Appendix F

Sanikiluaq Wind Energy + Battery Energy Storage Project Summary Report

Sanikiluaq

Wind Energy + Battery Energy Storage Project

Document Name:	Summary Report

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List of Acronyms

BESS – Battery Energy Storage System
CIPP – Commercial and Institutional Power Producers
CPL – Canadian Projects Limited
CSA – Canadian Standards Association
CT – Current Transformer
DC – Direct Current
DG – Distributed Generation
DBM – Design Basis Memorandum
EMC – Electromagnetic Compatibility
FEED – Front-End Engineering Design
FES – Frobisher Energy Services
GHG – Greenhouse Gas
HMI – Human Machine Interface
HVAC – Heating, Ventilation, Air Conditioning
IED – Intelligent Electronic Devices
IGBT – Insulated Gate Bipolar Transistor
kW – Kilowatt
kWh – Kilowatt Hour
MET – Meteorological Evaluation Tower
MTU – Master Terminal Unit
MW – Megawatt
NNC – Nunavut Nukkiksautiit Corporation
PCC – Point of Common Coupling
PMG – Permanent Magnet Generator
PT – Potential Transistor
QBDC – Qikiqtaaluk Business Development Corporation
QEC – Qulliq Energy Corporation
QIA – Qikiqtani Inuit Association
RTU – Remote Terminal Unit
SAO – Senior Administrative Officer
SAS – Substation Automation System
SCADA – Supervisory Control & Data Acquisition
SOE – Sequence of Events
VFD – Variable Frequency Drive

1.0 **Purpose**

The purpose of this document is to summarize the key components of the Sanikiluaq Wind Energy and Battery Energy Storage System (BESS) project as it relates to the Front-End Engineering Design (FEED). This document provides a high-level overview of some of the technical work completed to date, with further details appended.

1.1 Sanikiluaq Wind Energy Project

The Sanikiluaq Wind Energy and BESS Project ('Project') is a wind energy and storage platform tailored for deployment in the remote Hamlet of Sanikiluaq. The project configuration prior to FEED work consists of 1,000 kW wind energy combined with 1,000 kWh of battery energy storage. A meteorological evaluation tower (MET) (Pinard 2018) was installed in the community in March 2017 and actively collects raw wind data. A bankable Wind Resource Assessment (Zephyr North 2020) was completed by Zephyr North based on the data collected. The site-specific Wind Resource Assessment confirmed that the wind resource in the area is promising.

The project aims to provide clean, affordable, and reliable energy to the community while assuring local ownership, job creation, and a local economic boost. A primary goal of the project is to reduce diesel reliance for electricity production in the community by at least 50%. While the annual offset will remain the same, it is expected that there will be periods of time where the penetration rate is exceeded, especially in the winter months. As such, early analysis is ongoing to determine any potential to use excess electricity to generate heat locally for community buildings, or if there may be an opportunity to integrate additional storage technologies into the facility.

It is planned that the project will be owned in partnership with the Hamlet of Sanikiluaq. This could be through the formation of a joint venture agreement between a Nunavut Nukkiksautiit Corporation (NNC)-led holding company and the Hamlet, or through the establishment of some form of community enhancement fund which will be administered by local individuals within the community. Regardless of structure, it needs to be ensured that the Project's value will be shared directly with the community.

1.2 Team Profile

NNC, Growler Energy, and Landsvirkjun Power form the consortium of companies developing the Sanikiluaq Wind Energy and BESS Project. Each company is briefly described below, along with Growler Energy's partners Canadian Projects Limited (CPL) and Frobisher Energy Services (FES).

Nunavut Nukkiksautiit Corporation is a subsidiary of Qikiqtaaluk Corporation, a wholly owned Inuit birthright development corporation created by the Qikiqtani Inuit Association (QIA). By 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 Nunavut's Qikiqtani communities. NNC's aim is to sustainably power Nunavut's Qikiqtani region by empowering communities and supporting community/local participation in renewable energy projects, reflecting the needs of Nunavut as voiced by communities and Inuit leaders.

Growler Energy is a renewable energy development company that also provides professional services to the energy industry. Based in Newfoundland and Labrador, the Growler Energy team has a track record of successfully executing and delivering energy projects through all project 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 realised through strong front-end loading and development, using a risk-based approach to project management and establishment of robust project management systems.

Landsvirkjun Power was founded in 2007 as a subsidiary of Landsvirkjun, the National Power Company of Iceland, to manage its international operations with head offices in Reykjavik, Iceland. The primary purpose of Landsvirkjun Power is to provide expertise in the development, construction management and operations of renewable energy projects outside Iceland, either as a service or through co-development partnerships. The company is founded on Landsvirkjun's more than 50 years of experience in developing, building, operating, and maintaining renewable energy projects in Iceland and abroad. Landsvirkjun Power was part of the team that supported Greenland in their endeavours to replace diesel generation with renewable power and continue to support the Greenland Energy Utility (Nukissiorfiit) in operations and maintenance of hydro power facilities.

Canadian Projects Limited is an innovative consulting engineering company with a strong track record in the engineering, design, project management, and construction of renewable energy projects. Over 20 years, CPL has worked on projects ranging from 2 – 300 MW of installed capacity with deep experience in hydro, wind, and solar development in addition to a strong practice in water resource, dam safety, and dam rehabilitation. Through CPL's parent, Tetra Tech, CPL has access to one of the broadest engineering skillsets of any global engineering consulting firm, to augment the skills of the CPL team.

Frobisher Energy Services is a local consulting company that provides electrical design, project management, and technical consulting services for small and medium-sized power utilities and independent power producers in Northern Canada. FES specializes in cold climate and harsh arctic environments and supports all phases of a project life cycle, from conceptual design to detailed design, training, and commissioning/start-up technical assistance.

2.0 **Power and Energy Modelling**

A Power and Energy study was prepared for the project to provide an assessment of the appropriate wind generation and battery storage capacity configurations to achieve a minimum of 50% diesel generation offset. The following sections summarize the work completed in preparing the Power and Energy Study.

2.1 Model Inputs

The model was developed to estimate renewable energy penetration rate, average monthly and annual generation, battery energy storage performance, diesel generation, thermal load displacement, surplus energy, and greenhouse gas (GHG) emissions reduction for various configurations to determine the most appropriate wind and battery energy storage capacity for the project.

The model is a typical energy balance model developed by applying the potential wind power time series against the simultaneous electricity and thermal demand. The capital and operating costs used for optimization were estimated using a parametric sub-routine driven by the basic model parameters.

2.1.1 Electric Load

The electric load profile used in the Power and Energy model was developed based on 10-second data provided by Qulliq Energy Corporation (QEC). The average electrical load was 470 kW with hourly peak and minimum loads of 740 kW and 280 kW, respectively. The data provided was not exhaustive and had considerable gaps as demonstrated by Figure 1 below.

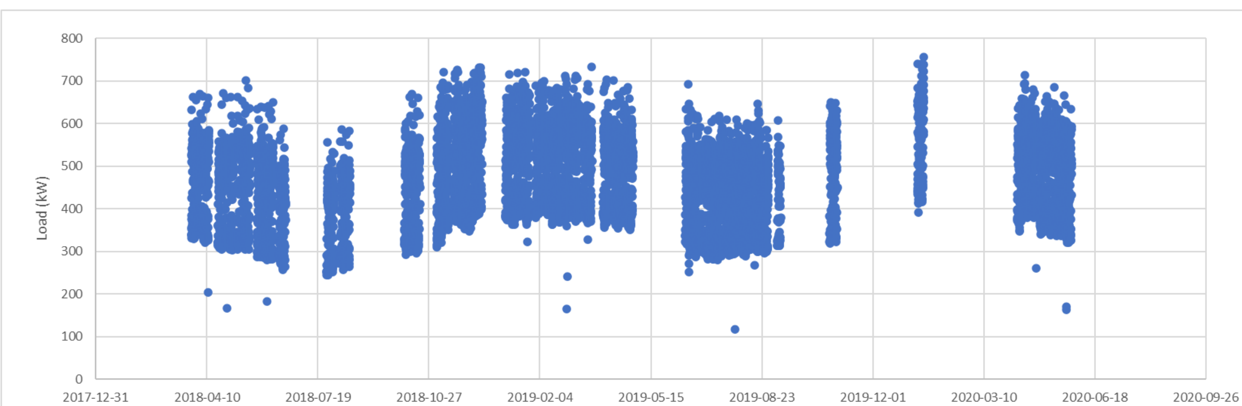

Figure1: Hourly QEC Data Scatter Plot.

Given that more complete data was not available from QEC, the 10-second data was down sampled to an hourly dataset and filled with synthetic data using a linear interpolation of the daily average load and a standard daily profile, as shown in Figure 2 below.

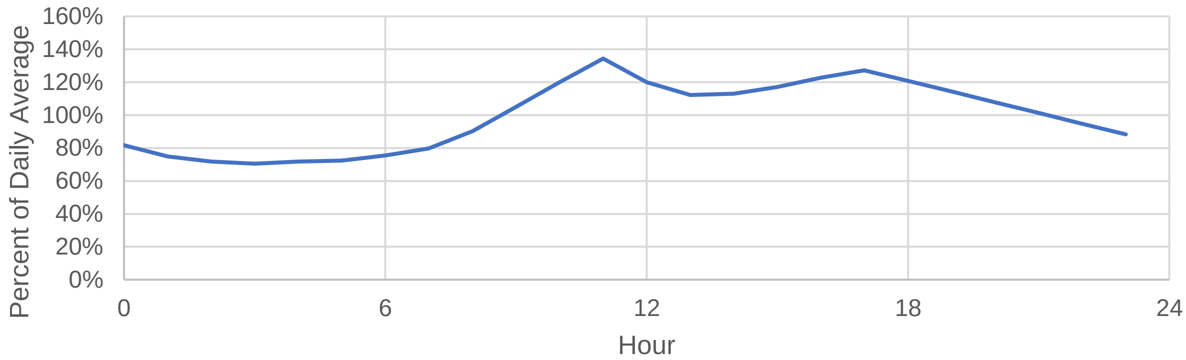

Figure2: Daily Load Profile.

The result was a hybrid hourly dataset spanning the period of March 27th, 2018, up to and including May 5th, 2020. The hybrid of real and synthetic data is shown in Figure 3.

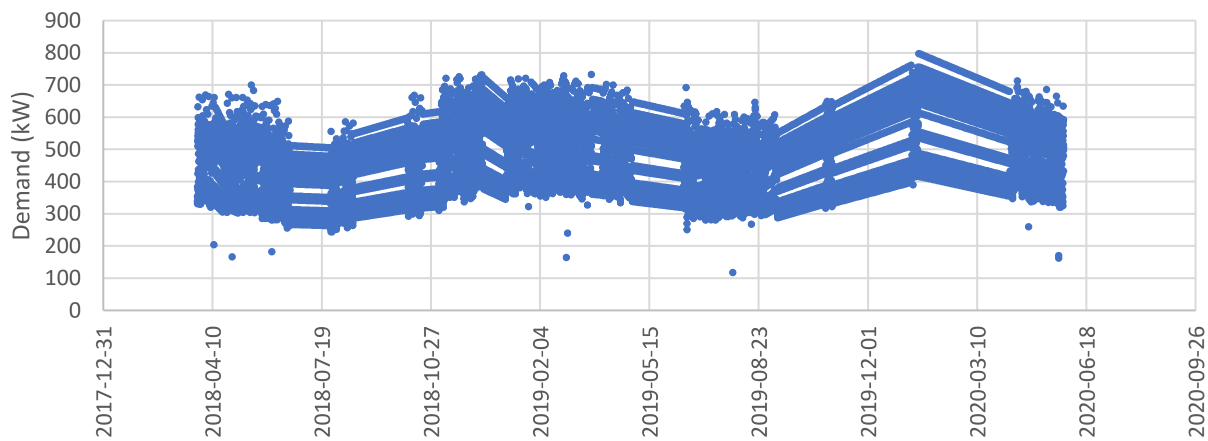

Figure3: Hybrid Dataset Scatter Plot.

Since the hybrid dataset constructed using QEC's data was from a different period than the wind dataset, a sinusoidal annual average demand profile was generated to facilitate the development of synthetic data beyond the period of QEC data. The profile was developed based upon the maximum average daily load of 550 kW (January 23rd) and minimum average daily load of 400 kW set to occur half a year later (July 24th) from the QEC data. The average daily profile from Figure 2 was then applied to the sinusoidal annual profile for finalization of the synthetic dataset. The synthetic electrical load dataset is shown in Figure 4.

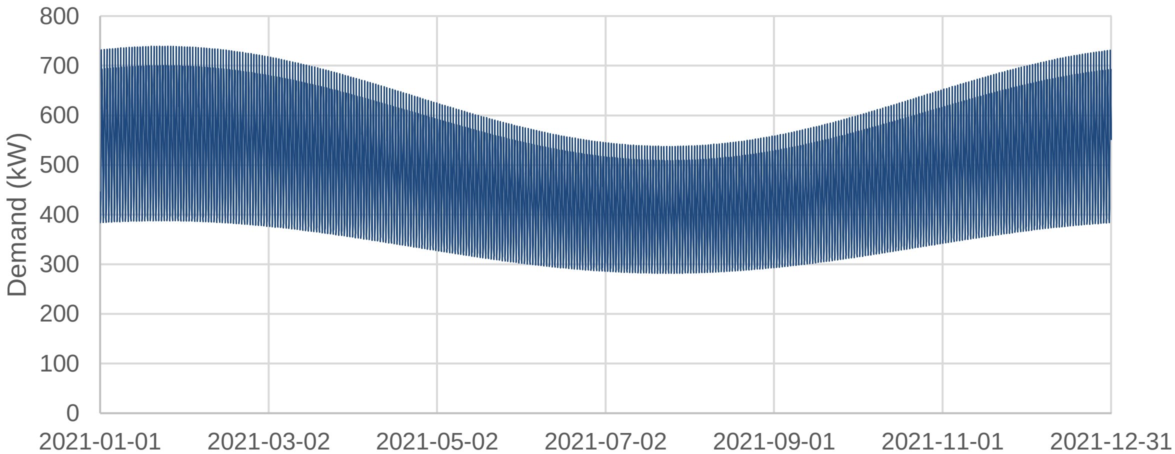

Figure 4: Sinusoidal Average Daily Electric Demand Profile.

2.1.2 Wind Resource

Wind speed, direction, and other meteorological data were collected at the proposed project site using a 34 m tower installed by J.P Pinard, Consulting Engineer in 2017. Data for the three-year period of March 28th, 2017, up to and including March 1st, 2020, was provided by Zephyr North (Zephyr North 2020) to perform data quality validation and station summary statistics.

The average measured wind speed was 8.5 m/s at 34 m and estimated to be 8.8 m/s at the proposed 50 m hub height by Zephyr North (Zephyr North 2020). The wind rose prepared by Zephyr North is presented in Figure 5, and the wind speed distribution is presented in Figure 6.

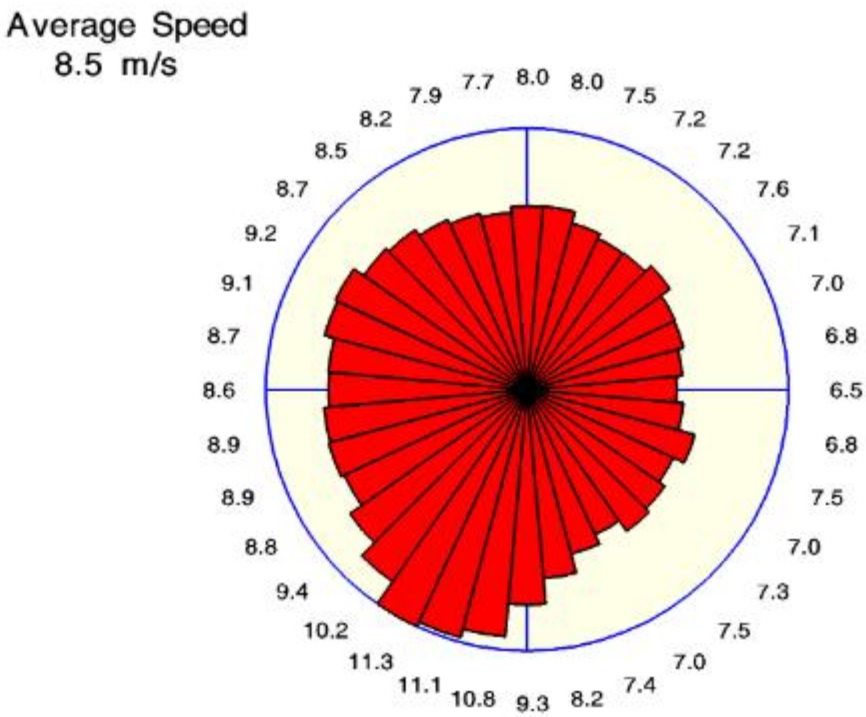

Figure5: Wind Rose for Proposed Site (Zephyr North 2020).

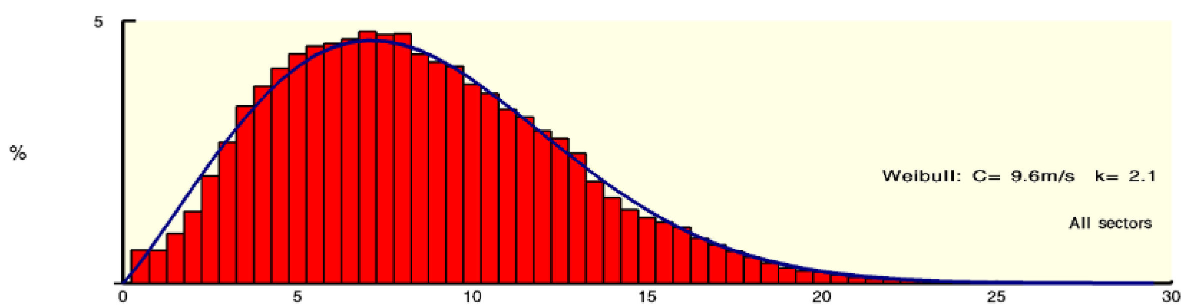

Figure6: Wind Speed Distribution for Proposed Project Site (Zephyr North 2020).

More information on the wind resource is available in the stand-alone Zephyr North report prepared in 2020 (Zephyr North 2020).

The raw wind data was provided to Growler Energy and CPL as recorded by the Symphonie data retriever in daily files with 10-minute interval data. The data was combined into a single text file and down sampled to hourly data to match the electrical load data timestep. The wind dataset contained data for all days in the period except for one, which was interpolated from adjacent days.

For the purposes of the Power and Energy model, the wind dataset was generated by taking the average recorded wind speed from both 34 m anemometers if both values agreed within 5% or using the larger of the two values if they were not in agreement. The dataset used in the Power and Energy model was in general agreement with the results presented in the Zephyr North report (Zephyr North 2020).

2.1.3 Wind Turbine Model

Figure 7 below shows five turbine model power curves normalized to 1,000 kW. For the Power and Energy model, Turbine 3 was used in the assessment.

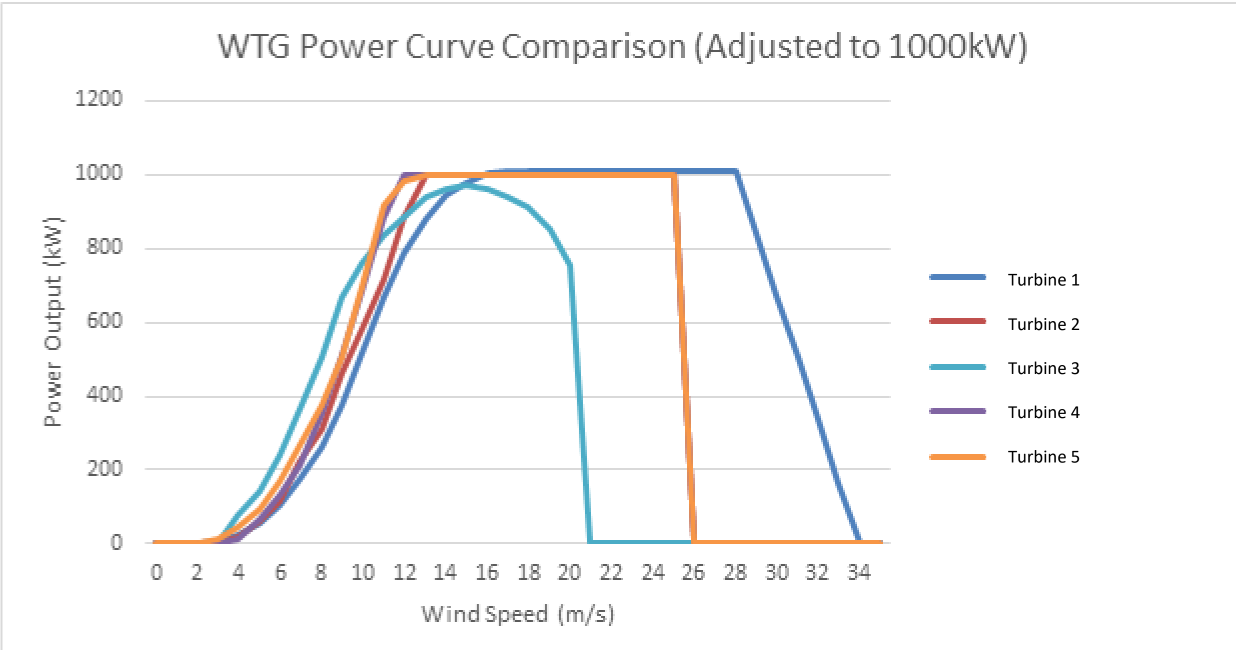

Figure7: Normalized Power Curve for Various Generic Turbines.

For the purposes of the model, a net wind power balance of plant efficiency of 83% was applied to the power curve.

2.1.4 Battery Energy Storage System

The battery energy storage system is assumed to consist of typical containerized lithium-ion batteries with a charge/discharge efficiency of 95%. A nominal 500 kWh module size was assumed with the number of the modules adjusted in the model. This size module is available in typical 20-foot-long shipping containers.

2.1.5 Greenhouse Gas Emissions

GHG emissions reductions were estimated using a fuel efficiency of 3.84 kWh/L based on generation information provided by QEC, and average GHG emissions efficiency of 750 g/kWh for Nunavut generation based on the National Inventory 2017 report (Canada Energy Regulator 2017).

2.1.6 Capital and Operating Costs

The capital and operating cost estimates in the model were estimated on a parametric sub-routine and are intended for relative comparison of Power and Energy system options. The estimates were not explicitly included in this report to maintain clarity that they are intended solely for relative comparison of plant capacities. The estimates to be referred to for investment/financial decision-making purposes are those prepared beyond this report.

2.2 Power and Energy Model Conclusions and Recommendations

The wind/BESS configuration and cost are most sensitive to the diesel base load (minimum diesel operating load). As discussed in the presentation "Alternative Energy Initiatives" (Papa and Haroon 2021) given by QEC at the 2021 Kivalliq Trade Show, diesel generators can be turned off, meaning no diesel baseload. As such, this was the assumption carried forward in the analysis and in selecting the recommended plant capacity. No diesel baseload aligns with the Liberal Government's 2021 election platform, as it was stated that a Clean Electricity Standard would be introduced to achieve a 100% net-zero emitting electricity system by 2035 (Liberal Party of Canada 2021). Since then, the Canadian Government has implemented its first emissions reduction target to cut GHG emissions by 40 to 45% below 2005 levels by 2030, which has been mandated by law under the new Canadian Net-Zero Emissions Accountability Act (Government of Canada 2021).

In saying this, the recommendation is that diesel base load requirements or provisions for diesel plant station service power should be discussed with the utility to achieve the minimum practical diesel plant base load to improve both fuel offset and project economics.

The post-FEED plant-sizing recommendations are in Table 1, with the characteristics presented in Table 2.

Table 1: Plant Sizing Recommendations

	Initial Build Recommendation	Maximum / Build Out for Balance of Plant Sizing Purposes
Wind Plant Power	1,000 kW	2,000 kW
BESS Discharge	1,000 kW	2,000 kW
BESS Storage	500 kWh	1,000 kWh

Table 2: Recommended Sizing Summary Characteristics

Diesel Offset Percentage (for electricity)	66%
GHG Emission Reduction (for electricity)	2,060 ton/year
Fuel Volume Eliminated (for electricity)	0.7 million Litre/year
Diesel off hours	1,886
Average Wind Energy	439 kW

3.0 **Site Selection**

The Sanikiluaq site was selected by Qikiqtaaluk Business Development Corporation (QBDC) based on the suggestion from the Hunters and Trappers Organization (HTO), as part of the community consults that took place in 2016 to 2017. Factors considered for site selection include, but are not limited to:

- 4-kilometre radius from the airport (as per Transport Canada requirements)
- Existing roads, trails, or other infrastructure
- Restricted zones
- Environmentally sensitive areas

The selected site for the Sanikiluaq project has pre-existing trails to and from the community which allow for easier road development and is clear of the 4-kilometre radius from the airport. Additionally, this location is not in any restricted zones or environmentally sensitive areas. The existing on-site MET tower that was erected in 2017 confirmed the resource opportunity of the site, and demonstrates the location is viable for the wind farm.

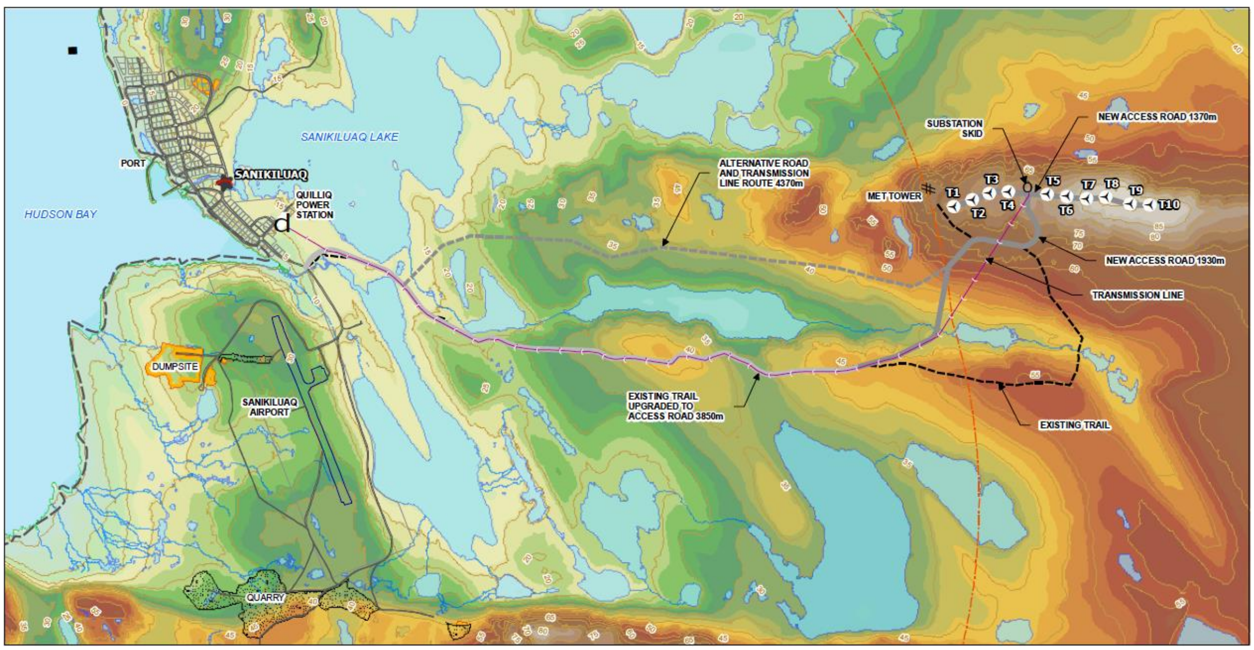

Figure8: Sanikiluaq Wind Project Location Plan and Elevation Map.

4.0 Electrical Design Basis

The Design Basis Memorandum (DBM) submitted by Frobisher Energy Services forms the overarching definition for the project electrical scope and can be used to prepare the engineering design specifications, strategies, estimates, schedules, and all other project related functions throughout the detailed design and execution phases of the project.

It is of utmost importance to highlight that the project team will endeavour to align with QEC technical specifications should they differ from what is proposed below, provided it remains up to code and is safe to operate.

The following design assumptions were established to complete this scope of work:

- Technical interconnection requirements have followed the existing Commercial and Industrial Power Producers (CIPP) program. In the future it will follow the Independent Power Producer (IPP) program, and as was confirmed in the October 5, 2021 meeting between QEC, NNC, LVP, and Growler at QEC's Office in Iqaluit, the IPP and CIPP programs will share the same requirements.
- Only proven technologies are considered ("off the shelf" commercially available)
- All equipment will be Canadian Standards Association (CSA) certified, approved for use in Canada, and meets all applicable governing standards, codes, acts, and regulations
- Principles of life cycle cost analysis are employed wherever practical
- All systems to be remotely operated and monitored
- All designs will assume a 25–30-year design life
- Local climatic, arctic conditions shall influence all designs (specific site requirements and environmental data can be found in the full Design Basis in Appendix A – Electrical Design Basis and Drawings)

The current QEC power plant in Sanikiluaq is approximately 20 years old and consists of three prime power rated generator sets, with total installed capacity of 1,400 kW. The peak load for the system is approximately 740 kW, with the power plant having a typical n-1 reliability model (i.e., largest unit unavailable, the firm capacity rating of 850 kW). The plant has a single bus arrangement for both generation, station services, and distribution system feeder breakers. There is a district heating system just installed in 2021 (or in the process of being installed) as well. All specific details pertaining to the current plant specifications and ratings can be found in Appendix A – Electrical Design Basis and Drawings.

4.1 Proposed Distribution Line Feeder

The current aerial overhead distribution system within the hamlet consists of two radial feeders operating at 5 kV class and are of standard utility construction. It is planned that an overhead aerial line will be constructed from the wind site to a new wind system substation located adjacent to the existing QEC powerhouse. This site will operate at 15 kV class and connect via power transformer T4 and T5 respectively. The total distance is estimated at 5 kilometres and will be rated to transfer up to 1.2 MVA @ 0.8 Power Factor (1,000 kW). Refer to Key Singleline Diagram in Appendix A – Electrical Design Basis and Drawings for more detail.

4.2 Wind System Substation (Townsite)

The intent is to construct a 5 kV class, air insulated modular substation (E House) adjacent to QEC plant to meet the following requirements of the wind system:

1) House 5 kV switchgear lineup, 600-volt MCC, and station service ancillaries
2) Interconnect QEC, BESS, and the wind system at the 5 kV level
3) House the Microgrid controller master terminal unit (MTU), Supervisory Control & Data Acquisition (SCADA) Historian and Workstations, Human Machine Interface (HMI), and process control/corporate network support infrastructure
4) Electric Boiler (dump load) controller and supply connection point (via 600-volt MCC)
5) Auxiliary load bank connection point (via 600-volt MCC)

4.2.1 Battery Energy Storage System (BESS)

The assumption is the BESS will consist of a compact, plug-and-play microgrid and battery energy storage solution built for utility grade grid applications. Built for the environment, the solution will have direct current (DC) protection, battery monitoring, heating, ventilation, air conditioning (HVAC), and fire protection in a fully enclosed building.

The BESS will be connected to the wind system substation 5 kV bus via transformer T6 to allow matching of the BESS output voltage to the 5 kV system, while providing electromagnetic compatibility (EMC) filtering and isolation.

4.3 Wind Site Plant

The wind site plant will consist of a modular, E-house style building located adjacent to the turbine tower structures and will house all controls associated with the wind turbine units. It will contain the following units:

1) 600 V or 480 V (dependant on turbine output voltage) switchboard lineup and station service ancillaries.
2) Interconnection point to the distribution system via Transformer T5 and main incomer breaker 52-6.
3) Microgrid controller remote terminal unit (RTU), HMI, and process control/corporate network support infrastructure.
4) Engineering workstation for equipment control logic and software updates.

The wind site plant would have a redundant, secure DC supply rated at 24 V for breaker, protection & control, and network equipment supply which will be sized in accordance with IEEE standard 485 and have an 8–12-hour outage supply rating. The system will be prefabricated, precommissioned, and shipped to site to reduce site works as much as possible. The entire system will follow the Canadian Electrical Code.

4.3.1 Wind Turbine Generator

The assumption is the wind turbine units will be of an inverter/variable frequency drive (VFD) based technology with rotating machines of either sub-synchronous induction motor or Permanent Magnet Generator (PMG) type. The AC system will connect via a back-to-back insulated gate bipolar transistor (IGBT) type VFD interface to the main 480 V or 600 V bus located at the wind site plant main bus.

4.4 Protection & Control

The three major technical challenges faced in an isolated power system is proper selectivity, sensitivity, and speed within its protection scheme to avoid mis-operation of key protection elements and subsequent nuisance trips that can impact on power quality and reliability. The overall protection scheme of the system must respond to faults both within, and outside of the wind system zones of protection to allow remedial actions and preserve each system from the negative effects of the fault occurrence. As such, the project protection and control scheme looks to at a minimum align with QEC's schemes, or exceed them.

4.4.1 Protection Relays

All protective relays as indicated on single line diagrams shall be microprocessor based, multi-function type and be classed as intelligent electronic devices (IED). The substation IEDs will be equipped with a communication capability for SCADA and overall substation automation system (SAS) operations. The primary communication protocol will be Modbus® over TCP/IP.

4.4.2 Apparatus

The current transformers (CT's) shall have accuracy designations of 2.5L200 or better for relaying accuracy and 0.6B2 for metering accuracy. The potential transformers (PT's) shall be withdrawable with a means of properly grounding the units when withdrawn (MV class only). The use of primary and secondary fusing is recommended. All revenue metering arrangements shall have instrument transformers rated for revenue class duty and accuracy, as per utility and Measurement Canada requirements.

The following equipment and connection points within the system shall employ a redundant scheme:

1) Point of common coupling (PCC) breaker 52-1 (trip and re-trip circuits)
2) Power transformers T4 & T5 (i.e., mechanical trips and IED thermal model)
3) Breakers 52-3 and 52-6 shall utilize line differential and include the distribution feeder within the zone of protection.

A more detailed breakdown of the protection elements and system studies is described in Appendix A – Electrical Design Basis and Drawings, including details regarding the uses of IEC 61850 protocols.

4.5 Supervisory Control & Data Acquisition

All alarms and sequence of events (SOE) will be collected and sent to the SCADA historian for purposes of troubleshooting analysis, planning, and production reporting. The local controllers (RTU's) will collect all hardwired alarms, shutdowns, and trip signals deemed critical. All other alarms and shutdown/trip "Soft" signal tags will be collected via the TCP/IP Modbus or IEC 61850 interfaces and routed to the SCADA historian as required.

4.5.1 Human Machine Interface

Panel mounted HMI units will be located at various locations throughout each site and give announcement of alarms and shutdowns, along with real time production data such as power flow and voltage levels. Software for all OEM equipment will also be installed on these PCs to allow for direct connection as required for IED configuration and O&M tasks.

4.6 System Frequency & Voltage/VAR Support

The BESS through its main controller, communicating with the microgrid controller will provide a 'virtual genset' mode as required to support the system in a manner similar to a synchronous generator. When the wind system is running in diesels off mode, frequency setpoints will be achieved through a combination of isochronous governor settings of the BESS controller working in concert with the microgrid controller to maintain a continuous frequency.

4.7 Line Voltage Regulation & Transformer Tap Strategy

The voltage regulation and tap setting strategy will align with the voltage levels as seen from the QEC plant 5 kV bus downstream to the connected distributed generation (DG) sources. The DG source voltage regulators (i.e., BESS & Wind) will then "follow" the fixed voltage baseline of the distribution system in concert with the microgrid controller setpoint. This will ensure minimal voltage fluctuation over varying load levels through line drop compensation techniques and align with utility voltage levels so synchronizing functions will be seamless during operation.

4.8 Load Sharing

System load sharing setpoint levels will be controlled and set primarily from the microgrid controller. Wind DG sources will drive the loading priority, while QEC diesel will pick-up the balance of the load and help provide system inertia along with the BESS. The BESS virtual genset will operate first, which allows the system to rely less on QEC diesel generation.

Isochronous droop and isochronous mode control scenario details can be found in Appendix A – Electrical Design Basis and Drawings.

4.9 Control Network

The Microgrid controller and SCADA system will be connected via an industrial hardened ethernet network. All the controllers and devices will be connected to the network on a single fiber/copper port. Each network will have separate, standalone hardware (i.e., switches, routers, etc.) but share cable management, secure DC supply, and mounting locations as required. Refer to the control system network diagram drawing in Appendix A – Electrical Design Basis and Drawings for more information.

4.10 Lightning & Grounding Protection

Lightning isochronic levels are typically low in the arctic and protection will be provided for one thunderstorm day per year. All Medium Voltage distribution, mainly the 15 kV overhead line, pad-mount power transformers, and underground cable systems will be fitted with MOV type surge arresters.

Low voltage systems will also be equipped with Category C surge protection device (TVSS – ANSI/IEEE C62.41) to mitigate low level surge and switching events. Lightning protection of the wind turbine tower structures will be determined during the next stage of design development.

Further significant study and assessment will be required to meet system, equipment, and lightning grounding and bonding requirements in a permafrost environment.

4.11 Dump Load System

As a part of the wind turbine control system, a requirement to reject excess generation capacity due to excessive wind conditions exists from time to time. Preliminary estimates have the sizing requirement of the dump load at 200 kW.

The dump load unit would consist of an electric boiler, fed from the wind substation station service switchboard (600-volt MCC) and operate in controlled steps of approximately 45 kW to allow for a staged ramping up and down of load as required from the wind control system.

The boiler system will be connected QEC's district heating supply lines and allow for surplus heat to be transferred to buildings connected to it throughout the Hamlet.

As previously mentioned, the project team will endeavour to align with QEC technical specifications should they differ from the proposal, provided it remains up to code and is safe to operate.

5.0 Meeting with Hamlet Council

The Municipality of Sanikiluaq's council meeting took place at the temporary Hamlet office on Thursday, October 14, 2021, at 9:00AM Eastern Standard Time. The purpose of meeting with the council was to provide an update to the council members on the progress of the project. This included an overview of the completed, ongoing, and upcoming tasks ranging from the installation of the MET tower through to first power. Meeting attendees from both the council and the Project Team are summarized in Table 3.

Table3: October 14 Council Meeting Attendees

Council	Project Team
Mayor Johnie Cookie	Heather Shilton – NNC
Senior Administrative Officer (SAO) Ronald Ladd	Einar Júlíusson – LVP
Deputy Mayor – Emily Kattuq	Stephanie Adey – Growler Energy
Councillor Dinah Kittosuk	
Councillor Mick Appaqaq	
Councillor Lucy Appaqaq	
Councillor Moses Appaqaq	
Councillor Johnny Appaqaq	
Councillor Mina Eyaituk	
Councillor Sarah Kittosuk	

The presentation went very well, and the key outcomes of the meeting are:

- In general, the council was very engaged in the presentation and are very thankful and supportive of the project. They recognize they are a smaller community within the territory of Nunavut, but they want, and know they can be, among the first for community-level wind development.

- The council demonstrated an interest in and were keen to learn more about the ownership and revenue sharing opportunities of the project. As a result, a Community Liaison is planned to be hired within Sanikiluaq to help facilitate our progress in understanding what these opportunities actually look like.

- When the site location was discussed, the council clarified the location was on the far side of the MET tower (in comparison to the community) and agreed that this is the best location for the turbines as it is not within prime hunting grounds. An upgraded access road to that area would benefit berry pickers and hunters as they venture further onto the land.

6.0 Conclusions

As the Front-End Engineering Design phase ends, it is important to acknowledge the thorough assessments and detailed technical designs undertaken. Although recommendations are made throughout the report, see below for the final overarching recommendations.

- The project configuration offers great reduction in current diesel demands in Sanikiluaq, achieving the objectives for at least 50% less diesel reliance for electricity production in the community. Provisions (i.e., balance of plant equipment ratings, cable sizing) should be made to increase the wind plant and BESS size in the future to offset thermal energy, load growth, or potentially improve economics should the value of energy increase. The Power & Energy Model should be updated with new information pertaining to turbine supplier, costs, and QEC diesel operation strategy as it becomes available.
- The wind/BESS configuration and cost are most sensitive to the diesel base load (minimum diesel operating load). No diesel baseload aligns with and supports the Canadian Government's first emissions reduction target to cut GHG emissions by 40 to 45% below 2005 levels by 2030, which has been mandated by law under the new Canadian Net-Zero Emissions Accountability Act (Government of Canada 2021).
- Diesel base load requirements or provisions for diesel plant station service power should be discussed with QEC to remove diesel plant base load to improve both fuel offset and project economics.

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