



NIRB Application for Screening #125843

Impacts of wastewater at Baker Lake, Nunavut

Application Type: New

Project Type: Scientific Research

Application Date: 8/1/2023 6:26:24 PM

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

Proposed Authorization: from 0001-01-01 to 0001-01-01

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DETAILS

Non-technical project proposal description

English: 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.

French: 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.

[illegible]

Personnel

Personnel on site: 2

Days on site: 25

Total Person days: 50

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

Activities

| Location | Activity Type | Land Status | Site history | Site archaeological or paleontological value | Proximity to the nearest communities and any protected areas |
|-----------------------------------------------------------------------|----------------|-------------|--------------------------------------------------------------------|----------------------------------------------|--------------------------------------------------------------|
| 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 |

Community Involvement & Regional Benefits

| Community | Name | Organization | Date Contacted |
|------------|---------------|----------------------|----------------|
| Baker Lake | Sheldon Dorey | Hamlet of Baker Lake | 2022-11-16 |

Authorizations

Indicate the areas in which the project is located:

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Authorizations

| Regulatory Authority | Authorization Description | Current Status | Date Issued / Applied | Expiry Date |
|-----------------------------|---------------------------------------|---------------------------|-----------------------|-------------|
| Fisheries and Oceans Canada | Authorization to collect fish samples | Applied, Decision Pending | | |

Project transportation types

| Transportation Type | Proposed Use | Length of Use |
|---------------------|--------------|---------------|
| Air | | |
| Land | | |

Project accomodation types

Community

Material Use

Equipment to be used (including drills, pumps, aircraft, vehicles, etc)

| Equipment Type | Quantity | Size - Dimensions | Proposed Use |
|-------------------------------|----------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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. |

Detail Fuel and Hazardous Material Use

| Detail fuel material use: | Fuel Type | Number of containers | Container Capacity | Total Amount | Units | Proposed Use |
|---------------------------|-----------|----------------------|--------------------|--------------|--------|------------------------------------------------------------------------------------------------------------------|
| 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. |

Water Consumption

| Daily amount (m3) | Proposed water retrieval methods | Proposed water retrieval location |
|-------------------|----------------------------------|-----------------------------------|
| 0 | | |

Waste

Waste Management

| Project Activity | Type of Waste | Projected Amount Generated | Method of Disposal | Additional treatment procedures |
|------------------|--------------------------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 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. |

Environmental Impacts:

The proposed project will involve sampling of water, sediments, microorganisms 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

Description of Existing Environment: Physical Environment

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

Description of Existing Environment: Biological Environment

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

Description of Existing Environment: Socio-economic Environment

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

Miscellaneous Project Information

Identification of Impacts and Proposed Mitigation Measures

We do not anticipate any negative impacts.

Cumulative Effects

We do not anticipate any cumulative effects.

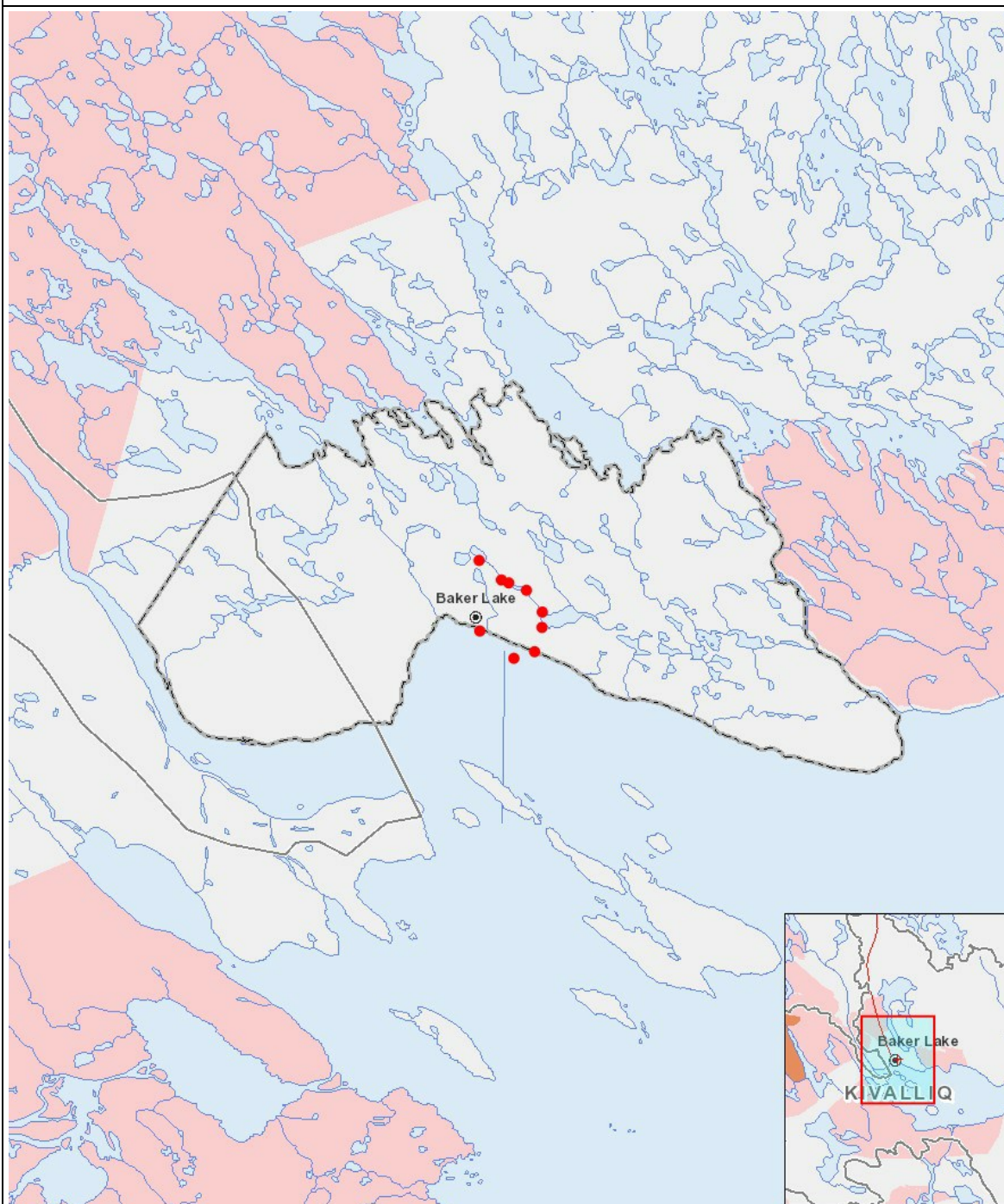
Impacts

Identification of Environmental Impacts

| | | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | | - | - | - | - | - | - | - | - | - | - | - | - | - | | - | - | - | - | - | | - | - | - | - | - |
| Operation | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | | - | - | - | - | - | - | - | - | - | - | - | - | - | | - | - | - | - | - | | - | - | - | - | - |
| Decommissioning | | | | | | | | | | | | | | | | | | | | | | | | | | |
| - | | - | - | - | - | - | - | - | - | - | - | - | - | - | | - | - | - | - | - | | - | - | - | - | - |

(P = Positive, N = Negative and non-mitigatable, M = Negative and mitigatable, U = Unknown)

Project Location



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