Final Scope of the NIRB's Assessment of the Iqaluit Hydroelectric Project Proposal

The Nunavut Impact Review Board (NIRB or the Board) has prepared a Final Scope List for its Review of Qulliq Energy Corporation's (QEC or the Proponent) proposed "Iqaluit Hydroelectric" project. The scoping process aims to identify the potential impacts of a proposed project as well as the valued components of the physical and social environment. The scope list includes the physical works and activities for all stages of the project, identifies components of the ecosystemic and socio-economic environments, and provides a list of the Valued Ecosystem Components (VECs) and Valued Socio-Economic Components (VSECs) which the Proponent will be required to discuss within its Environmental Impact Statement.

The scope of the NIRB's assessment is based on the requirements of Section 12.5.2 of the Nunavut Land Claims Agreement (NLCA), the NIRB's 10 Minimum Environmental Impact Statement (EIS) Requirements, and the project proposal submitted to the NIRB on February 25, 2013.

1) Project Description, including the purpose and need for the Project

The scope of the project proposal includes all physical works, activities, and/or undertakings, as submitted to the NIRB by QEC for the "Iqaluit Hydroelectric" project on February 25, 2013, and encompasses the life of the project.

a. Project Proposal Summary

The "Iqaluit Hydroelectric" project (the Project) is a proposed hydroelectric development located approximately 30 to 60 kilometres southwest of the City of Iqaluit within the Qikiqtani region (South Baffin). The Project includes the construction of two hydroelectric facilities at the Jaynes Inlet and Armshow South sites, rated at a maximum of 14.6 Megawatts (MW) and 8.8 MW, respectively.

QEC has proposed a two phased development, beginning with the construction of the Jaynes Inlet hydroelectric facility followed by the development of the Armshow South site. The development would involve a 3-year construction period at each site, followed by an anticipated operation period of 40 years for each site, although it is anticipated by the Proponent that with proper maintenance and retrofits, the facilities would be operational indefinitely. The Armshow South site would be developed when electricity demand increases to the point that electricity generated by the Armshow South site could be sold.

QEC's proposal indicates that Project construction would take approximately three (3) years at each site, with operational life anticipated at 40 years and through maintenance and appropriate retrofits, the facilities are expected to continue to operate indefinitely. As such, no timeline for

closure was provided within the proposal. Major maintenance and inspection for the facilities and ancillary infrastructure associated with the Project have been proposed to occur every 10-15 years. Ancillary infrastructure includes barge landings, airstrips, access roads and transmission lines to connect the facilities with the City of Iqaluit.

The project proposal indicated that up to 90 employees would be required during the construction phase, including staff from the QEC, as well as engineering, procurement and construction management contractors and a general construction contractor. The operations phase would require one or two full-time caretakers, with operations to likely be managed remotely from QEC headquarters in Iqaluit. Annual maintenance inspections would be conducted by a team of specialists, including dam safety, structural, mechanical and electrical engineers. Major maintenance and refurbishments would involve teams of engineers and technicians and would likely be carried out over a one month period.

b. Project Components

i) Jaynes Inlet

Construction, operation and decommissioning of a 10 to 14.6 MW storage hydroelectric facility which would consist of:

- 30 metres (m) high dam at the outlet of the upper lake;
- Concrete gravity buttress and intake structure;
- 5.7 kilometre (km) long surface penstock;
- Powerhouse with two Pelton turbines (each rated at 5 to 7.5 MW). The powerhouse would have a gate that opens for the discharge of water to the stream during the open water season;
- 3.2 km long tailrace to discharge water from the powerhouse to the lower lake during the winter. The tailrace outfall structure would be fitted with an energy diffuser;
- Permanent operator accommodation facility, workshop and accommodation facilities for maintenance crews; and
- Access road from powerhouse to barge landing.

ii) Armshow South

Construction, operation and decommissioning of a 6 to 8.8 MW storage hydroelectric facility which would consist of:

- 25 m high dam at the outlet of upper lake;
- 5.96 km long surface penstock;
- Powerhouse with two Pelton turbines (each rated at 3 to 4.4 MW). The powerhouse would have a gate that opens for the discharge of water to the stream during the open water season;
- 0.6 km long tailrace to discharge water from the powerhouse to the lower lake during the winter. The tailrace outfall structure would be fitted with an energy diffuser;
- Permanent operator accommodation facility, workshop and accommodation facilities for maintenance crews; and
- Access road from powerhouse to barge landing.

iii) Ancillary Infrastructure and Additional Details

- Construction, operation and decommissioning of barge landing sites at both of the Jaynes Inlet and Armshow South locations;
- Shipment of equipment, materials and fuel during construction phase (open water season)
- Development and decommissioning of laydown areas to store equipment and materials at both of the Jaynes Inlet and Armshow South sites;
- Development and decommissioning of access roads to support construction and operation at the Jaynes Inlet and Armshow South sites;
- Equipment proposed to be brought onsite for the construction phase includes helicopters, snowmobiles for personnel transportation, rock coring drills, dozers, loaders, boom and haul trucks and crushers;
- Construction, operation and decommissioning of a temporary 75-person camp at or near the coast of Jaynes Inlet and the Bay of Two Rivers during the construction phase at the Jaynes Inlet and Armshow South sites, respectively. The temporary camp would include:
    - Storage of approximately 550,000 liters (L) of fuel each construction season. Diesel (400,000 L) and gasoline (100,000 L) would be stored in double-walled iso-containers while aviation fuel (41,000 L) would be stored in drums;
    - Disposal of sewage (15 cubic metres per day (m^3/day)) using a packaged sewage treatment plant;
    - Disposal of greywater (6 m^3/day) and drilling brine (1 m^3/day) through a sump which will then be treated in the sewage treatment plant or stored in a container and shipped off-site; and
    - Management of solid waste through incineration in a camp incinerator and/or transportation to Iqaluit for disposal.
- Water utilization at the Jaynes Inlet and Armshow South hydroelectric dams is expected to be 765,000 m^3/day;
- Construction, operation and decommissioning of a 69 kV transmission line approximately 84 km long, to run from the powerhouse at Jaynes Inlet to a substation adjacent to the QEC main diesel generating plant in Iqaluit. The transmission line would cross the Armshow River near the powerhouse at Armshow South and would tie in to the line at the proposed Jaynes Inlet site which would connect on to Iqaluit; and
- Possible construction, operation and decommissioning of one airstrip at each of the Jaynes Inlet and Armshow South sites to facilitate access by fixed wing aircraft during the construction and operation phases of the project.

iv) Abandonment, Decommissioning and Reclamation

If/when the Project must be decommissioned, QEC has proposed that:

- All aboveground components would be dismantled and removed;
- Intake(s) would be plugged;
- Dam infrastructure would be removed and disturbed areas returned to pre-development state;
- The decommissioning of the powerhouse would involve:

- Removal of electrical and mechanical equipment;
- Dismantling of the structure; and
- Disposal or recycling of the metal and other construction materials.

- All waste materials to be disposed of either on-site in a landfill or in a facility off-site; and
- Some below-ground components such as concrete foundations may be left in place in order to minimize site disturbance if these components do not pose a risk to the environment or land users.

2. Anticipated ecosystemic and socio-economic impacts of the Project

The assessment of the potential for ecosystemic and socio-economic impacts by the proposed project components and activities as outlined in the section above must refer to the factors listed below. The scope of potential impacts caused by the project components, activities, and undertakings to environmental and socio-economic factors shall take into account the appropriate temporal and spatial boundaries and draw upon relevant information from scientific sources and traditional knowledge.

a. Air quality;
b. Climate and meteorology including climate change;
c. Noise and vibration;
d. Terrestrial environment, including:
  i. Terrestrial ecology;
  ii. Landforms and soils;
  iii. Permafrost and ground stability; and
  iv. Geotechnical hazards.
e. Geological features including discussion of geology and geochemistry;
f. Hydrological features (including water quality) and discussion of hydrogeology, including;
  i. Stream hydrology, including sediment loading to streams, stream thermal conditions and contaminant loading to streams;
  ii. Flows, including instream flows, flooding and dewatering;
  iii. Water quantity/water balance; and
  iv. Estuarine hydrology (the freshwater flow regime into the marine environment).
g. Groundwater and surface water quality, including surface runoff and snowmelt;
h. Freshwater aquatic environment, including:
  i. Aquatic ecology;
  ii. Fish passage;
  iii. Fish spawning;
  iv. Landlocked fish and habitat;
  v. Freshwater, including but not limited to effects on water quality, quantity and ice conditions downstream of the impoundment area;
  vi. Sediment quality;
  vii. Aquatic biota including fish as defined in the *Fisheries Act*, aquatic macrophytes, benthic invertebrates and other aquatic organisms;
  viii. Aquatic habitat including fish habitat as defined in the *Fisheries Act*; and
  ix. Commercial, recreational and Aboriginal fishery as defined in the *Fisheries Act*.

i. Terrestrial vegetation (including Porsild's bryum);
j. Terrestrial wildlife and wildlife habitat, including:
    i. Representative terrestrial mammals to include caribou, caribou habitat migration and behaviour, wolverine, polar bears, wolves, foxes and less conspicuous species that may be exposed to contaminants (include species at risk); and
    ii. Wildlife migration routes and crossings.
k. Birds and bird habitat, including:
    i. Raptors (including Peregrine falcons);
    ii. Migratory birds; and
    iii. Seabirds (including eider and gull species).
l. Marine environment, including:
    i. Marine ecology;
    ii. Marine water;
    iii. Sea ice;
    iv. Sediment quality;
    v. Marine biota including fish as defined under the *Fisheries Act* and benthic flora and fauna;
    vi. Marine habitat including fish habitat as defined in the *Fisheries Act*;
    vii. Marine wildlife;
    viii. Marine mammal harvest; and
    ix. Commercial, recreational and Aboriginal fishery as defined in the *Fisheries Act*.
m. Socio-economic factors, including:
    i. Economic development opportunities;
    ii. Employment;
    iii. Education and training;
    iv. Contracting and business opportunities;
    v. Population demographics;
    vi. Benefits and revenues (tax, royalties, etc.);
    vii. Navigation; and
    viii. Energy Security.
n. Traditional activity & knowledge including:
    i. Land and resource use;
    ii. Use of proposed Katannilik Territorial Park and Itijjagiaq Trail;
    iii. Food security;
    iv. Language; and
    v. Cultural and commercial harvesting.
o. Non-traditional land use and resource use, including:
    i. Visual and aesthetic resources;
    ii. Protected areas; and
    iii. Use of proposed Katannilik Territorial Park and Itijjagiaq Trail.
p. Heritage resources such as:
    i. Archaeology;
    ii. Palaeontology; and
    iii. Cultural sites.
q. Health and well-being of the community, including:
    i. Individual and community wellness; and

ii. Family and community cohesion.

r. Community infrastructure and public services;
s. Health and safety including employee and public safety;
t. Residual and cumulative effects; and
u. Transboundary effects.

3. Anticipated Effects of the Environment on the Project

The scope of the assessment will include the potential anticipated effects of the arctic environment on the project throughout the project's life, including the following factors:

a. Climate and meteorology including climate change and extreme weather events (storms, droughts, heavy rainfall events);
b. Permafrost;
c. Geotechnical hazards including slope movement, differential or thaw settlement, frost heave, and ice scour;
d. Subsidence;
e. Flooding and/or drought; and
f. Unfavourable geological conditions.

4. Steps which the proponent proposes to take including any contingency plans, to avoid and mitigate adverse impacts

The scope of the assessment will include any contingency plans or risk management plans to avoid and mitigate adverse impacts caused by the proposed project components and activities. These plans must extend, where relevant, through all project phases. These plans shall take into account the appropriate temporal and spatial boundaries and are expected to draw upon relevant information from scientific sources, best practices and traditional knowledge and are to include, but not be limited to:

a. Emergency and spill response;
b. Hazardous materials management;
c. Accidents and malfunctions;
d. Regulatory requirements;
e. Temporary closure plans; and
f. Mitigation measures.

5. Steps which the Proponent proposes to take to optimize benefits of the Project, with specific consideration being given to expressed community and regional preferences as to benefits

The scope of the assessment will include steps which the Proponent proposes to take to optimize benefits of the project, and should include, but not be limited to:

a. Compensation and benefits;
b. Health benefits;
c. Human health and well-being;
d. Employment;

e. Education and training;
f. Land use;
g. Contracting and business opportunities; and
h. Any non-confidential details from an Inuit Impact and Benefit Agreement.

6) Steps which the Proponent proposes to take to compensate interests adversely affected by the Project

The scope of the assessment will include the steps which the Proponent proposes to take to compensate interests of parties adversely affected by the Project including all non-confidential process and content details pertaining to any Inuit Impact and Benefit Agreement pursued in connection with the Project.

7) The monitoring programs proposed by the Proponent to identify and manage ecosystemic and socio-economic interests potentially affected by the Project

The scope of the assessment will include any programs that will be established to monitor the potential ecosystemic and socio-economic impacts caused by the proposed project components and activities.

8) The interests in lands, waters and other resources which the Proponent has secured or seeks to secure

The scope of the Project will include any interests in lands, waters and other resources which the Proponent has secured or seeks to secure based on the proposed works and activities or undertakings that constitute the Iqaluit Hydroelectric project proposal.

Nunavut Impact Review Board	Project Certificate
Nunavut Water Board	Type 'A' Water Licence
Qikiqtani Inuit Association	Right-of ways, Quarry Permits and Land Lease
City of Iqaluit	Right-of-Way approval
Government of Nunavut – Community and Government Services	Land Permit
Government of Nunavut – Department of Culture and Heritage	Archaeology Permit(s) and Palaeontology Permit(s)
Nunavut Research Institute	Socio-economic & Traditional Knowledge Research Licence, Scientific Research Licence
Aboriginal Affairs and Northern Development Canada	Class 'A' Land Use Permit, right-of-ways, Land Lease, Quarry Permits and authorizations under the *Dominion Water Power Act* and the *Arctic Water Pollution Act*
Environment Canada	Compliance to the *Canadian Environmental Protection Act 1999*, the *Migratory Birds Convention Act*, the *Species at Risk Act* and the pollution prevention provisions in the *Fisheries Act*
Fisheries and Oceans Canada	Authorization pursuant to the *Fisheries Act*
Natural Resources Canada	Licence pursuant to the *Explosives Act*

Transport Canada	Approval under the *Navigable Waters Protection Act*; compliance with the *Arctic Waters Pollution Prevention Act*, *Canada Shipping Act*, *2001*, *Transportation of Dangerous Goods Act* and their associated regulations.
Workers Safety & Compensation Commission	Permit to Store Detonators, Explosives Use Permit

9) Options for implementing the Project

The scope of the assessment is to include project alternatives including alternatives to individual components/activities, alternate timing and development options, as well as presenting the "no go" option as it pertains to the overall Project.

10) Any other relevant matters

The scope of the assessment will include any other matters that the NIRB considers relevant, including:

- **a.** Impacts of infrastructure previously undeveloped and untested in the Arctic;
- **b.** Traditional knowledge;
- **c.** Statement of consultation principles and practices;
- **d.** Significant effects analysis;
- **e.** Sustainability analysis;
- **f.** Interactions with Valued Ecosystem Components and Valued Socio-Economic Components;
- **g.** Discussion of similar developments in the North; and
- **h.** Long-term lifespan of development.