



Iqaluit

Nukkiksautiit Project

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1.0 Introduction

The document herein collates the initial work completed during the inception of the *Iqaluit Nukkiqsautiit Project*. The project focuses on the study of sustainable energy solutions for Iqaluit, the largest population center in the Territory and therefore the largest electrical load, and transitioning Iqaluit's electricity supply away from diesel generation. This is an Inuit-led initiative that focuses on solutions on Inuit-owned lands (IOL) in-line with the vision of Qikiqtani Inuit. To accomplish this, the project dedicates significant focus to community data as input and guidance of early phase concept development. The following sections summarize the preliminary study work completed in Q1 2022:

Technical Gap Analysis

The Gap Analysis Report summarizes the review of the relevancy of the existing data and how it can be used for future studies. It also recommends when new data should be collected in the project phases to help manage cost and ensure the correct data is being used at the right time.

The data types considered in this review include:

- Hydrometric & Wind Data
- Survey Data (Topography)
- Site Visits
- Geotechnical Data
- Environmental Baseline Data
- Electrical and Thermal Load Data

Preliminary Business Case

This task used existing data to begin laying out the preliminary business case of the project from a community perspective. It provides a project description, project boundaries, evaluation of economic benefits and highlights key risks. This document was generated based on the (limited) existing information to date on the broader view of the project. As more community input and technical data is gathered throughout the coming phases of the project, the business case will be updated to reflect the most recent information acquired to date. The formal Business Case will therefore not be completed until the completion of Phase 3, at which point a Decision Support Package for Investment will accompany the final Business Case.



CIRNAC Funding Submission

The objective of this task, initially, was to outline funding strategies to advance the project through early project development stages. Funding opportunities quickly arose so the strategy pivoted to funding submissions. This section includes the final CIRNAC submission that was, ultimately, successful in securing early phase funding. Please note funding strategies for the completion of the front-end project development and financing strategies for the long term development scenario will be developed in Phases 1 and 2.

2.0 Technical Gap Analysis



Iqaluit

Nukkiksautiit Project

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1.0 Introduction

Quilliq Energy Corporation (“QEC”) started a significant process reviewing the potential for renewable energy alternatives for the City of Iqaluit and initiated “*The Iqaluit Hydroelectric Project*” in 2005 as a long-term energy plan to supply a sustainable, affordable, and reliable source of energy to Nunavut’s capital city.

Work began with Knight Piesold undertaking a Phase I Prefeasibility Study which they completed in 2006 that identified and ranked potential hydroelectric project sites within a 100 km radius of Iqaluit. Subsequent work to these studies included site visits, review of geotechnical conditions, and identifying specific locations for project components. This led to an updated Phase II Prefeasibility Report for which hydrological investigations took place at four locations – Armshow River, Armshow South, Cantley Bay, and Jaynes Inlet. The result of the QEC-led prefeasibility studies was to recommend advancing further studies at Armshow River and Jaynes Inlet due to the promising economics associated with each site and further due diligence reviews by other contractors and Manitoba Hydro International.

QEC continued to refine project cost estimates and economic analysis in 2006 to 2008, with environmental baseline studies being completed for the Jaynes Inlet site in 2008 and 2009. This included an Ecological Land Classification Report as well as a Final Environmental Baseline Studies Summary Report. Further work continued in 2010 by QEC to engage contractors to refine and optimize project developments to support possible cost reductions in projects. This ultimately led to a “*Comprehensive Development Report*” being submitted by Knight Piesold to QEC April 13, 2011.

The “*Comprehensive Development Report*” is a detailed report and compilation of all data collected since work started by Knight Piesold and included the period of the project from 2005 to 2011. This report recommended a phased development with the Jaynes Inlet site first being developed, and the Armshow River site being developed later as demand growth dictated. The next steps were noted by QEC’s consultants as undertaking feasibility studies and commencing the Nunavut Impact Review Board (NIRB) Environmental Review process.

Due to the large capital investment required to proceed with the projects, and the inability of QEC to incur such large debt as a government-owned utility, the projects were put on hold in 2014 and it is not known if any additional work or data has been collected related to this initiative since 2014.

2.0 Scope

The Qikiqtani Inuit Association (“QIA”) and Nunavut Nukkiksautiit Corporation (“NNC”) are jointly interested in focusing on identifying opportunities to improve and secure energy supply, thereby reducing Greenhouse Gas (“GHG”) emissions in Iqaluit by harnessing renewable energy near Iqaluit. NNC is undertaking a phased approach to this project in collaboration with QIA to ensure a robust, defined, and community-led project process is followed – the phases of the project are as follows:

- Phase 0 – Project Governance & Staffing
- Phase 1 – Identify Opportunity
- Phase 2 – Alternatives Generation & Selection of Preferred Alternative
- Phase 3 – Development of the Preferred Alternative

QIA and NNC recognize that significant work has taken place since 2005 and understand the importance of first reviewing previous work undertaken by QEC to determine if it aligns with current business drivers. Work has begun on framing business drivers and the business case, and the scope of this exercise is to understand what data, if any, can be used from the original studies between 2005 and 2014.

Since considerable work to-date has been completed by QEC, it would be cost effective and beneficial to be able to leverage this past work. However, since over 10 to 15 years have passed since the original work was completed and the effects of climate change altering Artic landscapes, it is important to understand the relevancy and quality of this data.

Further, with changing economics and business drivers, it is likely that different sites/locations could be recommended with additional review in Phase 1. Community input on the preferred location is also a priority for QIA and NNC and it is not clear the level of effort of community engagement in previous work.

Regardless of the possibility of new sites/locations being determined, this report will review the relevancy of the existing data and how it can be used for future studies. It will also recommend when new data should be collected in the project phases to help manage cost and ensure the correct data is being used at the right time.

The data types being considered in this review are as follows:

- Hydrometric Data
- Wind Data
- Survey Data (Topography)
- Site Visits
- Geotechnical Data
- Environmental Baseline Data
- Electrical and Thermal Load Data



QIA and NNC will work with communities and any/all future data collection will be done in collaboration with relevant community members and all required permits will be acquired to do so. As the project moves through the next few Phases of the project and more detailed community information is gathered, this suggested plan for future data collection could be adjusted. Community input is the utmost priority for any project development activities on the project.

3.0 Hydrometric Data

Hydrometric Data collection is needed to help define baseline conditions, support development of hydraulic design criteria, and estimate power and energy potential for developments. Understanding the available data will help define what data, and when, will be required for each phase of the project.

Water Survey of Canada (Environment and Climate Change Canada) maintains a network of hydrometric stations in Canada. A list of active and deactivated stations in the Iqaluit region are detailed as follows with the period of record noted along with station identifier noted in parenthesis:

- Cantley River near the Mouth (10UH008) – 2006 to 2008
- Cornelia River near the Mouth (10UH009) – 2006 to 2008
- Anna Marie River near the Mouth (10UH003) – 2008 to 2014
- McKeand River near the Mouth Confluence (10UG002) – 2008
- Apex River at Apex (10UH002) – 1973 to present
- Inflow to Lake Geraldine near Iqaluit (10UH012) – 2007 to present
- Sylvia Grinnell River near Iqaluit (10UH001) – 1971 to present
- Jordan River near the Mouth (10UH011) – 2006 to 2013
- Armshow North River at Outlet Armshow North Lake (10UH006) – 2006 to 2014
- Armshow River near the Mouth (10UH004) – 2006 to 2014
- Armshow South River at Outlet Armshow South Lake (10UH005) – 2006 to 2014
- Jaynes River 10 km below Outlet of Jaynes Lake (10UH014) – 2012 to 2014
- Jaynes River at the Outlet of Jaynes Lake (10UH010) – 2006 to 2013

The hydrometric stations for Jaynes River, Armshow River, and Cantley River were all installed as part of Knight Piosold prefeasibility studies that started in 2005. The data collected was used to undertake the following hydrological analyses:

- Qikiqjjaarvik Hydrological Analysis (Jaynes River) – September 19, 2008
- Kangalait Hydrological Analysis (Cantley River) – September 19, 2008
- Akulikutaaq Hydrological Analysis (Armshow River) – September 19, 2008
- Tungatalik Hydrological Analysis (Armshow South River) – September 19, 2008

The hydrological analysis included correlating the period of record flow data for each location (approximately 1.5 years of data) to the long-term flow records for the Sylvia Grinnell River to create a synthetic long-term record for each site. At the time of the studies, it was noted the uncertainty of the data relative to short record period and as such the flow data was adjusted down by 25 percent to be conservative.

For this project, it is felt for the Phase 1 and Phase 2, this same approach can be taken, and further work done to understand the uncertainty and the need for a 25 percent reduction. Two

to three years for overlapping periods can support further reduction of risk. As the project continues in Phase 3, it will be important to re-establish hydrometric station(s) for baseline conditions and to also support design optimization. However, it will be first important in the first two phases to determine the preferred alternative, such that when hydrometric stations are re-installed, they are re-installed in the desired project location/basin. This will be further reviewed in Phase 1.

To summarize, following is the recommended data collection program for Hydrometric Data.

- *Phase 1* – Use existing Water Survey of Canada data + review/update previous hydrological analysis.
- *Phase 2* – Use existing Water Survey of Canada data + review/update previous hydrological analysis.
- *Phase 3* – Re-engage Water Survey of Canada (Environment Canada) to install hydrometric stations and collect additional data for preferred site locations.

4.0 Wind Data

Although wind project development was not a focus of project development between 2005 and 2014 with the focus being on hydroelectric power development, there was a study conducted in 2006 by Knight Piesold that reviewed the potential for a Wind – Hydro Hybrid project. The “*Iqaluit Combined Wind and Hydroelectric Energy Study*” reviewed the potential of optimizing the size of the hydro development utilizing wind energy as part of the project. The study concluded that this approach is logical and reduces the overall cost of energy, however, work did not continue to review this opportunity.

The reasoning for not pursuing this alternative could be based on the maturity of wind power development in the early 2000’s and the following was noted in the report. Given the immense maturation of wind turbine technology in the last two decades, as well as increased cost efficiency of wind turbine technology, it is worthwhile to revisit this potential project configuration.

According to the Knights Piesold study, they had *assumed that for 2 months of every year the wind turbines would have to be shut down due to extreme weather (i.e., extremely high winds or low temperatures < -35 C). Based on these constraints and an initial assessment, we would expect the wind farm to have a capacity factor of about 25%”.*

This would be considered a low-capacity factor for current wind development projects in Canada, given the maturity of wind technology in the past two decades. It is expected that during Phase 1 and Phase 2 studies, hybridizing a hydroelectric project with a wind development will be reviewed and assessed as a possible preferred alternative, pending community support. To undertake this review, some level of wind speed data will be needed, and no data was collected in the previous studies. However, there are public sources of data (Canadian Wind Atlas) and some existing wind speed data for Iqaluit (Tugliq Energy Co. Iqaluit Wind Project: Wind Resource Assessment Report - 2018) that can be used for Phase 1/2 analysis. Should the hybridized project be selected as the preferred alternative, then at that time (Phase 3), a wind monitoring campaign can take place with the installation of a meteorological tower at the preferred wind project location.

To summarize, following is the recommended data collection program for Wind Speed Data.

- *Phase 1* – Use existing publicly available data and other possible data sources.
- *Phase 2* – Use existing publicly available data and other possible data sources.
- *Phase 3* – Undertake Wind Monitoring Campaign and install meteorological tower at the preferred wind project location.

5.0 Survey Data (Topography)

A review of the previous studies indicate that some LiDAR based surveying was completed, however, this was only done for Jaynes Inlet project. It is always important to have good mapping and surveying data to advance project development and there is more publicly available data today, than was available 10 to 15 years ago.

The focus of this study should be to use available data from the previous work and data publicly available for Phase 1 work. As work continues to Phase 2 and alternatives are being assessed, the capturing of LiDAR based data (drone/satellite) has become more cost effective and can be employed at earlier phases to enhance project definition at earlier phases.

To summarize, the following is the recommended data collection program for Survey Data:

- *Phase 1* – Use existing publicly available data and previous LiDAR surveys.
- *Phase 2* – Conduct LiDAR based surveying of perspective sites.
- *Phase 3* – No Additional survey data expected in this phase.

6.0 Site Visit Data

Numerous site visits were undertaken during previous studies to prospective sites to support the overall understanding of the project development and site conditions (i.e., geotechnical conditions). This is generally something very important for the technical team to undertake and have first-hand knowledge of the site conditions to support design considerations. The previous site condition reports are detailed and can be supportive for early phase work, before additional site visits will be required by the technical team.

To summarize, the following is the recommended data collection program for Site Visit Data:

- *Phase 1* – Use previous site visit reports.
- *Phase 2* – Technical Team to undertake site visits.
- *Phase 3* – Site Visits, as required, for further project development.

7.0 Geotechnical Data

During previous site visits, information collected included evaluation of surficial geology, geotechnical conditions, and terrain hazards related to proposed development. No detailed geotechnical investigations were completed, and recommendations included undertaking detailed investigations during feasibility studies.

It is proposed to undertake the same approach to this work, but also leveraging some of the field study reports from existing studies to support early project development in the current work.

To summarize, the following is the recommended data collection program for Geotechnical Data:

- *Phase 1* – Use previous site visit reports and other publicly available data.
- *Phase 2* – Use previous site visit reports and other publicly available data – desktop review.
- *Phase 3* – Undertake detailed Geotechnical drilling program.

8.0 Environmental Baseline Data

Review of previous work indicates that significant environmental baseline and socio-economic studies took place between 2006 and 2009. This work was primarily done for the Jaynes Inlet development, and the concern related to this data for future use relates to the amount of time that has now passed since the original work. This will have to be reviewed in more detail during Phase 1 studies to understand how much of this data might be considered outdated and developing a new Environmental Baseline data collection program.

Knight Piesold issued to QEC a draft report September 14, 2012, titled “*Detailed Review of Baseline Reports and Data Gaps*” that is attached with this report. It will be important to review this report in the context to the amount of time that has passed, to understand a new data collection program for Environmental Baseline Data.

In general, a listing of the previous work completed is as follows:

- *2006 Environmental Baseline Studies – Five Sites*
 - Armshow River
 - Cantley Bay
 - Jaynes Inlet
 - Anna Maria Port, and
 - McKeand River.
 - The key objectives were to identify any major environmental considerations that would affect potential viability of sites under consideration. Baseline studies included Fisheries Assessments, Raptor Surveys, Land Use Studies, and Archaeology Studies.
- *2007 Environmental Baseline Studies – Armshow River, Cantley Bay and Jaynes Inlet*
 - These studies included completion of the IQ study led by QEC, Aquatic studies, desktop vegetation and ecological land classification studies, desktop terrestrial studies, and desktop and overview archaeological surveys.
- *2008 Environmental Baseline Studies – Jaynes Inlet*
 - Biophysical baseline studies in 2008 focused on Jaynes Inlet and included freshwater aquatics program, marine environment studies, and terrestrial environment studies. Also, an initial socio-economic impacts assessment was completed.

- *2009 Climate Change Impact Assessment*
 - The report included a review of physical environment, influence of climate change in northern climates, and description of the implication for hydroelectric development.

- *Spring 2009 Environmental Baseline Studies – Jaynes Inlet*
 - In 2009 several surveys were conducted including vegetation surveys, wildlife surveys, freshwater aquatic studies, and marine aquatic studies.

It will be important to review these reports in much more detail to understand the value of the data for future work. The data can be useful in early phases to help support high level environmental screening of alternatives to understand if there were any defined project constraints to development in certain areas. However, this can be impacted based on possible newer locations for developments because of updated community consultation efforts to ensure community support for the preferred development location. Some high-level notes on the sites from an environmental perspective from Knight Piesold reports follow.

Akulikutaaq (Armshow River) Site Summary: From a western scientific biological perspective, it is not conclusive that potential fish barriers on the mainstem prevent the upstream migration of sea-run char. The analysis of strontium ratios from captured fish is an option to assess these potential barriers and the extent of upstream migration by sea-run Arctic char. The Armshow River, compared to the other sites being considered, has the heaviest local use and it is expected that hydroelectric development on this river would generate the most public concern. The impact of discharging water from the powerhouse back into the river will need to be considered in terms of affecting land use. One of the smaller projects, Armshow Right Lake, is located within the Katannilik Territorial Park, which is a conflicting land use.

Qikiqijaarvik (Jaynes Inlet) Site Summary: From a western scientific biological perspective, there do not appear to be major obstacles to development of a hydroelectric project at Jaynes Inlet, and in fact, this project is probably the most attractive in this respect. There is limited potential to conflict with existing land uses. The issue of running a transmission line through the Katannilik Territorial Park, which does not permit industrial development within its boundaries, would need to be addressed before development of this site could occur, along with thorough community engagement.

Kangalait (Cantley Bay) Site Summary: Fisheries studies identified arctic char throughout this river system, including spawning freshwater char. A potential barrier to fish migration was identified in the lower reach of the river, and visual observations of captured fish are indicative of freshwater, but strontium testing would be required to be certain. Overall, the main potential obstacle to potential development of this site would be if additional testing to determine is a sea-run population of arctic char using the river.

To summarize, following is the recommended data collection program for Environmental Baseline Studies.

- *Phase 1* – Use previous reports to support environmental screening of project alternatives – detailed review of existing data and plan for future Environmental Baseline Studies.
- *Phase 2* – Use previous reports to support environmental screening of project alternatives – detailed review of existing data and plan for future Environmental Baseline Studies – likely start new Environmental Baseline Collection Program.
- *Phase 3* – Undertake/continue Environmental Baseline Data Collection Programs.

9.0 Iqaluit Electrical and Thermal Load Data

Iqaluit historical electrical and thermal load data and forecasts used in previous studies are now outdated. It will be important for QIA and NNC to work with/request updated data from QEC. This data should be made available for Phase 1 studies and be updated, along with sensitivities to forecast data, as the project is executed through each phase.

10.0 Conclusion and Recommendation

QEC started a significant process reviewing the potential for renewable energy alternatives for the City of Iqaluit in 2005 as a long-term energy plan to supply a sustainable, affordable, and reliable source of energy. This work continued for 10 years and in 2014 the project was cancelled due to the large capital investment required to proceed with the projects.

QIA and NNC are interested in focusing on identifying opportunities to improve and secure energy supply, thereby reduce Greenhouse Gas (“GHG”) emissions in Iqaluit by harnessing renewable energy near Iqaluit. QIA and NNC are undertaking a phased approach to this project to ensure a robust, defined, and community-led project process is followed.

QIA and NNC recognize that significant work has taken place since 2005 and understand the importance of first reviewing previous work undertaken by QEC to determine if it aligns with current business drivers. Work has begun on framing business drivers and the business case, and the scope of this exercise is to understand what data, if any, can be used from the original studies between 2005 and 2014.

It is recommended that existing data be used, as defined in this report, to support the new development work to be undertaken by QIA and NNC. However, there will be areas where additional data collection programs will be required as each phase of the project develops, as noted in this report. This detailed assessment will be further assessed as the project executes through the defined Road Map, with modifications to the plan to be updated in the Project Execution Plan as community consultations occur.

3.0 Preliminary Business Case



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Nukkiksautiit Project

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1.0 Project Definition

1.1 Project Description

Nunavut is currently 100% reliant on diesel fuel for electricity generation, which is neither economically nor environmentally sustainable in the long-term. With the City of Iqaluit having the largest population in the Territory and therefore the largest electrical load, transitioning Iqaluit's electricity supply away from diesel generation will have a significant impact in reducing Greenhouse Gas ("GHG") emissions in the Territory and reducing Nunavut's total reliance on diesel fuel. With this, NNC is investigating opportunities related to renewable energy development on Inuit Owned Land ("IOL") in the Iqaluit area, hereafter referred to as *Iqaluit Nukkiksautiit Project*. This would be a fully Inuit-led solution to transitioning remote communities in Canada off diesel.

This project is founded upon an Inuit-led approach to project development. Consistent with the spirit and commitment of reconciliation, this project presents a unique Inuit-led and Inuit governed approach to developing Nunavut's natural resources. This project will advance through the leadership, knowledge, and experience of Inuit governance systems according to a project plan that prioritizes the interests of Inuit rightsholders, the collection and application of Inuit knowledge, and community preferences directly into project planning and decision-making.

Nunavut's only utility, Qulliq Energy Corporation ("QEC"), has continuously noted their concerns with certain sources of renewable energy due to its intermittency; hydroelectricity does not have that same issue and can in fact be more reliable, safe, and resilient than diesel generation. As such, a hydroelectric project in Iqaluit has the potential to not only bring environmental, social, and economic benefits to Nunavummiut, but could also provide improved reliability and safety to QEC, along with cost savings on the operational side of utility management.

There is a strong business case for renewable energy development in the Iqaluit region both in terms of social and financial benefits. From a social perspective, increasing uncertainty around fuel supply and availability has increased risk associated with energy security. From the financial perspective, significant funding and low-rate financing are available for decarbonizing initiatives like the *Iqaluit Nukkiksautiit Project*.



1.2 Business Objectives

The primary project objective is to find and develop an economically and environmentally sustainable solution for Iqalungmiut through an Inuit-led approach to project development. The community drivers, in this case, outweigh purely financial/economic drivers, so they are unique in comparison to a traditional ‘for profit’ developer model. The business drivers, which will be used to steer and measure the success of the project at key milestones, will be detailed in a later section. Please note that the Inuit Qaujimagatuqangit (“IQ”) Assessment Criteria which will be established by QIA in Phase 2 will inform the Business Drivers further in a subsequent versions of this document, so specific drivers may be subject to change as the project matures.

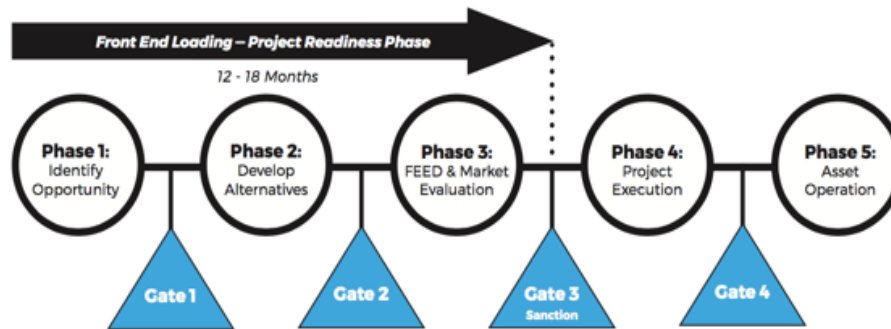
A “Vision of Success” for the *Iqaluit Nukkiksautiit Project* includes:

- Inuit & Community Support for the Project;
- Development of a Viable Renewable Energy Solution on Inuit-Owned Land;
- Majority Inuit Ownership;
- Economic and environmental benefits to the region;
- Long-term energy security for the City of Iqaluit;
- Job creation and educational capacity building.

To meet these objectives and overcome the challenges presented by diesel dependency, NNC have proposed the following actions:

1. Create a “Community-First” Project Plan, advancing Inuit and community consultation as an early project priority, which is carried through each subsequent phase of the Project;
2. Create a phase-gate project roadmap that clearly implements project checkpoints and establishes “off-ramps” to avoid poor project outcomes and improve Inuit oversight of the Project;
3. Create a Funding Roadmap and pursue funding for early project development to eliminate financial risk associated with early phase project development costs;
4. Establish Project Governance early in development to ensure continuous alignment with community and decision makers.

The *Iqaluit Nukkiksautiit Project* is clearly aligned with the business objectives and has the potential to meet the “Vision of Success”. By following the actions stated above, this can be achieved with little-to-no risk to both QIA and NNC business operations.



1.3 Project Benefits

There are a wide variety of environmental, social, and economic benefits that will be derived from the development of a hydroelectric facility in Iqaluit during all phases of the project development cycle. Residual benefits from this Project would be a novel approach toward Inuit rightsholder engagement, the completion of a Tusaqtavut Study which can inform both this Project and future developments in Iqaluit, and a clear record and summary of public views on hydroelectric development in the Canadian Arctic. Through the project governance structure and feasibility stages, NNC will be in a position to consistently apply information gathered directly into early project development, ensuring the tangible outcomes of the project best reflect the desires of Iqalungmiut. Commonly, natural resource projects initiate Inuit rightsholder engagement and Inuit Qaujimajatuqangit (“IQ”) studies following the completion of a feasibility assessments. Through this approach, Inuit cultural and societal values (“IQ”) will contribute directly to the project feasibility assessment. The feasibility study and early phase development work will proof assumptions related to job creation, GHG emissions reduction, annual energy generation potential, environmental impacts, etc. Information will be shared directly with Nunavummiut and will inform the NIRB proposal for the Project, which will be developed in Phase 3. This approach will also set a precedent for future natural resource development activities to ensure Inuit rightsholders are involved in every phase of development. *It is imperative to note that Inuit Knowledge and Inuit Traditional Knowledge will steer the development of this project; no development activities will continue without the full support of Inuit and community leaders.*

In addition to the benefits of the project development philosophies and approach, a successful project development initiative will carry many benefits:

- ✓ Long-term energy security for the City of Iqaluit;
- ✓ Emissions reduction through the direct elimination of fossil fuel generation with renewable energy generation (~150,000 MWh);
- ✓ Creation of a steady revenue stream for indigenous organizations;
- ✓ Return on Investment to the Qiqiktani Inuit;
- ✓ Creation of long-term jobs associated with the operations of renewable energy facilities;
- ✓ Operational cost savings through facility efficiency;

- ✓ Energy Independence, Self-Sufficiency;
- ✓ Alignment of energy supply with Inuit values.

1.4 Business Drivers

The business drivers for the *Iqaluit Nukkiksautiit Project* will be informed by NNC's Business Drivers Questionnaire upon completion. This ensures that community interest, a cornerstone of this project, are engrained in the project structure from the outset. As stated previously, the IQ Assessment Criteria established by QIA in Phase 2 will inform the Business Drivers further in a subsequent versions of this document, so specific drivers may be subject to change as the project matures.

Based on discussions leading up to the submission of a funding application for the Project, the following business drivers will be used for evaluating the project at key decision points:

1. **Community Favourability** – The facilities associated with the *Iqaluit Nukkiksautiit Project* will serve a core function to the community for generations-to-come and will also be a part of the physical landscape. It is important that the community understand the value created and the trade-offs of the project all throughout the project development cycle. For this reason, the project should conform to the 'phase-gate' approach of project development, with QIA & NNC filling the role of the 'gatekeepers' at each major progress milestone of the project.
2. **Economic Indicators (NPV, IRR)** – Key infrastructure projects, such as electricity systems, are central to the quality of life for a society. It is, therefore, understood that high financial returns are not the drivers of such projects. That said, the project should also make good financial sense, and have some positive return to investors. For these reasons, *the Iqaluit Nukkiksautiit Project* should target a *positive NPV position and set a desired IRR target in Phase 2*. Note that the economic targets may help guide decisions on sizing of the system for present vs. future load growth, a decision that currently sits 'on the frame'.
3. **Ownership Structure**– The *Iqaluit Nukkiksautiit Project* will, inevitably, be a major capital project and will therefore carry some inherent financial risk. This risk, carefully managed under a well-planned and executed project, will produce financial returns. Carrying 100% of this risk may not be desirable, so a *minimum target of 51% Inuit ownership* should be achieved through the course of the project. The project may start with 100% ownership and dilute down as the project proceeds to maturity.
4. **System Reliability** – Diesel systems, while cost prohibitive due to fuel cost, are highly reliable. In communities with transmission infrastructure, the reliability is constrained by the transmission system, reducing the reliability to 97%. Reliability is critical in the off-grid, since multiple generation sources are not typically an option. For the Iqaluit

Renewable Energy Project, *system reliability should achieve, at a minimum, the same reliability as a transmission-connected system, or 97%.*

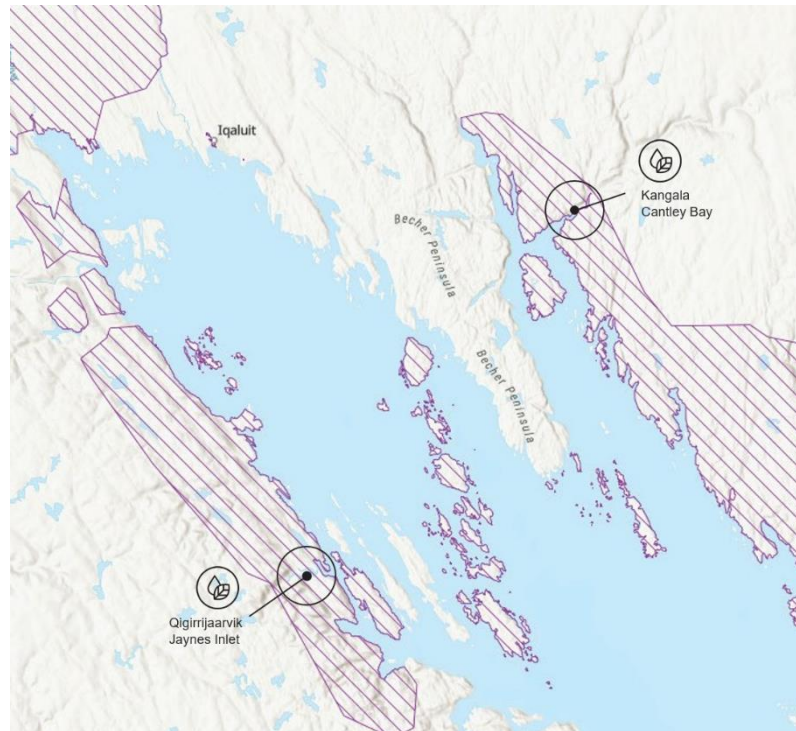
5. **Reducing the Environmental Footprint** – Diesel systems, while renewable, are significant sources of emissions, contributing to global warming and reducing air quality from a local perspective. Renewable systems, while boasting little-to-no emissions, also have an environmental footprint, especially in terms of physical landscape. Great care will be taken to minimize the impact to wildlife, hunting practices, and general quality of life for the community. Coordination with Inuit rightsholders, alignment with IQ and respect for the land will be paramount in project alignment with this business driver.

1.5 Preliminary Options

Some feasibility work was undertaken by QEC 10-15 years ago; a review of this past work has been completed to better understand any gaps in information and develop recommendations for future data collection (see IQA-TDP-RP-001). Three sites had previously been identified for hydroelectric development: Jaynes Inlet, Armshow River, and Cantley Bay. Both Jaynes Inlet and Cantley Bay have the potential to host project assets on Inuit Owned Land, making them both good options to investigate further. QEC has initially identified Armshow River as their preferred location, however this is not on IOL and received significant public pushback. Upon closer investigation, there appears to be an opportunity to optimize Jaynes Inlet and Cantley Bay by relocating facilities within IOL lands. As such, QIA and NNC are now exploring both Jaynes Inlet and Cantley Bay as options for development.

While it is envisaged that the project will primarily focus on hydro development, there have been numerous projects emerge internationally where ‘hybridizing’ of renewable energy sources have led to better project outcomes. For Iqaluit, this would mean potential consideration for augmenting hydro with wind development. This could potentially result in lower capital costs and a smaller environmental footprint without sacrificing the reliability of a hydroelectric facility.

Pre-feasibility work leading to feasibility work is now required to advance the readiness of the *Iqaluit Nukkiksautiit Project*. This work will be undertaken in three Phases and will be comprised of both technical and community consultation efforts.



1.6 Project Plan

The project will adopt a two-pronged approach advancing both technical and community engagement work from the outset. While early engagement has taken place, more detailed consultations with wider reaching stakeholders is planned for this next phase of pre-feasibility work. As the Designated Inuit Organization for the Qikiqtani Region (“DIO”), QIA plans to lead and initiate public outreach by exploring a series of broad questions regarding current energy systems and seeking feedback on the social acceptability of renewable energy solutions, focusing on hydroelectric power generation. Presuming Inuit rightsholders support examination of hydroelectric potential, QIA would undertake a Tusaqtavut Study to gather Inuit Qaujimajatuqangit (“IQ”) in the Iqaluit area, formally recording Inuit traditional knowledge and Inuit knowledge through documenting land use and cultural activities. This will help to inform project design considerations including confirming activities that would be incompatible with Inuit land use and values. Additionally, QIA and NNC plan to undertake collaborative community engagement to formally introduce the overall project plan, project components and stages, and to seek input and feedback from the public. These activities would focus on public engagements therefore extending beyond the interests of Inuit rightsholders and the Tusaqtavut Study.

In addition to Inuit rightsholder engagement, the Tusaqtavut Study, and public consultations, a technical investigation will be advanced in such a way as to revisit the previous design work completed by QEC and incorporating IQ along with new technological solutions into an updated preliminary design. An alternatives analysis will be completed to better understand any complimentary technologies that could be incorporated to improve the Project economics



and/or viability. Upon the completion of the pre-feasibility work, a site will be selected, and a preferred design will be selected to advance further, which will be heavily guided by Inuit Knowledge and Inuit Traditional Knowledge; movement beyond the pre-feasibility work is entirely contingent on Inuit and community support. Detailed feasibility work will then commence to allow for site-specific environmental, geotechnical, and hydrogeological survey work to be completed. Upon the completion of the feasibility activities, sufficient information will be available to submit a Nunavut Impact Review Board (“NIRB”) application for the *Iqaluit Nukkiksautiit Project*. This proposed stage-gate approach to project planning and decision making will also align with Inuit governance processes.

To illustrate overall project plans and timelines, a Project Roadmap has been created for the *Iqaluit Nukkiksautiit Project*. A high-level timeline has also been developed to depict a high-level timeline from project initiation to operations. As illustrated, renewable energy projects, like all major capital projects, have a long timeline, so it is imperative to start early phase work in a timely manner.

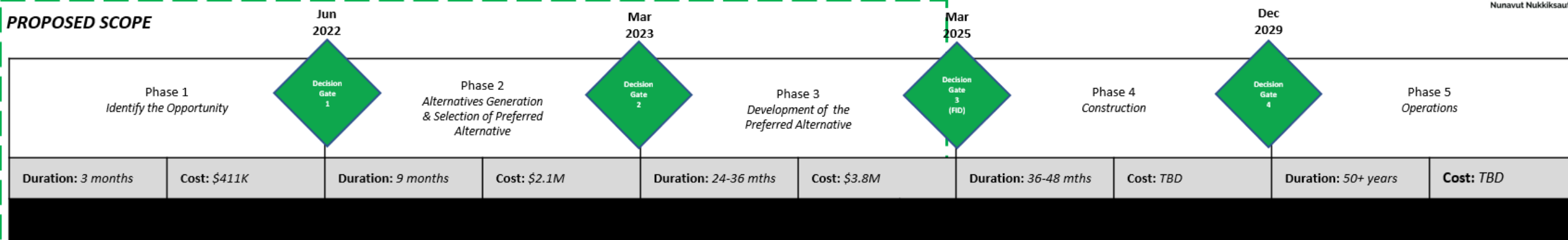


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Nunavut Nukkiqsautiit Corporation

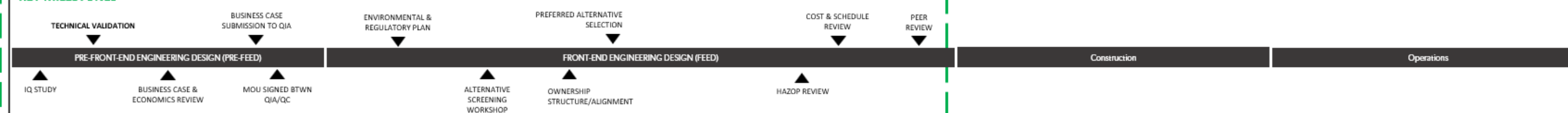
PROJECT ROADMAP

Iqaluit Nukkiqsautiit Project

PROPOSED SCOPE



KEY MILESTONES



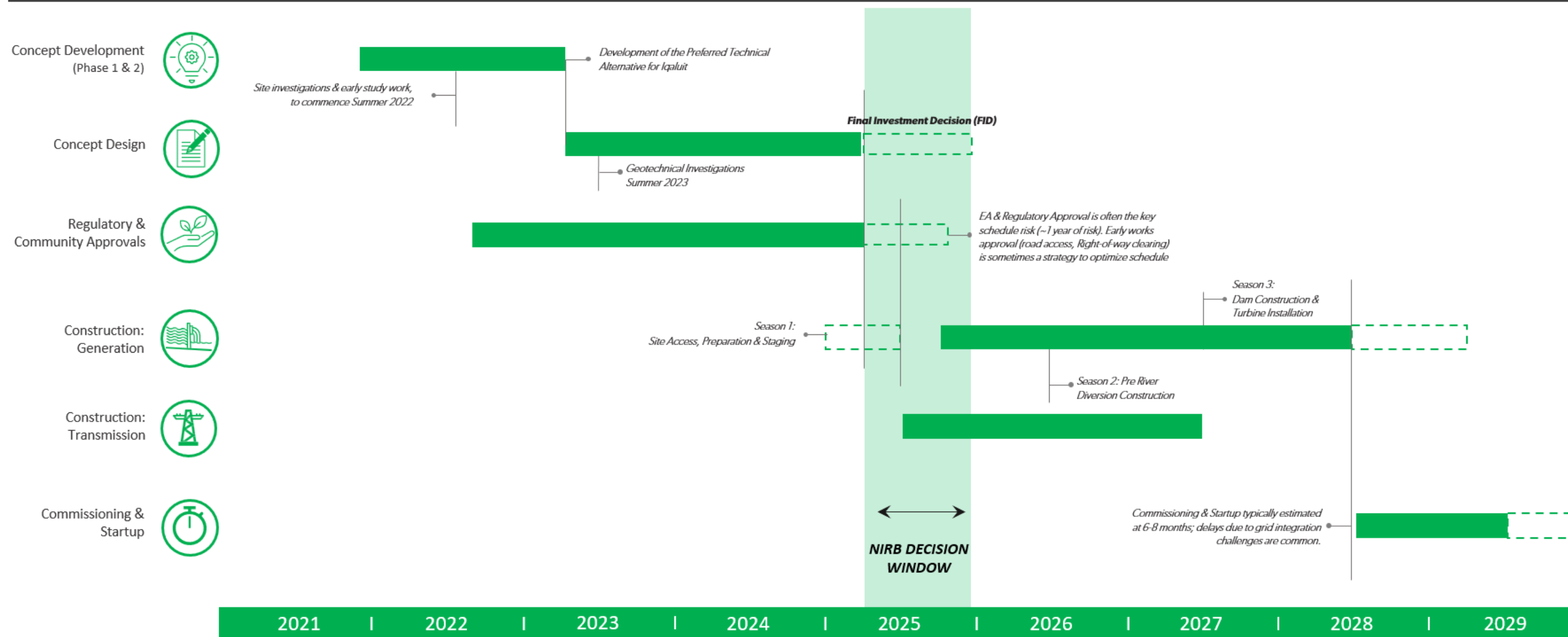
<p>ACTIONS:</p> <p>NNC to complete Project Validation using existing data and analysis. A business case and economics model will be created for the Iqaluit site. QIA to begin Inuit Qaujimajatuqangit study.</p> <p>KEY INTERIM DECISIONS:</p> <ul style="list-style-type: none"> Regional power outlook (inc. forecast) Commercial & Ownership Strategy Strategic Fit with Organizational Mandate Funding availability and Strategy <p>KEY DELIVERABLES:</p> <ul style="list-style-type: none"> Project Framing Document Technical Validation Report 'Book-end' Economics Model Phase 1 Decision Support Package Phase 2 Execution Plan Phase 2 Funding Plan Stakeholder Engagement Strategy 	<p>ACTIONS:</p> <p>NNC to look at viable alternative development schemes for Iqaluit; Alternatives will be evaluated and the Preferred Alternative/scheme will be proposed. Regulatory and Stakeholder Engagement Plan to be developed and implemented in this phase.</p> <p>KEY INTERIM DECISIONS:</p> <ul style="list-style-type: none"> Ownership structure Appropriate Project Boundaries & Frame Alternative Evaluation Criteria Preferred Alternative Selection <p>KEY DELIVERABLES:</p> <ul style="list-style-type: none"> IQ Study Alternatives Generation & Selection Report Environmental & Regulatory Review Report Updated Project Framing Document Level 4 Cost Estimate Level 2 Schedule Economics Model (for Preferred Alternative) Phase 2 Decision Support Package Phase 3 Funding & Financing Plan Phase 3 Execution Plan 	<p>ACTIONS:</p> <p>Several key activities to be completed in this phase, highlighted by detailed design of the Preferred Alternative for Iqaluit. Contracting Strategy will also be developed and implemented in this phase. Any early data collection and critical long lead item procurement (i.e. turbines) will occur in phase 3.</p> <p>KEY INTERIM DECISIONS:</p> <ul style="list-style-type: none"> Commercial Agreements (Land, water use, PPA etc) Environmental & Regulatory Strategy Contracting Strategy for Construction Phase Procurement of Critical Long Lead Items <p>KEY DELIVERABLES:</p> <ul style="list-style-type: none"> Technical Basis of Design Technical Drawings & Documents Work Breakdown Structure/Commercial Plan Power Purchase Agreement EA Project Registration Document Level 3 Schedule/Level 2 Cost Estimate Project Risk Assessment (Cold Eyes Review) Probabilistic/Risk Loaded Economics Model Phase 3 Decision Support Package (FID) Phase 4 Funding & Financing Plan Phase 4 Execution Plan 	<p>ACTIONS:</p> <p>Construction Phase will focus on the construction of the preferred alternative, with a high focus on safety, environmental stewardship, quality and engineering surveillance. Operations readiness will become a greater focus area in this phase. Project will be handed over to the operating entity at the end of the phase.</p> <p>KEY INTERIM DECISIONS:</p> <ul style="list-style-type: none"> Operating Philosophy Handover and Turnover Strategy Site Surveillance and Management Financial closeout strategy <p>KEY DELIVERABLES:</p> <ul style="list-style-type: none"> Phase 4 Construction Plan Site Safety Plan Project Controls Plan Risk Management Plan Quality Assurance & Surveillance Plan Environmental Monitoring Plan Lessons Learned - Construction Handover and Turnover Plan Ready For Operations Plan Commissioning & Start-up Plan 	<p><i>Operations Documents to be defined and implemented by the Operations Entity in Phase 2/3...</i></p>
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Nunavut Nukkiksautiit Corporation

PROJECT TIMELINE

Iqaluit Nukkiksautiit Project



1.7 Project Boundaries

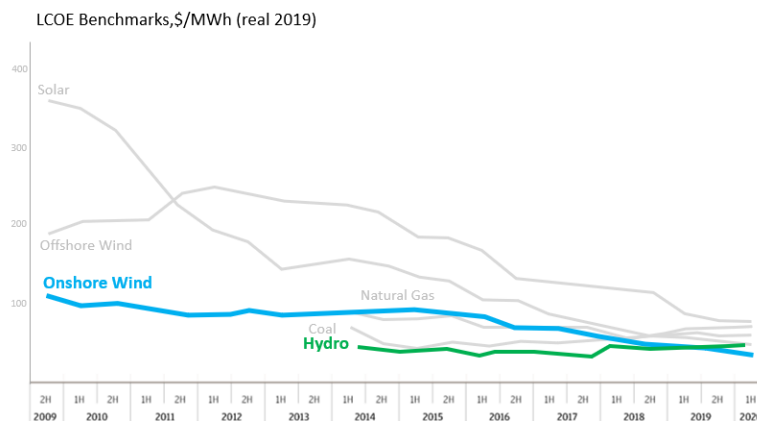
The following table illustrates project elements considered 'in/out of scope' for the project:

Project Boundaries	In Bounds	Out of Bounds	On the Boundary	Rationale: Why it should be <u>in</u>	Rationale: Why it should be <u>out</u>
Transmission Assets	X			There will be a requirement to interconnect to Iqaluit's existing grid.	
Generation Facility	X			Water power and wind power facilities will be the core asset in this project.	
Site access	X			Dedicated access will be required for construction and O&M activities.	
Distribution Assets and Equipment		X			It is assumed that power will be sold to QEC for distribution.
Switchyard/Substation Assets	X			Necessary for grid integration (upgrade to QEC switchyard) and switchyard at generation facility	
Protection and Controls			X	There will be some P&C involved with facility integration; boundary TBD	NNC may want to 'own' the integration in to the grid from a software perspective
Future Expansion/load growth in Iqaluit			X	This may be an opportunity to address future growth or displacement of thermal load	NNC may consider a 'stepped' approach where system is size for immediate/short term load.
Commissioning	X			Needs to be commissioned before integration to QEC's equipment	
Operations and Maintenance	X			Needs to be considered from perspective of economics and community benefits	
Environmental Remediation/Environmental Management	X			May need to mitigate issues raised during environmental assessment process	

1.8 Market Assessment

From a purely ‘energy demand’ perspective, it is reasonable to assume that energy consumption will grow in Iqaluit. With a large population (7,740 from the 2016 census), a healthy growth rate (15.5% from 2011 to 2016), stable employment, and accessible education, Iqaluit has all the metrics of a growing community. This is a positive indicator for renewable development in Iqaluit. Electricity demand, already known to be an inelastic commodity, will only grow in demand with the growth in electric vehicles for transportation and a global push to reduce emissions from all forms of fossil fuel consumption. This represents an opportunity from an electricity generation and sales perspective.

Over the past two decades, the performance of renewable energy systems has improved remarkably in all areas, including the generation, controls and transmission of renewable energy. While hydro has long been an economic source of energy, other renewable systems are also catching up. In general, it is now the case that renewable energy is outcompeting fossil fuel on a Levelized Cost of Energy (“LCOE”) basis.



There are numerous examples in Canada of successful off-grid conversions from diesel to hydroelectricity. Canada has one of the strongest hydro potential inventories globally, and has built an impressive portfolio of assets and skills to match. One example of a conversion is in L’Anse Au Loup, Labrador, where not only did they replace its diesel system with a hydroelectric source (Lac Robertson), consumer confidence immediately grew, and energy consumption grew almost immediately due to conversion to electric heat in homes, and confidence to open new ventures and businesses (Feehan, 2016).

In summary, electricity, an inelastic resource, sells itself, so there is a guaranteed market for the product. Other regions have demonstrated that stable, renewable systems evoke consumer confidence, resulting in demand growth almost immediately. This is a strong case for renewable development in Iqaluit.

1.9 Risk Assessment

While the market opportunity is clearly significant, it is important to note that major capital projects carry inherent risk, if the risks are not properly managed. NNC acknowledge this and through an early approach to risk management, have implemented a phase-gate project approach to the *Iqaluit Nukkiksautiit Project*. In addition to the phase gate system, the following are envisaged to be additional risk mitigation measures that will be built into the project plan:

- ‘Cold Eyes’ Review of Decision Support Packages at each major decision gate by expert organizations (i.e. PWC or equivalent);
- Involvement of international hydroelectric subject matter expert from Landsvirkjun, the national utility of Iceland, during the technical development of the project. Landsvirkjun offers the unique perspective of both a designer and a utility which will invaluable to the project;
- Obtain external funding for the early phases of developing, eliminating the risk of sunk cost;
- Early and ongoing engagement with Inuit rightsholders and community members to ensure local collaboration in all project phases;
- Early adoption of project management and controls mechanisms consistent with PMBOK standards.

Project risks will be captured and mitigated throughout the development, but early identified risks include:

Type of risk		Likelihood and project impact	Mitigation measure
1	Community Opposition	Likely – this could cause delays in Project Development	Medium – Engagement has already commenced with the Iqaluit Community Lands and Resources Committee (CLARC) and the establishment of a Stakeholder Engagement Plan will ensure stakeholders are engaged early and often
2	Data Collection Delays	Unlikely – this could cause delays in Project Development if fundamental data collection cannot be completed (electrical data, Inuit Knowledge, etc.)	Low – Data collection will commence early and members of the Project Team have collected this type of data for renewable energy projects in the past and thus have an appropriate understanding of the length of time and associated costs of doing so.
3	Travel Delays	Unlikely – this could cause delays in Project Development if required consultants are not able to travel to Nunavut to carry out necessary field work	Low – Planning will commence early enough that there should be no timing constraints if site visits are delayed due to weather constraints or potential new impacts of the spread of COVID-19 variants.
4	Inflation	Likely – inflation rates are expected to rise in 2022 and beyond.	Low – This risk will be low during the FEED and planning phase; it will be a risk to be contemplated during the construction phase and will be managed through a contracting strategy.

5	Productivity during Pandemic	Likely – Pandemic restrictions are expected to continue during 2022 and possibly beyond.	Low – Project team will be small and will reside in a relatively small populated/low risk region. Productivity not expected to be significantly impacted during planning phase.
6	Regulatory Approvals Process	Likely – Environment and regulatory approvals can be a source of cost variance beyond Phase 3.	Medium - Clarity on Regulatory Strategy will be confirmed through Phase 2 and 3.

Residual Risk Level	
Low	The residual risk has little potential for impact on project success. The Applicant is confident the mitigation measures in place effectively manage the risk.
Medium	The residual risk has some potential for impact on the project. With mitigation measures in place, the potential impact is not critical to project success or is very unlikely to occur.
High	The residual risk has significant potential to impact project success with outlined mitigation measures in place.

2.0 Financial Analysis

Previous study work of hydro developments off IOL lands have returned a wide range of outcomes, largely driven by the size of the generation facility itself. It should be noted that it is believed that relocating facilities on to IOL lands may lead to significant optimizations of facility sizes; while the study work must first be completed to validate this theory, it is believed to be an opportunity worth exploring in the early stages.

This section of the Business Case will be updated at the end of Phase 1.

2.1 Financial Appraisal [HOLD]

Complete this section at the end of Phase 1; use concept 'bookends' generated by the project team.

2.2 Sensitivity Analysis

Complete this section at the end of Phase 1; use concept 'bookends' generated by the project team.



3.0 Project Organization

NNC has unique experience in renewable energy development in Nunavut as a leader in the clean energy transition in the Territory. NNC will work closely with team members and stakeholders to ensure the rights and interests of Qikiqtani Inuit are prioritized and upheld.

As an Inuit-led project, NNC will prioritize the engagement of communities and community organizations, which will be represented in its team structure. Key team members for the project are:

Project Management

Team Member	Organization	Role	Phone number	Email	
1	<i>Heather Shilton</i>	Nunavut Nukkiksautiit Corporation	Project Manager	867-979-8400	hshilton@qcorp.ca
<p>Heather Shilton has over five years of experience in the renewable energy industry, primarily in Ontario, New York State, and Nunavut. She has a Bachelor's degree in Geography, Environmental Studies, and History from Mount Allison University and a Master's degree in Cultural Analysis and Social Theory from Wilfrid Laurier University. She currently serves as the Board Treasurer for the Arctic Renewables Society, is an appointed member to the Sustainable Development Advisory Council for Environment and Climate Change Canada, and oversees a number of renewable energy and energy efficiency initiatives in the Qikiqtani Region of Nunavut in her role as Director at Nunavut Nukkiksautiit Corporation. She is the Nunavut Regional Champion with Efficiency Canada and is a Certified Environmental Professional with a Specialization in Energy with ECO Canada. Heather joined NNC in 2019 bringing with her experience in developing various portfolios of 5-30 MW onshore wind and solar PV projects across North America, in addition to the early development community-scale renewable energy projects in remote communities. Prior to joining NNC, Heather worked on community-owned renewable energy projects in partnership with Indigenous communities and local community members. Heather will be Project Manager for the project. She currently resides in Iqaluit, NU.</p>					
2	<i>Keith Drover</i>	Growler Energy	Deputy Project Manager	709-730-0582	keith.drover@growlerenergy.com
<p>Keith Drover is a professional engineer with 15 years of experience executing complicated projects in harsh and challenging environments. With a background in both early project development and execution, Keith's skill set includes project organization and implementation of project management systems with a specialization in risk management. Keith's career has given him insight into all aspects of project development, including early phase wind and hydroelectric development and large-scale renewable energy project construction. Keith will be the Deputy Project Manager for the scope and will report to the Project Manager.</p>					



3	<i>Robert Woolgar</i>	Growler Energy	Senior Hydro Engineer	709-325-0773	Robert.woolgar@growlerenergy.com
<p>Robert is a professional engineer with over 23 years of professional and project management experience who has developed strong leadership and technical skills by working on diverse renewable energy projects across Canada. Robert, a Fellow with Engineers Canada, is a hydroelectric specialist and is an acting director with the Canadian Dams Association (CDA). Robert will act as the senior hydro engineer and Subject Matter Expert in-support of the technical scope.</p>					

Key Team Members

Team Member	Organization	Role	Phone number	Email	
1	<i>Stephen Williamson Bathory</i>	Qikiqtani Inuit Association	Senior Project Advisor	867-975-8400	SWBathory@QIA.ca
<p>Stephen Williamson Bathory has worked with QIA since 2007 focusing on the management of Inuit rights and interests in natural resources projects. Mr. Williamson Bathory has participated and led the negotiation of four Inuit Impact and Benefits Agreements and infrastructure agreements with the Federal government. As QIA's government relations lead, Mr. Williamson Bathory will assume a role of advising on government engagement with the Federal and Territorial government and development of Inuit and community benefit agreements.</p>					
2	<i>Matthew Hamp</i>	Qikiqtani Inuit Association	Senior Project Advisor	867-975-8400	MHamp@QIA.ca
<p>Matthew Hamp is a professional engineer with 14+ years of experience managing major construction projects in Nunavut. Mr. Hamp lived in Mittimatalik for 7 years and worked for both private and public sectors delivering construction projects. Matthew will be a senior project advisor, focusing on community activities.</p>					
3	<i>Adam Chubbs</i>	Frobisher Energy Services	Senior Electrical Lead	709-597-3020	Adam@frobisherenergy.ca
<p>Adam Chubbs has 17 years' experience in medium and high voltage power distribution, generation, underground and overhead systems, and controls engineering experience. He has extensive experience in cold climate isolated prime power diesel generation system operations in Nunavut. He has 10 years' experience in direct supervision of engineering and operations staff in multidisciplinary project management environments related to regulated utilities in the Nunavut Territory. Adam completed numerous projects across Nunavut and spent over 12 years working in all 24 Hamlets comprising the territory while living in Iqaluit. Adam will be the Electrical Lead for the scope.</p>					
4	<i>Oli G.B Sveinsson</i>	Landsvirkjun Power	Hydro Subject Matter Expert	+354 515 8900	oli.gretar.sveinsson@landsvirkjun.is
<p>Oli G.B. is the Director of Hydropower R&D at Landsvirkjun, the National Power Company of Iceland and also the Chief Engineer of Landsvirkjun Power, a subsidiary of Landsvirkjun. He has a PhD in Civil Engineering specializing in hydrological processes from Colorado State University. Since 2004 he has worked for Landsvirkjun or its subsidiaries. Dr. Sveinsson is a board member and Vice President of the International Hydropower Association (IHA) and a member of the Generation and Environmental Committee of Eurelectric. Oli will be the Subject Matter Expert for the technical scope.</p>					

4.0 CIRNAC Funding Submission



Proposal

Iqaluit Nukkiqsautiit Project Proposal

February 14, 2022

Nunavut Nukkiqsautiit Corporation (NNC) is pleased to submit this proposal for the *Iqaluit Nukkiqsautiit Project* to focus on identifying opportunities to improve energy security while reducing Greenhouse Gas (GHG) emissions in Iqaluit by harnessing renewable energy near Iqaluit.

NNC and its strategic partners are well positioned to execute the required scope of work. With a depth of experience in waterpower projects in analogous regions, this proposal includes companies with the requisite expertise to successfully complete the early phase scope proposed herein.

The proposal herein outlines the work plan for early phase development of renewable energy solutions for Iqaluit. This work will include early phase Inuit rightsholder engagement, project framing, analysis of preferred alternatives, and technical and design development of the preferred alternative. All of this will be completed in stages informed by Qikiqtani Inuit Association's (QIA) Inuit rightsholder and community engagement work, which is seen as perhaps the most fundamentally important early-phase activity for this project. This proposal provides a team and experience overview, highlights our approach to the proposed scope of work, and includes our commercial offer for execution.

A formal Letter of Support from QIA for the proposed workplan is forthcoming as an Addendum to the proposal.

Should you have any questions or concerns related to this proposal, please contact me per the below details.

Warm regards,

A handwritten signature in black ink, appearing to read "H Shilton".

Heather Shilton
Director
Nunavut Nukkiqsautiit Corporation

hshilton@qcorp.ca



Proposal

Iqaluit Nukkiksautiit Project Proposal

Applicant Information

Organization Name	Nunavut Nukkiksautiit Corporation
Type of Organization	Indigenous For-profit Organization
Registration/Incorporation Number	775949936 (Business Number)
Mailing Address	P.O. Box 1228, Iqaluit, NU, X0A 0H0
Project Manager	Heather Shilton, Director
Telephone	867-979-8400
E-mail	hshilton@qcorp.ca

Project Information

Project Name	Iqaluit Nukkiksautiit Project
Project Location	Iqaluit, NU
Ownership Percentage	100% Indigenous Owned
Estimated Project Start Date	March 2022
Estimated Project End Date	March 2025
Project Size	10-40 MW
Expected Annual Generation	~70-150,000 MWh
Capacity Factor	~84%
Expected Direct Job Years Created by Project	100
Total Project Costs	\$7,117,871 CAD
Requested Amount from Northern REACHE	\$7,067,871 CAD

Description of Project

Nunavut is currently 100% reliant on diesel fuel for electricity generation, which is neither economically nor environmentally sustainable in the long-term. With the City of Iqaluit having the largest population in the Territory and therefore the largest electrical load, transitioning Iqaluit's electricity supply away from diesel generation will have a significant impact in reducing Greenhouse Gas ("GHG") emissions in the Territory and reducing Nunavut's total reliance on diesel fuel. With this, Nunavut Nukkiksautiit Corporation ("NNC") is investigating opportunities related to renewable energy development on Inuit Owned Land ("IOL") in the Iqaluit area, hereafter referred to as Iqaluit Nukkiksautiit Project. This would be a fully Inuit-led solution to transitioning remote communities in Canada off diesel.

This project is founded upon an Inuit-led approach to project development through NNC. Consistent with the spirit and commitment of reconciliation, this project presents a unique Inuit-led and Inuit governed approach to developing Nunavut's natural resources. This project will advance through the leadership, knowledge, and experience of Inuit governance systems according to a project plan that prioritizes the interests of Inuit rightsholders, the collection and application of Inuit knowledge, and community preferences directly into project planning and decision-making. This proposal is a clear departure from natural resource project proposals developed by third-parties which seek Inuit participation following the development of a formal project proposal.

Proposal

Iqaluit Nukkiqsautiit Project Proposal

Nunavut’s only utility, Qulliq Energy Corporation (“QEC”), has continuously noted their concerns with certain sources of renewable energy due to its intermittency; hydroelectricity does not have that same issue and can in fact be more reliable, safe, and resilient than diesel generation. As such, a hydroelectric project in Iqaluit has the potential to not only bring environmental, social, and economic benefits to Nunavummiut, but could also provide improved reliability and safety to QEC, along with cost savings on the operational side of utility management.

Some feasibility work was undertaken by QEC 10-15 years ago; a review of this past work is currently underway to better understand any gaps in information and develop recommendations for future data collection. Three sites had previously been identified for hydroelectric development: Jaynes Inlet, Armshow River, and Cantley Bay. Both Jaynes Inlet and Cantley Bay have the potential to host project assets on IOL, making them both good options to investigate further. QEC had initially identified Armshow River as their preferred location, however this site is not on IOL and received significant public pushback. Upon closer investigation, there appears to be an opportunity to optimize Jaynes Inlet and Cantley Bay by relocating the renewable energy infrastructure within IOL lands. As such, NNC is now exploring both Jaynes Inlet and Cantley Bay as options for potential future renewable energy development.

Pre-feasibility work leading to feasibility work is now required to advance the readiness of the Iqaluit Nukkiqsautiit Project. This work will be undertaken in three Phases and will be comprised of both technical and community consultation efforts. The pre-feasibility work and subsequent feasibility work forms the basis of this proposal and is hereby referred to as the Project (“Project”).

While early engagement has taken place, more detailed consultations with wider reaching stakeholders is planned for this next phase of pre-feasibility work. As the Designated Inuit Organization (“DIO”) for the Qikiqtani Region, QIA will be tasked with leading and initiating public outreach by exploring a series of broad questions regarding current energy systems and seeking feedback on the social acceptability of renewable energy solutions, focusing on hydroelectric power generation. Presuming Inuit rightsholders support examination of hydroelectric potential, QIA would undertake a “Tusaqtavut Study” to gather Inuit Qaujimagatuqangit (“IQ”) in the Iqaluit area, formally recording Inuit knowledge and Inuit traditional knowledge through the documentation of land use and cultural activities. This will help to inform Project design considerations including confirming activities that would be incompatible with Inuit land use and values.

Additionally, NNC plans to undertake collaborative community engagement with QIA to formally introduce the overall project plan, project components and stages and to seek input and feedback from the general public. These activities would focus on public engagements therefore extending beyond the interests of Inuit rightsholders and the Tusaqtavut Study.

In addition to Inuit rightsholder engagement, the Tusaqtavut Study, and public consultations undertaken with CIRNAC funding, a technical investigation will be advanced in such a way as to revisit the previous design work completed by QEC and incorporating IQ along with new technological solutions into an updated preliminary design. An alternatives analysis will be completed to better understand any complimentary technologies that could be incorporated to improve the Project economics and/or viability. Upon the completion of the pre-feasibility work, a site will be selected, and a preferred design will be selected to advance further; movement beyond the pre-feasibility work is entirely contingent on Inuit and community support. Detailed feasibility work will then commence to allow for site-specific environmental, geotechnical, and hydrogeological survey work to be completed. Upon the completion of

the feasibility activities, sufficient information will be available to submit a Nunavut Impact Review Board (“NIRB”) application for the Iqaluit Nukkiqsautiit Project. This proposed stage-gate approach to project planning and decision making will also align with Inuit governance processes.

Project Benefits

Taking a staged approach toward this feasibility study will enable NNC to confirm a desire to advance the Iqaluit Nukkiqsautiit Project toward the creation of a formal project proposal presented to NIRB. A formal project proposal would be informed by all components of this proposal including but not limited to: Inuit rightsholder engagement, Tusaqtavut Study, community consultation results, site survey work, technical design work, and stakeholder/political engagements. The Project would allow NNC to perform thorough due diligence on all work completed to date and undertake all work required to fill gaps in knowledge in order to prepare a project proposal for NIRB.

While a wide variety of environmental, social, and economic benefits will be derived from the physical construction of a hydroelectric facility in Iqaluit, the same is true for the feasibility study. Residual benefits from this Project would be a novel approach toward Inuit rightsholder engagement, the completion of a Tusaqtavut Study which can inform both this Project and future developments in Iqaluit, and a clear record and summary of public views on hydroelectric development in Nunavut. Through the project governance structure and feasibility stages, NNC will be in a position to consistently apply information gathered directly into the feasibility study. Commonly, natural resource projects initiate Inuit rightsholder engagement and IQ studies following the completion of a feasibility assessments. Through this approach, Inuit cultural and societal values will contribute directly to the project feasibility assessment. The feasibility study and early phase development work will proof assumptions related to job creation, GHG emissions reduction, annual energy generation potential, environmental impacts, etc. Information will be shared directly with Nunavummiut and will inform the NIRB proposal for the Project. This approach will also set a precedent for future natural resource development activities to ensure Inuit rightsholders are involved in every phase of development.

Project Governance

NNC is a wholly-owned subsidiary of Qikiqtaaluk Corporation, which is the Inuit birthright development corporation created by QIA. Through selecting the optimal mix of clean energy technologies such as solar, wind, hydro, and energy storage, NNC tailors renewable energy projects that are affordable, reliable, and accessible for communities in the Qikiqtani Region. NNC’s goal is to sustainably power communities in the Qikiqtani Region through empowering communities and supporting community/local ownership of renewable energy projects, reflecting the needs of Nunavut as voiced by communities and Inuit leaders. Throughout the development of this project NNC will provide updates on project activities and outcomes for Qikiqtaaluk Corporation’s Board of Directors. Furthermore, through the stage-gate decision making process, engagement with QIA’s elected Leadership and Inuit rightsholders, specifically Hunters and Trappers Organizations, will be sought to confirm direction and decisions. This approach to Project Governance ensures Inuit rightsholders are the decision makers for the Project.



Proposal

Iqaluit Nukkiqsautiit Project Proposal

3	<i>Robert Woolgar</i>	Growler Energy	Senior Hydro Engineer	709-325-0773	Robert.woolgar@growlerenergy.com
<p>Robert is a professional engineer with over 23 years of professional and project management experience who has developed strong leadership and technical skills by working on diverse renewable energy projects across Canada. Robert, a Fellow with Engineers Canada, is a hydroelectric specialist and is an acting director with the Canadian Dams Association (CDA). Robert will act as the senior hydro engineer and Subject Matter Expert in-support of the technical scope.</p>					

Project Contributors

Team Member	Organization	Role	Phone number	Email	
1	<i>Stephen Williamson Bathory</i>	Qikiqtani Inuit Association	Senior Project Advisor	867-975-8400	SWBathory@QIA.ca
<p>Stephen Williamson Bathory has worked with QIA since 2007 focusing on the management of Inuit rights and interests in natural resources projects. Mr. Williamson Bathory has participated and led the negotiation of four Inuit Impact and Benefits Agreements and infrastructure agreements with the Federal government. As QIA's government relations lead, Mr. Williamson Bathory will assume a role of advising on government engagement with the Federal and Territorial government and development of Inuit and community benefit agreements.</p>					
2	<i>Matthew Hamp</i>	Qikiqtani Inuit Association	Senior Project Advisor	867-975-8400	MHamp@QIA.ca
<p>Matthew Hamp is a professional engineer with 14+ years of experience managing major construction projects in Nunavut. Mr. Hamp lived in Mittimatalik for 7 years and worked for both private and public sectors delivering construction projects. Matthew will be a senior project advisor, focusing on community activities.</p>					
3	<i>Richard Paton</i>	Qikiqtani Inuit Association	IQ Lead	867-975-8400	RPaton@QIA.ca
<p>Richard Paton, is QIA's Director of Inuit Qaujimagatuqangit and Engagement. Mr. Paton is responsible for overseeing and directing QIA's activities and interests in the areas of Inuit-led research, collection and application of IQ and integration of Inuit culture and societal values within projects. Mr. Paton has held a variety of senior positions with the Government of Nunavut and Nunavut Tunngavik which provide him with deep insight into the considerations required to effectively engage communities and project partners.</p>					
3	<i>Adam Chubbs</i>	Frobisher Energy Services	Senior Electrical Lead	709-597-3020	Adam@frobisherenergy.ca
<p>Adam Chubbs has 17 years' experience in medium and high voltage power distribution, generation, underground and overhead systems, and controls engineering experience. He has extensive experience in cold climate isolated prime power diesel generation system operations in Nunavut. He has 10 years' experience in direct supervision of engineering and operations staff in multidisciplinary project management environments related to regulated utilities in the Nunavut Territory. Adam completed numerous projects across Nunavut and spent over 12 years working in all 24 Hamlets comprising the territory while living in Iqaluit. Adam will be the Electrical Lead for the scope.</p>					

Proposal

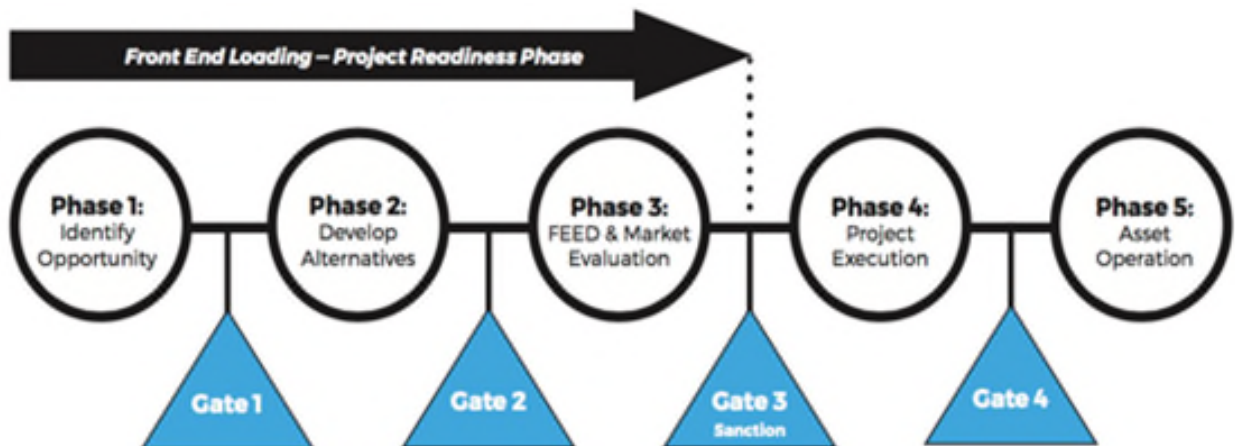
Iqaluit Nukkiqsautiit Project Proposal

4	<i>Oli G.B Sveinsson</i>	Landsvirkjun Power	Hydro Subject Matter Expert	+354 515 8900	oli.gretar.sveinsson@landsvirkjun.is
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Oli G.B. is the Director of Hydropower R&D at Landsvirkjun, the National Power Company of Iceland and also the Chief Engineer of Landsvirkjun Power, a subsidiary of Landsvirkjun. He has a PhD in Civil Engineering specializing in hydrological processes from Colorado State University. Since 2004 he has worked for Landsvirkjun or its subsidiaries. Dr. Sveinsson is a board member and Vice President of the International Hydropower Association (IHA) and a member of the Generation and Environmental Committee of Eurelectric. Oli will be the Subject Matter Expert for the technical scope.

Project Plan

This project is based on the gated system of project development as shown in the figure below. Here, it is critical to note that each stage gate will also be used to verify and consider the application of IQ and feedback from Inuit rightsholders prior to proceeding. During Phase 1, QIA will develop a set of IQ-based criteria that will be applied and used to inform project decision making. QIA's IQ-based criteria will be applied at each stage gate and will include a record of how IQ was considered.



This funding proposal application includes the first three phases of the Project, along with a preliminary resourcing phase, as described in the following:

Proposal

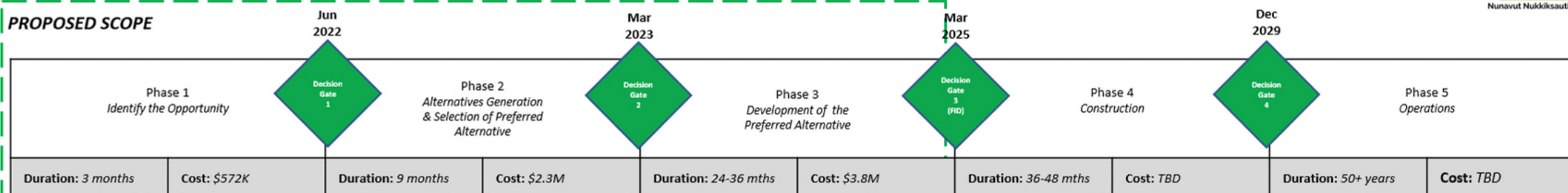
Iqaluit Nukkiqsautiit Project Proposal

- **Phase 0: Project Governance & Staffing:** The team will use this ‘pre-phase’ to clearly lay out the visions and objectives of the Project. Reporting structure, decision making rules and governance of the Project will be established and clearly defined. The Project leadership team will create organizational charts and ensure the Project is properly staffed for early development work.
- **Phase 1: Identify Opportunity:** Includes Project review to understand opportunity. This stage will focus attention on the development of an Inuit rightsholder approach to project development. Furthermore, QIA will be tasked with developing a preliminary plan for the Tusaqtavut Study, which will be shared with Inuit rightsholder organizations for advancement. This stage of the Project will also include a review of possible project configurations and high-level economics. Critical here is evaluating the market and recognizing project strengths and weaknesses. The purpose of this stage is to confirm agreement among project partners and Inuit rightsholders to proceed to deeper evaluation of the project.
- **Phase 2: Develop Alternatives:** The focus is building the project plan, led by an examination of Inuit rights and values. This phase would include initiation and undertaking of the Tusaqtavut Study by QIA. Phase 2 as a whole is more labour-intensive than the first phase and includes review of various project alternatives and preliminary engineering work. The purpose of this stage is to assess confidence in the project feasibility, including initial outcomes of the Tusaqtavut Study, market assessment, and economics before proceeding. This phase includes on-going Inuit rightsholder engagement and community consultations stakeholder engagement since this is critical to project success.
- **Phase 3: FEED and Market Evaluation:** The project’s design and development is executed along with the outcomes of the Tusaqtavut Study and on-going Inuit rightsholder engagement together with continued community consultations. Engineering and cost estimates are refined to continue to understand economic and technical feasibility. The key outcome from this phase is coming to a decision on whether and how the project should proceed to development of a formal project proposal for presentation to NIRB.

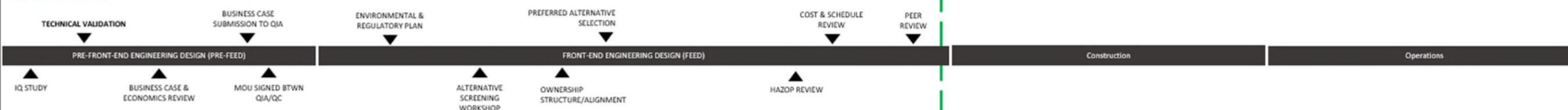
The Project plan and estimate is sub-divided for each phase and details are provided in the following roadmap, timeline, and tables.

PROJECT ROADMAP
Iqaluit Nukkiqsautiit Project

PROPOSED SCOPE



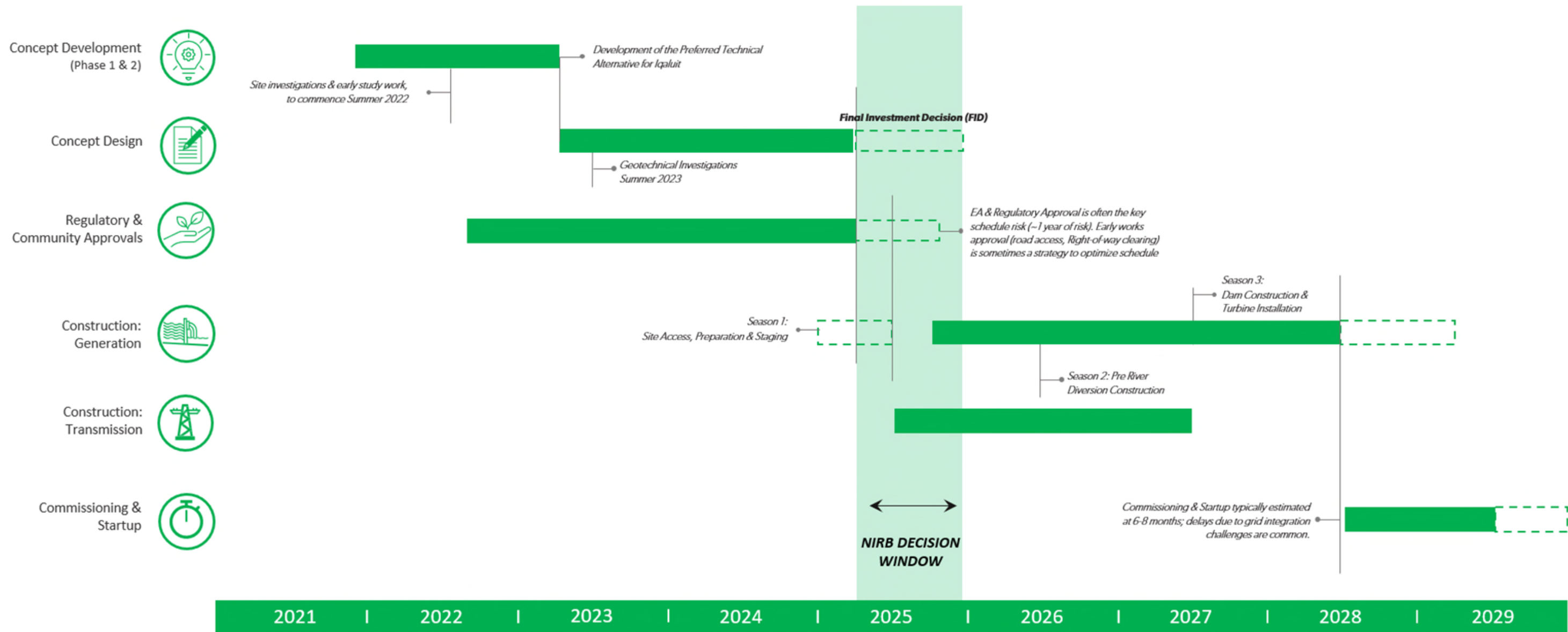
KEY MILESTONES



Phase	Key Deliverables	Key Interim Decisions	Actions
Phase 1	<p>KEY DELIVERABLES:</p> <ul style="list-style-type: none"> Project Framing Document Technical Validation Report 'Book-end' Economics Model Phase 1 Decision Support Package Phase 2 Execution Plan Phase 2 Funding Plan Stakeholder Engagement Strategy 	<p>KEY INTERIM DECISIONS:</p> <ul style="list-style-type: none"> Regional power outlook (inc. forecast) Commercial & Ownership Strategy Strategic Fit with Organizational Mandate Funding availability and Strategy 	<p>ACTIONS:</p> <p>NNC to complete Project Validation using existing data and analysis. A business case and economics model will be created for the Iqaluit site. QJA to begin Inuit Qaujimagajuqangit study.</p>
Phase 2	<p>KEY DELIVERABLES:</p> <ul style="list-style-type: none"> IQ Study Alternatives Generation & Selection Report Environmental & Regulatory Review Report Updated Project Framing Document Level 4 Cost Estimate Level 2 Schedule Economics Model (for Preferred Alternative) Phase 2 Decision Support Package Phase 3 Funding & Financing Plan Phase 3 Execution Plan 	<p>KEY INTERIM DECISIONS:</p> <ul style="list-style-type: none"> Ownership structure Appropriate Project Boundaries & Frame Alternative Evaluation Criteria Preferred Alternative Selection 	<p>ACTIONS:</p> <p>NNC to look at viable alternative development schemes for Iqaluit; Alternatives will be evaluated and the Preferred Alternative/scheme will be proposed. Regulatory and Stakeholder Engagement Plan to be developed and implemented in this phase.</p>
Phase 3	<p>KEY DELIVERABLES:</p> <ul style="list-style-type: none"> Technical Basis of Design Technical Drawings & Documents Work Breakdown Structure/Commercial Plan Power Purchase Agreement EA Project Registration Document Level 3 Schedule/Level 2 Cost Estimate Project Risk Assessment (Cold Eyes Review) Probabilistic/Risk Loaded Economics Model Phase 3 Decision Support Package (FID) Phase 4 Funding & Financing Plan Phase 4 Execution Plan 	<p>KEY INTERIM DECISIONS:</p> <ul style="list-style-type: none"> Commercial Agreements (Land, water use, PPA etc) Environmental & Regulatory Strategy Contracting Strategy for Construction Phase Procurement of Critical Long Lead Items 	<p>ACTIONS:</p> <p>Several key activities to be completed in this phase, highlighted by detailed design of the Preferred Alternative for Iqaluit. Contracting Strategy will also be developed and implemented in this phase. Any early data collection and critical long lead item procurement (i.e. turbines) will occur in phase 3.</p>
Phase 4	<p>KEY DELIVERABLES:</p> <ul style="list-style-type: none"> Phase 4 Construction Plan Site Safety Plan Project Controls Plan Risk Management Plan Quality Assurance & Surveillance Plan Environmental Monitoring Plan Lessons Learned - Construction Handover and Turnover Plan Ready For Operations Plan Commissioning & Start-up Plan 	<p>KEY INTERIM DECISIONS:</p> <ul style="list-style-type: none"> Operating Philosophy Handover and Turnover Strategy Site Surveillance and Management Financial closeout strategy 	<p>ACTIONS:</p> <p>Construction Phase will focus on the construction of the preferred alternative, with a high focus on safety, environmental stewardship, quality and engineering surveillance. Operations readiness will become a greater focus area in this phase. Project will be handed over to the operating entity at the end of the phase.</p>
Phase 5	<p><i>Operations Documents to be defined and implemented by the Operations Entity in Phase 2/3...</i></p>		

PROJECT TIMELINE

Iqaluit Nukkiqsautiit Project



Iqaluit Nukkiqsautiit Project - Key Tasks

Phase 0: Project Governance & Staffing

Duration: 6 Weeks (Feb-Mar 2022)



Task	Description	Key Deliverable(s)	Expenditure Category	Hours	Cost
1. General Activities					
Technical Project Management & Administration	Primary identification of project processes and tools to-be-used in project development; creation of monthly report and communications templates	i. Monthly Report Template	Salaries & Benefits	80	\$9,880
		ii. Draft Document Register	PSCS	80	\$13,200
Community Project Management & Administration	Primary planning of community engagement activities, including reporting and communication tools.	i. Monthly Report Template ii. Draft Document Register	Salaries & Benefits	40	\$4,940
2. Project-specific Activities					
Development of Iqaluit Nukkiqsautiit <i>Project Charter</i> and <i>Project Governance</i>	This activity will clearly lay out the visions and objectives of the project; structure and governance of the project will be established.	i. Project Charter	PSCS (QIA)	20	\$2,470
		ii. Project Governance	PSCS	80	\$33,200
Project Organizational Planning and Staff Onboarding	Proponents will develop Project Organization Charts and staffing/onboarding plans for Phase 1 of the project. Includes legal consultation.	i. Project Organization Chart	Salaries & Benefits	40	\$4,940
		ii. Staffing Recommendations	PSCS	80	\$13,200

Phase '0' Decision (Apr 2022)

Is the appropriate project governance structures in place to start the project? Has the organization identified the right team to begin phase 1 and is there a staff mobilization plan in-place?

Salaries & Benefits	\$19,760
PSCS (QIA)	\$2,470
PSCS	\$64,600
Overhead	\$10,420
Travel	\$5,000
Other	-
PHASE '0' TOTAL	\$102,250

Iqaluit Nukkiqsautiit Project - Key Tasks

Phase 1: Identify the Opportunity

Duration: 3 Months (Apr-Jun 2022)



Task	Description	Key Deliverable(s)	Expenditure Category	Hours	Cost
1. General Activities					
Technical Project Management & Administration	Implementation of project processes and tools; maintaining proper project controls (budget/cost). Regular reporting and interfacing duties	i. Monthly Reports	Salaries & Benefits	480	\$59,280
		ii. Project Controls Reports	PSCS	240	\$39,600
Community Project Management & Administration	Management and planning, reporting, communications and interfaces associated with community engagement activities. This is envisioned to be QIA for management of section 2.	i. Stakeholder Reports ii. Communications Register	PSCS (QIA)	60	\$7,410
2. Community Engagement Activities					
Planning & Preparation for Tusaqtavut Study	Tusaqtavut Study to collect Inuit Knowledge and Inuit Traditional Knowledge for the Iqaluit Area	i. Tusaqtavut Study Plan	PSCS (QIA)	Lump Sum	\$222,880
IQ Assessment Criteria Development	Development of IQ assessment criteria that will be used to assess the project during stage gate decisions.	i. IQ Project Criteria	PSCS (QIA)	Lump Sum	\$90,480
Development of Stakeholder Engagement Plan	Establish plan to engage each stakeholder including identification, timing/frequency of outreach, type of engagement, beginning with key stakeholders. QIA will lead with NNC resource support	i. Stakeholder Engagement Plan (Draft)	Salaries & Benefits	240	\$18,720
3. Technical Development Activities					
Technical Validation & Gap Analysis of Existing Data. Preliminary Concept Development	Review previous studies and data models. Undertake gap analysis and layout plan continued work. Early site identification/ concept review. Use of statistical methods to forecast and process data sets	i. Study Plan ii. Preliminary Concept Sketches	PSCS	240	\$33,000
Business Case & Preliminary 'Bookend' Economics	Prepare business case for the project based on community input and technical data. Evaluate 'bookend' economics using preliminary concepts	i. Deterministic Economics Model ii. Business Case	PSCS	160	\$26,400
Phase 1 Decision Support Package	Main deliverable that evaluates opportunity from a social, financial, and technical perspective. Includes Phase 2 Execution Plan	i. Decision Support Package ii. Plan for Phase 2	PSCS	240	\$19,200

Phase 1 Gate Decision (Jun 2022)

Does the project represent an opportunity that aligns with community drivers? Is the opportunity significant enough to explore viable concepts and alternatives? Decision to move forward into Phase 2 is entirely contingent on Inuit and community support to do so.

Salaries & Benefits (NNC)	\$78,000
PSCS (QIA)	\$320,770
PSCS	\$118,200
Overhead	\$73,250
Travel	\$18,000
Other	\$6,099

PHASE 1 TOTAL \$614,319



Proposal
Iqaluit Nukkiqsautiit Project Proposal

Iqaluit Nukkiqsautiit Project - Key Tasks

Phase 2: Alternatives Generation & Selection of Preferred Alternative

Duration: 9 Months (Jul 2022 - Mar 2023)



Task	Description	Key Deliverable(s)	Expenditure Category	Hours	Cost
1. General Activities					
Technical Project Management & Administration	Implementation of project processes and tools; maintaining proper project controls (budget/cost). Regular reporting and interfacing duties	i. Monthly Reports	Salaries & Benefits	720	\$88,920
		ii. Project Controls Reports	PSCS	720	\$118,800
Community Project Management & Administration	Management and planning, reporting, communications and interfaces associated with community engagement activities.	i. Stakeholder Reports ii. Communications Register	PSCS (QIA)	180	\$22,230
2. Community Engagement Activities					
Undertake the Tusaqtavut Study & IQ Criteria Development	Collection of Inuit Knowledge and Inuit Traditional Knowledge for Iqaluit Area. Includes detailed interviews with Inuit in the Iqaluit area including elders, community organizations, etc. Development of IQ criteria for adoption in later phases	i. Tusaqtavut Study Report ii. IQ Project Criteria	PSCS (QIA)	Lump Sum	\$496,504
Environment & Regulatory Review & Plan Development	Desktop review of previous studies, including analogous work in the region. Field reconnaissance and data collection.	i. Environmental & Regulatory Review: Findings, Gaps & Recommendations	Salaries & Benefits	1440	\$112,320
			PSCS	460	\$55,200
3. Technical Development Activities					
Data Collection & Load Profile Development	Obtain land access permits for any/all site visits and investigations. Site visits to key locations and hydrological assessment of existing data. Develop LiDAR based digital terrain Geotechnical assessment of feasibility for dam sites and tunneling (desktop)	i. Detailed Lidar base DTM ii. Hydrological & Geotechnical Studies iii. Load Profile Report + Power & Energy Model	PSCS	Lump Sum	\$417,873
			PSCS (SME Support)	215	\$41,925
Alternatives Generation, Analysis & Concept Selection	Viable alternatives development. Basic layout and key design feature development of 2 to 3 sites on IOL. Parametric AACE Class 4 cost estimate. Basic schedule development suitable for comparison of alternatives. Alternatives selection report.	i. Alternatives Generation & Selection Report	PSCS	Lump Sum	\$370,873
			PSCS (SME Support)	215	\$41,925
Phase 2 Decision Support Package, including Updated Business Case & Economics	Main deliverable that evaluates opportunity from a social, financial, and technical perspective. Includes Phase 3 Execution Plan	i. Decision Support Package ii. Plan for Phase 3	PSCS	720	\$143,800

Phase 2 Gate Decision (Mar 2023)

Has the project team developed doable alternatives? Has the project team recommended a robust preferred alternative that meets pre-determined Inuit Qaujimagatuqangit Assessment criteria and merits further design development? Decision to move forward into Phase 3 is entirely contingent on Inuit and community support to do so.

Salaries & Benefits (NNC)	\$201,240
PSCS (QIA)	\$518,734
PSCS	\$1,190,396
Overhead	\$219,750
Travel	\$59,000
Other	\$46,564

PHASE 2 TOTAL \$2,235,684



Proposal
Iqaluit Nukkiqsautiit Project Proposal

Iqaluit Nukkiqsautiit Project - Key Tasks

Phase 3: Development of the Preferred Alternative

Duration: 24 Months (Apr 2023 - Mar 2025)



Task	Description	Key Deliverable(s)	Expenditure Category	Hours	Cost
1. General Activities					
Technical Project Management & Administration	Implementation of project processes and tools; maintaining proper project controls (budget/cost). Regular reporting and interfacing duties	i. Monthly Reports	Salaries & Benefits	3360	\$414,960
		ii. Project Controls Reports	PSCS	1680	\$277,200
Community Project Management & Administration	Management and planning, reporting, communications and interfaces associated with community engagement activities.	i. Stakeholder Reports ii. Communications Register	PSCS (QIA)	420	\$51,870
2. Community Engagement Activities					
Stakeholder Engagements & Consultations	Continued community consultations. Ensure Iqalungmiut are informed from the very beginning of the Project political engagement, including QEC, territorial and federal agencies including financing	i. Community Consultation Sessions & Outcomes	PSCS (QIA)	Lump Sum	\$504,000
Environment & Regulatory Strategy & Planning	Prepare project description, Progress environmental studies, Progress EIS input data, Prepare regulatory strategy for next phase	i. NIRB Readiness Report	Salaries & Benefits	3360	\$262,080
			PSCS	800	\$96,000
3. Technical Development Activities					
Front-End Engineering Design (FEED) & Project Execution Plan (Phase 4 Readiness)*	Preliminary design including flood analysis, hydraulics, stability, conveyance sizing, basic electrical. General arrangement drawings. Basis of design documents. Detailed AACE 3/ 4 Cost Estimate including vendor and contractor engagement. Develop baseline project schedule. Develop project execution plan.	i. Preliminary Design Drawings ii. Class 3 Cost Estimate iii. Resource-Loaded Schedule iv. Project Execution Plan	PSCS	Lump Sum	\$867,050
			PSCS (SME Support)	400	\$78,000
Site-specific Data Collection & Analysis	Obtain land access permits for investigations and data acquisition programs. Implement Streamflow monitoring station(s). Undertake geotechnical drilling program.	i. Geotechnical and Hydrological Data Reports	PSCS	Lump Sum	\$489,050
			PSCS (SME Support)	400	\$78,000
Phase 3 Decision Support Package, including Updated Business Case & Economics	Main deliverable that evaluates opportunity from a social, financial, and technical perspective. Includes Phase 3 Execution Plan. This is a critical document for FID	i. Decision Support Package ii. Plan for Phase 4 (Construction Plan)	PSCS	840	\$163,600

Phase 3 Gate Decision (Mar 2025)

Has the project team advanced the design, planning and execution plans to a mature state that merits a Final Investment Decision? This is the most financially impactful gate, so financing, funding and economics models must be robust. Project must be approved by all key community stakeholders to proceed. Decision to move beyond Phase 3 is entirely contingent on Inuit and community support to do so.

Salaries & Benefits (NNC)	\$677,040
PSCS (QIA)	\$555,870
PSCS	\$1,970,900
Overhead	\$586,000
Travel	\$122,000
Other	\$203,808

PHASE 3 TOTAL \$4,115,618

Proposal

Iqaluit Nukkiksautiit Project Proposal

Project Risks

Type of risk		Likelihood and project impact	Mitigation measure
1	Community Opposition	Likely – this could cause delays in Project Development	Medium – Engagement has already commenced with the Iqaluit Community Lands and Resources Committee (CLARC) and the establishment of a Stakeholder Engagement Plan will ensure stakeholders are engaged early and often
2	Data Collection Delays	Unlikely – this could cause delays in Project Development if fundamental data collection cannot be completed (electrical data, Inuit Knowledge, etc.)	Low – Data collection will commence early and members of the Project Team have collected this type of data for renewable energy projects in the past and thus have an appropriate understanding of the length of time and associated costs of doing so.
3	Travel Delays	Unlikely – this could cause delays in Project Development if required consultants are not able to travel to Nunavut to carry out necessary field work	Low – Planning will commence early enough that there should be no timing constraints if site visits are delayed due to weather constraints or potential new impacts of the spread of COVID-19 variants.
4	Inflation	Likely – inflation rates are expected to rise in 2022 and beyond.	Low – This risk will be low during the FEED and planning phase; it will be a risk to be contemplated during the construction phase and will be managed through a contracting strategy.
5	Productivity during Pandemic	Likely – Pandemic restrictions are expected to continue during 2022 and possibly beyond.	Low – Project team will be small and will reside in a relatively small populated/low risk region. Productivity not expected to be significantly impacted during planning phase.
6	Regulatory Approvals Process	Likely – Environment and regulatory approvals can be a source of cost variance beyond Phase 3.	Medium - Clarity on Regulatory Strategy will be confirmed through Phase 2 and 3.

(Add additional rows as needed)

Residual Risk Level	
Low	The residual risk has little potential for impact on project success. The Applicant is confident the mitigation measures in place effectively manage the risk.
Medium	The residual risk has some potential for impact on the project. With mitigation measures in place, the potential impact is not critical to project success or is very unlikely to occur.
High	The residual risk has significant potential to impact project success with outlined mitigation measures in place.



Proposal

Iqaluit Nukkiksautiit Project Proposal

Inuit Rightsholders, Tusaqtavut Study, Community Consultations and Third-Party Engagement

Inuit Rightsholders

The Nunavut Agreement prescribes the rights afforded to Inuit and the responsibilities of Inuit organizations including a right to self-determination. Natural resource projects, such as hydroelectric power generation and supply, can be part of our future, provided proposals conform to an Inuit vision of the future. NNC believes such projects should only occur when Inuit believe it will strengthen Inuit communities and support a diversified Inuit economy, thereby enhancing Inuit cultural and social wellbeing. A proposed project located on IOL, using Inuit resources, and affecting every aspect of Inuit harvesting and cultural rights, must respect Inuit rights, knowledge, and needs. Understanding that Inuit rights and interests in the context of a natural resource project are not observed exclusively by NNC, additional time and attention will be focused upon inclusion of Hunters and Trappers organizations in potentially impacted communities, namely Iqaluit, Kimmirut and Pangnirtung.

The Iqaluit Nukkiksautiit Project will apply a “Nothing About Us Without Us” approach to Inuit rightsholders during all stages of the feasible study including during stage gate decisions to proceed.

Tusaqtavut Study

QIA will undertake a Tusaqtavut Study for Iqaluit as a part of the Project to gather IQ from Inuit in the Iqaluit area. Through this study, QIA will interview various individuals to collect Inuit Knowledge and Inuit Traditional Knowledge on cultural activities, land use, and historical utilization of the land around Iqaluit. Once collected, IQ will be assessed by IQ contributors working with QIA for the purpose of developing project recommendations. Application of IQ will be informed by project assessment criteria. The application of IQ will inform project design should there be a global recommendation to proceed with further project assessment and technical design.

QIA and NNC recognize that engagement of Inuit rightsholders in Iqaluit, Kimmirut and Pangnirtung are of utmost priority throughout all phases of this Project. Depending on a variety of considerations other communities may be included.

Community Consultations and Third-Party Engagement

In addition to working directly with Inuit rightsholders, the project will also seek to engage Inuit more generally through public consultations. These consultations will ensure that information developed and shared with active project participants is also disseminated to the public for the purpose of seeking additional feedback and information.

Furthermore, this Project will also include targeted engagement of specific third-party stakeholders with whom NNC will consult throughout the feasibility study:

- City of Iqaluit
- Hamlet of Kimmirut
- Hamlet of Pangnirtung
- Qulliq Energy Corporation
- Government of Nunavut Department of Environment
- Nunavut Planning Commission (“NPC”)



Proposal

Iqaluit Nukkiqsautiit Project Proposal

- Nunavut Impact Review Board (“NIRB”)
- Government of Nunavut Community and Government Services – Safety Services Division
- Nunavut Wildlife Management Board
- Nunavut Water Board
- Nunavut Research Institute
- Canadian Rangers – Nunavut Division
- DeBeers Canada

Indigenous Ownership or Partnership

NNC is 100% Inuit-owned and has contributed \$25,000 in-kind toward initiation of this Project, in addition to in-kind support through staff time to prepare project workplans, budgets, and undertake preliminary community engagements. QIA has also generously contributed \$25,000 in-kind toward the initiation of this Project, in addition to in-kind support through staff time to prepare project workplans, budgets, and undertake preliminary community engagements. This financial in-kind support has gone towards the gap analysis of existing work, preparation of a funding proposal, preparation of a high-level business case, and recommendations for a path forward for the project.

Regulatory Approvals/Permits

As this Project is mostly comprised of desktop work and community consultation efforts, limited approvals are required to undertake this work. Below is a list of approvals/permits the Project Team will be seeking to undertake the Project:

- QIA Land Access through the Iqaluit Community Lands and Resources Committee (“CLARC”)
- Hunter’s and Trapper’s Organization (“HTO”) Land Access
- NPC/NIRB
- Nunavut Research Institute

Land Access Rights

As the majority of the tasks included in this proposal are desktop in nature, very little access to land will be required with the exception of environmental field work and on-site survey work that is proposed to be undertaken in the summer of 2023. The Project is planned to be developed on IOL outside of Iqaluit and thus, approvals will be required from QIA as the land rights holder for IOL in the Qikiqtani Region.

In addition to the land rights provided to QIA as the DIO for the Qikiqtani Region under the Nunavut Agreement (“NA”), HTOs is responsible to matters related to harvesting and harvester. It is anticipated that HTOs in Iqaluit, Kimmirut and Pangnirtung will be engaged for this project.

For the environmental field work planned for the summer of 2023, land access rights will be secured from QIA and the Federal government, as required, including seeking endorsement from Inuit rightsholders.

Environmental Assessments

Site specific environmental field work is planned to be undertaken as a part of this feasibility study. The data collected during this field work will inform the NIRB proposal in order to clearly reflect the environmental impact of the renewable energy project as well as highlight any environmental constraints which must be considered in the detailed design of the infrastructure.



Proposal

Iqaluit Nukkiqsautiit Project Proposal

Plans to undertake environmental field work will be developed through consultations with the QIA and HTO's to ensure the data collected meets technical and Inuit standards.

Project Budget

Approved Budget (\$)	2021-22	2022-23	2023-24	2024-25	TOTAL (\$)
The Program (CIRNAC Contribution)	\$ 102,250	\$ 2,850,003	\$ 2,663,448	\$ 1,452,170	\$7,067,871
ELIGIBLE EXPENDITURES					
Salaries and Benefits	\$ 19,760	\$ 279,240	\$ 406,224	\$ 270,816	\$976,040
Overhead (limited to 15% of total Eligible)	\$ 10,420	\$ 293,000	\$ 293,000	\$ 293,000	\$889,420
Professional, Scientific and Contracting	\$ 117,070	\$ 2,148,100	\$ 1,768,739	\$ 758,030	\$4,791,939
Travel, including Meals and Accomodations	\$ 5,000	\$ 77,000	\$ 73,200	\$ 48,800	\$204,000
Other Expenses	\$ -	\$ 52,663	\$ 122,285	\$ 81,524	\$256,472
Total by Fiscal Year:	\$152,250	\$2,850,003	\$2,663,448	\$1,452,170	
Total Eligible Expenditures					\$7,117,871
INELIGIBLE COSTS					
INELIGIBLE EXPENDITURES					
Ineligible Expenditure Description 1 (specify)					\$0
Ineligible Expenditure Description 2 (specify & insert or delete rows as applicable)					\$0
Total Ineligible Expenditures					\$0
IN-KIND COSTS					
Description 1 (specify)					\$0
Description 2 (specify & insert or delete rows as applicable)					\$0
Total In-Kind Costs					\$0
Total Ineligible Costs					\$0
TOTAL PROJECT COSTS					\$7,117,871

Source of Contributions	Cash	In-Kind	Total
The Program	7,067,871	N/A	7,067,871
Applicant Organization	50,000		50,000
Other Governments 1 (Please provide name)			0
Other Governments 2 (Please provide name)			0
Other Contributor 1 (Please provide name)			0
Add lines as appropriate to reflect all contributors			0
Total	7,117,871	0	7,117,871



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Partnerships and Private Sector

List all partners and collaborators involved in project (including provincial/territorial and municipal governments and for-profit or not-for-profit organizations participating in project).

Organization Name	Contact Details
Nunavut Nukkiksautiit Corporation	Heather Shilton, 867-979-8400, Project Partner hshilton@qcorp.ca
<p><i>Nunavut Nukkiksautiit Corporation (NNC) is a wholly-owned subsidiary of Qikiqtaaluk Corporation, which is the Inuit birthright development corporation created by the Qikiqtani Inuit Association. Through selecting the optimal mix of clean energy technologies such as solar, wind, hydro, and energy storage, NNC tailors renewable energy projects that are affordable, reliable, and accessible for communities in the Qikiqtani Region. NNC’s goal is to sustainably power communities in the Qikiqtani Region through empowering communities and supporting community/local ownership of renewable energy projects, reflecting the needs of Nunavut as voiced by communities and Inuit leaders.</i></p> <p><i>NNC is currently leading the development and implementation of a clean energy microgrid in Iqaluit, a large wind and battery energy storage project in Sanikiluaq, and numerous research and pre-feasibility studies across the Qikiqtani Region of Nunavut. They are a leader in the renewable energy space in Nunavut and they have a mandate to provide meaningful employment opportunities for Qikiqtani Inuit, which would be achieved through the success of this funding application.</i></p> <p><i>NNC will lead this feasibility study and will intellectual property (IP) gained through this study. NNC has strategically selected Growler Energy to assist in the execution of this proposed study.</i></p>	
Growler Energy	Keith Drover, 709-730-0582, Project Partner keith.drover@growlerenergy.com
<p><i>Growler Energy is a renewable energy development company that also provides professional services to the energy industry. Based in Newfoundland & Labrador, the Growler Energy team has a track record of successfully executing and delivering energy projects through all phases and is known for a unique, effective approach and the ability to deliver projects on time and on budget. Growler Energy provides structure to the project development and execution processes by capturing the value realized through strong front-end loading and development, using a risk-based approach to project management and establishment of robust project management systems. For wind and water power projects in Canada, Growler Energy has strategically partnered with Landsvirkjun Power, the National Power Utility of Iceland. Growler will leverage the experience of the Landsvirkjun team working collaboratively with utilities thereby demonstrating a deep level of understanding from a northern utilities perspective.</i></p> <p><i>Growler Energy will oversee the execution of the technical aspects of this feasibility study.</i></p>	



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<i>Qikiqtani Inuit Association</i>	Matthew Hamp, 867-975-8400, mhamp@qcorp.ca	<i>Project Collaborator</i>
<p> <i>The Qikiqtani Inuit Association (QIA) is the Regional Inuit Association for the Qikiqtani Region of Nunavut, representing 51% of Inuit living in the territory located in the Canadian Arctic. QIA is the Designated Inuit Organization under the Nunavut Agreement. QIA is one of three Regional Inuit Associations affiliated with Nunavut Tunngavik Inc; QIA also works closely with their partners, such as Inuit Tapiriit Kanatami and the Inuit Circumpolar Council Canada, as well as different levels of government, to represent Inuit in the Inuit Nunangat, the Inuit homeland.</i> </p> <p> <i>QIA advances the rights and benefits of Qikiqtani Inuit through protecting and promoting its social, political, economic, and cultural interests; while safeguarding the land, waters and resources that sustain its communities.</i> </p> <p> <i>QIA will specifically oversee the Tusaqtavut Study, IQ Study as well as the community and stakeholder engagement plan.</i> </p>		

Sale of Electricity

As this Project is comprised of feasibility work and not installation of energy generation equipment, a PPA is not required at this time. However, given the significance this Project infrastructure represents if it does advance to construction, the Project Team will ensure detailed consultations with the Qulliq Energy Corporation and the Government of Nunavut take place throughout the feasibility work.

QEC has indicated they are in the advanced stages of implementing an Independent Power Production (“IPP”) policy for community-scale renewable energy projects. While we recognize the scale of the hydroelectric facility in Iqaluit may not facilitate a simple IPP arrangement, QEC’s adoption of such a policy would at the very least, indicate their willingness to work with Project Proponents in the integration of high-penetration renewable energy infrastructure.

Energy Resource Assessments or Feasibility Studies

Previous feasibility work was completed on a similar initiative by QEC from 2006 to 2013. As the Project was at the time owned by QEC, the recommendations to advance certain designs no longer align with the current Project Team. With this, NNC are looking to revisit the previous feasibility work completed and adjust to realign with the new vision of this being a fully Inuit-led, Inuit-owned renewable energy solution for Iqalungmiut.

While the previous feasibility work provides helpful context for the investigation of certain areas for hydroelectricity development, with the maturation of renewable energy technologies and updated business drivers for the Iqaluit Nukkiqsautiit Project, the Project will now investigate preferred sites and technological solutions to best serve Iqalungmiut.

This proposed Project will undertake the necessary feasibility work to prepare an application to NIRB.