night because of the surrounding mountains, Nain would be unable to evacuate in the event of an emergency, and this poses a safety risk to the community.
- To secure current and future generations' access to goods and services, as well as to ensure the community's safety, constructing a new airport in a different location is essential.
- It has not been determined what will occur with the existing airport. Consideration will be made for what to do with the old infrastructure as needed.

3. What is the process to approve the project?

- The process to approve the project involves a multi-phase analysis to determine the possibilities for the project.
    - Phase 0 involved a review of the existing airport.
    - Phase 1 involved developing an implementation plan for the New Nain Airport.
    - Phase 2 involved securing financing for the feasibility studies.
- The project is currently in Phase 3, which includes conducting feasibility studies to understand the full project scope.
- Phase 4 will involve securing financing for construction and Phase 5 will include detailed design, specifications, and the construction of the New Nain Airport. Finally, Phase 6 will involve the certification of the facility prior to operation.

4. What are the timelines for this project?

- Completion of the environmental impact assessment is scheduled for March 2026. If the proposed site is found suitable at the end of the impact assessment, the project would be slated for completion in 2030.

5. How was the site for the New Nain Airport chosen?

- The Nunatsiavut Government engaged consulting firms to conduct a site evaluation for new airport infrastructure.
- A team of aviation experts selected three potential new airport sites, taking into account weather and wind patterns, environmental and terrain features, accessibility to residents, ability to construct in the area, and other key considerations.
- The selected site – located west of Kauk Brook delta in a relatively flat area approximately 13 km southwest of Nain and requiring an access road from Nain - was the only site identified which can accommodate 24-hour flights 7 days per week and does not have space as a limiting factor.

6. Who will have ownership of the New Nain Airport and be responsible for ongoing operations and maintenance after it is built?

- Ownership is currently undecided but will become clearer when the funding model is developed and during the construction phase.
- The project team is mindful of the need for a robust ownership and operational structure as the size of the new airport and length of the road are significant. Once the proposed airport site is deemed feasible, an operational plan will be developed which will contemplate ownership.

7. How will safety be considered for people and animals, in the road alignment, construction, and maintenance? Will the road go through the Blowhole area?

- Engineering studies are currently underway to see how best to manage weather events for the road alignment and during the construction process.
- The proposed alignment goes from Nain, through the mountain pass towards Blowhole Pond. There are significant risks of avalanches and steep terrain. The feasibility study is underway, and engineers are reviewing design options for protecting the public from any risk of avalanche along that road.
- There have been roads safely developed in mountainous terrain such as through the Rocky Mountains and the Alps, and there are different options to consider for cutting slopes back or creating avalanche protection structures. The pass would be monitored for avalanches during operation, and snowpack management, for example setting off controlled avalanches, would be considered to ensure public safety.
- The area around the airport and airstrip will be fenced off to prevent wildlife from entering the airport area. This is to protect the safety of individuals in the area and to protect animals from airport operations.
- Safety is of critical importance to the project. Feasibility studies will continue to investigate how best to create and maintain a safe airport and access road in the community.

8. What type of surface will the access road have? Will the road have lighting and if so, how will it be powered? Will the road be kept clear for emergency situations?

- Safety is of critical importance to the project, including safety of the access road. Once the proposed airport site is deemed feasible, an operational plan will be developed that will include road maintenance measures to ensure safe, uninterrupted travel between Nain and the new airport.
- The current proposal is that the road between Nain and the new airport will be gravel and at present there is no plan to install lighting along the proposed access road.

9. The current airport is within walking distance for the community but the New Nain Airport will be more remotely located. How will the project ensure that there are no barriers to the community's access to the New Nain Airport?

- A key objective of the New Nain Airport project is to provide better services to the community and help connect Nunatsiavut to other Inuit regions and the rest of Canada, so the accessibility of the airport and access road are of critical importance.
- Transportation options to and from the airport, like a bus shuttle service, will be available and explored further in an operational plan once the proposed airport site and access road alignment is deemed feasible.

10. How will the New Nain Airport runway compare to the current airport runway?

- The new airstrip is proposed to be approximately 7000 feet in length, and will be able to accommodate turbo prop airplanes, like the Dash 8, but also up to Boeing 737-800. By comparison, the current airport runway length is only 1,986 feet, and cannot be extended given the constraints of the current location and impacts of climate change along the shore.

11. What will happen if the feasibility studies find the current proposed site for the New Nain Airport unsuitable?

- If the proposed site is deemed unsuitable at the end of the feasibility studies, a new process will be initiated to locate a new site that can accommodate the requirements of this proposed new airport.

12. What buildings/infrastructure will the New Nain Airport have?

- The current proposal includes a terminal to accommodate approximately 40 to 50 passengers at a time. The main terminal will have a number of components, including but not limited to, a notification area, electrical controls for the airport, baggage area, communications systems and washrooms.
- There will also be operations/maintenance facilities, where, for example, snow plough equipment can be stored.
- A separate building will contain generators planned for use at the airport with three available as back up.
- A cargo terminal, including refrigerated and frozen food storage, will also be built.
- There will also be groundside parking for vehicles and snowmobiles.
- Subsequent phases of building may include additional infrastructure in and around the airport to support operations and maintenance.

13. Will the project increase the reliability and convenience of travel options for community members?

- The New Nain Airport is taking into consideration the reliability and convenience of air travel as a priority for this project.
- A key objective is to provide better services to the community and help connect Nunatsiavut to other Inuit regions and the rest of Canada. Therefore, the New Nain Airport will have the capacity to operate 24 hours per day, 7 days per week.
- The airport will also be able to accommodate larger aircrafts, to help with demands in the region.

14. Will the New Nain Airport rely on the community's existing utility network (e.g. water, sewage, power) for its operations? How will fuel be offloaded?

- The New Nain Airport operations will be self-sufficient and details will be developed and outlined in an operational plan once the proposed site is deemed suitable.
- A feasibility study is currently underway exploring options to power the airport including a designated diesel generator, with consideration for renewable sources, including use of solar and wind power, at a later date.
- The current environmental assessment is also considering options for offloading fuel, including, for example, fuel being offloaded at the Nain main marine wharf and transported by refueling truck to the airport.

15. Will the proposed site for the New Nain Airport impact hunting and fishing and other cultural activities in that area?

- The Nunatsiavut government has retained a consultant to conduct a regional land use study, which will include assessing potential project impacts on cultural and land-based activities in the proposed site area. This study will extend into 2025.

16. What employment opportunities will the New Nain Airport bring to the community?

- This is unknown at this time. Should the proposed airport site be deemed feasible, and an operational plan is developed, more information will become available on potential employment opportunities, for example, during the construction phase of the project.

17. How will information about this project continue to be shared with the community? Will information be available in both English and Inuttitut?

- The Nunatsiavut government project team is exploring options for a Facebook page to provide the community with more information and ongoing project updates.
- As part of the environmental assessment process, AECOM is undertaking consultation with community members and other potentially impacted stakeholders through a variety of outreach methods, including email-distribution of information about the project and community meetings.
- Community meetings will be scheduled in 2024 to share information about the project, the progression of the feasibility studies, and to receive comments and feedback from the community.
- The Nunatsiavut government will make an effort to deliver project-related documents in both English and Inuttitut.

18. Where can I ask further questions about the project or share comments or concerns?

- AECOM has created a project consultation email, NNAFSProjectFeedback@aecom.com, where questions, comments or information can be shared confidentially in order to inform the environmental assessment process.
- Community members are also welcome to contact the government proponent lead on the New Nain Airport project, Colin Gilbride (Nunatsiavut Government) at colin.gilbride@nunatsiavut.com.

Appendix C8 Information Sheet #2

NEW NAIN AIRPORT PROJECT

INFORMATION SHEET: THE ACCESS ROAD

PROJECT OVERVIEW

The New Nain Airport Project, led by the Nunatsiavut Government, aims to build a new airport to replace the existing one which currently falls short of meeting the transportation needs of the community. This is due to several operational and design features that inhibit regular travel and are being exacerbated by climate change. The project comprises of three key components which include:

(1) The Airport;

(2) The Runway; and

(3) The Access Road

The core objective for the Project is to enhance transportation, health, and wellness needs in the Nain community by increasing reliability, maintaining round-the-clock operation, and enabling larger aircraft landings. This can improve connections with other Inuit regions and Canada.

Improving air travel reliability facilitates the arrival of essential goods, bolstering food security. In emergencies, faster access to healthcare can enhance regional health outcomes. Additionally, enhanced transportation reliability may increase the availability of previously inaccessible economic development opportunities outside of the community.

BACKGROUND INFORMATION ON THE ACCESS ROAD

Three sites were considered for the New Nain Airport Project. The most favourable location, selected for its unique ability to accommodate 24-hour flights and space for potential expansion of the airstrip in the future, is located west of Kauk Brook delta in a relatively flat area, approximately 12 km southwest of Nain. Due to the proposed location of the new airport and distance from Nain, a critical component of the Project is building a 12 km gravel access road that will join the community of Nain to the airport.

Consistent access to the new airport for frequent travel, especially in emergencies, is a priority for the Nunatsiavut Government. The access road will support continued delivery of essential services through the new airport.

Planning for the access road is ongoing through the current feasibility studies phase of the Project and takes into account complex characteristics of the landscape, including the mountainous environment, snow accumulation, archaeological findings, permafrost, water crossings, and geological properties in the area. In addition, how the road will be maintained to ensure continuous access is also a key planning consideration.

ROUTE OF THE ACCESS ROAD

The route of the access road was determined through a number of studies including helicopter and on-the-ground field studies that considered several socio-ecological factors such as the terrain of the area, existing road infrastructure, and community land use. The proposed route considers safety and consistent accessibility to the proposed airport site. The road travels south-east of Nain and will loop across a bridge over Kauk's Brook to reach the airport. The flow of the brook will not be affected by the bridge. The road avoids an archaeological site identified in the region and potential permafrost areas.

ROAD DESIGN CONSIDERATIONS

Guided by a team of senior civil engineers with expertise in successfully designing roads in other mountaineous regions, such as northern Canada, the following road design considerations have been incorporated into the Project:

- **Avalanche Risk** – The proposed road route goes through Blowhole Pass which is known as an avalanche risk zone. To reduce avalanche risk, the road has been designed to be on a flatter plateau area approximately 70 m east and 45 m higher from the snowmobile route through Blowhole Pass, as pictured here. This will protect the road from potential avalanches that may occur in that more vulnerable location. Additional mitigation measures along the at-risk areas to reduce avalanche risk including defense structures (nets) will be considered.
- **Permafrost** – The studies completed by permafrost experts indicated that there is no permafrost in the area proposed for the road, however, additional surveying will be conducted before road construction to identify and potentially avoid permafrost areas. If permafrost cannot be avoided, mitigation measures may include using geotextiles for structural support, removing permafrost and replacing the material with rock fill, and/or using rock fill in embankment construction to reduce localized settlement
- **Slopes, Hills & Speed** – The road will be flattened and smoothed in steep areas to ensure that any existing slopes and hills that may present driving hazards will be reduced to authorized slope levels, per design regulations. The road will be widened to ensure that travellers can stop along the road safely if needed and there will be further widening in areas where there are curves or sharp turns along the road. The road will have a maximum speed limit of 70 km per hour.
- **Water Retention and Flooding –** Along the road, culverts and retention areas with sufficient capacity for running water during melting periods will ensure that the road is not damaged or flooded at these times.

OPERATIONAL SAFETY & MAINTENANCE

Ownership and Maintenance Responsibility

Ownership of the road will be determined once the proposed airport site is deemed feasible. Operations and maintenance responsibility for the access road will rest with the owner, and the operational plan and decision for who will be responsible for road maintenance will be determined after project funding is secured and before construction is complete.

Ice and Snow Removal

The road will be consistently monitored for snowfall, and groomed and/or plowed as necessary. Sand will be used to reduce ice on the road. Additionally, plowing machinery that are successfully used in other northern communities that break up ice beneath the snow will be considered to keep the road consistently clear and safe to travel.

Road Maintenance and Surveillance

Regular maintenance of the access road will support 24/7 usability of the road. Gravel roads are commonly used in mountainous and northern regions in Canada and the Nunatsiavut Government is confident that a gravel road is a sound option for the new airport's access road. The access road will be also be treated with a durable non-toxic synthetic fluid that stabilizes gravel and improves operational and safety conditions in cold remote regions[1]. Its use will help to limit dust, improve water quality in runoff due to limited sedimentation, and lowers maintenance costs. At present, there is no plan to install lighting along the road itself; however, there will be personnel monitoring the road conditions to ensure it remains clear for road users.

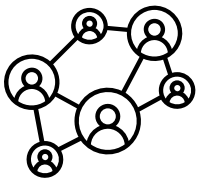
TRAVELLING TO THE AIRPORT USING THE ACCESS ROAD

The Nunatsiavut Government understands that the distance of the proposed airport location will be a significant change for the community of Nain. The Nunatsiavut Government has taken access to the airport seriously and has identified ways for residents to get to the airport when they need to. For access, there will be a shuttle bus operating at regular intervals. The pick-up location for the shuttle bus will be determined at a later date but access to the pick-up location will be a priority consideration when this is decided. In addition, parking for vehicles, including snowmobiles, will be located at the airport.

NEXT STEPS FOR THE ACCESS ROAD

Once the feasibility studies phase of the Project is complete and approved to continue, the next step for the access road will be to determine who will own, operate, and maintain the road and to confirm plans and details related to the shuttle bus.

The procurement process for construction will consider evaluation criteria that will ensure the access road is built with the highest standards in place to ensure its safe and reliable use. Local procurement for construction will also be a priority.



Stay Involved:

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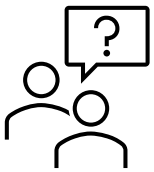

Questions, Comments, or Concerns:

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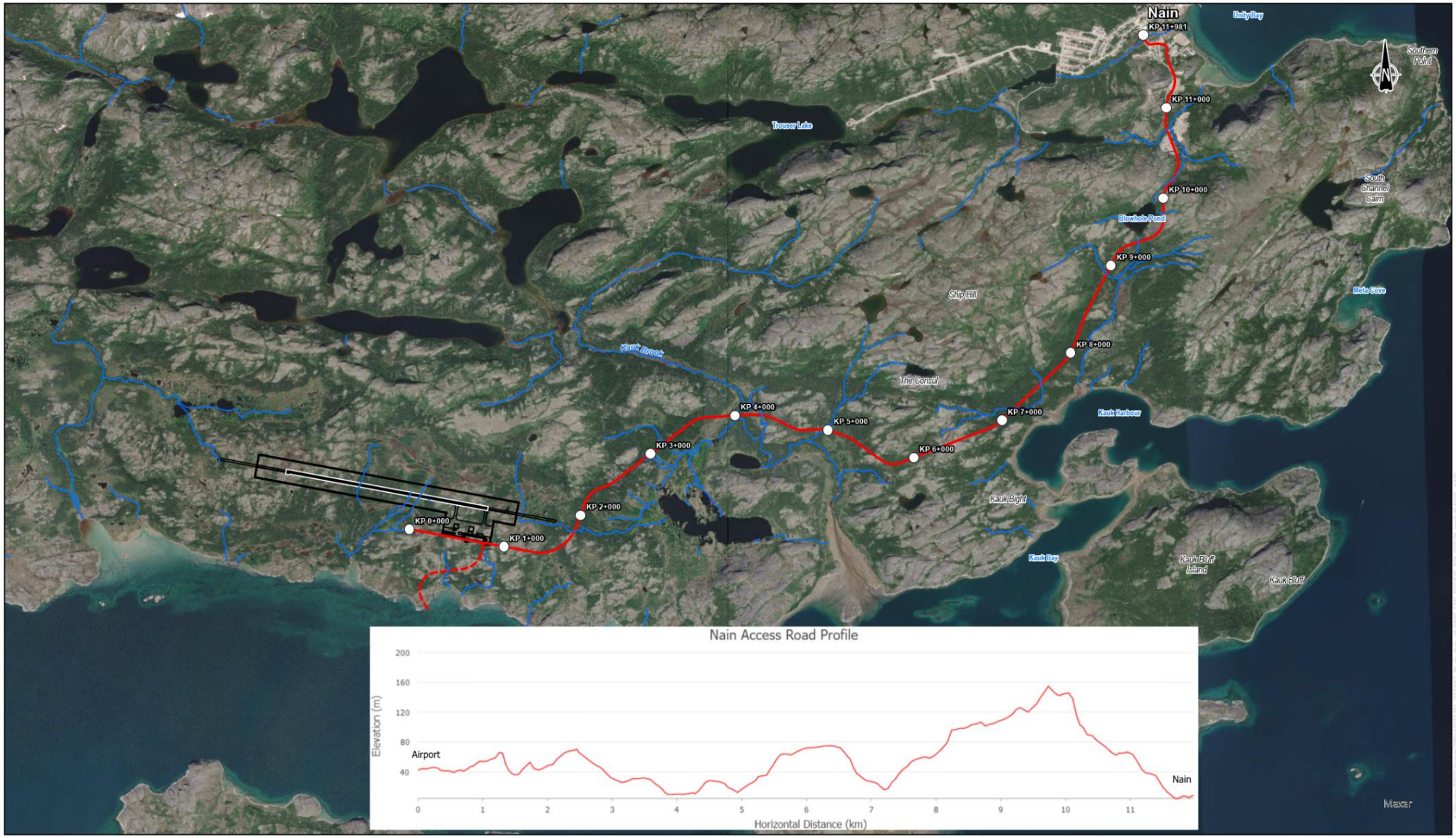
[1] Midwest Industrial Supply, Inc. (2022). *Executive Summary EK35® NTNU Laboratory Evaluation of EK35 Treated Aggregate.* Retrieved from https://www.midwestind.com/gravel-runway/dust-control-for-gravel-runways/



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Project Component
- Kilometer point
- Access road
- Temporary access road
- Runway
- Airport footprint

Hydrography
- Watercourse

1:38 000
0 250 500 m
NAD 1983 UTM Zone 20N
2024-04-02 13:25

Nain Access Road Profile

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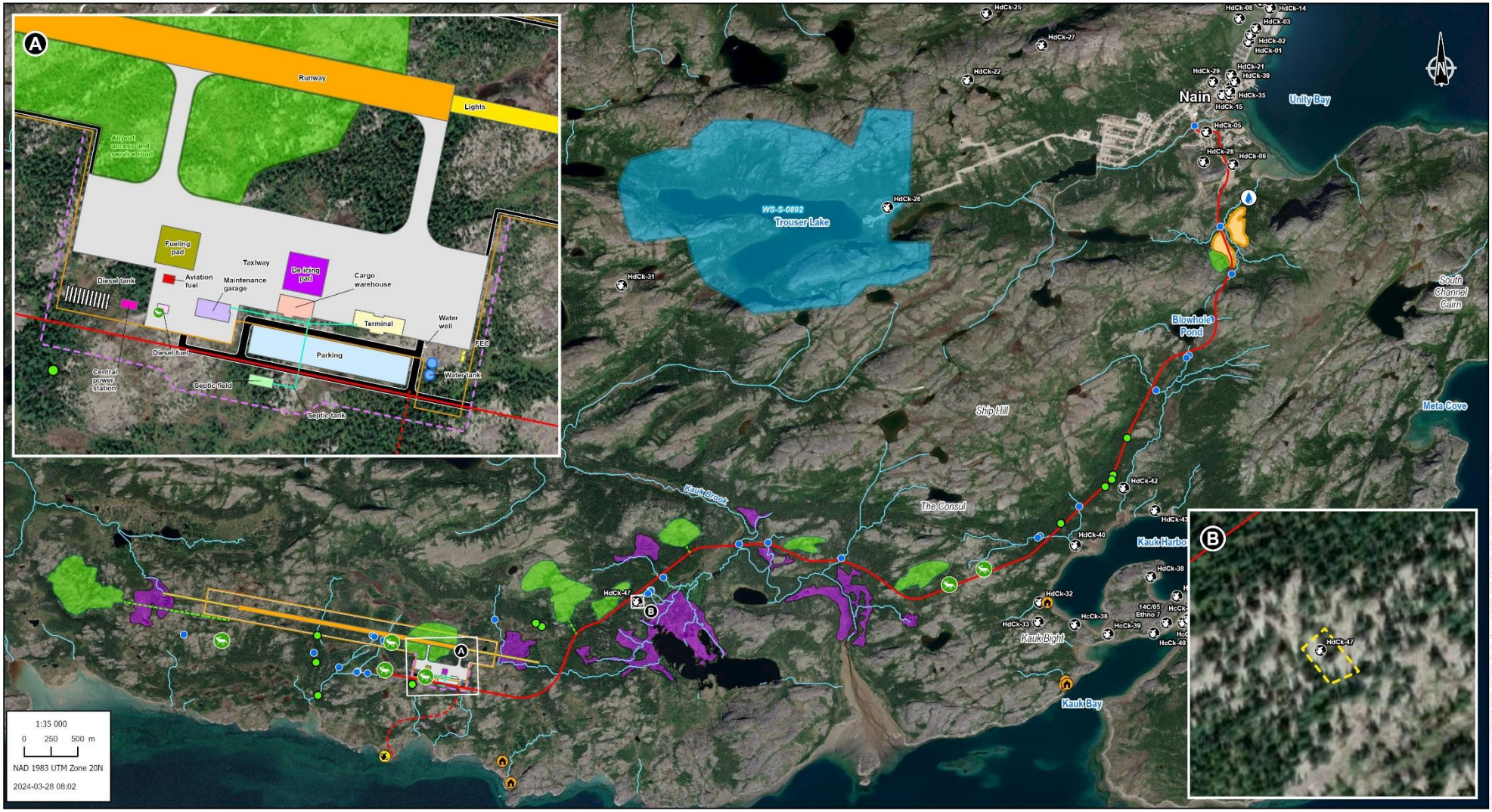

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Project Component

- Access road
- Temporary access road
- Temporary road to rock borrow
- Rock borrow
- Fence
- Top of embankment
- Sewer pipe
- Airport access and service road
- Aviation fuel
- Cargo warehouse
- Central power station
- De-icing pad
- Diesel fuel
- Fueling pad
- Lights
- Maintenance garage
- Parking
- Runway
- Taxiway
- Terminal
- Diesel tank
- Water tank
- Weather station
- FEC
- Septic field
- Septic tank
- Water well

Environmental Constraints

- Watercourse
- Watercourse crossing (desktop)
- Additionnal watercourse crossing (2023 field mapping)
- Potential permafrost
- Caribou track observation

Socio-Economic Constraints

- Cabin
- Archaeological site
- Archaeological site protection area
- Potential archaeological site
- Untreated drinking water source
- Protected Public Water Supply Area
- Quarry

Figure 2.1

Project Components and Initial Environmental / Socio-economic Constraints

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Appendix C9 Nain Inuit Community Government Meeting Presentation (February 7, 2024)

New Nain Airport: Project Update and Discussion

NUNATSIAVUT kavamanga Government

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Presentation to Nain Inuit Community Government
February 7, 2024
1:00-3:00PM (AST)/12:00-2:00PM (EST)

Agenda

- Project Overview
- Why is the Project Needed?
- Project Phases and Timeline
- Proposed Site Selection
  - Maps/Figures
- Current Status
- Next Steps
- Discussion/Q&A

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Project Overview

- Through the new Nain Airport Project, the Nunatsiavut Government aims to build a new certified airport for Nain, replacing the community's existing airport infrastructure.
- This project comprises three main components:

1	**The Airport**: Includes the terminal, equipment maintenance hangar, cargo terminal (frozen, cooled, regular), apron, groundside parking, and related facilities. The airport will also serve as the emergency response centre for Nain.
2	The Runway: A new airstrip approximately 1,830 m in length and 40 m in width.
3	The Access Road: A new road approximately 12 km in length joining the Airport to Nain.

- By increasing reliability, enabling round-the-clock operation and facilitating larger aircraft landings, the new Nain Airport intends to enhance:
  - Access to services in the community (including transportation, arrival of essential goods, healthcare, economic development opportunities); and
  - Connections with other Inuit regions and the rest of Canada.

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Why is the New Nain Airport Needed?

- The current Nain airport falls short of providing necessary services and meeting the transportation needs of the local community.
  - The airstrip alignment results in frequent delays or cancellations, hampering essential services and goods delivery.
  - A lack of night access hinders 24-hour flight availability.
  - Worsening climate change impacts on the airstrip renders upgrades to the existing airport impractical.
- To secure current and future generations' access to goods and services, as well as to ensure the community's safety, constructing a new airport in a different location is essential.

"The existing airport infrastructure has reached the end of its service life... [A]ny improvements would be limited to a rehabilitation that would temporarily extend its usability."

- Analysis of the existing airstrip in 2018

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Project Phases and Timeline

Phase 0: Review of Existing Airport (2018)

Current airport assessed and deemed unsuitable for upgrades due to climate change effects on infrastructure, rising sea levels, its proximity to water, suboptimal site selection regarding weather, and limited available space for upgrades.

Phase 1: Implementation Plan for New Airport (2020)

Involved developing an implementation plan for the new Nain airport, including identifying proposed new sites and selecting an optimal location.

Phase 2: Secure Financing for Feasibility Studies (2021)

Funding authorized in September 2021. The feasibility study comprises 12 separate studies, collectively referred to as New Nain Airport Feasibility Studies (NNAFS).

Phase 3 (*Present)*: Conducting Feasibility Studies (2022-2024)

Involves collecting data and undertaking technical studies to understand the feasibility of undertaking this project.

Phase 4: Securing Financing for Construction Phase (2024-2026)

Phase 5: Detailed Design, Specifications, and Construction of New Airport (2026-2027)

Phase 6: Certification of the Facilities and Commissioning (2027-2030)

Proposed Site Selection

- The Nunatsiavut Government engaged consulting firms to conduct a site evaluation for new airport infrastructure.
- Considerations included weather and wind patterns, environmental and terrain features, accessibility to residents, ability to construct in the area, etc. Three potential sites were evaluated:

Site 1: The first identified site was west of Meta Cove (N 56°31'9.02", W 61°40'59.10"). The site was identified as inadequate due to the available width and altitude, which would result in a lack of night access. Additionally, the access road would require steep grading creating problems in the winter.

Site 2: The second identified site was southeast of Trouser Lake (N 56°31'42.06", W 61°44'23.28"). Site 2 presented similar challenges to Site 1, resulting in the site being deemed as inadequate for development.

Site 3: The third identified site is located west of Kauk Brook delta in a relatively flat area approximately 13 km southwest of Nain and requiring an access road from Nain.

This was selected as the most favourable location as it was ***the only site identified*** which can accommodate 24-hour flights 7 days per week and does not have space as a limiting factor.

Phase 0: Review of Existing Airport (2018)
Phase 1: Implementation Plan for New Airport (2020)
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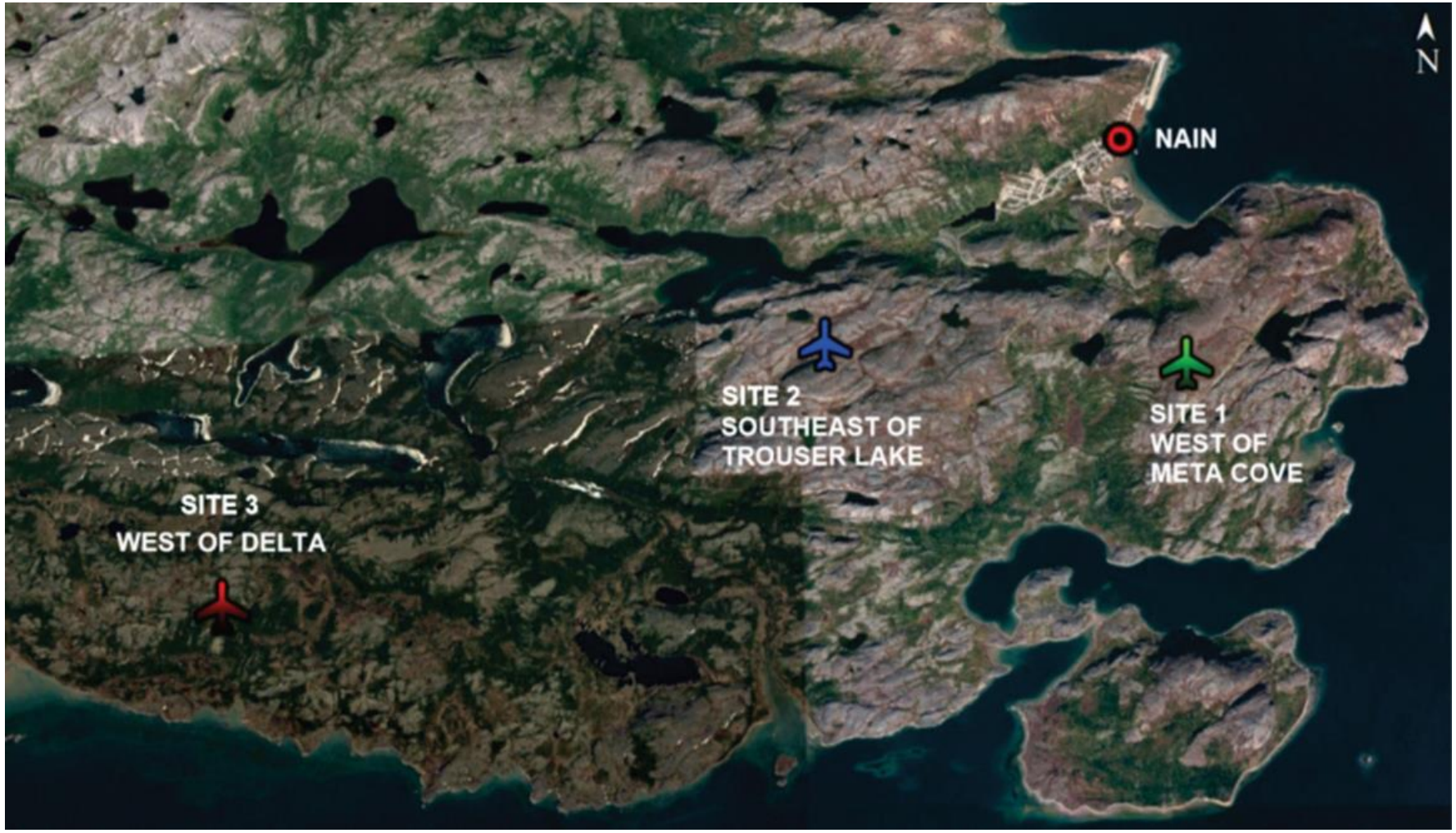
Proposed Sites

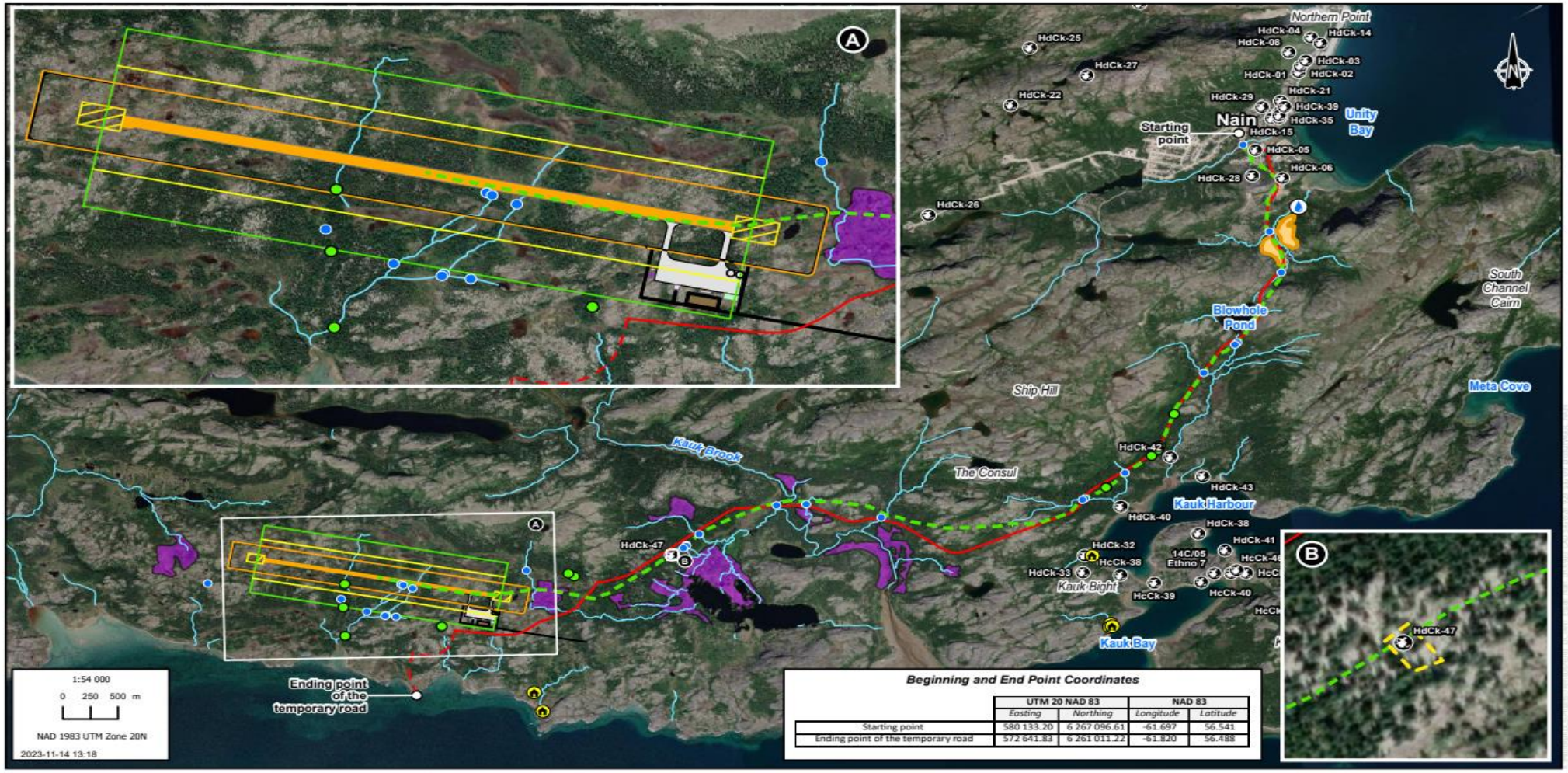


Proposed New Airport Project Rendering

Proposed New Airport Project Site and Access Road

NUNATSIAVUT
kavamanga government

NEW NAIN AIRPORT: PROPOSED PROJECT SITE 3 AND PROPOSED ACCESS ROAD



Beginning and End Point Coordinates

	UTM 20 NAD 83		NAD 83	
	Easting	*Northing*	*Longitude*	*Latitude*
Starting point	580 133.20	6 267 096.61	-61.697	56.541
Ending point of the temporary road	572 641.83	6 261 011.22	-61.820	56.488

Project Component
- Original access road alignment
- Access road
- Proposed temporary road
- Fence
- Transitional surface (23 m)
- Transitional surface (45 m)
- Helicopter helipad
- Runway safety area
- ATB
- Aircraft hangar
- Airport access and service road
- De-icing fluid
- Fuel
- Maintenance building
- Parking
- Runway
- Taxiway

Environmental Constraints
- Watercourse
- Watercourse crossing (desktop)
- Additionnal watercourse crossing (2023 field mapping)
- Potential permafrost

Socio-Economic Constraints
- Cabin
- Archaeological site
- Archaeological site protection area
- Untreated drinking water source
- Quarry

Figure 1

Project Components and Initial Environmental / Socio-economic Constraints

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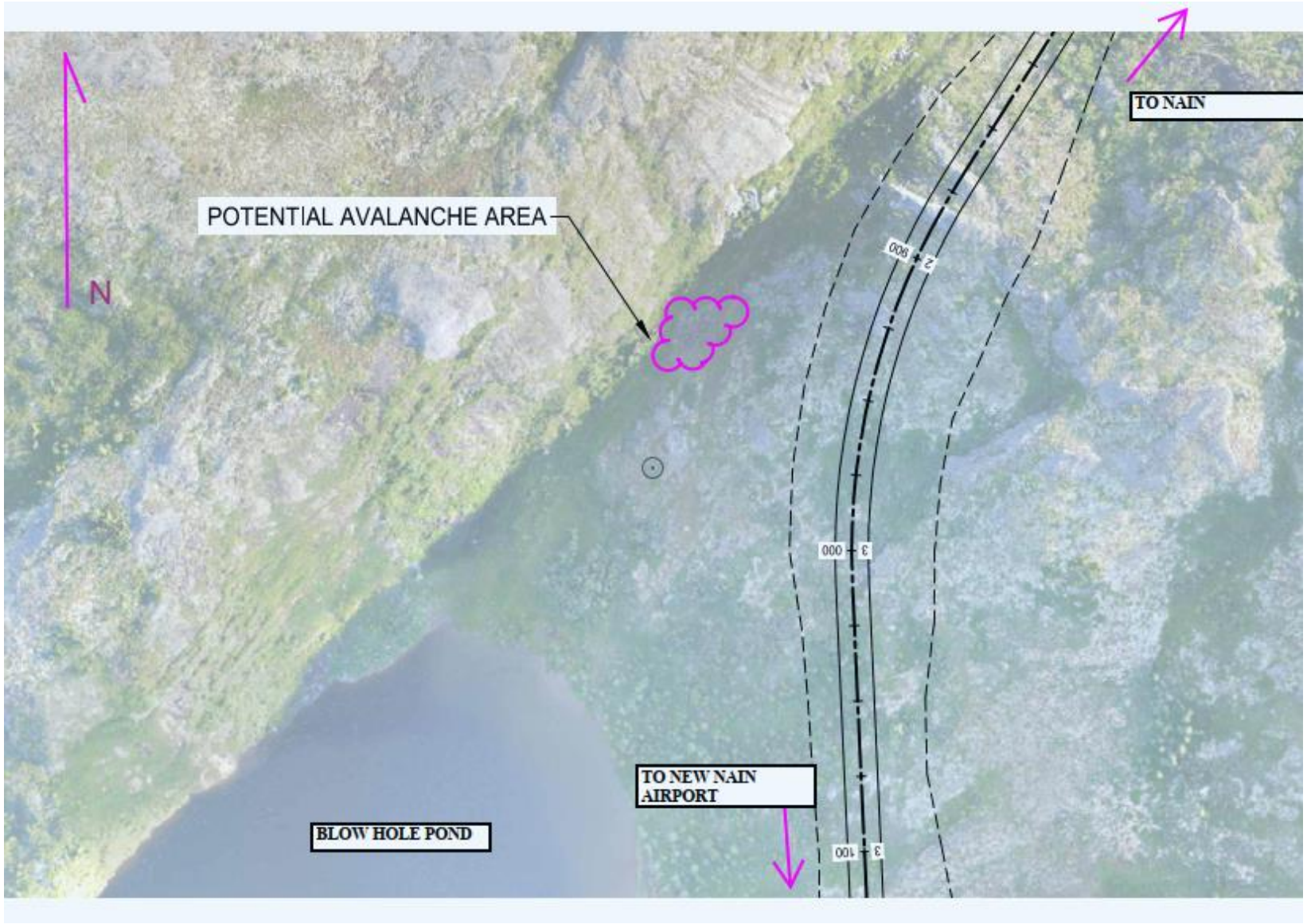
EXPERTS EN SOLUTIONS POUR L'AVIATION

AECOM

NNAFS R8 avalanche and Access road



Current Status

- The Nunatsiavut Government submitted an Initial Project Description to the Impact Assessment Agency of Canada (IAAC) in December 2023, as part of the planning phase of the impact assessment process.
  - IAAC is inviting Indigenous peoples and the public to review the summary of the Initial Project Description and provide feedback by **February 16, 2024**. Comments received will be used by IAAC to prepare the summary of issues.
  - IAAC hosted public information sessions about the project on January 17 and 18, 2024.
- The Project is currently in Phase 3 – conducting feasibility studies. This comprises 12 separate studies, collectively referred to as New Nain Airport Feasibility Studies (NNAFS).

Phase 0: Review of Existing Airport (2018)
Phase 1: Implementation Plan for New Airport (2020)
Phase 2: Secure Financing for Feasibility Studies (2021)
Phase 3 *(Present)*: Conducting Feasibility Studies (2022-2024)
Phase 4: Securing Financing for Construction Phase (2024-2026)
Phase 5: Detailed Design, Specifications, and Construction, of New Airport (2026-2027)
Phase 6: Certification of the Facilities and Commissioning (2027-2030)

Current Status (Continued)

- The status of the NNAFS are below:

R1 – Weather Station and collect data (phase 1) Completed

R2 – Topographic survey Completed

R3 – Preliminary environmental review – Desktop Assessment Completed

R4 – Surficial geology, geomorphology, permafrost and hydrogeological investigations Completed

R5 – Meteorogical studies and report (phase 2) Completed

R6 – Hydrological study Completed

R7 – Electrical Power Supply Alternatives Completed

R8 – Preliminary engineering services In Progress

R9 – Preliminary architectural design services In Progress

R10 – Construction and supply strategy In Progress

R11 – Cost estimation In Progress

R12 – Environmental Impact Assessment In Progress

FINAL REPORT DECEMBER 2024

Current Status (Continued)

- AECOM has been contracted by the Nunatsiavut Government for R12 - Environmental Impact Assessment for the proposed new airport and to support proponent-consultation activities.
- Environmental field studies were conducted by AECOM staff in summer 2023 and analysis is underway to inform an Environmental Impact Statement report, scheduled for completion in 2024.
- Project Consultation activities are underway:
  - Proponent Project Launch Meeting in Nain (Oct 2023);
  - Information Sheet (Nov 2023); FAQ Sheet (Feb 2024);
  - Targeted 1 on 1 Interviews and Meetings (Jan – Feb 2024);
  - Open House: Nain Community Meeting (March 2024 - TBC);
  - Ongoing Consultation (Spring - Summer 2024); and
  - Project Update Communications and other Meetings as requested (ongoing).

Scheuchzer's Cottongrass

Greenland Stitchwort

Fish and fish habitat (FAFH) field study

NUNATSIAVUT kavamanga Government

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Next Steps

- Planned Project Activities in 2024:
  - Project Consultation activities are ongoing.
  - Continuation of environmental impact assessment fieldwork and analysis:
    - Human Environment Interviews
    - Regional Land Use Study
    - Archaeology
- Planned submission of an Environmental Impact assessment report in 2024.
  - Approvals from three governments (Nunatsiavut Government, Newfoundland and Labrador Government, and Government of Canada) will be required.
- Project anticipated to be slated for completion in 2030.

Discussion Questions

- Questions or feedback on today's presentation about the New Nain Airport project and proposed site and access road?
- How would Nain Inuit Community Government like to be involved in the project going forward?
- Are there key community leaders, business owners, and members that Nain Inuit Community Government would recommend the AECOM consultation team engage about the Project?

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Thank You

Questions, Comments, or Concerns?

Please contact NNAFSProjectFeedback@aecom.com or

Colin Gilbride (Nunatsiavut Government) at colin.gilbride@nunatsiavut.com

Appendix A – Consultation Activities

The following Indigenous governments and communities have been invited to participate in consultation activities as part of the New Nain Airport Project. The status of consultation activities as of January 2024 is below.

Name	Consultation Activities & Status
Nain Inuit Community Government	• NG Infrastructure Project Presentation October 2023 • Virtual Project updates shared as of November 2023 • February 7, 2024 Project meeting • Open House: Nain Community Meeting (March 2024 – TBC) • Ongoing consultation (Spring – Summer 2024)
Hopedale Inuit Community Government	• Virtual Project updates shared as of November 2023 • As of January 2024, not interested in dedicated Project meetings, but will receive virtual project updates
Sheshatshiu Innu First Nation	• Virtual Project updates shared as of November 2023 • Invitations extended for dedicated Project meetings, but none requested as of January 2024
Natuashish (Mushuau Innu First Nation)	

Appendix B - Preliminary Field Results

Archaeology	• Stage 1 overview/background Archaeological Assessment completed in May 2023 • 12 potential archaeological sites are located within 5 km of Project Area. A Stage 2 Archaeological Assessment field survey was completed in June 2023 to verify sites • 164 shovel test pits were completed – all were negative • Per archaeological recommendation, road alignment adjusted to avoid 1 archaeological site area
Wildlife	• Mammal signs observed included caribou tracks, black bear, snowshoe hare and short-tailed weasel • 35 songbird species typically found in the region were observed • Few surveys have been conducted in northern Labrador and little is known about songbird species presence. • As a result, 6 additional songbird species not previously known to occur were observed • One federally listed species at risk, the rusty blackbird, was detected in open bog/fen habitats. The rusty blackbird is listed as sensitive and included on Schedule 1 of the Species at Risk Act Caribou track observed in July 2023
Wetlands, Vegetation, Soils	• Over 130 vegetation species were identified • No federally listed vegetation species were observed • 13 Species of conservation concern (SOCC*) were also identified, including Scheuchzer's Cottongrass and Greenland Stitchwort.
Fish and Fish Habitat	• 40 water crossings have been visited and documented in the field within the project footprint with additional waterbodies documented downstream • Select water crossings have been surveyed: Two water crossings (WC 10 and WC 12) confirmed to be fish bearing (Brook trout and Stickleback) • No Arctic char were collected nor observed • No SAR identified in the freshwater Brook trout Three-spine stickleback
Country Foods	• Ten Arctic char were collected from the local community and sent to a lab for analysis • Traditional use plants, including Labrador tea and berries, and soil were collected for lab analysis

Appendix C10 Nain Inuit Community Government Meeting Notes (February 7, 2024)

Proposed New Nain Airport Project

Meeting Notes – Nain Inuit Community Government

February 21, 2024 1-2:30PM AST/12-1:30PM EST

Attendees:

David Dicker (Nain Inuit Community Government, newly elected Ordinary Member)
Marie-Helene Simard (OCTANT Aviation)
Sarah De Decker (AECOM Consultation)
Ammie Singh-Persaud (AECOM Consultation)
Elaine Lee-Ho (AECOM Nain Environmental Assessment Lead)

Regrets:
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Angajukĸâk (Mayor) Julius Dicker (Nain Inuit Community Government)

Meeting Objective:

To provide updates on the New Nain Airport Project and discuss any issues, priorities or concerns related to the Project.

Meeting Discussion:

Marie-Helene: noted that there is a new and more accurate/realistic map for the airport and access road that she would like to share and discuss during today's presentation, as follow up to questions asked during Monday Feb 19 Nunatsiavut Government (NG)-hosted meeting.

Sarah: noted that the project team attached previous (Feb 7) meeting products for today's meeting. Have maps and slides project team can go through. Acknowledged that David Dicker was at Monday night NG-hosted meeting (Feb 19) and had chance for background. Enquired if David had anything in particular he wanted project team to discuss/begin with or if he wanted the project team to go through the slide deck.

Sarah: went over overview of agenda (background history on project, work done to date, site selection, update on field study program)

Sarah: discussed Project overview. The NG is the proponent; infrastructure department is lead in designing the program and studying opportunity for new airport. Although Marie-Helene and team are involved in supporting the regulator process, it is led by NG Environment department (they led Monday Feb 19 meeting). There are also regulatory requirements of federal gov't and provincial gov't. Three gov'ts involved in regulatory process. Today's convo is with proponent team. AECOM supporting on environmental assessment side. Our objectives today are to make sure you (David Dicker) can ask questions about the process, discuss steps that will take place in next few years. Project contemplates airport, runway and access road connecting airport to

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David: said plan looks good, glad study was done to determine best/most feasible location for airport.

Marie-Helene: pulled up new map of airport and access road. Noted the real access road path is in map. What you see at bottom (left side of map) is that the road coming to the airport goes further than airport area due to location of airport diesel tanks. Dotted red line is the temporary road for construction of the airport and access road. Map shows yellow and white sites - yellow is a potential archaeological site, white is a confirmed archaeological site. Site found along access road ("B" on map) is about 35m from road. Road was moved, site will be fenced and protected. Other potential archaeological site that will be looked at is near the water and near the construction road. Already did deviation of construction road from site – will be protected.

David: for temporary access road coming in – this will be fenced off from public access?

Marie-Helene: the temporary road is only for construction; only the construction company will have access. After construction the road will not exist – will close it and it won't be accessible.

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David: Will blasting notifications be shared with the public?

Marie-Helene: yes. Airport needs to be advised for operations too.

Marie-Helene: on map, top left shows terminal area and aircraft parking area. Will have terminal, cargo warehouse, de-icing pad on tarmac, maintenance garage, fuelling pad, aviation fueling systems, diesel fuel (tanks will be to left) and power station for airport, as well as parking area and runway. Yellow strip in top left of map represent approach lights which are needed at each end extending from the runway threshold outward as part of the equipment.

David: wanted to ensure that area in Nain where residents fetch water from a stream near quarry was documented.

Marie-Helene: noted project is aware of this. Will not be touched. Road going to quarry will not be changed.

David: enquired if trees near the power station at the new airport will be cut.

Marie-Helene: yes, noted that inside boundaries of the airport all trees will be cut.

Marie-Helene: according to what we heard, Kauk Brook is an Arctic char fishing area. Access road will be gravel, can be dusty. Want to make sure it doesn't affect the quality/pollute Kauk Brook. Kauk Brook bridge will be metal bridge – standard bridge (flat). Foundations well apart because of the area. Working on other projects with special stabilization systems that can be used for roads and airports to stabilize surfaces and are dust-free. For mitigation of dust along the access road, will recommend that while gravel is used for top of the road, it be stabilized

using non-toxic, environmentally certified synthetic fluid (EK 35). Also going to recommend for runway. Goes through rigorous certification in Quebec by Bureau de normalisation du Québec (BNQ). Will be part of answers for environmental studies. Was in Nain last summer, witnessed all the dust.

David: town provides calcium chloride on roads. Considered possibly having water truck on road. If EK 35 solution is recommended by AECOM, would be better solution to mitigate contamination.

Marie-Helene: don't want more corrosion capacity along that road. Will be culverts – corrosion will affect culverts. Through all the drilling in area (access road and airport), study found out that water pH is high (corrosive) in nature. Going to take care of this for construction. Specifications to address this.

David: asked about impact of acid-generating rock on high pH levels in water.

Marie-Helene: committed to going back to reports to check; noted the high pH levels are natural in the area.

David: Asked if pH levels could cause harm to humans and environment.

Marie-Helene: said no but noted it will affect the foundations of the bridge and culvert (will be 26 culverts along road). Looking at durability, material, coatings.

Marie-Helene: when you see purple on map, it's potential permafrost (has been permafrost in that area and maybe leftover), but it's discontinued/melting fast. During R4 study, boreholes drilled to get info on freezing, all stayed no lower than 2 degrees. To our understanding, permafrost almost gone in that area. Doing more drilling in June mainly in airport area and along access road. Engineers taking good care to consider permafrost – not first time building near permafrost. Following required engineering processes so road is stable.

Marie-Helene: road not going through avalanche area. Pulled up avalanche map.

David: going back to the new map of airport and access road, asked about the space between the two taxiways at the airport, and whether that could be flooded.

Marie-Helene: *(initially pulled up rendering of new airport).* Noted that the rendering was from pre-feasibility studies timeframe; rendering was prepared by architect just to give an idea of what the view *could* be. Noted the ground around the rendering is a real picture of the area, but in reality now, the proposed runway is more to the north of the rendering (6m elevation). *(pulled up new map of airport and access road).* The gap between the two taxiways will not accept any water.

Sarah: discussed access road and avalanche risk. Pulled up image of avalanche area near Blowhole Pond. Noted engineers moved the road as the previous road alignment was closer to the avalanche risk area.

Marie-Helene: new access road alignment is 70 m from area where avalanche risk area is. Higher elevation than area of avalanche. Skidoo trail probably won't be used anymore, skidoo riders will use road.

Sarah: current status – in phase 3. Some of work Marie-Helene and team doing is part of this phase. Feasibility studies (archaeology, road alignment, permafrost, fulsome environmental assessment) are all in support of more information and understanding the needs of the space/site before design etc. and will support regulatory processes underway. Federal gov't involved on impact assessment, NG involved in environmental assessment (open comment period as well), province will be engaged too. Coordinated reviews.

Sarah: proponent team continue to do environmental assessment work. Many studies completed or close to being completed; environmental assessment process done a lot of field work and continuing to analyze that info to support reporting for all three levels of gov't.

Elaine: five trips done last year. Land use permit from NG Environment, including archaeological permit. As noted, archaeological site located so access road moved. Had meeting with NFL gov't on approach to surveys before going out to do field studies. In Dec 2023, submitted Initial Project Description (IPD) to all three regulators for them to comment. As part of that, NG Environment division started regional land use study (should be in Nain this week). For environmental impact aspect, open house tentative for spring 2024. Species mentioned on Monday call?

David: Ptarmigan – hunt in that area of the Brook where bridge crosses.

Elaine: did not observe Arctic char. To protect habitat for fish, building bridge instead of culvert. Question about berries at Monday's call. Collected bog cranberries (did not collect blueberries, aware that it is traditional, wasn't enough to take samples). Doing tissue sample – making sure no contaminant (baseline).

David: Also collect red and black berries.

Elaine: red is bog cranberries, but did not collect black berries.

Marie-Helene: asked David if he was born in Nain.

David: from Happy Valley Goose Bay but lived in Nain whole life.

Marie-Helene: do you go fishing? Where do you go for fishing?

David: when fish is out on the run in the summer months, fish along the delta (opening to ocean), runs all the up to the lake.

Marie-Helene: Arctic char – do they need a lot of water depth to be able to go to the lake?

David: no, Arctic char is a strong fish species, similar to salmon. Can jump and swim.

Marie-Helene: a lot of curves in the brook; there is a big change of water levels from spring to fall – water levels drop. Was surprised how little water there would be in that area in August. Is it always like that or getting worse?

David: can't answer. Arctic char – can't say they don't go to brook area where bridge is.

Marie-Helene: someone said they were going fishing for Arctic char in April – is that not still winter with ice and snow?

David: yes, but people go fishing in spring (even with ice).

Elaine: planning to go back out in June (drilling) and piggybacking on that to do terrestrial study. Ongoing - human environment, regional land use study and archaeology. Goal to have environmental impact assessment report in 2024. Project slated for completion in 2030.

Sarah: approval process requires all three levels of gov't. Operational and construction plans to be developed on how to build both road and airport to be operational by 2030.

David: when the study was done on Kauk Brook, did you find any other fish? What were water levels? How far up Kauk Brook did study go?

Elaine: Found Brook trout and three-spine stickleback. Study covered the two water crossings where bridge will be with a little buffer.

David: where are the locations for airport fuel? Understand there will be fuel station at the new airport that is going to hold 60-70K litres of fuel. Is Nain the secondary/back up location for fuel station?

Marie-Helene: first option was to have floating transfer for fueling airport. Woodward did not agree. Fuel will be unloaded in Nain, using reserve tanks currently in Nain (which can accommodate larger quantities of fuel than current airport uses) then transferred by truck to airport, as requested.

David: In Monday night meeting (Feb 19), talks of maybe doing solar power later in project?

Marie-Helene: R7 study looked at electricity needed. asked them to look further down the road for more green ways to power project. Two options – wind turbine and other solar panel. Wind turbine is probably best because there is lots of wind and there are small wind turbines specifically for this. Such turbines cannot be installed near airport as they are considered obstacles for approaches. Would have to be along access road. Other thing – electricity has to be moved to airport - works but very expensive. For start of airport preferred to do only with generators (standards in aviation critical for airport and runway, lighting etc). If generator goes down, need a second one to pick up load in 15 seconds. With time, will be able to harness wind. Solar panels – are good but big study in Sherbrooke University in Quebec suggests that solar panels in the Arctic are not working well, so mindful of those findings for this project. Green options recommended for second stage of implementation for airport.

Marie-Helene: Access road invites possibilities for industry/growth. With Nain population rising, access road and airport are mechanisms to leverage. Nain is in strategic area to be leveraged for mining, etc.

Sarah: asked David for his thoughts on questions the community will want to focus on in April.

David: what type of spill plan is in place during construction or after airport built?

Marie-Helene: for construction will have to follow requirements for spills. Will have closed septic tanks.

Marie-Helene: for de-icing, light de-icing in Nain, not heavy duty de-icing like in other large airports but following operations done in Nunavut (e.g. Air Inuit using Boeing 737, large dash aircraft, do de-icing). Pads will be constructed with pipes all the around. When refuelling jets and large aircraft in cold conditions, top of wings tends to freeze because the jet fuel is cold, so light de-icing involves de-icing the top of the wings, and horizontally across the plane. All new construction, including new Nain airport, needs to have de-icing pads according to regulations. Will have double wall self-contained tanks for de-icing that are not in the ground (so they can be physically checked/inspected). System at airport inspected every year and are life limits on them so they don't go beyond that. Have double wall tanks at existing airport.

David: construction companies hiring local beneficiaries for construction of road?

Marie-Helene: it's always better to hire people from the area as they know the location. Project has been leveraging Nain workforce for aspects of the project so far and will be doing so when coming back to Nain in June. Expecting that during construction, construction companies will use workforce from Nain.

Sarah: looking forward to coming out in April and hope to see David in person and have discussion with community.

David: looking forward to meeting with everyone in April.

Appendix C11 Nain Inuit Community Government Meeting Notes (February 21, 2024)

Proposed New Nain Airport Project

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David: enquired if trees near the power station at the new airport will be cut.

Marie-Helene: yes, noted that inside boundaries of the airport all trees will be cut.

Marie-Helene: according to what we heard, Kauk Brook is an Arctic char fishing area. Access road will be gravel, can be dusty. Want to make sure it doesn't affect the quality/pollute Kauk Brook. Kauk Brook bridge will be metal bridge – standard bridge (flat). Foundations well apart because of the area. Working on other projects with special stabilization systems that can be used for roads and airports to stabilize surfaces and are dust-free. For mitigation of dust along the access road, will recommend that while gravel is used for top of the road, it be stabilized

using non-toxic, environmentally certified synthetic fluid (EK 35). Also going to recommend for runway. Goes through rigorous certification in Quebec by Bureau de normalisation du Québec (BNQ). Will be part of answers for environmental studies. Was in Nain last summer, witnessed all the dust.

David: town provides calcium chloride on roads. Considered possibly having water truck on road. If EK 35 solution is recommended by AECOM, would be better solution to mitigate contamination.

Marie-Helene: don't want more corrosion capacity along that road. Will be culverts – corrosion will affect culverts. Through all the drilling in area (access road and airport), study found out that water pH is high (corrosive) in nature. Going to take care of this for construction. Specifications to address this.

David: asked about impact of acid-generating rock on high pH levels in water.

Marie-Helene: committed to going back to reports to check; noted the high pH levels are natural in the area.

David: Asked if pH levels could cause harm to humans and environment.

Marie-Helene: said no but noted it will affect the foundations of the bridge and culvert (will be 26 culverts along road). Looking at durability, material, coatings.

Marie-Helene: when you see purple on map, it's potential permafrost (has been permafrost in that area and maybe leftover), but it's discontinued/melting fast. During R4 study, boreholes drilled to get info on freezing, all stayed no lower than 2 degrees. To our understanding, permafrost almost gone in that area. Doing more drilling in June mainly in airport area and along access road. Engineers taking good care to consider permafrost – not first time building near permafrost. Following required engineering processes so road is stable.

Marie-Helene: road not going through avalanche area. Pulled up avalanche map.

David: going back to the new map of airport and access road, asked about the space between the two taxiways at the airport, and whether that could be flooded.

Marie-Helene: *(initially pulled up rendering of new airport).* Noted that the rendering was from pre-feasibility studies timeframe; rendering was prepared by architect just to give an idea of what the view *could* be. Noted the ground around the rendering is a real picture of the area, but in reality now, the proposed runway is more to the north of the rendering (6m elevation). *(pulled up new map of airport and access road).* The gap between the two taxiways will not accept any water.

Sarah: discussed access road and avalanche risk. Pulled up image of avalanche area near Blowhole Pond. Noted engineers moved the road as the previous road alignment was closer to the avalanche risk area.

Marie-Helene: new access road alignment is 70 m from area where avalanche risk area is. Higher elevation than area of avalanche. Skidoo trail probably won't be used anymore, skidoo riders will use road.

Sarah: current status – in phase 3. Some of work Marie-Helene and team doing is part of this phase. Feasibility studies (archaeology, road alignment, permafrost, fulsome environmental assessment) are all in support of more information and understanding the needs of the space/site before design etc. and will support regulatory processes underway. Federal gov't involved on impact assessment, NG involved in environmental assessment (open comment period as well), province will be engaged too. Coordinated reviews.

Sarah: proponent team continue to do environmental assessment work. Many studies completed or close to being completed; environmental assessment process done a lot of field work and continuing to analyze that info to support reporting for all three levels of gov't.

Elaine: five trips done last year. Land use permit from NG Environment, including archaeological permit. As noted, archaeological site located so access road moved. Had meeting with NFL gov't on approach to surveys before going out to do field studies. In Dec 2023, submitted Initial Project Description (IPD) to all three regulators for them to comment. As part of that, NG Environment division started regional land use study (should be in Nain this week). For environmental impact aspect, open house tentative for spring 2024. Species mentioned on Monday call?

David: Ptarmigan – hunt in that area of the Brook where bridge crosses.

Elaine: did not observe Arctic char. To protect habitat for fish, building bridge instead of culvert. Question about berries at Monday's call. Collected bog cranberries (did not collect blueberries, aware that it is traditional, wasn't enough to take samples). Doing tissue sample – making sure no contaminant (baseline).

David: Also collect red and black berries.

Elaine: red is bog cranberries, but did not collect black berries.

Marie-Helene: asked David if he was born in Nain.

David: from Happy Valley Goose Bay but lived in Nain whole life.

Marie-Helene: do you go fishing? Where do you go for fishing?

David: when fish is out on the run in the summer months, fish along the delta (opening to ocean), runs all the up to the lake.

Marie-Helene: Arctic char – do they need a lot of water depth to be able to go to the lake?

David: no, Arctic char is a strong fish species, similar to salmon. Can jump and swim.

Marie-Helene: a lot of curves in the brook; there is a big change of water levels from spring to fall – water levels drop. Was surprised how little water there would be in that area in August. Is it always like that or getting worse?

David: can't answer. Arctic char – can't say they don't go to brook area where bridge is.

Marie-Helene: someone said they were going fishing for Arctic char in April – is that not still winter with ice and snow?

David: yes, but people go fishing in spring (even with ice).

Elaine: planning to go back out in June (drilling) and piggybacking on that to do terrestrial study. Ongoing - human environment, regional land use study and archaeology. Goal to have environmental impact assessment report in 2024. Project slated for completion in 2030.

Sarah: approval process requires all three levels of gov't. Operational and construction plans to be developed on how to build both road and airport to be operational by 2030.

David: when the study was done on Kauk Brook, did you find any other fish? What were water levels? How far up Kauk Brook did study go?

Elaine: Found Brook trout and three-spine stickleback. Study covered the two water crossings where bridge will be with a little buffer.

David: where are the locations for airport fuel? Understand there will be fuel station at the new airport that is going to hold 60-70K litres of fuel. Is Nain the secondary/back up location for fuel station?

Marie-Helene: first option was to have floating transfer for fueling airport. Woodward did not agree. Fuel will be unloaded in Nain, using reserve tanks currently in Nain (which can accommodate larger quantities of fuel than current airport uses) then transferred by truck to airport, as requested.

David: In Monday night meeting (Feb 19), talks of maybe doing solar power later in project?

Marie-Helene: R7 study looked at electricity needed. asked them to look further down the road for more green ways to power project. Two options – wind turbine and other solar panel. Wind turbine is probably best because there is lots of wind and there are small wind turbines specifically for this. Such turbines cannot be installed near airport as they are considered obstacles for approaches. Would have to be along access road. Other thing – electricity has to be moved to airport - works but very expensive. For start of airport preferred to do only with generators (standards in aviation critical for airport and runway, lighting etc). If generator goes down, need a second one to pick up load in 15 seconds. With time, will be able to harness wind. Solar panels – are good but big study in Sherbrooke University in Quebec suggests that solar panels in the Arctic are not working well, so mindful of those findings for this project. Green options recommended for second stage of implementation for airport.

Marie-Helene: Access road invites possibilities for industry/growth. With Nain population rising, access road and airport are mechanisms to leverage. Nain is in strategic area to be leveraged for mining, etc.

Sarah: asked David for his thoughts on questions the community will want to focus on in April.

David: what type of spill plan is in place during construction or after airport built?

Marie-Helene: for construction will have to follow requirements for spills. Will have closed septic tanks.

Marie-Helene: for de-icing, light de-icing in Nain, not heavy duty de-icing like in other large airports but following operations done in Nunavut (e.g. Air Inuit using Boeing 737, large dash aircraft, do de-icing). Pads will be constructed with pipes all the around. When refuelling jets and large aircraft in cold conditions, top of wings tends to freeze because the jet fuel is cold, so light de-icing involves de-icing the top of the wings, and horizontally across the plane. All new construction, including new Nain airport, needs to have de-icing pads according to regulations. Will have double wall self-contained tanks for de-icing that are not in the ground (so they can be physically checked/inspected). System at airport inspected every year and are life limits on them so they don't go beyond that. Have double wall tanks at existing airport.

David: construction companies hiring local beneficiaries for construction of road?

Marie-Helene: it's always better to hire people from the area as they know the location. Project has been leveraging Nain workforce for aspects of the project so far and will be doing so when coming back to Nain in June. Expecting that during construction, construction companies will use workforce from Nain.

Sarah: looking forward to coming out in April and hope to see David in person and have discussion with community.

David: looking forward to meeting with everyone in April.

Appendix C12 Correspondence from Hopedale Inuit Nation, Sheshatshiu Innu First Nation, and Natuashish Innu First Nation

From:
Sent: January 18, 2024 1:58 PM
To:
Cc: Colin Gilbride; Marie-Helene Simard; mbarrette@octantaviation.ca; NNAFS Project Feedback; Lee-Ho, Elaine; De Decker, Sarah
Subject: RE: Initial Project Meeting for Nain Airport Project Consultation

Hello Angajukkâk ,

Great, thank you for confirming. We will be sure to continue to include you in any future communication about the Project.

Have a lovely rest of your day,

From:
Sent: Thursday, January 18, 2024 12:11 PM
To: Singh-Persaud, Ammie <ammie.singh-persaud@aecom.com>;
Cc: Colin Gilbride <Colin.Gilbride@nunatsiavut.com>; Marie-Helene Simard <mhsimard@octantaviation.ca>; mbarrette@octantaviation.ca; NNAFS Project Feedback <NNAFSProjectFeedback@aecom.com>; Lee-Ho, Elaine <Elaine.LeeHo@aecom.com>; De Decker, Sarah <Sarah.DeDecker@aecom.com>
Subject: Re: Initial Project Meeting for Nain Airport Project Consultation

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Report Suspicious

Hi
Yes that would be nice.
Thanks

From: >
Sent: January 18, 2024 12:31 PM
To:
Cc: Colin Gilbride <Colin.Gilbride@nunatsiavut.com>; Marie-Helene Simard <mhsimard@octantaviation.ca>; mbarrette@octantaviation.ca <mbarrette@octantaviation.ca>; NNAFS Project Feedback <NNAFSProjectFeedback@aecom.com>; Lee-Ho, Elaine <Elaine.LeeHo@aecom.com>; De Decker, Sarah <Sarah.DeDecker@aecom.com>
Subject: RE: Initial Project Meeting for Nain Airport Project Consultation

You don't often get email from . Learn why this is important

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello Angajukkâk ,

Thank you very much for your quick response. Would Hopedale still be interested in continuing to receive virtual Project updates?

Please do not hesitate to reach out should Hopedale have any feedback to share about the Project as it progresses or if you would like to meet for a discussion at a later date.

Best,

From:
Sent: Thursday, January 18, 2024 10:03 AM
To: ;
Cc: Colin Gilbride <Colin.Gilbride@nunatsiavut.com>; Marie-Helene Simard <mhsimard@octantaviation.ca>; mbarrette@octantaviation.ca; NNAFS Project Feedback <NNAFSProjectFeedback@aecom.com>; Lee-Ho, Elaine <Elaine.LeeHo@aecom.com>; De Decker, Sarah <Sarah.DeDecker@aecom.com>
Subject: Re: Initial Project Meeting for Nain Airport Project Consultation

Good morning ,
At this point I do not feel we need to be involved in the Nain Airport only to wish them well in this very important project!
Regards,

From:
Sent: January 18, 2024 10:09 AM
To:
Cc: Colin Gilbride <Colin.Gilbride@nunatsiavut.com>; Marie-Helene Simard <mhsimard@octantaviation.ca>; mbarrette@octantaviation.ca <mbarrette@octantaviation.ca>; NNAFS Project Feedback <NNAFSProjectFeedback@aecom.com>; Lee-Ho, Elaine <Elaine.LeeHo@aecom.com>; De Decker, Sarah <Sarah.DeDecker@aecom.com>
Subject: Initial Project Meeting for Nain Airport Project Consultation

Some people who received this message don't often get email from . Learn why this is important

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello Angajukkâk ,

My name is and I am emailing on behalf of the Nunatsiavut Government about the **New Nain Airport Project**.

Through the New Nain Airport Project, the Nunatsiavut Government aims to build a new airport in the community of Nain. The proposed Project involves the construction of the new airport, a new runway, and an

access road. It is ultimately intended to enhance transportation, health, and wellness needs by increasing air travel reliability in and out of the community and enabling 24-hour operation and larger aircraft landings.

For additional background information about the proposed Nain airport, I have attached an *Information Sheet* to this e-mail. It includes a map of the proposed project site for your reference. The current project schedule is targeting commissioning of the new Nain Airport in 2030, pending regulatory approvals.

AECOM has been contracted by the Nunatsiavut Government to complete an environmental assessment for the New Nain Airport Project, including coordinating consultation activities with surrounding communities to Nain**.**

Please let us know if Hopedale Inuit Community Government has an interest in being involved in the consultation process, and if so, in what way. We can keep your community informed with virtual Project Updates and welcome your feedback at any time as the Project continues to proceed or schedule an initial discussion to provide an overview of the Project and discuss your level of interest or perspectives on the proposed New Nain Airport Project.

Should you have any questions or require any further information, please do not hesitate to reach out. Thank you in advance for your time.

Best,

| Intermediate Social Impact Specialist *(she/her)*

Delivering a better world aecom.com

This message (including any attachments) is intended only for the use of the individual or entity to which it is addressed and may contain information that is non-public, proprietary, privileged, confidential, and exempt from disclosure under applicable law or may constitute as attorney work product. If you are not the intended recipient, you are hereby notified that any use, dissemination, distribution, or copying of this communication is strictly prohibited. If you have received this communication in error, notify us immediately by telephone and (i) destroy this message if a facsimile or (ii) delete this message immediately if this is an electronic communication.

This message (including any attachments) is intended only for the use of the individual or entity to which it is addressed and may contain information that is non-public, proprietary, privileged, confidential, and exempt from disclosure under applicable law or may constitute as attorney work product. If you are not the intended recipient, you are hereby notified that any use, dissemination, distribution, or copying of this communication is strictly prohibited. If you have received this communication in error, notify us immediately by telephone and (i) destroy this message if a facsimile or (ii) delete this message immediately if this is an electronic communication.

Initial Project Meeting for Nain Airport Project Consultation

SA

To

Cc

Reply | Reply All | Forward

Thu 2024-01-18 9:10 AM

Nain Info Sheet - Nov 2023.pdf
2 MB

Hello

My name is Ammie Singh-Persaud and I am emailing on behalf of the Nunatsiavut Government about the **New Nain Airport Project**.

Through the New Nain Airport Project, the Nunatsiavut Government aims to build a new airport in the community of Nain. The proposed Project involves the construction of the new airport, a new runway, and an access road. It is ultimately intended to enhance transportation, health, and wellness needs by increasing air travel reliability in and out of the community and enabling 24-hour operation and larger aircraft landings.

For additional background information about the proposed Nain airport, I have attached an *Information Sheet* to this e-mail. It includes a map of the proposed project site for your reference. The current project schedule is targeting commissioning of the new Nain Airport in 2030, pending regulatory approvals.

AECOM has been contracted by the Nunatsiavut Government to conduct an environmental assessment for the New Nain Airport Project, including coordinating consultation activities with surrounding communities to Nain.

Please let us know if Sheshatshiu Innu First Nation has an interest in being involved in the consultation process, and if so, in what way. We can keep your community informed with virtual Project Updates and welcome your feedback at any time as the Project continues to proceed or schedule an initial discussion to provide an overview of the Project and discuss your level of interest or perspectives on the proposed New Nain Airport Project.

Should you have any questions or require any further information, please do not hesitate to reach out. Thank you in advance for your time.

Best,

Initial Project Meeting for Nain Airport Project Consultation

SA

To
Cc

Reply | Reply All | Forward

Thu 2024-01-18 9:11 AM

Nain Info Sheet - Nov 2023.pdf
2 MB

Hello Chief John Nui,

My name is Ammie Singh-Persaud and I am emailing on behalf of the Nunatsiavut Government about the **New Nain Airport Project**.

Through the New Nain Airport Project, the Nunatsiavut Government aims to build a new airport in the community of Nain. The proposed Project involves the construction of the new airport, a new runway, and an access road. It is ultimately intended to enhance transportation, health, and wellness needs by increasing air travel reliability in and out of the community and enabling 24-hour operation and larger aircraft landings.

For additional background information about the proposed Nain airport, I have attached an *Information Sheet* to this e-mail. It includes a map of the proposed project site for your reference. The current project schedule is targeting commissioning of the new Nain Airport in 2030, pending regulatory approvals.

AECOM has been contracted by the Nunatsiavut Government to complete an environmental assessment for the New Nain Airport Project, including coordinating consultation activities with surrounding communities to Nain.

Please let us know if Natuashish Innu First Nation has an interest in being involved in the consultation process, and if so, in what way. We can keep your community informed with virtual Project Updates and welcome your feedback at any time as the Project continues to proceed or schedule an initial discussion to provide an overview of the Project and discuss your level of interest or perspectives on the proposed New Nain Airport Project.

Should you have any questions or require any further information, please do not hesitate to reach out. Thank you in advance for your time.

Best,

Appendix C13 Nain Community Member Q&A

New Nain Airport – Q&A (January 2024)

Question of Comment	Response
What do Elders think [about the New Nain Airport Project]?	We hope to discuss the project with Elders to get their feedback and will integrate their perspective into the analysis and conditions reporting but have not had success connecting with an Elder so far. Do you have any suggested contacts we should reach out to?
MMIWG2S+ and construction: I worry about the influx of construction workers and others to build the road and all the facilities to run the airport for several reasons. Most temporary workers (especially in construction) are men, and with such a large area I worry about incidents along the road and at the airport in which women and girls are targeted by these workers. There are good and decent workers of course, but even within town I have experienced harassment from seasonal construction workers. I worry about the distance from town in case something was to happen and if there would be support or relief if needed.	Thank you for your specific comments on the potential impacts to MMIWG2S+ during periods where there will be more construction workers in the community of Nain. These concerns will be included in the human environment assessment, including specific concerns related to safety from the increased number of construction workers in the region during the construction. The assessment will consider mitigation measures during this time to support community safety and well-being.
The fact that the proposed site would cover caribou grounds and pathways concerns me since we are already dealing with the ban of the George River caribou herd. The caribou were likely impacted by Voisey's Bay and the combination of construction and noise it would just add insult to injury. Nainimiut also hike from Nain to Kauk in the spring to collect mussels and I imagine this would impact both the trail and the mussels, potentially making them inedible. Nainimiut also hunt geese in the spring and fall, has NG talked about the potential disruptions to geese migrating to the area?	Based on the surveys completed by our field studies team so far, caribou occur in the area at very low numbers. Caribou tracks were observed at 6 locations, primarily near the airport footprint with one location including tracks of a caribou cow and calf. There were no caribou observed from the helicopter by any team in 2023. Given the very low number of caribou currently using the area, impacts overall on the George River caribou herd are expected to be negligible. We understand that there is work being done to restore the population in the area and it is anticipated that as caribou populations recover, they'll move back into areas of suitable habitat including areas near the airport and access road. Wildlife tend to acclimatize to benign human disturbances and activity in the absence of hunting. Although caribou are not likely to avoid activity at the airport once operational, they will likely avoid areas where there is hunting pressure, which could include areas adjacent to the access road. As such, mitigations will likely need to focus on reducing hunting pressures surrounding the access road and airport. Our field studies team has looked into and are cognizant of caribou as an important species to watch for as work for the new airport continues. As the project relates to geese, our field studies team indicated that the area proposed for the airport wouldn't interfere with geese habitat. They also noted that geese tend to be very resilient to airports and successfully exist in areas where airports exist. The field studies team has indicated that any geese using the coastline would not be impacted by the Project.

	In terms of mussels, the team expects that some impacts will be experienced during the construction phase of the project. During construction, equipment will need to be offloaded along the marine shoreline. No docks or structures will be built that would disturb mussel habitat. However, marine vessels will stage along the shoreline and the team is exploring mitigation measures to further address these issues.
Community members should be employed in all stages of this process, including snow clearing in the winter months.	We have noted this recommendation as a project enhancement during the procurement process for construction.
Nain/Nunatsiavut residents should be allowed to harvest wood from the clearing of the area rather than disposing of the cut trees and brush.	We have noted this recommendation as a project enhancement during the procurement process for construction.
I read that the larger runway will be capable of landing De Havilland Canada (DHC)-8 turboprop aircraft and jets (e.g. Boeing 737-200), what changes will happen to the twin otters and their pilots? This is more of a personal curiosity.	At this time, the NG has not determined flight schedules and potential plane size. Therefore, it is unknown whether these planes and pilots will remain in operation or if they will be replaced with larger aircrafts in time. The New Nain Airport is designed with the future in mind and the potential for larger aircrafts.
What airlines would travel to the coast? PAL?	At this time the NG has not determined whether additional airlines will travel to Nain. For the time being, it is assumed that PAL/ Air Borealis will continue flight operations in Nain. The New Nain Airport is designed with the future in mind and the potential for different airlines.
From the summary, it says the airport is expected to support between 130 and 140 flights per month and that it is likely there will eventually be fewer flights as larger aircraft will be able to use the airport. This huge airport that accommodates jets would bring in more people to the community, either temporarily or permanently. Where would they live (considering the housing crisis)? Will housing prices increase for residents? What about the increase in crime and healthcare needs?	Thank you for highlighting the significant challenges related to housing in Nain. The construction phase of the project is likely to see a temporary increase in population in the region. Given community concerns about the current state of housing, temporary accommodations for the influx of workers may be considered to avoid putting additional strain on the existing housing system. Our team is also continuing to explore and assess the potential related impacts to healthcare, safety, and housing in the upcoming assessment phase.
Even though we have a main water source, many people (including my family) prefer to fetch water from Annainak's brook. How will this brook be affected, and would the water source be deemed unfit to consume?	The project will use the road that currently crosses Annainak's brook. During preliminary conversations with community members it was identified that this brook is a drinking water source. Based on this information the project design team decided to not make any road or culvert improvements at this crossing, so there will not be any impacts to water quality from project construction. We have considered that there will likely be more traffic in this area to get to the airport in general, which may increase risk of things like spills from vehicles holding diesel and jet fuel periodically. The project team will

	consider mitigation measures like truck inspections and speed limits to reduce risks and response plans are created to maintain the brook's water quality.
Do you know who will be contracted to create the road? Will the road be done by contractors who are known to do poor jobs (lol)? I know within town there have been complaints about certain contractors and I would hope that a project at this scale would have some of the best contractors to undertake it.	Construction contracts for the road will be awarded at a later date pending feasibility study completion and project approval. We will note this for consideration during the procurement process for construction.
How will NG/NICG take care of dust from the road? This would cause additional harm to the environment and the health of animals, birds, and people as we inhale a lot of dust during the summer.	Mitigation measures to combat potential air quality impacts will be explored, including the use of a water truck for dust suppression. The Access Road will be treated with a durable non-toxic synthetic fluid that stabilizes gravel and improves operational and safety conditions in cold remote regions. Its use will help to limit dust, improve water quality in runoff due to limited sedimentation, and lowers maintenance costs. Overall air quality within Nain is expected to improve with the relocation of the airport.

Appendix C14 April 10 Community meeting Poster

NEW NAIN AIRPORT PROJECT

NAIN COMMUNITY MEETING

OPEN TO THE PUBLIC

The Nunatsiavut Government invites Nain residents, business owners, and all interested persons to attend a community meeting on the new proposed airport project.

APRIL 10, 2024

4:00PM – 7:00PM

PRESENTATION @ 5:00PM

GOVERNMENT OFFICE

25 IKAJUKTAUVIK RD, NAIN

PIZZA AND REFRESHMENTS PROVIDED

AECOM NUNATSIAVUT kavamanga Government OCTANT

FOR MORE INFORMATION:
CONTACT SARAH.DEDECKER@AECOM.COM

NEW NAIN AIRPORT PROJECT

NAIN COMMUNITY MEETING

OPEN TO THE PUBLIC

The Nunatsiavut Government invites Nain residents, business owners, and all interested parties to a community meeting on the new proposed airport project.

JUNE 12, 2024

4:00PM – 7:00PM

PRESENTATION @ 5:00PM

GOVERNMENT OFFICE

25 IKAJUKTAUVIK RD, NAIN

PIZZA AND REFRESHMENTS PROVIDED

AECOM NUNATSIAVUT kavamanga Government OCTANT

FOR MORE INFORMATION:
CONTACT NNAFSPROJECTFEEDBACK@AECOM.COM

Appendix C15 April 10 Community Meeting Cancellation Notice

Octant Aviation
4501 rue Bishop, bureau 202
Longueuil (QC) J3Y 9E1

April 8, 2024

Send by email

Subject: **NAIN Community meeting- Letter of cancellation**

We regret to inform you of the cancellation of the community meeting scheduled for April 10th, 2024, regarding the New Nain Airport Project.

The Nunatsiavut Government understands the critical importance of this project and community involvement in it. Community engagement will continue including providing Project Updates virtually and identifying opportunities for community meetings. As the proponent of this project, the Nunatsiavut Government values your input and participation in this important endeavour.

If you have any questions or concerns, please feel free to directly contact colin.gilbride@nunatsiavut.com, NG Infrastructure and New Nain Airport Project Lead or reply to this project email.

Thank you for your understanding.

<Original signed by>

Marie-Hélène Simard
Project Manager New Nain Airport Feasability Study
Senior Consultant, Strategy and Regulation
Octant Aviation
Email: mhsimard@octantaviation.ca

c.c. Colin Gilbride, Director of Infrastructure and Planning Nunatsiavut Government
Darryl Shiwak, Minister Nunatsiavut Government
Isabella Pain, Deputy Minister Nunatsiavut Government

Appendix C16 June 12 Community Meeting Presentation

New Nain Airport: Community Meeting

NUNATSIAVUT
kavamanga Government

AECOM

Presentation to Nain Community
June 12, 2024, 6:30 PM – 9:00 PM

OCTANT

Agenda

1. Project Overview
2. Project Phase
3. Current Status - Impact Assessment and Feasibility Study
4. Environmental Studies
5. Potential Water Source
6. Terminal Concept
7. Consultation Update
8. Project Improvements
9. Recommendations & Considerations Proposed Access Road
10. Discussion Period

NUNATSIAVUT kavamanga Government

AECOM

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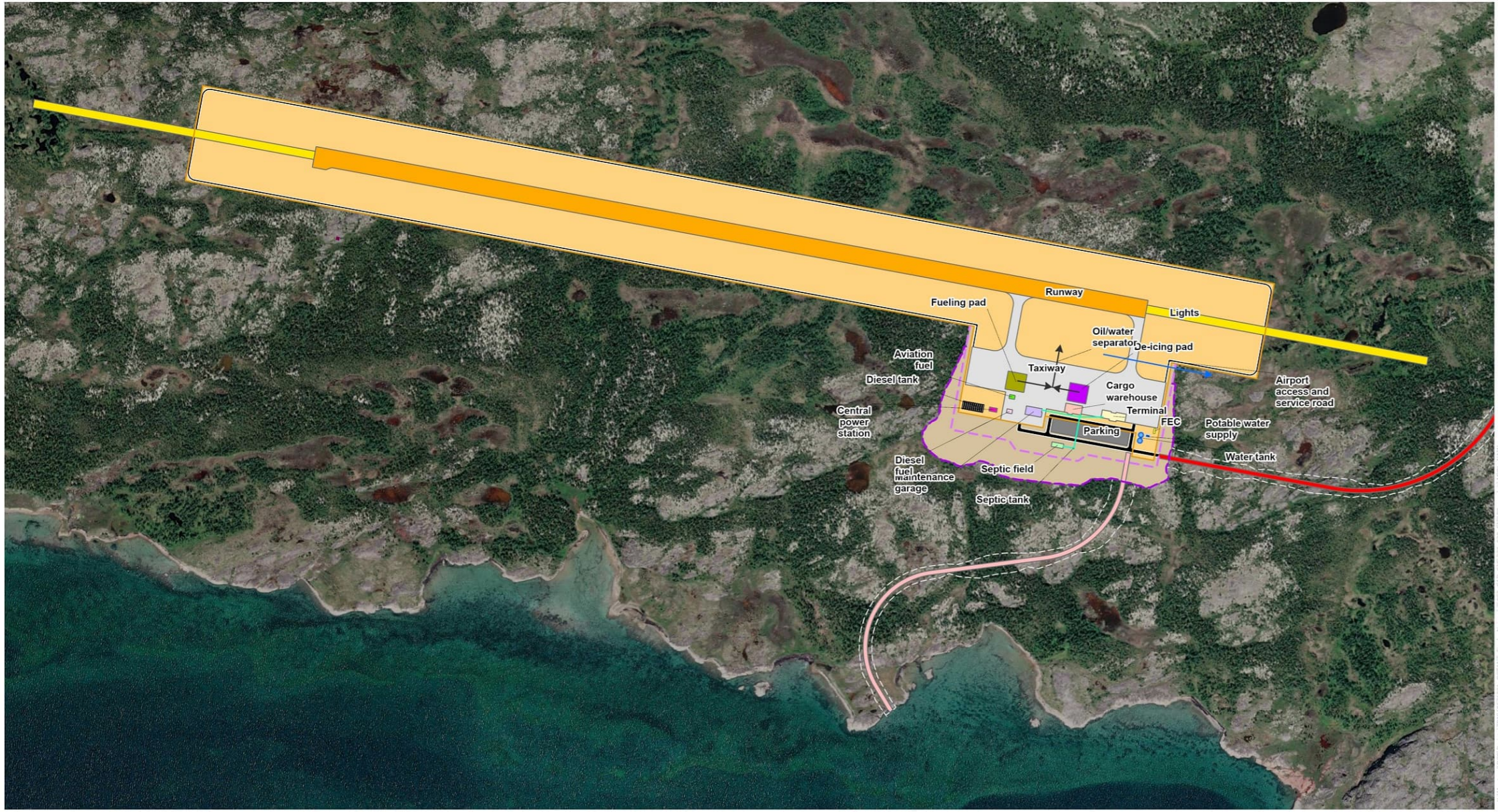
Project Overview

- The Nunatsiavut Government (NG) aims to build a new certified airport for Nain community, replacing the current airport.
- Three (3) main components:
  - **Airport** : includes terminal, maintenance hangar, cargo warehouse (frozen/fresh) , etc.
  - **Runway**: approx. 7,000 feet long by 130 feet wide,
  - Sea main level elevation : 60 m
    - Distance from shoreline : 850 m
  - **Access Road**: approx. 12 km in length starting from existing road in Nain (Quarry)
- Additional Improvements:
  - **24/7 all weather operation** which will facilitate larger aircraft combi (cargo & passengers) and medical evacuation
  - Instrument flight regulations instead of visual flight regulations
    - Instrument approach at 200 ft and half a mile visibility
  - Enhancing
    - Access to better community services; and
    - Connections with other Inuit regions and the rest of Canada.
- The New Nain Airport is anticipated to be completed in 2030.

AECOM

OCTANT

Proposed New Airport Project Site and Access Road



OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

Project Component

- Access road
- Temporary access road
- Construction limit
- Construction laydown
- Fence
- Sewer pipe
- Top of embankment
- Bottom of embankment
- Culvert drainage
- Fuelling and de-icing pad drainage system
- Fencing and vegetation control
- Parking area and embankment
- Airport access and service road
- Aviation fuel
- Cargo warehouse
- Central power station
- De-icing pad
- Diesel fuel
- Diesel tank
- FEC
- Fueling pad
- Lights
- Maintenance garage
- Oil/water separator
- Parking
- Potable water supply
- Runway
- Septic field
- Septic tank
- Taxiway
- Terminal
- Water tank
- Weather station

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0 100 200 m
NAD 1983 UTM Zone 20N

Airstrip and Airport Apron

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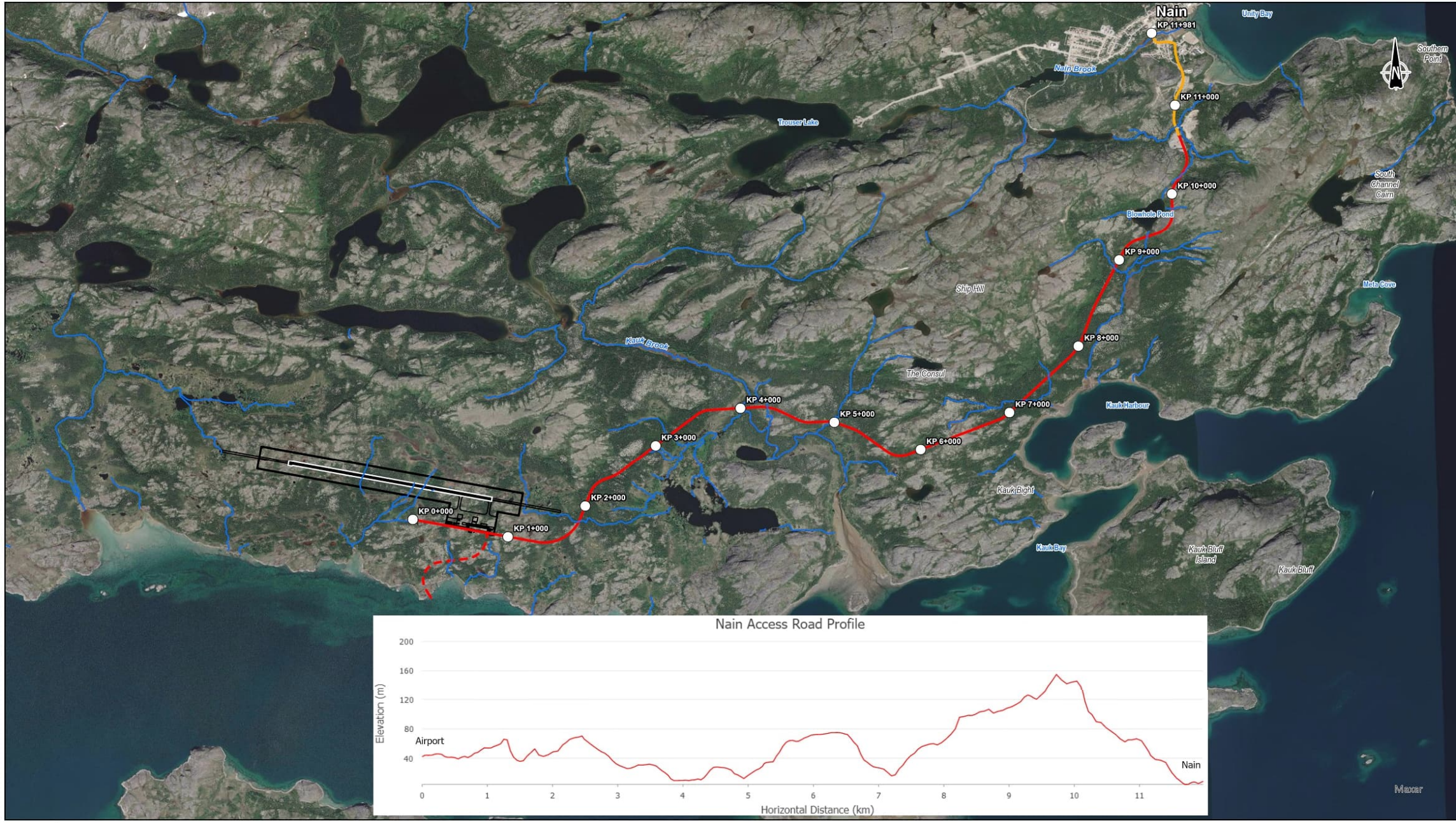
Access Road (12 km) Starting from existing road in Nain



OCTANT
EXPERTS EN SOLUTIONS POUR L'AVIATION

Project Component
- Kilometer point
- Existing road
- Access road
- Temporary access road
- Runway
- Airport footprint

Hydrography
- Watercourse

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Nain Access Road Profile

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Project Phases

Phase 0: Review of Existing Airport (2018)

Current airport assessed and considered unsuitable for upgrades due to: climate change effects, proximity to water, weather condition of the site, and limited space for upgrades.

Phase 1: Implementation Plan for New Airport (2020)

Developing an implementation plan for the New Nain Airport, including identifying proposed new sites and selecting an optimal location.

Phase 2: Secure Financing for Feasibility Studies (2021)

Funding authorized. The feasibility study includes 12 separate studies, referred to as **New Nain Airport Feasibility Studies** (NNAFS).

Phase 3 (*Present*): Conducting Feasibility Studies (2021-2024)

Collecting data and undertaking technical studies to understand the feasibility of this project.

Phase 4: Securing Financing for Construction Phase (2024-2026)

Phase 5: Detailed Design and Specifications to be completed (2026)

Phase 6: Construction of the New Airport and Certification of the Facilities and Commissioning (2027-2030)

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Current Status - Feasibility Studies

Completed

R1 – Weather Station data collected (phase 1)

R2 – Topographic survey

R3 – Preliminary environmental review – Desktop Assessment

R4 – Surficial geology, geomorphology, permafrost and hydrogeological investigations

R5 – Meteorological studies and report (phase 2)

R6 – Hydrological study

R7 – Electrical Power Supply Alternatives

R8 – Preliminary engineering services

R9 – Preliminary architectural design services

In Progress

R10 – Construction and supply strategy

R11 – Cost estimation

R12 – Environmental Impact Assessment

➢ FINAL FEASIBILITY REPORT DECEMBER 2024

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Current Status – Impact Assessment

- **As the Proponent**, NG (Infrastructure)
  - Submitted **Initial Project Description (IPD)** to the Impact Assessment Agency of Canada (IAAC) on **December 4, 2023**

- **As the Regulator** "leading" a collaborative approach, **IAAC**
  - Created the **New Nain Airport Project** Portal https://iaac-aeic.gc.ca/050/evaluations/proj/87156
  - Indigenous peoples & public were invited to provide feedback and to review the summary of the Initial Project Description (IPD) on **December 18, 2023 and February 16, 2024**
  - Public information sessions were held on **January 17 and 18, 2024**
  - IAAC Summary of issues was received on **February 27, 2024**

- **NG Department of Lands & Natural Resources** held community consultations on the proposed project on **February 7 (virtual) and February 19, 2024 (in-person)**
- AECOM is working on the Detailed Project Description (DPD)

Submit to the project portal here!

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Environmental Studies

- **NG Department of Lands & Natural Resources -** Separate Regional Land-Use Study
  - Community interviews conducted in February 19 - March 22, 2024.
  - Draft results anticipated in summer 2024.
  - Final report anticipated in 2025.
- R12 Environmental Impact Assessment began in **May 2023** and included field surveys completed in **Summer and Fall 2023**.
- Potential additional field work in the future as needed.

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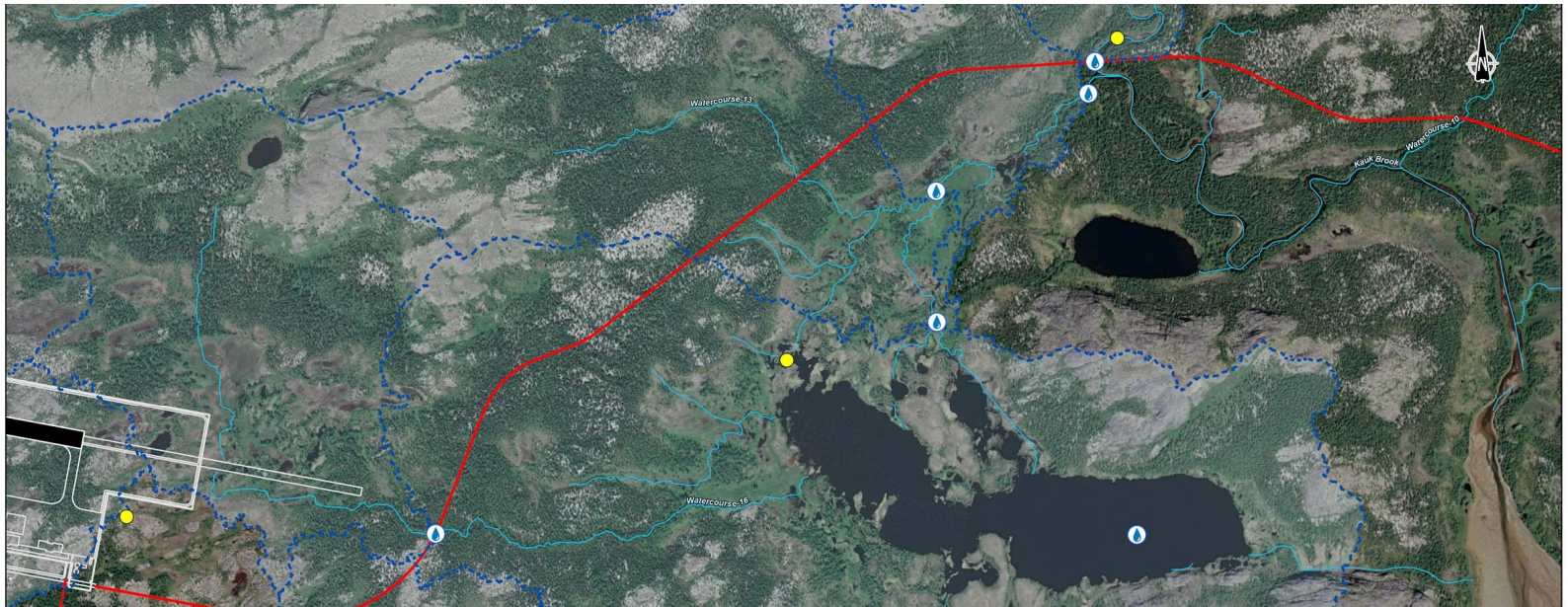
Potential Water Source

- May - June 2024: Engineering is currently looking at potential water source options for **Potable Water for the Terminal**
- **Surface water** – best reliable option
  - Best options are assessed for nearby brooks and/or ponds-lakes (3-km radius) , on the following criteria:
    - Enough quantity of water
    - Year-round water (deep enough)
    - Preserving ecological flow (low-flow analysis)
- **Ground water** – less likely option

● Surface and Ground water potential options



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Terminal Concept

Terminal Concept – Art integration

Cargo Warehouse

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Maintenance Garage

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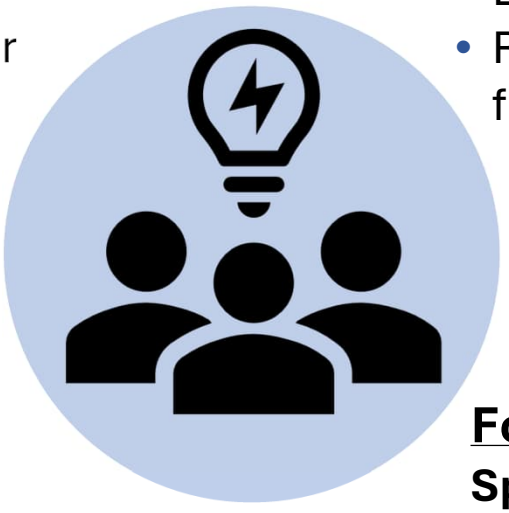
Consultation Update

Information Sharing
September 2023 – Ongoing

Identify key community contacts and share information with community members or other stakeholders:

- Information Sheet #1: Project Overview
- Information Sheet #2: Access Road
- Project FAQs



CURRENT: Nain Community Meeting
June 12, 2024

- Lead presentation on Project Status & next steps
- Receiving questions & comments from community members & key stakeholders

Community Leader Meetings & Stakeholder Interviews
January – April 2024

Engage with community leaders & key stakeholders to understand potential positive & negative project impacts to inform feasibility study

Follow-up Consultation
Spring - Summer 2024

Additional or follow-up information sharing or engagements as required to support completion of Phase 3

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Project Improvements

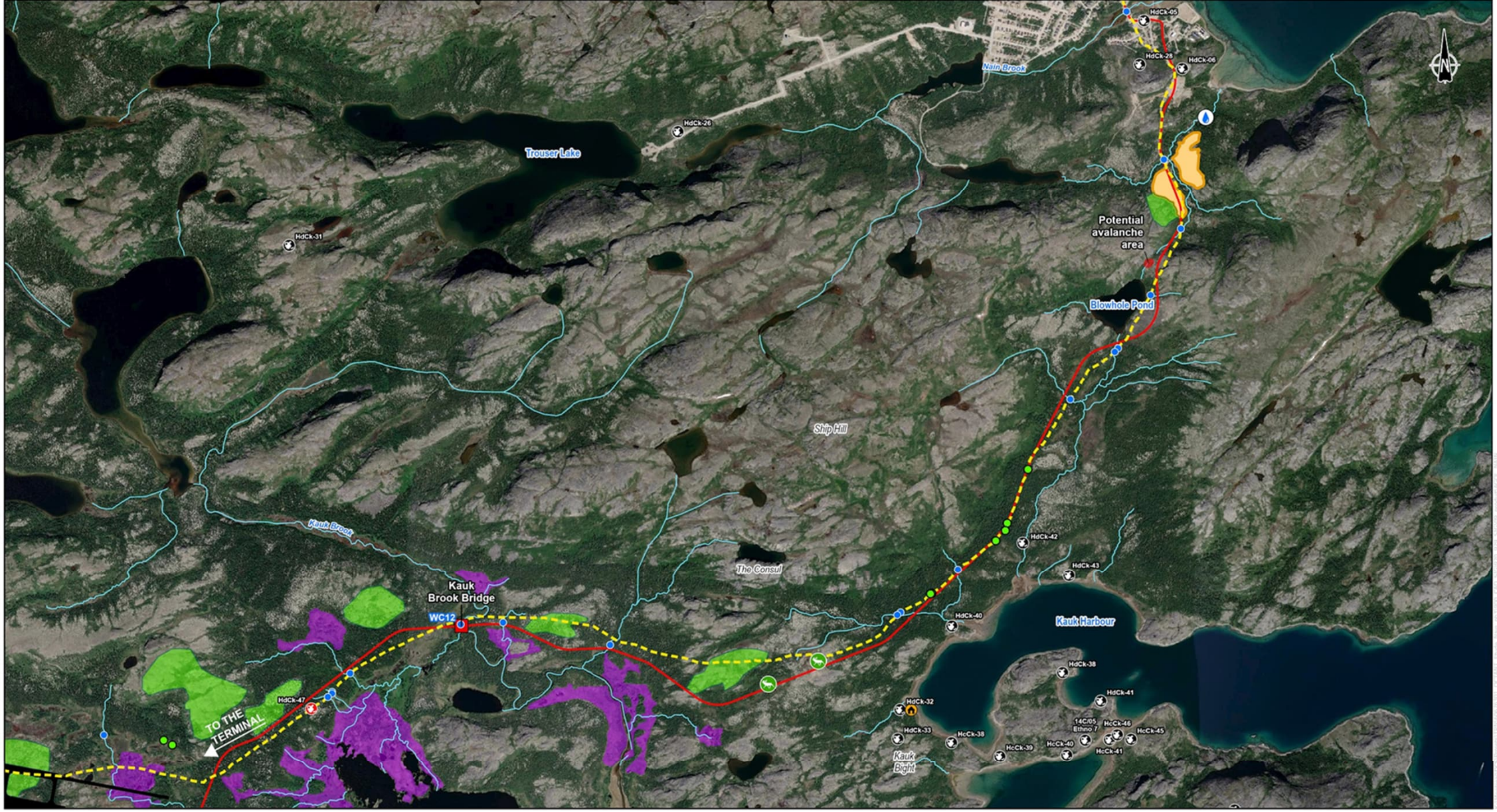
Environment related adjustments reflect community priorities and important resources:

- **Archaeological site avoidance**
  - An archeological site was identified during R4

- **Potential permafrost**
  - Potential permafrost areas were mapped during R4, and design was change to avoid these areas.
  - During construction, environmental monitoring will be done, and if new areas are found, mitigation measures and/or realignment of road will be applied.

- **Kauk Brook and Arctic Char**
  - Mitigation measures to reduce impact included a bridge crossing instead of culvert.

Proposed New Airport Project Site and Access Road



Project Component

- Kauk Brook Bridge
- Original access road alignment
- Access road
- Main Project Infrastructure
- Rock borrow

Environmental Constraints

- Watercourse
- Watercourse crossing (desktop)
- Additionnal watercourse crossing (2023 field mapping)
- Potential permafrost
- Caribou track observation
- Potential avalanche area

Socio-Economic Constraints

- Cabin
- Archaeological site protection area
- Archaeological site
- Potential archaeological site
- Untreated drinking water source
- Quarry

1:24 000

0 250 500 m

NAD 1983 UTM Zone 20N

Project Components and Environmental / Socio-economic Constraints

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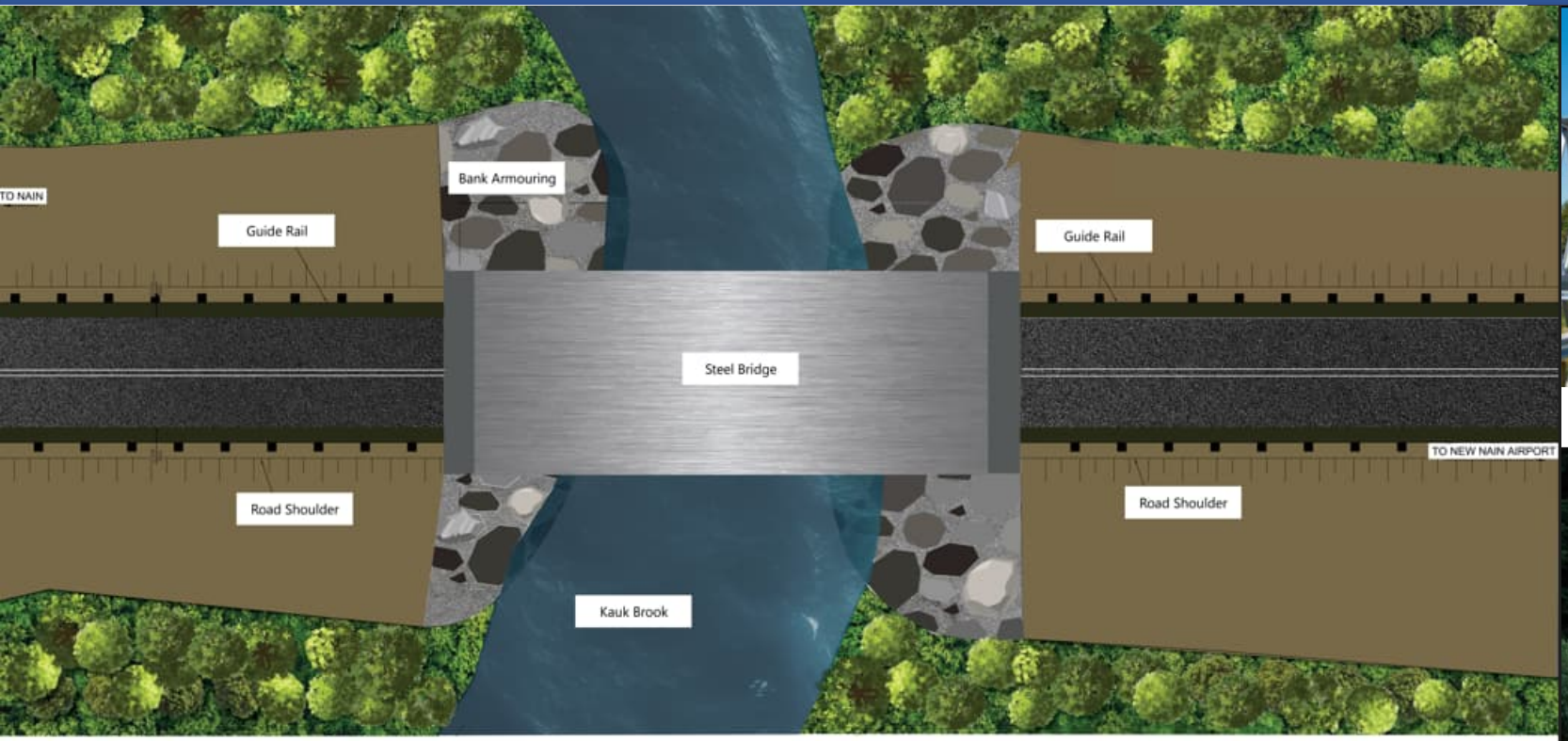
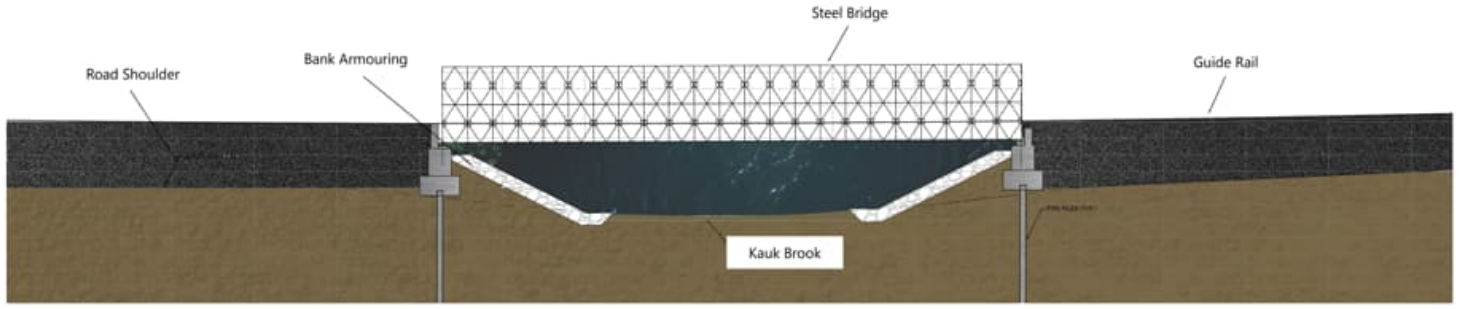
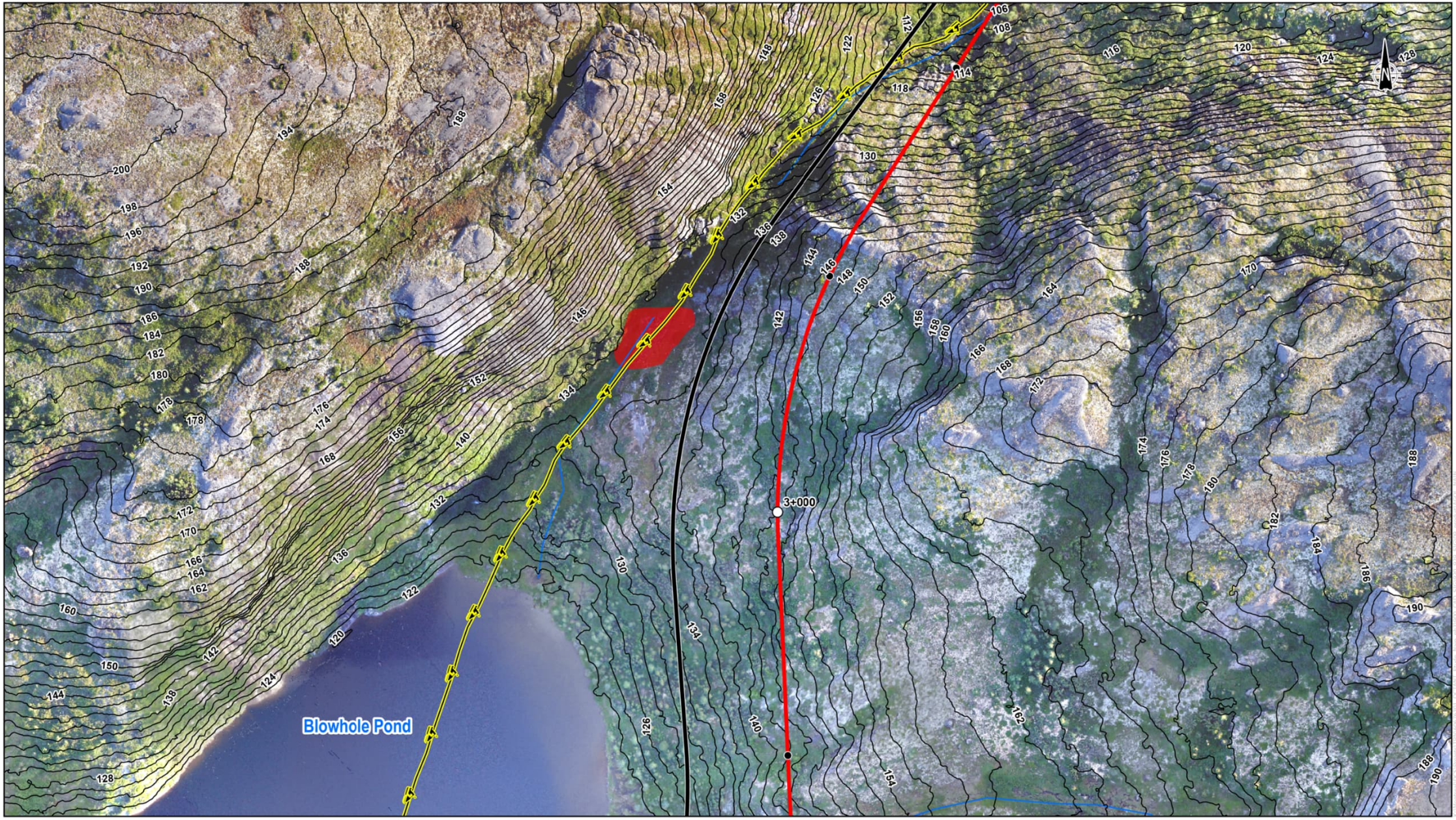
Kauk Brook Bridge Design



Example metal bridge with gravel road
(Quartz Creek Near Golden BC)



Access Road and Avalanche Risk



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Project Component
- 2023 Access road alignment
- *2024 Access road alignment*
- Kilometer point
- Access road

Land use
- Snowmobile trail

Hydrography
- Watercourse

Other
- Potential avalanche area

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Figure x
Project Road Route Through Blowhole Pass

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Mitigation of Avalanche Risk (steep slope)

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Discussion Period

YOUR VOICE COUNTS:

- What do you want to hear from us?
  - *Information Sheets, meetings, website or Facebook postings etc.*
- What are your concerns with the New Nain airport project?
- What are your new concerns and questions on the New Nain airport project?

➢ **You have more questions or comments? Come and see us tomorrow here!**

How do you want to be involved?

Establish and Maintain an Airport Working Group in the Community

Create a working group with Nain residents to define engagement needs in the community.

Focus Groups

Create dedicated spaces for Nain residents to offer feedback about the Project.

Regular Update Meetings

Provide regular updates to the community regarding Project progress.

Continued Information Sharing

Provide regular updates via an airport newsletter, online postings, or other community preferred channels.

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New Nain Airport Feedback Survey

Please share any comments, questions, or concerns with the Project Team.

Thank You!

BLO

Questions, Comments, or Concerns?
Please contact:

NNAFSProjectFeedback@aecom.com **or**

Colin Gilbride (Nunatsiavut Government) at
colin.gilbride@nunatsiavut.com

Additional Information

Project Consultation Approach (R12)

AWARENESS

Enhance understanding and awareness of the proposed Project and activities.

IDENTIFY

Provide opportunities for participants to identify areas of interest and concern.

INPUT

Seek input from local Inuit communities and key stakeholders to inform assessment processes.

RESPOND

Listen and respond to questions and concerns raised by community members and stakeholders.

COLLABORATE

Work with local Inuit communities to identify and develop potential measures to avoid or mitigate any adverse effects upon asserted or established Inuit rights and interests.

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2023 Field Results

Archaeology Phase 1 (May 2023) and Phase 2 (June 2023)

- 164 shovel test pits were completed – all were negative.
- Recommended 1 archaeological site area be avoided by rerouting the access road and fencing off during Project construction.

Country Foods (Summer 2023)

- Ten Arctic char were collected from the local community and sent to a lab for analysis.
- Traditional use plants, including Labrador tea and berries (bog cranberry and blueberry), and soil were collected for lab analysis.

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2023 Field Results

- **Biophysical surveys (June to October 2023)**
  - Wildlife (Summer 2023)
    - Mammal signs observed included **caribou** tracks, **black bear**, **snowshoe hare** and **short-tailed weasel.**
    - **35 songbird** species typically found in the region were observed including **ptarmigan.**
    - One federally listed species at risk (SAR), **the rusty blackbird**, was detected in open bog/fen habitats.

Brook trout

Three-spine stickleback

  - Fish and Fish Habitat (July 2023)
    - **40 water crossings** have been visited and documented within the project footprint.
    - **2 water crossings** (WC 10 and WC 12) confirmed to be fish bearing (Brook trout and Stickleback). **No species at risk** was identified in the freshwater surveyed.
    - **Kauk Brook** was surveyed. known habitat of significance for the community due to the **Arctic Char** presence, none were observed during the July 2023 field survey.
  - Wetlands, Vegetation, Soils (Summer 2023)
    - **Over 130 vegetation** species were identified, no federally listed vegetation species were observed.
    - **13 species** of conservation concern (SOCC*), including **Scheuchzer's Cottongrass** and **Greenland Stitchwort** were observed.

Greenland Stitchwort

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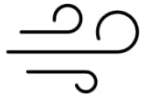
Project Improvements

Infrastructure related - adjustments reflect community priorities and important resources:



- **Dust Suppression on gravel road**
  - *EK35®* = A durable and non-toxic synthetic fluid enhanced with natural rosin that stabilizes gravel and improves operational and safety conditions in cold, remote regions.

- **Community drinking water source avoidance**
  - Avoid upgrading the access road near Annainak's Brook to avoid impacts to the drinking water source.

- **Addition of refrigeration and freezer capacity at the new terminal**
  - Refrigerated and frozen food capacity will be built in the New Airport.

- **Access Road alignment near the previous avalanche area by Blowhole Pond**
  - Altered design to select a different topography than the Blowhole Pass (Avalanche reported).
  - Designed to be on a flat plateau area approx. 70m East and 45m higher from the Blowhole Pass.
    - Reduce risk associated with potential avalanches that may occur at this vulnerable location.

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Recommendations & Considerations Proposed Access Road

Designed with thorough safety and accessibility considerations & promoting harvesting activities

Ice and Snow Removal	The road will be monitored for snowfall, groomed, and/or plowed as necessary. Sand and plowing machinery will be used.
Travelling to the Airport	There will be a shuttle bus operating. Vehicle and snowmobile parking will be available along the access road **allowing harvesting activities.**
Water Retention & Flooding	Along the road, culverts and retention areas will ensure that the road is not damaged or flooded during melting periods.
Permafrost	Potential permafrost areas were mapped and road realigned to avoid them. During construction, if **any signs of permafrost** is found, **work will stop**. Mitigation measures include using geotextiles for structural support, removing/replacing permafrost with rock, and/or using rock fill to reduce localized settlement.
Slopes, Hills & Speed	The road will be flattened and smoothed in steep areas to authorized slope levels. It will also be widened to minimize sharp turns and curves and to ensure travellers can stop safely. Max. speed limit will be 70 km/hr.
Avalanche Risk	The road has been designed on a flatter plateau to reduce avalanche risk. Additional mitigation measures are considered in steep slope segments.

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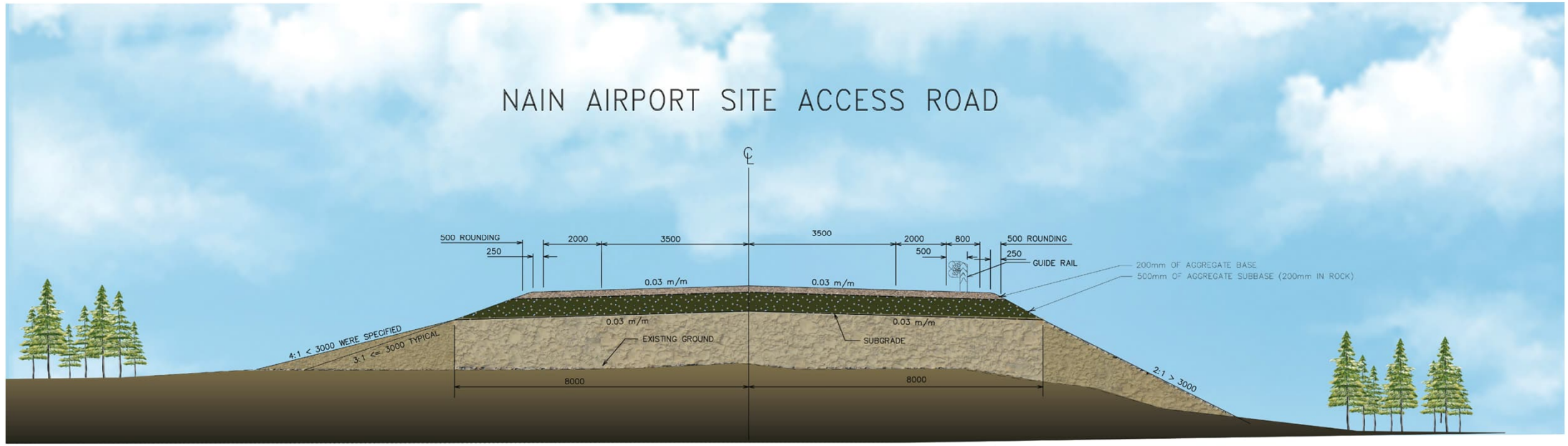
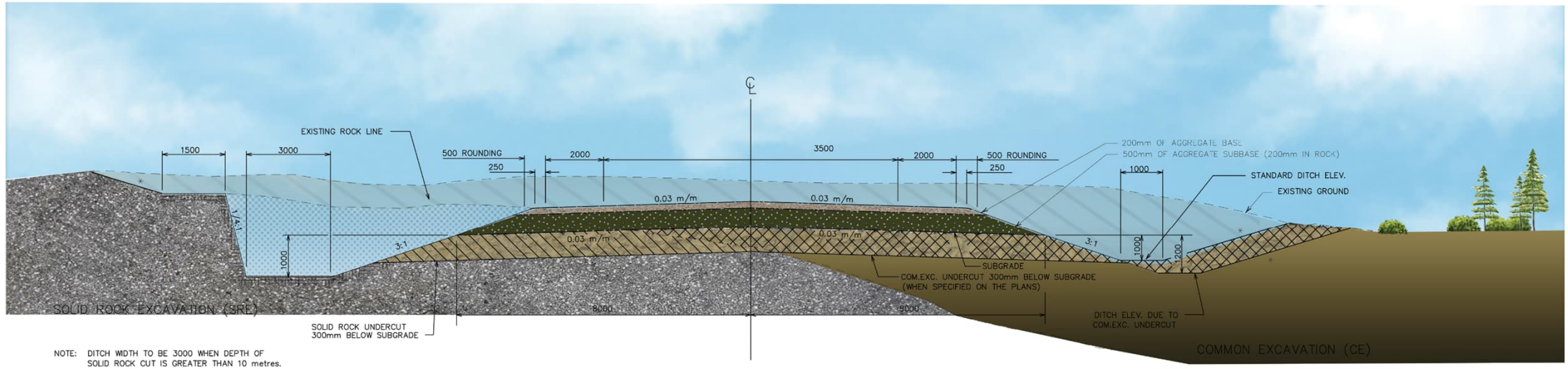
Proposed Access Road



FILL SECTION



NOTE: DITCH WIDTH TO BE 3000 WHEN DEPTH OF SOLID ROCK CUT IS GREATER THAN 10 metres.

CUT SECTION

NOTE: * SLOPE TYPICALLY 3:1

Proposed Temporary Barge

Example roll on / roll off barge to transport construction equipment (Robert Allan Ltd, Waiward steel barge ferry)

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Appendix C17 Innu Nation Correspondence

From: <>
Sent: Wednesday, May 1, 2024 1:16:19 PM
To: <>
Cc: <>;<>; <>
Subject: Re: New Nain Airport Project Information

Good afternoon <>,

I will take this forward to Innu Nation's Environmental office.

Thanks for reaching out.

<>

Attached Files:

Nain FAQs (February 2024).pdf; Nain Info Sheet (April 2024).pdf; and Nain Info Sheet Access Road (April 2024).pdf

From: <>
Sent: Wednesday, May 1, 2024 11:31 AM
To: <>
Cc: NNAFS Project Feedback <>;<>;<>
Subject: New Nain Airport Project Information

Hello <>,

I am emailing on behalf of the Nunatsiavut Government about the New Nain Airport Project.

Through the New Nain Airport Project, the Nunatsiavut Government aims to build a new airport in the community of Nain. The proposed Project involves the construction of the new airport, a new runway, and an access road. It is ultimately intended to enhance transportation, health, and wellness needs by increasing air travel reliability in and out of the community and enabling 24-hour operation and larger aircraft landings. For additional background information about the proposed Nain airport, I have attached an *Information Sheet* to this e-mail. It includes a map of the proposed project site for your reference. The current project schedule is targeting commissioning of the new Nain Airport in 2030, pending regulatory approvals.

AECOM has been contracted by the Nunatsiavut Government to complete an environmental assessment for the New Nain Airport Project, including coordinating consultation activities with surrounding communities to Nain.

Please let us know if the Innu Nation has an interest in being involved in the consultation process, and if so, in what way. We can keep your community informed with virtual Project Updates, invitation to community meetings, and or schedule an initial discussion to provide an

overview of the Project and discuss your level of interest or perspectives on the proposed New Nain Airport Project. Our team welcomes your feedback at any time as the Project continues to proceed.

Should you have any questions or require any further information, please do not hesitate to reach out.

Thank you

<>

Appendix C18 June 12 Community Meeting Q&A

New Nain Airport Project: Community Meeting

Summary of Questions and Comments Received

Date: June 12th, 2024

Airport Infrastructure

Question 1: What is the difference in size of the existing airport runway, versus the new airport runway?

Answer: The existing airport runway is approximately 2,000 ft long. The new airport runway will be approximately 7,000 ft long. The new airstrip will be approximately 3.5x the size of the existing airport. The map below displays a comparison of the two runways.

Question 2: The current airport lacks comfortable waiting areas; comfortable seating for elders, play area for children, beds for people waiting for medical transfers and more, will those be provided in the new Nain Airport?

Answer: The project team recognizes that there will be different needs inside the new airport. These specifications will be completed as part of the detailed design phase of the project. During the feasibility stage of the project, we have created a space that is large and can be modified to represent what the community wants out of this space. Future discussions during the detailed design phase will allow community members to share feedback.

Question 3: Will there be a hangar to store the planes during the winter?

Answer: The airport will have space to build a maintenance hangar in the future, but it is not currently included in the airport design.

Question 4: Will the airport have its own power? What will the power source be?

Answer: The airport will be powered by a diesel generator. In future, there will be opportunities to expand to consider solar or wind energy.

Question 5: How will fuel be transported to the airport?

Answer: The fuel will be trucked from the community to the airport.

Access Road Logistics

Question 6: What was the process for selecting the Access Road route, versus other routes?

Answer: The process for selecting the access road involved designing a route that would avoid as much as possible Labrador Inuit Lands, quarries, steep slopes, wetlands, potential permafrost, an archaeological feature, a second crossing of Kauk Brook and the risk of deep snow accumulations and avalanches in winter (figure below). The objective was to avoid environmentally sensitive areas by shifting the alignment throughout the feasibility study as information became available.

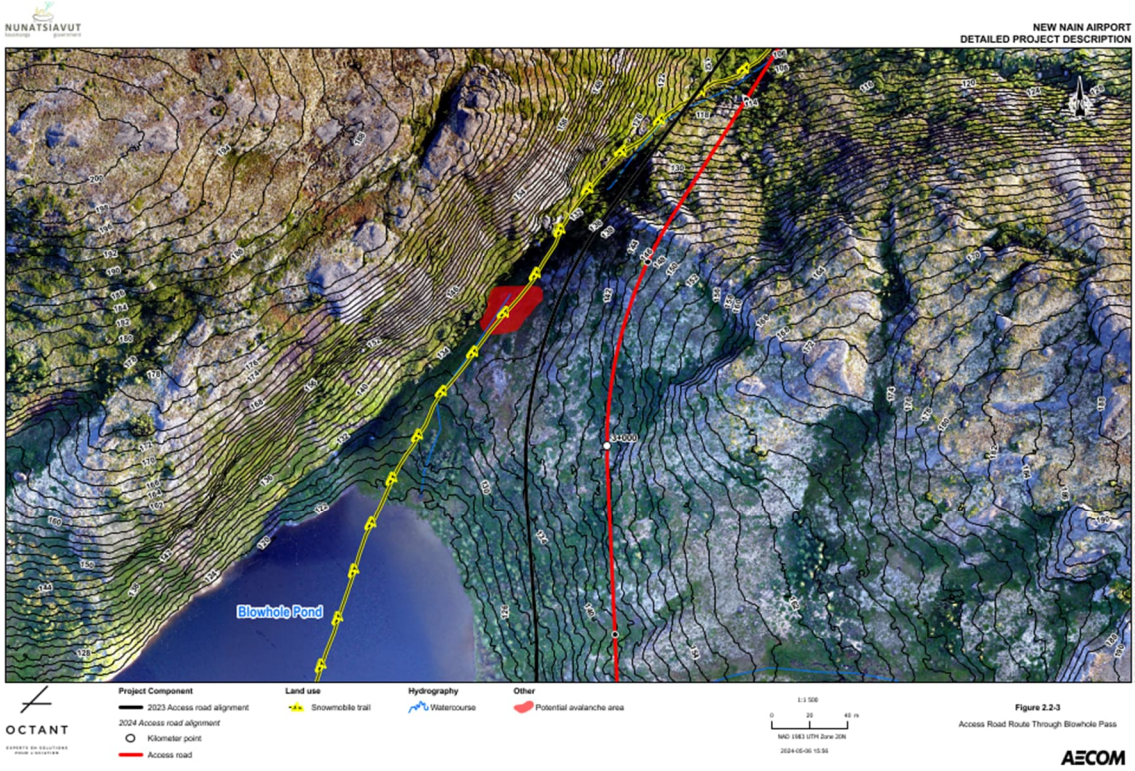


Figure 2.2-3
Access Road Route Through Blowhole Pass

Question 7: Will the Access Road and the Airport landing be paved to reduce the dust?

Answer: Due to the weather conditions in Nain, it is not recommended to pave the roads, as the cost of the maintenance would be high. We recommend a new innovative nontoxic synthetic fluid called EK35 be used for the airstrip and access road. It is the first product that has been environmentally certified and is a high-quality product that solidifies the gravel. With good maintenance the product can last 10 years without causing significant dust. Additional information on the EK35 product can be found here: https://www.midwestind.com/product-overview/ek35

Question 8: The town is not plowed during the winter; instead, the roads are groomed for skidoo use. How will someone be transported from the medical clinic (groomed road) to the airport on the plowed access road?

Answer: NG Infrastructure is exploring different options such as a shuttle and/or ambulance service. The access road will be plowed. However, we have not determined which roads, if any, into the community will be plowed. The access road design includes a wide shoulder along the access road to support skidoo traveling during the winter season.

Question 9: What will the NG do to support skidoo travel around the community, hindered by the Access Road? Will there be additional trails created for individuals not traveling to the airport?

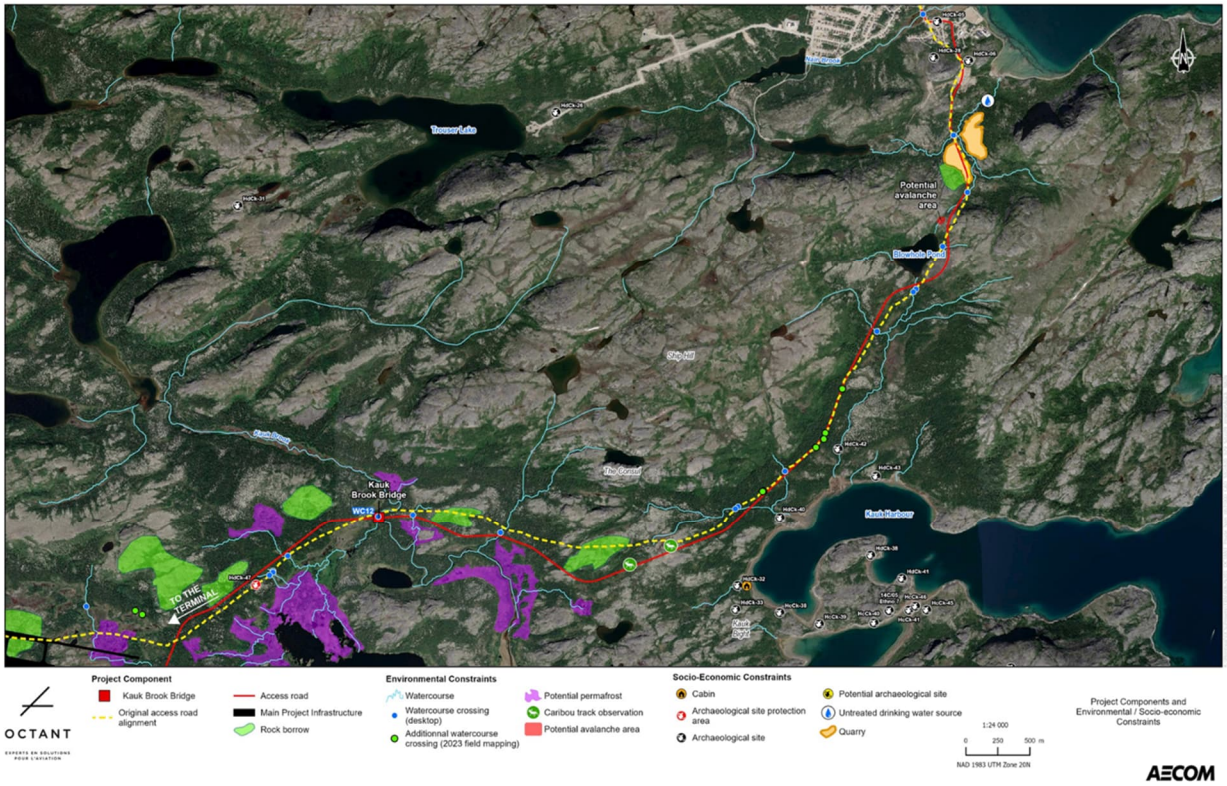
Answer: The road is designed to include skidoo trails on the shoulder of the road to enable travel by skidoo. The NG will consider looking at other potential skidoo trail locations for people that need to cross the access road or access other areas outside of the airport.

Question 10: Who will be contracted to build the airport? Will it be a local company?

Answer: It is still too early to determine who will be awarded the contract to build the New Nain Airport. This will be determined in future phases of the project.

Question 11: Where will the rock borrow materials be sourced for the construction of the access road?

Answer: We have identified several rock borrow areas along that access road that could be potential areas to extract material. The rock borrow locations will be close to the access road to avoid transporting material over long distances, in an effort to reduce construction costs. The map below provides the potential rock borrow locations.



Airport Feasibility

Question 12: What happens if the airport is not feasible? Do we need to start over?

Answer: The current airport is maintained by the province, and the province is obliged to continue maintaining it. The current airport cannot support additional improvements including 24/7 flight capability. If this site is not considered feasible, we will continue to explore options for improving air service in Nain and may consider new locations.

Question 13: When will the project be determined feasible?

Answer: It is anticipated that the three governments (Nunatsiavut Government, Provincial Government of Newfoundland and Labrador, and the Government of Canada) will come to an agreement on the feasibility of the project by March 2026.

Airport Operations

Question 14: How many people are needed to operate the New Nain Airport?

Answer: We anticipate that there will need to be approximately 5 people working inside the airport and up to 3 people working in the cargo space. Roles at the new airport could include positions such as airport director, runway maintenance personnel, winter maintenance personnel, wildlife controllers, and more. Since the airport will now operate 24/7, there will also be multiple shifts of

people operating the airport. These numbers will be determined during future phases of the project.

Question 15: Are there other airlines and travel routes that will be considered with the New Nain Airport?

Answer: We are building the airport with the capacity to expand service offerings in Nain. We anticipate that Nain could become a gateway to other Northern communities. However, at this feasibility study stage planning for additional airlines and routes is not in our scope.

Question 16: If the project does move forward, will the proposed site of the airport have a port?

Answer: There will be a temporary barge during the project's construction phase which will be used to bring in the material needed for the project. To support this temporary barge, a temporary access road will connect the new airport location to the sea. These areas will be reclaimed after use.

Question 17: Who will own and operate the airport?

Answer: The provincial government owns the existing Nain airstrip. Ownership of the new airport will be determined in future phases of the project.

Question 18: What will the Nunatsiavut Government (NG) do to support people in receiving adequate training in time?

Answer: The NG recognizes the importance of training to support the new positions created from the construction and maintenance of the New Nain Airport. The NGs Economic Development Department has been made aware of this upcoming project and intends to develop a program to support training for community members.

At this stage we have not determined if the project is feasible, so it is still too early to begin the training programs. The NG will look into training programs in future phases of the project.

Land Use

Question 19: Is the land that is proposed for the New Nain Airport used for harvesting? Will there be harvester compensation? Or would harvest activities be a red light for the project?

Answer: The NG Lands and Natural Resource is undertaking a regional land use study which will allow us to understand how the land around the airport is used. We will look at different options and the potential for compensation once we understand how the land is used.

Question 20: Will the trees cut down during construction of the airport and access road be used in the community for firewood and other purposes?

Answer: Yes, any trees taken down during construction will be provided to the community, NG has policies to support this for all construction projects.

Fieldwork Studies

Question 21: Are there current plans to come back for additional fish studies?

Answer: The project team is planning for potential future field studies during the recommended survey windows provided by the community (spring or fall). Moreover, mitigations measures are planned to make sure that the fish and fish habitats in the area are protected.

Other Significant Comments

Comment 1: We have heard that we would get a new airport in Nain for over 25 years. This project should have started already. We need to get this project started soon. A new airport in Nain is a matter of life and death.

Response: We understand the importance of this Project and are on track with the timelines defined for the feasibility study.

Comment 2: Regarding the lake referred to as "Banana Lake" [otherwise unnamed], I am concerned that you will not be able to draw enough drinkable water to supply the airport. Most of the area is a bog and you will not be able to draw water. Most of the area is a wetland. This may be a difficult water body to draw consistent water from. You may want to look elsewhere. Though, it is possible that there is a deep spot.

Response: We will incorporate your feedback in our portable water source assessment.

Comment 3: My concern is that we are overestimating our needs which will lead to the project being deemed as not feasible. If that happens, the project won't be funded, and we will need to start over.

Response: We understand that it is a large upgrade when compared to the existing airport. We have started conversations with different levels of government, and they recognize the need for this new airport. The NG will continue to advocate for adequate funding for this Project.

Appendix D

Vegetation and Wetlands Supporting Information

Appendix D1 Observed Plant Species

Common Name	Scientific Name	Rank[1]	Vegetation Community[2]
Alpine Azalea	*Kalmia procumbens*	S4S5	DS
Alpine Bearberry	*Arctous alpina*	S5	BA, DS
Alpine Bistort	*Bistorta vivipara*	S5	DS
Alpine Bluegrass	*Poa alpina*	S3S5	BA, DS
Alpine Clubmoss	*Diphasiastrum alpinum*	S4S5	DS
Alpine Clubrush	*Trichophorum alpinum*	S3S5	DS, WE
AIpine Pondweed	*Potamogeton alpinus*	S2S4 (SOCC)	WA
Arctic Kidney Lichen	*Nephroma arcticum*	S5	CF
Arctic Raspberry	*Rubus arcticus*	S5	CF
Arctic Sweet Coltsfoot	*Petasites frigidus*	S4S5	CF, WE
Balsam Fir	*Abies balsamea*	S5	CF
Baltic Rush	*Juncus balticus*	S4	RI
Bearberry Willow	*Salix uva-ursi*	S5	BA, DS
Bigelow's Sedge	*Carex bigelowii*	S4S5	DS
Black Crowberry	*Empetrum nigrum*	S5	CF
Black Spruce	*Picea mariana*	S5	BA, CF, OF, WE
Bluejoint Reedgrass	*Calamagrostis canadensis*	S5	WE
Bog Aster	*Oclemena nemoralis*	S5	WE
Bog Bilberry	*Vaccinium uliginosum*	S5	BA, CF, DS, OF, WE
Bog Rosemary	*Andromeda polifolia*	S5	WE
Bog Willow	*Salix pedicellaris*	S4	WE
Boreal Bog Sedge	*Carex magellanica*	S5	WE
Boreal Cup Lichen	*Cladonia borealis*	SU	BA, CF, OF
Bristle-stalked Sedge	*Carex leptalea*	S3S5	CF
Brown-Fruited Rush	*Juncus pelocarpus*	SU	DS
Bunchberry	*Cornus canadensis*	S5	CF
Cloudberry	*Rubus chamaemorus*	S5	WE
Common Butterwort	*Pinguicula vulgaris*	S4S5	WE
Common Freckle Pelt Lichen	*Peltigera aphthosa*	S5	CF
Common Labrador Tea	*Rhododendron groenlandicum*	S5	BA, CF, OF
Common Mare's-tail	*Hippuris vulgaris*	S4S5	WA
Common Silverweed	*Potentilla anserina*	S5	DE, RI
Creeping Snowberry	*Gaultheria hispidula*	S5	OF, WE

Common Name	Scientific Name	Rank[1]	Vegetation Community[2]
Dwarf Bilberry	*Vaccinium cespitosum*	S4S5	BA, CF
Easter Foam Lichen	*Stereocaulon paschale*	S3S5	BA, OF
Elephant's-head Lousewort	*Pedicularis groenlandica*	S3S4 (SOCC)	BA, DS, RI
Feather Moss	*Hylocomium splendens*	S4S5	CF
Few-flowered Sedge	*Carex pauciflora*	S4S5	WE
Fireweed	*Chamaenerion angustifolium*	S5	DE
Flat-leaved Bladderwort	*Utricularia intermedia*	S4S5	WA, WE
Fragile Fern	*Cystopteris fragilis*	S3S4 (SOCC)	BA
Gaspe Peninsula Arrow-Grass	*Triglochin gaspensis*	SU	RI
Glandular Birch	*Betula glandulosa*	S5	DS, OF, WE
Goldthread	*Coptis trifolia*	S5	CF, WE
Green Alder	*Alnus alnobetula*	S5	CF, DS
Grey-leaved Willow	*Salix glauca*	S5	CF, DS, WE
Hairy Butterwort	*Pinguicula villosa*	S2S3 (SOCC)	WE
Hairy Willow	*Salix vestita*	S4	CF
Heart-leaved Twayblade	*Neottia cordata*	S4S5	DS
Hoary Sedge	*Carex canescens*	S3S5	CF, WE
Hooded Ladies's-tresses	*Spiranthes romanzoffiana*	S3S4 (SOCC)	WE
Juniper Haircap Moss	*Polytrichum juniperinum*	S4S5	CF
Knights Plume Moss	*Ptilium crista-castrensis*	S4S5	CF
Labrador Lousewort	*Pedicularis labradorica*	S4S5	CF, OF, WE
Lapland Dandelion	*Taraxacum lapponicum*	S4	DS
Lapland Diapensia	*Diapensia lapponica*	S5	BA, DS
Large-leaved Goldenrod	*Solidago macrophylla*	S5	DS
Lesser Pyrola	*Pyrola minor*	S4S5	CF
Long-styled Sedge	*Carex stylosa*	S4S5	WE
Marsh Cinquefoil	*Comarum palustre*	S4S5	WE
Moor Rush	*Juncus stygius*	S3S4 (SOCC)	WE
Mountain Cranberry (Redberry)	*Vaccinium vitis-idaea*	S5	BA, OF
Mountain Sandwort (Greenland Stitchwort)	*Mononeuria groenlandica*	S3S4 (SOCC)	BA
Mountain Wood Fern	*Dryopteris campyloptera*	S4	DS
Mud Sedge	*Carex limosa*	S5	WE
Multi-rayed Goldenrod	*Solidago multiradiata*	S3S4 (SOCC)	BA, WE
Narrowleaf Peatmoss	*Sphagnum angustifolium*	S4S5	WE
Narrow-leaved Cottongrass	*Eriophorum angustifolium*	S4S5	WE
Northeastern Paintbrush	*Castilleja septentrionalis*	S4S5	DS
Northern Beech Fern	*Phegopteris connectilis*	S5	BA

Common Name	Scientific Name	Rank[1]	Vegetation Community[2]
Northern Bog Sedge	*Carex gynocrates*	S3S4 (SOCC)	WE
Northern Comandra	*Geocaulon lividum*	S5	BA, OF
Northern Firmoss	*Huperzia selago*	SU	DS
Northern Ground-cedar	*Diphasiastrum complanatum*	S5	CF, OF
Northern Labrador Tea	*Rhododendron tomentosum*	S4S5	BA, OF
Northern Peatmoss	*Sphagnum capillifolium*	S4S5	WE
Northern Starflower	*Lysimachia borealis*	S5	CF
Northern Woodrush	*Luzula confusa*	S4S5	DS
One-sided Wintergreen	*Orthilia secunda*	S5	CF
Pale Bog Laurel	*Kalmia polifolia*	S5	WE
Poverty Oatgrass	*Danthonia spicata*	SU	CF, DS, WE
Purple False Melic	*Schizachne purpurascens*	S3S5	CF
Purple Mountain Heather	*Phyllodoce caerulea*	S4S5	CF
Reindeer Cup Lichen	*Cladonia rangiferina*	S5	BA, CF, OF
River Beauty	*Chamaenerion latifolium*	S5	RI
Roseroot	*Rhodiola rosea*	S4S5	RI
Rough Bentgrass	*Agrostis scabra*	S5	DE
Round-leaved Sundew	*Drosera rotundifolia*	S5	WE
Russet Cottongrass	*Eriophorum russeolum*	S3S5	WE
Russet Sedge	*Carex saxatilis*	S4S5	WE
Saltmarsh Sedge	*Carex salina*	S2S3 (SOCC)	RI
Scheuchzer's Cottongrass	*Eriophorum scheuchzeri*	S3S4 (SOCC)	DE, WE
Schreber's Feathermoss	*Pleurozium schreberi*	S4S5	CF
Seabeach Sandwort	*Honckenya peploides*	S4S5	RI
Short-leaved Fescue	*Festuca brachyphylla*	S4S5	BA
Single-spike Sedge	*Carex scirpoidea*	S3S5	DS
Slender Pondweed	*Potamogeton pusillus*	S2S3 (SOCC)	WA
Small Burreed	*Sparganium natans*	S2S4 (SOCC)	WA, WE
Small Cranberry	*Vaccinium oxycoccos*	S5	CF, WE
Small Tofieldia	*Tofieldia pusilla*	S4S5	BA, DS
Small-flowered Woodrush	*Luzula parviflora*	S5	BA, DS
Snowbed Willow	*Salix herbacea*	S4S5	DS
Southern Ground-cedar	*Diphasiastrum digitatum*	SU	CF
Sphagnum	*Sphagnum fuscum*	S4S5	WE
Star Sedge	*Carex echinata*	S3S5	WE
Star-tipped Cup Lichen	*Cladonia stellaris*	S5	BA, OF
Stiff Clubmoss	*Spinulum annotinum*	S5	CF

Common Name	Scientific Name	Rank[1]	Vegetation Community[2]
Sweet Gale	*Myrica gale*	S5	WE, DS
Tamarack	*Larix laricina*	S5	CF, OF, WE
Tea-leaved Willow	*Salix planifolia*	S5	CF, DS
Thread Rush	*Juncus filiformis*	S5	WE
Three-flowered Rush	*Juncus triglumis*	S4S5	WE
Three-seeded Sedge	*Carex trisperma*	S4S5	CF
Three-toothed Cinquefoil	*Sibbaldia tridentata*	S5	BA
Tufted Clubrush	*Trichophorum cespitosum*	S5	WE
Tufted Hairgrass	*Deschampsia cespitosa*	S3S5	WE
Twinflower	*Linnaea borealis*	S5	CF
Violet species	*Viola* sp.	--	CF
Water Sedge	*Carex aquatilis*	S4S5	WE
Wavy Hairgrass	*Avenella flexuosa*	S5	CF
White Water Buttercup	*Ranunculus aquatilis*	S4S5	WA
Woodland Horsetail	*Equisetum sylvaticum*	S5	CF, WE
Yellow Collar Moss	*Splachnum luteum*	SU	WE

[1] Source: ACCDC 2023

[2] BA = Unvegetated/barrens/bare rock, CF = Closed black spruce/moss/lichen forest, DE = Developed, DS = Deciduous Shrubland, OF = Open tamarack/lichen forest, RI = Riparian, WA = Water, WE= Wetland

Appendix D2 Summary of the Functional Assessment for Wetlands within the Local Study Area

Wetland Id	Wetland Class and Dominant Form	Wetland Indicators and Description	Verified, Assessed, or None	Wetland Area (ha)	Total wetland area (ha)	Percentage of the wetland in the LSA (%)
WL01	Fen - open	**Hydroperiod**: Seasonal flooded; 5% cover of surface water at 5cm **Soils**: Organic soils <40cm, Mesisol (Van Post 5, 6) **Vegetation**: Open meadow community dominated by Tufted Clubrush (*Trichophorum cespitosum*) and Russet Cottongrass (*Eriophorum russeolum*); **Wetland functions[1]:** Supports a variety of native plant species, contain a number of major vegetation cover types (open vs forested), high interspersion of the vegetation cover types, surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments **Other:** Moor Rush (*Juncus stygius*; S3S4)	Assessed	0.10	1.77	5
WL08	Fen - open	**Hydroperiod**: Semipermanent flooded; 10% cover of surface water at 10cm **Soils**: Organic soils <40cm, Humisol (Von Post 7-10) **Vegetation**: Open meadow community dominated by Water Sedge *(Carex aquatilis*), Star Sedge (*Carex echinata*), Russet Cottongrass, Small-flowered Woodrush (*Luzula parviflora*) **Wetland functions[1]**: supports a variety of native plant species, contain a number of major vegetation cover types (open vs forested), high interspersion of the vegetation cover types, surrounding landscape supports a variety of wildlife species, vegetation cover density decreases water energy and allows settling of sediments **Other**: Anthropogenically impacted by the existing Nain quarry.	Assessed	0.50	0.50	100
WL10	Fen - open	**Hydroperiod**: Semipermanent flooded; 25% cover of surface water at 15cm **Soils**: Organic soils <40cm, Humisol (Von Post 7-10) **Vegetation**: Open meadow community dominated by Water Sedge, Star Sedge, Russet Cottongrass, Small-flowered Woodrush, Black Spruce (*Picea mariana)* **Wetland functions[1]**: Supports a variety of native plant species, contain a number of major vegetation cover types (open vs forested), high interspersion of the vegetation cover types, surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments	Assessed	0.49	0.71	69
WL11	Complex- fen, bog	**Hydroperiod**: Semipermanent flooded; 30% cover of surface water at 8cm **Soils**: Organic soils <40cm, Mesisol (Van Post 5, 6)	Assessed	0.16	0.62	26

Wetland Id	Wetland Class and Dominant Form	Wetland Indicators and Description	Verified, Assessed, or None	Wetland Area (ha)	Total wetland area (ha)	Percentage of the wetland in the LSA (%)
		Vegetation: Open sedge meadow and coniferous tree communities dominated by Russet Cottongrass Water Sedge, Tamarack (*Larix laricina*), Black Spruce, Sweet Gale (*Myrica gale*), Sphagnum (*Sphagnum fuscum*) **Wetland functions[1]:** Supports a variety of native plant species, contain a number of major vegetation cover types (open vs forested), surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments				
WL12	Fen	**Hydroperiod**: Permanent flooded; 20% cover of surface water at 15cm **Soils**: Organic soils <40cm, Mesisol (Van Post 5, 6) in majority of wetland, and 15 cm sandy and small gravel and bedrock **Vegetation**: Open sedge meadow and coniferous tree communities dominated by Tufted Clubrush, Star Sedge, Water Sedge, Glandular Birch (*Betula glandulosa*), Tamarack, Black Spruce **Wetland functions[1]:** Supports a variety of native plant species, contain a number of major vegetation cover types (open vs forested), surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments **Other:** Northern Bog Sedge (*Carex gynocrates*; S3S4)	Assessed	2.22	3.30	67
WL13	Complex- fen, bog	**Hydroperiod**: Permanent flooded; 15% cover of surface water at 15cm **Soils**: Organic soils <40cm, Fibrisol (Von Post 1 -4) and Mesisol (Van Post 5, 6); mineral soils silty sandy loam (10YR 3/1) **Vegetation**: Open sedge meadow, open sphagnum mat, and coniferous tree communities dominated by Tamarack, Alpine Azalea, Water Sedge, Star Sedge, Tufted Clubrush, Glandular Birch, Black Spruce, Sweet Gale **Wetland functions[1]:** Supports a variety of native plant species, contain a number of major vegetation cover types (open vs forested), high interspersion of the vegetation cover types, surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments **Other:** Hooded Ladies's-tresses (*Spiranthes romanzoffiana*; S3S4), Multi-rayed Goldenrod (*Solidago multiradiata*; S3S4), Small Burreed (*Sparganium natans*; S2S4)	Assessed	47.70	94.73	50
WL16	Complex- fen, bog, marsh	**Hydroperiod:** Semipermanent flooded; 6% cover of surface water at 5cm **Soils**: Organic soils <40cm, Fibrisol (Von Post 1 -4) and mineral soil silty sandy loam (10YR 3/1) **Vegetation**: Open sedge meadow and coniferous tree communities dominated by Tufted Clubrush, Russet Cottongrass, Tamarack, Alpine Azalea, Black Spruce, Common Labrador Tea (*Rhododendron groenlandicum*) **Wetland functions[1]:** Supports a variety of native plant species, contain a number of major vegetation cover types (open vs forested), high interspersion	Assessed	6.01	9.09	66

Wetland Id	Wetland Class and Dominant Form	Wetland Indicators and Description	Verified, Assessed, or None	Wetland Area (ha)	Total wetland area (ha)	Percentage of the wetland in the LSA (%)
		of the vegetation cover types, surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments **Other:** Small Burreed (S2S4), Hairy Butterwort (S2S3)				
WL17	Complex- marsh, fen	**Hydroperiod**: Semipermanent flooded; 20% cover of surface water at 7cm **Soils:** Organic soils <40cm, Mesisol (Van Post 5, 6); mineral soils silty sandy loam (10YR 3/2) **Vegetation**: Open sedge meadow, floating leaved, and coniferous tree community dominated by Water Sedge, Few-flowered Sedge, Russet Cottongrass, Glandular Birch, Tamarack, Black Spruce **Wetland functions[1]:** supports a variety of native plant species, contain a number of major vegetation cover types (open vs forested), high interspersion of the vegetation cover types, surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments	Assessed	16.56	27.63	60
WL18	Fen	N/A	Verified	0.35	0.35	100
WL19	Fen	N/A	Verified	0.05	0.05	100
WL20	Complex-fen, bog, and open water	**Hydroperiod**: Permanent flooded; 20% cover of surface water at 5 to 30cm **Soils**: Organic soils <40cm, Fibrisol (Van Post 1 -4) **Vegetation**: Open sedge meadow, floating leaved, and coniferous tree community dominated by Water Sedge, Few-flowered Sedge, Russet Cottongrass, Glandular Birch, Tamarack, Black Spruce, Northern Labrador Tea (*Rhododendron tomentosum*), Narrowleaf Peatmoss (*Sphagnum angustifolium)* **Wetland functions[1]: S**upports a variety of native plant species, contain a number of major vegetation cover types (open vs forested), high interspersion of the vegetation cover types, surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments	Assessed	4.76	64.41	7
WL21	Fen	N/A	Verified	0.30	0.30	100
WL22	Bog	N/A	Verified	0.26	0.29	89
WL23	Fen - open	**Hydroperiod**: Permanent flooded; 40% cover of surface water at 25 to 40cm **Soils**: Organic soils <40cm, Humisol (Van Post 7 to 10) and 15cm organic and bedroock **Vegetation**: Open sedge meadow community dominated by Water Sedge, Boreal Bog Sedge (*Carex magellanica*), Tufted Clubrush, Alpine Azalea, Sweet gale, Tamarack,	Assessed	1.96	3.04	64

Wetland Id	Wetland Class and Dominant Form	Wetland Indicators and Description	Verified, Assessed, or None	Wetland Area (ha)	Total wetland area (ha)	Percentage of the wetland in the LSA (%)
		Wetland functions[1]: Supports a variety of native plant species, contain a number of major vegetation cover types (open vs forested), high interspersion of the vegetation cover types, surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments				
WL24	Complex -fen, bog	**Hydroperiod**: Semipermanent flooded; 20% cover of surface water at 2 to 30cm **Soils**: Organic soils <40cm, Fibrisol (Van Post 1 -4) **Vegetation**: Open sedge meadow and coniferous tree community dominated by Tufted Clubrush, Russet Cottongrass, Glandular Birch, Tamarack, Northern Peatmoss, Cloudberry (*Rubus chamaemorus*), Common Labrador Tea (*Rhododendron groenlandicum*) **Wetland functions[1]: S**upports a variety of native plant species, contain a number of major vegetation cover types (open vs forested), surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments **Other:** Hairy Butterwort (S2S3)	Assessed	2.22	2.22	100
WL25	Complex - fen, marsh	**Hydroperiod**: Semipermanent flooded; 15% cover of surface water at 10cm **Soils**: Organic soils <40cm, Mesisol (Van Post 5, 6) **Vegetation**: Open sedge meadow community dominated by Tufted Clubrush, Water Sedge, Glandular Birch, Tamarack **Wetland functions[1]: S**upports a variety of native plant species, surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife	Assessed	0.46	1.22	38
WL26	Fen	**Hydroperiod**: Semipermanent flooded; 15% cover of surface water at 10cm **Soils**: Organic soils <40cm, Mesisol (Van Post 5, 6) **Vegetation**: Open sedge meadow community dominated by Tufted Clubrush, Narrow-leaved Cottongrass (*Eriophorum angustifolium*), Star Sedge (Carex *echinata*) **Wetland functions[1]: S**upports a variety of native plant species, contain a number of major vegetation cover types (open vs forested), high interspersion of the vegetation cover types, surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments **Other:** Anthropogenically impacted by boreholes and snowmobile trails.	Assessed	0.78	0.78	100
WL27	Fen – open and treed	**Hydroperiod**: Permanent flooded; 15% cover of surface water at 10cm **Soils**: Organic soils <40cm, Fibrisol (Van Post 1 -4) and Mesisol (Van Post 5, 6); 15 cm orgainic to bedroock	Assessed	3.57	12.23	29

Wetland Id	Wetland Class and Dominant Form	Wetland Indicators and Description	Verified, Assessed, or None	Wetland Area (ha)	Total wetland area (ha)	Percentage of the wetland in the LSA (%)
		Vegetation: Open sedge meadow community dominated by Water Sedge, Tufted Clubrush, Boreal Bog Sedge, Russet Cottongrass **Wetland functions[1]: S**upports a variety of native plant species, contain a number of major vegetation cover types (open vs forested), high interspersion of the vegetation cover types, surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments **Other:** Small Burreed (S2S4)				
WL28	Bog - trred	**Hydroperiod**: Ephemeral Vernal Pools **Soils**: Organic soils <40cm, Mesisol (Van Post 5, 6) **Vegetation**: Open sphagnum mat community dominated by Sphagnum, Black Spruce, Tufted Clubrush, Narrow-leaved Cottongrass **Wetland functions[1]: S**upports a variety of native plant species, contain a number of major vegetation cover types (open vs forested), high interspersion of the vegetation cover types, surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments	Assessed	0.13	0.13	100
WL29	Bog - treed	**Hydroperiod**: Ephemeral Vernal Pools; 10% cover of surface water at 5cm **Soils**: Organic soils <40cm, Fibrisol (Van Post 1 -4) **Vegetation**: Open sphagnum mat community dominated by Sphagnum (*Sphagnum fuscum*), Few-flowered Sedge, Arctic Raspberry (*Rubus arcticus*), Common Labrador Tea **Wetland functions[1]: S**upports a variety of native plant species, contain a number of major vegetation cover types (open vs forested), surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments **Other:** Hairy Butterwort (S2S3)	Assessed	0.14	0.35	39
WL30	Bog - treed	**Hydroperiod**: Saturated Soils (surface water seldom present **Soils**: Organic soils <40cm, Fibrisol (Van Post 1 -4) **Vegetation**: Open sphagnum mat community dominated by Sphagnum (*Sphagnum fuscum*), Black Spruce, Common Labrador Tea **Wetland functions[1]: S**upports a variety of native plant species, surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments **Other:** Hairy Butterwort (S2S3)	Assessed	0.22	0.22	100
WL31	Fen	**Hydroperiod**: Semipermanent flooded; 20% cover of surface water at 8cm **Soils**: Organic soils <40cm, Fibrisol (Van Post 1 -4)	Assessed	0.38	1.38	28

Wetland Id	Wetland Class and Dominant Form	Wetland Indicators and Description	Verified, Assessed, or None	Wetland Area (ha)	Total wetland area (ha)	Percentage of the wetland in the LSA (%)
		Vegetation: Open sedge meadow community dominated by Water Sedge, Tufted Clubrush, Bog Bilberry (*Vaccinium uliginosum*), Glandular Birch **Wetland functions[1]: S**upports a variety of native plant species, surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments				
WL32	Bog	N/A	Verified	0.52	0.99	52
WL33	Bog	**Hydroperiod**: Seasonally flooded **Soils**: Organic soils <40cm, Mesisol (Van Post 5, 6) **Vegetation**: Coniferous tree community dominated by Tamarack, Black Spruce, Glandular Birch, Common Labrador Tea **Wetland functions[1]: S**upports a variety of native plant species, surrounding landscape supports a variety of wildlife species, vegetation cover density decreases water energy and allows settling of sediments **Other:** Anthropogenically impacted by the road to the Nain quarries.	Assessed	0.05	0.05	100
WL34	Fen	N/A	Verified	1.19	9.61	12
WL35	Bog	N/A	N/A	0.43	0.43	100
WL40	Marsh	**Hydroperiod**: Semipermanent flooded; 40% cover of surface water at 10cm **Soils**: Organic soils 15cm, Fibrisol (Van Post 1 -4) and Sandy soil (10YR 3/1) **Vegetation**: Open sedge meadow community dominated by Water Sedge, Tufted Clubrush **Wetland functions1: S**urrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife	Assessed	0.02	0.02	100
WL41	Marsh	**Hydroperiod**: Seasonally flooded **Soils**: Sandy soil (10YR 5/1) **Vegetation**: Open sedge meadow community dominated by Long-styled Sedge (*Carex stylosa*), Northern Bog Sedge (*Carex gynocrates*), Baltic Rush (*Juncus balticus*) **Wetland functions[1]: S**urrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife	Assessed	0.04	0.04	100
WL42	Marsh	**Hydroperiod**: Seasonally flooded **Soils**: Sandy soil (10YR 5/1) **Vegetation**: Open sedge meadow community dominated by Water Sedge, Brown-Fruited Rush (*Juncus pelocarpus*) **Wetland functions[1]: S**urrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife	Assessed	0.00	0.00	100
WL43	Marsh	**Hydroperiod**: Permanent flooded; 45% cover of surface water at 30cm **Soils**: Sandy soil (10YR 5/1)	Assessed	0.08	0.15	53

Wetland Id	Wetland Class and Dominant Form	Wetland Indicators and Description	Verified, Assessed, or None	Wetland Area (ha)	Total wetland area (ha)	Percentage of the wetland in the LSA (%)
		Vegetation: Open sedge meadow community dominated by Water Sedge, Northern Bog Sedge **Wetland functions[1]: S**upports a variety of native plant species, surrounding landscape supports a variety of wildlife species, vegetation cover density decreases water energy and allows settling of sediments				
WL45	Seepage marsh	**Hydroperiod**: Semipermanent flooded; 25% cover of surface water at 15cm **Soils**: Organic soils 30cm to bedrock, Mesisol (Van Post 5, 6) **Vegetation**: Open sedge meadow community dominated by Tufted Clubrush, Brown-fruited Rush, Tamarack, Northern Bog Sedge **Wetland functions[1]: S**upports a variety of native plant species, surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments	Assessed	0.93	0.93	100
WL46	Fen - open	**Hydroperiod**: Semipermanent flooded; 20% cover of surface water at 10cm **Soils**: Organic soils <40cm, Humisol (Van Post 7 to 10) **Vegetation**: Open sedge meadow community dominated by Tufted Clubrush, Water Sedge, Mud Sedge, Tamarack, Glandular Birch **Wetland functions[1]: S**upports a variety of native plant species, surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments	Assessed	0.08	2.31	3
WL47	Bog	N/A	N/A	0.63	0.63	100
WL48	Fen	N/A	N/A	1.33	2.20	60
WL49	Bog	N/A	N/A	0.31	0.31	100
WL50	Fen	N/A	N/A	1.30	2.09	62
WL51	Bog	N/A	N/A	0.13	0.13	100
WL52	Bog	N/A	N/A	0.07	0.07	100
WL53	Fen	N/A	N/A	1.38	1.51	91
WL54	Fen- open	**Hydroperiod**: Saturated Soils (surface water seldom present) **Soils**: Organic soils <40cm, Mesisol (Van Post 5, 6) **Vegetation**: Open sedge meadow community dominated by Tufted Clubrush, Water Sedge, Star Sedge, Tamarack, Glandular Birch **Wetland functions[1]: S**upports a variety of native plant species, surrounding landscape supports a variety of wildlife species, surrounded by a large tract of undeveloped land important for wildlife, vegetation cover density decreases water energy and allows settling of sediments	Assessed	0.26	0.26	100
WL55	Fen	N/A	N/A	0.38	0.75	50

Wetland Id	Wetland Class and Dominant Form	Wetland Indicators and Description	Verified, Assessed, or None	Wetland Area (ha)	Total wetland area (ha)	Percentage of the wetland in the LSA (%)
WL56	Fen	N/A	N/A	0.82	1.87	44
WL57	Fen	N/A	N/A	1.16	6.15	19
WL58	Marsh/water	N/A	N/A	0.43	0.48	91
WL60	Fen	N/A	N/A	1.23	27.39	4
WL61	Fen	N/A	N/A	0.46	0.58	79
WL63	Fen	N/A	N/A	0.23	0.29	79
WL64	Fen	N/A	N/A	2.85	134.94	2
WL65	Fen	N/A	N/A	0.25	0.25	100
WL66	Fen	N/A	N/A	0.35	0.35	100
WL67	Marsh/water	N/A	N/A	0.40	0.40	100
WL68	Fen	N/A	N/A	0.05	0.05	100
WL69	Fen	N/A	N/A	0.03	0.03	100
WL70	Fen	N/A	N/A	0.05	0.05	100
WL71	Fen	N/A	N/A	0.12	0.12	100
WL73	Fen	N/A	N/A	0.31	0.31	100
WL74	Fen	N/A	N/A	2.92	21.64	13
WL75	Marsh	N/A	Verified	0.03	0.03	100
WL76	Marsh/Water	N/A	Verified	0.03	0.03	100
WL77	Marsh/Water	N/A	Verified	0.01	0.01	100

Source: [1]Hanson et al. 2008.

Appendix D3 Newfoundland & Labrador Plant & Lichen Species at Risk

Common Name	Scientific Name	SARA Designation	COSEWIC Designation	NL ESA Designation	Habitat Description	Nearest Known Occurrence to Project
Alaska rein orchid	*Platanthera unalascensis*	--	--	Endangered	Larch shrub swamps with low balsam fir and black spruce.	Newfoundland (NL); no occurrences in Labrador (LB)
Barrens willow	*Salix jejuna*	Endangered	Endangered	Endangered	Exposed gravely and rocky limestone areas with little vegetation and a thin layer of low-nutrient soil.	NL; no occurrences in LB
Black ash	*Fraxinus nigra*	Not on Schedule 1	Threatened	Threatened	Floodplain forests, basin, seepage, and lacustrine swamp forests, shoreline forest margins, and fens.	NL; no occurrences in LB
Bodin's milk-vetch	*Astragalus bodinii*	--	--	Threatened	Varied, mostly upland habitat with elevations ranging between 300-3,000 m; also unique coastal habitat in NL.	NL; no occurrences in LB
Crowded wormseed mustard	*Erysimum coarctatum*	--	--	Endangered	Calcareous talus and cliffs, meadows, bluffs, spruce forests, roadsides, crevices, ledges. (FNA)	NL; no occurrences in LB
Cutleaf fleabane	*Erigeron compositus*	--	--	Endangered	Dry, gravelly or boulder-limestone substrate associated with scree, within open-to-sparse vegetation.	NL; no occurrences in LB
Feathery false Solomon's seal	*Maianthemum racemosum*	--	--	Endangered	Deciduous woods and shaded roadsides.	NL; no occurrences in LB
Fernald's braya	*Braya fernaldii*	Endangered	Endangered	Endangered	A mosaic of patches of shallow nutrient-poor, calcium-rich soils in frost-shattered barrens, bedrock outcrops, fine-grained substrate, and tundra-like heaths within 1.5 km of the coast, and situated 13 to 15 m above sea level.	NL; no occurrences in LB
Gmelin's watercrowfoot	*Ranunculus gmelinii*	--	--	Endangered	Shallow river backwaters with a muddy bottom.	NL; no occurrences in LB
Griscom's arnica	*Arnica griscomii* ssp. *griscomii*	Threatened	Threatened	Endangered	Calcium-rich soils in full sun or partial shade, and is usually found on cliff faces, talus slopes, around rock outcrops, and at the edge of vegetation patches on natural limestone gravel barrens.	NL; no occurrences in LB
Lindley's aster	*Symphyotrichum ciliolatum*	--	--	Endangered	Rich, open, and often calcareous boreal deciduous forests.	NL; no occurrences in LB
Long's braya	*Braya longii*	Endangered	Endangered	Endangered	Tundra-like habitats with shallow, calcium-rich soil that are well-drained and often windswept in the winter,	NL; no occurrences in LB
Low northern rockcress	*Neotorularia humilis (Braya humilis)*	--	--	Endangered	Limestone barrens on exposed mountain ridges	NL; no occurrences in LB
Mackenzie's sweetvetch	*Hedysarum boreale* ssp. *mackenzii*	--	--	Threatened	Open limestone barrens.	NL; no occurrences in LB
Mountain bladder fern	*Cystopteris montana*	--	--	Endangered	Wet woodlands or along watercourses in cool climates.	NL; no occurrences in LB
Mountain holly fern	*Polystichum scopulinum*	Threatened	Threatened	--	Dry, alkaline soil habitats with very spars vegetation cover and the absence of trees.	NL; no occurrences in LB
Northern bog aster	*Symphyotrichum boreale*	--	--	Endangered	Calcareous bogs, swamps, marshes, fens, wet gravels and shores. (FNA)	NL; no occurrences in LB
Northern twayblade	*Neottia borealis (Listera borealis)*	--	--	Endangered	Coniferous and mixed hardwood forests, swamps, along streams, tundra slopes, and floodplains.	NL; no occurrences in LB
Oval-leaved creeping spearwort	*Ranunculus flammula* var. *ovalis*	--	--	Endangered	Intermittent pools found in exposed portions of limestone barrens.	NL; no occurrences in LB
Porsild's bryum	*Haplodontium macrocarpum (Bryum porsildii)*	Threatened	Threatened	Threatened	Mountainous areas in shaded microhabitats on cliffs or rock outcrops and is kept continually moist during the growing season by seepage through rock crevices or splash from nearby flowing water.	NL; no occurrences in LB
Rattlesnakeroot	*Nabalus racemosus (Prenanthes racemosa)*	--	--	Endangered	Sandy alluvial soils of stream banks, wet meadows, tall-grass prairies, fens, marshy flats, calcareous bogs. (FNA)	NL; no occurrences in LB
Red pine (natural populations)	*Pinus resinosa*	--	--	Threatened	Sandy soils, eastern boreal forests. (FNA)	NL; no occurrences in LB
Rock dwelling sedge	*Carex petricosa* var. *misandroides*	--	--	Endangered	Limestone barrens, taluses, screes, cliffs, and shores at elevations ranging from 0-300 m.	NL; no occurrences in LB
Sharpleaf aster	*Oclemena acuminata*	--	--	Threatened	Shaded woodland habitats.	NL; no occurrences in LB
Tradescant's aster	*Symphyotrichum tradescantii*	--	--	Threatened	Shoreline habitats, can survive periods of complete inundation.	NL; no occurrences in LB
Vole ears lichen (graceful felt lichen)	*Erioderma mollissimum*	Endangered	Endangered	Endangered	Cool, humid coastal coniferous forests dominated by balsam fir, with cool summers, relatively warm winters, and high rainfall.	NL; no occurrences in LB
Vreeland's striped coralroot	*Corallorhiza striata* var. *vreelandii*	--	--	Endangered	Semi-open, second-growth forests of balsam fir, black spruce, eastern larch, speckled alder, balsam poplar, and mountain white birch.	NL; no occurrences in LB
Wooly arnica	*Arnica angustifolia* ssp. *tomentosa*	--	--	Endangered	Limestone areas of alpine slopes and subalpine meadows. (FNA)	NL; no occurrences in LB

Common Name	Scientific Name	SARA Designation	COSEWIC Designation	NL ESA Designation	Habitat Description	Nearest Known Occurrence to Project
Wrinkled shingle lichen	*Pannaria lurida*	Threatened	Threatened	Threatened	Mature deciduous trees, most often on red maple that grow near imperfectly drained habitats such as treed swamps or floodplains.	NL; no occurrences in LB

Source: Flora of North America, Newfoundland & Labrador Species at Risk, SARA Public Registry

Appendix E

Wildlife and Migratory Birds Supporting Information

Appendix E1 Species Observations and Status

Common Name	Scientific Name	Newfoundland and Labrador Status[1]	SARA Status[2]	Spring Migration Survey	Breeding Bird Survey	Fall Migration Survey	Incidental Obs.
			Birds				
American black duck	*Anas rubripes*						X
American pipit	*Anthus rubescens*	-	-	X	-	-	-
American robin	*Turdus migratorius*	-	-	X	X	X	X
American three-toed woodpecker	*Picoides dorsalis*	-	-	-	-	-	X
American tree sparrow	*Spizelloides arborea*	-	-	X		-	X
Black-backed woodpecker	*Picoides arcticus*	-	-		X	-	X
Blackpoll warbler	*Setophaga striata*	-	-	X	X	-	-
Boreal chickadee	*Poecile hudsonicus*	-	-		X	X	X
Canada goose	*Branta canadensis*	-	-	-	-	X	--
Canada jay	*Perisoreus canadensis*	-	-	X	X	X	X
Common goldeneye	*Bucephala clangula*			-	-	-	X
Common loon	*Gavia immer*	-	-		-	X	X
Common merganser	*Mergus merganser*			-	-	-	X
Common raven	*Corvus corax*	-	-	X	X	X	X
Common redpoll	*Acanthis flammea*	-	-	X	X	X	X
Dark-eyed junco	*Junco hyemalis*	-	-	X	X	X	X
Double-crested cormorant	*Phalocrocorax auritus*			-	-	-	X
Fox sparrow	*Passerella iliaca*	-	-	X	X	-	X
Gray-cheeked thrush	*Catharus minimus*	Threatened	-		X		
Great black-backed gull	*Larus marinus*	-	-	-	-	-	X
Gull species	*Larus* spp.		-	-	-	X	-
Hawk species	-	-	-	-	-	X	-
Hermit thrush	*Catharus guttatus*	-	-	X	X	-	X
Herring gull	*Larus argentatus*	-	-	-	-	X	X
Iceland gull	*Larus glaucoides*	-	-	-	-	X	-
Killdeer	*Charadrius vociferus*	-	-	X	-	-	-
Lincoln's sparrow	*Melospiza lincolnii*	-	-	X	X	-	X
Mallard	*Anas platyrhynchos*	-	-	-	-	X	-
Merlin	*Falco columbarius*	-	-	X	-	-	-
Northern hawk owl	*Surnia ulula*	-	-	X	-	-	-
Northern shrike	*Lanius excubitor*	-	-	-	-	X	-
Northern waterthrush	*Parkesia noveboracensis*	-	-	X	X	-	X
Orange-crowned warbler	*Leothlypis celata*	-	-		X		-

Common Name	Scientific Name	Newfoundland and Labrador Status[1]	SARA Status[2]	Spring Migration Survey	Breeding Bird Survey	Fall Migration Survey	Incidental Obs.
Peregrine falcon (*anatum/tundrius)* ssp)	*Falco peregrinus anatum/tundrius*	Vulnerable	-	-	-	X	-
Pine grosbeak	*Pinicola enucleator*	-	-	X	X	X	X
Ptarmigan species	*Lagopus* spp.	-	-	-	-	-	X
Rough-legged hawk	*Buteo lagopus*	-	-	-	-	X	-
Ruby-crowned kinglet	*Regulus calendula*	-	-	X	X		X
Rusty blackbird	*Euphagus carolinus*	Vulnerable	Special Concern		X		X
Savannah sparrow	*Passerculus sandwichensis*	-	-	X	-	-	-
Snow bunting	*Plectrophenax nivalis*	-	-	X	-	-	-
Spruce grouse	*Falcipennis canadensis*	-	-	-	X	X	X
Swainson's thrush	*Catharus ustulatus*	-	-		X		X
Swamp sparrow	*Melospiza georgiana*	-	-	-	-	-	X
Tennessee warbler	*Leothlypis peregrina*	-	-		X		-
White-crowned sparrow	*Zonotrichia leucophrys*	-	-	X	X	-	X
White-winged crossbill	*Loxia leucoptera*	-	-	X	X-		X
Wilson's snipe	*Gallinago delicata*	-	-	X	-	-	-
Wilson's warbler	*Cardellina pusilla*	-	-		X		X
Winter wren	*Troglodytes hiemalis*	-	-		X		X
Yellow-bellied flycatcher	*Empidonax flaviventris*	-	-		X		X
Yellow-rumped warbler	*Setophaga coronata*	-	-	X	X	-	X
Mammals							
Arctic hare	*Lepus arcticus*	-	-	-	-	-	X
Black bear	*Ursus americanus*	-	-	-	-	-	X
Harp seal	*Pagophilus groenlandicus*	-	-	-	-	-	X
Red squirrel	*Tamiasciurus hudsonicus*	-	-	-	-	-	X
Short-tailed weasel	*Mustela erminea*	-	-	-	-	-	X
Snowshoe hare	*Lepus americanus*	-	-	-	-	-	X
Woodland caribou	*Rangifer tarandus*	Threatened		-	-	-	X

[1] Newfoundland and Labrador. 2024. Fisheries, Forestry and Agriculture. Wildlife. Species at Risk. Birds. Available online at: https://www.gov.nl.ca/ffa/wildlife/endangeredspecies/birds/

[2] Government of Canada. 2023. Species at Risk Public Registry. Available online at: https://species-registry.canada.ca/index-en.html#/species?ranges=Newfoundland%20and%20Labrador&taxonomyId=Birds&sortBy=commonNameSort&sortDirection=asc&pageSize=10

Appendix F

Fish and Fish Habitat Supporting Information

Appendix F1 Photo Log from Fish and Fish Habitat Field Program

Photo 1: WC-01 culvert opening (July 29, 2023).	Photo 2: WC-02 leading to culvert beneath road (July 29, 2023).
Photo 3: WC-03 meandering through vegetation (July 28, 2023).	Photo 4: Looking downstream along WC-04 towards Blowhole Pond (July 3, 2023).
Photo 5: WC-01-new channelized through vegetation (July 3, 2023).	Photo 6: WC-05 with small boulders and bordered by vegetation (July 26, 2023).

Photo 7: WC-06 narrow channel bordered by vegetation (July 26, 2023).	Photo 8: WC-07 with strong flow (July 3, 2023).
Photo 9: WC-02-new channel flowing through vegetation (July 3, 2023).	Photo 10: WC-03-new channel through dense vegetation (July 3, 2023).
Photo 11: WC-04-new narrow meandering channel (July 3, 2023).	Photo 12: WC-05-new narrow channel bordered by vegetation (July 3, 2023).

Photo 13: WC-06-new flowing water over hard substrate (July 3, 2023).	Photo 14: WC-07-new channelized surface water (July 3, 2023).
Photo 15: WC-08 with flowing water and visible pebbles on the channel bottom (July 26, 2023).	Photo 16: WC-10 flowing water over cobles. Dense vegetation along channel banks (July 27, 2023).
Photo 17: WC-11 with a narrow channel width and bordered by dense vegetation (July 29, 2023).	Photo 18: WC-12 (aka Kauk Brook) with field crew conducting survey (July 27, 2023).

Photo 19: WC-13 narrow channel with bordering vegetation (July 5, 2023).	Photo 20: WC-14a with no visible flow and dense vegetation (July 5, 2023).
Photo 21: WC-14b seep with no flowing water (July 5, 2023).	Photo 22: WC-15 seep through a fen (July 5, 2023).
Photo 23: WC-08-new shallow channel through dense vegetation (July 5, 2023).	Photo 24: WC-09-new narrow bordered by dense vegetation (July 5, 2023).

Photo 25: No observed watercourse at WC-16 (July 28, 2023).	Photo 26: WC-10-new narrow channel flowing (July 6, 2023).
Photo 27: WC-new-11 with a narrow channel and bordered by vegetation (July 28, 2023).	Photo 28: WC-New-12 with flowing water through boulder substrate (July 29, 2023).
Photo 29: WC-new-13 narrow channel/wetted area through vegetation (July 29, 2023).	Photo 30: WC-new-14 narrow channel bordered by dense vegetation (July 7, 2023).

Photo 31: WC-new-15a channel (July 29, 2023).	Photo 32: WC-new-15b channel (July 29, 2023).
Photo 33: WC-19 wetted area; no channel seen (July 29, 2023).	Photo 34: WC-new-17 wetted area (July 28, 2023).
Photo 35: WC-17 channel through vegetation with low flow (July 6, 2023).	Photo 36: WC-18 with a narrow channel and bordered by vegetation (July 28, 2023).

Photo 37: WC-18b with a narrow channel width and bordered by vegetation (July 28, 2023).	Photo 38: WC-20 wetted and surrounding areas (July 29, 2023).
Photo 39: Three-spine stickleback catch from WC-12 (July 29, 2023).	Photo 40: Brook trout catch from WC-10 (July 27, 2023).
Photo 41: Access road terminus looking south towards sea (Sept 29, 2023).	Photo 42: Access road terminus looking east towards sea (Sept 29, 2023).

Photo 43: WS-03 wetland into defined channels (July 28, 2023).	Photo 44: WS-04 (July 28, 2023).
Photo 45: WS-05 (July 28, 2023).	Photo 46: WS-07 aerial image of watercourse (Sept 27, 2023).
Photo 47: WS-09 (Sept 29, 2023).	Photo 48: WS-10 (July 26, 2023).

Photo 49: WS-11 (Sept 29, 2023).	Photo 50: WS-12 (Sept 29, 2023).
Photo 51: WS-13 (Sept 29, 2023).	Photo 52: WS-14 (Sept 29, 2023).
Photo 53: WS-15 flowing over hard substrates (Sept 29, 2023).	Photo 54: WS-16 leading to the sea (Sept 29, 2023).

Photo 55: WS-17 with no visible channel feature amongst vegetation (Sept 29, 2023).	Photo 56: WS-18 with varied substrate sizes (Sept 29, 2023).
Photo 57: WS-19 channel flowing through vegetation (Sept 29, 2023).	Photo 58: WS-20 narrow channel (July 26, 2023).
Photo 59: Temporary access road terminus at the shoreline looking east (Sept 29, 2023).	Photo 60: Temporary access road terminus at the shoreline looking south (Sept 29, 2023).

Appendix F2 – Watercrossing Detailed Assessment Areas

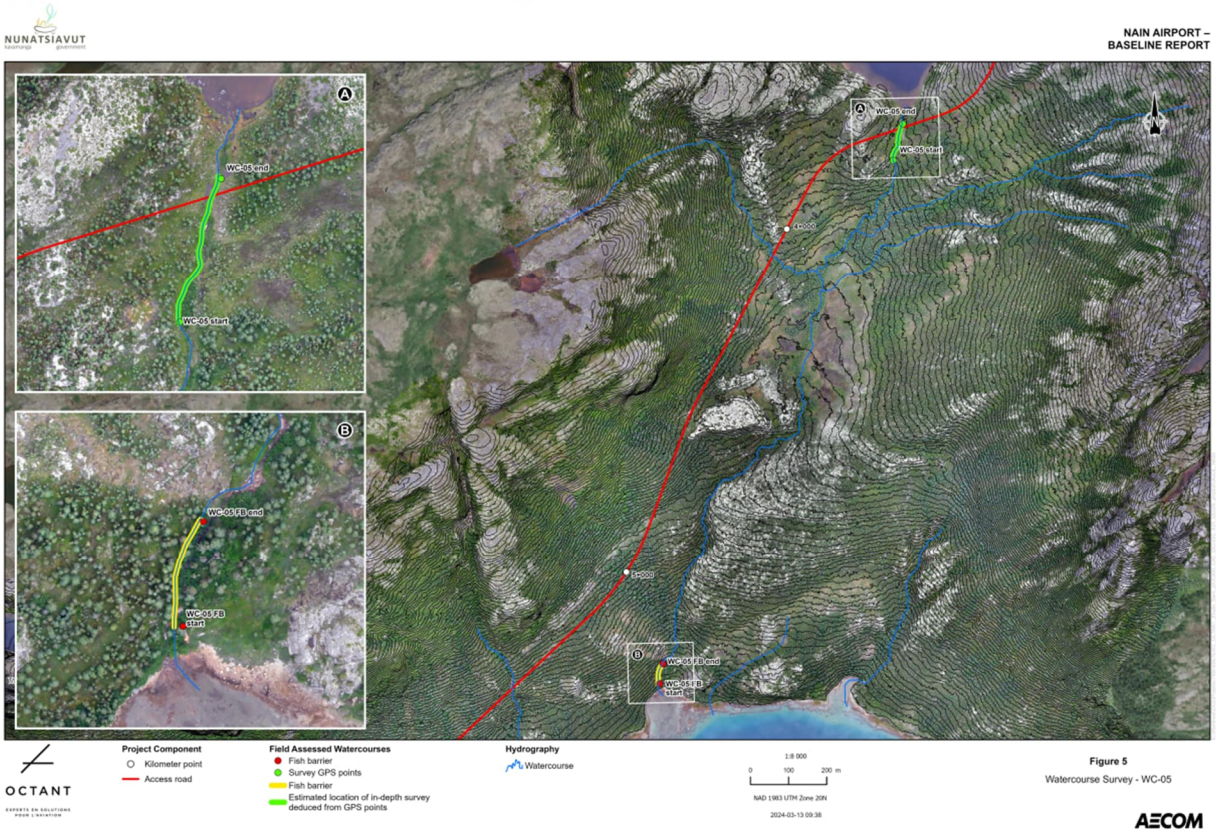


Figure 1. Estimated transect location from GPS points for WC-05 (green line) and location of fish barrier at watercourse terminus (yellow line). The red line shows the proposed Project access road alignment at the time of assessment.

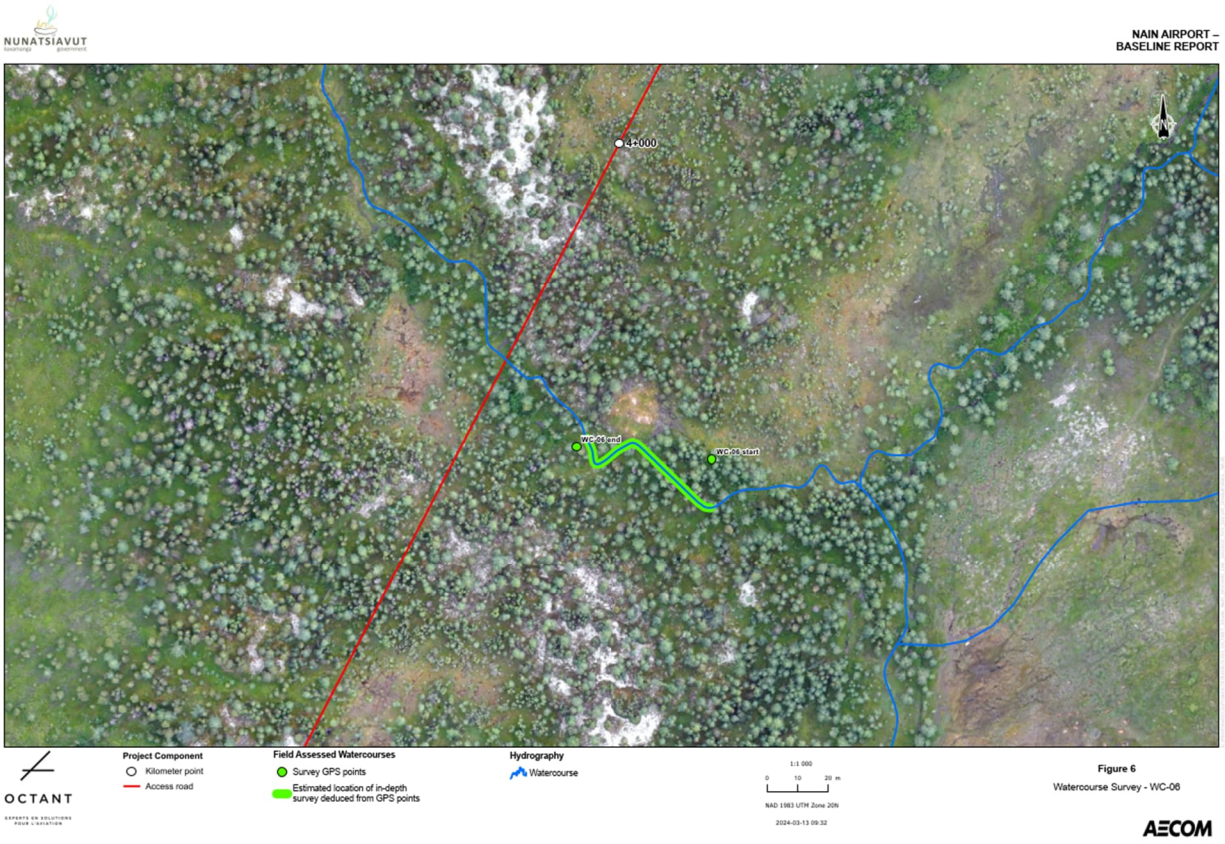


Figure 2. Estimated transect location from GPS points for WC-06 (green line). The red line shows the proposed Project road alignment at the time of assessment.

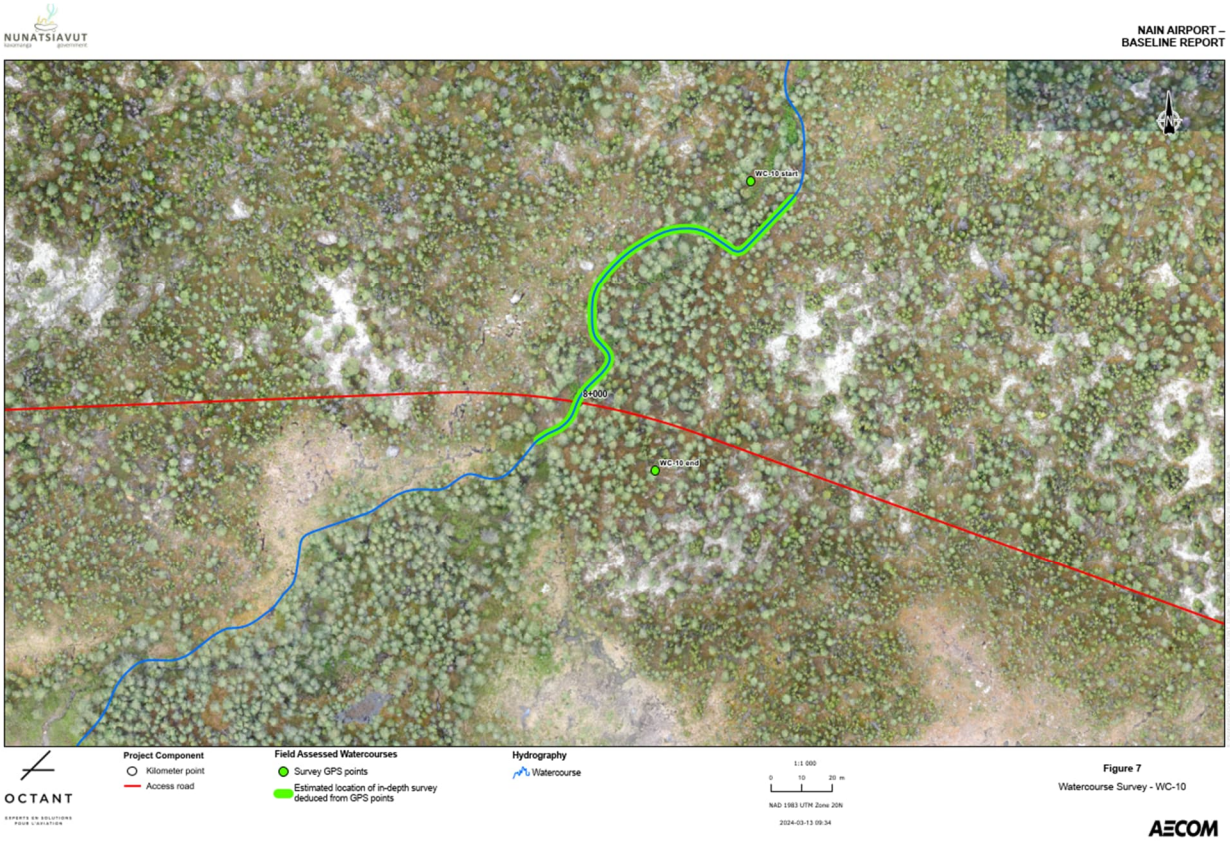


Figure 3. Estimated transect location from GPS points for WC-10 (green line). The red line shows the proposed Project road alignment at the time of assessment.

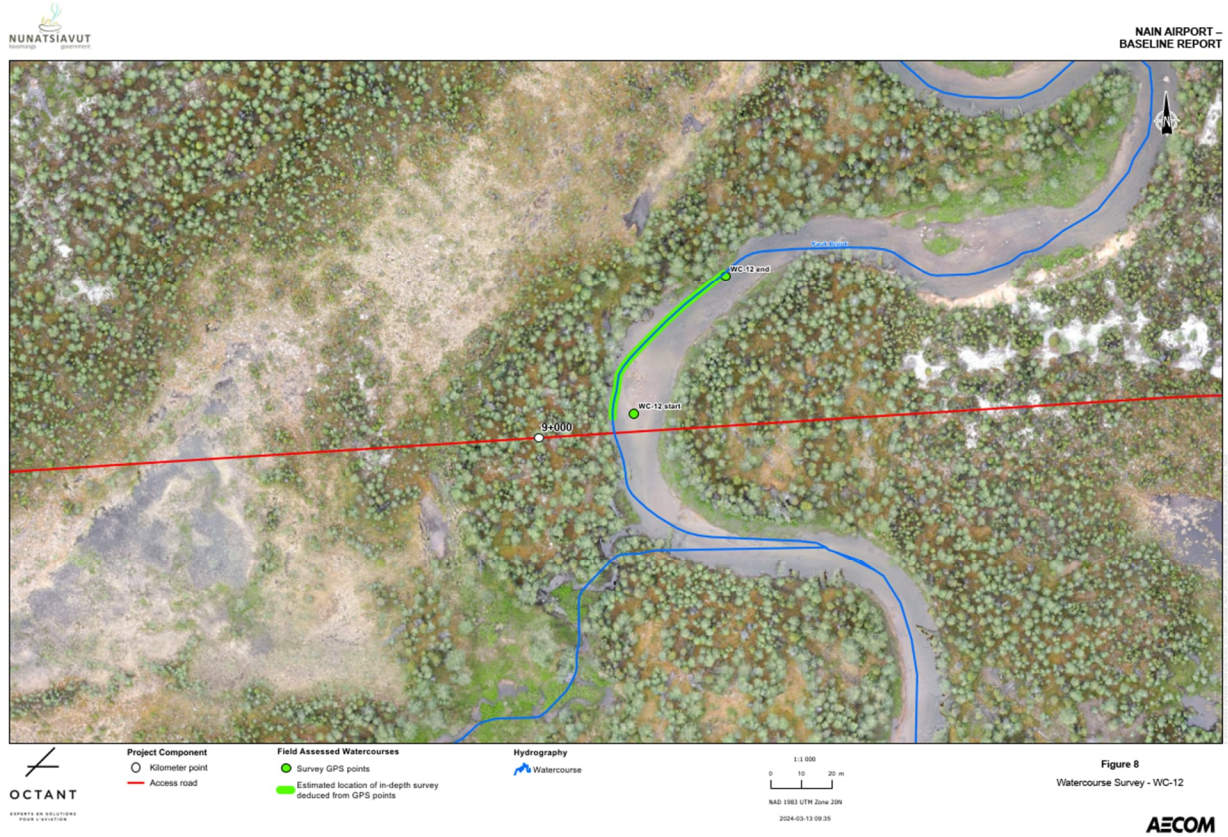


Figure 4. Estimated transect location from GPS points for WC-12 (green line). The red line shows the proposed Project road alignment at the time of assessment.

Appendix F3 – Water Quality Sampling Results

Water Chemistry

Table 1. Surface water chemistry (conventional: calculated and inorganics) of WC-05, WC-08, WC-10, and WC-12.

Variables	Unit	WC-08		WC-05		WC-12		WC-10	
Calculated Parameters		**Amount**	**RDL**	**Amount**	**RDL**	**Amount**	**RDL**	**Amount**	**RDL**
Anion Sum	mg/L	0.240	N/A	0.170	N/A	0.230	N/A	0.160	N/A
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	6.7	1.0	4.0	N/A	6.7	N/A	5.8	1.0
Calculated TDS	mg/L	22	1.0	13	N/A	16	N/A	15	1.0
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	1.0	ND	N/A	ND	N/A	ND	1.0
Cation Sum	mg/L	0.290	N/A	0.170	N/A	0.230	N/A	0.220	N/A
Hardness (CaCO3)	mg/L	8.7	1.0	4.4	N/A	6.7	N/A	6.8	1.0
Ion Balance (% Difference)	%	9.43	N/A	0.00	N/A	0.00	N/A	15.8	N/A
Langelier Index (@ 20C)	N/A	-3.05	N/A	-3.77	N/A	-3.03	N/A	-3.22	N/A
Langelier Index (@ 4C)	N/A	-3.30	N/A	-4.02	N/A	-3.28	N/A	-3.48	N/A
Nitrate (N)	mg/L	0.066	0.050	ND	N/A	ND	N/A	0.11	0.050
Saturation pH (@ 20C)	N/A	10.1	N/A	10.6	N/A	10.2	N/A	10.3	N/A
Saturation pH (@ 4C)	N/A	10.3	N/A	10.8	N/A	10.4	N/A	10.5	N/A
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	6.7	2.0	4.0	N/A	6.7	N/A	5.8	2.0
Dissolved Chloride (Cl-)	mg/L	1.7	1.0	1.5	N/A	1.4	N/A	1.3	1.0
Colour	TCU	15	5.0	11	N/A	9.4	N/A	14	5.0
Nitrate + Nitrite (N)	mg/L	0.083	0.050	ND	N/A	ND	N/A	0.12	0.050
Nitrite (N)	mg/L	0.017	0.010	0.017	N/A	ND	N/A	0.012	0.010
Nitrogen (Ammonia Nitrogen)	mg/L	ND	0.050	ND	N/A	ND	N/A	ND	0.050
Total Organic Carbon (C)	mg/L	3.2	0.50	2.6	N/A	2.1	N/A	2.2	0.50
Orthophosphate (P)	mg/L	ND	0.010	ND	N/A	ND	N/A	ND	0.010
pH	pH	7.02	N/A	6.81	N/A	7.14	N/A	7.03	N/A
Reactive Silica (SiO2)	mg/L	7.3	0.50	3.2	N/A	3.8	N/A	4.9	0.50
Dissolved Sulphate (SO4)	mg/L	2.6	2.0	2.3	N/A	2.5	N/A	ND	2.0
Turbidity	NTU	0.19	0.10	0.51	N/A	0.43	N/A	0.10	0.10
Conductivity	uS/cm	30	1.0	20	N/A	26	N/A	25	1.0

Note: RDL = Reportable Detection Limit; ND = Not Detected at a concentration equal or greater than the indicated Detection Limit; N/A = Not Applicable

Table 2. Surface water chemistry (metals) of WC-05, WC-08, WC-10, and WC-12.

Metals	Units	WC-08	WC-05	WC-12	WC-10	RDL
Total Aluminum (Al)	ug/L	73	59	40	58	5.0
Total Antimony (Sb)	ug/L	ND	ND	ND	ND	1.0
Total Arsenic (As)	ug/L	ND	ND	ND	ND	1.0
Total Barium (Ba)	ug/L	2.4	2.2	1.4	2.1	1.0
Total Beryllium (Be)	ug/L	ND	ND	ND	ND	0.10
Total Bismuth (Bi)	ug/L	ND	ND	ND	ND	2.0
Total Boron (B)	ug/L	ND	ND	ND	ND	50
Total Cadmium (Cd)	ug/L	ND	ND	ND	ND	0.010
Total Calcium (Ca)	ug/L	2400	1200	1900	1800	100
Total Chromium (Cr)	ug/L	ND	ND	ND	ND	1.0
Total Cobalt (Co)	ug/L	ND	ND	ND	ND	0.40
Total Copper (Cu)	ug/L	ND	ND	ND	ND	0.50
Total Iron (Fe)	ug/L	91	95	57	92	50
Total Lead (Pb)	ug/L	ND	ND	ND	ND	0.50
Total Magnesium (Mg)	ug/L	640	330	490	550	100
Total Manganese (Mn)	ug/L	ND	2.7	ND	ND	2.0
Total Molybdenum (Mo)	ug/L	ND	ND	ND	ND	2.0
Total Nickel (Ni)	ug/L	ND	ND	ND	2.1	2.0
Total Phosphorus (P)	ug/L	ND	ND	ND	ND	100
Total Potassium (K)	ug/L	160	ND	160	ND	100
Total Selenium (Se)	ug/L	ND	ND	ND	ND	0.50
Total Silver (Ag)	ug/L	ND	ND	ND	ND	0.10
Total Sodium (Na)	ug/L	2500	1800	2100	2000	100
Total Strontium (Sr)	ug/L	11	5.7	9.1	8.6	2.0
Total Thallium (Tl)	ug/L	ND	ND	ND	ND	0.10
Total Tin (Sn)	ug/L	ND	ND	ND	ND	2.0
Total Titanium (Ti)	ug/L	ND	ND	ND	ND	2.0
Total Uranium (U)	ug/L	ND	ND	ND	ND	0.10
Total Vanadium (V)	ug/L	ND	ND	ND	ND	2.0
Total Zinc (Zn)	ug/L	ND	ND	ND	ND	5.0

Note:
RDL = Reportable Detection Limit
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit

Table 3. Water field duplicate quality control sample results for WC-12.

Calculated Parameters - Nain WCs 2023				
Parameter	**Units**	**WC-12**		
		Original	**Duplicate**	**RPD (%)**
Anion Sum	me/L	0.23	0.24	-4
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	6.7	7.2	-7
Calculated TDS	mg/L	16	17	-6
Carb. Alkalinity (calc. as CaCO3)	mg/L	ND	ND	
Cation Sum	me/L	0.230	0.230	0
Hardness (CaCO3)	mg/L	6.7	6.7	0
Ion Balance (% Difference)	%	0.00	2.13	-200
Langelier Index (@ 20C)	N/A	-3.03	-3.05	-1
Langelier Index (@ 4C)	N/A	-3.28	-3.30	-1
Nitrate (N)	mg/L	ND	ND	
Saturation pH (@ 20C)	N/A	10.2	10.1	1
Saturation pH (@ 4C)	N/A	10.4	10.4	0
Field Measurements - Nain WCs 2023				
Parameter	**Units**	**WC-12**		
		Original	**Duplicate**	**RPD (%)**
Field pH	pH	7.40	7.40	0
Field Temperature	Celsius	15.7	15.7	0
Inorganics - Nain WCs 2023				
Parameter	**Units**	**WC-12**		
		Original	**Duplicate**	**RPD (%)**
Total Alkalinity (Total as CaCO3)	mg/L	6.7	7.2	-7
Dissolved Chloride (Cl-)	mg/L	1.4	1.5	-7
Colour	TCU	9.4	9.2	2
Nitrate + Nitrite (N)	mg/L	ND	ND	
Nitrite (N)	mg/L	ND	0.016	
Nitrogen (Ammonia Nitrogen)	mg/L	ND	ND	
Total Organic Carbon (C)	mg/L	2.1	1.9	10
Orthophosphate (P)	mg/L	ND	ND	
pH	pH	7.14	7.10	1
Reactive Silica (SiO2)	mg/L	3.8	3.6	5
Dissolved Sulphate (SO4)	mg/L	2.5	2.6	-4
Turbidity	NTU	0.43	0.46	-7
Conductivity	uS/cm	26	26	0

Metals - Nain WCs 2023				
Parameter	**Units**	**WC-12**		
		Original	**Duplicate**	**RPD (%)**
Total Aluminum (Al)	ug/L	40	37	8
Total Antimony (Sb)	ug/L	ND	ND	
Total Arsenic (As)	ug/L	ND	ND	
Total Barium (Ba)	ug/L	1.4	1.4	0
Total Beryllium (Be)	ug/L	ND	ND	
Total Bismuth (Bi)	ug/L	ND	ND	
Total Boron (B)	ug/L	ND	ND	
Total Cadmium (Cd)	ug/L	ND	ND	
Total Calcium (Ca)	ug/L	1900	1900	0
Total Chromium (Cr)	ug/L	ND	ND	
Total Cobalt (Co)	ug/L	ND	ND	
Total Copper (Cu)	ug/L	ND	ND	
Total Iron (Fe)	ug/L	57	51	11
Total Lead (Pb)	ug/L	ND	ND	
Total Magnesium (Mg)	ug/L	490	490	0
Total Manganese (Mn)	ug/L	ND	ND	
Total Molybdenum (Mo)	ug/L	ND	ND	
Total Nickel (Ni)	ug/L	ND	ND	
Total Phosphorus (P)	ug/L	ND	ND	
Total Potassium (K)	ug/L	160	260	-48
Total Selenium (Se)	ug/L	ND	ND	
Total Silver (Ag)	ug/L	ND	ND	
Total Sodium (Na)	ug/L	2100	2100	0
Total Strontium (Sr)	ug/L	9.1	9.3	-2
Total Thallium (Tl)	ug/L	ND	ND	
Total Tin (Sn)	ug/L	ND	ND	
Total Titanium (Ti)	ug/L	ND	ND	
Total Uranium (U)	ug/L	ND	ND	
Total Vanadium (V)	ug/L	ND	ND	
Total Zinc (Zn)	ug/L	ND	ND	

Notes:
RPD = Relative Percent Difference (see text)
RPD values in grey exceed 40%

Table 4. CCME Water Sample Screening for WC-05, WC-08, WC-10, and WC-12.

Parameter	Unit	Guidelines for the Protection of Aquatic Life		Sampling Sites			
				WC-08	WC-05	WC-12	WC-10
		CCME Acute	CCME Chronic				
Conventional Parameters							
Anion Sum	me/L	-	-	0.24	0.17	0.23	0.16
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	-	-	6.7	4	6.7	5.8
Calculated TDS	mg/L	-	-	22	13	16	15
Carb. Alkalinity (calc. as CaCO3)	mg/L	-	-	ND	ND	ND	ND
Cation Sum	mg/L	-	-	0.29	0.17	0.23	0.22
Hardness (CaCO3)	mg/L	-	-	8.7	4.4	6.7	6.8
Ion Balance (% Difference)	%	-	-	9.43	0	0	15.8
Langelier Index (@ 20C)	N/A	-	-	-3.05	-3.77	-3.03	-3.22
Langelier Index (@ 4C)	N/A	-	-	-3.3	-4.02	-3.28	-3.48
Nitrate (N)	mg/L	550	13	0.066	ND	ND	0.11
Saturation pH (@ 20C)	N/A	-	-	10.1	10.6	10.2	10.3
Saturation pH (@ 4C)	N/A	-	-	10.3	10.8	10.4	10.5
Inorganics							
Total Alkalinity (Total as CaCO3)	mg/L	-	-	6.7	4	6.7	5.8
Dissolved Chloride (Cl-)	mg/L	640	120	1.7	1.5	1.4	1.3
Colour	TCU	-	-	15	11	9.4	14
Nitrate + Nitrite (N)	mg/L	-	-	0.083	ND	ND	0.12
Nitrite (N)	mg/L	-	-	0.017	0.017	ND	0.012
Nitrogen (Ammonia Nitrogen)	mg/L	-	-	ND	ND	ND	ND
Total Organic Carbon (C)	mg/L	-	-	3.2	2.6	2.1	2.2
Orthophosphate (P)	mg/L	-	-	ND	ND	ND	ND
pH	pH	-	6.5-9.0	7.02	6.81	7.14	7.03
Reactive Silica (SiO2)	mg/L	-	-	7.3	3.2	3.8	4.9
Dissolved Sulphate (SO4)	mg/L	-	-	2.6	2.3	2.5	ND

Turbidity	NTU	-	-	0.19	0.51	0.43	0.1
Conductivity	uS/cm	-	-	30	20	26	25
Metals							
Total Aluminum (Al)	ug/L	-	100[a]	73	59	40	58
Total Antimony (Sb)	ug/L	-	-	ND	ND	ND	ND
Total Arsenic (As)	ug/L	-	5	ND	ND	ND	ND
Total Barium (Ba)	ug/L	-	-	2.4	2.2	1.4	2.1
Total Beryllium (Be)	ug/L	-	-	ND	ND	ND	ND
Total Bismuth (Bi)	ug/L	-	-	ND	ND	ND	ND
Total Boron (B)	ug/L	29,000	1,500	ND	ND	ND	ND
Total Cadmium (Cd)	ug/L	0.11-0.17[b]	0.04[b]	ND	ND	ND	ND
Total Calcium (Ca)	ug/L	-	-	2400	1200	1900	1800
Total Chromium (Cr)	ug/L	-	-	ND	ND	ND	ND
Total Cobalt (Co)	ug/L	-	-	ND	ND	ND	ND
Total Copper (Cu)	ug/L	-	2[b]	ND	ND	ND	ND
Total Iron (Fe)	ug/L	-	300	91	95	57	92
Total Lead (Pb)	ug/L	-	1[b]	ND	ND	ND	ND
Total Magnesium (Mg)	ug/L	-	-	640	330	490	550
Total Manganese (Mn)	ug/L	-	-	ND	2.7	ND	ND
Total Molybdenum (Mo)	ug/L	-	73	ND	ND	ND	ND
Total Nickel (Ni)	ug/L	-	25[b]	ND	ND	ND	2.1
Total Phosphorus (P)	ug/L	-	guidance framework[c]	ND	ND	ND	ND
Total Potassium (K)	ug/L	-	-	160	ND	160	ND
Total Selenium (Se)	ug/L	-	1	ND	ND	ND	ND
Total Silver (Ag)	ug/L	-	0.25	ND	ND	ND	ND
Total Sodium (Na)	ug/L	-	-	2500	1800	2100	2000
Total Strontium (Sr)	ug/L	-	-	11	5.7	9.1	8.6
Total Thallium (Tl)	ug/L	-	0.8	ND	ND	ND	ND
Total Tin (Sn)	ug/L	-	-	ND	ND	ND	ND
Total Titanium (Ti)	ug/L	-	-	ND	ND	ND	ND

Total Uranium (U)	ug/L	33	15	ND	ND	ND	ND
Total Vanadium (V)	ug/L	-	-	ND	ND	ND	ND
Total Zinc (Zn)	ug/L	NA[(d)]	NA[(d)]	ND	ND	ND	ND

[(a)] = guideline is pH dependent. The guideline range shown is based pH ≥ 6.5
[(b)] = guideline is hardness dependent. The guideline range shown is based on the hardness range observed in the dataset (4.4 to 8.7 mg/L). The guideline is calculated based on the individual hardness value for each sample.
[(c)] = Canadian Guidance Framework for Phosphorus is for developing phosphorus guidelines (does not provide guidance on other freshwater nutrients). It provides Trigger Ranges for Total Phosphorus (µg/L) (see Guidance Framework for Phosphorus factsheet):
- ultra-oligotrophic <4
- oligotrophic 4-10
- mesotrophic 10-20
- meso-eutrophic 20-35
- eutrophic 35-100
- hyper-eutrophic >100

[(d)] = parameters for Total Zinc not met for assessment. Requires water hardness and DOC. DOC not recorded.

ND= Not detected at a concentration equal or greater than the indicated Detection Limit.
- = no guideline or no data.

Source: Canadian Countil of Ministers of the Environment (CCME)

Benthic Invertebrate Community

Table 5. Benthic invertebrate identification and abundance at WC-05, WC-10, and WC-12. Number of individuals collected are recorded below.

Major Taxon	Family	Subfamily/Tribe	Genus/Species	WC-5	WC-10	WC-12
Oligochaeta	Naididae	Naidinae		9	-	
Nematoda				3	-	
Pelecypoda	Pisidiidae (i/d)			24	-	6
Pelecypoda	Pisidiidae		Pisidium	38	-	3
Acari - Hydracarina	Hydrozetidae		Hydrozetes	-	1	-
Acari - Hydracarina	Lebertiidae		Lebertia	24	-	3
Acari - Hydracarina	Sperchontidae		Sperchon	48	7	1
Ephemeroptera	Baetidae (i/d)			-	-	1
Ephemeroptera	Baetidae		Baetis	-	5	1
Ephemeroptera	Ephemerellidae		Ephemerella	24	-	3
Ephemeroptera	Heptageniidae		Heptagenia	-	-	1
Ephemeroptera	Heptageniidae		Epeorus	-	10	-
Plecoptera	Chloroperlidae		Sweltsa	-	18	-
Plecoptera	Leuctridae (i/d)			40	1	-
Plecoptera	Nemouridae		Zapada	-	41	-
Trichoptera	Glossosomatidae		Glossosoma	-	-	1
Trichoptera	Hydroptilidae		Oxyethira	-	-	20
Trichoptera	Rhyacophilidae - pupa			-	1	
Trichoptera	Rhyacophilidae		Rhyacophila	1	1	1
Coleoptera	Dytiscidae (i/d)			8	-	-
Coleoptera	Hydrophylidae		Helophorus	-	1	-
Diptera	Ceratopogonidae		Bezzia	-	3	1
Diptera	Empididae		Chelifera	-	-	24
Diptera	Empididae		Oreogeton	-	12	-
Diptera	Tipulidae		Hexatoma	-	-	1
Diptera	Simuliidae		Simulium	61	20	-
Diptera	Chironomidae - pupa			-	6	-
Diptera	Chironomidae	Chironominae	Microtendipes	-	-	1
Diptera	Chironomidae		Paracladopelma	-	-	1
Diptera	Chironomidae		Polypedilum	-	1	1
Diptera	Chironomidae	Diamesinae	Pagastia	-	14	-
Diptera	Chironomidae	Tanypodinae	Ablabesmyia	-	-	1
Diptera	Chironomidae		Thienemannimyia	31	-	19
Diptera	Chironomidae	Tanytarsini	Micropsectra	-	1	27
Diptera	Chironomidae		Paratanytarsus	-	-	4
Diptera	Chironomidae		Stempellina	-	2	-
Diptera	Chironomidae	Orthocladiinae (i/d)		-	3	1
Diptera	Chironomidae	Orthocladiinae	Cricotopus / Orthocladius	12	7	2

Diptera	Chironomidae		Eukiefferiella	8	9	-
Diptera	Chironomidae		Heterotrissocladius	-	-	1
Diptera	Chironomidae		Parametriocnemus	-	5	1
Diptera	Chironomidae		Rheocricotopus	8	1	-
Diptera	Chironomidae		Tvetenia	-	6	1
Terrestrial				10	3	-
TOTAL				**349**	**179**	**127**

Source: Benthic invertebrate samples were analysed by Jack Zolty Ltd., Summerland, BC, 2023.

Appendix F4 - Collected Fish Data

Table 1. Brook trout data determined from FAFH electrofishing capture at WC-10 and WC-12 by laboratory analysis of fish scales.

Label	Sub-label	Weight (g)	Fork Length (mm)	Age (yrs)
WC-10	BT1	21	130	1+
WC-10	BT2	25	140	1+
WC-10	BT3	6	88	0+
WC-10	BT4	28	137	1+
WC-10	BT5	16	116	1+
WC-10	BT6	14	112	1+
WC-10	BT7	21	134	1+
WC-12	BT1	3	77	0+
WC-12	BT2	35	144	1+
WC-12	BT3	2	66	0+
WC-12	BT4	5	85	0+
WC-12	BT5	6	84	0+
WC-12	BT6	3	70	0+

Source: Laboratory analysis completed by Canadian Rivers Institute, Fredericton, NB, 2023.

Table 2. Arctic char whole fish analysis – Kauk Brook Estuary

Fish ID	Length (cm)	Weight (g)	Gutted Weight (g)	Otoliths	Scales	Age: Scale Sample 1	Age: Scale Sample 2	Age: Otolith Sample 1	Age: Otolith Sample 2	Estimated Age	Mercury (mg/L)
AC-1	58	2759.31	2448.85	N	Y	10	9	N/A	N/A	9	0.042
AC-2	43	1220.25	1106.98	Y	Y	5	5	6	5	5	No Data
AC-3	45	1331.38	1228.42	Y	Y	6	6	5	5	5	0.024
AC-4	44.5	1449.58	1323.05	Y	Y	5	5	5	5	5	0.029
AC-5	53.5	1925.01	1683.02	Y	Y	8	8	10	9	9	0.016
AC-6	48.5	1709.29	1572.25	Y	Y	6	6	8	7	7	0.033
AC-7	41.5	1128.18	993.42	Y	Y	6	6	7	6	6	0.019
AC-8	43	1216.06	1075.14	Y	Y	5	6	6	5	6	0.016
AC-9	42	1113.8	998.21	Y	Y	5	5	5	5	5	0.032

Note: Arctic char were caught on August 17 and 19, 2023, using a gill net (24 hr set). They were caught at the Kauk Brook Estuary, about 1 km west of the terminus of the watercourse.

AECOM

Appendix G

Human Environment Supporting Information

Appendix G1 Country Foods Sampling Results

Your Project #: 235-001
Site Location: Nain
Your C.O.C. #: 765605

Attention: Kathryn Dawe

SEM Ltd.
79 Mew's Place
Second Floor
St. John's, NL
CANADA A1B 4N2

Report Date: 2023/11/24
Report #: R7926636
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3T3007
Received: 2023/09/19, 11:25

Sample Matrix: Tissue
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Benzo(b/j)fluoranthene Sum (tissue)	10	N/A	2023/11/24	N/A	Auto Calc.
Mercury in biota	9	2023/11/13	2023/11/15	ATL SOP 00026	EPA 245.6 R2.3 m
Mercury in biota	1	2023/11/08	2023/11/15	ATL SOP 00026	EPA 245.6 R2.3 m
Metals in Tissue	10	2023/11/13	2023/11/15	ATL SOP 00058	EPA 6020B R2 m
PAH in Tissue by GC/MS (SIM) (1)	8	2023/11/22	2023/11/24	ATL SOP 00104	EPA 8270E R6 m
PAH in Tissue by GC/MS (SIM) (1)	1	2023/11/08	2023/11/23	ATL SOP 00104	EPA 8270E R6 m
PAH in Tissue by GC/MS (SIM) (1)	1	2023/11/08	2023/11/24	ATL SOP 00104	EPA 8270E R6 m
Weight of Tissue	10	N/A	2023/10/31		

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Results are reported on an as received basis unless otherwise indicated.

Bureau Veritas 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvna.com

Your Project #: 235-001
Site Location: Nain
Your C.O.C. #: 765605

Attention: Kathryn Dawe

SEM Ltd.
79 Mew's Place
Second Floor
St. John's, NL
CANADA A1B 4N2

Report Date: 2023/11/24
Report #: R7926636
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3T3007
Received: 2023/09/19, 11:25

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Michelle Huth, Project Manager
Email: michelle.brescacin@bureauveritas.com
Phone# (902) 420-0203

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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Suzanne Rogers, General Manager responsible for Nova Scotia Environmental laboratory operations.

Bureau Veritas Job #: C3T3007
Report Date: 2023/11/24

SEM Ltd.
Client Project #: 235-001
Site Location: Nain
Sampler Initials: MCH

RESULTS OF ANALYSES OF TISSUE

Bureau Veritas ID		XBL082	XBL082	XBL083	XBL083	XBL084	XBL084	XBL085		
Sampling Date		2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19		
COC Number		765605	765605	765605	765605	765605	765605	765605		
	UNITS	AC-1	AC-1 Lab-Dup	AC-2	AC-2 Lab-Dup	AC-3	AC-3 Lab-Dup	AC-4	RDL	QC Batch
Inorganics										
Weight	g	208	225	208	200	212	199	188	0.10	9020236

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas ID		XBL085	XBL086	XBL086	XBL087	XBL087	XBL088	XBL088		
Sampling Date		2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19		
COC Number		765605	765605	765605	765605	765605	765605	765605		
	UNITS	AC-4 Lab-Dup	AC-5	AC-5 Lab-Dup	AC-6	AC-6 Lab-Dup	AC-7	AC-7 Lab-Dup	RDL	QC Batch
Inorganics										
Weight	g	205	193	219	213	198	221	200	0.10	9020236

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas ID		XBL089	XBL089	XBL090	XBL090	XBL091	XBL091		
Sampling Date		2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19		
COC Number		765605	765605	765605	765605	765605	765605		
	UNITS	AC-8	AC-8 Lab-Dup	AC-9	AC-9 Lab-Dup	AC-10	AC-10 Lab-Dup	RDL	QC Batch
Inorganics									
Weight	g	178	190	192	178	191	188	0.10	9020236

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas 200 Bluewater Rd, Suite 105, Bedford, Nova Scotia Canada B4B 1G9 Tel: 902-420-0203 Toll-free: 800-565-7227 Fax: 902-420-8612 www.bvna.com

Bureau Veritas Job #: C3T3007
Report Date: 2023/11/24

SEM Ltd.
Client Project #: 235-001
Site Location: Nain
Sampler Initials: MCH

MERCURY BY COLD VAPOUR AA (TISSUE)

Bureau Veritas ID		XBL082	XBL082	XBL083	XBL084	XBL085	XBL086	XBL087		
Sampling Date		2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19		
COC Number		765605	765605	765605	765605	765605	765605	765605		
	UNITS	AC-1	AC-1 Lab-Dup	AC-2	AC-3	AC-4	AC-5	AC-6	RDL	QC Batch
Metals										
Mercury (Hg)	mg/kg	0.042	0.030	ND	0.024	0.029	0.016	0.033	0.010	9045643

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas ID		XBL088	XBL089	XBL090	XBL091		
Sampling Date		2023/08/19	2023/08/19	2023/08/19	2023/08/19		
COC Number		765605	765605	765605	765605		
	UNITS	AC-7	AC-8	AC-9	AC-10	RDL	QC Batch
Metals							
Mercury (Hg)	mg/kg	0.019	0.016	0.032	0.045	0.010	9045643

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Bureau Veritas Job #: C3T3007
Report Date: 2023/11/24

SEM Ltd.
Client Project #: 235-001
Site Location: Nain
Sampler Initials: MCH

ELEMENTS BY ICP/MS (TISSUE)

Bureau Veritas ID		XBL082	XBL082	XBL083	XBL084	XBL085	XBL086	XBL087		
Sampling Date		2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19		
COC Number		765605	765605	765605	765605	765605	765605	765605		
	UNITS	AC-1	AC-1 Lab-Dup	AC-2	AC-3	AC-4	AC-5	AC-6	RDL	QC Batch
Metals										
Aluminum (Al)	mg/kg	ND	ND	ND	ND	ND	ND	ND	2.5	9045543
Antimony (Sb)	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.50	9045543
Arsenic (As)	mg/kg	0.75	0.74	0.54	1.1	0.62	0.59	0.58	0.50	9045543
Barium (Ba)	mg/kg	ND	ND	ND	ND	ND	ND	ND	1.5	9045543
Beryllium (Be)	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.50	9045543
Boron (B)	mg/kg	ND	ND	ND	ND	ND	ND	ND	1.5	9045543
Cadmium (Cd)	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9045543
Chromium (Cr)	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.50	9045543
Cobalt (Co)	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.20	9045543
Copper (Cu)	mg/kg	ND	ND	0.56	0.53	0.50	ND	0.54	0.50	9045543
Iron (Fe)	mg/kg	ND	ND	ND	ND	ND	ND	ND	15	9045543
Lead (Pb)	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.18	9045543
Lithium (Li)	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.50	9045543
Manganese (Mn)	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.50	9045543
Molybdenum (Mo)	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.50	9045543
Nickel (Ni)	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.50	9045543
Selenium (Se)	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.50	9045543
Silver (Ag)	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.12	9045543
Strontium (Sr)	mg/kg	ND	1.9	ND	2.7	ND	ND	2.2	1.5	9045543
Thallium (Tl)	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.020	9045543
Tin (Sn)	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.50	9045543
Uranium (U)	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.020	9045543
Vanadium (V)	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.50	9045543
Zinc (Zn)	mg/kg	5.2	5.3	5.4	5.9	5.2	5.5	5.6	1.5	9045543

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Report Date: 2023/11/24

SEM Ltd.
Client Project #: 235-001
Site Location: Nain
Sampler Initials: MCH

ELEMENTS BY ICP/MS (TISSUE)

Bureau Veritas ID		XBL088	XBL089	XBL090	XBL091		
Sampling Date		2023/08/19	2023/08/19	2023/08/19	2023/08/19		
COC Number		765605	765605	765605	765605		
	UNITS	AC-7	AC-8	AC-9	AC-10	RDL	QC Batch
Metals							
Aluminum (Al)	mg/kg	ND	ND	ND	ND	2.5	9045543
Antimony (Sb)	mg/kg	ND	ND	ND	ND	0.50	9045543
Arsenic (As)	mg/kg	ND	ND	ND	ND	0.50	9045543
Barium (Ba)	mg/kg	ND	ND	ND	ND	1.5	9045543
Beryllium (Be)	mg/kg	ND	ND	ND	ND	0.50	9045543
Boron (B)	mg/kg	ND	ND	ND	ND	1.5	9045543
Cadmium (Cd)	mg/kg	ND	ND	ND	ND	0.050	9045543
Chromium (Cr)	mg/kg	ND	ND	ND	ND	0.50	9045543
Cobalt (Co)	mg/kg	ND	ND	ND	ND	0.20	9045543
Copper (Cu)	mg/kg	ND	ND	ND	ND	0.50	9045543
Iron (Fe)	mg/kg	ND	ND	ND	ND	15	9045543
Lead (Pb)	mg/kg	ND	ND	ND	ND	0.18	9045543
Lithium (Li)	mg/kg	ND	ND	ND	ND	0.50	9045543
Manganese (Mn)	mg/kg	ND	ND	ND	ND	0.50	9045543
Molybdenum (Mo)	mg/kg	ND	ND	ND	ND	0.50	9045543
Nickel (Ni)	mg/kg	ND	ND	ND	ND	0.50	9045543
Selenium (Se)	mg/kg	ND	ND	ND	ND	0.50	9045543
Silver (Ag)	mg/kg	ND	ND	ND	ND	0.12	9045543
Strontium (Sr)	mg/kg	ND	ND	1.6	ND	1.5	9045543
Thallium (Tl)	mg/kg	ND	ND	ND	ND	0.020	9045543
Tin (Sn)	mg/kg	ND	ND	ND	ND	0.50	9045543
Uranium (U)	mg/kg	ND	ND	ND	ND	0.020	9045543
Vanadium (V)	mg/kg	ND	ND	ND	ND	0.50	9045543
Zinc (Zn)	mg/kg	4.6	4.9	4.9	5.1	1.5	9045543

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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SEMI-VOLATILE ORGANICS BY GC-MS (TISSUE)

Bureau Veritas ID		XBL082			XBL082			XBL083	XBL084		
Sampling Date		2023/08/19			2023/08/19			2023/08/19	2023/08/19		
COC Number		765605			765605			765605	765605		
	UNITS	AC-1	RDL	QC Batch	AC-1 Lab-Dup	RDL	QC Batch	AC-2	AC-3	RDL	QC Batch
Polyaromatic Hydrocarbons											
1-Methylnaphthalene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
2-Methylnaphthalene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Acenaphthene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Acenaphthylene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Anthracene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Benzo(a)anthracene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Benzo(a)pyrene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Benzo(b)fluoranthene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Benzo(b/j)fluoranthene	mg/kg	ND	0.10	9022054				ND	ND	0.10	9022054
Benzo(g,h,i)perylene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Benzo(j)fluoranthene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Benzo(k)fluoranthene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Chrysene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Dibenzo(a,h)anthracene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Fluoranthene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Fluorene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Indeno(1,2,3-cd)pyrene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Naphthalene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Perylene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Phenanthrene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Pyrene	mg/kg	ND	0.050	9065099	ND	0.050	9065099	ND	ND	0.050	9065099
Surrogate Recovery (%)											
D10-Anthracene	%	91		9065099	93		9065099	100	94		9065099
D14-Terphenyl	%	88		9065099	89		9065099	98	91		9065099
D8-Acenaphthylene	%	86		9065099	94		9065099	101	96		9065099

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
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Bureau Veritas Job #: C3T3007
Report Date: 2023/11/24

SEM Ltd.
Client Project #: 235-001
Site Location: Nain
Sampler Initials: MCH

SEMI-VOLATILE ORGANICS BY GC-MS (TISSUE)

Bureau Veritas ID		XBL085	XBL086	XBL087	XBL088	XBL089	XBL090	XBL091		
Sampling Date		2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19	2023/08/19		
COC Number		765605	765605	765605	765605	765605	765605	765605		
	UNITS	AC-4	AC-5	AC-6	AC-7	AC-8	AC-9	AC-10	RDL	QC Batch
Polyaromatic Hydrocarbons										
1-Methylnaphthalene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
2-Methylnaphthalene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Acenaphthene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Acenaphthylene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Anthracene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Benzo(a)anthracene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Benzo(a)pyrene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Benzo(b)fluoranthene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Benzo(b/j)fluoranthene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.10	9022054
Benzo(g,h,i)perylene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Benzo(j)fluoranthene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Benzo(k)fluoranthene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Chrysene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Dibenzo(a,h)anthracene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Fluoranthene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Fluorene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Indeno(1,2,3-cd)pyrene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Naphthalene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Perylene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Phenanthrene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Pyrene	mg/kg	ND	ND	ND	ND	ND	ND	ND	0.050	9065099
Surrogate Recovery (%)										
D10-Anthracene	%	97	98	101	95	105	98	104		9065099
D14-Terphenyl	%	96	93	98	90	102	91	96		9065099
D8-Acenaphthylene	%	101	100	105	97	106	101	110		9065099

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Report Date: 2023/11/24

SEM Ltd.
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GENERAL COMMENTS

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

Package 1	-11.3°C

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9020236	BAN	RPD [XBL082-01]	Weight	2023/10/31	8.0		%	25
9020236	BAN	RPD [XBL083-01]	Weight	2023/10/31	3.8		%	25
9020236	BAN	RPD [XBL084-01]	Weight	2023/10/31	6.5		%	25
9020236	BAN	RPD [XBL085-01]	Weight	2023/10/31	9.0		%	25
9020236	BAN	RPD [XBL086-01]	Weight	2023/10/31	13		%	25
9020236	BAN	RPD [XBL087-01]	Weight	2023/10/31	7.0		%	25
9020236	BAN	RPD [XBL088-01]	Weight	2023/10/31	10		%	25
9020236	BAN	RPD [XBL089-01]	Weight	2023/10/31	6.5		%	25
9020236	BAN	RPD [XBL090-01]	Weight	2023/10/31	7.5		%	25
9020236	BAN	RPD [XBL091-01]	Weight	2023/10/31	1.3		%	25
9045543	EPU	Matrix Spike [XBL082-01]	Aluminum (Al)	2023/11/15		112	%	75 - 125
			Antimony (Sb)	2023/11/15		110	%	75 - 125
			Arsenic (As)	2023/11/15		133 (1)	%	75 - 125
			Barium (Ba)	2023/11/15		99	%	75 - 125
			Beryllium (Be)	2023/11/15		98	%	75 - 125
			Boron (B)	2023/11/15		99	%	75 - 125
			Cadmium (Cd)	2023/11/15		108	%	75 - 125
			Chromium (Cr)	2023/11/15		104	%	75 - 125
			Cobalt (Co)	2023/11/15		99	%	75 - 125
			Copper (Cu)	2023/11/15		105	%	75 - 125
			Iron (Fe)	2023/11/15		111	%	75 - 125
			Lead (Pb)	2023/11/15		102	%	75 - 125
			Lithium (Li)	2023/11/15		110	%	75 - 125
			Manganese (Mn)	2023/11/15		103	%	75 - 125
			Molybdenum (Mo)	2023/11/15		102	%	75 - 125
			Nickel (Ni)	2023/11/15		102	%	75 - 125
			Selenium (Se)	2023/11/15		98	%	75 - 125
			Silver (Ag)	2023/11/15		101	%	75 - 125
			Strontium (Sr)	2023/11/15		168 (1)	%	75 - 125
			Thallium (Tl)	2023/11/15		105	%	75 - 125
			Tin (Sn)	2023/11/15		94	%	75 - 125
			Uranium (U)	2023/11/15		102	%	75 - 125
			Vanadium (V)	2023/11/15		98	%	75 - 125
			Zinc (Zn)	2023/11/15		107	%	75 - 125
9045543	EPU	Spiked Blank	Antimony (Sb)	2023/11/15		99	%	75 - 125
			Arsenic (As)	2023/11/15		92	%	75 - 125
			Barium (Ba)	2023/11/15		98	%	75 - 125
			Beryllium (Be)	2023/11/15		84	%	75 - 125
			Boron (B)	2023/11/15		85	%	75 - 125
			Cadmium (Cd)	2023/11/15		92	%	75 - 125
			Chromium (Cr)	2023/11/15		94	%	75 - 125
			Cobalt (Co)	2023/11/15		91	%	75 - 125
			Copper (Cu)	2023/11/15		94	%	75 - 125
			Iron (Fe)	2023/11/15		92	%	75 - 125
			Lead (Pb)	2023/11/15		92	%	75 - 125
			Lithium (Li)	2023/11/15		106	%	75 - 125
			Manganese (Mn)	2023/11/15		95	%	75 - 125
			Molybdenum (Mo)	2023/11/15		97	%	75 - 125
			Nickel (Ni)	2023/11/15		93	%	75 - 125
			Selenium (Se)	2023/11/15		95	%	75 - 125
			Silver (Ag)	2023/11/15		92	%	75 - 125
			Strontium (Sr)	2023/11/15		80	%	75 - 125
			Thallium (Tl)	2023/11/15		96	%	75 - 125

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Tin (Sn)	2023/11/15		96	%	75 - 125
			Uranium (U)	2023/11/15		94	%	75 - 125
			Vanadium (V)	2023/11/15		93	%	75 - 125
			Zinc (Zn)	2023/11/15		89	%	75 - 125
9045543	EPU	Method Blank	Aluminum (Al)	2023/11/15	ND, RDL=2.5		mg/kg	
			Antimony (Sb)	2023/11/15	ND, RDL=0.50		mg/kg	
			Arsenic (As)	2023/11/15	ND, RDL=0.50		mg/kg	
			Barium (Ba)	2023/11/15	ND, RDL=1.5		mg/kg	
			Beryllium (Be)	2023/11/15	ND, RDL=0.50		mg/kg	
			Boron (B)	2023/11/15	ND, RDL=1.5		mg/kg	
			Cadmium (Cd)	2023/11/15	ND, RDL=0.050		mg/kg	
			Chromium (Cr)	2023/11/15	ND, RDL=0.50		mg/kg	
			Cobalt (Co)	2023/11/15	ND, RDL=0.20		mg/kg	
			Copper (Cu)	2023/11/15	ND, RDL=0.50		mg/kg	
			Iron (Fe)	2023/11/15	ND, RDL=15		mg/kg	
			Lead (Pb)	2023/11/15	ND, RDL=0.18		mg/kg	
			Lithium (Li)	2023/11/15	ND, RDL=0.50		mg/kg	
			Manganese (Mn)	2023/11/15	ND, RDL=0.50		mg/kg	
			Molybdenum (Mo)	2023/11/15	ND, RDL=0.50		mg/kg	
			Nickel (Ni)	2023/11/15	ND, RDL=0.50		mg/kg	
			Selenium (Se)	2023/11/15	ND, RDL=0.50		mg/kg	
			Silver (Ag)	2023/11/15	ND, RDL=0.12		mg/kg	
			Strontium (Sr)	2023/11/15	ND, RDL=1.5		mg/kg	
			Thallium (Tl)	2023/11/15	ND, RDL=0.020		mg/kg	
			Tin (Sn)	2023/11/15	ND, RDL=0.50		mg/kg	
			Uranium (U)	2023/11/15	ND, RDL=0.020		mg/kg	
			Vanadium (V)	2023/11/15	ND, RDL=0.50		mg/kg	
			Zinc (Zn)	2023/11/15	ND, RDL=1.5		mg/kg	
9045543	EPU	RPD [XBL082-01]	Aluminum (Al)	2023/11/15	NC		%	35
			Antimony (Sb)	2023/11/15	NC		%	35

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Arsenic (As)	2023/11/15	0.82		%	35
			Barium (Ba)	2023/11/15	NC		%	35
			Beryllium (Be)	2023/11/15	NC		%	35
			Boron (B)	2023/11/15	NC		%	35
			Cadmium (Cd)	2023/11/15	NC		%	35
			Chromium (Cr)	2023/11/15	NC		%	35
			Cobalt (Co)	2023/11/15	NC		%	35
			Copper (Cu)	2023/11/15	NC		%	35
			Iron (Fe)	2023/11/15	NC		%	35
			Lead (Pb)	2023/11/15	NC		%	35
			Lithium (Li)	2023/11/15	NC		%	35
			Manganese (Mn)	2023/11/15	NC		%	35
			Molybdenum (Mo)	2023/11/15	NC		%	35
			Nickel (Ni)	2023/11/15	NC		%	35
			Selenium (Se)	2023/11/15	NC		%	35
			Silver (Ag)	2023/11/15	NC		%	35
			Strontium (Sr)	2023/11/15	22		%	35
			Thallium (Tl)	2023/11/15	NC		%	35
			Tin (Sn)	2023/11/15	NC		%	35
			Uranium (U)	2023/11/15	NC		%	35
			Vanadium (V)	2023/11/15	NC		%	35
			Zinc (Zn)	2023/11/15	2.3		%	35
9045643	SGK	Matrix Spike [XBL082-01]	Mercury (Hg)	2023/11/15		104	%	75 - 125
9045643	SGK	QC Standard	Mercury (Hg)	2023/11/15		119	%	75 - 125
9045643	SGK	Spiked Blank	Mercury (Hg)	2023/11/15		110	%	80 - 120
9045643	SGK	Method Blank	Mercury (Hg)	2023/11/15	ND, RDL=0.010		mg/kg	
9045643	SGK	RPD [XBL082-01]	Mercury (Hg)	2023/11/15	NC		%	30
9065099	SA9	Reagent Blank	1-Methylnaphthalene	2023/11/23	ND, RDL=0.050		mg/kg	
			2-Methylnaphthalene	2023/11/23	ND, RDL=0.050		mg/kg	
			Acenaphthene	2023/11/23	ND, RDL=0.050		mg/kg	
			Acenaphthylene	2023/11/23	ND, RDL=0.050		mg/kg	
			Anthracene	2023/11/23	ND, RDL=0.050		mg/kg	
			Benzo(a)anthracene	2023/11/23	ND, RDL=0.050		mg/kg	
			Benzo(a)pyrene	2023/11/23	ND, RDL=0.050		mg/kg	
			Benzo(b)fluoranthene	2023/11/23	ND, RDL=0.050		mg/kg	
			Benzo(g,h,i)perylene	2023/11/23	ND, RDL=0.050		mg/kg	
			Benzo(j)fluoranthene	2023/11/23	ND, RDL=0.050		mg/kg	
			Benzo(k)fluoranthene	2023/11/23	ND, RDL=0.050		mg/kg	
			Chrysene	2023/11/23	ND, RDL=0.050		mg/kg	
			D10-Anthracene	2023/11/23		100	%	50 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			D14-Terphenyl	2023/11/23		97	%	50 - 130
			D8-Acenaphthylene	2023/11/23		98	%	50 - 130
			Dibenzo(a,h)anthracene	2023/11/23	ND, RDL=0.050		mg/kg	
			Fluoranthene	2023/11/23	ND, RDL=0.050		mg/kg	
			Fluorene	2023/11/23	ND, RDL=0.050		mg/kg	
			Indeno(1,2,3-cd)pyrene	2023/11/23	ND, RDL=0.050		mg/kg	
			Naphthalene	2023/11/23	ND, RDL=0.050		mg/kg	
			Perylene	2023/11/23	ND, RDL=0.050		mg/kg	
			Phenanthrene	2023/11/23	ND, RDL=0.050		mg/kg	
			Pyrene	2023/11/23	ND, RDL=0.050		mg/kg	
9065099	SA9	Matrix Spike [XBL082-01]	1-Methylnaphthalene	2023/11/23		90	%	50 - 130
			2-Methylnaphthalene	2023/11/23		98	%	50 - 130
			Acenaphthene	2023/11/23		100	%	50 - 130
			Acenaphthylene	2023/11/23		95	%	50 - 130
			Anthracene	2023/11/23		104	%	50 - 130
			Benzo(a)anthracene	2023/11/23		102	%	50 - 130
			Benzo(a)pyrene	2023/11/23		80	%	50 - 130
			Benzo(b)fluoranthene	2023/11/23		81	%	50 - 130
			Benzo(g,h,i)perylene	2023/11/23		77	%	50 - 130
			Benzo(j)fluoranthene	2023/11/23		77	%	50 - 130
			Benzo(k)fluoranthene	2023/11/23		77	%	50 - 130
			Chrysene	2023/11/23		100	%	50 - 130
			D10-Anthracene	2023/11/23		99	%	50 - 130
			D14-Terphenyl	2023/11/23		98	%	50 - 130
			D8-Acenaphthylene	2023/11/23		99	%	50 - 130
			Dibenzo(a,h)anthracene	2023/11/23		80	%	50 - 130
			Fluoranthene	2023/11/23		103	%	50 - 130
			Fluorene	2023/11/23		96	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/11/23		81	%	50 - 130
			Naphthalene	2023/11/23		94	%	50 - 130
			Perylene	2023/11/23		74	%	50 - 130
			Phenanthrene	2023/11/23		98	%	50 - 130
			Pyrene	2023/11/23		97	%	50 - 130
9065099	SA9	Spiked Blank	1-Methylnaphthalene	2023/11/23		97	%	50 - 130
			2-Methylnaphthalene	2023/11/23		105	%	50 - 130
			Acenaphthene	2023/11/23		110	%	50 - 130
			Acenaphthylene	2023/11/23		96	%	50 - 130
			Anthracene	2023/11/23		105	%	50 - 130
			Benzo(a)anthracene	2023/11/23		103	%	50 - 130
			Benzo(a)pyrene	2023/11/23		85	%	50 - 130
			Benzo(b)fluoranthene	2023/11/23		91	%	50 - 130
			Benzo(g,h,i)perylene	2023/11/23		83	%	50 - 130
			Benzo(j)fluoranthene	2023/11/23		84	%	50 - 130
			Benzo(k)fluoranthene	2023/11/23		86	%	50 - 130
			Chrysene	2023/11/23		105	%	50 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			D10-Anthracene	2023/11/23		103	%	50 - 130
			D14-Terphenyl	2023/11/23		101	%	50 - 130
			D8-Acenaphthylene	2023/11/23		100	%	50 - 130
			Dibenzo(a,h)anthracene	2023/11/23		84	%	50 - 130
			Fluoranthene	2023/11/23		107	%	50 - 130
			Fluorene	2023/11/23		102	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/11/23		85	%	50 - 130
			Naphthalene	2023/11/23		102	%	50 - 130
			Perylene	2023/11/23		78	%	50 - 130
			Phenanthrene	2023/11/23		106	%	50 - 130
			Pyrene	2023/11/23		100	%	50 - 130
9065099	SA9	Method Blank	1-Methylnaphthalene	2023/11/23	ND, RDL=0.050		mg/kg	
			2-Methylnaphthalene	2023/11/23	ND, RDL=0.050		mg/kg	
			Acenaphthene	2023/11/23	ND, RDL=0.050		mg/kg	
			Acenaphthylene	2023/11/23	ND, RDL=0.050		mg/kg	
			Anthracene	2023/11/23	ND, RDL=0.050		mg/kg	
			Benzo(a)anthracene	2023/11/23	ND, RDL=0.050		mg/kg	
			Benzo(a)pyrene	2023/11/23	ND, RDL=0.050		mg/kg	
			Benzo(b)fluoranthene	2023/11/23	ND, RDL=0.050		mg/kg	
			Benzo(g,h,i)perylene	2023/11/23	ND, RDL=0.050		mg/kg	
			Benzo(j)fluoranthene	2023/11/23	ND, RDL=0.050		mg/kg	
			Benzo(k)fluoranthene	2023/11/23	ND, RDL=0.050		mg/kg	
			Chrysene	2023/11/23	ND, RDL=0.050		mg/kg	
			D10-Anthracene	2023/11/23		104	%	50 - 130
			D14-Terphenyl	2023/11/23		105	%	50 - 130
			D8-Acenaphthylene	2023/11/23		101	%	50 - 130
			Dibenzo(a,h)anthracene	2023/11/23	ND, RDL=0.050		mg/kg	
			Fluoranthene	2023/11/23	ND, RDL=0.050		mg/kg	
			Fluorene	2023/11/23	ND, RDL=0.050		mg/kg	
			Indeno(1,2,3-cd)pyrene	2023/11/23	ND, RDL=0.050		mg/kg	
			Naphthalene	2023/11/23	ND, RDL=0.050		mg/kg	
			Perylene	2023/11/23	ND, RDL=0.050		mg/kg	
			Phenanthrene	2023/11/23	ND, RDL=0.050		mg/kg	
			Pyrene	2023/11/23	ND, RDL=0.050		mg/kg	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9065099	SA9	RPD [XBL082-01]	1-Methylnaphthalene	2023/11/23	NC		%	50
			2-Methylnaphthalene	2023/11/23	NC		%	50
			Acenaphthene	2023/11/23	NC		%	50
			Acenaphthylene	2023/11/23	NC		%	50
			Anthracene	2023/11/23	NC		%	50
			Benzo(a)anthracene	2023/11/23	NC		%	50
			Benzo(a)pyrene	2023/11/23	NC		%	50
			Benzo(b)fluoranthene	2023/11/23	NC		%	50
			Benzo(g,h,i)perylene	2023/11/23	NC		%	50
			Benzo(j)fluoranthene	2023/11/23	NC		%	50
			Benzo(k)fluoranthene	2023/11/23	NC		%	50
			Chrysene	2023/11/23	NC		%	50
			Dibenzo(a,h)anthracene	2023/11/23	NC		%	50
			Fluoranthene	2023/11/23	NC		%	50
			Fluorene	2023/11/23	NC		%	50
			Indeno(1,2,3-cd)pyrene	2023/11/23	NC		%	50
			Naphthalene	2023/11/23	NC		%	50
			Perylene	2023/11/23	NC		%	50
			Phenanthrene	2023/11/23	NC		%	50
			Pyrene	2023/11/23	NC		%	50

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Reagent Blank: A blank matrix containing all reagents used in the analytical procedure. Used to determine any analytical contamination.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Matrix Spike exceeds acceptance limits, probable matrix interference.

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Bureau Veritas Job #: C3T3007
Report Date: 2023/11/24

SEM Ltd.
Client Project #: 235-001
Site Location: Nain
Sampler Initials: MCH

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

<Original signed by>

Colleen Acker, B.Sc, Scientific Service Specialist

<Original signed by>

Phil Deveau, Scientific Specialist (Organics)

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Your Project #: 235-001 (CF)

Attention: Kathryn Dawe

SEM Ltd.
79 Mew's Place
Second Floor
St. John's, NL
CANADA A1B 4N2

Your C.O.C. #: C#955259-01-01, C#955259-03-01, C#955259-04-01, C#955259-05-01

Report Date: 2023/11/16
Report #: R7914497
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3U8087
Received: 2023/10/03, 13:15

Sample Matrix: Soil
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Mercury (CVAA)	12	2023/10/19	2023/10/19	ATL SOP 00026	EPA 245.5 m
Metals Solids Acid Extr. ICPMS	2	2023/10/24	2023/10/24	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS	10	2023/10/24	2023/10/25	ATL SOP 00058	EPA 6020B R2 m
Moisture (1)	4	N/A	2023/10/14	CAM SOP-00445	Carter 2nd ed 51.2 m
Moisture (1)	8	N/A	2023/10/16	CAM SOP-00445	Carter 2nd ed 51.2 m
PAH Compounds in Soil by GC/MS (SIM) (1)	1	2023/10/18	2023/10/18	CAM SOP-00318	EPA 8270E
PAH Compounds in Soil by GC/MS (SIM) (1)	11	2023/10/18	2023/10/21	CAM SOP-00318	EPA 8270E

Sample Matrix: Vegetation
Samples Received: 22

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Mercury in biota	22	2023/11/13	2023/11/15	ATL SOP 00026	EPA 245.6 R2.3 m
Metals in Terrestrial Biota	3	2023/11/07	2023/11/07	ATL SOP 00058	EPA 6020B R3 m
Metals in Terrestrial Biota	8	2023/11/07	2023/11/08	ATL SOP 00058	EPA 6020B R3 m
Metals in Terrestrial Biota	11	2023/11/09	2023/11/10	ATL SOP 00058	EPA 6020B R3 m
PAH Compounds by GC/MS (SIM) (1, 2)	13	2023/11/02	2023/11/04	CAM SOP - 00318	EPA 8270 m
PAH Compounds by GC/MS (SIM) (1, 2)	9	2023/11/02	2023/11/05	CAM SOP - 00318	EPA 8270 m
Moisture (1)	22	N/A	2023/11/09	CAM SOP-00715	AOAC\ADPI methods

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Your Project #: 235-001 (CF)

Attention: Kathryn Dawe

SEM Ltd.
79 Mew's Place
Second Floor
St. John's, NL
CANADA A1B 4N2

Your C.O.C. #: C#955259-01-01, C#955259-03-01, C#955259-04-01, C#955259-05-01

Report Date: 2023/11/16
Report #: R7914497
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C3U8087
Received: 2023/10/03, 13:15

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Mississauga, 6740 Campobello Rd , Mississauga, ON, L5N 2L8
(2) Sample(s) analyzed using methodologies that have not been subjected to Bureau Veritas standard validation process for the submitted matrix and is not an Accredited method. Analysis performed with client consent, however results should be viewed with discretion.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Michelle Huth, Project Manager
Email: michelle.brescacin@bureauveritas.com
Phone# (902) 420-0203
==========
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RESULTS OF ANALYSES OF SOIL

Bureau Veritas ID		XER691		XER692		XER695		
Sampling Date		2023/09/26 12:30		2023/09/26 13:12		2023/09/26 14:43		
COC Number		C#955259-01-01		C#955259-01-01		C#955259-01-01		
	UNITS	23-NAIN-SOIL-001	QC Batch	23-NAIN-SOIL-002	QC Batch	23-NAIN-SOIL-003	RDL	QC Batch
Inorganics								
Moisture	%	60	8982163	17	8983530	34	1.0	8982163

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		XER697	XER699		XER705	XER706		
Sampling Date		2023/09/26 16:12	2023/09/26 16:12		2023/09/27 08:37	2023/09/27 09:36		
COC Number		C#955259-01-01	C#955259-03-01		C#955259-03-01	C#955259-03-01		
	UNITS	23-NAIN-SOIL-004	23-NAIN-SOIL-005	QC Batch	23-NAIN-SOIL-006	23-NAIN-SOIL-007	RDL	QC Batch
Inorganics								
Moisture	%	14	17	8982163	21	23	1.0	8983530

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		XER709	XER712	XER715	XER718	XER721		
Sampling Date		2023/09/27 12:37	2023/09/27 14:06	2023/09/28 08:35	2023/09/28 09:40	2023/09/28 12:43		
COC Number		C#955259-04-01	C#955259-04-01	C#955259-04-01	C#955259-04-01	C#955259-05-01		
	UNITS	23-NAIN-SOIL-008	23-NAIN-SOIL-009	23-NAIN-SOIL-010	23-NAIN-SOIL-011	23-NAIN-SOIL-012	RDL	QC Batch
Inorganics								
Moisture	%	36	15	29	7.8	17	1.0	8983530

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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MERCURY BY COLD VAPOUR AA (SOIL)

Bureau Veritas ID		XER691	XER692	XER695	XER697		
Sampling Date		2023/09/26 12:30	2023/09/26 13:12	2023/09/26 14:43	2023/09/26 16:12		
COC Number		C#955259-01-01	C#955259-01-01	C#955259-01-01	C#955259-01-01		
	UNITS	23-NAIN-SOIL-001	23-NAIN-SOIL-002	23-NAIN-SOIL-003	23-NAIN-SOIL-004	RDL	QC Batch
Metals							
Mercury (Hg)	mg/kg	0.049	0.044	0.025	ND	0.010	8991715

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas ID		XER699	XER705	XER706	XER709		
Sampling Date		2023/09/26 16:12	2023/09/27 08:37	2023/09/27 09:36	2023/09/27 12:37		
COC Number		C#955259-03-01	C#955259-03-01	C#955259-03-01	C#955259-04-01		
	UNITS	23-NAIN-SOIL-005	23-NAIN-SOIL-006	23-NAIN-SOIL-007	23-NAIN-SOIL-008	RDL	QC Batch
Metals							
Mercury (Hg)	mg/kg	ND	0.012	0.019	0.040	0.010	8991715

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas ID		XER712	XER715	XER718	XER721		
Sampling Date		2023/09/27 14:06	2023/09/28 08:35	2023/09/28 09:40	2023/09/28 12:43		
COC Number		C#955259-04-01	C#955259-04-01	C#955259-04-01	C#955259-05-01		
	UNITS	23-NAIN-SOIL-009	23-NAIN-SOIL-010	23-NAIN-SOIL-011	23-NAIN-SOIL-012	RDL	QC Batch
Metals							
Mercury (Hg)	mg/kg	0.014	0.023	0.037	0.019	0.010	8991715

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		XER721		
Sampling Date		2023/09/28 12:43		
COC Number		C#955259-05-01		
	UNITS	23-NAIN-SOIL-012 Lab-Dup	RDL	QC Batch
Metals				
Mercury (Hg)	mg/kg	0.017	0.010	8991715

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Bureau Veritas ID		XER691	XER692	XER692	XER695		
Sampling Date		2023/09/26 12:30	2023/09/26 13:12	2023/09/26 13:12	2023/09/26 14:43		
COC Number		C#955259-01-01	C#955259-01-01	C#955259-01-01	C#955259-01-01		
	UNITS	23-NAIN-SOIL-001	23-NAIN-SOIL-002	23-NAIN-SOIL-002 Lab-Dup	23-NAIN-SOIL-003	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	6700	22000	21000	17000	10	9001357
Acid Extractable Antimony (Sb)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Arsenic (As)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Barium (Ba)	mg/kg	18	14	12	11	5.0	9001357
Acid Extractable Beryllium (Be)	mg/kg	ND	ND	ND	ND	1.0	9001357
Acid Extractable Bismuth (Bi)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Boron (B)	mg/kg	ND	ND	ND	ND	50	9001357
Acid Extractable Cadmium (Cd)	mg/kg	ND	ND	ND	ND	0.30	9001357
Acid Extractable Chromium (Cr)	mg/kg	8.2	11	11	13	2.0	9001357
Acid Extractable Cobalt (Co)	mg/kg	1.8	14	11	3.3	1.0	9001357
Acid Extractable Copper (Cu)	mg/kg	2.6	16	15	4.8	2.0	9001357
Acid Extractable Iron (Fe)	mg/kg	11000	34000	30000	20000	50	9001357
Acid Extractable Lead (Pb)	mg/kg	3.0	2.7	2.6	3.1	0.50	9001357
Acid Extractable Lithium (Li)	mg/kg	ND	6.8	6.9	4.3	2.0	9001357
Acid Extractable Manganese (Mn)	mg/kg	14	110	88	51	2.0	9001357
Acid Extractable Mercury (Hg)	mg/kg	0.15	ND	ND	ND	0.10	9001357
Acid Extractable Molybdenum (Mo)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Nickel (Ni)	mg/kg	8.2	49	40	8.9	2.0	9001357
Acid Extractable Rubidium (Rb)	mg/kg	ND	ND	ND	2.5	2.0	9001357
Acid Extractable Selenium (Se)	mg/kg	0.81	0.79	0.72	ND	0.50	9001357
Acid Extractable Silver (Ag)	mg/kg	ND	ND	ND	ND	0.50	9001357
Acid Extractable Strontium (Sr)	mg/kg	13	10	13	6.5	5.0	9001357
Acid Extractable Thallium (Tl)	mg/kg	ND	ND	ND	ND	0.10	9001357
Acid Extractable Tin (Sn)	mg/kg	ND	ND	ND	ND	1.0	9001357
Acid Extractable Uranium (U)	mg/kg	0.22	0.51	0.48	0.29	0.10	9001357
Acid Extractable Vanadium (V)	mg/kg	27	33	30	36	2.0	9001357
Acid Extractable Zinc (Zn)	mg/kg	ND	24	20	12	5.0	9001357

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Bureau Veritas ID		XER697	XER699	XER705	XER706		
Sampling Date		2023/09/26 16:12	2023/09/26 16:12	2023/09/27 08:37	2023/09/27 09:36		
COC Number		C#955259-01-01	C#955259-03-01	C#955259-03-01	C#955259-03-01		
	UNITS	23-NAIN-SOIL-004	23-NAIN-SOIL-005	23-NAIN-SOIL-006	23-NAIN-SOIL-007	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	2400	3400	3200	2600	10	9001357
Acid Extractable Antimony (Sb)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Arsenic (As)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Barium (Ba)	mg/kg	6.1	8.1	5.3	5.7	5.0	9001357
Acid Extractable Beryllium (Be)	mg/kg	ND	ND	ND	ND	1.0	9001357
Acid Extractable Bismuth (Bi)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Boron (B)	mg/kg	ND	ND	ND	ND	50	9001357
Acid Extractable Cadmium (Cd)	mg/kg	ND	ND	ND	ND	0.30	9001357
Acid Extractable Chromium (Cr)	mg/kg	14	11	4.8	3.8	2.0	9001357
Acid Extractable Cobalt (Co)	mg/kg	13	15	1.6	4.1	1.0	9001357
Acid Extractable Copper (Cu)	mg/kg	2.2	3.4	ND	ND	2.0	9001357
Acid Extractable Iron (Fe)	mg/kg	26000	28000	8700	6900	50	9001357
Acid Extractable Lead (Pb)	mg/kg	1.3	1.5	2.0	0.74	0.50	9001357
Acid Extractable Lithium (Li)	mg/kg	ND	2.2	ND	ND	2.0	9001357
Acid Extractable Manganese (Mn)	mg/kg	160	180	29	45	2.0	9001357
Acid Extractable Mercury (Hg)	mg/kg	ND	ND	ND	ND	0.10	9001357
Acid Extractable Molybdenum (Mo)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Nickel (Ni)	mg/kg	39	41	6.1	13	2.0	9001357
Acid Extractable Rubidium (Rb)	mg/kg	ND	2.1	ND	ND	2.0	9001357
Acid Extractable Selenium (Se)	mg/kg	ND	ND	ND	ND	0.50	9001357
Acid Extractable Silver (Ag)	mg/kg	ND	ND	ND	ND	0.50	9001357
Acid Extractable Strontium (Sr)	mg/kg	5.3	5.8	ND	6.3	5.0	9001357
Acid Extractable Thallium (Tl)	mg/kg	ND	ND	ND	ND	0.10	9001357
Acid Extractable Tin (Sn)	mg/kg	ND	ND	ND	ND	1.0	9001357
Acid Extractable Uranium (U)	mg/kg	ND	0.10	0.14	ND	0.10	9001357
Acid Extractable Vanadium (V)	mg/kg	36	26	16	6.3	2.0	9001357
Acid Extractable Zinc (Zn)	mg/kg	16	19	6.1	8.8	5.0	9001357

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Bureau Veritas ID		XER709	XER712	XER715	XER718		
Sampling Date		2023/09/27 12:37	2023/09/27 14:06	2023/09/28 08:35	2023/09/28 09:40		
COC Number		C#955259-04-01	C#955259-04-01	C#955259-04-01	C#955259-04-01		
	UNITS	23-NAIN-SOIL-008	23-NAIN-SOIL-009	23-NAIN-SOIL-010	23-NAIN-SOIL-011	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	7200	3800	2800	7200	10	9001357
Acid Extractable Antimony (Sb)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Arsenic (As)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Barium (Ba)	mg/kg	18	7.8	16	30	5.0	9001357
Acid Extractable Beryllium (Be)	mg/kg	ND	ND	ND	ND	1.0	9001357
Acid Extractable Bismuth (Bi)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Boron (B)	mg/kg	ND	ND	ND	ND	50	9001357
Acid Extractable Cadmium (Cd)	mg/kg	ND	ND	ND	ND	0.30	9001357
Acid Extractable Chromium (Cr)	mg/kg	24	11	7.5	5.4	2.0	9001357
Acid Extractable Cobalt (Co)	mg/kg	ND	1.4	1.3	1.1	1.0	9001357
Acid Extractable Copper (Cu)	mg/kg	2.1	2.1	2.4	3.3	2.0	9001357
Acid Extractable Iron (Fe)	mg/kg	7300	9200	6100	5300	50	9001357
Acid Extractable Lead (Pb)	mg/kg	3.6	2.3	3.1	2.9	0.50	9001357
Acid Extractable Lithium (Li)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Manganese (Mn)	mg/kg	10	36	22	19	2.0	9001357
Acid Extractable Mercury (Hg)	mg/kg	ND	ND	ND	ND	0.10	9001357
Acid Extractable Molybdenum (Mo)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Nickel (Ni)	mg/kg	5.2	4.2	3.4	4.1	2.0	9001357
Acid Extractable Rubidium (Rb)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Selenium (Se)	mg/kg	0.62	ND	ND	ND	0.50	9001357
Acid Extractable Silver (Ag)	mg/kg	ND	ND	ND	ND	0.50	9001357
Acid Extractable Strontium (Sr)	mg/kg	16	5.0	6.7	8.6	5.0	9001357
Acid Extractable Thallium (Tl)	mg/kg	ND	ND	ND	ND	0.10	9001357
Acid Extractable Tin (Sn)	mg/kg	ND	ND	ND	ND	1.0	9001357
Acid Extractable Uranium (U)	mg/kg	0.39	0.18	0.26	0.28	0.10	9001357
Acid Extractable Vanadium (V)	mg/kg	29	25	19	9.3	2.0	9001357
Acid Extractable Zinc (Zn)	mg/kg	ND	5.9	ND	ND	5.0	9001357

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Bureau Veritas ID		XER721		
Sampling Date		2023/09/28 12:43		
COC Number		C#955259-05-01		
	UNITS	23-NAIN-SOIL-012	RDL	QC Batch
Metals				
Acid Extractable Aluminum (Al)	mg/kg	5500	10	9001357
Acid Extractable Antimony (Sb)	mg/kg	ND	2.0	9001357
Acid Extractable Arsenic (As)	mg/kg	ND	2.0	9001357
Acid Extractable Barium (Ba)	mg/kg	7.3	5.0	9001357
Acid Extractable Beryllium (Be)	mg/kg	ND	1.0	9001357
Acid Extractable Bismuth (Bi)	mg/kg	ND	2.0	9001357
Acid Extractable Boron (B)	mg/kg	ND	50	9001357
Acid Extractable Cadmium (Cd)	mg/kg	ND	0.30	9001357
Acid Extractable Chromium (Cr)	mg/kg	9.4	2.0	9001357
Acid Extractable Cobalt (Co)	mg/kg	1.4	1.0	9001357
Acid Extractable Copper (Cu)	mg/kg	2.4	2.0	9001357
Acid Extractable Iron (Fe)	mg/kg	11000	50	9001357
Acid Extractable Lead (Pb)	mg/kg	2.8	0.50	9001357
Acid Extractable Lithium (Li)	mg/kg	ND	2.0	9001357
Acid Extractable Manganese (Mn)	mg/kg	34	2.0	9001357
Acid Extractable Mercury (Hg)	mg/kg	ND	0.10	9001357
Acid Extractable Molybdenum (Mo)	mg/kg	ND	2.0	9001357
Acid Extractable Nickel (Ni)	mg/kg	3.7	2.0	9001357
Acid Extractable Rubidium (Rb)	mg/kg	ND	2.0	9001357
Acid Extractable Selenium (Se)	mg/kg	ND	0.50	9001357
Acid Extractable Silver (Ag)	mg/kg	ND	0.50	9001357
Acid Extractable Strontium (Sr)	mg/kg	ND	5.0	9001357
Acid Extractable Thallium (Tl)	mg/kg	ND	0.10	9001357
Acid Extractable Tin (Sn)	mg/kg	ND	1.0	9001357
Acid Extractable Uranium (U)	mg/kg	0.14	0.10	9001357
Acid Extractable Vanadium (V)	mg/kg	25	2.0	9001357
Acid Extractable Zinc (Zn)	mg/kg	5.3	5.0	9001357

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Bureau Veritas ID		XER691		XER692		XER695		
Sampling Date		2023/09/26 12:30		2023/09/26 13:12		2023/09/26 14:43		
COC Number		C#955259-01-01		C#955259-01-01		C#955259-01-01		
	UNITS	23-NAIN-SOIL-001	RDL	23-NAIN-SOIL-002	RDL	23-NAIN-SOIL-003	RDL	QC Batch
Polyaromatic Hydrocarbons								
Acenaphthene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Acenaphthylene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Anthracene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Benzo(a)anthracene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Benzo(a)pyrene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Benzo(b/j)fluoranthene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Benzo(g,h,i)perylene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Benzo(k)fluoranthene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Chrysene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Dibenzo(a,h)anthracene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Fluoranthene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Fluorene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Indeno(1,2,3-cd)pyrene	ug/g	ND (1)	0.20	ND	0.0050	ND (1)	0.030	8988054
1-Methylnaphthalene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
2-Methylnaphthalene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Naphthalene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Phenanthrene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Pyrene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Benzo(b)fluoranthene	ug/g	ND	0.0090	ND	0.0030	ND	0.0030	8988054
Perylene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Benzo(j)fluoranthene	ug/g	ND	0.0090	ND	0.0030	ND	0.0030	8988054
Surrogate Recovery (%)								
D10-Anthracene	%	95		99		102		8988054
D14-Terphenyl (FS)	%	110		120		112		8988054
D8-Acenaphthylene	%	94		94		99		8988054

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Detection Limit was raised due to matrix interferences.

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SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Bureau Veritas ID		XER697		XER699	XER705		XER706		
Sampling Date		2023/09/26 16:12		2023/09/26 16:12	2023/09/27 08:37		2023/09/27 09:36		
COC Number		C#955259-01-01		C#955259-03-01	C#955259-03-01		C#955259-03-01		
	UNITS	23-NAIN-SOIL-004	RDL	23-NAIN-SOIL-005	23-NAIN-SOIL-006	RDL	23-NAIN-SOIL-007	RDL	QC Batch
Polyaromatic Hydrocarbons									
Acenaphthene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Acenaphthylene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Anthracene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(a)anthracene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(a)pyrene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(b/j)fluoranthene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(g,h,i)perylene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(k)fluoranthene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Chrysene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Dibenzo(a,h)anthracene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Fluoranthene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Fluorene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Indeno(1,2,3-cd)pyrene	ug/g	ND (1)	0.010	ND	ND	0.0050	ND (1)	0.0070	8988054
1-Methylnaphthalene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
2-Methylnaphthalene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Naphthalene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Phenanthrene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Pyrene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(b)fluoranthene	ug/g	ND	0.0030	ND	ND	0.0030	ND	0.0030	8988054
Perylene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(j)fluoranthene	ug/g	ND	0.0030	ND	ND	0.0030	ND	0.0030	8988054
Surrogate Recovery (%)									
D10-Anthracene	%	100		100	104		104		8988054
D14-Terphenyl (FS)	%	111		110	110		114		8988054
D8-Acenaphthylene	%	97		98	100		101		8988054

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Detection Limit was raised due to matrix interferences.

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SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Bureau Veritas ID		XER709		XER712	XER715		XER718		
Sampling Date		2023/09/27 12:37		2023/09/27 14:06	2023/09/28 08:35		2023/09/28 09:40		
COC Number		C#955259-04-01		C#955259-04-01	C#955259-04-01		C#955259-04-01		
	UNITS	23-NAIN-SOIL-008	RDL	23-NAIN-SOIL-009	23-NAIN-SOIL-010	RDL	23-NAIN-SOIL-011	RDL	QC Batch
Polyaromatic Hydrocarbons									
Acenaphthene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Acenaphthylene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Anthracene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(a)anthracene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(a)pyrene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(b/j)fluoranthene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(g,h,i)perylene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(k)fluoranthene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Chrysene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Dibenzo(a,h)anthracene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Fluoranthene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Fluorene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Indeno(1,2,3-cd)pyrene	ug/g	ND (1)	0.0060	ND	ND	0.0050	ND (1)	0.0090	8988054
1-Methylnaphthalene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
2-Methylnaphthalene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Naphthalene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Phenanthrene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Pyrene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(b)fluoranthene	ug/g	ND	0.0030	ND	ND	0.0030	ND	0.0030	8988054
Perylene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(j)fluoranthene	ug/g	ND	0.0030	ND	ND	0.0030	ND	0.0030	8988054
Surrogate Recovery (%)									
D10-Anthracene	%	94		99	87		94		8988054
D14-Terphenyl (FS)	%	105		106	97		106		8988054
D8-Acenaphthylene	%	94		96	88		94		8988054

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Detection Limit was raised due to matrix interferences.

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SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Bureau Veritas ID		XER721		
Sampling Date		2023/09/28 12:43		
COC Number		C#955259-05-01		
	UNITS	23-NAIN-SOIL-012	RDL	QC Batch
Polyaromatic Hydrocarbons				
Acenaphthene	ug/g	ND	0.0050	8988054
Acenaphthylene	ug/g	ND	0.0050	8988054
Anthracene	ug/g	ND	0.0050	8988054
Benzo(a)anthracene	ug/g	ND	0.0050	8988054
Benzo(a)pyrene	ug/g	ND	0.0050	8988054
Benzo(b/j)fluoranthene	ug/g	ND	0.0050	8988054
Benzo(g,h,i)perylene	ug/g	ND	0.0050	8988054
Benzo(k)fluoranthene	ug/g	ND	0.0050	8988054
Chrysene	ug/g	ND (1)	0.030	8988054
Dibenzo(a,h)anthracene	ug/g	ND	0.0050	8988054
Fluoranthene	ug/g	ND	0.0050	8988054
Fluorene	ug/g	ND	0.0050	8988054
Indeno(1,2,3-cd)pyrene	ug/g	ND	0.0050	8988054
1-Methylnaphthalene	ug/g	ND	0.0050	8988054
2-Methylnaphthalene	ug/g	ND	0.0050	8988054
Naphthalene	ug/g	ND	0.0050	8988054
Phenanthrene	ug/g	ND	0.0050	8988054
Pyrene	ug/g	ND	0.0050	8988054
Benzo(b)fluoranthene	ug/g	ND	0.0030	8988054
Perylene	ug/g	ND	0.0050	8988054
Benzo(j)fluoranthene	ug/g	ND	0.0030	8988054
Surrogate Recovery (%)				
D10-Anthracene	%	103		8988054
D14-Terphenyl (FS)	%	110		8988054
D8-Acenaphthylene	%	98		8988054

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Detection Limit was raised due to matrix interferences.

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RESULTS OF ANALYSES OF VEGETATION

Bureau Veritas ID		XER689		XER690		XER693		
Sampling Date		2023/09/26 12:10		2023/09/26 12:10		2023/09/26 13:28		
COC Number		C#955259-01-01		C#955259-01-01		C#955259-01-01		
	UNITS	23-NAIN-CF-001	QC Batch	23-NAIN-CF-002	QC Batch	23-NAIN-CF-003	RDL	QC Batch
Nutritional Parameters								
Moisture	g/100g	52.81	9038834	82.79	9038736	51.47	0.10	9038834

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		XER694		XER696		XER698	XER700		
Sampling Date		2023/09/26 13:12		2023/09/26 14:55		2023/09/26 16:12	2023/09/26 16:12		
COC Number		C#955259-01-01		C#955259-01-01		C#955259-01-01	C#955259-03-01		
	UNITS	23-NAIN-CF-004	QC Batch	23-NAIN-CF-005	QC Batch	23-NAIN-CF-006	23-NAIN-CF-007	RDL	QC Batch
Nutritional Parameters									
Moisture	g/100g	82.08	9038736	51.77	9038834	83.37	84.06	0.10	9038736

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		XER701	XER702		XER703		XER704		
Sampling Date		2023/09/26 16:22	2023/09/26 16:22		2023/09/27 08:37		2023/09/27 08:37		
COC Number		C#955259-03-01	C#955259-03-01		C#955259-03-01		C#955259-03-01		
	UNITS	23-NAIN-CF-008	23-NAIN-CF-009	QC Batch	23-NAIN-CF-010	QC Batch	23-NAIN-CF-011	RDL	QC Batch
Nutritional Parameters									
Moisture	g/100g	51.61	51.78	9038834	83.16	9038736	51.41	0.10	9038834

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		XER707		XER708	XER710		XER711		
Sampling Date		2023/09/27 09:36		2023/09/27 09:36	2023/09/27 12:37		2023/09/27 12:45		
COC Number		C#955259-03-01		C#955259-03-01	C#955259-04-01		C#955259-04-01		
	UNITS	23-NAIN-CF-012	QC Batch	23-NAIN-CF-013	23-NAIN-CF-014	QC Batch	23-NAIN-CF-015	RDL	QC Batch
Nutritional Parameters									
Moisture	g/100g	51.77	9038834	84.00	84.63	9038736	52.05	0.10	9038834

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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RESULTS OF ANALYSES OF VEGETATION

Bureau Veritas ID		XER713		XER714		XER716	XER716		
Sampling Date		2023/09/27 14:06		2023/09/27 14:06		2023/09/28 08:35	2023/09/28 08:35		
COC Number		C#955259-04-01		C#955259-04-01		C#955259-04-01	C#955259-04-01		
	UNITS	23-NAIN-CF-016	QC Batch	23-NAIN-CF-017	QC Batch	23-NAIN-CF-018	23-NAIN-CF-018 Lab-Dup	RDL	QC Batch
Nutritional Parameters									
Moisture	g/100g	84.97	9038736	48.33	9038834	85.65	85.69	0.10	9038736

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas ID		XER717		XER719		XER720		
Sampling Date		2023/09/28 08:50		2023/09/28 09:53		2023/09/28 09:53		
COC Number		C#955259-04-01		C#955259-05-01		C#955259-05-01		
	UNITS	23-NAIN-CF-019	QC Batch	23-NAIN-CF-020	QC Batch	23-NAIN-CF-021	RDL	QC Batch
Nutritional Parameters								
Moisture	g/100g	53.31	9038834	83.82	9038736	53.87	0.10	9038834

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		XER722		
Sampling Date		2023/09/28 12:43		
COC Number		C#955259-05-01		
	UNITS	23-NAIN-CF-022	RDL	QC Batch
Nutritional Parameters				
Moisture	g/100g	83.37	0.10	9038736

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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MERCURY BY COLD VAPOUR AA (VEGETATION)

Bureau Veritas ID		XER689	XER690	XER693	XER694	XER694		
Sampling Date		2023/09/26 12:10	2023/09/26 12:10	2023/09/26 13:28	2023/09/26 13:12	2023/09/26 13:12		
COC Number		C#955259-01-01	C#955259-01-01	C#955259-01-01	C#955259-01-01	C#955259-01-01		
	UNITS	23-NAIN-CF-001	23-NAIN-CF-002	23-NAIN-CF-003	23-NAIN-CF-004	23-NAIN-CF-004 Lab-Dup	RDL	QC Batch
Metals								
Mercury (Hg)	mg/kg	ND	ND	ND	ND	ND	0.020	9045622

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas ID		XER696	XER698	XER700	XER701	XER702		
Sampling Date		2023/09/26 14:55	2023/09/26 16:12	2023/09/26 16:12	2023/09/26 16:22	2023/09/26 16:22		
COC Number		C#955259-01-01	C#955259-01-01	C#955259-03-01	C#955259-03-01	C#955259-03-01		
	UNITS	23-NAIN-CF-005	23-NAIN-CF-006	23-NAIN-CF-007	23-NAIN-CF-008	23-NAIN-CF-009	RDL	QC Batch
Metals								
Mercury (Hg)	mg/kg	ND	ND	ND	ND	ND	0.020	9045622

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas ID		XER703		XER704		XER707	XER708		
Sampling Date		2023/09/27 08:37		2023/09/27 08:37		2023/09/27 09:36	2023/09/27 09:36		
COC Number		C#955259-03-01		C#955259-03-01		C#955259-03-01	C#955259-03-01		
	UNITS	23-NAIN-CF-010	QC Batch	23-NAIN-CF-011	QC Batch	23-NAIN-CF-012	23-NAIN-CF-013	RDL	QC Batch
Metals									
Mercury (Hg)	mg/kg	ND	9045622	ND	9045643	ND	ND	0.020	9045622

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas ID		XER710	XER711	XER713	XER714	XER716		
Sampling Date		2023/09/27 12:37	2023/09/27 12:45	2023/09/27 14:06	2023/09/27 14:06	2023/09/28 08:35		
COC Number		C#955259-04-01	C#955259-04-01	C#955259-04-01	C#955259-04-01	C#955259-04-01		
	UNITS	23-NAIN-CF-014	23-NAIN-CF-015	23-NAIN-CF-016	23-NAIN-CF-017	23-NAIN-CF-018	RDL	QC Batch
Metals								
Mercury (Hg)	mg/kg	ND	ND	ND	ND	ND	0.020	9045622

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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MERCURY BY COLD VAPOUR AA (VEGETATION)

Bureau Veritas ID		XER717	XER719		XER720	XER722		
Sampling Date		2023/09/28 08:50	2023/09/28 09:53		2023/09/28 09:53	2023/09/28 12:43		
COC Number		C#955259-04-01	C#955259-05-01		C#955259-05-01	C#955259-05-01		
	UNITS	**23-NAIN-CF-019**	**23-NAIN-CF-020**	**QC Batch**	**23-NAIN-CF-021**	**23-NAIN-CF-022**	**RDL**	**QC Batch**
Metals								
Mercury (Hg)	mg/kg	ND	ND	9045622	ND	ND	0.020	9045643

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ELEMENTS BY ATOMIC SPECTROSCOPY (VEGETATION)

Bureau Veritas ID		XER689		XER690	XER690	XER693		
Sampling Date		2023/09/26 12:10		2023/09/26 12:10	2023/09/26 12:10	2023/09/26 13:28		
COC Number		C#955259-01-01		C#955259-01-01	C#955259-01-01	C#955259-01-01		
	UNITS	23-NAIN-CF-001	QC Batch	23-NAIN-CF-002	23-NAIN-CF-002 Lab-Dup	23-NAIN-CF-003	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	120	9033096	23	25	46	10	9038516
Acid Extractable Antimony (Sb)	mg/kg	ND	9033096	ND	ND	ND	2.0	9038516
Acid Extractable Arsenic (As)	mg/kg	ND	9033096	ND	ND	ND	2.0	9038516
Acid Extractable Barium (Ba)	mg/kg	8.7	9033096	50	57	96	5.0	9038516
Acid Extractable Beryllium (Be)	mg/kg	ND	9033096	ND	ND	ND	2.0	9038516
Acid Extractable Boron (B)	mg/kg	ND	9033096	18	19	17	5.0	9038516
Acid Extractable Cadmium (Cd)	mg/kg	ND	9033096	ND	ND	ND	0.30	9038516
Acid Extractable Chromium (Cr)	mg/kg	ND	9033096	ND	ND	ND	2.0	9038516
Acid Extractable Cobalt (Co)	mg/kg	1.4	9033096	ND	ND	ND	1.0	9038516
Acid Extractable Copper (Cu)	mg/kg	2.9	9033096	4.2	5.0	3.5	2.0	9038516
Acid Extractable Iron (Fe)	mg/kg	1400	9033096	ND	ND	ND	50	9038516
Acid Extractable Lead (Pb)	mg/kg	ND	9033096	ND	ND	ND	0.50	9038516
Acid Extractable Lithium (Li)	mg/kg	ND	9033096	ND	ND	ND	2.0	9038516
Acid Extractable Manganese (Mn)	mg/kg	100	9033096	590	650	290	2.0	9038516
Acid Extractable Molybdenum (Mo)	mg/kg	ND	9033096	ND	ND	ND	2.0	9038516
Acid Extractable Nickel (Ni)	mg/kg	6.2	9033096	ND	2.5	4.0	2.0	9038516
Acid Extractable Selenium (Se)	mg/kg	ND	9033096	ND	ND	ND	2.0	9038516
Acid Extractable Silver (Ag)	mg/kg	ND	9033096	ND	ND	ND	0.50	9038516
Acid Extractable Strontium (Sr)	mg/kg	ND	9033096	9.1	10	28	5.0	9038516
Acid Extractable Thallium (Tl)	mg/kg	ND	9033096	ND	ND	ND	0.10	9038516
Acid Extractable Uranium (U)	mg/kg	ND	9033096	ND	ND	ND	0.10	9038516
Acid Extractable Vanadium (V)	mg/kg	ND	9033096	ND	ND	ND	2.0	9038516
Acid Extractable Zinc (Zn)	mg/kg	6.9	9033096	22	24	26	5.0	9038516

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ELEMENTS BY ATOMIC SPECTROSCOPY (VEGETATION)

Bureau Veritas ID		XER694		XER696		XER698		
Sampling Date		2023/09/26 13:12		2023/09/26 14:55		2023/09/26 16:12		
COC Number		C#955259-01-01		C#955259-01-01		C#955259-01-01		
	UNITS	23-NAIN-CF-004	QC Batch	23-NAIN-CF-005	QC Batch	23-NAIN-CF-006	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	27	9033096	29	9038516	32	10	9033096
Acid Extractable Antimony (Sb)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Arsenic (As)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Barium (Ba)	mg/kg	8.7	9033096	83	9038516	11	5.0	9033096
Acid Extractable Beryllium (Be)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Boron (B)	mg/kg	ND	9033096	20	9038516	6.3	5.0	9033096
Acid Extractable Cadmium (Cd)	mg/kg	ND	9033096	ND	9038516	ND	0.30	9033096
Acid Extractable Chromium (Cr)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Cobalt (Co)	mg/kg	ND	9033096	ND	9038516	ND	1.0	9033096
Acid Extractable Copper (Cu)	mg/kg	2.4	9033096	3.5	9038516	3.2	2.0	9033096
Acid Extractable Iron (Fe)	mg/kg	ND	9033096	ND	9038516	ND	50	9033096
Acid Extractable Lead (Pb)	mg/kg	ND	9033096	ND	9038516	ND	0.50	9033096
Acid Extractable Lithium (Li)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Manganese (Mn)	mg/kg	54	9033096	260	9038516	140	2.0	9033096
Acid Extractable Molybdenum (Mo)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Nickel (Ni)	mg/kg	2.8	9033096	2.5	9038516	2.1	2.0	9033096
Acid Extractable Selenium (Se)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Silver (Ag)	mg/kg	ND	9033096	ND	9038516	ND	0.50	9033096
Acid Extractable Strontium (Sr)	mg/kg	ND	9033096	15	9038516	ND	5.0	9033096
Acid Extractable Thallium (Tl)	mg/kg	ND	9033096	ND	9038516	ND	0.10	9033096
Acid Extractable Uranium (U)	mg/kg	ND	9033096	ND	9038516	ND	0.10	9033096
Acid Extractable Vanadium (V)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Zinc (Zn)	mg/kg	ND	9033096	21	9038516	7.5	5.0	9033096

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ELEMENTS BY ATOMIC SPECTROSCOPY (VEGETATION)

Bureau Veritas ID		XER700		XER701	XER702		
Sampling Date		2023/09/26 16:12		2023/09/26 16:22	2023/09/26 16:22		
COC Number		C#955259-03-01		C#955259-03-01	C#955259-03-01		
	UNITS	23-NAIN-CF-007	QC Batch	23-NAIN-CF-008	23-NAIN-CF-009	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	30	9033096	45	18	10	9038516
Acid Extractable Antimony (Sb)	mg/kg	ND	9033096	ND	ND	2.0	9038516
Acid Extractable Arsenic (As)	mg/kg	ND	9033096	ND	ND	2.0	9038516
Acid Extractable Barium (Ba)	mg/kg	9.2	9033096	73	49	5.0	9038516
Acid Extractable Beryllium (Be)	mg/kg	ND	9033096	ND	ND	2.0	9038516
Acid Extractable Boron (B)	mg/kg	7.2	9033096	18	17	5.0	9038516
Acid Extractable Cadmium (Cd)	mg/kg	ND	9033096	ND	ND	0.30	9038516
Acid Extractable Chromium (Cr)	mg/kg	ND	9033096	ND	ND	2.0	9038516
Acid Extractable Cobalt (Co)	mg/kg	ND	9033096	ND	ND	1.0	9038516
Acid Extractable Copper (Cu)	mg/kg	3.3	9033096	3.6	4.6	2.0	9038516
Acid Extractable Iron (Fe)	mg/kg	ND	9033096	ND	ND	50	9038516
Acid Extractable Lead (Pb)	mg/kg	ND	9033096	ND	ND	0.50	9038516
Acid Extractable Lithium (Li)	mg/kg	ND	9033096	ND	ND	2.0	9038516
Acid Extractable Manganese (Mn)	mg/kg	140	9033096	370	270	2.0	9038516
Acid Extractable Molybdenum (Mo)	mg/kg	ND	9033096	ND	ND	2.0	9038516
Acid Extractable Nickel (Ni)	mg/kg	2.0	9033096	2.3	ND	2.0	9038516
Acid Extractable Selenium (Se)	mg/kg	ND	9033096	ND	ND	2.0	9038516
Acid Extractable Silver (Ag)	mg/kg	ND	9033096	ND	ND	0.50	9038516
Acid Extractable Strontium (Sr)	mg/kg	ND	9033096	12	7.7	5.0	9038516
Acid Extractable Thallium (Tl)	mg/kg	ND	9033096	ND	ND	0.10	9038516
Acid Extractable Uranium (U)	mg/kg	ND	9033096	ND	ND	0.10	9038516
Acid Extractable Vanadium (V)	mg/kg	ND	9033096	ND	ND	2.0	9038516
Acid Extractable Zinc (Zn)	mg/kg	8.0	9033096	24	24	5.0	9038516

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ELEMENTS BY ATOMIC SPECTROSCOPY (VEGETATION)

Bureau Veritas ID		XER703		XER704	XER707		
Sampling Date		2023/09/27 08:37		2023/09/27 08:37	2023/09/27 09:36		
COC Number		C#955259-03-01		C#955259-03-01	C#955259-03-01		
	UNITS	23-NAIN-CF-010	QC Batch	23-NAIN-CF-011	23-NAIN-CF-012	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	28	9033096	20	44	10	9038516
Acid Extractable Antimony (Sb)	mg/kg	ND	9033096	ND	ND	2.0	9038516
Acid Extractable Arsenic (As)	mg/kg	ND	9033096	ND	ND	2.0	9038516
Acid Extractable Barium (Ba)	mg/kg	7.1	9033096	100	86	5.0	9038516
Acid Extractable Beryllium (Be)	mg/kg	ND	9033096	ND	ND	2.0	9038516
Acid Extractable Boron (B)	mg/kg	6.9	9033096	15	20	5.0	9038516
Acid Extractable Cadmium (Cd)	mg/kg	ND	9033096	ND	ND	0.30	9038516
Acid Extractable Chromium (Cr)	mg/kg	ND	9033096	ND	ND	2.0	9038516
Acid Extractable Cobalt (Co)	mg/kg	ND	9033096	ND	ND	1.0	9038516
Acid Extractable Copper (Cu)	mg/kg	3.8	9033096	3.9	3.5	2.0	9038516
Acid Extractable Iron (Fe)	mg/kg	ND	9033096	ND	ND	50	9038516
Acid Extractable Lead (Pb)	mg/kg	ND	9033096	ND	ND	0.50	9038516
Acid Extractable Lithium (Li)	mg/kg	ND	9033096	ND	ND	2.0	9038516
Acid Extractable Manganese (Mn)	mg/kg	95	9033096	290	380	2.0	9038516
Acid Extractable Molybdenum (Mo)	mg/kg	ND	9033096	ND	ND	2.0	9038516
Acid Extractable Nickel (Ni)	mg/kg	ND	9033096	ND	3.0	2.0	9038516
Acid Extractable Selenium (Se)	mg/kg	ND	9033096	ND	ND	2.0	9038516
Acid Extractable Silver (Ag)	mg/kg	ND	9033096	ND	ND	0.50	9038516
Acid Extractable Strontium (Sr)	mg/kg	ND	9033096	24	14	5.0	9038516
Acid Extractable Thallium (Tl)	mg/kg	ND	9033096	ND	ND	0.10	9038516
Acid Extractable Uranium (U)	mg/kg	ND	9033096	ND	ND	0.10	9038516
Acid Extractable Vanadium (V)	mg/kg	ND	9033096	ND	ND	2.0	9038516
Acid Extractable Zinc (Zn)	mg/kg	8.3	9033096	31	23	5.0	9038516

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ELEMENTS BY ATOMIC SPECTROSCOPY (VEGETATION)

Bureau Veritas ID		XER708	XER708	XER710		XER711		
Sampling Date		2023/09/27 09:36	2023/09/27 09:36	2023/09/27 12:37		2023/09/27 12:45		
COC Number		C#955259-03-01	C#955259-03-01	C#955259-04-01		C#955259-04-01		
	UNITS	23-NAIN-CF-013	23-NAIN-CF-013 Lab-Dup	23-NAIN-CF-014	QC Batch	23-NAIN-CF-015	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	21	21	22	9033096	30	10	9038516
Acid Extractable Antimony (Sb)	mg/kg	ND	ND	ND	9033096	ND	2.0	9038516
Acid Extractable Arsenic (As)	mg/kg	ND	ND	ND	9033096	ND	2.0	9038516
Acid Extractable Barium (Ba)	mg/kg	7.0	6.3	12	9033096	65	5.0	9038516
Acid Extractable Beryllium (Be)	mg/kg	ND	ND	ND	9033096	ND	2.0	9038516
Acid Extractable Boron (B)	mg/kg	10	10	5.1	9033096	15	5.0	9038516
Acid Extractable Cadmium (Cd)	mg/kg	ND	ND	ND	9033096	ND	0.30	9038516
Acid Extractable Chromium (Cr)	mg/kg	ND	ND	ND	9033096	ND	2.0	9038516
Acid Extractable Cobalt (Co)	mg/kg	ND	ND	ND	9033096	ND	1.0	9038516
Acid Extractable Copper (Cu)	mg/kg	2.6	2.6	2.9	9033096	5.0	2.0	9038516
Acid Extractable Iron (Fe)	mg/kg	ND	ND	ND	9033096	ND	50	9038516
Acid Extractable Lead (Pb)	mg/kg	ND	ND	ND	9033096	ND	0.50	9038516
Acid Extractable Lithium (Li)	mg/kg	ND	ND	ND	9033096	ND	2.0	9038516
Acid Extractable Manganese (Mn)	mg/kg	85	87	53	9033096	230	2.0	9038516
Acid Extractable Molybdenum (Mo)	mg/kg	ND	ND	ND	9033096	ND	2.0	9038516
Acid Extractable Nickel (Ni)	mg/kg	ND	ND	ND	9033096	2.1	2.0	9038516
Acid Extractable Selenium (Se)	mg/kg	ND	ND	ND	9033096	ND	2.0	9038516
Acid Extractable Silver (Ag)	mg/kg	ND	ND	ND	9033096	ND	0.50	9038516
Acid Extractable Strontium (Sr)	mg/kg	ND	ND	ND	9033096	9.4	5.0	9038516
Acid Extractable Thallium (Tl)	mg/kg	ND	ND	ND	9033096	ND	0.10	9038516
Acid Extractable Uranium (U)	mg/kg	ND	ND	ND	9033096	ND	0.10	9038516
Acid Extractable Vanadium (V)	mg/kg	ND	ND	ND	9033096	ND	2.0	9038516
Acid Extractable Zinc (Zn)	mg/kg	6.8	6.6	6.9	9033096	24	5.0	9038516

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ELEMENTS BY ATOMIC SPECTROSCOPY (VEGETATION)

Bureau Veritas ID		XER713		XER714		XER716		
Sampling Date		2023/09/27 14:06		2023/09/27 14:06		2023/09/28 08:35		
COC Number		C#955259-04-01		C#955259-04-01		C#955259-04-01		
	UNITS	23-NAIN-CF-016	QC Batch	23-NAIN-CF-017	QC Batch	23-NAIN-CF-018	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	25	9033096	49	9038516	16	10	9033096
Acid Extractable Antimony (Sb)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Arsenic (As)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Barium (Ba)	mg/kg	12	9033096	61	9038516	10	5.0	9033096
Acid Extractable Beryllium (Be)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Boron (B)	mg/kg	ND	9033096	14	9038516	6.7	5.0	9033096
Acid Extractable Cadmium (Cd)	mg/kg	ND	9033096	ND	9038516	ND	0.30	9033096
Acid Extractable Chromium (Cr)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Cobalt (Co)	mg/kg	ND	9033096	ND	9038516	ND	1.0	9033096
Acid Extractable Copper (Cu)	mg/kg	3.0	9033096	3.8	9038516	2.8	2.0	9033096
Acid Extractable Iron (Fe)	mg/kg	ND	9033096	ND	9038516	ND	50	9033096
Acid Extractable Lead (Pb)	mg/kg	ND	9033096	ND	9038516	ND	0.50	9033096
Acid Extractable Lithium (Li)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Manganese (Mn)	mg/kg	68	9033096	410	9038516	48	2.0	9033096
Acid Extractable Molybdenum (Mo)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Nickel (Ni)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Selenium (Se)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Silver (Ag)	mg/kg	ND	9033096	ND	9038516	ND	0.50	9033096
Acid Extractable Strontium (Sr)	mg/kg	6.6	9033096	16	9038516	ND	5.0	9033096
Acid Extractable Thallium (Tl)	mg/kg	ND	9033096	ND	9038516	ND	0.10	9033096
Acid Extractable Uranium (U)	mg/kg	ND	9033096	ND	9038516	ND	0.10	9033096
Acid Extractable Vanadium (V)	mg/kg	ND	9033096	ND	9038516	ND	2.0	9033096
Acid Extractable Zinc (Zn)	mg/kg	6.0	9033096	25	9038516	ND	5.0	9033096

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ELEMENTS BY ATOMIC SPECTROSCOPY (VEGETATION)

Bureau Veritas ID		XER717		XER719		XER720		
Sampling Date		2023/09/28 08:50		2023/09/28 09:53		2023/09/28 09:53		
COC Number		C#955259-04-01		C#955259-05-01		C#955259-05-01		
	UNITS	23-NAIN-CF-019	QC Batch	23-NAIN-CF-020	QC Batch	23-NAIN-CF-021	RDL	QC Batch
Metals								
Acid Extractable Aluminum (Al)	mg/kg	32	9038516	36	9033096	45	10	9038516
Acid Extractable Antimony (Sb)	mg/kg	ND	9038516	ND	9033096	ND	2.0	9038516
Acid Extractable Arsenic (As)	mg/kg	ND	9038516	ND	9033096	ND	2.0	9038516
Acid Extractable Barium (Ba)	mg/kg	78	9038516	9.9	9033096	110	5.0	9038516
Acid Extractable Beryllium (Be)	mg/kg	ND	9038516	ND	9033096	ND	2.0	9038516
Acid Extractable Boron (B)	mg/kg	13	9038516	7.1	9033096	13	5.0	9038516
Acid Extractable Cadmium (Cd)	mg/kg	ND	9038516	ND	9033096	ND	0.30	9038516
Acid Extractable Chromium (Cr)	mg/kg	ND	9038516	ND	9033096	ND	2.0	9038516
Acid Extractable Cobalt (Co)	mg/kg	ND	9038516	ND	9033096	ND	1.0	9038516
Acid Extractable Copper (Cu)	mg/kg	5.0	9038516	3.1	9033096	4.0	2.0	9038516
Acid Extractable Iron (Fe)	mg/kg	ND	9038516	ND	9033096	ND	50	9038516
Acid Extractable Lead (Pb)	mg/kg	ND	9038516	ND	9033096	ND	0.50	9038516
Acid Extractable Lithium (Li)	mg/kg	ND	9038516	ND	9033096	ND	2.0	9038516
Acid Extractable Manganese (Mn)	mg/kg	270	9038516	98	9033096	260	2.0	9038516
Acid Extractable Molybdenum (Mo)	mg/kg	ND	9038516	ND	9033096	ND	2.0	9038516
Acid Extractable Nickel (Ni)	mg/kg	2.1	9038516	ND	9033096	ND	2.0	9038516
Acid Extractable Selenium (Se)	mg/kg	ND	9038516	ND	9033096	ND	2.0	9038516
Acid Extractable Silver (Ag)	mg/kg	ND	9038516	ND	9033096	ND	0.50	9038516
Acid Extractable Strontium (Sr)	mg/kg	14	9038516	ND	9033096	12	5.0	9038516
Acid Extractable Thallium (Tl)	mg/kg	ND	9038516	ND	9033096	ND	0.10	9038516
Acid Extractable Uranium (U)	mg/kg	ND	9038516	ND	9033096	ND	0.10	9038516
Acid Extractable Vanadium (V)	mg/kg	ND	9038516	ND	9033096	ND	2.0	9038516
Acid Extractable Zinc (Zn)	mg/kg	30	9038516	7.4	9033096	32	5.0	9038516

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ELEMENTS BY ATOMIC SPECTROSCOPY (VEGETATION)

Bureau Veritas ID		XER722		
Sampling Date		2023/09/28 12:43		
COC Number		C#955259-05-01		
	UNITS	23-NAIN-CF-022	RDL	QC Batch
Metals				
Acid Extractable Aluminum (Al)	mg/kg	36	10	9033096
Acid Extractable Antimony (Sb)	mg/kg	ND	2.0	9033096
Acid Extractable Arsenic (As)	mg/kg	ND	2.0	9033096
Acid Extractable Barium (Ba)	mg/kg	7.0	5.0	9033096
Acid Extractable Beryllium (Be)	mg/kg	ND	2.0	9033096
Acid Extractable Boron (B)	mg/kg	6.0	5.0	9033096
Acid Extractable Cadmium (Cd)	mg/kg	ND	0.30	9033096
Acid Extractable Chromium (Cr)	mg/kg	ND	2.0	9033096
Acid Extractable Cobalt (Co)	mg/kg	ND	1.0	9033096
Acid Extractable Copper (Cu)	mg/kg	3.3	2.0	9033096
Acid Extractable Iron (Fe)	mg/kg	ND	50	9033096
Acid Extractable Lead (Pb)	mg/kg	ND	0.50	9033096
Acid Extractable Lithium (Li)	mg/kg	ND	2.0	9033096
Acid Extractable Manganese (Mn)	mg/kg	72	2.0	9033096
Acid Extractable Molybdenum (Mo)	mg/kg	ND	2.0	9033096
Acid Extractable Nickel (Ni)	mg/kg	2.1	2.0	9033096
Acid Extractable Selenium (Se)	mg/kg	ND	2.0	9033096
Acid Extractable Silver (Ag)	mg/kg	ND	0.50	9033096
Acid Extractable Strontium (Sr)	mg/kg	ND	5.0	9033096
Acid Extractable Thallium (Tl)	mg/kg	ND	0.10	9033096
Acid Extractable Uranium (U)	mg/kg	ND	0.10	9033096
Acid Extractable Vanadium (V)	mg/kg	ND	2.0	9033096
Acid Extractable Zinc (Zn)	mg/kg	6.3	5.0	9033096

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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SEMI-VOLATILE ORGANICS BY GC-MS (VEGETATION)

Bureau Veritas ID		XER689			XER690			XER693		
Sampling Date		2023/09/26 12:10			2023/09/26 12:10			2023/09/26 13:28		
COC Number		C#955259-01-01			C#955259-01-01			C#955259-01-01		
	UNITS	23-NAIN-CF-001	RDL	QC Batch	23-NAIN-CF-002	RDL	QC Batch	23-NAIN-CF-003	RDL	QC Batch
Polyaromatic Hydrocarbons										
Acenaphthene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
Acenaphthylene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
Anthracene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
Benzo(a)anthracene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
Benzo(a)pyrene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
Benzo(b/j)fluoranthene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
Benzo(g,h,i)perylene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
Benzo(k)fluoranthene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
Chrysene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
Dibenzo(a,h)anthracene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
Fluoranthene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
Fluorene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
Indeno(1,2,3-cd)pyrene	ug/g	ND (1)	2	9024630	ND	0.05	9025857	ND (1)	1	9024630
1-Methylnaphthalene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
2-Methylnaphthalene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
Naphthalene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
Phenanthrene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
Pyrene	ug/g	ND	0.5	9024630	ND	0.05	9025857	ND	0.5	9024630
Surrogate Recovery (%)										
D10-Anthracene	%	88		9024630	115		9025857	87		9024630
D14-Terphenyl (FS)	%	81		9024630	105		9025857	80		9024630
D8-Acenaphthylene	%	82		9024630	88		9025857	82		9024630

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Detection Limit was raised due to matrix interferences.

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SEMI-VOLATILE ORGANICS BY GC-MS (VEGETATION)

Bureau Veritas ID		XER694			XER696			XER698		
Sampling Date		2023/09/26 13:12			2023/09/26 14:55			2023/09/26 16:12		
COC Number		C#955259-01-01			C#955259-01-01			C#955259-01-01		
	UNITS	23-NAIN-CF-004	RDL	QC Batch	23-NAIN-CF-005	RDL	QC Batch	23-NAIN-CF-006	RDL	QC Batch
Polyaromatic Hydrocarbons										
Acenaphthene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Acenaphthylene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Anthracene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Benzo(a)anthracene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Benzo(a)pyrene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Benzo(b/j)fluoranthene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Benzo(g,h,i)perylene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Benzo(k)fluoranthene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Chrysene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Dibenzo(a,h)anthracene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Fluoranthene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Fluorene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Indeno(1,2,3-cd)pyrene	ug/g	ND	0.05	9025857	ND (1)	1	9024630	ND	0.05	9025857
1-Methylnaphthalene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
2-Methylnaphthalene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Naphthalene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Phenanthrene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Pyrene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Surrogate Recovery (%)										
D10-Anthracene	%	117		9025857	66		9024630	116		9025857
D14-Terphenyl (FS)	%	104		9025857	47		9024630	107		9025857
D8-Acenaphthylene	%	92		9025857	62		9024630	90		9025857

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Detection Limit was raised due to matrix interferences.

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SEMI-VOLATILE ORGANICS BY GC-MS (VEGETATION)

Bureau Veritas ID		XER700			XER701	XER702		
Sampling Date		2023/09/26 16:12			2023/09/26 16:22	2023/09/26 16:22		
COC Number		C#955259-03-01			C#955259-03-01	C#955259-03-01		
	UNITS	23-NAIN-CF-007	RDL	QC Batch	23-NAIN-CF-008	23-NAIN-CF-009	RDL	QC Batch
Polyaromatic Hydrocarbons								
Acenaphthene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Acenaphthylene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Anthracene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Benzo(a)anthracene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Benzo(a)pyrene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Benzo(b/j)fluoranthene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Benzo(g,h,i)perylene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Benzo(k)fluoranthene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Chrysene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Dibenzo(a,h)anthracene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Fluoranthene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Fluorene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Indeno(1,2,3-cd)pyrene	ug/g	ND	0.05	9025857	ND (1)	ND (1)	1	9024630
1-Methylnaphthalene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
2-Methylnaphthalene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Naphthalene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Phenanthrene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Pyrene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Surrogate Recovery (%)								
D10-Anthracene	%	107		9025857	88	88		9024630
D14-Terphenyl (FS)	%	97		9025857	89	84		9024630
D8-Acenaphthylene	%	85		9025857	85	87		9024630

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Detection Limit was raised due to matrix interferences.

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SEMI-VOLATILE ORGANICS BY GC-MS (VEGETATION)

Bureau Veritas ID		XER703			XER704	XER707		
Sampling Date		2023/09/27 08:37			2023/09/27 08:37	2023/09/27 09:36		
COC Number		C#955259-03-01			C#955259-03-01	C#955259-03-01		
	UNITS	23-NAIN-CF-010	RDL	QC Batch	23-NAIN-CF-011	23-NAIN-CF-012	RDL	QC Batch
Polyaromatic Hydrocarbons								
Acenaphthene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Acenaphthylene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Anthracene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Benzo(a)anthracene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Benzo(a)pyrene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Benzo(b/j)fluoranthene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Benzo(g,h,i)perylene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Benzo(k)fluoranthene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Chrysene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Dibenzo(a,h)anthracene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Fluoranthene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Fluorene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Indeno(1,2,3-cd)pyrene	ug/g	ND	0.05	9025857	ND (1)	ND (1)	1	9024630
1-Methylnaphthalene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
2-Methylnaphthalene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Naphthalene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Phenanthrene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Pyrene	ug/g	ND	0.05	9025857	ND	ND	0.5	9024630
Surrogate Recovery (%)								
D10-Anthracene	%	116		9025857	91	87		9024630
D14-Terphenyl (FS)	%	106		9025857	63	63		9024630
D8-Acenaphthylene	%	88		9025857	84	83		9024630

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Detection Limit was raised due to matrix interferences.

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SEMI-VOLATILE ORGANICS BY GC-MS (VEGETATION)

Bureau Veritas ID		XER708	XER710			XER711		
Sampling Date		2023/09/27 09:36	2023/09/27 12:37			2023/09/27 12:45		
COC Number		C#955259-03-01	C#955259-04-01			C#955259-04-01		
	UNITS	23-NAIN-CF-013	23-NAIN-CF-014	RDL	QC Batch	23-NAIN-CF-015	RDL	QC Batch
Polyaromatic Hydrocarbons								
Acenaphthene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
Acenaphthylene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
Anthracene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
Benzo(a)anthracene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
Benzo(a)pyrene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
Benzo(b/j)fluoranthene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
Benzo(g,h,i)perylene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
Benzo(k)fluoranthene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
Chrysene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
Dibenzo(a,h)anthracene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
Fluoranthene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
Fluorene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
Indeno(1,2,3-cd)pyrene	ug/g	ND	ND	0.05	9025857	ND (1)	1	9024630
1-Methylnaphthalene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
2-Methylnaphthalene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
Naphthalene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
Phenanthrene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
Pyrene	ug/g	ND	ND	0.05	9025857	ND	0.5	9024630
Surrogate Recovery (%)								
D10-Anthracene	%	117	114		9025857	90		9024630
D14-Terphenyl (FS)	%	110	109		9025857	69		9024630
D8-Acenaphthylene	%	91	91		9025857	79		9024630

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Detection Limit was raised due to matrix interferences.

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SEMI-VOLATILE ORGANICS BY GC-MS (VEGETATION)

Bureau Veritas ID		XER713			XER714			XER716		
Sampling Date		2023/09/27 14:06			2023/09/27 14:06			2023/09/28 08:35		
COC Number		C#955259-04-01			C#955259-04-01			C#955259-04-01		
	UNITS	23-NAIN-CF-016	RDL	QC Batch	23-NAIN-CF-017	RDL	QC Batch	23-NAIN-CF-018	RDL	QC Batch
Polyaromatic Hydrocarbons										
Acenaphthene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Acenaphthylene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Anthracene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Benzo(a)anthracene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Benzo(a)pyrene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Benzo(b/j)fluoranthene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Benzo(g,h,i)perylene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Benzo(k)fluoranthene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Chrysene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Dibenzo(a,h)anthracene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Fluoranthene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Fluorene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Indeno(1,2,3-cd)pyrene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
1-Methylnaphthalene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
2-Methylnaphthalene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Naphthalene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Phenanthrene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Pyrene	ug/g	ND	0.05	9025857	ND	0.5	9024630	ND	0.05	9025857
Surrogate Recovery (%)										
D10-Anthracene	%	114		9025857	95		9024630	114		9025857
D14-Terphenyl (FS)	%	107		9025857	81		9024630	107		9025857
D8-Acenaphthylene	%	89		9025857	82		9024630	89		9025857

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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SEMI-VOLATILE ORGANICS BY GC-MS (VEGETATION)

Bureau Veritas ID		XER717			XER719			XER720		
Sampling Date		2023/09/28 08:50			2023/09/28 09:53			2023/09/28 09:53		
COC Number		C#955259-04-01			C#955259-05-01			C#955259-05-01		
	UNITS	23-NAIN-CF-019	RDL	QC Batch	23-NAIN-CF-020	RDL	QC Batch	23-NAIN-CF-021	RDL	QC Batch
Polyaromatic Hydrocarbons										
Acenaphthene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
Acenaphthylene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
Anthracene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
Benzo(a)anthracene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
Benzo(a)pyrene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
Benzo(b/j)fluoranthene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
Benzo(g,h,i)perylene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
Benzo(k)fluoranthene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
Chrysene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
Dibenzo(a,h)anthracene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
Fluoranthene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
Fluorene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
Indeno(1,2,3-cd)pyrene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND (1)	1	9024630
1-Methylnaphthalene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
2-Methylnaphthalene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
Naphthalene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
Phenanthrene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
Pyrene	ug/g	ND	0.5	9024630	ND	0.04	9025857	ND	0.5	9024630
Surrogate Recovery (%)										
D10-Anthracene	%	92		9024630	113		9025857	87		9024630
D14-Terphenyl (FS)	%	78		9024630	105		9025857	65		9024630
D8-Acenaphthylene	%	81		9024630	90		9025857	83		9024630

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Detection Limit was raised due to matrix interferences.

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SEMI-VOLATILE ORGANICS BY GC-MS (VEGETATION)

Bureau Veritas ID		XER722		
Sampling Date		2023/09/28 12:43		
COC Number		C#955259-05-01		
	UNITS	23-NAIN-CF-022	RDL	QC Batch
Polyaromatic Hydrocarbons				
Acenaphthene	ug/g	ND	0.05	9025857
Acenaphthylene	ug/g	ND	0.05	9025857
Anthracene	ug/g	ND	0.05	9025857
Benzo(a)anthracene	ug/g	ND	0.05	9025857
Benzo(a)pyrene	ug/g	ND	0.05	9025857
Benzo(b/j)fluoranthene	ug/g	ND	0.05	9025857
Benzo(g,h,i)perylene	ug/g	ND	0.05	9025857
Benzo(k)fluoranthene	ug/g	ND	0.05	9025857
Chrysene	ug/g	ND	0.05	9025857
Dibenzo(a,h)anthracene	ug/g	ND	0.05	9025857
Fluoranthene	ug/g	ND	0.05	9025857
Fluorene	ug/g	ND	0.05	9025857
Indeno(1,2,3-cd)pyrene	ug/g	ND	0.05	9025857
1-Methylnaphthalene	ug/g	ND	0.05	9025857
2-Methylnaphthalene	ug/g	ND	0.05	9025857
Naphthalene	ug/g	ND	0.05	9025857
Phenanthrene	ug/g	ND	0.05	9025857
Pyrene	ug/g	ND	0.05	9025857
Surrogate Recovery (%)				
D10-Anthracene	%	119		9025857
D14-Terphenyl (FS)	%	110		9025857
D8-Acenaphthylene	%	93		9025857

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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GENERAL COMMENTS

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

Package 1	8.8°C

PAH Analysis: Samples are reported based on wet weight, as per client request.

PAH ANALYSIS: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample XER691 [23-NAIN-SOIL-001] : PAH ANALYSIS: Detection limits were adjusted for high moisture content.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8982163	JTS	RPD	Moisture	2023/10/14	1.3		%	20
8983530	SB3	RPD	Moisture	2023/10/16	4.0		%	20
8988054	LFE	Matrix Spike	D10-Anthracene	2023/10/18		98	%	50 - 130
			D14-Terphenyl (FS)	2023/10/18		106	%	50 - 130
			D8-Acenaphthylene	2023/10/18		91	%	50 - 130
			Acenaphthene	2023/10/18		97	%	50 - 130
			Acenaphthylene	2023/10/18		93	%	50 - 130
			Anthracene	2023/10/18		97	%	50 - 130
			Benzo(a)anthracene	2023/10/18		100	%	50 - 130
			Benzo(a)pyrene	2023/10/18		94	%	50 - 130
			Benzo(b/j)fluoranthene	2023/10/18		99	%	50 - 130
			Benzo(g,h,i)perylene	2023/10/18		100	%	50 - 130
			Benzo(k)fluoranthene	2023/10/18		96	%	50 - 130
			Chrysene	2023/10/18		101	%	50 - 130
			Dibenzo(a,h)anthracene	2023/10/18		103	%	50 - 130
			Fluoranthene	2023/10/18		103	%	50 - 130
			Fluorene	2023/10/18		98	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/10/18		97	%	50 - 130
			1-Methylnaphthalene	2023/10/18		86	%	50 - 130
			2-Methylnaphthalene	2023/10/18		84	%	50 - 130
			Naphthalene	2023/10/18		84	%	50 - 130
			Phenanthrene	2023/10/18		96	%	50 - 130
			Pyrene	2023/10/18		103	%	50 - 130
			Benzo(b)fluoranthene	2023/10/18		104	%	50 - 130
			Perylene	2023/10/18		104	%	50 - 130
			Benzo(j)fluoranthene	2023/10/18		95	%	50 - 130
8988054	LFE	Spiked Blank	D10-Anthracene	2023/10/18		106	%	50 - 130
			D14-Terphenyl (FS)	2023/10/18		112	%	50 - 130
			D8-Acenaphthylene	2023/10/18		104	%	50 - 130
			Acenaphthene	2023/10/18		107	%	50 - 130
			Acenaphthylene	2023/10/18		106	%	50 - 130
			Anthracene	2023/10/18		104	%	50 - 130
			Benzo(a)anthracene	2023/10/18		108	%	50 - 130
			Benzo(a)pyrene	2023/10/18		104	%	50 - 130
			Benzo(b/j)fluoranthene	2023/10/18		110	%	50 - 130
			Benzo(g,h,i)perylene	2023/10/18		112	%	50 - 130
			Benzo(k)fluoranthene	2023/10/18		104	%	50 - 130
			Chrysene	2023/10/18		108	%	50 - 130
			Dibenzo(a,h)anthracene	2023/10/18		111	%	50 - 130
			Fluoranthene	2023/10/18		112	%	50 - 130
			Fluorene	2023/10/18		106	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/10/18		108	%	50 - 130
			1-Methylnaphthalene	2023/10/18		99	%	50 - 130
			2-Methylnaphthalene	2023/10/18		97	%	50 - 130
			Naphthalene	2023/10/18		104	%	50 - 130
			Phenanthrene	2023/10/18		106	%	50 - 130
			Pyrene	2023/10/18		111	%	50 - 130
			Benzo(b)fluoranthene	2023/10/18		112	%	50 - 130
			Perylene	2023/10/18		116	%	50 - 130
			Benzo(j)fluoranthene	2023/10/18		107	%	50 - 130
8988054	LFE	Method Blank	D10-Anthracene	2023/10/18		103	%	50 - 130
			D14-Terphenyl (FS)	2023/10/18		109	%	50 - 130
			D8-Acenaphthylene	2023/10/18		96	%	50 - 130
			Acenaphthene	2023/10/18	ND, RDL=0.0050		ug/g	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acenaphthylene	2023/10/18	ND, RDL=0.0050		ug/g	
			Anthracene	2023/10/18	ND, RDL=0.0050		ug/g	
			Benzo(a)anthracene	2023/10/18	ND, RDL=0.0050		ug/g	
			Benzo(a)pyrene	2023/10/18	ND, RDL=0.0050		ug/g	
			Benzo(b/j)fluoranthene	2023/10/18	ND, RDL=0.0050		ug/g	
			Benzo(g,h,i)perylene	2023/10/18	ND, RDL=0.0050		ug/g	
			Benzo(k)fluoranthene	2023/10/18	ND, RDL=0.0050		ug/g	
			Chrysene	2023/10/18	ND, RDL=0.0050		ug/g	
			Dibenzo(a,h)anthracene	2023/10/18	ND, RDL=0.0050		ug/g	
			Fluoranthene	2023/10/18	ND, RDL=0.0050		ug/g	
			Fluorene	2023/10/18	ND, RDL=0.0050		ug/g	
			Indeno(1,2,3-cd)pyrene	2023/10/18	ND, RDL=0.0050		ug/g	
			1-Methylnaphthalene	2023/10/18	ND, RDL=0.0050		ug/g	
			2-Methylnaphthalene	2023/10/18	ND, RDL=0.0050		ug/g	
			Naphthalene	2023/10/18	ND, RDL=0.0050		ug/g	
			Phenanthrene	2023/10/18	ND, RDL=0.0050		ug/g	
			Pyrene	2023/10/18	ND, RDL=0.0050		ug/g	
			Benzo(b)fluoranthene	2023/10/18	ND, RDL=0.0030		ug/g	
			Perylene	2023/10/18	ND, RDL=0.0050		ug/g	
			Benzo(j)fluoranthene	2023/10/18	ND, RDL=0.0030		ug/g	
8988054	LFE	RPD	Acenaphthene	2023/10/18	NC		%	40
			Acenaphthylene	2023/10/18	NC		%	40
			Anthracene	2023/10/18	NC		%	40
			Benzo(a)anthracene	2023/10/18	NC		%	40
			Benzo(a)pyrene	2023/10/18	NC		%	40
			Benzo(b/j)fluoranthene	2023/10/18	NC		%	40
			Benzo(g,h,i)perylene	2023/10/18	NC		%	40
			Benzo(k)fluoranthene	2023/10/18	NC		%	40
			Chrysene	2023/10/18	22		%	40
			Dibenzo(a,h)anthracene	2023/10/18	NC		%	40
			Fluoranthene	2023/10/18	NC		%	40
			Fluorene	2023/10/18	NC		%	40
			Indeno(1,2,3-cd)pyrene	2023/10/18	NC		%	40
			1-Methylnaphthalene	2023/10/18	NC		%	40
			2-Methylnaphthalene	2023/10/18	NC		%	40
			Naphthalene	2023/10/18	NC		%	40

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Phenanthrene	2023/10/18	NC		%	40
			Pyrene	2023/10/18	NC		%	40
8991715	SGK	Matrix Spike [XER721-01]	Mercury (Hg)	2023/10/19		103	%	75 - 125
8991715	SGK	QC Standard	Mercury (Hg)	2023/10/19		82	%	50 - 150
8991715	SGK	Spiked Blank	Mercury (Hg)	2023/10/19		100	%	80 - 120
8991715	SGK	Method Blank	Mercury (Hg)	2023/10/19	ND, RDL=0.010		mg/kg	
8991715	SGK	RPD [XER721-01]	Mercury (Hg)	2023/10/19	9.3		%	30
9001357	JHY	Matrix Spike [XER692-01]	Acid Extractable Antimony (Sb)	2023/10/24		102	%	75 - 125
			Acid Extractable Arsenic (As)	2023/10/24		104	%	75 - 125
			Acid Extractable Barium (Ba)	2023/10/24		99	%	75 - 125
			Acid Extractable Beryllium (Be)	2023/10/24		104	%	75 - 125
			Acid Extractable Bismuth (Bi)	2023/10/24		102	%	75 - 125
			Acid Extractable Boron (B)	2023/10/24		104	%	75 - 125
			Acid Extractable Cadmium (Cd)	2023/10/24		102	%	75 - 125
			Acid Extractable Chromium (Cr)	2023/10/24		106	%	75 - 125
			Acid Extractable Cobalt (Co)	2023/10/24		101	%	75 - 125
			Acid Extractable Copper (Cu)	2023/10/24		103	%	75 - 125
			Acid Extractable Lead (Pb)	2023/10/24		100	%	75 - 125
			Acid Extractable Lithium (Li)	2023/10/24		104	%	75 - 125
			Acid Extractable Manganese (Mn)	2023/10/24		NC	%	75 - 125
			Acid Extractable Mercury (Hg)	2023/10/24		97	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2023/10/24		105	%	75 - 125
			Acid Extractable Nickel (Ni)	2023/10/24		95	%	75 - 125
			Acid Extractable Rubidium (Rb)	2023/10/24		103	%	75 - 125
			Acid Extractable Selenium (Se)	2023/10/24		106	%	75 - 125
			Acid Extractable Silver (Ag)	2023/10/24		105	%	75 - 125
			Acid Extractable Strontium (Sr)	2023/10/24		107	%	75 - 125
			Acid Extractable Thallium (Tl)	2023/10/24		103	%	75 - 125
			Acid Extractable Tin (Sn)	2023/10/24		107	%	75 - 125
			Acid Extractable Uranium (U)	2023/10/24		102	%	75 - 125
			Acid Extractable Vanadium (V)	2023/10/24		112	%	75 - 125
			Acid Extractable Zinc (Zn)	2023/10/24		99	%	75 - 125
9001357	JHY	Spiked Blank	Acid Extractable Antimony (Sb)	2023/10/24		105	%	75 - 125
			Acid Extractable Arsenic (As)	2023/10/24		98	%	75 - 125
			Acid Extractable Barium (Ba)	2023/10/24		97	%	75 - 125
			Acid Extractable Beryllium (Be)	2023/10/24		99	%	75 - 125
			Acid Extractable Bismuth (Bi)	2023/10/24		97	%	75 - 125
			Acid Extractable Boron (B)	2023/10/24		109	%	75 - 125
			Acid Extractable Cadmium (Cd)	2023/10/24		96	%	75 - 125
			Acid Extractable Chromium (Cr)	2023/10/24		100	%	75 - 125
			Acid Extractable Cobalt (Co)	2023/10/24		99	%	75 - 125
			Acid Extractable Copper (Cu)	2023/10/24		98	%	75 - 125
			Acid Extractable Lead (Pb)	2023/10/24		96	%	75 - 125
			Acid Extractable Lithium (Li)	2023/10/24		100	%	75 - 125
			Acid Extractable Manganese (Mn)	2023/10/24		100	%	75 - 125
			Acid Extractable Mercury (Hg)	2023/10/24		98	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2023/10/24		100	%	75 - 125
			Acid Extractable Nickel (Ni)	2023/10/24		102	%	75 - 125
			Acid Extractable Rubidium (Rb)	2023/10/24		97	%	75 - 125
			Acid Extractable Selenium (Se)	2023/10/24		101	%	75 - 125
			Acid Extractable Silver (Ag)	2023/10/24		97	%	75 - 125
			Acid Extractable Strontium (Sr)	2023/10/24		98	%	75 - 125
			Acid Extractable Thallium (Tl)	2023/10/24		98	%	75 - 125
			Acid Extractable Tin (Sn)	2023/10/24		101	%	75 - 125

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Uranium (U)	2023/10/24		98	%	75 - 125
			Acid Extractable Vanadium (V)	2023/10/24		99	%	75 - 125
			Acid Extractable Zinc (Zn)	2023/10/24		99	%	75 - 125
9001357	JHY	Method Blank	Acid Extractable Aluminum (Al)	2023/10/24	ND, RDL=10		mg/kg	
			Acid Extractable Antimony (Sb)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Arsenic (As)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Barium (Ba)	2023/10/24	ND, RDL=5.0		mg/kg	
			Acid Extractable Beryllium (Be)	2023/10/24	ND, RDL=1.0		mg/kg	
			Acid Extractable Bismuth (Bi)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Boron (B)	2023/10/24	ND, RDL=50		mg/kg	
			Acid Extractable Cadmium (Cd)	2023/10/24	ND, RDL=0.30		mg/kg	
			Acid Extractable Chromium (Cr)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Cobalt (Co)	2023/10/24	ND, RDL=1.0		mg/kg	
			Acid Extractable Copper (Cu)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Iron (Fe)	2023/10/24	ND, RDL=50		mg/kg	
			Acid Extractable Lead (Pb)	2023/10/24	ND, RDL=0.50		mg/kg	
			Acid Extractable Lithium (Li)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Manganese (Mn)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Mercury (Hg)	2023/10/24	ND, RDL=0.10		mg/kg	
			Acid Extractable Molybdenum (Mo)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Nickel (Ni)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Rubidium (Rb)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Selenium (Se)	2023/10/24	ND, RDL=0.50		mg/kg	
			Acid Extractable Silver (Ag)	2023/10/24	ND, RDL=0.50		mg/kg	
			Acid Extractable Strontium (Sr)	2023/10/24	ND, RDL=5.0		mg/kg	
			Acid Extractable Thallium (Tl)	2023/10/24	ND, RDL=0.10		mg/kg	
			Acid Extractable Tin (Sn)	2023/10/24	ND, RDL=1.0		mg/kg	
			Acid Extractable Uranium (U)	2023/10/24	ND, RDL=0.10		mg/kg	
			Acid Extractable Vanadium (V)	2023/10/24	ND, RDL=2.0		mg/kg	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Zinc (Zn)	2023/10/24	ND, RDL=5.0		mg/kg	
9001357	JHY	RPD [XER692-01]	Acid Extractable Aluminum (Al)	2023/10/24	1.2		%	35
			Acid Extractable Antimony (Sb)	2023/10/24	NC		%	35
			Acid Extractable Arsenic (As)	2023/10/24	NC		%	35
			Acid Extractable Barium (Ba)	2023/10/24	16		%	35
			Acid Extractable Beryllium (Be)	2023/10/24	NC		%	35
			Acid Extractable Bismuth (Bi)	2023/10/24	NC		%	35
			Acid Extractable Boron (B)	2023/10/24	NC		%	35
			Acid Extractable Cadmium (Cd)	2023/10/24	NC		%	35
			Acid Extractable Chromium (Cr)	2023/10/24	1.6		%	35
			Acid Extractable Cobalt (Co)	2023/10/24	22		%	35
			Acid Extractable Copper (Cu)	2023/10/24	5.7		%	35
			Acid Extractable Iron (Fe)	2023/10/24	14		%	35
			Acid Extractable Lead (Pb)	2023/10/24	2.5		%	35
			Acid Extractable Lithium (Li)	2023/10/24	2.4		%	35
			Acid Extractable Manganese (Mn)	2023/10/24	26		%	35
			Acid Extractable Mercury (Hg)	2023/10/24	NC		%	35
			Acid Extractable Molybdenum (Mo)	2023/10/24	NC		%	35
			Acid Extractable Nickel (Ni)	2023/10/24	19		%	35
			Acid Extractable Rubidium (Rb)	2023/10/24	NC		%	35
			Acid Extractable Selenium (Se)	2023/10/24	9.9		%	35
			Acid Extractable Silver (Ag)	2023/10/24	NC		%	35
			Acid Extractable Strontium (Sr)	2023/10/24	19		%	35
			Acid Extractable Thallium (Tl)	2023/10/24	NC		%	35
			Acid Extractable Tin (Sn)	2023/10/24	NC		%	35
			Acid Extractable Uranium (U)	2023/10/24	5.3		%	35
			Acid Extractable Vanadium (V)	2023/10/24	7.1		%	35
			Acid Extractable Zinc (Zn)	2023/10/24	15		%	35
9024630	RAJ	Spiked Blank	D10-Anthracene	2023/11/03		96	%	30 - 130
			D14-Terphenyl (FS)	2023/11/03		85	%	30 - 130
			D8-Acenaphthylene	2023/11/03		93	%	30 - 130
			Acenaphthene	2023/11/03		101	%	50 - 130
			Acenaphthylene	2023/11/03		96	%	50 - 130
			Anthracene	2023/11/03		100	%	50 - 130
			Benzo(a)anthracene	2023/11/03		102	%	50 - 130
			Benzo(a)pyrene	2023/11/03		101	%	50 - 130
			Benzo(b/j)fluoranthene	2023/11/03		101	%	50 - 130
			Benzo(g,h,i)perylene	2023/11/03		109	%	50 - 130
			Benzo(k)fluoranthene	2023/11/03		112	%	50 - 130
			Chrysene	2023/11/03		102	%	50 - 130
			Dibenzo(a,h)anthracene	2023/11/03		100	%	50 - 130
			Fluoranthene	2023/11/03		97	%	50 - 130
			Fluorene	2023/11/03		99	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/11/03		103	%	50 - 130
			1-Methylnaphthalene	2023/11/03		102	%	50 - 130
			2-Methylnaphthalene	2023/11/03		93	%	50 - 130
			Naphthalene	2023/11/03		95	%	50 - 130
			Phenanthrene	2023/11/03		97	%	50 - 130
			Pyrene	2023/11/03		95	%	50 - 130
9024630	RAJ	RPD	Acenaphthene	2023/11/03	0.28		%	50
			Acenaphthylene	2023/11/03	0.13		%	50
			Anthracene	2023/11/03	0.56		%	50
			Benzo(a)anthracene	2023/11/03	0.67		%	50
			Benzo(a)pyrene	2023/11/03	4.5		%	50

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(b/j)fluoranthene	2023/11/03	4.2		%	50
			Benzo(g,h,i)perylene	2023/11/03	0.59		%	50
			Benzo(k)fluoranthene	2023/11/03	5.0		%	50
			Chrysene	2023/11/03	0.96		%	50
			Dibenzo(a,h)anthracene	2023/11/03	0.080		%	50
			Fluoranthene	2023/11/03	3.8		%	50
			Fluorene	2023/11/03	0.23		%	50
			Indeno(1,2,3-cd)pyrene	2023/11/03	3.2		%	50
			1-Methylnaphthalene	2023/11/03	0.049		%	50
			2-Methylnaphthalene	2023/11/03	0.054		%	50
			Naphthalene	2023/11/03	0.80		%	50
			Phenanthrene	2023/11/03	0.11		%	50
			Pyrene	2023/11/03	3.9		%	50
9024630	RAJ	Method Blank	D10-Anthracene	2023/11/03		93	%	30 - 130
			D14-Terphenyl (FS)	2023/11/03		79	%	30 - 130
			D8-Acenaphthylene	2023/11/03		85	%	30 - 130
			Acenaphthene	2023/11/03	ND, RDL=0.005		ug/g	
			Acenaphthylene	2023/11/03	ND, RDL=0.005		ug/g	
			Anthracene	2023/11/03	ND, RDL=0.005		ug/g	
			Benzo(a)anthracene	2023/11/03	ND, RDL=0.005		ug/g	
			Benzo(a)pyrene	2023/11/03	ND, RDL=0.005		ug/g	
			Benzo(b/j)fluoranthene	2023/11/03	ND, RDL=0.005		ug/g	
			Benzo(g,h,i)perylene	2023/11/03	ND, RDL=0.005		ug/g	
			Benzo(k)fluoranthene	2023/11/03	ND, RDL=0.005		ug/g	
			Chrysene	2023/11/03	ND, RDL=0.005		ug/g	
			Dibenzo(a,h)anthracene	2023/11/03	ND, RDL=0.005		ug/g	
			Fluoranthene	2023/11/03	ND, RDL=0.005		ug/g	
			Fluorene	2023/11/03	ND, RDL=0.005		ug/g	
			Indeno(1,2,3-cd)pyrene	2023/11/03	ND, RDL=0.005		ug/g	
			1-Methylnaphthalene	2023/11/03	ND, RDL=0.005		ug/g	
			2-Methylnaphthalene	2023/11/03	ND, RDL=0.005		ug/g	
			Naphthalene	2023/11/03	ND, RDL=0.005		ug/g	
			Phenanthrene	2023/11/03	ND, RDL=0.005		ug/g	
			Pyrene	2023/11/03	ND, RDL=0.005		ug/g	
9025857	JYO	Spiked Blank	D10-Anthracene	2023/11/04		113	%	30 - 130
			D14-Terphenyl (FS)	2023/11/04		103	%	30 - 130
			D8-Acenaphthylene	2023/11/04		90	%	30 - 130
			Acenaphthene	2023/11/04		103	%	50 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acenaphthylene	2023/11/04		98	%	50 - 130
			Anthracene	2023/11/04		113	%	50 - 130
			Benzo(a)anthracene	2023/11/04		103	%	50 - 130
			Benzo(a)pyrene	2023/11/04		97	%	50 - 130
			Benzo(b/j)fluoranthene	2023/11/04		103	%	50 - 130
			Benzo(g,h,i)perylene	2023/11/04		94	%	50 - 130
			Benzo(k)fluoranthene	2023/11/04		100	%	50 - 130
			Chrysene	2023/11/04		99	%	50 - 130
			Dibenzo(a,h)anthracene	2023/11/04		88	%	50 - 130
			Fluoranthene	2023/11/04		108	%	50 - 130
			Fluorene	2023/11/04		105	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/11/04		94	%	50 - 130
			1-Methylnaphthalene	2023/11/04		103	%	50 - 130
			2-Methylnaphthalene	2023/11/04		90	%	50 - 130
			Naphthalene	2023/11/04		98	%	50 - 130
			Phenanthrene	2023/11/04		100	%	50 - 130
			Pyrene	2023/11/04		109	%	50 - 130
9025857	JYO	RPD	Acenaphthene	2023/11/04	0.71		%	50
			Acenaphthylene	2023/11/04	0.20		%	50
			Anthracene	2023/11/04	3.5		%	50
			Benzo(a)anthracene	2023/11/04	2.0		%	50
			Benzo(a)pyrene	2023/11/04	1.2		%	50
			Benzo(b/j)fluoranthene	2023/11/04	0.19		%	50
			Benzo(g,h,i)perylene	2023/11/04	1.4		%	50
			Benzo(k)fluoranthene	2023/11/04	5.4		%	50
			Chrysene	2023/11/04	1.4		%	50
			Dibenzo(a,h)anthracene	2023/11/04	1.4		%	50
			Fluoranthene	2023/11/04	1.6		%	50
			Fluorene	2023/11/04	1.3		%	50
			Indeno(1,2,3-cd)pyrene	2023/11/04	1.6		%	50
			1-Methylnaphthalene	2023/11/04	2.4		%	50
			2-Methylnaphthalene	2023/11/04	2.1		%	50
			Naphthalene	2023/11/04	2.9		%	50
			Phenanthrene	2023/11/04	0.41		%	50
			Pyrene	2023/11/04	1.2		%	50
9025857	JYO	Method Blank	D10-Anthracene	2023/11/04		120	%	30 - 130
			D14-Terphenyl (FS)	2023/11/04		102	%	30 - 130
			D8-Acenaphthylene	2023/11/04		86	%	30 - 130
			Acenaphthene	2023/11/04	ND, RDL=0.005		ug/g	
			Acenaphthylene	2023/11/04	ND, RDL=0.005		ug/g	
			Anthracene	2023/11/04	ND, RDL=0.005		ug/g	
			Benzo(a)anthracene	2023/11/04	ND, RDL=0.005		ug/g	
			Benzo(a)pyrene	2023/11/04	ND, RDL=0.005		ug/g	
			Benzo(b/j)fluoranthene	2023/11/04	ND, RDL=0.005		ug/g	
			Benzo(g,h,i)perylene	2023/11/04	ND, RDL=0.005		ug/g	
			Benzo(k)fluoranthene	2023/11/04	ND, RDL=0.005		ug/g	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Chrysene	2023/11/04	ND, RDL=0.005		ug/g	
			Dibenzo(a,h)anthracene	2023/11/04	ND, RDL=0.005		ug/g	
			Fluoranthene	2023/11/04	ND, RDL=0.005		ug/g	
			Fluorene	2023/11/04	ND, RDL=0.005		ug/g	
			Indeno(1,2,3-cd)pyrene	2023/11/04	ND, RDL=0.005		ug/g	
			1-Methylnaphthalene	2023/11/04	ND, RDL=0.005		ug/g	
			2-Methylnaphthalene	2023/11/04	ND, RDL=0.005		ug/g	
			Naphthalene	2023/11/04	ND, RDL=0.005		ug/g	
			Phenanthrene	2023/11/04	ND, RDL=0.005		ug/g	
			Pyrene	2023/11/04	ND, RDL=0.005		ug/g	
9033096	MTZ	Matrix Spike [XER708-01]	Acid Extractable Antimony (Sb)	2023/11/08		107	%	75 - 125
			Acid Extractable Arsenic (As)	2023/11/08		99	%	75 - 125
			Acid Extractable Barium (Ba)	2023/11/08		97	%	75 - 125
			Acid Extractable Beryllium (Be)	2023/11/08		97	%	75 - 125
			Acid Extractable Boron (B)	2023/11/08		98	%	75 - 125
			Acid Extractable Cadmium (Cd)	2023/11/08		100	%	75 - 125
			Acid Extractable Chromium (Cr)	2023/11/08		99	%	75 - 125
			Acid Extractable Cobalt (Co)	2023/11/08		98	%	75 - 125
			Acid Extractable Copper (Cu)	2023/11/08		98	%	75 - 125
			Acid Extractable Lead (Pb)	2023/11/08		100	%	75 - 125
			Acid Extractable Lithium (Li)	2023/11/08		101	%	75 - 125
			Acid Extractable Manganese (Mn)	2023/11/08		NC	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2023/11/08		102	%	75 - 125
			Acid Extractable Nickel (Ni)	2023/11/08		99	%	75 - 125
			Acid Extractable Selenium (Se)	2023/11/08		102	%	75 - 125
			Acid Extractable Silver (Ag)	2023/11/08		96	%	75 - 125
			Acid Extractable Strontium (Sr)	2023/11/08		98	%	75 - 125
			Acid Extractable Thallium (Tl)	2023/11/08		100	%	75 - 125
			Acid Extractable Uranium (U)	2023/11/08		101	%	75 - 125
			Acid Extractable Vanadium (V)	2023/11/08		99	%	75 - 125
			Acid Extractable Zinc (Zn)	2023/11/08		98	%	75 - 125
9033096	MTZ	Spiked Blank	Acid Extractable Antimony (Sb)	2023/11/07		106	%	75 - 125
			Acid Extractable Arsenic (As)	2023/11/07		99	%	75 - 125
			Acid Extractable Barium (Ba)	2023/11/07		101	%	75 - 125
			Acid Extractable Beryllium (Be)	2023/11/07		99	%	75 - 125
			Acid Extractable Boron (B)	2023/11/07		100	%	75 - 125
			Acid Extractable Cadmium (Cd)	2023/11/07		102	%	75 - 125
			Acid Extractable Chromium (Cr)	2023/11/07		99	%	75 - 125
			Acid Extractable Cobalt (Co)	2023/11/07		97	%	75 - 125
			Acid Extractable Copper (Cu)	2023/11/07		96	%	75 - 125
			Acid Extractable Lead (Pb)	2023/11/07		101	%	75 - 125
			Acid Extractable Lithium (Li)	2023/11/07		103	%	75 - 125
			Acid Extractable Manganese (Mn)	2023/11/07		103	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2023/11/07		106	%	75 - 125
			Acid Extractable Nickel (Ni)	2023/11/07		100	%	75 - 125

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Selenium (Se)	2023/11/07		105	%	75 - 125
			Acid Extractable Silver (Ag)	2023/11/07		97	%	75 - 125
			Acid Extractable Strontium (Sr)	2023/11/07		101	%	75 - 125
			Acid Extractable Thallium (Tl)	2023/11/07		104	%	75 - 125
			Acid Extractable Uranium (U)	2023/11/07		102	%	75 - 125
			Acid Extractable Vanadium (V)	2023/11/07		99	%	75 - 125
			Acid Extractable Zinc (Zn)	2023/11/07		100	%	75 - 125
9033096	MTZ	Method Blank	Acid Extractable Aluminum (Al)	2023/11/07	ND, RDL=10		mg/kg	
			Acid Extractable Antimony (Sb)	2023/11/07	ND, RDL=2.0		mg/kg	
			Acid Extractable Arsenic (As)	2023/11/07	ND, RDL=2.0		mg/kg	
			Acid Extractable Barium (Ba)	2023/11/07	ND, RDL=5.0		mg/kg	
			Acid Extractable Beryllium (Be)	2023/11/07	ND, RDL=2.0		mg/kg	
			Acid Extractable Boron (B)	2023/11/07	ND, RDL=5.0		mg/kg	
			Acid Extractable Cadmium (Cd)	2023/11/07	ND, RDL=0.30		mg/kg	
			Acid Extractable Chromium (Cr)	2023/11/07	ND, RDL=2.0		mg/kg	
			Acid Extractable Cobalt (Co)	2023/11/07	ND, RDL=1.0		mg/kg	
			Acid Extractable Copper (Cu)	2023/11/07	ND, RDL=2.0		mg/kg	
			Acid Extractable Iron (Fe)	2023/11/07	ND, RDL=50		mg/kg	
			Acid Extractable Lead (Pb)	2023/11/07	ND, RDL=0.50		mg/kg	
			Acid Extractable Lithium (Li)	2023/11/07	ND, RDL=2.0		mg/kg	
			Acid Extractable Manganese (Mn)	2023/11/07	ND, RDL=2.0		mg/kg	
			Acid Extractable Molybdenum (Mo)	2023/11/07	ND, RDL=2.0		mg/kg	
			Acid Extractable Nickel (Ni)	2023/11/07	ND, RDL=2.0		mg/kg	
			Acid Extractable Selenium (Se)	2023/11/07	ND, RDL=2.0		mg/kg	
			Acid Extractable Silver (Ag)	2023/11/07	ND, RDL=0.50		mg/kg	
			Acid Extractable Strontium (Sr)	2023/11/07	ND, RDL=5.0		mg/kg	
			Acid Extractable Thallium (Tl)	2023/11/07	ND, RDL=0.10		mg/kg	
			Acid Extractable Uranium (U)	2023/11/07	ND, RDL=0.10		mg/kg	
			Acid Extractable Vanadium (V)	2023/11/07	ND, RDL=2.0		mg/kg	
			Acid Extractable Zinc (Zn)	2023/11/07	ND, RDL=5.0		mg/kg	
9033096	MTZ	RPD [XER708-01]	Acid Extractable Aluminum (Al)	2023/11/08	1.3		%	35
			Acid Extractable Antimony (Sb)	2023/11/08	NC		%	35
			Acid Extractable Arsenic (As)	2023/11/08	NC		%	35

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Barium (Ba)	2023/11/08	9.5		%	35
			Acid Extractable Beryllium (Be)	2023/11/08	NC		%	35
			Acid Extractable Boron (B)	2023/11/08	2.8		%	35
			Acid Extractable Cadmium (Cd)	2023/11/08	NC		%	35
			Acid Extractable Chromium (Cr)	2023/11/08	NC		%	35
			Acid Extractable Cobalt (Co)	2023/11/08	NC		%	35
			Acid Extractable Copper (Cu)	2023/11/08	1.0		%	35
			Acid Extractable Iron (Fe)	2023/11/08	NC		%	35
			Acid Extractable Lead (Pb)	2023/11/08	NC		%	35
			Acid Extractable Lithium (Li)	2023/11/08	NC		%	35
			Acid Extractable Manganese (Mn)	2023/11/08	2.5		%	35
			Acid Extractable Molybdenum (Mo)	2023/11/08	NC		%	35
			Acid Extractable Nickel (Ni)	2023/11/08	NC		%	35
			Acid Extractable Selenium (Se)	2023/11/08	NC		%	35
			Acid Extractable Silver (Ag)	2023/11/08	NC		%	35
			Acid Extractable Strontium (Sr)	2023/11/08	NC		%	35
			Acid Extractable Thallium (Tl)	2023/11/08	NC		%	35
			Acid Extractable Uranium (U)	2023/11/08	NC		%	35
			Acid Extractable Vanadium (V)	2023/11/08	NC		%	35
			Acid Extractable Zinc (Zn)	2023/11/08	4.1		%	35
9038516	MTZ	Matrix Spike [XER690-01]	Acid Extractable Antimony (Sb)	2023/11/10		106	%	75 - 125
			Acid Extractable Arsenic (As)	2023/11/10		106	%	75 - 125
			Acid Extractable Barium (Ba)	2023/11/10		117	%	75 - 125
			Acid Extractable Beryllium (Be)	2023/11/10		104	%	75 - 125
			Acid Extractable Boron (B)	2023/11/10		106	%	75 - 125
			Acid Extractable Cadmium (Cd)	2023/11/10		106	%	75 - 125
			Acid Extractable Chromium (Cr)	2023/11/10		106	%	75 - 125
			Acid Extractable Cobalt (Co)	2023/11/10		106	%	75 - 125
			Acid Extractable Copper (Cu)	2023/11/10		107	%	75 - 125
			Acid Extractable Lead (Pb)	2023/11/10		107	%	75 - 125
			Acid Extractable Lithium (Li)	2023/11/10		105	%	75 - 125
			Acid Extractable Manganese (Mn)	2023/11/10		NC	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2023/11/10		110	%	75 - 125
			Acid Extractable Nickel (Ni)	2023/11/10		108	%	75 - 125
			Acid Extractable Selenium (Se)	2023/11/10		107	%	75 - 125
			Acid Extractable Silver (Ag)	2023/11/10		99	%	75 - 125
			Acid Extractable Strontium (Sr)	2023/11/10		110	%	75 - 125
			Acid Extractable Thallium (Tl)	2023/11/10		98	%	75 - 125
			Acid Extractable Uranium (U)	2023/11/10		112	%	75 - 125
			Acid Extractable Vanadium (V)	2023/11/10		109	%	75 - 125
			Acid Extractable Zinc (Zn)	2023/11/10		109	%	75 - 125
9038516	MTZ	Spiked Blank	Acid Extractable Antimony (Sb)	2023/11/10		101	%	75 - 125
			Acid Extractable Arsenic (As)	2023/11/10		96	%	75 - 125
			Acid Extractable Barium (Ba)	2023/11/10		94	%	75 - 125
			Acid Extractable Beryllium (Be)	2023/11/10		93	%	75 - 125
			Acid Extractable Boron (B)	2023/11/10		96	%	75 - 125
			Acid Extractable Cadmium (Cd)	2023/11/10		93	%	75 - 125
			Acid Extractable Chromium (Cr)	2023/11/10		94	%	75 - 125
			Acid Extractable Cobalt (Co)	2023/11/10		95	%	75 - 125
			Acid Extractable Copper (Cu)	2023/11/10		94	%	75 - 125
			Acid Extractable Lead (Pb)	2023/11/10		94	%	75 - 125
			Acid Extractable Lithium (Li)	2023/11/10		94	%	75 - 125
			Acid Extractable Manganese (Mn)	2023/11/10		95	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2023/11/10		102	%	75 - 125
			Acid Extractable Nickel (Ni)	2023/11/10		98	%	75 - 125

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Selenium (Se)	2023/11/10		96	%	75 - 125
			Acid Extractable Silver (Ag)	2023/11/10		89	%	75 - 125
			Acid Extractable Strontium (Sr)	2023/11/10		97	%	75 - 125
			Acid Extractable Thallium (Tl)	2023/11/10		98	%	75 - 125
			Acid Extractable Uranium (U)	2023/11/10		95	%	75 - 125
			Acid Extractable Vanadium (V)	2023/11/10		95	%	75 - 125
			Acid Extractable Zinc (Zn)	2023/11/10		96	%	75 - 125
9038516	MTZ	Method Blank	Acid Extractable Aluminum (Al)	2023/11/10	ND, RDL=10		mg/kg	
			Acid Extractable Antimony (Sb)	2023/11/10	ND, RDL=2.0		mg/kg	
			Acid Extractable Arsenic (As)	2023/11/10	ND, RDL=2.0		mg/kg	
			Acid Extractable Barium (Ba)	2023/11/10	ND, RDL=5.0		mg/kg	
			Acid Extractable Beryllium (Be)	2023/11/10	ND, RDL=2.0		mg/kg	
			Acid Extractable Boron (B)	2023/11/10	ND, RDL=5.0		mg/kg	
			Acid Extractable Cadmium (Cd)	2023/11/10	ND, RDL=0.30		mg/kg	
			Acid Extractable Chromium (Cr)	2023/11/10	ND, RDL=2.0		mg/kg	
			Acid Extractable Cobalt (Co)	2023/11/10	ND, RDL=1.0		mg/kg	
			Acid Extractable Copper (Cu)	2023/11/10	ND, RDL=2.0		mg/kg	
			Acid Extractable Iron (Fe)	2023/11/10	ND, RDL=50		mg/kg	
			Acid Extractable Lead (Pb)	2023/11/10	ND, RDL=0.50		mg/kg	
			Acid Extractable Lithium (Li)	2023/11/10	ND, RDL=2.0		mg/kg	
			Acid Extractable Manganese (Mn)	2023/11/10	ND, RDL=2.0		mg/kg	
			Acid Extractable Molybdenum (Mo)	2023/11/10	ND, RDL=2.0		mg/kg	
			Acid Extractable Nickel (Ni)	2023/11/10	ND, RDL=2.0		mg/kg	
			Acid Extractable Selenium (Se)	2023/11/10	ND, RDL=2.0		mg/kg	
			Acid Extractable Silver (Ag)	2023/11/10	ND, RDL=0.50		mg/kg	
			Acid Extractable Strontium (Sr)	2023/11/10	ND, RDL=5.0		mg/kg	
			Acid Extractable Thallium (Tl)	2023/11/10	ND, RDL=0.10		mg/kg	
			Acid Extractable Uranium (U)	2023/11/10	ND, RDL=0.10		mg/kg	
			Acid Extractable Vanadium (V)	2023/11/10	ND, RDL=2.0		mg/kg	
			Acid Extractable Zinc (Zn)	2023/11/10	ND, RDL=5.0		mg/kg	
9038516	MTZ	RPD [XER690-01]	Acid Extractable Aluminum (Al)	2023/11/10	6.5		%	35
			Acid Extractable Antimony (Sb)	2023/11/10	NC		%	35
			Acid Extractable Arsenic (As)	2023/11/10	NC		%	35

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Barium (Ba)	2023/11/10	14		%	35
			Acid Extractable Beryllium (Be)	2023/11/10	NC		%	35
			Acid Extractable Boron (B)	2023/11/10	4.5		%	35
			Acid Extractable Cadmium (Cd)	2023/11/10	NC		%	35
			Acid Extractable Chromium (Cr)	2023/11/10	NC		%	35
			Acid Extractable Cobalt (Co)	2023/11/10	NC		%	35
			Acid Extractable Copper (Cu)	2023/11/10	17		%	35
			Acid Extractable Iron (Fe)	2023/11/10	NC		%	35
			Acid Extractable Lead (Pb)	2023/11/10	NC		%	35
			Acid Extractable Lithium (Li)	2023/11/10	NC		%	35
			Acid Extractable Manganese (Mn)	2023/11/10	9.7		%	35
			Acid Extractable Molybdenum (Mo)	2023/11/10	NC		%	35
			Acid Extractable Nickel (Ni)	2023/11/10	23		%	35
			Acid Extractable Selenium (Se)	2023/11/10	NC		%	35
			Acid Extractable Silver (Ag)	2023/11/10	NC		%	35
			Acid Extractable Strontium (Sr)	2023/11/10	13		%	35
			Acid Extractable Thallium (Tl)	2023/11/10	NC		%	35
			Acid Extractable Uranium (U)	2023/11/10	NC		%	35
			Acid Extractable Vanadium (V)	2023/11/10	NC		%	35
			Acid Extractable Zinc (Zn)	2023/11/10	11		%	35
9038736	A1K	QC Standard	Moisture	2023/11/09		109	%	N/A
9038736	A1K	Method Blank	Moisture	2023/11/09	ND, RDL=0.10		g/100g	
9038736	A1K	RPD [XER716-01]	Moisture	2023/11/09	0.042		%	20
9038834	AN3	QC Standard	Moisture	2023/11/09		116	%	N/A
9038834	AN3	Method Blank	Moisture	2023/11/09	ND, RDL=0.10		g/100g	
9038834	AN3	RPD	Moisture	2023/11/09	0.22		%	20
9045622	SGK	Matrix Spike [XER694-01]	Mercury (Hg)	2023/11/15		114	%	75 - 125
9045622	SGK	QC Standard	Mercury (Hg)	2023/11/15		119	%	N/A
9045622	SGK	Spiked Blank	Mercury (Hg)	2023/11/15		117	%	80 - 120
9045622	SGK	Method Blank	Mercury (Hg)	2023/11/15	ND, RDL=0.010		mg/kg	
9045622	SGK	RPD [XER694-01]	Mercury (Hg)	2023/11/15	NC		%	30
9045643	SGK	Matrix Spike	Mercury (Hg)	2023/11/15		104	%	75 - 125
9045643	SGK	QC Standard	Mercury (Hg)	2023/11/15		119	%	75 - 125
9045643	SGK	Spiked Blank	Mercury (Hg)	2023/11/15		110	%	80 - 120
9045643	SGK	Method Blank	Mercury (Hg)	2023/11/15	ND, RDL=0.010		mg/kg	
9045643	SGK	RPD	Mercury (Hg)	2023/11/15	NC		%	30

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

Mike MacGillivray

Mike MacGillivray, Scientific Specialist (Inorganics)

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Your Project #: 235-001 (CF)
Your C.O.C. #: C#955259-01-01

Attention: Kathryn Dawe

SEM Ltd.
79 Mew's Place
Second Floor
St. John's, NL
CANADA A1B 4N2

Report Date: 2023/10/25
Report #: R7878827
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BUREAU VERITAS JOB #: C3U8087
Received: 2023/10/03, 13:15

Sample Matrix: Soil
Samples Received: 12

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Mercury (CVAA)	12	2023/10/19	2023/10/19	ATL SOP 00026	EPA 245.5 m
Metals Solids Acid Extr. ICPMS	2	2023/10/24	2023/10/24	ATL SOP 00058	EPA 6020B R2 m
Metals Solids Acid Extr. ICPMS	10	2023/10/24	2023/10/25	ATL SOP 00058	EPA 6020B R2 m
Moisture (1)	4	N/A	2023/10/14	CAM SOP-00445	Carter 2nd ed 51.2 m
Moisture (1)	8	N/A	2023/10/16	CAM SOP-00445	Carter 2nd ed 51.2 m
PAH Compounds in Soil by GC/MS (SIM) (1)	1	2023/10/18	2023/10/18	CAM SOP-00318	EPA 8270E
PAH Compounds in Soil by GC/MS (SIM) (1)	11	2023/10/18	2023/10/21	CAM SOP-00318	EPA 8270E

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCCFP, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Mississauga, 6740 Campobello Rd , Mississauga, ON, L5N 2L8

Bureau Veritas | Partial/Rush Results

Your Project #: 235-001 (CF)
Your C.O.C. #: C#955259-01-01

Attention: Kathryn Dawe

SEM Ltd.
79 Mew's Place
Second Floor
St. John's, NL
CANADA A1B 4N2

Report Date: 2023/10/25
Report #: R7878827
Version: 1 - Partial

CERTIFICATE OF ANALYSIS – PARTIAL RESULTS

BUREAU VERITAS JOB #: C3U8087
Received: 2023/10/03, 13:15

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Michelle Huth, Project Manager
Email: michelle.brescacin@bureauveritas.com
Phone# (902) 420-0203

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Bureau Veritas - Partial/Rush Results

RESULTS OF ANALYSES OF SOIL

Bureau Veritas ID		XER691		XER692		XER695		
Sampling Date		2023/09/26 12:30		2023/09/26 13:12		2023/09/26 14:43		
COC Number		C#955259-01-01		C#955259-01-01		C#955259-01-01		
	UNITS	23-NAIN-SOIL-001	QC Batch	23-NAIN-SOIL-002	QC Batch	23-NAIN-SOIL-003	RDL	QC Batch
Inorganics								
Moisture	%	60	8982163	17	8983530	34	1.0	8982163

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		XER697	XER699		XER705	XER706		
Sampling Date		2023/09/26 16:12	2023/09/26 16:12		2023/09/27 08:37	2023/09/27 09:36		
COC Number		C#955259-01-01	C#955259-01-01		C#955259-01-01	C#955259-01-01		
	UNITS	23-NAIN-SOIL-004	23-NAIN-SOIL-005	QC Batch	23-NAIN-SOIL-006	23-NAIN-SOIL-007	RDL	QC Batch
Inorganics								
Moisture	%	14	17	8982163	21	23	1.0	8983530

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		XER709	XER712	XER715	XER718	XER721		
Sampling Date		2023/09/27 12:37	2023/09/27 14:06	2023/09/28 08:35	2023/09/28 09:40	2023/09/28 12:43		
COC Number		C#955259-01-01	C#955259-01-01	C#955259-01-01	C#955259-01-01	C#955259-01-01		
	UNITS	23-NAIN-SOIL-008	23-NAIN-SOIL-009	23-NAIN-SOIL-010	23-NAIN-SOIL-011	23-NAIN-SOIL-012	RDL	QC Batch
Inorganics								
Moisture	%	36	15	29	7.8	17	1.0	8983530

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas - Partial/Rush Results

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MERCURY BY COLD VAPOUR AA (SOIL)

Bureau Veritas ID		XER691	XER692	XER695	XER697		
Sampling Date		2023/09/26 12:30	2023/09/26 13:12	2023/09/26 14:43	2023/09/26 16:12		
COC Number		C#955259-01-01	C#955259-01-01	C#955259-01-01	C#955259-01-01		
	UNITS	23-NAIN-SOIL-001	23-NAIN-SOIL-002	23-NAIN-SOIL-003	23-NAIN-SOIL-004	RDL	QC Batch
Metals							
Mercury (Hg)	mg/kg	0.049	0.044	0.025	ND	0.010	8991715

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas ID		XER699	XER705	XER706	XER709		
Sampling Date		2023/09/26 16:12	2023/09/27 08:37	2023/09/27 09:36	2023/09/27 12:37		
COC Number		C#955259-01-01	C#955259-01-01	C#955259-01-01	C#955259-01-01		
	UNITS	23-NAIN-SOIL-005	23-NAIN-SOIL-006	23-NAIN-SOIL-007	23-NAIN-SOIL-008	RDL	QC Batch
Metals							
Mercury (Hg)	mg/kg	ND	0.012	0.019	0.040	0.010	8991715

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas ID		XER712	XER715	XER718	XER721		
Sampling Date		2023/09/27 14:06	2023/09/28 08:35	2023/09/28 09:40	2023/09/28 12:43		
COC Number		C#955259-01-01	C#955259-01-01	C#955259-01-01	C#955259-01-01		
	UNITS	23-NAIN-SOIL-009	23-NAIN-SOIL-010	23-NAIN-SOIL-011	23-NAIN-SOIL-012	RDL	QC Batch
Metals							
Mercury (Hg)	mg/kg	0.014	0.023	0.037	0.019	0.010	8991715

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas ID		XER721		
Sampling Date		2023/09/28 12:43		
COC Number		C#955259-01-01		
	UNITS	23-NAIN-SOIL-012 Lab-Dup	RDL	QC Batch
Metals				
Mercury (Hg)	mg/kg	0.017	0.010	8991715

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas - Partial/Rush Results

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Bureau Veritas ID		XER691	XER692	XER692	XER695		
Sampling Date		2023/09/26 12:30	2023/09/26 13:12	2023/09/26 13:12	2023/09/26 14:43		
COC Number		C#955259-01-01	C#955259-01-01	C#955259-01-01	C#955259-01-01		
	UNITS	23-NAIN-SOIL-001	23-NAIN-SOIL-002	23-NAIN-SOIL-002 Lab-Dup	23-NAIN-SOIL-003	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	6700	22000	21000	17000	10	9001357
Acid Extractable Antimony (Sb)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Arsenic (As)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Barium (Ba)	mg/kg	18	14	12	11	5.0	9001357
Acid Extractable Beryllium (Be)	mg/kg	ND	ND	ND	ND	1.0	9001357
Acid Extractable Bismuth (Bi)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Boron (B)	mg/kg	ND	ND	ND	ND	50	9001357
Acid Extractable Cadmium (Cd)	mg/kg	ND	ND	ND	ND	0.30	9001357
Acid Extractable Chromium (Cr)	mg/kg	8.2	11	11	13	2.0	9001357
Acid Extractable Cobalt (Co)	mg/kg	1.8	14	11	3.3	1.0	9001357
Acid Extractable Copper (Cu)	mg/kg	2.6	16	15	4.8	2.0	9001357
Acid Extractable Iron (Fe)	mg/kg	11000	34000	30000	20000	50	9001357
Acid Extractable Lead (Pb)	mg/kg	3.0	2.7	2.6	3.1	0.50	9001357
Acid Extractable Lithium (Li)	mg/kg	ND	6.8	6.9	4.3	2.0	9001357
Acid Extractable Manganese (Mn)	mg/kg	14	110	88	51	2.0	9001357
Acid Extractable Mercury (Hg)	mg/kg	0.15	ND	ND	ND	0.10	9001357
Acid Extractable Molybdenum (Mo)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Nickel (Ni)	mg/kg	8.2	49	40	8.9	2.0	9001357
Acid Extractable Rubidium (Rb)	mg/kg	ND	ND	ND	2.5	2.0	9001357
Acid Extractable Selenium (Se)	mg/kg	0.81	0.79	0.72	ND	0.50	9001357
Acid Extractable Silver (Ag)	mg/kg	ND	ND	ND	ND	0.50	9001357
Acid Extractable Strontium (Sr)	mg/kg	13	10	13	6.5	5.0	9001357
Acid Extractable Thallium (Tl)	mg/kg	ND	ND	ND	ND	0.10	9001357
Acid Extractable Tin (Sn)	mg/kg	ND	ND	ND	ND	1.0	9001357
Acid Extractable Uranium (U)	mg/kg	0.22	0.51	0.48	0.29	0.10	9001357
Acid Extractable Vanadium (V)	mg/kg	27	33	30	36	2.0	9001357
Acid Extractable Zinc (Zn)	mg/kg	ND	24	20	12	5.0	9001357

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas - Partial/Rush Results

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Bureau Veritas ID		XER697	XER699	XER705	XER706		
Sampling Date		2023/09/26 16:12	2023/09/26 16:12	2023/09/27 08:37	2023/09/27 09:36		
COC Number		C#955259-01-01	C#955259-01-01	C#955259-01-01	C#955259-01-01		
	UNITS	23-NAIN-SOIL-004	23-NAIN-SOIL-005	23-NAIN-SOIL-006	23-NAIN-SOIL-007	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	2400	3400	3200	2600	10	9001357
Acid Extractable Antimony (Sb)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Arsenic (As)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Barium (Ba)	mg/kg	6.1	8.1	5.3	5.7	5.0	9001357
Acid Extractable Beryllium (Be)	mg/kg	ND	ND	ND	ND	1.0	9001357
Acid Extractable Bismuth (Bi)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Boron (B)	mg/kg	ND	ND	ND	ND	50	9001357
Acid Extractable Cadmium (Cd)	mg/kg	ND	ND	ND	ND	0.30	9001357
Acid Extractable Chromium (Cr)	mg/kg	14	11	4.8	3.8	2.0	9001357
Acid Extractable Cobalt (Co)	mg/kg	13	15	1.6	4.1	1.0	9001357
Acid Extractable Copper (Cu)	mg/kg	2.2	3.4	ND	ND	2.0	9001357
Acid Extractable Iron (Fe)	mg/kg	26000	28000	8700	6900	50	9001357
Acid Extractable Lead (Pb)	mg/kg	1.3	1.5	2.0	0.74	0.50	9001357
Acid Extractable Lithium (Li)	mg/kg	ND	2.2	ND	ND	2.0	9001357
Acid Extractable Manganese (Mn)	mg/kg	160	180	29	45	2.0	9001357
Acid Extractable Mercury (Hg)	mg/kg	ND	ND	ND	ND	0.10	9001357
Acid Extractable Molybdenum (Mo)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Nickel (Ni)	mg/kg	39	41	6.1	13	2.0	9001357
Acid Extractable Rubidium (Rb)	mg/kg	ND	2.1	ND	ND	2.0	9001357
Acid Extractable Selenium (Se)	mg/kg	ND	ND	ND	ND	0.50	9001357
Acid Extractable Silver (Ag)	mg/kg	ND	ND	ND	ND	0.50	9001357
Acid Extractable Strontium (Sr)	mg/kg	5.3	5.8	ND	6.3	5.0	9001357
Acid Extractable Thallium (Tl)	mg/kg	ND	ND	ND	ND	0.10	9001357
Acid Extractable Tin (Sn)	mg/kg	ND	ND	ND	ND	1.0	9001357
Acid Extractable Uranium (U)	mg/kg	ND	0.10	0.14	ND	0.10	9001357
Acid Extractable Vanadium (V)	mg/kg	36	26	16	6.3	2.0	9001357
Acid Extractable Zinc (Zn)	mg/kg	16	19	6.1	8.8	5.0	9001357

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas - Partial/Rush Results

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Bureau Veritas ID		XER709	XER712	XER715	XER718		
Sampling Date		2023/09/27 12:37	2023/09/27 14:06	2023/09/28 08:35	2023/09/28 09:40		
COC Number		C#955259-01-01	C#955259-01-01	C#955259-01-01	C#955259-01-01		
	UNITS	23-NAIN-SOIL-008	23-NAIN-SOIL-009	23-NAIN-SOIL-010	23-NAIN-SOIL-011	RDL	QC Batch
Metals							
Acid Extractable Aluminum (Al)	mg/kg	7200	3800	2800	7200	10	9001357
Acid Extractable Antimony (Sb)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Arsenic (As)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Barium (Ba)	mg/kg	18	7.8	16	30	5.0	9001357
Acid Extractable Beryllium (Be)	mg/kg	ND	ND	ND	ND	1.0	9001357
Acid Extractable Bismuth (Bi)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Boron (B)	mg/kg	ND	ND	ND	ND	50	9001357
Acid Extractable Cadmium (Cd)	mg/kg	ND	ND	ND	ND	0.30	9001357
Acid Extractable Chromium (Cr)	mg/kg	24	11	7.5	5.4	2.0	9001357
Acid Extractable Cobalt (Co)	mg/kg	ND	1.4	1.3	1.1	1.0	9001357
Acid Extractable Copper (Cu)	mg/kg	2.1	2.1	2.4	3.3	2.0	9001357
Acid Extractable Iron (Fe)	mg/kg	7300	9200	6100	5300	50	9001357
Acid Extractable Lead (Pb)	mg/kg	3.6	2.3	3.1	2.9	0.50	9001357
Acid Extractable Lithium (Li)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Manganese (Mn)	mg/kg	10	36	22	19	2.0	9001357
Acid Extractable Mercury (Hg)	mg/kg	ND	ND	ND	ND	0.10	9001357
Acid Extractable Molybdenum (Mo)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Nickel (Ni)	mg/kg	5.2	4.2	3.4	4.1	2.0	9001357
Acid Extractable Rubidium (Rb)	mg/kg	ND	ND	ND	ND	2.0	9001357
Acid Extractable Selenium (Se)	mg/kg	0.62	ND	ND	ND	0.50	9001357
Acid Extractable Silver (Ag)	mg/kg	ND	ND	ND	ND	0.50	9001357
Acid Extractable Strontium (Sr)	mg/kg	16	5.0	6.7	8.6	5.0	9001357
Acid Extractable Thallium (Tl)	mg/kg	ND	ND	ND	ND	0.10	9001357
Acid Extractable Tin (Sn)	mg/kg	ND	ND	ND	ND	1.0	9001357
Acid Extractable Uranium (U)	mg/kg	0.39	0.18	0.26	0.28	0.10	9001357
Acid Extractable Vanadium (V)	mg/kg	29	25	19	9.3	2.0	9001357
Acid Extractable Zinc (Zn)	mg/kg	ND	5.9	ND	ND	5.0	9001357

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas - Partial/Rush Results

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ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Bureau Veritas ID		XER721		
Sampling Date		2023/09/28 12:43		
COC Number		C#955259-01-01		
	UNITS	23-NAIN-SOIL-012	RDL	QC Batch
Metals				
Acid Extractable Aluminum (Al)	mg/kg	5500	10	9001357
Acid Extractable Antimony (Sb)	mg/kg	ND	2.0	9001357
Acid Extractable Arsenic (As)	mg/kg	ND	2.0	9001357
Acid Extractable Barium (Ba)	mg/kg	7.3	5.0	9001357
Acid Extractable Beryllium (Be)	mg/kg	ND	1.0	9001357
Acid Extractable Bismuth (Bi)	mg/kg	ND	2.0	9001357
Acid Extractable Boron (B)	mg/kg	ND	50	9001357
Acid Extractable Cadmium (Cd)	mg/kg	ND	0.30	9001357
Acid Extractable Chromium (Cr)	mg/kg	9.4	2.0	9001357
Acid Extractable Cobalt (Co)	mg/kg	1.4	1.0	9001357
Acid Extractable Copper (Cu)	mg/kg	2.4	2.0	9001357
Acid Extractable Iron (Fe)	mg/kg	11000	50	9001357
Acid Extractable Lead (Pb)	mg/kg	2.8	0.50	9001357
Acid Extractable Lithium (Li)	mg/kg	ND	2.0	9001357
Acid Extractable Manganese (Mn)	mg/kg	34	2.0	9001357
Acid Extractable Mercury (Hg)	mg/kg	ND	0.10	9001357
Acid Extractable Molybdenum (Mo)	mg/kg	ND	2.0	9001357
Acid Extractable Nickel (Ni)	mg/kg	3.7	2.0	9001357
Acid Extractable Rubidium (Rb)	mg/kg	ND	2.0	9001357
Acid Extractable Selenium (Se)	mg/kg	ND	0.50	9001357
Acid Extractable Silver (Ag)	mg/kg	ND	0.50	9001357
Acid Extractable Strontium (Sr)	mg/kg	ND	5.0	9001357
Acid Extractable Thallium (Tl)	mg/kg	ND	0.10	9001357
Acid Extractable Tin (Sn)	mg/kg	ND	1.0	9001357
Acid Extractable Uranium (U)	mg/kg	0.14	0.10	9001357
Acid Extractable Vanadium (V)	mg/kg	25	2.0	9001357
Acid Extractable Zinc (Zn)	mg/kg	5.3	5.0	9001357

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas - Partial/Rush Results

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SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Bureau Veritas ID		XER691		XER692		XER695		
Sampling Date		2023/09/26 12:30		2023/09/26 13:12		2023/09/26 14:43		
COC Number		C#955259-01-01		C#955259-01-01		C#955259-01-01		
	UNITS	23-NAIN-SOIL-001	RDL	23-NAIN-SOIL-002	RDL	23-NAIN-SOIL-003	RDL	QC Batch
Polyaromatic Hydrocarbons								
Acenaphthene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Acenaphthylene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Anthracene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Benzo(a)anthracene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Benzo(a)pyrene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Benzo(b/j)fluoranthene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Benzo(g,h,i)perylene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Benzo(k)fluoranthene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Chrysene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Dibenzo(a,h)anthracene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Fluoranthene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Fluorene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Indeno(1,2,3-cd)pyrene	ug/g	ND (1)	0.20	ND	0.0050	ND (1)	0.030	8988054
1-Methylnaphthalene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
2-Methylnaphthalene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Naphthalene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Phenanthrene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Pyrene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Benzo(b)fluoranthene	ug/g	ND	0.0090	ND	0.0030	ND	0.0030	8988054
Perylene	ug/g	ND	0.015	ND	0.0050	ND	0.0050	8988054
Benzo(j)fluoranthene	ug/g	ND	0.0090	ND	0.0030	ND	0.0030	8988054
Surrogate Recovery (%)								
D10-Anthracene	%	95		99		102		8988054
D14-Terphenyl (FS)	%	110		120		112		8988054
D8-Acenaphthylene	%	94		94		99		8988054

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Detection Limit was raised due to matrix interferences.

Bureau Veritas - Partial/Rush Results

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SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Bureau Veritas ID		XER697		XER699	XER705		XER706		
Sampling Date		2023/09/26 16:12		2023/09/26 16:12	2023/09/27 08:37		2023/09/27 09:36		
COC Number		C#955259-01-01		C#955259-01-01	C#955259-01-01		C#955259-01-01		
	UNITS	23-NAIN-SOIL-004	RDL	23-NAIN-SOIL-005	23-NAIN-SOIL-006	RDL	23-NAIN-SOIL-007	RDL	QC Batch
Polyaromatic Hydrocarbons									
Acenaphthene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Acenaphthylene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Anthracene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(a)anthracene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(a)pyrene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(b/j)fluoranthene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(g,h,i)perylene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(k)fluoranthene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Chrysene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Dibenzo(a,h)anthracene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Fluoranthene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Fluorene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Indeno(1,2,3-cd)pyrene	ug/g	ND (1)	0.010	ND	ND	0.0050	ND (1)	0.0070	8988054
1-Methylnaphthalene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
2-Methylnaphthalene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Naphthalene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Phenanthrene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Pyrene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(b)fluoranthene	ug/g	ND	0.0030	ND	ND	0.0030	ND	0.0030	8988054
Perylene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(j)fluoranthene	ug/g	ND	0.0030	ND	ND	0.0030	ND	0.0030	8988054
Surrogate Recovery (%)									
D10-Anthracene	%	100		100	104		104		8988054
D14-Terphenyl (FS)	%	111		110	110		114		8988054
D8-Acenaphthylene	%	97		98	100		101		8988054

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Detection Limit was raised due to matrix interferences.

Bureau Veritas - Partial/Rush Results

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SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Bureau Veritas ID		XER709		XER712	XER715		XER718		
Sampling Date		2023/09/27 12:37		2023/09/27 14:06	2023/09/28 08:35		2023/09/28 09:40		
COC Number		C#955259-01-01		C#955259-01-01	C#955259-01-01		C#955259-01-01		
	UNITS	23-NAIN-SOIL-008	RDL	23-NAIN-SOIL-009	23-NAIN-SOIL-010	RDL	23-NAIN-SOIL-011	RDL	QC Batch
Polyaromatic Hydrocarbons									
Acenaphthene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Acenaphthylene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Anthracene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(a)anthracene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(a)pyrene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(b/j)fluoranthene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(g,h,i)perylene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(k)fluoranthene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Chrysene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Dibenzo(a,h)anthracene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Fluoranthene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Fluorene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Indeno(1,2,3-cd)pyrene	ug/g	ND (1)	0.0060	ND	ND	0.0050	ND (1)	0.0090	8988054
1-Methylnaphthalene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
2-Methylnaphthalene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Naphthalene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Phenanthrene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Pyrene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(b)fluoranthene	ug/g	ND	0.0030	ND	ND	0.0030	ND	0.0030	8988054
Perylene	ug/g	ND	0.0050	ND	ND	0.0050	ND	0.0050	8988054
Benzo(j)fluoranthene	ug/g	ND	0.0030	ND	ND	0.0030	ND	0.0030	8988054
Surrogate Recovery (%)									
D10-Anthracene	%	94		99	87		94		8988054
D14-Terphenyl (FS)	%	105		106	97		106		8988054
D8-Acenaphthylene	%	94		96	88		94		8988054

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Detection Limit was raised due to matrix interferences.

Bureau Veritas - Partial/Rush Results

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SEMI-VOLATILE ORGANICS BY GC-MS (SOIL)

Bureau Veritas ID		XER721		
Sampling Date		2023/09/28 12:43		
COC Number		C#955259-01-01		
	UNITS	23-NAIN-SOIL-012	RDL	QC Batch
Polyaromatic Hydrocarbons				
Acenaphthene	ug/g	ND	0.0050	8988054
Acenaphthylene	ug/g	ND	0.0050	8988054
Anthracene	ug/g	ND	0.0050	8988054
Benzo(a)anthracene	ug/g	ND	0.0050	8988054
Benzo(a)pyrene	ug/g	ND	0.0050	8988054
Benzo(b/j)fluoranthene	ug/g	ND	0.0050	8988054
Benzo(g,h,i)perylene	ug/g	ND	0.0050	8988054
Benzo(k)fluoranthene	ug/g	ND	0.0050	8988054
Chrysene	ug/g	ND (1)	0.030	8988054
Dibenzo(a,h)anthracene	ug/g	ND	0.0050	8988054
Fluoranthene	ug/g	ND	0.0050	8988054
Fluorene	ug/g	ND	0.0050	8988054
Indeno(1,2,3-cd)pyrene	ug/g	ND	0.0050	8988054
1-Methylnaphthalene	ug/g	ND	0.0050	8988054
2-Methylnaphthalene	ug/g	ND	0.0050	8988054
Naphthalene	ug/g	ND	0.0050	8988054
Phenanthrene	ug/g	ND	0.0050	8988054
Pyrene	ug/g	ND	0.0050	8988054
Benzo(b)fluoranthene	ug/g	ND	0.0030	8988054
Perylene	ug/g	ND	0.0050	8988054
Benzo(j)fluoranthene	ug/g	ND	0.0030	8988054
Surrogate Recovery (%)				
D10-Anthracene	%	103		8988054
D14-Terphenyl (FS)	%	110		8988054
D8-Acenaphthylene	%	98		8988054

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Detection Limit was raised due to matrix interferences.

Bureau Veritas - Partial/Rush Results

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GENERAL COMMENTS

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

Package 1	8.8°C

Sample XER691 [23-NAIN-SOIL-001] : PAH ANALYSIS: Detection limits were adjusted for high moisture content.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8982163	JTS	RPD	Moisture	2023/10/14	1.3		%	20
8983530	SB3	RPD	Moisture	2023/10/16	4.0		%	20
8988054	LFE	Matrix Spike	D10-Anthracene	2023/10/18		98	%	50 - 130
			D14-Terphenyl (FS)	2023/10/18		106	%	50 - 130
			D8-Acenaphthylene	2023/10/18		91	%	50 - 130
			Acenaphthene	2023/10/18		97	%	50 - 130
			Acenaphthylene	2023/10/18		93	%	50 - 130
			Anthracene	2023/10/18		97	%	50 - 130
			Benzo(a)anthracene	2023/10/18		100	%	50 - 130
			Benzo(a)pyrene	2023/10/18		94	%	50 - 130
			Benzo(b/j)fluoranthene	2023/10/18		99	%	50 - 130
			Benzo(g,h,i)perylene	2023/10/18		100	%	50 - 130
			Benzo(k)fluoranthene	2023/10/18		96	%	50 - 130
			Chrysene	2023/10/18		101	%	50 - 130
			Dibenzo(a,h)anthracene	2023/10/18		103	%	50 - 130
			Fluoranthene	2023/10/18		103	%	50 - 130
			Fluorene	2023/10/18		98	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/10/18		97	%	50 - 130
			1-Methylnaphthalene	2023/10/18		86	%	50 - 130
			2-Methylnaphthalene	2023/10/18		84	%	50 - 130
			Naphthalene	2023/10/18		84	%	50 - 130
			Phenanthrene	2023/10/18		96	%	50 - 130
			Pyrene	2023/10/18		103	%	50 - 130
			Benzo(b)fluoranthene	2023/10/18		104	%	50 - 130
			Perylene	2023/10/18		104	%	50 - 130
			Benzo(j)fluoranthene	2023/10/18		95	%	50 - 130
8988054	LFE	Spiked Blank	D10-Anthracene	2023/10/18		106	%	50 - 130
			D14-Terphenyl (FS)	2023/10/18		112	%	50 - 130
			D8-Acenaphthylene	2023/10/18		104	%	50 - 130
			Acenaphthene	2023/10/18		107	%	50 - 130
			Acenaphthylene	2023/10/18		106	%	50 - 130
			Anthracene	2023/10/18		104	%	50 - 130
			Benzo(a)anthracene	2023/10/18		108	%	50 - 130
			Benzo(a)pyrene	2023/10/18		104	%	50 - 130
			Benzo(b/j)fluoranthene	2023/10/18		110	%	50 - 130
			Benzo(g,h,i)perylene	2023/10/18		112	%	50 - 130
			Benzo(k)fluoranthene	2023/10/18		104	%	50 - 130
			Chrysene	2023/10/18		108	%	50 - 130
			Dibenzo(a,h)anthracene	2023/10/18		111	%	50 - 130
			Fluoranthene	2023/10/18		112	%	50 - 130
			Fluorene	2023/10/18		106	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2023/10/18		108	%	50 - 130
			1-Methylnaphthalene	2023/10/18		99	%	50 - 130
			2-Methylnaphthalene	2023/10/18		97	%	50 - 130
			Naphthalene	2023/10/18		104	%	50 - 130
			Phenanthrene	2023/10/18		106	%	50 - 130
			Pyrene	2023/10/18		111	%	50 - 130
			Benzo(b)fluoranthene	2023/10/18		112	%	50 - 130
			Perylene	2023/10/18		116	%	50 - 130
			Benzo(j)fluoranthene	2023/10/18		107	%	50 - 130
8988054	LFE	Method Blank	D10-Anthracene	2023/10/18		103	%	50 - 130
			D14-Terphenyl (FS)	2023/10/18		109	%	50 - 130
			D8-Acenaphthylene	2023/10/18		96	%	50 - 130
			Acenaphthene	2023/10/18	ND, RDL=0.0050		ug/g	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acenaphthylene	2023/10/18	ND, RDL=0.0050		ug/g	
			Anthracene	2023/10/18	ND, RDL=0.0050		ug/g	
			Benzo(a)anthracene	2023/10/18	ND, RDL=0.0050		ug/g	
			Benzo(a)pyrene	2023/10/18	ND, RDL=0.0050		ug/g	
			Benzo(b/j)fluoranthene	2023/10/18	ND, RDL=0.0050		ug/g	
			Benzo(g,h,i)perylene	2023/10/18	ND, RDL=0.0050		ug/g	
			Benzo(k)fluoranthene	2023/10/18	ND, RDL=0.0050		ug/g	
			Chrysene	2023/10/18	ND, RDL=0.0050		ug/g	
			Dibenzo(a,h)anthracene	2023/10/18	ND, RDL=0.0050		ug/g	
			Fluoranthene	2023/10/18	ND, RDL=0.0050		ug/g	
			Fluorene	2023/10/18	ND, RDL=0.0050		ug/g	
			Indeno(1,2,3-cd)pyrene	2023/10/18	ND, RDL=0.0050		ug/g	
			1-Methylnaphthalene	2023/10/18	ND, RDL=0.0050		ug/g	
			2-Methylnaphthalene	2023/10/18	ND, RDL=0.0050		ug/g	
			Naphthalene	2023/10/18	ND, RDL=0.0050		ug/g	
			Phenanthrene	2023/10/18	ND, RDL=0.0050		ug/g	
			Pyrene	2023/10/18	ND, RDL=0.0050		ug/g	
			Benzo(b)fluoranthene	2023/10/18	ND, RDL=0.0030		ug/g	
			Perylene	2023/10/18	ND, RDL=0.0050		ug/g	
			Benzo(j)fluoranthene	2023/10/18	ND, RDL=0.0030		ug/g	
8988054	LFE	RPD	Acenaphthene	2023/10/18	NC		%	40
			Acenaphthylene	2023/10/18	NC		%	40
			Anthracene	2023/10/18	NC		%	40
			Benzo(a)anthracene	2023/10/18	NC		%	40
			Benzo(a)pyrene	2023/10/18	NC		%	40
			Benzo(b/j)fluoranthene	2023/10/18	NC		%	40
			Benzo(g,h,i)perylene	2023/10/18	NC		%	40
			Benzo(k)fluoranthene	2023/10/18	NC		%	40
			Chrysene	2023/10/18	22		%	40
			Dibenzo(a,h)anthracene	2023/10/18	NC		%	40
			Fluoranthene	2023/10/18	NC		%	40
			Fluorene	2023/10/18	NC		%	40
			Indeno(1,2,3-cd)pyrene	2023/10/18	NC		%	40
			1-Methylnaphthalene	2023/10/18	NC		%	40
			2-Methylnaphthalene	2023/10/18	NC		%	40
			Naphthalene	2023/10/18	NC		%	40

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Phenanthrene	2023/10/18	NC		%	40
			Pyrene	2023/10/18	NC		%	40
8991715	SGK	Matrix Spike [XER721-01]	Mercury (Hg)	2023/10/19		103	%	75 - 125
8991715	SGK	QC Standard	Mercury (Hg)	2023/10/19		82	%	50 - 150
8991715	SGK	Spiked Blank	Mercury (Hg)	2023/10/19		100	%	80 - 120
8991715	SGK	Method Blank	Mercury (Hg)	2023/10/19	ND, RDL=0.010		mg/kg	
8991715	SGK	RPD [XER721-01]	Mercury (Hg)	2023/10/19	9.3		%	30
9001357	JHY	Matrix Spike [XER692-01]	Acid Extractable Antimony (Sb)	2023/10/24		102	%	75 - 125
			Acid Extractable Arsenic (As)	2023/10/24		104	%	75 - 125
			Acid Extractable Barium (Ba)	2023/10/24		99	%	75 - 125
			Acid Extractable Beryllium (Be)	2023/10/24		104	%	75 - 125
			Acid Extractable Bismuth (Bi)	2023/10/24		102	%	75 - 125
			Acid Extractable Boron (B)	2023/10/24		104	%	75 - 125
			Acid Extractable Cadmium (Cd)	2023/10/24		102	%	75 - 125
			Acid Extractable Chromium (Cr)	2023/10/24		106	%	75 - 125
			Acid Extractable Cobalt (Co)	2023/10/24		101	%	75 - 125
			Acid Extractable Copper (Cu)	2023/10/24		103	%	75 - 125
			Acid Extractable Lead (Pb)	2023/10/24		100	%	75 - 125
			Acid Extractable Lithium (Li)	2023/10/24		104	%	75 - 125
			Acid Extractable Manganese (Mn)	2023/10/24		NC	%	75 - 125
			Acid Extractable Mercury (Hg)	2023/10/24		97	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2023/10/24		105	%	75 - 125
			Acid Extractable Nickel (Ni)	2023/10/24		95	%	75 - 125
			Acid Extractable Rubidium (Rb)	2023/10/24		103	%	75 - 125
			Acid Extractable Selenium (Se)	2023/10/24		106	%	75 - 125
			Acid Extractable Silver (Ag)	2023/10/24		105	%	75 - 125
			Acid Extractable Strontium (Sr)	2023/10/24		107	%	75 - 125
			Acid Extractable Thallium (Tl)	2023/10/24		103	%	75 - 125
			Acid Extractable Tin (Sn)	2023/10/24		107	%	75 - 125
			Acid Extractable Uranium (U)	2023/10/24		102	%	75 - 125
			Acid Extractable Vanadium (V)	2023/10/24		112	%	75 - 125
			Acid Extractable Zinc (Zn)	2023/10/24		99	%	75 - 125
9001357	JHY	Spiked Blank	Acid Extractable Antimony (Sb)	2023/10/24		105	%	75 - 125
			Acid Extractable Arsenic (As)	2023/10/24		98	%	75 - 125
			Acid Extractable Barium (Ba)	2023/10/24		97	%	75 - 125
			Acid Extractable Beryllium (Be)	2023/10/24		99	%	75 - 125
			Acid Extractable Bismuth (Bi)	2023/10/24		97	%	75 - 125
			Acid Extractable Boron (B)	2023/10/24		109	%	75 - 125
			Acid Extractable Cadmium (Cd)	2023/10/24		96	%	75 - 125
			Acid Extractable Chromium (Cr)	2023/10/24		100	%	75 - 125
			Acid Extractable Cobalt (Co)	2023/10/24		99	%	75 - 125
			Acid Extractable Copper (Cu)	2023/10/24		98	%	75 - 125
			Acid Extractable Lead (Pb)	2023/10/24		96	%	75 - 125
			Acid Extractable Lithium (Li)	2023/10/24		100	%	75 - 125
			Acid Extractable Manganese (Mn)	2023/10/24		100	%	75 - 125
			Acid Extractable Mercury (Hg)	2023/10/24		98	%	75 - 125
			Acid Extractable Molybdenum (Mo)	2023/10/24		100	%	75 - 125
			Acid Extractable Nickel (Ni)	2023/10/24		102	%	75 - 125
			Acid Extractable Rubidium (Rb)	2023/10/24		97	%	75 - 125
			Acid Extractable Selenium (Se)	2023/10/24		101	%	75 - 125
			Acid Extractable Silver (Ag)	2023/10/24		97	%	75 - 125
			Acid Extractable Strontium (Sr)	2023/10/24		98	%	75 - 125
			Acid Extractable Thallium (Tl)	2023/10/24		98	%	75 - 125
			Acid Extractable Tin (Sn)	2023/10/24		101	%	75 - 125

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Uranium (U)	2023/10/24		98	%	75 - 125
			Acid Extractable Vanadium (V)	2023/10/24		99	%	75 - 125
			Acid Extractable Zinc (Zn)	2023/10/24		99	%	75 - 125
9001357	JHY	Method Blank	Acid Extractable Aluminum (Al)	2023/10/24	ND, RDL=10		mg/kg	
			Acid Extractable Antimony (Sb)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Arsenic (As)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Barium (Ba)	2023/10/24	ND, RDL=5.0		mg/kg	
			Acid Extractable Beryllium (Be)	2023/10/24	ND, RDL=1.0		mg/kg	
			Acid Extractable Bismuth (Bi)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Boron (B)	2023/10/24	ND, RDL=50		mg/kg	
			Acid Extractable Cadmium (Cd)	2023/10/24	ND, RDL=0.30		mg/kg	
			Acid Extractable Chromium (Cr)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Cobalt (Co)	2023/10/24	ND, RDL=1.0		mg/kg	
			Acid Extractable Copper (Cu)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Iron (Fe)	2023/10/24	ND, RDL=50		mg/kg	
			Acid Extractable Lead (Pb)	2023/10/24	ND, RDL=0.50		mg/kg	
			Acid Extractable Lithium (Li)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Manganese (Mn)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Mercury (Hg)	2023/10/24	ND, RDL=0.10		mg/kg	
			Acid Extractable Molybdenum (Mo)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Nickel (Ni)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Rubidium (Rb)	2023/10/24	ND, RDL=2.0		mg/kg	
			Acid Extractable Selenium (Se)	2023/10/24	ND, RDL=0.50		mg/kg	
			Acid Extractable Silver (Ag)	2023/10/24	ND, RDL=0.50		mg/kg	
			Acid Extractable Strontium (Sr)	2023/10/24	ND, RDL=5.0		mg/kg	
			Acid Extractable Thallium (Tl)	2023/10/24	ND, RDL=0.10		mg/kg	
			Acid Extractable Tin (Sn)	2023/10/24	ND, RDL=1.0		mg/kg	
			Acid Extractable Uranium (U)	2023/10/24	ND, RDL=0.10		mg/kg	
			Acid Extractable Vanadium (V)	2023/10/24	ND, RDL=2.0		mg/kg	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Acid Extractable Zinc (Zn)	2023/10/24	ND, RDL=5.0		mg/kg	
9001357	JHY	RPD [XER692-01]	Acid Extractable Aluminum (Al)	2023/10/24	1.2		%	35
			Acid Extractable Antimony (Sb)	2023/10/24	NC		%	35
			Acid Extractable Arsenic (As)	2023/10/24	NC		%	35
			Acid Extractable Barium (Ba)	2023/10/24	16		%	35
			Acid Extractable Beryllium (Be)	2023/10/24	NC		%	35
			Acid Extractable Bismuth (Bi)	2023/10/24	NC		%	35
			Acid Extractable Boron (B)	2023/10/24	NC		%	35
			Acid Extractable Cadmium (Cd)	2023/10/24	NC		%	35
			Acid Extractable Chromium (Cr)	2023/10/24	1.6		%	35
			Acid Extractable Cobalt (Co)	2023/10/24	22		%	35
			Acid Extractable Copper (Cu)	2023/10/24	5.7		%	35
			Acid Extractable Iron (Fe)	2023/10/24	14		%	35
			Acid Extractable Lead (Pb)	2023/10/24	2.5		%	35
			Acid Extractable Lithium (Li)	2023/10/24	2.4		%	35
			Acid Extractable Manganese (Mn)	2023/10/24	26		%	35
			Acid Extractable Mercury (Hg)	2023/10/24	NC		%	35
			Acid Extractable Molybdenum (Mo)	2023/10/24	NC		%	35
			Acid Extractable Nickel (Ni)	2023/10/24	19		%	35
			Acid Extractable Rubidium (Rb)	2023/10/24	NC		%	35
			Acid Extractable Selenium (Se)	2023/10/24	9.9		%	35
			Acid Extractable Silver (Ag)	2023/10/24	NC		%	35
			Acid Extractable Strontium (Sr)	2023/10/24	19		%	35
			Acid Extractable Thallium (Tl)	2023/10/24	NC		%	35
			Acid Extractable Tin (Sn)	2023/10/24	NC		%	35
			Acid Extractable Uranium (U)	2023/10/24	5.3		%	35
			Acid Extractable Vanadium (V)	2023/10/24	7.1		%	35
			Acid Extractable Zinc (Zn)	2023/10/24	15		%	35

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Cristina Carriere, Senior Scientific Specialist

Mike MacGillivray, Scientific Specialist (Inorganics)

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Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Suzanne Rogers, General Manager responsible for Nova Scotia Environmental laboratory operations.

Bureau Veritas - Partial/Rush Results

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Appendix G2 Land and Resources Use Study Letter

From: Rodd Laing <rodd.laing@nunatsiavut.com>
Sent: Wednesday, November 29, 2023 11:58 AM
To: Marie-Helene Simard
Cc: Colin Gilbride; Aignel, Rozenn; Tremblay, Valerie; Nancy Griffiths; Manon Barrette; Frederic Dwyer-Samuel
Subject: RE: URGENT REQUEST Land Use

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Marie-Helene,

As discussed on previous calls, the Final Land Use Study report will not be complete until March 2025. This study is being led by the Nunatsiavut Government, through the support of the Polynya Consulting Group. The Land Use Study focuses on a specific area of use, no the airport specifically, but does cover off the entirety of the impacted area. The responses to your specific points are as follows:

1. **R12:** The Land Use Study being conducted is substantially more detailed than what was being proposed through R12 and the consultant. It will follow the methodology used in previous land use studies and will have Inuit conducting and participating in the documentation of Inuit Knowledge through established ethical mechanisms and procedures that have been approved by the Nunatsiavut Government Research Advisory Committee. By the Nunatsiavut Government leading the study, it will ensure it meets the requirements of the Environmental Review process. If the Land Use Study was conducted as originally proposed, and it didn't meet our requirements, it could have led to substantial delays (a year or two) until those requirements were met. This will be avoided by having the NG lead this study. In the registration, you can mention that the NG is leading a land use study that will meet the requirements of their Environmental Review process for this project.
2. **Reception of the Land Use Study:** As indicated in previous calls, a draft report by August 2024 and a Final report by October 2024 is not possible. In order to follow the appropriate and ethical processes for the documentation, collection, verification and analyses of Inuit Knowledge, and then report writing, appropriate time must be given for each of those steps. Data collection is taking place this winter, with verification taking place in the spring and analyses taking place in late-spring and summer, and report writing to follow. The final report will be completed by March 2025.
3. **Land Use Study Updates:** There will be regular updates provided on the progress of the land use study and we will set up meetings every 2 or 3 months to provide space for discussion and updates on the land use study. We will set these up starting in the new year.

Thanks for your time, we look forward to reviewing your final Registration document.

-Rodd

Rodd Laing
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Subject: URGENT REQUEST Land Use
Importance: High

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Good day Rodd,

As we don't want to delay the environmental study schedule and ensure that deliverables are met, **we will need to receive information from the Land Use study before it is completed in 2025**.
We had already discussed this at our meetings. We have reviewed the timetable for the R12 study, and the Land Use results will have to be provided to us in 2024. At specific dates so as not to alter the timetable for the entire feasibility study, which ends in December 2024.
Here is a brief description of the various deliverables:

1) Reception of Land use mapping data to deliver to R12 (requested already as *interim* data): Proposed date: end of March 2024. In order to have this realistic, we can request to have Sebastien Boudreau prior to their land use mapping of January – to have him show them what we have in the NNAFS project (Arc GIS Online)- to see if import from their mapping system could be eased.
2) Reception of Land Use study :
    a. Date of Draft Report requested by NG to the Consultant Polynomia . This needs to be PRIOR to August 2024
    b. Date of Final Report requested by NG to the Consultant Polynomia. This needs to be PRIOR to October 2024. **If not granted, NG has to provide a letter to NG Infra saying that all 3 regulators will accept the EIS without the final report on Land Use.**

We need an urgent response by the end of the day tomorrow, November 28, in order to adjust the registration document on this subject.

I hope you will cooperate as soon as possible, as we have to submit the documents on Monday, December 4, 2023.

MH

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Appendix H

Air Quality and Climate Supporting Information

Initial Greenhouse Gas Assessment under Strategic Adaptation of Climate Change (SACC) Planning Phase

Nain Airport Project

Impact Assessment Agency of Canada (IAAC), Government of Newfoundland and Labrador (NFL) and Nunatsiavut Government (NG)

Project Number: 60706559

June 2024

Delivering a better world

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Appendix A. Detailed Emission Calculations

List of Acronyms and Abbreviations

AADT	Average Annual Daily Traffic
AEPA	Alberta Environment and Protected Areas
ANFO	Ammonium nitrate fuel oil
BAT	Best Available Technologies
BC MECCS	B.C. Ministry of Environment and Climate Change Strategy
BEP	Best Environmental Practice
CH_4	Methane
CO_2	Carbon dioxide
CSA	Canadian Standards Association
ECCC	Environment and Climate Change Canada
GHG	Greenhouse Gas
GWP	Global Warming Potential
ha	Hectare
HFCs	Hydrofluorocarbons
IAA	Impact Assessment Act
IAAC	Impact Assessment Agency of Canada
ICAO	International Civil Aviation Organization
IPCC	Intergovernmental Panel on Climate Change
IPD	Initial Project Description
N_2O	Nitrous oxide
NF_3	Nitrogen trifluoride
NFL	Government of Newfoundland and Labrador
NG	Nunatsiavut Government
O&M	Operations and Maintenance
PFCs	Perfluorocarbons
RCP	Representative Concentration Pathway
SACC	Strategic Assessment of Climate Change
Scope 1	Direct greenhouse (GHG) emissions that occur from sources that are controlled or owned by an organization
Scope 2	Indirect GHG emissions from consumption of purchased electricity, heat, cooling or steam
SF_6	Sulfur hexafluoride
VKT	Vehicle Kilometres Travelled

1. Introduction

In order to enable consistent, predictable, efficient and transparent consideration of climate change throughout the impact assessment process, Environment and Climate Change Canada (ECCC) has developed the strategic assessment of climate change (SACC). The latter is conducted under section 95 of the Impact Assessment Act (IAA) and it applies to designated projects under the IAA. The SACC describes the greenhouse gas and climate change information that project proponents need to submit at each phase of a federal impact assessment and requires proponents of projects with a lifetime beyond 2050 to provide a credible plan that describes how the project will achieve net-zero emissions by 2050. The sections below described how these objectives will be achieved for the construction of a new airport (the Project), in Nain, Labrador.

This greenhouse gas assessment was completed for the purposes of the Detailed Project Description (DPD) under the IAA Planning Phase for the New Nain Airport Project (Project). It should be noted that the available data at this stage of the Project is insufficient to provide an accurate emission estimate; the current emission calculation has been developed using the data currently available and professional judgement. This initial assessment focused on the new airport's construction, operation and decommissioning activities. A more detailed GHG estimate will be prepared for the Environmental Impact Assessment as Project engineering design progresses and more information is available.

1.1 General Project Description

The Project is a New Airport for Nain, the northernmost Inuit Community in Labrador, Newfoundland and Labrador (NL). Nain lies north of Unity Bay, about 50 km from the Atlantic Ocean and 370 km north of Happy Valley-Goose Bay (HVGB). The Nunatsiavut Government (NG) is planning to build the new certified airport to replace the existing airstrip at Nain. The three main components of the Project are:

- Runway: new 2,133 m (7,000 ft) long gravel airstrip, with approach lighting and surrounding fence and service road.
- Airport: includes a multi-functional terminal building, aircraft (fixed wing and rotary) parking apron, taxiways, maintenance building, freight and storage warehouse, de-icing pad, and fuelling area
- Access road, a new gravel road approximately 12 km in length to connect the town of Nain to the new airport.

The New Nain Airport will operate 24 hours a day, seven days a week and will be able to serve as the emergency response centre for the region.

2. Strategic Climate Change Assessment

2.1 Greenhouse Gas Emissions

The greenhouse gas (GHG) emissions quantification allows the identification of carbon sources and their relative significance to give a better understanding of the most impactful mitigation strategies which may apply. The quantification of GHG emissions will consider the seven gases defined as GHGs under the United Nations Intergovernmental Panel on Climate Change (IPCC) (IPCC, 2022) and by ECCC:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs – a family of gases)
- Nitrogen trifluoride (NF_3)
- Perfluorocarbons (PFCs – another family of gases)
- Sulphur hexafluoride (SF_6)

It is anticipated that GHG will mostly be emitted as CO_2, CH_4 and N_2O, and only these gases are quantified using an appropriate emissions factor based on the source of fuels and activities shown in Table 2-4, Table 2-5, and summarized in Table 2-6. The emissions are converted into tonnes of CO_2 equivalent (tCO_2-eq) using global warming potential (GWP) which is the heat absorbed by any greenhouse gas in the atmosphere, as a multiple of the heat that would be absorbed by the same mass of carbon dioxide. The scope of emissions inventory of the Project will include all direct emissions (Scope 1) associated to combustion of fossil fuels by stationery and mobility sources.

The initial estimation of GHG emissions associated with the Project includes the construction, operation, and decommissioning phases. The estimation will be updated and completed as part of the environmental impact assessment.

2.1.1 Data Requirements and Gathering of Quantifiable Data

Carbon accounting begins with appropriate setting data collection templates which defines aspects of GHG quantification aligning with the physical scope of the activities taking place throughout all life cycle stages of the Project. Collecting the data used to quantify the inputs and outputs in the GHG emissions assessment process is a critical component of the reporting and methodology development. To distinguish the data collecting process related to GHG quantification, the Project will be categorized into three (3) separate phases: construction, operation, and decommissioning.

The GHG quantification period will match the required service life of the infrastructure asset. It will include all activities leading to carbon emissions within the system boundary, and only exclude activities that do not significantly change the result of the quantification (i.e., less than 1% of total GHG emissions) with justification from assumptions, inputs, and data gaps used and sensitivity analysis demonstrating validity of exclusions.

The boundaries for the construction phase include the details of the equipment involved in the Project and changes to land use. GHG emissions and carbon sinks removal resulting from the Project's land use conversion will have a direct impact in the GHG assessment. This assessment will be conducted according to the area of land affected in each land use category of the intergovernmental panel of climate change (IPCC, 2019) and using the Greenhouse Gas Emissions Quantification Guide (Quebec Government, 2022).

The emissions associated with the construction phase will include materials and equipment used to construct the access road and airport, transportation, clearing of the area (tree removal and blasting of rock material). The operation phase will be evaluated through the aircraft use and maintenance, including the buildings related to the airport operations, access road and power generating station.

Decommissioning emissions include activities related to the closure of the airport including equipment, transportation, waste treatment and land use. We anticipate decommissioning emissions will be lower than construction emissions. There will be demolition of buildings and removal of concrete, which emissions are expected to be lower than blasting for construction. The access road will not be decommissioned, but the airport site will be decommissioned and revegetated for CO_2 sequestration.

2.1.2 Net Greenhouse Gas Quantification Methodology

The GHG quantification assessment has been conducted using the key principles of relevancy, completeness, consistency, accuracy, transparency, and conservativeness. These principles are aligned with the CSA-ISO 14064 standards (CSA, 2018) and the GHG Protocol[1] standards and are defined below. It is also noted that the emission factors are acquired from the National Inventory Report 1990-2021: GHG Sources and Sinks in Canada, Part 2 (Government of Canada, 2023) and Canada's Greenhouse Gas Quantification Requirements (Version 6.0) (ECCC, 2022).

- **Relevance:** The relevance of GHG sources, data, and methodologies regarding the selected, defined documented and used boundaries.
- **Completeness:** All relevant GHG emissions will be included in the assessment with supporting information on criteria and procedures. The GHG quantification assessment will describe what sources will be included and excluded.
- **Consistency:** The assessment shall enable meaningful comparisons in GHG-related information. Consistent methodologies and data sources for carbon management are to be used to allow comparison over time.
- **Accuracy:** The assessment must reduce bias and uncertainties as far as is practical. GHG quantification will be based on available data, emission factors and estimation methodologies used, recognizing that uncertainties exist due to the early stage of the Project and to emission factor availabilities for the identified activities. A conservative approach will be undertaken in the latter cases.
- **Transparency:** The assessment must disclose sufficient and appropriate GHG related information to allow conclusions and decisions to be made with reasonable confidence.
- **Conservativeness:** The assessment must use conservative assumptions, values and, and procedures to ensure that GHG emission reductions are not over-estimated.

Tables 1-1, 1-2 and 1-3 list the emission factors used in conjunction with activity factors to estimate GHG emissions of CO_2, CH_4 and N_2O associated with the Project.

1. *Homepage | GHG Protocol*

Table 2-1: Emission Factors for Diesel Combustion

Diesel Burning Sources	g CO_2/L	g CH_4/L	g N_2O/L	Source
Heavy Duty Diesel Truck	2,680.5	0.11	0.151	Part 2 Table A6.1-14 (Government of Canada, 2023)
Off-Road Equipment Tier 1-3	2,680.5	0.073	0.022	
Off-Road Equipment Tier 4	2,680.5	0.073	0.227	
Stationary Equipment	2,681	0.078	0.02	Table 2-2 and 2-7 (ECCC, 2022)

Table 2-2: Emission Factors for Road Construction

Source	Unit	CO_2	CH_4	N_2O	Source
Blasting	t of CO_2/ t of ANFO*	0.189	-	-	The Mining Association of Canada (2014)
Forest Loss	t of CO_2/ha**	153	-	-	Quebec Government (2022) Eq. 10 & IPCC (2019) Table 4.4.; 4.7
Sequestration Loss	t of CO_2/ha	75	-	-	Quebec Government (2022) Eq. 11 & IPCC (2019) Table 4.3; 4.4; 4.9
Wetland Loss	kg/ha	440	2.0	3.2	Quebec Government (2022) Section 3.12

*Notes: *ANFO – Ammonium nitrate fuel oil*
***ha – Hectare*

Table 2-3: Emission Factors for Access Road and Airport Operations

Source	Unit	CO_2	CH_4	g N_2O/L	Source
Aircraft (Jet Fuel)	Kg/kL	2,559.7	0.018	0.0711	Table A6.1-14 (Government of Canada, 2023)
Access Road small cars	g/VKT*	146.3	0.01	0.001	US EPA MOVES model
Access Road trucks	g/VKT*	202.9	0.01	0.007	US EPA MOVES model
Commercial large vehicles	g/VKT*	723.7	2.04	0.05	US EPA MOVES model
Auxiliary Equipment at Airport – diesel (Tier 4)	Kg/kL	2,680.5	0.073	0.227	Table A6.1-14 (Government of Canada, 2023)
Auxiliary Equipment at Airport - gasoline	Kg/kL	2,307	5.08	0.064	Table A6.1-14 (Government of Canada, 2023)
Diesel Burning Generation Station	Kg/kL	2,681	0.078	0.02	ECCC (2022)

*Note: *VKT – Vehicle Kilometres Travelled – total kilometres travelled by all vehicles in a one day*

2.2 Direct Emissions from Road and Airport Construction and Airport Decommissioning

Since the terrain and weather are challenging, it was assumed that construction will be completed over two five-month periods.

During construction the main source of Scope 1 emissions is the combustion of diesel. The detailed list of equipment expected to be used for construction is listed in Appendix A (Table A-1). Emissions from crushing and transportation of crushed material for use as road and airport construction / fill material are included, and transportation of sand from the Nain quarry may also be required. Limited permafrost (wetland) will be lost.

Vegetation clearing for airport, landing strip and access road causes GHG emissions due to loss of forest land carbon stocks. In addition, cutting trees causes loss of CO_2 sink (loss of CO_2 sequestration) for the next 100 years. Details of emission calculations are in Appendix A.

Direct emissions from construction of the access road and airport are estimated to be 12,746 tCO_2 eq (Table 2-4). Decommissioning emissions are assumed for the purpose of this assessment to be equal to airport construction emissions (12,746 tCO_2 eq).

Table 2-4: GHG Emissions from Construction of Road and Airport and Decommissioning of Airport

Scope	Source	Material (Unit)	Amount	tCO_2	tCH_4	tN_2O	tCO_2-eq
Scope 1 Emissions	Diesel Combustion (two years of construction assumed)	Diesel (L)	4,001,862	10,727	0.306	0.165	10,780
	Loss of Forest Land Carbon	Forest Lost (ha)	7.91	1,208	-	-	1,208
	Net Loss of CO_2 Sequestration over 100 y	Forest Lost (ha)	7.91	758	-	-	758
	TOTAL for Construction			**12,693**	**0.306**	**0.165**	**12,746**
	TOTAL for Decommissioning			**12,693**	**0.306**	**0.165**	**12,746**

2.3 Direct Emissions from Airport Operation

During airport operations, aircraft flights and landing / departing / maneuvering are the main sources of Scope 1 emissions (around 83% of total airport operations GHG emissions). Auxiliary equipment includes tugs, tractors, forklifts, snow truck, landing strip maintenance equipment, trucks, and cars, etc. In addition, there will be electricity generators at the power plant. According to the average annual flights to and from Nain (9 flights per day on average with expected range from 4 to 18 flights), and an operation phase of 50 years, the direct emissions from operations are 1,005,820 tCO_2 - eq (Table 2-5). Appendix A contains assumptions and detailed calculations.

Table 2-5: GHG Emission Values from Airport Operations

Scope	Operations	Fuel Consumption (L/y)	tCO_2/yr	tCH_4/yr	tN_2O/yr	tCO_2-eq/yr	tCO_2-eq Operational Phase (50 years)
Scope 1 Direct Emissions	Landing / Departing / Maneuvering	4,055,082	10,380	0.073	0.288	10,458	522,912
	Auxiliary Equipment	269,164	698	0.330	0.051	721	36,054
	Flights to Goose Bay and Natuashish	-	-	-	-	6,316	315,790
	Electricity Generation	975,000	2,614	0.076	0.020	2,621	131,064
	TOTAL		13,692	0.48	0.36	20,116	1,005,820

2.4 Acquired Energy Emissions

Acquired energy emissions are assumed to be zero, as all power will be generated at the airport site.

2.5 Avoided Domestic GHG Emissions

The Project does not avoid domestic GHG emissions.

2.6 Excluded from Analysis GHG Emissions

The GHG emissions which are below 1% of the total were excluded from Table 2-4 and Table 2-5. In Table 2-4 blasting of rock would yield CO_2 emissions 0.2% of total and loss of wetland (permafrost), would be below 0.5% of total CO_2-eq for construction. In Table 2-5 access road emissions would be 0.8% of total airport emissions during operational phase. Appendix A provides calculations and values of excluded from analysis sources of the CO_2-eq calculations.

2.7 Total New Nain Airport Emissions

Table 2-6 summarizes annual and total Project emissions from construction, operation for 50 years and decommissioning including small sources less than 1% of the totals not included in Table 2-4 and Table 2-5. Net GHG emissions for 50 years of operations will be 1,005,820 tCO_2-eq. Decommissioning and construction emissions are significantly lower than operating emissions. Including construction and estimated decommissioning emissions, the total net GHG emissions of the new airport will be 1,033,218 tCO_2-eq (Figure 2-1).

Table 2-6: New Nain Airport Emissions (tCO_2-eq) for Construction, Operation for 50 years, and Decommissioning

Year	Source	tCO_2-eq
1	Construction of Airport and Access Road – Deforestation and Sequestration	7,356
2	Construction of Airport and Access Road	5,390
3-52	Operation of Airport (20,282 tCO2-eq each year for 50 years)	1,014,100
53	Decommissioning of Airport	12,746
	TOTAL	1,039,592

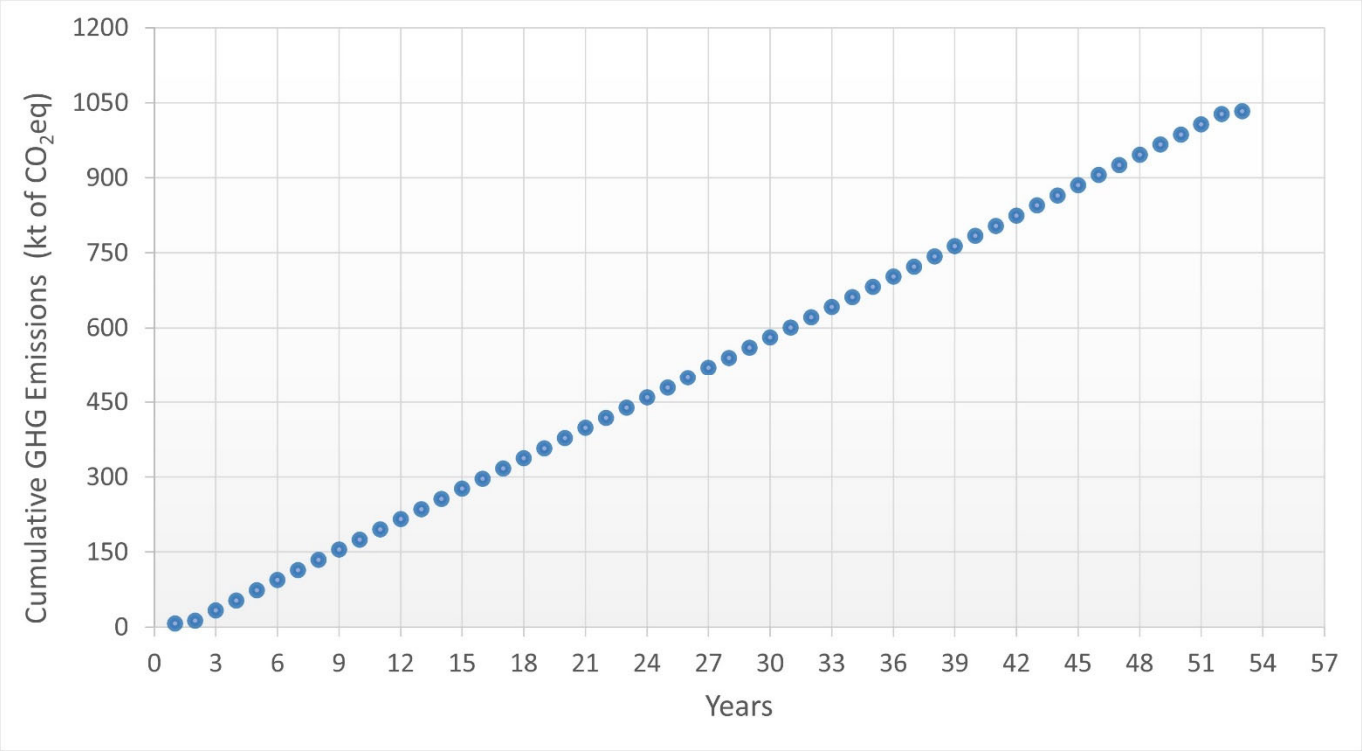

Figure 2-1 Annual GHG Emissions from Construction, Operation, and Decommissioning

2.8 Mitigation Measures, Net-Zero Plan

As required by SACC guidelines, developing, and implementing a net-zero plan for 2050 will be included in the environmental impact assessment. Stemming from the need to find innovative ways to reduce carbon within the infrastructure delivery process, a baseline will be established to set the goals and develop mitigation measures.

The development and implementation of mitigation measures will follow the principles outlined below:

- Emphasis on reducing the net GHG emissions of the Project as early as possible during the project lifetime.
- Based on the concept of energy efficiency, the BAT/BEP (Best Available Technologies / Best Environmental Practice) reduces energy and resource consumption at the source
- A BAT/BEP will be performed over the Project lifetime, including any emerging technologies and practices that may become technically and/or economically feasible during the lifetime of the Project.

The BAT/BEP Determination process, shown in Figure 2-2 (Government of Canada, 2021), will involve a structured analysis developed in six steps to identify and select the most effective technologies, techniques and practices that are technically and economically feasible to minimize GHG emissions associated with the Project. The scope of the BAT/BEP analysis will consider all main sources of emissions of the Project, from the construction, operation, and decommissioning phases. This provides the flexibility to create Project-wide scenarios that include technologies and practices minimizing GHG emissions from the main emission sources of the Project.

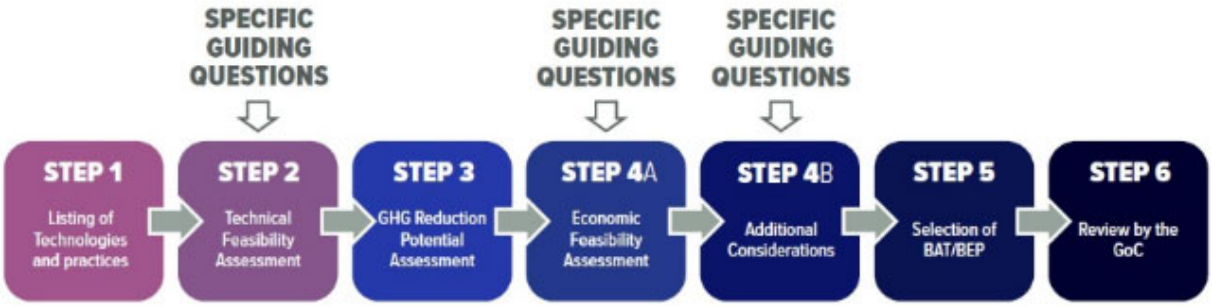

Figure 2-2: Steps of the BAT/BEP Determination Process

At this stage in the Project, the mitigation measures that could lead to the greatest GHG emission reductions are:

- Installation of solar panels and wind farm together with battery storage system to reduce or eliminate emissions from power generators.
- Energy-efficient and/or electric airport auxiliary equipment
- Use of aviation biofuels
- Implementation of an energy management system (ISO 50 001)

Additional mitigation measures considered can include:

- Use of local materials – minimize haul distance for construction material. For example, the sand quarry in Nain can provide sand for access road construction and for concrete used in buildings.
- Using repurposed or recycled or materials – wood from cut trees can be used as construction material.
- Low-carbon materials selection

- Minimizing building heating and cooling requirements and associated systems
- Minimizing waste
- Minimizing site transport
- Efficient construction methods (e.g., modular systems, precision manufacturing and MMC) contributing to better built quality, reducing construction-phase waste and need for repairs in the post completion and defects period (snagging)
- Lightweight construction which uses less material
- Encourage durable construction and flexible designs

2.9 Limitations

It should be noted that the available data at this stage of the Project is insufficient to provide an accurate emission estimate; the current emission calculation has been developed using the data currently available and professional judgement. The downstream and upstream GHG emissions were not included as per the SACC guidelines and due to lack of information. As an example, emissions related to transport of equipment/materials/fuel/etc. to the site via by barge were not included in the assessment. Also, the development of a temporary construction camp was not included in this exercise due to the lack of available data.

The assessment is focusing on the new airport's construction, operation, and decommissioning activities. During construction phase, the old airport will still be in operation. The existing airport GHG emissions are not part of this assessment. Similarly, decommissioning emission of existing airport, overlapping with beginning of the operation of the new airport are also not included. It should be mentioned that the existing airport is much smaller (i.e., with smaller aircrafts) than the proposed new airport. The current annual average is three flights a week to, from Natuashish and six flights a week to and from Goose Bay. There is only one small building on the site of the existing airport, and decommissioning of this site will produce very low emissions.

The assessment will be reviewed when Project engineering progresses and when project Tailored Impact Statement Guidelines are received. At that time, the estimation will be reassessed, using more accurate information, as part of the environmental impact assessment as the Project moves forward.

2.10 Resilience to Climate Change

As part of the SACC, a climate change resilience analysis will be conducted. This will include a selection of weather-related risks that may change under current and anticipated climates. In 2021, ECCC published a technical guide that provides instructions and details on the level of information for the climate change resilience assessment. The climate change resilience analysis will be completed in accordance with this document and the procedures contained in Canadian Standards Association published CSA 4011:19 – Technical Guide: Infrastructure in permafrost: A guideline for climate change adaptation (CSA, 2019). This document provides guidance and practical advice on location and design for infrastructure in northern environments. The document describes the nature of permafrost, trends in climate change, foundation systems for community infrastructure, and presents a process for ensuring climate change is incorporated into design and location decisions. In that context, the following activities will be conducted:

- Assessment of the interactions of historical climate conditions within the Project area, both in terms of trends in key climate variables (e.g., precipitation or temperature) and records of extreme events (e.g., heat waves, floods).
- Collect information and observations from the Indigenous peoples affected by the Project.
- Analysis of projected future changes in the climate using climate model projections for two ranges of emission scenarios also called the Representative Concentration Pathway (RCP). These scenarios will be

the intermediate scenarios (RCP 4.5) and the high emission scenario (RCP 8.5). Uncertainty, including estimates of the level of confidence in the projections of changes to the likelihood of a given climate hazard of interest, will be evaluated.

- Determination of climate indicators, which represents conditions or events that can cause loss of productivity, damage to the infrastructure, harm to employees or visitors, etc. The probability associated with an indicator will be calculated from observations at weather stations and climate simulations.
- Assessment of the potential climate change vulnerability. This screening determines the exposure, sensitivity, and adaptive capacity of Project assets/components, the people, and the environment to the selected climate indicators. Assets and operations that are exposed, sensitive and have low inherent capacity to adapt will go to the next stage of Risk Analysis. The latter will be conducted to evaluate the impacts of the climate indicators on each of the Project components by evaluating their likelihood of occurrence and their potential consequences to the Project, environment, and people.
- Risk will be evaluated to rank them from unacceptable risks to acceptable levels. This risk evaluation will provide the basis for identifying when risk treatment and adaptation measures are necessary. These adaptation measures will be divided by the implementation stage:
    - Design: Measures to be incorporated during the design phase of assets for these to be resilient to future climate risks and to prevent costly revamps.
    - Operations and Maintenance (O&M): Measures to be incorporated over the lifespan of the assets during operation and maintenance to ensure resiliency.
    - Policy: Measures to be executed to always provide and maintain safe and healthy working

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Appendix A

Detailed Emission Calculations

Construction Phase

A-1 Emissions from Diesel Combustion Construction Equipment

In the absence of construction design information, **Table A-1** lists construction equipment conservatively assumed in emission calculations. Days per year were estimated for two years of construction (five months each year – ten months in total). **Table A-2** summarizes Global Warming Potential (GWP – AR5) values used to calculate emissions as CO_2-eq.

Table A-1: Construction Equipment

Diesel Combustion Sources	Classification	Fleet Size	Hours/ Day	Days/ Two Year	Engine Power (Hp)	Ave. Fuel Consumption (L/h)
Sandvik QJ241I Mobile Jaw Crusher	Off Road Tier 1-3	4	12	240	225	30
Truck CAT773D	Heavy Duty Truck	2	12	240	650	48.1
Excavator CAT374D with Breaker Attachment	Off Road Tier 1-3	3	12	60	476	44.6
CAT 990H Wheel Loader	Off Road Tier 1-3	2	12	240	627	66.7
Water Truck CAT773 Modified	Heavy Duty Truck	1	6	240	650	48.1
Scraper CAT627K	Off Road Tier 1-3	3	12	240	290	71.6
Wheel Compactor CAT CP54B	Off Road Tier 4	3	12	240	131	12
Wheel Compactor CAT CS44B	Off Road Tier 1-3	3	12	240	100	10
Grader CAT 16H	Off Road Tier 1-3	3	12	240	275	25
Track Bulldozer CATD9R	Off Road Tier 1-3	2	12	240	405	52.8
Crane – SCX 1500A-3	Off Road Tier 4	2	12	60	282	40
TERRAMAC RT9 Concrete Mixer	Stationary	2	12	60	220	30
Pump for Pouring Cement PB51AT-4-E	Stationary	2	12	60	40	8
EK300LS Cable Crowd Piling Rig	Stationary	4	12	60	443	55
Track Bulldozer CATD9R	Off Road Tier 1-3	2	12	240	575	56
Atlas Copco D65 drill	Off Road Tier 1-3	8	12	180	540	52.6

Table A-2: Global Warming Potential

Chemical Formula	GWP
CO_2	1
CH_4	28
N_2O	265

Using emission factors from **Table 2-1**, applied to equipment from **Table A-1** and GWP from **Table A-2**, fuel consumption and GHG emissions for diesel burning construction equipment were calculated (**Table 2-4**). It was assumed that total time of construction will be two years (10 months).

A-2 Blasting Emissions

To conservatively estimate the rock volume blasted, the following assumptions were made:

1. The most challenging part of the road construction will be the steeply sloped bedrock area of Mount Sophie. It was estimated that around 800,000 m^3 of rock will be blasted in this area assuming corridor 20 m deep, 20 m wide and 200 m long, representative of the terrain variations through the pass.
2. The remainder of the road is a mix of permafrost, forested area, and bare rock. Some parts of the road, landing strip and airport area will be smoothed (with cut and fill approaches) with material from blasting. To simplify calculations, it was assumed that on average, the whole road length was cut 0.33 m deep and 20 m wide. Total volume of the blasted rock was 85,800 m^3.
3. The landing strip will have maximum length of 1,829 m and width of 30.5 m. Total area of the strip will be 55,784.5 m^2. There will be additional 1,300 m^2 space (for parking, terminal, etc.,). It was estimated that on average, the blasting was equivalent to a depth of 0.33 m over this area.

The total blasted volume was estimated as 184,638 m^3.

Blasting emissions were based on the use of ammonium filtrate mixture with fuel oil (ANFO), with a range of emulsion over volume from 0.75 to 0.30 kg/m^3. Using the 0.75 kg/m^3 ratio, 138.5 t of ANFO is required for blasting of all material during road and airport construction. Using emission factor from the Mining Association of Canada (0.189 t of CO_2/t of ANFO), emissions were estimated as 26 t CO_2-eq. It was assumed that drilling of holes for blasting and blasting of the rock will be done for 3 months at beginning of every year of construction. It was assumed all blasted rock will be used in road and airport construction (coarse and fine, road and strip layers).

Since blasting emissions (26 t CO_2-eq) would be 0.20% of total construction emissions, these emissions were not used in the assessment.

A-3 Emissions from Deforestation

The forest around Nain is described as boreal forest, tundra woodland based on surveys to date. Emissions of CO_2 from loss of forest land carbon stocks can be calculated using Equation 10 from Quebec Government (2022):

$$GHG\ (tCO_2\text{-}eq) = N_H \times t_{DMh} \times (1+T_X) \times CC \times 44/12$$

Where: N_H = Number of hectares deforested – estimated as 7.91 ha
t_{DMh} = Tonnes of dry matter per hectare – for tundra woodland primary forest = 63.7 t/ha
T_X = Ratio of below-ground biomass to above-ground biomass – for tundra woodland = 0.39
CC = Carbon content of wood, expressed as tonnes of carbon per tonne of dry matter – default = 0.47
$44/12$ = Molecular weight ratio of CO_2 to carbon
GHG (tCO_2-eq) = 7.92 ha x 73.7 t CO2/ha x (1+0.39) x 0.47 x 44/12 = 1,208 tCO_2-eq

A-4 Emissions from Loss of CO2 Sequestration

Loss of CO_2 sequestration over 100 years can be calculated using Equation 11 from Quebec Government (2022):

$$L_{SEQ}\ (tCO_2\text{-}eq) = N_H \times GAB \times (1+T_X) \times CC \times 44/12 \times 100$$

Where: N_H = Number of hectares deforested – estimated as 7.91 ha
GAB = Annual growth rate of above-ground biomass, in tonnes of dry matter per hectare per year = 0.4 t/ha/yr
T_X = Ratio of below-ground biomass to above-ground biomass – for tundra woodland = 0.39
CC = Carbon content of wood, expressed as tonnes of carbon per tonne of dry matter – default = 0.4

44/12 = Molecular weight ratio of CO_2 to carbon
L_{SEQ} (tCO_2-eq) = 7.91 ha x 0.4 tCO2/ha x (1+0.39) x 0.4 x 44/12 x 100 years = 758 tCO_2-eq

A-5 Emissions from Wetland Loss

There will be loss of permafrost and marshes along access road and at the future site of the landing strip and airport. The loss of wetland will be larger than the area used for construction, and it was conservatively estimated using Google Earth as 43.82 ha. The CO_2 emissions from wetland loss can be calculated using Equation 13, 14 and 15 from Quebec Government (2022):

Equation 13: CO_2 emissions from wetland loss: $E_{CO2} = L_{WL} \times EF_{CO2} \times 44/12$

Where: L_{WL} = Wetland loss in hectares – estimated as 43.82 ha
EF_{CO2} = CO_2 emission factor due to wetland loss – for boreal forest = 0.12 t of carbon/ha
44/12 = Molecular weight ratio of CO_2 to carbon
E_{CO2} = 43.82 ha x 0.12 t CO2/ha x 44/12 = 19.28 tCO2-eq

Equation 14: CH_4 emissions from wetland loss: $E_{CH4} = L_{WL} \times EF_{CH4}$

Where: EF_{CH4} = CH_4 emission factor due to wetland loss – for boreal forest nutrient rich = 2.0 kg of CH_4/ha
E_{CH4} = 43.82 ha x 2 kg CO2/ha / 1000 kg/t = 0.087 t

Equation 15: N_2O emissions from wetland loss $E_{N2O} = L_{WL} \times EF_{N2O}$

Where: EF_{N2O} = N_2O emission factor due to wetland loss – for boreal forest low nutrient rich = 3.2 kg of N_2O/ha
E_{N2O} = 43.82 ha *3.2 kg CO2/ha / 1000 kg/t = 0.140 t

Total GHG emissions from wetland loss: $E_{Wetland\ Loss}$ = 19.28 t + 28*0.087 t+ 265*0.14 t = 58.5 t CO_2-eq

Wetland loss emissions would be below 0.5% of total construction emissions and it is not used in assessment.

Operations Phase

A-6 Emissions from Diesel Power Generator

According to the R7 Feasibility Study (CIMA+, 2023), there will be a maximum power demand of 975 kWh and generators will consume 975,000 L/yr of diesel. Based on emission factors from **Table 2-3** and **Table A-2**, emissions from continuous power generation for 50 years were 130,197 tCO_2-eq.

A-7 Emissions from Aircraft Arrival, Departure, and Maneuvering

Several aircraft may operate at the new Nain Airport: Dash 8-100, Dash 8-300, ATR 72, ATR 42, and Boeing 737-200. Since the last has the highest emissions (and fuel consumption), it was assumed that nine Boeing 737-200 will land and depart each day - three from or to Natuashish and six from or to Goose Bay. Since the access road was designed for Average Annual Daily Traffic (AADT) of 100, it was assumed that a maximum of 612 people will use the airport daily (the capacity of a Boeing 737-200 is 136 passengers, assuming that average number of passengers will be 68 (50% of the maximum capacity). The fuel consumption was calculated using ICAO database (ICAO Aircraft Engine Emissions Databank | EASA (europa.eu)) and **Table A-3** summarizes fuel consumption.

Table A-3: Fuel Consumption Calculations for Boeing 737-200 Aircraft

Mode	Engine Thrust Setting (% of Maximum Thrust	ICAO Default Time (minutes)	Fuel Flow per Engine (kg/s)	Fuel Used by Two Engines (kg)
Take-Off	100	0.7	1.245	104.6
Climb Out	85	2.2	0.997	263.2
Approach	30	4	0.354	169.9
Idle	7	26	0.147	458.6
			TOTAL Fuel (kg)	**996.3**

Assuming 9 flights a day and 365 days annual operations, turbo fuel use will be: 996.3*9*365 = 3,273,003 kg of turbo fuel. Assuming fuel density 0.81 kg/L (AEPA, 2023), turbo fuel usage is 4,040,745 L/yr. In addition, there are fuel additives and oil, up to 0.36% of fuel volume for 2015-2019 by Canadian air carriers I to III (https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=2310026701). In total, annual aviation fuel consumption was estimated as 4,055,082 L/yr. Using emission factors from **Table 2-5** and GWP from **Table A-2,** emissions were estimated as 10,458 tCO_2-eq/yr or 522,912 tCO_2-eq per 50 years of airport operations assuming no changes during the lifetime of operations.

A-8 Emissions from Aircraft In Flight

The calculations used distance-based emission factors for short and long haul taken from Table 18 in Best Practices Methodology for Quantifying Greenhouse Gas Emissions (BC MECCS, 2023). **Table A-4** summarizes emission calculation assumptions.

Table A-4: Fuel Consumption Calculations for Boeing 737-200 Aircraft

Destination	Distance (km)	Flights per Day	Flights per Year	Max. Number of Passengers / Flight	Kg CO_2-eq / Passenger / km	t CO_2-eq/yr	tCO_2-eq (50 years)
Goose Bay	367	6	2,190	68	0.1021	5,580.1	279,007
Natuashish	76	3	1,095	68	0.1300	735.7	36,783
					TOTAL Emissions	**6,316**	**315,790**

The Boeing 737-200 capacity is 136 passengers. It was assumed that with 9 flights a day in this aircraft, the maximum reasonable number of passengers per flight will be half capacity, which is 68 passengers. Total emissions were estimated as 6,316 tCO_2-eq/yr and 315,790 tCO_2-eq over 50 years.

A-9 Emissions from Airport Operations

Equipment and operations assumptions were:

1. Snow removal trucks work for 312 hours a year (considering snow fall days and amounts), consuming 6.8 L/hour of diesel (up to 2,134 L/yr)
2. Eight cars used by airport staff work 4 hours a day, consuming 5.3 L/hour of gasoline (up to 62,021 L/yr)
3. Two light trucks used by airport staff work 4 hours a day, consuming 6.8 L/hour of diesel (up to 19,973 L/yr)
4. Four forklifts each work 12 hours a day, burning 2.6 L/hour of diesel (up to 45,552 L/yr)
5. Four bobcats, each work 2 hours a week (104 hours a year) and burning in total 2,829 L/yr

6. Other equipment like tugs, tractors, refuelers, rollers, and scrapers for landing strip maintenance consume 136,656 L/yr of diesel.

Using emission factors for mobile diesel (Tier 4) and gasoline from **Table 2-5** and GWP from **Table A-2**, emissions are summarized in **Table A-5**.

Table A-5: Emissions from Equipment Working at New Nain Airport

Destination	Fuel (L/yr)	tCO_2/yr	tCH_4/yr	tN_2O/yr	tCO_2-eq/yr	tCO_2-eq (50 years)
Mobile diesel	207,144	555.25	0.015	0.047	568.1	28,407
Gasoline	62,021	143.08	0.315	0.004	153.0	7,648
TOTAL	**269,164**	**698.3**	**0.330**	**0.051**	**721**	**36,054**

A-10: Emissions from Access Road

Emissions from traffic on the access road were quantified using the emission factors from the US EPA MOVES model, with the speed in the range from 44 km/hr to 52 km/hr, as presented in **Table A-6**. The assumed average daily traffic count was 100 vehicles (36 passenger cars, 36 pick-up trucks/vans, and 28 buses or heavy delivery trucks). The total emissions from the access road are summarized in **Table A-7**.

Table A-6: Emission Factors from MOVES

Type	Quantity	Access Road (km)	Annual Total VKT (km)	CO_2 Emission Factor (g/VKT)	CH_4 Emission Factor (g/VKT)	N_2O Emission Factor (g/VKT)
Passenger Car	36	13	170,820	146.3	0.01	0.001
Pickup Truck or Van	36	13	170,820	202.9	0.01	0.007
Bus	28	13	132,860	723.7	2.04	0.05

Table A-7: Total Emissions from Access Road

Type	tCO_2/yr	tCH_4/yr	tN_2O/yr	tCO_2-eq/yr	tCO_2-eq (50 years)
Passenger Car	25.0	0.001	0.0001	25	1,253
Pickup Truck or Van	34.7	0.001	0.0013	35	1,751
Bus	96.2	0.271	0.0073	106	5,284
Total Emissions	155.8	0.273	0.0087	166	8,287

Total emissions from access road would be 0.8% of total emissions for new airport operations and they are not included in assessment.

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