

WASTE MANAGEMENT PLAN

BAKER LAKE GEOTHERMAL PROJECT Hamlet of Baker Lake, Nunavut

Prepared for:



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1 Introduction

The Baker Lake Geothermal Project (the Project) Waste Management Plan (WMP) has been developed on behalf of Quilliq Energy Corporation (QEC or the Company) in accordance with applicable legislation, guidelines and best practices.

This WMP will come into effect as soon as all permits, licences and authorizations have been obtained for the Project. Copies and updates to this plan may be obtained via the Company or APEX Geoscience Ltd. ("APEX"). This WMP will be replaced, upon approval, if there are any significant changes to the activities outlined in the existing permits, which warrant changes to this WMP. Minor changes will be submitted as an addendum to this WMP and submitted to the distribution list as required.

1.1 Contact Details

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1.2 Purpose and Scope

The primary objective of the Baker Lake Geothermal Project WMP is to provide employees and contractors with operational guidelines to minimize the generation of waste and facilitate the collection, storage, transportation, and disposal of wastes while minimizing adverse effects on the environment. The WMP includes the following:

- A summary of regulatory requirements.
- Potential waste minimization, recycling, and reuse options.
- Methods for collection, storage, and disposal of hazardous and non-hazardous wastes.
- Ways to minimize environmental impacts.
- Training, inspection, and monitoring efforts.

1.3 Other Plans

This WMP should be considered as a part of the Project wide management system. Other management plans in place at the Baker Lake Geothermal Project include:

- Abandonment and Restoration Plan (ARP)
- Emergency Response Plan (ERP)
- Environmental Management Plan (EMP)
- Spill Contingency and Fuel Management Plan (SCFMP)

1.4 Project Description

QEC is a 100% Government of NU owned corporation that is the sole provider of electrical power in the Territory. QEC currently provides power to all 25 communities in NU by

operating stand-alone diesel power plants in each, which means that it is dependent upon fossil fuels. However, QEC is actively searching for new and renewable energy resources.

QEC commissioned a Nunavut Geothermal Feasibility Study, completed by RESPEC, with guidelines set by the Canadian Geothermal Energy Association (CanGEA) for the Canadian National Geothermal Database (CNGD), published in June 2018. Baker Lake has been selected as a test site for investigating the geothermal potential in the Canadian Shield.

The Project will consist of the completion of a small diameter, temperature gradient hole in which geothermal properties will be studied. Should this work yield positive results, further investigations, will be conducted that might ultimately lead to the construction of a geothermal heat and power facility that would help reduce, if not eliminate, the hamlet's dependence on fossil fuels.

The Project will commence in the late summer or fall and will comprise the drilling of a single, approximately 800-metre deep, vertical core hole at a target location within Lot 447 of the hamlet of Baker Lake. A small volume of fuel (less than 4,000 L) will be required to power the drill during the program and will be appropriately permitted and managed. A camp will not be required for the exploration program, as the project is within the municipal boundaries of the hamlet of Baker Lake.

A Community Consultation visit to Baker Lake to discuss the QEC Baker Lake Geothermal Project is planned prior to the commencement of the program.

All drilling will be confined to Lot 447 of Baker Lake as seen in Figure 2 of Appendix 1.

1.5 Applicable Legislation and Guidelines

Acts, regulations, and legislation that relate to waste management in Nunavut are listed below:

1.5.1 Federal

- Canadian Centre for Occupational Health and Safety Act
- Canadian Environmental Protection Act
- Fisheries Act
- Nunavut Waters and Nunavut Surface Rights Tribunal Act
- Transportation of Dangerous Goods Act
- National Fire Code of Canada
- Northern Land Use Guidelines
- Workplace Hazardous Materials Information System (WHMIS)
- CCME Environmental Codes of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products
- Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations
- Guidelines for Spill Contingency Planning

1.5.2 Territorial

- Fire Prevention Act
- Environmental Protection Act
- Mine Health and Safety Act and Regulations
- Public Health Act
- Safety Act
- Nunavut Occupational Health and Safety Regulations
- Environmental Guideline for the General Management of Hazardous Waste

2 Waste Management

2.1 Definition of Wastes

Waste at the Baker Lake Geothermal Project is considered to be any material or substance that can no longer be used for its intended purpose, and is destined for recycling, disposal, or storage. Hazardous wastes are broadly defined by the Nunavut Department of Environment's Environmental Guideline for the General Management of Hazardous Waste as being "any unwanted material or products that can cause illness or death to people, plants and animals". Hazardous wastes may include waste petroleum products, solvents, paints, waste chemicals, batteries, and any combination of hazardous and non-hazardous materials (i.e. mixed waste).

The responsibility for proper waste management rests with the waste generator and should be budgeted for accordingly, as a cost of doing business.

2.2 Waste sources

Tables 2.1 and 2.2 provide a summary of the anticipated types and amounts of non-hazardous (inert) and hazardous and wastes anticipated to be generated at the Baker Lake Geothermal Project.

Table 2.1: Non - hazardous (Inert) Wastes

Waste Type	Examples	Estimated Quantity Generated	Treatment/Disposal Method
Combustible solid waste	Food wastes, paper, untreated wood	Minimal (e.g. bagged lunch wastes, printed out documents, lumber for drill floor, etc)	Disposed of at drilling personnel accommodations or, if required at the Baker Lake municipal waste facility
Non-combustible solid waste, bulky items, scrap metal	Scrap metal (e.g. empty drums, nails/screws), glass (e.g. bottles, jars), rubber products (e.g. tires, floor mats), plastics (e.g. bottles, packaging, bags), non-hydrocarbon contaminated equipment (e.g. motors, fans, heaters, pumps, screens)	Minimal (only one drillhole)	Stored in sealed containers, and transported south to an accredited facility once drilling has been completed
Drilling Greywater	Drill cuttings, additives & water	~ 100 m ³ /day	Excavated sump located adjacent to drillhole; allowed to percolate into overburden; minimum distance of 31 m from nearby water sources

Table 2.2: Hazardous Wastes and Pollutants

Waste Type	Examples	Estimated Quantity Generated	Treatment/Disposal Method
Petrochemicals	Waste oils	Minimal (only one drillhole)	Stored in sealed containers, removed and transported south to an accredited facility once drilling has been completed.
Solvents	Varsol, cleaning products		
Contaminated soil/snow/water	Soil/snow/water with fuel spilled on it		
Electronics	Computer parts, circuit boards, transformers		
Fluorescent tubes	Regular and compact fluorescent tubes		
Batteries	Dry cell batteries, button batteries, lead-acid based batteries		

2.3 Waste Management Activities

Waste management operations at the Baker Lake Geothermal Project comprise a number of activities with the common goal of reducing the amount of waste generated on site and to ensure that any wastes created are reused, recycled, or disposed of in a responsible manner. Waste will be separated at the source into a number of categories including: organics (food wastes), inert recyclables, inert non-combustible materials, and various hazardous materials. Materials that cannot be disposed of at the Baker Lake waste facility will be stored in appropriate containers until they can be removed from site for treatment and/or disposal at an accredited facility.

2.4 Waste Recovery and Reuse

Recovery and reuse options at the Baker Lake Geothermal Project are limited and restricted to what will be accepted by the Baker Lake waste facility. However, any available opportunity for waste recovery and reuse will be taken.

3 Waste Classification and Disposal Plan

3.1 Hazardous Wastes

All opportunities will be taken to reuse or recycle hazardous waste materials. All hazardous wastes will be placed in sealed containers and stored within “Arctic Insta-Berms”, or similar, for secondary containment until they can be reused or backhauled for recycling or disposal. A hazardous waste storage area will be established adjacent to the main fuel cache at the drill site.

3.1.1 Used Oil

Waste lubricating oils, from vehicles, generators, pumps, or other equipment will be collected and stored in labeled 205 L steel drums. Although used oil may be combusted in specifically designed burners for heat generation, at this time it is not known if any waste oil burners will be on site at the Baker Lake Geothermal Project, therefore, waste oil will be backhauled to a registered hazardous waste receiver.

3.1.2 Hydraulic Fluid

Whenever possible, hydraulic fluids will be filtered and reprocessed for reuse. Hydraulic fluid that cannot be reprocessed will be sealed in labeled 205 L steel drums and stored in the hazardous waste storage area until the product can be backhauled to a registered hazardous waste receiver.

3.1.3 Contaminated or Expired Fuels

Contaminated fuels will remain clearly labeled and tightly sealed in their original containers within the fuel storage area. The fuels will be moved to the hazardous waste storage area for backhaul to a registered hazardous waste receiver.

3.1.4 Solvents

Whenever possible, non-toxic alternatives will be used in place of petroleum based solvents. Excess or waste solvents will be packaged in clearly labeled, original, tightly

sealed containers, or manufactured containers designed for solvent transport. Waste solvents will be stored in the hazardous waste storage area until backhauled to a registered hazardous waste receiver.

3.1.5 Contaminated Soil, Snow, and Ice

Any contaminated soil, snow, or ice will be cleaned up immediately in accordance with the Baker Lake Geothermal Project “Spill Contingency and Fuel Management Plan.” All contaminated soil, snow, and ice will be sealed in 205 L steel drums and stored in the hazardous waste storage area to await backhaul to a registered hazardous waste receiver.

3.1.6 Used Rags and Sorbents

Used rags and sorbents will be placed in clearly labeled, tightly sealed containers, such as 205 L steel drums, and stored in the hazardous waste storage area until disposal or backhaul is possible. Granular sorbent will be stored in drums and backhauled to a registered hazardous waste receiver.

3.1.7 Empty Hazardous Material Containers and Drums

Empty containers will be stored in a designated area and backhauled to a certified waste processing facility. Drums may alternatively be drained, air dried, crushed and backhauled to a recycling facility. Any residual fuels drained will be consolidated into drums and backhauled to a registered hazardous waste receiver.

3.1.8 Waste Batteries

Generation of waste batteries will be reduced by properly maintaining batteries to prolong life and by replacing non-rechargeable batteries with rechargeable alternatives whenever possible. Even with proper maintenance, all batteries will eventually deteriorate and reach the end of their useful life. Waste batteries must be properly handled to avoid spillage of corrosive materials and the release of metals into the environment.

Dry cell batteries are used in equipment such as hand-held radios and GPS units, flashlights, and cameras. Some of these types of devices utilize rechargeable battery packs, but others use general dry cell battery types such as AAA to D cells, 6 or 9 volt consumer batteries, and button batteries. Specific containers will be set up to collect dry cell batteries. The batteries will be placed in appropriate shipping containers and backhauled to an off-site recycling facility.

Waste lead acid batteries and rechargeable batteries will be stored in a 205 L plastic drum, within the hazardous waste storage area. These types of batteries can only be stored in this manner in quantities of 1,000 kg or less and for periods of less than 180 days. All waste lead acid and rechargeable batteries will be backhauled from site as necessary to conform to regulations.

3.1.9 Aerosol Cans

Use of aerosol cans at the Baker Lake Geothermal Project will be limited. Whenever possible, alternatives, such as spray bottles, will be used in place of aerosol cans. Any

waste aerosol cans will be collected in specific containers at the drill site. The cans will be stored in the hazardous waste storage area until backhauled for disposal.

3.1.10 Fluorescent Bulbs and Tubes

Waste fluorescent bulbs and tubes will be packaged in their original (or equivalent) containers and stored in a watertight enclosure in the hazardous waste storage area until backhauled to a hazardous waste recycling or disposal company. Fluorescent bulbs and tubes are considered hazardous waste if broken, and should be handled accordingly.

3.2 Inert Non-Combustible Solid Wastes

Labeled bins will be provided at the drill site for each type of waste listed below. Effort will be made to re-use or re-purpose any materials before disposal is considered.

3.2.1 Tires and Other Rubber Materials

Waste tires, hoses, and other rubber materials that cannot be repaired or repurposed will be backhauled for recycling or disposal.

3.2.2 Scrap Metal and Glass

Scrap metal and glass will be re-purposed for alternative uses whenever possible. Any residual metal or glass that cannot be re-used will be placed in 205 L steel drums and backhauled for recycling. Scrap metal may be disposed of at the Baker Lake solid waste facility.

3.2.3 Electronics

Electronics and electrical equipment will be collected and stored in sealed containers within the hazardous waste storage area and removed from site for recycling or disposal.

3.2.4 Vehicles and Other Mechanical Equipment

Vehicles and other mechanical equipment, such as generators, that are no longer usable, will be removed from site for refurbishment or recycling/disposal. Vehicles and equipment awaiting backhaul will be stored in a specially designated, bermed area.

3.3 Inert Combustible Solid Waste

All combustible solid waste will be stored in appropriate containers until they can be disposed at the Baker Lake Waste facility.

3.3.1 Food Waste and Packaging

Food waste and packaging will be disposed of at the Baker Lake waste facility, and if it cannot, it will be stored in appropriate containers until they can be removed from site for treatment and/or disposal at a southern accredited facility.

3.3.2 Paper and Cardboard

Use of electronic methods for communication will be encouraged at the Baker Lake Geothermal Project to minimize the amount of paper used. Effort will be taken to restrict the amount of corrugated cardboard coming to the drill site, and waste cardboard will be

reused as needed, possibly as packaging for backhauled materials. Waste paper and cardboard will be returned to an accredited facility, and if the Baker Lake waste facility cannot be used, it will be stored in appropriate containers until they can be removed from site for treatment and/or disposal at a southern accredited facility.

3.3.3 Waste Lumber

Whenever possible, lumber will be reused at the Baker Lake Geothermal Project. Excess waste lumber will be stored in appropriate areas and backhauled to the Baker Lake Waste facility.

3.4 Sewage

A porta-potty, pacto toilet, or similar system will be utilized at the drillsite. Contents will be regularly emptied either via vacuum truck (for the porta-potty) or transported to the Baker Lake Waste Facility for incineration (in the case of a pacto system).

4 Site Facilities

4.1 Hazardous Waste Storage Area

The temporary hazardous waste storage area will be located adjacent to the drill site, fully within the QEC power plant property. The area will include a small fuel cache, a minimum of 31 metres from the normal high-water mark of any water body. The storage area will be used for temporary storage of any hazardous wastes until they can be backhauled for recycling or disposal. All hazardous wastes will be sealed in appropriate, clearly labeled, watertight containers, such as 205 L steel or plastic drums.

All containers housing hazardous waste will be stored within “Arctic Insta-Berms”, or similar, for secondary containment. These types of berms utilize chemical and fire resistant fabric (generally polyurethane coated nylon or vinyl coated polyester material) designed for extreme arctic temperatures and puncture resistance. “RainDrain” or similar hydrocarbon filtration systems will be used to safely remove any water collected inside the berms, and as a safeguard against any potential overflows of contaminated water.

All waste storage areas will be clearly marked and labeled with appropriate signage. Within the storage area, wastes will be segregated by type, and labeled to ensure safety for handlers and appropriate disposal.

5 Training

The Project Field Manager and any personnel required to handle hazardous wastes will be required to have valid First Aid, WHMIS, and Transportation of Dangerous Goods (TDG) training. Site and job-specific training will be provided to all personnel who are required to handle waste materials. All employees and contractors will receive training in emergency response and spill response, as outlined in the Baker Lake Geothermal Project “Emergency Response Plan” and “Spill Contingency and Fuel Management Plan”, respectively.

6 Inspection and Monitoring

Inspections of the hazardous waste storage area and other waste storage facilities will be conducted daily. Daily inspections will include an assessment of the condition of waste receptacles and storage containers, checking for any damaged or leaking containers or berms, and ensuring that waste is collected and stored in the correct containers and storage areas. These inspections will be completed in conjunction with those outlined in the Baker Lake Geothermal Project “Spill Contingency and Fuel Management Plan.” Any leaks or spills will be treated as outlined in the “Spill Contingency and Fuel Management Plan.”

The Project Field Supervisor is responsible for supervising the monitoring and inspection program and keeping a detailed inventory of all hazardous wastes on site.

Appendix 1: Figures

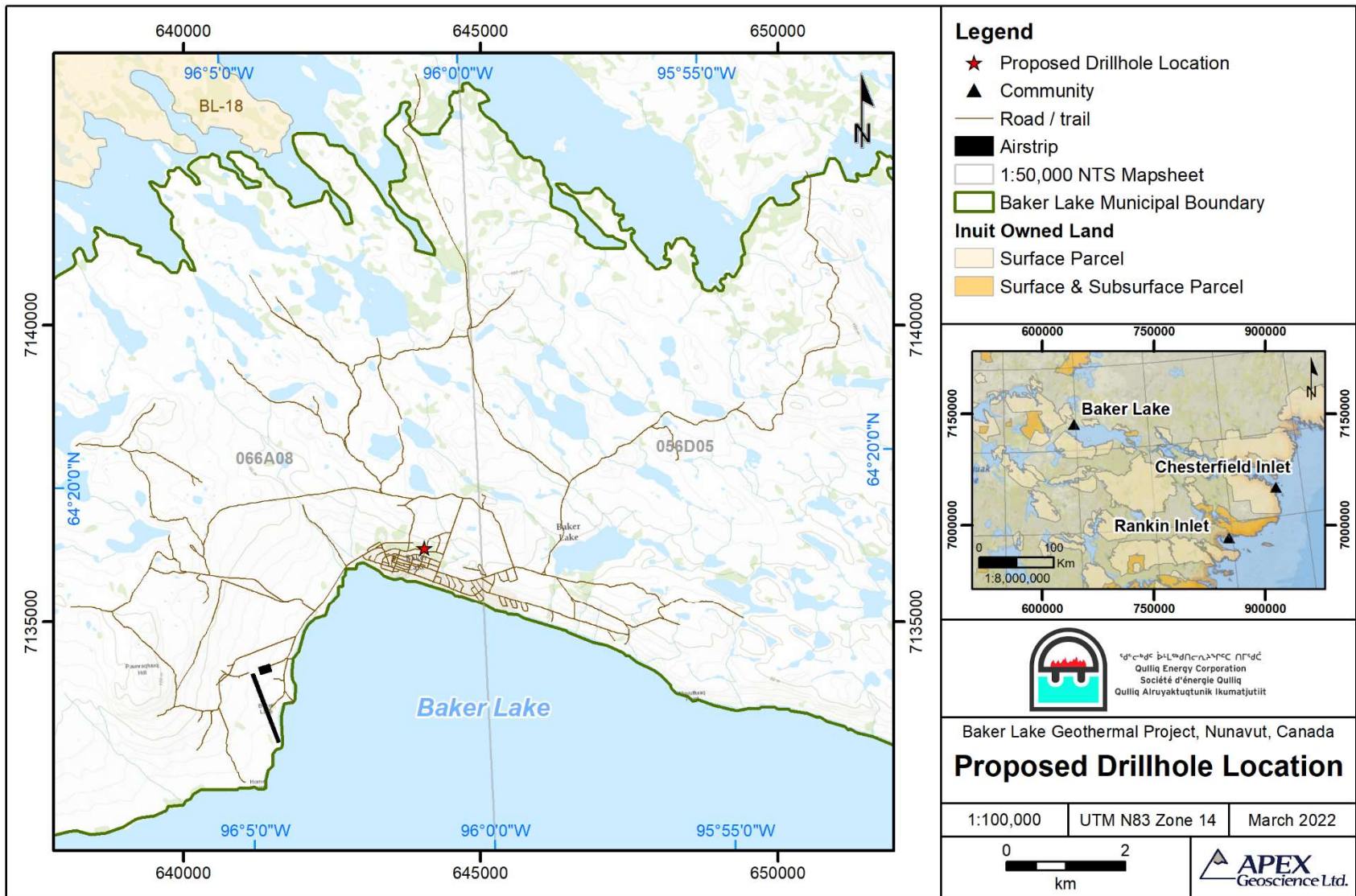


Figure 1 Baker Lake Geothermal Project Location

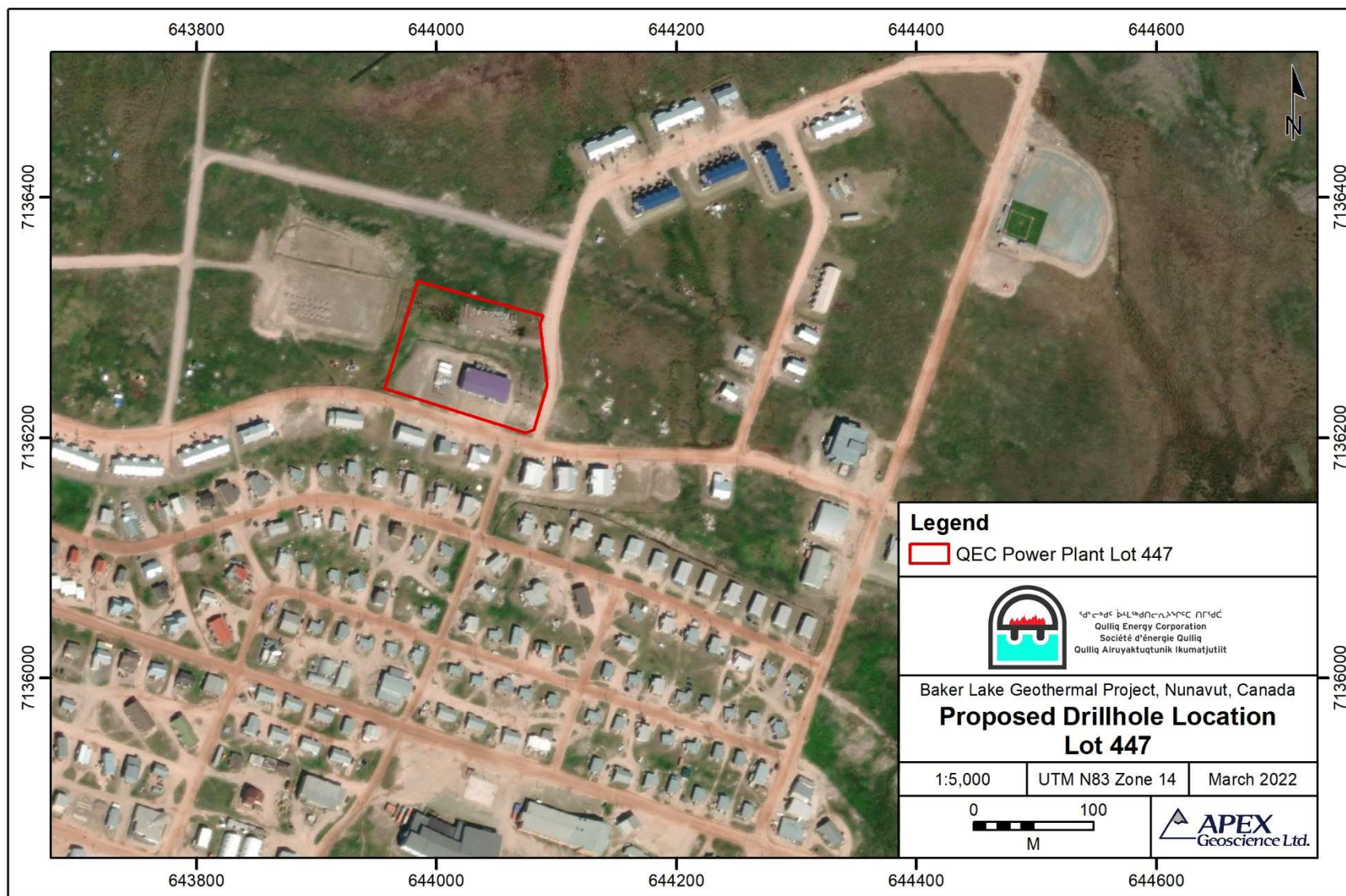


Figure 2 Baker Lake Geothermal Project Location Close-Up