Public Registry - Project Proposals

NPC 150651: Western Hudson Bay geoscience for infrastructure project

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Proposal Status: Conformity Determination Issued

Overview Documents Questionnaire

Project Overview

Type of application: Amendment

Proponent name: Greg Oldenborger

Proponent company: Natural Resources Canada

Project Description:

The western coast of Hudson Bay in the Kivalliq region of Nunavut is undergoing significant infrastructure development associated with natural resources, shipping and community sustainability. Permafrost and ground ice are important features of this landscape that can significantly affect land-based infrastructure through influence on ground stability and drainage patterns. Knowledge of permafrost conditions is required to characterize climate change impacts, reduce risks and aid in adaptation solutions for the region. However, there are only limited studies of permafrost and ground temperature data in the Kivalliq region. The proposed activity will 1) provide valuable baseline terrain and permafrost information along the western Hudson coast of Nunavut (surficial geology, land cover, periglacial landforms, ground temperature), 2) develop a regional permafrost study that integrates knowledge from different sources across different scales from site-based to remote sensing systems, and 3) use knowledge gained to improve understanding of permafrost conditions and the potential response to infrastructure development and climate warming for the Kivalliq region. The initial stage of the proposed project was community contact in Spring 2015 in the form of letters of introduction to the Kivalliq Inuit Association, the Rankin Inlet Hunters and Trappers Organization and the Hamlet of Rankin Inlet. This was followed by a preliminary visit to Rankin Inlet in June 2015 for in-person meetings with members from the KIA, HTO, the Hamlet and the Arctic College. During these meetings, there was support for conducing community engagement activities on the topic of permafrost research in the Rankin Inlet region. The result was a community engagement workshop in Rankin Inlet from February 1–3, 2016. Central to this workshop was a participatory mapping exercise for gathering local and traditional knowledge on permafrost and landscape Change in the Rankin Inlet region (NRCan Open File 8057). Results of this mapping exercise were used for planning the field operations in this submission. Results of the workshop will also be used to in conjunction with data gathered during research activities if approved. We are currently proposing field operations to be conducted in and around Rankin Inlet on the western coast of Hudson Bay and in the greater Kivalliq region of Nunavut. Our field operations will include geological and geomorphological observations, shallow sediment sampling, installation of temperature sensors, acquisition of ground-based geophysical data, and acquisition of data in support of remote sensing products. The research is aimed at better understanding local terrain conditions, thermal conditions, ground ice occurrence, thaw susceptibility, and the

processes affecting permafrost. We will also take the opportunity during field work to advance collaboration with stakeholders (such as by working with local government and community members to establish drill sites) and identify research gaps for the region. For summer 2016, proposed fieldwork will be divided into four components: 1) site visits to validate remote sensing products and site visits with workshop participants (Rankin Inlet community members) to observe and validate landscape features identified during the participatory mapping exercise, 2) shallow drilling for examination of surficial geology and ground ice occurrence and to validate remote sensing products, 3) deep drilling and installation of ground temperature monitoring sites within the hamlet of Rankin Inlet and in undisturbed terrain, and 4) installation of one or more ground temperature monitoring site(s) in the interior of the Kivalliq region at a licenced tourism establishment (outpost camps, in collaboration with the GN). The schedule of 2016 summer field activities is from August 7th to August 27th. This is 21 days for field work. For subsequent summers, fieldwork would involve data collection at established sites, plus potential establishment of additional permafrost monitoring stations in the communities of Baker Lake, Chesterfield Inlet and Whale Cove. Site visits may be conducted in winter (2017 and subsequent) to collect ground temperature data, geophysical data, and perform snow surveys in the vicinity of established sites.

Project Schedule

Start Date: 2025-06-01

End Date: 2027-12-31

Project Map

List of project geometries:

| Id | Geometry | Location Name |
|---|---|---|
| 15248 | polygon | zone_rankin |
| 15249 | polygon | Project hull |
| 15281 | polygon | Zone Arviat |
| 15241 | point | Arctic Haven wilderness lodge/Ennadai Lake |
| 15242 | point | Henik Lake Adventure/Nueltin Lake camp |
| 15243 | point | Kasba Lake Lodge/Tabane Lake outpost |
| 15244 | point | Henik Lake Adventure/Henik Lake camp |
| 15245 | point | Henik Lake adventure/Kuuglik Bear camp |
| 15246 | point | Dubawnt camp/tukto lodge (south Dubawnt) |
| 15247 | point | Dubawnt camp/tukto lodge (north Dubawnt) |

NPC Planning regions:

Keewatin

Project Land Use and Authorizations

Project Land Use:

Scientific Research

Licensing Agencies:

Government of Nunavut - Department of Environment

Nunavut Tunngavik Inc.

Kivalliq Inuit Association

Nunavut Impact Review Board

Nunavut Water Board

Material Use

Equipment:

| Type | Quantity | Type | Use |
|---|---|---|---|
| Light drilling machine | 1 | 0.5X0.5m | Drilling permafrost cores at depth up to 3 meters |
| Drill | 1 | 3X3m | Large permafrost drilling equipment, typically used for installing piles |
| Geophysical equipment | 1 | 1X1m | System is operated on the ground by team on foot, for electrical resistivity |
| Drone | 1 | 1x1 | Study site overview , digital elevation model, and thermal imagery |
| car | 2 | 3x2 | Travelling around Rankin Inlet and Arviat communities |
| ATV | 4 | 1.5x1.5 | Travelling around Rankin Inlet and Arviat communities |
| Light drilling machine (battery) | 1 | 2x2m | Drilling permafrost cores at depth up to 3 meters, borehole equipped with ground temperature sensors |
| Geophysical equipment | 1 | 0.30x3 m | System is operated on the ground by team on foot, for electromagnetic surveys |

Fuel Use:

| Type | Container | Capacity | Use |
|---|---|---|---|
| Gasoline | 2 | 20 | engines |

Hazardous Material and Chemical Use:

| Type | Container | Capacity | Use |
|---|---|---|---|

No data found

Water Consumption:

| Daily Amount (m2) | Retrieval Method | Retrieval Location |
|---|---|---|
| 0 | | |

Waste and Impacts

Environmental Impacts:

Environmental impact is estimated to be very low, and no long-term environmental impacts are expected. Installed permafrost instruments are small and any land owner permission will be acquired. The proposed work will not have any important impact on the wildlife itself or on the major habitats that support the wildlife. No temporary camp will be installed. All work will be conducted based out of communities. Study sites will be finalized during the first week of field work. Deep drilling locations will be established in conjunction with local the authorities (Hamlet, GN, KIA). Proposed reclamation plan: Boreholes tubes will be cut to the land surface after the project is complete. Unless the local and territorial governments want to continue the monitoring of the ground, sensors from inside the casing data loggers and power sources will be removed after the duration of the study. If the casing and sensors cannot be removed, they will remain in place, but do not contain any hazardous chemicals. Specific impact related to the usage of machines: - Light Drilling machine: Disturbance to the surrounding vegetation will be minimized by laying plywood and/or a tarp on the ground surface. Shallow drilling sometimes requires the use of water, but all water is returned to the ground and nothing is added to the water. - Drill: the same drill (Air Track drill) typically used in arctic communities for construction work (pile installation) will be used to install monitoring sensors down to 15-20 m depth. The drill does not require water to run. Drilling sites will be limited to places accessible to the drill machine (in town, close to roads). Disturbance to the surrounding vegetation would be minimized by laying plywood and /or a tarp on the ground surface. Drilling may cause vegetation disturbance from the drill machine tracks. Some sensors cannot be retrieved from the borehole, but do not contain any hazardous chemicals. For light and deep drillings, light PVC and ABS casing is placed in the holes and sticks up approximately 50 cm above the ground (instrumented to monitor the ground). Casing is filled with water (for water and thaw tube measurements) or food-grade silicon oil (for thermistors cables – ground temperature) to prevent freezing. No harmful chemicals will be placed down the holes. Boreholes may be instrumented with inactive sensors connected to temporary power sources and data loggers at the surface. Data loggers will be removed after the duration of the study. Some sensors cannot be retrieved from the borehole, but do not contain any hazardous chemicals. - Ground geophysics: These surveys are conducted by one to three people walking over the land either carrying instrumentation, or laying cables and electrodes on the ground. There is no disturbance to the land. -Drone (UAV): Drone equipped with optical, thermal, and lidar sensors. All flights will be conducted outside of aerodrome areas as required by Nav Canada by a pilot with a basic certification (drones more than 250 grams and less than 25 kg). All flights will also be conducted to avoid any disturbance with caribou and we will make sure to stay away from any wildlife or private cabins.

Waste Management:

| Waste Type | Quantity Generated | Treatement Method | Disposal Method |
|---|---|---|---|

| | | |
|---|---|---|
| Overburden (organic soil, waste material, tailings) as best as possible | 0 Material is put back in the hole | Site is returned to natural conditions |