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Kativik environmental quality commission
Commission de la qualité de l'environnement Kativik

Decision Report for the Inukjuak Backup Thermal Generating Station Project by Hydro-Québec

Dossier 3215-10-012

March 2022

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INTRODUCTION

The Inukjuak backup thermal generating station project by Hydro-Quebec is subject to the environmental and social impact assessment and review procedure provided for in Title II of the *Environment Quality Act* (EQA), since its capacity is greater than 3 MW. Consequently, an impact study for the Inukjuak backup thermal generating station project was filed on May 21, 2021, with the Provincial Administrator of the *James Bay and Northern Quebec Agreement* (JBNQA).

1. BACKGROUND AND RATIONALE FOR THE PROJECT

Many Northern Villages in Quebec are not connected to the main electric network and are therefore supplied by autonomous networks. In most cases, these autonomous networks produce energy from fossil fuels. The partial or total conversion of autonomous networks is underway. For the Northern Village of Inukjuak, Hydro-Québec has entered into a 40-year power supply agreement with Innavik Hydro Limited Partnership, to supply the community with power from a new hydroelectric generating station slated to be commissioned in 2022. Electricity generated by the hydroelectric generating station will be brought to the village by a 25-kV power line owned by Innavik Hydro Ltd., then distributed from a new substation and two new 25-kV lines belonging to Hydro-Québec that will connect to the existing distribution system at the village's northern edge.

The Innavik thermal generating station is a private project, the result of a partnership between the Pituvik Landholding Corporation and the Quebec-based company Innergex Renewable Energy Inc. It arises from the community's desire to reduce GHG emissions and have positive economic and social impacts for the 1,800 villagers. It is part of the Government of Québec's 2030 Energy Policy, one of the objectives of which is to reduce use of petrol products by 40%. A targeted priority is converting electricity production from fossil fuels to renewable energy sources in communities isolated from Hydro-Québec's transmission grids. Like other villages in Nunavik, Inukjuak's electricity supply is provided by a diesel thermal generating station operated by Hydro-Québec and located in the Northern Village of Inukjuak. Hydroelectric power plant projects, as well as structures associated with this type of development, are subject to the environmental and social impact assessment and review process set out in Section 23 of the *James Bay and Northern Quebec Agreement* (JBNQA) and Title II of the EQA.

The project covered by this impact study consists of building a backup thermal generating station to take over from the Innavik generating station in the event of breakdown or planned interruption. More specifically, in the operation phase, it is expected that energy from the backup thermal generating station will be required for the equivalent of one month per year until 2063. However, more sustained use may be required in the event that the Innavik generating station experiences difficulties. Fuel for the backup generating station will be supplied, transported and handled by the Fédération des coopératives du Nouveau-Québec (FCNQ). The FCNQ will bring a total volume of 350,000 litres, via 35 annual deliveries, to the Inukjuak dock, and then this fuel would be trucked to the site. The fuel will be stored at the generating station site, in two storage tanks holding up to 50,000 litres.

As part of the environmental and social impact assessment and review process, the Kativik Environmental Quality Commission (KEQC) analyzed the preliminary information provided by the Ministère du Environment de l'Environnement et des Parcs (MDDEP). In directives issued on July 17, 2020, the KEQC informed the administrator of Section 23 of the JBNQA of the scope and content of the impact study to be conducted. The completed impact study and related documents

were sent to the KEQC on March 8, 2010, and on June 16, 2021. A first set of questions and comments was sent to the proponent on September 23, 2021, who responded on November 12, 2021.

1.1 General description of the project and its components

The project consists of building a backup thermal generating station on the territory of the Northern Village of Inukjuak, its operation over a 40-year period, and its eventual decommissioning. It will be equipped with two generating sets of 2.5-3 MW each, for an installed capacity of roughly 6 MW. According to the information presented in the impact study, a third 3.0 MW generator could be added, if necessary. It should be noted that the proponent will have to obtain the required authorizations from the MELCC prior to installing a third generator. The backup thermal generating station will be connected to the new 25 kV substation built as part of the Innavik hydroelectric project. It is planned that the main building, with a floor area of approximately 520 m^2, will house all power generation, control, automation and protection equipment and systems, as well as all amenities for maintaining and operating the generating station. The site will also feature a fuel depot and storage spaces required for site operation and maintenance. The granular material and crushed rock required for the surface development of the site will be sourced from sites in the vicinity of Inukjuak. The developed area will be approximately 9,446 m^2 and will be surrounded by a chain-link fence. It should also be noted that the proponent has undertaken to provide decommissioning plans for the structures and facilities five years prior to the cessation of activities.

According to the information the proponent has provided in the impact study, temporary facilities and infrastructures will be reduced to a minimum since all material reception, handling and storage areas, as well as the machinery and fuel yards, and a waste disposal site will be located on a platform built in summer 2021 as part of the construction of the transformer substation. It should be noted that the construction of the transformer substation and the improvements it requires (i.e. the installation of the platform where the station will be located and the access road leading to it, the installation of the power distribution lines as well as the dismantling of the current thermal power plant) are projects that are related to the Inukjuak backup thermal generating station. They are not subject to the environmental and social impact assessment and review procedure.

1.2 Project schedule and cost

The proponent wishes to proceed with the commissioning of the backup thermal generating station in December 2024. Specifically, grading, backfilling and earthworks would take place in July and August 2023, followed by construction of the station, installation of equipment and final landscaping through August 2024. A commissioning period is then foreseen until the system is made operational.

2. PRESENTATION OF THE PROJECT'S ENVIRONMENT

The community of Inukjuak, with a population of approximately 1,800, is located on the east coast of Hudson Bay, about 140 km north of the treeline. It is the second most populous Northern Village in Nunavik, after Kuujjuaq.

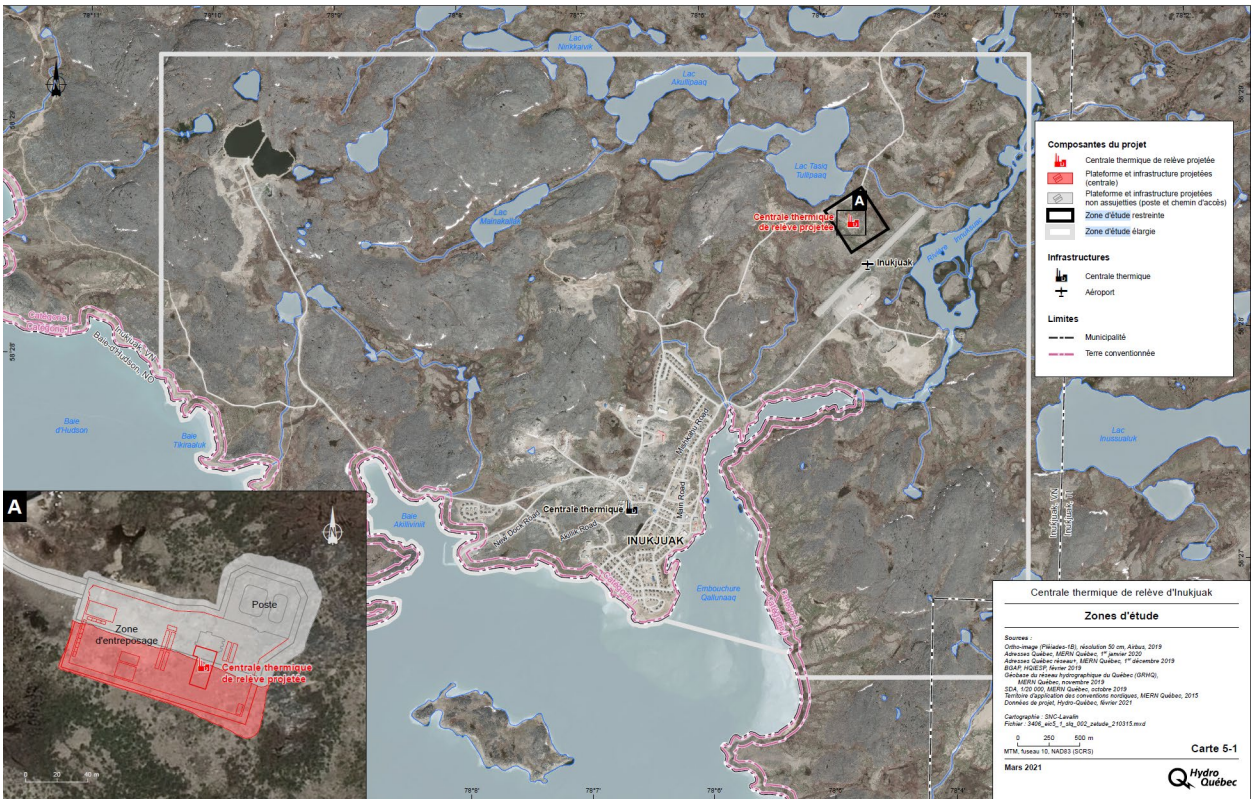
According to 2016 Census data, the active population is about 700 people (62% of residents), working mostly in healthcare and social services (25%) and educations (25%). The unemployment rate was 23%.

Inukjuak's climate is typical of northern Quebec. The average temperature in July and August is 9°C, while in January and February it is -25°C. The ice cover on the Inukjuak River generally begins in November and remains until the end of May. The project area is located in a continuous permafrost zone where the duration of the frost-free season averages 40 days.

The Inukjuak thermal generating station is located on Class I lands. It is also located at a distance of more than one kilometre from the village and residential areas or areas with residential potential.

Analysis carried out by the proponent as part of the impact study considered two zones, namely an extended study zone, with a surface area of 3032 ha, and a restricted study zone, with a surface area of 13.8 ha. The two study areas are illustrated below, on Map 1.

Map 1 - Extended and Restricted Study Areas



Source: From Impact Assessment, Volume 1, May 2021

3. THE PROPONENT

Hydro-Québec's distribution, procurement and shared services division is the proponent of the Inukjuak backup generating station development and operations project. Through its autonomous power systems division, Hydro-Québec is responsible for supplying electricity to communities that are not connected to the grid. To this end, the division is responsible for designing, operating and maintaining the electricity-generation infrastructure in these communities.

The proponent has implemented a consultation program focused on informing and consulting community members affected by the new backup generating station. Its purpose was to raise

awareness about the project, learn the community's concerns, meet information needs and ensure follow-up with various stakeholders. These include the Pituvik Landholding Corporation, which is required to provide occupancy approval for Category I lands, and the Northern Village of Inukjuak, as the backup generating station would be built within the village boundaries. In 2019 and 2020, the proponent held public consultations, meetings with the Inukjuak municipal council and the board of directors of the Pituvik Landholding Corporation. Specifically, the proponent held information meetings with the Inukjuak municipal council and the Pituvik Landholding Corporation's board of directors on October 9, 2019, and January 28, 2020, respectively. Public information meetings were also held with the community on January 29 and November 9, 2020. It should be noted that, given the COVID-19 pandemic, the proponent had to adjust its information and consultation process so that community members could participate safely. The October 9 information meeting was held over local radio, after a summary document and a short questionnaire were sent to community members. It should be noted that no Inukjuak resident answered the questionnaire. Following these steps, the municipal council and the Pituvik Landholding Corporation accepted the site proposed by Hydro-Quebec and, during the public information meeting of January 29, 2020, no concerns were raised by community members regarding the project and the choice of site.

Finally, the proponent has undertaken to pursue its consultation process, by keeping the community informed of the project's progress and by organizing other meetings, which will be held either in-person or remotely, depending on status of the public health crisis.

5. MAIN ISSUES

The following sections present the analysis of the project's main issues, as per the documents submitted by the proponent and the expert opinions obtained during the intergovernmental consultation.

5.1 Management of waste and hazardous waste

Waste management in northern Quebec is a major issue. Consequently, it is crucial the proponent ensure the residual materials generated during the construction, operation and decommissioning of the station be disposed of in accordance with applicable legislation, notably the *Regulation respecting the landfilling and incineration of residual materials* (ch. Q.2, r.19). It will be important to ensure unused materials or machinery brought in by contractors not be abandoned at the station and be returned to southern Quebec or recovered on site. The following sections lay out estimates of the types and quantities of residual materials generated by the project's different phases, and the mitigation measures and management methods planned.

Construction phase

During the construction phase, the total amount of residual materials is estimated at 300 m^3. They will be consist of several types of materials, according to the following percentages:

Wood	39.3%
Cardboard	29.5 %
Masonry	14.8 %
Gypsum	10.0 %
Plastic	4.9 %
Steel, aluminium	1.2 %

Copper	0.3 %

Operating phase

During the operation phase, the generated residual materials will mainly consist of the following products:

- Lubricating oil for generating sets (drained)
- Waste oil (oil mixed with water in the building's interception wells)
- Coolant (drained)
- Cleaning products, degreasers, solvents
- Household waste (packaging, putrescible materials)
- Septic sludge

Shutdown phase

During the shutdown phase, all of the materials previously listed for the construction and operation phases will also be generated, in addition to the following items, which will be dismantled:

- Generating sets
- Tanks

Mitigation measures and management options

Overall, the proponent will apply standard mitigation measures to reduce at-source the impacts of its interventions on the environment. These measures are described in Hydro-Québec's standard environmental clauses (SEC) presented in Appendix E of the impact study. More specifically, Sections 16 and 17 of the SEC deal with residual and hazardous materials. In addition to the measures provided for in the SECs, the proponent has committed to implementing a waste management plan in three main stages: inventory, sorting and temporary storage, and disposal. In sum, when a residual material is recorded, the site manager must complete the form by specifying the nature of the waste material and the quantity produced, and by estimating the quantities destined for reuse, recycling or disposal.

Following this step, the materials will be divided into three groups: residual hazardous materials (RHM), residual materials that can be reused by the community and, finally, residual materials for disposal. RHMs will be stored in sealed containers (two indoor tanks with a total capacity of 4.5 m^3, and 52 barrels of 205 litres). Materials that can be reused would be stored in a trailer. Residual materials destined for disposal will be stored in three containers: a 3-m^3 container for metals, a second 3-m^3 container for dry materials, and a waste container for putrescibles and household waste.

Finally, the disposal of residual materials will also follow three channels. RHMs will be disposed of in locations authorized by the MELCC. More specifically, the RHMs will be stored in sealed drums and transported by truck to the dock, from where they will be shipped by boat, via the Port of Bécancour, to Hydro-Québec's hazardous materials processing centre. Materials that can be reused will be donated to the Northern Village of Inukjuak. Finally, during the construction, operation and closure phases, residual materials for disposal will be sent to southern Quebec to facilities authorized by the MELCC, or to the Inukjuak northern landfill site, subject to acceptance by site managers. It should be noted that during the construction and dismantling phases, the proponent indicates that the choice of the disposal site will be left to the discretion of the contractor carrying out the work. However, Hydro-Québec requires, through contractual clauses (among others, SECs 16 and 17), compliance with applicable laws and regulations, including disposal at authorized sites. In all cases, the proponent shall provide additional information, including the identification of the disposal sites and the agreements ensuring these sites' acceptance or refusal of the residual materials generated by the project. A more detailed description of the storage conditions for hazardous waste should also be provided.

5.2 Soundscape

The backup thermal generating station project may have an impact on the soundscape, namely during construction, operation and decommissioning activities. The noise may be a nuisance for some people living or working near the infrastructures and for land users. It is therefore important that the proponent follow certain rules so that the increase in ambient noise remains at an acceptable level. The impact study presents the characteristics both of the existing soundscape and of the anticipated changes in the areas around the backup generating station site. It should be noted that the currently operating thermal generating station is located within the Northern Village of Inukjuak and operates continuously, while the backup thermal generating station will be located on the outskirts of the village. Moreover, according to the information presented in the impact study, the latter is expected to be used for about one month per year, as a backup to the Innavik hydroelectric plant, and for one hour per month for synchronization with the grid. Although the proponent cannot guarantee that the use of the backup thermal generating station will not increase in the future, it is likely that once the station currently in operation is dismantled, the soundscape in Inukjuak will improve.

Initial soundscape

The initial soundscape corresponds to the noise level perceived in the study area before any change stemming from the project. It results from the addition of noise from many close-by and distant sources, each of which have a distinct stability, duration and intensity. The proponent did not take a sound sample of the initial noise environment in the field as part of the impact study, as it felt the soundscape was quiet. According to the information presented in the impact study, this type of environment would have noise levels of 45 dBA during the day and 35 dBA at night.

5.2.1 Impacts in the construction phase

All of the construction work, including grading, backfilling, earthworks, transportation, traffic, and installing equipment, will result in an increase in ambient noise during the works. According to the information presented by the proponent, no permanent or secondary residences would be located in the area or in its vicinity. However, some residential areas of the village may experience temporary disruptions during the trucking of materials and equipment from the Inukjuak dock or borrow pits.

In order to mitigate the impacts of the project on the soundscape during the construction phase, the proponent has undertaken to apply and respect the MELCC's *Lignes directrices relativement aux niveaux sonores provenant d'un chantier de construction industriel*,[1] and to implement Section 2 of Hydro-Québec's SECs during the works. Further, the proponent undertakes to implement a complaint management program during the construction and operation phases.

5.2.2 Impacts in the operation phase

During the operation phase, noise emissions will come mainly from the generators and heaters, and will then diffuse through the walls of the plant and through the ventilation openings.

Applicable noise limits

The proponent undertakes agree to apply and comply with MELCC instructional note 98-01 *Traitement des plaintes sur le bruit et exigences aux entreprises qui le génèrent*[2] (IN 98-01). The most restrictive criterion in the IN was used to determine the applicable noise limits of 45 dBA during the day and 40 dBA at night. These limits target areas with single or semi-detached dwellings, schools, hospitals or other educational, health or convalescent service facilities.

Modeling of the soundscape

The proponent submitted soundscape modeling during the impact study to assess the project's noise compliance during operations. However, the latter shows that several exceedances of the IN 98-01 standard could occur, depending on the scenario being considered. As a result of the questions and comments sent to the proponent, this latter proposes to add sound-insulating material on the interior faces of the passages between the air intakes and the air-intake fans. The anticipated noise levels, after this measure has been added to the initial design, are as presented in the table below.

Table 1 - Anticipated noise levels of the station during operation

Point d'évaluation	Niveaux sonores anticipés	Limites sonores [a]		Conformité avec la note d'instructions 98-01 du MELCC (Oui / Non)	
		Jour (de 7 h à 19 h)	Nuit (de 19 h à 7 h)	Jour (de 7 h à 19 h)	Nuit (de 19 h à 7 h)
1	35	45	40	Oui	Oui
2	32			Oui	Oui
3	31			Oui	Oui
4	35			Oui	Oui
5	38			Oui	Oui
6	51			Non	Non

a. Selon la catégorie de zonage I de la note d'instructions 98-01 du MELCC.

[1] https://www.environnement.gouv.qc.ca/publications/note-instructions/98-01/lignes-directrices-construction.pdf

[2] https://www.environnement.gouv.qc.ca/publications/note-instructions/98-01/note-bruit.pdf

Source: From Impact Assessment, Volume 1, May 2021

It can be seen that, despite the addition of sound-insulating materials on the interior faces of the passages between the air intakes and the air-intake fans, Assessment Point 6 shows non-compliance during both day and night. This assessment point is currently uninhabited, but housing may be built there in the future. Should this be the case, the proponent undertakes to implement additional mitigation measures to comply with the criteria of IN 98-01.

Soundscape monitoring program during the operation phase

In order to validate the data obtained during the modeling, the proponent also undertakes to submit, for approval at the time of their request for a ministerial authorization, a monitoring program on noise during the operation phase. Covering the first year after commissioning, this soundscape monitoring program will include a description of the sound measurement method and will propose mitigation measures in the event of exceedances. Once approved, this program must be implemented.

Complaint management program

Lastly, and as mentioned in section 5.2.1 above, the proponent undertakes to implement a complaint management program during the construction and operation phases.

5.3 Surface water and drainage

Inukjuak is located near the mouth of the Innuksuac River. Originating in Lake Chavigny, located more than 260 km from Inukjuak, the river flows into Hudson Bay. Hudson Bay is located nearly 3 km from the proposed project, while the Innuksuac River is more than 500 m away. The latter are within the extended study area of the project, but will not be affected by the project. In addition to Hudson Bay and the Innuksuac River, numerous permanent and indeterminate streams and small waterways are located within the extended study area. In particular, a few major lakes occupy the northern portion of the extended study area, namely Nirikkaivik, Akullipaaq and Tasiq Tullipaaq lakes. The project site is located at the interface of two sub-drainage basins, one of which drains into Lake Tasiq Tullipaaq to the northwest and the other into the Innuksuac River to the southeast. Most of the proposed site drains to the airstrip ditch and then into the Innuksuac River. It should also be noted that the village's drinking water intake is located approximately 950 m to the southeast, in the Innuksuac River. In the restricted study area, there is only one stream, which is located at its eastern boundary. This stream flows southeast towards the Inukjuak airstrip and drains into the ditch at the edge of the airstrip. Characterized in July 2020, this stream has permanent flow. However, it will not be affected by the project, as it is located more than 100 m from the proposed plant.

During the construction phase, the works (grading, backfilling, earthworks, transportation, etc.) are likely to alter water quality via the suspension of sediment, accidental spills of petroleum products or inadequate management of residual materials.

In order to mitigate the project's impacts on surface water quality and drainage during the construction phase, the proponent undertakes to implement its SECs, erosion control and sediment management measures in the area of the works. It should also be noted that the backfill works planned for the construction phase will make it possible to install gutters and embankments to ensure proper drainage of the site. In addition, at the end of the works, the proponent will proceed

with the redevelopment of the temporarily affected areas and apply the most appropriate revegetation technique. In addition, Section 8.5 of the impact study presents information on equipment and safety measures during the construction phase, while Section 8.6 deals with an emergency measures plan during the construction phase, including certain mitigation measures related to surface water quality and drainage. More details related to safety measures and the emergency response plan are presented in section 6.6 - Health, Safety and Accident Risk Management of this report.

During the operation phase, the storage of hazardous and non-hazardous residual materials and plant refueling are the main dangers for surface water quality.

In order to mitigate potential impacts, the proponent undertakes to apply the mitigation measures provided for in sheets 6, 7, 9, 10, 15, 16, 17, 21, 22 and 24 of its SEC. In addition, Section 8.2 of the impact study presents information on accident prevention measures and the safety of the facilities during the operating phase, while Section 8.3 deals with an emergency measures plan for the operating phase. More details are presented in Section 6.6 - Health, Safety and Accident Risk Management of this report.

5.4 Soil quality

The extended study area is part of the superior geological province, specifically in the Minto geological subprovince. The surface deposits are mostly rocky outcrops and shallow water facies. According to the information presented in the impact study, the permafrost in the Inukjuak region is continuous and its thickness is variable, sometimes exceeding 150 m. Sampling was performed on the site as part of the studies carried out prior to the submission of the impact study. These analyses provided information on the nature and quality of the site's soil. The surface deposits consist of a layer of till, varying between 0.35 and 2.43 m, located under a thin layer of organic soil. The bedrock is located at depths varying between 0.51 and 1.34 m. Based on the results obtained, the environmental soil characterization study concludes that the soils are not contaminated at the sampling locations.

The project includes the construction of the generating station on bedrock covered by an approximately .5–1.0-m layer of medium-to-coarse, gravelly sand with a thin (approx. 5–15 cm) layer of topsoil in some places.

5.4.1 Impacts in the construction phase

During the construction phase, the main risks of soil contamination arise from accidental spills of petroleum products or inadequate management of construction waste. The proponent will implement its SECs to mitigate the project's impacts on soil quality during construction. Appendices 6, 17 and 24 of the SECs deal with accidental spills of contaminants, residual materials and contaminated soils, respectively. In addition, Section 8.5 of the impact study presents information on equipment and safety measures during the construction phase, while Section 8.6 deals with an emergency measures plan during the construction phase. More details are presented in section 6.6 - Health, Safety and Accident Risk Management of this report.

5.4.2 Impacts in the operation phase

During operations, it is the station's storage and refueling, and used-oil management that pose the risks of soil contamination, given these can lead to accidental spills. It should be noted that the fuel would be transported from the port of Inukjuak to the proposed generating station over a distance of approximately 4.8 km, with two or three deliveries per month. In order to mitigate these

risks, the proponent mentions in its impact study that fuel will be stored in outdoor tanks compliant with applicable regulations. Presented in the impact study, Table 8-6 identifies the sources of potential release into the environment, as well as the prevention or protection measures for each piece of equipment or activity that is a potential source of release.

In addition to the prevention or protection measures mentioned above, the proponent also plans to collect and store used oil in airtight containers inside the main building, prior to disposal. In addition, Section 8.2 of the impact study presents information on accident prevention measures and the safety of the facilities during the operating phase, while Section 8.3 deals with an emergency measures plan for the operation phase. More details are presented in Section 6.6 - Health, Safety and Accident Risk Management of this report.

5.5 Air quality

The impact study mentions that there is no government air quality monitoring station in Inukjuak or elsewhere in northern Quebec but that, due to the distance from major urban areas, the air quality is good most of the time. The main sources of air pollutants in Inukjuak are oil-fired heating systems and the thermal generating station currently in operation. The main contaminants would be nitrogen oxides (NO_x) and fine particles ($PM_{2.5}$)

5.5.1 Impacts in the construction phase

All activities related to the construction works (grading, backfilling, earthworks, traffic, etc.) will result in air emissions into the environment, particularly from the vehicles and machinery used, as well as from the dust generated by the vehicles.

In order to mitigate the project's impacts on air quality during the construction phase, the proponent will implement its SECs, including Sheet 20 on air quality. This sheet mentions, among other things, that the contractor must comply with the applicable regulations, in particular the *Clean Air Regulation* (chapter Q-2, r.4.1) (CAR), and that it will be forbidden to let the vehicles' engines idle for more than three minutes per hour.

5.5.2 Impacts in the operation phase

The main source of contaminants that could impact air quality during the operation phase is obviously the operation of the plant itself.

In order to assess the compliance of air contaminant emissions from the proposed thermal generating station with the emission standards set out in CAR, the proponent presentsin the impact study an air dispersion study based on two scenarios. The first is the use of one of the two generators, one month per year, to compensate a lack of power or during maintenance of the Innavik hydroelectric plant. The second scenario considers monthly synchronization of the backup generating station to the grid, at a rate of one hour per month. The contaminants of interest for this study are nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), total particulate matter (TPM) and fine particulate matter ($PM_{2.5}$). The level of odour generated by the engines around the plant was also verified and compared to MELCC criteria. The atmospheric modeling study concludes that all results fall below CAR standards and MELCC odour criteria at the receptors of interest.

Following study analysis, the proponent was asked if it would be possible for both generators to be used as backup and, if so, to present additional modeling for this scenario. The proponent responds that the most plausible scenario is for one generator to be used, but that it cannot

completely rule out the possibility of using both generators simultaneously. Therefore, a technical note was submitted, to present the results of the simulation of atmospheric dispersion of plant emissions for a maximum backup scenario that considers two generators operating continuously and at full capacity. The report states that, given the previous results for other contaminants (PMT, SO_2 and CO) did not suggest any significant effect on air quality for a full capacity backup scenario, only NO_2, $PM_{2.5}$ and odours were considered. The technical note also concludes that all results fall below CAR standards and MELCC odour criteria at the receptors of interest.

Considering the results obtained and that the modeling was done according to industry best practices, the project should meet the CAR requirements.

Finally, it should be noted that the thermal generating station currently in operation is located in the Northern Village of Inukjuak and operates continuously, while the proposed backup thermal power plant is located on the outskirts of the village. According to the information presented in the impact study, the backup station is expected to be used for approximately one month per year to back up the Innavik hydroelectric plant and for one hour per month to synchronize with the grid. Therefore, based on the information presented in the impact study, a significant improvement in air quality in the village of Inukjuak is anticipated.

6. OTHER CONSIDERATIONS

The following sections present the analysis of the project's secondary issues, as per the documents submitted by the proponent and the expert opinions obtained during the intergovernmental consultation.

6.1 Adaptation to climate change

The proponent consulted the Ouranos Climate Portraits tool to present future climate projections for the project area. Considering the approximate lifetime of the thermal generating station, the horizon 2041-2070 was chosen. Analysis of climate projections for the proposed station area shows a marked increase in average and maximum temperatures, as well as in total annual precipitation. As a result of these findings, the potential impacts of climate change on the project are:

- Instability of the projected infrastructures due to the increase in average temperatures that, in turn, cause the thawing of the permafrost;
- Failures in electricity supply to Inukjuak, due to the increased frequency and intensity of extreme weather events;
- Impact on fuel supply by ship, due to changes in ice cover.

To take the potential impacts of climate change into account, the proponent considered the following:

- Construction of the proposed generating station on a site with bedrock outcrops, to avoid instability caused by thawing permafrost and, to guide the engineering, completion of a geotechnical study determining the depth and nature of the bedrock;
- The selected site is elevated above the level of the Innuksuac River and Lake Tasiq Tullipaaq, the two closest waterbodies. In addition, to withstand extreme weather conditions, the proposed generating station and its infrastructures will be designed and built in accordance with current codes and regulations;

- As for the supply of fuel by boat, the proponent anticipates a potential positive impact, since the melting of the ice could facilitate access to the territory.

The proponent mentions that, in the event that extreme weather events force the shutdown of the Innavik hydroelectric plant, the proposed thermal generating station would have sufficient power and stored fuel quantities to supply the entire village for a period of four to five days.

To complete the analysis of the project's adaptation to climate change, the proponent also commissioned a study of the its climate-change resilience. This study identifies the following potential impacts:

- More frequent infiltrations in case of a break in the waterproofing planes
- Increased snow load on fuel tanks, causing differential settlement, leaks, or even structural failure
- Flooding of retention systems at the base of tanks
- Worker health and safety and increased risk of workplace accidents in storm conditions
- Widespread power outages
- Damage to culverts and roads during floods and surges, leading to a loss of accessibility to sites.

In addition to the main potential impacts listed above, the proponent also presents adaptation measures in its response to the questions and comments sent as part of the project assessment. After consideration of the proponent's mitigation measures, the final level of risk is considered to be low for each of the potential impacts.

6.2 Greenhouse gases (GHG)

Construction phase

The majority of GHG emissions to the atmosphere will come from vehicles and machinery used for site development and construction of the station (i.e. from the combustion of diesel and gasoline).

The proponent estimates that the total GHG emissions will be 609.50 tonnes of carbon dioxide equivalent (tCO_2e).

To track and possibly better control the project's construction-phase emissions, the proponent undertakes to implement a construction-phase GHG-emissions-monitoring plan based on daily construction records.

Operation phase

During the operation phase, the backup generating station will emit GHGs while in use, and during maintenance and servicing activities requiring the use of machinery and vehicles. However, GHG emissions from maintenance and servicing activities were deemed to be negligible. The proponent did not submit an estimate of emissions from the use of the station and mentions that it is difficult to do so, given that the station is slated as a backup to the existing hydroelectric plant. The proponent nevertheless mentions that there is reason to believe that the annual GHG emissions resulting from the use of the backup station will be less than 1,000 tCO_2e if there are no problems with the operation of the hydroelectric plant. It should be noted that the current station, which supports the Northern Village of Inukjuak, emits approximately 8,000 tCO_2e per year. The replacement of the existing thermal generating station by a hydroelectric power plant, which would

be backed up the backup thermal generating station, would therefore bring significant overall environmental gain.

6.3 Avifauna

The proponent consulted various databases to determine which bird species are likely to be present in the expanded study area. The number of bird species in the extended area was then estimated to be 76. Among these, we should mention the presence of eight species with special status: golden eagle, peregrine falcon, Barrow's goldeneye, short-eared owl, bank swallow, barn swallow, red-necked phalarope and rusty blackbird.

In order to paint a more accurate picture, the proponent conducted avifauna inventories on July 20 and 21, 2021, in both the restricted and extended study areas. These led to the identification of 20 bird species: 8 confirmed nesters, 2 probable nesters, 9 possible nesters and 1 non-nester. The impact study mentions that the quantity and diversity of bird species in the study area are low. In addition, the only special-status species observed was the peregrine falcon. However, given that this species breeds on cliffs, the proponent considers that there is no probability of nesting in the restricted study area.

During the construction phase, the main impacts would be related to the loss of habitat, approximately 0.53 ha of shrub tundra and other previously disturbed areas. The loss of habitat would force some species to seek new habitat, but the small area affected would ensure that the impact would be negligible given the abundance of similar habitat in the vicinity. In addition, the various construction activities, transportation and traffic could disturb the birds and cause them to move temporarily. The impact study mentions that birds using the affected habitats during the construction period will be able to relocate nearby, since the disturbed habitats are not locally rare habitats. In addition, no special-status bird species were recorded as nesting in the restricted study area. A peregrine falcon was seen in flight, but it probably nests on the cliffs located several kilometers from the future station site.

To minimize impact on avifauna during the construction phase, the proponent undertakes as much as possible to remove the vegetation outside the nesting period between May 25 and August 15. In the event that this timeframe cannot be respected, and given the small area to be stripped, a professional nest search could be conducted after July 15, when most of the young birds have left their nests. If there are no active nests, work could begin before August 15.

No additional impacts are anticipated during the operation phase.

6.4 Socio-economic spin-offs

During its construction phase, the project will employ 25 workers during the first construction season, from July to December 2023, and 20 workers during the second season, from April to December 2024. The proponent mentions that the majority of these workers will come from outside the Northern Village of Inukjuak, but that it plans to hire local workers, according to their availability. It is planned that external workers will be housed in a camp set up near the station site. The proponent mentions that the construction of a temporary camp to house the workers assigned to the construction and the installation of wastewater treatment facilities will be the responsibility of the general contractor tasked with the works, and therefore it cannot provide more details on these facilities at this time. The presence of external workers could generate indirect benefits, via the purchase of goods and services in the community. The proponent also mentions

that the hiring of local suppliers, mainly those required to operate heavy machinery and to supply and transport granular materials, will also provide local economic spin-offs.

To maximize local economic benefits during the construction phase, the impact study presents the following measures:

- Implementation of measures to facilitate local workers' access to project-related employment and business opportunities and to promote their retention;
- Encourage the hiring and training of local employees;
- Include incentives for Indigenous hiring in subcontractor tenders;
- Give preference to hiring local suppliers of goods and services.

In the operation phase, no significant changes are anticipated; it is expected that the two people who operate the thermal generating station currently in use will be reassigned to the projected backup thermal generating station. Station maintenance will be carried out by specialized external employees. In addition, certain services will be required to maintain the site, such as snow removal and fuel supply.

To maximize local economic spin-offs during the operations phase, the impact study presents the following measures:

- Give priority to hiring local workers for station operation and maintenance and prepare successors for the two current employees;
- Give preference to local companies for needs related to the maintenance of the station site;
- If necessary, provide training to plant operators so that they can also participate in maintenance activities.

The KEQC considers that the proponent will have to put extra care in meeting the maximization of the local economic spin-off goals and the hiring of local workers goals.

6.5 Archaeology

As part of the impact study, the proponent had the archaeological potential of the study area assessed. It should be specified that the archaeological potential study is based on an analysis of the environmental and historical possibilities, taking into account the presumed lifestyles of the various groups that may have occupied the area. The assessment identified four areas of archaeological potential located in the vicinity of the construction site. This potential was primarily based on the presence of known archaeological sites and topography favourable to human settlement. One of the four areas is the location chosen for the construction of the backup generating station. It is bound on the east and west by wetlands, and on the south by the airstrip runway. The impact study mentions that this flat area may have archaeological potential.

It is mainly the construction (excavation, grading, earthworks, etc.) of the proposed thermal generating station project that could impact archaeological heritage, though waste management could also damage or destroy archaeological remains.

To confirm the presence or lack of presence of archaeological sites in the right-of-way of the works, an inventory must be carried out in the field, in the places where digging will be necessary to proceed with the construction of station infrastructure. The proponent mentions the need to carry out a systematic archaeological inventory (visual inspections and surveys), before the start of the construction, in order to validate the presence or absence of archaeological sites in the targeted

sector. It also points out that this work is essential to ensuring the absence of archaeological remains in the construction area.

Further, to mitigate the impacts of the backup generating station, the proponent has committed to applying its SECs, and more specifically Sheet 19, which essentially stipulates that the contractor must halt the construction works and notify Hydro-Québec in the event of an incidental archaeological discovery. Where appropriate, the proponent states that the necessary protective actions will be implemented, with the support of relevant authorities. Among these actions, we should mention salvage excavation, as well as the marking of the vestiges to indicate their presence and sensitivity to people passing through the vicinity.

Finally, it should be noted that under Section 74 of the *Cultural Heritage Act* (ch. P-9.002): *"A person who discovers an archaeological property or site must inform the Minister of it without delay."* Therefore, the proponent will also be required to notify the Minister in the event of an archaeological discovery.

6.6 Health, safety and accident risk management

Health and safety

Inukjuak, like all Northern Villages in Nunavik, has a Kativik Regional Police Force station. In addition, Inukjuak has a fire department with a fire station and a dedicated ambulance vehicle.

During the construction phase, the main impacts of the project on health and safety will be increased transportation and traffic, and the presence of external workers. Greater traffic is likely to increase the number of accidents among residents and other road users and may also cause inconvenience, such as noise and dust. The presence of external workers is likely to put additional pressure on Inukjuak's health services, and have negative social impact, particularly in regards to alcohol and drug use.

To mitigate the project's impacts on health and safety in the community of Inukjuak, the proponent undertakes to implement the following mitigation measures:

- Inform the municipal council of the schedule of the works and the number of workers expected to come to the community;
- Establish, in cooperation with the municipal council, a transportation plan for equipment and materials. This plan will take into account the location of the community's most sensitive areas, such as the school, playgrounds and daycares, as well as school attendance times and the routes taken by school children;
- Implement appropriate road signs to increase user safety;
- If necessary, use flaggers or a security escort when moving trucks;
- Maintain and clean public roads used by heavy vehicles and use certified dust collectors, as required;
- Make workers from outside the community aware of the issues spurred by their presence, provide them with a code of conduct and ensure that they are aware of it;
- Ensure that external contractors are aware of the code of conduct;
- Inform external workers of Inukjuak's regulations on alcohol use;
- Encourage workers to avoid alcohol or drugs during their stay for the works.

In the operational phase, apart from the truck traffic for the supply of diesel to the station, the proponent does not anticipate other potential impacts on the health and safety of the residents of

Inukjuak. However, it should be noted that a technological accident could have health and safety impacts. This aspect is discussed in further detail below.

Technological accident risk management

To evaluate the consequences of an accident on sensitive elements in the environment, the proponent analyzed the technological risks in both the construction and operation phases.

During the construction phase, the accidents that could occur would mainly be contaminant releases or fires involving, in particular, the hydrocarbons on the site.

To minimize the risk of accidents and the impact of an accident occurring during construction, the proponent mentions in the impact study that the environmental specifications will be binding for the selected contractors. Further, a Hydro-Quebec environmental supervisor will see to their enforcement. These specifications include the following:

- Refueling should be done under constant supervision and at dedicated locations;
- Fuel tanks on the site must be double-walled or equipped with a retention tank;
- Provision of a temporary storage area to facilitate consolidation (e.g. drumming) to allow contractors to finalize packaging and labelling prior to shipment to authorized locations;
- Emergency response kits and portable fire extinguishers must be provided at strategic locations on the job site.

In addition to the specifications mentioned above, it should also be noted that the proponent undertakes to develop a specific contingency plan for emergency response during the construction phase. The construction contractor will be contractually obligated to have this emergency response plan in place and the proponent will ensure their compliance. A draft construction-phase contingency plan has been filed as an appendix to the impact study.

During the operations phase, the accidents that could occur would be similar to those listed for the construction phase, notably contaminant releases or fires involving, in particular, the hydrocarbons on the site. Table 2 below presents the main hazardous substances on the site during the operations phase, as well as their storage method.

Table 2: Main hazardous substances at the generating station during the operation phase

Nom	Entreposage [a]	Quantité maximale sur le site [a]
Diesel	2 réservoirs extérieurs	2 x 50 m³
	1 réservoir journalier intérieur	2,5 m³
Huile lubrifiante pour les groupes électrogènes	1 réservoir intérieur et 24 barils	3 m³ (réservoir) 4,9 m³ (24 barils de 205 litres)
Liquide de refroidissement et antigel (éthylène glycol) pour les groupes électrogènes	1 réservoir intérieur et 8 barils	2 m³ (réservoir) 1,6 m³ (8 barils de 205 litres)
Huile isolante pour les transformateurs	7 transformateurs à l'huile	11,2 m³
Matières dangereuses résiduelles	2 réservoirs intérieurs et 52 barils	4,5 m³ (réservoirs) 10,7 m³ (52 barils de 205 litres)

a. Ces données sont approximatives. Le nombre de barils variera selon la fréquence et l'utilisation réelle de la centrale. Le réservoir et les barils ne sont normalement pas tous pleins en même temps.

Source: From Impact Assessment, Volume 1, May 2021

The impact study mentions that the relatively small amount of diesel stored on site, the use of double-walled outdoor diesel tanks, and the retention and capture of releases from other equipment and tanks located inside the main building are expected to help reduce the risks inherent to the project.

In order to minimize the risk of accidents and the damage an accident during the operation phase, the proponent presents several measures in the impact study and in the responses to questions and comments. These include the following:

- The site will be fenced and the access controlled;
- The outdoor diesel tanks will be double-walled;
- The equipment and indoor tanks will be located in basin rooms with sumps;
- RHM will be stored in a shelter set up for this purpose;
- Use of an automated fire protection system to protect the generator bay, indoor tank room and pump room;
- Emergency response kits and portable fire extinguishers must be provided at strategic locations on the site;
- The generating station personnel assigned to the management of hazardous materials will be required to follow training in the (marine and road) transporting and storing hazardous materials, recovering hazardous materials, and operating a hazardous materials recovery centre.

In addition to the mitigation measures to which the proponent has committed, it should be noted that the proponent undertakes to draft an emergency measures plan for the operation phase and to consult the Inukjuak municipal council and other relevant authorities as part of this exercise. A draft operation-phase contingency plan has been filed as an appendix to the impact study.

6.7 Wetlands and water environments (WWE)

According to the information the proponent presented in the impact study, notably based on the consultation of various sources of cartographic data, the extended study area of the proposed generating station would include 488.7 ha of wetlands, or approximately 16% of its 3,032-ha surface area. The vast majority of these would be undefined peatland-type wetlands. A field visit to characterize the wetlands in the restricted study area was conducted in July 2020. As a result, seven wetlands, totaling an area of nearly 2.3 ha, were characterized within the restricted study area by means of 11 stations. The detailed characterization sheets are presented in the appendix of the impact study.

In terms of the water environments in the extended study area, the proponent has determined, based on topographic data, that a total surface area of 305.1 ha is made up of waterways, lakes and ponds. Only one stream is present on the eastern boundary of the restricted study area (the reference number presented in the impact study is “CE01”). This stream was characterized in July 2020 and has permanent flow. Further, it flows southeast towards the Inukjuak airstrip and drains into the ditch at the edge of the airstrip. The characterization data for Stream CE01 is presented in the impact study, while photographs of the stream are presented in the appendix of the impact study.

In sum, seven wetlands and one perennial stream were identified within the restricted study area. However, no impact is expected on the WWEs since the thermal generating station project is

designed to avoid permanent or temporary encroachment. More specifically, the wetlands closest to the site are located more than 45 m from the proposed station, while Stream CE01 is more than 100 m from the station.

6.8 Special-status species

Plant species designated as threatened or vulnerable, or likely to be so designated

In order to validate if such plant species are found in the restricted study area of the generating station project, a request was submitted to the Centre de données sur le patrimoine naturel du Québec (CDPNQ). Furthermore, the potential for habitat supporting such species was analyzed using various data sources. Field inventories were also conducted in July 2020.

According to data obtained from the CDPNQ, there are no known occurrences of threatened or vulnerable species in the restricted study area. However, two historical occurrences of species likely to be designated as threatened or vulnerable have been identified in the vicinity of the Northern Village of Inukjuak, namely alpine deschampsia and shortleaf pseudocalliergon. In addition, the analysis of habitat potential for vascular species showed that the area is a potential habitat for 13 special-status plant species. Lastly, no special-status species were observed during the field inventory.

Special-status wildlife species

The impact study mentions that, based on known ranges, habitats considered suitable for the species, and available habitats, 12 special-status wildlife species are likely to frequent habitats in the extended study area. These include pygmy weasel, wolverine, polar bear, golden eagle, peregrine falcon, Barrow's goldeneye, bank swallow, barn swallow, short-eared owl, ivory gull, red-necked phalarope and rusty blackbird. However, it also states that the CDPNQ does not report any occurrences of threatened or vulnerable wildlife species, or species likely to be so designated, within the extended study area.

6.9 Environmental monitoring

In order to ensure that all of its SECs and commitments are implemented in the field, the proponent states that it will carry out environmental monitoring at all stages of a project's development. In particular, the proponent will write environmental clauses into the calls for tenders and draft an environmental monitoring program in which all the environmental commitments will be collated in table form. All clauses and commitments will be forwarded to the construction site manager coordinating the works by the selected contractors. The construction manager and the proponent's environmental supervisor will be responsible for ensuring that environmental requirements and protection are being met on the site. Finally, at the end of the works, the proponent's environmental supervisor will ensure that the site is restored, proceed with the environmental acceptance of the works and certify that the works have been carried out as planned.

DECISION AND CONDITIONS

In accordance with Section 23 of the *James Bay and Northern Quebec Agreement* and Title II of the *Environment Quality Act*, and after analysis of the documents provided by the proponent:

The Kativik Environmental Quality Commission has ruled that the Inukjuak backup generating station project by Hydro-Québec must be authorized.

This decision relates to the project presented in the Environmental and Social Impact Assessment and related documents. Any changes or additions to the authorized project must be presented to the KEQC for ruling.

This decision is conditional upon compliance with the conditions listed in this document as well as the commitments made by the proponent in its documents.

Condition 1: In the event that the proponent wishes to proceed with the installation of a third generator, it will be required to file with the Provincial Administrator for approval of an amendment to its certificate of approval for authorization of this addition.

Condition 2: No later than one (1) year after the authorization of the project, and before the beginning of the works the proponent must file with the Provincial Administrator, for information purposes, additional and detailed information concerning the management of hazardous waste for the construction and operation phases. This information must include a more detailed description of the storage conditions for hazardous waste, identification of the disposal sites, and written agreements ensuring acceptance of the material at these sites.

Condition 3: No later than one (1) year after project approval, and before the beginning of the works the proponent shall submit to the Provincial Administrator, for approval, a noise monitoring program for the operation phase. Covering the first year following commissioning, this noise monitoring program will include a description of the noise measurement method and will propose mitigation measures in the event of exceedances.

Condition 4: No later than one (1) year after the authorization of the project, and before the beginning of the works, the proponent must file with the Provincial Administrator, for information purposes, its contingency plan for the construction and operation phases.

Condition 5: No later than one (1) year after the authorization of the project, and before the beginning of the works, the proponent must file with the Provincial Administrator, for information purposes, the environmental monitoring program that it has undertaken to produce and which must include all commitments made in the form of mitigation measures, compensation and follow-up programs, including those identified in the conditions of this certificate of authorization.

Condition 6: An environmental monitoring report shall be submitted to the Provincial Administrator for information purposes every three (3) years, beginning at the end of the first year of the construction phase. This report must include the progress of the works, problems encountered in the course of regular operations, the solutions implemented, and an assessment of the effective use of the station.

Condition 7: One (1) year after the construction phase, the promoter shall submit to the Provincial Administrator, for information purposes, a report on all the measures taken by the promoter and its contractors in order to maximize the local and regional economic benefits. As much as possible,

these measures will have to be quantified, including details on the hiring and training of local workers and the exact number of the workers hired (numbers and provenance).