
**DIRECTION GÉNÉRALE DE L'ÉVALUATION
ENVIRONNEMENTALE ET STRATÉGIQUE**

**DIRECTION DE L'ÉVALUATION ENVIRONNEMENTALE
DES PROJETS NORDIQUES ET MINIERS**

**Second Series of Questions and Comments
for the Innavik Hydroelectric Project
by the Pituvik Landholding Corporation**

File 3215-10-05

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*Développement durable,
Environnement et Lutte
contre les changements
climatiques*

Québec 

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INTRODUCTION

This document comprises a second series of questions and comments addressed to the Pituvik Landholding Corporation and its partner Innergex as part of the analysis of the environmental impact assessment for the Innalik Hydroelectric Project.

QUESTIONS AND COMMENTS

1. GENERAL CONTEXT

QC2-1. The Developer shall submit an Addendum to the 2010 impact assessment. This Addendum will include the new general project description (Point 3.3 of the directive) and the labour required (Point 3.4 of the directive). The Developer shall provide the most up-to-date technical information, including preliminary sketches and designs for all of the temporary and permanent infrastructures that it intends to install as part of the Innalik Hydroelectric Project.

The Addendum shall also specify whether the Core Study Area still captures all environmental elements likely to be affected by the project's commissioning. Additionally, the Developer shall explain whether there is any change in the assessment of each of the anticipated impacts or whether there are any additional impacts. If so, the Developer shall explain whether it intends to amend its mitigation measures and its overall monitoring program.

RQC2-1 The requested Addendum is attached in Appendix RQC2-1 of this document.

QC2-2. The Developer shall specify the state of progress of these discussions with Hydro-Québec Distribution with regard to signing the power purchase agreement. According to Hydro-Québec's Strategic Plan 2016-2020, calls for tenders for the conversion of stand-alone grids will not be launched in Inukjuak until 2018. How does the Innalik project fit into this context?

RQC2-2 At the request of the president of Hydro-Québec Distribution (HQD), a delegation from Hydro-Québec met with the Developer on July 4 and 5, 2017 in Inukjuak and a comprehensive analysis process of the Innalik project was undertaken by HQD. Additionally, in its letter to the Developer dated August 3, 2017, HQD encourages the Developer to pursue the environmental authorization processes for the Innalik project with the relevant authorities in parallel with the project analysis being conducted by HQD. This letter is provided in Appendix RQC2-2.1 to this document.

Furthermore, Inuit leaders at Makivik Corporation and the Fédération des coopératives du Nouveau-Québec (FCNQ) announced in February 2017 the creation of a joint venture to develop renewable energy projects in Nunavik. In a letter addressed to the Developer, the president of Makivik Corporation acknowledged that:

"We understand the Innavik project is quite advanced. Although we do not know all of the details regarding the Innavik project but given that the community has been working on this project for more than 10 years, we have no objection for the Government of Quebec, the Federal Government and the Societe Plan Nord to analyze your project as a priority."

This letter is provided in Appendix RQC2-2.2 to this document.

2. LEGAL FRAMEWORK

QC2-3. The legal framework within which the project is being carried out will be described while specifying relevant conventions, laws and regulations. Additionally, government policies and directives concerning the sector of activity will be presented, including those of Makivik Corporation and the Kativik Regional Government (KRG).

RQC2-3 Relevant laws and regulations in the context of the Innavik project are presented in Table 1 below. The project will be carried out in compliance with regulations applicable to the Category I lands of the Northern Village of Inukjuak as well as with governmental policies and the relevant directives of Makivik, if any, and the Kativik Regional Government (KRG), which are presented in the *Guide for Construction in Nunavik* (Epoo et al., 2003).¹

¹ Epoo, D., M. Larivière and C. Larrivé (2003). *Guide for Construction in Nunavik*. Nunavik Landholding Corporations Association, Makivik Corporation and Kativik Regional Government. 18 p., available at: http://www.krg.ca/images/stories/docs/Guide_for_construction_in_Nunavik.pdf

Table 1 Applicable Laws and Regulations in Context of Innavik Project

Authority	Law and Regulation
Government of Quebec	
Provincial Administrator (Sub-ministry of the Ministry of Sustainable Development, Environment and the Fight against Climate Change)	James Bay and Northern Quebec Agreement (JBNQA)
Ministry of Sustainable Development, Environment and the Fight against Climate Change	<p>Environment Quality Act (CQLR, c. Q-2)</p> <p>Regulation respecting the application of section 32 of the Environment Quality Act (c. Q-2, r. 2)</p> <p>Regulation respecting the application of the Environment Quality Act (c. Q-2, r. 3)</p> <p>Clean Air Regulation (c. Q-2, r. 4.1)</p> <p>Regulation respecting pits and quarries (c. Q-2, r. 7)</p> <p>Regulation respecting the declaration of water withdrawals (c. Q-2, r. 14)</p> <p>Regulation respecting the landfilling and incineration of residual materials (c. Q-2, r. 19)</p> <p>Regulation respecting the environmental and social impact assessment and review procedure applicable to the territory of James Bay and Northern Québec (c. Q-2, r. 25)</p> <p>Regulation respecting hazardous materials (c. Q-2, r. 32)</p> <p>Regulation respecting certain bodies for the protection of the environment and social milieu of the territory of James Bay and Northern Québec (c. Q-2, r. 34)</p> <p>Protection Policy for Lakeshores, Riverbanks, Littoral Zones and Floodplains (c. Q-2, r. 35)</p> <p>Water Withdrawal and Protection Regulation (c. Q-2, r. 35.2)</p> <p>Regulation respecting the quality of drinking water (chapter Q-2, r. 40)</p> <p>Natural Heritage Conservation Act (CQLR, c. C-61.01)</p> <p>Sustainable Development Act (CQLR, c. D-8.1.1)</p> <p>Act respecting threatened or vulnerable species (CQLR, c. E-12.01)</p> <p>Regulation respecting threatened or vulnerable plant species and their habitats (c. E-12.01, r. 3)</p> <p>Act respecting compensation measures for the carrying out of projects affecting wetlands or bodies of water (CQLR, c. M-11.4)</p> <p>Watercourses Act (CQLR, c. R-13)</p> <p>Regulation respecting the water property in the domain of the State (c. R-13, r. 1)</p> <p>Dam Safety Act (CQLR, c. S-3.1.01)</p> <p>Dam Safety Regulation (c. S-3.1.01, r. 1)</p>

Authority	Law and Regulation
Department of Forests, Wildlife and Parks	<p>Act respecting the conservation and development of wildlife (CQLR, c. C-61.1)</p> <p>Regulation respecting wildlife habitats (c. C-61.1, r. 18)</p> <p>Sustainable Forest Development Act (CQLR, c. A-18.1)</p> <p>Regulation respecting standards of forest management for forests in the domain of the State (c. A-18.1, r. 7), which beginning in 2017 will be replaced by the Regulation respecting sustainable forest development in the domain of the State (RADF).</p> <p>Act respecting threatened or vulnerable species (CQLR, c. E-12.01)</p> <p>Regulation respecting threatened or vulnerable wildlife species and their habitats (c. E-12.01, r. 2)</p>
Ministry of Public Security	Act respecting explosives (CQLR, c. E-22)
Ministry of Work, Employment and Social Solidarity	<p>Act respecting occupational health and safety (CQLR, c. S-2.1)</p> <p>Regulation respecting sanitary conditions in industrial or other camps (c. S-2.1, r. 5.1)</p>
Ministry of Municipal Affairs and Land Occupancy	Act respecting Northern villages and the Kativik Regional Government (CQLR, c. V-6.1)
Ministry of Culture and Communications	Cultural Heritage Act (CQLR, P-9.002)
Ministry of Transport, Sustainable Mobility and Transport Electrification	Highway Safety Code (CQLR, c. C-24.2)
Régie du bâtiment du Québec	Building Act (CQLR, chapter B-1.1)
Government of Canada	
Canadian Environmental Assessment Agency	<p>Canadian Environmental Assessment Act, 2012 (S.C. 2012, c. 19, s. 52)</p> <p><i>Note:</i> Environmental assessment deemed not required under this law (letter from Judy Doré, Fisheries and Oceans Canada, addressed to Eric Ataagotaluk, July 17, 2012)</p>
Transport Canada	Navigation Protection Act (R.S.C., 1985, c. N-22)
Natural Resources Canada	Explosives Act (R.S.C., 1985, c. E-17)
Environment Canada	<p>Canadian Environmental Protection Act, 1999 (S.C. 1999, c. 33)</p> <p>Migratory Birds Convention Act, 1994 (S.C. 1994, c. 22)</p> <p>Species at Risk Act (S.C. 2002, c. 29)</p> <p>Canada Wildlife Act (R.S.C., 1985, c. W-9)</p>
Fisheries and Oceans Canada	Fisheries Act (R.S.C. 1985, c. F-14)

Authority	Law and Regulation
Local Authorities	
Pituvik Landholding Corporation	<ul style="list-style-type: none"> • Memorandum of Understanding signed with the contractor for the occupation and use of Category I lands during construction • Water power lease (<i>bail de location des forces hydrauliques</i>) • Right to occupy water property (<i>droit d'occupation du domaine hydrique</i>) • Lease for project infrastructures • Lease to mine surface mineral substances (<i>bail d'exploitation de substances minérales de surface</i>) <p>(Under Titre IV of the Act respecting the land regime in the James Bay and New Québec territories, Art. 116)</p>
Kativik Regional Government	<ul style="list-style-type: none"> • Certificate of Compliance
Northern Village of Inukjuak	<ul style="list-style-type: none"> • Development permits for projects carried out on Category I lands • Authorization for extraction of natural material on Category I Lands • Permit for worker camp (within municipal boundaries)

3. TECHNICAL PARTNER

QC2-4. The Developer shall specify whether Innergex has experience in northern environments. If not, the Developer shall specify how it intends to acquire this expertise. The Developer shall refer to experience acquired in the context of small hydroelectric projects in northern Quebec, specifically the Maquatua and Menihék projects, in order to avoid repeating the same types of mistakes that caused these two projects to fail to fully achieve their initial objectives.

RQC2-4 Innergex's engineering department is directed by Claude Chartrand, Eng., who boasts over 40 years of expertise in the design and execution of hydroelectric projects. He has been involved in a number of projects in the James Bay region (Laforge 1, Eastmain 1), Toulnostouc (north of Baie-Comeau) as well as projects in Yukon and British Columbia. Mr. Chartrand has had to deal with issues such as permafrost, ice and frazil ice, all of which are relevant in the context of the Innavik project. Additionally, experts in permafrost and ice issues have been consulted in order to establish the appropriate design criteria and approaches. The selected contractor, CRT Construction, has vast experience in projects completed in the James Bay (La Sarcelle) and Côte-Nord (Romaine 3) regions.

We will ensure that the operators are adequately qualified and trained in order to operate the Innavik project in an optimal manner and thereby avoid any recurrence of the types of issues experienced at the Maquatua project.

With regard to the Menihék project, the issue is related to the phenomenon of frazil ice, which occurs prior to ice cover formation on the reservoir. This reservoir is not deep enough to allow for the formation and retainment of frazil ice. In the context of the Innavik project, the dimensions and depth of the reservoir are sufficient to allow for the accumulation of frazil ice under the ice and the proper functioning of the water intake.

4. PROJECT VARIANT PRESENTED

QC2-5. The Developer shall examine the possibility of building the diversion channel in such a manner as to avoid excavating rock at two locations on these banks. Additionally, the quantities of produced and usable rock following spillway construction shall be updated.

RQC2-5 This variant was studied but was not retained. Work performed in Northern Quebec is planned according to a relatively short schedule. The work is organized and timed in such a way as to minimize the duration of the work schedule. Several scenarios were analyzed and the variant retained is presented in the Addendum provided in Appendix RQC2-1 herein. Unlike what was presented in the environmental assessment in 2010, the diversion channel and the spillway are now planned for the left bank, while the tailrace and the plant will remain on the right bank.

The updated rock volumes are presented in the Addendum in Appendix RQC2-1 of this document.

5. DAM

QC2-6. The Developer shall complete its answer 3-A of the first series of questions and comments by indicating the corrective measures that Raglan Mine had to make to its initial dam project in order to create an impoundment. The Developer shall provide details on the maintenance program, the type of monitoring performed, and issues, if any.

RQC2-6 According to available information, the initial Raglan dam had been constructed with a frozen asphalt core, which subsequently did not perform well. The replacement dam built downstream is composed of a rockfill structure with a concrete-filled sheet pile core similar to the one that is being proposed for Innavik. We were able to collect information that guided the design and execution.

With regard to the maintenance program as well as the monitoring conducted at the Raglan dam, we made numerous unsuccessful attempts to obtain this information. To our knowledge, the project is performing in line with expectations.

6. EXPERTISE IN HYDRAULICS AND HYDROLOGY

QC2-7. The assessment of flows associated with the design flood and the safety flood is notably based on a regional analysis taken from a Hydro-Québec (HQ) study conducted in 1986 (i.e. over 30 years ago). The Developer shall submit the HQ study and present an update thereof, should one be required. It would also be appropriate for the Developer to submit the *Feasibility Study (2009)* for verification purposes (see Question QC2-12).

RQC2-7 The Developer carried out its own study using available databases while validating previous studies conducted by Hydro-Québec and RSW. The Developer is aware of the limitations in accuracy associated with the limited duration as well as the datedness of the data set. In this context, in the winter of 2016-2017 the Developer, together with MDDELCC's Centre d'Expertise Hydrique du Québec, installed a new gauge for continuous monitoring of the Inukjuak River in addition to taking benchmarking measures. These new data will be integrated into the assessment as they become available.

The Feasibility Study is attached in Appendix RQC2-7 of this document.

QC2-8. With regard to the analysis of the Inukjuak River flow regime, the HEC-RAS hydrodynamic model developed by the US Army Corps of Engineers (USACE) is a 1D numerical modelling tool recognized in the field of hydraulics and widely used by engineering firms. Its effectiveness is contingent upon a calibration and validation process, which allows the model to represent water level conditions measured on site. The Developer shall provide the methodology used and comment on the quality (accuracy) of its model. The Developer shall also provide the information from the Environnement Illimité report dated May 2009.

RQC2-8 Indeed, the Feasibility Study conducted in 2009 used an HEC-RAS model developed by the US Army Corps of Engineers (USACE). This model was used to calculate water levels, velocity and other hydraulic parameters. In this model, 106 river sections were considered between the estuary and Lac Qattaakuluup Tasinga. Sections were extracted from bathymetric data measured by Environnement Illimité as well as topographic data obtained via lidar and from NASA's Shuttle Radar Topography Mission (SRTM). The model was calibrated with water levels measured by RSW and Hydro-Québec in September 2007. The Developer accepts the results of this study.

The report prepared by Environnement Illimité in May 2009 is annexed to the Feasibility Study. The complete Feasibility Study is attached in Appendix RQC2-7 of this document.

QC2-9. The Developer shall present the high water mark (HWM). If the HWM cannot be identified using the botanical method (simplified or expert), a hydrological method based on a 2-year flood may be used. The Developer shall also provide coastal encroachment calculations (performed using the HWM value).

RQC2-9 The map provided in Appendix RQC2-9 herein illustrates the footprint of Innavik project infrastructures on the coast as well as the encroachment areas. These calculations were performed on the basis of available aerial images. The high water mark based on a 2-year flood was not determined.

7. FLOODING

QC2-10. The Developer shall detail the mitigation measures that will be taken to reduce potential impacts related to increased turbidity or any other form of contamination as well as the appearance of erosion-sensitive areas due to flooding.

RQC2-10 The Project headpond will be located largely within the existing natural pathway of the Inukjuak River. The shorelines of this area are composed of bedrock, which will minimize the potential for the introduction of sediment/turbidity into the Inukjuak River during construction and operation of the Project. During construction, water management will be strictly controlled using standard construction techniques such as road ditching, sump areas, settling ponds and isolation of works from flowing water. Where this is not possible, primarily for the construction of temporary coffer dams, the rock used and placement technique will occur with the goal of minimizing introduction of sediment into the Inukjuak River.

After construction is complete, filling of the headpond located upstream of the permanent dam will occur slowly. The risk of erosion of shorelines (and associated increase in turbidity) is expected to be low due to the presence of bedrock that will form the perimeter/shoreline of the pond. One area on the right downstream-facing shoreline of the pond (currently a low marshy area) will be monitored actively during headpond filling to ensure water quality in the headpond does not deteriorate due to suspension of sediments.

8. ECONOMIC JUSTIFICATION

QC2-11. The Developer shall further document the project in order to justify its construction. Specifically, the Developer shall provide the following information:

RQC-2-11

- **Details on project financing;**

The total project cost is \$104 million. This figure includes an initial capital injection of approximately \$24 million from the Developer and its partner

(Pituvik and Innergex, respectively). The remaining amount of roughly \$80 million will be obtained from financial institutions through a long-term loan (debt). In this regard, Pituvik's partner Innergex has approximately 27 years of experience in the financing of hydroelectric power projects throughout Canada.

- **The power and energy supply/demand balance to satisfy the energy needs of the Inukjuak community with this hydroelectric project for the next 20 years;**

By 2031, energy demand is expected to stabilize, according to Pituvik and Innergex's forecasts. Total electricity demand will reach approximately 35 gigawatt-hours (GWh), while the hydroelectric plant will be able to supply approximately 55 GWh. The total demand of 35 GWh is composed of the following three elements: 15 GWh for basic electricity needs, 5 GWh for electricity used for water heating and approximately 15 GWh for electricity used for space heating (residential buildings).

With regard to power, it should be noted that in the rare cases when the hydroelectric plant is unable to fully meet demand for basic electricity needs and for water heating, the thermal plant will enter into production to bridge the energy gap. In fact, once again by 2031, it should be noted that energy demand in January will exceed the energy output of the Innavik hydroelectric plant for this month. During the periods of the year and the hourly peaks when the hydroelectric plant is unable to fully meet the electricity demand for space heating, the dual-energy residential heating systems will switch into thermal mode.

Ultimately, the proposed system will allow for:

- A nearly complete elimination of diesel consumption at the thermal plant in favour of hydroelectricity produced by the Innavik plant, both for basic electricity needs and for water heating;
- As for electricity demand for space heating, the conversion to dual-energy systems will allow for load shedding of the thermal mode whenever hydro power is available, i.e. most of the time.
- **Greenhouse gas emissions produced before and after project construction;**

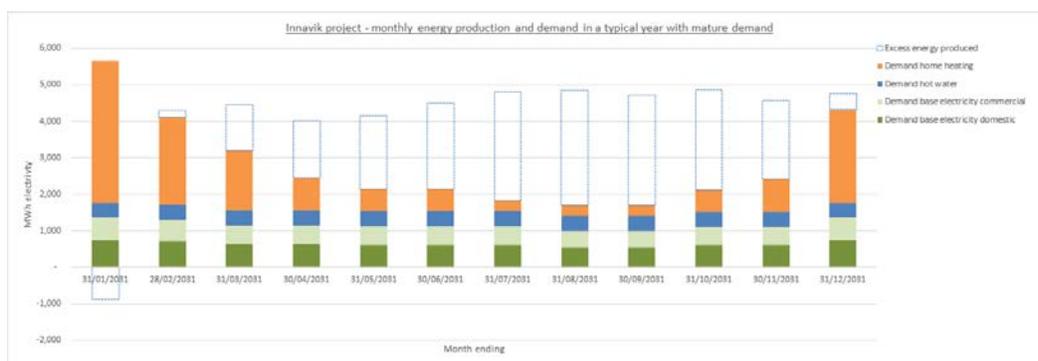
A summary calculation of greenhouse gas emissions is presented in RQC2-21 answer.

- **The proposed plan to make use of the project's surplus energy (considering the installed capacity of this project to satisfy the maximum load in the course of the year);**

Figure 2 below presents the surplus energy available for each month of the year 2031, when according to predictions demand growth will have peaked. This figure indicates the presence of abundant surplus energy

every year between the months of May and October. In this context, the community of Inukjuak has identified a promising project for using this energy, namely the production of greenhouse vegetables. This is also part of a project supported by the Société du Plan Nord. Other projects might also be possible in the future thanks to the availability of this surplus energy such as the gradual electrification of vehicles, hydrogen production, or any other economic development project that the community of Inukjuak wishes to pursue.

Figure 2 Innalik Project – Typical Monthly Energy Production and Demand in Year of Projected Peak Demand (2031)



- **Work to be performed to transmit the electricity to the village, i.e. a detailed description of the parameters of the transmission line and associated costs;**

Details on the power transmission line are presented in the Addendum in Appendix RQC2-1 of this document. The 25 kV, three-phase power line will be approximately 8.9 km long and will be installed on wooden poles. Drilling and blasting work is planned in order to install these poles in the rock. A total of 220 poles will be required. The work is estimated to cost a total of \$2 million.

- **Planned work to ensure electricity distribution to the village to allow for this type of power supply and work to convert residences to electric space and water heating (replacement of electric panels, new heating equipment), with the objective of documenting the financial plan to this effect and the required costs, whether included in the budget or not;**

A description of the work and budget associated with heating system conversion as updated by SHQ in March 2017 (Appendix RQC2-11).

- **Fuel supply costs for Inukjuak before and after project construction, as well as their impact on profitability while accounting for the revised cost of the village's overall fuel supply;**

The Developer is unable to reply to this question, as it is not neither the supplier nor the end user of fuel in the community of Inukjuak.

- **A more detailed financial plan to justify what is and is not included: transmission and distribution costs, projected provincial and federal subsidies (if any), operation and maintenance costs, costs to maintain HQ's thermal plant as an alternative (i.e. fully detailed costs), anticipated advantages in terms of economic development and jobs for the community.**

The total cost of the Innavik project is \$104 million. The cost of the heating system conversion program is approximately \$3.9M according to the estimate made by the Société d'habitation du Québec (SHQ). All capital and operating costs required to complete the Innavik project are included in the project being proposed. These costs remain less than or equal to the avoided and saved diesel costs at Hydro-Québec's thermal plant as well as the dwellings that will be converted to all-electric water heaters and dual-energy space heating.

Additionally, the Innavik project could potentially generate additional capital and operation cost savings for Hydro-Québec (Inukjuak thermal station) such as the avoided costs of refurbishment with higher-capacity diesel generating units, reduced number of diesel tanks to be upgraded, reduced risks of spills and associated site rehabilitation costs, combined operation services, etc. However, the Proponent does not have access to any of these data (which are confidential in nature) that would allow it to accurately assess the feasibility and magnitude of these potential additional savings for Hydro-Québec.

Lastly, the Innavik project is expected to generate the following economic advantages:

- Creation of jobs during construction and operation phases;
- Payment of financial profits to Pituvik Landholding Corporation, which will be re-injected into the community;
- Generation of surplus renewable energy that would facilitate the development of a vegetable greenhouse and other projects to be initiated in the community of Inukjuak.

QC2-12. On several occasions, the Developer refers to feasibility studies in its answers to the questions. The Developer shall either submit the studies in question or clearly specify the data referred to in these answers.

RQC2-12 The Feasibility Study is attached in Appendix RQC2-7 of this document.

QC2-13. The Developer shall provide a progress report of these discussions with the Société d'habitation du Québec and Hydro-Québec with regard to the conversion of electric and heating systems.

RQC2-13 The Developer is in continual communication with the Société d'habitation du Québec (SHQ) with regard to the conversion program for electric and heating systems in Inukjuak. In March 2017 the SHQ updated the budget estimate of the conversion program that calls for the conversion of 394 space heating units to dual energy and 301 water heaters to fully electric. The budget estimate is \$3.9 million. It is planned to gradually implement the conversion program over a 4-year period, i.e. from 2020 to 2023. SHQ needs to validate certain technical aspects of the conversion program with Hydro-Québec.

9. SOCIAL ASPECTS

QC2-14. The Developer shall adequately answer Point 1.4 of the directive with regard to communication and consultations. Notably, the Developer shall describe in detail whether the local population is in agreement with the Project and shall present the methods that were employed to garner its support. It shall:

- **Detail each presentation, information or consultation session, etc. that was organized;**
- **Present the materials used;**
- **Indicate who participated;**
- **Provide a detailed account of what was exchanged or presented;**
- **Identify all concerns that were expressed;**
- **Describe the follow-up performed for each of these concerns and how the latter were taken into consideration in the project design;**
- **Mention whether or not the results were validated by the individuals consulted.**

RQC2-14 Details of the most recent consultation (June 19, 2017) as well as a history of all the consultations held since 2007 are provided in Appendix RQC2-14 of this document.

QC2-15. The Developer shall prepare a communication plan that notably specifies the schedule of information or consultation sessions that it intends to organize in the future, as well as the methodology to be used. The project website does not seem to have been updated since 2010. The Developer shall specify whether it intends to update this site.

RQC2-15 The website has been updated. A video has been available since 2014 (<https://www.youtube.com/watch?v=PX-QWRXR0dU>) that presents the Innalik project and justifications for its development.

The Developer will create a follow-up and cooperation committee as soon as the construction phase commences. The mandate of this committee will be to ensure that the development, construction and operation of the run-of-river plant is carried out in a spirit of cooperation with the host community. During the construction phase, the follow-up and cooperation committee could meet once a month. In the operation phase, the frequency of such meetings could be based on the needs expressed by committee members or by the community. If necessary and depending on the availability of members, additional meetings could be scheduled.

The follow-up and cooperation committee could consist of the following members:

Representative	Organization
To be determined	Northern Village of Inukjuak
To be determined	Uumajuit warden (KRG)
To be determined	Pituvik Landholding Corporation
To be determined	Inukjuak Hunting Fishing Trapping Association
To be determined	Hunters and Trappers Committee Association
To be determined	Innergex

The role of this committee will also be to monitor and improve as needed the process of receiving and handling comments and complaints at the committee's monthly meetings, without being directly involved in their handling. The main objective of the Comments and Complaints Management Plan remains to rectify problematic situations as quickly as possible.

The steps for processing comments and complaints are described below.

1- Reception of comment or complaint – In person at the plant or by phone

- The responsible party documents in writing the elements that are the subject of the comment or complaint (Appendix RQC2-15.1 – Comments and Complaints Form).
- For complaints, this individual shall also assess whether a corrective action can be taken immediately or if the complaint is inherent to the normal activities of the construction site.

2- *Handling (Appendix RQC2-15.2 – Diagram of Comment and Complaint Handling Process)*

- Documentation and validation of motive for complaint by the party responsible for comments and complaints;
- Follow-up with work site managers;

3- *Application of mitigation measures*

- Application of relevant corrective measures;

4- *Feedback and information*

- Feedback and information provided to the complainant;
- Written record of file and transfer of file to the follow-up and cooperation committee at its meeting.

QC2-16. The Developer shall adequately describe how the project area is used, e.g. hunting, fishing and trapping areas found in the Core Study Area, as well as associated infrastructure (roads, trails, camps, etc.), traditional transit and navigation routes and their periods of use within the study area. The Developer shall also detail the consequences on current and anticipated land/resource uses and in particular on accessibility to the project area (including shorelines and watercourses) with regard to hunting, fishing, trapping and outfitter activities, if any. The Developer shall ultimately detail the impacts involving public or community service infrastructures such as roads, ATV/snowmobile trails, parks or other natural sites or areas of particular interest.

RC2-16 The Developer has taken into consideration all information gathered in the context of the environmental impact assessment in order to describe land use in the project area and evaluate the associated impacts. Additionally, the Developer has met with the community on several occasions since 2007 (see RQC2-14). No concerns regarding land use have been raised. Additional initiatives have been taken with the Nunavik Marine Region Planning Commission (NMRPC) since July 2017 in order to complete the land use characterization with the data compiled by this organization. However, these efforts have proven unsuccessful and no additional data have been obtained for consultation to date. These data will be provided to the Commission as soon as they become available.

The project will not significantly alter land access; the area will remain accessible at all times, with the exception of certain periods during the construction phase for safety reasons, notably in the event of blasting. Access to the area during the operation phase will be facilitated through an

upgrade of existing roads and construction of a bridge providing access to the left bank of the Inukjuak River. The Developer will oversee maintenance of the access roads to the facilities for the duration of the power plant service life.

The Developer is making a concerted effort to limit repercussions on land users. The Innavik project is being developed by the community for the community. The Developer will create a follow-up and cooperation committee as soon as the construction phase commences. The mandate of this committee will be to ensure that the development, construction and operation of the run-of-river plant is carried out in a spirit of cooperation with the host community (see RQC2-15).

QC2-17. The Developer shall adequately answer Question QC6 of the first series of questions and comments with regard to the workcamp. The Developer shall specify the exact location of the accommodation facilities as well as their capacity and duration/periods of use.

RQC2-17 Further details concerning the planned workcamp are presented in the Addendum, which can be found in Appendix RQC2-1 herein. The said camp will be located at the northern edge of the village at the intersection with the site access road. Measuring 0.9 ha, the camp will have a capacity of 128 persons and will be able to accommodate two 10-11-hour work shifts as well as staff rotations. The camp will be used essentially during periods of construction, which will extend over the course of 3 years.

QC2-18. The Developer shall also discuss, if applicable, how the two power plants (hydro and thermal) will complement one another in terms of electricity distribution. The Developer shall specify the social and environmental impacts of this approach, if any, such as job losses at the thermal plant.

RQC2-18 With regard to electricity production and distribution, an integrated control and management system of the thermal plant, hydroelectric plant and the dual-energy heating systems will be developed and implemented. Priority will be given to using electricity from the hydro plant, which is clean and does not generate greenhouse gases. In the rare cases when the hydroelectric plant is unable to fully meet demand for basic electricity needs and for water heating, the thermal plant will enter into production to bridge the energy gap. During the periods of the year and the hourly peaks when the hydroelectric plant is unable to fully meet the electricity demand for space heating, the dual-energy residential heating systems will switch into thermal mode.

In terms of human impact, optimal use of the power production of the hydroelectric and thermal plants will require close coordination or even the integration of operation services. The Developer intends to discuss this issue with Hydro-Québec Distribution with a view to signing a service agreement aiming to employ, for instance, the same operators for both plants.

Ultimately, with or without this type of agreement, the number of man-hours required to operate both plants will exceed the number of man-hours required to operate the thermal plant alone. Consequently, operating two plants represents a net gain of jobs and not a loss.

In terms of health and the environment, commissioning the Innalik project will offer the following advantages:

- Significant reduction of greenhouse gas emissions (see answer RQC2-11);
- Reduction of the risks of a diesel spills associated with the transport, pumping, delivery and storage of this fuel;
- Air quality improvement in the village of Inukjuak.

10. EMERGENCY ACTION PLAN

QC2-19. The Developer shall answer Point 5 of the directive concerning accident risk management. The Developer shall notably submit a preliminary Emergency Action Plan and detail the anticipated impacts in the event of a failure (consequences for the village and the water intake, potential for major erosion- and sedimentation-sensitive areas due to a hypothetical failure, need to maintain operation of the thermal plant in response to a failure, etc.).

RQC2-19 Details on the emergency measures for each project phase are described below.

Construction Phase

Impacts anticipated during project construction essentially relate to drinking water quality. In order to limit the potential for additional sediment in the Inukjuak River, a temporary sedimentation pond will be used to manage excavation water in order to bring the presence of suspended sediments below allowable federal and provincial levels for discharge into the river. Prior to discharge into the river, an analysis of suspended matter concentrations will be conducted and discharge will take place if the relevant criteria are met.

However, it should be noted that the shorelines of this area are composed of bedrock, which will minimize the potential for the introduction of sediment/turbidity into the Inukjuak River during Project construction and operation.

Water potentially affected by concreting activities will be channelled to a specific pond separate from the sedimentation pond for excavation water. This pond is expected to have a high pH value (in the order of 11). Water will

be treated in order to re-establish a pH level that meets the criteria for discharge of the said water into the environment.

It is planned to install a temporary water intake upstream of the work to avoid any potential for drinking water contamination for the village of Inukjuak.

A detailed Emergency Action Plan will be submitted as part of the application for the Certificate of Authorization (Article 22 of EQA). A draft Emergency Action Plan for the construction period is attached in Appendix RQC2-19.1 of this document.

Operation Phase

With regard to the operation period, preliminary studies have determined the risks associated with dam failure to be low, with no human fatalities and minimal economic loss. However, as a matter of precaution, a recurrence interval of 1,000 years was used for the design flood.

In the event of a failure of a temporary or permanent structure, the potential for the transport of sediment is limited.

In fact, the Inukjuak River features wider sections downstream of the dam where flow velocities are lower. These sections have the capacity to contain the water volumes involved, hence the village water intake should not be affected.

A sudden drop in the water body would trigger the shutdown of the hydroelectric plant and the start-up of the thermal plant. It had already been planned to keep the latter available in order to meet electricity demand if required in the event of low water levels in winter. During the operation phase, the ponds will be regularly checked to ensure the absence of hydrocarbon contamination before water is discharged into the environment. Moreover, all precautionary measures will be taken to avoid the presence of hydrocarbons in these basins. Such measures include, but are not limited to, developing an Emergency Action Plan in the event of a hydrocarbon spill and maintaining equipment on site for managing spills.

For all of its operating plants, Innergex has developed an "Emergency Situation Management Procedure". The goal of this procedure is to identify and assess the response needs for all probable emergencies in order to properly plan and effectively respond in the event that such an emergency were to occur. The Innalik hydroelectric plant is an integral part of this procedure. A sample of this procedure is presented in Appendix RQC2-19.2.

A list of potential emergency situations that could affect staff or the population, production, equipment and the environment has been compiled based on the company's experience and the professional judgement of the team. Such potential emergencies include but are not limited to the following:

- Injury / fatality
- Evacuation
- Fire at the plant
- Hydrocarbon spill
- Flooding at the plant
- Extreme flood / potential dam failure
- Earthquake
- Etc.

11. WATER INTAKE

QC2-20. The Developer shall update the state of progress of these discussions with KRG and Makivik Corporation with regard to drinking water quality monitoring.

RQC2-20 The village of Inukjuak is responsible for drinking water management. Meetings are planned with Timothy Naluktuk to coordinate the work and monitoring to be undertaken during construction and operation of the hydroelectric plant.

Kativik Regional Government (KRG) will offer its support should a water quality issue arise; however, drinking water quality monitoring will be the responsibility of the local municipality. It is probable that sample analysis will be delegated to the Nunavik Research Centre, which is located in Kuujuaq and operated by Makivik Corporation's Resource Development Department.

12. CARBON EXCHANGE

QC2-21. The Developer shall provide all information necessary for the calculation of GHG emission reductions, i.e. the quantities of fuels and combustibles replaced by hydroelectricity and how energy needs will be met during peak periods.

RQC2-21 The calculation of greenhouse gas reductions is presented below:

Estimation of greenhouse gases reductions by replacing diesel and heating fuel	Annual average	Over 40 years
Basic electricity ¹	13 million kg of eq. CO ₂	520 million kg of eq. CO ₂
Electrical conversion – water and housing heating ²	4.4 million kg of eq. CO ₂	176 million kg of eq. CO ₂
Total	17.4 million kg of eq. CO₂	696 million kg of eq. CO₂

1. Average value of 878 kg eq. CO₂/MWh* multiplied by an average of 15 000 MWh/year for basic electricity over 40 years.
*Source of the emission rate: International Reference Centre for the Life Cycle of Products, Processes and Services (CIRAIG) report prepared for Hydro-Québec in November 2014. The value of 878 kg eq. CO₂/MWh is for continuous generation, therefore probably underestimated for Inukjuak.
2. 3000 litres of heating fuel per year per household multiplied by 537 households (430 SHQ + 107 more) x 2.734 eq. CO₂ per heating fuel litre (light heating oil). Source: Agence d'efficacité énergétique du Québec, September 16, 2009.

The Innavik project will meet nearly 100% of Inukjuak's basic electricity demand for the next forty years. With regard to higher electricity demand stemming from the conversion of heating systems, the Innavik project is mostly able to meet such demand, with the exception of certain hourly peaks at certain times of the year. This is the reason why conversion to dual-energy heating systems is being advocated, i.e. so that thermal power can be used as back-up during these peaks. This being the case, it is estimated that on an annual basis, the majority of Inukjuak's heating needs will be met by renewable electricity generated by the Innavik project, which will reduce diesel use by an equal amount. Consequently, it should be noted that the Innavik project will help achieve an exceptionally high penetration rate of renewable electricity.

For indicative purposes, in 2016 Inukjuak consumed 2.7 million litres of diesel fuel and this figure continues to rise.

The GHG reduction calculation presented above and attributable to basic electricity needs considers an average production of 15,000 megawatt-hours per year over 40 years.

13. CLIMATE CHANGE

QC2-22. The Developer shall explain how it has taken climate change into account in the planning and operationalization of its project. The Developer shall notably provide a detailed argument of the impacts of climate change on the structural and hydraulic parameters of its project based on available scientific documentation (Ouranos, Arctic Net, Centre for Northern Studies (CEN), etc.)

RQC2-22 The hydrological study conducted for the project is based on the assumption according to which the conditions that governed the flow regime in the past will remain the same in the future. On account of expected climate change, this assumption is being called into question.

Recent studies available from the MDDELCC² present an up-to-date table of recently acquired knowledge on the subject, notably hydrological indicators used to forecast trends for spring floods and summer/fall floods as well as high water levels in winter. However, these studies are currently limited to southern Quebec. At the current time, given the scope of the project, the Developer maintains the approach that has been used, i.e. that the flow regimes of the past will remain the same in the future.

QC2-23. The Developer shall characterize the permafrost distribution and estimate the impacts stemming from the risks of subsidence and erosion due to melting permafrost in the vicinity of the planned installations.

RQC2-23 According to the studies consulted,³ Inukjuak region is located in a continuous permafrost zone, which was confirmed during site visits. The Developer has developed its project while accounting for the continuous nature of the permafrost throughout the construction site, where work will be performed essentially on rock.

Exposure of the rock face during excavations will trigger local relaxations which will be contained by means of consolidation of surfaces on the exposed faces. At the structure locations, it is planned to use thermal protections to stabilize the exposure to temperature variations. The detailed design will be completed, however, following drilling surveys at the locations of the main structures.

14. WASTE MANAGEMENT

QC2-24. The impact assessment mentions that waste stemming from construction activities and the workcamp will be transported to the site designated by the village and authorized for this purpose. The Developer shall specify whether it has an agreement with the village to this effect. The Developer shall also specify whether it has taken into account waste that will be generated from related work in the village and at the thermal plant, e.g. conversion of heating systems.

² Notably the document: Centre d'expertise hydrique du Québec (CEHQ). *Atlas hydroclimatique du Québec méridional – Impact des changements climatiques sur les régimes de crue, d'étiage et d'hydraulicité à l'horizon 2050*. Québec City, 2015, 81 p.

³ Allard, M. and M. K.-Séguin (1987). "Le pergélisol au Québec nordique : bilan et perspectives". *Géographie physique et Quaternaire* 411 (1987): 141-152.

Government of Canada (2017). "Pergélisol, glace et neige" (available in English as "Earth Sciences Permafrost, Ice, and Snow"). Natural Resources Canada. Consulted in October 2017 at: <http://www.rncan.gc.ca/sciences-terre/sciences/pergelisol-glace-neige/10825>

RQC2-24 The Waste Management Plan is attached in Appendix RQC2-24 of this document. It should be noted that with regard to the conversion of heating systems, it is planned to initiate this work in 2020 and complete it in 2023. The run-of-river plant will have been built and commissioned by this time.

QC2-25. The response to Question QC7 is incomplete. The Developer shall provide broad outlines of its waste and sanitary facility management approach.

RQC2-25 The Waste Management Plan is attached in Appendix RQC2-24 of this document.

15. FISH

QC2-26. The Developer shall provide the scope of the proposed spawning areas (including the potential of Sanirqamatik Creek for developing such spawning areas) as indicated in Answers 12-E and 12-F.

RQC2-26 The Developer maintains its commitment to carry out compensation measures for the alteration of fish habitat in consultation with municipal authorities (Uumajuit warden, municipality, etc.), as recommended by Ms. Laurie Beaupré from the MFFP in a conference call on August 25, 2017. In this regard, the scope of work will be submitted at a later time once specific compensation projects have been identified.

QC2-27. The Developer shall undertake to implement a monitoring program of the created spawning areas for a minimum of 10 years after construction, due to the slow growth rate and late sexual maturity of fish populations at northern latitudes.

RQC2-27 The Developer undertakes to perform monitoring over a 10-year period on the spawning areas developed according to recommendations made by community members, who will be consulted in order to develop compensation measures that are appropriate for the modifications incurred by the fish habitat. The monitoring program will be developed in collaboration with MFFP and MPO representatives, as the case may be.

QC2-28. The Developer shall undertake to implement a fish contamination monitoring program. It is suggested that a fish sampling program be put into place prior to commencement of work and that it continue for a period of 15 years after work has been completed in order to determine and monitor the evolution of mercury levels, and thereby be able, if necessary, to formulate and communicate to the community of Inukjuak recommendations to limit consumption of certain fish species for certain size ranges.

RQC2-28 The Project headpond will be relatively small and largely within the existing channel of the Inukjuak River. As well, the area of be inundated is dominated

by bedrock which is not a source for contamination of fish tissues (including mercury). Of primary concern are newly-inundated areas composed of vegetation and terrestrial soils; one area of this type will be located within the headpond footprint (on the right downstream-facing shoreline).

A fish contamination monitoring program will be implemented for the Project to determine and monitor potential changes in mercury concentration in fish tissue. Baseline fish tissue samples collected to date will be augmented by additional fish tissue sampling prior to start of construction. Two fish species potentially used as a food source by Inukjuak residents, lake whitefish and brook trout, will be the focus of the monitoring program. A comprehensive monitoring program (including details on the methodology and timing of the sampling) will be prepared by a specialist consultant and submitted to MDDELCC for review and approval.

The program will include a sampling regime that will allow determination of fish tissue mercury concentration at a point 15 years after the original headpond flooding. The exact sampling years (e.g., Years 1, 2, 5, 7, 10, 15) will be supplied in the forthcoming monitoring program.

16. PEREGRINE FALCON

QC2-29. The peregrine falcon is a potential breeder on the project construction site, including the area to be flooded. The Developer shall better document the presence of the peregrine falcon by means of a survey in the Core Study Area, particularly in the flood zone.

RQC2-29 Following discussions with MFFP expert Alexandre Ancil, it was agreed that Johnny Mina (Uumajuit warden) and Sandy Kooktoo (photographer), both from the municipality of Inukjuak, would travel to the site in order to carry out a survey at target locations selected by Alexandre Ancil. The survey was conducted on August 2, 2017. A report accompanied by field notes and high-resolution photos was sent to Alexandre Ancil and the information was deemed satisfactory.

The original report as well as the photos are attached in Appendix RQC2-29 of this document.

17. THREATENED OR VULNERABLE PLANT SPECIES (TVPSL)

QC2-30. The Developer shall specify the name and the title of the party that performed the plant survey that was carried out from August 17 to 21, 2016. The Developer shall indicate the number of sites surveyed and present them on a map.

RQC2-30 The field surveys performed in 2016 (August 17-21) were conducted by Ms. Jeanne Gaudreault, forest engineer at Innergex, and Mr. Jean Deshayé, biologist and expert botanist at WSP. A total of 42 survey stations were

visited during the field campaign. The locations of the latter are presented in the map provided in Appendix RQC2-30 of this document.

18. WETLANDS

QC2-31. Ground surveys shall be carried out in order to delineate and identify all wetlands that might be affected by any element of the project (including the dam structure, the area to be flooded, access roads to the dam and bridge, electricity transmission network, new borrow pit areas and all permanent and temporary work areas including those for storage, construction of worker accommodation, etc.). Wetlands present within or in proximity to the work areas and the impoundment area shall also be covered in the ground survey.

RQC2-31 A field survey was performed between August 22 and September 1, 2017 with the objective of completing the 2016 survey as well as performing a characterization of natural spaces and wetlands mapping. The report presenting this survey is attached in Appendix RQC2-31 of this document.

QC2-32. The Developer shall provide a new map that incorporates the survey results in order to illustrate the project's impact more specifically on the "wetland" component. The following elements shall be presented in the mapping:

- **Boundaries of wetlands and wetland complexes in proximity to the work site (the Developer shall indicate the work method used, the wetland type selection criteria and the names and qualifications of the individuals that performed the validation);**
- **Plant communities present within and in proximity to the wetlands;**
- **Detailed hydrographic network (watercourses and ditches);**
- **Project elements having an effect on the natural environment (e.g. road, impoundment, dam and bridge, hydroelectric line, permanent and temporary work areas, borrow pit, etc.)**

Survey results shall be summarized in tabular format by presenting the total surface areas of each wetland or wetland complex, the surface areas affected and the percentage of surface area lost for each of these wetlands.

RQC2-32 The requested information is provided in Appendix RQC2-31.

QC2-33. The Developer shall document avoidance efforts and justify those cases where it was not possible to avoid certain wetlands. The Developer shall also propose mitigation measures to limit impacts to wetlands and provide a draft of its compensation plan, including a list of potential compensatory projects that it has identified.

RQC2-33 The Developer maintains its intention to apply the mitigation sequence that aims to avoid wetlands, minimize losses, and compensate for any losses that cannot be avoided. The Developer has rerouted the access roads to the infrastructures in order to reduce the required land area, maximize use of existing access roads and avoid the wetlands identified in the August 2017 characterization work as much as possible (Appendix RQC2-31). The land area required for the borrow pits was reduced by 54% (see Addendum in Appendix RQC2-1).

A compensation plan will be developed in consultation with municipal parties (Uumajuit warden, municipality, elders, youth, women, etc.), as recommended by Ms. Chantal Bouchard from the MDDELCC at the meeting of July 20, 2017. Discussions will be held in the months to come in order to identify potential compensation projects that are supported by the community. In this regard, a draft compensation plan will be submitted as part of the application for the Certificate of Authorization under Article 22 of the EQA.