Public Services and Procurement Canada | Services publics et Approvisionnement Canada

Arctic Bay Harbour Development

Project Specific Information Requirements (PSIR)

Submitted to:

Nunavut Impact Review Board
Prairie and Northern Regional Office
29 Mitik Street, PO Box 1360
Cambridge Bay, Nunavut X0B 0C0
http://www.nirb.ca
Tel.: 1-866-233-3033

Submitted by:

Government of Canada - Public Services and Procurement Canada

Fisheries and Oceans Canada – Small Craft Harbours

PSPC No.: R.110729.001

Prepared by:

Advisian-Ikpiaryuk JV
Box 25
Arctic Bay, Nunavut X0A 0A0
Tel.: 604-298-1616

9 August 2021

317071-00037

Advisian Worley Group | Ikpiaryuk Services Ltd.

advisian.com

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Company details

Advisian-Ikpiaryuk JV

Box 25 Arctic Bay,
Nunavut X0A 0A0
Tel: 604-298-1616 | Fax: 604-298-1625

PROJECT: 317071-00037- 00-PM-PMT-0003: Arctic Bay Harbour Development – Project Specific Information Requirements (PSIR)

Rev.	Description	Author	Review	Advisian approval	Revision date
0	Issued for Use	L. Borden / L. Pittman / P. Crompton	V. Burdett-Coutts	H. Kullmann	29-Jul-21
1	Re-issued for Use	L. Borden	V. Burdett-Coutts	H. Kullmann	09-Aug-21

317071-00037-00-PM-PMT-0003_R1.docx

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Abbreviations and Acronyms

Acronym/abbreviation	Definition
ARDP	Archaeological Resource Discovery Plan
AGP	Acid Generating Potential
AIA	Archaeological Impact Assessment
ARD	Acid rock drainage
ATV	All-terrain vehicle
BMPs	Best Management Practices
CAN-EWLAT	Canadian Extreme Water Level Adaptation Tool
CCG	Canadian Coast Guard
CCME	Canadian Council of Ministers of the Environment
CD	Chart datum
CEGEP	Collège d'enseignement général et professionnel (Vocational college)
CEMP	Construction Environmental Management Plan
CEPA	*Canadian Environmental Protection Act*
CGS	Community and Government Services
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
CNWA	*Canadian Navigable Waters Act*
CBD	Convention on Biological Diversity
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
cSEL	Cumulative sound exposure level
CSP	Construction Staging Plan
CWPs	Construction Work Plans
DAS	Disposal at sea
DCH	Department of Culture and Heritage
DFO	Fisheries and Oceans Canada
DFO-SCH	DFO-Small Craft Harbours
DIO	Designated Inuit Organization

Acronym/abbreviation	Definition
DoE	Department of Environment
DoF	Death of Fish
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
ELC	Ecological land classification
EM	Environmental Monitor
ESBAs	Ecologically and Biologically Significant Areas
ESEB	Environmental and Socio-Economic Baseline
ESWG	Ecological Stratification Working Group
EZ	Exclusion Zone
FAA	Fisheries Act Authorization
FFHPP	Fish and Fish Habitat Protection Program
FMP	Fuel Management Plan
FYI	First-Year Ice
GN	Government of Nunavut
HADD	Harmful alteration, disruption or destruction
HF	High-frequency
HHWLT	Higher High Water Large Tide
HHWMT	Higher High Water Mean Tide
HRQ	Haul Road Quarry
HTA	Hunters and Trappers' Association
HSERP	Health and Safety and Emergency Response Plan
HWL	High water line
IAA	*Impact Assessment Act*
IBA	Important Bird Area
IIBA	Inuit Impact and Benefit Agreement
INAC	Indigenous and Northern Affairs Canada
IOL	Inuit Owned Land

Acronym/abbreviation	Definition
IPCC	Intergovernmental Panel on Climate Change
IQ	Inuit Qaujimajatuqangit
IR	Information Request
ISQG	Interim Sediment Quality Guidelines
IUCN	International Union for Conservation of Nature
LF	Low-frequency
LLWLT	Lower Low Water Large Tide
LLWMT	Lower Low Water Mean Tide
LoA	Letter of Advice
LUP	Land Use permit
MBS	Migratory Bird Sanctuaries
MCTS	Marine Communications and Traffic Services
MF	Mid-frequency
ML	Metal leaching
MMO	Marine mammal observers
MP	Monitoring Plan
MSP	Marine Safety Plan
MWL	Mean Water Level
MYI	Multi-Year Ice
NAPS	National Air Pollutant Surveillance
Nauttisqsuqtit	The Guardians
NavCan	NavCanada
NAVWARNS	Navigational Warnings
NBRLUP	North Baffin Regional Land Use Plan
NEAS	Nunavut Eastern Arctic Shipping
NGMP	Nunavut General Monitoring Plan
NHC	Nunavut Housing Corporation
NIRB	Nunavut Impact Review Board

Acronym/abbreviation	Definition
NLCA	Nunavut Land Claims Agreement
NMC	Nunavut Marine Council
NNF	Nanisivik Naval Facility
NO_2	Nitrogen dioxide
NOAA	National Oceanic Atmospheric Administration
NOTAM	Notice to Airmen
NoW	Notice of Works
NOx	Nitrous Oxides
NPC	Nunavut Planning Commission
NPP	Navigation Protection Program
NRCan	Natural Resources Canada
NSIDC	National Snow & Ice Data Center
NSSI	Nunavut Sealink and Supply Inc.
NTI	Nunavut Tunngavik Incorporated
NuPPAA	*Nunavut Planning and Project Assessment Act*
NWB	Nunavut Water Board
NWMB	Nunavut Wildlife Management Board
NWNSRTA	*Nunavut Waters and Nunavut Surface Rights Tribunal Act*
NWT	Northwest Territories
O_3	Ozone
OEMP	Operations Environmental Management Plan
OHWM	Ordinary high water mark
OLWM	Ordinary low water mark
OW	Otariid pinnipeds
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PEL	Probable Effects Level
PM_{10}	Particulate matter 10 micrometres or less

Acronym/abbreviation	Definition
$PM_{2.5}$	Particulate matter less than 2.5 µm
PPD	Petroleum Products Division
PSIR	Project Specific Information Requirement
PSPC	Public Services and Procurement
PTS	Permanent threshold shifts
PW	Phocid pinnipeds
QAA	Quarry Administration Agreement
QARP	Quarry Abandonment and Restoration Plan
QBMP	Quarry and Blast Management Plan
QEC	Qulliq Energy Corporation
QEP	Qualified Environmental Professional
QIA	Qikiqtani Inuit Association
QWB	Qikiqtaaluk Wildlife Board
RA	Regulatory Authorities
RCMP	Royal Canadian Mounted Police
RDL	Reportable detection limit
RFR	Request for Review
RIA	Regional Inuit Associations
Rms	Root mean square pressure
SAP	Sediment analysis program
SAR	Species at Risk
SARA	*Species at Risk Act*
SCH	Small Craft Harbour
SCOPs	Standard code and practices
SDR	Screening Decision Report
SEC	Sediment and erosion control
SO_2	Sulphur dioxide
SRP	Spill Response Plan

Acronym/abbreviation	Definition
TC	Transport Canada
The Project	Arctic Bay SCH
TI NMCA	Tallurutiup Imanga National Marine Conservation Area
TMP	Traffic Management Plan
TSP	Total Suspended Particles
TTS	Temporary threshold shifts
VEC	Valued Ecosystem Component
VHF	Very high frequency
VSEC	Valued Socio-Economic Component
WSCC	Workers' Safety and Compensation Commission

Table of Concordance

This table concordance has been developed to support the screening by the Nunavut Impact Review Board (NIRB) and is informed by this Project Specific Information Requirement (PSIR) report, as well as the Project's Environmental and Socio-Economic Baseline [ESEB] (Advisian-Ikpiaryuk JV 2021d) and Construction Environmental Management Plan (CEMP) (Advisian-Ikpiaryuk JV 2021c)

General Project Information Requirements	Report	Section	Comment
Project Coordinates and Maps			
1. The preferred method for submitting project coordinates information is through the use of a Geographic Information System (GIS) compatible digital file. Although an ESRI ArcView 3.x shape file (in decimal degrees) is the preferred interchange format, the NIRB has the capacity to receive over 100 GIS and CAD related formats, including MapInfo and AutoCAD, provided proper format and projection metadata is also submitted. The NIRB requires coordinates for the project proposal which reflect the entire project area as defined by: a. Area/sites of investigation; b. Boundaries of the foreseen land use permit (LUP)/right-of-way area(s) to be applied for; c. Location of any proposed infrastructure or activity(s); and d. Boundaries of the mineral claim block(s) where proposed activities will be undertaken.	ESEB, CEMP	Figure 1-1	A .kml file has been uploaded to the NIRB portal which depicts the SCH boundaries.
	PSIR	Section 1.1, Figure 1-1	
2. Map of the project site within a regional context indicating the distance to the closest communities.	PSIR	Figure 1-4, Section 1.18	The closest communities to Arctic Bay are Pond Inlet (240 km east) and Resolute (350 km northwest)
3. Map of any camp site including locations of camp facilities.	PSIR	Section 2.2.7	Due to limited available local accommodations, a construction camp may l be required. If additional permits are required (e.g. NWB), these will be the responsibility of the contractor.

General Project Information Requirements	Report	Section	Comment
			The location of the construction camp will be determined by the contractor in consultation with the Hamlet and will be within municipal boundaries.
4. Map of the project site indicating existing and/or proposed infrastructure, proximity to water bodies and proximity to wildlife and wildlife habitat.	ESEB, PSIR, CEMP	Figure 1-2 (schematic layout)	The Project site is not located in close proximity to sensitive wildlife or wildlife habitat. Water bodies near the Project site include Dead Dog Lake (near the planned quarry location), and Adams Sound.
	ESEB	Figure 2-1 (land use)	
		Figure 11-5 (SCH Habitat map)	
		Figure 8-2 (vegetation communities within the HRQ Study Area)	
		Figure 9-1 (wildlife and wildlife features observed or detected during field survey)	
	PSIR	Figure 1-1 (nearby lakes)	
		Figure 6-4 (marine water bodies)	
		Figure 4-1 (land use)	
		Figure 6-3 (SCH drainage ditches)	
Project General Information			
5. Discuss the need and purpose of the proposed project.	PSIR	Section 1.4	The community of Arctic Bay currently does not have a harbour to provide appropriate moorage to existing vessels.

General Project Information Requirements	Report	Section	Comment
6. Discuss alternatives to the project and alternative methods of carrying out the project, including the no-go alternative. Provide justification for the chosen option(s).	PSIR	Section 1.7	The Project is being constructed in the same location as the existing breakwater.
7. Provide a schedule for all project activities.	PSIR	Section 1.13, Table 1-2	Construction is planned to start in the 2022 open-water season and will be operation for summer 2025.
	CEMP	Section 3.3, Table 3-3	
8. List the acts, regulations and guidelines that apply to project activities.	CEMP	Section 2.1,	Construction of the SCH will require federal, territorial, and municipal government permits. The Project has engaged with RAs, Inuit boards and the QIA to confirm compliance with relevant legislation, regulation and BMPs.
	PSIR	Section 5	
		Section 8.1 (best management practices)	
9. List the approvals, permits and licenses required to conduct the project.	PSIR	Section 5.17, Table 5-1	All Project permits and approvals will be in place prior to the start of construction.
	CEMP	Section 2.2, Table 2-1	
Transportation			
10. Describe how the project site will be accessed and how supplies will be brought to site. Provide a map showing access route(s).	PSIR	Section 1.14	It is expected that all supplies will arrive by existing sealift deliveries, therefore a figure of the transit route has not been provided.
11. If a previous airstrip is being used, provide a description of the type of airstrip (ice-strip/all-weather), including its location. Describe dust management procedures (if applicable) and provide a map showing location of airstrip.	N/A	N/A	This is not appliable to the Project. If charter flights are used to transport project personnel or materials, they will utilize the Arctic Bay airport.
12. Describe expected flight altitudes, frequency of flights and anticipated flight routes.	N/A	N/A	
Equipment			
13. Provide a list of equipment required for the project and discuss the uses for the equipment.	PSIR	Section 1.17.1, Table 1-4	The Project will be constructed with land-based equipment and potentially supported with marine-based equipment. The decision will be made by the contractor.
	CEMP	Section 3.5, Table 3-4	

General Project Information Requirements	Report	Section	Comment
14. If possible, provide digital photos of equipment.	PSIR	Photo 1-2	Construction is expected to be performed with land-based equipment, with the potential for marine-based equipment to be determined by the contractor
Water			
15. Describe the location of water source(s), the water intake methods, and all methods employed to prevent fish entrapment. Provide a map showing the water intake locations.	PSIR	Section 1.15	No water withdrawal is planned, as water for construction will be obtained from the existing municipal supply. Should that change, the contractor will be responsible for obtaining the NWB authorization.
16. Describe the estimated rate of water consumption (m^3/day).	PSIR	Section 1.15	Water consumption is estimated to be 5 m^3 per day, for approximately 120 days (per construction season).
17. Describe how waste water will be managed. If relevant, provide detail regarding location of sumps, including capacity of sumps and monitoring.	PSIR	Section 1.16.1	Wastewater will be managed through holding tanks in the in-site sanitary facilities and transported for disposal in the Hamlet's existing sewage lagoon.
18. If applicable, discuss how surface water and underground water will be managed and monitored.	NA	NA	This is not applicable to the Project
Waste Water (Grey water, Sewage, Other)			
19. Describe the quantities, treatment, storage, transportation, and disposal methods for the following (where relevant): – Sewage – Camp grey water – Combustible solid waste – Non-combustible solid waste, including bulky items/scrap metal – Hazardous waste or oil – Contaminated soils/snow – Empty barrels/ fuel drums – Any other waste produced	PSIR	Section 1.16 (waste) Section 1.17.3, Table 1-6 (Chemicals and Hazardous materials)	Estimated quantities of waste are provided in the relevant report sections. Waste will be managed through the Hamlet or stored for appropriate transport to the south.

General Project Information Requirements	Report	Section	Comment
20. If the project proposal includes a landfill or landfarm, indicate the locations on a map, provide the conceptual design parameters, and discuss waste management and contact-water management procedures.	N/A	N/A	This is not applicable to the Project. Waste will be managed through the Hamlet or stored for appropriate transport to the south.
Fuel			
21. Describe the types of fuel, quantities (number of containers, type of containers and capacity of containers), method of storage and containment. Indicate the location on a map where fuel is to be stored, and method of transportation of fuel to project site.	PSIR	Section 1.17.2, Table 1-5 (fuel)	Appropriate measures for the storage and handling of fuel shall be implemented by the contractor. The location for fuel storage will be provided by the contractor.
		Section 1.16.2, Table 1-3 (solid waste)	
		Section 8.3.3 (Spill Prevention and Response Plan (SPRP) CWP)	
22. Describe any secondary containment measures to be employed, including the type of material or system used. If no secondary containment is to be employed, please provide justification.	PSIR	Section 1.17.2	Fuelling will be required near the marine environment during construction, but appropriate measures, including secondary containment, will be in place.
	CEMP	Section 5.4.22 (Hazardous material)	
		Section 5.4.23 (waste management)	
		Section 5.4.24 (SPRP CWP)	
23. Describe the method of fuel transfer and the method of refuelling.	PSIR	Section 1.17.2	Appropriate measures will be in place to confirm that fuelling is performed safely. Fuelling near, on and over water may be required depending on the type of equipment used and ocean conditions (e.g. iced ocean).
		Section 8.3.3 (SPRP CWP)	
	CEMP	Section 5.4.24 (SPRP CWP)	
24. Describe spill control measures in place.	PSIR	Section 8.3.3 (SPRP CWP)	Minimum spill response measures are described in the CEMP, which will form the basis for the Contractors SPRP CWP. Appropriate reporting to relevant Regulatory Authorities (RAs) (e.g. Government of Nunavut Department of Environment (GN
	CEMP	Sections 5.4.24 (SPRP CWP), 5.9.2.2 (reporting)	

General Project Information Requirements	Report	Section	Comment
			DoE)) be undertaken by the contractor's Environmental Monitor (EM).
Chemical and Hazardous Materials			
25. Describe the types, quantities (number of containers, the type of container and capacity of containers), method of storage and containment. Indicate the location on a map where material is to be stored, and method of transportation of materials to project site.	PSIR	Section 1.17.2, Table 1-5 (fuel) Section 1.17.3, Table 1-6 (chemicals and hazardous materials)	Estimated quantities of waste are provided in the relevant report sections. Waste will be managed through the Hamlet or stored for appropriate transport to the south.
26. Describe any secondary containment measures to be employed, including the type of material or system used.	PSIR	Section 1.17.2	Fuelling will be required near the marine environment during construction, but appropriate measures, including secondary containment, will be in place.
	CEMP	Section 5.4.24	
27. Describe the method of chemical transfer.	PSIR	Section 1.17.2, Table 1-5 (fuel)	The contractor will confirm chemicals and quantities that are required, but estimates have been provided in this PSIR. The contractor will provide appropriate storage for the chemicals and will describe transfer methods in the CCEMP (see Section 8.2.2).
		Section 8.3.3 (SPRP CWP)	
		Section 1.17.3, Table 1-6 (chemicals and hazardous materials)	
		Section 8.2.2 (Contractor Construction Environmental Management Plan (CCEMP))	
28. Describe spill control measures in place.	PSIR	Section 8.3.3 (SPRP CWP)	Minimum spill response measures are described in the CEMP, which will form the basis for the contractors SPRP CWP. Appropriate reporting to relevant RAs (e.g. GN DoE) be undertaken by the contractor's EM.
	CEMP	Section 5.4.24 (SPRP CWP)	

General Project Information Requirements	Report	Section	Comment
Workforce and Human Resources/Socio-Economic Impacts			
29. Discuss opportunities for training and employment of local Inuit beneficiaries.	PSIR	Section 1.19	The Project has provided Inuit project personnel from Arctic Bay and Pond Inlet (SmartIce) with employment and training opportunities as wildlife monitors, field technicians, and ice monitoring specialists since the initiation of the environmental and geotechnical baseline data collection and engineering design in 2019. The Project anticipates the community will see further economic benefits and training opportunities with the hiring of local labour, as well as secondary economic benefits.
		Section 3.4, Table 3-2 (employment and training opportunities)	
		Section 7.1.3.1	
	CEMP	Section 5.4.19	
		Section 5.11	
30. Discuss workforce mobilization and schedule, including the duration of work and rotation length, and the transportation of project personnel to site.	PSIR	Section 1.14, Table 1-2	Mobilization to site is planned for the first sealift of 2022 open water season. The work day will be restricted to 12-hour work days and it is expected that construction will be completed in three years with approximately 120 days per season. The project personnel rotation schedule will be determined by the contractor.
	CEMP	Section 3.4, Table 3-3	
31. Discuss, where relevant, any specific hiring policies for Inuit beneficiaries.	PSIR	Section 1.19	Project will comply with the new *Treasury Board Directive on Government Contracts Including Real Property Leases, in the Nunavut Settlement Area* (Government of Canada 2019a).
		Section 3.4, Table 3-2 (employment and training opportunities)	
Public Involvement / Traditional Knowledge			
32. Indicate which communities, groups, or organizations would be affected by this project proposal.	PSIR	Section 3.2	DFO-SCH and PSPC are conducting a comprehensive consultation program to design the Project to serve the needs and priorities of the community including hunters, fishers, recreational users, residents, and businesses. The consultation program has been designed to include input from hunters, trappers,
33. Describe any consultation with interested Parties which has occurred regarding the development of the project proposal.	PSIR	Section 3.3	

General Project Information Requirements	Report	Section	Comment
34. Provide a summary of public involvement measures, a summary of concerns expressed, and strategies employed to address any concerns.	PSIR	Section 3.3, 3.4	fishers, residents, and other community groups and organizations obtained through a variety of methods and materials. The consultation program has been successful in gathering input from community residents, hunters, fishers, and other users of the SCH. The input received resulted in design modifications to meet the needs and priorities of the community. DFO-SCH and PSPC will continue to engage in the community. DFO-SCH and PSPC will provide Project updates and continue to maintain the positive rapport they have built with the community.
35. Describe how traditional knowledge was obtained, and how it has been integrated into the project.	PSIR	Section 4	
36. Discuss future consultation plans.	PSIR	Section 3.5	
Section 2.0 Project Specific Information			
37. The following table identifies the project types identified in Section 3 of the NIRB, Part 1 Form. Please complete all relevant sections. – It is the proponent's responsibility to review all sections in addition to the required sections to ensure a complete application form.			

Section 2, Table 1: Project Type and Information Required

Project Type	Type of Project Proposal	Information Request
1	All-Weather Road/Access Trail	Section A-1 and Section A-2
6	Pits and Quarries	Section C
7	Offshore Infrastructure(port, break water, dock)	Section D

Section	Report	Section	Comment
Section A: Roads/Trails **A.1 Project Information**			
1. Describe any field investigations and the results of field investigations used in selecting the proposed route (e.g. geotechnical, snow pack).	ESEB	Sections 4 – 6, Sections 8 -11, 14	Field surveys were conducted in 2019 (terrestrial, marine, geology, archaeology), 2020 (marine) and 2021 (geotechnical drilling).
2. Provide a conceptual plan of the road, including example road cross-sections and water crossings.	ESEB, PSIR, CEMP	Figure 1-1	The haul road will be an existing road with upgrades as required to facilitate the rock trucks. The installation of culverts, if they are required will be the responsibility of the contractor and will be permitted by the NWB.
3. Discuss the type and volume of traffic using the road/trail (i.e. type of vehicles and cargo and number of trips annually).	PSIR	Section 1.4	The haul road is an existing road and Project related use will largely be haul trucks moving material from the quarry to the harbour.
4. Discuss public access to the road.	PSIR	Sections 2.2.2, 3.4, Table 3-2	The haul road is an existing road and there will be minimal interruptions to public access. The exception to this is the short durations when there is blasting.
5. Describe maintenance procedures.	PSIR	Section 2.2.2 (haul road)	The contractor will be responsible for the maintenance of the haul road during construction.
6. Describe whether any portion of the road will be located outside of the Nunavut Settlement Area and whether any other regulatory requirements must be met (e.g. IAA).	NA	N/A	The Project is exclusively located in Arctic Bay.
A.2 All-Weather Road/Access Trail			
7. Discuss road design considerations for permafrost.	PSIR	Section 2.2.2	The haul road is an existing road which will have minor localized improvements to accommodate construction traffic. There are no concerns for permafrost.
8. Describe the construction materials (type and sources for materials), and the acid rock drainage (ARD) and metal leaching (ML)	PSIR	Section 2.2.1	The haul road is an existing road with minor improvements expected, materials for which will be sourced from existing or the
	ESEB	Section 6.2.2.4	

Section	Report	Section	Comment
characteristics of the construction materials.			new quarry. ARD for the quarry is addressed in Section C No. 16 of this TOC.
9. Discuss construction techniques, including timing for construction activities.	PSIR	Section 1.13 and 2.2.2, Table 1-2	Upgrades to the road in the form of a locally widened surface will be required prior to the start of construction and are expected to occur in 2022.
	CEMP	Section 3.3 and 5.3, Table 3-3	
10. Indicate on a map the locations of designated refuelling areas, water crossings, culverts, and quarries/borrow sources.	PSIR	Section 8.3.3 (SPRP CWP)	The haul route is very short (~2 km) and fueling on the route will not be required. The contractor will be responsible for determining the location for refueling, and water crossings/culverts, should that be required. Refuelling of equipment will occur at the SCH, quarry and contractor laydown area.
11. Identify the proposed traffic speed and measures employed to ensure public safety.	PSIR	Section 7.1.3.3and 8.3.2 (TMP CWP)	A speed limit of 20 km/h will be enforced for the Haul road and traffic management measures will be in place for public safety.
	CEMP	Section 5.4.20	
12. Describe dust management procedures.	PSIR	Section 8.2.2 (CCEMP)	The contractor will be responsible for developing a Sediment and Erosion Control (SEC) plan as part of the MP CWP and will include dust mitigation measures.
	CEMP	Section 5.4.20.2	
Section C: Pits and Quarries			
1. Describe all activities included in this project. – Pitting – Quarrying – Overburden removal – Road use and/or construction (please complete Section A) – Explosives transportation and storage – Work within navigable waters – Blasting – Stockpiling – Crushing – Washing – Other	PSIR	Section 2.2.1 (pits and quarry), Section 2.2.1.1 (drilling and blasting, crushing and screening and stockpiling)	Construction activities for the permanent components of the Project will include infill, dredging and pile driving. Temporary construction activities will include drilling, blasting, crushing and stockpiling from the quarry.
	CEMP	Section 3.2, Table 3-2	

Section	Report	Section	Comment
2. Describe any field investigations and the results of field investigations used in determining new extraction sites.	ESEB	Sections 6, 8 -10, 14	Field surveys were conducted in 2019 (terrestrial, archaeology, geology) and 2021 (geotechnical drilling).
3. Identify any carving stone deposits.	PSIR	Section 3.4, Table 3-2, Figure 4-1	A marble deposit has been identified within the quarry area. The contractor will be required to stockpile sufficient carving stone for local residents to use.
4. Provide a conceptual design including footprint.	ESEB, PSIR, CEMP	Figure 1-2	The GN – Community and Government Services (GN-CGS) are in the planning phase for the development of a Quarry Administration Agreement (QAA) with the Hamlet.
	PSIR	Section 2.2.1, Figure 2-1	
5. Describe the type and volume of material to be extracted.	PSIR	Section 2.2.1 (pits and quarries), Section 2.1.2.1 (aggregates)	A volume of approximately 85, 600 m^3, of bedrock, over an area of 3 ha., will need to be blasted to support construction of the SCH.
6. Describe the depth of overburden.	PSIR	Section 6.4.2	Negligible. The quarry is exposed bedrock.
7. Describe any existing and potential for thermokarst development and any thermokarst prevention measures.	ESEB	Section 6.1.2 (surface features) Section 6.1.4 (permafrost)	Not applicable. The quarry is entirely exposed bedrock and no ice lenses observed in drilling results. Adjacent grassy areas will not have potential for thermokarst development as bedrock is very shallow and the permafrost will not be within what little overburden exists.
	PSIR	Section 6.4.3 (surface features), Section 6.4.4 (ground stability and permafrost)	
8. Describe any existing or potential for flooding and any flood control measures.	PSIR	Sections 6.4.5, 7.1.1.5	There are no concerns for flooding. The area is positively sloped and well draining.
9. Describe any existing or potential for erosion and any erosion control measures.	PSIR	Sections 6.5.9, 7.5.9	The contractor will be responsible for the implementation of an appropriate SEC program.
	CEMP	Section 5.4.9 (SEC)	
10. Describe any existing or potential for sedimentation and any sedimentation control measures.	PSIR	Sections 6.5.9, 7.5.9	There are no existing sedimentation concerns, the contractor will confirm that appropriate measures are in place

Section	Report	Section	Comment
			for in stockpile, blasting and crushing areas.
11. Describe any existing or potential for slumping and any slump control measures.	PSIR	Section 6.4.2, 7.4.2	There are no concerns for slumping at the quarry as it is primarily bedrock.
12. Describe the moisture content of the ground.	PSIR	Section 6.4.3	There is low moisture content as the quarry is exposed bedrock.
13. Describe any evidence of ice lenses.	PSIR	Section 6.4.3	There were no ice lenses observed during the geotechnical drilling program and are not expected in the igneous dyke.
14. If blasting, describe methods employed.	CEMP	Section 3.2, Table 3-2	Not yet known, initial information in CEMP. Methodology with be determined by the contractor.
15. Describe the explosive type(s), hazard class, volumes, uses, location of storage (show on map), and method of storage.	PSIR	Section 8.3.4 (Quarry and Blast Management Plan (QBMP) CWP)	The contractor will be responsible for developing and QBMP.
16. Discuss methods used to determine ARD and ML potential and results.	ESEB	Section 6.2.1 and 6.2.2.4	Surface samples were collected during the feasibility phase of the project and from drill cores during the geotechnical drilling program. Lab results confirm that aggregates are non potentially acid generating.
17. Discuss safety measures for the workforce and the public.	PSIR	Section 8.3.2 (TMP CWP) Section 8.3.5 (Health, Safety and Emergency Response Plan (HSERP) CWP) Section 8.3.1 (Marine Safety Plan, (MSP) CWP) Section 3.4, Table 3-2	Appropriate safety measures will be in place during Project construction.

Section	Report	Section	Comment
Section D: Offshore Infrastructure			
D.1 Mill (this section refers to the SCH)			
1. Describe any field investigations and the results of field investigations used in selecting the site (i.e. aerial surveys, bathymetric surveys, tidal processes, shoreline erosion processes, and geotechnical foundation conditions).	ESEB	Section 4, 5, 11 (marine) Section 8 – 10 (terrestrial) Section 14 (Archeological) Section 6 (Geotechnical)	Field surveys were conducted in 2019 (terrestrial, marine, geology, archaeology), 2020 (marine) and 2021 (geotechnical drilling).
2. Provide a conceptual plan, profile description and drawing(s) a) indicating shoreline, b) facility footprint, c) tidal variations, d) required vessel draft, e) keel offset, f) deck height freeboard.	PSIR	a) and b) Figure 1-2 c) Section 6.4.12 d) Section 1.4 e) and f) NA	The SCH encompasses a permanent footprint that is approximately 35,000 m^2. The seaward extent is 180 m from shore (perpendicular) to a depth range of approximately -12.6 m Chart Datum (CD). The length of the SCH parallel to shore is 320 m.
3. Discuss how anticipated loads on the seabed foundation and on the offloading platform will be incorporated into the design.	PSIR	Section 2.1.2.2	An area underneath the breakwater will be pre-dredged to increase slope stability.
4. Describe how vessels will manoeuvre around the facility. (e.g. pull alongside or in front).	PSIR	Section 1.6	The Project has been designed to consider the specific needs of marine users.
5. Discuss the anticipated life of the facility.	PSIR	Section 1.9	The SCH is expected to be a permanent facility in Arctic Bay with a realistic lifespan of 100+ years.
6. Describe whether part of the facility or project will be located outside of the Nunavut Settlement Area and whether any other regulatory requirements must be met (e.g. *Impact Assessment Act* (IAA)).	Not relevant	NA	The harbour is located in Arctic Bay.

Section	Report	Section	Comment
D.2 Facility Construction			
7. Describe the types of material used for construction (i.e. granular or rock, steel piling or sheet piling, concrete). If material is granular, consider ARD potential, ML potential, percentage of fines, size.	PSIR	Section 2.2.4	The construction of the SCH is expected to require typical harbour materials required for its construction including rocks, steel and electrical components. All materials will be brought from outside of Nunavut other than the rock that will be sourced from the quarry.
8. Describe dredging activities.	PSIR	Section 2.1.2.2	The harbour includes dredging of the entrance channel and 45 m turning circle, adjacent to the fixed wharf, to an elevation of -5.0 m CD. The float area will be dredged to an elevation of -1.5 m.
9. Indicate source of granular or rock material used in construction.	PSIR	Figure 1-1 Section 2.2.1	Rock will be obtained from the quarry.
10. List quantities of the various types of material used in construction.	PSIR	Section 2.2.4	Estimates of materials required are provided, however, final quantities will be decided by the contractor.
11. Describe construction method(s).	PSIR CEMP	Section 2.1.2 Section 3.2, Table 3-2	It is expected that construction will be completed using land-based equipment, however, the Contractor may decide to support with marine-based equipment. Equipment will arrive in Arctic Bay either by sealift.
12. Indicate whether a site engineer will be on-site to inspect construction.			A full-time engineer will be on-site throughout construction.
13. If proposed construction method involves dumping of fill into water, discuss measures for mitigating the release of suspended solids.	PSIR	Section 2.1.2.3 Section 8.2.2 (CCEMP)	Disposal at sea (DAS) may be required and mitigation measures will be detailed in the CCEMP.
D.3 Facility Operation			
14. Describe maintenance activities associated with the facility (e.g. dredging, maintenance to account for potential settlement of facility).	PSIR CEMP	Section 2.1.4, 8.4 Section 3.8	DFO-SCH will be responsible for the operations of the SCH and will develop and implement plans for all aspects of the harbour operations.

Section	Report	Section	Comment
15. Discuss whether the public will have access to the facility(s) and describe public safety measures.	PSIR	Section 1.10	The SCH is a public facility and will not have access restrictions
16. Describe cargo and container handling, transfer and storage facilities.	PSIR	Section 1.3	The sealift cargo is lightered to shore by tugs and barges, brought onshore west of the existing breakwater and in the adjacent areas.
17. Indicate whether fuel will be transferred from barges at this site and describe the method of that fuel transfer.	PSIR	Section 1.17.2, Table 1-5	Barges will not use the harbour.
18. Discuss frequency of use.	PSIR	Section 1.4	The SCH will be used through-out the open-water season.
D.4 Vessel Use in Offshore Infrastructure			
19. Please complete Section H.			
Section 4.0. Description of the Existing Environment			
38. Describe the existing environment, including physical, biological and socioeconomic aspects. Where appropriate, identify local study areas (LSA) and regional study areas (RSA). a. Please note that the detail provided in the description of the existing environment should be appropriate for the type of project proposal and its scope. b. The following is intended as a guide only.	PSIR	Section 6.2, Figure 1-1	No RSA was developed for the Project, as it is expected to be reviewed by NIRB as a Part 4 Screening, not a Part 5 Environmental Assessment. The LSA is considered to be the Study Areas developed for the Project. There are no impacts outside of the LSA as shipping is not an activity.
Physical Environment			
39. Please note that a description of the physical environment is intended to cover all components of a project, including roads/trails, marine routes, etc. that are in existence at present time.	ESEB	Section 7.2 (designated areas) Section 3 (oceanography, ice and weather)	The Project site is located within the TI NMCA designated area, and is in close proximity to IBAs and EBSAs (Victor Bay and Adams Sound).

Section	Report	Section	Comment
a. Proximity to protected areas, including: i. designated environmental areas, including parks; ii. heritage sites; iii. sensitive areas, including all sensitive marine habitat areas; iv. recreational areas; v. sport and commercial fishing areas; vi. breeding, spawning and nursery areas; vii. known migration routes of terrestrial and marine species; viii. marine resources; ix. areas of natural beauty, cultural or historical history; x. protected wildlife areas; and xi. other protected areas. b. Eskers and other unique landscapes (e.g. sand hills, marshes, wetlands, floodplains). c. Evidence of ground, slope or rock instability, seismicity. d. Evidence of thermokarsts. e. Evidence of ice lenses. f. Surface and bedrock geology. g. Topography. h. Permafrost (e.g. stability, depth, thickness, continuity, taliks). i. Sediment and soil quality. j. Hydrology/ limnology (e.g. watershed boundaries, lakes, streams, sediment geochemistry, surface water flow, groundwater flow, flood zones).		Section 6 (geology) Section 14 (Archaeological and culturally significant sites)	
	PSIR	Section 6.4	

Section	Report	Section	Comment
k. Tidal processes and bathymetry in the project area (if applicable). l. Water quality and quantity. m. Air quality. n. Climate conditions and predicted future climate trends. o. Noise levels. p. Other physical Valued Ecosystem Components (VEC) as determined through community consultation and/or literature review.			
Biological Environment			
• Vegetation (terrestrial as well as freshwater and marine where applicable). • Wildlife, including habitat and migration patterns. • Birds, including habitat and migration patterns. • Species of concern as identified by federal or territorial agencies, including any wildlife species listed under the Species at Risk Act (SARA), its critical habitat or the residences of individuals of the species. • Aquatic (freshwater and marine) species, including habitat and migration/spawning patterns. • Other biological VEC as determined through community consultation and/or literature review.	ESEB	Section 7.1 (SAR) Section 8 – 10 (terrestrial vegetation and wildlife, migratory birds) Section 11 – 12 (fish and fish habitat, marine mammals)	The habitat values within the Project Study Areas were generally low to moderate in the marine portions and low in the terrestrial portions. Several Species at Risk (SAR) organisms have the potential to be present in the Study Areas, but the Study Areas do not provide critical habitat requirements for these species.
	PSIR	Section 6.5	
Socio-economic Environment			
• Proximity to communities. • Archaeological and culturally significant sites (e.g. pingos, soap stone quarries) in the project (Local	ESEB	Section 13	There are no archaeologically, paleontologically or culturally significant sites near the Project. Harvesting is Arctic Bay is limited and is primarily fishing near the community and at Victor Bay.
	PSIR	Section 6.6	

Section	Report	Section	Comment
Study Area) and adjacent area (Regional Study Area). • Paleontological component of surface and bedrock geology. • Land and resource use in the area, including subsistence harvesting, tourism, trapping and guiding operations. • Local and regional traffic patterns. • Human Health, broadly defined as a complete state of wellbeing (including physical, social, psychological, and spiritual aspects). • Other Valued Socioeconomic Components (VSEC) as determined through community consultation and/or literature review.			
Section 5.0. Identification of Impacts and Proposed Mitigation Measures			
40. Please complete the attached Table 1 - Identification of Environmental Impacts, taking into consideration the components/activities and project phase(s) identified in Section 4 of this document. Identify impacts in Table 1 as either positive (P), negative and mitigable (M), negative and non-mitigable (N), or unknown (U).	PSIR	Table 7-2, 7.3	With the exception of the loss of seabed footprint due to the construction of the SCH there are no residual effects expected subsequent to the implementation of Project mitigation and monitoring measures. A CEMP has been developed that details measure to be implemented to minimize negative environmental and socio-economic effects associated with the construction phase of the Project. Seabed residual effects will be managed directly with Fisheries and Oceans Canada – Fish and Fish Habitat Program (DFO-FFHPP) during the Fisheries Act Authorization (FAA) process.
	CEMP	Section 4, Table 4-1	
41. Discuss the impacts identified in the above table.	PSIR	Section 7	
42. Discuss potential socioeconomic impacts, including human health.	PSIR	Section 7.1.3	
43. Discuss potential for transboundary effects related to the project.	PSIR	Section 7.5	
44. Identify any potentially adverse effects of the project proposal on species listed under the SARA and their critical habitats or residences, what measures will be taken to avoid or lessen those effects and how the effects will be monitored.	PSIR	Section 7.1.2.6 (construction), Section 7.2.2.6 (operations)	

Section	Report	Section	Comment
45. Discuss proposed measures to mitigate all identified negative impacts.	PSIR	Section 7,	
	CEMP	Sections 5.4 (mitigation), 5.5 (monitoring)	
Section 6.0. Cumulative Effects			
46. A cumulative impact (or effect) can be defined as the impact on the environment that results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions. Cumulative impacts can also result from individually minor but collectively significant actions taking place over a period of time. – Discuss how the effects of this project interact with the effects of relevant past, present and reasonably foreseeable projects in a regional context.	PSIR	Section 7.4	There are two projects nearby to the Project site – Nanisivik Naval Facility (NNF) and QECs new power plant. However, there are no cumulative negative effects on the physical, biological or socio-economic VECs/VSECs expected.
Section 7.0. Supporting Documents			
47. Supporting Documents: – CEMP – ESEB Report – Arctic Bay Harbour Development – Community Consultations (First and Second reports) – Seismic Refraction and Sub-Bottom Profiling Survey Report – Archaeological Impact Assessment (AIA) – Arctic Bay Small Craft Harbour Development – First and Second Consultation Summary Reports – Coastal Processes and Wave Climate Report – Community Consultation Log	PSIR	Section 6.3, Table 6-3	

1 General Project Information Requirements

This document is the Project Specific Information Requirement (PSIR) supplementary report for the Arctic Bay Harbour Development Project (the Project). The purpose is to support the Nunavut Impact Review Board (NIRB) Screening.

1.1 Project Location

The Project is located at Arctic Bay, a Hamlet on the northwest coast of Baffin Island (Borden Peninsula), in Admiralty inlet (73° 1.529'N, 85° 7.203'W) (see Figure 1-1). It is located in the Qikiqtaaluk Region, within the North Baffin Regional Land Use Plan (NBRLUP) area (Nunavut Planning Commission) (NPC 2000b).

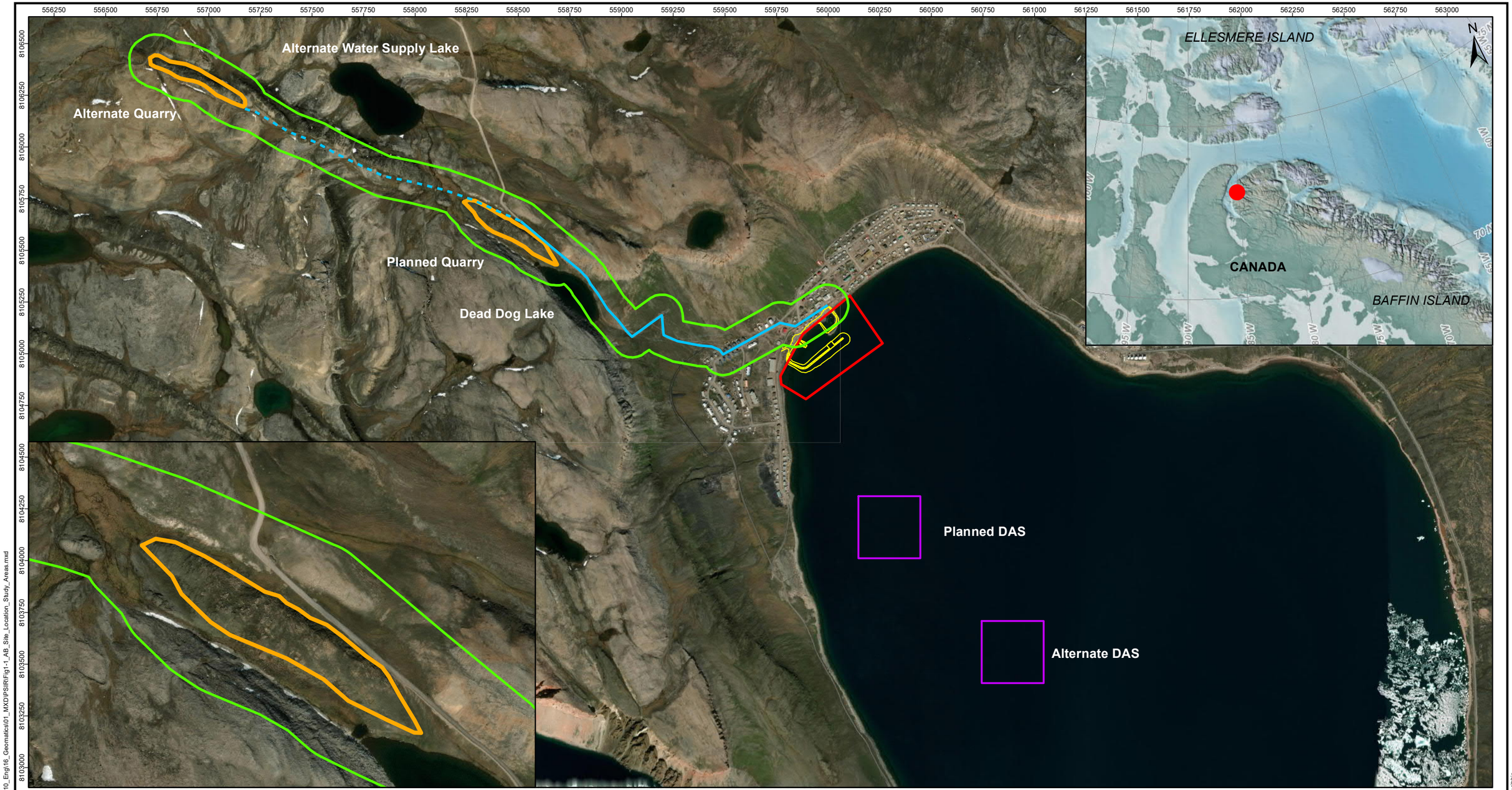
1.2 Project Overview

Fisheries and Oceans Canada – Small Craft Harbours (DFO-SCH) through Public Services and Procurement Canada (PSPC) is developing a small craft harbour (SCH) in the Hamlet of Arctic Bay, Nunavut. The Arctic Bay SCH (the Project) is part of the Inuit Impact and Benefit Agreement (IIBA) (IIBA 2019) negotiated for the Tallurutiup Imanga (Lancaster Sound) National Marine Conservation Area (TI NMCA). The Project will improve safety and access to water, functionality of boating activities, and reduce the congestion and environmental risks associated with the current use of the harbour. The permanent components of the Project include the construction of a new breakwater with fixed wharf, a boat launch ramp, small craft floating docks, laydown area and harbour lighting. The general layout of the SCH is presented in Figure 1-2. Temporary uses during construction include a quarry, haul road, and potentially a disposal at sea (DAS) site. Project components are further described in Section 2.1.1.

Worley Canada Services Ltd. and Ikpiaryuk Services Ltd. in joint venture, operating as Advisian-Ikpiaryuk JV, have been retained by PSPC to perform detailed design, community consultation support, regulatory support, and construction support services for the Project.

Construction is anticipated to commence during the open-water season of 2022 and be completed within three years, prior to the iced-season of 2025. Construction of the Project is being managed by PSPC and DFO-SCH will own, operate, and maintain the SCH.

During construction, the Project will use the existing scheduled sealift deliveries and scheduled flights, with the potential for use of chartered flights when additional cargo or project personnel capacity is required. Fuel, potable water, sanitary and solid waste disposal are anticipated to be provided by via existing facilities. Accommodations for project personnel will be the responsibility of the contractor, and a construction camp may need to be established (described in Section 2.2.7).



Legend

- Site Location
- SCH Footprint
- Haul Road (existing road to planned quarry)
- Potential Haul Road (to alternate quarry if required)

Study Areas

- SCH Study Area
- DAS Study Area
- Quarry Study Area
- Haul Road and Quarry (HRQ) Study Area

Project Study Area = HRQ + SCH Study Areas

0 200 400 800
Metres

1:18,000

WGS 1984 UTM Zone 16N

N

Locations approximate.

FISHERIES AND OCEANS CANADA
SMALL CRAFT HARBOURS
ARCTIC BAY

PROJECT STUDY AREAS AND LOCATION

Date: 30-JUN-21	Drawn by: KR	Edited by: KR	App'd by: VB
Project No. 317071-00037			
FIG No 1-1		REV 0	

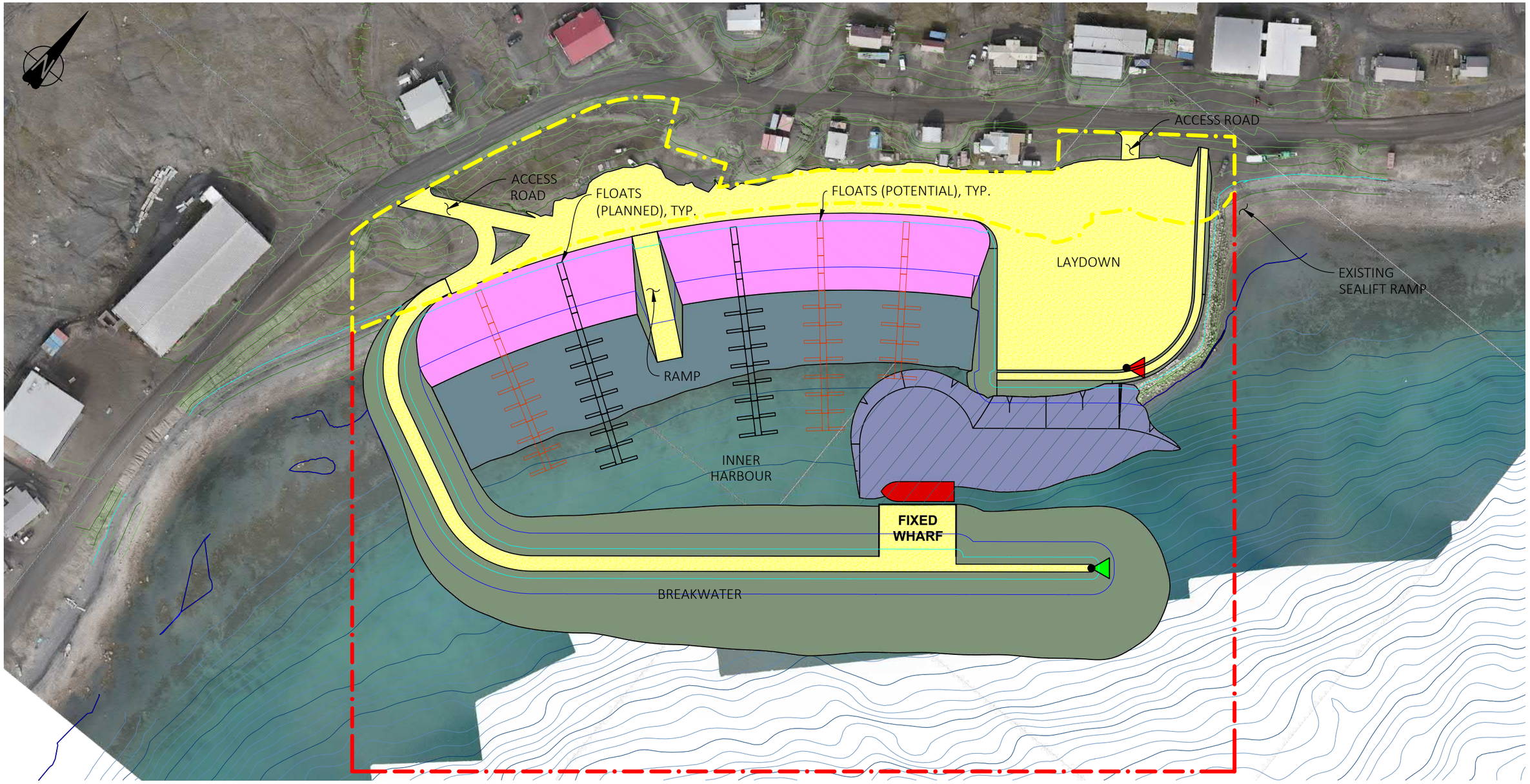
Advisian Ikpiaryuk Services Ltd.

"This drawing is prepared solely for the use of our customers as specified in the accompanying report. Worley Canada Services Ltd. assumes no liability to any other party for any representations contained in this drawing."

FILE LOCATION: U:\YVR\317071\000037_PWGS_ArcBay\CES\10_Engl\6_Geomatics\01_MXD\PSIR\Fig1-1_AB_Site_Location_Study_Areas.mxd

PLOT DATE & TIME: 6/3/2021 10:03:02 AM USER NAME: kenneth.v.richie
SAVE DATE & TIME: 6/3/2021 10:02:48 AM ISSUING OFFICE: BURNABY GIS

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
NOAA Environmental Satellite, Data, & Information Service (NESDIS), National Geophysical Data Center (NGDC), IBCAO, GEBCO



LEGEND:

- BATHYMETRIC CONTOUR (1m INTERVALS)
- BATHYMETRIC CONTOUR (0.5m INTERVALS)
- TOPO CONTOUR (1m INTERVALS)
- TOPO CONTOUR (0.5m INTERVAL)
- GN-CGS LAND TRANSFER
- CIRNAC LAND TRANSFER
- GRAVEL - NON DRIVEABLE
- FILL OR CUT SIDE SLOPE
- GRAVEL - DRIVEABLE
- DREDGE -5m
- DREDGE -1.5m
- NAVIGATION LIGHT

PLAN

1:1500

m 0 10 20 30 40 50 100 m

1:1500

FISHERIES AND OCEANS CANADA
SMALL CRAFT HARBOURS
ARCTIC BAY

GENERAL ARRANGEMENT

Date:	Drawn by:	Edited by:	App'd by:
26-FEB-21	JLC	TJM	VBC

Worley Project No. 317071-00037

FIG No 1-2 | REV 0

Advisian Worley Group | Ikpiaryuk Services Ltd.

USER NAME: aaron.lehtinen
ISSUING OFFICE: VANCOUVER, BC
PLOT DATE & TIME: 8/7/2021 8:45:39 AM
SAVE DATE & TIME: 8/7/2021 8:45:29 AM

FILE LOCATION: U:\YVR\317071\00037_PWGS_ARCBAYCES\11_DRAWINGS\14_ENV_PLANNING\DFO-SUPPL_REP\DWGS\317071-00037_FIG1-2.DWG

1.3 Existing Infrastructure

The existing harbour has one small breakwater (140 m long) providing a semi-sheltered area (0.4 ha) for small craft moorage (see Photo 1-1). During poor weather conditions boats are tied to large boulders on the interior side of the breakwater but are often still exposed to southerly waves that result in vessel damage and equipment loss. The rubble mound breakwater configuration exposes the harbour to waves from the south and south-west causing sediment to build up within the harbour requiring maintenance dredging.

The community is served by Nunavut Eastern Arctic Shipping (NEAS) and Nunavut Sealink and Supply Inc. (NSSI) for annual dry-cargo. The cargo is lightered to shore by tugs and barges that are carried on board the arriving ship. The beach area immediately to the east of the existing breakwater is used as the sealift ramp to offload barges. The Hamlet and the Ikajutit Hunters and Trappers' Association (HTA) have advised that during sealift operations, the area becomes very congested and conflicts exist with the sealift ramp, the adjacent road, access to boats, storage and general safety concerns.

Photo 1-1 Existing Breakwater in Arctic Bay

Source: Advisian, taken September 17, 2020

1.4 SCH Purpose and Vessels (New and Existing)

The Project is designed to serve existing small boat users such as hunters and fishers, outfitters, recreational users, and cruise ship tenders as well as future inshore commercial fisheries.

The construction of a SCH in Arctic Bay is being proposed to:

- Support safe access to the land and sea in the context of rapid environmental changes in the Arctic and in support of community fish and marine mammal harvesting.
- Support the developing inshore and offshore commercial fisheries, ensuring that local fishing operations have access to safe harbours and landing facilities.

The objective of the Project is to improve access and safety for existing users and to provide a safe landing facility for future commercial fisheries. It is acknowledged that the community will continue to grow, likely resulting in increased boaters and cruise and adventurer/pleasure craft traffic to Arctic Bay.

A commercial fishery, should it be developed in the future, is not part of this NIRB screening application.

Two types of vessels are expected to use the facility:

- Small craft are intended to use floating docks located along the shoreline of the harbour. The small craft floats have been designed based on the average size of local vessels, which are 8 m long with a beam of 3 m. Initially, the harbour will have approximately 60 boat slips using two float strings (see Figure 1-2). The harbour has been designed to offer an additional 2 floating wharf strings with the capacity to accommodate 60 boats. Cruise ship tenders are expected to use the boat launch ramp. There is also room to allow anchoring inside the harbour.

- Fishing trawlers and other large vessels are expected to use the fixed wharf. The design vessel for the fixed wharf is based on the fleet of the Arctic Fisheries Alliance that has an overall length of 30 m, beam of 8 m, and draft of 4 m.

1.5 Project Layout

The general layout of the SCH is presented in Figure 1-2. The new harbour will consist of a laydown area to the north and a large breakwater that wraps around the west and south to create a protected harbour. On the leeward side of the breakwater there will be a fixed wharf that includes a dredged berth pocket and approach channel allowing larger boats to access. An expanded laydown area will be located on the north side of the harbour entrance, adjacent to the existing sealift ramp. Initially, two strings of floating docks will be provided for the mooring of small vessels with room for future additional float strings. The area along the shoreline and under the floating docks will also be dredged to increase the water depth. At low tide the harbour will have a water surface area of approximately 2.2 ha, which includes the area for the small craft floats. A boat launch ramp will be located along the shoreline approximately midway between the laydown area and the west portion of the breakwater.

Details of the Project are presented in Section 2. The final arrangement of the SCH may change through the design development phase of the Project as DFO-SCH/PSPC plans to continue consulting with the HTA, Hamlet Council and local residents to refine the Project design.

Rock material used to construct the SCH will be sourced from a new rock quarry. The location of the quarry and proposed haul road are presented in Figure 1-2. Details of the quarry and the haul route are presented in Sections 2.2.1 and 2.2.2 respectively.

1.6 Community Benefits

The Project will improve safe access to water and the functionality of boating activities, reduce congestion, safety concerns, and environmental risks associated with the existing breakwater. Small craft users such as: hunters and fishers, outfitters, recreational users and cruise ship tenders will have safer and protected access to water.

The new breakwater will better protect the harbour from the prevailing winds and waves, which was a safety concern expressed during consultation with the community. The arrangement of the new breakwater with an expanded laydown area will create a much larger protected harbour, allowing for more movement within a sheltered area for kayaks through to larger vessels. The fixed wharf will allow for larger vessel moorage, such as fishing trawlers, and removable floating docks will be provided inside the harbour for smaller vessels. The new boat launch will provide all tide access and ample manoeuvring space on shore. The Project will also improve day-to-day operations and safety for users by providing an expanded laydown area adjacent to the shoreline that is four times larger than what currently exists. This will allow space for parking and provisioning and for separation from sealift operations. Further amenities of the design include an improved shoreline (grading and levelling to create a driving surface) and better lighting, including navigation lights at the harbour entrance.

1.7 Project Alternatives

The selected locations to be used for the project components are discussed in this section. Site selection is determined by a variety of variables which includes environmental, socio-economic, logistical and geological characteristics.

1.7.1 Harbour

The location of the Project was selected as it incorporates the existing breakwater and harbour into the new design, it is centrally located and the community supports the continued operation at its current location. Three preliminary options (Options 1, 2 and 3) were presented to the community in 2019 and 2020 in a feasibility study conducted by DFO-SCH and Advisian (Advisian 2020). Design workshops and community consultations commenced in 2018 and were conducted throughout the feasibility study to discuss the various layouts and associated benefits and disadvantages of each option. Following the study, Option 1 was chosen as the preferred SCH arrangement by the community during consultations conducted by DFO-SCH in February 2020 which included meetings with the Hamlet, HTA, Qikiqtani Inuit Association (QIA) representatives and a public open house (Advisian-Ikpiaryuk JV 2020b, 2021j).

1.7.2 Quarry

Two locations were shortlisted for the quarry (planned and alternate) (see Figure 1-1) based initially on aerial imagery to identify suitable rock types and subsequently after investigating eight locations. The shortlisted options were selected based primarily on quality of surface rock and proximity to the SCH. The

planned quarry location is favourable because it is located closer to the Project site (2 km north) and can be accessed entirely with existing roads that would require only maintenance and minor upgrades to support construction needs.

1.7.3 Haul Road

Although there is an existing road between the quarry and SCH, the Project considered an alternate bypass route suggested by a resident during consultation to avoid impacting certain residences. However, the alternate bypass would require building a new section of road on a steep hillside. Additionally, the distance for the suggested alternate route would be greater and pass in front of nearly the same number of residences. A new road and increased trucking distance would reduce the available funds for the project without a measurable benefit for the community. For these reasons, the alternate bypass route was not considered favourable and the existing road between the quarry and SCH was chosen as the haul road.

1.7.4 Disposal at Sea Site

Disposal at sea (DAS) may be required due to excess dredged materials that cannot be repurposed for other Project components. Two locations were considered for the DAS site based on depth and proximity to the community. The planned DAS site was chosen due its proximity to the SCH and habitat characteristics (see Section 11.2.3.2 of the Project's Environmental and Socio-Economic Baseline [ESEB] (Advisian-Ikpiaryuk JV 2021d) for habitat survey results). Consultation with the community indicated that both DAS sites studied were too deep for seal hunting and that clams and mussels are not harvested in either location. The community is supportive of using the planned DAS site, if required.

1.8 Land Tenure

The land ownership for what will be the SCH currently occupies Crown (below high water line [HWL]) and Municipal, Untitled Municipal (Commissioners Lands). Discussions are underway between DFO-SCH/PSPC and both of the Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) and the Government of Nunavut (GN) Community and Government Services (CGS) lands office for the transfer of administrative control. The ownership boundaries are depicted in Figure 1-2.

1.9 Facility Life

The SCH is expected to be a permanent facility in Arctic Bay with a realistic lifespan of over 100 years. Individual components of the facility will generally be based on services lives from 40 to 75 years, with the exception of the float system which is expected to have a reduced design service life. It is important to note that service life does not imply that maintenance on the structure will not be required during that period. Maintenance and renewal will be required to allow for the continued operation of the SCH over its lifespan.

1.10 Public Access

The SCH will be a public facility for the community and will not have access restrictions.

1.11 Climate Change and Harbour Design

Climate change has been considered in the design of the SCH, including sea level rise, reduced ice cover, and increased storm intensity. Permafrost and its potential degradation is not expected to affect this facility (see Section 6.4.4).

According to climate models developed by the Intergovernmental Panel on Climate Change (IPCC) for the 5th Assessment Report (2014) (IPCC 2014), global sea levels are expected to rise between 0.28 m and 0.98 m by the end of the 21st century. However, this does not account for the 0.32 m to 0.33 m of uplift of the Arctic Bay area as indicated by the Canadian Extreme Water Level Adaptation Tool (CAN-EWLAT) (Bedford Institute of Oceanography 2021). Using the 95th percentile for emissions predicted over a 50-year period, the anticipated global median sea level rise is approximately 0.44 m. To balance the functionality of design with climate change considerations, an allowance of 0.2 m has been incorporated into the design.

As per 30-year averages from 1981 to 2010, the breakup date for Arctic Bay occurs in early July and freezes up in early October (Figure 1-3). Since the increased effects of climate change have been recognized in recent years, the 30-year averages are not necessarily applicable. With global temperatures rising the likelihood of open-water season extending increases. If this occurs, it will potentially expose the SCH infrastructure to the higher frequency of storms seen in October and November. Analysis of wind data shows that the frequency of storms with a wind speed of 15.2 m/s or higher has increased since 2000. The strongest and most frequent storms occur in September through January, with the largest concentration in October and November. This distribution gives warning for a potential increase of severe weather conditions in the context of climate change. This has been incorporated into the design by increasing the open-water season to December while the design storm wave has been taken based on a 1-in 50-year storm event.

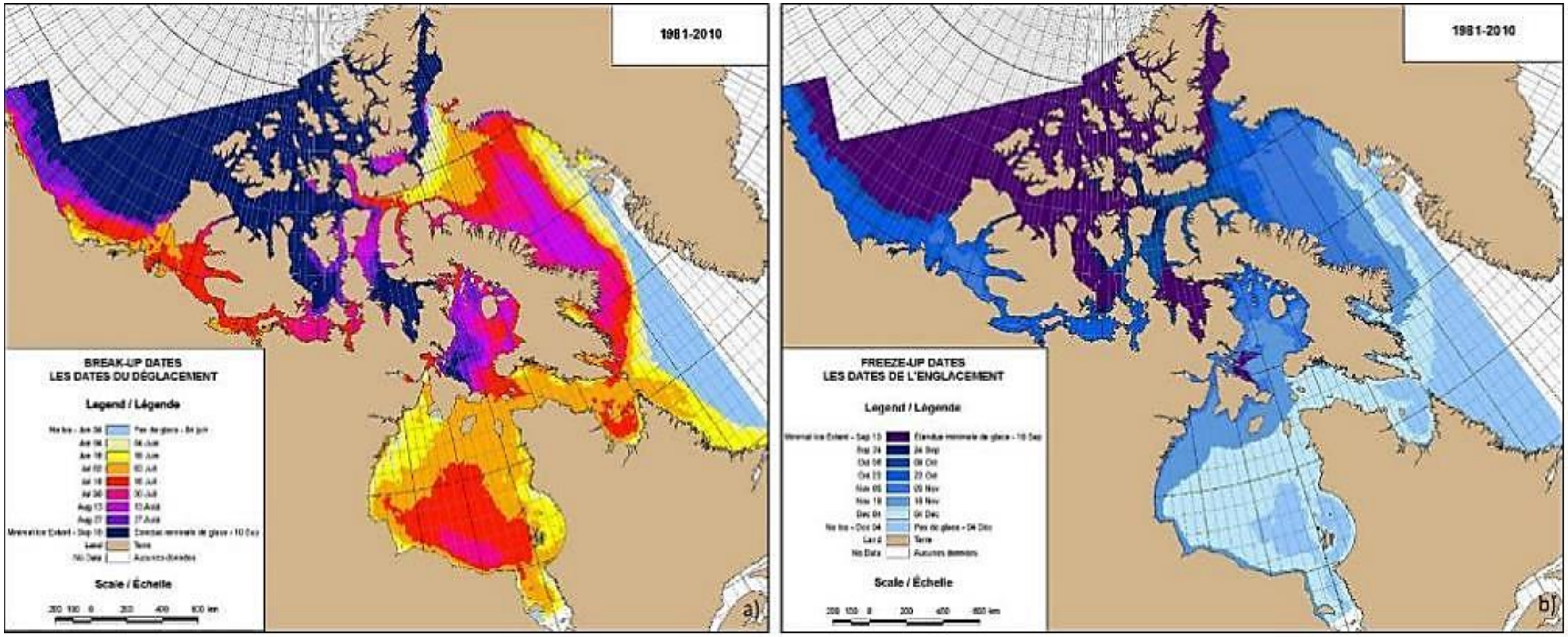


Figure 1-3 30-Year Ice a) Break-up Dates and b) Freeze-up Dates

Source: Government of Canada (2020a)

1.12 Construction Activities

Construction activities to be undertaken are summarized in Table 1-1.

Table 1-1 Construction Activities Associated with the Harbour

Harbour	Pits and Quarry	Haul Road
Infill	Drilling and Blasting	Upgrades to existing road
Pile driving	Crushing and Screening	Installation of culverts (potential)
Dredging	Stockpiling	Transportation of rocks
DAS (potential)	Operation of equipment	Operation of equipment
Installation of small craft floats		
Drainage ditch diversion		
Operation of equipment		

1.13 Project Schedule

Construction is anticipated to be initiated in the open-water season of 2022 and completed within three years. The SCH is expected to be operational in the open-water season of 2025. The anticipated schedule for the SCH construction is provided in Table 1-2. The majority of construction is expected to be completed in open-water seasons, which for Arctic Bay is approximately from early July to late October. The expected number of construction days per season is approximately 120 (see Table 1-7). Project personnel will operate on one 12-hour work shift and there will be no 24-hour operations.

Table 1-2 Anticipated Schedule for the Project

Task	Timeline
Pre-Construction	
• Permitting, Baseline Surveys and Consultations	August 2020 to January 2022
• Schematic Design	August 2020 to January 2021
• Geotechnical Investigations	Spring 2021
• Detailed Design and Construction Documents Preparation	February 2021 to September 2021
• Permitting Complete	December 2021
• Construction Tender Period	Spring 2022
• Construction Contract Tender Period	Spring 2022
• Award of Construction Contract	April 2022

Task	Timeline
Construction	
• Mobilization of equipment and supplies • Set up construction camp and equipment maintenance facilities, as required • Prepare quarry and commence blasting for aggregate production and stockpile pads. • Set up crusher and complete test runs. • Commence placement of breakwater core.	2022 Construction season
• Aggregate production • Breakwater core and armour placement • Wharf construction including topsides • Dredging and onshore disposal • Partial demobilization	2023 Construction season
• Complete breakwater armour surfacing. • SCH floats, including installation and removal demonstration • Final grading and compaction • Electrical installations • Remainder of demobilization	2024 Construction season
Operations	
• Harbour operations	September 2025

1.14 Transportation (Mobilization and Demobilization)

Mobilization to site will commence with the sealift of the 2022 season, which typically arrives in Arctic Bay at the end of August or early September. For the first year of construction, mobilization will include equipment mainly for quarrying and earthworks, sheet piles, construction camp and miscellaneous construction consumables. At the end of the construction seasons, the site will be prepped for overwintering and the main construction equipment is expected to remain on site. Planning must take into consideration the timing of the sealifts and the materials and equipment that will be needed for the upcoming construction seasons. As tasks are completed and equipment is no longer needed, equipment will be demobilized from site and returned to the south via sealift.

Equipment mobilization and demobilization will be undertaken by the contractor. The majority of the materials and equipment required for the construction for the Project will arrive on the annual sealift provided by NEAS and NSSI.

Marine-based equipment, depending on size may arrive by sea.

Project personnel travelling to the site will use air travel and arrive either on regularly scheduled commercial flights or on private charter flights if required.

1.15 Water Sources and Consumption

Water for construction use will be obtained from the existing water supply infrastructure in Arctic Bay. It is anticipated that water will be delivered by a local contracted water truck, or the contractor's own water truck. If the local water supply is unable to meet the water needs of the community, the contractor will be responsible for the appropriate permitting from the NWB.

Estimated water use during construction is only 5 m^3 per day, for approximately 120 days (per season) during construction.. Water for construction use is anticipated to be the following:

- Dust suppression
- Drinking water and sanitary facilities
- Earthworks (for compaction if necessary)
- Cleaning of equipment

Water use for the construction camp will be managed by the contractor either through discussions with the Hamlet for provision from the municipal supply or through a NWB authorization if the contractor is required to obtain their own supply. There is an additional approximately 5 m^3 per day on average to support southern construction crews, whether in a camp, hotel, or local houses.

During operation of the SCH, there will be no water supply facilities. Water usage by facility users is not expected to vary from the current operations.

1.16 Waste Management

Wastewater management estimated volumes consider the construction sites and the construction camp.

1.16.1 Wastewater

The anticipated total wastewater produced for the Project is expected to be approximately 1,000 m^3, including both sewage (human waste) and grey water. Wastewater will be managed through holding tanks in the sanitary facilities for the construction site(s) and construction camp and will be transported by either the Hamlet's sewage truck or the contractor's own sewage truck and disposed of in the Hamlet's sewage lagoon.

During operation of the SCH, there will be no wastewater reception. Users of the facility will manage wastewater on their boats as per current operations.

1.16.2 Solid Waste

Solid waste generated during construction is anticipated to be disposed of using the existing municipal facility in the Hamlet. Table 1-3 presents the estimated solid waste generated during Project construction.

Table 1-3 Estimated Solid Waste Production

Type of waste	Anticipated Waste	Projected amount generated	Method of Disposal
Combustible wastes	Food waste, wood crating/packaging, cardboard and paper, plastics	5 tons	Hamlet landfill
Non-Combustible wastes	Scrap steel, glass	1 ton	Hamlet landfill
Overburden	Organic soil, unsuitable fill material	Negligible	What little overburden exists at the quarry will be set aside and stockpiled at the quarry
Hazardous waste	Waste oil/grease, batteries, antifreeze, contaminated soils	2,000 litres	Returned to south in sealed drums or lined bags, transported in 20' shipping containers and disposed in accordance with regulatory procedures.

1.17 Materials Use

1.17.1 Equipment

It is expected that construction will be completed using land-based equipment, however, the contractor may decide to support with marine-based equipment. Equipment will arrive in Arctic Bay by sealift.

The anticipated construction equipment for the Project is as outlined in Table 1-4 with example equipment in Photo 1-1.

Table 1-4 Anticipated Construction Equipment

Equipment Type and Number	Size	Use
Drills – 2 to 3	5 tons	Quarrying
Excavators – 3 to 4	30 to 40 ton	Quarrying, handling armour stone, loading trucks, excavating
Trucks – 4 to 5	35 to 40 ton articulating	Hauling quarried rock
Transport Trucks	Heavy Duty (off-road capable tractor and trailer (40 tons)	Moving materials and equipment onsite
Front end loader – 2 to 3	966 to 988	Loading rock and moving cargo/equipment
Compactor – 1	20 ton	Compacting road surfacing
Dozer – 1	D8	placing rock and road surfaces
Grader – 1	140	Road maintenance, final grading

Equipment Type and Number	Size	Use
Spud barge/derrick– 1	20 m x 50 m deck w/ 150t to 250t crane	Dredging, sheet pile installation, moving/lifting materials and equipment
Dump scows – 2 to 3	150 to 500 cubic metre	Dredging and DAS
Tug – 1	1,000 – 1,500 horsepower	Mobilization and floating equipment movement
Work boats – 1 to 2	Varies, 50 to 500 horsepower	Floating equipment movement
Pickup trucks – 5	Crew cab, ¾ ton	Crew and supplies movement
Mini-bus – 1	15 passenger	Daily crew mobilization from accommodation to Project site
Fuel/service truck – 1	10 ton	Daily refueling and servicing of major mobile equipment, fueled from GN - Petroleum Products Division (PPD) dispensers in Arctic Bay.
Water truck – 1	10 ton	Construction, dust suppression, and miscellaneous water
Telehandler – 1	5 ton	Moving materials and equipment
Rough terrain crane – 1	80 ton	Lifting materials
Vibro/Impact Hammer – 1	---	Installing sheet piles
Rock Crusher – 1	---	Crushing run of quarry materials

Photo 1-2 Representative Construction Equipment: a) Drill Rig; b) Excavator; c) Rock Truck; d) Crusher

1.17.2 Fuel

Based on recent conversations with the PPD and the Hamlet, the community's current fuel storage capacity is likely insufficient to support the Project's construction fuel needs. The Project is engaging with PPD to coordinate multiple fuel shipments to support both community and construction requirements. Currently, the Taqqut Co-op is contracted by PPD to deliver fuel to the community. If multiple fuel shipments become impractical, the contractor will be required to supply temporary double-wall fuel tanks for Project fuel storage during construction.

Appropriate measures will be in place for the use and storage of fuel, which will be outlined in the Spill Prevention and Response Plan (SPRP)Construction Work Plan (CWP) (Section,8.3.3). Estimated fuel consumption during construction for the Project is outlined in Table 1-5. Designated fuelling areas will be established in the laydown area. Fuelling will be required near the marine environment as the SCH is constructed. If construction occurs in the iced season or with marine-based equipment, refuelling will be required on or over water.

Table 1-5 Estimated Fuel Consumption During Construction

Fuel	Number of Containers and Capacity	Total Amount of Fuel (in Litres)	Proposed Storage Methods	Proposed Use
Diesel	N/A	1,500,000	Supplied by the PPD and dispensed from existing facilities in the Hamlet or from double-wall storage tanks supplied by the contractor.	Mobile equipment, remote generators, and heaters
Gasoline	N/A	15,000	Supplied by the PPD and dispensed from existing facilities in the Hamlet.	Mobile equipment, remote generators, and heaters
Propane	20 - 50kg tanks	20 to 30 litres per tank	Appropriate storage, such as a metal cylinder rack, will be arranged by the contractor	Heaters

1.17.3 Chemicals and Hazardous Materials

Anticipated chemical or hazardous materials required for the SCH construction is provided in Table 1-6.

Table 1-6 Chemicals and Hazardous Materials Expected to be Required During Construction

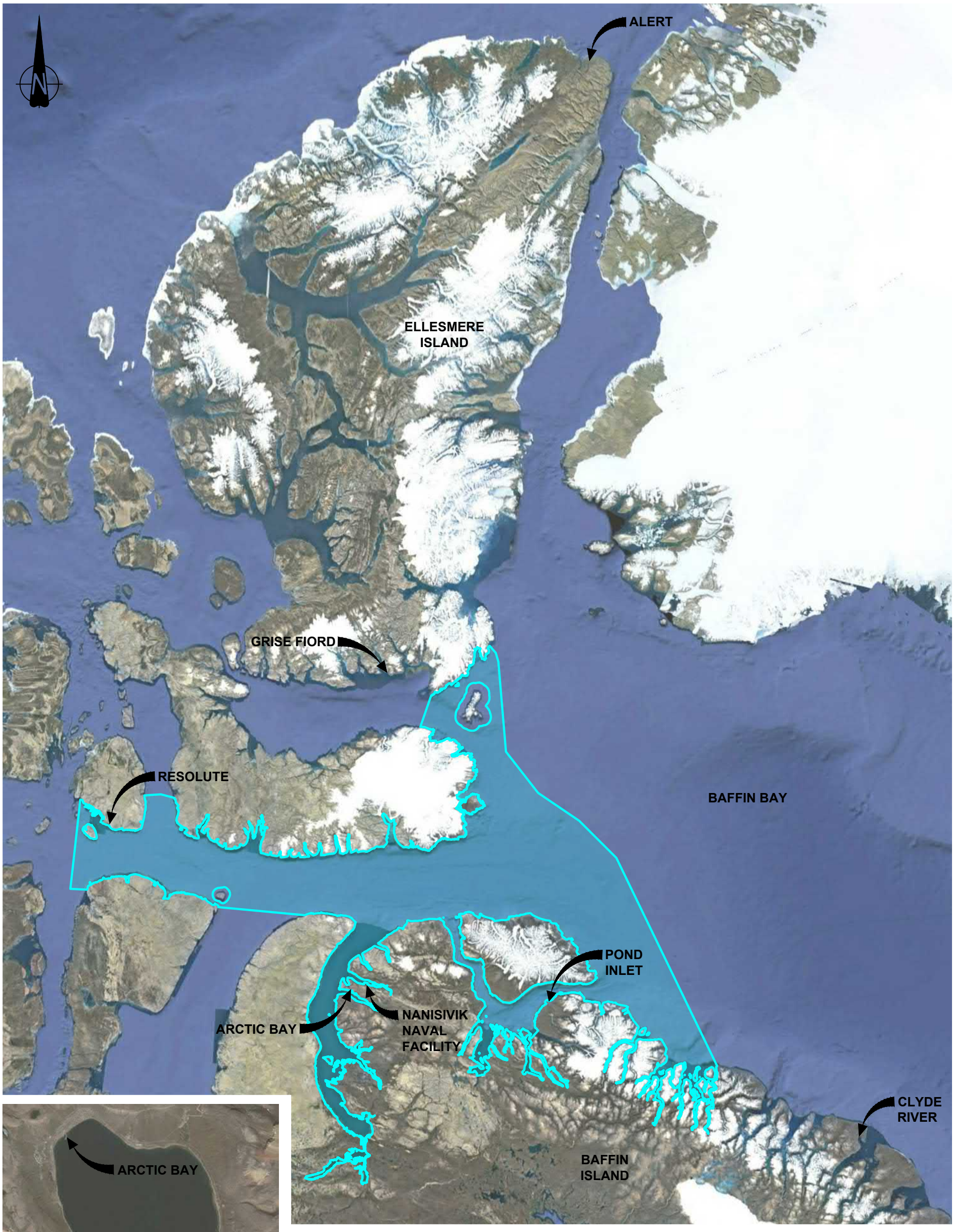
Hazardous Materials and Chemicals	Number of Containers and Capacity	Total Amount of Hazardous Materials and Chemicals (in Litres)	Proposed Storage Methods	Proposed Use
Lube and oils	Lube and oils	10 drums, and 10 5-gallon pails	Drums on pallets, in lined storage area	Maintenance of mobile equipment
Oxy/Acetylene	10 each, 140 cu.ft. cylinders		Forklift-able metal cylinder rack	Welding and cutting of steel
Paint	10 1-gallon cans	40 litres	Inside fireproof cabinets, stored inside heated enclosure	Painting wharf hardware and miscellaneous components
Explosives	Standard explosives and magazines	40 tonnes	Certified explosives magazine	Quarrying

1.18 Nearby Communities and Protected Areas

The closest communities to Arctic Bay are Pond Inlet and Resolute which are 240 km east and 350 km northwest, respectively. The Nanisivik Naval Facility (NNF) to the east is connected to Arctic Bay by a 32 km road. The TI NMCA borders Arctic Bay at the harbour entrance (see Figure 1-4).

FILE LOCATION: U:\YVR\317071\00037_PWGS_ARCBAYCES\11_DRAWINGS\15_I_AND_E\02_MARINE\FIGURES\317071-00037_FIG1-3.DWG

PLOT DATE & TIME: 4/3/2021 11:19:20 AM
SAVE DATE & TIME: 4/3/2021 11:18:38 AM
USER NAME: jennifer.coppendale
ISSUING OFFICE: VANCOUVER_BC



LEGEND:

TALLURUTIUP IMANGA NATIONAL MARINE CONSERVATION AREA

DISTANCE TO ARCTIC BAY

LOCATION		DISTANCE (km)	DIRECTION
COMMUNITY	OTHER		
ALERT	-	1,166	N
CLYDE RIVER	-	642	S/E
GRISE FIORD	-	383	N
-	NANISIVIK NAVAL FACILITY	20	E
POND INLET	-	240	E
RESOLUTE	-	352	N/W

FISHERIES AND OCEANS CANADA
SMALL CRAFT HARBOURS
ARCTIC BAY

COMMUNITIES AND OTHER SITES IN PROXIMITY TO ARCTIC BAY

Date: 26-FEB-2021	Drawn by: JLC	Edited by: JLC	App'd by: VBC

Advisian
Ikpiarjuk Services Ltd.

Worley Project No. 317071-00037

FIG No 1-4

REV A

WPL_B_Enviro

1.19 Workforce and Human Resources

The Project does not require a large construction workforce as activity will be restricted to a 12-hour day shift. Approximately 30 project personnel are expected to be required. It is expected that each construction season will be 120 days, and three construction seasons will be required to complete the Project (see Table 1-7).

The workforce will be comprised of skilled and semi-skilled labour including the following: heavy equipment operator; truck driver, driller, blaster, crane operator; welder; marine deckhand; tug operator; mechanic; electrician; and general labourers. Work rotations for non-local labour are presently unknown but will be determined by the contractor and will comply with all applicable Workers Safety and Compensation Commission (WSCC) regulations (WSCC 2021).

The Project will comply with the new Treasury Board *Directive on Government Contracts Including Real Property Leases, in the Nunavut Settlement Area* (Government of Canada 2019a) and aims to maximize participation of Inuit labour, training and Inuit owned businesses on the Project.

The Project has provided Inuit project personnel from Arctic Bay and Pond Inlet (SmartIce) with employment and training opportunities as wildlife monitors, field technicians, and ice monitoring specialists since the initiation of the environmental and geotechnical baseline data collection and engineering design in 2019.

The Project anticipates the community will see further economic benefits and training opportunities with the hiring of local labour. In addition, there will be secondary economic benefits through the Project's expenditures in local businesses.

The Project is expected to rely on scheduled flights for personnel but may need to use chartered flights, as required, to avoid the Project filling seats on scheduled flights that the community depends on. Due to limited available local accommodations, a construction camp may be required (see Section 2.2.7).

Table 1-7 Personnel Numbers per Construction Season and Total for Project

Shift Type	Total Number of Personnel	Total Number of Days on Site per Season	Total number of Person Days per Season	Number of Seasons	Total Number of Construction Days	Total number of Person days
12 – hour	30	120	3600	2.5	300	9,000

1.20 Proponent Information

DFO-SCH through PSPC are planning the construction of an SCH in the Hamlet of Arctic Bay, Nunavut. Operation of the SCH will be the responsibility of DFO-SCH.

Contact information is provided in Table 1-8.

Table 1-8 Project Contact Details

Contact Category	Contact Details
Name of Proponent Contact / Primary Contact	Eleanor McEwan, Senior Project Engineer
Proponent Mailing Address	Fisheries and Oceans Canada, Small Craft Harbour 501 University Crescent Winnipeg, MB R3T 2N6 Telephone: 204-984-1102 Fax: 204-983-7166 Email: Eleanor.McEwan@dfo-mpa.gc.ca
Name of Consultant	Victoria Burdett-Coutts, Marine Biologist and Regulatory Lead, M.Sc., R.P.Bio.
Consultant Mailing Address	Suite 200 -2930 Virtual Way Vancouver, British Columbia V5M 0A5 Office: 778-945-5501 Mobile: 778-839-2372 Fax: 604-298-1625 Email: Victoria.Coutts@advisian.com

2 Project Specific Information (Works, Undertakings and Activities)

2.1 Harbour (Offshore Infrastructure)

The SCH encompasses a permanent footprint that is approximately 35,000 m^2. The seaward extent is 180 m from shore (perpendicular) to a depth range of approximately -12.6 m CD. The length of the SCH parallel to shore is 320 m (see layout in Figure 1-2). A description of the field activities already undertaken at the SCH is provided in the ESEB (Advisian-Ikpiaryuk JV 2021d).

2.1.1 Components

2.1.1.1 Site Access

The site has two vehicle access points. One is located at the east end of the site where vehicles turn off the existing road onto the laydown area. The other access is to the west where the road turns down the hill onto the site and gives direct access onto the breakwater or to the shoreline where the boat launching ramp is located. The shoreline between the breakwater and the laydown area will be filled and graded to create a uniform and level driving surface above high water.

2.1.1.2 Laydown Area

The laydown area is located at the east end of the Project site adjacent to the harbour entrance. The top surface is approximately 0.6 ha and will be used for parking, boat storage, cargo storage, and a sealift laydown area. It will incorporate a portion of the existing breakwater. One navigation light will be placed on the laydown area at the entrance to the harbour.

2.1.1.3 Breakwater

Approximately 220 m west of the laydown area, the breakwater stems south from the shoreline for approximately 100 m before turning east and extending parallel to the shoreline. The breakwater will have a 6 m wide driving surface to allow for vehicle access along the first 300 m of its length. The total breakwater length is approximately 350 m long. A second navigation light will be located at the offshore end of the breakwater.

2.1.1.4 Fixed Wharf

The fixed wharf is a steel sheet pile structure. The total length of the wharf is approximately 40 m long. It is located on the lee side of the breakwater approximately 60 m from the end. Topsides include mooring cleats, ladders, electrical services, lighting and a bull rail.

2.1.1.5 Boat Launching Ramp

A 10 m wide boat launch is located midway along the beach between the breakwater and the laydown area. The ramp will allow for boat launching at all tide levels with adequate space on shore for vehicle and trailer manoeuvrability.

2.1.1.6 Floating Docks

When first operational, the harbour allows for the moorage of approximately 60 boats on two strings of floating docks, 2.4 m wide and 80 m long. When demand and usage increases, the harbour has space for at least and additional 60 boats.

2.1.1.7 Entrance Channel and Dredging

A 30 m wide entrance channel is located on the east side of the site, between the breakwater and the laydown area. The channel leads to a 45 m diameter turning circle located adjacent to the fixed wharf. Both the entrance channel and the turning circle will be dredged to an elevation of -5.0 m CD. This will be the deepest part of the harbour. The harbour, under the float strings and along the shoreline will be dredged to -1.5 m CD.

2.1.1.8 Temporary Rock Platforms

Temporary rock platforms may be required to support construction if construction is performed with land-based equipment. Temporary infills, if required, are likely to be composed of a rock material and will be restricted to the dredge pocket footprints. Once removed, the fill will be repurposed, most likely to be used to complete the laydown area and other permanent components of the Project. The requirement for temporary infills, their composition, and where the fill is repurposed to will be a decision made by the contractor. Temporarily infills will be discussed with DFO- Fish and Fish habitat Protection Program (FFHPP) and will be required to stay within dredge pocket footprints.

2.1.2 Construction Activities

Construction activities for the SCH are described in this section.

Construction at the SCH will be carried out with mainly land-based equipment. The contractor may elect to complete some works with floating equipment. The majority of construction will be done during the open-water season. Construction planned during the shoulder seasons will require ice management to confirm ice is not buried under the breakwater construction material.

The contractor may wish to complete some, generally non-disruptive, work at night. This may be limited to incidental low-tide work at the harbour (most likely related to the wharf construction) and crushing and/or sorting of rock at the quarry. Such work extensions would proceed only after consulting with the community and obtaining approval from the Hamlet.

2.1.2.1 Aggregates

Generally, the aggregates will be produced from the quarry approximately 2 km away from the SCH. The materials will include run-of-quarry (bulk fill), large diameter armour stone, and crushed aggregates for driving surfaces, subbase and filter layers.

Laydown area

The primary fill for the laydown area is expected to be dredged sediments from the entrance channel and float area. Prior to dredging, a containment berm will be constructed to contain the sediments.

The dredged sediments will be placed inside the bermed area and a crushed granular road structure will be placed on top to provide a suitable driving surface.

Shoreline

The upland shoreline between the breakwater and the laydown area will be raised and graded to create a level driving surface. The driving surface will be composed of crushed granular aggregates/rock. Along the offshore edge, a coarser crushed aggregate/rockfill will be placed to gently slope towards the water at 6H:1V to create a landing pad for the floating docks.

Breakwater

The breakwater core will be comprised of a coarse run-of-quarry and the interior and exterior side slopes will be covered by rock armour. The road along the top of the structure will be finished with a crushed granular aggregate/rock driving surface.

Boat launch ramp

The boat launch ramp will be comprised of a run-of-quarry fill and will be finished with a crushed coarse granular road surface.

Fixed Wharf

The steel sheet pile structure will be filled with a coarse crushed quarry rock and topped with a granular road surfacing.

2.1.2.2 Dredging

The harbour includes dredging of the entrance channel and 45 m diameter turning circle, adjacent to the fixed wharf, to an elevation of -5.0 m CD. The area underneath of the floating docks will be dredged to an elevation of -1.5 m. This will result in the removal of approximately 20,000 m^3 of sediment. Dredgeate will be repurposed as fill for the laydown area, disposed of upland as agreed with the Hamlet and/or disposed at sea if required (permitted through Environment and Climate Change Canada [ECCC] [see Table 5-1]).

The contractor will determine whether dredging is conducted with a land or marine-based equipment. Based on the volume of dredging required and the location of the work, it is expected that dredging will be completed using conventional mechanical equipment such as a clamshell bucket. Material will be

dredged from the seabed, raised to the surface and placed either into a rock truck if disposing of the dredgeate on land or onto a sealed scow if it will be disposed of at sea.

Selected sections below the breakwater will be dredged to remove soft sediments and re-purposed as ballast on the seaward side of the breakwater to increase stability.

Dredging of shallow areas are likely to be dredged with land-based equipment using temporary fill placed in the water to use as a working platform above water level and removed as dredging is completed.

2.1.2.3 Disposal at Sea

The distance between the SCH and the planned DAS site is 500 m. Marine-based equipment will be required should DAS be needed. The contractor is expected to load dredged sediments directly into dump scows which will be towed to the DAS site using small tugs. The number of trips required, would depend on the volume being disposed of. A preliminary sediment analysis program (SAP) has been completed and approved by ECCC (Advisian-Ikpiaryuk JV 2020a). Should DAS be required, an application for approval will be submitted to ECCC.

2.1.2.4 Pile Driving

The fixed wharf is anticipated to be a steel sheet pile structure filled with crushed rock produced from the quarry. Whether piles are installed with marine- or land-based equipment will be determined by the contractor. Pile driving will be performed with either a vibratory or an impact hammer. The acoustic monitoring requirements for these two types of pile driving will be stipulated in the Fisheries Act Authorization (FAA) to be issued by DFO-FFHPP.

2.1.2.5 Installation of Small Craft Floating Docks

The floating docks will be standard float design provided by DFO-SCH and assembled with the support of the community. The docks will be secured with a chain anchoring system with anchor blocks on the seabed and a recessed concrete abutment at the shoreline. The docks will be removed prior to freeze up and stored above high water, then redeployed for the open-water season following ice breakup and clearing of the harbour.

2.1.2.6 Local Drainage

There are six culverts crossing the adjacent road that drain onto the SCH property. A drainage ditch will be run along the upland side of the property to collect the runoff and around the harbour discharge. Culverts will be placed under the access road (see Figure 6-3).

2.1.3 Area lighting and Electrical

General area lighting will illuminate the fixed wharf working surface, laydown area, boat launch ramp (top only), the breakwater roadway and the access roads. The area lights and poles will be provided from Quilliq Energy Corporation (QEC).

Two hard-wired navigation lights will be located at the harbour entrance, one on the breakwater supported on its own foundation, and one on the laydown area located on a QEC pole. These lights are proposed to be LED, with a two nautical miles range. Transport Canada (TC) will review the application in the Notice of Works Approval (NoW) and confirm approval (see Table 5-1).

Two power pedestals will be located on the fixed wharf, providing power for boat operations.

2.1.4 Operations

The Operations Plan of the SCH will be developed by DFO-SCH in concert with the local harbour committee that is being set up to function as the interface between DFO-SCH and the users.

The general maintenance and operations activities of the SCH are expected to include the following:

- Establish the harbour authority to support the administration of the harbour. The harbour is a non-profit organization that will be composed of local community members, members of the HTA and Hamlet Council that will be dedicated to managing the harbour. The harbour authority will appoint a representative that will be the local point of contact for the users in the event of concerns or disputes develop and would monitor users. The contact is also expected to be the interface with sealift companies to secure laydown area for incoming cargo.
- Annual inspections of the harbour components
- Spring clearing of culvert inlets and outlets of drifted snow.
- Deployment and recovery of the floating docks. It is expected that the floating docks will be stored on the laydown area or the shoreline adjacent to the launch ramp.
- Periodic sounding surveys to confirm there are no locations of accumulating sediments or boulders deposited by shifting ice.
- The regular maintenance is expected to be as follows:
  - Re-grading/compaction of the road surfaces and laydown areas.
  - Re-grading/compaction of the boat launching ramp.
  - Periodic replacement of float components, including chains, hinges, sleepers and deck.
  - Periodic re-dressing of riprap surface where rocks may have been plucked by ice.

An Operations Environmental Management Plan (OEMP) will be prepared with further information provided in Section 8.4.

The Canadian Coast Guard (CCG) spill response seacans are expected to be relocated to the laydown area for better deployment and permanent storage.

2.1.5 Decommissioning

The SCH is considered a permanent structure with no plans for decommissioning.

2.2 Other Components

Other components of the Project include the quarry, the haul route planned for the trucking of aggregates from the quarry to the harbour, and locations of temporary storage and facilities. A description of the field activities undertaken at the quarry and haul road is provided in the ESEB (Advisian-Ikpiaryuk JV 2021d).

2.2.1 Pits and Quarry

The proposed quarry is located directly adjacent to the road that connects Arctic Bay and Victor Bay and is approximately 2 km from the SCH (see location in Figure 1-1) and is located within the Hamlet boundaries. Assessment from the 2019 field program shows the location is an outcropping of a igneous dyke. The igneous dyke is located on the west side of the road, with sufficient room for aggregate stockpiles in the surrounding area. Drilling work and laboratory testing of samples confirm the rock is suitable and highly durable for use in breakwater construction and other uses and is absent of Acid Rock Drainage (ARD) potential.

The Hamlet has approved the quarry and GN-CGS Planning and Lands has prepared the quarry administration agreement (QAA) (described in Section 5.4.2). A legal survey and registering of the quarry limits is underway (see Figure 2-1). GN-CGS has allowed for space for stockpiling within the quarry limits and accepted stockpiling outside the quarry limits.

The contractor will drill and blast the igneous dyke to create all the rock quantities for the Project. Required quantities and the size of the quarry are discussed in Section 2.2.4. The blasted rock will be sorted, crushed and/or screened and stockpiled to produce the various products.

All quarry activities will be undertaken in accordance with Workers' Safety and Compensation Commission of the Northwest Territories (WSCC) and Nunavut Act and Regulations (WSCC 2021). The contractor will be required to develop a Quarry and Blast Management Plan (QBMP) CWP (see Section 8.3.4). Permitting requirements for explosives storage to by obtained by the contractor are described in Table 5-1.

Figure 2-1 Quarry Limits to be used in Quarry Administration Agreement

2.2.1.1 Construction Activities

Planned quarry activities are as follows:

- Overburden and vegetation removal.
- Drilling and blasting.
- Sorting blasted rock to produce run-of-quarry and riprap.
- Crushing/screening of run-of-quarry to produce finer, processed, granular products.

Drilling and Blasting

To support aggregate needs, drilling and blasting of bedrock at the quarry will be required.

Approximately 90,000 m^3 of bedrock is required to be blasted for the construction of the SCH, over an area of 6 ha, including stockpile areas (see Figure 2-1).

Appropriate measures will be in place to confirm SEC measures are implemented to protect the nearby lake (Dead Dog Lake, see Figure 1-1 for location). Appropriate consultation and coordination planning will also be conducted with the community to schedule road restrictions for access to Victor Bay are well communicated to the community and limited in durations.

Crushing and Screening

Crushing and screening of blasted rock will be required to produce various granular products. This will be performed at the quarry but will not occur within 30 m of Dead Dog Lake.

Stockpiling

Stockpiling of aggregates will be required, which will largely be performed at the quarry. This activity will not occur within 30 m of Dead Dog Lake. Smaller stockpiles of aggregates will be required at the harbour.

2.2.1.2 Maintenance

The contractor will be responsible for maintenance requirements at the quarry for the duration of construction which will include safety and environmental protection measures. Safety measures will be described in the QBMP, and environmental measures will be included in the CCEMP (Section 8.2.2). This will include safety features during the off season before the project is completed.

2.2.1.3 Decommissioning

If decommissioned the contractor will include requirements in the QBMP (see Section 8.3.4). However, it is likely that the quarry will be maintained as a long-term asset by the Hamlet. In this case, the contractor will be responsible for securing the quarry and ensuring public safety measures are in place prior to transfer to the Hamlet.

2.2.2 Haul Road

A haul road is required to transport aggregates from the quarry to the SCH and will use the existing roads.

2.2.2.1 Construction

The length of road used for hauling operations will be approximately 2 km. Improvements to the road will be made to accommodate rock trucks and the combined traffic of local vehicles and construction vehicles. The existing road alignment has two tight turns that will require softening by widening the roadbed. Additional widening in some areas, in the form of pull-outs will be located at several locations along the road to allow for rock trucks and community vehicles to safely pass each other. The number of pull outs required and safety measures required will depend on their implementation plan, including traffic control measures (communications/flaggers), speed, size, and number of trucks.

All haul road activities will be undertaken in accordance with WSCC and Nunavut Acts and Regulations (WSCC 2021). To manage interactions with the public the contractor will be required to develop a Traffic Management Plan (TMP) CWP to confirm health and safety measures that will be undertaken during construction (see Section 8.3.2). The contractor will be required to submit the TMP CWP to the Hamlet and obtain their approval.

2.2.2.2 Maintenance

The contractor will be responsible for the maintenance of the haul road during active construction of the SCH.

2.2.2.3 Decommissioning

The haul road is an existing road in Arctic Bay and thus there are no plans for its decommissioning. Improvements to the road constructed as part of the Project to suit truck traffic will be handed over the Hamlet and not removed.

2.2.3 Contractor Laydown Area

Construction materials and equipment for the Project will be stored in a construction laydown area. Although the laydown area will be left to the contractor to accommodate with the Hamlet, it is expected that the gravel pad located on the east side of the tank farm at the industrial site will be main location for storage, equipment maintenance facilities and vehicle parking (see Figure 2-2 for location). This site is currently being used for the new power plant (see Section 7.4.1), which is expected to be vacated for the start of construction for the Project. The contractor will use the laydown area to store construction materials and equipment received from the sealift for the duration of the Project or until there is sufficient space for it at the Project site.

Figure 2-2 Potential Contractor Laydown Area

2.2.4 Materials and Quantities

The construction of the SCH is expected to require the following construction materials.

- 90,000 m^3 (260,000 tonnes) of rock.
- 300 tonnes of steel sheet piles and associated steel fabrications and hardware.
- Small craft floating docks, including principle and finger floats.
- Wharf hardware, including mooring cleats, ladders, and bullrail.
- Electrical components including cables, junction boxes and enclosures, wiring devices, lights, and light poles.

All materials will be brought from outside of Nunavut other than the rock that will be sourced from the quarry.

2.2.5 Site Services

For construction, the contractor will require additional consumables and site services in the form of water, fuel, electricity, and waste removal. For water, waste removal, and fuel see Sections 1.14 (Water Sources and Consumption),1.16 (Waste Management), and 1.16.2 (Fuel).

The contractor will require power at their laydown area and at the site to power site offices, maintenance outbuildings, and equipment. It is expected that the contractor will obtain temporary power from the local

grid, via QEC. If some facilities are removed from the Hamlet's grid, the contractor may elect to run generators.

2.2.6 Site Offices and other Temporary Structures

The contractor will require temporary structures to facilitate construction personnel and administrative duties. These will be in the forms of:

- Site offices.
- Garages for vehicle and equipment maintenance.

2.2.7 Accommodations

Due to limited available local accommodations, non-local project personnel may be housed in a combination of local accommodations and a construction camp for up to 30 people. Prefabricated modular accommodations are expected to be brought into the community by the contractor to establish the camp. The location of a potential camp has not been selected but will likely require up to approximately 0.5 hectares. The Hamlet has confirmed that there are existing areas in town suitable for establishing a construction camp and that some contractors own houses in the hamlet for the expressed use of housing construction personnel. The location of the construction camp will be determined in consultation with the community and with approval from the Hamlet. If additional permits are required (e.g. NWB) in relation to the construction camp, this will be the responsibility of the contractor.

3 Community Consultation

3.1 Objectives

DFO-SCH and PSPC are conducting a comprehensive consultation program to design the Project to serve the needs and priorities of the community including hunters, fishers, recreational users, residents, and businesses.

The consultation program was designed with the following objectives:

- Identify all potentially affected and interested parties as early as possible.
- Establish and maintain a positive relationship with residents, hunters, fishers, local businesses, community groups and others based on mutual respect.
- Provide timely and relevant information pertaining to the nature and scope of the Project, permitting process and engineering design.
- Provide meaningful opportunities for community members and stakeholders to review the proposed Project, ask questions and provide input into its planning and design.
- Collaborate with the community on Project design to meet the needs of the community while staying within the allotted available funding.
- Integrate community input and mitigate concerns and issues through design modifications and improvements.
- Collaborate with the community to identify valued ecosystem components (VEC) and valued socio-economic components (VSEC).
- Collaborate with the community to identify potential Project effects and mitigation measures to inform construction management plan procedures.
- Incorporate Inuit Qaujimajatuqangit (IQ) and local knowledge into the Project design, assessment and management planning.
- Confirm the Project doesn't impact Inuit Harvesting Rights.

3.2 Communities, Groups and Organizations

The following community groups and organizations have been identified as being potentially affected by the Project:

- Hamlet of Arctic Bay – Mayor and Council
- Ikajutit HTA
- QIA
- Nauttisqsuqtit (the Guardians)
- Residents of Arctic Bay
- Local businesses including stores and hotels
- Arctic Bay Health Centre

- Royal Canadian Mounted Police (RCMP)
- Sealift companies
- Fuel carriers
- Tourism operators (outfitters/guides and cruise ships)

3.3 Overview of Consultation Program

The consultation program has been designed to confirm that hunters, trappers, fishers, residents, and other community groups and organizations are consulted using a variety of methods and materials. Consultations for the Project began during the Advisian feasibility study (Advisian 2020) and include consultations dating back to 2018. Consultations are on-going and will continue throughout the life of the Project.

The consultation program includes formal and informal meetings, semi-structured interviews, workshops, residents' meetings and public open houses. The materials used include presentations, pamphlets, community notices, non-technical Project summaries, engineering design drawings, and maps. All materials are provided in English and Inuktitut and all meetings are supported by simultaneous interpretation, as required. Translation and Interpretation for the Project is provided by Mishak Allurut, a local interpreter.

To date, the community has been very engaged in the Project and has provided valuable input into design and planning on numerous occasions. The input has been carefully considered and design modifications have been made based on feedback from design workshops with HTA, meetings with the Hamlet, residents, land use sessions with hunters and elders, and the open house. This collaborative approach has also led to determining Project effects and the joint development of mitigation and management measures that address the concerns of the community.

Table 3-1 outlines the key groups engaged as well as the method and dates of engagement.

Table 3-1 Consultation Overview

Group	Consultation Methodology	Dates
Ikajutit HTA	• Initial introductory meetings, follow-up design workshops, IQ verification meetings, formal joint meetings with Hamlet, QIA and the Guardians, and drop-in discussions with board members and key personnel. • Project personnel included the Lead Marine Engineer and the Consultation Lead. • Materials used included maps, photos and engineering design drawings. • Discussions focused on design, quarry and haul route, community needs, potential effects and mitigation, permitting process including NIRB and sharing of local knowledge of site conditions and wildlife, such as: current use of the existing harbour, quarry and haul route areas; boating activities; wind direction; waves and currents; observations of changes due to climate change; ice and water access	November 2018 June 2019 November 2019 February 2020 September 2020 March 2021

Group	Consultation Methodology	Dates
	and travel routes; fish and fish habitat; potential DAS sites; navigation lighting; cultural sites; stone areas; parking; and, marine mammals. • Consultation aimed to support the design of the SCH to meet the needs of hunters and fishers and to confirm that Inuit harvesting rights would not be affected by the Project. • All materials were translated, and simultaneous interpretation was provided during all consultation activities.	
Hamlet of Arctic Bay	• Formal meetings with Mayor and Council and department leads and joint meetings with QIA community representatives, the Guardians, and the HTA. • Presentation of Project information, schedule, design concepts, environmental and geotechnical baseline data collection, Project needs for community services (water, sewage, waste mgmt.), potential effects and mitigation development and permitting including NIRB screening process. • Hard copies of all presentations were provided in English and Inuktitut. • Simultaneous interpretation was provided during all	November 2018 June 2018 November 2019 February 2020 September 2020 March 2021
Residents of Arctic Bay	• Open house was advertised on Facebook, posters placed around town (Hamlet, co-op and Northern stores, health center etc.) and local radio broadcast. • Open House attended by 42 residents • Presentation of Project information, schedule, design concepts, environmental and geotechnical field studies, quarry and haul route, construction activities, potential effects and mitigation development and permitting including NIRB screening process. • Materials included translated slide show, presentation slides, large posters of maps and drawings. • Interpretation was provided to support discussions during the Open House as needed.	February 2020
Shoreline and Haul Route Residents	• One-to-one meetings were held with residents (door-to-door) along the shoreline and quarry haul route.	September 2020 March 2021
QIA and the Guardians	• Joint meetings with QIA community representatives, the Guardians, Hamlet and the HTA. • Presentation of Project information, schedule, design concepts, quarry and haul route, environmental and geotechnical baseline field activities and results, construction activities and requirements, construction needs for community services (water, sewage, waste mgmt.), potential effects and mitigation development and permitting including NIRB screening process.	November 2019 September 2020 March 2021

Group	Consultation Methodology	Dates
	• Hard copies of all presentations were provided in English and Inuktitut. • Simultaneous interpretation was provided for all meetings.	
RCMP	• Brief drop-in meetings were conducted to introduce and inform the RCMP of Project information, answer questions, and understand any needs or concerns.	November 2018 September 2020 March 2021
Local Businesses	• Brief drop-in meetings were conducted with the Northern Store and the Co-Op to introduce and inform the businesses of Project information, answer questions, and understand any needs or concerns.	November 2018 September 2020 March 2021
Sealift Carriers	• Email exchanges to provide Project information and updates and to solicit input on design, operational needs of sealift carriers and vessels' specifications.	February 2021 May 2021
Fuel Carriers	• Email exchanges to provide Project information and updates and to solicit input on design, operational needs of fuel carriers and vessels' specifications.	February 2021
Cruise Ship Operators	• Email exchanges to provide Project information and to solicit input on SCH design, operational needs of cruise ship operators and vessels' specifications.	May 2021 June 2021

3.4 Concerns Expressed and Strategies to Address

The consultation program has been successful in gathering input from community residents, hunters, fishers, and other users of the SCH. The input received resulted in design modifications to meet the needs and priorities of the community. Further, the input received provided a basis for the development of mitigation measures to address concerns during construction and operation of the SCH, including the development of the Construction Environmental Management Plan (CEMP), as described in Section 7.2.3.

The community is very much looking forward to the Project as the current harbour area is too small resulting in public safety risks and many boats getting damaged. The Project has very good support from the Hamlet, HTA and community members who will benefit from improved safety and boat access from the SCH.

> *"This is a very big benefit to the community"* - Council Member
>
> "*We have been waiting for this harbour for so many years, we need this Project to go forward"* – HTA member

HTA members and community members do not anticipate any major effects on wildlife from noise and construction activities. They have observed that animals and marine life that avoid areas during construction return once projects are completed. The effects on wildlife from the Project will be minimal and temporary and no concerns regarding impacts to wildlife were expressed.

The community expressed no concerns over the loss of seabed due to construction of the SCH.

> *"Putting boulders in the water for the breakwater is not a concern"* – HTA member.

Impacts to Fish and Fish Habitat have been discussed with the community several times since the feasibility study and no concerns have ever been expressed. There is very limited harvesting near the Project site and hunters do not anticipate that construction will have any significant impacts on wildlife or their ability to continue subsistence activities such as hunting, fishing, trapping and gathering.

Table 3-2 provides a summary of the concerns expressed by the community during consultation to date and a summary of the strategies employed to address these concerns. A detailed list of all consultation events and feedback received to date is provided in the initial Feasibility Study consultation summary report for Arctic Bay (Advisian 2019a) and in two design and construction planning phase Community Consultation Summary Reports (Advisian-Ikpiaryuk JV 2020b), and (Advisian-Ikpiaryuk JV 2021j). A consultation log has also been developed that provides a detailed record of the community comments and inquiries received and the responses provided by the Project team during consultations conducted since completion of the Feasibility Study (Advisian-Ikpiaryuk JV 2021b). All consultation documents have been uploaded to the NIRB portal in support of this PSIR document.

Table 3-2 Summary of Concerns Expressed and Strategies to Address

Topic	Concerns Expressed	Strategies to Address
Quarry	• Concerns over the planned quarry location due to its proximity to the road and the community's alternate water supply. • Concerns that rock falls will be caused by blasting and could lead to damage to residences and community buildings in steep areas. • Concerns about blasting communications with the community – people need to be kept properly informed. • Concerns about access to and from Victor Bay during very busy open-water season being restricted due to road closures for blasting. • Concerns about continued access to a marble deposit used for carving stone in the quarry area	• Blasting expert (Explotech Engineering) has been engaged to support the safety of the quarry location. They have confirmed that blasting can be executed in ways which will not impact the community's water supply and will cause minimal road closures. • Develop a management plan with measures to control sediment and blast residuals to prevent any leaching into the lake (to be described in the QBMP CWP [see Section 8.3.4]) • Virtually no risk to community of rock falls from proximity of quarry to rock slopes adjacent to the community. However, control fencing (1.8 m tall orange fencing using rebar) has been added as a mitigation measure for protection where houses/building are at risk of falling rock. • Limit Daily Road Closures – ~30 mins/day once a day to maintain access to Victor Bay. • Flag People and warning system to protect residents from blast zone. • Daily Blasting Notices –radio, social media, hamlet, posted on bulletin boards, and on very high frequency (VHF) radio (cabin owners at Victor Bay are only reachable by VHF). • Blasting usually at the same time every day so residents can plan accordingly. • The Project will rip and stockpile carving stone for use by local residents to minimize any impact on access to carving stone from the Project. • The Project has engaged local carvers to identify the location of carving stone areas in the quarry and to determine approximate amount of carving stone required to be stockpiled. If use increases and the stockpile is not sufficient the Contractor will rip more as needed.

Topic	Concerns Expressed	Strategies to Address
Haul Road	• Most residents along the haul road are supportive of the Project despite the anticipated impacts caused by trucking. • Frustration from one resident that a suggested alternate bypass road going along the shoreline wasn't implemented. • Hamlet concerned that the suggested alternate bypass road proposed would have trucks crossing the community hall and arena during busy summer programs for kids. • The haul road must be upgraded to accommodate large trucks and be well maintained for public traffic. It is a very busy road, especially during the open-water season when it is planned to have quarrying and hauling.	• The Project considered the alternate bypass route suggested by the resident. However, the alternate bypass would require building a road on a steep embankment that may not be stable (there is no information and it has not been drilled). The distance for the suggested alternate route would be greater and pass in front of nearly the same number of residences, which would mean less money for the SCH yet similar number of impacted residents. The cost for the road would come out of the harbour funds. • The haul road alignment will be improved to allow for safe truck travel (easing corners, increasing width in areas, upgrade existing hillside etc.) and upgraded with features like pull outs to permit vehicle passing. • The contractor will be responsible for maintaining the road in good condition.
Public Safety	• One of the community's primary concerns is safety, particularly about traffic safety with the use of existing roads as the haul route during construction. • It was noted that children and youth spend their summers playing in the roads at all hours, especially in the summer and that roads must be shared with pedestrians, bikes and all-terrain vehicles (ATVs). • The safety of the community has to be looked at very carefully	• The contractor will prepare a TMP CWP (see Section 8.3.2). Additional mitigations will be described in the CEMP (Advisian-Ikpiaryuk JV 2021c) to mitigate safety concerns raised by the community. • Public safety measures described in detail in Section 7.1.3.3 (and detailed in the TMP CWP and CEMP), include: flag people/spotters at intersections and near any homes or buildings, limiting vehicle speeds to 20km/hr, ensuring all trucks have proper braking systems to handle the conditions of the road (especially steepness), equipment kept properly maintained to avoid accidents with equipment failure, community notices and traffic awareness etc.
Dust	• Dust is a serious concern in the community. • Concerns not only of dust affecting respiratory health but also accumulating on equipment critical for hunting and camping that are stored outside peoples' homes.	• Maximum speeds will be kept low (20km/hr) and dust suppression will be used (water or other approved dust suppressant) • Traffic management and dust suppression measures as outlined in Section 7.1.3.3 and 7.1.1.6 (see Sections 8.3.2 and 8.3.4 for TMP and QBMP CWPs).

Topic	Concerns Expressed	Strategies to Address
Fuel Supply	• Fuel supply in the community is not likely to be sufficient to support construction needs without burdening community's already strained supply	• The Project is coordinating with PPD, who will arrange multiple fuel shipments to support both community and construction requirements. If this becomes impractical, the contractor will be required to bring in temporary double-wall fuel tanks for Project fuel storage during construction so as not to impact the community's fuel supply. The SPRP CWP will detail fueling practices (see Section 8.3.3).
Construction Hours	• Residents along the haul route and shoreline expressed concerns over the possibility of 24 hr. construction. • Concerns that 24-hr. trucking would be too disruptive and would not allow residents to sleep, especially elders and children. • 24 hr. construction was not generally supported in the community.	• The contractor will be limited to working 12 hrs/day on the dayshift only. • Some non-disruptive work may be required to continue at night. This may be limited to incidental low-tide work at the harbour (most likely related to the wharf construction) and crushing and/or sorting of rock at the quarry. Such work extensions will be subject to the approval of the Hamlet. • There will be no hauling at night.
Complaints Mechanism during Construction	• Concerns that any complaints will not be handled properly by contractor.	• The Project will implement a complaints process beyond that of the contractor's (there will be onsite monitoring of construction works by Project personnel in town) and will consider hiring a local Inuit community coordinator that residents can contact when issues arise.
Sealift	• Concerns that sealift operating in the area will continue to cause too much traffic and congestion – a public safety hazard. Sealift must be moved to the industrial zone.	• The Project includes an expanded laydown area (roughly four times larger than existing) to accommodate sealift cargo in the near term and vehicle parking/storage. The Project also includes a dedicated boat launching ramp, avoiding conflicts during sealift.
Launching at Victor Bay	• Disappointment that a launch ramp at Victor Bay was not included in the Project design despite numerous requests by hunters since the feasibility study. • Concerns with launching boats from Victor Bay. It is an important area for accessing harvesting areas but very difficult for hunters to launch from there. *"Nothing fancy, just a simple launching pad"*	• The Project recognizes the frustration and need for a ramp at Victor Bay. The scope of the current Project is for a SCH for Arctic Bay only. DFO-SCH will own the SCH and will continue to engage the community through construction and operations of the facility. DFO-SCH can consider a ramp at Victor Bay as part of future expansion for marine infrastructure in Arctic Bay. • The Hamlet is also investigating options to build the ramp with annual funds provided by the GN.

Topic	Concerns Expressed	Strategies to Address
Water / Ice Access and Navigation	• The quarry has the potential to affect skidoo traffic, restricting access for hunters. • There are many well-travelled skidoo trails heading to Victor Bay • Access to ice is relatively easy along the shoreline where it's not very steep. No concerns were expressed about the SCH affecting ice access. *"We've been requesting a small craft harbour for so many years, we are an adaptable people, we will find new routes"* • Concerns that construction at the harbour will impede access for boaters and cause congestion and public safety hazards.	• Land use workshops and interviews indicated that hunters' access to and from Victor Bay on skidoo is mostly along the sides of the road, particularly around the proposed quarry. • The Project will construct skidoo access over potential barriers caused by stockpiles or stockpile pads to maintain access to Victor Bay for hunters • The contractor will be required to coordinate and sequence construction activities so that access to boaters is maintained at all times during construction. • A TMP CWP will be implemented to minimize congestion resulting from heavy equipment operating at the shoreline and to increase public safety. See Section 8.3.2.
Employment and Training Opportunities	• Community expects local labour to be maximized during construction of the Project. • Hiring local should be prioritized and local equipment should be used as much as possible.	• The Project will comply with the new Treasury Board *Directive on Government Contracts Including Real Property Leases, in the Nunavut Settlement Area* (Government of Canada 2019a) and aims to maximize participation of Inuit labour, training and Inuit owned businesses on the Project. • To date, the Project has provided Inuit from Arctic Bay and Pond Inlet (SmartIce) with employment and training opportunities as wildlife monitors, field technicians, ice monitoring specialists, and interpreters/translators. • Further economic benefits and training opportunities from the Project are anticipated as, in addition to direct local hiring for the Project, there will be secondary economic benefits through the Project's management and expenditures in local businesses.
Dredging and DAS	• Concern with sea bottom animals and the need for studies to determine sea bottom. • The Hamlet can think of ways to use the dredge material if study shows it being suitable for use on land.	• The Project completed a study of the potential DAS site in 2019. ECCC are satisfied that sufficient information of the site is available. • Community is supportive of using the proposed DAS site, if required. • Sediments being dredged have little value upland, being very soft, and the majority are being incorporated into the Project on the site.

Topic	Concerns Expressed	Strategies to Address
		• Upland disposal locations are being discussed with the Hamlet and available if advantageous to the Project and the Hamlet. Therefore, DAS may not be required. • Clams and mussels are not harvested in the potential DAS sites shown, it's too deep. • Potential DAS sites shown are too deep for seal hunting. If a seal sinks, it's too deep to try and retrieve it. Hunters prefer harvesting in shallower areas.

3.5 Future Consultation

DFO-SCH and PSPC will continue to engage with the Hamlet Council, the HTA, QIA, Guardians, residents and key stakeholders in the community. DFO-SCH and PSPC will provide Project updates and continue to maintain the positive rapport they have built with the community. Specifically, DFO-SCH and PSPC will continue to solicit feedback and engage in collaborative problem solving with respect to:

- Engineering design.
- Permits, approvals, and licences.
- Construction schedule and sequencing of activities.
- Quarry development and haul route.
- Environmental and socio-economic effects, including Project effects on fish and fish habitat, and marine mammals.
- Marine traffic and navigation.
- Contractor environmental and TMPs.
- Employment and training opportunities.
- Potential for future development of a ramp at Victor Bay.
- Operations planning including maintenance of the floating docs and facilities.

Consultation will be ongoing throughout the life of the Project. Two further community consultation visits are planned during the current phase of the Project, including call in radio shows, information tables at the co-op and another community open house, if permitted by public health gathering limits at the time.

Once a contractor is engaged to construct the SCH, further consultation with the community will take place. This engagement will include timing and methodology of construction activities and traffic management as well as emergency response plans, community service delivery, security of the construction site, public safety, environmental management measures, construction communications (blasting notices, road closures etc.) and equipment and material storage. Additionally, the contractor will work with the community to maximize local labour force and business opportunities.

4 Inuit Quajimajatuqanjit

IQ, although often translated as Inuit Traditional Knowledge, also includes important Inuit values, principles, cultural beliefs and behaviours. There are many different definitions of IQ that aim to describe its holistic nature. The QIA has recently provided the following description that has guided our understanding of IQ (QIA 2018a):

> *"Inuit Qaujimajatuqangit is a morality that is the base for Inuit existence. It is the belief system at the core of Inuit identity and governs Inuit society. It is born through a collective effort to survive in extreme conditions where no one else could and there is no other way to do so but together. Within this ideal lives a great life-affirming admiration to the land and animals. It is about living through helping each other. It is the Inuit way."*

IQ, as the Project team understands it, is not merely a collection of information about the land and wildlife, but also an approach and set of principles to conducting research and project development that is based in respect and collaboration. The local knowledge holders the Project team works jointly with are also actively guiding decisions on the design and construction planning of the SCH for Arctic Bay. The Project's IQ program aims to gather local Inuit knowledge of marine habitat, wildlife, land use, year-round access for harvesting, and areas of cultural value in and around the proposed Project to support Project decision-making, construction planning and to inform the environmental-screening process.

IQ has been collected to date during:

- Three design workshops in November 2018, June 2019, and November 2019 with members of the HTA in Arctic Bay.
- One land use and wildlife focused workshop with three active Inuit hunters and fishers in June 2019.
- One verification workshop with the same Inuit hunters and fishers in November 2019.
- One ice access and travel routes interview with an active Inuit hunter, outfitter and dog team owner in March 2021.

The first design workshop in November 2018 concentrated on gaining an understanding from HTA members of the current conditions for accessing water and ice in Arctic Bay and the specific needs for a SCH. With the aid of an interpreter and aerial maps and photographs, an open dialogue between HTA members and the consultation team occurred allowing feedback and local knowledge from the most active users of the harbour to be obtained. IQ was noted and marked on maps during discussions on topics such as: wind direction and strength, currents, seasonal changes to ice, DAS sites, water and ice access, and current boat traffic and ramp use. The workshop also provided an opportunity for the consultation team to advise the HTA of the field program being planned for the summer of 2019 and to describe the research activities expected to be conducted. Of interest to the HTA was the coordination of local support to the field team.

The second design workshop, conducted in June 2019, presented concept designs that had been developed using the IQ and feedback provided in the first workshop. The workshop allowed HTA members to see how their suggestions and local knowledge had been directly considered in the design of the concept options and provide their feedback on any changes needed and any preferred options. IQ was noted during discussions on topics such as: changes to ice once the harbour is built, seasonal access for

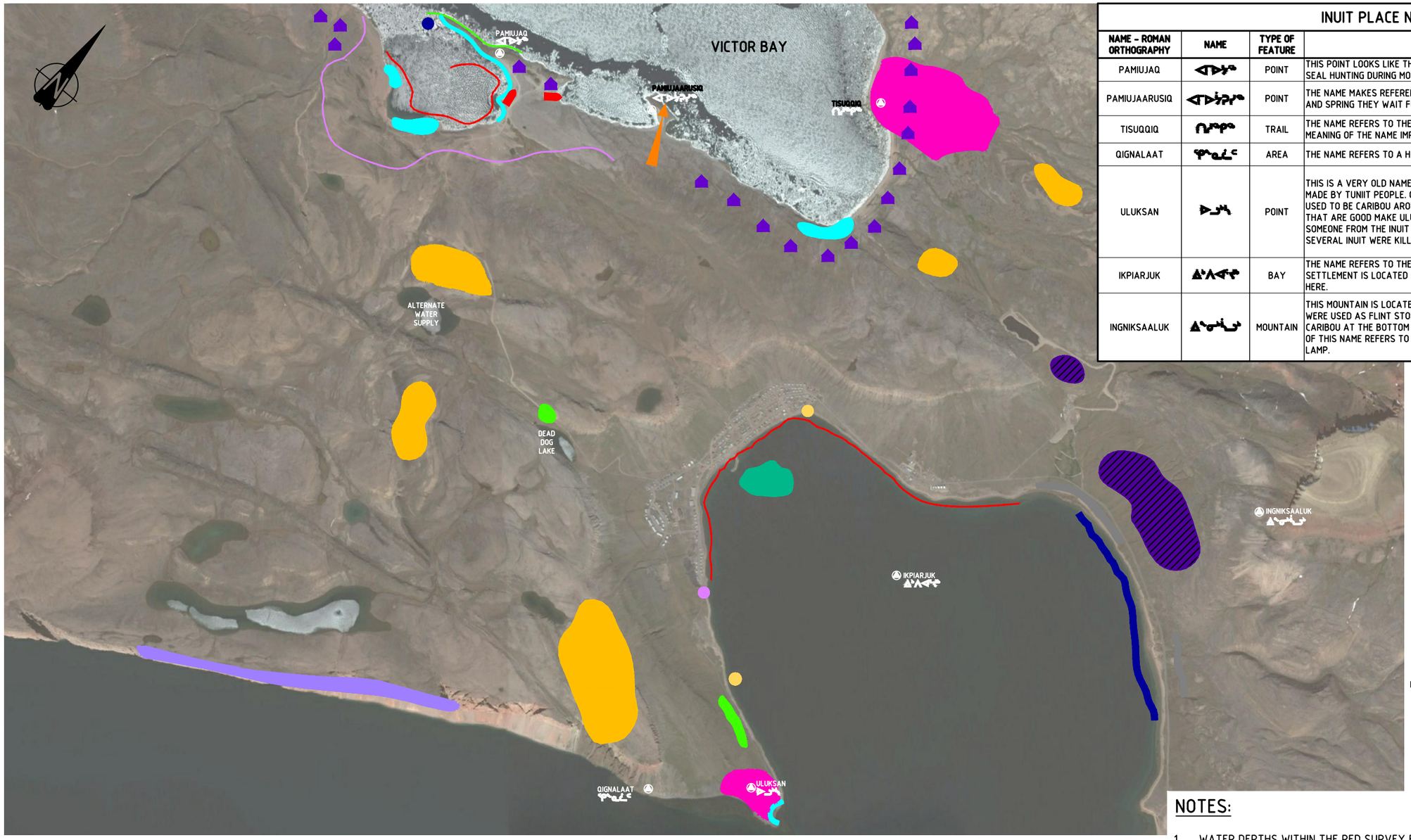
hunters during construction, DAS sites, quarry and haul road options, and Project schedule. The workshop also allowed the consultation team to provide further details to HTA members on the field program being planned for August 2019.

A land use and wildlife focused workshop (IQ workshop) was conducted in June 2019 with three currently active Inuit hunters and fishers (knowledge holders): Jonah Oyukuluk, Olayuk Nagitarvik, and Tom Nagitarvik. The knowledge holders were selected by the HTA for being especially knowledgeable of harvesting areas in and around Arctic Bay and for being currently quite active out on the land and water. In an effort to better understand the potential interactions between harvesting rights and anticipated Project activities, discussions during the workshop focused on harvest locations, water and ice access, fish, marine and land mammals, birds and other wildlife and the potential locations of the proposed SCH, quarry and haul routes in relation to land use activities (e.g. fishing, hunting, gathering and trapping). Land use and occupancy, and any culturally or ecologically valued areas were marked on maps and later digitized.

A third design workshop with the HTA was held in November 2019 to present the results of the field program, further refine the design concepts and to discuss the proposed quarry and haul route in more detail. A verification workshop was also held in November 2019 to confirm that the information gathered during the earlier IQ workshop (June 2019) was not misinterpreted or presented in a manner unintended by the knowledge holders. All knowledge holders consented to their knowledge being shared with the team and for the purpose of informing the design, permitting and planning of the SCH. Consent was also provided by the knowledge holders to have their knowledge presented as noted in the Land Use and Occupancy map (Figure 4-1).

A brief land use interview with knowledge holder and outfitter, Tom Nagitarvik, was conducted in March 2021 to better understand ice access and skidoo trails along the shoreline and haul route. The locations of sled dog teams were also confirmed with Mr. Nagitavik to minimize any impacts from the geotechnical drilling program on the dogs.

A review of existing and accessible IQ research relevant to the Project site was also conducted to provide valuable regional context to the baseline study. The Project team has attempted to join IQ with results from the scientific studies to allow the Project, in collaboration with community members, to make informed decisions on the design and construction planning of the SCH that reflects local peoples' needs, priorities and values. However, the IQ findings are based on a small number of workshops and a selection of readily available literature, and do not represent the full intensity and extent of Inuit use and occupancy of either the Project Study Areas or the surrounding region.



INUIT PLACE NAMES

NAME - ROMAN ORTHOGRAPHY	NAME	TYPE OF FEATURE	DESCRIPTION
PAMIUJAQ	ᐱᒪᐃᔪᖅ	POINT	THIS POINT LOOKS LIKE THE TAIL OF A FOUR-LEGGED ANIMAL. GOOD CAMPING PLACE AND SEAL HUNTING DURING MOST OF THE YEAR.
PAMIUJAARUSIQ	ᐱᒪᐃᔪᐊᕐᓱᖅ	POINT	THE NAME MAKES REFERENCE TO PAMIUJAQ (A NEIGHBOURING POINT). DURING SUMMER AND SPRING THEY WAIT FOR SEALS AND NARWHALS ON THE SHORES OF THIS POINT.
TISUQQIQ	ᑎᓴᖅᖃᖅ	TRAIL	THE NAME REFERS TO THE THE RIVER AND THE VALLEY THAT CONSITUTE A TRAIL. THE MEANING OF THE NAME IMPLIES "SLIDING DOWN."
QIGNALAAT	ᖃᐄᓇᓚᐢ	AREA	THE NAME REFERS TO A HILL AND A CLIFF. PART OF THE CLIFF AND HILL IS DARK.
ULUKSAN	ᐅᓗᒃᓴᓇ	POINT	THIS IS A VERY OLD NAME. THERE SOME VERY OLD SOD HOUSES IN THE AREA, THAT WERE MADE BY TUNIIT PEOPLE. GOOD CAMPING PLACE AND SEAL HUNTING DESTINATION. THERE USED TO BE CARIBOU AROUND THE BAY. THEY NAMED THE PLACE FOR THE FLAT ROCKS THAT ARE GOOD MAKE ULUS. LONG TIME AGO SOME WHALING SHIPS ANCHORED THERE. SOMEONE FROM THE INUIT SETTLEMENT STOLE SOMETHING FROM THE SHIPS, AND SEVERAL INUIT WERE KILLED. THERE ARE SOME VERY OLD GRAVES IN THE AREA.
IKPIARJUK	ᐃᖃᐱᕐᔪᖅ	BAY	THE NAME REFERS TO THE NAME OF THE BAY BEING LIKE A SACK. THE PRESENT SETTLEMENT IS LOCATED BY THE SHORES OF THIS BAY. WHALING SHIPS USED TO ANCHOR HERE.
INGNIKSAALUK	ᐃᖏᓂᓵᓗᒃ	MOUNTAIN	THIS MOUNTAIN IS LOCATED AROUND THE CURRENT SETTLEMENT. THE ROCKS UP THERE WERE USED AS FLINT STONES TO MAKE FIRE. IN THE PAST THERE USED TO BE A LOT OF CARIBOU AT THE BOTTOM OF THIS MOUNTAIN. ANOTHER EXPLANATION FOR THE MEANING OF THIS NAME REFERS TO THE MOUNTAIN RESEMBLING THE EDGE OF A TRADITIONAL INUIT LAMP.

m 0 500 1000 1500 m

1:30000

PLAN

1:30000

LEGEND:

- FISHING (NETS AND SOME CASTING)
- VARIOUS BIRDS (NESTING)
- SEAL / MARINE MAMMAL WAITING AREA
- CLAMS
- POLAR BEAR (HARVESTED)
- POLAR BEAR (MAIN AREA OF SIGHTINGS)
- CARVING STONE
- NARWHAL PODS (SOMETIMES GREATER THAN 100 IND.)
- NARWHAL (NOT OBSERVED OVER PAST 10 YRS)
- TENTS / CABINS
- BERRY HARVESTING
- SLED DOG AREAS
- FOOD CACHE (CURRENT, STILL IN USE)
- RAVENS NEST
- BELUGA (HARVESTED)
- SPRING ICE ACCESS
- BOATS
- SOURCE INUIT HERITAGE TRUST: PLACE NAMES PROGRAM. INUIT HERITAGE TRUST INCORPORATED. JUNE, 2005

NOTES:

1. WATER DEPTHS WITHIN THE RED SURVEY BOUNDARY PROVIDED BY FISHERIES AND OCEANS CANADA. SURVEY WAS PERFORMED ON SEPTEMBER 14, 2018 BY AQUATICS-ESI, PROJECT NO. 18S022002, DRAWING NO. A1, REVISION 2, DATED 19/01/07

FISHERIES AND OCEANS CANADA
SMALL CRAFT HARBOURS
ARCTIC BAY

LAND USE AND OCCUPANCY MAP

Date:	Drawn by:	Edited by:	App'd by:
01-JUN-21	JLC	TJM	HGK

Worley Project No. 317071-00037

FIG No 4-1

REV 0

Advisian Worley Group

Ikpiaryuk Services Ltd.

FILE LOCATION: U:\YVR\317071\00037_PWGS_ARCBAYCES\11_DRAWINGS\14_ENV_PLANNING\PSI_(NIRB)_REP\317071-00037_FIG4-1.DWG

PLOT DATE & TIME: 8/6/2021 3:19:41 PM
SAVE DATE & TIME: 8/6/2021 3:19:22 PM
USER NAME: brian.mawsulo
ISSUING OFFICE: VANCOUVER

5 Regulatory Compliance

Construction and operation of the SCH in Arctic Bay will require securing permits and approvals from: federal, territorial, and municipal governments; Inuit boards; and the QIA. The Project has engaged with RAs, Inuit boards and the QIA to confirm compliance with relevant legislation (and regulations), policies, protocols and best management practices (BMPs) will be in place. Several interested stakeholders will be engaged through the respective permitting processes of NIRB and DFO-FFHPP. The Project has made the decision to send information packages to these stakeholders to confirm their interests are addressed in advance (see Sections 5.7, 5.8, 5.9).

A summary of permits expected to be required for the Project is provided in Table 5-1, the majority of which will be held by DFO-SCH, although several will be the responsibility of the Contractor.

5.1 Nunavut Planning Commission

As stipulated in the *Nunavut Planning and Project Assessment Act* (NuPPAA), the NPC is the 'gate keeper' in the determination of referrals to NIRB, which are communicated through a Conformity Determination. NPC will take the decision for referral and include pertinent Federal and Territorial regulators, most of whom are encompassed in Table 5-1. The NPC application was submitted on 22 December 2020 (NPC 2020), with the application package accepted for review on January 15, 2021 (NPC 2021a) by NPC (No. 149437), and the conformity determination was issued on January 27, 2021 (NPC 2021b).

5.2 Nunavut Impact Review Board

The Project was accepted for review by NIRB on January 27, 2021 (NIRB 2021) (No. 21UN004), and the final application will be submitted via the NIRB online portal in July 2021. It is expected the Project will require a screening under Nunavut Agreement Part 4 by the NIRB (Screening). Screenings are conducted over 45 to 60 days which include a 21-day consultation period. Consultation consists of a public comment period via the NIRBs online registry and a NIRB determined distribution list which will include pertinent RAs, hamlets/municipalities, the HTA, Regional Inuit Associations (RIA), such as the QIA, and non-government organizations. After receiving comments back from these groups, NIRB may request additional information through Information Requests (IR).

5.3 Nunavut Water Board

The Nunavut Water Board (NWB) has the mandate to protect, manage and regulate freshwater courses in Nunavut. NWB has a public registry and projects submitted to NWB will be publicly posted. For the Project an NWB Type B license will be required if the haul road requires culverts to be installed or if stream alteration is required for the Project. As the streams are not major water courses, it is expected that a Type B permit will be acceptable whether the alterations are temporary or permanent. NWB compliance requirements will be the responsibility of the Contractor. If the Contractor requires a water license for water withdrawal, it is expected an Authorization will be sufficient as daily withdrawal needs are a lot less than the 50 m^3 daily threshold (NWB 2021).

5.4 Government of Nunavut Departments

5.4.1 Culture & Heritage

An AIA was completed in August 2019 under Class 2 Archaeologist Permit 19-051A (Lifeways 2019) and no archaeological sites of interest were identified within the Project footprint (or within a 30 m buffer), therefore no further work was recommended. Further permitting through GN Department of Culture and Heritage (DCH) will not be required.

5.4.2 Community and Government Services

The proposed quarry is located on Untitled Municipal Lands (Commissioners Land) and therefore would typically require a LUP which would be administered through the GN-CGS in the Lands Administration Office. However, GN-CGS are in the planning phase for the development of a QAA with the Hamlet. The QAA is expected to be in place at the start of construction which enables the Hamlet to administer the quarry and a LUP from GN-CGS is not expected to be required.

Should the contractor require stockpiling outside of the quarry, another LUP may be required. The contractor will be responsible for the acquisition of any other LUPs from GN-CGS.

The foreshore of the SCH also sits on Municipal, and Untitled Municipal (Commissioners) Lands. DFO-SCH are applying for administrative control of this foreshore area, subsequent to the finalization of the legal survey in the summer of 2021 (see Figure 1-2 for administrative control boundaries).

5.4.3 Department of Environment

No permits are expected from the GN Department of Environment (DoE), however, during construction the contractor will be required to report accidental spills as per territorial requirements. The minimum requirements for spill reporting will be identified in the CEMP (Section 8.2.2) and a SPRP CWP will reiterate spill reporting requirements (see Section 8.3.3). Reporting requirements are also summarized in Section 5.10.2.2 of the CEMP.

5.5 Hamlet

Acquisition of rock for the quarry will need to be approved through the Hamlet. As summarized in Section 5.4.2, GN-CGS is working on the QAA for the proposed quarry to enable the Hamlet to administer the quarry. The contractor will be responsible for obtaining a quarry permit from the Hamlet. Further to this, a LUP will be required from the Hamlet for the use of explosives (By-Law 54 Land Administration). The contractor will be responsible for obtaining this LUP.

Additionally, approval is required from the Hamlet for the Project to access community services to support construction such as water, sewage, and waste management services. The Project will adhere to any pertinent Hamlet by-laws.

Locations for use as laydown or other construction related uses will be required to be approved by the Hamlet. The Hamlet will also be required to approve the TMP CWP (see Section 8.3.2).

5.6 Qikiqtani Inuit Association

The QIA is a Designated Inuit Organization (DIO) under the Nunavut Agreement (QIA 2020) established to protect, promote and advance the rights and benefits of Inuit of the Qikiqtani region in Nunavut. It is also one of three RIAs affiliated with Nunavut Tunngavik Incorporated (NTI) and manages the Inuit Owned Lands (IOL) in the Qikiqtani Region. When Project components are located on IOL, a Right of Way Agreement issued by the QIA is required. As per the Canada Lands Survey Records, there are no IOL within the Municipal Boundary of Arctic Bay, therefore it is not expected that a Right of Way Agreement will be required for the Project (Government of Nunavut 2021).

The QIA has been engaged on the Project since the feasibility phase and has participated in both joint meetings with the Hamlet and HTA during the design phase. The QIA will continue to be engaged throughout the life of the Project. The QIA will also be consulted by NPC, NIRB, ECCC (if DAS is required) and DFO-FFHPP. Given its mandate to protect Inuit rights and benefits, the QIA will be interested in ensuring that Inuit harvesting rights are not impacted by the Project.

5.7 Nunavut Marine Council

The Nunavut Marine Council (NMC) was established through the Nunavut Land Claims Agreement (NLCA) as a means of advancing the initiatives set forth by the Nunavut Wildlife Management Board (NWMB), the NPC, the NIRB and the NWB. The NMC is composed of the staff and board members of these organizations to advise and make recommendations on the effects and implications of marine issues in the NSA. As a focus they review existing, or proposed regulatory, policy, research, development, management planning initiatives that affect or may affect marine areas in the future (NMC 2020).

The NMC will not issue any permits for the Project but may be engaged through the NIRB or DFO-FFHPP permitting processes, and thus an information package in both English and North Baffin Inuktitut was submitted to the NMC on June 30, 2021 (Advisian-Ikpiaryuk JV 2021f; DFO-SCH 2021a). However, as stated above the NIRB is one of the board members of the NMC.

5.8 Qikiqtaaluk Wildlife Board

The Qikiqtaaluk Wildlife Board (QWB) is composed of Chairmen from each HTA within the Qikiataaluk Region, and was established for the following reasons (QWB 2020):

- To regulate and manage the harvesting practices of HTA members.
- Oversee the allocation and enforcement of regional basic needs and adjusted basic needs levels among HTAs within the region.

The QWB will not issue any permits for the Project but may be engaged through the NIRB and DFO-FFHPP permitting processes, and thus an information package in both English and North Baffin Inuktitut was submitted to the QWB on June 30, 2021 (Advisian-Ikpiaryuk JV 2021i; DFO-SCH 2021d). It should be understood that the interest of the QWB are met through engagement and consultation with the HTAs/HTOs of specific communities. In Arctic Bay the HTA have been involved since the feasibility phase of the Project.

5.9 Nunavut Wildlife Management Board

The NWMB was established in accordance with the Nunavut Agreement (NWMB 2020). The NWMB's mandate is to regulate and manage the access to wildlife within the NSA. Further to this, they have the ability to advise the NPC with respect to works within wildlife management zones and provide recommendations to the NIRB or other agencies for mitigation measures or compensations related to impacts from commercial or industrial developments on wildlife habitat. The local HTAs/HTOs are created under the NWMB and therefore must be involved in consultation and engagement.

The NWMB's mandate will likely be met through the Ikajutit HTA but may be engaged by NIRB and DFO-FFHPP through their respective permitting processes, and thus an information package in both English and North Baffin Inuktitut was submitted to the NWMB on June 30, 2021 (Advisian-Ikpiaryuk JV 2021h; DFO-SCH 2021c).

5.10 DFO – Fish and Fish Habitat Protection Program

DFO-FFHPP is the RA who administers Section 35 and 34.4 of the *Fisheries Act*, which prohibits causing the harmful alteration, disruption or destruction (HADD) of fish habitat and Death of Fish (DoF), respectively. To ensure compliance with the *Fisheries Act*, it is recommended that proponents submit projects to DFO-FFHPP for review. DFO-FFHPP will subsequently review the project, through the request for review (RFR) process. If DFO-FFHPP recognizes the project impacts can be mitigated, a Letter of Advice (LOA) will be issued to the Proponent. If DFO-FFHPP identifies a potential for the project to result in a prohibition, an FAA application will be required to be submitted for the Project. Other regulatory tools such as the Interim Code of Practice notifications (DFO 2019c), can be used to remain in compliance with the *Fisheries Act*. For the Project, DFO-SCH submitted a RFR to DFO-FFHPP on May 12, 2020 (DFO-SCH 2020c). DFO-SCH has remained in regular contact with DFO-FFHPP, however DFO-FFHPP will defer any official correspondence, until a NIRB Screening Decision Report (SDR) has been issued. It is expected that a FAA will be required due to the loss of seabed habitat resulting from the construction of the facility's permanent components. The Offset Plan component of the FAA will be managed internally within DFO-SCH and DFO-FFHPP.

5.11 Transport Canada

The *Canadian Navigable Waters Act* (CNWA) is administered through the Navigation Protection Program (NPP) where TC is the RA. The CNWA protects marine safety by regulating works in navigable waters. Works include the placement of any structure, device or thing, whether temporary or permanent. TC will require a NoW approval and navigational commitments will be followed during the construction and operation of the SCH. The CEMP will require the Contractor to comply with established navigational communication procedures.

Continued collaboration with the community and the HTA will confirm that any potential navigational interferences, particularly with subsistence harvesting are well understood. TC is working closely with DFO-SCH. TC visited the community during consultation for the SCH feasibility study in November 2019 and are expected to participate in consultations going forward.

5.12 Environment and Climate Change Canada

ECCC is the RA for DAS permits. While the preferred choice would be to repurpose dredged sediments as fill, DAS may be required for the Project. DAS is regulated under the *Canadian Environmental Protection Act* (CEPA), and the associated DAS Regulations. It is also informed by the principles of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention 1972) and the associated 1996 Protocol (London Protocol 1996).

Sufficient sediment sampling has been conducted to allow for submission of a DAS application as was confirmed through submission of a SAP to ECCC (Advisian-Ikpiaryuk JV 2020a). The SAP was submitted to ECCC on 27 November 2020 (DFO-SCH 2020b) and approved on 7 December 2020 (ECCC 2020).

5.13 Crown-Indigenous Relations and Northern Affairs Canada

DFO-SCH is working with CIRNAC to confirm the transfer of administrative control of the water lot prior to construction. DFO-SCH has confirmed that the "jaws of the land" (NRCan 2016) does not apply and CIRNAC is responsible for the water lot below the ordinary high water mark (OHWM) and not limited by the ordinary low water mark (OLWM). Thus, it is not expected that a LUP will be required for the construction phase of the Project at the harbour.

The construction required for the SCH includes works that are above or below the HWL. The HWL is separate from the OHWM, as the HWL changes as the Project construction is pushed seaward.

5.14 Natural Resources Canada

A permit from Natural Resources Canada (NRCan) is required for storage of explosives during the construction phase of the Project. Compliance requirements with NRCan regarding explosives will be the responsibility of the Contractor. Transportation permits are also required for the explosives, but it is expected that these will be handed by the sealift companies who will be transporting the materials on behalf of the contractor.

5.15 Canadian Coast Guard and Nav Canada

Nav Canada (NavCan) has confirmed that they need to be engaged to confirm if Notice to Airmen (NOTAM) communications for blasting will be required for the Project (NavCan 2021). The contractor will be responsible for engaging with NavCan a minimum of 30 days prior to blasting to confirm requirements.

The contractor will be responsible for communications with the CCG Marine Communications and Traffic Services Centre (MCTS) to file appropriate Navigational Warnings (NAVWARNs) so that marine construction activities can be communicated to mariners. NAVWARNs are required regardless of construction being performed with marine- or land-based equipment for all construction that occurs below the HWL.

5.16 Nunavut Tunngavik Inc.

The Nunavut Tunngavik Inc (NTI) coordinates and manages Inuit responsibilities set out in the Nunavut Agreement and ensures that governments (federal, territorial) fulfil their obligations (NTI 2020b). The NTI board of directors is composed of elected members registered under the Nunavut Agreement. Six of the of the members are the QIA presidents (in the case of Arctic Bay relevance is the QIA president and vice president) (NTI 2020a).

The NTI will not be issuing a permit for the Project, and are technically already being engaged through communications with the QIA, however an information package in both English and North Baffin Inuktitut was submitted to the NTI on June 30, 2021 (Advisian-Ikpiaryuk JV 2021g; DFO-SCH 2021b).

5.17 Expected Permits

See Table 5-1 for a summary of Project permits.

Table 5-1 Summary of Federal, Territorial and Municipal Permitting Requirements

Regulatory/Authorizing Authority	Construction Activity	Required Authorization/ Permit/Approval	Permit Holder	Legislation
Inuit Boards				
Nunavut Planning Commission (NPC)	Development of land and water resources within Nunavut	Conformity Determination (149437)	Fisheries and Oceans Canada (DFO)-Small Craft Harbours (SCH)	*Nunavut Land Claims Agreement Act* (Nunavut Agreement, or NA) Article 11 *Nunavut Planning and Project Assessment Act* (NuPPAA) *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (NWNSRTA) (*Nunavut Waters and Nunavut Surface Rights Tribunal Act* 2002) (*Nunavut Waters and Nunavut Surface Rights Tribunal Act* 2002) (*Nunavut Waters and Nunavut Surface Rights Tribunal Act* 2002) (*Nunavut Waters and Nunavut Surface Rights Tribunal Act* 2002) (*Nunavut Waters and Nunavut Surface Rights Tribunal Act* 2002) (*Nunavut Waters and Nunavut Surface Rights Tribunal Act* 2002) (*Nunavut Waters and Nunavut Surface Rights Tribunal Act* 2002) Nunavut Water Regulations. https://laws-lois.justice.gc.ca/eng/acts/N-28.75/page-2.html#h-370569
Territorial				
Nunavut Impact Review Board (NIRB)	Any development of land and water resources within Nunavut as determined by NPC's conformity determination	Screening Decision Report (SDR) (SDR not issued, Permit No. 21UN004)	DFO-SCH	NuPPAA https://laws-lois.justice.gc.ca/eng/acts/N-28.75/page-2.html#h-370569
Nunavut Water Board (NWB)	Potential for withdrawal of freshwater or the need to cross freshwater crossings for haul road construction	Type B Water Licence	contractor	*Nunavut Waters and Nunavut Surface Rights Tribunal Act*, Nunavut Water Regulations https://www.canlii.org/en/ca/laws/regu/sor-2013-69/latest/sor-2013-69.html
	Potential for diversion of small drainage ditch within SCH footprint	Type B Water Licence	DFO SCH	
GN-Community and Government Services (GN-CGS)	Construction on Commissioners Land or Untitled Municipal Lands. Not expected to be required as the Quarry Administration Agreement (QAA) will be in place which allows the Hamlet to issue a quarry permit. However, if stockpiling occurs outside of the quarry area, the contractor may be required to obtain a Land use Permit (LUP) from GN-CGS	LUP	contractor (if required)	*Commissioners Land Act* https://www.justice.gov.nt.ca/en/files/legislation/commissioners-land/commissioners-land.a.pdf Commissioners Land Regulations https://www.lands.gov.nt.ca/en/policies-and-legislation Hamlet of Arctic Bay Land Administration By-Law, Consolidation of Explosives Use Act https://laws-lois.justice.gc.ca/eng/acts/e-17/FullText.html
Federal				
Fisheries and Oceans Canada (DFO)	In water or near water works associated with the construction of the SCH that have the ability to result in the harmful alteration, disruption or destruction of fish habitat or in the death of fish, as defined under the *Fisheries Act*. This will include potential effects to both marine and freshwater courses (if determined to be fish bearing, e.g. water crossings, blasting near water).	*Fisheries Act* Authorization (FAA)	DFO-SCH	*Fisheries Act* https://laws-lois.justice.gc.ca/PDF/F-14.pdf

Regulatory/Authorizing Authority	Construction Activity	Required Authorization/ Permit/Approval	Permit Holder	Legislation
Environment and Climate Change Canada (ECCC)	Disposal of dredged material at sea at an approved location.	Disposal at Sea (DAS) Permit	DFO-SCH	*Canada Environmental Protection Act* (CEPA): DAS Regulations http://laws-lois.justice.gc.ca/eng/acts/c-15.31/ http://laws-lois.justice.gc.ca/eng/regulations/SOR-2001-275/
Transport Canada (TC)	In-water works associated with the construction and operations of the SCH that have the potential to interfere with navigation.	NoW Approval	DFO-SCH	*Canadian Navigable Waters Act* (CNWA) http://laws-lois.justice.gc.ca/PDF/N-22.pdf
Natural Resources Canada (NRCan)	Blasting – For any industrial explosive that is to be imported into or manufactured, transported, possessed or used in Canada. Transport, storage and acquisition of explosives *it is assumed that the sealift company manages responsibility for permits for transportation of explosives	Authorization of Explosives Magazine Licence Application	contractor	*Explosives Act* (Section 7): Explosives Regulations (2013) Act: http://laws-lois.justice.gc.ca/PDF/E-17.pdf Regulation: http://laws.justice.gc.ca/PDF/SOR-2013-211.pdf
Municipal				
Hamlet	Quarry use and operation	Quarry permit	contractor	*Nunavut Land Claims Agreement Act,* Article 14 (Planning and Lands Section)
	Use of explosives	LUP	contractor	Workers Safety and Compensation Commission (Workers' Safety and Compensation Commission (WSCC) | WSCC | Workers' Safety and Compensation Commission) Arctic Bay By-Law 54 Land Administration (CGS Planning & Lands - Community Plans and Zoning By-laws (cgs-pals.ca)

6 Description of the Existing Environment & Socio-Economic Conditions

An ESEB study was conducted between 2019 and 2021 to determine the existing environmental and socio-economic conditions at the Project site. Information on the physical, biological, socio-economic, and archaeological environment was gathered from a combination of desktop review, field programs, and IQ. Desktop review and field survey methodologies are provided in the ESEB report with high level summaries provided in the respective sections below.

6.1 Valued Ecosystem Component and Valued Socio-Economic Components

Determination of VECs and VSECs for the Project was done in collaboration with the community and key stakeholders and guided by NIRB's Proponent Guidance document (NIRB 2018). This allowed for an assessment of the potential environmental and socio-economic effects of the Project including its anticipated impacts on VECs and VSECs of residents and SCH users.

The scope of the ESEB Advisian-Ikpiaryuk JV (2021d) included the following VECs and VSECs to inform the assessment of potential effects and in support of the regulatory process (see Table 6-1 for definition):

- Physical
  - Designated Environmental Areas
  - Geological Site Conditions
  - Surface Features
  - Ground Stability and Permafrost
  - Hydrology
  - Air Quality
  - Noise
  - Climate Conditions
  - Marine Sediment and Water Quality
  - Coastal Morphology
  - Bathymetry
  - Tides and Current
- Biological
  - Terrestrial Vegetation (including rare plants)
  - Terrestrial Wildlife (including habitat and migratory patterns)
  - Migratory and Marine Birds (including habitat and migratory patterns)
  - Fish Habitat (including marine vegetation)
  - Fish and Marine Mammals
  - Species at Risk

- Socio-Economic
  - Employment, Training and Business Opportunities
  - Land and Resource Use
  - Local and Regional Traffic Patterns
  - Human Health and Community Wellness
  - Community Infrastructure and Services
  - Archaeological and Culturally Significant Sites

Table 6-1 Definition of VEC and VSEC as by NIRB

Valued Ecosystem Components	Valued Socio-Economic Components
Those aspects of the environment considered to be of vital importance to a particular region or community, including: 2. Resources that are either legally, politically, publicly or professionally recognized as important, such as parks, land selections, and historical sites 3. Resources that have ecological importance 4. Resources that have social importance.	Those aspects of the socio-economic environment considered to be of vital importance to a particular region or community, including components relating to the local economy, health, demographics, traditional way of life, cultural well-being, social life, archaeological resources, existing services and infrastructure, and community and local government organizations.

Source: NIRB (2007)

6.2 Study Areas

Study Areas were designed to support the ESEB study and to facilitate the identification of potential impacts to the physical, biological and socio-economic environment (see Figure 1-1).

Study Areas for each Project component were determined based on potential construction footprints for the SCH, haul road and quarry. The Study Areas for the quarry and haul road include the potential locations, either existing or new construction options, plus a 100 m buffer. When referenced together, the haul road and quarry is referred collectively as the Haul Road Quarry (HRQ) Study Area. The revised quarry footprint for what will be permitted by the Hamlet is larger than what was proposed in the field program (Study Area in Figure 1-1, revised quarry footprint in Figure 2-1). However, this still is included in the HRQ Study Area, and therefore has been considered for potential effects. The DAS site footprint is unknown at this time, but based on Advisian's experience with similar projects, it was estimated to be 100 m x 100 m and, thus the DAS Study Area is 200 m x 200 m. When all Study Areas are discussed, they are collectively referred to as the Project Study Areas.

The Socio-Economic Study Area includes an area within the municipal borders of Arctic Bay and the marine environment where socio-economic effects of the proposed development are likely to occur.

During the operations phase, the SCH Study Area is the only one to consider as the quarry, haul road and potential DAS site are only required during the construction phase to support the development of the SCH.

Study Areas pertinent to the VECs/VSECs when discussing existing conditions, potential effects and proposed mitigation/monitoring measures are identified in Table 6-2.

Table 6-2 Project Study Areas Pertinent to VECS and VSECS

VEC/VSEC	Study Area
Physical	
Designated Environmental Areas	Project
Geological Site Conditions	SCH, Quarry
Surface Features	SCH, Quarry
Ground Stability and Permafrost	Project
Hydrology	SCH, DAS
Air Quality	Project
Noise	Project
Climate Conditions	Project
Marine Sediment and Water Quality	SCH, DAS
Coastal Morphology	SCH
Bathymetry	SCH
Tides and Currents	SCH, DAS
Biological	
Terrestrial Vegetation (Including Rare Plants)	HRQ
Terrestrial Wildlife (Including Habitat and Migratory Patterns)	HRQ
Migratory and Marine Birds (Including Habitat and Migratory Patterns)	Project
Fish Habitat (Including Marine Vegetation)	SCH, DAS
Fish and Marine Mammals	Project
SAR	Project
Socio-Economic Conditions	
Population, Education and Employment	Socio-Economic Study Area
Land and Resource Use	
Local and Regional Traffic Patterns	
Human Health and Community Wellness	
Housing and Community Infrastructure and Services	
Archaeological and Culturally Significant Sites	Project (SCH limited to intertidal extent)

6.3 Supporting Documentation

Documents that have been developed in support of design and regulatory compliance requirements are summarized in Table 6-3.

Table 6-3 Arctic Bay Harbour Development Supporting Documentation

Name	Purpose	Reference
Project Description	This document summarizes the Arctic Bay SCH project as a submission requirement for the Nunavut Impact Review Board.	(Advisian-Ikpiaryuk JV 2021e)
Environmental & Socio-Economic Baseline Report	This report builds upon the initial ESEB Survey produced in 2020 as part of the Advisian Feasibility Study. It works to define existing conditions of the site and assess potential Project effects to inform the regulatory process.	(Advisian-Ikpiaryuk JV 2021d)
Community Consultations	This report summarizes the activities and feedback received from the community during consultations conducted throughout the Advisian Feasibility Study.	(Advisian 2019a)
Seismic Refraction and Sub-Bottom Profiling Survey Report	Appended to the initial geological assessment for Arctic Bay, this document aimed at classifying the subsurface material and bedrock overburden within the SCH footprint.	(Frontier 2019)
Archaeological Impact Assessment	To preliminarily survey the Project site for areas of archaeological significance.	(Lifeways 2019)
Arctic Bay Community Feedback Notes	This document summarizes feedback received from the community during consultations conducted by DFO-SCH in February 2020 after completion of the feasibility study.	(DFO-SCH 2020a)
Arctic Bay Small Craft Harbour Development – First and Second Consultation Summary Reports	These reports summarize the feedback received from the community during the first and second consultations of the harbour development.	(Advisian-Ikpiaryuk JV 2020b) and (Advisian-Ikpiaryuk JV 2021j)
Coastal Processes and Wave Climate Report	This report summarizes modelling conducted of the coastal processes and sedimentation patterns of the existing and future SCH configurations. It also outlines a wave climate and agitation study executed to confirm the future harbour will be compliant within harbour guidelines and be functional and safe for users.	(Advisian-Ikpiaryuk JV 2021a)

Name	Purpose	Reference
Community Consultation Log	The Consultation Log provides a detailed record of consultation activities that have occurred in support of the Project since the Feasibility Study. It details the dates and location of meetings, the participating individuals or organization, the input received and how the Project addressed the input, such as through design modification or the development of mitigation and/or management plans.	(Advisian-Ikpiaryuk JV 2021b)
Construction Environmental Management Plan	This plan has been developed that details measures to be implemented to minimize negative environmental and socio-economic impacts associated with the construction phase of the Project.	(Advisian-Ikpiaryuk JV 2021c)

6.4 Physical Conditions

Artic Bay, which is located on the western coast of the Borden Peninsula of northern Baffin Island, experiences long, cold winters and short ice-free periods in the open-water season. Marine and tundra environments with exposed valley walls, talus slopes, and steep cliff faces rising above the ocean are characteristic of the area.

6.4.1 Designated Environmental Areas

The United Nations *Convention on Biological Diversity* (CBD) known as Aichi Target 11 (Convention on Biological Diversity 2010), committed countries, including Canada, to conserving 10% of coastal and marine areas by 2020. On August 1, 2019, Canada had met and exceeded this goal reaching 14% with recent Arctic designations (National Observer 2019). The announcement of the TI NMCA contributed to this goal. NMCAs, Ecologically and Biologically Significant Areas (EBSAs), Important Bird Areas (IBAs), and Migratory Bird Sanctuaries (MBS) are all ultimately designed and designated for the protection or conservation of species and species habitat. Information on these designated areas as they relate to the Project are identified below.

Federally, marine habitat designations are managed by Parks Canada, DFO, and TC. These three federal bodies signed the IIBA (Government of Canada 2019g) along with the QIA. The IIBA covers the requirements for any protected areas established within Canada's High Arctic Basin (Tuvaijuittuq) (Atlas of Marine Protection 2019).

The NBRLUP (NPC 2000b) has also presented existing and proposed protected areas, including the TI NMCA described below.

6.4.1.1 National Marine Conservation Areas

NMCAs are managed by the federal government through Parks Canada, DFO and TC. The purpose of these areas is to protect and conserve representative marine habitat for the benefit, education and enjoyment of Canadians (Government of Canada 2019f). NMCAs are established to represent a marine region and include protection of the seabed, water column above it and may include wetlands, estuaries, islands, and

other coastal lands (Parks Canada 2017). They are protected from activities such as ocean dumping, undersea mining, and oil and gas exploration and development. Traditional fishing activities are permitted but are managed for ecosystem conservation. Specifically, as defined by Parks Canada (2017) NMCAs are designed and designated to:

- Represent oceanic and lake diversity
- Maintain ecological processes and life support systems
- Provide a model for sustainable use of marine species and ecosystems
- Encourage marine research and ecological monitoring
- Protect depleted, vulnerable, threatened or endangered marine species and their habitats
- Provide for marine interpretation and recreation
- Contribute to a growing worldwide network of marine protected areas

Tallurutiup Imanga National Marine Conservation Area

The establishment of the TI NMCA (Government of Canada 2019h; Inuit Tapiriit Kanatami 2019) was announced on August 1, 2019. However, an order designating the TI NMCA under the *Oceans Act* has not been issued at the time of this report (Government of Canada 2021b). The new TI NMCA is approximately 108,000 km^2 and accounts for 1.9% of Canada's 14% protected coastal and marine areas (Government of Canada 2019e). Arctic Bay is within the TI NMCA, however, there is an area in the waters fronting Arctic Bay that has been excluded to allow for the development of a SCH (including the potential DAS site) through Article 4 of the IIBA (IIBA 2019).

6.4.1.2 Ecologically and Biologically Significant Areas

EBSAs are areas within Canada's oceans that have been identified through formal scientific assessments as having special biological or ecological significance when compared with the surrounding marine ecosystem (DFO 2004). The identification of EBSAs is a key component of basis for the development of federally designated areas (Cobb 2011). EBSAs are designated by government using criteria set out and facilitated by the Conference of the Parties to the CBD (CBD 2019). The criteria include:

- Uniqueness or rarity
- Special importance for species' life history
- Important for at-risk species and habitats
- Vulnerability, fragility, sensitivity, or slow recovery
- Biological productivity and diversity
- Naturalness

There are five Arctic marine biogeographic units for which EBSAs are identified: Arctic Basin, Western Arctic, Arctic Archipelago, Eastern Arctic, and Hudson Bay Complex. Arctic Bay is within the Eastern Arctic ecoregion; ID 2.10: Baffin Island Coastline (DFO 2011, 2015b). The EBSAs are also demonstrated in the NBRLUP, Schedule B.

Admiralty Inlet is designated as an EBSA and includes both Baillarge Bay and Berlinguet Inlet IBAs. It is inclusive of Victor Bay and Adams Sound which are just north and south of the Project, respectively (Schimnowski et al. 2018). Although Admiralty Inlet was identified primarily based on narwhal summering stock aggregations, water current interactions between Admiralty Inlet and Lancaster Sound create localized enrichment of nutrients ideal for seabird foraging (Mallory & Fontaine 2004).

6.4.1.3 Important Bird Areas

IBAs are sites that have been identified as internationally significant for the conservation of birds and biodiversity (Bird Studies Canada 2019). IBAs support birds such as threatened species, large congregations of birds, and birds restricted in range or habitat. These IBAs are identified according to internationally agreed upon, standardized, quantitative, and scientifically defensible criteria. IBAs have been identified for their global and continental significance for species that congregate, and concentrations of waterfowl, and colonial waterbirds and seabirds. Though IBAs are located outside the Project Study Areas, birds are highly mobile, and most are migratory. Consequently, there is potential for these species to occupy, stop-over, or pass through on their way to nearby IBAs. IBAs have also been identified as key bird and habitat sites, and in some cases are also designated as an EBSA (DFO 2015a; W. W. F. C. Oceans North Conservation Society, and Ducks Unlimited Canada, 2018).

Baillarge Bay and Berlinguet Inlet are IBAs located approximately 35 km north (northeast shore of Admiralty Inlet) and 72 km south (south shore of Admiralty Inlet) of the Project, respectively (Bird Studies Canada 2019).

6.4.1.4 Migratory Bird Sanctuaries

Under the *Migratory Birds Convention Act*, ECCC, through the Canadian Wildlife Service, can establish MBSs on federal, provincial/territorial, or private land to protect terrestrial and marine habitat and provide safe refuge for migratory birds (Government of Canada 2017). Once established, hunting of a listed species is not permitted, and rules and prohibitions are established with respect to taking, injuring, destruction, and molestation of migratory birds, their nests, or eggs. There are no migratory bird sanctuaries near the Project Study Areas.

6.4.1.5 Polynyas

Sea ice is a fundamental component of Arctic environments that has a significant effect on the spatial and temporal distribution of marine life across all trophic levels. This influence subsequently has shaped socio-economic and cultural practices for the Inuit who depend on the harvest of these animals. Polynyas and ice edge habitat, characteristically areas of higher productivity, have a long history of cultural significance to the Inuit (NPC 2000b). A polynya is an area of open-water that remains ice-free all year-round (National Snow & Ice Data Center) (NSIDC 2019). There are 23 polynyas in Canada's Arctic. The closest polynya to the Project is the Lancaster Sound polynya which is about 150 km to the north (Canadian Geographic 2019). The presence of polynyas has contributed to some EBSA designations. Canadian Geographic provides an interactive map which provides details on specific polynyas of interest (Canadian Geographic 2019).

6.4.1.6 North Baffin Regional Land Use Plan

Existing and proposed protected areas in the NBRLUP are demonstrated in NPC's interactive maps from 2014 and 2016 (NPC 2019):

2014 Interactive Maps

- Schedule A: Land Use Designations Interactive Map
- Schedule B: Direction to Regulators Interactive Map
- Community Priorities and Values Interactive Map

2016 Interactive Maps

- Schedule A: Designations
- Schedule B: Valued Ecosystem and Socio-Economic Components
- 7Schedule B1: Terrestrial Valued Components
- Schedule B2: Cariboo Ranges Valued Ecosystem Components
- Schedule B3: Marine Valued Components

6.4.1.7 National Parks

Nunavut has five national parks. Sirmilik National Park is the closest and is located approximately 200 km east of the Project.

Sirmilik National Park

Sirmilik National Park was established in 2001 (The Canadian Encyclopedia 2019) and protects 22,252 km^2 of geological, natural history, and cultural values within the Eastern Arctic Lowlands and North Davis Natural Regions (Parks Canada 2016). It is located on North Baffin Island, extending from the eastern entrance to Admiralty Inlet to west of the Hamlet of Pond Inlet, approximately 200 km east of Arctic Bay (NPC 2016). The park is divided into four parcels: Bylot Island, Borden Peninsula, Baillarge Bay, and Oliver Sound. With respect to wildlife, Sirmilik hosts the most diverse avian community in the high Arctic with more than 74 species of birds, of which 45 are confirmed breeders. Bylot Island has up to 320,000 thick-billed murres and 50,000 black-legged kittiwakes. In addition to its avian diversity, 19 mammal species inhabit Bylot Island, of which, nine are terrestrial (Université of Laval 2016).

6.4.1.8 Territorial Parks

The GN-DoE put out a call for people interested in participating in a joint planning and management committee for four territorial parks, which included Kinngaaluk Territorial Park near Sanikiluaq, Aguttinni Territorial Park near Clyde River, Napartulik Territorial Park near Grise Fiord and Kugluk Territorial Park near Kugluktuk. The Committees are composed of six people, based on interest, knowledge, Inuit culture and heritage. Community interest in the development of territorial parks is based on; Inuit rights to continue to use and enjoy parks; protecting culturally significant sites and important wildlife areas; promoting cultural

and natural heritage; and developing economic and education benefits (Nunuvut News Online 2019). There are no territorial parks near Arctic Bay.

6.4.2 Geological Site Conditions

Bedrock geology near the community forms part of the Arctic Bay and Society Cliffs Formations (see Figure 6-1), which are part of the Eqalulik and Uluksan Groups, respectively. The Arctic Bay formation predominantly consists of mudstones (shale) and is understood to be approximately 200 m thick (Turner 2009). The overlying Society Cliffs Formation comprises dolostone. The area also includes predominantly northwest or north-northwest trending igneous dykes (Pehrsson & Buchan 1999; Turner 2009) associated with the Franklin igneous event (approximately 723 million years ago).

The geotechnical field survey confirmed that both quarry sites northwest of the community comprise predominantly slightly to moderately weathered surfaces, frost shattered in part, dark grey to black diorite. Both are part of the same diorite dyke that extends approximately 3 km, trending northwest to southeast.

An assessment of acid rock drainage (ARD) and metal leaching (ML) potential was conducted on one rock sample representative of the major rock type from the proposed quarry locations. ARD/ML testing results indicated basic or alkaline tendency, with very low concentrations of acid generating potential (AGP). Methods and results are provided in Section 6 and Appendix 5 of the ESEB (Advisian-Ikpiaryuk JV 2021d). Subsequent testing of four (4) rock samples collected from drilling of the dyke confirms the rock is non potentially acid generating (non-PAG).

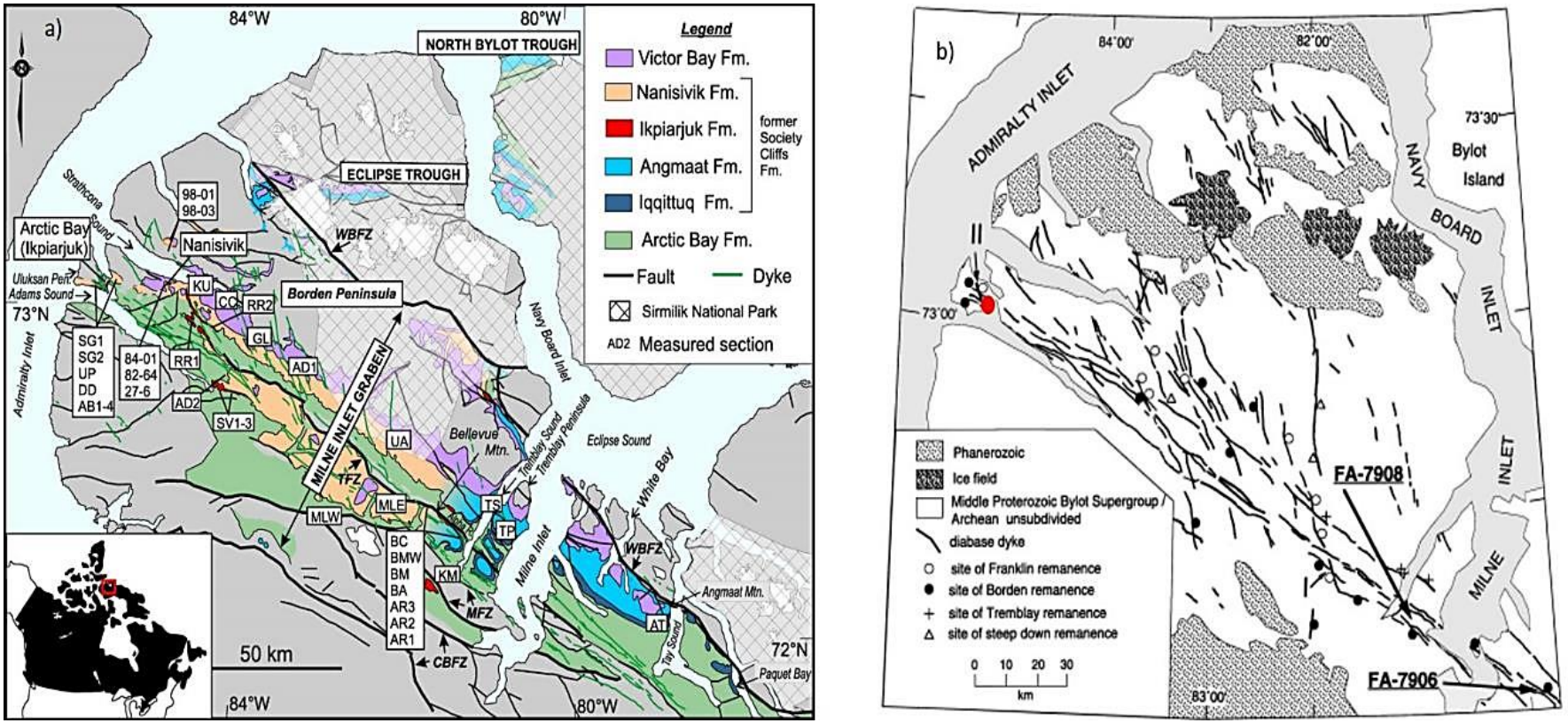


Figure 6-1 Arctic Bay – Bedrock Geology

Source: a) Turner (2009); and b) Pehrsson and Buchan (1999)

6.4.3 Surface Features

Arctic Bay and the surrounding area are characterized by mountains and valleys which have either been carved out by glaciers or intruded by igneous dykes. Valley walls and cliffs are dominated by individual and coalescing rock fall talus cones and boulder tongues, with very steep rock walls at the top, becoming gentler due to the accumulation of talus nearer the base. The community is located at the northwestern head of the bay, which is relatively flat, sloping gently to the shoreline and from the shoreline the seabed also slopes gently into the bay.

The SCH Study Area shoreline is comprised mainly of coarse sub-rounded to angular gravel and cobbles with gravelly sand. The gravel and cobbles include various lithologies and occasional ice rafted boulders (beach deposits) are evident in the intertidal/supratidal area. The supra/intertidal zone contains coarser deposits compared to subtidal sediments which are predominantly sand with lesser amounts of gravel.

Drilling in March/April 2021 confirmed that the shallow subsurface sediments are consistent with the geophysical assessment completed in August 2019. The sediments overlying shallow bedrock are a combination of silty sands, clays and till.

Review of available aerial imagery showed patterned ground is present on slopes north of the community, which could indicate ice wedge polygons and/or solifluction processes within the seasonal active soil zones above the permafrost. There was no evidence of thermokarsts or standing water in the Quarry Study Area; no features were observed in the ground surface that may be associated with polygonal ground or ice lenses such as fractures.

6.4.4 Ground Stability and Permafrost

All of Baffin Island is in the Continuous Permafrost Zone (Osterkamp 2001), where the ground remains below 0°C for a minimum of two years (International Permafrost Association). As per Journeaux Associates (2012) there is no sub-sea permafrost in Nunavut (Figure 6-2). However, Advisian has experienced other projects (Nanisivik and Milne Inlet) where sub-sea permafrost was detected, therefore is likely to be present in Arctic Bay. It is expected that this permafrost will only occur deep within the bedrock. The permafrost of Baffin Island uplands has been estimated to be 400 to 700 m thick (Aarluk 2012) with a surface active layer that can vary widely from less than 1 m in wet soils to greater than 5 m in rock outcrop.

While melting permafrost could affect the structures, it is unlikely in this case since melting sub-sea permafrost is a relatively slow process (hundreds of years), and it is typically located well below the seabed surface, which in this case is within the stable bedrock.

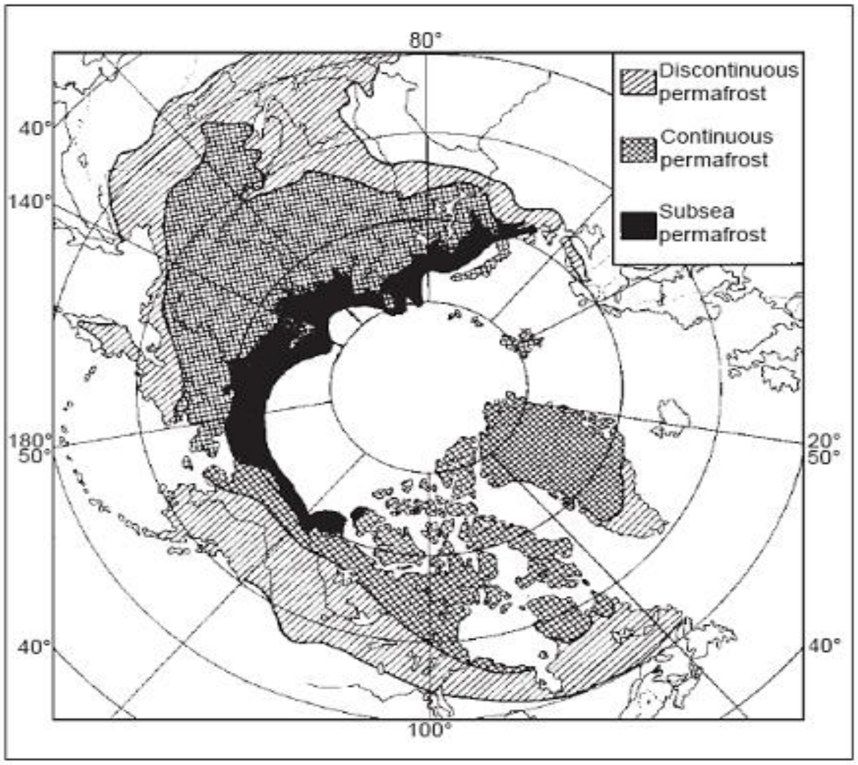


Figure 6-2 Distribution of Permafrost in Canada

Source: Brown et al. (1997)

6.4.5 Hydrology

The freshwater and marine watersheds pertinent to Arctic Bay are displayed in Figure 6-4 and described below.

6.4.5.1 Fresh Water

Drainage in Arctic Bay is controlled by valleys which also includes lakes that supply the community with drinking water. There are two lakes located north of the community, Dead Dog Lake and Alternate Water Supply Lake (see Figure 1-1 for location), which are connected by a small creek.

There are several small drainage ditches which flow through and/or around the community into the bay during the summer (see in figure 6-4). It is known that these are for surface drainage and are known to not be fish bearing (described in Section 11.3.2.1 of the ESEB (Advisian-Ikpiaryuk JV 2021d)).

6.4.5.2 Marine

Situated on the Northern shore of Adams Sound, water from Arctic Bay flows into Adams Sound, which feeds west into Admiralty Inlet, and ultimately flushes into Lancaster Sound at the north end of Baffin Island.

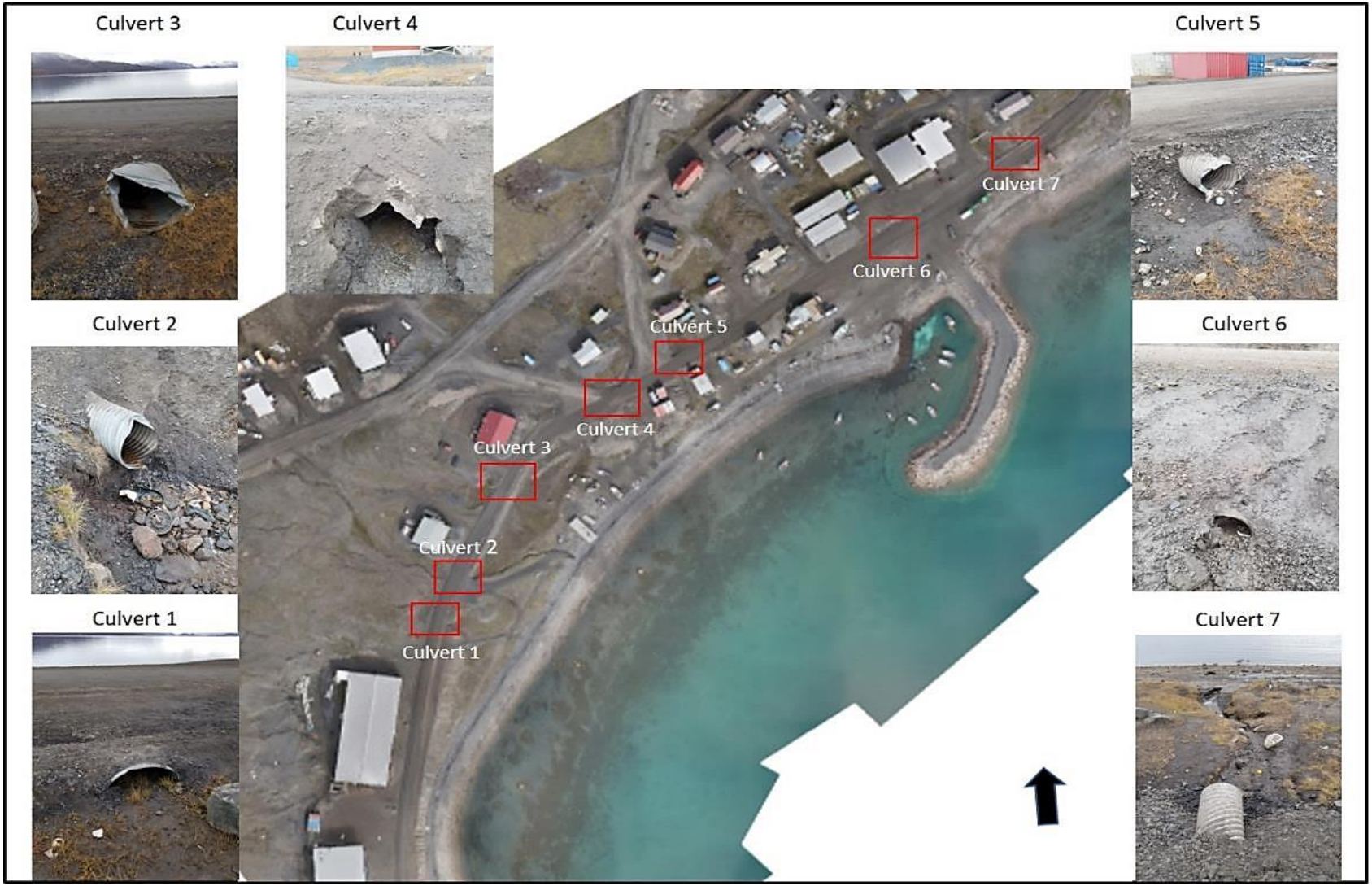


Figure 6-3 Small Craft Harbour Study Area Drainage Ditches

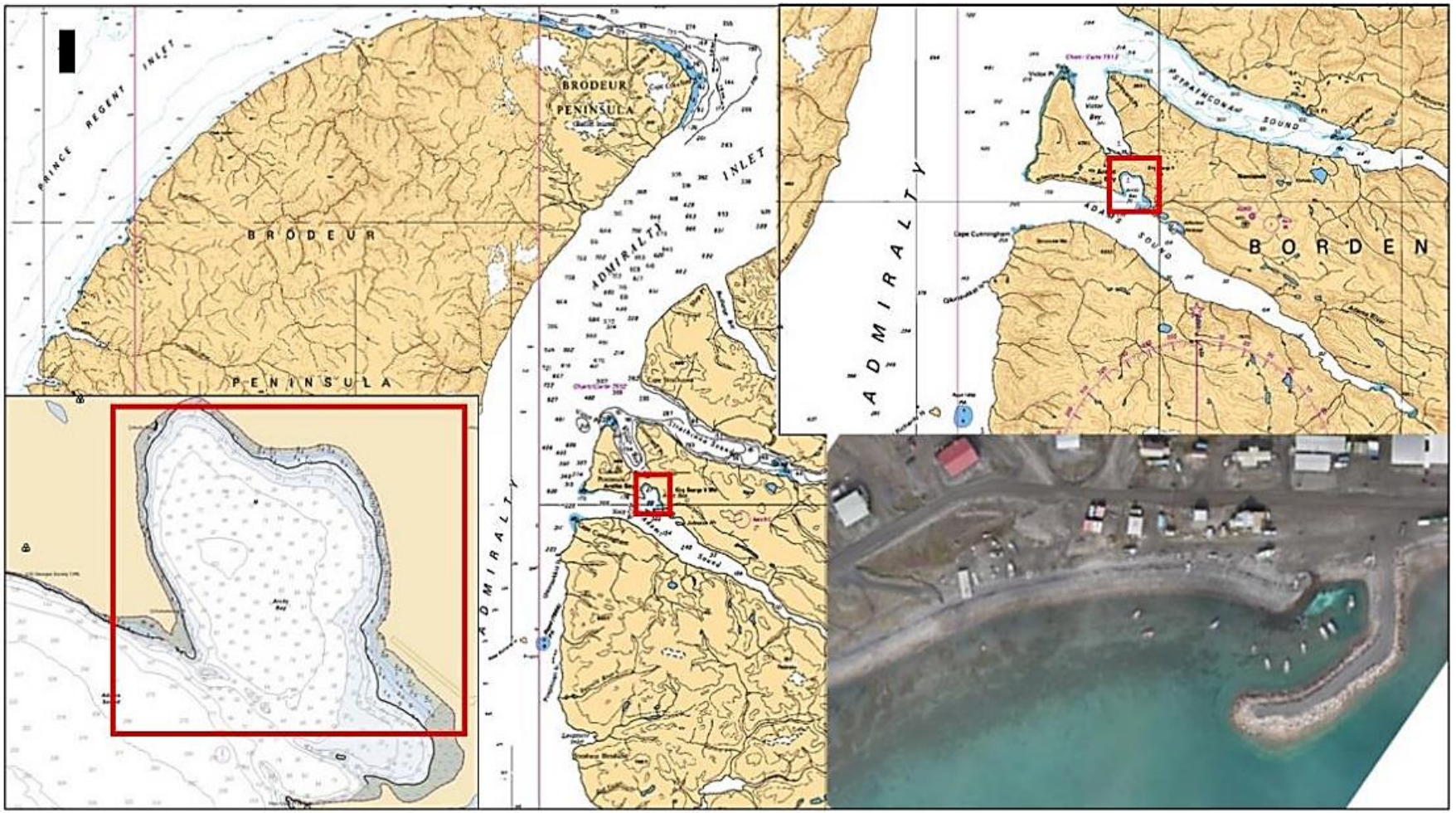


Figure 6-4 Marine Bodies Near Arctic Bay

6.4.6 Air Quality

Air quality data for Arctic Bay is not available, however Nunavut based data is available for Mary River (275 km southeast), Resolute (350 km northwest), Iqaluit (1,230 km southeast) and Alert (1,165 km north). Data when available was compared to the Nunavut Ambient Air Quality Standard (Government of Nunavut 2011a).

Regional air quality monitoring was conducted for North Baffin Island as part of the Baffinland Project, Environmental Assessment (EA, (RWDI Air Inc. 2008)). Ambient air quality was measured in July 2007 in Mary River (300 km south east of the Hamlet). Total Suspended Particles (TSP) measurements ranged from 3.5 to 7.0 µg/m^3 (RWDI Air Inc. 2008). This is much lower than the 24-hour standard of 120 µg/m^3 and annual standard of 60 µg/m^3 outlined in the Nunavut Ambient Air Quality Standard (Government of Nunavut 2011a). Due to the short duration of the measurement, the results were compared to long-term monitoring data locations in remote, northern areas operated by the GN DoE and Natural Resources in Northwest Territories (NWT). The measured concentrations for the Baffinland Project were also lower than measurements from all comparison sites in the NWT (RWDI Air Inc. 2008). Similarly, particulate matter 10 micrometres or less (PM_{10}) concentrations ranged from 1.5 to 3.8 µg/m^3 which was comparable to the annual average concentrations measured in NWT (RWDI Air Inc. 2008). Note that there is no PM_{10} ambient air quality standard in Nunavut to compare with these measurements. The 30-day average sulphur dioxide (SO_2) (≤0.262 µg/m^3), nitrogen dioxide (NO_2) (≤0.188 µg/m^3), and ozone (O_3) (range from 44.0 to 52.8 µg/m^3) concentrations were well below 1-hour, 24-hour, and annual standards (RWDI Air Inc. 2008). Therefore based on RWDI Air Inc. (2008) analysis, the baseline air quality in Mary River is considered pristine and typical of remote Arctic environments.

Air quality monitoring conducted in Resolute and Kinngait (formerly Cape Dorset) in 2013 determined that waste burn, airport operations and town activities such as vehicle traffic, residential combustion and power generators contributed to nitrogen oxide (NO_X) and $PM_{2.5}$ pollution (Aliabadi et al. 2015). SO_2 pollution was affected by airport activities and ships anchoring in position (Aliabadi et al. 2015). Resolute is a coastal community in northern Nunavut, approximately 350 km northwest of Arctic Bay and air quality is expected to be similar. In the absence of ships, the measured NO_X concentration was less than 1.3 µg/m^3 (Aliabadi et al. 2015). This is much lower than the Nunavut standards: 400 µg/m^3 (1-hour); 200 µg/m^3 (24-hour); and 60 µg/m^3 (annual). The maximum measured SO_2 concentration was 1.05 µg/m^3, which is much lower than the Nunavut standards: 450 µg/m^3 (1-hour); 150 µg/m^3 (24-hour); and 30 µg/m^3 (annual). The $PM_{2.5}$ concentration was up to 10 µg/m^3, which is lower than the 24-hour standard of 30 µg/m^3.

There are currently two active monitoring stations in Nunavut as part of the National Air Pollutant Surveillance (NAPS) Program. These two monitoring stations are located in Iqaluit (Water Lab, NAPS ID: 129303) and Alert (NAPS ID: 129401), approximately 1,210 km southeast and 1,150 km north-northeast of the Project respectively. Measurements recorded at the Alert station are incomplete and so only the Iqaluit station is shown.

The most current year with a full year of data is 2019. Results are summarized in Table 6-4 and were compared to Nunavut air quality standards (Government of Nunavut 2011a).

Table 6-4 Iqaluit Air Quality Monitoring Results in 2019

Measured Pollutant	Averaging Period	Concentrations (µg/m³) unless otherwise specified		Percent of Standard
		Nunavut Air Quality Standards	Water Lab	
$PM_{2.5}$	24-hour	30	20	67
TSP	24-h	120	n/a	n/a
	Annual	60	n/a	n/a
O_3	8-hour	65 ppb	38 ppb	58
NO_2	1-hour	400	79	<30
	24-hour	200	56	
	Annual	60	6	
SO_2	1-hour	450	8	<3
	24-hour	150	3	
	Annual	30	0.5	

Source: Government of Nunavut (2011a).

6.4.7 Noise

Noise data specific to the Project Study Areas was not available. It is assumed that noise would be generated from several sources including automobiles, aircrafts and ATVs/snowmobiles and general equipment used in the Hamlet. The Project site is adjacent to a busy road which is currently used frequently by trucks and other vehicles accessing the existing breakwater and nearby residential and commercial properties. The area is also frequently used in winter by snowmobiles accessing the ice. The sources described may emit noise for short periods of time and noise effects diminish with distance from a source.

6.4.8 Climate Conditions

Typical of high latitude areas, Arctic Bay experiences extremes of total darkness or total light at certain periods of the year. During the months of 24-hour sunlight, from May to August, temperatures on average reach 7.5°C, with the warmest recorded temperature being 18.5°C (June 2000). February is Arctic Bay's coldest month when temperatures on average reach -33.2°C with the coldest recorded temperature being -53°C (February 1979) (Government of Canada 2020b).

Precipitation in Arctic Bay typically falls as snow through all twelve months of year, with the greatest rainfall occurring during July and August. Average monthly snowfall ranges from 52 mm in February to 382 mm in October. (Government of Canada 2020b). Snow depth ranges from 320 mm in March to clear of snow in July (Government of Canada 2020b).

Sea ice is present most of the year in Arctic Bay, with a short open-water (ice-free) season from mid-July to early October (see Section 6.4.12). The Arctic has been experiencing a significant reduction in multi-year sea ice (MYI). Currently over 70% of the Arctic sea ice is first-year-ice (FYI) and melts seasonally. In Arctic Bay, the presence of MYI is 1% to 15% during the time of ice break-up. Icebergs are common in Lancaster Sound and Admiralty Inlet. Occasionally icebergs make their way into Adams Sound and can enter Arctic Bay.

Prevailing winds at Arctic Bay are northwesterly through July and August but turn to east or southeast through September and October. Winds in Arctic Bay are strongest from the southeast, south and southwest. Extreme wind analysis for the open-water season showed that over a one-year return period, the strongest winds occur from the southeast and reach up to 12.7 m/s (45 kph). In general, the strongest winds occur in the fall and early winter months (September to January), with the greatest frequency of windstorms in October and November.

6.4.9 Marine Sediment and Water Quality

Sediments in the SCH Study Area consist primarily of sand, ranging from 50% to 70%, with varying amounts of gravel, silt, and clay. Areas near the existing breakwater are predominately clay and silt with less sand and gravel, likely influenced by the structure of the breakwater. The intertidal zone contained sand and larger substrates like gravel and cobble, while the subtidal zone was primarily sand with less gravel.

As determined during field surveys, marine water quality in Arctic Bay was consistent across location and depth, except for dissolved oxygen which decreased with depth. Physicochemical parameters at AB WQ2 were consistent with depth, but greatly increased in value from 12 m to 14 m. Visual observations in this sampling location confirmed a higher turbidity than other locations.

Concentrations of metals were generally consistent within Arctic Bay. Large spikes in lead and antimony concentrations observed at one sampling site were attributed to the disposal and dumping of lead-acid batteries from a historic weather station near the breakwater (please see Table 5-2, Section 5.3 of the ESEB). Mercury concentrations at one sampling location exceeded Canadian Council of Ministers of the Environment (CCME) Interim Sediment Quality Guidelines (ISQG), CCME Probable Effects Level (PEL), and DAS regulations; however, the source of the high concentration is unknown (see Table 5-2, Section 5.3 of the ESEB (Advisian-Ikpiaryuk JV 2021d)).

Metal concentrations in sediments depend largely on regional and local geology and oceanography, particle size and proximity to contaminant sources (Nunavut General Monitoring Plan (NGMP 2013)), but comparisons of metal concentrations in this area cannot be made due a lack of studies available in the literature. Dissolved metal concentrations are generally comparable to total concentrations, indicating that metals are not bound to solids, except for total aluminum, copper, iron, and zinc. No CCME guidelines exist for these parameters, however, all metal concentrations were below respective long term CCME water quality guidelines for the protection of marine species (CCME 1999). There are no apparent trends in metal concentrations, major ions, and nutrients with depth or location.

Half of the analyzed Polycyclic Aromatic Hydrocarbons (PAHs) were below CCME ISQG regulations, and the remaining PAHs were below respective reportable detection limits (RDLs) but exceeded CCME ISQG regulations in 2020 due to the application of higher laboratory detection limits. PAHs were below CCME PEL and DAS regulations, and Polychlorinated Biphenyls (PCBs) were below CCME ISQG, CCME PEL, and DAS regulations.

Detailed information regarding the water quality and sediment field surveys, including methods and laboratory analysis, is provided in the Sections 4 and 5 respectively of the ESEB (Advisian-Ikpiaryuk JV 2021d).

6.4.10 Coastal Morphology

Arctic Bay and the surrounding area are characterized by mountains and valleys which have either been carved out by glaciers or intruded by igneous dykes. The community of Arctic Bay is located at the northwestern head of the bay, on the north arm of Adams Sound. The SCH Study Area is relatively flat, sloping gently to the shoreline. From the shoreline the seabed also slopes gently into the bay.

6.4.11 Bathymetry

Bathymetry in the vicinity of the SCH Study Area is depicted in Figure 1-2. Seabed elevation at the seaward extent of the existing breakwater is approximately – 2 m CD.

6.4.12 Tides and Currents

Tides in Arctic Bay are semidiurnal, with two high and two low tides in a lunar day (24.84 hours) (Hsiao 1992). In 2020, a tide gauge was deployed in Arctic Bay and obtained a 77-day tidal record to establish a set of updated tide levels. These updated tide levels were provided to Advisian by DFO-SCH (DFO 2020) and are provided in Table 6-5. Tide information can also be obtained from the Government of Canada tidal predictions website (Arctic Bay Tide Station No. 5865) (DFO 2021).

Currents in Arctic Bay are influenced by surface winds and the tide. As determined from a drogue drifter study in 2019, mean and maximum currents recorded were 0.16 m/s and 0.28 m/s respectively and net movement was toward the south during an ebb tide. The maximum current was located at the end of the drogue track, near the mouth of the bay entering into Adams Sound. Wind data collected from ECCC at the time of the survey indicates relatively calm weather during the track with light winds reaching 5 km/hr from the north (Government of Canada 2021a). These results are consistent with what would be expected to be typical of currents in Arctic Bay with a net southward movement.

Table 6-5 Tide Levels at Arctic Bay

Tide	Elevation (m, CD)
Extreme Predicted High*	3.3
Higher High Water Large Tide (HHWLT)	3.0
Higher High Water Mean Tide (HHWMT)	2.4

Tide	Elevation (m, CD)
Mean Water Level (MWL)	1.5
Lower Low Water Mean Tide (LLWMT)	0.6
Lower Low Water Large Tide (LLWLT)	0.0
Extreme Predicted Low*	-0.4

*Estimated, based on extremes at the reference station of Resolute Bay.

Source: DFO (2020)

6.5 Biological Conditions

Given the harsh climates of the region, biological diversity surrounding Arctic Bay are mostly limited to treeless landscapes, migratory birds, and marine ecosystems.

6.5.1 Terrestrial Vegetation (Including Rare Plants)

Most of Nunavut, including the HRQ Study Area, is located in the Tundra Biome and Northern Arctic Ecozone (Ecological Stratification Working Group [ESWG] 1995). The Northern Arctic Ecozone is among the largest Arctic ecosystems in the world and is divided into a number of ecoregions. The Project occurs within the Ecoregion 22 – Borden Peninsula Plateau. The dominant vegetation communities are herbaceous and lichen communities. Lichen communities are typical in rocky areas and occur in the HRQ Study Area while herbaceous communities are more common in in wetter and sheltered sites. Mixed low-growing herbs and shrubs species occur in warmer microsites with wet sites dominated by sedges (*Carex* spp.) and arctic willow (*Salix arctica* Pall.). There are more than 2,200 species of vascular plants in the Arctic, north of the tree line (Chester 2016).

Vegetation surveys of the terrestrial environment in the HRQ Study Area were conducted from August 9–10, 2019. An ecological land classification (ELC) field survey was completed to classify vegetation communities. All vascular and non-vascular species encountered were inventoried. Specimens of unknown species were collected and identified by a taxa expert.

Six distinct communities were identified: Upland Dwarf Shrub, Upland Lichen Barren, Wetland Dwarf Shrub Drainage, Wetland Graminoid Drainage, Disturbed Human-Caused, and Open Water. All communities appear to be typical of the Borden Peninsula Plateau Ecoregion within the Northern Arctic Ecozone of the Tundra Biome (ESWG 1995). The HRQ Study Area was dominated by the Upland Dwarf Shrub community and contained regionally common vegetation communities and plant species. This community was characterized based on the presence of rolling plateaus of frost shattered rocky outcrops and dwarf shrub vegetation.

There were 63 vegetation species identified, including seven shrub, 11 graminoid, 18 forb, 14 bryophyte, and 13 lichen species in the HRQ Study Area. No rare plants were identified during field surveys. The Upland Dwarf Shrub community contains many traditionally used plants, although there are no specific places within the HRQ Study Area where these plants are harvested or picked (IQ Workshop 2019 - Jonah

Oyukuluk; IQ Workshop 2019 - Olayuk Nagitarvik; IQ Workshop 2019 - Tom Nagitarvik; Mishak Allurut. pers. comm. June 2019).

6.5.2 Terrestrial Wildlife (including Habitat and Migratory Patterns)

In general, habitat near the SCH Study Area is anthropogenically disturbed and of limited value for terrestrial wildlife. Human development in the Hamlet extends to the edge of the ocean and the beach has structures and boats along its length. The buildings along the beach may provide cover for small mammals, and at low tide, the intertidal zone may provide limited foraging opportunities. However, the value of these areas for habitat is low given the amount of disturbance and frequent human activity.

Within the HRQ Study Area, habitats available for wildlife are considered to be moderate quality. The valley pass is frequented by human traffic crossing over towards Victor Bay from the Hamlet. Much of the terrain was undisturbed and comprised of upland shrubs with graminoids and wetland areas providing cover and foraging opportunities for wildlife. Security, escape, and thermal cover for some small mammals was present, and this may provide foraging opportunities for medium-sized mammals such as arctic fox (*Alopex lagopus*) and ermine (*Mustela ermine*).

A general reconnaissance survey of the HRQ Study Area was the focus of the wildlife fieldwork, which was conducted in conjunction with the vegetation survey. Incidental observations made outside the HRQ Study Area were included as part of the survey because some terrestrial wildlife are migratory or nomadic and travel long distances and have large home ranges. Two sets of fox tracks (suspected to be made by arctic fox) were identified at the north end of the HRQ Study Area. No other land mammals or terrestrial wildlife features (e.g. dens, burrows, diggings) were observed during the field survey.

6.5.3 Migratory and Marine Birds (including Habitat and Migratory Patterns)

In general, habitat in the SCH Study Area is of limited value to migratory and marine birds, given its location within the Hamlet. The beach is developed and has structures and boats along its length. For species that nest on bare ground or rocky areas (e.g. snow buntings: *Plectrophenax nivalis*) or are relatively tolerant of human disturbance (e.g. common raven: *Corvus corax*), there may be limited nesting habitat. However, human use and dogs likely discourage most nesting activity. At low tide, the intertidal zone provides foraging opportunities, but only for those species tolerant of human activity, such as gulls (*Larus* spp.), northern fulmars (*Fulmarus glacialis*), and ravens. Consequently, the value of these habitats is considered low given disturbance and human activity. The HRQ Study Area offers more natural habitat including wetlands, rocky outcrops, and vegetated areas, and therefore offers some value for nesting birds. No bird species would nest in the DAS Study Area.

The field survey focused on the SCH and HRQ Study Areas, but incidental observations were also recorded outside this area, which included the DAS Study Area. Nine bird species were identified during the field survey including flocks of northern fulmars offshore near the SCH Study Area, and flocks of snow buntings within the HRQ Study Area. In addition, ptarmigan (*Lagopus* sp.) scat was identified in the HRQ Study Area and confirms that this species frequents the area. In Victor Bay, a small flock of thick-billed murres (*Uria lomvia*) and a family of red-throated loons were observed. Common ravens were frequent within the Hamlet, and glaucous gulls (*L. hyperboreus*) and Thayer's gulls (*L. thayeri*) were also observed. IQ indicates

that eider ducks (*Somateria* spp.) occupy the shoreline during migration and use the DAS Study Area for staging (Arctic Bay IQ Workshop 2019 - Tom Nagitarvik).

According to ECCC, the general nesting season for the region (N10: Arctic Plains and Mountains, Bird Conservation Region 3) is between late-May and mid-August, and the primary season (61–100% of birds nesting) is from early-June to late-July (ECCC 2016). No nesting or breeding behaviour was identified, but the survey was conducted at the end of the general nesting season. Therefore, the lack of observed breeding behaviour does not preclude the potential for birds to nest in the area. IQ indicates that gulls and marine birds nest on the cliffs of Admiralty Inlet (about 2 km from the SCH Study Area) and ravens nest near the Hamlet (Mishak Allurut, pers. comm. June 2019).

6.5.4 Fish Habitat (including Marine Vegetation)

Habitat function and structure is driven by the physical characteristics and assemblage of species that comprise an ecosystem. For most focal species in the SCH and DAS Study Areas for the Project, habitat use is primarily for feeding or migration. For example, the anadromous Arctic char (*Salvelinus alpinus)* utilizes the marine habitat exclusively for feeding, while freshwater environments are required for spawning. However, three focal species found in Arctic Bay – amphipods, sculpins and soft-shell clams – rely on the soft sediment and marine vegetation that make up the benthic habitat of the SCH Study Area for all life history stages (feeding, spawning etc.).

Field surveys were conducted in the SCH Study Area in 2019 (August 9 and 10) and 2020 (September 18 to 23) to assess habitat conditions. The intertidal shoreline was primarily hard substrates consisting of cobble, gravel and sand. Habitat characteristics between the two years was similar, although the tide range was 1.2 m in 2019 and 2.1 m in 2020.

In the subtidal habitat, the depth range of the area observed in 2019 was 0.5 m to 9 m CD. Substrates in the SCH Study Area were primarily sand with clustered boulders. Other substrates observed on top of the sand were cobble and shell hash. The exception to this is within the existing inner harbour (immediately west of existing breakwater) where the substrates are exclusively silt.

When hard substrates are present, marine vegetation is typically present, which is most pronounced with a rockweed bed that is west of the existing breakwater. This rockweed bed was mapped during the 2020 field program and considered to be an area with a minimum of 80% aerial coverage and patches that were less than 2 m apart. The depth range of the rockweed patch observed during the snorkel survey ranged from 0.5 m to 1.7 m CD. Other types of marine vegetation observed included occasional patches of kelp (sugar wrack kelp, *Saccharina latissima*, ~<5% in clusters; sea colander, *Agarum clathratum*, <10% on occasional boulder). When observed, kelp species were between 2 m to 7 m CD depth. A brown filamentous algae, which is possibly thread brown algae (*Chordaria sp*.), was observed throughout the site as a thin layer on both hard (boulders) and soft substrates (sand).

Substrates observed within the DAS Study Area were primarily soft substrates (silt) with occasional boulder, which were at times in clusters. When hard substrates were present, higher densities of sessile marine invertebrates were observed.

Overall, the habitat quality within the SCH and DAS Study Areas was considered low. The exception to this was the rockweed bed that is east of the existing breakwater, and the narrow 2 m wide area of the lower portion of the intertidal zone. Despite permanent (SCH) or temporary (DAS) alteration of these habitats, the overall impact should be minimal due to similarity to nearby habitats. In the SCH Study Area, subtidal rockweed beds extend beyond the proposed footprint and likely support a similar assemblage of species. In the DAS Study Area, the materials being disposed are comparable to the existing silt habitat and following temporary alteration it is likely that species in neighbouring habitat, which are also composed primarily of silt and boulder clusters, will recolonize the area.

6.5.5 Fish and Marine Mammals

Focal fish and marine mammal species were selected based on several variables which included; their importance to the Inuit for subsistence and food security, their geographic ranges which includes the potential to occur in the SCH or DAS Study Areas, and for their representative role in food chain dynamics. Species identified as focal are listed in Table 6-6. Species categories were defined to represent the extent to which the marine species migrate and whether they are permanent residents of Arctic waters. These definitions are provided in Section 6.5.5.1.

Table 6-6 Occurrence of Marine Focal Species

Species (Common Name)	Species (Latin Name)	Species Spatial Category	Type	Seasonal Occurrence
amphipod	*Gammarus* sp.	Resident	Benthic invertebrate	Year-round
Arctic char	*Salvelinus alpinus*	Anadromous	Pelagic fish	Open-water season
Arctic cod	*Boreogadus saida*	Visitor	Pelagic fish	Open-water season
bearded seal	*Erignathus barbatus ssp. Barbatus*	Resident	Pinniped	Summer, Fall, Other seasons indicated by harvest data
beluga whale	*Delphinapterus leucas*	Resident	Cetacean	Spring, Summer, Fall
bowhead whale	*Balaena mysticetus*	Resident	Cetacean	Summer
harp seal	*Pagophilus groenlandicus*	Visitor	Pinniped	Summer, Fall, Other seasons indicated by harvest data
hooded seal	*Cystophora cristata*	Visitor	Pinniped	Summer, Fall. Spring and Winter ice dependent
killer whale	*Orcinus orca*	Visitor	Cetacean	Spring, Summer, Fall
narwhal	*Monodon Monoceros*	Resident	Cetacean	Summer
polar bear	*Ursus maritimus*	Resident	Fissiped	Spring, Summer, Fall

Species (Common Name)	Species (Latin Name)	Species Spatial Category	Type	Seasonal Occurrence
ringed seal	*Pusa hispida ssp. Hispida*	Resident	Pinniped	Spring, Summer, Fall, Winter
sculpin	*Myoxocephalus Scorpius* (shorthorn) *Gymnocanthus tricuspis* (Arctic staghorn)	Resident	Bottom dwelling fish	Year-round
truncate soft-shell clam	*Mya truncate*	Resident	Bivalve invertebrate	Year-round
walrus	*Odobenus rosmarus ssp. Rosmarus*	Resident	Pinniped	Summer, Fall

6.5.5.1 Species Spatial Categories

Fish

Marine fish that are found in the Arctic occupy the ocean differentially, either as residents, migratory species or anadromous, as defined below:

- **Migratory:** species that migrate exclusively in the marine environment on an annual or seasonal basis, triggered by local climate, food availability or for mating reasons.
- **Resident:** species that occupy the same general area throughout the year.
- **Anadromous**: the movement of fish between freshwater and marine environments for the purposes of feeding in one environment and spawning in the other.

The coastal marine environment fronting the SCH Study Area may be used by migratory species such as Arctic char and Arctic cod (*Boreogadus saida*). Both species are present predominantly during the open-water season. Arctic char are an important subsistence and commercial fishery species in Nunavut that have both a lacustrine and anadromous life history. Anadromous Arctic char live primarily in fresh water, and migrate to the ocean for a short summer migration (~20 to 45 days) (Bégout Anras et al. 1999; Klemetsen et al. 2003) in order to increase energy reserves, at which time they may double their body mass (Jørgensen et al. 1997). There is limited documented information on the migratory patterns of Arctic char in and around Arctic Bay to confirm where they are migrating from. During the IQ Workshop one individual stated that the fish come from Marcil Lake (Arctic Bay IQ Workshop 2019 - Jonah Oyukuluk) (see Figure 13-1 of ESEB for location). Arctic cod are a pelagic marine species believed to be the single most important species in the trophic link between plankton, and marine birds and mammals in the Arctic ecosystem (Welch et al. 1992). This species is considered to be inferior to Arctic char in terms of a harvestable species, "*The cods poor diet and high water content leads to poorer tasting meat and shorter preservation*," (Hurtubise 2016; p43, pers comm July 13 2015). Arctic cod are caught in the bay, although not fished regularly (Mishak Allurut. pers. comm. Nov 2019). Not many people are catching them and they are considered to possibly be too small and going through the nets (Arctic Bay IQ Workshop 2019 - Jonah

Oyukuluk). However, fishing competitions have shown that cod are present during the iced season (pers. Obs. Sampson Ejangiaq). Whether or not this is the same Arctic cod species is unclear.

During the field surveys, the only observation of a marine fish were limited to several different sculpin species which were frequently associated with anthropogenic debris. The presence of sculpins was further confirmed during the IQ workshop although they are rarely harvested for food by residents (Mishak Allurut. pers. comm. Nov 2019). In 2020, ten sculpins were collected during the field survey, and all were identified as Arctic staghorn sculpin *(Gymnocanthus tricuspis*).

Marine invertebrates, including amphipods and truncated soft-shell clams, are a common part of the benthic ecosystem in Nunavut. The distribution of Arctic amphipods is dictated by habitat type and food resources available (Oceans North Conservation Society et al. 2018). When amphipods are present in intertidal benthic environment, there is a tendency to be associated with moist habitats, which consist of either rock (boulder, cobble) or seaweed (typically rockweed). The truncate soft-shell clam (*Mya truncata*) is an in-faunal species in the Arctic that plays an important role in carbon cycling. Amphipods and soft-shell clams are important food sources for a variety of marine animals including; marine mammals (walrus, bowhead whales, bearded seals *(Hobson et al. 2002)*); fish (Arctic char), and birds (benthic-feeding eider ducks, Thick-billed murres) (Crawford et al. 2015; Gaston & Elliott 2014; Whitehouse et al. 2017). Given the sedentary adult life stage of the soft-shell clam, they are a valuable and predictable food source for these higher trophic level species (Highsmith & Coyle 1990).

During field surveys, amphipods and truncated soft-shell clams were present, but biomass and biodiversity of organisms was considered low to moderate. Within the SCH Study Area, in 2020, a narrow band of intertidal habitat at the low water line was observed to support relatively high densities of amphipods which were later identified as *Gammarus setosus*. Within the subtidal areas of the SCH Study Area the truncate soft-shell clam was observed and estimated to occur in densities that ranged from 5/m^2 to upwards of 50/m^2.

Other marine invertebrates observed included:

- Green sea urchins (*Strongylocentrotus drobachiensis)*
- Seastars (sun star, *Solaster* sp.*,* rose star, *Crossater papposus*, blood star [not identified to species level])
- Brittle stars (*Ophiocten* or *Ophiura* sp)
- Tube dwelling anemones (*Pachycerianthus borealis*)
- Anemones (*Hormatia rugosa, Cribrinopsis* sp*)*

Within the DAS Study Area, the most abundant marine invertebrates were brittle stars which occurred in very high densities throughout the DAS Study Area (*Ophiocten* or *Ophiura* sp, 20 to 60/m^2 when observed). For both the SCH and DAS Study Area, species assemblages in neighbouring habitats was considered similar, thus likely able to serve an equivalent ecosystem function.

Freshwater Fish

A small creek was identified to the west of the SCH during field surveys. However, it is likely for surface drainage, and thus not fish bearing, based on observation of the drone and Google earth imagery. This was confirmed as not to be fish bearing (Mishak Allurut. pers. comm. Nov 2019).

Two lakes – Dead Dog Lake and Alternate Water Supply Lake – are approximately 100 m south and 520 m northwest from the planned quarry, respectively (Figure 4-1). Local residents have confirmed that there is land locked Arctic char in both lakes but no fish in the creeks in that area (Mishak Allurut. pers. comm. Nov 2019).

Marine Mammals

Marine mammals that are found in the Arctic were categorized as either Arctic Residents or Seasonal Visitors, as defined below:

- **Arctic Resident:** species that resides in the Arctic year-round.
- **Seasonal Visitor:** species that predictably resides within the Arctic region for a portion of the year, which most typically is the open-water season.

Seven species of marine mammal are considered resident to Arctic Bay (Table 6-6). Three species of whale – narwhal (*Monodon monoceros*), beluga (*Delphinapterus leucas*), and bowhead (*Balaena mysticetus*) – are found in Admiralty Inlet during summer and early winter. IQ reports indicate that beluga whales are present near Arctic Bay in Admiralty Inlet and Lancaster Sound between *Upirngasaaq* (mid-March through end of May) and *Ukiassaaq* (end of September to mid-October) and that the arrival of beluga whales coincides with the arrival of harp seals (*Pagophilus groenlandicus*) (QIA 2018a). Narwhals are seen around Arctic Bay and Admiralty Inlet from April to October, calving, nursing and rearing their young (Arctic Bay Adventures 2017; Canadian Northern Economic Development Agency 2019; DFO 2010; Government of Nunavut 2010). IQ informs that bowhead whales occur at the floe edge off Admiralty Inlet in the *Upirngasaaq* (early spring) and *Upirngaaq* (late spring), then occur along the coast and congregate in open-waters throughout Admiralty Inlet in the *Aujaq* (summer), and move toward the open-water before freeze-up during the *Ukiassaaq* (early fall) (QIA 2018a). However, bowhead whales are a rarity in Arctic Bay over the past decade ((Arctic Bay IQ Workshop 2019 - Tom Nagitarvik). None of these species are commonly found within the Bay, relying mainly on pelagic food sources such as zooplankton and Arctic cod as they migrate through the region.

Bearded seals (*Erignathus barbatus ssp. Barbatus)*, ringed seals (*Pusa hispida ssp. Hispida)* and walrus (*Odobenus rosmarus ssp. Rosmarus*) are resident in Arctic Bay, feeding on fish, invertebrates and other benthic prey in shallow coastal environments. Ringed seals are a non-migratory species that remain in Arctic waters year-round and can be found throughout Lancaster Sound and the contiguous waterways, including Admiralty Inlet and in Arctic Bay (Goodwin 1990; Kingsley 1989; Natures Edge 2015). Ringed seals are known utilize a variety of feeding habitats including shallow coastal waters, as well as offshore waters as deep as 150 m (McLaren 1958), with their seasonal distribution highly influenced by the ice. According to the NPC, Arctic Bay is proximal to an identified high-density area for bearded seals (NPC 2017b). However, this species is reported to occur very occasionally in Arctic Bay (Arctic Bay IQ Workshop 2019 - Jonah Oyukuluk ; Arctic Bay IQ Workshop 2019 - Olayuk Nagitarvik ; Arctic Bay IQ Workshop 2019 - Tom Nagitarvik) (Mishak Allurut. pers. comm. June 2019). Walrus are known to aggregate in Lancaster Sound near northwestern Bylot Island (Baffinland Iron Mines Corporation 2012). However, in the general vicinity of Arctic Bay, "*Walrus - very rare to see them in the bay*". – Oyaluk.' (Arctic Bay IQ Workshop 2019 - Olayuk Nagitarvik).

Polar bears (*Ursus maritimus*) are found throughout the high Arctic and can be found along the entire Baffin, Devon, and Ellesmere Islands coastlines (QIA 2018b). IQ indicates that polar bears are found throughout the TI NMCA including at Arctic Bay (Arctic Bay IQ Workshop 2019 - Tom Nagitarvik ; IQ Workshop - Olayuk Nagitarvik). Polar bears with cubs are present in the Arctic Bay region during the summer (Arctic Bay Adventures 2017) and denning sites occur along the shorelines in nearby Lancaster Sound along Baffin and Devon islands (NPC 2017a).

Though resident to the region, each of these marine mammals are often passing through the area, utilizing pelagic and benthic habitats primarily for feeding during migration. It is likely that habitat surrounding the Project site can support the lower trophic species that marine mammals feed on, and thus there are minimal impacts expected from the Project construction on resident marine mammals.

6.5.6 Species at Risk

Species discussed in this section have been assessed by international (International Union for Conservation of Nature [IUCN]), federal (Committee on the Status of Endangered Wildlife in Canada [COSEWIC] and *Species at Risk Act* [SARA]), territorial agencies (GN-DoE), and the NBRLUP (NPC 2000b). A list of the at-risk vegetation, wildlife, marine and migratory birds, marine fish and marine mammals that have potential to occur in the Project Study Areas and their likelihood of occurrence are listed in Table 7-1 of the ESEB (Advisian-Ikpiaryuk JV 2021d). Threatened or Endangered species may occur, but none were identified during field program (see applicable sections for more information).

DFO has generated an Aquatic SAR map; however, at this time it does not include Arctic Bay (Government of Canada 2019c).

6.6 Socioeconomic Conditions

The community of Arctic Bay is located on the north shore of Adams Sound off the coast of Admiralty Inlet on northern Baffin Island. It is also known as 'Ikpiarjuk' meaning "pocket" in Inuktitut, referring to the way it is nestled among high hills and cliffs. The nearest communities are Pond Inlet (~240 km E), Resolute Bay (~350 km NW) and Grise Fiord (~380 km N) (see Figure 1-4 for locations).

6.6.1 Population and Education

According to Statistics Canada 2016 census data, the population of Arctic Bay is 868, representing an increase of 5.5% since 2011. The population is young with children aged 0–14 years representing over a third of the total population (38.0% or 330 individuals) and a median age of 22.3 years old for the total population (Statistics Canada 2017). The total self-declared Inuit population is 825 or 95.0% of the total population (Statistics Canada 2017).

In 2016, of the total population 15 years old and over in Arctic Bay, 15.7% (85 individuals) held a secondary school diploma (or equivalent) as their highest educational attainment and 22.2% (120 individuals) held a postsecondary certificate, diploma, or degree. Of the 120 individuals with postsecondary accreditations, 25.0% (30 individuals) held apprenticeship or trades certificates or diploma; 58.3% (70 individuals) held college, general and vocational college (CEGEP) or other non-university certification; and 12.5% (15 individuals) graduated from a University with a bachelor level degree or higher (Statistics Canada 2017).

Inuktitut is the prevalent language in Arctic Bay, reported as the mother tongue for 93.0% of residents. Nearly 1-in-2 Inuit (48.5%) work in settings where Inuktitut is the language most often used at work (Statistics Canada 2017). Additionally, large numbers of people speak English in Arctic Bay – 760 residents or 87.6% of the population (Statistics Canada 2017).

6.6.2 Employment and Economic Activity

Lack of basic literacy and numeracy present a challenge to labour force development in Arctic Bay and across Nunavut (Government of Nunavut & Nunavut Tunngavik Incorporated 2006). Individuals with low levels of literacy are prevented from gaining meaningful employment, "*while others are dead-ended in positions from which they can't progress without additional education and training*" (Government of Nunavut & Nunavut Tunngavik Incorporated 2006). Of the population 15 years old and over (535), 280 people or 52.3% participate in the labour force in Arctic Bay. The unemployment rate is considerably higher in Arctic Bay (21.4%) compared to the average rate of 17.3% for Baffin (Statistics Canada 2017). The largest employers in Arctic Bay are the Hamlet, the Northern store, and the school.

The economy of Arctic Bay is characterized by traditional subsistence activities (hunting, fishing, trapping, and gathering) mixed with wage-based activities. Despite the high costs associated with harvesting (such as equipment, fuel and materials), participation rates in the traditional economy remain high (Government of Nunavut 2011c). Of interest to local hiring for the Project is that during the 2016 census, 15 individuals worked in construction; 20 in transportation and warehousing; and 10 in accommodation and food services. Additionally, Baffinland's Mary River iron ore mining project has had an impact on the local economy more recently. According to Baffinland's 2019 Socio-Economic Monitoring Report, a total of 60 local Inuit residents were employed by either the Baffinland Corporation or its Contractors at the Mary River mine site in 2019 (Baffinland 2020).

6.6.3 Land and Resource Use

6.6.3.1 Harvesting

Harvesting remains an essential part of life in Arctic Bay. Despite the high costs associated with harvesting (such as equipment, fuel and materials), participation rates in the traditional economy remain high (Government of Nunavut 2011c). According to Statistics Canada's Aboriginal Peoples Survey in 2006, 83.0% of respondents from Arctic Bay reported having hunted, 86.0% fished, and 79.0% gathered wild plants in the 12 months preceding the survey (Statistics Canada 2006). The availability of traditionally harvested foods (country food) is crucial in that it lowers the demand for imported food which is very costly and often less nutritious. Many Arctic Bay residents continue to rely heavily on fish, seal, and whale hunting, both for subsistence and sustaining culture, including traditional resource sharing practices.

Harvesting is limited in Arctic Bay, except for fishing and the occasional seal or beluga.

> *"When the ice is forming the seals come close to town but there's really nothing much in the bay when it's open-water season."* (IQ Workshop - Olayuk Nagitarvik)

Nearby Victor Bay is an important area for hunting, especially in the spring and summer (IQ Workshop 2019). Many cabins and tents are dotted around the Victor Bay area and it is very busy there all summer long.

"We know there will be noise to construct the harbour but most of the hunters will be on the other side (Victor Bay) where the animals are anyway." (IQ Workshop - Tom Nagitarvik)

Fishing (nets and casting/jigging) occurs all along the shoreline in the harbour area in Arctic Bay and at Victor Bay. Clams and mussels, although present in the bay, are not harvested because the area they occur is too deep to harvest without scuba equipment or long poles.

Although berry harvesting sites have been noted in the community none are located anywhere near any of the Project Study Areas. Additionally, there is very limited harvesting of any other plants in the community. Knowledge holders remarked that there are no important areas for harvesting plants or berries in the community that should be avoided or protected. Additionally, there is no harvesting of any kelp or seaweed in Arctic Bay (IQ Workshop 2019). A few people still trap in Arctic Bay but there are no specific areas for setting traps, they place them anywhere (IQ Workshop 2019).

Identified harvesting locations in and around the Project Study Areas are shown in Figure 4-1.

6.6.3.2 Access and Navigation

Boats and skidoos are critical for subsistence harvesting in the Arctic. Most hunting and fishing in Arctic Bay are done far from the community and requires boats and skidoos to access (Advisian-Ikpiaryuk JV 2021d). The community's existing harbour has one small breakwater providing a semi-sheltered area for small craft moorage. There is only one ramp in the community from which to launch boats during the open-water season. Sealift barges are brought into the ramp that is also used for launching boats. Most of the upland area at the ramp is used for dry cargo storage temporarily until it is delivered to the community. Congestion and conflicts with boating exist until the cargo is cleared several days after the delivery. There is no access to the ramp for hunters during sealift delivery. The ramp and surrounding shoreline area become extremely congested and hunters are unable to use the ramp to launch their boats to access harvesting areas (Advisian 2019b). Several community members expressed safety concerns associated with the congestion caused by sealift. In addition to traffic concerns at the shoreline, water safety is also an ongoing concern in the Hamlet, especially considering that many children enjoy playing on the beach and around the shoreline during the summer (Advisian-Ikpiaryuk JV 2021d).

During the winter, ice access in Arctic Bay is considered very good and hunters can easily access the ice from many areas along the shoreline to travel to their hunting grounds far from the community. No concerns were expressed about the Project affecting ice access during consultations.

Ice break-up occurs later at Victor Bay than Arctic Bay. In late spring "*even up until July some years*" the ice is still accessible to hunters at Victor Bay. There are well traveled skidoo trails from the community to Victor Bay, mostly along the sides of the road, particularly around the proposed quarry and stockpile areas (Advisian 2019b). The road to Victor Bay is also heavily travelled during the open-water season. *"The road to Victor Bay is very busy all summer. It is an important area for harvesting and people enjoy their cabins and tents there"* (Figure 4-1).

6.6.3.3 Tourism

Arctic Bay offers tourists a unique opportunity to visit a vibrant and traditional community. The Hamlet is located on the western boundary of Sirmilik National Park (Section 6.4.1.7, see Section 7.5.1 of ESEB

(Advisian-Ikpiaryuk JV 2021d)). The terrain around Arctic Bay is comprised of a variety of geological formations, including glacial carved fiords, hoodoos, flat-topped pillars of stone and sheer red rock cliffs as high as 180 m that attract tourists to the area. Arctic Bay's sheltered shores and steep cliffs also provide tourists with a chance to observe many unique species of High Arctic birds and Its sea waters are home to narwhals and bowhead whales.

Two cruise ships visited the Hamlet in the summer of 2019: L'Austral, (July 2019) with approximately 224 passengers and M/V Ocean Adventurer Quark Expeditions with approximately 128 passengers (September 2019). Additionally, the community has noticed an increase in the number of yacht visits over the last several summers, except for summer 2020 due to the pandemic.

Locally based outfitters include: the HTA; Nagitarvik Outfitting; Arctic Bay Adventures; Iglurjuat Outfitting; and Siqiniq Outfitting (Julian Oyukuluk. EDO. Pers. comm. Dec 2020).

6.6.4 Local and Regional Traffic Patterns

The roads in Arctic Bay are gravel surfaced with no walkways. Pedestrians, ATVs, snow machines, cars, and trucks all share the road. Although dust control on roads is provided by the Hamlet, dust in the community is a concern. Investments in dust control and road resurfacing using fine shale to combat dust are among the priorities listed for the community in their 2019–2020 Infrastructure Plan (Government of Nunavut 2011c). The roads are steep in areas and often require maintenance with gravel in the winter to keep them safe.

A 5 km road connecting Arctic Bay to Victor Bay is well traveled and especially busy all summer. The NNF is a refueling port for navy patrol ships that is linked to Arctic Bay by a 40 km road, the only highway in Nunavut. The NNF is near completion of construction. It is anticipated that the NNF will be operationally linked to Arctic Bay for personnel and equipment support. The road between Arctic Bay and NNF was upgraded in 2019 by the GN in preparation for operations at NNF.

The Hamlet is serviced by scheduled commercial flights provided by Canadian North several times a week. Koonoo Taxi and J.E Taxi provide service to and from the airport and the Taqqut Inn offers a free airport shuttle.

The sealift is a vital link for all communities in Nunavut. Details on the sealift operations are provided in Section 1.3.

6.6.5 Human Health and Community Wellness

A new Arctic Bay Health Centre was opened in September 2017 to meet the current and future needs of Arctic Bay. It features new radiology and diagnostic systems and has a five-plex residential unit to accommodate staff (Government of Nunavut 2017).

A non-emergency medical clinic is open Monday to Friday from 9:00 am to 12:15 pm. The Health Centre provides a 24-hour on-call emergency service. The Arctic Bay Health Centre is staffed by a supervising nurse, three full time nurses and a mental health nurse. (Gail Redpath, Supervising Nurse, pers. comm. Dec 2019). Arctic Bay also utilizes tele-med services.

The Health Centre delivers community programs that include but are not limited to: Pre-natal and Post-natal Care, Well Woman, Well Man, Well Child and Chronic Disease Clinics. There area visiting specialists who fly into the community several times a year including dentists, doctors, physiotherapists, psychiatrists, dieticians, and public health nurses to assist with specific programs such as immunizations.

The Arctic Bay Health Centre is not equipped to allow overnight stays and patients who require that level of care are flown by medevac to the hospital in Iqaluit. The Health Clinic had a total of 10,470 visits in 2016 and 13.3 visits per capita (Government of Nunavut 2018). The health centre is considered adequately staffed to meet the current health care needs of the community and construction activities of the NNF did not create any significant demands on the community's health resources (Gail Redpath, Supervising Nurse, pers. comm. Dec 2019).

Beyond public health programs and the health centre, Inuit traditional activities such as harvesting, preserving food, preparing skins and resource sharing contribute greatly to familial and cultural cohesion which are critical to community wellness. In addition, social activities such as sports, Inuit games, dog sledding competitions, storytelling, arts and crafts and land-based programs are important factors in promoting community health and personal well-being in Arctic Bay.

6.6.6 Housing and Community Infrastructure and Services

According to the Nunavut Housing Needs Survey, approximately 45.0% of occupied dwellings in Arctic Bay in 2011 were classified as crowded based on the lack of enough bedrooms (Government of Nunavut 2011b).The Nunavut Housing Corporation's (NHC) Annual report for 2018-2019 listed Arctic Bay's housing stock at 43.0%, indicating a critical need for housing (NHC 2019).

Temporary accommodation in the Hamlet is limited and is provided by the Taqqut Inns North hotel which runs a main hotel building (10 rooms) and a Bed and Breakfast (6 rooms) with a total capacity for 31 guests.

The Hamlet is responsible for water, sewage, and solid waste collection in Arctic Bay. Water is collected from Marcil Lake (see Figure 13-1 of ESEB for location) and is the only potable water source for the community. Water is treated with chlorine at the truck fill station and loaded into trucks for distribution to holding tanks in each building and dwelling. The Hamlet reports no issues with water capacity or quality but notes that delivery is at times effected when a truck or driver is down (Deborah Johnson, SAO. pers. comm. March 2021).

A new single cell sewage lagoon, commissioned in 2012, receives trucked sewage from holding tanks for each building. Sewage and municipal wastewater are collected by two trucks daily. A spare truck is used when needed. As with the water trucks, an ongoing issue with consistent service is truck maintenance and availability of drivers (Deborah Johnson, SAO. pers. comm. March 2021).

The municipal waste management facility, located 3 km from the centre of town, includes domestic wastes, construction wastes, metal wastes and hazardous goods. The Hamlet operates one garbage truck three days a week to collect solid wastes within the community and transfer them to the facility. The Hamlet reports no issues with the current capacity of the waste management facility (Deborah Johnson. SAO. pers. comm. March 2021).

Electricity through diesel generators is provided by the QEC, a territorial corporation that is 100% owned by the GN. All electricity needs in Nunavut are met by imported fossil fuel supplies. The Arctic Bay power plant was constructed in 1974 and its capacity is no longer adequate to meet the community's current capacity requirements. Construction of a new diesel generated power plant including two new 90,000 L horizontal fuel tanks for bulk fuel storage is currently under construction in the community.

The Taqqut Co-op is contracted by GN-PPD to deliver fuel to the community. Fuel is stored at a tank farm located approximately 1.5 km from the community and delivered to residents and businesses with one fuel truck. Fuel storage capacity and delivery quantities for 2017/2018 for Arctic Bay are provided in Table 6-7 and Table 6-8.

Table 6-7 Bulk Fuel Storage Capacity for Arctic Bay

Total Diesel (L)	Total Reserve (L)	Total Gasoline (L)	Total Jet A-1 (L)
3,188,704	377,640	641,555	1,376,516

Table 6-8 GN-PPD Fuel Delivery for Arctic Bay 2017/2018

Diesel (L)	Gasoline (L)	Jet A-1 (L)
2,869,580	498,317	1,037,248

Source: Legislative Assembly of Nunavut (2018)

Fire protection is the responsibility of the Hamlet and currently relies on 19 volunteer firefighters, led by a Fire Chief. A new fire hall is expected to be operational by summer 2021. The Hamlet currently has one fire truck and one ambulance.

Landline, mobile, and internet services are provided by NorthwesTel/Bell Mobility and Qiniq. The local community radio (Atta Suvaguuq Radio Society) broadcasts daily in Inuktitut and English.

6.6.7 Archaeological and Culturally Significant Sites

An AIA was conducted in 2019 by Lifeways of Canada Limited (Lifeways 2019) in support of the Project.

A desktop review of existing knowledge of archaeological resources and available IQ was conducted to assess landforms for their heritage resource potential. Information on any previously recorded sites within 20 km of the Project site was reviewed, as well as available relevant archaeological reports, studies and published academic articles. Based on the desktop study and a thorough review of the database of significant paleontological sites that the Canadian Museum of Natures maintains, there were no known archaeological or paleontological sites within the Project Study Areas.

An archaeological field survey was conducted on August 9 and 10, 2019 that consisted of pedestrian surveys to assess all areas of elevated archaeological potential within the Project Study Areas. The SCH

Study Area was limited to the accessible foreshore and intertidal portions. No archaeological or paleontological sites were observed within the Project Study Areas.

There are several sources of carving stone in the community (see Figure 4-1). Several community members requested that the Project, during quarry operations, considers producing a stockpile of carving stone. It was noted that carvers from Arctic Bay and from Igloolik who travel to Arctic Bay for stone, would really appreciate having a stockpile of carving stone (IQ workshop June 2019, HTA design workshop Nov 2019, Hamlet meeting Nov 2019). Other than the carving stone areas noted, no other culturally significant sites were identified by knowledge holders (IQ workshop June 2019).

7 Potential Impacts and Proposed Mitigation

Potential impacts were considered relative to the proposed construction activities (described in Section 1.12) for the Project Study Areas (described in Section 6.2) and specific to each of the VECs and VSECs. Impacts were considered for their potential to effect the baseline environmental and socio-economic conditions, as well as by the criteria NIRB uses for screening decisions:

- Could the Project have significant adverse effects on the environment, and Inuit harvesting?
- Could the Project have significant adverse effects on the well-being of northerners?
- Does the Project cause significant public concern?
- Does the proposal involve new technologies with unknown effects?

Potential impacts were categorized by the terms in Table 7-1 and are summarized in Table 7-2. For the construction phase, the Project Study Areas were all considered (described in Section 6.2), however during the operations phase, the consideration is exclusive to the SCH Study Area. The descriptions pertinent to the construction and operations phases are summarized in Sections 7.1 and 7.2.

All impacts were considered either "Positive" or "Negative and Mitigatable" and thus no residual effects are expected subsequent to implementation of mitigation and monitoring measures.

Mitigation and monitoring measures will be implemented for the construction phase to minimize negative effects. These measures are summarized in the subsections below and detailed in the CEMP. Further, the contractor will be required to develop CWPs that will detail the methodology for implementing mitigation and monitoring measures (see Sections 8.2.2 and 8.3).

Table 7-1 Screening Assessment Categories

Category	Term in Table 7-2	Definition
Positive	P	Net gain in functionality after construction or during operations
Negative, non-mitigatable	N	Negative and will remain as a residual effect, after construction or during operations
Negative, mitigatable	M	Negative, but measures can be put in place to minimize or eliminate the effect
Unknown	U	Information is not available to confirm what effects will be
No impact	Blank	There is a no effect, and thus considered neutral

Note: see Table 7-2 or VECs and VSECs categories.

Table 7-2 PSIR Environmental Effects Table

	Physical	Designated Environmental Areas	Geological Site Conditions	Surface Features	Ground Stability and Permafrost	Hydrology	Air Quality	Noise	Climate Conditions	Marine Sediment and Water Quality	Coastal Morphology and Bathymetry	Tides and Currents	**Biological**	Vegetation (Terrestrial)	Wildlife	Birds (Migratory and Marine)	Marine Fish Habitat	Fish and Marine Mammals	Species at Risk	**Socio-Economic**	Employment, training and business opportunities	Land and resource use	Tourism	Local and regional traffic patterns	Community Health and Wellness	Community Infrastructure and services	Archaeological and culturally significant sites
Construction																											
Infill							**M**	**M**		**M**	**M**			**M**	**M**	**M**	**M**	**M**	**M**		**P**	**M**	**M**	**M**	**M**	**M**	
Dredging							**M**	**M**		**M**	**M**					**M**	**M**	**M**	**M**		**P**	**M**	**M**	**M**	**M**	**M**	
Disposal at Sea							**M**	**M**		**M**					**M**	**M**	**M**	**M**	**M**		**P**	**M**	**M**	**M**	**M**	**M**	
Pile driving							**M**	**M**		**M**					**M**	**M**	**M**	**M**	**M**		**P**	**M**	**M**	**M**	**M**	**M**	
Installation of Floating docks							**M**	**M**								**M**	**M**	**M**	**M**		**P**	**M**	**M**	**M**	**M**	**M**	
Drilling and Blasting							**M**	**M**							**M**	**M**	**M**	**M**	**M**		**P**	**M**	**M**	**M**	**M**	**M**	
Crushing and Screening							**M**	**M**							**M**	**M**		**M**	**M**		**P**	**M**	**M**	**M**	**M**	**M**	
Stockpiling																		**M**	**M**		**P**	**M**	**M**	**M**	**M**	**M**	
Haul Road Upgrades														**M**	**M**	**M**			**M**		**P**	**M**	**M**	**M**	**M**	**M**	
Drainage for quarry or haul roads (culverts)					**M**										**M**	**M**	**M**				**P**	**M**	**M**	**M**	**M**	**M**	
Mobilization/Demobilization of equipment							**M**	**M**						**M**					**M**		**P**	**M**	**M**	**M**	**M**	**M**	
Construction equipment (marine, land based)							**M**	**M**						**M**	**M**	**M**	**M**	**M**	**M**		**P**	**M**	**M**	**M**	**M**	**M**	
Light (illumination of Project site)														**M**	**M**	**M**		**M**	**M**		**P**	**M**	**M**	**M**	**M**	**M**	
Fuel storage, refueling, accidental spills							**M**	**M**		**M**				**M**	**M**	**M**	**M**	**M**	**M**		**P**	**M**	**M**	**M**	**M**	**M**	
Construction workforce							**M**	**M**													**P**	**M**	**M**	**M**	**M**	**M**	
Operation																											
Marine Access							**M**	**M**													**P**	**P**	**P**	**P**	**P**	**P**	
Road access							**M**	**M**							**M**	**M**											
Fuel storage, refueling, accidental spills							**M**	**M**						**M**	**M**	**M**											

NIRB Nunavut Impact Review Board	**Physical**	Designated Environmental Areas	Geological Site Conditions	Surface Features	Ground Stability and Permafrost	Hydrology	Air Quality	Noise	Climate Conditions	Marine Sediment and Water Quality	Coastal Morphology and Bathymetry	Tides and Currents	**Biological**	Vegetation (Terrestrial)	Wildlife	Birds (Migratory and Marine)	Marine Fish Habitat	Fish and Marine Mammals	Species at Risk	**Socio-Economic**	Employment, training and business opportunities	Land and resource use	Tourism	Local and regional traffic patterns	Community Health and Wellness	Community Infrastructure and services	Archaeological and culturally significant sites
Cargo delivery (sealift operations)																					**P**	**P**	**P**	**P**	**P**	**P**	
Boat launching																					**P**	**P**	**P**	**P**	**P**	**P**	
Decommissioning																											
Not applicable.																											

Note: See Table 7-1 for screening categories

7.1 Construction Phase Impacts and Mitigation

Regulatory compliance requirements will be identified in the CEMP, in CWPs, and in permits and approvals issued by RAs. The Contractor will be responsible for the design and implementation of a compliance monitoring program, which will be overseen by DFO-SCH. Roles and responsibilities pertinent to the regulatory compliance program are described in the CEMP.

7.1.1 Physical Components

Construction activities as described in Section 2. that have the potential to impact the physical VECs identified are summarized in Table 7-2.

7.1.1.1 Designated Environmental Areas

There are no designated environmental areas within the Project Study Areas.

7.1.1.2 Geological Site Conditions

Results of laboratory tests on rock samples collected from the proposed quarry indicated low long-term potential for acid generation and ML from the proposed rock cut locations. Therefore, no impacts relating to ARD/ML are expected.

7.1.1.3 Surface Features

There will be no impacts to surface conditions due to the construction of the SCH. Impacts on surface features due to construction of the quarry are expected to be minimal and limited to the footprint of the quarry.

7.1.1.4 Ground Stability and Permafrost

Geotechnical drilling over the sea ice in early 2021 encountered no evidence of sub-sea permafrost in the deepest (8.26 m below mudline) borehole. Relic offshore permafrost likely exists (based on experience at Nanisivik and Milne Inlet) but is likely below the deepest hole and within bedrock, and not within the zone of influence of the harbour. Soft sediments observed during the geotechnical drilling program, have affected the design, which will include dredging below a portion of the breakwater to remove these sediments.

No impacts to ground stability pertaining to permafrost thaw in the intertidal zone within the SCH Study Area are anticipated during construction based on the results of the site investigation. Permafrost is not expected in the intertidal deposits and no impact is expected when blasting at the quarry for rock production. This area is predominantly bedrock with properties not directly affected by permafrost.

Any construction or maintenance activities for the haul road can cause ground disturbance and/or change in the ground/air temperature balance. This would cause an increase in the active layer thickness and permafrost degradation. Any thawing of permafrost may lead to differential settlement problems that may lead to ponding of surface water, impact any erosion and cause failure of the proposed structure. Any construction in low lying areas that are ice rich and have poor drainage would require that the granular

working surface (embankment) is constructed to a suitable thickness (at least 1 m to 1.5 m) before any surface course is applied to limit any disturbance to the thermal regime that would induce thawing.

While no impacts due to ground stability and permafrost are expected, the following measures will be required (further detailed in the CEMP (Advisian-Ikpiaryuk JV 2021c)):

- Retain suitable embankments thickness to limit disturbance to thermal regime.
- Road usage would only be used for relatively short period of time with heavy equipment.
- Monitoring the road for stability concerns.
- Design of the haul road improvements will allow for pullouts for resident vehicles and rock trucks to pass one another and to soften tight turns. This will be determined by the Contractor.

7.1.1.5 Hydrology

It is not expected that there will be impacts to hydrology due to the construction of the SCH. Construction will not impact ice cover in the Arctic Bay or Adams Sound. However, it is expected that the ice in the harbour will thaw later and freeze up earlier than the existing nearshore conditions, reducing the overall accessibility period of boats in the shoulder season. The community is aware of and accepting of this inevitable limitation. The diversion of the small drainage ditches at the SCH will have no negative effects as the drainage will be maintained, albeit diverted, and is not expected to be in place for a significant period of time. It is known that these are not fish bearing watercourses.

Along the quarry and haul road, the contractor will construct appropriately designed culverts if required during upgrades to the haul road. Further, the contractor will be required to implement appropriate drainage at the quarry site, if necessary. Drainage at the proposed quarry location flows northwest towards the Alternate Water Supply Lake.

It is anticipated that there will be no impacts to hydrology, but the following measures are will be implemented for best practices:

- Work site boundaries will be flagged to prevent inadvertent loss or alteration of habitat.
- Water flow will be maintained in lowland areas by installing culverts and/or other drainage techniques during road construction as deemed appropriate.
- Installation of appropriate SEC measures implemented as required.

7.1.1.6 Air Quality

Impacts to air quality are considered negative but mitigatable. Minimum compliance requirements to manage and respond to concerns are detailed in the CEMP. Where relevant, CWPs will be developed by the contractor to manage specific concerns (see Section 8.3).

There is the potential for increase of air contaminants such as NO_2 and SO_2 to the atmosphere from diesel- and gas-powered vehicles which will be operating at the SCH, along the haul road and at the quarry. However, the primary potential impact to air quality from the Project is expected be dust generated from blasting and crushing at the quarry, rock transfer, stockpile wind erosion, and rock hauling along the unpaved haul road.

The following measures are designed to mitigate potential negative impacts to air quality (further detailed in the CEMP):

- The contractor will have an appropriate inspection and maintenance program in place for all construction equipment and vehicles.
- Appropriate measures will be included in the TMP CWP (Section 8.3.2) to identify speed limits or other actions equipment operators need to consider to minimize dust, wildlife mortality, and other negative effects. The maximum speed limit will be 20 km/hr.
- Selection of appropriate construction material for any road construction that will not require significant dust management efforts.
- Use of approved dust suppressants and/or watering to reduce dust generation. Dust suppressants will be in accordance with the GN, Department of Sustainable Development, Environmental Protection Service, and Environmental Guideline for Dust Suppression (GN 2002).
- Proactive maintenance to address problem areas of the haul route which may produce significant dust.
- Implementation of a QBMP CWP (see Section 8.3.4).

7.1.1.7 Noise

Impacts to noise are considered negative but mitigatable.

Nearly all Project construction activities and components have the potential to affect noise levels (Table 7-2). The proposed SCH is located adjacent to residential properties, which are the closest non-Project receptors to construction activities. The greatest source of increased noise to these residents will result from pile-driving activities at the SCH. There will be preferential use of vibratory piling equipment over impact pile driving to reduce the level of noise generated and it is expected that the majority if not all of the pile driving will be possible with vibratory equipment. The use of other heavy equipment and machinery during construction will be comparable to existing equipment used in the Hamlet and at a lower noise level than the planes using the airport.

The planned quarry is located outside the residential portion of the Hamlet, adjacent to an existing aggregate source used for the town. The closest community residence is located approximately 1 km south of the planned quarry, while cabins at Victor Bay are approximately 2 km east of the planned quarry. The greatest source of increased noise at the quarry will result from blasting, screening and crushing activities. Similar to the SCH, the use of other heavy equipment and machinery at the quarry will be comparable to existing equipment used in the area and at a lower noise level than the planes using the airport.

In the absence of a noise by-law in Arctic Bay, timing restrictions will be agreed with the Hamlet. At this time, there will only be one 12-hour shift per day and there will be no night-time works. Specific activities such as blasting may require further timing restrictions. Non-disruptive construction activities that may be required outside of the 12-hour workday will proceed only after consulting with the community and obtaining approval from the Hamlet.

The following measures are designed to mitigate potential negative impacts to noise (further detailed in the CEMP (Advisian-Ikpiaryuk JV 2021c)):

- The contractor will have an appropriate inspection and maintenance program in place for all construction equipment and vehicles.
- Implement control technologies such as the installation of silencers and mufflers on equipment where appropriate, limitations on engine revving where applicable.
- Locating and orientating equipment to minimize propagation of noise in critical directions of receptors.
- Limit revving of engines on mobile or stationary machines.
- Implement timing restrictions to one 12-hour shift per day and limited non-disruptive night works. As there is no applicable noise by-law, timing restrictions will be agreed through discussion with the Hamlet.
- A notification protocol with input from the Hamlet and residents for advance notification of planned noise-causing activities, such as pile driving and blasting.

Potential impacts of noise on biological receptors is discussed in other sections for terrestrial wildlife (Section 7.1.2.2), migratory and marine birds (Section 7.1.2.3) and fish and marine mammals (Section ▪).

7.1.1.8 Climate Conditions

There will be no impacts to climate conditions due to the construction of the SCH.

7.1.1.9 Marine Sediment and Water Quality

Impacts to marine sediment and water quality are considered negative but mitigatable. Minimum compliance requirements to manage and respond to concerns are detailed in the CEMP (Advisian-Ikpiaryuk JV 2021c). Where relevant, CWPs will be developed by the contractor to manage specific concerns (see Section 8.3).

Potential impacts to marine sediment and water quality are summarized below.

Decreased Water Quality Due to Sediment Mobilization

There is the potential for mobilization or introduction of sediment into the marine environment during construction. A compliance monitoring program will be in place to confirm sediment plumes do not exceed CCME turbidity thresholds.

Further to that, appropriate SEC measures will be required to confirm that land-based activities do not result in excessive sediment being introduced to the marine environment.

Decreased Water Quality Due to the Deleterious Substances

There is potential for accidental spills of deleterious substances due to use of construction equipment on (e.g. barge, ice) or near the marine environment during the Project. A SPRP CWP (see Section 8.3.3) will be developed and implemented by the contractor to confirm appropriate measures are in place to respond to accidental spills of deleterious substances. The SPRP CWP will include standard preventative measures (e.g. use of secondary containment (spill trays), spill response protocols).

The following measures are designed to mitigate potential negative impacts to marine sediment and water quality (further detailed within the CEMP (Advisian-Ikpiaryuk JV 2021c)):

- A qualified environmental monitor (EM) will be present during construction activities (land and marine-based).
- A documentation and reporting process will be managed by the Contractor to confirm disturbance, injury or death of any land or marine wildlife due to Project construction.
- The contractor will have an appropriate inspection and maintenance program in place for all construction equipment and vehicles (including brake checks).
- A turbidity monitoring program will be in place to confirm appropriate measures are in place for works in or near water that have the potential for sediment mobilization (see Section 5.5.4 of the CEMP).
- The EM will confirm appropriate SEC monitoring measures are in place to confirm that land-based activities do not result in sediment or other deleterious substances entering aquatic environments (marine, freshwater). Where appropriate equipment installations will be undertaken (e.g. turbidity curtain, silt fences).
- The SPRP CWP will detail response procedures to be implemented in the event of an accidental release; and refuelling and storage practices for operation of equipment over or near water (see Section 8.3.3).
- Fuel storage and transfer measures will be detailed in the SPRP CWP (see Section 8.3.3) and include appropriate measures for fuelling near or over water. At no time will storage of fuel be less than 31 m from aquatic watercourses (marine, freshwater).
- Stockpiling and storage of material must occur in upland designated areas and controlled in a way that debris and sediment will not enter the marine or freshwater environment.
- Actions to prevent and respond to accidental release of deleterious substances into the marine environment will be undertaken by the EM. Minimum measures will be detailed in the CCEMP (Section 8.2.2) and SPRP CWPs (see Section 8.3.3).

7.1.1.10 Coastal Morphology

The impacts to coastal morphology are minimal and localized to the Project footprint.

Some amount of sediment accumulation is expected to occur on the southwest side of the breakwater. This will be in the form of beach formation for littoral drift due to southerly storm waves within the bay. This effect is similar to the sediment accumulation that has occurred inside the existing harbour and has required periodic dredging.

7.1.1.11 Bathymetry

The impacts to bathymetry are minimal and localized to the Project footprint. Dredging will be executed in two locations within the harbour. The entrance channel will be dredged to -5 m CD, and lead to a 45 m turning circle, at the same depth, adjacent to the fixed wharf. A region along the shoreline underneath the floating docks will be dredged to -1.5 m CD.

Refer to Section 7.1.1.9 for comments on sediment accumulation that will affect bathymetry. Based on analytical work on sediment transport modeling, it is expected that the low tide line will extend offshore approximately 20 metres immediately adjacent to the breakwater. This assumes that the sediment source remains constant but may be the result of erosion of the former airstrip which has been southwest of the site (and redeveloped into a residential street and lots) which has more recently been armoured to reduce erosion.

7.1.1.12 Tides and Currents

There will be minimal impacts to currents within the Project Study Areas. The presence of a new and larger breakwater will affect localized tidal induced currents. However, since the tidal currents are already minimal at the head of the bay, the effect of the new breakwater will be negligible.

There will be no impact to tides in the bay.

7.1.2 Biological Components

Construction activities as described in Section 2 that have the potential to effect the biological VECs identified are summarized in Table 7-2.

7.1.2.1 Terrestrial Vegetation (Including Rare Plants)

Impacts to vegetation are considered negative but mitigable and significant adverse effects are not expected. Mitigation measures will be in place to manage and minimize negative effects. Where relevant, CWPs will be developed by the contractor to manage specific concerns (see Sections 8.2.2 and 8.3).

Potential impacts to vegetation are summarized below.

Removal of terrestrial vegetation within the Project footprint

There is no terrestrial vegetation in the SCH footprint therefore there are no impacts to terrestrial vegetation in the SCH footprint. Surface clearing will be minimal and limited to the quarry and haul road upgrade footprints. Vegetation at the quarry is dominated by bedrock with extensive lichen cover, as well as perennial Arctic plant species. Project impacts to vegetation are mitigatable in the long term as it is expected that lichen and other hardy Arctic plants will recolonize portions of the area following removal. In addition, the availability of bedrock for lichen growth is not limited in the area. Disturbances to plant harvesting sites is considered minimal because berry picking generally occurs outside of the HRQ Study Area (Arctic Bay IQ Workshop 2019 - Tom Nagitarvik).

Impacts to vegetation health resulting from dust deposition and/or contaminant spills

There is potential for dust deposition resulting from rock blasting and vehicle traffic during construction. Dust can negatively impact vegetation by affecting important processes (photosynthesis, respiration and transpiration) of the plant (Farmer 1993). Impacts include decreased vegetative productivity, and vegetation community shifts towards species which are adapted to mineral rich environments and those that are more dust tolerant (Walker & Everett 1987). Vegetation with mat and prostate growth forms, which are common in Nunavut, have high susceptibility to dust coverage as their form traps dust (Walker

& Everett 1987). Dust control mitigation measures will be implemented as outlined in the TMP CWP (Section 8.3.2).

Spills could directly affect vegetation through contact and physical damage and indirectly via contaminant assimilation from soil or water subsequent to a spill. The Contractor will be responsible for the development and implementation of an SPRP CWP that will minimize or eliminate potential effects to terrestrial vegetation (see Section 8.3.3).

Potential introduction of invasive plant species

There are 14 plant species known to be human-introduced in Nunavut (Government of Nuanvut 2011). Although there are currently no known plant species that are classified as terrestrially invasive in Nunavut, the potential for seeds and plant propagules to be transported via shipping and movement of equipment northward increases with greater human activity and development (Lassuy & Lewis 2013). The warming of the global climate further gives more opportunities for invasive species to establish (Lassuy & Lewis 2013). Mitigation and monitoring measures will be implemented to reduce the chance of spreading non-native plant seeds and plant propagules.

The following measures are designed to mitigate potential negative impacts to terrestrial vegetation (further detailed in the CEMP (Advisian-Ikpiaryuk JV 2021c)):

- A qualified EM will be present during construction activities (land and marine-based).
- A documentation and reporting process will be managed by the Contractor to confirm disturbance, injury or death of any land or marine wildlife due to Project construction
- Inclusion of decommissioning procedures to be in the QBMP CWP prior to the closure of the quarry, if required (Section 8.3.4).
- The EM will confirm appropriate SEC monitoring measures are in place to confirm that land-based activities do not result in sediment or other deleterious substances entering aquatic environments (marine, freshwater). Where appropriate equipment installations will be undertaken (e.g. turbidity curtain, silt fences)
- Water flow will be maintained in lowland areas by installing culverts and/or other drainage techniques during road construction as deemed appropriate.
- Use of approved dust suppressants and/or watering to reduce dust generation on roadways, stockpiles and any other construction activity that generates dust. Dust suppressants will be in accordance with the GN, Department of Sustainable Development, Environmental Protection Service, and Environmental Guideline for Dust Suppression (GN 2002).
- Confirm Project equipment mobilized to the Hamlet is inspected to be clean and free of soil that may introduce invasive species to the area.
- Stockpiling and storage of material must occur in upland designated areas and controlled in a way that debris and sediment will not enter the aquatic environments (marine, freshwater).
- The contractor will have an appropriate inspection and maintenance program in place for all construction equipment and vehicles

7.1.2.2 Wildlife (including Habitat and Migratory Patterns)

Impacts to wildlife (including habitat and migratory patterns) are considered negative but mitigable and significant adverse effects are not expected. Mitigation measures will be in place to manage and minimize negative effects. Where relevant CWPs will be developed by the contractor to manage specific concerns (see Sections 8.2.2 and 8.3).

Potential impacts to wildlife are summarized below.

Loss or alteration of habitat

Given the level of existing human development and activity within the Project Study Areas, the Project is not expected to remove or alter habitat of consequence and any loss or alteration is unlikely to be adverse to most species. Existing infrastructure exists within the Project Study Areas and will be upgraded, and the low to moderate value habitat does not appear to be limiting. Large mammals are unlikely to occupy the Project Study Areas and most large mammals (e.g. Arctic wolves and caribou) have large home ranges, are wide ranging, and somewhat wary of human development. Moreover, any species inhabiting the Project Study Areas are likely relatively tolerant of human activity (e.g. Hèllstedt & Henttonen 2006), and thus are expected to adapt quickly to minor changes in habitat.

Sensory disturbance and habitat avoidance

Noise, light, and general human activity and presence resulting from construction may result in minor temporary sensory disturbance. Without mitigation, sensory disturbance may temporarily alter habitat use in the Project Study Areas causing some individuals to avoid otherwise suitable habitat. However, most species that are likely to use habitat within the SCH will already be tolerant of human activity and associated sensory disturbances (noise and light). Blasting activities at the quarry and piling at the SCH have the greatest potential for sensory disturbance and habitat avoidance, although the frequency and timing are expected to be of relatively short duration.

Injury and mortality

Increased human presence, road traffic, and equipment and machinery activities are unlikely to injure wildlife given the predominant land activity is related to upgrading existing infrastructure. Improper waste management could result in increased human-wildlife interactions and subsequent lethal control of wildlife for protection of community members and project personnel. Fuel or other contaminant spills could also result in negative impacts on wildlife. However, construction is to occur within areas already exposed to human activity and waste management and spill prevention plans will be in place.

The following measures are designed to mitigate potential negative impacts to wildlife. These measures will be further detailed within the CEMP (Advisian-Ikpiaryuk JV 2021c):

- A qualified EM will be present during construction activities (land and marine-based).
- A documentation and reporting process will be managed by the contractor to confirm disturbance, injury or death of any land or marine wildlife due to project construction.
- A zero-tolerance policy regarding the harassment, disturbance and feeding of wildlife, birds, and aquatic organisms will be implemented.

- All project personnel will be educated on the wildlife (potentially nesting birds, fish, marine mammals etc.) and SAR expected to occur in the area according to scientific research and IQ/traditional knowledge.
- The CCEMP (see Section 8.2.2) will identify an appropriate strategy for documentation of wildlife observations. An immediate reporting structure will be in place to communicate observations of potentially dangerous wildlife observations which includes recording the time, date, location, activity, and proximity to project personnel (e.g. polar bears).
- Food, food waste, and other attractants will be handled, stored and disposed of safely to avoid attracting and habituating wildlife.
- Wildlife will be given the right-of-way so as not to chase, weary, harass or injure animals on the road.
- Implement timing restrictions to one 12-hour shift per day. As there is no applicable noise by-law, timing restrictions will be agreed through discussion with the Hamlet.
- A pre-construction wildlife (including migratory and marine birds) sweep will be conducted by a qualified professional to identify any sensitive wildlife features. Works cannot begin until this survey has been completed and confirmed that additional compliance measured are not required. The contractor will confirm their pre-construction wildlife sweep in the contractors CEMP (see Section 8.2). Minimum requirements for the survey are provided in Section 5.5.3 of the CEMP.
- Work site boundaries will be flagged to prevent inadvertent loss or alteration of habitat.
- Lighting will be limited to the extent required to provide a safe work site and shielded and directed to reduce diffusion outside of the work area.
- The SPRP CWP (see Section 8.3.3) will detail response procedures to be implemented in the event of an accidental release and refuelling and storage practices for operation of equipment over or near water.
- Movement of vehicles and machinery will be restricted if any large congregations of wildlife or birds occur in the SCH, Quarry or along the haul road. The EM will determine if work stoppage is required and when work can commence.

7.1.2.3 Migratory and Marine Birds

Impacts to migratory and marine birds are considered negative but mitigable and significant adverse effects are not expected. Mitigation measures will be in place to manage and respond to concerns. Where relevant, CWPs will be developed by the contractor to manage specific concerns (see Sections 8.2.2 and 8.3).

Potential impacts to migratory and marine birds are summarized below.

Loss or alteration of habitat

The Project is not expected to destroy or alter habitat of consequence and any loss or alteration is unlikely to be detrimental to birds because of the existing human development and activity within the SCH Study Area. Also, there is existing infrastructure within the Project Study Areas, which will be upgraded. This lower value habitat does not appear to be limiting. Most avian species likely to nest within the Project

Study Areas (e.g. common raven) are relatively tolerant and often nest in areas modified by human development (Cornell Lab of Ornithology 2017).

Sensory disturbance and habitat avoidance

Noise, light, and general increased human activity and presence resulting from construction could result in temporary sensory disturbances. Without mitigation these sensory disturbances may temporarily alter habitat use causing some less-tolerant individuals to avoid otherwise suitable habitat or at worst, result in abandonment of nests. Lighting during construction could disrupt migratory patterns; however, this impact is likely limited given that construction will occur primarily during summer months when daylight will be at its maximum and migratory birds are already present. Blasting activities at the quarry and pile driving at the SCH have the greatest potential for sensory disturbance and habitat avoidance, although the frequency and timing are expected to be of relatively short duration. Mitigation measures will be implemented to reduce sensory disturbance to migratory and marine birds.

Injury and mortality

Construction activities including grading, site preparation, and blasting have the potential to disturb nesting migratory birds and contribute to incidental take without proper mitigation. Increased human presence, road traffic, machinery, and activities have the potential to inadvertently injure birds during construction. Specifically, blasting could result in injury or mortality and abandonment of nesting, and fuel or other contaminant spills could result in mortality, injury or sub-lethal effects on birds. Mitigation measures will be implemented to reduce the possibility of injury and mortality to migratory and marine birds.

The following measures are designed to mitigate potential negative impacts to migratory and marine birds. These measures will be further detailed within the CEMP (Advisian-Ikpiaryuk JV 2021c):

- A qualified EM will be present during construction activities (land and marine-based).
- A documentation and reporting process will be managed by the contractor to confirm disturbance, injury or death of any land or marine wildlife, due to Project construction.
- A zero-tolerance policy regarding the harassment, disturbance and feeding of wildlife, birds and aquatic organisms will be implemented.
- All project personnel will be educated on the wildlife (potentially nesting birds, fish, marine mammals etc.) and SAR expected to occur in the area according to scientific research and IQ/traditional knowledge.
- Food, food waste, and other attractants will be handled, stored and disposed of safely to avoid attracting and habituating wildlife.
- Movement of vehicles and machinery will be restricted if any large congregations of wildlife including marine or migratory birds occur in the Project Study Areas. The EM will determine if work stoppage is required and when work can commence.
- Activities and infrastructure will be sited away from nests and roosts that will be protected by prohibited entry buffers based upon government or biologist recommended setback distances based on the 'alert' and 'flush' behaviors.

- A pre-construction wildlife (including migratory and marine birds) sweep will be conducted by a qualified professional to identify any sensitive wildlife features and bird nests. Works cannot begin until this survey has been completed and confirmed that additional compliance measured are not required. The contractor will confirm their pre-construction wildlife sweep in the contractor's CEMP (see Section 8.2.2). Minimum requirements for the survey are provided in Section 5.5.3 of the CEMP.
- Work site boundaries will be flagged to prevent inadvertent loss or alteration of habitat.
- If there are large flocks of marine or migratory birds near the Project during sound producing activities (such as pile driving), the EM will document their behaviour. No large flocks are anticipated to be present near the Project other than when foraging or staging during migration.
- Lighting is limited to the extent required to provide a safe work site and shielded and directed to reduce diffusion outside of the work area.
- The SPRP CWP (see Section 8.3.3) will detail response procedures to be implemented in the event of an accidental release; and refuelling and storage practices for operation of equipment over or near water.

7.1.2.4 Fish Habitat (including Marine Vegetation)

Impacts to fish habitat are considered negative but mitigable and significant adverse effects are not expected. Mitigation measures will be in place to manage and minimize negative impacts. Where relevant CWPs will be developed by the contractor to manage specific concerns (see Sections 8.2.2 and 8.3).

An Offset Plan will be developed to support the FAA application submitted to DFO-FFHPP to offset for the loss of seabed due to Project construction. There will be some positive habitat impacts due the hard substrates provided by the shoreline protection component of the SCH.

The following measures are designed to mitigate potential negative impacts to fish habitat. These measures will be further detailed within the CEMP (Advisian-Ikpiaryuk JV 2021c):

- A qualified EM will be present during construction activities (land and marine-based).
- A documentation and reporting process will be managed by the contractor to confirm disturbance, injury or death of any land or marine projects due to Project construction.
- If HADD to fish habitat or DoF beyond what is identified in the FAA is determined, DFO-FFHPP will be notified).
- No disturbance to the seabed outside of the Project footprint shall occur (with the exception of barge spudding and vessel anchoring).
- If marine-based equipment is used by the contractor, and if temporary pads need to be constructed on the foreshore for overwinter storage, the location will be discussed with and approved by DFO-FFHPP.
- Any Project generated debris that enters the marine environment will be retrieved.
- The EM will confirm appropriate SEC monitoring measures are in place to confirm that land-based activities do not result in sediment or other deleterious substances entering aquatic environments (marine, freshwater). Where appropriate, equipment installations will be undertaken (e.g. turbidity curtain, silt fences).

- The SPRP CWP (see Section 8.3.3) will detail response procedures to be implemented in the event of an accidental release; and refuelling and storage practices for operation of equipment over or near water.
- Land-based sources of sediment (stockpiling, placement of rock fill, drainage ditches) will be controlled in a way that debris and sediment will not enter the aquatic environments (marine, freshwater).
- Actions to prevent and respond to accidental release of deleterious substances into the marine environment will be undertaken by the EM. Minimum measures will be detailed in the CCEMP (Section 8.2.2) and SPRP CWPs (see Section 8.3.3).

7.1.2.5 Fish and Marine Mammals

Impacts to fish and marine mammals are considered negative but mitigable and significant adverse impacts are not expected. Mitigation measures will be in place to manage and minimize negative impacts. Where relevant CWPs will be developed by the contractor to manage specific concerns (see Sections 8.2.2 and 8.3).

Potential impacts to fish are summarized below.

Disturbance or Injury to Fish or Marine Mammals due to Underwater Sound

There are currently no federal underwater sound disturbance criteria in Canada. However, marine mammal and fish sound threshold guidance is provided by the National Oceanic and Atmospheric Administration (NOAA) (NOAA 2018), and by DFO-FFHPP through LoAs and FAAs which have consistently been providing underwater acoustic metrics and distance radii relevant to fish and marine mammals.

Anthropogenic sounds in water are categorized as impulsive or continuous in nature (OSPAR OAP 2017). Impulsive sounds include impact pile driving, air guns, explosions and sonar pings. Where continuous sounds include activities such as vibratory pile driving, drilling rigs, ship engines and sonar (National Research Council 2003).

Construction activities that have the potential to result in underwater sound (e.g. dredging, pile driving) will be required to be acoustically monitored to confirm that DFO-FFHPP recommended thresholds are not exceeded. The contractor will be required to implement adaptive management measures, if necessary, to minimize acoustic disturbances (e.g. bubble curtains). The quarry is located more than 1.5 km from the marine environment, and so near-water blasting is not a concern for the marine environment. However, due to the proximity of the quarry to Dead Dog Lake (see Figure 1-1 for location), the same acoustic measures will be required during blasting considered to be near-water. The DFO-FFHPP will stipulate the thresholds (see Section 5.5.7.1 of the CEMP for expected guidance) and monitoring requirements expected during these underwater sound producing activities.

Fish (Marine and Freshwater)

The sensitivity of marine fish to anthropogenic underwater sound is primarily driven by the presence or absence of a swim bladder within a particular species. Species with no swim bladder (e.g. sculpin) are the least sensitive to underwater sound (J. R. Nedwell et al. 2004). Fish with swim bladders will have variable sensitivities to underwater sound; species who use the swim bladder for hearing, and thus have a close

connection between the swim bladder and the ear, are the most sensitive (Halvorsen et al. 2012; J. Nedwell et al. 2006; Popper et al. 2006). Sculpin will be the primary species of interest, as other species such as Arctic char and Arctic cod, would be migrating through, as opposed to being residents in the area. Sculpin do not have a swim bladder and thus are likely to be less vulnerable to sound influencing activities.

Previous guidance from DFO-FFHPP stated that the underwater sound threshold for marine fish was 30 kPa (BC Marine and Pile Driving Contractors Association 2003b), however, updated information on acoustic sound thresholds for fish are available and are likely to apply for the Project. DFO-FFHPP currently recommends two underwater sound thresholds for fish, specified at 206 dB re 1µPa for peak sound pressure levels, and 186 dB re 1µPa^{2}s for an accumulated sound exposure level (cSEL). These thresholds are to be applied at a distance of 10 m from the sound source and are based on NOAA guidance (see Table 7-3, see Section 5.5.7.2 of the CEMP for expected guidance).

Table 7-3 Onset of Physical Injury and Behavioural Effects to Fish

Effect	Metric	Fish mass (g)	Threshold
Onset of Injury	Peak Pressure	NA	206 dB re 1µPa
Adverse Behavioural Effects	cSEL	≥ 2	187 dB re 1µPa^{2}s
		≤ 2	183 dB re 1µPa^{2}s
Adverse Biological Effects	Root mean square (rms)	NA	150 dB re 1µPa

Source: NOAA (2018)

Marine Mammals

The NOAA guidance provides underwater acoustic thresholds to evaluate levels of effect due to underwater sound to marine mammals for temporary threshold shifts (TTS) and permanent threshold shifts (PTS) based on the functional hearing groups of marine mammals. This guidance provides dual metrics for the onset of PTS for sounds that are impulsive or continuous in nature. Under both, the current and pre-August 2019 *Fisheries Act*, DFO-FFHPP's recommended requirement through LoAs and FAAs has been for a single underwater acoustic metric (impulsive sound) for marine mammals at 160 dB re1µPa rms, regardless of the sound characteristics to avoid potential marine mammal disturbance (and thereby injury) (pers. obs. Victoria Burdett-Coutts). NOAA's guidance based on different marine mammal groups is provided in Table 7-4. There are seven species of marine mammals known to occur near Arctic Bay, including whales (beluga, bowhead and narwhal), seals (ringed and bearded), walrus and polar bears. Their presence in Arctic Bay is further described in Section 6.5.5. If the contractor plans for construction in the iced season, in addition to underwater sound monitoring there will be requirements for in-air monitoring to protect on ice pinnipeds.

Table 7-4 Onset of Physical Injury and Behavioural Effects to Marine Mammals

Hearing Group	PTS		TTS	Behavioural Change
	dB Peak SPL	dB cSEL	dB cSEL	dB rms
Low-Frequency (LF) cetaceans	219	199	179	120
Mid-Frequency (MF) cetaceans	230	198	178	120
High-Frequency (HF) cetaceans	202	173	153	120
Phocid Pinnipeds (PW) (underwater)	218	201	181	120
Otariid Pinnipeds (OW) (underwater)	232	219	199	120

Source: NOAA (2018)

Fish Mortality

Direct mortality to fish is not expected to occur to the extent that would impact the ongoing productivity of fish. There will be some mortality for sessile species in the immediate footprint of the SCH, however mobile species (e.g. Arctic char, Arctic cod) are expected to move to other nearby areas. Measures will be in place to protect fish and marine mammals from acoustic disturbance.

Arctic char and Arctic cod may temporarily move out of the Project site during construction activities; however, it is expected that any impacts to the distribution of marine fish will be short-term and reversible, as nearby habitats can be used that are of equal value. Within these nearby habitats, the opportunity for foraging or protection from predators is expected to be the same. The construction of the SCH will not impact the migratory needs of Arctic char or Arctic cod, as they will be able to swim around the facilities (Indigenous and Northern Affairs Canada) (now known as CIRNAC) (INAC 2012).

Behavioural Modifications

There is potential for behavioural modifications of fish or marine mammals due to certain activities (e.g. artificial light, pile driving). These impacts are expected to be short term.

Water and Sediment Quality Degradation

Impacts to fish health due to sediment mobilization are not expected. A compliance monitoring program will be in place to confirm sediment plumes generated by dredge activities do not exceed CCME turbidity thresholds (described in Section 5.5.4 of the CEMP (Advisian-Ikpiaryuk JV 2021c)).

The following measures are designed to mitigate potential negative impacts to fish (further detailed within the CEMP):

- A zero-tolerance policy regarding the harassment, disturbance and feeding of wildlife, birds and marine organisms will be implemented.

- All project personnel will be educated on the wildlife (potentially nesting birds, fish, marine mammals etc.) and SAR expected to occur in the area according to scientific research and IQ/traditional knowledge.
- Turbidity monitoring will be implemented as per the CEMP. In the event that monitoring results exceed CCME water quality guidelines, adaptive management will be implemented (e.g. use of silt curtains) (described in Section 5.5.4 of the CEMP).
- Underwater sound thresholds will comply with thresholds indicated in the FAA and summarized in the CEMP (Sections 5.5.7.1 and 5.5.7.2 of the CEMP).
- A qualified EM will be present during construction activities (land and marine-based).
- A documentation and reporting process will be managed by the contractor to confirm disturbance, injury or death of any land or marine projects due to Project construction
- Actions to prevent and respond to accidental release of deleterious substances into the marine environment will be undertaken by the EM. Minimum measures will be detailed in the CCEMP (Section 8.2.2) and SPRP CWPs (see Section 8.3.3).
- Lighting will be limited to the extent required to provide a safe work site and shielded and directed to reduce diffusion outside of the work area.
- Marine Mammal Observers (MMOs) will be present on site to implement necessary acoustic monitoring requirements, establishment of Exclusion Zones (EZ) and documentation of marine mammals observed.
- Inclusion of appropriate measures (e.g. soft-start, bubble curtains) and procedures for activities that could generate underwater sound levels.
- Construction vessels will maintain vigilance for marine mammals: minimum approach distances and best practices as outlined in the Marine Mammal Regulations must be adhered to, and protected areas as outlined within the most recent Notice to Mariners published by the CCG at the time of construction will be followed.
- The SPRP CWP (see Section 8.3.3) will detail response procedures to be implemented in the event of an accidental release; and refuelling and storage practices for operation of equipment over or near water.

7.1.2.6 Species at Risk

Very few SAR are likely to be within the Project Study Areas during construction, as discussed in Section 6.5.6, and in Table 7-1 of the ESEB (Advisian-Ikpiaryuk JV 2021d). Project impacts and mitigation measures for terrestrial wildlife, migratory and marine birds, fish, and marine mammal SAR will be similar to those discussed in Sections 7.1.2.1 to 7.1.2.5. Construction activities that have the potential to impact on SAR include blasting, construction traffic and land-based equipment.

The likelihood of negative impacts to SAR is considered very low. These potential impacts are mitigatable and therefore serious adverse impacts to SAR are not expected. However, if observed, the following will be undertaken:

- If SAR are encountered during construction, the EM will document appropriately. This will include recording the locations and dates of any observations of SAR, behaviour or actions taken by the

animals when Project activities were encountered, and any actions taken by the contractor to avoid contact or disturbance to the species and its habitat.

- All project personnel will be educated on the wildlife (particularly SAR) expected to occur in the area according to scientific research and IQ/traditional knowledge.
- Appropriate measures will be in place to confirm potential SAR are protected. It is not likely that SAR species are in the footprint.

Caribou are not expected in the Project Study Areas, however the following measures will be undertaken if they are observed.

- If caribou are sighted near a workspace, the EM will determine if work stoppage is required and when work can commence.
- Measures to protect caribou will follow those outlined in Appendix I of the NBLUP (NPC 2000a).

7.1.3 Socio-Economic Components

Construction activities as described in Section 2 that have the potential to impact the socio-economic VSECs identified are summarized in Table 7-2.

7.1.3.1 Employment, Training and Business Opportunities

Employment, training and business opportunities available during construction represent a short-term positive impact to the community.

The Project will comply with the new Treasury Board *Directive on Government Contracts Including Real Property Leases, in the Nunavut Settlement Area* (Government of Canada 2019b) and aims to maximize participation of Inuit labour, training and Inuit owned businesses on the Project.

Positive short-term spin-off economic impacts are also anticipated, with Project spending on local accommodation and food from local businesses (e.g. hotel, lodge, Co-op, Northern Store). It is also likely that some non-local workers will make personal purchases such as arts and crafts from local artisans.

7.1.3.2 Land and Resource Use

Harvesting, Travel Routs, and Access

Harvesting is essential to Inuit culture and livelihood. Residents in Arctic Bay continue to rely on harvesting activities (hunting, fishing, trapping and gathering) as a source of nutrition, clothing, and for arts and crafts. The following factors have been taken into consideration for assessing the potential impacts from the Project to harvesting, travel routes and access:

- Harvesting locations in and around the Project areas (depicted in Figure 4-1).
- Access to ice, water and land.
- Timing of construction activities.
- Potential impacts to harvested wildlife.

Feedback received from elders and HTA members has indicated that harvesting is limited in Arctic Bay, with the exception of fishing and the occasional seal or beluga (IQ Workshop 2019). Elders and HTA members are not concerned about impacts to subsistence fishing caused by construction of the Project and indicated the Project would have no impact on their ability to fish. Additionally, when asked about any concerns on wildlife impacts, especially marine mammals due to underwater sound generated during construction, the feedback received indicated that the hunters expected the impact would be temporary and wouldn't have any lasting impacts on the wildlife they harvest.

The quarry and haul route have potential to impede access for hunters to reach Victor Bay, an important area for harvesting, especially during the open-water season. During construction, although it is expected that boaters with trailers will continue to launch using the sealift ramp as always, the Project has the potential to impede access to boaters.

Ice access is considered very good along the shoreline fronting the Hamlet and is not anticipated to be an issue during construction of the SCH.

The following measures are designed to mitigate potential negative impacts on Inuit Harvesting. These measures will be further detailed within the CEMP (Advisian-Ikpiaryuk JV 2021c):

- The contractor will be required to coordinate and sequence construction activities so that access to boaters is maintained at all times during construction.
- The Project will construct skidoo access over any potential barriers caused by stockpiles or stockpile pads to provide pass-through access to hunters.
- Daily road closures will be limited to ~ 30 mins/day once a day and coordinated to be at the same time as much as possible so residents can plan accordingly.
- Daily road closure notices will be posted on radio, social media, hamlet, and on VHF radios for cabin owners at Victor Bay.
- Continued consultation and coordination of construction activities with the HTA will be conducted.

Given the limited harvesting activities identified in the Project Study Areas and the mitigations described above (along with the mitigations proposed in previous sections for noise, wildlife, fish, marine mammals, and fish habitat), the Project does not expect to have a significant adverse effect on land and resource use or Inuit harvesting rights and any impacts are mitigatable.

Prior to demobilization at the end of each construction season, the contractor will meet with a designated HTA representative to confirm that Project sites have been left in a state so as to maintain access throughout the winter months. If concerns are raised, the contractor will make corrections that are accepted by the HTA representative prior to end of season demobilization.

Tourism

The Project has the potential to impede access for outfitters and cruise ship tenders during construction. Potential impacts to tourism are considered negative but mitigatable and significant adverse effects to tourism are not expected.

The following measures are designed to mitigate potential negative impacts to tourism. These measures will be further detailed within the CEMP (Advisian-Ikpiaryuk JV 2021c):

- The Project will consult with cruise ship operators and outfitters to maintain safe access for passengers.
- The contractor will be required to coordinate and sequence construction activities so that access for outfitters and cruise ship tenders and passenger safety is maintained during construction.
- Contractor will be required to issue NAVWARNs to notify mariners of any potential navigational interferences.

7.1.3.3 Local and Regional Traffic Patterns

Potential impacts to local and regional traffic patterns are considered to be negative but mitigatable and significant adverse effects are not expected.

The Project has the potential to impede operations of the sealift in the laydown area during construction of the SCH. In order to mitigate for this potential negative effect, the Project will consult and coordinate with the sealift companies and engage the Hamlet to confirm construction vehicles and equipment do not obstruct traffic going in and out of the area while the sealift is in. Additionally, the sealift ramp is located outside the Project footprint and will remain accessible as always.

Given this mitigation and that sealift operations are only a few days, it is anticipated that Project construction activities will not interrupt sealift activities and residents will continue to have access to their cargo as usual.

To reduce impacts on air transportation, the Project will plan accordingly so that it does not monopolize commercial flights. The Project will use private charter flights to transport project personnel as necessary, to avoid the Project taking up seats on scheduled flights that the community depends on.

A large volume of haul truck traffic will be required to transport the rock from the quarry to the SCH. The existing haul road will require improvements to allow for safe truck travel (easing corners, increasing width in areas, pull outs to permit vehicle passing). The Contractor will also be responsible for maintaining the road in good condition. Use of the existing road by the Contractor will also require adherence to a TMP CWP (see Section 8.3.2) to mitigate impacts on residential areas, community service trucks and community traffic.

Given the volume of truck traffic expected and the fact that roads are shared by many users including ATVs, snow machines, trucks, cyclists, and pedestrians, a TMP CWP will be implemented by the contractor in order to minimize the risk of traffic accidents.

The following measures are designed to mitigate potential negative impacts on local and regional traffic patterns. These measures will be further detailed within the CEMP (Advisian-Ikpiaryuk JV 2021c):

- The contractor will have an appropriate driver training and safety awareness program that will be in place.
- The contractor will confirm that appropriate vehicles and equipment are in use during construction that are properly suited for conditions of the road, especially brakes to handle steepness.
- The contractor will have an appropriate inspection and maintenance program in place for all construction equipment and vehicles (including brake checks).

- Appropriate measures will be included in the TMP CWP (see Section 8.3.2) to identify speed limits or other actions equipment operators need to consider to minimize dust, wildlife mortality, and other negative impacts. The maximum speed limit will be 20 km/hr.
- Adequate lighting on all vehicles so they can be easily seen.
- Use of approved dust suppressants and/or watering to reduce dust generation on roadways, stockpiles and any other construction activity that generates dust. Dust suppressants will be in accordance with the GN, Department of Sustainable Development, Environmental Protection Service, and Environmental Guideline for Dust Suppression (GN 2002).
- Traffic control measures such as flag people at busy intersections and along residential segments of the haul route.
- The contractor will conduct a traffic awareness campaign concerning road safety, particularly for children and teens (e.g. traffic safety and awareness talks in local schools and public events/community centres, posters distributed and posted around town, radio shows etc.).
- Daily road closures will be limited to ~ 30 mins/day once a day and coordinated to be at the same time as much as possible so residents can plan accordingly.
- Daily road closure notices will be posted on radio, social media, hamlet, and on VHF radios for cabin owners at Victor Bay.

7.1.3.4 Human Health and Community Wellness

Potential impacts to human health and wellness are considered negative but mitigatable and significant adverse effects are not expected.

The Project aims to reduce any undue strain on the Hamlet's community health centre. The contractor will be required to have an emergency responder specifically dedicated to Project personnel.

Project personnel will receive health and safety induction and training to industry standards. In emergency situations, the contractor may rely on the health centre to stabilize any injured worker(s) while they await medical evacuation to a larger centre. Given the small size of the construction labour force, providing a dedicated emergency responder for the Project and an emergency medi-vac plan for the workforce should effectively mitigate any negative impacts on the community health centre.

The impacts of increased dust caused by construction activities are considered negative but mitigatable and will be minimized. Impacts to respiratory health due to increased dust during construction are not anticipated.

The following measures are designed to mitigate potential negative impacts on human health and community wellness. These measures will be further detailed within the CEMP (Advisian-Ikpiaryuk JV 2021c):

- The contractor will be responsible for Installing diesel particulate filters on diesel equipment.
- The contractor will have an appropriate inspection and maintenance program in place for all construction equipment and vehicles (including brake checks).

- Appropriate measures will be included in the TMP CWP (Section 8.3.2) to identify speed limits or other actions equipment operators need to consider to minimize dust, wildlife mortality, and other negative impacts. The maximum speed limit will be 20km/hr.
- Use of approved dust suppressants and/or watering to reduce dust generation on roadways, stockpiles and any other construction activity that generates dust. Dust suppressants will be in accordance with the GN, Department of Sustainable Development, Environmental Protection Service, and Environmental Guideline for Dust Suppression (GN 2002).
- Implementation of a QBMP CWP (see Section 8.3.4).

There is potential for negative social impacts during construction resulting from non-local workers living and interacting with the community. The Project will take steps to minimize activities and behaviours with the potential to cause negative social or environmental impacts on the community. As part of their employment with the contractor, workers will be required to sign a Code of Conduct governing their behaviour on the job and during recreational hours. This will include adhering to all rules at construction sites and the construction camp. Additionally, the worker induction program will include an Inuit cultural awareness component to promote understanding and respect for local culture and residents. There will also be a zero-tolerance policy for alcohol, marijuana or illicit drug possession or use.

7.1.3.5 Community Infrastructure and Services

Potential impacts to community infrastructure and services are considered to be negative but mitigatable and significant adverse effects are not expected.

The Project aims to minimize any undue burden on community services and infrastructure. Maintaining community infrastructure and services is also a priority for the Hamlet.

Given the limited availability of accommodation in Arctic Bay, accommodation for non-local workers during construction will likely be provided by a construction camp; it is known that some contractors own houses in the hamlet for the expressed use of construction crews. This will effectively minimize any impacts on housing and accommodation facilities in the community.

The Hamlet provides fire response, water, sewage and solid waste services for the community. The Project will limit use of Hamlet services by having an on-site fire response plan to deal with local fires and have staff trained in the use of fire suppression aids. In the rare event that additional firefighting aid is required, the local volunteer fire station will be called.

It is anticipated that any solid waste disposal, water and sewage services required for the Project will be minimal and can be met by the current capacity of the hamlet's landfill facility, wastewater treatment and water reservoir facilities. The Project will have a dedicated water truck to support construction water and dust suppression needs, unless the Hamlet prefers to support the Project with their equipment.

The Project will have a dedicated fuel truck for meeting Project fuel requirements. Given that fuel supply in the community is not likely to be sufficient to meet construction needs, the Project is coordinating with PPD, who will arrange multiple fuel shipments to support both community and construction requirements. If this becomes impractical, the Contractor will be required to bring in temporary double-wall fuel tanks for fuel storage during construction to avoid impacting the community's fuel supply.

A TMP CWP (see Section 8.3.2) will be implemented for the Project to mitigate potential negative effects on the truck traffic for the delivery of community services by the large volume of haul truck traffic required to transport rock material from the Quarry to the SCH.

Use of approved dust suppressants and/or watering to reduce dust generation on roadways, stockpiles and any other construction activity that generates dust. Dust suppressants will be in accordance with the GN, Department of Sustainable Development, Environmental Protection Service, and Environmental Guideline for Dust Suppression (GN 2002).

7.1.3.6 Archaeological and Culturally Significant Sites

There were no archaeological or paleontological sites found within the Project Study Area and so there are no impacts. The Contractor will be required to have chance find procedures in place.

If historical or palaeontological features (e.g. stone features, stone tools, modified bone, fossils) or potential human remains are discovered within the construction footprint during construction, the measures outlined in the Archaeological Resource Discovery Plan (ARDP) CWP will be implemented (see Section 8.3.6), minimum requirements outlined in Section 5.4.14 of the CEMP (Advisian-Ikpiaryuk JV 2021c)).

Project personnel will be prohibited from collecting any archaeological or palaeontological materials.

7.2 Operations Phase Impacts and Mitigations

During the operations phase of the Project, only the SCH Study Area is relevant to potential impacts. The quarry will no longer be in operation for Project needs and rock hauling along the road will have ceased.

Operation of the SCH will be managed by DFO-SCH and an OEMP will be developed (see Section 8.4).

The operations phase also does not consider changes due to potential for increased shipping. It is not anticipated that the SCH will attract more marine traffic than what already exists for ports of call to Arctic Bay.

7.2.1 Physical Components

7.2.1.1 Designated Environmental Areas

There will be no impacts to designated environmental areas due to SCH once operational. There are no changes to shipping from what is currently existing and thus no impacts to the nearby TI NMCA. The proponents for the development of any new inshore commercial fisheries would need to confirm if any territorial permitting was required due to the potential impacts from increased shipping. A commercial fishery, should it be developed in the future, is not part of this NIRB screening application.

7.2.1.2 Geological Site Conditions

There will be no impacts to the geological site conditions during operations.

7.2.1.3 Surface Features

There will be no impacts to the surface feature conditions during operations.

7.2.1.4 Ground Stability and Permafrost

There will be no impacts to the ground stability and permafrost conditions during operations.

7.2.1.5 Hydrology

There will be no impacts to hydrology conditions during operations. The haul road and quarry will only be used by the Project during construction.

7.2.1.6 Air Quality

There is no new equipment being considered for future SCH operations that will generate additional emissions. Road and marine traffic levels during operation of the SCH will be the same as existing and therefore there is no impact on air quality during operations. In fact, the improvements to access may reduce congestion and waiting times and therefore reduce the amount of idling.

7.2.1.7 Noise

There is no new equipment being considered for future SCH operations that will generate additional noise. Road and marine traffic levels during operation of the SCH will be the same as prior to the construction of the Project and therefore there is no increase in noise during operations. The improvements to access may reduce congestion and waiting times and therefore may reduce the amount of noise, e.g. idling.

7.2.1.8 Climate Conditions

An expanding open-water season as a result of climate change will likely see the harbour used for a comparative increased length of time, as subsistence fishing throughout the accessible season is important to the community. No additional impacts from an increased period of use have been identified.

It is not clear how a longer open-water season will affect the cruise industry over the longer term, as cruise duration is critical to controlling costs and attracting business. The cruise industry normally meets demand and a longer open-water season does not mean more passengers will come. It is expected that there will need to be a significant increase in open-water season before a single vessel is able to add an additional voyage, beyond those already in place, in a single season. Over the longer term, and expanded Arctic season may permit more cruises to be undertaken. While the existing expedition fleet uses ice capable vessels under 500 passengers, larger non-ice class vessels could become economically feasible. Again, no additional impacts are expected due to the use of the harbour.

7.2.1.9 Sediment and Water Quality

There is no new equipment or activities within the SCH that could impact water or sediment quality during operations beyond the existing boating related activities.

Potential impacts to water quality during operations activities could occur as a result of accidental spills from vessels. However, the increased and safer access to the water is expected to reduce the risk of spills compared to existing operations. These impacts are therefore considered positive. An OEMP will be prepared to manage operations and minimize the risk of spills, as described in Section 8.4.

7.2.1.10 Coastal Morphology

The shoreline along the SCH has a gentle slope with sediment types such as gravel and cobble with a fraction of sand. Historical shoreline changes at the harbour and surrounding area have been noted through surveys and aerial imagery studies. There is evidence of a net northward sediment movement with sediment accumulation observed on the south side of the existing breakwater. After construction of the new breakwater, it is predicted sediment accumulation will result in a seaward shift of the shoreline south of the SCH, while the shoreline to the north will continue to erode. This is not anticipated to occur on a scale that would result in negative impacts.

On the northeast side of the harbour, it is not expected that significant amount of sediments will be transported into the inner harbour. Further, low wave energy due to wind and wave action from the east will cause minimal sedimentation at the harbour entrance.

7.2.1.11 Bathymetry

As noted in Section 6.4.11, the bathymetry will change due to littoral drift.

7.2.1.12 Tides and Currents

There will be no impacts to the tide and current conditions during operations.

7.2.2 Biological Components

7.2.2.1 Terrestrial Vegetation (Including Rare Plants)

There will be no impacts to vegetation during operations as all surface disturbances and blasting activities will be complete.

7.2.2.2 Wildlife (including Habitat and Migratory Patterns)

Road traffic levels to the SCH will be similar to existing and given the low incidence of wildlife and value of the habitat for with the SCH Study Area, no adverse impact on wildlife during operations is expected.

7.2.2.3 Migratory and Marine Birds (including Habitat and Migratory Patterns)

No nests or colonies of marine and migratory birds are located near the SCH Study Area and no adverse impacts during operations are expected on birds that might forage in the area.

7.2.2.4 Marine Fish Habitat (including Marine Vegetation)

Impacts to marine fish habitat due to operational activities are considered positive as the SCH will facilitate existing boating activities that will be conducted in a safer manner with less risk to the marine environment from spills.

7.2.2.5 Fish and Marine Mammal Species

The Project is being proposed in an area that is already heavily used for marine access, despite the presence of minimal infrastructure. During operations the SCH will provide a safer access point with less risk to the marine environment from spills.

There will be no impacts to marine fish during the operational phase of the Project. The Project will be constructed to service existing marine use and therefore additional vessel traffic is not planned. Furthermore, the presence of the facility is unlikely to interfere with Arctic char migration as they are expected to swim around the breakwater (INAC 2012).

There are no impacts to freshwater fish during operations as the quarry and haul road are only required during the construction phase.

7.2.2.6 Species at Risk

No impacts to vegetation, wildlife or marine mammal SAR have been identified from the operation of the SCH as there are very few SAR likely to be present within the Project Study Areas. Therefore, impacts on species-at-risk are not expected.

7.2.3 Socioeconomic Conditions

7.2.3.1 Population, Education and Employment

In the future, the presence of a SCH in Arctic Bay could provide opportunities for economic development in the community such as a commercial fishery or the potential to increase tourism by attracting more outfitting and cruise ship visits. However, any such opportunities would be developed outside of this Project and related impacts would be addressed directly by the proponent of these activities.

7.2.3.2 Land and Resource Use

Once operational, the Project will have a positive impact on harvesting, navigation, and travel. The Project will provide a safe harbour for launching, landing and mooring boats. The Project also includes a dedicated boat launching ramp which will avoid the existing conflicts and safety hazards during sealift. The new dedicated boat launching ramp will provide a positive impact by maintaining access for hunters to undertake subsistence harvesting when the sealift is operating.

No concerns from the community were expressed about the SCH affecting ice access once operational. Feedback received from elders, HTA members, and other knowledge holders has indicated that ice access is considered very good along the shoreline fronting the hamlet and is not anticipated to be an issue

during operation of the SCH. Hunters remarked that alternate routes along the shoreline could be taken if required.

> *"We've been requesting a small craft harbour for so many years, we are an adaptable people, we will find new routes."*

7.2.3.3 Local and Regional Traffic Patterns

Once the SCH is built, an expanded laydown area (size described in Section 2.1.1, roughly four times larger than the existing area) will be available to accommodate sealift cargo and vehicle parking/storage. The Project also includes a dedicated boat launching ramp, avoiding conflicts during sealift. It is anticipated that the expanded laydown area will have a positive impact on the community by reducing traffic congestion when the sealift is in. This will provide infrastructure for faster sealift unloading, and increased safety for the public. The SCH will also have a positive impact on marine traffic navigating through Arctic Bay by providing a safe harbour for boaters and cruise ship passengers. Boat launching and landing facilities will be improved and an area to safely moor and offload boats will be provided. The SCH will therefore have a positive impact on local and regional traffic patterns.

7.2.3.4 Human Health and Community Wellness

The SCH will improve the access and safety of boating operations and therefore will have a positive impact on community health and wellness.

7.2.3.5 Housing and Community Infrastructure and Services

The operation of the SCH will have a positive impact on existing community infrastructure for boat launching, landing and mooring by providing a dedicated launch ramp separate from sealift, a safe harbour and an expanded laydown area for sealift. It is expected that two launching ramps and a greatly expanded laydown area will improve traffic congestion and public safety.

The operation of the project will have no impact on the delivery of trucked community services (i.e. water, fuel, sewage, and solid waste).

7.2.3.6 Archaeological and Culturally Significant Sites

There will be no impacts to archaeological or culturally significant sites from the operation of the SCH.

7.3 Residual Effects

With the exception of the FAA expected to be required from DFO-FFHPP no residual effects to the environment subsequent to the implementation of mitigation and monitoring measures for the Project are expected. An Offset Plan will be designed and proposed to DFO-FFHPP, where this RA is already integrated into the Project.

7.4 Cumulative Effects

All Project effects previously described are expected to be negative and mitigatable, or positive. The past, present and reasonably foreseeable projects which have the potential to interact with the Project have been identified to be included within this Cumulative Effects Assessment. Two projects have the potential to interact with the construction of the SCH.

7.4.1 New Power Plant

The QEC Project is located approximately 4 km east of the Hamlet of the community of Arctic Bay and consists of the construction of a new diesel generated power plant to replace the existing plant (NPC No. 149027, NIRB No. 19XN009). The QEC Project includes the construction of construction support facilities and installation of two double-walled fuel tanks (90,000L capacity each) for bulk fuel storage. The QEC Project is proposed in order to upgrade to existing power plant to support community power needs for the next 40 years. The construction phase initiated in 2020 and is expected to occur until 2023.

There is no marine component or hauling for the QEC Project and construction activities are all contained at the site located in the industrial area of the Hamlet (over 4 km from the harbour). According to QEC's NIRB Application for Screening (NIRB No. 19XN009), the QEC Project also has very minimal requirements for water (2 m^3 /day) or any other community services. Similar to the Project, the QEC Project requires a small workforce (less than 20 workers) and aims to maximize local employment. Given the small number of non-local workers expected for both projects and the implementation of cultural awareness training and code of conduct on the Project, it is not anticipated that non-local workers from the Project will result in any socio-economic cumulative effects. For these reasons, cumulative effects from the QEC Project on the physical, biological or socio-economic VECs/VSECs for the Project are not anticipated.

7.4.2 Nanisivik Naval Facility

The NNF is a refueling port of modest facilities for naval and other government vessels located nearly 40km from Arctic Bay. The facility includes a deep sea wharf, two naval distillate tanks, two small diesel generators, a small warehouse with fenced compound and a site office (NIRB No. 09DN018). It will receive fuel at the start of the open-water season to fill the tanks or as much fuel as is planned for naval vessel missions for the season. Fuel will be dispensed on an as-needed basis when vessels call ahead to schedule a refuel. CCG vessels, which currently refuel at sea, will have the opportunity to refuel at NNF. NNF will continue to provide trans-shipment support for dry cargo into Eureka and possibly Kugaaruk. Construction of the NNF initiated in 2014 and is expected to be completed in 2022.

The NNF is located far from the community (see location in Figure 1-4). It is expected to be fully operational by the time construction on the Project begins. NNF operations will be limited to receiving fuel at the start of the open-water season and then only as needed for fueling vessels throughout the open-water. Additionally, the NNF will have very limited needs for community services or local labour once operational. For these reasons, cumulative effects from the NNF on the physical, biological or socio-economic VECs/VSECs are not expected (see Figure 7-1).

Legend

- Project Location
- Nanisivik Naval Facility
- Qulliq Energy Corporation (QEC) Power Plant

Locations approximate.

0 500 1,000 2,000
Metres

1:60,000

WGS 1984 UTM Zone 16N

N

FISHERIES AND OCEANS CANADA
SMALL CRAFT HARBOURS
ARCTIC BAY

NEARBY PROJECTS

Date: 07-JUN-21	Drawn by: KR	Edited by: KR	App'd by: VB

Project No. 317071-00037

FIG No 7-1 | REV A

Advisian Ikpiaryuk Services Ltd.

PLOT DATE & TIME: 6/7/2021 3:46:05 PM
SAVE DATE & TIME: 6/7/2021 3:45:52 PM
USER NAME: kenneth.w.ritchie
ISSUING OFFICE BURNABY GIS

FILE LOCATION: U:\YVR\317071\00037_PWGS_ArcBayCES\10_Eng\16_Geomatics\01_MXD\PSIR\Fig7-1_AB_Nearby_Projects.mxd

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

7.5 Assessment of Transboundary Effects

Potential Project effects identified in Section 7 are localized to the Project Study Areas and will be minimized or eliminated by the mitigation measures described.

Delivery of construction equipment and materials for the Project will be handled by existing sealift vessels so there is no additional vessel traffic, which could be transboundary, resulting from the Project.

The SCH has been designed to improve existing access for boats and the overall safety of marine activities in the community by providing a protected harbour. Any increase in shipping during operation of the SCH, which could be transboundary, is not considered part of the Project. Any new commercial fisheries that may be developed and use the SCH would require permitting under a separate application to NPC for referral to NIRB.

No anticipated transboundary effects are therefore expected from the Project, with the closest territorial, provincial or international boundaries to the Project Study Areas being the NWT (785 km to the north west) and Greenland (600 km to north east) (see Figure 7-2).

Figure 7-2 National and International Boundaries. (note: red dot denoted Arctic Bay, Project location)

Source: OneWorld (2021)

8 Environmental Management and Monitoring Plans

Regulatory compliance will be managed using BMPs and the development of several compliance documents, including a CEMP, CWPs and an OEMP.

8.1 Best Management Practices

Guidelines and BMPs that will be incorporated into the CEMP, the CCEMP and into the Contractor CWPs include:

- DFO: Fish and Fish Habitat Protection Policy statement (DFO 2019a)
- DFO: Measures to Protect Fish and Fish Habitat (DFO 2019d)
- DFO: Standards and Codes of Practice (DFO 2019b)
- DFO: Nunavut Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat (DFO 2013)
- DFO: Projects Near Water - Nunavut Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat (DFO 2019e)
- DFO: Guidelines for the Use of Explosives in or Near Canadian Water (Wright & Hopky 1998)
- Best Management Practices for Pile Driving and Related Operations (BC Marine and Pile Driving Contractors Association 2003a)
- NOAA :2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (NOAA 2018)
- Environmental Protection Service, and Environmental Guideline for Dust Suppression (GN 2002)
- Government of Canada: General nesting periods of migratory birds (Government of Canada 2018a)
- Government of Canada: Guidelines to reduce risk to migratory birds (Government of Canada 2019d)
- Government of Canada: Guidelines to avoid disturbance to seabird and waterbird colonies in Canada (Government of Canada 2018b)
- Government of Nunavut: Non-native and invasive species in Nunavut (Government of Nuanvut 2011)
- Contingency Planning and Spill Reporting in Nunavut. A Guide to the New Regulations (Government of Nunavut 2003)
- Guidelines for Spill Contingency Planning (INAC 2008)
- Guidelines for the Preparation of Hazardous Material Spill Contingency Plans (ECCC 1990)
- Emergency and continuity management program, Canadian Standards Association (CSA) Z1600-14, 2014 (CSA 2014)
- National Oil Spill Preparedness and Response Regime (Transport Canada 2019)
- A Best Practices Guide to Solid Waste Reduction, Canadian Construction Association, 2001 (Canadian Construction Association 2001)
- Environmental Guideline for the General Management of Hazardous Waste, Government of Nunavut, Department of Environment, 2010 (GN DoE 1999)

- Environmental Guideline for Used Oil and Waste Fuel (DoE 2012)
- Environmental Guidelines for Industrial Waste Discharges into Municipal Waste and Sewage Treatment Facilities (GN DoE 2011)
- Northern Land use Guidelines, Pits and Quarries, INAC, 2010 (INAC 2010)
- Northern Land Use Guidelines, Access Roads and Trails, INAC 2010 (INAC 2010)
- National Fire Code of Canada, National Research Council Canada, 2015 (National Research Council Canada 2010)
- Workplace Hazardous Materials Information System (WHMIS) (Health Canada 2020)

8.2 Construction Environmental Management Plan

8.2.1 Regulatory Construction Environmental Management Plan

A CEMP has been developed that details measures to be implemented to minimize potential negative environmental and socio-economic effects associated with the construction phase of the Project. Implementation of the measures detailed in the CEMP will support permitting and regulatory requirements and will be in place to confirm that residual effects due to Project construction do not occur (Advisian-Ikpiaryuk JV 2021c).

8.2.2 Contractors Construction Environmental Management Plan

The contractor will be responsible for developing a Contractor CEMP (CCEMP), to be in compliance with the Regulatory CEMP (Advisian-Ikpiaryuk JV 2021c) and permit and approval conditions received from RAs.

8.3 Construction Work Plans

Prior to construction, the contractor will be responsible for submitting a construction method statement which describes the phases for mobilization, preparation, drilling, site clean up and restoration and demobilization.

CWPs will be developed prior to construction as summarized below. Minimum requirements for the CWPs are provided in Section 5.3 of the CEMP (Advisian-Ikpiaryuk JV 2021c).

8.3.1 Marine Safety Plan

The Marine Safety Plan (MSP) is intended to minimize traffic interferences for the community and confirm that Inuit harvesting rights are not impacted on land or in water. It will identify a communication plan for mariners, and regulatory authorities (NAVWARNs) and identify any temporary structures associated with the Project. It is also to confirm that mitigation measures (e.g. navigational markers and marine construction buoys) are being undertaken for the TC NoW permit to minimize navigational interferences.

8.3.2 Traffic Management Plan

The TMP is intended to confirm an appropriate plan is in place to manage site access, traffic through the community and ensure the community is informed of ongoing construction traffic safety concerns. This includes driver training and safety awareness, establishing a dedicated haulage route, management of road closures, and a public safety awareness campaign.

8.3.3 Spill Prevention and Response Plan

A Spill Prevention and Response Plan (SPRP) will identify spill prevention and response procedures for accidental spills and to confirm compliance with regulatory communication requirements. The SPRP will describe procedures for safe fuel handling and storage, including details of the requirements for secondary containment for all equipment in addition to any specific procedures required for near- or over-water fuelling. The contractor must have spill response procedures in place. The purpose of the SPRP is to establish policies, procedures, and a communication matrix for the steps to be followed during an accidental spill.

8.3.4 Quarry and Blasting Management Plan

A QBMP is intended to confirm the procedures for the safe operation of the quarry during construction and blasting. A QBMP will be developed to detail the operations and maintenance to be undertaken by the contractor during SCH construction, including site safety and security measures and steps for development, operation, maintenance and monitoring of the quarry. The QBMP will also identify appropriate decommissioning of the quarry, including soil replacement, removal of waste and public safety measures

8.3.5 Health and Safety and Emergency Response Plan

The Health and Safety and Emergency Response Plan (HSERP) is intended to establish Health and Safety procedures to be undertaken to confirm a safe working environment and Emergency Response. The HSERP will address all health and safety aspects of the Project as required by Nunavut Safety Acts and Regulations to address potential emergency situations (e.g. fire, vehicle or equipment incidents, major first aid, wildlife encounters or natural disasters) that could occur at the Project site during the construction phases.

8.3.6 Archaeological Resource Discovery Plan

An ARDP is intended to confirm appropriate measures are in place should there be an archaeological discovery. An ARDP will describe the measure to be taken if historical or paleontological features not previously recorded are identified.

8.4 Operations Environmental Management Plan

DFO-SCH is responsible for oversight of small craft harbours throughout Canada, including Pangnirtung in southern Baffin Island and as such is familiar with the preparation and implementation of regulatory operations manuals and plans, including emergency response plans, SRPs, facilities inspection protocols, inventory management, and reporting requirements. DFO-SCH will be responsible for the operations of the SCH and will develop and implement plans for all aspects of the harbour operations. DFO-SCH will work with the Hamlet of Arctic Bay, the HTA, and local Contractors as required to confirm that operational requirements are met.

The plan will incorporate any permit conditions that relate to operations. The components of the plan will include:

- Roles and Responsibilities, including inter-agency agreements with the Municipality, the Municipal Fire Department, and the HTA as required.
- Operations – reference to berthing guidelines; procedures for cargo handling, fuelling, seasonal float removal and reinstatement, etc.
- Environmental Management, Mitigation and Monitoring Measures:
  - Waste Management
  - Spill Prevention and Response
  - Sediment and Erosion Control
  - Wildlife and Vegetation
- Inspections, Reporting and Conformance – daily, seasonal and longer term inspection schedules.
- Maintenance – marine structures, rock armour, supporting infrastructure (i.e. beach erosion, etc.).
- Training and Competency.
- Operations HSERP to same minimum requirements described in Section 8.3.5.
- Communications Protocols – regulatory and community.

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