



# Kimmirut Sealift Project Field Program

## Environmental Management Plan

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## Acronyms and Abbreviations

Acronyms/Abbreviation	Definition
AHJ	Authorities Having Jurisdiction
AIA	Archaeological Impact Assessment
AISR	Aquatic Invasive Species Regulations
BMP	Best Management Practices
CCA	Canadian Construction Association
CCME	Canadian Council of Ministers of the Environment
CEQG	Canadian Environmental Quality Guidelines
CESCC	Canadian Endangered Species Conservation Council
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
CMZ	Compliance Monitoring Zone
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CS	Community Services
CTD	Conductivity, Temperature and Depth
CWS	Canadian Wildlife Service
dB	Decibel
DFO-FHPP	Fisheries and Oceans Canada Fish and Fish Habitat Protection Program
DFO-FMO	DFO-Fisheries Management Office
Dynamic Ocean	Dynamic Ocean Consulting Ltd
EBSA	Ecologically and Biologically Significant Area
ECCC	Environment and Climate Change Canada
EM	Environmental Manager
EMP	Environmental Management Plan
EZ	Exclusion Zone
FAA	<i>Fisheries Act</i> Authorization
GN-CH	Government of Nunavut Department of Culture and Heritage
GN-DoE	GN-Department of Environment
GN-TIN	GN- Transportation and Infrastructure Nunavut
GPS	Global Positioning System
HADD	Harmful Alteration Disruption or Destruction
HFC	High Frequency Cetaceans
HTA	Hunters and Trappers Association
HWL	High-Water Line
IBA	Important Bird Area
IBKS	Inuit Bowhead Knowledge Study

Acronyms/Abbreviation	Definition
IQ	Inuit Qaujimagatuqangit
IUCN	International Union for Conservation of Nature
LFC	Low Frequency Cetaceans
LFSP	License to Fish for Scientific Purposes
LoA	Letter of Advice
LUP	Land Use Permit
LWL	Low-Water Line
MBCA	<i>Migratory Birds Convention Act</i>
MBES	Multibeam Echosonar
MMR	Marine Mammal Regulations
NAPSR	Nunavut Archaeological and Palaeontological Sites Regulations
NCRI	Nunavut Coastal Resources Inventory
NIRB	Nunavut Impact Review Board
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPC	Nunavut Planning Commission
NRI	Nunavut Research Institute
NSA	Nunavut Settlement Area
NuPPAA	<i>Nunavut Planning and Project Assessment Act</i>
NWA	<i>Nunavut Wildlife Act</i>
NWB	Nunavut Water Board
NWHS	Nunavut Wildlife Harvest Study
NWMB	Nunavut Wildlife Management Board
OW	Otariids in Water
OZ	Observation Zone
PPE	Personal Protection Equipment
PW	Phocid Pinnipeds in Water
QIA	Qikiqtani Inuit Association
RFR	Request for Review
RMS	Root Mean Squared
RNLUP	Recommended Nunavut Land Use Plan
ROV	Remotely Operated Vehicle
SAR	Species at Risk
SARA	<i>Species at Risk Act</i>
SBP	Sub-Bottom Profiler
SCOP	Standards and Codes of Practice

Acronyms/Abbreviation	Definition
SCUBA	Self-Contained Underwater Breathing Apparatus
SDR	Screening Decision Report
SDS	Safety Data Sheets
SEL	Sound Exposure Level
SERP	Spill and Emergency Response Plan
SPL	Sound Pressure Levels
TC	Transport Canada
VHF	Very High Frequency
WHS	Western Hudson Strait
Worley Consulting	Worley Canada Services Ltd.
WQG	Water Quality Guidelines

## Disclaimer & Limitations of the Report

The information presented in this document was compiled and interpreted exclusively for the purposes of permitting the Kimmirut Sealift Field Program (the Program). Dynamic Ocean Consulting Ltd. (Dynamic Ocean) in collaboration with Worley Canada Services Ltd. (operating as Worley Consulting) provided this report to the Government of Nunavut (GN) Department of Transportation and Infrastructure Nunavut (TIN) solely for the purpose noted above.

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Any questions concerning the information or its interpretation should be directed to Victoria Burdett-Coutts.

# 1 Introduction

## 1.1 Background

The Government of Nunavut – Transportation and Infrastructure Nunavut (GN-TIN) are planning the construction of Sealift safety improvements in Kimmirut, Nunavut. Worley Canada Services Ltd. (Worley Consulting) has been retained by the GN-TIN to support the detailed design of the Kimmirut Sealift (the Project). Kimmirut is located on southern Baffin Island, on the Meta Incognita Peninsula, in the Qikiqtaaluk Region of Nunavut (62° 50.845'N, 69° 52.152'W, see Figure 1-1). Dynamic Ocean Consulting Ltd. (Dynamic Ocean) is supporting Worley Consulting on the permitting requirements for the Project. To inform the design phase, several field programs will be undertaken over the next few years, initiating in late 2025 (collectively referred to as the Program).

The intention of the Program, will be as below:

- Conduct environmental, geological, geophysical, and archaeological baseline studies.
- Perform a geotechnical program to confirm seabed and quarry rock conditions.
- Topographic and bathymetric surveys.
- Existing conditions or effects studies during or post-construction of the Project.

The Sealift general arrangement is provided in Drawing 1-1.

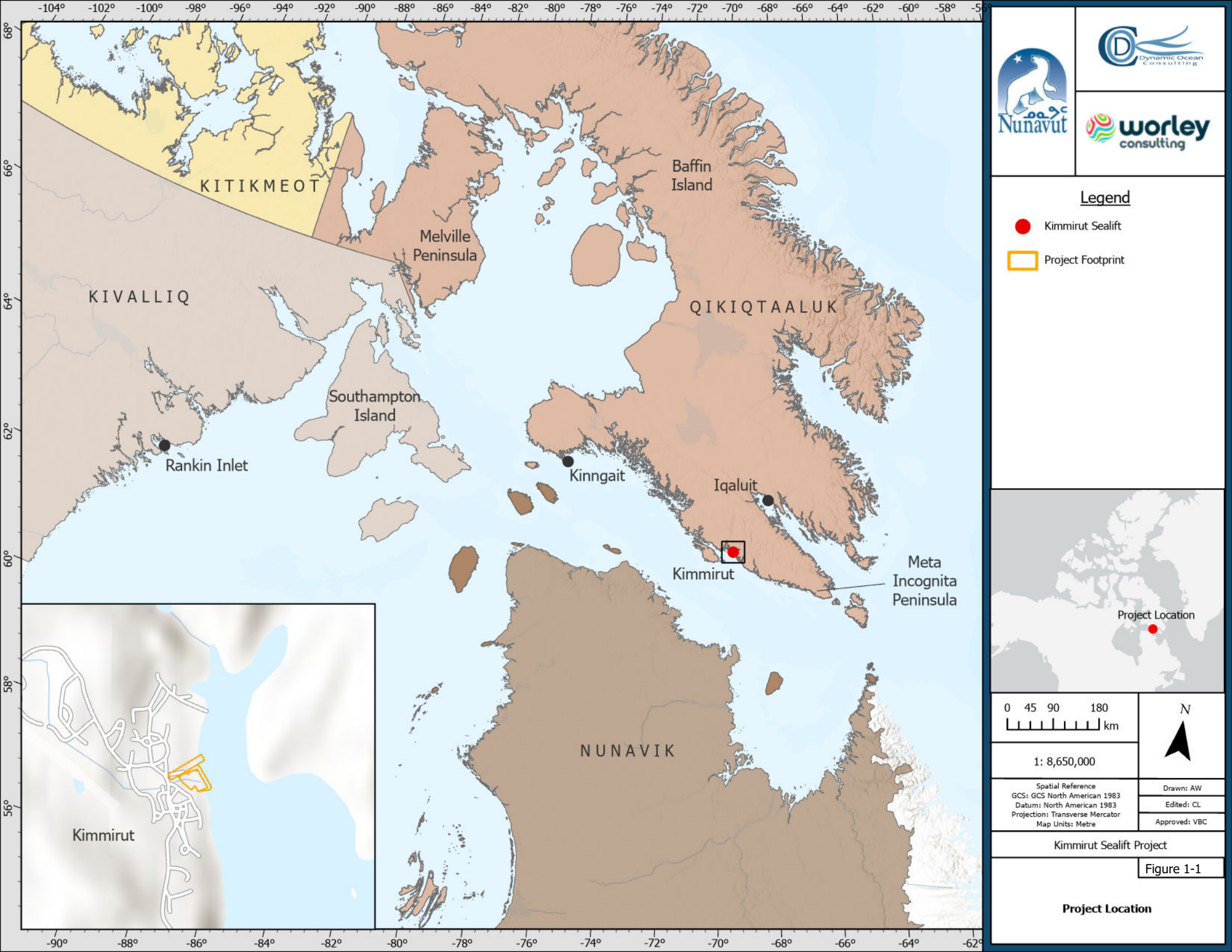
## 1.2 Introduction and Program Intention

To support permitting and inform the design phase of the Project, the Program will consist of several field programs. Initiating late 2025, the Program is anticipated to continue over the next few years.

The Program may consist of the following:

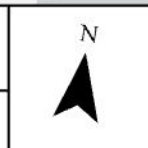
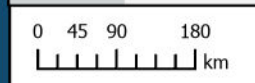
- Geophysics Program.
- Geotechnical Program.
- Topographic Program.
- Marine Program.
- Terrestrial Program.

For the full scope of the Program see Section 2.1 (Table 2-1, Table 2-2).



**Legend**

- Kimmirut Sealift
- Project Footprint



1: 8,650,000

Spatial Reference  
 GCS: GCS North American 1983  
 Datum: North American 1983  
 Projection: Transverse Mercator  
 Map Units: Metre

Drawn: AW  
 Edited: CL  
 Approved: VBC

Kimmirut Sealift Project

Figure 1-1

**Project Location**

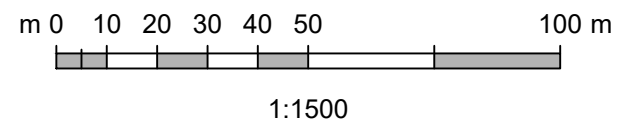


**KEY PLAN**  
1:15000

**LEGEND:**

- ⊙ **POWER / LIGHT POLE**
- x— **FENCE**
- M **GATE**

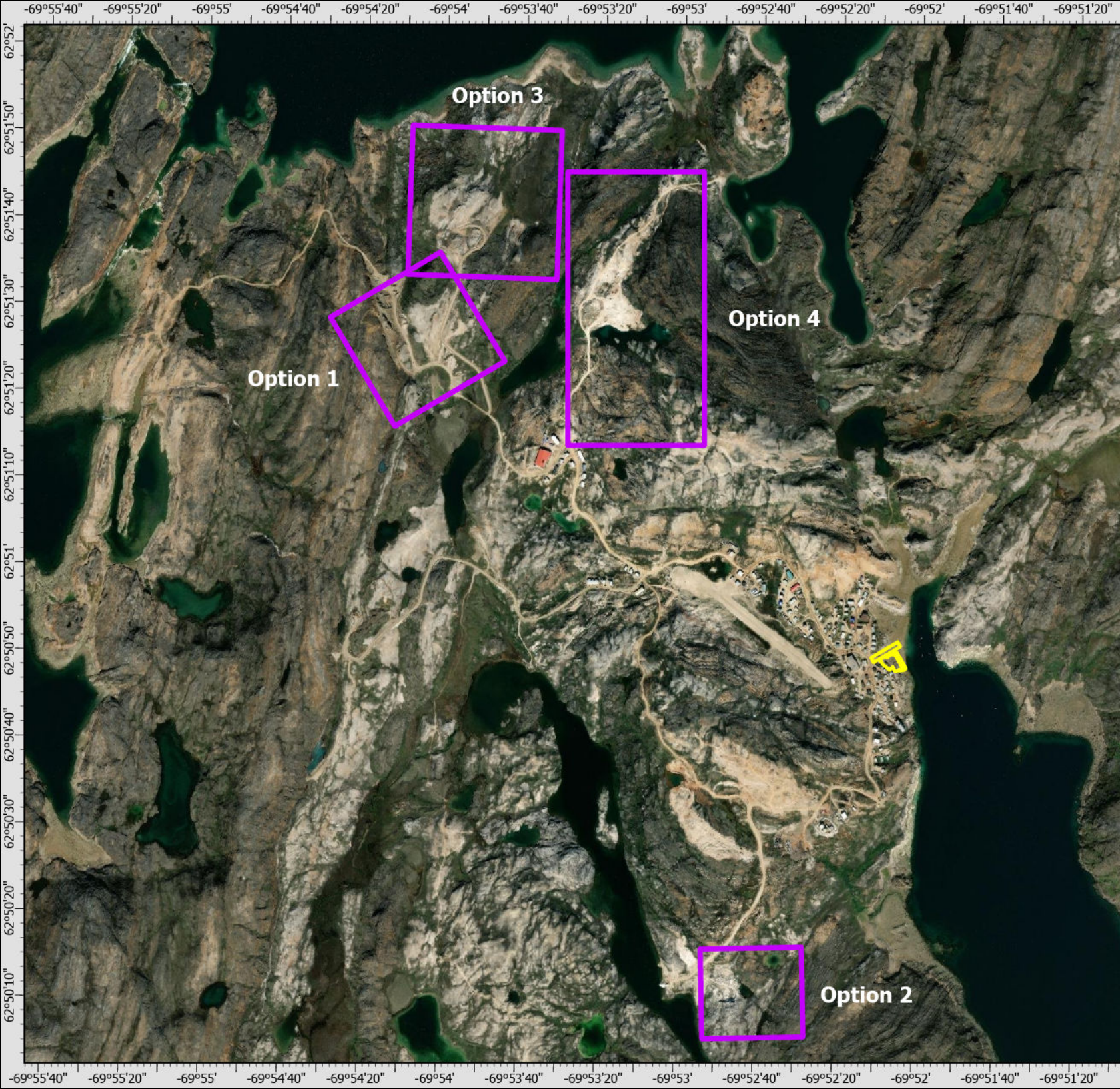
**PLAN**  
1:1500



	GOVERNMENT OF NUNAVUT HAMLET OF KIMMIRUT					
	<b>OCEANS PROTECTION PLAN SUBMISSION</b> Drawing 1-1 <b>GENERAL ARRANGEMENT - SEALIFT EXPANSION</b>					
	Date: 25-JAN-23	Drawn by: CH	Edited by: JLC	App'd by: HGK	WorleyParsons Project No. 317071-00019 DRG No. <b>11-MA-DSK-0001</b>	
						REV <b>A</b>
	This drawing is prepared for the use of the contractual customer of WorleyParsons Canada Services Ltd. and WorleyParsons Canada Services Ltd. assumes no liability to any other party for any representations contained in this drawing.					

### 1.3 Study Area

The Program Study Areas will be inclusive of the Sealift Study Area and the Quarry Study Area. The Sealift Study Area is located adjacent to the existing Sealift ramp on the northeastern shore of Glasgow Bay (Figure 1-2). There are four locations under consideration for the Quarry Study Area, all of which have existing road access (Figure 1-2).



**Legend**

- Sealift Footprint
- Quarry Options



Scale: 1:18,000	
Spatial Reference GCS: GCS North American 1983 CSRS Datum: North American 1983 CSRS Projection: Transverse Mercator Map Units: Metre	Drawn: AW Edited: CL Approved: VBC

Kimmirut Sealift Project

Figure 1-2

**Quarry Options for Kimmirut**

#### 1.4 Document Intention

This document is the Environmental Management Plan (EMP) for the Program and has the following objectives:

- Target mandates of pertinent Authorities Having Jurisdiction (AHJ) and associated legislation to confirm permit approvals and relevant compliance requirements (see Section 1.5).
- Outline mitigation and monitoring measures to be implemented to minimize negative impacts to the physical, biological, and socio-economic environment associated with program activities (Sections 5.3).
- Confirm adherence to relevant Best Management Practices (BMPs) (see Section 5.1).

The EMP is an evolving document and will be updated if any changes to compliance measures occur due to adaptive management or if additional measures are added through permit conditions.

#### 1.5 Regulatory Compliance

A summary of compliance and permitting requirements for the Program is provided in this section and further described in Table 1-1.

Table 1-1: List of Compliance Requirements for the Program

Legislation	Authority Having Jurisdiction	Required Authorization/Permit/Approval	Program Aspect	Required	Description	Permit ID	Permit Status
<b>Territorial Requirements</b>							
<i>Nunavut Land Claims Agreement Act, Article 11</i> <i>Nunavut Planning and Project Assessment Act (NuPPAA)</i>	Nunavut Planning Commission (NPC)	Conformity Determination	All.	Yes.	All activities within Nunavut are assessed to confirm conformity with approved Land Use Plans. The NPC is likely to refer the Program to the NIRB because it does not belong to a class of exempt works or activities set out in Schedule 12-1 of the Nunavut Agreement.	150935	Submitted: 03-Oct-25 (Dynamic Ocean, 2025).
<i>Nunavut Land Claims Agreement Act, Article 12</i> NuPPAA	Nunavut Impact Review Board (NIRB)	Screening Decision Report (SDR)	All.	Yes.	The NIRB is responsible for the assessment of ecosystemic and socioeconomic impacts of projects in the Nunavut Settlement Area (NSA), and for monitoring of approved projects under Article 12 of the Nunavut Agreement. The impact assessment process for Nunavut was established under the NuPPAA. The Program will likely require a screening under Nunavut Agreement Part 4 by the NIRB (Screening), which are conducted over 45 to 60 calendar days, inclusive of a 21-day consultation period.  The NIRB application will be submitted once the NPC Conformity Determination is issued.	-	Pending Submission.
<i>Nunavut Scientists Act</i>	Nunavut Research Institute (NRI)	Scientific Research License	All.	Yes.	Research activities in natural and physical sciences will require a Scientific Research License from NRI, which include surveys that involved the collection of habitat data.  All research activities that occur in Nunavut require approval from NRI.	-	Pending Submission.
Schedule 2 of the Nunavut Water Regulations	Nunavut Water Board (NWB)	Water License	Withdrawal of fresh water.	To be confirmed.	If drilling occurs at the Sealift Study Area, ocean water will be used. Drilling at the quarry is not expected however, if it is required and if needs cannot be met by municipal supply, then an NWB Authorization or a Water License will be obtained for freshwater water withdrawal.	-	Pending Requirement Confirmation.
<i>Territorial Lands Act</i> Land Use Territorial Regulations	GN-Community Services (CS) (Planning and Lands Division)	Land Use Permit (LUP)	Land based activities on commissioners' lands.	Dependent on location of ground interaction activities at the Sealift Study Area.	There is an interaction of with commissioners land and the Sealift footprint (see Appendix A (Figure A-1)), however it is not known whether or not there will be drilling in these locations. If yes, a LUP will be obtained from GN-CS (Planning and Lands Division) <sup>1</sup> .	-	Pending Submission.

<sup>1</sup> A GN-CS LUP will be required during the Project permitting phase, which is outside of the context of this application

Legislation	Authority Having Jurisdiction	Required Authorization/Permit/Approval	Program Aspect	Required	Description	Permit ID	Permit Status
<i>Nunavut Wildlife Act (NWA)</i> Licences and Tags Regulations	GN-Department of Environment (DoE)	Wildlife Research License	Terrestrial survey.	To be confirmed.	There will be no capture, trapping, marking, tagging, close observation, manipulation, or intentional disturbance to wildlife during the Program. The terrestrial survey will be completed through incidental observations, where all wildlife (including flora and fauna) encountered during travel around the Study Areas will be recorded.  The GN-DoE will be engaged to confirm if a Wildlife Research License or Wildlife Observation License are required.	-	Pending Requirement Confirmation.
		Wildlife Observation Licence				-	
<i>Nunavut Act</i> <i>Nunavut Land Claims Agreement Act</i> Nunavut Archaeological and Palaeontological Sites Regulations (NAPSR)	GN-Department of Culture and Heritage (CH)	Class 2 Archaeologist Permit	Any activity that has the potential to interfere with areas of archaeological importance.	Dependent on location of ground interaction activities at the Sealift Study Area (above Low-Water Line [LWL] and quarry).	A Professional Archaeologist has been engaged to support the Program. For any ground interaction activities (e.g. drilling) that occur above the LWL, the Professional Archaeologist will be engaged to confirm if a Class 2 Archaeologist Permit is required to support an Archaeological Impact Assessment (AIA). The Professional Archaeologist will engage with the GN Territorial Archaeologist and support decision making for the protection of archaeological resources in Nunavut.	-	Pending Submission.
<b>Federal Requirements</b>							
<i>Fisheries Act:</i> <ul style="list-style-type: none"> <li>Section 34.4(1).</li> <li>Section 35(1).</li> </ul> Marine Mammal Regulations (MMR) Aquatic Invasive Species Regulations (AISR)	Fisheries and Oceans Canada (DFO) – Fish and Fish Habitat Protection Program (FFHPP)	Request for Review (RFR) to obtain a Letter of Advice (LoA)	Marine survey.	No.	A RFR is not required because it is not expected that there will be residual negative effects subsequent to the implementation of mitigation and monitoring measures outlined in Section 5.3, 5.4. This document will be provided to the NIRB and other AHJs and outlines the measures to be implemented to minimize negative environmental effects. Specific to the marine environment, this includes consideration for accidental spills (Section 5.3.12), management of drilling fluids (Section 5.3.11) and monitoring for underwater noise during drilling operations (Section 5.4.5).	-	Not Required.
Fisheries (General) Regulations, Section 52	DFO - Fisheries Management Office (FMO)	License to Fish for Scientific Purposes (LFSP)	Incidental capture of organisms	To be confirmed.	There are no plans for capture of marine organisms; however, due to marine-based drilling, DFO-FMO may request one due to potential for incidental capture.	-	Pending Requirement Confirmation.

Legislation	Authority Having Jurisdiction	Required Authorization/Permit/Approval	Program Aspect	Required	Description	Permit ID	Permit Status
			through project activities.		DFO-FMO will be engaged to confirm if a LFSP is required.		
<i>Territorial Lands Act</i> Territorial Land Use Regulations	Crown-Indigenous and Northern Affairs Canada (CIRNAC) <sup>2</sup>	LUP	Drilling in marine environment.	To be confirmed.	Not expected to be required for the Program as the drilling component is not expected to fall within the thresholds of Sections 8 or 9 of the Territorial Land Use Regulations. Dynamic Ocean has engaged with CIRNAC on a similar drilling program that would utilize the same equipment and were informed a LUP was not required (pers. Comm. Victoria Burdett-Coutts).	-	Pending Requirement Confirmation.

<sup>2</sup> The requirement for LUPs from CIRNAC will be dependent on the status of devolution (Government of Canada, 2025a)

## 2 Kimmirut Sealift Project Field Program Activities Description

### 2.1 Intention and Activities Description

The intention of the Program is to support permitting and assess seabed and subsurface (soil, rock, groundwater and permafrost), environmental baseline and existing conditions to support the detailed design phase of the Project. Initiating late 2025, the Program is anticipated to continue over the next few years.

The Program will be composed of a combination of geotechnical, geophysical, topographical, marine, and terrestrial surveys as outlined in Table 2-1 and further described in Table 2-2.

**Table 2-1: Program Components**

Activity Name	Location		Interaction		
	Marine	Terrestrial	Seabed	Underwater Noise	Air Noise
<b>Geophysical Program</b>					
Multibeam Echosonar (MBES) <sup>1</sup>	✓	-	No	Yes	No
Subbottom profiling <sup>1</sup>	✓	-	No	Yes	No
<b>Geotechnical Program</b>					
Test pits (excavator)	✓	✓	Yes	Yes	Yes
Drilling (boreholes) <sup>1</sup>	✓	✓	Yes	Yes	Yes
Fill and rock samples	-	✓	No	No	No
<b>Topographic Program</b>					
Drone Survey	✓	✓	No	No	Yes
<b>Environmental Programs</b>					
Subtidal Survey (Remotely Operated Vehicle [ROV])	✓	-	No	No	No
Intertidal survey <sup>2</sup>	✓	-	Yes	No	No
Sediment quality (ponar)	✓	✓	Yes	No	No
Water quality	✓	-	No	No	No
Wildlife survey <sup>2</sup>	✓ <sup>3</sup>	✓	Yes	No	No
Vegetation survey <sup>2</sup>	-	✓	Yes	No	No
Archaeological field study <sup>2</sup>	✓ <sup>4</sup>	✓	Yes	No	No
Hydroacoustic monitoring <sup>5</sup>	✓	-	No	No	No

Note:

1. Activities that have the potential to produce underwater noise that may overlap with the hearing frequency of marine mammals. See Section 4.1 (Table 4-2) for more details



2. Ground interaction is exclusively due to people walking and potentially placing transects and quadrats
3. Wildlife survey below the High-Water Line (HWL) is exclusive to incidental observations of marine and migratory birds
4. Archaeological investigations may be inclusive of area above the LWL (intertidal)
5. Hydroacoustic monitoring is exclusive to noise producing activities during the open-water season

Table 2-2: Description of Activities

Activity/Survey Type	Purpose	Field Methodology	Equipment Required	Transportation Mode
<b>Geophysical Program</b>				
Swath Bathymetry with MBES	<ul style="list-style-type: none"> <li>Provides seabed profile for type and condition. A correction will be applied for the speed of sound in seawater and recorded in metres.</li> </ul>	<ul style="list-style-type: none"> <li>Provide dimensional bathymetric mapping using multiple beams elongated in the across track direction to cover a fan-shaped sector (or swath). The across track beam is typically 150° to 160° (Crocker &amp; Fratantonio, 2016).</li> </ul>	<ul style="list-style-type: none"> <li>Hull or pole mounted MBES that will obtain continuous depth recordings.</li> <li>Depth resolution and bathymetric accuracy of 1%.</li> </ul>	Vessel.
Subbottom profiling	<ul style="list-style-type: none"> <li>Determine the thickness and nature of substrate conditions below the seabed.</li> <li>Identify subsurface seabed features, inclusive of type, texture, variability.</li> <li>Identify nature and density of subsurface seabed for up to 4 m below the seabed.</li> <li>Investigate the upper layers of the seabed sediments.</li> </ul>	<ul style="list-style-type: none"> <li>Most likely to be towed but can be hull mounted.</li> <li>Can penetrate the seabed to a range of depths to identify changes in sediment or structures within the sediment.</li> <li>Generate acoustic signal through impulsive physical processes of electrostatic discharge (e.g. sparkers) or electromagnetically via accelerated water mass (e.g. boomers).</li> </ul>	<ul style="list-style-type: none"> <li>High-resolution Sub-Bottom Profiler (SBP) is required to determine the thickness and nature of the sediments. Details and resolution of sediments to 1 m greater than the target depth of burial is critical, but the system must be capable of determining the geology and structure of the underlying seabed.</li> </ul>	Vessel.
<b>Geotechnical Program</b>				
Test pits	<ul style="list-style-type: none"> <li>Required to assess subsurface conditions (excavatability and material types) and to collect samples for standard geotechnical laboratory testing.</li> </ul>	<ul style="list-style-type: none"> <li>Test pits will need to be performed within the intertidal area of the Sealift Study Area.</li> <li>Test pits will be approximately 1 m in width and be excavated to a depth upon which either refusal on hard stratum, sloughing of sidewalls or if the excavator boom reach is maximized.</li> <li>All test pits will be backfilled the same day with cuttings and bucket compacted.</li> </ul>	<ul style="list-style-type: none"> <li>An excavator with a bucket attachment will be used to dig the test pits.</li> </ul>	Excavator on land.
Drilling (boreholes)	<ul style="list-style-type: none"> <li>Understand the subsurface conditions, including soil and rock properties.</li> </ul>	<ul style="list-style-type: none"> <li>Boreholes locations will be chosen in the field in necessary, however they will occur within the Sealift Study Area.</li> <li>Water for terrestrial boreholes will also be extracted from the ocean during open water conditions.</li> <li>Land- and marine-based boreholes may require drill mud. Subsequent to drilling, excess soil and rock cuttings will be placed back down the hole with excess cuttings spread around the ground surface. No cuttings or drill fluids will be removed from site.</li> </ul>	<ul style="list-style-type: none"> <li>The drilling will be executed using a portable five-ton rotary drill mounted on rubber tracks. The drill and its components will be moved using the drill rig.</li> <li>For marine boreholes, an ice auger will be used to create a hole through the ice to allow for extraction of seawater for drilling.</li> </ul>	Drill rig on ground (terrestrial) or ice (marine).
Fill and rock samples	<ul style="list-style-type: none"> <li>A geotechnical survey is required to identify suitable quarry locations for sourcing the required fill and rock armour.</li> </ul>	<ul style="list-style-type: none"> <li>The survey will consist of a visual assessment of exposed bedrock and noting rock type, major structural defects, weathering and field estimate of rock strength. The surveyor will tag potential quarry locations and delineate possible quarry extents. This information may inform future environmental studies. Locations which are identified as potential for source rock, representative rock samples</li> </ul>	<ul style="list-style-type: none"> <li>Geotechnical hammer, tape measure, hand lens.</li> </ul>	On foot.

Activity/Survey Type	Purpose	Field Methodology	Equipment Required	Transportation Mode
		will be collected. The rock samples will be sent to a laboratory for strength and durability testing.		
<b>Topographic Program</b>				
Drone Survey	<ul style="list-style-type: none"> <li>Survey to collect ground surface elevation and anthropogenic features in each community, particularly at the Study Areas.</li> </ul>	<ul style="list-style-type: none"> <li>Pre-programmed flight routes to be flown at low tide in each community.</li> </ul>	<ul style="list-style-type: none"> <li>Drone.</li> </ul>	On foot.
<b>Environmental Program</b>				
Subtidal Survey	<ul style="list-style-type: none"> <li>Visual observation of seabed conditions to support regulatory and environmental requirements.</li> </ul>	<ul style="list-style-type: none"> <li>A device with a camera attached by a tether to a laptop to view video in real time.</li> <li>Can be submerged in depths up to 300 m.</li> <li>Pre-determined transect locations along the Sealift Study Area.</li> </ul>	<ul style="list-style-type: none"> <li>Remotely Operated Vehicle.</li> </ul>	Vessel.
Intertidal Survey	<ul style="list-style-type: none"> <li>Visual observation of intertidal habitats to support regulatory and environmental requirements.</li> </ul>	<ul style="list-style-type: none"> <li>Intertidal surveys will follow a standardized transect method from high to low water line.</li> <li>The survey will be run at low-tide or near low-tide conditions.</li> </ul>	<ul style="list-style-type: none"> <li>Transect tape and quadrat.</li> </ul>	On foot.
Sediment Quality	<ul style="list-style-type: none"> <li>Collect samples for standard laboratory testing (i.e., metals and trace elements).</li> </ul>	<ul style="list-style-type: none"> <li>Intertidal collection of sediments within the Sealift Study Area will be taken either on foot or by lowering a grab sampler over the side of a vessel to the seabed collecting a sample approximately 8 cm in depth over an area of 225 cm<sup>2</sup> (15 cm x 15 cm area).</li> </ul>	<ul style="list-style-type: none"> <li>Sediment samples will be taken using a grab sampler (i.e., ponar), although samples can also be acquired during the borehole drilling and from digging test pits.</li> </ul>	Vessel/on foot.
Water Quality	<ul style="list-style-type: none"> <li>Water quality analysis will be conducted to confirm water characteristics at the site.</li> <li>Samples sent to the laboratory for chemical analysis will be analyzed for the following:               <ul style="list-style-type: none"> <li>Nutrients (ammonia, nitrate, nitrite, phosphate, total organic carbon).</li> <li>Physical parameters (pH, total suspended solids).</li> <li>Total metals.</li> <li>Dissolved metals.</li> <li>Physicochemical parameters will include temperature, salinity, pH, turbidity and conductivity.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Water quality sample locations may be collected as required. When collected, each location will consist of a shallow (1 m below surface) and a deep (1 m above seabed) sample.</li> <li>Samples for chemical analysis will be collected using a 1.5 L Niskin bottle deployed from a boat. A Niskin sampler will be lowered over the side of the boat, the messenger deployed and the Niskin hauled back into the boat. Once at the surface, the water sample will be decanted into specific containers, supplied by an accredited laboratory. Sample containers will be labelled and immediately stored in coolers. Samples will be retained in coolers until they can be shipped to the south for laboratory processing.</li> <li>Physicochemical parameters may be collected to confirm a vertical profile for Conductivity, Temperature and Depth (CTD). When undertaken, multiple casts will be conducted at each location to determine variations in parameters during tidal exchange.</li> </ul>	<ul style="list-style-type: none"> <li>CTD, Niskin sampler, depth sounder, iPad.</li> </ul>	Vessel.

Activity/Survey Type	Purpose	Field Methodology	Equipment Required	Transportation Mode
Wildlife Survey	<ul style="list-style-type: none"> <li>The wildlife survey will involve recording incidental observations (sight and sound) and integration of local knowledge and values to determine presence of wildlife within the relevant Study Area(s).</li> </ul>	<ul style="list-style-type: none"> <li>If incidental observation occurs during the Program, species will be identified (by tracks, scat, sign, and/or vocalizations), recorded, and georeferenced using a handheld Global Positioning System (GPS).</li> <li>A general habitat assessment will be conducted and observations of important wildlife habitat or sensitive wildlife features (e.g. nests, dens, mineral licks) will be identified, recorded, and georeferenced.</li> </ul>	<ul style="list-style-type: none"> <li>Binoculars, Tablet, Camera.</li> </ul>	On foot.
Vegetation Survey	<ul style="list-style-type: none"> <li>The purpose of the vegetation assessment is to determine the plant species, plant communities, and potential plant species or ecosystems at risk that occur within the relevant Study Area(s).</li> <li>The vegetation assessment will include a desktop review, field survey, and integration of local knowledge and values.</li> </ul>	<ul style="list-style-type: none"> <li>Field verification will involve a random quadrat survey. The field technician will use a 1 m x 1 m quadrat and quadrat locations will be recorded with GPS coordinates and photographed.</li> <li>Percent cover will be estimated for all species and photographs of the quadrats will be taken to support post-field verification.</li> <li>If any Species at Risk (SAR), key traditional use plants, or weedy or invasive species are identified, their population characteristics will be documented.</li> </ul>	<ul style="list-style-type: none"> <li>Quadrat, measuring tape, pin flags, plant press, iPad, hand lens.</li> </ul>	On foot.
Archaeological field study	<ul style="list-style-type: none"> <li>An AIA will be conducted if required.</li> </ul>	<ul style="list-style-type: none"> <li>A Professional Archaeologist has been engaged to support the Program. For any ground interaction activities (e.g. drilling) that occur above the LWL, the Professional Archaeologist will be engaged to confirm if a Class 2 Archaeologist Permit is required to support an AIA.</li> <li>The AIA of the Program will include pedestrian survey of the proposed Study Areas(s) and will target undisturbed areas. Transects will be conducted, the spacing of which will be determined based on characteristics of the landscape. Depending on the ground cover, assessment will involve visual inspection of all existing exposures, systematic and judgmental shovel testing of areas lacking exposure but with archaeological potential. All shovel tests (positive and negative) will be recorded using a GPS and all sites will be mapped, sketched and photographed.</li> <li>Should artifacts be recovered during the AIA, these will be cleaned, catalogued, identified, inventoried, and descriptions of each will be present in the final project report.</li> </ul>	<ul style="list-style-type: none"> <li>Visual assessment.</li> </ul>	On foot.
Hydroacoustic monitoring	<ul style="list-style-type: none"> <li>A stationary autonomous system to assess for noise (anthropogenic) and sound (marine mammals).</li> </ul>	<ul style="list-style-type: none"> <li>A hydrophone will be deployed off the side of a vessel to record underwater noise during noise producing activities.</li> </ul>	<ul style="list-style-type: none"> <li>Hydrophone.</li> </ul>	Vessel.

## 2.2 Schedule

The Program will be implemented through several field surveys occurring over a period of four to 15 days. The Program is expected to be completed over several years and will be carried out during the open-water season.

## 2.3 Equipment

Equipment expected to be required for the Program are summarized in Table 2-3. Exact specifications of equipment will be determined closer to the start of the Program, but the types of equipment used is not expected to change potential environmental effects outlined in Section 4.

**Table 2-3: Equipment Requirements the Program**

Activity	Equipment Used	Quantity	Size & Dimensions	Proposed Use
<b>Geophysical Program</b>				
Bathymetric Survey	MBES	1	1 m x 50 cm	Seabed type and conditions.
Subbottom Profiling	SBP	1	1 m x 1 m	Ground conditions below seabed.
<b>Geotechnical Program</b>				
Test pits	Excavator	1	30 to 40 ton	The excavator will be used to dig test pits.
Drilling	Mounted drill rig	1	2.5 m x 5.5 m x 3 m	A geotechnical subsurface drilling program is required to understand the type and variability of subsurface soil and/or rock conditions.
Fill and rock samples	Geotechnical hammer	1	~2 kg (30 to 40 cm)	A geotechnical survey is required to identify suitable quarry locations for sourcing the required fill and rock armour for the Sealift construction.
Sediment Quality	Sediment / grab sampler	1	3 m x 50 cm	Collection of sediment samples.
<b>Topographical Program</b>				
Drone Survey	Drone	1	To be confirmed	Aerial topographic and feature survey using a drone.
<b>Environmental Program</b>				
Subtidal Survey	ROV	1	72 cm x 24 cm x 44 cm	Underwater video survey to determine habitat characteristics of the subtidal seabed.
Intertidal Survey	Transect tape	1	50 m	

Activity	Equipment Used	Quantity	Size & Dimensions	Proposed Use
	Quadrat	1	1 m <sup>2</sup>	A survey of the intertidal area to confirm the fish habitat quality within the footprint of the proposed Sealift.
	Clinometer	1	15 cm	
Sediment Quality	Ponar	1	3 m x 50 cm	Subtidal samples will be collected using a ponar grab sampler (grab sampler) or by Self-Contained Underwater Breathing Apparatus (SCUBA) divers.
	Scuba gear	2	-	
Water Quality	CTD meter	1	3.5 cm x 9.0 cm	Device used to assist in water quality parameters during water quality survey.
	Niskin Sampler	As required	1.5 L	Collection device to get water from depth during water quality survey.
Wildlife Survey	Binoculars	2	-	A wildlife survey (incidental observations by sight and sound) will be conducted to determine presence of wildlife (including potential SAR and critical habitat) within the relevant Study Area(s).
Vegetation Survey	Transect tape	1	50 m	The purpose of the vegetation assessment is to determine the plant species, plant communities, and potential plant species or ecosystems at risk that occur within the relevant Study Area(s).
	Quadrat	1	1 m <sup>2</sup>	
Archaeological Field Study	Camera, notebook	-	-	An archaeological field study (if required) will be performed by a professional archaeologist recognized by the GN Territorial Archaeologist for the preparation of an AIA.
Hydroacoustic Monitoring	Hydrophone	1	53 cm x 6 cm	Assess for noise from equipment used on the Program.

### 3 Fish and Fish Habitat Existing Conditions

Existing conditions for fish, marine mammals and their habitats were assessed through desktop review and Inuit Qaujimagatuqangit (IQ).

Important IQ and desktop resources that contributed to the understanding of existing conditions are listed below:

- Recommended Nunavut Land Use Plan (RNLUP) (NPC, 2023a) and Interactive Maps (NPC, 2023b).
- Nunavut Coastal Resources Inventory (NCRI) for Kimmirut (GN, 2009).
- Nunavut Wildlife Harvest Study (NWHS) (Priest & Usher, 2004).
- Inuit Bowhead Knowledge Study (IBKS) (Nunavut Wildlife Management Board [NWMB, 2000]). Aquatic SAR Map (DFO, 2024a).
- Non-native invasive species in Nunavut (GN & ECCC, 2022).
- Important Areas for Birds in Nunavut (ECCC, 2012).

#### 3.1 Focal Fish and Marine Mammals

Focal marine fish, marine mammals, and marine and migratory birds were selected based on desktop study with the selection criteria as summarized below and defined in Table 3-1.

- Importance to Inuit for subsistence and food security.
- Geographic ranges, which includes the potential to occur in or near the Program.
- Representative role in food chain dynamics.

Focal species, with their species description, are listed in Appendix B (Table B-1).

**Table 3-1: Arctic Species Spatial Categories and Descriptions**

Category	Definition
Resident	Species that occupy in the same general area throughout the year.
Migratory	Species that predictably reside within the Arctic region for a portion of the year (seasonal, annual), most typically the open-water season. Typically triggered by local climate, food availability or for mating reasons.
Anadromous	The movement of fish between freshwater and marine environments for the purpose of feeding in one environment and spawning in the other.

#### 3.2 Designated Species

Species At Risk were categorized by international, federal, and territorial designations, and were selected as those having the potential to overlap within the Program Study Areas for various life history stages (e.g., breeding, nursery, resident, migration, and feeding). See Appendix B (Table B-2) for a full list of species with designations that have the potential to be present during the Program.

### 3.2.1 Aquatic Invasive Species

Risk of introducing invasive species due to the Program is not expected, as vessels are all local to Kimmirut.

## 3.3 Fish Habitat

### 3.3.1 Designated Habitats

Kimmirut is in proximity to the several designated habitats, however with the exception of the Western Hudson Strait (WHS) none are within the Program Study Areas. A description of the habitats, along with their distance and direction from Kimmirut is provided in Table 3-2, along with a reference to figures in Appendix A that depict their location.

**Table 3-2: Designated Areas in Proximity to Kimmirut**

Designated Area	Description	Distance and Direction	Appendix A Figure Reference
Western Hudson Strait (WHS)	The WHS Ecologically and Biologically Significant Area (EBSA) was established for its uniqueness to a migration corridor for the Western and Eastern Hudson Bay beluga whale ( <i>Delphinapterus leucas</i> ), overwintering for bowhead whales ( <i>Balaena mysticetus</i> ), and Atlantic walrus haul-out sites. Aggregations of seabird colonies (murre: <i>Uria</i> spp.), sea duck (eiders: <i>Somateria</i> spp.) nesting, epibenthic habitat, and sponge ( <i>Porifera</i> sp) beds are other reasons for its designation (DFO, 2011).	Kimmirut is within the WHS.	Figure A-2
Katannilik Territorial Park	Katannilik Territorial Park, approximately 1,420 km <sup>2</sup> , is located on southern Baffin Island and is used as an important harvesting area for Inuit. Katannilik is notable for protecting the Soper River watershed, a Canadian Heritage River. The landscape is diverse with uniquely dispersed willow shrubs that are some of the tallest in the eastern Arctic (GN-DoE, 2022). The park has been identified as supporting many species including caribou ( <i>Rangifer tarandus</i> ), Arctic char ( <i>Salvelinus alpinus</i> ), migratory birds, and at least three bird species which over winter in the park.	Approximately 3 km north of Kimmirut.	Figure A-2
Important Bird Area (IBA) NU101 (Markham Bay Eider Colony)	The Markham Bay Eider Colony (NU101) is an IBA situated on the southern coast of Baffin Island. The colony consists of approximately 2,200 common eider ( <i>Somateria mollissima</i> ) nests. Other birds present during the breeding season include long-tailed duck ( <i>Clangula hyemalis</i> ), king eider ( <i>Somateria spectabilis</i> ), glaucous gull ( <i>Larus hyperboreus</i> ), Thayer's gull ( <i>Larus thayeri</i> ), black guillemot ( <i>Cephus grylle</i> ), and snow bunting ( <i>Plectrophenax nivalis</i> ) (Bird Studies Canada, 2024).	Approximately 125 km northwest of Kimmirut.	Figure A-3

Designated Area	Description	Distance and Direction	Appendix A Figure Reference
Isulijarniq Migratory Bird Sanctuary (MBS)	The Isulijarniq MBS (formerly know as the Dewey-Soper MBS) is located on the southwestern coast of Baffin Island. The area is protected to preserve breeding and nesting habitat for the lesser snow goose ( <i>Anser caerulescens</i> subspecies <i>caerulescens</i> ) (ECCC, 2019a). Additional key species identified include cackling goose ( <i>Branta hutchinsii</i> ), Atlantic brant ( <i>Branta bernicla</i> ), long-tailed duck, common eider, and king eider, along with 25 other migratory bird species. The area features vast, flat and marshy lowlands starting at the coast and transitioning to meadow type habitats inland (ECCC, 2019a).	Approximately 320 km northwest of Kimmirut.	Figure A-3

### 3.3.2 Critical Habitats

For all designated species, the *Species at Risk Act* (SARA) defines critical habitat as “the habitat that is necessary for the survival or recovery of listed extirpated, endangered, or threatened species, and that is identified as critical habitat in a recovery strategy or action plan” (DFO, 2020a; Government of Canada, 2024). Further to this, a Critical Habitat Order provides legal protection to the critical habitats of listed species through the application of the prohibition in subsection 58(1) of SARA.

There are no SARA defined or critical habitats in proximity to the Program.

### 3.3.3 Important Habitats Defined by the Recommended Nunavut Land Use Plan

There are several important habitats defined in the RNLUP (NPC, 2023a) that are in proximity to Kimmirut, however, there will be no spatial interactions with them. The RNLUP habitats are depicted in Appendix A (Figure A-4).

While there is a very low probability of encounter, mitigation measures to protect these important habitats have been incorporated into this EMP (see Section 5.3).

## 4 Potential Environmental Effects

Potential negative environmental effects due to the Program are summarized in Table 4-1. There are no residual environmental effects after the implementation of environmental management as outlined in Section 5.

**Table 4-1: Potential Effects Due to the Program**

Effect	Section
Disturbance, injury, or mortality to fish and marine mammals due to underwater noise	4.1
Disturbance or injury to marine or migratory birds due to air noise	4.2
Sediment and water quality degradation	4.3
Physical damage to marine organisms (crushing, burial, or mortality)	4.4
Modification and destruction of fish habitat	4.5
Important marine habitats	4.6
Waste production and Accidental Spills	4.7
Terrestrial and Wildlife Disturbance	4.8

### 4.1 Disturbance or Injury to Fish or Marine Mammals Due to Underwater Noise

There are currently no federal noise disturbance criteria in Canada; however, marine mammal noise threshold guidance is provided by the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS, 2024a) and by DFO-FFHPP through LoAs and *Fisheries Act* Authorizations (FAAs), which have consistently been providing underwater acoustic metrics and distance radii for Exclusion Zones (EZs) relevant to fish and marine mammals. Anthropogenic noises in water are categorized as impulsive or continuous signals (Transport Canada [TC, 2020]). Impulsive signals include impact pile driving, air guns, explosions and sonar pings. Continuous signals on the other hand include activities such as vibratory pile driving, drilling rigs, and ship engines. There is the potential for some of the Program equipment to contribute to both continuous and impulsive anthropogenic noise (see Table 4-2) in the marine environment. The MBES, SBP, and drilling all have the potential to contribute to underwater noise (see maximum source sound pressure level in Table 4-2 (NMFS, 2024b)).

Marine mammals can be categorized into different hearing groups, which reflect major taxonomic groups including baleen whales (Low Frequency Cetaceans [LFC]), odontocete whales (high and very High Frequency Cetaceans [HFC]), phocid pinnipeds (in water [PW]), and Otariids and other non-phocid marine carnivores (in water [OW]), among others. These taxonomic groups reflect the species groups regularly found in Study Area and were selected as focal species when assessing disturbance of underwater noise. Fish were also be considered when assessing the impacts of underwater noise using a single hearing group for Arctic fish. The hearing ranges of these groups are provided in Table 4-3, along with auditory thresholds (see hearing range) for injury and behavioural disturbance from NOAA (NMFS, 2024a). This can be compared to the minimum and maximum frequency range of the equipment (Table 4-2) to consider ‘an overlap’ for the audible range of marine species.



Noise generated due to the MBES is not likely to negatively impact marine mammals as it operates at a higher frequency than the audible range of the focal marine mammals. However, the SBP and drilling does operate within marine mammal audible ranges.

Exclusion Zones and hydroacoustic monitoring will be in place during the noise producing components of the Program that occur in the open-water season to mitigate injury from underwater noise (see Section 5.4.4).

Table 4-2: Specifications of Acoustic Sources<sup>3</sup>

Equipment Type	Frequency Range		Noise Type	Impulse Duration (ms)	Maximum Source Sound Pressure Level (SPL) <sup>1</sup> (Decibel [dB])		Reference
	Minimum	Maximum			Minimum	Maximum	
<b>Geotechnical Program</b>							
Drilling (Boreholes)	20 Hz	200 Hz	Continuous	N/A	142	160	Erbe and McPherson (2017)
<b>Geophysical Program</b>							
MBES	200 kHz	700 kHz	Impulsive	0.05 - 10	210	245	BEIS (2020); Crocker and Fratantonio (2016); Danson (2005); DECC (2011); Hopkins (2023); Lurton (2016); Lurton and DeRuiter (2011)
SBP	2kHz	16 kHz	Impulsive	5 - 40	185	215	Crocker and Fratantonio (2016); Hartley Anderson (2020)

- Note:
1. Measurement applies for 1  $\mu$ Pa at 1 m
  2. Source levels for all equipment and frequency ranges for SBPs derived from Crocker and Fratantonio (2016) and Hartley Anderson (2020). Parametric SBP operates with two differences sources simultaneously and thus has two frequency ranges/ source levels
  3. Note, any equipment not listed here is not considered sound producing

**Table 4-3: National Oceanic and Atmospheric Administration Acoustic Injury and Behavioural Disturbance Thresholds**

Hearing Group	Hearing Range	Applicable Species	Impulsive Source (0-pk, re 1 µPa) (dB)			Continuous Source (Root Mean Square [RMS], re 1 µPa) (dB)		
			Auditory Injury	Temporary Threshold Shift	Behavioural Disturbance	Auditory Injury	Temporary Threshold Shift	Behavioural Disturbance
LFC	7 Hz – 36 kHz	Bowhead Whale	222	216	160	197	177	120
HFC	150 Hz – 160 kHz	Beluga, Narwhal, Killer whale	230	224		201	181	
PW	40 Hz – 90 kHz	Ringed Seal ( <i>Pusa hispida</i> ), Bearded Seal ( <i>Erignathus barbatus</i> )	223	217		195	175	
OW	60 Hz – 68 kHz	Atlantic walrus	230	224		199	179	
Fish	-	Arctic Cod ( <i>Boreogadus saida</i> ), Arctic Char ( <i>Salvelinus alpinus</i> )	206	-	150	-	-	-

Source: Hearing range from Table 1 in NMFS (2024b)

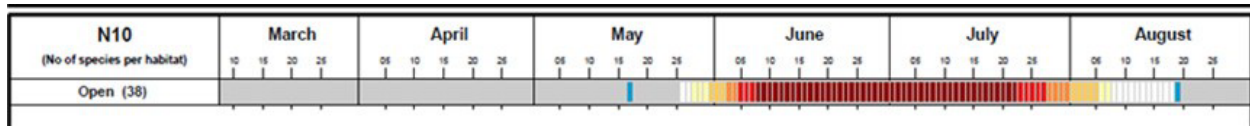
Note: Sound Pressure Levels provided in table are flat weighted. Fish in NOAA (NMFS, 2024a) are divided into two groups; <2 g and >2 g with differing Sound Exposure Level (SEL) thresholds, but were simplified into single category for this table since peak injury and behavioural disturbance thresholds were the same between group

#### 4.2 Disturbance or Injury to Marine or Migratory Birds Due to Air Noise

Some activities, similar to those described in Section 4.1 (marine mammals), have the potential to cause disturbance to marine and migratory birds. Nesting seasons and important habitats (see Section 3.3.1 (Table 3-2)) pertinent to marine and migratory birds are provided in Appendix A (Figure A-3). Figure 4-1 further depicts the general nesting season for marine and migratory birds in Kimmirut, which falls between late May to mid August (Nesting Zone N10).

There is the potential for disturbance to marine and migratory birds, due to ‘air noise’ producing activities (see Section 2.1 (Table 2-2, Table 2-3)). However, the spatial areas (see Figure 1-2) are not located in areas that have the potential for ‘high aggregation’ of birds. Air noise-producing activities will also not be occurring during the peak nesting season, and the scale of the surveys is considered very localized in terms of potential for effects.

Mitigation measures to be followed during Drone Survey are provided in Section 5.3.5 (Table 5-5).



**Figure 4-1: Nesting Window for Marine and Migratory Birds in Kimmirut**

Source: Environment and Climate Change Canada (ECCC (2025))

#### 4.3 Sediment and Water Quality Degradation

Short-term degradation of marine water quality has the potential to occur during the Program due to accidental spills, or turbidity from the activities that interact with the seabed.

Negative effects on water quality are expected to be minimal and will be managed through appropriate BMPs and mitigation measures (see Sections 5.1, 5.3). A spill prevention and response procedure will be implemented to ensure the appropriate spill response equipment is on site should a spill occur (described in Section 5.3.12), and the Spill Planning and Reporting Regulations in Nunavut (Section 5.3.12.1) will be followed. The potential environmental effects and responses are further described in Section 4.7.

Seafloor disturbance during drilling expected to be minimal as the footprint of the drill head (diameter of 150 mm) is considered relatively small in comparison to the extent of available seabed. Turbidity is not anticipated to exceed the Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines (WQG) (CCME, 2002), and turbidity beyond a Compliance Monitoring Zone (CMZ, generally 30 m from source) is not expected to occur. Worley Consulting has performed environmental monitoring for a multitude of drilling studies in southern locations with open-water conditions and compliance monitoring as per CCME WQG (CCME, 2002) has never been required. Turbidity monitoring during an iced ocean program is not practical, but due to the small size of the drill head and QP experience, negative effects to fish and fish habitat are not expected. Sediment and water quality mitigation measures are summarized in Section 5.3.3.

#### 4.4 Physical Damage to Marine Organisms (Crushing, Burial or Desiccation)

Physical damage to marine organisms is not expected to occur and direct mortality to fish is improbable. Test pits and drilling will occur in out-of-water tidal conditions, and an intertidal salvage of macro invertebrates within the test pit and drilling footprints, as well as the path that the excavator and the drill rig need to travel below the HWL, will be performed. Given the small footprint of the drill heads, activities are not expected to cause fish mortality.

#### 4.5 Modification and Destruction of Fish Habitat

The impacts to the seabed during the Program, as summarized in Section 4.2, will be minimal and temporary in nature. There are no activities that will cause permanent damage to fish habitat.

#### 4.6 Important Marine Habitats

There will be no impact to the important or designated marine habitats as described in Section 3.3.3, 3.3.1. Mitigation and monitoring measures that are described in Section 5.3 and 5.4, such as those for spill response, will be in place throughout the Program.

#### 4.7 Waste Production and Accidental Spills

The Program waste generation will be reduced when possible and disposed of appropriately as outlined in the Waste Management mitigation measures (Section 5.3.11).

While accidental spills may occur, there will be BMPs in place to minimize the potential for spills to occur. If spills do occur, there will be appropriate spill response equipment on site (see Section 5.3.12). The Program will be in compliance with the Spill Planning and Reporting Regulations in Nunavut. Spill response measures will be designed to be implemented for the prevention and management of spills to a worst-case scenario size that could occur as a result of the Program (further described in Section 5.3.12.1).

#### 4.8 Terrestrial and Wildlife Disturbance

There will be minimal impacts to terrestrial habitats and no anticipated direct impacts to wildlife. The Program will be undertaken in a well-trafficked, disturbed area. A wildlife monitor will be present during all aspects of the Program. Personnel will undergo wildlife training and any wastes generated will be appropriately stored so as not to attract wildlife.

## 5 Environmental Management

### 5.1 Guidelines and Best Management Practices

The following guidelines and BMPs are relevant to the Program.

- DFO: Fish and Fish Habitat Protection Policy statement (DFO, 2019).
- DFO: Measures to Protect Fish and Fish Habitat (DFO, 2025b).
- DFO: Interim code of practice: End-of-pip fish protection screens for small water intakes in freshwater (DFO, 2020b).
- DFO: Pathways of Effects (PoE) (DFO, 2024b).
- NPC: RNLUP (NPC, 2023a).
- NOAA: 2024 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0) (NMFS, 2024a).
- Government of Canada: Guidelines for Spill Contingency Planning (INAC, 2013).
- Government of Canada: National Oil Spill Preparedness and Response Regime (TC, 2019).
- Canadian Construction Association (CCA) 81 – 2001: A Best Practices Guide to Solid Waste Reduction (Canadian Construction Association, 2001).
- GN: Non-native and invasive species in Nunavut (GN & ECCC, 2022).
- GN: Contingency Planning and Spill Reporting in Nunavut. A Guide to the New Regulations (GN, 2022).
- GN-Department of Environment (DoE): Environmental Guideline for the General Management of Hazard Waste (GN, 1999).
- Canadian Environmental Quality Guidelines (CEQG) (CCME, 2024).
- ECCC: Guidelines to Avoid Harm to Migratory Birds (ECCC, 2024).

### 5.2 Roles and Responsibilities

The work shall be overseen by the Worley Consulting Geotechnical Lead and supported by several consulting firms or subcontractors, collectively referred to as the Program Team. Local helpers will function as a wildlife monitors and field assistant as needed. An Environmental Monitor (EM)/ Marine Observer, fulfilled by local support, will also be required to support some aspects of the Program. The main role of the EM/Marine Observer will be to monitor the presence, behaviour, and distance of marine mammals during the Geophysical Program and drilling. Monitoring measures are further detailed in Section 5.4. A communication protocol (e.g. mobile phones, Very High Frequency [VHF] radio) will be established between the Worley Consulting Team, their supporting consultants and the local helpers to enable effective regulatory compliance procedures.

### 5.3 Mitigation Measures

Mitigation measures to be implemented to minimize negative effects are provided in this section. The categories of considered impacts were developed during the NIRB permitting process, and while

assigned to one category, may be applicable to others. These measures, combined with AHJ approvals constitute the regulatory compliance program.

Additional measures that are required through conditions issued by NIRB, the NWB and CIRNAC pertinent to the Program must also be followed.

### 5.3.1 General

General mitigation measures that will be in place throughout the Program are detailed in Table 5-1.

**Table 5-1: General Mitigation**

ID	Mitigation Measure
G1	A qualified EM/Marine Observer will be available for the duration of the Program and will be responsible for the implementation of measures as outlined in this EMP, and as detailed in permit conditions from pertinent AHJs.
G2	Worley Consulting shall ensure that all personnel are adequately trained prior to commencement of all activities, and shall be made aware of all operational plans, management plans, guidelines.
G3	Sufficient planning should be undertaken to limit the duration of in-water (or over water) works, undertakings and activities (conducting operations) so as to not diminish the ability of fish to carry out one or more of their life processes (e.g., spawning, rearing, feeding, migrating).
G4	All activities will be suspended should any dead fish or wildlife (both marine and terrestrial), or any injured wildlife be observed during any works or activities in and around the marine waters. Activities may only be resumed on the recommendation of the authorizing agencies.
G5	Appropriate stop-work and non-compliance reporting will be implemented as applicable. See Section 5.8.
G6	Routine inspections of the support equipment (survey equipment and those used for transportation (e.g. vessels, trucks, ATVs), as required to ensure regulatory compliance.
G7	Worley Consulting will complete all AHJ communications as summarized in Section 5.8.

### 5.3.2 Program Permit and Approval Compliance

Mitigation measures associated with Program permit and approval compliance are described in Table 5-2.

**Table 5-2: Program Permit and Approval Compliance**

ID	Mitigation Measure
PPAC1	The Program Team will operate in compliance with applicable Acts, Regulations and BMPs (see Section 5.1). This includes permits, approvals and authorizations received after issuance of this EMP.

ID	Mitigation Measure
PPAC2	The Program Team will provide each other copies all permits they respectively obtained in advance of mobilization. On-site personnel will maintain copies of Program permits, approvals and authorizations issued by AHJs at the site at all times.
PPAC3	A copy of each permit, license, or other authorization issued for the Program will be submitted to NPC and the NIRB as per S 137(4) of the NuPPAA. Worley Consulting will be responsible for the submission of permits on behalf of the Program Team.
PPAC4	Worley Consulting’s Geotechnical Lead will conduct a ‘tailgate’ meeting prior to the start of the Program to confirm that all personnel are aware of regulatory compliance requirements and understand their responsibilities (e.g. during spill response).
PPAC5	The Program Team will provide pertinent AHJs with copies of all permits issued for the Program in advance of field program mobilization.

### 5.3.3 Sediment and Water Quality

Mitigation measures for sediment and water quality are described in Table 5-3.

**Table 5-3: Sediment and Water Quality**

ID	Mitigation Measure
SWQ1	The EM/Marine Observer will confirm that no activities performed during the Program will result in exceedances of the CCME Approved WQG outside the work area. Monitoring and compliance thresholds are outlined in Section 5.3.3.
SWQ2	Machinery and equipment will be maintained in good working order to minimize emissions.
SWQ3	The Program Team will not deposit any deleterious substances (e.g., fuel, chemicals, waste) into the marine environment. Should such activities occur, appropriate measures for response and reporting must be adhered to as outlined in Section 5.3.12.
SWQ4	Drill muds, additives, and other products shall be non-toxic and environmentally friendly.
SWQ5	Measures designed to minimize disturbance to seabed sediments, benthic communities, and marine wildlife will be implemented when carrying out activities within the marine environment.

### 5.3.4 Fish and Fish Habitat (Including Marine Mammals)

Mitigation measures for fish, fish habitat, and marine mammals are described in Table 5-4.

**Table 5-4: Fish and Fish Habitat (Including Marine Mammals)**

ID	Mitigation Measure
FMM1	Visual monitoring will be undertaken as described in Section 5.4.2. All aquatic works will cease in the event of fish kill/injury or stress to aquatic wildlife is observed until the EM/Marine Observer can provide guidance for the continuation of program activities.
FMM2	A Marine Observer will be available for the activities below the HWL during the Program to monitor for the presence of marine mammals and document species observations. The EZ will be set and maintained as described in Section 5.4.4.
FMM3	Activities shall cease if there is risk of physical harm to a marine mammal from direct contact. Activities shall only resume once there is no longer a risk of injury to marine mammals from direct contact. Monitoring is described in Section 5.4.2.
FMM4	Water will not be extracted from any fish-bearing waterbody unless undertaken in compliance with NWB and DFO-FFHPP legislative requirements. If saltwater extraction is required for desalination for fresh water, water intake must be in compliance with DFO-FFHPP’s Standards and Codes of Practice (SCOPs) for end of pipe fish protection screens (DFO, 2024c).
FMM5	Measures designed to minimize disturbance to seabed sediments and benthic communities and marine wildlife when carrying out activities within the marine environment shall be implemented.
FMM6	Drilling activity will be ceased if there is a risk of physical harm to any seals from direct contact. Activity will only resume once there is no longer risk of injury to seals from direct contact.

### 5.3.5 Wildlife and Migratory Bird Management

Mitigation measures for wildlife management are described in Table 5-5.

**Table 5-5: Wildlife and Migratory Bird Management**

ID	Mitigation Measure
WLMB1	A wildlife monitor/Marine Observer will be present at all stages of the Program.
WLMB2	All Program personnel will participate in wildlife safety training, including bear safety training. This will be carried out during the site orientation.
WLMB3	Waste material will be stored in appropriately sealed bins to prevent scavenging by wildlife and feral animals, as well as to control odour.
WLMB4	All Program personnel will be instructed that the feeding of terrestrial or marine wildlife is prohibited.
WLMB5	All Program personnel will be made aware of the measures to protect wildlife and are provided with training and/or advice on how to implement these measures.

ID	Mitigation Measure
WLMB6	The Program Team shall carry out all phases of the Program in a manner that protects migratory birds and avoids harming, killing or disturbing migratory birds or destroying, disturbing or taking their nests or eggs.
WLMB7	No substantial alteration, damage or destruction to any wildlife habitat will occur when conducting the Program unless otherwise authorized by the appropriate authorizing agencies.
WLMB8	If a nest containing a migratory bird or egg is discovered, disruptive activities will cease until a buffer zone is established. The distance of the buffer zone will be based on appropriate setback for the species as confirmed by a QP. The buffer zone will remain in place until the young have naturally and permanently left the vicinity of the nest.
WLMB9	A preflight observation will be performed in advance of drone flight take off to confirm no wildlife (inclusive of marine mammals) are in proximity to the take off area. If wildlife is observed, the take off area will be adjusted to provide a buffer, and there will be no circling, hovering, repeat passes or rapid elevation changes.
WLMB10	If wildlife concentrations are observed, or if wildlife exhibit agitation or avoidance behaviour, drone flight operations will be delayed, temporarily relocated, or suspended until the area is confirmed clear.

### 5.3.6 Species at Risk

Mitigation measures for SAR are described in Table 5-6.

**Table 5-6: Species at Risk**

ID	Mitigation Measure
SAR1	If SAR are reported or observed, the EM will record, document, and monitor their presence (including time, date, location, activity, and proximity to vessel) and determine potential impacts to SAR, as well as any modification to program activities that may be required to protect SAR.
SAR2	Should SAR species be observed, reporting to pertinent AHJs will be performed as summarized in Section 5.8.

### 5.3.7 Local Support and Harvesting

Mitigation measures for local support and Inuit harvesting are detailed in Table 5-7.

**Table 5-7: Local Support and Harvesting**

ID	Mitigation Measure
LSH1	The Program Team will consult with local residents regarding their activities in the area and solicit available IQ and information that can inform Program activities.

ID	Mitigation Measure
LSH2	The Program Team shall ensure that Program activities do not interfere with Inuit harvesting or traditional land use activities.
LSH3	The Program Team shall, to the extent possible, hire local people and access local services where possible.

### 5.3.8 Air Quality

Mitigation measures for air quality are described in Table 5-8.

**Table 5-8: Air Quality**

ID	Mitigation Measure
AQ1	There will be no unnecessary idling of equipment or vehicles.
AQ2	Machinery and equipment will be maintained in good working order to minimize emissions.

### 5.3.9 Communication

Mitigations outlined in Table 5-9 pertain to communication with AHJs, stakeholders, the Hamlet, the Mayukalik Hunters and Trappers Association (HTA), and community members.

**Table 5-9: Communication**

ID	Mitigation Measure
COM1	Appropriate communication and documentation measures will be in place for reportable incidents (Section 5.8.3), non-compliances (Section 5.8.2) and adaptive management measures implemented (Section 5.5).
COM2	Communication requirements as required by permit conditions to pertinent AHJs will be completed as required. Parties responsible for AHJ communications is addressed in Section 5.2.
COM3	The Program Team will include the GN-TIN representative on communications with AHJs, stakeholders or other community groups related to Program activities.
COM4	Communication protocols will be established to provide the community timely notifications of marine activities, supported by ongoing consultation with the Hamlet, HTA and community members.
COM5	An appropriate communication plan will be provided to the GN-TIN in advance of mobilization for the Program to confirm that the EM have clear communication protocols with the Program Team should shut down or other activities be required to be quickly communicated during program activities.

### 5.3.10 Fuelling and Chemical Storage

Near or over water re-fuelling is required due to the nature of the Program (drilling) and because it is standard practice for marine-based studies. Measures are in place to minimize negative effects to the marine environment. These measures have been developed using BMPs and industry standard measures to minimize or prevent spills to the marine environment.

**Table 5-10: Fuel and Chemical Storage**

ID	Mitigation Measure
FCS1	Fuelling of equipment may occur over and near water; the Program Team will verify the use of secondary containment, drip trays, and fuel line check valves during fuelling, and have spill kits readily accessible.
FCS2	Should fuel storage be required, fuel storage containers shall at a minimum be 31 m above the normal high-water mark of any natural water body.
FCS3	Procedures and methods will be in place to prevent spillage of deleterious substances or debris falling into the marine environment including measures to minimize the spread to surrounding lands or into water.
FCS4	The Program Team will maintain an inspection record for equipment used that requires hydraulic, fuel, and lubrication systems.
FCS5	The Program Team will provide a list of all chemicals and expected volumes which are planned to be mobilized to site and stored for use. The plan will also include a description of how chemicals will be stored on site.
FCS6	The Program Team shall ensure that wildlife deterrent systems are utilized at the time of a spill incident in order to avoid wildlife (terrestrial or marine) and migratory birds from being contaminated.
FCS7	All stationary petroleum products storage facilities shall be marked with flags, posts or similar devices so that they are at all times plainly visible.
FCS8	Routine inspection of storage areas, secondary containment, and containers for leaks, and addressing leaks or containers found in poor condition or improperly sealed. Further they will be covered to keep out rainwater and snow.

### 5.3.11 Waste Management

Mitigation measures for waste management are described in Table 5-11.

**Table 5-11: Waste Management**

ID	Mitigation Measure
WM1	Storage and handling procedures designed to prevent harm to personnel and the environment from hazardous materials, as per the Safety Data Sheets (SDS), shall be implemented. SDS will be kept on site.

ID	Mitigation Measure
WM2	Procedures and methods in place during the Program that prevents waste material from entering the environment. This will include plans on how food, food waste, and other attractants will be handled, stored, and disposed of safely to avoid attracting and habituating animals.
WM3	All garbage and debris shall be kept in a covered metal container until disposed of. All wastes shall be kept inaccessible to wildlife at all times.
WM4	All waste shall be properly sealed and transported to the appropriate disposal facilities if required. Records of disposal shall be maintained and available upon request.
WM5	Engine oils and lubricants will be stored in separate leak-proof containers.
WM6	Storage tanks used for mixing muds and storing fluids for the quarry drilling will be within a self-contained closed loop system to allow for reusing and minimization of waste.
WM7	Routine inspection of worksites, equipment, as required to ensure regulatory compliance and spill prevention.
WM8	All drill fluids used will be bio-degradable gum xanthun and have minimal impact on the environment.
WM9	All fluids used for drilling activities will be properly contained and labelled. Secondary containment will be provided.
WM10	Waste will be stored in labelled containers and appropriately segregated based on material.
WM11	Disposal of drill wastes shall be undertaken in a way that does not cause harm to the environment.

### 5.3.12 Spill Prevention and Emergency Response

Mitigation measures for spill prevention and emergency response are provided in Table 5-12. Steps and measures to be taken in the event of an accidental spill are summarized in Section 5.3.12.1 (Spill Response Protocol). The Schedule B Spill Contingency Planning and Reporting Regulations are provided in Appendix C.

**Table 5-12: Spill and Emergency Response**

ID	Mitigation Measure
SERP1	Emergency response kits and spill kits will be onsite and will be appropriate to the type and amount of hazardous materials associated with the Program. Spill kits will contain materials appropriate for the potential products to be spilled, taking into consideration the surrounding environment and seasonal conditions (e.g. iced ocean). The emergency response kits will include appropriate Personal Protection Equipment (PPE) such as gloves and goggles.
SERP2	All personnel will be instructed on their role and responsibility in the event of spill response requirements, in addition to the location of spill response equipment.

ID	Mitigation Measure
SERP3	The Program Team will understand their roles and responsibilities in the event of a spill in advance of the start of the Program.
SERP4	The Program Team will have on hand, emergency response kits and spill kits to manage spills of a predictable size for their operations. All contractor personnel will be aware of the location of the spill response materials and they will be in a location that is easily accessible in the event of a spill.
SERP5	In the event a spill occurs, spill response will be carried out as outlined in Section 5.3.12.1 and notifications to AHJ and the GN-TIN as indicated in Section 5.8.3 will be undertaken.
SERP6	The Program Team will provide a list of accidental discharges and of corrective actions taken to the Worley Consulting Field Supervisor.

### 5.3.12.1 Spill Response Protocol

Accidental releases of deleterious substances, such as hydrocarbons, can affect soils, freshwater fish and aquatic life, terrestrial wildlife, birds, or marine mammals or fish in the area. Whether the spill is on land, water, or snow/ice, a Spill and Emergency Response Plan (SERP), as outlined below, will be implemented if a spill occurs during the Program:

- In the event of a spill, activities will be immediately suspended, and emergency response procedures will be initiated.
- Stop the spill or leak, where practical and safe to do so.
- Identify, if possible, the substance involved and review applicable SDS prior to attempting further mitigation. Obtain safety equipment as necessary before proceeding.
- Obtain and use spill control equipment to contain the spill.
- Contain any spill to water bodies by installing berms or aquatic containment (e.g., floating oil booms) appropriate for the type and size of spill.
- Contain the spill on land as required (e.g. spill pads).
- Contain any spill on snow or ice and prevent spilled liquids from moving towards waterways using absorbent materials or a snow dike.
- Determine if external support, such as local authorities, should be called to assist.
- Determine if the spill is reportable by consult per the Reportable Threshold Table<sup>3</sup>.
- Divert potential runoff away from the spill area, if possible.
- Store and/or dispose of contaminated materials resulting from the spill appropriately.
- Determine the extent of the spill, volume, area affected, and equipment required to conduct remediation works.
- Plan and implement remediation works.

<sup>3</sup> GN-DoE Report a Spill (<https://www.gov.nt.ca/ecc/en/services/report-spill>)

- Complete an incident report.

### 5.3.13 Reclamation

Reclamation is not required given the location that the Program is being undertaken. However, the drill and test pit footprints will be left in the same condition they were in prior to the respective activities.

**Table 5-13: Reclamation Requirements**

ID	Mitigation Measure
RC1	After the Program is complete, the Program Team will ensure the area is cleaned. This includes the removal of all equipment, the plugging and capping of drill holes and general waste clean-up.
RC2	All equipment used to conduct the studies will be removed and transported offsite.
RC3	Any spills will be cleaned-up and the area remediated prior to completion of the Program.
RC4	Drill cuttings shall be discharged to their marine or terrestrial origin within a drilling footprint.

## 5.4 Monitoring Measures

Monitoring measures to be completed by the EM/Marine Observer to meet compliance requirements are described in this section. The EM/Marine Observer will be responsible for appropriate documentation of activities and for environmental monitoring to confirm measures are tracked for reporting.

### 5.4.1 General

Primary responsibilities of the EM/Marine Observer will be to:

- Conduct regular monitoring for the duration of the Program.
- Visual monitoring as outlined in Section 5.4.2.
- Monitor and adaptively manage work procedures as necessary to limit environmental effects.
- Monitor for presence of marine mammals, and document behaviors and distance from Program activities, as outlined in Section 5.4.2.
- Monitor and document presence of SAR, as outlined in Section 5.3.6.
- Monitor large congregations of seabirds and communicate with personnel to avoid those areas while the birds are present.
- Routinely check to verify that equipment in use for the Program is in good working condition.
- Routinely check to determine that the required emergency response materials, including the spill kits, are on site and appropriately stocked during the Program.
- Confirm site personnel are aware of and trained in emergency procedures outlined in the SERP (Section 5.3.12).

- Confirm that mitigations outlined within Section 5.3 are strictly adhered to.
- Report any non-compliance or unplanned events as outlined in Section 5.7.
- Reporting requirements as described in Section 5.8.

#### 5.4.2 Visual Monitoring

Visual monitoring during the Program will include:

- Monitoring for stressors on aquatic species, fish kills, any fish spawning/migration activity.
- Incidental SAR occurrences.
- Observe for the presence of marine mammals to avoid physical interaction and maintain an EZ (see Section 5.4.4).

Details of sightings including species, number, and behaviour of wildlife observed will be included in the end of program report (see Section 5.8.1).

#### 5.4.3 Turbidity

Turbidity plumes are not expected to occur during the Program activities that interact with the seabed due to the relatively small size of the sampling equipment and the probability of dilution in the marine environment. During surveys that occur in open-water conditions, the EM will be vigilant visually to monitor for the presence of turbidity plumes within the 30 m CMZ as per the thresholds summarized in Table 5-14 to confirm compliance with Federal CCME WQG (CCME, 1999). If there are concerns for turbidity during visual monitoring in open-water conditions, compliance sampling will be undertaken.

**Table 5-14: Turbidity Thresholds**

Flow State	Turbidity Threshold
Clear flow water	<ul style="list-style-type: none"> <li>• Maximum increase of 8 Nephelometric Turbidity Units (NTUs) from background levels for short-term exposure (e.g., 24-hour period).</li> <li>• Maximum average increase of 2 NTUs from background levels for a longer-term exposure (e.g., 30-day period).</li> </ul>
High flow or turbid water	<ul style="list-style-type: none"> <li>• Maximum increase of 8 NTUs from background levels at any one time when background levels are between 8 and 80 NTUs.</li> <li>• Should not increase more than 10% of background levels when background is &gt; 80 NTUs.</li> </ul>

Source: CCME (1999)

#### 5.4.4 Exclusion Zones and Marine Mammal Observation

The Marine Observer will be equipped to detect presence of marine mammals using binoculars and will monitor two different zones (EZ and Observation Zone [OZ]) of different radii and purpose depending on the Program activity. Descriptions of the monitoring zones are provided in Table 5-15, with the specific radii for the EZ and OZ being 500 m and 1,000 m respectively.

**Table 5-15: Marine Mammal Monitoring Zones**

Term	Definition
EZ	The marine observer will issue stop work procedures when a marine mammal enters the EZ.
OZ	The Marine Observer will monitor and document species that enter the OZ, but no action will be required. The purpose of the OZ is to provide the marine observer and contractor advanced notification regarding the presence of marine mammals in the activity area and forewarning of potential activity shut down should the marine mammal enter the EZ.

The Marine Observer will monitor for stress related behaviours to marine mammals within the monitoring zones. If observed, adaptive management will be implemented or, if necessary, stop-work procedures will be implemented until effective mitigation measures are in place. The marine observer monitoring will be performed as follows:

- A 30-minute pre-observation period will occur prior to the start of any noise producing activities (SPB).
- The marine observer will document:
  - Behaviours of marine mammals which will be able to demonstrate whether marine mammals are responding to the survey activities.
  - How the marine observer requirements have been managed (if any).
  - Any additional requirements due to adaptive management (if needed).

#### 5.4.5 Underwater Noise

An Underwater Noise Monitoring Program will be undertaken during the Program for activities that are noise generating and overlap with hearing frequencies of Arctic marine mammals (see Section 4.1 (Table 4-2, Table 4-3)). Underwater noise thresholds that will be followed are provided in Table 5-16, which are based on NOAA recommendations (NMFS, 2024a)

The Underwater Noise Monitoring Program will follow these steps:

- The hydroacoustic technician will make a field decision on whether full time or confirmatory monitoring is required based on how close measured noise is to the thresholds.
- The hydrophone used to perform underwater sound monitoring will be capable of recording ‘real time’ acoustics for SEL, and Peak RMS measurements in order to immediately confirm compliance with acoustic thresholds.
- The hydroacoustic technician will keep a detailed record of measured noise, inclusive of raw data, maximum readings and any documented noise exceedances.

**Table 5-16: Acoustic Thresholds for Marine Mammals and Fish**

Type	Threshold
Marine Mammal	160 dB re 1µPa rms at the EZ boundary.
Fish	206 dB re1 µPa Peak SPL at 10 m.

### 5.5 Adaptive Management

During the Program, it may be necessary to modify methodology and address site conditions not foreseen in this EMP. Should adaptation to field conditions need to be addressed, the EM on site, in conjunction with Worley Consulting, will develop the update to the methodology, and mitigation measures will be updated. For communication measures, see Section 5.3.9 (Table 5-9). Adaptive management reporting will be detailed within the monitoring reports in accordance with Section 5.8.1.

### 5.6 Stop-Work

Stop-work procedures will be implemented, when necessary, based on specific conditions. A clear communication strategy must be described by the Worley Consulting Field Supervisor prior to mobilization for the Program. See 5.3.9 (Table 5-9) to outline how EM can notify the Field Supervisor when this is necessary.

### 5.7 Non-Compliance

In the event of a non-compliance or a potential non-compliance with this EMP and/or applicable environmental permits, the EM/Marine Observer has the authority to suspend survey activities and/or implement adaptive management strategies (see Section 5.5) to re-instate Program compliance. Non-compliances must be reported to the Program Team immediately. Non-compliance reporting protocols to pertinent AHJs will be determined by GN-TIN and communicated to the Program Team prior to the start of the Program.

### 5.8 Reporting

#### 5.8.1 Regulatory Authority Annual Reporting

Annual reports will be required to be submitted to the NRI and can be provided to any AHJ upon request.

#### 5.8.2 Non-Compliance

All non-compliance, or potential non-compliance, will be reported to the pertinent AHJ as required.

#### 5.8.3 Incident Reporting

Incident reporting as required to pertinent AHJ is detailed in this section. The GN-TIN and Worley Consulting must all be notified by the supporting consultants when a reportable incident (e.g. spill, mortality of an organism, impacts to SAR species) has occurred. Incident reporting must be completed within 24 hours of the occurrence.

Incident reporting will be the responsibility of the Program Team members present and will at a minimum consist of the requirements outlined in Table 5-17, with contact information provided in Table 5-18.

**Table 5-17: Minimum Reporting Requirements for Reportable Incidents**

Spills <sup>1</sup>	Observations of Injury / Mortality Marine Mammals, Marine or Migratory Birds, Wildlife, Fish, and Inclusive of SAR <sup>2</sup>
<ul style="list-style-type: none"> <li>• Date and time of call.</li> <li>• Location, date and time of spill.</li> <li>• Direction spill is moving.</li> <li>• Name and contact details for a person close to the location of the spill.</li> <li>• Type of contaminant and quantity spilled.</li> <li>• Cause of the spill.</li> <li>• Whether the spill is continuous or has been contained.</li> <li>• Evacuation procedure (if required).</li> <li>• Spill response actions taken prior to reporting.</li> <li>• Name owner or person in charge, management or control of contaminants spilled.</li> <li>• Assistance required for successfully containing and cleaning the spill or release.</li> </ul>	<ul style="list-style-type: none"> <li>• Species name.</li> <li>• Photograph of the individuals involved.</li> <li>• Location, date and time of incident.</li> <li>• Type of incident.</li> <li>• Number of individuals involved.</li> <li>• Condition and behaviour of the individuals involved.</li> <li>• Cause of injury or mortality.</li> <li>• Habitat condition.</li> </ul>

Note:

1. Incident reporting will be the responsibility of the Program Team personnel in the field at the time of the incident, and will at a minimum consist of the following, which is taken from the Spill Contingency Planning and Reporting Regulations S.11(1)
2. In the event of any potential disturbance to fish, fish habitat, SAR, migratory birds, and marine mammals occurs during the Program, monitoring reports will be submitted to pertinent AHJs, including ECCC-Canadian Wildlife Services (CWS), DFO, and GN-DoE

**Table 5-18: Authorities Having Jurisdiction Reporting Information**

Authority Having Jurisdiction	Summary	Contact
GN-DoE	<ul style="list-style-type: none"> <li>Currently the Spill Contingency Planning and Reporting Regulations outline reporting requirements based on specific volumes. Reporting requirements for spill magnitudes of individual contaminants are provided in Schedule B of the Regulations (R-068-93) (see Appendix C).</li> </ul>	GN-DoE 24-hour spill report line (1-867-920-8130) and through their fillable form <sup>4</sup> which can be submitted via email ( <a href="mailto:spills@gov.nt.ca">spills@gov.nt.ca</a> ), with a copy provided in Appendix D.
	<ul style="list-style-type: none"> <li>Any interactions and incidents involving the potential disturbance of SAR under GN’s lead management responsibility will be reported to GN-DoE.</li> </ul>	<a href="mailto:environment@gov.nu.ca">environment@gov.nu.ca</a> .
DFO-FFHPP	<ul style="list-style-type: none"> <li>Any activities that have the potential to violate the <i>Fisheries Act</i>, including Harmful Alteration Disruption or Destruction (HADD) of fish habitat, and death of fish.</li> </ul>	DFO-FFHPP Arctic Region 24-hour reporting hotline at 1-855-777-7500.
	<ul style="list-style-type: none"> <li>Any interactions and incidents involving the potential disturbance of marine mammals or SAR under DFO’s lead management responsibility will be reported to DFO.</li> </ul>	1-867-979-8000.
ECCC-CWS	<ul style="list-style-type: none"> <li>Any harm, destruction, or disturbance to terrestrial SAR species (plants and animals), as well as birds, nests, or eggs that are afforded protection under the <i>Migratory Bird Convention Act</i> (MBCA), will be considered reportable. Such events result in immediate notification to the CWS branch of ECCC.</li> </ul>	Toll-free 24-hour reporting hotline at 1-800-668-6767 or through email ( <a href="mailto:cwsnorht-scfnord@ec.gc.ca">cwsnorht-scfnord@ec.gc.ca</a> ).
ECCC	<ul style="list-style-type: none"> <li>Deposit of deleterious substances are prohibited under Section 36(3) of the <i>Fisheries Act</i>, unless specifically authorized under a <i>Fisheries Act</i> regulation or by a regulation under other federal legislation. Any deposit whether made directly into water frequented by fish or indirectly must be immediately reported to ECCC’s environmental notification system.</li> </ul>	24-hour telephone number for the Nunavut region (Spill: 1-867-979-526, <a href="mailto:lqaNordreg@innav.gc.ca">lqaNordreg@innav.gc.ca</a> , Environmental Emergency: 1-867-920-8130) (ECCC, 2019b).

<sup>3</sup> Nunavut fillable spill report form available at: <https://www.gov.nu.ca/environment/documents/nt-nu-spill-report-form-pdf>

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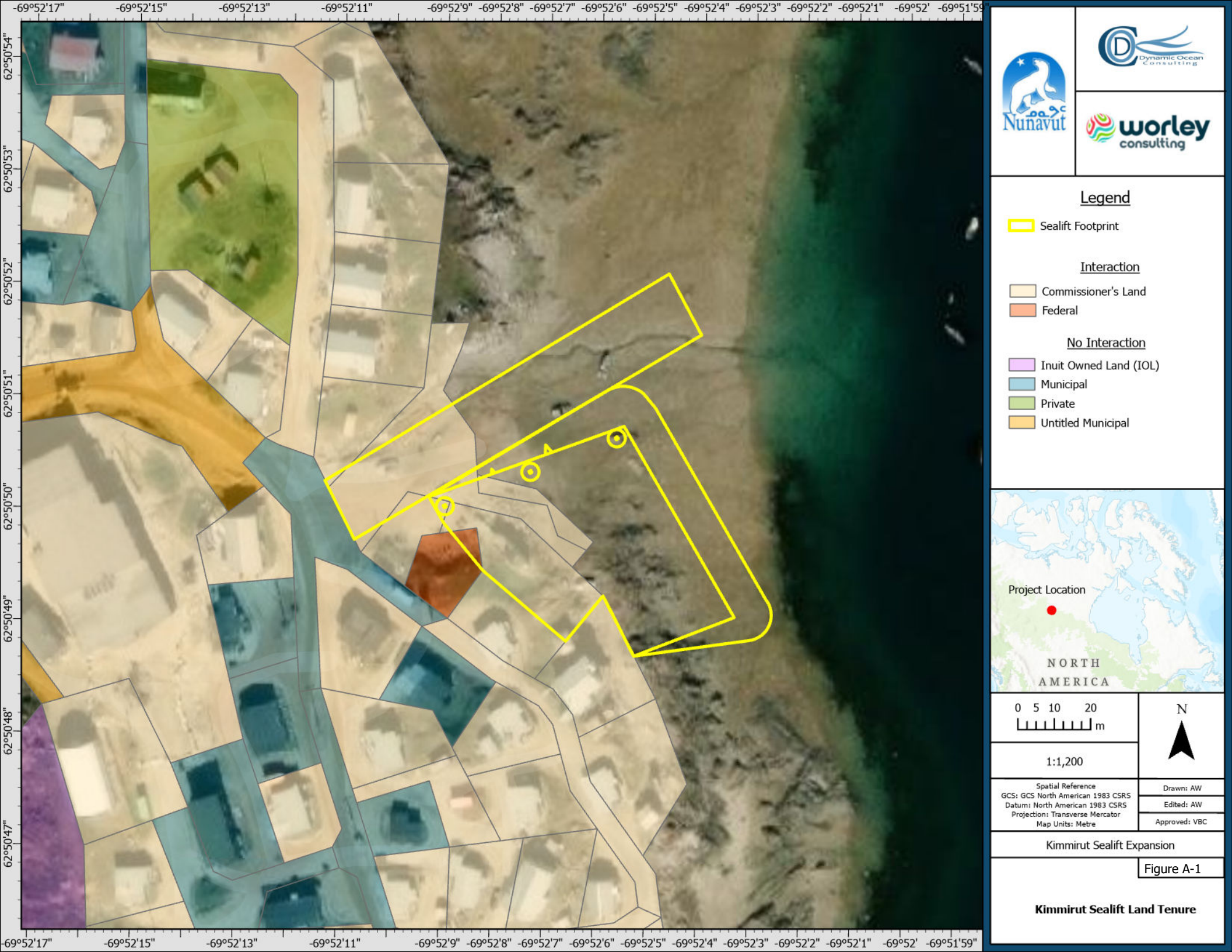
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# Appendix A: Supporting Figures



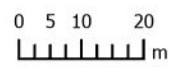
**Legend**

- Sealift Footprint
  
- Interaction**

  - Commissioner's Land
  - Federal

  
- No Interaction**

  - Inuit Owned Land (IOL)
  - Municipal
  - Private
  - Untitled Municipal



1:1,200

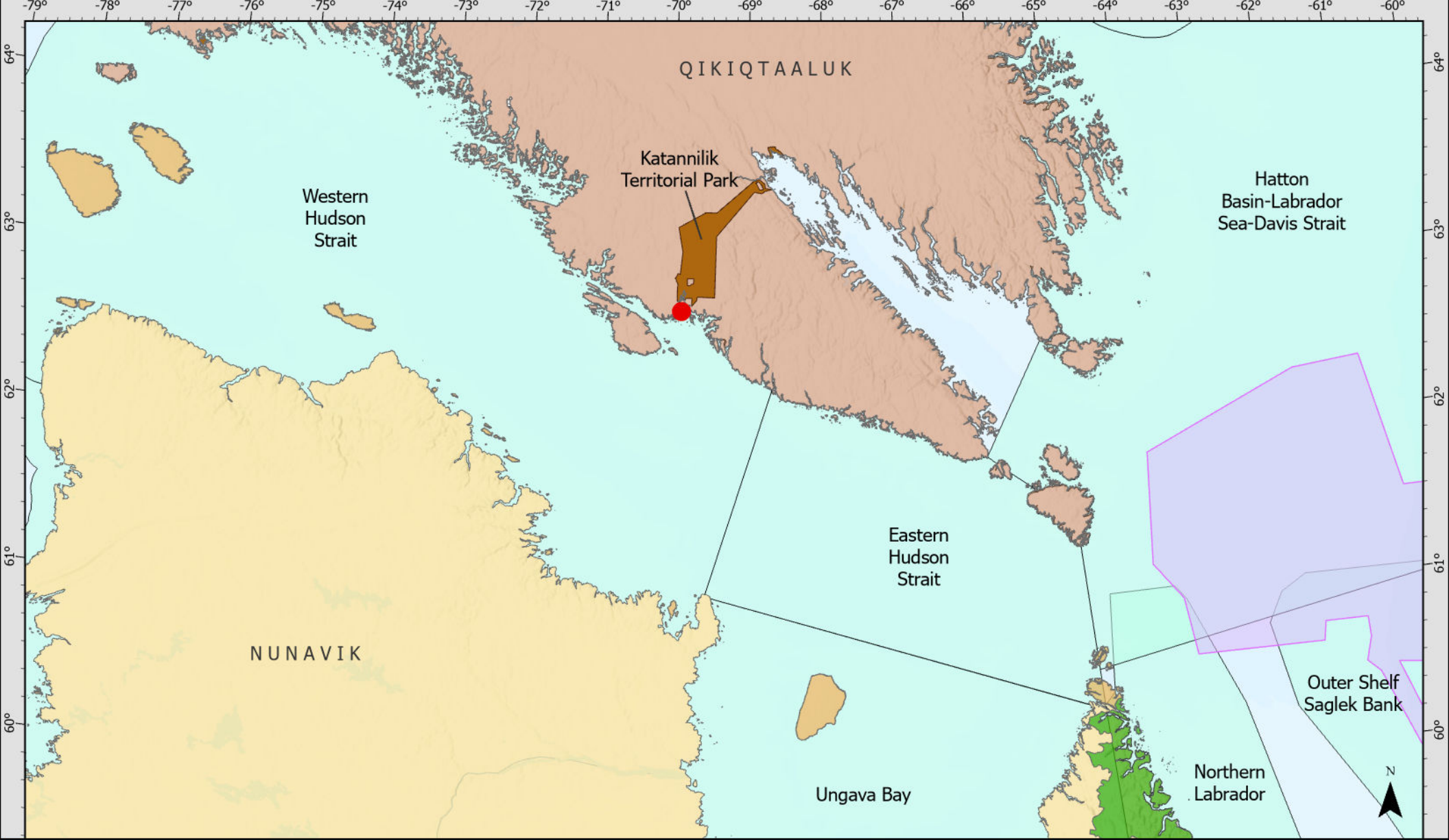
Spatial Reference  
 GCS: GCS North American 1983 CSRS  
 Datum: North American 1983 CSRS  
 Projection: Transverse Mercator  
 Map Units: Metre

Drawn: AW  
 Edited: AW  
 Approved: VBC

Kimmirut Sealift Expansion




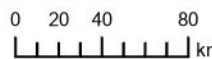

Figure A-1

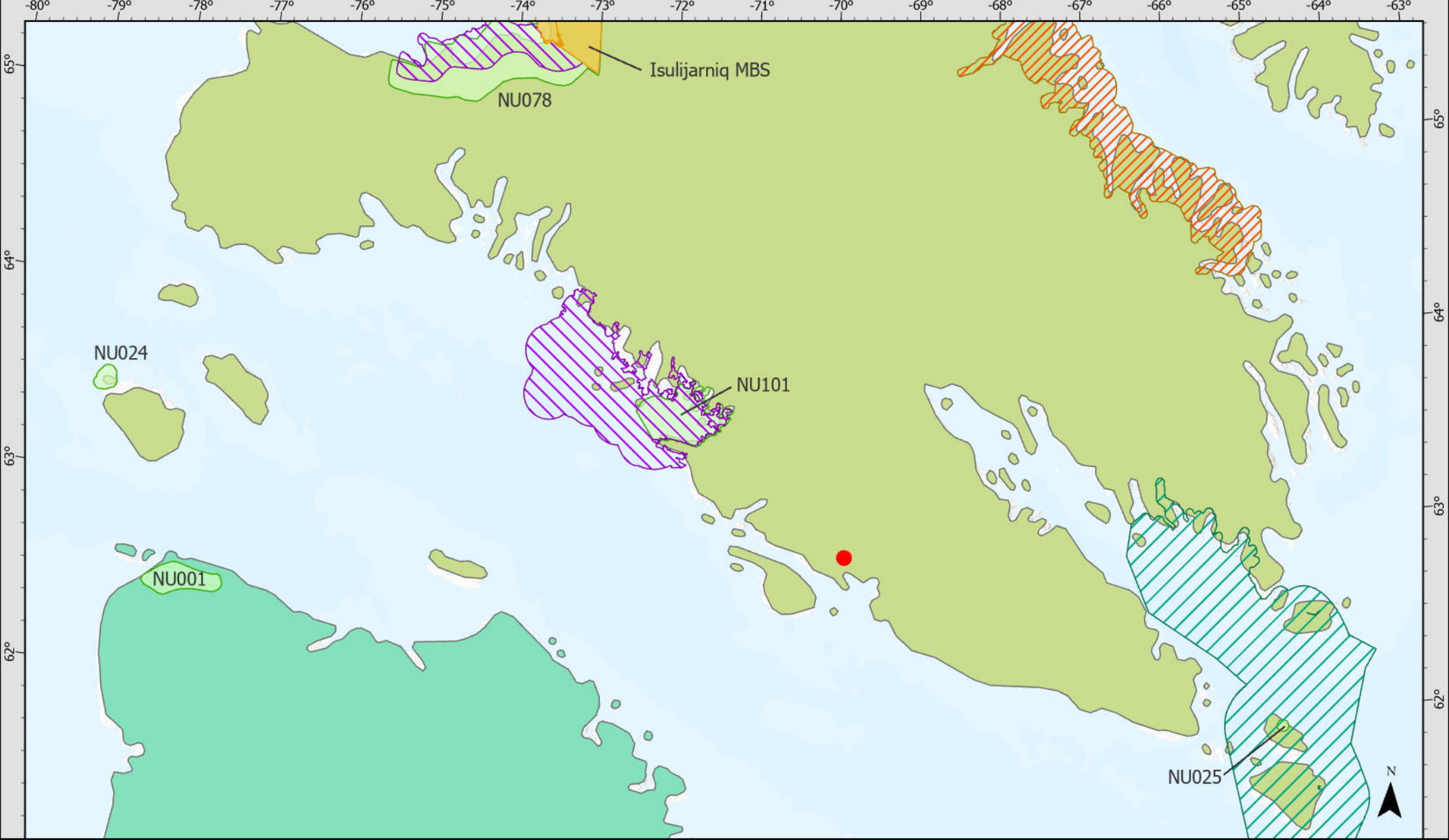
**Kimmirut Sealift Land Tenure**



**Legend**

- Kimmirut Sealift
- Interaction**
- Ecologically and Biologically Significant Area
- No Interaction**
- Marine Refuge
- Territorial Park
- National Park

Drawn: CL Edited: CL Approved: VBC	<b>Kimmirut Sealift Project</b>  <b>Designated Areas in Proximity to Kimmirut</b>
Figure A-2	
  	Spatial Reference GCS: GCS North American 1983 CSRS Datum: North American 1983 CSRS Projection: Transverse Mercator Map Units: Metre
	
Scale: 1:3,500,000	
	



**Legend**

- Kimmirut Sealift
- Important Bird Area
- Migratory Bird Sanctuary

- Nesting Zones**
- No Potential for Seasonal Interaction  
N10 (Late May - Mid Aug)
  - No Potential for Spatial Interaction  
N8 (Mid May - Mid Aug)

- Key Migratory Bird Habitat Sites**
- No Potential for Spatial Interaction  
Class 1
  - Class 2
  - Class 3

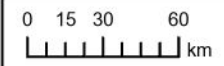
Drawn: CL  
 Edited: CL  
 Approved: VBC

Kimmirut Sealift Project  
**Marine and Migratory Bird Designated and Important Habitats and Nesting Zones in Proximity to Kimmirut**

Figure A-3

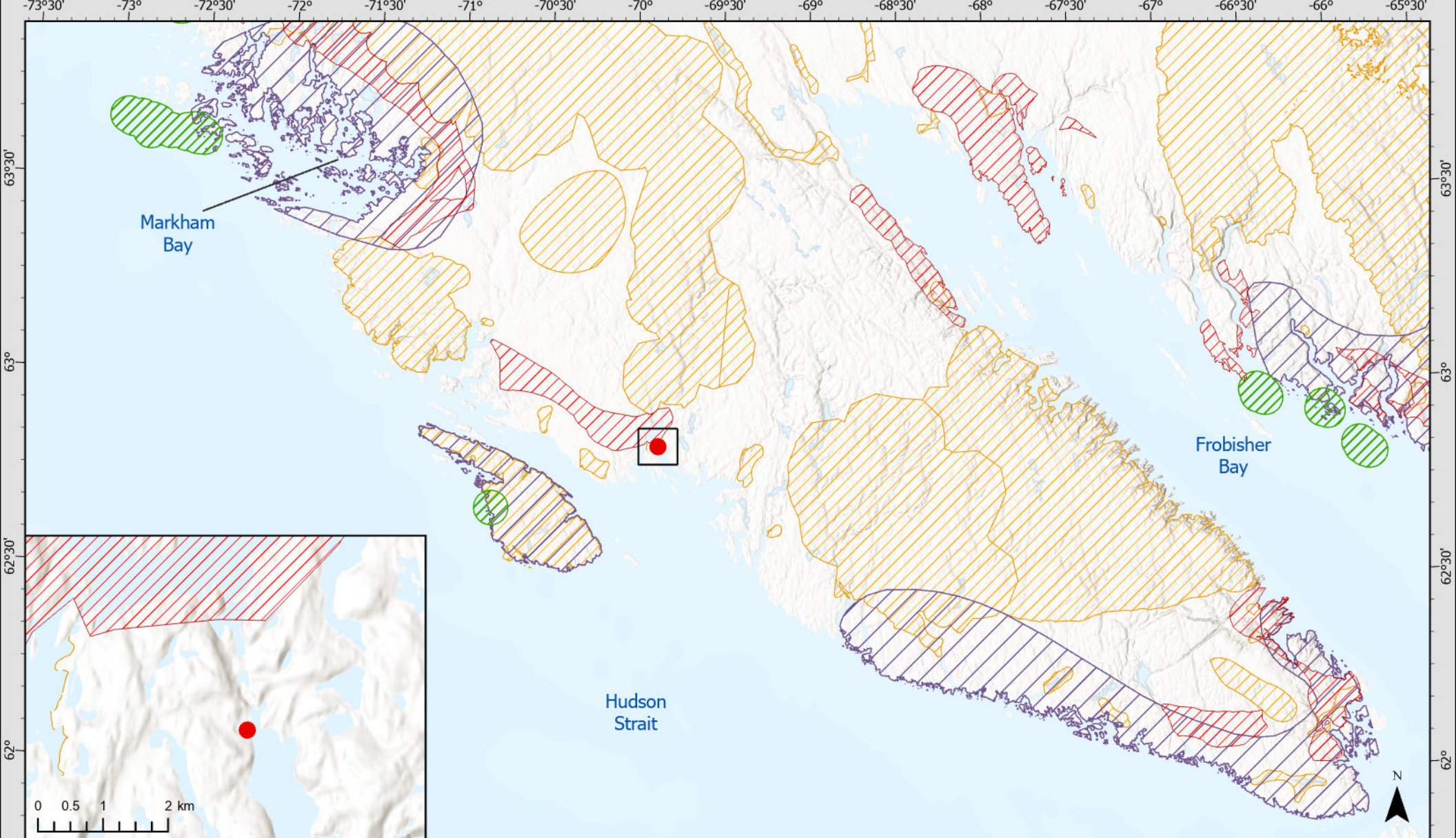


Spatial Reference  
 GCS: GCS North American 1983 CSRS  
 Datum: North American 1983 CSRS  
 Projection: Transverse Mercator  
 Map Units: Metre



Scale: 1:3,000,000





**Legend**

- Kimmirut Sealift
- No Potential for Spatial Interaction
- Polar Bear Denning
- Walrus Haulout
- Caribou Calving and Post-Calving Area
- Caribou Winter Range

Drawn: AW, CL	Kimmirut Sealift Project	
Edited: CL	Figure A-4	
Approved: VBC	<b>Important Marine and Terrestrial Habitats Identified in the Recommended Nunavut Land Use Plan in Proximity to Kimmirut</b>	
	Spatial Reference GCS: GCS North American 1983 CSRS Datum: North American 1983 CSRS Projection: Transverse Mercator Map Units: Metre	 Project Location
	0 5 10 20  km	
	Scale: 1:1,500,000	

# Appendix B: Supporting Tables

Table B-1: Description and Occurrence of Focal Fish and Marine Mammals in Kimmirut

Species (Common Name)	Species (Latin Name)	Inuktitut Name	Species Spatial Category	Type	Seasonal Occurrence	Species Description
<b>Fish</b>						
Amphipod	<i>Gammarus sp.</i>	Kingu	Resident	Benthic invertebrate	Year-round	Amphipods are a group (order Amphipoda) of crustaceans, and many species are endemic to the Arctic. They are commonly found in both benthic and pelagic environments. Amphipods are a key link in the Arctic food web and are a significant food source for marine fish, mammals and bird (GN, 2009; Oceans North Conservation Society <i>et al.</i> , 2018). Seals in polynyas near Kimmirut are often found with their stomach filled with amphipods and shrimp (GN, 2009).
Arctic char	<i>Salvelinus alpinus</i>	Ikaliviit, Ivitaruk	Anadromous	Pelagic fish	Year-round	Arctic char are ecologically and socio-economically important. Runs of Arctic char are either anadromous or strictly freshwater (landlocked) (DFO, 2018a). Anadromous populations are found commonly throughout Nunavut (GN, 2012a, Figure 10). In the marine environment Arctic char have better foraging opportunities but will migrate along coastlines to return to their natal spawning grounds in freshwater habitats (Moller <i>et al.</i> , 2018; Moore <i>et al.</i> , 2016; Moore, 1975). Arctic char are fished for Inuit subsistence and commercial fisheries across the Arctic (DFO, 2025a; NWMB & DFO, 2020) (Galappaththi <i>et al.</i> , 2022; Roux <i>et al.</i> , 2011), this harvests in Kimmirut reported in May through October (GN, 2009).
Arctic cod	<i>Boreogadus saida</i>	Ugak	Migratory	Pelagic fish	Year-round	Arctic cod are an ecologically important prey species occurring throughout the Arctic (Froese & Pauly, 2000). Arctic cod are fast growing and short lived with high fecundity (DFO, 2016; Lawson <i>et al.</i> , 1998). Arctic cod are harvested for subsistence in Nunavut but are not considered of high value (Hurtubise, 2016; p43, pers comm July 13 2015). There are no commercial fisheries for Arctic cod in the Arctic; however, there is interest in exploring future opportunities (CBC, 2015; Nunatsiq News, 2016).
Sculpin	<i>Myoxocephalus Scorpius (shorthorn)</i> <i>Gymnocanthus tricuspis (Arctic staghorn)</i>	Kanayuk, Kanajuq	Resident	Bottom dwelling fish	Year-round	Sculpin include fourteen marine species found across Nunavut (Moller <i>et al.</i> , 2018). The most common species is the Shorthorn sculpin, Arctic staghorn sculpin and Arctic sculpin (GN, 2009, 2012b). All sculpin in the region are generalist feeders (Landry <i>et al.</i> , 2018), and are an important food source for harp seals, bearded seals, black guillemots, Brunnich's murre, thick-billed murre, Arctic cod, and Arctic char (Moller <i>et al.</i> , 2018). There are no commercial fisheries for Arctic sculpin in Nunavut; however, it is considered a subsistence fishery species (GN, 2009, 2012b; QIA, 2018b). Although present in coastal environment near Kimmirut, they aren't mentioned as a species harvested by hunters (GN, 2009).
Truncated softshell clam	<i>Mya truncata</i>	Ammuumajuq	Resident	Benthic invertebrate	Year-round	The truncate soft-shell clam is an ecologically and culturally significant bivalve species that constitutes an important traditional food resource for Inuit communities throughout Nunavut. It commonly inhabits coastal intertidal and shallow subtidal zones of Arctic marine environment (Wood <i>et al.</i> , 2022).
<b>Marine Mammals</b>						
Atlantic walrus	<i>Odobenus rosmarus ssp. rosmarus</i>	Akvik	Resident	Pinniped	Summer, Fall	The Atlantic walrus are the largest pinnipeds in the Northern Hemisphere. They spend up to two-thirds of their time at sea, with the other third spent hauled-out on sea ice and land to moult, rest, and rear pups (Godwin, 1990). While at sea, walrus forage primarily on the seafloor for invertebrates, but have also been known to prey on squid, birds, and seals (Bluhm & Gradinger, 2008). They are a gregarious species, that are often found in large groups while hauled-out (Lowry, 2016). Walrus are present in the Hudson Strait and Hudson Bay region year-round (Lowry, 2016) and are an important harvested species for local Inuit communities (GN, 2009).

Species (Common Name)	Species (Latin Name)	Inuktitut Name	Species Spatial Category	Type	Seasonal Occurrence	Species Description
Bearded seal	<i>Erignathus barbatus ssp. barbatus</i>	Ukalik, Qilalugaq	Resident	Pinniped	Year-round	Bearded seals are usually solitary and occasionally appear in small groups. Bearded seals are generally found in areas with moving pack-ice and open-water such as polynyas (Kovacs, 2018). They are primarily benthic foragers that feed on invertebrates, however, they have also been known to prey on forage fish (Bluhm & Gradinger, 2008). Bearded seals are an important harvested species for local Inuit communities throughout Nunavut, including in Kimmirut where they are harvested year-round (GN, 2009).
Beluga whale	<i>Delphinapterus leucas</i>	Kilalugak	Resident	Cetacean	Summer, Fall	Beluga whales are migratory and usually move in large social groups between their wintering and summering grounds. Their distribution is strongly influenced by ice cover and prey availability (Ellis, 1980). Their diet covers a diverse array of pelagic and benthic fish and invertebrates (Bluhm & Gradinger, 2008). In the Hudson Strait and Hudson Bay region, there are three distinct populations of beluga whale; the West Hudson Bay population, the East Hudson Bay population, and the James Bay population (Committee on the Status of Endangered Wildlife in Canada [COSEWIC], 2016). The East and West Hudson Bay populations migrate through the Hudson Strait in the late-spring to their respective summering grounds and return as ice freezes up in the fall, with many overwintering in the Hudson Strait (COSEWIC, 2020a). Local hunters from Kimmirut regularly harvest belugas as they travel through. Belugas are frequently observed and harvested in the shore leads off North Bay and within the polynya situated between Big Island and the coast (GN, 2009; Oceans North Conservation Society <i>et al.</i> , 2018).
Bowhead whale	<i>Balaena mysticetus</i>	Arviq	Resident	Cetacean	Summer	Bowhead whales are the only baleen whale endemic to the Arctic. Bowhead whales in the Hudson Bay and Hudson Strait region are part of the Eastern Canada-West Greenland population, one of four global subpopulations. Their seasonal migrations follow the break-up of sea ice in the spring into productive Arctic waters and move to overwintering habitats as the ice freezes in the fall (COSEWIC, 2009). The Hudson Strait is one such overwintering area, while Western Hudson Bay and Foxe Basin are known to be summering areas for bowhead whales. (COSEWIC, 2009). Bowhead whales are filter feeders and prey on copepods and other aggregations of small zooplankton (Bluhm & Gradinger, 2008). Bowhead whales have traditionally been an important harvested species for Inuit; however, the population was decimated by commercial whaling, resulting in restricted catches (COSEWIC, 2009). Subsistence hunts have been allowed since 1991 but are strictly controlled, monitored, and managed hunt by DFO (NWMB, 2000). In Kimmirut, bowhead whales can often be seen near Big Island (GN, 2009).
Harp seal	<i>Pagophilus groenlandicus</i>	Qairulik	Migratory	Pinniped	Summer, Fall	Harp seals are the most abundant marine mammal in the Northern Hemisphere, with a stable population of 7.5 million (Stenson, 2015). Harp seals visit the Arctic during the open-water season from their winter breeding areas off Newfoundland and Labrador. The primary migratory pathway of harp seals is on the East Coast of Baffin Island (DFO, 2005). They breed on sea-ice and are almost never seen on land. Harp seals are mainly piscivorous, feeding on capelin, Arctic and Atlantic cod, herring, as well as many other fishes (Bluhm & Gradinger, 2008). Harp seals are highly social and can be found in large groups throughout their range (Godwin, 1990). They can be found in the Hudson Strait near Kimmirut during the open-water season. In the Kimmirut region, harp seals are regularly observed south of Big Island and High Bluff Island, as well as in North Bay, particularly during the spring and fall migration periods (GN, 2009).
Hooded seal	<i>Cystophora cristata</i>	Nattivak	Migratory	Pinniped	Summer, Fall	Sea ice availability influences the hooded seals distribution as they tend to winter in the south, and move north in the summer (Campbell, 1997). The hooded seal is common in the Davis Strait and southern Baffin Island region, as they use the Davis Strait as a migratory corridor (Andersen <i>et al.</i> , 2013). This species is present in the summer, from June to October in Kimmirut (GN, 2009).

Species (Common Name)	Species (Latin Name)	Inuktitut Name	Species Spatial Category	Type	Seasonal Occurrence	Species Description
Killer whale	<i>Orcinus orca</i>	Aarluk	Rare Visitor	Cetacean	Summer, Fall	Killer whales are one of the oceans top predators and are a seasonal visitor to the Arctic. The species is experiencing a range expansion as their presence in the Arctic has been increasing substantially over the last few decades (Higdon et al., 2012; Lefort et al., 2020). Killer whales are present in the Arctic during the open-water season with most sightings occurring in August and September, while they hunt a wide variety of marine mammals including ringed and bearded seals, beluga whales, narwhals, and bowhead whales (COSEWIC, 2023). Killer whales do spend time in the Hudson Strait and Northern Hudson Bay; however, sightings in this region are less common than in other areas of the Arctic (Lefort et al., 2020), with six to eight killer whales reported near Kimmirut in 2002 (GN, 2009). Inuit generally do not harvest killer whales but they sometimes co-hunt with the whales as they drive narwhals and beluga whales toward shore. Calls to manage the population have increased because of concerns that killer whales are a threat to the populations of more locally important harvested marine mammal species (Lefort et al., 2020).
Narwhal	<i>Monodon monoceros</i>	Allanguaq, Tuugaalik	Rare Visitor	Cetacean	Fall	Narwhals are the most northerly of all cetaceans, and show a strong affinity for dense pack-ice for most of the year (Ellis, 1980). There are five subpopulations of narwhal in the East Canadian Arctic; narwhal that occur around the Hudson Bay and Hudson Strait are from the Northern Hudson Bay subpopulation. This population is relatively small at approximately 3,500 individuals (COSEWIC, 2024). Narwhals are capable of diving down to 1,200 m to hunt for prey, and their diet consists of benthic and pelagic fish, squid, and crustaceans (Bluhm & Gradinger, 2008). Narwhals are a very important harvested species for Inuit across Nunavut, as they are prized for their tusks and maktaaq (skin); however, they are not commonly harvested in Kimmirut, with reported sightings in 1982, 1986 and 2008 (Priest & Usher, 2004).
Polar bear	<i>Ursus maritimus</i>	Nanuit, Nanuk	Resident	Ursid/Fissiped	Spring, Winter	Polar bears are found throughout the Arctic, preferring coastal areas with shallow, ice-covered seas (Wiig et al., 2015). Polar bears primarily prey on bearded, harp, and ringed seals in these regions. Like most bears, polar bears show a high degree of opportunistic dietary flexibility, and have been seen preying on beluga whales, walrus, narwhals, marine birds, and caribou (Bluhm & Gradinger, 2008). Polar bears are harvested under the Nunavut Polar Bear Co-Management Plan, allowing only Inuit to hunt them. Polar bears are found throughout Kimmirut, with most sightings and harvest occurring from October to April. However, sightings are not uncommon in the summer months (GN, 2009).
Ringed seal	<i>Pusa hispida ssp. hispida</i>	Natinat, Natsiq	Resident	Pinniped	Year-round	The ringed seal is the most common marine mammal in Arctic waters and is found throughout the Canadian Arctic with an estimated population of 2.3 million (COSEWIC, 2019). Ringed seals feed upon a variety of planktonic, nektonic, and benthic prey with considerable regional and seasonal variability (Bluhm & Gradinger, 2008). Migration patterns are not well understood for ringed seals. The species has been documented as travelling as far as 2,500 km; although, ringed seals are thought to have a limited range (Canadian Geographic, 2014). Ringed seals are a very important harvested species for local Inuit communities across Nunavut, including Kimmirut where they are present throughout the year, with high concentrations typically observed between July and September (GN, 2009).





# **Appendix C: Spill Contingency Planning and Reporting Regulations Schedule B**

# SPILL CONTINGENCY PLANNING AND REPORTING REGULATIONS

## SCHEDULE B

(Section 9)

<i>Item No.</i>	<i>TDGA Class</i>	<i>Description of Contaminant</i>	<i>Amount Spoiled</i>
<b>1.</b>	1	Explosives	Any amount
<b>2.</b>	2.1	Compressed gas (flammable)	Any amount of gas from containers with a capacity greater than 100 l.
<b>3.</b>	2.2	Compressed gas (non-corrosive, non flammable)	Any amount of gas from containers with a capacity greater than 100 l.
<b>4.</b>	2.3	Compressed gas (toxic)	Any amount
<b>5.</b>	2.4	Compressed gas (corrosive)	Any amount
<b>6.</b>	3.1, 3.2, 3.3	Flammable liquid	100 l
<b>7.</b>	4.1	Flammable solid	25 kg
<b>8.</b>	4.2	Spontaneously combustible solids	25 kg
<b>9.</b>	4.3	Water reactant solids	25 kg
<b>10.</b>	5.1	Oxidizing substances	50 l or 50 kg
<b>11.</b>	5.2	Organic Peroxides	1 l or 1 kg
<b>12.</b>	6.1	Poisonous substances	5 l or 5 kg
<b>13.</b>	6.2	Infectious substances	Any amount
<b>14.</b>	7	Radioactive	Any amount
<b>15.</b>	8	Corrosive substances	5 l or 5 kg
<b>16.</b>	9.1 (in part)	Miscellaneous products or substances, excluding PCB mixtures	50 l or 50 kg
<b>17.</b>	9.2	Environmentally hazardous	1 l or 1 kg
<b>18.</b>	9.3	Dangerous wastes	5 l or 5 kg
<b>19.</b>	9.1 (in part)	PCB mixtures of 5 or more parts per million	0.5 l or 0.5 kg
<b>20.</b>	None	Other contaminants	100 l or 100 kg

# Appendix D: Spill Report Form



Canada

# NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE

TEL: (867) 920-8130

FAX: (867) 873-6924

EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR		REPORT TIME		<input type="checkbox"/> ORIGINAL SPILL REPORT, OR <input type="checkbox"/> UPDATE # _____ TO THE ORIGINAL SPILL REPORT	<b>REPORT NUMBER</b>  _____
	B		OCCURRENCE DATE: MONTH – DAY – YEAR			
C	LAND USE PERMIT NUMBER (IF APPLICABLE)			WATER LICENCE NUMBER (IF APPLICABLE)		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION				REGION <input type="checkbox"/> NWT <input type="checkbox"/> NUNAVUT <input type="checkbox"/> ADJACENT JURISDICTION OR OCEAN	
E	LATITUDE			LONGITUDE		
	DEGREES	MINUTES	SECONDS	DEGREES	MINUTES	SECONDS
F	RESPONSIBLE PARTY OR VESSEL NAME		RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION			
G	ANY CONTRACTOR INVOLVED		CONTRACTOR ADDRESS OR OFFICE LOCATION			
H	PRODUCT SPILLED		QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER		
	SECOND PRODUCT SPILLED (IF APPLICABLE)		QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER		
I	SPILL SOURCE		SPILL CAUSE	AREA OF CONTAMINATION IN SQUARE METRES		
J	FACTORS AFFECTING SPILL OR RECOVERY		DESCRIBE ANY ASSISTANCE REQUIRED	HAZARDS TO PERSONS, PROPERTY OR ENVIRONMENT		
K	ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS					
L	REPORTED TO SPILL LINE BY	POSITION	EMPLOYER	LOCATION CALLING FROM	TELEPHONE	
M	ANY ALTERNATE CONTACT	POSITION	EMPLOYER	ALTERNATE CONTACT LOCATION	ALTERNATE TELEPHONE	
<b>REPORT LINE USE ONLY</b>						
N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130	
LEAD AGENCY <input type="checkbox"/> EC <input type="checkbox"/> CCG <input type="checkbox"/> GNWT <input type="checkbox"/> GN <input type="checkbox"/> ILA <input type="checkbox"/> INAC <input type="checkbox"/> NEB <input type="checkbox"/> TC			SIGNIFICANCE <input type="checkbox"/> MINOR <input type="checkbox"/> MAJOR <input type="checkbox"/> UNKNOWN		FILE STATUS <input type="checkbox"/> OPEN <input type="checkbox"/> CLOSED	
AGENCY		CONTACT NAME	CONTACT TIME	REMARKS		
LEAD AGENCY						
FIRST SUPPORT AGENCY						
SECOND SUPPORT AGENCY						
THIRD SUPPORT AGENCY						