ATTACHMENT 23

LTWP Preliminary Design Report – Appendix M – Environmental Protection Plan

City of Iqaluit

Environmental Protection Plan

Long Term Water Project – Supply and Storage

September 2024

City of Iqaluit Long Term Water Project

Environmental Protection Plan

September 2024

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Acronyms and Abbreviations

AQHI	Air Quality Health Index
DFO	Department of Fisheries and Oceans
EMP	Environmental Management Plan
EPP	Environmental Protection Plan
ERP	Emergency Response Plan
ESCP	Erosion and Sediment Control Plan
GHG	Greenhouse Gases
LTWP	Long-Term Water Project
MSDS	Material Safety Data Sheet
NIRB	Nunavut Impact Review Board
NPC	Nunavut Planning Commission
NU	Nunavut
PBSEIA	Physical, Biological and Socio-Economic Impact Assessment
PPE	Personal Protective Equipment
RWPS	Raw Water Pump Station
SAR	Species At Risk
SGB	Surveyor General Branch
SVEC	SocioEconomic Valued Environmental Component
VEC	Valued Environmental Components
WHMIS	Workplace Hazardous Materials Information System

1 Introduction

Arcadis Canada Inc. (Arcadis) was retained by the City of Iqaluit (City) to prepare the Environmental Protection Plan (EPP) for the planned Long-Term Water Program - Raw Water Supply and Storage Project (LTWP) in Iqaluit, Nunavut (NU). The objective of this EPP is to expand on the Environmental Management Plan (EMP) through the identification of project related impacts and specific mitigation measures required for regulatory compliance, This document is designed to be a living document that will be updated as the LTWP design advances and is to be adapted as environmental protection obligations are identified by regulators and stakeholders.

1.1 Project Description

The LTWP consists of developing a permanent water conveyance system from Lake Qikiqtalik (Unnamed Lake) to the Lake Geraldine Reservoir, as well as an expansion of the capacity of a New Reservoir, and other associated structural requirements. The primary objectives of the project are to:

- Establish a new long-term water source and the necessary infrastructure to address the City's present and future water demands, ensuring that the water supply system supports economic growth; and,
- Construct a new reservoir to secure sufficient year-round water storage capacity by adding a minimum 1.5 increase in the over-winter storage capacity and meeting the current and projected needs of the City.

The main project components include:

- Intake at Lake Qikiqtalik
- Raw Water Pumping Station (RWPS) at Lake Qikiqtalik
- New water conveyance pipeline
- Upgrading as required of the existing road and culverts located between Lake Qikiqtalik and the Road to Nowhere
- Pipeline crossing of the Apex River
- New access road from the Road to Nowhere to the New Reservoir requiring the dewatering and filling of three existing ponds
- Laydown areas near the RWPS and shooting range
- Concrete plant at the RWPS
- Eight retention structures creating the New Reservoir
- One spillway to the Apex River
- Valve access building at the New Reservoir
- Buried conveyance pipeline between the New Reservoir and Lake Geraldine
- Quarries for rock at the New Reservoir and the construction laydown area
- Borrows for sand materials

- Electrical distribution line to the RWPS at Lake Qikiqtalik and the control building at the New Reservoir
- Backup power generation is needed at these locations to maintain the thermal protection pipes in winter

See Figure 1 for details. These components are subject to change until the LTWP design is finalized.

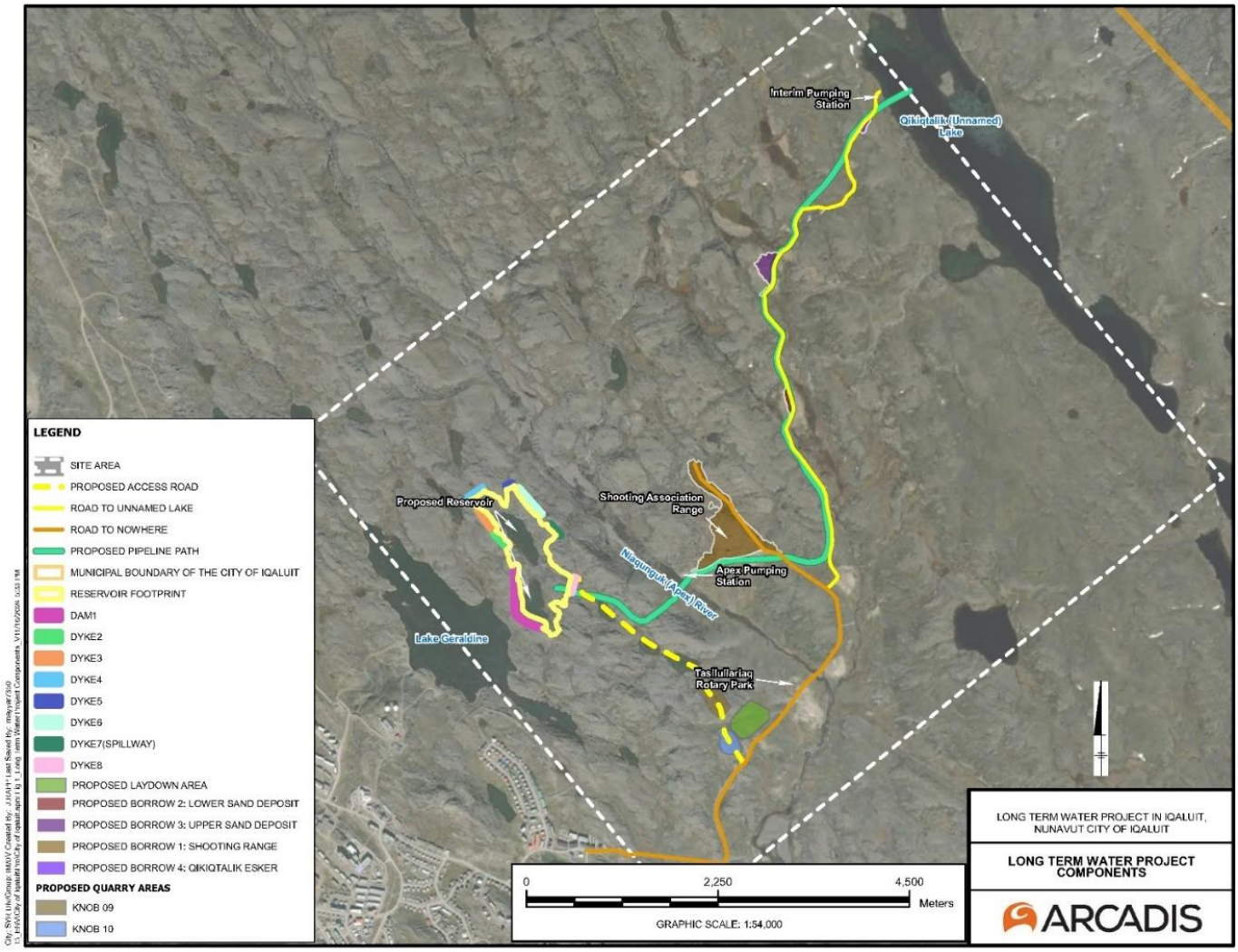

Figure 1 LTWP Components

1.2 Objective of the EPP

The objectives of this EPP are to identify, plan for, and manage the environmental protection activities of the LTWP. It is the City's goal that the LTWP activities do not unnecessarily impact the environment and provides a summary of environmental protection measures to ensure the least impacts. The City commits to ongoing improvement to the LTWP's environmental performance, and that a strong framework is established for communicating environmental requirements to all personnel at all Project phases.

1.3 Applicability and Scope

The scope of this EPP applies to all activities undertaken by the City and its subcontractors during the design, construction, and operational phases of the LTWP. The EPP will be relevant and applicable to all project personnel and associates participating in Project Works.

This EPP describes all the environmental obligations, requirements, standards, and procedures to be followed by Project personnel, including contractors and subcontractors, during the design, construction, and operational phases. The EPP is a "living document" and will be reviewed and updated at various stages of the Project (as required) to include the most current project information and activities. The focus of the EPP in the design phase is to develop appropriate sub-plans to identify the design requirements and to incorporate these into the required permit applications. These sub-plans will be revisited on an ongoing basis and adjusted as necessary to address the specific conditions encountered during the construction phase.

2 Environmental Interactions

The environmental aspects of the LTWP include components of the existing physical, biological, or socio-economic environments that may be impacted by the project activities. The environment aspects for the LTWP were prepared based on the Valued Environmental Components (VECs) identified in the *DRAFT Physical, Biological and Socioeconomic Impact Assessment* (PBSEIA) report of November 2023 and follows the guidelines available in the *Proponent's Guide – NIRB Technical Guide Series* dated February 2020. The mitigation of potential impacts is achieved by anticipating and identifying the project environment interactions and documenting them. To do this, an Environmental Aspects Interactions Matrix was created. For each environmental and social aspect, the effects from activities related to planning and design, construction and operation will be expanded upon in this EPP. These are shown in Table 1. For the full Environmental Aspects Interactions Matrix, refer to Appendix B of the EMP.

Table 1 Summary of Environmental Aspects Interactions Matrix

Project Components / Activities	Environmental Aspects																				
	Physical Environment											Biological Environment					Socio-Economic Environment				
	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 Process and Bathymetry	Air Quality	Noise levels	Terrestrial Vegetation	Terrestrial Wildlife and Habitat	Species at Risk and Migratory Birds	Aquatic Species and Habitat	Archaeological and Cultural Historic Site	Employment	Community Wellness	Community Infrastructure	Human Health
Planning and Design Phase					X				X				X	X	X		X				
Construction Phase		X	X	X	X			X	X		X	X	X	X	X	X	X	X	X	X	X
Operation Phase					X	X			X		X	X				X			X		X

An important consideration throughout planning is weather and climate. The LTWP is located in the City of Iqaluit, Nunavut, which is in the arctic, and access to Baffin Island is only by ship or airplane. Constraints on the LTWP due to these factors must be considered including:

- Duration of winter and cold temperatures causing delays or impacting ship transport
- Difficulty transporting specialized equipment or materials to Iqaluit
- Limited possibilities for environmentally conscious construction practices (e.g. use of biodegradable lubricants/fluids/fuels in construction equipment)

2.1 Summary of Impacts

The conclusion of the Draft PBSEIA Report was that the LTWP would have an overall positive environmental impact by ensuring a safe and reliable drinking water supply for the City of Iqaluit, and that all potential negative impacts associated with the LTWP can be mitigated or eliminated by implementing a series of measures. No negative impacts were identified in the study. The EPP will expand on the measures required for a safe and sustainable outcome.

2.1.1 Ground Stability

It is likely that given the granitic composition of the ground of the LTWP, little to no ground instability will be observed during project activities. In areas where till or soil is present, caution using heavy machinery should be taken. This includes using precaution where there is the presence of erratics to avoid any rock falls and potential injuries. More data should be available after the Geotechnical Drilling component is done. It is possible that some impacts on ground stability occur due to some construction phase activities, such as:

- Ground clearing
- Laydown areas, access roads, new reservoir dam and pipeline construction and erosion control
- Blasting
- Heavy machinery

2.1.2 Permafrost

The effects of the LTWP on permafrost at the Project site will be confirmed once Geotechnical work is completed in the Fall of 2024, however, impacts are likely to occur. Some possible activities that could cause impacts on permafrost in the area are:

- Laydown areas, access roads, new reservoir dam and pipeline construction
- Blasting
- RWPS and water conveyances construction

Extraction of material from borrow areas, quarries and blast material and soil from the New Reservoir, RWPS and Apex River crossing site can expose the underlying permafrost, resulting in melting, which can cause ground instability, subsidence and soil erosion.

It is likely that the flooding of the New Reservoir will transfer heat to the surrounding ground and create a talik, however the extent is not known at this point.

2.1.3 Hydrology / Limnology

The local limnology north of Iqaluit will be altered to develop the LTWP. It is possible that hydrological features of the landscape change during construction and once the system is operational. It is likely that the transfer of water to the New Reservoir will impact water levels at Lake Qikiqtalik however the water balance assessment is in progress. The activities that may have impacts on hydrology and/or limnology of the site include:

- Dewatering of existing waterbodies
- Erosion control
- Blasting
- Dam, laydown areas, access roads, and pipeline maintenance
- Pumping water

2.1.4 Water Quality

The waterbodies within the LTWP project boundaries are from the Koojesse Inlet Watershed and the Apex River Watershed. Included in these are the Apex River, Lake Geraldine, the two waterbodies forming the New Reservoir, and Lake Qikiqtalik. Water quality records show that these water bodies are generally of suitable standards to serve

as drinking water source. The construction and operations activities that have the potential to impact water quality are the following:

- Geotechnical drilling
- Ground clearing
- Erosion control
- Blasting
- Equipment refuelling
- Hazardous materials and waste
- Pumping water
- Storage of fuels

Accidental fuel spills from equipment, machinery and vehicles used during construction, blasting and excavation activities have the potential to impact sediment and soil quality. During construction of the New Reservoir, the fill used to construct the earthen dams could contain materials which can become suspended in surface water and transferred to Lake Geraldine. Maintaining water quality during the construction and the flooding of the New Reservoir and its flooding will be important.

2.1.5 Climate Conditions

Climate change impacts for the construction phase of the LTWP are not expected as the timescale of the construction period is three years. Some effects on climate due to activities of the Project may include:

- GHGs will be emitted by the operations of mobile construction equipment and portable diesel-powered electrical generators during the construction phase.
- Production and transportation of equipment and materials to Iqaluit will emit GHGs from the burning of fossil fuels from marine and air transport.
- Generation of electricity for operations of the plant will burn fossil fuels which will emit GHGs, and
- It is likely that with the warming climate trend in Iqaluit, plus the long-life design of the LTWP, climate change will impact LTWP in the future.

The main project activities that may have an effect on climate conditions during the construction and operational phases are any that require fossil fuel powered machinery and equipment, these include but are not limited to:

- Blasting
- Heavy machinery
- RWPS and water conveyance maintenance
- Pumping water
- Operation of vehicles

2.1.6 Eskers and Other Unique or Fragile Features

A presumed esker is located west of Lake Qikiqtalik and has already been used as source of borrow material for the construction of the Emergency Road. Removing too much borrow materials from the area may impact eskers by causing slope instability or erosion. It is unclear whether thermokarsts are present at the Project site. Some

planning phase activities that will validate the presence and extent of eskers, thermokarsts and other fragile landscape features include:

- Geotechnical studies
- Ecological surveys
- Surveying

Other fragile landscape features that should be noted, but that will be covered in the section on terrestrial vegetation are mosses and lichens. These important ecological features are very slow growing, and their disturbance and destruction should be avoided as much as possible throughout the Project.

2.1.7 Surface and Bedrock Geology

The LTWP site geology is mostly composed of bedrock and glacial till cover. There is not a significant amount of soil at the surface in the area. Geotechnical surveys to come will evaluate the bedrock geology in more detail and provide a more concise idea of impact risks. Blasting will be required during construction of the LTWP to break bedrock into smaller dimensions for transport and reuse in the construction. The main construction activity that could have impacts on the local geology features is:

- Blasting

2.1.8 Sediment and Soil Quality

Ground cover disruption from the construction and installation of temporary and permanent infrastructure required for the Project will occur. Work near and in water bodies have the potential to disturb the sediment, impact its quality, and cause other ecosystem effects. In general, the Project activities that have the potential to impact the sediment and soil quality at the site during planning, construction and operation are:

- Geotechnical drilling
- Ground clearing
- Dewatering of existing waterbodies
- Erosion control
- Blasting
- Equipment refueling
- Hazardous materials and waste
- Storage of fuels

2.1.9 Air Quality

Currently, Environment Canada reports Air Quality Health Index (AQHI) forecasts without any measured observations. The typical AQHI forecasts for the City and the Region appear to be reported at “Low Risk”. Some existing historical air quality reports suggest that although some concentrations of contaminants have been recorded, the region typically has clean air quality. The impact interactions between environmental aspects and LTWP activities include:

- Ground clearing
- Blasting

- Heavy machinery
- RWPS and water conveyance, maintenance and operation of vehicles

2.1.10 Noise Levels

It is anticipated that the implementation of the LTWP (i.e., construction) and its operation would have the potential to impact the acoustical environment at the LTWP site and in the surrounding areas. The construction and the operation of the Project will increase the ambient noise levels in the surroundings, and the increase in noise levels may be disruptive to humans and wildlife located within and adjacent to the LTWP site. Residential subdivisions, the Road to Nowhere and Plateau subdivisions, are closest to the site at approximately 700 m distance currently. A detailed noise assessment will be conducted prior to construction. The activities that impact noise levels during construction include:

- Ground clearing
- Blasting
- Heavy machinery
- Construction noise

As part of the Project, the following new sources of sound will be introduced and could potentially cause a Negative but mitigable impact to the existing acoustical environment during the operations phase:

- Mechanical equipment at the RWPS at Lake Qikiqtalik
- Mechanical equipment at the control building for the New Reservoir
- Vehicular traffic along the new access road from Road to Nowhere to the New Reservoir

2.1.11 Terrestrial Vegetation

The LTWP has the potential to cause Negative and mitigable (M) effects to terrestrial vegetation and wetlands during both the planning and construction phases. Some areas at the Project site will be permanently impacted for the installation of new infrastructure. The LTWP has the potential to cause Negative and mitigable (M) effects to terrestrial vegetation and wetlands during both the Construction and Operation Phases. These potential impacts may occur due to:

- Accidental fuel spills from equipment, machinery and vehicles used during construction, blasting and excavation activities that have the potential to impact terrestrial vegetation, wetlands and watercourses. Releases of petroleum-based products can induce toxic effects in terrestrial plants including mortality and sub-lethal effects such as impaired growth or reproductive capacity.
- Land alteration activities such as construction of access roads, grading, blasting, installing of the pipeline and quarrying will destroy vegetation and impact wetlands.
- Removal and disturbance of native plants that may result in a loss of regional biodiversity.
- Disturbance from construction activities in wetlands that may impact hydrological functions by changing the water regime and destroy sensitive wetland vegetation by heavy equipment entering wetlands and installing pipelines and covers.
- Heavy machinery and equipment used during project implementation that may increase the risk of transporting noxious weeds and invasive species to the Sites. Noxious weeds and invasive species may

negatively impact biodiversity by out-competing and replacing native plants and plant SAR in the area, potentially causing species extirpation and even extinction.

Potential impact interactions exist for activities such as:

- Geotechnical drilling
- Ecological surveys
- Surveying
- Ground clearing
- Laydown Areas, Access Roads, New Reservoir Dam and Pipeline Construction RWPS and Water Conveyances Construction
- Erosion control
- Blasting
- Equipment refuelling
- Hazardous materials and waste
- Heavy machinery

2.1.12 Terrestrial Wildlife and Habitat

The LTWP could potentially have impacts on wildlife and wildlife habitat during both the planning, construction and operation phases. Some effects are:

- The use of machinery and equipment that could potentially harm terrestrial wildlife, including SAR and migratory birds that enter the Project area and damage previously unknown wildlife habitat features that are encountered during project implementation.
- Wildlife becoming trapped in open excavation areas and areas of standing water.
- Releases of petroleum-based products which could induce toxic effects in terrestrial (and aquatic) organisms including mortality and sub-lethal effects such as impaired growth or reproductive capacity, and
- Increased levels of noise in the natural environment which could potentially be disruptive to terrestrial animals in the immediate area, potentially resulting in their relocation from the area.

These potential impacts may occur during:

- Geotechnical drilling
- Ecological surveys
- Surveying
- Ground clearing
- Laydown Areas, Access Roads, New Reservoir Dam and Pipeline Construction Dewatering of Existing Waterbodies
- RWPS and Water Conveyances Construction
- Erosion control
- Blasting
- Equipment refuelling

- Hazardous materials and waste
- Heavy machinery
- Construction noise

2.1.13 Species at Risk and Migratory Birds

The LTWP could potentially have Negative but mitigable (M) impacts on SAR and migratory birds during both the Construction and Operation Phases. These potential impacts may occur due to:

- Increased levels of noise in the natural environment that could potentially be disruptive to terrestrial animals, including migratory/SAR birds, in the immediate area, potentially resulting in their relocation from the area.
- Damage caused by machinery and equipment to SAR and migratory birds that enter the project area and previously unknown SAR habitat features that are encountered during project implementation.
- Construction activities that could potentially result in the loss of nesting habitat, loss of nests (direct mortality) and the disruption to bird breeding and nesting activities. Most native bird species in Canada are protected under the *Migratory Birds Convention Act*, 1994 (*MBCA*), and are collectively referred to as "migratory birds". General prohibitions under the *Act* and its regulations protect migratory birds, their nests and eggs anywhere they are found in Canada.
- Construction activities that could potentially result in the loss of SAR and SAR habitat. Section 33 of the *Species at Risk Act* (*SARA*) prohibits damaging or destroying the residence of a listed threatened, endangered, or extirpated species. SARA defines residence as: "a dwelling-place, such as a den, nest or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating".

Project activities that can cause an impact on this VEC are similar to those listed in the previous section on Wildlife and Wildlife Habitat.

2.1.14 Aquatic Species and Habitat

An impact classification of Negative and mitigable (M) is given for the construction and operations activities of the LTWP pertaining to the Aquatic Species and Habitat VEC.

The Project has the potential to affect aquatic species and habitat during both its construction and operation phases. The potential negative effects are anticipated on the habitats, populations and migrations/spawning of the fish and other aquatic species in Lake Qikiqtalik, Apex River, the two lakes forming the new reservoir, Lake Geraldine and other minor waterbodies in the LTWP.

Construction of the intake/discharge pipes at the terminus of the pipelines/canals, construction of the new reservoir (in particular, construction of the berms/dykes and blasting and removal of waste rock), dewatering activities necessary to prepare areas of construction (for example intake and outfall structures) and construction of the pipeline and ancillary features including roads, utilities and other supporting structures necessary to construct, operate and maintain the water supply system may result in the following effects:

- Lethal effects to fish from blasting, in-water material placement and dewatering; Currently, there is no evidence of fish inhabiting the two lakes that will form the new reservoir. However, this information is pending further field studies. Nevertheless, if any fish are found in these lakes, the construction activities

planned for the reservoir will likely result in direct lethal effects to the fish. These effects may include stranding on land due to dewatering and physical damage, such as ruptures, caused by blasting.

- Changes in water quality including increase in turbidity and sediment load due to erosion and dewatering, increase in nitrogen compounds from explosives residue, introduction of hydrocarbons and other deleterious substances from machinery operation in and around the water. An increase in turbidity and sediment load in aquatic environments can have adverse effects on fish and their habitats by reducing water clarity, limiting light penetration, and disrupting feeding and reproductive behaviors. Elevated nitrogen compounds as well as the introduction of hydrocarbons and other deleterious substances can be toxic to fish, affecting their health and potentially leading to mortality. These combined effects can disrupt the balance of aquatic ecosystems, impacting the survival, reproduction, and overall well-being of fish populations and the habitats they rely on.
- Physical disturbance and stream alterations during spawning/migrations. These disruptions can lead to the displacement of spawning grounds, damage to critical habitat, and interference with the natural behaviors of fish during their crucial reproductive and migratory phases. These disturbances can result in reduced recruitment and long-term impacts on fish populations, potentially leading to declines in their numbers and overall health.
- Removal of benthic habitat and changes to benthic invertebrate communities. Benthic habitats serve as essential foraging areas and refuge for fish, providing access to prey, shelter, and suitable conditions for growth and reproduction. Disruption of these habitats can lead to reduced food availability and affect overall health and survival of fish.
- Introduction of invasive species. The introduction of invasive species to aquatic ecosystems can have devastating effects on native aquatic species and habitats. Invasive species often outcompete native species for resources, disrupt food chains, and alter the physical and chemical characteristics of aquatic habitats. These impacts can lead to declines in native species, changes in ecosystem structure, and pose a significant threat to the health and sustainability of aquatic ecosystems.

Potential negative effects on aquatic species and habitats during operation of the LTWP may include the following:

- Mortality of fish and other aquatic organisms due to entrainment and impingement in the pumping equipment.
- Loss of fish habitat and stranding of fish and other organisms in Lake Qikiqtalik as a result of the drawdown.
- Loss of fish habitat and stranding of fish and other organisms in the new reservoir and Geraldine Lake if changes are made to the drawdown regime.
- Possible impacts on fish from alterations in water temperature due to the discharge of water into Geraldine Lake from the new reservoir. Temperature alterations can impact the metabolic rates, growth, and reproduction of aquatic organisms, potentially leading to changes in species distribution and abundance. Water temperature changes can affect the timing of critical life cycle events like spawning and can potentially trigger harmful algal blooms and other ecological disturbances.
- The flow into Geraldine Lake has the potential to result in bed erosion within the channel and an associated increase in sediment load.
- It is worth noting that potential effects on water quality in Geraldine Lake, aside from changes in temperature resulting from the discharge from the new reservoir, are not addressed here. This is because the water in Lake Qikiqtalik, which will be pumped into the new reservoir, complies with the CCME Guidelines for the

Protection of Aquatic Life and, therefore, is not expected to impact aquatic species and habitat in the new reservoir.

2.1.15 Archaeological and Cultural Historic Site

An impact classification of Negative and mitigable (M) is given for the construction activities of the LTWP that will impact the Archaeological and Cultural historic Socioeconomic Valued Environmental Component (SVEC) due to the following:

- Archaeological sites KkDn-54, KkDn-55, and KkDn-58 were determined to be historically significant sites with interpretive value. It is recommended as part of the AIA that KkDn-54, KkDn-55, and KkDn-58 be avoided if possible. However, if it is not possible to avoid disturbing the features as part of the project construction then mitigation measures such as detailed mapping, dismantling of the feature, and mitigative excavations will be undertaken.

2.1.16 Community Wellness, Infrastructure and Human Health

An impact classification of Negative and mitigable (M) is given for the construction activities of the LTWP as they pertain to the Community Wellness SVEC. This classification acknowledges the potential likelihood that the construction of the LTWP will limit access to the lands east of Iqaluit due to construction equipment operating during the construction period. This would include the use of the firing range and potentially limit the use of the rotary park.

An impact classification of Unknown (U) is given for the construction activities of the LTWP for the Community Infrastructure SVEC as the construction plans and schedule for the LTWP are not yet available. It is likely that the construction activities will require the temporary use of existing municipal roads and bridges to move construction materials and vehicles. In addition, the Project would likely involve the use of the ports for the delivery of materials and may require shipping special types of construction vehicles. Water may be required for concrete mix. Waste materials generated will require disposal in the landfill. Electricity will be needed to power the construction and operations phases. Sources are either to use mobile fossil fuel powered generators or to construct a utility connection. During construction, the laydown area mobile offices, rock crushers and concrete plants will need electricity to operate. Once the LTWP is in operations, the RWPS and the new reservoir will need an electricity to operate their pump and control equipment.

For the construction activities of the LTWP as they pertain to the Human Health SVEC the following impacts may occur:

- A maximum of 100 temporary workers in Iqaluit may place an undue strain on the emergency services of Iqaluit should there be a large-scale medical urgency on the LTWP. The construction plans and schedule have not been prepared but will be later in the planning of the LTWP.

3 Environmental Mitigation Measures

In this section, the three phases of the LTWP, Planning & Design, Construction and Operation are presented by the type of activities that will be required to complete the work. For each major activity associated with these phases, environmental or socio-economic effects are listed according to the VECs and SVECs as they appear in Appendix B of the EMP document. Mitigation measures are provided for each potential effect listed, and these adhere to the legislative and permit-specific requirements that have been received thus-far for the Project.

The Mitigation Measures presented in this section will be updated as further information on the LTWP site conditions and specific requirements from regulators and stakeholders are provided. Permit requirements provided to date have been copied to Table 2 presented below.

Permits or project documentation referenced to date in this EPP are as follows:

- DFO (2024) 24-HCAA-00575 - City of Iqaluit DFO Permit Request - Niaqunguk (Apex) River Drilling. Department of Fisheries and Oceans Canada. Email dated May 23, 2024.
- EEL (2023). DRAFT Long Term Water Program – Raw Water Supply and Storage Project Blasting Assessment Report. Explotech Engineering Limited, Dated December 15, 2023.
- NIRB (2023). Long Term Water Project – Geotechnical Investigations Screening Decision Report. Nunavut Impact Review Board. NIRB File No. 23YN040. Dated November 2, 2023.
- PBSIA (2023). Physical, Biological and Socio-Economic Impact Report – DRAFT. Arcadis Canada Inc. Dated November 2023.

Table 2 LTWP VEC Mitigation Measures According to Project Components

Project Component	VEC(s) Affected	Mitigation Measures	Source
Geotechnical Drilling	- Water Quality - Sediment and Soil Quality - Terrestrial Vegetation - Terrestrial Wildlife and Habitat - Archaeological and Cultural Historic Site	- All heavy duty machinery wilk be operated by a qualified person. Operators must have their license and qualification on their person while operating the machinery or vehicle. - Steps will be taken to ensure that equipment, machinery and vehicles used on Site are in good working order and comply with applicable air quality standards. - Equipment and machinery will be operated at optimum rated loads. - Mobile equipment and machinery will be turned off when not in use to minimize exhaust. - Equipment and machinery producing excessive exhaust will be repaired or replaced. - Vehicle idling time will be minimized. - Stationary emission sources (e.g., portable diesel generators, compressors, etc.) will be used only as necessary and turn off when not in use. - Regular inspection and maintenance of vehicles and equipment will be conducted to reduce the risk of sudden breakdown, leaks or spills of fossil fuels and other mechanical fluids. - Any vehicle refueling will be conducted at least 31 meters away from waterbodies or fragile ecosystems by authorized personnel who have spill response materials and equipment readily on-hand. - The footprint of the area being excavated or disturbed will be always minimized. - Existing trails, roads, or cut lines will be used wherever possible to avoid disturbance to the riparian vegetation. - The removal of select plants within the exploration site may be required to meet operational and/or safety concerns. Vegetation removal will be minimal and when practicable, pruned or top the vegetation instead of uprooting. - All drill cuttings, fluids or sludge will be contained in closed systems for reuse, off-site disposal, or otherwise contained and stabilized to prevent their entry into any water body. Where sumps are utilized they will be located above the high water mark of any water body and will be able to contain all drilling waste. - Only non-toxic drilling additives and muds will be used. - any artesian flow that is encountered and any holes drilled in wet areas (e.g., lake or wetland) upon completion of the project will be plugged and permanently sealed . - Small diameter/low density on-ice drilling may be undertaken, except in known fish spawning habitat. Drilling will be avoided in gravel or rock rubble substrates in water depths less than four (4) metres within water bodies where fall-spawning fish species (e.g., trout, whitefish) are likely to be present. - All project materials will be removed from the ice prior to spring break-up. - In order to avoid negative impacts to fish and fish habitat caused by flow alterations, reduction in water levels, or entrainment/impingement at water pump intakes, the following measures are to be incorporated for any water-taking activities:	DFO 2024 NIRB 2023 PBSIA 2023

Project Component	VEC(s) Affected	Mitigation Measures	Source
		- Water will be withdrawn from non-fish bearing water bodies only, whenever feasible. - If fish-bearing water bodies cannot be avoided, only larger streams or lakes will be used and small water bodies shall be avoided. - Steps will be taken to ensure that water withdrawal volumes do not impact fish or fish habitat. Withdrawals from fish-bearing waters should not result in any noticeable change in water level or downstream flows, particularly during sensitive life stages (e.g., by dewatering spawning or egg incubation areas). - For any multiple or simultaneous water withdrawals, the cumulative impact of the total withdrawal volume on fish habitat by all water users will be considered. - Steps will be taken to ensure that water pump intakes are designed and operated in a manner that prevents streambed disturbance and fish mortality. The *Interim code of practice: end-of-pipe fish protection screens for small water intakes in freshwater* found at https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html, will be followed. - An undisturbed natural buffer zone will be maintained between areas of on-land exploration (e.g., pitting, trenching, or surface stripping) and the HWM of any water body to assist in sediment and erosion control and retention of riparian vegetation. - Any in-water mineral exploration activities will be timed to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows, with the exception of on-ice drilling (see Measure 9), or any water withdrawal activities (see Measure 11). Timing windows can be found at https://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/index-eng.html. - Machinery will be operated in a manner that minimizes disturbance to the water body bed and banks and prevents entry of deleterious substances into any water body. - Machinery will arrive on site in a clean condition and will be maintained free of fluid leaks. - Machinery will be washed, refueled, and serviced, and fuel and other materials for the machinery stored away from the water, except for projects involving on-ice drilling where appropriate precautions are taken to prevent spills. - An emergency spill kit will be kept on site in case of fluid leaks or spills from machinery. - Appropriate measures, including an emergency contingency plan will be applied for inadvertent spills, to ensure that deleterious substances such as drill cuttings, acidic or metal leaching water, petroleum products, sediment, and debris do not enter any water body. - Effective sediment and erosion control measures will be installed, where appropriate, before starting work to prevent entry of sediment into any water body. Inspect them regularly during the course of the work and make all necessary repairs if any damage or malfunction occurs. - Steps will be taken to ensure that the discharge of any water into or near a water body is done in a manner that prevents sedimentation or erosion (e.g., by stabilizing the discharge site). - All disturbed areas will be stabilized and reclaimed upon completion of work. All debris or waste produced or associated with the work will be immediately removed.	

Project Component	VEC(s) Affected	Mitigation Measures	Source
		- Any waste materials removed from the work site will be stabilized to prevent them from entering any water body. This could include covering spoil piles with biodegradable mats or tarps or planting them with, preferably native, grass or shrubs. - Any disturbed areas will be vegetated by planting and seeding preferably with native trees, shrubs or grasses and such areas will be covered with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site will be stabilized (e.g., cover exposed areas with biodegradable erosion control blankets to keep the soil in place and prevent erosion) until naturally re-vegetated the following spring. - Effective sediment and erosion control measures will be maintained until re-vegetation of disturbed areas is achieved. - If archaeological sites or features are encountered, activities will be immediately halted and moved away from this location. Each new site encountered will be recorded and reported to the Government of Nunavut-Department of Culture and Heritage. - No activities will be conducted within the 50 metres buffer zone of any archaeological/ historical sites.	
Ecological Surveys	- Terrestrial Vegetation - Terrestrial Wildlife and Habitat - Species at Risk and Migratory Birds	- Vehicles will always remain on roads and pre-established trails that can accommodate them. Care will be taken to avoid trampling vegetation and wildlife. - Field personnel walking across the site will remain on roads and pre-established trails as much as possible. Where it is impossible, care will be taken to avoid trampling vegetation and wildlife. - Surveyors will not deposit, nor permit the deposit of any fuel, chemicals, wastes (including wastewater) or sediment into any water body. - Surveyors will not substantially alter or damage or destroy any wildlife habitat in conducting this activity unless otherwise authorized by the appropriate authorizing agencies. - All phases of the project will be carried out in a manner that protects migratory birds and avoids harming, killing or disturbing migratory birds or destroying, disturbing or taking their nests or eggs. In this regard, the project will comply with the *Environment and Climate Change Canada's Avoidance Guidelines,* the *Migratory Birds Convention Act, 1994, and the Species at Risk Act.* - Project activities will not disturb or destroy the nests or eggs of any birds. If active nests of any birds are discovered or located (i.e., with eggs or young), work will be avoided these areas until nesting is complete and the young have naturally left the vicinity of the nest by establishing a protection buffer zone appropriate for the species and the surrounding habitat. - It is encouraged to work with local communities and knowledge holders to inform project design, to carry out the project, and to confirm or validate the perspectives represented in publications, reports produced as part of the project. Care will be taken to ensure that Inuit Qaujimaningit and local knowledge collected for the project is used with permission and is accurately represented.	NIRB 2023 PBSIA 2023

Project Component	VEC(s) Affected	Mitigation Measures	Source
Surveying	- Eskers and Other Unique or Fragile Landscapes - Terrestrial Vegetation	- Vehicles will always remain on roads and pre-established trails that can accommodate them. Care will be taken to avoid trampling vegetation and wildlife. - Field personnel walking across the site will remain on roads and pre-established trails as much as possible. Where it is impossible, care will be taken to avoid trampling vegetation and wildlife.	PBSIA 2023
Ground Clearing	- Ground Stability - Water Quality - Sediment and Soil Quality - Air Quality - Noise Levels - Terrestrial Vegetation - Terrestrial Wildlife and Habitat - Species at Risk and Migratory Birds - Archaeological and Cultural Historic Site	- Erosion and sediment suppression measures will be implemented on all areas during all project activities in order to prevent sediment or fugitive dust from entering any water body or surrounding environment. Erosion prevention measures may include berms or silt fences. - No equipment or vehicles will be moved unless the ground surface is in a state capable of fully supporting the equipment or vehicles without rutting or gouging. Overland travel of equipment or vehicles must be suspended if rutting occurs. - When possible, a winter route that maximizes the use of frozen water bodies will be used. - Existing trails will be used where possible during project activities on the land. - No disturbance of the stream bed, lakebed or the banks of any definable watercourse will be permitted, except where deemed necessary for maintaining project-specific operational commitments or approved by a responsible authority in cases of spill management. - There will be no deposits, nor permitting of the deposit of any fuel, chemicals, wastes (including wastewater) or sediment into any water body. An Emergency Spill Response Plan will be in place that is approved by the appropriate authorizing agency(ies). - Existing trails will be used where possible during project activities on the land. - The land use area will be kept clean and tidy at all times. - All garbage, fuel and equipment will be removed at the end of each field season and/or upon completion of work and/or upon abandonment. - All disturbed areas will be restored to a stable or pre-disturbed state using Best Available Technology Economically Achievable (BATEA) upon completion of work and/or abandonment. - No disturbance of the stream bed, lakebed or the banks of any definable watercourse will be permitted, except where deemed necessary for maintaining project-specific operational commitments or approved by a responsible authority in cases of spill management. - All phases of the project will be carried out in a manner that protects migratory birds and avoids harming, killing or disturbing migratory birds or destroying, disturbing or taking their nests or eggs. In this regard, the Proponent shall take into account Environment and Climate Change Canada's Avoidance Guidelines. The Proponent's actions in applying the Avoidance Guidelines shall be in compliance with the Migratory Birds Convention Act, 1994 and with the Species at Risk Act. - The activities will not disturb or destroy the nests or eggs of any birds. If active nests of any birds are discovered or located (i.e., with eggs or young), these areas will be avoided until nesting is complete	NIRB 2023 PBSIA 2023

Project Component	VEC(s) Affected	Mitigation Measures	Source
		and the young have naturally left the vicinity of the nest by establishing a protection buffer zone appropriate for the species and the surrounding habitat. - Using a qualified biologist to conduct a bird nest survey within two days prior to commencement of vegetation removal activities, if activities will be conducted during the nesting period and/or if there is the potential that nests of SAR, migratory birds, eagles, peregrine falcons, gyrfalcons may be present. If nests are present, a qualified biologist will develop a management plan identifying protective measures specific to the species present. Species specific management plans will be developed as needed. The qualified biologist who is provided with authority to modify or halt project activities if it is deemed necessary to do so for the protection of bird species or habitat, will monitor the plan through implementation. - Requiring a Stop Work Order if nests are encountered at any time during project implementation and inform the Project Manager. Work in the vicinity of the nest will not commence until a qualified biologist has been to the Site, assessed the feature and developed a management plan. - Avoiding damage or destruction to any nests from mid-May or the date when adults are first seen building or occupying the nest (whichever is earlier) to August 19 or when the bird is last seen at the nest (whichever is later). Activities include, but are not limited to, moving, damaging or destroying nests; blocking access to the nests; and/or disturbing the nests (including auditory disturbance), or any other activity that would damage or destroy the functions of the nests. - Creating a buffer of 30 m should a nest be observed in order to not disturb the birds during breeding bird season. - The best management principles adopted by the construction industry will be adhered to in order to prevent the emission of dust and other pollutants into the atmosphere, such as: - Discourage unnecessary on-site vehicle and equipment idling. - Complete daily inspections of heavy equipment to ensure all construction equipment operated for the Project is in good working order and following the approved maintenance program. - Monitor visible emissions as well as air quality via handheld and continuous air quality monitoring stations. Where abnormal emissions from equipment such as odours and high opacity is observed and/or measured, the Operators will be actioned to either have under vehicle maintenance or provide records that show it has been tuned and maintained in accordance with preventative maintenance programs following manufacturers requirements in order to minimize harmful emissions from incomplete combustion. - Use water spray to control dust generation from construction activities. - Use tarpaulins, soil binders or similar preventative techniques to control dust. However, chemical dust suppressants will not be used in areas where terrestrial vegetation, wetlands, or other aquatic organisms could potentially be harmed. When using chemical dust suppressants, a non-chloride dust suppressant that is approved by the Government of Nunavut will be used.	

Project Component	VEC(s) Affected	Mitigation Measures	Source
		- Tracking of earth or soil from the site by trucks to adjacent roadways will be minimized by using mechanical means such as mud mats (e.g., granular pads located at site entrance), and/or street sweeping and the physical removal of earth from vehicles (e.g., wheel washing), as needed. - Vehicles hauling soil, aggregates or fine or dusty material will be covered to minimize the generation of dust. - Schedule and plan construction activities in order to minimize the areas of soil exposed at any given time. - Construction activities will be scheduled and managed to avoid interfering with peak period traffic and to reduce the obstruction of traffic lanes adjacent to the construction areas in order to minimize idling emissions, without compromising safety of the travelling public and workers. - Exposed soil areas and adjacent roads will be monitored for dust generation potential, with attention paid to areas used for pedestrian walkways and vehicle traffic. - On-site sweeping and cleaning will need to be performed as needed to minimize dust generation. - Restore and stabilize soil surfaces as soon as possible after the cessation of construction works in that area. - Schedule transportation and delivery of construction materials to minimize the amount of dust-generating construction materials that are stored on-site at a given time. - Compliance with posted speed limits, and further reducing speed when travelling on unpaved surfaces to reduce the generation of dust. Per Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities, (ECCC, 2005) Section 6.5.1, "Construction sites should limit the speed of vehicles travelling on unpaved access/haul roads within construction sites to a maximum of 16-24 kilometres per hour (10-15 miles per hour) and to 10 kilometres per hour (6 miles per hour) on unmade surfaces". - Encourage the use of construction equipment that are of low emissions factors and high energy efficiency such as the use of reformulated fuels, emulsified fuels, exhaust catalyst and filtration technologies, cleaner engine repowers, and new alternative-fuelled trucks capable of using ultra-low sulphur diesel fuels and/or equipped with tier 4 (or better) rated diesel engines with diesel particulate matter traps. - Archaeological and paleontological sites will not purposely or inadvertently disturbed by clients or staff as a result of project activities. - All clients and staff will be aware of the responsibilities and requirements regarding archaeological or palaeontological sites that are encountered during land-based activities. This will include briefings explaining the prohibitions regarding removal of artifacts, and defacing or writing on rocks and infrastructure. - No activities shall be conducted in the vicinity (50 metres buffer zone) of any archaeological/historical sites. If archaeological sites or features are encountered, activities shall immediately be interrupted and	

Project Component	VEC(s) Affected	Mitigation Measures	Source
		moved away from this location. Each site encountered needs to be recorded and reported to the Government of Nunavut-Department of Culture and Heritage.	
Heavy Machinery	- Air Quality - Water Quality - Noise Levels - Terrestrial Vegetation - Terrestrial Wildlife and Habitat - Species at Risk and Migratory Birds - Aquatic Species and Habitat - Human Health - Community Infrastructure	- No disturbance of the stream bed, lakebed or the banks of any definable watercourse be permitted, except where deemed necessary for maintaining project-specific operational commitments or approved by a responsible authority in cases of spill management. - Local residents will be informed of planned activities in the area and should solicit available Inuit Qaujimaningit and information regarding current recreational and traditional usage of the project area which may inform project activities. Posting of translated public notices and direct engagement with potentially interested groups and individuals prior to undertaking project activities is strongly encouraged. - Project activities will not interfere with Inuit wildlife harvesting or traditional land use activities.	NIRB 2023
Equipment Refuelling, Hazardous Materials & Waste	- Water Quality - Sediment and Soil Quality - Terrestrial Vegetation - Terrestrial Wildlife and Habitat - Aquatic Species and Habitat - Human Health	- There will be no deposits, nor permitting of the deposit of any fuel, chemicals, wastes (including wastewater) or sediment into any water body. An Emergency Spill Response Plan will be in place that is approved by the appropriate authorizing agency(ies). - All hazardous and non-hazardous waste including food, domestic wastes, debris and petroleum-based chemicals (e.g., greases, gasoline, glycol-based antifreeze) will be managed in such a manner as to always avoid release into the environment and access to wildlife until disposed of appropriately or at an approved facility. - All fuel and other hazardous materials will be located a minimum distance away from the high-water mark of any water body and environmentally sensitive areas as required by the appropriate authorizing agencies. The materials shall be stored in such a manner as to prevent their release into the environment. - Adequate secondary containment or a surface liner (e.g., self-supporting insta-berms and fold-a-tanks) will be used when storing barreled fuel and chemicals at all locations. - Re-fuelling of all equipment will occur a minimum distance away from the high-water mark of any water body as required by the appropriate authorizing agencies. - A Spill Contingency Plan will be in place at all fuel storage or transfer locations and shall ensure that appropriate spill response equipment and clean-up materials (e.g., shovels, pumps, barrels, drip pans, and absorbents) are readily available. - The authorizing agencies' direction for management and removal of hazardous materials and wastes will be followed (e.g., contaminated soils, sediment and waste oil). - Wildlife deterrent systems will be utilized at the time of a spill incident in order to avoid wildlife (terrestrial or marine) and migratory birds from being contaminated. - All spills of fuel or other deleterious materials of 100 litres or more must be reported immediately to the 24-hour Spill Line at (867) 920-8130.	NIRB 2023

Project Component	VEC(s) Affected	Mitigation Measures	Source
Laydown Areas, Access Roads, New Reservoir Dam and Pipeline Construction	- Ground Stability - Permafrost - Terrestrial Vegetation - Terrestrial Wildlife and Habitat - Species at Risk and Migratory Birds - Archaeological and Cultural Historic Site - Community Infrastructure	- No disturbance of the stream bed, lakebed or the banks of any definable watercourse will be permitted, except where deemed necessary for maintaining project-specific operational commitments or approved by a responsible authority in cases of spill management. - Erosion and sediment suppression measures will be implemented on all areas during all project activities in order to prevent sediment or fugitive dust from entering any water body or surrounding environment. Erosion prevention measures may include berms or silt fences. - Equipment or vehicles will not be moved unless the ground surface is in a state capable of fully supporting the equipment or vehicles without rutting or gouging. Overland travel of equipment or vehicles must be suspended if rutting occurs. - Winter route that maximizes the use of frozen water bodies will be used. - Wastes will not be allowed to spread to the surrounding lands or water bodies. - Any deleterious substances (as defined in the *Fisheries Act*) resulting from its activities do not enter into any water bodies frequented by fish. - All areas are to be constructed to facilitate minimizing the environmental footprint of the project area. - Land-based drilling or mechanized clearing activities will not be conducted at a minimum distance of the normal high-water mark of any water body as required by an authorizing agency. - If an artesian flow is encountered, the drill hole is to be immediately plugged and permanently sealed. - All sump/depression capacities are to be sufficient to accommodate the volume of wastewater and any fines that are produced. The sumps shall only be used for inert drilling fluids, and not any other materials or substances. - Sumps will not be located within a minimum distance of the normal high-water mark of any water body as required by an authorizing agency. - All drill holes are to be backfilled or capped prior to the end of each field season. All sumps must be backfilled and restored to original or stable profile prior to the end of each field season. - Existing trails are to be used where possible during project activities on the land. - The land use area is to be kept clean and tidy at all times. - All garbage, fuel and equipment will be removed at the end of each field season and/or upon completion of work and/or upon abandonment. - All disturbed areas will be restored to a stable or pre-disturbed state using Best Available Technology Economically Achievable (BATEA) upon completion of work and/or abandonment. - Archaeological and paleontological sites are not to be purposely or inadvertently disturbed by clients or staff as a result of project activities. - All clients and staff are to be made aware of the responsibilities and requirements regarding archaeological or palaeontological sites that are encountered during land-based activities. This should include briefings explaining the prohibitions regarding removal of artifacts, and defacing or writing on rocks and infrastructure.	NIRB 2023

Project Component	VEC(s) Affected	Mitigation Measures	Source
		- No activities will be conducted in the vicinity (50 metres buffer zone) of any archaeological/historical sites. If archaeological sites or features are encountered, activities shall immediately be interrupted and moved away from this location. Each site encountered needs to be recorded and reported to the Government of Nunavut-Department of Culture and Heritage. - Local residents will be informed of planned activities in the area and should solicit available Inuit Qaujimaningit and information regarding current recreational and traditional usage of the project area which may inform project activities. Posting of translated public notices and direct engagement with potentially interested groups and individuals prior to undertaking project activities is strongly encouraged. - Project activities will not interfere with Inuit wildlife harvesting or traditional land use activities.	
Dewatering of Existing Waterbodies	- Hydrology / Limnology - Aquatic Wildlife and Habitat - Species at Risk and Migratory Birds	- Wastes will not be allowed to spread to the surrounding lands or water bodies. - Any deleterious substances (as defined in the *Fisheries Act*) resulting from its activities do not enter into any water bodies frequented by fish. - All areas are to be constructed to facilitate minimizing the environmental footprint of the project area. - Land-based drilling or mechanized clearing activities will not be conducted at a minimum distance of the normal high-water mark of any water body as required by an authorizing agency. - If an artesian flow is encountered, the drill hole is to be immediately plugged and permanently sealed. - All sump/depression capacities are to be sufficient to accommodate the volume of wastewater and any fines that are produced. The sumps shall only be used for inert drilling fluids, and not any other materials or substances. - Sumps will not be located within a minimum distance of the normal high-water mark of any water body as required by an authorizing agency. - All drill holes are to be backfilled or capped prior to the end of each field season. All sumps must be backfilled and restored to original or stable profile prior to the end of each field season. - While there is currently no evidence of fish inhabiting the two lakes that will eventually become part of the new reservoir, as a precautionary measure before draining these lakes and commencing construction of the new reservoir, any fish present in the lakes will be carefully captured and relocated to a similar natural habitat. - In-water works will be minimized to the greatest extent possible; Where pipelines and ancillary structures must cross waterbodies, the crossing area will be appropriately isolated with an accommodation to allow fish movement around the construction area if necessary and pumping facilities will be in place to ensure that instream flows are maintained and the construction area is not at risk of flooding. - A setback distance of 30 meters will be enforced, prohibiting any non-essential construction activities within 30 meters of UNL, Apex River, the two lakes that constitute the new reservoir, and Geraldine Lake. No construction activities will be allowed within the 30-meter setback area adjacent to any other bodies of water.	NIRB 2023 PBSIA 2023

Project Component	VEC(s) Affected	Mitigation Measures	Source
		- A water treatment reservoir will be constructed to collect water from dewatering and construction areas, ensuring the removal of harmful substances, such as nitrogen compounds and sediment, before releasing the treated water into the natural environment. - A Spill Contingency Plan will be developed and rigorously implemented to minimize the risk of accidental spills or releases from entering nearby watercourses or bodies of water. - All machinery arriving on site will be in a clean condition and meticulously maintained to prevent fluid leaks and invasive species contamination. Environmentally friendly hydraulic fluids, such as biodegradable vegetable oil, will be utilized on equipment whenever possible. - To minimize disruption to the banks and bed of the waterbody, machinery operations will, whenever feasible, take place above the high-water mark (HWM). Steep-banked or sloped areas will be conscientiously avoided when entering or exiting a waterbody. - An Erosion and Sediment Control Plan will be developed and implemented to effectively mitigate the environmental impacts of erosion and sediment runoff. - Prior to commencing any work, robust erosion and sediment control measures will be put in place to prevent the entry of sediment into the waterbody. These measures will undergo regular inspection, maintenance, and repair if damaged during construction. - The clearing of riparian vegetation will be minimized, and existing trails, roads, or cut lines will be utilized whenever possible to avoid disturbing riparian vegetation and prevent soil compaction. - Activities that could alter flow, water levels, or obstruct fish movement or migration will be strictly avoided. - Avoid in-water construction work during the period from September 1 to June 30, in waters supporting arctic char and any forage fish. - Construction activities in fish-bearing waterbodies will adhere to *Nunavut Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat.* These timing windows are designed to safeguard fish during critical spawning and incubation periods when spawning fish, eggs, and fry are particularly vulnerable to disturbance or sediment. For fall-spawning Arctic char, the timing window spans from August 15 to June 30.	
Pumphouse at Lake Qikiqtalik and Water Conveyances (LQ & LG) Construction	- Hydrology/Limnology - Aquatic Species and Habitat - Species at Risk and Migratory Birds	- Wildlife habitat will not be substantially altered or damaged or destroyed in conducting this operation unless otherwise authorized by the appropriate authorizing agencies. - All phases of the project will be carried out in a manner that protects migratory birds and avoids harming, killing or disturbing migratory birds or destroying, disturbing or taking their nests or eggs. In this regard, the project will comply with the *Environment and Climate Change Canada's Avoidance Guidelines,* the *Migratory Birds Convention Act, 1994, and the Species at Risk Act.* - Project activities will not disturb or destroy the nests or eggs of any birds. If active nests of any birds are discovered or located (i.e., with eggs or young), work will be avoided these areas until nesting is complete and the young have naturally left the vicinity of the nest by establishing a protection buffer zone appropriate for the species and the surrounding habitat. No disturbance of the stream bed, lakebed or the banks of any definable watercourse will be permitted, except where deemed necessary for	NIRB 2023

Project Component	VEC(s) Affected	Mitigation Measures	Source
		maintaining project-specific operational commitments or approved by a responsible authority in cases of spill management. - Erosion and sediment suppression measures will be implemented on all areas during all project activities in order to prevent sediment or fugitive dust from entering any water body or surrounding environment. Erosion prevention measures may include berms or silt fences. - Equipment or vehicles will not be moved unless the ground surface is in a state capable of fully supporting the equipment or vehicles without rutting or gouging. Overland travel of equipment or vehicles must be suspended if rutting occurs. - Drilling wastes will not be allowed to spread to the surrounding lands or water bodies. - Any deleterious substances (as defined in the *Fisheries Act*) resulting from its activities do not enter into any water bodies frequented by fish. - All areas are to be constructed to facilitate minimizing the environmental footprint of the project area. - Land-based drilling or mechanized clearing activities will not be conducted at a minimum distance of the normal high-water mark of any water body as required by an authorizing agency. - If an artesian flow is encountered, the drill hole is to be immediately plugged and permanently sealed. - All sump/depression capacities are to be sufficient to accommodate the volume of wastewater and any fines that are produced. The sumps shall only be used for inert drilling fluids, and not any other materials or substances. - Sumps will not be located within a minimum distance of the normal high-water mark of any water body as required by an authorizing agency. Existing trails are to be used where possible during project activities on the land. - The land use area is to be kept clean and tidy at all times. - All garbage, fuel and equipment will be removed at the end of each field season and/or upon completion of work and/or upon abandonment. - All disturbed areas will be restored to a stable or pre-disturbed state using Best Available Technology Economically Achievable (BATEA) upon completion of work and/or abandonment. - Archaeological and paleontological sites are not to be purposely or inadvertently disturbed by clients or staff as a result of project activities. - All clients and staff are to be made aware of the responsibilities and requirements regarding archaeological or palaeontological sites that are encountered during land-based activities. This should include briefings explaining the prohibitions regarding removal of artifacts, and defacing or writing on rocks and infrastructure. - No activities will be conducted in the vicinity (50 metres buffer zone) of any archaeological/historical sites. If archaeological sites or features are encountered, activities shall immediately be interrupted and moved away from this location. Each site encountered needs to be recorded and reported to the Government of Nunavut-Department of Culture and Heritage. - Local residents will be informed of planned activities in the area and should solicit available Inuit Qaujimaningit and information regarding current recreational and traditional usage of the project area	

Project Component	VEC(s) Affected	Mitigation Measures	Source
		which may inform project activities. Posting of translated public notices and direct engagement with potentially interested groups and individuals prior to undertaking project activities is strongly encouraged. - Project activities will not interfere with Inuit wildlife harvesting or traditional land use activities.	
Blasting	- Terrestrial Wildlife and Habitat - Species at Risk and Migratory Birds - Aquatic Species and Habitat - Species at Risk and Migratory Birds - Noise Levels - Human Health	- All blasting shall be performed in accordance with the *Guidelines for the Use of Explosives Near Canadian Fisheries Waters* as well as any project specific Permits and Authorizations issued. - The use of ammonium nitrate fuel oil explosive (ANFO) shall not be permitted. - Detonation wires and shock tubes shall be collected and removed following each blast. - Continual efforts shall be employed to reasonably reduce fish mortality rates. - Water overpressure monitoring is performed whenever blasting operations encroaches within 30m of a waterbody that has been identified as containing live fish. Additionally, ground vibrations should be measured at the closest location that has been identified as a spawning bed in to confirm the DFO limit of 13mm/s is adhered to during periods of spawning. - All blasting operations shall be performed in complete compliance with applicable Federal, Provincial and Municipal Legislative Acts, Regulations and By-laws. - Based on the project footprint and surrounding structures, a seismograph should be installed at the properties to the South of the reservoir located on the Road to Nowhere, the properties located on in the Plateau Subdivision to the West of the reservoir, Geraldine Dam and at the shoreline of the closest spawning bed to each individual blast during spawning windows (if applicable). - When blasting encroaches within 30m of a waterbody containing live fish, water overpressure monitoring shall be performed at the closest portion of the waterbody to the blast. - Archaeological and paleontological sites are not to be purposely or inadvertently disturbed by clients or staff as a result of project activities. - All clients and staff are to be made aware of the responsibilities and requirements regarding archaeological or palaeontological sites that are encountered during land-based activities. This should include briefings explaining the prohibitions regarding removal of artifacts, and defacing or writing on rocks and infrastructure. - No activities shall be conducted in the vicinity (50 metres buffer zone) of any archaeological/historical sites. If archaeological sites or features are encountered, activities shall immediately be interrupted and moved away from this location. Each site encountered needs to be recorded and reported to the Government of Nunavut-Department of Culture and Heritage.	EEL 2023 PBSIA 2023
Construction Noise	- Terrestrial Wildlife and Habitat - Species at Risk and Migratory Birds - Aquatic Species and Habitat	- The Proponent will adhere to the requirements outlined in the City of Iqaluit's Noise By-law limiting construction activities to only the time period of 07:00 to 22:00. If construction needs to occur outside the above-noted hours, an authorization from the City of Iqaluit must be obtained to be exempted from the Noise By-law. - Scheduling major construction activities during daytime hours, where possible, when ambient/existing noise levels are higher, thus avoiding the quieter nighttime period.	NIRB 2023 PBSIA 2023

Project Component	VEC(s) Affected	Mitigation Measures	Source
	- Species at Risk and Migratory Birds - Noise	- Requiring the Contractor to keep the idling of construction equipment to a minimum as necessary and to maintain equipment in good working condition to reduce noise from construction activities. - Installing and properly maintaining noise mitigation equipment (e.g., muffler systems) in accordance with equipment manufacturer requirements. - Installing temporary noise walls to mitigate the noise at the source (i.e. construction equipment). - Preventing the occurrence of multiple construction activities during a single event (cumulative effects) for prolonged periods. - Project activities will not interfere with Inuit wildlife harvesting or traditional land use activities. - Local residents will be informed of planned activities in the area and should solicit available Inuit Qaujimaningit and information regarding current recreational and traditional usage of the project area which may inform project activities. Posting of translated public notices and direct engagement with potentially interested groups and individuals prior to undertaking project activities is strongly encouraged.	
Dam, Laydown Areas, Access Roads, and Pipeline Maintenance	- Hydrology/Limnology - Noise - Human Health	- The new reservoir dam and berms shall be inspected regularly as per the current *Dam Safety Guidelines* (DSG) of the Canadian Dam Association. Applicable maintenance activities will be undertaken as required. - An Operations and Maintenance Manual outlining the operations of the LTWP will be developed and implemented. It will list the equipment built onsite and provide guidance on the maintenance routines for the equipment installed as well as the annual startup/shut down of the equipment. - Regular inspections of the built structures will take place to ensure their proper function. Repairs will be undertaken as required. - Vehicles will remain on the designated access roads.	
RWPS and Water Conveyance Maintenance	- Hydrology/Limnology - Aquatic Species and Habitat - Noise	- Access to the RWPS will be controlled by a security fence on the access roads to the buildings. - Noise generating equipment associated with the RWPS and the control building will be enclosed in buildings.	
Pumping Water	- Hydrology/Limnology - Water Quality - Climate Conditions - Aquatic Species and Habitat - Species at Risk and Migratory Birds	- Water withdrawal will be undertaken at rate permitted by the regulatory agencies. - Water intakes will be equipped with screens in accordance with *DFO's Freshwater Intake End-of-Pipe Fish Screen Guideline* (1995) to prevent fish entrainment and impingement. The screens will be designed and installed to prevent the uptake and entrainment of sediment and benthic organisms. - Regular maintenance and cleaning of the intake and screens will be conducted to prevent fouling with debris and fish impingement. Provisions will be made for screen removal, inspection, and cleaning, with pumps being shut down during this process. - Withdrawal from LQ will be limited to less than 10% of it's volume. Withdrawal will cease once Geraldine Lake reaches its capacity.	PBSIA 2023

Project Component	VEC(s) Affected	Mitigation Measures	Source
		- If any modifications to the drawdown regime in Geraldine Lake or the new reservoir become necessary, a separate permit request will be submitted, and an additional effects assessment will be conducted. - Water temperature in the new reservoir and Geraldine Lake will be monitored before discharge to ensure compliance with guidelines for aquatic life protection (e.g., alteration of existing thermal stratification and subsequent turnover dates or exceeding the maximum weekly average temperature [CCME 1987] in Geraldine Lake. - An Erosion and Sediment Control Plan (ESCP) will be developed and implemented to effectively mitigate the environmental impacts of erosion and sediment runoff. - Prior to commencing any work, robust erosion and sediment control measures will be established to prevent sediment entry into the waterbodies. These measures will be subject to regular inspection, maintenance, and repair if damaged during operations.	
Operation of Vehicles	- Climate Conditions - Air Quality - Noise Levels	- All heavy duty machinery must be operated by a qualified person. Operators must have their license and qualification on their body while operating the machinery or vehicle. - Ensure equipment, machinery and vehicles used on Site are in good working order and comply with applicable air quality standards. - Operate equipment and machinery at optimum rated loads. - Turn off equipment and machinery when not in use to minimize exhaust. - Repair or replace equipment and machinery producing excessive exhaust. - Minimize vehicle idling time. - Use stationary emission sources (e.g., portable diesel generators, compressors, etc.) only as necessary and turn off when not in use. - Conduct regular inspection and maintenance of vehicles and equipment to reduce the risk of sudden breakdown, leaks or spills of fossil fuels and other mechanical fluids that are harmful. - Any vehicle refueling must be conducted at least 31 meters away from waterbodies or fragile ecosystems by authorized personnel who have spill response materials and equipment readily on-hand. - Always minimize the footprint of the area being excavated or disturbed. - If archaeological sites or features are encountered, activities will immediately be interrupted and moved away from this location. Each new site encountered will be recorded and reported to the Government of Nunavut-Department of Culture and Heritage. - No activities are to be conducted within the 50 metres buffer zone of any archaeological/ historical sites. - If available, hybrid or electric vehicles will be used.	NIRB 2023
Storage of Fuels	- Water Quality - Aquatic Species and Habitat - Sediment and Soil - Community Wellness	- There will be no deposits, nor permitting of the deposit of any fuel, chemicals, wastes (including wastewater) or sediment into any water body. An Emergency Spill Response Plan will be in place that is approved by the appropriate authorizing agency(ies). - All hazardous and non-hazardous waste including food, domestic wastes, debris and petroleum-based chemicals (e.g., greases, gasoline, glycol-based antifreeze) will be managed in such a manner to avoid	NIRB 2023

Project Component	VEC(s) Affected	Mitigation Measures	Source
	- Human Health -	release into the environment and access to wildlife at all times until disposed of appropriately or at an approved facility. - All fuel and other hazardous materials will be located at a minimum distance away from the high-water mark of any water body and environmentally sensitive areas as required by the appropriate authorizing agencies. The materials shall be stored in such a manner as to prevent their release into the environment. - Adequate secondary containment or a surface liner (e.g., self-supporting insta-berms and fold-a-tanks) will be used when storing barreled fuel and chemicals at all locations. - Re-fuelling of all equipment will occur at a minimum distance away from the high-water mark of any water body as required by the appropriate authorizing agencies. - A Spill Contingency Plan will be in place at all fuel storage or transfer locations and shall ensure that appropriate spill response equipment and clean-up materials (e.g., shovels, pumps, barrels, drip pans, and absorbents) are readily available. - The authorizing agencies' direction for management and removal of hazardous materials and wastes (e.g., contaminated soils, sediment and waste oil) will be followed. - Wildlife deterrent systems are to be utilized at the time of a spill incident in order to avoid wildlife (terrestrial or marine) and migratory birds from being contaminated. - All spills of fuel or other deleterious materials of 100 litres or more must be reported immediately to the 24-hour Spill Line at (867) 920-8130.	

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