

**Demande de la CNER faisant l'objet d'un examen préalable #125784**  
**Keewatin Glacial Dynamics**

# DÉTAILS

## Description non technique de la proposition de projet

Anglais: The landscapes we see today in northern Canada are a product of what happened during and since ancient glaciations. Whether it is the land, the forests or the animals, everything evolved with the rhythm of growth and decay of the ice sheets. It is therefore important to understand the history of these glaciation and deglaciation cycles to provide a context for studies on climate change, archeology, geology, ecology, etc. Much is known about these glaciations in the south, but in northern Canada, extensive regions remain poorly studied because of their remoteness and hence knowledge there is limited. Therefore, the Geological Survey of Canada initiated in 2022 a 4-year research project to compile and understand the history of ancient glaciations in mainland Nunavut and Northwest Territories. The project titled "Synthesis of the glacial dynamics of the Laurentide Ice Sheet in the west-central Keewatin" and led by GSC researchers Janet Campbell and Etienne Brouard, aims to provide the age of the glacial terrains and the composition of materials that lay over bedrock. The project also aims to map the glacial landforms using satellite imagery and to model glacial history using new and published data. This knowledge will help to show how sediments were transported by ice and help trace how glaciers disappeared. To provide the data for the study, two 2.5-weeks fieldwork seasons have been planned: one from July 27th to August 13th, 2023, and one in 2024. The area of interest extends along the NWT border, southwest of Baker Lake, stretching from the east part of the Thelon Wildlife Sanctuary to north of Ennadai Lake. The field work will be based out of Tukto Lodge, Mosquito Lake, NWT (closest accommodation to the field area) with the entire crew returning to the lodge at the end of each day. The field survey will be supported by one helicopter stationed and refueling at the lodge. There will also be 2 small fuel caches of 5 sealed drums located outside of the Thelon Wildlife Sanctuary and will be removed at the end of the fieldwork. To access sites on the ground, the helicopter will fly high (>1000 ft) to avoid disturbance to wildlife. Field work at each site will involve making observations, collecting GPS locations and hand-held compass measurements, taking photographs, and collecting samples of surface earth materials. Small soil samples will be collected with a hand shovel and small bedrock samples from will be taken using a small rock saw. The soil sample holes will be filled in. Hence, minimal environmental, wildlife and human impact will result from the proposed field work. A field assistant or wildlife monitor from one of the communities is proposed if available. Field work will be followed by analytical, compilation and publication work in Ottawa. All data will be published in geodatabase and shapefile formats and will be available in future on NRCan open geoscience portal. Results will be shared with affected communities digitally, in print form, and by in-person sharing sessions upon request.

Français: Les paysages que nous voyons aujourd'hui dans le nord du Canada sont le produit de ce qui s'est passé pendant et depuis les anciennes glaciations. Que ce soit la terre, les forêts ou les animaux, tout a évolué au rythme de la croissance et de la fonte des calottes glaciaires. Il est donc important de comprendre l'histoire de ces cycles de glaciation et de déglaciation pour fournir un contexte aux études sur les changements climatiques, l'archéologie, la géologie et l'écologie, etc. On sait beaucoup de choses sur ces glaciations dans le sud, mais dans le nord du Canada, de vastes régions restent mal étudiées en raison de leur éloignement et, par conséquent, les connaissances y sont limitées. Par conséquent, la Commission géologique du Canada a lancé en 2022 un projet de recherche de 4 ans pour compiler et comprendre l'histoire des glaciations anciennes au Nunavut continental et dans les Territoires du Nord-Ouest. Le projet intitulé « Synthesis of the glacial dynamics of the Laurentide Ice Sheet in the west-central Keewatin » et dirigé par les chercheurs de la CGC Janet Campbell et Etienne Brouard, vise à fournir l'âge des terrains glaciaires et la composition des matériaux qui reposent sur le socle rocheux. Le projet vise également à cartographier les reliefs glaciaires à l'aide d'images satellitaires et à modéliser l'histoire glaciaire à l'aide de données publiques et de nouvelles données acquises sur le terrain. Ces connaissances permettront de montrer comment les sédiments ont été transportés par la glace et de retracer le patron de fonte des glaciers. Pour fournir les données de l'étude, deux saisons de terrain de 2,5 semaines ont été prévues : une du 27 juillet au 13 août 2023 et une en 2024. La zone d'intérêt s'étend le long de la frontière des Territoires du Nord-Ouest, au sud-ouest du lac Baker, s'étendant de la partie est de la réserve faunique de la rivière Thelon au nord du lac Ennadai. Le travail sur le terrain sera basé à Tukto Lodge, Mosquito Lake, Territoires du Nord-Ouest (l'hébergement le plus proche de la zone de terrain) et toute l'équipe retournera au lodge à la fin de chaque journée. Les travaux sur le terrain seront appuyés par un hélicoptère stationné et ravitaillant au lodge. Il y aura également 2 petites caches de carburant de 5 barils scellés situées à l'extérieur de la réserve faunique de la rivière Thelon et seront retirées à la fin des travaux. Pour accéder aux sites au sol, l'hélicoptère volera haut (>1000 pieds) pour éviter de perturber la faune. Le travail sur le terrain à chaque site impliquera de faire des observations, de collecter des positions GPS et des mesures de boussole, de prendre des photographies et de collecter des échantillons de sols. De petits échantillons de sol seront prélevés à l'aide d'une pelle à main et de petits échantillons de substrat rocheux seront prélevés à l'aide d'une petite scie à roche. Les trous d'échantillonnage du sol seront remplis après l'échantillonnage. Par conséquent, les travaux de terrain proposés auront un impact environnemental, biologique et socioéconomique minimal. Un assistant de terrain ou un surveillant de la faune de l'une des communautés est proposé si possible. Le travail sur le terrain sera suivi d'un travail d'analyse, de compilation et de publication à Ottawa. Toutes les données seront publiées dans des formats de

[illegible]

Operations Phase: from 2023-07-28 to 2023-08-12

## Activités

Emplacement	Type d'activité	Statut des terres	Historique du site	Site à valeur archéologique ou paléontologique	Proximité des collectivités les plus proches et de toute zone protégée
Proposed fieldwork area	Scientific/International Polar Year Research	Crown	N/A	We have been in contact with the Territorial Archaeologist and have filled a Site Data Request Form to obtain the position of known archeological site within our proposed field area. We are waiting to get the positions. All archeological sites will be avoided. If archaeological remains are found, all activity in the area will be ceased immediately and the territorial archaeologist will be contacted.	A part of our study area falls within the Thelon Wildlife Sanctuary. Our study area doesn't include Inuit Owned Lands. The closest community lands belong to Baker Lake and Arviat. Baker Lake is ~ 200 km and Arviat is ~320 km from the closest border of the proposed field area

### Engagement de la collectivité et avantages pour la région

Collectivité	Nom	Organisme	Date de la prise de contact
Arviat	Nicole Issakiark	Arviat Hunters and Trappers Organization	2023-02-10
Arviat	Joe Savikataaq	Hamlet of Arviat	2023-02-10
Arviat	Steve England	Hamlet of Arviat	2023-02-10
Baker Lake	Richard Awksawnee	Hamlet of Baker Lake	2023-02-10
Baker Lake	Sheldon Dory	Hamlet of Baker Lake	2023-02-10
Baker Lake	Brian Pudnak	Baker Lake Hunters and Trappers Organization	2023-02-10
Rankin Inlet	Luis Manzo	Kivalliq Inuit Association	2023-02-10
Cambridge Bay	Jorgan Aitaok	Nunavut Tunngavik Incorporated	2023-02-10

# Autorisations

Indiquez les zones dans lesquelles le projet est situé:

Transboundary  
Kivalliq

## Autorisations

Organisme de régulation	Description des autorisations	État actuel	Date de l'émission/de la demande	Date d'échéance
Institut de recherche du Nunavut	We applied for a scientific research licence for physical / natural sciences research	Applied, Decision Pending	2023-03-02	

## Project transportation types

Transportation Type	Utilisation proposée	Length of Use
Air	Helicopter	

## Project accomodation types

Permanent Camp

## Utilisation de matériel

Équipement à utiliser (y compris les perceuses, les pompes, les aéronefs, les véhicules, etc.)

Type d'équipement	Quantité	Taille – Dimensions	Utilisation proposée
Shovels	3	1 m	Shovels will be use to dig holes to take soil sample daily.
Rocksaw	1	12 in	The rocksaw will be used to collect bedrock or boulder samples daily.
Helicopter	1	Exterior Height: 10 ft 4 in Wing Span: 35 ft 1 in Length: 35 ft 11 in diameter	One Astar 350B2 helicopter will be used daily access field sites.
Hammers	3	12 in	The hammers will be used to collect bedrock or boulder samples daily.
Chisels	3	12 in	The chisels will be used to collect bedrock or boulder samples daily.
Field tablets/computers	2	12 in	The field tablets will be used daily to collect data and navigate samples.
Compasses	4	3 in	The compasses will be used daily to collect orientation of ice movement indicators.
Digital Cameras	2	3 in	The digital cameras will be used daily to pictures of landscapes and samples.

Décrivez l'utilisation du carburant et des marchandises dangereuses

Décrivez l'utilisation de carburant :	Type de carburant	Nombre de conteneurs	Capacité du conteneur	Quantité totale	Unités	Utilisation proposée
Aviation fuel	fuel	10	205	2050	Liters	Aviation fuel from the cache at Tukto Lodge, NWT will be the main source for the daily helicopter trips. Two small fuel caches (5-7 containers each) will be placed by fixed wing airplane outside the Thelon Wildlife Sanctuary in NU. An electrical pump supplied by the helicopter contractor will be used for the transfer of Jet A aviation fuel. Spill kits will

						be carried at all times in the helicopter and will be available at the lodge.
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#### Consommation d'eau

Quantité quotidienne (m3)	Méthodes de récupération de l'eau proposées	Emplacement de récupération de l'eau proposé
0		

# Déchets

## Gestion des déchets

Activités du projet	Type des déchets	Quantité prévue	Méthode d'élimination	Procédures de traitement supplémentaires
Scientific/International Polar Year Research	Déchets non combustibles	Minimal	Any garbage would be small (i.e., waste from a lunch or snack) and will be packed out of the site and returned to the lodge for proper disposal.	Na

## Répercussions environnementales :

Impacts on the physical environment are likely to be localized, of low-magnitude, reversible and restricted to the short period of the proposed project activities, the cumulative effect will therefore be minimal. While we will be shoveling small hole (and refilling them) and collecting small rock sample we believe that our work will provide baseline environmental data for surface and bedrock geology as well as sediment and soil quality, that will be available for decision making. In the same way, our work will report unique glacial landscapes that could be used to preserve sites of scientific/environmental value. To avoid any possible disturbance of lacustrine habitat and for safety reasons, we won't fly over the lakes. Holes where samples will be taken will be filled back before leaving the sites. The helicopter will fly high (> 1,000 ft) to keep noise levels low and to avoid disturbance of wildlife. If wildlife is present at a site of interest, the helicopter will not land and will go to the next planned site. If this occurs, planned sites will be revisited at a latter date if wildlife has left the area. While on the ground, the crew will avoid disturbance of vegetation. The exception will be the immediate site of the sample hole. The crew will avoid working in fragile environments (wetlands). The crew will report sightings of species at risks. The crew will keep all garbage and debris in bags placed in a covered metal container or equivalent until disposed of at an approved facility. All such wastes shall be kept inaccessible to wildlife at all times. A field assistant or wildlife monitor from one of the communities is proposed if available.



# **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 I1: Municipal Development**

### **Description de l'environnement existant : Environnement physique**

See Keewatin Glacial Dynamics – Additional information (KGD\_nirb\_additional\_info.pdf) section 3.

### **Description de l'environnement existant : Environnement biologique**

See Keewatin Glacial Dynamics – Additional information (KGD\_nirb\_additional\_info.pdf) section 4.

### **Description de l'environnement existant : Environnement socio-économique**

See Keewatin Glacial Dynamics – Additional information (KGD\_nirb\_additional\_info.pdf) section 5.

### **Miscellaneous Project Information**

Previous work related to this project has been screened by NIRB in 2018 (NIRB application ID 18YN005). This activity is related to projects J. Campbell 2018 Nunavut research license 01 009 17N-A, and I. McMartin, 2017 Nunavut research license 03 009 17N-A. With respect our request to work within the Thelon Wildlife Sanctuary, in 2018 we were given permission by NPC, NRIB, NRI and the Kitikmeot Inuit Association to conduct this type of research within the Sanctuary, respecting the wildlife and birds' avoidance and disturbance restrictions.

### **Identification des répercussions et mesures d'atténuation proposées**

See Keewatin Glacial Dynamics – Additional information (KGD\_nirb\_additional\_info.pdf) section 10.

### **Répercussions cumulatives**

See Keewatin Glacial Dynamics – Additional information (KGD\_nirb\_additional\_info.pdf) section 9.

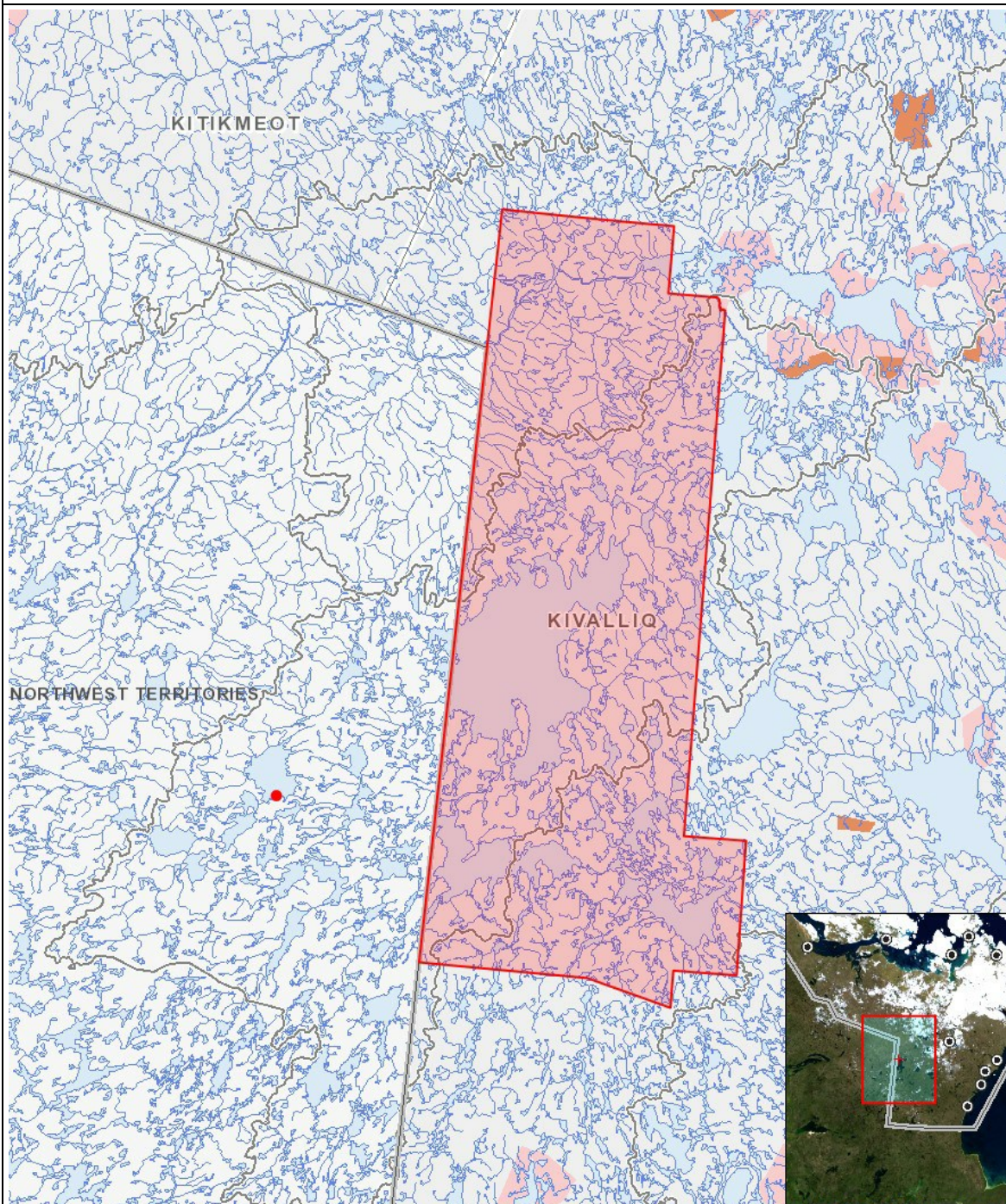
# Impacts

## Identification des répercussions environnementales

	PHYSICAL	Designated environmental areas	Ground stability	Permafrost	Hydrology / Limnology	Water quality	Climate conditions	Eskers and other unique or fragile landscapes	Surface and bedrock geology	Sediment and soil quality	Tidal processes and bathymetry	Air quality	Noise levels	BIOLOGICAL	Vegetation	Wildlife, including habitat and migration patterns	Birds, including habitat and migration patterns	Aquatic species, incl. habitat and migration/spawning	Wildlife protected areas	SOCIO - ECONOMIC	Archaeological and cultural historic sites	Employment	Community wellness	Community infrastructure	Human health	
Construction																										
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Exploitation																										
Scientific/International Polar Year Research		M	-	-	-	-	-	-	P	P	P	-	-	M		M	M	M	-	M		-	P	-	-	-
Désaffectation																										
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(P = Positive, N = Négative et non gérable, M = Négative et gérable, U = Inconnue)

# Site du projet



## Liste des géométries de projet

1	polygon	Proposed fieldwork area
2	point	Tukto Lodge