

# APPLICATION INFORMATION REQUIREMENTS FOR SUBMISSIONS TO NUNAVUT IMPACT REVIEW BOARD

## 1 Project Overview

### 1.1 Introduction and Project Location

Advisian has been retained by Fisheries and Oceans Canada – Small Craft Harbours Program (DFO-SCH) to conduct an engineering feasibility study for the construction of small craft harbour (SCH) in four communities in Nunavut: Arctic Bay, Grise Fiord, Resolute Bay, and Clyde River. To inform the feasibility study, a field program will be undertaken during the 2019 open water season to conduct environmental, geoscience, geophysics and archaeological baseline studies in each location as detailed in Table 1-1 and depicted in Figure 1 (Attachment 1). All locations are in the Qikiqtaaluk Region.

This letter provides the details for the 2019 field season to fulfil the requirements for the Nunavut Impact Review Board (NIRB) to review the field program to determine whether it complies with all terms and conditions of any applicable land use plans.

**Table 1-1 Field Program Locations**

Location	Location Description	Latitude	Longitude
Arctic Bay	the northwest coast of Baffin Island (Borden Peninsula)	73° 1.529'N	85° 7.203'W
Grise Fiord	located on the southern shore of Ellesmere Island in Jones Sound	76° 25.001'N	82° 54.935'W
Resolute Bay	located on the south shore of Cornwallis Island in Parry Channel	74° 41.472'N	94° 51.549'W
Clyde River	located in Patricia Bay on the northeast coast of Baffin Island	70° 28.189'N	68° 34.616'W

### 1.2 Project Name

Four Harbour Feasibility Study (Environment, Geotechnical, Geophysics, Archaeology).

## 2 Proponent and Representative Details

Contact information for the proponent and representative are provided in Table 2-1.

**Table 2-1 Proponent and Contact Information**

Contact Category	Details
<b>Name of Business / Company</b>	Fisheries and Oceans Canada – Small Craft Harbour Branch (DFO-SCH)
<b>Name of Proponent</b>	Eleanor McEwan, P.Eng., Project Engineer
<b>Proponent Mailing Address</b>	Central and Arctic Region, Freshwater Institute 501 University Crescent Winnipeg, Manitoba R3T 2N6 Phone: 204-984-1102 Fax: 204-983-7166 Email: <a href="mailto:Eleanor.McEwan@dfo-mpo.gc.ca">Eleanor.McEwan@dfo-mpo.gc.ca</a> ,
<b>Name of Consultant / Primary Contact</b>	Victoria Burdett-Coutts, Marine Biologist, R.P.Bio.
<b>Consultant Mailing Address</b>	Suite 500 - 4321 Still Creek Drive Burnaby, British Columbia V5C 6S7 Office: 778-945-5501 Mobile: 778-839-2372 Fax: 604-298-1625 Email: <a href="mailto:Victoria.Coutts@advisian.com">Victoria.Coutts@advisian.com</a>

## 3 Project Description

### 3.1 Program Scope

The field program consists of the following:

- Marine Field Study;
- Wildlife Field Study;
- Vegetation Field Study;
- Geoscience Field Study;
- Geophysics Field Study; and
- Archaeological Field Study.

## 3.2 Study Areas

Study Areas will be developed prior to mobilization into the field to encompass the following Project components:

- Small Craft Harbour (SCH);
- Haul Road and Quarry; and
- Disposal at Sea sites (not confirmed if required).

All Study Areas will be designed to include the maximum footprint required for construction plus a 100 m buffer. Study areas were not defined at the time of this permit application, but their predicted extent is described in Table 3-1 and displayed in Attachment 1.

**Table 3-1 Field Program Study Areas**

Location	Study Areas				Figure No. in Attachment 1
	SCH	Disposal at Sea (marine field study only)	Haul Road	Quarry	
Arctic Bay	West of existing breakwater	Two sites under consideration	Not determined at time of application. May use existing road infrastructure	Three sites under consideration	2
Clyde River	Existing breakwater	One site under consideration	Not determined at time of application. May use existing road infrastructure	One site under consideration	3
Grise Fiord	East or west of community	One site under consideration	Not determined at time of application.	Two sites under consideration	4
Resolute Bay	East or west of Resolute Bay	Two sites under consideration	At this time, it is not known if there will be options for the development of a quarry. A determination will be made by the geologist during the 2019 field program. If a quarry site is located, a Haul Road Study Area will be determined.		5

## 3.3 Field Programs

Field surveys are required to document existing conditions within the Project Study Areas and to support engineering design. A summary of the purpose and proposed methodology for each of the field studies is provided in Table 3-2.

**Table 3-2 Field Components for the Four Harbour Feasibility Study**

Program	Component	Survey Purpose	Field Methodology	Equipment Required	Transportation Mode	Program Study Area
Marine	Fish Habitat - Intertidal	A survey of the foreshore including the intertidal and subtidal areas will be conducted to confirm the fish habitat quality within the footprint of the proposed SCH	<p>Intertidal surveys will be conducted at low tide to maximize the extent of seabed exposed. Transects will be established perpendicular to shore within the SCH Study Area (impacted site) and outside the SCH footprint (control site). A minimum of four transects will be completed but will depend on habitat characteristics observed on site.</p> <p>Field personnel will document substrate and habitat characteristics. Information gathered will include substrate type and composition, algae species identification, and relative abundance of marine invertebrates.</p> <p>Transects will be established perpendicular to the shoreline at regular intervals from the HHWM to the water line. Perpendicular transects facilitate the identification of transitions between habitat types, where zonation is a strong feature of intertidal communities for both rocky and sandy communities.</p> <p>A 1 m<sup>2</sup> quadrat will be spaced equidistantly along the transect line. The length of the transect will be determined by the number of habitat bands and the extent of intertidal, however will consist of a minimum of five quadrats per transect.</p>	Transect line, quadrat, iPad, clinometer	On foot	SCH
	Fish Habitat – Subtidal		<p>A local boat operator will be subcontracted. Perpendicular and parallel to shore subtidal transects will be conducted using a VideoRay Pro 4 remotely operated vehicle (ROV).</p> <p>Field personnel will document substrate and habitat characteristics. Information gathered will include substrate type and composition, algae species identification, and relative abundance of marine invertebrates. Data collected from these surveys will be complimentary to the intertidal habitat surveys and allow for the creation of a habitat map.</p>	ROV, iPad, depth sounder	Boat	SCH, DAS (if required)
	Water Quality	<p>Water quality analysis will be conducted to confirm water characteristics at the site</p> <p>Samples sent to the laboratory for chemical analysis will be analyzed for the following:</p> <ul style="list-style-type: none"> <li>▪ Nutrients (ammonia, nitrate, nitrite, phosphate, total organic carbon);</li> <li>▪ Physical parameters (pH, total suspended solids);</li> <li>▪ Total metals;</li> <li>▪ Dissolved metals; and</li> <li>▪ Physicochemical parameters will include temperature, salinity, pH, turbidity and conductivity.</li> </ul>	<p>Water quality sample locations will be selected within and outside of the relevant Study Area(s). A total of 10 locations per Study Area will be sampled. Each location will consist of a shallow (1 m below surface) and a deep (1 m above seabed) sample.</p> <p>Samples for chemical analysis will be collected using a 1.5 L niskin bottle deployed from a boat. A Niskin sampler will be lowered over the side of the boat, the messenger deployed and the niskin hauled back into the boat. Once at the surface, the water sample will be decanted into specific containers, supplied by an accredited laboratory. Sample containers will be labelled and immediately stored in coolers. Samples will be retained in coolers until they can be shipped to the south for laboratory processing.</p> <p>A conductivity, temperature and depth (CTD) SeaBird 19 will be used to measure physicochemical parameter at each location. If scheduling allows, multiple casts will be conducted at each location to determine variations in parameters during tidal exchange.</p>	CTD, Niskin sampler, depth sounder, iPad	Boat	SCH, DAS (if required)

Program	Component	Survey Purpose	Field Methodology	Equipment Required	Transportation Mode	Program Study Area
	Sediment Quality	<p>Sediment quality analysis will be conducted to confirm options for disposal of dredged sediment.</p> <p>Based on the requirements for the Disposal at Sea Regulations and ECCC (2014), sample analysis will include:</p> <ul style="list-style-type: none"> <li>Total organic carbon (TOC);</li> <li>Total metals (suite of 32);</li> <li>Polycyclic aromatic hydrocarbons (PAHs);</li> <li>Polychlorinated biphenyls (PCBs); and</li> <li>Sediment grain size.</li> </ul>	<p>Sediment quality sample locations will be selected within and outside of the relevant Study Area(s). A total of 10 locations per Study Area will be sampled. Samples will be collected either on foot or from a boat depending on if the area is intertidal or subtidal.</p> <p>Intertidal samples will be collected with a sterilized stainless-steel spoon and bowl. Subtidal samples will be collected using a ponar grab sampler (grab sampler). The grab sampler will be lowered over the side of the boat to the seabed to collect a sample.</p> <p>Physical characteristics of the sediment will be documented (e.g. colour, texture) and samples will be photographed.</p> <p>10 samples will be taken in each Study Area investigated.</p> <p>Samples will be retained in coolers until they can be shipped to an accredited laboratory for processing.</p>	Petite ponar, iPad, depth sounder	Boat	SCH, DAS (if required)
	Benthic Infaunal	<p>Benthic community analysis will only be required if the DAS sites are investigated to determine the infaunal biological community.</p>	<p>Sediment samples will be collected at the DAS Study Area as described in the Sediment Quality Section above.</p> <p>Separate grab samples will be conducted for sediment quality and benthic community analysis. Each sample will be sieved using a 1 mm stainless steel mesh, transferred to individual 500 mL plastic sampling jars, and preserved with 10% buffered formalin. Samples will travel back to Vancouver with field staff for transfer to an accredited laboratory for analysis.</p>	Petite ponar, iPad, depth sounder, formalin	Boat	DAS (if required)
	Drogue	<p>Collection of surface current data is required to characterize surface current patterns within the relevant Study Area(s). This data may further be used to calibrate the sediment dispersion model for the DAS site. Surface current speed and direction data will be collected using a surface drogue</p>	<p>The drogues will be deployed in multiple locations near the Project and DAS site during a flood tide and an ebb tide. The position of the drogue will be recorded using an Automatic Identification System (AIS) attached to the drogue.</p>	Drogue, AIS	Boat	SCH, DAS (if required)
Terrestrial	Wildlife	<p>A wildlife survey will be conducted to determine presence of wildlife (including species at risk and critical habitat) within the relevant Study Area(s). The wildlife survey will be composed of three parts: a) a general reconnaissance survey, b) breeding bird point counts, and c) coastal waterbird survey.</p> <p>As the boundaries of the Quarry and Haul Road Study Area(s) are not known at this time, the terrestrial biologist will initially work with the geoscientist to confirm which area is the most probable to assist in targeting their spatial focus.</p>	<p>The wildlife reconnaissance survey will consist of a meandering search across the entire Study Area (s). All wildlife species observed or detected (by tracks, scat, sign, and vocalizations) will be identified, recorded, and georeferenced using a handheld global positioning system (GPS). A general habitat assessment will be conducted and observations of important wildlife habitat or sensitive wildlife features (e.g. nests, dens, mineral licks) will be identified, recorded, and georeferenced.</p> <p>The breeding bird survey will consist of several point counts to document the bird species present, their abundance, and breeding status. Point counts will follow standard methodology (e.g. Ralph et al. 1995). All birds identified by sight and sound will be recorded including their distance from the observer and time of detection.</p> <p>The coastal bird survey will consist of transects along the shoreline. Counts will follow standard methodology (e.g. BSC and EC 2013). All birds identified by sight and sound will be recorded including their distance from the observer and time of detection.</p>	Global positioning device (GPS), Binoculars, Spotting scope, Kestrel Pocket Weather meter, Tablet, Camera	On foot, vehicle or ATV	Quarry, Haul Road, and SCH

Program	Component	Survey Purpose	Field Methodology	Equipment Required	Transportation Mode	Program Study Area
	Vegetation	<p>The purpose of the vegetation assessment is to determine the plant species, plant communities, and potential plant species or ecosystems at risk that occur within the relevant Study Area(s). The vegetation assessment will include a desktop review, field survey, and integration of local knowledge and values.</p> <p>Surveys will consist of an ecological land classification, a search for species at risk or key traditional use plants, and mapping of any weedy or invasive species.</p> <p>See description in wildlife section for targeting spatial extent.</p>	<p>Vegetation communities will be grouped based on similar characteristics such as vegetation species composition, moisture regime, topographical position, and hydrogeochemical characteristics. Vegetation communities will be delineated using a combination of field verification and desktop aerial imagery interpretation. Field verification will include plot-level surveys located in each vegetation community encountered. Plots will be positioned in homogeneous vegetation communities, representative of the typical composition in the polygon. Plots will be inset within varying plot sizes based on whether lichens, shrubs or trees are present. Plot size will range from 1 m x 1 m to 10 m x 10 m.</p> <p>Percent cover will be estimated to the nearest 1% for all species and assigned a cover of 0.5% for any species less than 1%. If species cannot be identified in the field, and the population size permits (1 in 50 rule), a voucher specimen will be collected for later identification in a herbarium.</p> <p>If any species at risk, key traditional use plants, or weedy or invasive species are identified, their population characteristics will be documented. Plot location will be recorded with GPS coordinates and photographed.</p>	<p>Quadrat, measuring tape, pin flags, plant press, iPad, hand lens</p>	<p>On foot, vehicle or ATV</p>	<p>Quarry, Haul Road</p>
<b>Geotechnical</b>	Geotechnical	<p>A geotechnical survey is required to identify suitable quarry locations for sourcing the required fill and rock armour for the SCH construction.</p>	<p>The survey will consist of a visual assessment of exposed bedrock and noting rock type, major structural defects, weathering and field estimate of rock strength. The surveyor will tag potential quarry locations and delineate possible quarry extents. This information may inform future environmental studies and provide the spatial extent for borehole locations in a future geotechnical program. Locations which are identified as potential for source rock, a representative rock sample will be collected. The rock sample will be sent to a laboratory for strength and durability testing.</p> <p>Drilling is not in the scope of the current field study.</p>	<p>Geotechnical hammer, tape measure, hand lens</p>	<p>On foot, vehicle or ATV</p>	<p>Quarry, Haul Road</p>
<b>Geophysics</b>	Geophysics	<p>Bathymetry and sub-bottom profiling is required to inform engineers of depth and substrate type. This is critical information for completing the engineering feasibility study.</p>	<p>Overwater sub-bottom acoustic profiling is a process where an electrical acoustic source and hydrophone receivers are towed behind a boat. Reflections from the ocean bottom, sub-bottom layering, and bedrock surface are received and recorded. The purpose of the survey is to identify changes in bottom hardness (and to locate bedrock) and to form the basis upon which to recommend locations for future geotechnical drilling programs.</p> <p>The overwater acoustic profiling will be carried out using a Lister electrical pulser system. The pulser system is used with a multi-element hydrophone receiver array. The electrical pulser system has a high efficiency electromagnetic drive for low frequency sound output.</p> <p>During the first round of community visits, the Hamlet and Ikajutit HTA were consulted on the overall summer field program which included a detailed description of the geophysical survey work being proposed. No concerns were raised from the Hamlet or HTA when the proposed geophysics program was discussed, and all approved with proceeding as planned. The proposed geophysics work will be presented again to the Hamlet and HTA in June 2019, during the second round of community visits and prior to the field program, to verify continued support of the program by the community.</p>	<p>Seismograph, hydrophones, submersible hydro cable</p>	<p>Boat</p>	<p>Project</p>

Program	Component	Survey Purpose	Field Methodology	Equipment Required	Transportation Mode	Program Study Area
Archaeological	Archaeological	An Archaeological Impact Assessment (AIA) will be conducted	<p>A Class II Nunavut Archaeologist Permit application has been acquired by Lifeways.</p> <p>The AIA of the Project will include pedestrian survey of the proposed Study Areas (s) and will target undisturbed areas. Transects will be conducted, the spacing of which will be determined based on characteristics of the landscape. Depending on the ground cover, assessment will involve visual inspection of all existing exposures, systematic and judgmental shovel testing of areas lacking exposure but with archaeological potential. All shovel tests (positive and negative) will be recorded using a GPS and all sites will be mapped, sketched and photographed.</p> <p>Should artifacts be recovered during the AIA, these will be cleaned, catalogued, identified, inventoried, and descriptions of each will be present in the final project report. All collected artifacts considered unstable will be discussed with the Lifeways conservator prior to transport for conservation.</p>		Foot	SCH (land portion), Quarry, Haul Road

## 4 Schedule

The field program is likely to be undertaken in August, but timing is dependent on open-water ocean conditions and thus dependent on the timing of ice break up. At this time, there are two field days planned in each location, with one day of travel between sites.

## 5 Personnel

### 5.1 Proposed Research Team

The research team affiliated with the Four Harbour Feasibility Field Study will consist of six people, each responsible for leading a discipline as detailed in Table 5-1. Any questions associated with the field program can be directed to Victoria Burdett-Coutts (email: [Victoria.coutts@advisian.com](mailto:Victoria.coutts@advisian.com); phone: 778-945-5501).

**Table 5-1 Research Team**

Name	Title	Discipline	Organization
Victoria Burdett-Coutts	Senior Marine Scientist	Marine Field Study	Advisian
Cameron Knight	Field Technician	Marine Field Study, Equipment Specialist (remote operated vehicle (ROV), drogue study, CTD)	Advisian
Jeff Gibson	Senior Engineering Geologist	Geotechnical Field Study	Advisian
Stephen Symes	Senior Wildlife Biologist	Terrestrial Field Study: only one of these four individuals will accompany the field team	Advisian
Michael Boyd	Wildlife Biologist		Advisian
Lucas Pittman	Ecologist		Advisian
Allison Routledge	Vegetation Ecologist		Advisian
Beth Galambos	Geophysicist	Geophysics Field Study	Frontier Geophysics Inc. (Frontier)
Brent Murphy	Archaeologist	Archaeology Field Study	Lifeways of Canada Ltd (Lifeways)

## 5.2 Opportunities for Local Participation

The research team will require local support such as wildlife monitors, field assistants, boat/operators, trucks, all terrain vehicles (ATVs) etc.

## 6 Consultation

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### 6.1 Consultation Summary

Harald Kullmann (Project Manager and marine infrastructure engineer, Advisian) and Diane Pinto (Consultation Lead, Advisian) travelled to Arctic Bay, Grise Fiord, Resolute Bay and Clyde River from November 9-22, 2018 to conduct initial consultations in the communities.

Separate meetings were conducted with Hamlets and the Hunters and Trappers Organizations (HTO) in each community except for a joint Hamlet/HTO meeting in Grise Fiord.

Meetings began with Advisian presenting an overview of the feasibility study including details on the field baseline research being proposed followed by open discussion. The presentations covered the following topics relevant to the field research:

- Project schedule;
- Bathymetric and topographic surveys;
- Summer field program 2019 for the terrestrial (wildlife, vegetation) and marine (habitat survey, sediment and water quality collection);
- Geophysical survey planned;
- Potential quarry locations;
- Suggested disposal sites for dredged sediments including disposal at sea (DAS); and
- Finding local field support and communicating opportunities and study activities/ results with the community.

An open dialogue between HTO and Hamlet members and Advisian was facilitated by the use of maps, surveys and photographs. Local interpreters were hired in each community as required.

A second round of consultations will be conducted in the communities from May 23-June 11, 2019 to present the harbour concept drawings developed based on community feedback received in November 2018 and to reintroduce the summer field program activities being planned.

A third round of consultations is planned for October 2019 to present the final refined harbour concepts and to share the results of the field program studies with the community.

## 6.2 Proposed use of Local Knowledge

Traditional land use and environmental knowledge workshops with local key knowledge holders are planned to guide and complement the overall field baseline study. Elder interviews and verification meetings will be conducted in October 2019 after the field studies are complete to discuss the baseline results and verify that local knowledge has been accurately and appropriately interpreted and analyzed in the study.

Key knowledge holders to participate in the workshops will be determined by engaging with the HTO/HTA in each community. Participants will represent a cross-section of knowledge holders and may include elders, active land users, HTO board members, traditional healers etc.

In advance of the workshop and interviews, the Inuit Qaujimagatuqangit (IQ) facilitator will engage with the various discipline leads to confirm the information required for each component.

## 7 Project Map

See Attachment 1.

## 8 Land Use and Licensing

### 8.1 Land Use

Field-based studies.

**Table 8-1 Land Use and Ownership**

Administrative Boundary	Qikiqtaaluk Region
Planning Region	North Baffin
Land Use	Field activities which by NPC's descriptions would be most closely categorized as scientific research
Land Ownership	Municipal

## 8.2 Permitting

**Table 8-2 Licenses and Permits Relevant to the Field Program**

Permit	Regulatory Authority	Program Aspect	Status
Research Permit	Nunavut Research Institute (NRI)	All	Separate applications for each location. Pending submission to NRI
Social Science Research Permit	NRI	All	One application for all four harbours Pending submission for October 2019 Community Consultation Program.
License to Fish for Scientific Purposes	DFO	Marine Field Study. Specific to collection of sediment for infaunal community analysis or collection of amphipods during intertidal survey	One application for all four harbours. Submitted 13 May 2019
Wildlife Research Permit	Ministry of Environment	Wildlife and Vegetation Field Study	One application for all four harbours. Submitted 22 May 2019
Vegetation (wildlife) export permit	Ministry of Environment (Local Conservation Officer)	Vegetation Field Study	Will be obtained from last community conservation office visited, prior to travelling south.
Class 2 Permit	Department of Culture and Heritage	Archaeology	Separate applications for each location. Submitted April 2019

## 9 Material Use

### 9.1 Equipment

See Table 3-2.

### 9.2 Fuel Use

Not relevant.

### 9.3 Hazardous Materials

Small quantities of preservatives such as formalin, ethanol and hydrochloric acid are required to preserve water and sediment quality samples for the marine program.

- Hazardous Materials – Sample preservatives (less than 1 millilitre of acid per sample bottle), ethanol for benthic invertebrate preservation, fuel for support vehicles.
- Chemical Use – Sample preservatives (less than 1 millilitre of acid per sample bottle), ethanol for benthic invertebrate preservation.

## 10 Environmental Management

Potential environmental effects and proposed mitigation measures are provided in Table 10-1.

**Table 10-1 Feasibility Study Environmental Effects and Mitigation**

Environmental Effect	Relevant Field Study	Mitigation
Disturbance of terrestrial and marine habitat and wildlife	All	Field personnel will be accompanied by local field assistants to confirm minimal disturbance to terrestrial and marine habitats and organisms.
Disruption of traditional use of proposed study area	All	Arrival of the research team will be advertised in advance of the field study. There is no aspect of works required that would modify the use of terrestrial or marine areas by local people.
Temporary sediment suspension	Marine – Sediment Quality	The footprint of the grab sampler is very small (<10 cm <sup>2</sup> ), so disturbance of sediment will be minimal.

Environmental Effect	Relevant Field Study	Mitigation
Disturbance of heritage resources	Archaeology	<p>Measures are described in the Class 2 permit applications which have been submitted to the Department.</p> <p>Field documentation will include details relevant to complete site forms. In the event artifacts that are diagnostic in nature are discovered in subsurface contexts or that are threatened by current or near future site situation they will be collected, cleaned, identified and catalogued.</p> <p>The final report will follow the requirements defined in the Guidelines for Applicants and Holders of Nunavut Territory.</p> <p>Archaeological and Palaeontology Permits.</p>
Increased overall anthropogenic presence within study areas	All	The research team is small and are conducting non-invasive short term studies.

## 11 Waste Management

- Waste Management – Environmental baseline studies will employ a ‘pack in, pack out’ policy in terms of waste management. Bulk waste is not anticipated during these studies. Some non-combustible waste will be created from consumables during sampling (bottles, bags, gloves, etc.).
- Sewage / Human Waste – the field crew will use existing facilities.

## Attachments

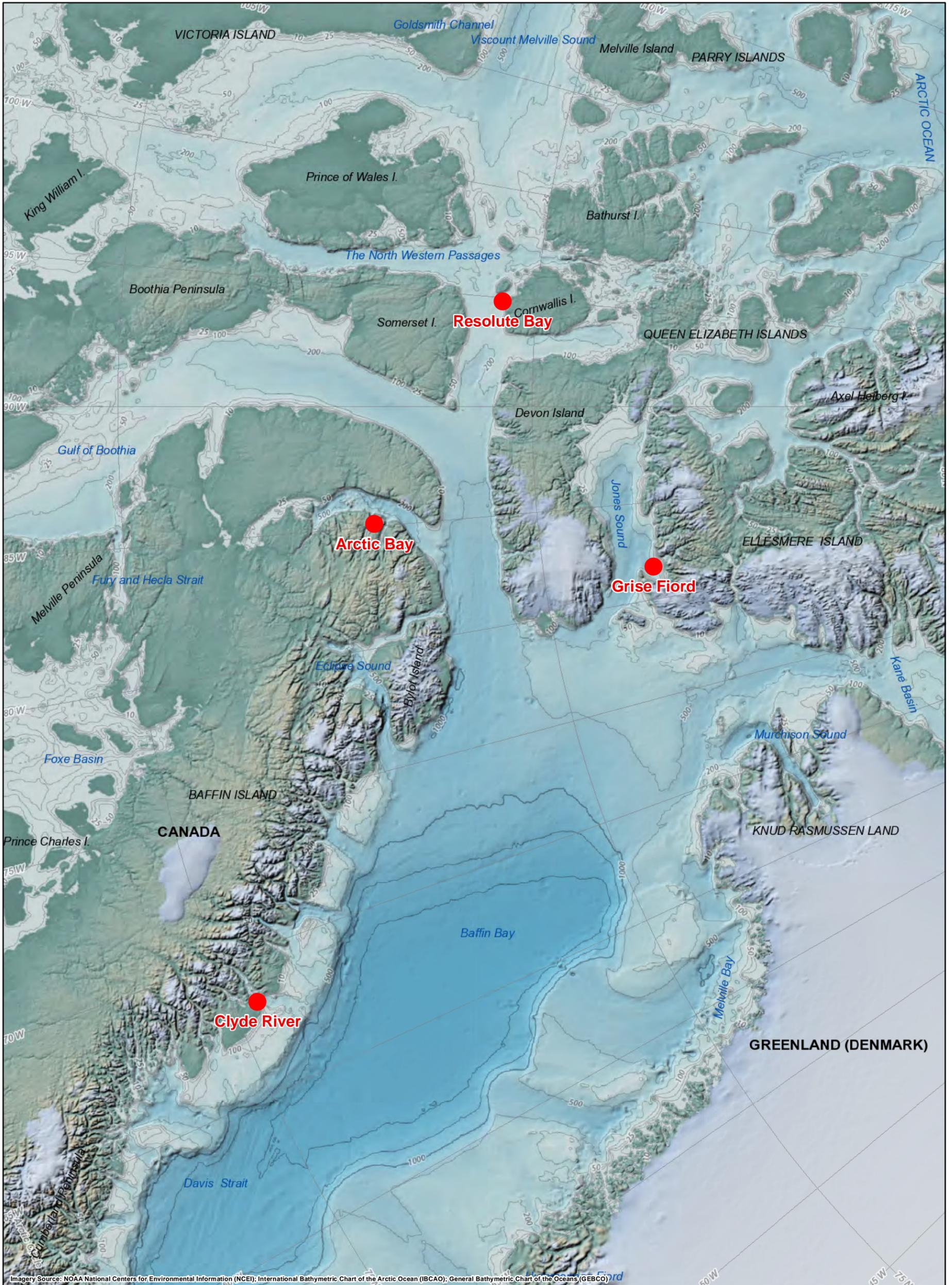
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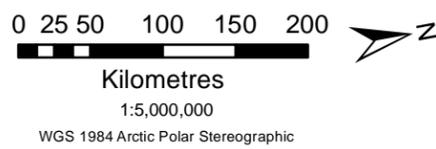
## Attachment 1 Figures

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Imagery Source: NOAA National Centers for Environmental Information (NCEI); International Bathymetric Chart of the Arctic Ocean (IBCAO); General Bathymetric Chart of the Oceans (GEBCO) <sup>©</sup>rd



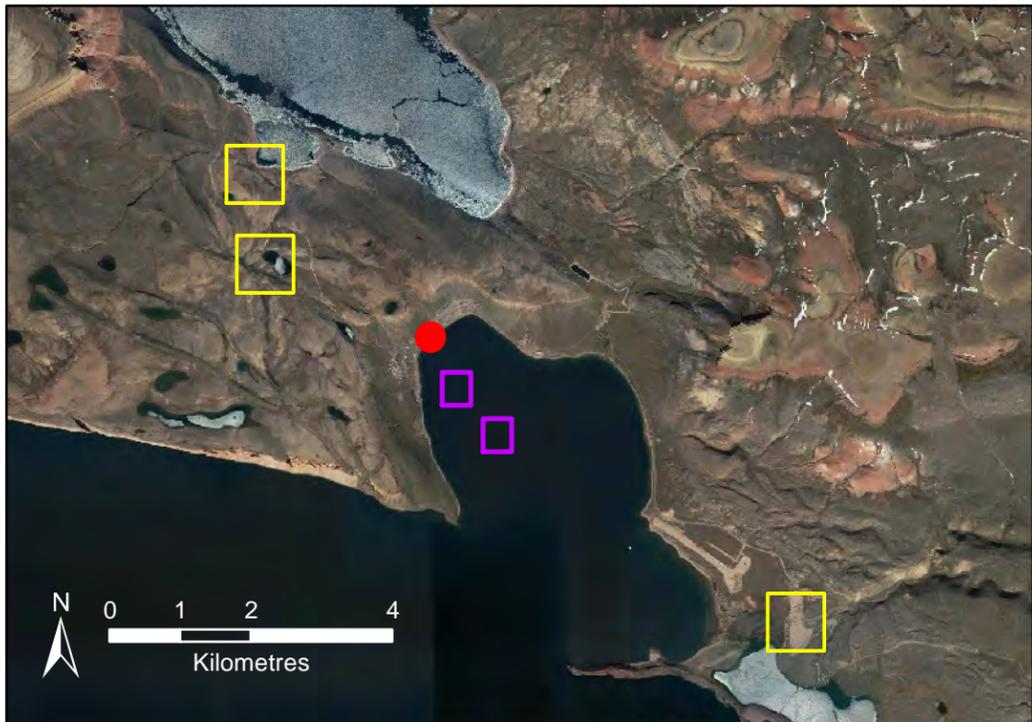
DEPARTMENT OF FISHERIES AND OCEANS -  
 SMALL CRAFT HARBOUR  
 FOUR HARBOUR FEASIBILITY STUDY

**FOUR HARBOUR FEASIBILITY STUDY LOCATIONS**



Date: 22-MAY-19	Drawn by: KR	Edited by: KR	App'd by: VB
		Project No. 307071-01306	REV
		FIG No 1	0

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- Legend**
- Site Location
  - Potential Small Craft Harbour Study Area
  - Potential Quarry Location
  - Potential Disposal At Sea (DAS) Site

Aerial Image: GoogleEarth, July 2016  
Locations approximate.

DEPARTMENT OF FISHERIES AND OCEANS -  
SMALL CRAFT HARBOUR  
ARCTIC BAY FEASIBILITY STUDY

**ARCTIC BAY PROJECT LOCATION AND  
POTENTIAL STUDY AREAS**

	Date: 22-MAY-19	Drawn by: KR	Edited by: KR	App'd by: VB
			Project No. 307071-01306	
	Worley Group		FIG No. 2	REV 0

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**Legend**

- Site Location
- Potential Small Craft Harbour Study Area
- Potential Quarry Location
- Potential Disposal At Sea (DAS) Site

Aerial Image: GoogleEarth, July 2016  
Locations approximate.

DEPARTMENT OF FISHERIES AND OCEANS - SMALL CRAFT HARBOUR GRISE FIORD FEASIBILITY STUDY				
<b>GRISE FIORD PROJECT LOCATION AND POTENTIAL STUDY AREAS</b>				
	Date: 22-MAY-19	Drawn by: KR	Edited by: KR	App'd by: VB
			Project No. 307071-01306	REV 0
			FIG No. 3	REV 0
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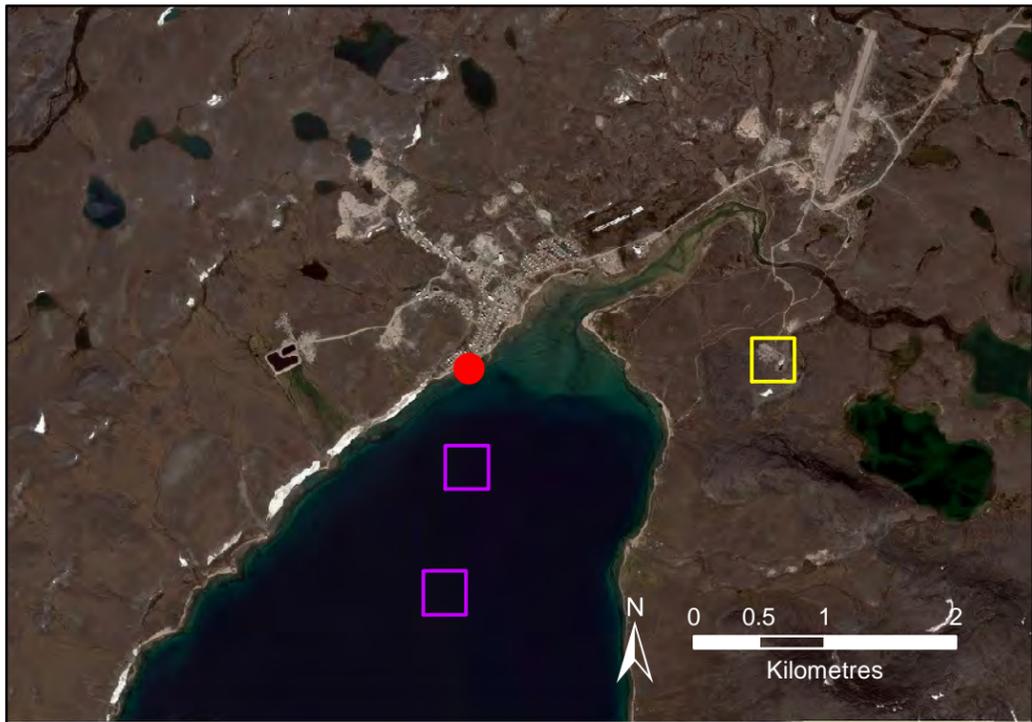


- Legend**
- Site Location
  - Potential Small Craft Harbour Study Area
  - Potential Disposal At Sea (DAS) Site

Imagery Source: NOAA National Centers for Environmental Information (NCEI); International Bathymetric Chart of the Arctic Ocean (IBCAO); General Bathymetric Chart of the Oceans (GEBCO)

Aerial Image: GoogleEarth, July 2016  
Locations approximate.

DEPARTMENT OF FISHERIES AND OCEANS - SMALL CRAFT HARBOUR RESOLUTE BAY FEASIBILITY STUDY				
<b>RESOLUTE BAY PROJECT LOCATION AND POTENTIAL STUDY AREAS</b>				
	Date: 22-MAY-19	Drawn by: KR	Edited by: KR	App'd by: VB
			Project No. 307071-01306	REV 0
	FIG No. <b>4</b>			
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- Legend**
- Site Location
  - Potential Small Craft Harbour Study Area
  - Potential Quarry Location
  - Potential Disposal At Sea (DAS) Site

Aerial Image: GoogleEarth, July 2016  
Locations approximate.

DEPARTMENT OF FISHERIES AND OCEANS - SMALL CRAFT HARBOUR CLYDE RIVER FEASIBILITY STUDY				
<b>CLYDE RIVER PROJECT LOCATION AND POTENTIAL STUDY AREAS</b>				
	Date: 22-MAY-19	Drawn by: KR	Edited by: KR	App'd by: VB
	 Worley Group		Project No. 307071-01306	REV 0
			FIG No. 5	REV 0
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