



[illegible]

ᐅᓂᓄᓇᓂᓗᓃᑦ: Our project is focused on understanding risks from climate change and growth in shipping across Inuit Nunangat and to identify ways to manage these issues that support Inuit self-determined shipping and oceans governance. Our project objectives include to: 1. Analyse past and future ship traffic in Nunavut; 2. Model current and future underwater noise caused by ships; 3. Sample potential air and water pollution from ships; 4. Evaluate potential for non-indigenous species introduction from ships, and; 5. Develop risk maps and evidence-based recommendations. Fieldwork: We will opportunistically conduct water samples from on board ships (Amundsen, Ocean Endeavour, Fram), transiting Nunavut waters from July-September, 2023, and 2024. We will also opportunistically conduct water and sediment samples at shore locations along cruise ship routes (where appropriate). Shore locations may include Dundas Harbour, Fort Ross, Gjoa Haven, Beechey Island, Resolute, and Cambridge Bay. We will also conduct community-based sampling of air, water, and sediment, led by Inuit in Arviat and Pond Inlet from June – September, 2023 and 2024. Methods: Onboard the ships, we will sample seawater from the inlet in the hull and filter it through a mesh to collect plastic and other sediments. We will set up onboard air sampling arrays, where particles in the air will be collected on filters. We will take water samples for eDNA to identify any non-indigenous species upstream and downstream of the ship and at shore locations. At shore locations, we will take sediment samples (100g) in a metal bottles and take pictures of any plastic debris. Community-based sampling in Arviat and Pond Inlet will include setting up air sampling arrays near the communities, water sampling for plastic and eDNA by boat and Remotely Operated Vehicle (ROV) (Pond Inlet in 2023 and 2024, Arviat in 2024). Impacts: There are no expected impacts to the environment, wildlife, or people. Data Storage and Management: The research team follows all procedures for data management and storage that is outlined in the Tri-Council protocols and the National Inuit Strategy on Research. All data and samples are saved and/or stored in locked facilities and password protected computers/servers. Physical samples (air, water, and sediment) will be stored at locked facilities in Ottawa and Cambridge, UK. Nunavut residents involvement: Nunavut residents have been involved in the project since the beginning. We have partnered with Ikaarvik (Pond Inlet, NU) and Aqqiumavvik Society (Arviat, NU) to develop the original project proposal and research questions. In May, 2022 all southern team members attended training on Inuit Qaujimajatuqangit (IQ). In December, northern team members received training on how to collect acoustic data using hydrophones, and, in February, training on water and plastics sampling and analysis. In 2023-24, we plan to conduct similar community researcher sampling training and workshops. Results Sharing: Results validation and sharing workshops in Arviat and Pond Inlet are planned for 2025. These events will be co-led by Inuit Youth. Results will also be shared with Nunavut partners throughout the project.

▷ ΔΑΝΟC: N/A

[illegible]

Operations Phase: from 2022-04-01 to 2025-03-31

$$\Lambda \subset \mathbb{N} \triangleleft \mathbb{N} \xrightarrow{\sigma} \mathbb{N} \xrightarrow{\sigma^b} \mathbb{N}^c$$

Area	Sampling sites	Municipal	N/A	N/A	We will be sampling the shoreline within or near the community depending on where the ship goes.
Arctic Bay (potential shore location)	Sampling sites	Municipal	N/A	N/A	We will be sampling the shoreline within or near the community depending on where the ship goes.
Gjoa Haven (potential shore location)	Sampling sites	Municipal	N/A	N/A	We will be sampling the shoreline within or near the community depending on where the ship goes.
Cambridge Bay (potential shore location)	Sampling sites	Municipal	N/A	N/A	We will be sampling the shoreline within or near the community depending on where the ship goes.
Resolute Bay (potential shore location)	Sampling sites	Municipal	N/A	N/A	We will be sampling the shoreline within or near the community depending on where the ship goes.
Dundas Harbour (potential shore location)	Sampling sites	Crown	N/A	N/A	N/A
King William Island (potential shore location)	Sampling sites	Crown	N/A	N/A	N/A



Γ <sup>c</sup> ΠLC <sup>b</sup>	Eric Soloman	Ikaarvik	2021-07-27
Γ <sup>c</sup> ΠLC <sup>b</sup>	Shelly Elverum	Ikaarvik	2021-07-27
Γ <sup>c</sup> ΠLC <sup>b</sup>	Justin Milton	Ikaarvik	2021-07-27
Γ <sup>c</sup> ΠLC <sup>b</sup>	Michael Milton	Ikaarvik	2023-02-24
Δ <sup>c</sup> ΛΔ <sup>c</sup>	Kukik Baker	Aqqiumavvik Society	2021-07-27
Δ <sup>c</sup> ΛΔ <sup>c</sup>	Shirley Tagalik	Aqqiumavvik Society	2021-07-27
Γ <sup>c</sup> ΠLC <sup>b</sup>	Peter Inootik	N/A	2023-02-16
Γ <sup>c</sup> ΠLC <sup>b</sup>	Jamie Enook	ECCC	2022-09-20
Δ <sup>c</sup> ΛΔ <sup>c</sup>	Jimmy Muckpah	Aqqiumavvik Society	2023-02-10
Δ <sup>c</sup> ΛΔ <sup>c</sup>	Zachariah Owingayak	Aqqiumavvik Society	2023-02-10

$\epsilon \Delta^{\alpha} j^{\beta} \wedge J^{\alpha} e^{\beta} \dot{N} \quad d^{\alpha} r^{\beta} C D P L \dot{r}^{\gamma}$

$a^{\dagger}r d^{ab} r^a \sigma^b \wedge c_n d_n e^c \Delta D \sigma d^{fb} D^c$   $\partial\partial f^f \omega^c:$

## Transboundary

## Kitikmeot

## Kivalliq

North Baffin

ᄇᄃᆫᆯᆺ ᄇᄃᆫᆯᆺ ᄇᄃᆫᆯᆺ

ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ	ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ	ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ	ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ	ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ
ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ	QIA Land Use Exemption Certificate– QX- 2210 (Jennifer Provencher)	Active	2022-06-01	2025-12-31
ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ, ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ	NRI Scientific Research License – 03 014 22R-M (Jennifer Provencher). Renewal pending.	Active	2022-06-01	2022-12-31
ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ, ᐱᑦᓴᐅᑦᓴᐅᑦᓴᐅᑦ	NRI Scientific Research License	Applied, Decision Pending		

## Project transportation types

Transportation Type	Transportation Mode	Length of Use
Water	Ship and local boats	

### Project accomodation types

◁ ୨୦୧୬,

◀ ▶ ↺ ↻ ⌂ 🔍

Λ<sup>9</sup>d<sup>c</sup> d<sup>8</sup>r<sup>a</sup>z<sup>b</sup> d<sup>7</sup>c<sup>b</sup>dσd<sup>6</sup>h<sup>a</sup>z<sup>b</sup> Δc<sup>9</sup>b<sup>a</sup>d<sup>8</sup>n<sup>a</sup>o<sup>a</sup>r<sup>c</sup> ΔjCΔ<sup>c</sup>, Γ<sup>c</sup>o<sup>a</sup>d<sup>8</sup>p<sup>a</sup>ñ<sup>c</sup>, y<sup>b</sup>z<sup>b</sup>L<sup>c</sup>j<sup>y</sup>, m<sup>a</sup>e<sup>a</sup>r<sup>d</sup><sup>c</sup> d<sup>8</sup>r<sup>b</sup>r<sup>c</sup>o

ᐃᓕᐱᓐ ᐱᓐᐃᓐ ᐃᐱᐱᓐ ᐃᓕᐱᓐ ᓐᐃᐱᓐᐃᓐ	ᓐᐃᓐᐃᓐ	ᐃᓕᐱᓐ - ᐃᓐᐃᓐ	ᓐᐃᓐ ᐃᐱᐱᓐᐃᓐ
Air sampling array	4	<1m	Optical particle counters, air filtration units and depositional dust gauges to quantify the concentration and size distribution of particulates and allowing for the assessment of black carbon concentration.
Water filters	4	0.5m	Customised filtration system which sample a ship's uncontaminated sea water supply (ambient near-surface waters pumped through the hull). The filtration system has an inline flow meter to record the volume of water filtered and three sequential filters (i.e., mesh size 300, 100 and 50 microns).
Manta net	2	2m x 0.6m	Sampling using manta nets to identify and quantify the concentration of anthropogenic particulates and microplastics in surface waters.
Niskin water sampler	4	0.6m	Collect small water samples (50mL) for environmental DNA(eDNA) meta-barcoding.
Remotely Operated Vehicle (ROV)	2	0.5m x 0.4m	Take surface water samples using syringe sampler and take underwater photographs vessel hulls to determine the extent of biofouling.

በበፍጥረቱ ምሥራቅ አካባቢ ለሚገኝ ልዩ ልዩ የፍጥነት ምሳሌ ሲሆን





# ᐃᑦᑕᑦ

ᐃᑦᑕᑦ ᑕᑦᑕᑦ ᐃᑦᑕᑦ

ᐃᑦᑕᑦ ᐃᑦᑕᑦ ᐃᑦᑕᑦ	ᐃᑦᑕᑦ ᐃᑦᑕᑦ	ᐃᑦᑕᑦ ᐃᑦᑕᑦ	ᐃᑦᑕᑦ ᐃᑦᑕᑦ	ᐃᑦᑕᑦ ᐃᑦᑕᑦ
ᐃᑦᑕᑦ ᐃᑦᑕᑦ ᐃᑦᑕᑦ	ᐃᑦᑕᑦ ᐃᑦᑕᑦ	ᐃᑦᑕᑦ ᐃᑦᑕᑦ	ᐃᑦᑕᑦ ᐃᑦᑕᑦ	ᐃᑦᑕᑦ ᐃᑦᑕᑦ
Information is not available				

## ᐃᑦᑕᑦ ᐃᑦᑕᑦ ᐃᑦᑕᑦ

Waste: We expect waste to be minimal, limited to small amounts of garbage from sampling equipment. Sampling equipment will be unpacked in the South to reduce waste brought to Nunavut. Any waste produced while sampling will be packed out and transported South for disposal. Wildlife disturbance: All sampling activities will be accompanied by local residents and/or vessel operators trained in the local marine and terrestrial wildlife, in order to reduce any potential disturbances. Environmental disturbance: All research staff are trained in sampling protocols in order to minimize any potential disturbance to the environment. Physical samples taken will be small, and we will not be taking more than is needed for laboratory analysis. Local residents: Our research is being conducted in partnership with local organizations and relies on IQ in order to be of maximum benefit to local residents. Before any research activities are undertaken, we will consult with our Inuit partners, local hunters, and local residents to ensure our activities will not disrupt any traditional practices (e.g. hunting activities).

# **Additional Information**

**SECTION A1: Project Info**

**SECTION A2: Allweather Road**

**SECTION A3: Winter Road**

**SECTION B1: Project Info**

**SECTION B2: Exploration Activity**

**SECTION B3: Geosciences**

**SECTION B4: Drilling**

**SECTION B5: Stripping**

**SECTION B6: Underground Activity**

**SECTION B7: Waste Rock**

**SECTION B8: Stockpiles**

**SECTION B9: Mine Development**

**SECTION B10: Geology**

**SECTION B11: Mine**

**SECTION B12: Mill**

**SECTION C1: Pits**

**SECTION D1: Facility**

**SECTION D2: Facility Construction**

**SECTION D3: Facility Operation**

**SECTION D4: Vessel Use**

**SECTION E1: Offshore Survey**

**SECTION E2: Nearshore Survey**

### SECTION E3: Vessel Use

## SECTION F1: Site Cleanup

## SECTION G1: Well Authorization

## SECTION G2: Onland Exploration

## SECTION G3: Offshore Exploration

## SECTION G4: Rig

## SECTION H1: Vessel Use

## SECTION H2: Disposal At Sea

## SECTION 11: Municipal Development

[illegible]

**ᐱᓪᑦ ᐃᑲᐅᑦ ᖃᓄᐃᑦᑐᓚᓂᐅᓂᖅ: ᐅᐭᔨᖃᑕᖃᑦᓂᖅ**

[illegible]

### Miscellaneous Project Information

[illegible]

Waste: We expect waste to be minimal, limited to small amounts of garbage from sampling equipment. Sampling equipment will be unpacked in the South to reduce waste brought to Nunavut. Any waste produced while sampling will be packed out and transported South for disposal. Wildlife disturbance: All sampling activities will be accompanied by local residents and/or vessel operators trained in the local marine and terrestrial wildlife, in order to reduce any potential disturbances. Environmental disturbance: All research staff are trained in sampling protocols in order to minimize any potential disturbance to the environment. Physical samples taken will be small, and we will not be taking more than is needed for laboratory analysis. Local residents: Our research is being conducted in partnership with local organizations and relies on IQ in order to be of maximum benefit to local residents. Before any research activities are undertaken, we will consult with our Inuit partners, local hunters, and local residents to ensure our activities will not disrupt any traditional practices (e.g. hunting activities).

### Cumulative Effects

## Impacts

$\Delta^{\text{b}} \text{CD} \sigma^{\text{b}} \text{r}^{\text{c}}$ 
 $\Delta^{\text{b}} \text{CD} \sigma^{\text{b}} \text{r}^{\text{c}}$ 
 $\Delta^{\text{b}} \text{CD} \sigma^{\text{b}} \text{r}^{\text{c}}$

[illegible]
$$(P = \langle b \rangle \dot{\cup} P \cap \langle a \rangle^c, N = \langle b \rangle \dot{\cup} P \setminus \langle D \rangle \langle a \rangle^c, \langle \langle D \rangle \setminus P \rangle^c \langle D \rangle \langle a \rangle^c, M = \langle b \rangle \dot{\cup} P \setminus \langle D \rangle \langle a \rangle^c, \langle \langle D \rangle \setminus P \rangle^c \langle \langle D \rangle \setminus P \rangle^c \langle D \rangle \langle a \rangle^c, U = \langle b \rangle \dot{\cup} P \langle a \rangle^c \rangle$$

1	polyline	Potential ship route
2	polyline	Potential ship route
3	polyline	Potential ship route
4	point	Pond Inlet - community-based sampling
5	point	Arviat - community-based sampling
6	point	Dundas Harbour (potential shore location)
7	point	King William Island (potential shore location)
8	point	Arctic Bay (potential shore location)
9	point	Gjoa Haven (potential shore location)

1	polyline	Potential ship route
2	polyline	Potential ship route
3	polyline	Potential ship route
4	point	Pond Inlet - community-based sampling
5	point	Arviat - community-based sampling
6	point	Dundas Harbour (potential shore location)
7	point	King William Island (potential shore location)
8	point	Arctic Bay (potential shore location)
9	point	Gjoa Haven (potential shore location)

10	point	Cambridge Bay (potential shore location)
11	point	Fort Ross (potential shore location)
12	point	Resolute Bay (potential shore location)
13	point	Devon Island (potential shore location)
14	point	Prince Leopold Island (potential shore location)
15	point	Kugluktuk (potential shore location)
16	point	Grise Fiord (potential shore location)
17	point	Smith Sound (potential shore location)