



NIRB Uuktuttinga Ihivriuqhikhamut #125843 Impacts of wastewater at Baker Lake, Nunavut

Uuktuttinga Qanurittuq: New

Havaap Qanurittunia: Scientific Research

Uuktuttinga Ublua: 8/1/2023 6:26:24 PM

Period of operation: from 0001-01-01 to 0001-01-01

Piumayaat Angirutinga: from 0001-01-01 to 0001-01-01

Havauhikhaq Ikayuqtinga: Rob Jamieson
Dalhousie University
1360 Barrington Street
Halifax Nova Scotia B3J 1Z1
Canada
Hivayautit Nampanga:: 9028801501, Kayumiktukkut Nampanga::

QANURITTUT

Tukihianaqtunik havaariyauyumayumik uqauhiuyun

Qablunaatitut: The overall objective of this research program is to understand the impacts of the Baker Lake, NU, wastewater treatment system on environmental and human health, and develop recommendations for improving wastewater management in the community. The current wastewater treatment system in Baker Lake consists of a pond-wetland complex that ultimately discharges into Baker Lake. Baker Lake is important fish habitat and also provides the water supply for the community of Baker Lake. Wastewater accumulates in a small detention pond during the winter months (October – May), and then discharges in an uncontrolled manner into the wetland as it thaws during the spring freshet. This scenario is typical of many wetland treatment areas in Nunavut, and has been documented to contribute to poor levels of wastewater treatment that may pose a risk to both human and environmental health. The research program will involve an interdisciplinary team of researchers and will employ a holistic approach to characterize the impacts of the current wastewater treatment system on environmental and human health.

Uiviitut: L'objectif global de ce programme de recherche est de comprendre les impacts du système de traitement des eaux usées de Baker Lake (NU) sur l'environnement et la santé humaine, et de formuler des recommandations pour améliorer la gestion des eaux usées dans la communauté. Le système actuel de traitement des eaux usées de Baker Lake consiste en un complexe étang-zone humide qui se déverse finalement dans le lac Baker. Le lac Baker est un habitat important pour les poissons et constitue également une source d'approvisionnement en eau pour la communauté de Baker Lake. Les eaux usées s'accumulent dans un petit bassin de rétention pendant les mois d'hiver (d'octobre à mai), puis se déversent de manière incontrôlée dans la zone humide lors du dégel pendant la crue printanière. Ce scénario est typique de nombreuses zones de traitement des zones humides au Nunavut, et il a été prouvé qu'il contribue à des niveaux médiocres de traitement des eaux usées qui peuvent constituer un risque pour la santé humaine et environnementale. Le programme de recherche impliquera une équipe interdisciplinaire de chercheurs et utilisera une approche holistique pour caractériser les impacts du système actuel de traitement des eaux usées sur l'environnement et la santé humaine.

Personnel

Personnel on site: 2

Days on site: 25

Total Person days: 50

Operations Phase: from 2023-06-01 to 2026-06-02

Hulilukaarutit

| Inigiyá | Hulilukaarut Qanurittuq | Nunanngá Qanurittaakhaanik | Initurlingá qanuritpa | Initurlingá utuqqarnitat unaluuniit Ingilraaqnitat Uyarannguqtut akhuurninnga | Qanitqiayuyuq qanitqiamut nunallaat kitulluuniit ahiruqtailiyainnit nuna |
|---|-------------------------|----------------------------|--|---|--|
| Shoreline Baker Lake (near drinking water intake and treatment plant) | Sampling sites | Municipal | Shoreline of Baker Lake | No known archeological value | 500 m |
| Input to Baker Lake (wastewater effluent enters here) | Sampling sites | Municipal | Municipal wastewater discharge location | No known archeological value | 500 m |
| Airplane Lake outflow | Sampling sites | Municipal | Outflow from lake receiving municipal wastewater | No known archeological value | 700 m |
| Upstream background site | Sampling sites | Municipal | Upstream of municipal wastewater lagoon and wetland treatment area | No known archeological value | 800 m |

Nunaliin Ilauyun, Aviktuqhimayuniitunullu Ikayuuhiarunguyun

| Nunauyuq | Atia | Timiuyuq | Upluani Uqaqatigyaungmata |
|--------------|---------------|----------------------|---------------------------|
| Qamaniittuaq | Sheldon Dorey | Hamlet of Baker Lake | 2022-11-16 |

Angiuttauvaktunik

Naunaiqlugu nunanga talvani havauhikhaq ittuq:

Kivalliq

Angiuttauvaktunik

| Munariniqmut Ayuittiaqtuq | Angirutinga Qanurittuq | Tadja Qanurittaakhaanik | Ublua Tuniyauyuq/Uuktuqtuq | Umikvikhaa Ublua |
|------------------------------------|---------------------------------------|---------------------------|----------------------------|------------------|
| Iqalukhiurniqmut Tariuqmiu Kaanata | Authorization to collect fish samples | Applied, Decision Pending | | |

Project transportation types

| Transportation Type | Qanuq Atuqtauniarmangaa | Length of Use |
|---------------------|-------------------------|---------------|
| Air | | |
| Land | | |

Project accomodation types

Nunayuuq

Ihuaqutivaluin Atuqtauyukhan

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

| Hanalrutit Qanurittuq | Qaffiuyut | Aktikkulaanga – Qanurittullu | Qanuq Atuqtauniarmangaa |
|-------------------------------|-----------|-------------------------------|---|
| boat | 1 | < 20' | A small boat would be used to carry sampling equipment, including samplers, to offshore sites. |
| passive samplers | 9 | 20 cm diameter x 30 cm length | Passive water samplers will be deployed at sites for up to 3 weeks each, during the sampling season. These require no power to operate, and would be deployed by cable attached to fixed points on shore (e.g., poles or existing structures) or buoys if offshore. All equipment will be removed at the end of the field season. |
| primary productivity measures | 9 | 1 m ² | These consist of sealed bottles with known algal and nutrient compositions, and would be deployed on site to measure algal productivity. They would be removed after measurements are done. |
| current meters | 6 | 10 cm | We will be measuring stream flow downstream of the existing wastewater treatment plant using portable current meters. Water level loggers (10 cm in size) will be deployed in the stream beds in-stream for the season, to monitor water flow continuously, and removed at the end of the summer. |
| Quadrats | 1 | 1m x 1m | Quadrats will be used to characterize vegetation and wetland presence in the vicinity of the existing wastewater treatment system and reference site. This will involve transecting the tundra on foot, placing a temporary 1 m x 1 m PVC quadrat on the ground surface, and taking photographs, and at times collecting small soil samples (<500 g). |
| truck | 1 | standard size pickup truck | A pickup truck or similar vehicle would be used to carry sampling equipment to onshore sites. |

Qanurittuq Urhuqyuaq unalu Qayangnaqtut Hunavaluit Aturninnga

| Qanurittuq urhuqyuaq hunavaluit aturninnga: | Urhuqyuaq Qanurittuq | Qaffiuyut qattaryut | Qattaryuk Aktikkulaanga | Atauttimut Qaffiuyut | Ilanga | Qanuq Atuqtauniarmangaa |
|---|----------------------|---------------------|-------------------------|----------------------|--------|-------------------------|
| | | | | | | |

| | | | | | | |
|----------|------|---|-----|-----|--------|--|
| Diesel | fuel | 1 | 50 | 50 | Liters | Diesel fuel for the small boat listed above. Estimated maximum amount used for sampling work during the season. |
| Gasoline | fuel | 1 | 100 | 100 | Liters | Gasoline for the sampling truck listed above. Estimated maximum amount used for sampling work during the season. |

Imaqmik Aturninnga

| Ubluq qanuraaluk (m3) | Aturumayain imavaluin utiqtittagaani qanuq | Atulirumayain imavaluin utiqtittagani humi |
|-----------------------|--|--|
| 0 | | |

Iqqakuq

Ikkakunik Munakgiyauyunik

| Havauhikhaq Hulilukaarut | Qanurittuq Iqqakut | Ihumagiyaayuq Qanuraaluktut Atuqtait | Qanuq Iqqakuurniarmangaa | Halummaqtirarnirutikan piyutin |
|--------------------------|--|--------------------------------------|---|--|
| Sampling sites | Other, Small amounts of packaging materials for sampling supplies. | Less than 1 kg | We will be taking all waste materials with our samples and equipment back with us to our respective universities. | No additional treatment procedures will be required as we will be removing all wastes. |

Avatiliriniqmut Ayurhautingit:

The proposed project will involve sampling of water, sediments, microorgansims and fish in a lagoon/wetland/stream system currently receiving municipal wastewater. Up to 10 fish/species/lake will be collected, humanely euthanized following conditions of our animal care license (cervical dislocation and swift blow to the head), and sampled for flesh, liver (contaminant concentrations), and otoliths (fish age).

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**

The physical environment that will be studied includes the current municipal wastewater lagoon, treatment wetland and receiving environment.

Qanurittuq Ittunik Avatinga: Inuuhimayunut Avatinga

The current biological environment to be studied includes microorganisms, invertebrates and fish in the wastewater treatment system.

Qanurittuq Ittunik Avatinga: Inungit-maniliurutingit Avatinga

The work will be conducted in the community of Baker Lake, Nunavut.

Miscellaneous Project Information**Naunaiyainiq ukuninnga Ayurhautingit unalu Piumayaat Ikikliyuumiutinahuarutit**

We do not anticipate any negative impacts.

Tamatkiumayunik Ihuikgutivaktunik

We do not anticipate any cumulative effects.

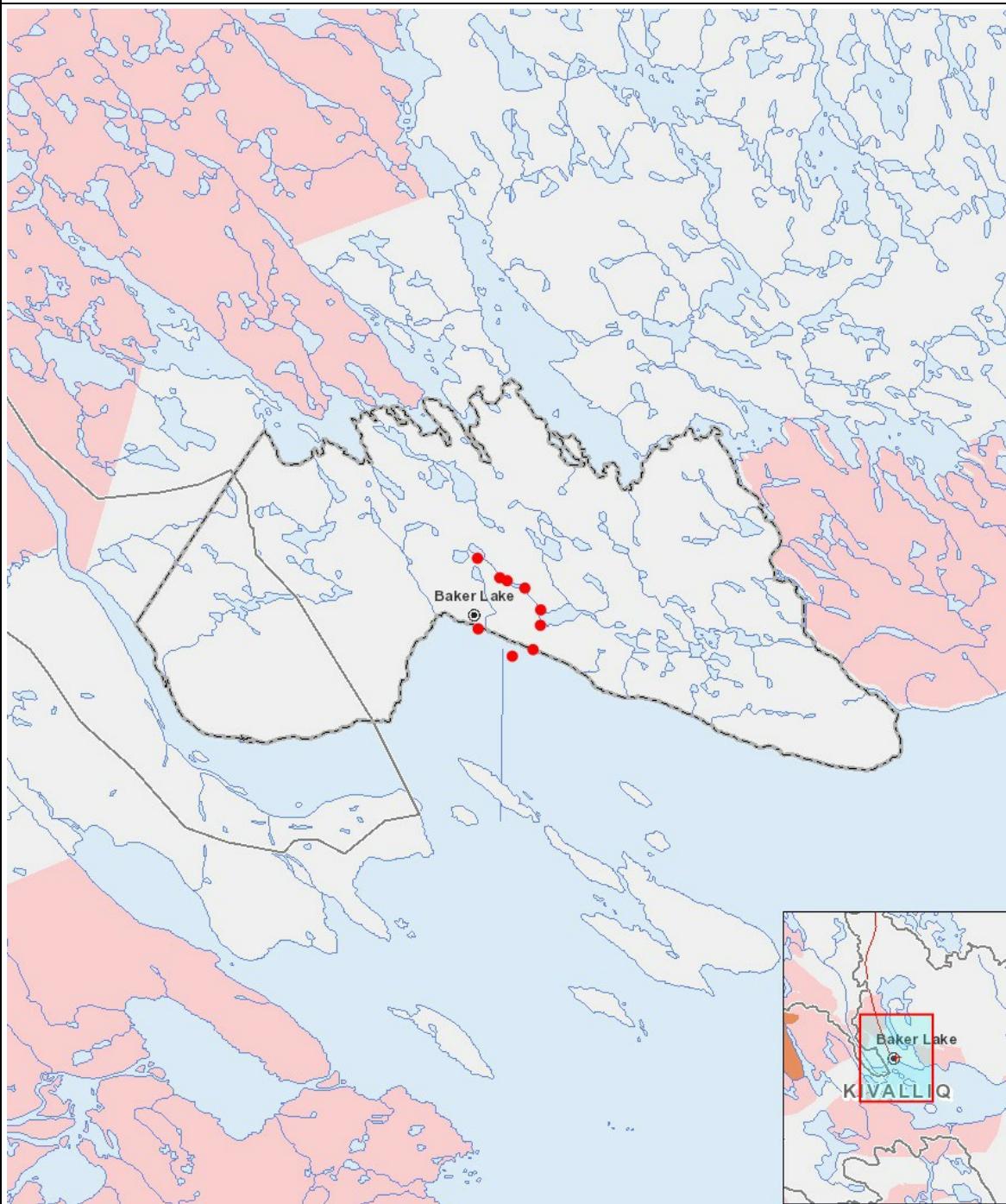
Impacts

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 | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Piiqtauniq | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

(P = Nakuuyuq, N = Nakuungittut unalu mikhilimaittuq, M = Nakuungittut unalu mikhittaaqtuq, U = Naluyaayuq)

Havaariyaukhamut Nayugaa



List of Project Geometries

- 1 point Shoreline Baker Lake (near drinking water intake and treatment plant)
- 2 point Baker Lake offshore water
- 3 point Input to Baker Lake (wastewater effluent enters here)
- 4 point Airplane Lake outflow
- 5 point Airplane Lake inflow
- 6 point Finger Lake outflow
- 7 point Finger Lake inflow
- 8 point Lagoon
- 9 point Upstream background site