Project Introduction: Chesterfield Inlet

Qulliq Energy Corporation (QEC) is proposing to construct and operate a new diesel-fired power plant in the Hamlet of Chesterfield Inlet, which is located in the Kivalliq Region of Nunavut. This multi-year project will include a new four-engine power generation facility (proposed generating capacity of 1,820 kilowatts) designed for a life expectancy of over 40 years. It will also incorporate new technology in order to improve reliability, efficiency, operation, safety, and to reduce environmental impacts.

Construction will include a fuel storage system consisting of two 90,000 litre double-walled, 110% contained horizontal fuel tanks, appropriate fuel pumping facilities, Quonset garage, transformer storage, pole racks, oil and glycol drum storage and waste disposal area (with secondary containment berm). Space will also be provided for a transient staff accommodation unit, sea cans for storage, and a back-up emergency generator. Upgrades to the existing distribution system will also be required to connect to the new power plant. An approximately 250-metre fuel pipeline will be constructed to connect to the Government of Nunavut's Petroleum Products Division (PPD) bulk fuel storage facility located to the south. The pipeline is anticipated to be of aboveground construction. The new plant will be capable of integrating renewable energy sources, including wind and solar.

Proponent Information

Qulliq Energy Corporation (QEC) is a Government of Nunavut (GN) territorial corporation. Through the operation of 25 stand-alone diesel-fueled reciprocating-engine-based power plants with a total installed capacity of approximately 76,000 kilowatts, QEC is the sole provider of electricity to approximately 15,000 metered accounts in the territory. QEC provides mechanical, electrical, and line maintenance services from three regional centers: Iqaluit, Rankin Inlet and Cambridge Bay. QECs administrative activities are carried out at the Head Administrative Office in Baker Lake and the Corporate Office in Iqaluit.

QEC is committed to planning and developing cost-effective and efficient ways to provide a safe, reliable and stable energy supply for all Nunavummiut.

Project Background

Chesterfield Inlet is a hamlet located on the western shore of Hudson Bay in the Kivalliq Region of Nunavut, Canada. Access to the community is limited to air and sea traffic travel only. The community fuel supply, which is overseen and administered by PPD, is replenished annually in the summer/fall via marine fuel-supply tanker.

Chesterfield Inlet is gradually growing and thus is experiencing an increasing demand for electricity. Anticipated population is projected to be roughly 570 individuals in 2036. The community includes a health centre, as well as various commercial and institutional buildings. Each building exerts its demands on the power supply.

Figure 1: Physical location of Chesterfield Inlet with respect Iqaluit, the capital of Nunavut

The existing Chesterfield Inlet power plant was constructed by the Northern Canada Power Commission (NCPC) in 1975. At 47 years old, the plant has exceeded its design life. The installed firm capacity (defined as the power available with the largest unit out of service) of the existing vintage power plant is inadequate to meet the community's projected required firm capacity. Without changes to the power-generation infrastructure, the capacity shortfall will steadily increase with increased electricity demand in the community, thereby resulting in reduced plant reliability and therefore blackouts or rolling blackouts.

The building structure, foundation, and ancillary equipment are in poor condition, having started to deteriorate. Some of the generators are nearing the end of their rated lifespans. The existing switchgear is obsolete and is not arc-flash resistant, and there is no automatic fire-suppression system. This increases the fire and employee-safety risk of the facility. As the systems continue to age and become more outdated, it will become more difficult to maintain the facility, and plant reliability will become an issue. Without reliable equipment, QEC's customers are at risk of partial or total system failure.

A new power plant equipped with fuel-efficient generators and plant automation will increase fuel efficiency and overall plant reliability. A study into the topic of impact on customer utility costs

found that the increase would be less than a half-cent per kilowatt-hour. This very small impact is due to the combination of savings due to improved efficiency (i.e. less fuel usage) and reliability (i.e. reduction in emergency repairs), as well as the primary funding from the federal Arctic Energy Fund.

Given that the new plant will be more efficient and cleaner than the existing one, the reduction in airborne emissions demonstrates respect for the environment. This fulfils the Inuit Societal value of *Kamatsiarniq.*

Replacing the existing power plant will enable QEC to provide a safe and reliable electricity supply to the community. This demonstrates QEC's respect for the valued relationship and care it has for its customers, *Inuuqatigiitsiarniq.*

Alternatives Considered

QEC recognizes the need for a long-term approach to prioritize and maximize the benefit of capital expenditures while providing safe and reliable electricity service. The existing plant deficiencies mean the "Do Nothing" option is not a viable option. Operating assets beyond their service life also places a larger burden on QEC's maintenance and operations personnel by trying to maintain and operate assets that should be replaced.

The following two alternatives were evaluated and are described further below.

- Major plant upgrade
- Construct a new plant at a new location

<u>Upgrading of existing vintage power plant</u>

A major plant upgrade would include replacement of major components and systems within the existing facility, including the generators, switchgear and fuel system. This option was determined to be not technically feasible for the following reasons:

- The powerhouse building has deteriorated due to age and is not upgradeable. Multiple building systems have already reached the end of their service lives.
- The existing powerhouse foundation is literally crumbling and cannot be repaired. The building is literally on its last legs.
- The existing plant footprint is exceedingly cramped and is too small to accommodate the space required for the new generator sets.
- The existing plant site does not have sufficient land space to accommodate any type of plant expansion.
- The existing facility's two fuel tanks are single-walled and do not comply with federal storage-tank system regulations nor with current codes of practice. The secondary-containment gravel

berm is also unsatisfactory. Upgrading the fuel storage at the existing facility is not possible without taking the entire plant out of service for an extended period of time. This would plunge Chesterfield Inlet into darkness.

The existing power plant is located in an area defined by the Hamlet of Chesterfield Inlet for community use. It is generally understood that the Hamlet of Chesterfield Inlet is interested in the relocation of industrial land uses outside of the community core area where feasible.

<u>Construction of a new plant at a new location</u>

Considering the space issues associated with upgrading the existing facility, QEC explored constructing an entirely new power plant at a suitable location in the community. QEC preliminarily reviewed three different location options (shown in Figure 2), and examined a number of criteria that are of key importance in determining a suitable location for a new power plant. These include the following:

- Proximity to Petroleum Products Division (PPD) Tank Farm: If the power plant is located near the PPD Tank Farm, then QEC can have a direct pipeline connection for fuel transfers. This reduces the health and safety risks associated with trucking fuel across roadways.
- Sufficient space: QEC requires at least 6,000 m^2 to accommodate the power plant building, fuel system, pole storage, transient unit, Quonset garage, and waste oil containment area.
- Current land use zoning: If an area is not currently zoned for industrial development, then additional time might be needed for obtaining re-zoning applications prior to securing land for the power plant.
- Flat and level: If an area is flat and level, this reduces the cost and time associated with earthworks that would be required to prepare the site for construction.
- Airport Restrictions: Transport Canada Airport Zoning Regulations apply to areas within 4 kilometres of an airport. Additional permitting and approval required.
- Previous Disturbance/Development: Preference is to avoid impacts to native tundra areas. Additional cost and construction-scheduling implications arise if an area has not been previously disturbed or developed (e.g., survey, site investigations, earthworks).
- Proximity to Migratory Bird or Wildlife Areas or Cultural Sites: Close proximity to migratory bird sanctuary, wildlife area or cultural site may increase environmental permitting requirements and the need for environmental monitoring during construction and operation.
- Evidence of Groundwater or Surface Drainages: Developments requiring in-stream works (such as bridges or culverts) may require permits or environmental monitoring during construction/operations.
- Prevailing wind: Wind direction affects noise, odour and snow drifting considerations depending on if the wind prevails towards or away from the community.

- Known Contamination: Pre-existing subsurface contamination could impact the type and extent of site investigation required and could increase environmental risk. Additional permitting may be required if the power plant is located within 450 m of a waste disposal site.

QEC met with Chesterfield Inlet Hamlet Council in August 2020 in order to present the proposed location options (as shown in Figure 2) for the new power plant, as well as to outline the benefits and drawbacks of each location. Following these discussions, the Hamlet issued a letter of acceptance of herein described location dated September 3, 2020. Site investigations were completed in the summer of 2020 and included a Phase 1 and limited Phase 2 environmental site assessment as well as a geotechnical assessment. An archaeological assessment was completed in the summer of 2021.

Figure 2: Chesterfield Inlet Proposed Sites of New Power Plant. We have chosen Option 3.

Project Location and Components

The results of the site investigations provided QEC with sufficient site-specific information to confirm that Option 3, as shown in Figure 2, would be technically best suited to for construction and

operation of the power plant. A preliminary site layout was prepared and a land application was submitted to the Hamlet of Chesterfield Inlet on August 17, 2021.

After having submitted the application, QEC worked collaboratively with representatives of the Government of Nunavut (GN) Department of Community and Government Services (CGS) Planning and Lands Division to further refine the location. The resulting proposed location for the power plant considers the future plans of the Hamlet to establish a formal road easement for the existing road to the PPD bulk fuel facility as well as establish additional lots on the east side of the road for industrial land use.

The proposed lot is approximately 6,200 square metres located on unsurveyed, untitled Commissioner's land, off of Crescent 1A, and approximately 225 metres northeast of the PPD bulk fuel facility. QEC's land application was presented to and approved by the Hamlet of Chesterfield Inlet in August 2021. A copy of the material is attached.

The power plant will include a four-engine generation facility, with a proposed total generating capacity of 1,820 kilowatts and an installed firm capacity (i.e. capacity with largest unit out of service) or 1,270 kilowatts. The facility will be designed for a life expectancy exceeding 40 years. Construction will include a fuel storage system consisting of two 90-cubic-metre double-walled, 110% contained horizontal fuel tanks with electronic monitoring. Also present will be appropriate fuel pumping facilities, transformer storage, pole racks, oil and glycol drum storage and a waste disposal area that includes a secondary containment berm.

Space at the site will also be provided for a transient staff accommodation unit, sea cans for storage, and a back-up emergency generator. Upgrades to the existing distribution system will also be required to connect to the new power plant. An above-ground fuel pipeline of approximately 250 metres in length will be constructed in the future to connect to the Petroleum Products Division (PPD) bulk fuel storage facility located to the south. This will be made of welded steel with a corrosion-inhibiting coating. This pipe will be operated only for fuel transfers, and therefore it will not have fuel continuously flowing through its length.

Detailed design of the new plant will include engine-manufacturer-provided packaged oxidation-catalyst units as well as mufflers (also known as silencers). The new plant will also be capable of integrating renewable energy sources.

The main power plant building (40 by 23 metres) will include an electrical control room, mechanical room, garage, workshop, a fully accessible office with washroom, and the power generation hall. The specific location and orientation of these components within the area selected will be determined through detailed engineering; however, a preliminary site layout of the power plant is provided in the Attachment section.

Schedule

The project schedule is shown in Table 1.

Table 1: Schedule for the Chesterfield Inlet Power Plant Project

Task	**Anticipated Milestone**
Selected Land and Complete Archaeological Impact Assessment	March 2021 to March 2022 (already completed)
Detailed engineering design	April 2023 to March 2024
Contracting and Procurement	April 2024 to March 2024
Construction	April 2025 to December 2026 (climatically seasonal)
Testing and Commissioning	January 2027 to March 2027
Plant Handover to QEC Staff	March/April 2027
Operations (power production)	2027 to 2067 and beyond

Construction Labour

Based on previous project statistics, the anticipated total number of workers during construction is shown in Table 2. The contractor awarded the construction tender will ultimately determine their required labour force to meet project requirements.

Table 2: Estimated Number of Construction Workers Required During Construction

Construction Phase	**Estimated Number of Workers**	**Estimated Time On-Site (Days)**
Foundation and Land Development	15	90
Civil Works, Building Structure, Fuel System	35	250
Mechanical and Electrical Installations	15	180

Commissioning	20	60

Construction of the Project will be completed through a request for tender (RFT) process. As per the Nunavummi Nangminiqaqtunik Ikajuuti (NNI) Regulation, contractors will be obligated to meet mandatory Inuit labour levels for all construction work.

Operations Labour

QEC has staff in Chesterfield Inlet that are responsible for the daily operation of the existing power plant. This includes a Plant Superintendent (full time), and two Assistant Operators (part time). It is expected that existing staff will transition over to the new power plant once it has been constructed and commissioned. No new staffing is anticipated to be required as a result of this project.

QEC has regionally based power line technicians and maintenance crews based in Iqaluit, Rankin Inlet, and Cambridge Bay that travel to and from communities to provide support to the operations staff in each community on an as-needed basis and respond to emergencies (for example major power outages) or for assisting with large-scale tasks such as complete generator overhauls.

Construction Materials and Equipment

The majority of construction materials for the Project will be delivered to the community by sealift. Some materials may be sourced locally or delivered via cargo plane depending on size and quantity.

Construction equipment anticipated to be required during construction will include the following. It should be kept in mind that this is not an exhaustive list, given that the contractor will be responsible for choosing the equipment to be used.

- Excavator
- Backhoe
- Bulldozer
- Grader
- Compactor machines
- Dump trucks and articulated trucks
- Truck-mounted telescoping crane

- Pile drilling/boring/driving machine
- Towable portable generator
- Boom truck
- Tele-handlers
- Forklift truck
- Trailer with tractor
- Concrete mixers, vibrators, rotary finishers, and ancillary equipment
- Arc-welding machines
- Steel-cutting machines
- Towable air compressor
- Portable fuel tanks (double-walled)
- Testing, inspection and commissioning equipment such as load banks

The contractor awarded the construction tender will be responsible for sourcing the equipment. This may include a combination of sub-contracting locally available equipment or bringing equipment to the community through the annual sealift.

During the construction phase, the provision of water required for this work (e.g. concrete preparation) will be the responsibility of the construction contractor (e.g., sourcing and obtaining applicable permits). Meanwhile, during actual plant operations, the domestic needs (washroom facilities) will be met via a freshwater tank and a sewage tank, both of which will be serviced via standard truck filling.

Fuel Management

Fuel storage and handling during construction will be the responsibility of the contractor. Details regarding the location and volume of fuel storage or equipment refueling during construction will be determined by the contractor. The contractor will be required to provide appropriate secondary containment for fuel storage and/or refueling location and have a refueling procedure and spill response plan in place.

For operational requirements of the new plant, QEC will draw fuel from two onsite tanks, each of size 90 cubic metres. The remaining fuel supply required for over-winter power-plant operation will be stored at the existing PPD bulk fuel facility. The final design of QEC's fuel system and the piping routing between the QEC power plant and the PPD bulk fuel storage facility will be determined as part of detailed engineering. The following fuel-system specifications are standard for our power

plants in communities of this size.

- Two above-ground, horizontal fuel storage tanks, each with a nominal capacity of 90 cubic metres, designed to function 24 hours per day, and 365.25 days per year, with a minimum design life of 40 years.
- Fuel storage tanks will be shop fabricated as per the ULC S601 standard, will adhere to the National Fire Code of Canada (NFCC) and National Fire Protection Association (NFPA) 30 guidelines, and comply with Canadian Council of Ministers of the Environment (CCME) Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products and local, territorial and federal acts and regulation requirements.
- Fuel storage tanks will be double-walled with 110% containment, an interstitial space monitoring system (via vacuum) and will arrive from the factory with skid type mountings.
- Suitable leak detection monitoring system in accordance with Part 6 of the CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products.
- Applicable corrosion protection and monitoring in accordance with Section 3.8 of the CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products.
- Applicable overfill protection system with audible/visual alarm and automatic mechanism for shutting off the fuel supply such as per applicable standard.

The tanks will connect directly with the PPD bulk fuel facility by 4-inch interior-diameter steel pipeline for fuel transfers. The fuel tanks will also connect with the day tank inside the power plant by 2-inch steel interior-diameter pipeline. The day tank will supply fuel to the generators. The pipeline system will be designed to meet the federal Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations, and the CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products. QEC will also work with PPD to confirm the pipeline connection is designed to meet facility specific requirements. This will include having a metering device to measure and record fuel delivery. Prior to the onset of power-plant operation, the QEC fuel system will be registered with Environment Canada's Identification Registry for Storage Tank Systems.

In addition to connecting the power plant to the PPD bulk-fuel storage facility, a truck-based fuel-replenishment station will be constructed with applicable safety measures (e.g., bollards) and spill prevention. Also included will be a spill-containment box, as well as dual check valves and dual in-line shutoff valves for flow control and anti-backflow purposes. Since the PPD pipeline will be

constructed after the plant itself has been completed, the truck-based refueling station will be used until the pipeline connection is constructed. The truck-based fueling connection will also serve as a backup in the event that pipeline maintenance is required.

Waste Management

During construction, the contractor will be responsible for appropriately handling, storing, and disposing of all construction waste, including hazardous waste such as waste oil, in accordance with municipal and territorial requirements. The contractor will be required to have a waste-management plan in place prior to commencing construction.

QEC has a number of environmental standard operating procedures (SOPs) that provide guidance on waste management during operations. Liquid waste (such as waste crankcase oil and waste glycol) is stored in drums or totes within secondary containment and disposed of as part of QEC's annual waste shipment from the community. Domestic waste during operations will be disposed of in accordance with municipal and territorial requirements. For standard household-type waste, this may include disposal of some waste at the community landfill with permission from the Hamlet. Non-household-type solid wastes would be shipped south for disposal at an approved facility.

Anticipated Permit Requirements

The permits approvals anticipated to be required prior to starting construction of the project are listed in Table 3. If additional permits or approvals are required as the process proceeds, then QEC is committed to working with the applicable agency in order to obtain the necessary approvals in a timely manner.

Table 3: Anticipated Permit Requirements

Agency	**Permit Requirement**
Nunavut Planning Commission	Conformity Determination
Nunavut Impact Review Board	Screening Decision
Hamlet of Chesterfield Inlet	Development Permit
Government of Nunavut – Community	Lease agreement for new lot (Planning and Lands)

and Government Services	Approval Letter (Nunavut Airports)
	Building Permit (Safety Services)
NavCanada	Aviation Contextual Land Use Proposal Review
Transport Canada	Aeronautical Assessment

Engagement with the Community and with GN-CGS

Correspondence with representatives from the GN-CGS Planning and Lands Division has assisted in optimizing the proposed lot location.

QEC presented three proposed location options for the new power plant during a meeting with Chesterfield Inlet Hamlet Council on August 17, 2020. On September 3, 2020, a confirmation letter from Douglas Aggark, Acting Senior Administrative Officer of Chesterfield Inlet, was received.

Environmental Effects

Potential environmental effects resulting from the Project and the proposed mitigation measures that QEC will put in place are given in Table 4.

Table 4: Potential Environmental Effects Resulting from the Chesterfield Inlet Power Plant Project

Activity	Potential Environmental Effect	Positive or Negative Effect	Mitigation
Construction of all components of the Project	Construction of the power plant on a new lot will result in loss of space within the community for use by community members and wildlife	Negative	• The area proposed for the power plant has been designated by the Hamlet as industrial land use and was the location previously identified by the Hamlet for the power plant. This implies that the Hamlet is interested in or is willing to consider some form of development in this area. • Surrounding development in this area is industrial in nature (e.g., PPD bulk fuel facility). • Given that the proposed power plant will be on an existing road and in close proximity to the PPD bulk fuel facility, community members or wildlife using this area will already be accustomed to traffic activity in the area. • The location selected for the power plant is generally flat terrain and is geologically amenable to construction. • Regarding a small creek that is located about 50 metres from our site, we have received confirmation from the Nunavut Water Board that no special procedures are required, given that our plant does not entail any water-takings, nor in-stream works, nor any discharge of waste to these small water features. We note that our use of diesel generators uses radiators to air for cooling. Our domestic water usage the plant will entail a freshwater tank along with a sewage tank, both serviced via truck. Construction activities will also entail tanked water, with portable toilets for employees. The contractor will also be required to ensure that surface disturbance (e.g. disrupted soils) are not able to run off the site. For this purpose, standard silt fences are anticipated to be used. • There are no designated wildlife areas, marine protected areas, territorial or national parks or Inuit owned lands in conflict with the power plant location. That being said, it is acknowledged that terrestrial and marine wildlife may be observed in the surrounding area, especially by observers equipped with tripod-mounted telephoto lenses.
	Construction of the power plant on a new lot may result in the disturbance or destruction of cultural or archaeological artifacts	Negative	• An archaeological impact assessment was carried out in the summer of 2021 in order to determine if archaeological sites are in potential conflict with the project and identify any necessary avoidance or mitigation measures. Several graves were found near (but not on) the proposed power-plant site. We have planned the property boundaries of the proposed Chesterfield Inlet power plant in order to satisfy the 30-metre buffer zone requirement (i.e. 30 metres from the property boundary). To ensure that construction equipment remains well away from the grave sites, well-marked physical barriers will be erected and flagged, and the construction crew will be notified and all equipment operators will be briefed on these aspects. • In the event that latent cultural or archaeological artifacts are encountered during the construction at the site, construction activity will stop and the Government of Nunavut Department of Culture and Heritage will be contacted.
	Construction of all components of the Project may contribute to permafrost degradation	Negative	• For all our power plants, the protection of permafrost and stability of the foundations/structural ground floor of the power plant are prime structural-design considerations • The geology of this area indicates that bedrock is present within about a metre of the ground surface, with average permafrost active layer thickness is estimated to be approximately 1.5 metres. • We prefer to build our power plants with a steel-reinforced-concrete foundation that sits directly on bedrock, although we

Activity	Potential Environmental Effect	Positive or Negative Effect	Mitigation
			have the alternative of rock-socketed steel piles. • The foundation design for the power plant will be reviewed by a qualified professional with expertise in permafrost. • For our storage racks for poles and transformers, piles will be used in structural supports.
	Construction of all components of the Project may contribute to additional dust and noise in the community	Negative	• Contractors will be required to maintain equipment in good working order to reduce noise generation. • Construction will occur during typical working hours (e.g., 10 to 12-hour shift). • Dust suppression (e.g., water) will be used on-site during construction as required. • Other development in the surrounding area is industrial in nature. With this in mind, it is likely that community members nearby are already accustomed to some level of dust and noise emanating from this general area, due to the combination of the existing gravel roads and the general industrial and other activities that take place here.
Fuel or hydraulic oil leak from equipment during construction	Fuel or hydraulic oil could leak or spill on to the ground resulting in contaminated soil or surface water	Negative	• Contractors will be required to use equipment in good working condition. • Regarding a small creek that is located about 50 metres from our site, we have received confirmation from the Nunavut Water Board that no special procedures are required, given that our plant does not entail any water-takings, nor in-stream works, nor any discharge of waste to these small water features. We note that our use of diesel generators uses radiators to air for cooling. Our domestic water usage the plant will entail a freshwater tank along with a sewage tank, both serviced via truck. • Contractors will be required to have a spill response plan as well as spill response equipment and materials available in the event of a leak or spill • In the event of a spill or leak, contaminated soil will be collected for disposal at an approved facility • Contractors will be required to have a fuel management plan in place that includes refueling procedures and proper bulk storage if applicable.
Fuel leak from the Fuel System during operation	Fuel stored within the QEC fuel system could leak on to the ground resulting in contaminated soil or surface water if it is not maintained	Negative	• Fuel tanks will be shop fabricated as per the ULC S601 standard, NFCC and NFPA 30 guidelines • Fuel tanks and pipelines will be constructed and operated in compliance with Canadian Council of Ministers of the Environment (CCME) Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products • Fuel storage tanks will be double-walled with 110% containment, an interstitial space monitoring system and will be skid mounted • Suitable leak detection monitoring system in accordance with Part 6 of the CCME Environmental Code of Practice for

Activity	Potential Environmental Effect	Positive or Negative Effect	Mitigation
			Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products. • Applicable corrosion protection and monitoring in accordance with Section 3.8 of the CCME Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products. • Applicable overfill protection system with audible/visual alarm and automatic mechanism for shutting off the fuel supply such as per applicable standard. • The QEC fuel system will be inspected by QEC personnel on a monthly basis. Annual inspection by the QEC Health, Safety, and Environment Department will also be done. • The QEC fuel system will be inspected by a qualified third-party contractor in accordance with API 653 as required. • A spill contingency plan and community specific spill plan will be updated to reflect the location of the new power plant. • Spill response materials will be kept on-site during operations. • Regarding a small creek that is located about 50 metres from our site, we have received confirmation from the Nunavut Water Board that no special procedures are required, given that our plant does not entail any water-takings, nor in-stream works, nor any discharge of waste to these small water features. We note that our use of diesel generators uses radiators to air for cooling. Our domestic water usage the plant will entail a freshwater tank along with a sewage tank, both serviced via truck.
Fuel or oil leak from generators or other onsite activities during operation	Fuel or oil could leak or spill in the plant or on the ground resulting in contaminated soil or surface water	Negative	• Extensive containment measures will be present for fuel tanks, including double-walled fuel tanks with interstitial vacuum with integrity monitoring, automatic level monitoring with real-time deduction for fuel consumed (as recorded by each engine), as well as flexion couplings at junctures and anti-corrosion features on the tanks. • Surface water will be diverted around project components and towards drainage ditches established adjacent to roadways • In the event of a spill or leak, contaminated soil will be collected for disposal at an approved facility • Environmental Standard Operating Procedures (SOPs) will be followed by operations staff • A lined berm will be onsite for storage of new and waste hazardous products (e.g., fuel, oil, glycol) • A spill contingency plan and community specific spill plan will be updated to reflect the new power plant location • Two sets of spill-response materials will be kept on-site during operations
Fuel spill during fuel transfer	Fuel could spill on the ground resulting in contaminated soil or surface water	Negative	• Fuel transfers can occur via both pipeline connection from the PPD Tank Farm as well as via filling from tanker truck, with the latter serving as backup for the former.

Activity	Potential Environmental Effect	Positive or Negative Effect	Mitigation
			• For the truck-based fuel-replenishment station, an appropriate secondary containment box will be included in the design. • QEC Environmental SOPs will be followed for all fuel transfers; this includes visual monitoring for the duration of the transfer, with all involved staff members being both physically present and attentive throughout the duration of the entire operation. • A spill-contingency plan and site-specific spill plan will be updated to reflect the new power plant location • Spill-response materials will be kept on-site during operation and will be readily available during fuel transfers
Operation of the Power Plant	Operation of the new power plant may contribute to additional noise or dust in the community	Negative	• The new power plant location is well outside the community core. This distancing ensures that noise and dust that may be generated during operations will have less effect on the community, in comparison to the existing power plant, which is situated in the community core. • The prevailing wind is from the northwest. Therefore, there is limited potential for dust or noise to be directed towards the community. • New, more efficient generators and equipment are anticipated to generate less noise and dust in comparison to the vintage equipment at the existing power plant. • New generators employ fully electronically controlled high-pressure fuel injection with precision monitoring of exhaust gas temperature and other real-time operational parameters, in order to ensure long-term high efficiency and confirmation of completeness of combustion. Because completely burned fuel translates into the fuel being converted into carbon dioxide and water instead of being blown out as carbonized fuel droplets or soot, the completeness of combustion also serves to visibly reduce emissions. • Generators employ heavy-duty turbocharged-intercooled four-stroke industrial diesel engines with fully replaceable cast-iron cylinder sleeves and other key components. All components germane to proper fuel combustion and motive-power conversion are fully maintainable and replaceable. Because these components are also essential to cleanliness of combustion, their replaceability enables the engines to burn cleanly throughout their entire life expectancies. • Electronic fuel metering at each engine ensures that each engine receives only the fuel that it needs, thereby averting the inefficiencies (and soot generation) inherent to older all-mechanical fuel-injection designs of vintage engines. The use of electronic fuel metering also serves to tangibly reduce emissions. • The new power plant will use four generators, thereby enabling close matching of generator capacity to actual power demand, thereby further maximizing efficiency. Having four generators also facilitates servicing and ensures good redundancy for safety, especially given that the remoteness of the community would complicate midwinter replacements of generator units. • The exhaust system will include a bed-type oxidation catalyst in order to help break down nitrogen oxides. Some entrapment of residual particulates and oxidation of same can also be expected to occur. The catalyst technology will be

Activity	**Potential Environmental Effect**	**Positive or Negative Effect**	**Mitigation**
			provided in packaged form by the engine manufacturer. An example would entail ceramic pellets coated with titanium dioxide and vanadium pentoxide, thus reflecting the general catalyst component of the emissions technology currently found on many heavy-duty trucks and other overland vehicles. Full details will emerge at the detailed design phase, since the power plant's detailed internal layout (including choice of manufacturers of engines and other appurtenances) will be designed subsequent to all land-usage approvals having been granted. • The exhaust system will also include high-quality mufflers (also known as silencers) in order to reduce the sound profile.
	The new power plant will be designed to meet the current and future energy needs of the community which will contribute to community growth	Positive	• No mitigation measures are applicable, given that this is a positive effect.
Reduction in diesel fuel usage	Operation of more efficient generators will result in a reduction in the amount of fuel used during operation of the power plant.	Positive	• No mitigation measures are applicable, given that this is a positive effect.
	Operation of more efficient generators will reduce the amount of fuel used during operation of the power plant which will result in the reduction of greenhouse gas emissions	Positive	• No mitigation measures are applicable, given that this is a positive effect.

Closure

This project is anticipated to provide an overall benefit to the Hamlet of Chesterfield Inlet with more efficient use of diesel fuel as well as the reduction of greenhouse gas emissions as well as a reductions in both noise and in air pollutants. The proposed new plant will also allow QEC to improve power generation infrastructure in the community and will support continued community growth. The new plant will also enable QEC to satisfy its mandate of providing safe, reliable electrical power to the communities it serves.

If additional information is required, please contact QEC's Health, Safety and Environment representative:

MFrind
Environmental Specialist
Qulliq Energy Corporation
Phone: 867 979 7579
Email: MFrind@qec.nu.ca

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Attached Documents (filed as separate Adobe PDF files)

Letter of support from Douglas Aggark, Acting Chief Administrative Officer, Hamlet of Chesterfield Inlet

QEC letter of support from Hamlet.pdf

Site Layout and Site Plan Drawings of the Proposed Power Plant at Chesterfield Inlet

Ches-SK-01_REV 4_04APR2022.pdf