



NIRB Uuktuutinga Ihivriuhikhamut #125781

Geothermal Energy Potential at Cambridge Bay and Resolute Bay

Uuktuutinga Qanurittuq:	New
Havaap Qanurittunia:	Scientific Research
Uuktuutinga Ublua:	3/15/2023 10:40:00 AM
Period of operation:	from 0001-01-01 to 0001-01-01
Piumayaat Angirutinga:	from 0001-01-01 to 0001-01-01
Havauhikhaq Ikayuqtinga:	Derek Allerton Qulliq Energy Corporation (QEC) P.O. Box 250 Iqaluit Nunavut X0A 0H0 Canada Hivayautit Nampanga:: 8679797586, Kayumiktukkut Nampanga:: 8679797519

Total Person days: 70

Hulilukaarutit

Inigiya	Hulilukaarut Qanurittuq	Nunannga Qanurittaakhaanik	Initurlinga qanuritpa	Initurlinga utuqqarnitat unaluuniit Ingilraaqnitat Uyarannguqtut akhuurninnga	Qanitqiayuyuq qanitqiamut nunallaat kitulluuniit ahiruqtaliyainnit nuna
QEC_Proposed_Cambridge_Geophysics_Area_n83z13_20220207	Researching	Municipal	All activities will be contained within the Municipal boundaries of the Hamlet of Cambridge Bay.	There is a low potential for archaeological/paleontological artifacts/sites to be discovered as all of the activities will be located within the Hamlet of Cambridge Bay. In the event an artifact/site is discovered work in the area will halt and the Project Supervisor will immediately contact the Hamlet and the GN Department of Culture and Heritage. Nothing will be removed, disturbed, or displaced at any archaeological/paleontological site	Within the Municipal boundaries of the Hamlet of Cambridge Bay
QEC_Proposed_Resolute_Geophysics_Area_n83z15_20220207	Researching	Municipal	All activities will be contained within the Municipal boundaries of the Hamlet of Resolute.	There is a low potential for archaeological/paleontological artifacts/sites to be discovered as all of the activities will be located within the Hamlet of Resolute. In the event an artifact/site is discovered work in the area will halt and the Project Supervisor will immediately contact the Hamlet and the GN Department of Culture and Heritage. Nothing will be removed, disturbed, or displaced at any archaeological/paleontological site.	Within the Municipal boundaries of the Hamlet of Resolute.

Nunaliin Ilauyun, Aviktuqhimayuniitunullu Ikayuuhiarunguyun

Nunauyuq	Atia	Timiuyuq	Upluani Uqaqatigiyaungmata
Qausuittuq	Nancy Amarualik	Resolute Bay Hunters and Trappers Association	2022-05-17
Qausuittuq	Nancy Amarualik	Resolute Bay Hunters and Trappers Association	2022-06-04
Qausuittuq	Ian Dudla	Hamlet of Resolute Bay	2022-06-04
Qausuittuq	Mark Amarualik	Hamlet of Resolute Bay	2022-10-19
Ikaluktuttiak	Jim MacEachern	Hamlet of Cambridge Bay	2023-03-15
Ikaluktuttiak	Angela Gerbrandt	Hamlet of Cambridge Bay	2023-03-16
Ikaluktuttiak	Derek Elias	Kitikmeot Inuit Association	2023-03-16

Angiuttauvaktunik

Naunaiqlugu nunanga talvani havauhikhaq ittuq:

Kitikmeot
North Baffin

Angiuttauvaktunik

Munariniqmut Ayuittiaqtuq	Angirutinga Qanurittuq	Tadja Qanurittaakhaanik	Ublua Tuniyauyuq/Uuktuqtuq	Umikvikhaa Ublua
Nunavut Kavamanga, Nunavunmi Ihivriuqniqmut Timiqutigiyanga	Scientific Research Licence Application for Physical / Natural Sciences Research	Not Yet Applied		

Project transportation types

Transportation Type	Qanuq Atuqtauniarmangaa	Length of Use
Land	Travel by truck, All Terrain Vehicles and on foot to all measurement locations	

Project accomodation types

Nunauyuq

Ihuaqutivaluin Atuqtauyukhan

Hanalrutit atuqtaunahuat (ukuallu ikuutat, pampiutainnik, tingmitinik, akhaluutinik, hunaluuniit)

Hanalrutit Qanurittuq	Qaffiuyut	Aktikkulaanga – Qanurittullu	Qanuq Atuqtauniarmangaa
Hand Tools	various	various	Various Hand tools to conduct Geophysical work
Truck or ATV	1-2	Pick up	Transport personnel to geophysical measurement locations

Qanurittuq Urhuqyuaq unalu Qayangnaqtut Hunavaluit Aturninnga

Qanurittuq urhuqyuaq hunavaluit aturninnga:	Urhuqyuaq Qanurittuq	Qaffiuyut qattaryut	Qattaryuk Aktikkulaanga	Atauttimut Qaffiuyut	Ilanga	Qanuq Atuqtauniarmangaa
Information is not available						

Imaqmik Aturninnga

Ubluq qanuraaluk (m3)	Aturumayain imavaluin utiqittagaani qanuq	Atulirumayain imavaluin utiqittagani humi
0		

Iqqakuq

Ikkakunik Munakgiyauyunik

Havauhikhaq Hulilukaarut	Qanurittuq Iqqakut	Ihumagiyauyuq Qanuraaluktut Atuqtait	Qanuq Iqqakuurniarmangaa	Halummaqtirarnirutikhan piyutin
Researching	Ikulalaaqtun iqqakuuvaluin	Minimal	The small amount of meal and paper waste produced during each shift can be disposed of at the personnel accommodations.	A policy of bring whatever you brought in with you, out with you will be enforced.

Avatiliriniqmut Ayurhautingit:

There are no potential environmental impacts anticipated to occur with the implementation of the proposed Project 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 I1: Municipal Development

Qanurittuq Ittunik Avatinga: Avatingalluanga

Proximity to protected areas, including:i.designated environmental areas, including parks; The Project activities will be located within the municipal boundaries of the Hamlets of Resolute and Cambridge Bay. The nearest territorial park to Cambridge Bay is the Ovayuk Territorial Park, approximately 15 km east. The Queen Maud Gulf Migratory Bird Sanctuary is located about 75 km south of Cambridge Bay, across the Queen Maud Gulf. Tuprvik Territorial Park is within the municipal boundaries of Resolute Bay, 5 km north of the Resolute Bay Airport.ii.heritage sites; The ruins of a Dorset or Tuniit longhouse is within the municipal boundaries of Cambridge Bay.iii.sensitive areas, including all sensitive marine habitat areas; The Project is located within the municipal boundaries of Resolute Bay and Cambridge Bay.iv.recreational areas;The Tuprvik Territorial Park Campground is within the municipal boundaries of Resolute Bay.v.sport and commercial fishing areas; N/A. Will not be affected by this project.vi.breeding, spawning and nursery areas; N/A. Will not be affected by this project.vii.known migration routes of terrestrial and marine species; N/A. Will not be affected by this project.viii.marine resources; N/A. Will not be affected by this project.ix.areas of natural beauty, cultural or historical history; All efforts will be made to respect and preserve all natural, cultural or historical resources.x.protected wildlife areas; andN/A. Will not be affected by this project.xi.other protected areas.There are no other protected areas within the project area.Eskers and other unique landscapes (e.g. sand hills, marshes, wetlands, floodplains):QEC considers all landscapes to be critical to the natural environment and as such all areas of the Project area will be treated with care and respect. Any seemingly unique and fragile landscapes will be avoided.Evidence of ground, slope or rock instability, seismicity:N/A. Will not be affected by this project.Evidence of thermokarsts:N/A. Will not be affected by this project.Evidence of ice lenses:N/A. Will not be affected by this project.Surface and bedrock geology:The bedrock geology of Cambridge Bay is generally comprised of Lower Paleozoic sedimentary rocks of the Arctic Platform (dolostone, limestone, sandstone, shale, intraclast conglomerate and breccia). Bedrock outcrops are rare in and around the Hamlet. Surficial geology of Cambridge Bay area generally comprised of either glacial till veneer or blanket, consisting of mainly sand and some gravel varying in thicknesses between 1 m and over 5 m in depth over the bedrock, with locally interbedded meltwater deposits.The bedrock geology of Resolute Bay is generally comprised of Lower Mesozoic sedimentary rocks. Bedrock outcrops are rare in and around the Hamlet. Surficial geology of Resolute Bay area generally comprised of undifferentiated regolith, consisting of fine sand to clay diamicton which may include rubble and felsenmeer; variable thickness derived predominately from weathering of bedrock; may include areas of bedrock mixed with till locally. Topography:Cambridge Bay is located within the Amundsen Gulf Lowlands Ecoregion of the Northern Arctic Ecozone. The hamlet of Cambridge Bay is situated on an extensive rolling plateau that gently rises from steep coastal cliffs. The terrain is dotted with innumerable lakes and ponds. Resolute Bay is located within the Parry Islands Plateau Ecoregion of the Northern Arctic Ecozone. The terrain near Resolute Bay has rocky coastal bluffs and gravel flats along its shoreline, with rolling hills, deposits of glacial moraine and several small lakes nearby.Permafrost (e.g. stability, depth, thickness, continuity, taliks):Cambridge Bay and Resolute Bay are underlain by deep, continuous permafrost with medium ice content, and abundant ice wedges.Permafrost occurs continuously throughout the Northern Arctic Ecozone. Lying sometimes just a few centimetres below the surface, it acts as a dam that stops the downward flow of water. Consequently, even though there is little precipitation here, the soils are often waterlogged or frozen. Repeated freezing and thawing of these soils creates interesting features on the surface, including cell-like polygons, bulging hummocks, and bare mud boils where the soil is so active that no plants can take root. Intense frost heaving often splits apart the underlying bedrock and forces large angular boulders to the surface.Sediment and soil quality:Flat areas are dominated by felsenmeer and cryoturbated soils. Cryoturbation produces features such as frost boils, ice-wedge polygons, stone nets and stone stripes.●Hydrology/ limnology (e.g. watershed boundaries, lakes, streams, sediment geochemistry, surface water flow, groundwater flow, flood zones):The Project is located within the Resolute and Cambridge Bay community water source watersheds. The watersheds will not be affected by this project.Tidal processes and bathymetry in the project area (if applicable): N/A. Will not be affected by this project.Water quality and quantity:N/A. Will not be affected by this project.Air quality:N/A. Will not be affected by this project.Climate conditions and predicted future climate trends:The Project areas are characterized by a sub arctic climate with temperature extremes of minus 40° C in the winter to plus 30° C in the summer. The microclimate is very unpredictable and daily temperatures can change rapidly. The biggest single difficulty in the summer is the common occurrence of fog banks forming in the morning and persisting until noon. Total annual precipitation is usually less than 200 mm in both Resolute and Cambridge Bay.Noise levels:N/A. Will not be affected by this project.●Other physical Valued Ecosystem Components (VEC) as determined through community consultation and/or literature review:None known at this time.

Qanurittuq Ittunik Avatinga: Inuuhiyayunut Avatinga

Vegetation (terrestrial as well as freshwater and marine where applicable):Cambridge Bay has dwarf tundra vegetation, consisting of dwarf birch, willow, northern Labrador tea, Dryas spp (e.g. mountain avens), and Vaccinium spp. (e.g., blueberry, cranberry), Tall dwarf birch, willow, and alder occur on warm sites; wet sites are dominated by willow and sedge.Resolute has sparse and discontinuous vegetation cover of moss, along with mixed low-growing herbs and shrubs such as purple saxifrage, arctic willow and Dryas spp., kobresia, sedge, and arctic poppy.Wildlife, including habitat and migration patterns:Characteristic wildlife around Resolute and Cambridge Bay includes muskox, caribou, arctic hare, arctic fox, snowy owl, rap tors, polar bear, seal, seabirds and waterfowl. The proposed activities will not interfere with wildlife, their habitat or migration patterns.Birds, including habitat and migration patterns:The proposed activities will not interfere with bird 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:QEC recognizes that with any project, there is a potential for activities to negatively affect wildlife, and of greatest concern, affect species at risk. According to the Environment and Climate Change Canada (ECCC) Species at Risk Public Registry, there are 22 Schedule 1 species at risk protected under the Species at Risk Act that may occur in or have ranges that overlap with portions of the Nunavut Territory. This includes species such as: caribou, polar bear, ivory gull, buff-breasted sandpiper, red knot (islandic and rufa subspecies), peregrine falcon, barn swallow, and short-eared owl to name a few. Suitable habitat for a number of these species, such as caribou and polar bear are known to occur in the vicinity of both Resolute and Cambridge Bay. However, the potential for schedule 1 species to be found within the project areas is anticipated to be low.Aquatic (freshwater and marine) species, including habitat and migration/spawning patterns:The proposed activities will not interfere with marine species. Other biological Valued Ecosystem Components: None known at this time.

Qanurittuq Ittunik Avatinga: Inungit-maniliurutingit Avatinga

Proximity to communities:The Project is to be conducted within the municipal boundaries of Resolute and Cambridge Bay.Archaeological and culturally significant sites (e.g. pingos, soap stone quarries) in the project (Local Study Area) and adjacent area (Regional Study Area):The ruins of a Dorset or Tuniit longhouse is just outside the main community area of Cambridge Bay. No measurement locations will be selected in this area, and any other areas of archaeological and/or culturally significance. The company is not aware of any known archaeological and/or culturally significant sites within the project area of the Hamlet of Resolute.Palaeontological component of surface and bedrock geology:The company is not aware of any known palaeontological sites.Land and resource use in the area, including subsistence harvesting, tourism, trapping and guiding operations:The Project is to be conducted within the municipal boundaries of Resolute and Cambridge Bay and therefore will not have any impact to the cultural value of the area, including subsistence harvesting, tourism, trapping and guiding operations.Local and regional traffic patterns:This Project will not have any effect on local or regional traffic patterns.Human Health, broadly defined as a complete state of wellbeing (including physical, social, psychological, and spiritual aspects):This Project is not anticipated to have any effect on human health.Other Valued Socioeconomic Components (VSEC) as determined through community consultation and/or literature review. None known at this time.

Miscellaneous Project Information

For additional information see:Non-Technical Summary for Cambridge Bay & Resolute Bay Geothermal Project – English; Non-Technical Summary for Cambridge Bay & Resolute Bay Geothermal Project – Inuktitut; Non-Technical Summary for Cambridge Bay & Resolute Bay Geothermal Project – Inuinnaqtun; Cambridge Bay Proposed Geophysical Survey Area Figure; Resolute Bay Proposed Geophysical Survey Area Figure

Naunaiyainiq ukuninnga Ayurhauingit unalu Piumayaat Ikikliyuumiutinahuarutit

PHYSICAL AND BIOLOGICALDesignated Environmental Areas:N/A. Will not be affected by this project.Ground Stability:N/A. Will not be affected by this project.Permafrost:N/A. Will not be affected by this project.Surface Water Hydrology:N/A. Will not be affected by this project.Water Quality:N/A. Will not be affected by this project.Climate Conditions:N/A. Will not be affected by this project.Eskers and Other Unique or Fragile Landscapes:N/A. Will not be affected by this project.Surface and Bedrock Geology:N/A. Will not be affected by this project.Sediment and Soil Quality: N/A. Will not be affected by this project.Tidal Processes and Bathymetry: N/A. Will not be affected by this project.Air Quality:N/A. Will not be affected by this project.Noise Levels:N/A. Will not be affected by this project.Vegetation and Wildlife Habitat:NA. Will not be affected by this project.Wildlife and Birds (including habitat and migration patterns):Wildlife can be disturbed by noise or human interaction. Disturbance can cause stress-induced health problems and mortality. Mitigation procedures for reducing the impact of activities on wildlife will include, but not be limited to the following:- All personnel will be trained on wildlife-human interaction/encounters procedures.- Wildlife sightings will be recorded, and this information will be passed on to other members of the crew;- Proper storage of garbage, food and any other potential attractants will be ensured to avoid exposure to wildlife;- All personnel will be aware of, and will follow, wildlife deterrence techniques (including proper storage and disposal of food) to reduce the possibility of attracting wildlife;- All personnel will have bear safety training and will be aware of the penalties for shooting polar bears, even in self defense.SOCIO-ECONOMICArchaeological and cultural historic sites:There is a low potential for archaeological/paleontological artifacts/sites to be discovered as all of the activities will be located within the Hamlets of Resolute and Cambridge Bay. In the event an artifact/site is discovered, work in the area will halt and the Project Supervisor will

immediately contact the Hamlet and the GN Department of Culture and Heritage. Nothing will be removed, disturbed, or displaced at any archaeological/paleontological site. Employment:QEC believes that it is essential to develop the project in cooperation with local communities. The proposed geophysical program will look to employ at least one member of the local community to help with installation of instruments and as a wildlife monitor. Local employment benefits individuals and families in isolated communities which may have few opportunities. This in turn boosts the local economy.Community wellness:Whenever possible, goods and services will be sourced from local businesses. QEC is committed to engaging communities in an open and honest manner and would appreciate and consider any and all knowledge, advice and input received. With proper mitigation, the project should not affect land and water use, traditional use or cultural resources.Human Health:The proposed project will have no impact to local human health.

Tamatkiumayunik Ihuikgutigivaktunik

There are no cumulative effects anticipated by the implementation of the project.

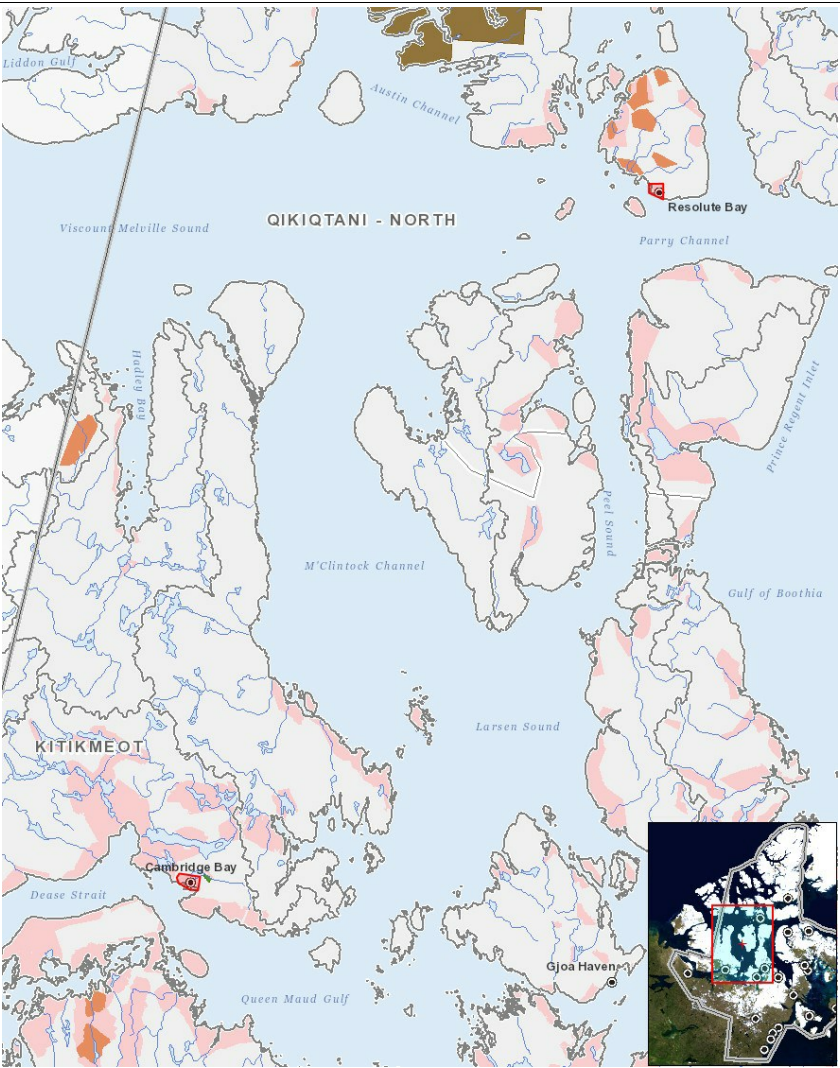
Impacts

Ilitariyauniq Avatiliriniqmut Ayurhautingit

		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
Havakvinga																										
-			•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•		•	•	•	•	•
Aulapkaininnga																										
Researching		•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•		•	P	P	P	•
Piiqtauniq																										
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(P = Nakuuyuq, N = Nakuungittut unalu mikhilimaittuq, M = Nakuungittut unalu mikhittaaqtuq, U = Naluyayuq)

Havaariyauyukhamut Nayugaa



List of Project Geometries

- | | | |
|---|---------|--|
| 1 | polygon | QEC_Proposed_Cambridge_Geophysics_Area_n83z13_20220207 |
| 2 | polygon | QEC_Proposed_Resolute_Geophysics_Area_n83z15_20220207 |

