

## GRAND RENEWABLE ENERGY PARK PROJECT

### APPLICATION EXHIBIT LIST

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**IN THE MATTER** of the *Ontario Energy Board Act, 1998*, S.O. 1998, c.15, Schedule B, (the "**OEB Act**");

**AND IN THE MATTER** of an Application by Grand Renewable Wind LP for an Order or Orders granting Leave to Construct new Transmission Facilities within Haldimand County, Ontario.

### **APPLICATION FOR LEAVE TO CONSTRUCT**

- 1) Grand Renewable Wind LP (the "**Applicant**") hereby applies to the Ontario Energy Board (the "**Board**") pursuant to section 92 of the OEB Act for an order or orders granting leave to construct the proposed transmission facilities (the "**Proposed Facility**"), as further described below and more particularly described in Exhibit B-1-1. The Applicant also hereby applies, pursuant to section 97 of the OEB Act, for approval of the form of ground lease (the "**Ground Lease**") found in Exhibit B-3-2.
- 2) The Applicant is a limited partnership that was formed pursuant to the laws of the Province of Ontario on January 10, 2011 for the purposes of managing the development, construction and operation of the Wind Project (further described below). The Applicant is owned by two limited partners each holding 49.99% interest, respectively, being Samsung Renewable Energy Inc. ("**SRE**") and Pattern Grand LP Holdings LP ("**Pattern LP**"), as well as its general partner, Grand Renewable Wind GP Inc., which holds a 0.02% interest. The corporate ownership structure of the Applicant can be found at Exhibit A-3-1.
- 3) SRE is a corporation formed pursuant to the laws of the Province of Ontario and is wholly owned by Samsung C&T Corporation. Samsung C&T Corporation is an affiliate of the Samsung Group of Companies, which is located and registered in Seoul, Korea. SRE and Samsung C&T Corporation are actively engaged in the renewable energy business in Ontario, including renewable energy generation development, solar cell manufacturing, wind turbine generator manufacturing, and related engineering, procurement and construction works.
- 4) Pattern LP is a partnership formed pursuant to the laws of Ontario. Pattern LP is an indirectly wholly-owned subsidiary of Pattern Energy Group LP, located in San Francisco, US, which company has been actively engaged in the renewable energy business in Ontario and other places of Canada, including development of wind farms, arrangement of business deals in relation to construction, operation and maintenance of wind farms.

5) The Proposed Facility is comprised of:

- a) approximately 19 kilometres of 230 kV transmission line (the "**Transmission Line**"), of which 95% (~ 18 kilometres) will be built along the municipal right of way known as Regional Road 20 (the "**Haldimand ROW**"), which is owned by Haldimand County;
- b) a collector substation (the "**Collector Substation**"), which includes two 34.5 kV/230 kV step-up transformers;
- c) transition stations (the "**Transition Stations**") used to transfer the Transmission Line from an overhead configuration to an underground configuration; and
- d) an interconnect station (the "**Interconnection Station**")

all as further described in Exhibit B-1-1.

- 6) The Proposed Facility will be used to connect the Grand Renewable Energy Park (the "**GREP**", the GREP and the Proposed Facility referred to collectively as the "**Project**") which is to be located in Haldimand County, Ontario, north of the Lake Erie shoreline and west of the Grand River. The GREP will consist of (i) a 153.1 MW (nameplate capacity) wind power generating facility (the "**Wind Project**", owned by the Applicant), and (ii) a 100 MW (nameplate capacity) solar photovoltaic generating facility (the "**Solar Project**", to be owned by a yet –to-be-formed special purpose vehicle ("**Solar LP**"). A detailed description of each of the Solar Project and the Wind Project can be found in Exhibit B-1-1.
- 7) Preliminary development work on the Project has been carried out to date by SRE and Pattern LP, including obtaining the necessary permits and approvals for both the GREP and the Proposed Facility. As such, the existing permits and approvals (the "**Proposed Facility Permits**") required for the Proposed Facility that have been in the name of SRE will be transferred to the Applicant prior to the construction of the Proposed Facility.
- 8) As the future owner and operator of the Wind Project, the Applicant will be deemed a generator pursuant to section 56 of the OEB Act once the Wind Project achieves commercial operation. The Applicant therefore intends to submit a notice of proposal to own transmission facilities pursuant to section 81 of the OEB Act when it applies for a generating licence from the Board.
- 9) The GREP covers an area of 7600 hectares of mainly agricultural land and encompasses both the Wind Project and the Solar Project within that area. The Solar Project and the Wind Project will be located in the same general vicinity. The Solar Project is centrally located within the GREP project area. The Wind Project surrounds the Solar Project in a north-western to south-eastern direction. The Proposed Facility will be used to convey the

power generated from both the Solar Project and the Wind Project to the Independent Electricity System Operator ("**IESO**")-controlled grid.

- 10) While the Proposed Facility will be used to transmit the electricity generated from both the Wind Project and the Solar Project to the IESO-controlled grid, any electricity generated by the Solar Project will be transmitted for a price that is no greater than that required to recover all reasonable costs. In transmitting the electricity generated from the Solar Project, the Applicant therefore relies on section 4.0.2(1)(d) of Ontario Regulation 161/99, *Definitions and Exemptions* made pursuant to the OEB Act, to be exempt from the requirement to obtain a transmitter licence under section 57(b) of the OEB Act.
- 11) The Project is being developed to further the provincial government's policy objective to increase the amount of renewable energy generation being added to the province's energy supply mix. The Ontario government's policy regarding renewable energy is outlined in the *Green Energy and Green Economy Act, 2009*, S.O. 2009, c. 12, which act amended key pieces of legislation to promote the use and generation of electricity from renewable energy sources, including the OEB Act. In particular, the Project will contribute a total of 253.1 MW of clean, renewable energy to the provincial electricity grid, and forms part of the Applicant's commitment, in conjunction with its affiliates, to develop 2500 MW of renewable energy in Ontario over the next five years.
- 12) The Applicant, via SRE, is in the process of completing a system impact assessment ("**SIA**") with the IESO. The draft SIA is expected to be delivered on or about March 23, 2011. The SIA will be filed with the Board upon completion by the IESO. A customer impact assessment ("**CIA**") is currently being completed by Hydro One Networks Inc. ("**Hydro One**") in order to assess the impact of the Project on the reliability of service for other transmission customers and will be filed with the Board as soon as it is completed. The Applicant will adhere to the requirements of the CIA and SIA in constructing the Proposed Facility.
- 13) In order to construct the Proposed Facility, the Applicant requires certain rights over both privately-held and publicly-held lands. In particular, SRE has entered into two Ground Leases and is seeking to enter into a third Ground Lease with the three affected private landowners (the "**Landowners**") in order to obtain the rights to construct the two Transition Stations and the Interconnection Station, respectively. Option agreements are also being sought with the Ontario Realty Corporation ("**ORC**") in order to acquire rights to lands held by the Ministry of Infrastructure, to which the ORC acts as land manager to build the Collector Substation and a portion (~5% of the linear length) of the Transmission Line. The Ground Leases and the ORC option agreements will be assigned to the Applicant prior to the start of construction of the Proposed Facility. The Landowners and the ORC are aware

of the relationship between SRE and the Applicant and do not object to the assignment of the Ground Leases and the option agreements from SRE to the Applicant.

- 14) As stated above, the majority of the Transmission Line (~95% of the linear length) will be constructed along the Haldimand ROW. Although the Applicant has a statutory right<sup>1</sup> to construct transmission facilities along municipal right-of-ways, the Applicant believes that a well-designed facility can address any valid concerns raised by the County.
- 15) The Applicant, via SRE, is therefore seeking to execute an easement with Haldimand County to delineate the terms of the construction of the Transmission Line along the Haldimand ROW.
- 16) Details with respect to land acquisition process relating to the Ground Leases, the ORC option agreements and the Haldimand ROW are contained in Exhibit B-3-1.
- 17) The GREP and the Proposed Facility are subject to the environmental assessment process prescribed by Ontario Regulation 359/09, *Renewable Energy Approvals under Part V.0.1 of the Act* made pursuant to *Environmental Protection Act*, R.S.O. 1990, c. E.19 (the "**REA Regulation**"). The Applicant is in the process of preparing an application (the "**REA Application**") for a renewable energy approval for the Project for submission to the Ministry of Environment ("**MOE**"). The MOE has indicated that, if approved, it intends to issue two REA approvals under the REA Application, one for each of the Solar Project and the Wind Project. The Proposed Facility is being evaluated as part of the REA Application and, as confirmed by the MOE, will be evaluated as part of the Wind Project. Accordingly, the REA with respect to the Wind Project, if issued, will also approve the Proposed Facility.
- 18) As part of the REA Application process, the Applicant has conducted extensive consultation with interested stakeholders regarding both the GREP and the Proposed Facility (i.e. the Project). The Project was officially announced to stakeholders through a Notice of Proposal and Notice of Public Open House which was published in June 2010. As part of the initial Notice, a Draft Project Description Report was released to the public for review which detailed preliminary information about the Project. A public open house was held on July 8, 2010 in Cayuga. Members of the public and aboriginal communities were invited to attend so that they could view preliminary information about the Project and speak directly to members of the study team. Following the open house, comments have been provided (via

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<sup>1</sup> Pursuant to section 41 of the *Electricity Act*, 1998, S.O. 1998, Chapter 15, Sched. A, the Applicant has the right to construct the transmission lines over, under or on any public street or highway. The consent of the owner (or any other person having interest) of the public street or highway is not required in order to erect the transmission line.

email, phone, comment cards, etc.) by stakeholders which are currently being addressed by the Applicant.

- 19) Draft reports (the "**Draft Reports**") developed in furtherance of the REA Application will be released to aboriginal communities and the public in March 2011 with a second public meeting planned for May 2011 (at least 60 days following the release of the Draft Reports). Following the second public meeting, the Draft Reports will be finalized and the REA Application will be submitted to the MOE for approval. As part of the final REA Application, a consultation report (the "**Consultation Report**") will be prepared, which will summarize all of the consultation activities and comments received by agencies, aboriginal communities, and the public throughout the REA process. Copies of all notices and comments will also be provided within the Consultation Report. A copy of the Consultation Report will be filed with the Board upon completion.
- 20) The Applicant expects to receive a decision from the MOE regarding the Wind Project/Proposed Facility REA by September 2011. Construction of the Proposed Facility is expected to begin in September 2011 with commissioning occurring in the first quarter of 2013. A detailed construction and in-service schedule is contained in Exhibit B-6-1. Based on the above noted timelines, the Applicant hereby requests that the Board issue a decision in this matter at its earliest opportunity.
- 21) The Applicant will finance the development and construction the Proposed Facility using its own resources or alternatively, obtain financing from its affiliates. As such, the Proposed Facility will not have any adverse impact on ratepayers. Once constructed, the Applicant intends to retain ownership of the Proposed Facility.
- 22) The individuals below are the authorized representatives of the Applicant for the purpose of serving documents throughout this proceeding:

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- 23) Additional written evidence, as may be required, will be filed in support of the application and may be amended from time to time prior to the Board's final decision.
- 24) The Applicant requests that the Board proceed by way of written hearing, pursuant to Section 34.01 of the Board's *Rules of Practice and Procedure*.

DATED February 28, 2011 at Toronto, Ontario

**GRAND RENEWABLE WIND LP**  
by its counsel  
McCarthy Tétrault LLP

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George Vegh

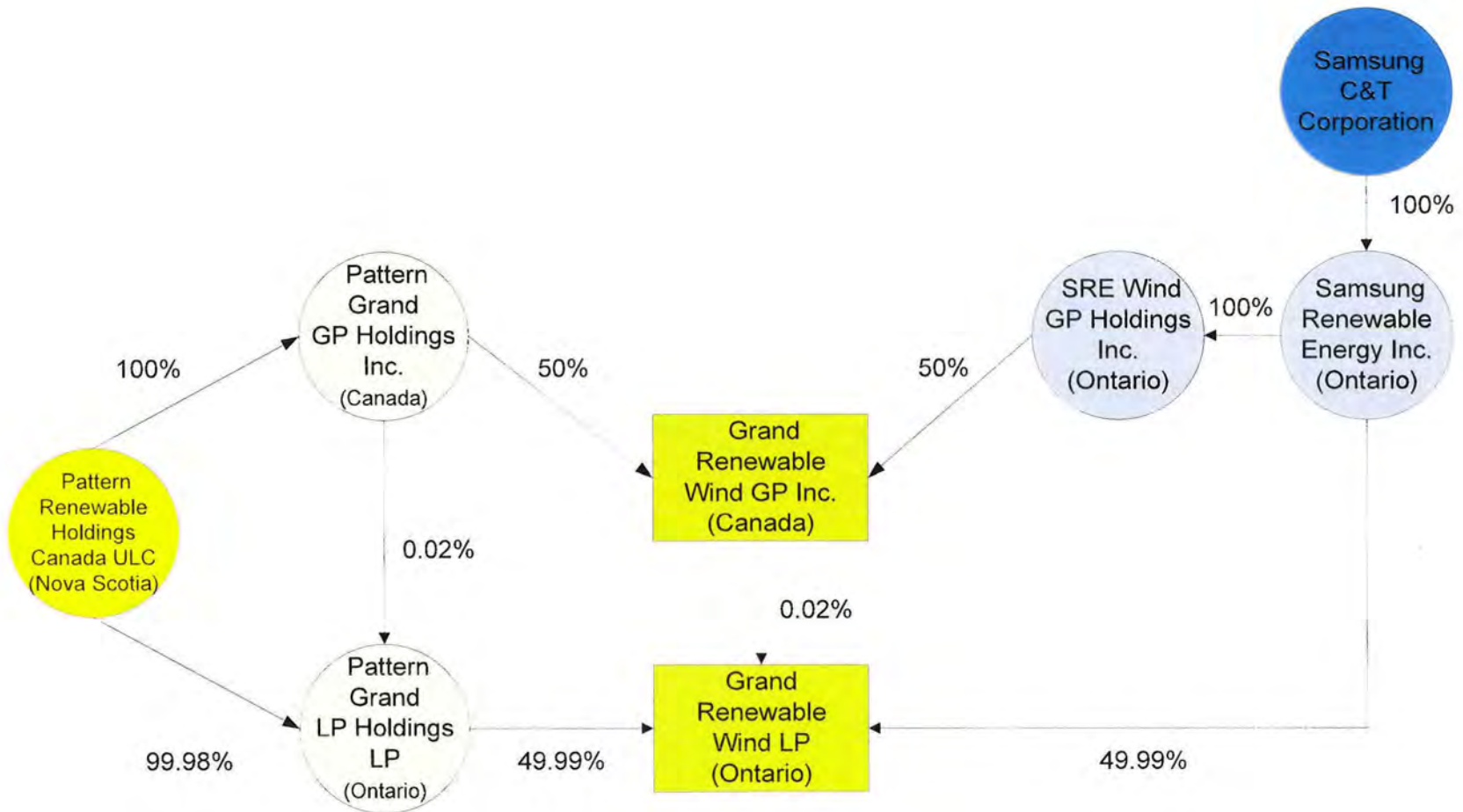
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Kristyn Annis

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## **CORPORATE CHART**

## Samsung-Pattern Ontario Joint Venture



## PROJECT SUMMARY – GREP AND PROPOSED FACILITIES

- 25) The GREP and the Proposed Facility include, respectively, (i) solar panels, wind turbines, access roads, underground and overhead electrical collector lines, an operation and maintenance building, and (ii) the Interconnection Station, the Collector Substation (including step-up transformers), the Transition Stations and the Transmission Line, all as further described below.

### ***The Grand Renewable Energy Park***

- 26) The GREP, which is comprised of the Wind Project and the Solar Project, is to be located within Haldimand County, Ontario, north of the Lake Erie shoreline and west of the Grand River. A map and layout of the GREP and the Proposed Facility is found in Exhibit B-2-2. The GREP also includes construction access roads to the wind turbines and solar panels.
- 27) SRE, on behalf of the Applicant, is currently negotiating power purchase agreements (the “PPAs”) substantially in the form of the Feed-in-tariff Contract, with the Ontario Power Authority (“OPA”), in which the OPA will procure the power generated from each of the Solar Project and the Wind Project for the purposes of injecting the power to the IESO-controlled grid via Hydro One’s N5M Circuit (further described below).
- 28) The benefits of the Project to the public are considerable. The electricity generated from the GREP and transmitted via the Proposed Facility to the IESO-controlled grid will help meet the Province of Ontario’s targets for clean, renewable energy in their supply mix as well as bring manufacturing in renewable technologies to the Province. Importantly, the development, construction and operation of the Project is expected to provide approximately 8,790 person-month employment positions. In addition, through the establishment and operation of four manufacturing facilities such as wind blade, wind tower, solar module and solar inverter manufacturing facilities, approximately 900 jobs will be created during peak production.
- 29) The Wind Project is 153.1 MW (nameplate capacity) and is being developed by the Applicant. The Wind Project will consist of 68 Siemens model SWT-2.221 and one Siemens model SWT-2.126 wind turbines. The Wind Project is located on approximately 18,000 acres of land owned by private land owners as well as land (the “**MOI Lands**”) owned by Her Majesty the Queen in Right of Ontario as represented by the Minister of Infrastructure and managed by the ORC. SRE, on behalf of the Applicant, has acquired the necessary land rights for the Wind Project. Rights to the Wind Project, including the REA

approval when received, and land rights, will be assigned to the Applicant prior to construction. It is anticipated that the construction of the Wind Project will commence in Q3 2011 and that the Wind Project will reach commercial operation by March 2013.

- 30) The Solar Project will be comprised of approximately 425,000 solar panels covering 325 hectares of Class III agricultural lands, as designated by the Canada Land Inventory designations. The Solar Project will be located on both privately owned land as well as MOI Lands. It is anticipated that the construction of the Solar Project will commence in Q3 of 2011 and that the Solar Project will reach commercial operation by March 2013.

***Proposed Facility***

- 31) The Proposed Facility is comprised of the following four elements, as described from the eastern most point of the proposed corridor (the "Transmission Corridor") of the Proposed Facility:

- a) Collector Substation: The substation will collect distribution lines from both the Wind Project and the Solar Project. Protection and control systems, two step-up transformers and the SCADA system will be included. The step-up transformers will transform the power from a 34.5 kV collection voltage to a 230 kV transmission voltage. The wind power transformer is rated 100/133/166 MVA while the solar power transformer is rated 65/86/108 MVA. Each transformer is mounted on a concrete base foundation within an oil containment facility that would capture all of the oil insulating fluid within each transformer in the event of a leak. A sound attenuation wall will be constructed around the perimeter of the two power transformers to minimize the escape of transformer noise into the surrounding environment. The sound attenuation wall will be constructed with a minimum density of 20 kg/m<sup>2</sup> that will break the line of sight with any noise receptors.
- b) Transmission Line: an overhead 19 km long 230 kV electricity transmission line, consisting of single, 3-conductor aluminium circuit. At kilometre 12.8 along the Transmission Corridor, the Transmission Line will be placed underground for a linear distance of approximately 700 m. The Transmission Line is being buried since adequate clearances cannot be maintained from the existing built structures. The underground portion of the Transmission Line will be encased in a 230 kV ductbank, which will be constructed a minimum of 1.2 m below grade and will be backfilled with thermal fill to dissipate heat of cable power losses throughout the ground.
- c) Transition Stations: There will be two transition stations that will be constructed to redirect the overhead Transmission Line into the underground duct banks for a distance of 700 m under the hamlet of Nelles Corners. The Transition Stations are

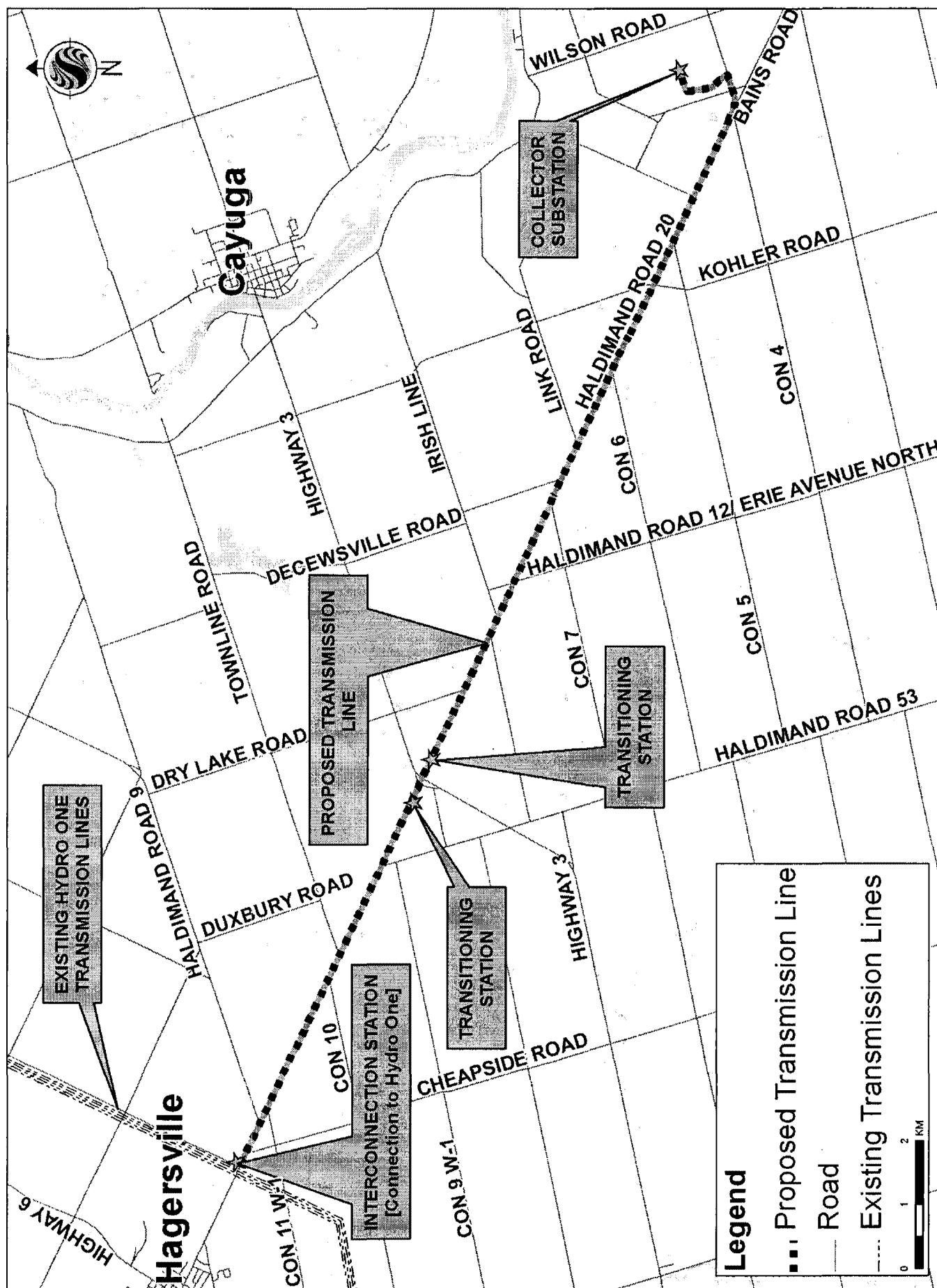
located at (i) eastern border of Nelles Corners at kilometre 12.8 of the Transmission Corridor, and (ii) the western border of Nelles Corners at kilometre 13.5 along the Transmission Corridor, respectively.

- d) Interconnection Station: The Interconnection Station will be constructed at Regional Road 20 and 1st Row Road and will be directly adjacent to the existing Hydro One transmission corridor providing 2 – 500 kV circuits and 4 – 230 kV circuits from the Nanticoke TS to the Middleport TS. Based on initial discussions with Hydro One and the IESO, it has been proposed that the Project will connect to Hydro One's existing 230 kV N5M circuit contained within this transmission corridor. The Interconnection Station will consist of disconnect switches, lightning arrestors, 230 kV circuit breaker, associated protection and control equipment and incoming and outgoing termination gantries. Communication interface to Hydro One for the transfer trip control of the 230 kV circuit breaker will also be provided at the Interconnection Station. The specific 230 kV circuit (confirmation of the N5M circuit) and any requirements of Hydro One at the Interconnection Station are to be confirmed in the completed SIA/CIA.

- 32) The Proposed Facility is being constructed to connect the power generated by the GREP to Hydro One's N5M Circuit, at a connection point located at 579429, 4756378 UTM 17, south of Hagersville, Ontario. A diagram of the Proposed Facility is located at Exhibit B-1-2.

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## **DIAGRAM OF PROPOSED FACILITIES**



### **PROJECT LOCATION**

- 33) The approximate centre of the GREP is situated at 4748952 N, 601102 E, Zone 17, NAD 83 Datum. The GREP site is generally bounded by provincial Highway 3 to the north, Fisherville Road to the west, the Grand River to the east and Lake Erie to the south.
- 34) A map of the GREP, the Proposed Facility and existing transmission and distribution infrastructure can be found at Exhibit B-2-2. The Transmission Line will be located along Regional Road 20 within the Haldimand ROW. The Collector Substation will be located near Regional Road 20 and Mt. Olivet Road within the Solar Project site area. The Transition Stations, which are required to facilitate underground construction of the Transmission Line beneath the small hamlet of Nelles Corners, will be located at the eastern and western borders of Nelles Corners. The Interconnection Station will be located at the north side of Regional Road 20, just east of the N5M Circuit transmission corridor, east of Hagersville. The Interconnection Station will be used to facilitate the connection of the Transmission Line to Hydro One's existing N5M circuit originating at the Nanticoke Power Generating Station.
- 35) A satellite view of the proposed routing of the Transmission Line, and the location of the Collector Substation, the Transition Stations and the Interconnection Station may be found at Exhibit B-2-3.

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Exhibit B

Tab 2

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**MAP OF PROJECT AREA (GREP AND PROPOSED FACILITIES)**



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**MAP OF PROPOSED FACILITIES (SATELLITE VIEW)**



- Legend**
- Transmission Line**
- Overhead Transmission Line
  - - - - - Underground Transmission Line
  - ★ Electrical Transmission Component
- Existing Features**
- Road
  - Railway
  - Abandoned Railway
  - Transmission Line (MNR)
  - Watercourse (MNR)
  - Waterbody (MNR)



- Notes**
1. Coordinate System: UTM NAD 83 - Zone 17 (N).
  2. Base features produced under license with the Ontario Ministry of Natural Resources © Queens Printer Ontario, 2011 © Samsung, 2011.
  3. Image Source: © TerraPoint, 2011 - Imagery Date: July 2009; Grand River Conservation Authority © First Base Solutions, 2011 - Imagery Date: Spring 2005.

Client/Project  
SAMSUNG, PATTERN & KEPKO (SPK)  
GRAND RENEWABLE ENERGY PARK

Figure No.  
1

Title  
**PROPOSED TRANSMISSION LINE  
ROUTING  
(EXHIBIT A, TAB 2, SCHEDULE 2)**

DRAFT

## **LAND MATTERS**

- 36) The Proposed Facility will be developed across three distinct types of land, being 3 parcels of privately owned land, the MOI Lands and the Haldimand ROW (owned by Haldimand County). Approximately 95% of the Transmission Corridor will be composed of the Haldimand ROW. Another 3% of the Transmission Corridor will be the land that is privately held by the Landowners, while the remaining 2% of the Transmission Corridor will be MOI Lands. Apart from the Landowners, no landowner will be directly affected by the Proposed Facility, this due primarily to the fact that 95% of the Transmission Corridor is along the Haldimand ROW.
- 37) The Applicant has not finalized a detailed list of crossings as the routing for the Transmission Line has recently been finalized. A preliminary list of consents required for temporary crossings includes consents from Haldimand County, Haldimand County Hydro Inc., several communications providers, Ministry of Transportation and a possible gas line and possible rail crossing. The Applicant will work to obtain all necessary temporary crossings prior to construction and will update the evidence accordingly.

### ***Land acquisition process – Private Landowners***

- 38) SRE, on behalf of the Applicant and Solar LP, has acquired rights to over 18,000 acres if privately-owned lands required for both the GREP.
- 39) During the consultations with the community, and in particular the landowners surrounding the Project, the Proposed Facility was discussed at length with regard to land use and visual impacts. Construction timelines were also discussed. In particular, the landowners with property adjacent the Haldimand ROW were delivered Notice of Commencements as per the requirements in the REA Regulation.
- 40) The community was also invited to a public meeting at which time the Applicant presented details on the Proposed Facility and was available to answer questions from the audience. The Applicant continues to meet individually with members of the community to listen to, and address, any concerns that may arise.
- 41) SRE, on behalf of the Applicant, has entered into two Ground Leases and is seeking to enter into a third Ground Lease with the three Landowners in order to obtain the rights to construct the two Transition Stations and the Interconnection Station, respectively. The form of Ground Lease is found at Exhibit B-3-2. The Ground Lease provides the lessee with the unobstructed and exclusive right to use the leased lands for the purposes of the erection, installation, re-installation, construction, operation, maintenance, inspection, relocation, etc. of all equipment associated with the Wind Project, including but not limited

to the overhead and underground electricity or distribution lines or cabling and transformer boxes, any related equipment, maintenance buildings, substations, maintenance yards, construction laydown areas, site offices and access roads.

- 42) The Ground Leases will be assigned by SRE to the Applicant prior to the start of construction of the Proposed Facility. The Landowners are aware of the relationship between SRE and the Applicant and do not object to the assignment of the Ground Leases from SRE to the Applicant. The lessee has the right to assign the Ground Lease and does not require the consent of the lessor written or otherwise to assign the Ground Lease.
- 43) The municipal addresses of the privately held land parcels are below (please note that the names of the property owners have been removed for their sake of privacy):

| <u>Landowner</u>          | <u>Municipal Address</u>                                             | <u>Requirement/Status</u>                       |
|---------------------------|----------------------------------------------------------------------|-------------------------------------------------|
| Landowner A<br>(Parcel 1) | 1138 Haldimand Road 20 (Conc 8 Lot 3, Geo Twp of Rainham)            | Transition Station<br>Lease executed            |
| Landowner B<br>(Parcel 2) | Conc 9 Pt Lot 1, Pt Lot 2, Geo Twp of Rainham (no municipal address) | Transition Station<br>Lease executed            |
| Landowner C<br>(Parcel 3) | 352 1st Line (Conc. 1 Lots 13 to 16, Geo Twp of Oneida)              | Interconnection<br>Station<br>Under negotiation |

### ***MOI Lands***

- 44) A portion the Transmission Line and the Collector Substation will be built on MOI Lands (such particular parcel of MOI Lands referred to as the “**ORC Land**”), being:
- SCAY CON 4 PT LOTS 29 30 TWN CAYUGA
- 45) A license agreement (the “**Licence Agreement**”) has been executed between SRE and the Ministry of Infrastructure with respect to the ORC Land. The License Agreement provides the Applicant with the right to conduct due diligence activities on the ORC Land for the purposes of design and permitting of the Proposed Facility and with an option to enter into a wind option agreement and a solar option agreement (each an “**ORC Option Agreement**”) to secure rights to for rights to develop the Wind Project and the Solar Project on the ORC Lands.

- 46) The terms of the ORC Option Agreement are currently being negotiated between ORC and the SRE with respect to the ORC Land. It is intended that the ORC Option Agreement will provide the SRE with the rights to design and construct a portion of the Transmission Line and the Collector Substation on the ORC Land. The form of ORC Option Agreement will be filed with the Board as Exhibit B-3-4 as soon as it is finalized.

***Transmission Corridor Considerations***

- 47) The Applicant will be using the Haldimand ROW for the purposes of ~95% of the linear length of the Transmission Corridor. The Applicant took into account several design parameters and standards in locating and designing the Transmission Corridor. In particular, the following criteria were used to decide the width of the above-ground portion of the Transmission Corridor, which will be 10 meters:
- CAN/CSA-C22.3 N0. 1-06 and AEUC horizontal clearances and conductor swing under moderate wind pressure of 230Pa.
  - 60 Hz flashover clearances and conductor swing under high wind.
  - Switching surge flashover clearance and conductor swing under five year return wind.
- 48) Existing structures (polelines) within the Transmission Corridor may have to be relocated in order to achieve the proper clearances. The extent of relocations necessary has yet to be determined as the Transmission Line pole placement is still being finalized. Discussions with Haldimand County Hydro Inc. are ongoing.
- 49) The design parameters pertinent to the Transmission Corridor width also include consideration of: span between structures, conductor sag, arrangement of insulator set "I" or "V", specified electrical clearances, layout of phase conductors etc.
- 50) Use of the area inside the overhead Transmission Corridor will be allowed but it will be restricted. Transmission lines are designed so that safe electrical clearances are maintained during the line's operation. The height of the energized conductors above ground accessible to vehicles and over the farmland is sufficient to allow large vehicles (i.e. trucks and standard agricultural machines) to safely pass under the conductors. The land under the Transmission Line can be used for agriculture purposes, however the growing of tall trees or constructing buildings under the Transmission Line is not permitted. The Transmission Corridor will be so arranged that ground access for maintenance and urgent repairs is available at all times.
- 51) In the case of the underground cable installation, the width of the Transmission Corridor is significantly less than the overhead portion since there are no exposed live parts of the

Transmission Line requiring clearances from ground or other objects. The underground portion of the Transmission Line will require trenching along the entire buried section. The construction of underground portion of the Transmission Line is anticipated to take 5 or 6 months including testing. Construction works within the Haldimand ROW may result in short-term, localized disturbance to traffic. Detailed plans or agreements regarding maintenance and/or repairs of the local roads and road right-of-way damaged during construction will be developed with Haldimand County. Pre and post construction road survey will also be conducted. The Applicant will implement a traffic management plan to identify and deal with specific traffic planning issues including the management of traffic and delivery of materials.

- 52) A 3 m ROW is adequate for most single circuit underground applications. The underground duct bank construction for the Transmission Line is anticipated to be a maximum of 3 meters wide and be within the Haldimand ROW dependent on the Transition Stations being no more than 700m apart. At each end of the ductbank will be a utility pulling vault measuring 5 m long x 3 m wide x 3 m deep. The construction will typically require 450 mm of engineered fill/onsite crushed materials to form a base slab on which the vault will be positioned. A crane is to be used to lift the vault into place from a flatbed delivery truck.
- 53) The trenching will typically utilize one crew, each consisting of excavators, dump trucks and compaction equipment. The trenching will take six (6) to eight (8) weeks. Space within the ROW will be required to facilitate the pulling of the 230 kV conductors into the ducts within the ductbank. Pulling equipment will be located in the utility vaults.

### ***Haldimand County***

- 54) As indicated above, the Applicant intends to construct 95% of the Transmission Line along Haldimand ROW, being Regional Road 20, which is owned by Haldimand County. As such, the SRE is currently negotiating an easement agreement (the "**ROW Agreement**") with Haldimand County. The ROW Agreement will allow the Applicant to design and construct the Transmission Line along Regional Road 20. A copy of the proposed form of ROW Agreement to be executed between the Applicant and Haldimand County is included in Exhibit B-3-3. As proposed, the ROW Agreement does not contain any restrictions with respect to assignment and SRE will assign the ROW Agreement to the Applicant prior to construction of the Proposed Facility.
- 55) Construction works along Regional Road 20 and an increase in excess load traffic may result in short-term, localized disturbance to traffic and create potential traffic safety hazards, and/or produce abnormal wear on the roads. These issues are being discussed with Haldimand County and will be addressed in the ROW Agreement.

- 56) Existing electrical distribution infrastructure Regional Road 20 will be affected by the Transmission Line. Selected portions of the existing electrical distribution system along Regional Road 20 will have to be relocated (within the right of way) to facilitate the installation of the Transmission Line. Detailed plans and agreements will be developed with Haldimand County Power Inc. for the relocation and restoration work of the existing distribution system. Selected portions of the existing communications infrastructure along Regional Road 20 may also require relocation (within the right of way) due to construction of the Transmission Line. Detailed plans and agreements for the relocation of the existing communications wiring along Regional Road 20 will be developed with the LDC and the communications provider for the relocation work in the same manner as the existing electrical services relocations. The relocation of any existing electrical and communication services along Regional Road 20 would be well planned in advance of construction in order to minimize the duration of any service interruptions.
- 57) Apart from the Landowners (i.e. the owners of Parcels 1, 2 and 3), the Applicant will not require the use of any additional privately-held lands. However, the Applicant has identified the 53 landowners (the "**ROW Landowners**") whose properties border the Haldimand ROW. The Applicant continues to consult with the ROW Landowners to ensure that, to the extent possible, any concerns raised by the ROW Landowners have been addressed.

### ***Crossings***

- 58) The Transmission Line will cross the following watercourses:

- Stoney Creek;
- Hemlock Creek; and,
- Wardells Creek.

- 59) Temporary crossings of watercourses may be required at these locations. The Applicant is seeking to confirm such crossings in accordance with the REA Application.

### ***Environmental considerations***

- 60) The environmental effects of overhead transmission lines are minimized through line design process, and environmental protection measures implemented during construction and operation of the line. Environmental studies that are part of the REA Application process for new projects consider the effects of tree cutting, soil erosion, fish and wildlife impacts and noise effects. It is always possible to restore the ROW area after the line construction so that the surrounding ground, waters and vegetation rest unaffected. Sensitive areas such as wilderness, scenic areas, aboriginal sites and burial grounds, parks and historical

sites should be given special consideration and be avoided if possible. The electrical influences on the environment caused by high voltage power transmission lines include:

- The effects of electric fields;
- The effects of magnetic fields;
- Radio interference;
- Audible noise; and,
- Ground currents and corrosion effects.

- 61) Noise will be generated by the Collector Substation. Based upon the Project (GREP and the Proposed Facility) design, the analysis documented in the Noise Assessment Report indicates that sound produced by the Project was found to be within the acceptable limits established by the MOE at all noise receptors. A sound attenuation wall will also be constructed around the Collector Substation to further attenuate noise produced by the Project. Some audible noise is normal during periods of atmospheric abnormalities such as mist and rain.
- 62) No adverse net effects on human health are expected from operation of the Project. A fence will be installed around the Collector Substation and Interconnection Station in order to limit the proximity to which members of the public may approach these facilities.
- 63) There are no anticipated significant effects to telecommunication/radar systems during the operation of the Project. Ground currents and corrosion effects are mitigated by effectively grounding each transmission structure.
- 64) The siting of the Transmission Line from an environmental perspective was based on the following principles:
- a) Avoidance of sensitive environmental and socio-economic features and associated impacts through routing;
  - b) Minimize impact through mitigation, including such considerations (i.e. construction timing, directional drilling or spanning of watercourses by aerial crossings); and,
  - c) Compensate for unavoidable impacts, including such measures as revegetation and creation of fish habitat.
- 65) Construction of the overhead portion of the Transmission Line that lies entirely within the Haldimand ROW will avoid surrounding sensitive environmental features, and most socio-economic features and archaeological sites. This type of construction will also ensure that

land being used is previously disturbed (i.e. trees removed, topsoil impacted, and watercourses spanned).

- 66) SRE is in the process of preparing an REA Application for the Project (in its entirety) for submission to the MOE. The MOE has indicated that, if approved, it intends to issue two REA approvals under the REA Application, one for each of the Solar Project and the Wind Project. The Proposed Facility is being evaluated as part of the REA Application and, as confirmed by the MOE, is considered to be part of the Wind Project. Accordingly, the REA with respect to the Wind Project, if issued, will also approve the Proposed Facility and will be assigned to the Applicant prior to construction.
- 67) As part of the REA process, Notice of a Proposal to Engage in a Renewable Energy Project was posted on June 7 and 8, 2010 (Brantford Expositor), June 9, 2010 (Haldimand Press), and June 9, 2010 (Dunnville Chronicle). Copies of the notice were mailed to adjacent landowners, including all three Landowners, and numerous public and agency stakeholders including municipal, provincial and federal regulatory agencies and provincial and municipal government. A Public Meeting was held on July 8, 2010 in Cayuga, Ontario. Draft reports along with the "Consultation Form: Municipalities, Local Authorities" were sent to Haldimand County on February 14, 2011. A presentation was made to Haldimand County Council about the REA process on December 8, 2010.
- 68) Copies of the notice to engage and public open house is provided as Exhibit B-3-5.
- 69) To date no specific concerns have been voiced by members of the public with respect to the construction and operation of the Proposed Facility. Concerns have been expressed by the Haldimand County Hydro Inc. as to how the Transmission Line will affect their existing infrastructure. Discussions with Haldimand County Hydro Inc. are ongoing.

EB-2011-0063  
Filed: 2011-02-28  
Exhibit B  
Tab 3  
Schedule 2  
Pages: 20

## **FORM OF GROUND LEASE**

## GROUND LEASE

### (Auxiliary Uses)

**THIS GROUND LEASE** made as of the • day of •, 20\_\_\_ between \_\_\_\_\_ (hereinafter called the “**Lessor**”), being the registered owner of an estate in fee simple composed of the lands described in Exhibit “A” (hereinafter the “**Property**”) and the lands described in Exhibit “B” (hereinafter the “**Demised Lands**”) and • (hereinafter called the “**Lessee**”) (the Lessor and the Lessee may be herein collectively referred to as the “**Parties**”).

In consideration of the compensation described in Section 5 hereof, and in consideration of the covenants hereinafter contained to be kept and performed by the Lessor and the Lessee, the Lessor does hereby grant, demise and lease unto the Lessee the Demised Lands for the following sole purposes, namely the unobstructed and exclusive right of the Lessee to use the Demised Lands for the purposes of the erection, installation, re-installation, construction, operation, maintenance, inspection, patrol, removal, replacement, reconstruction, relocation, enlargement, alteration and repair on the Demised Lands at all times of all equipment, devices, apparatus, accessories and works associated with the Lessee’s wind power project(s) located, in part, on the Demised Lands (the “**Project**”) including, but not limited to, any overhead and underground electricity transmission or distribution lines or cabling and transformer boxes, any related equipment, apparatus, accessories, works or appurtenances thereto, wind measurement equipment, control and maintenance buildings, substations, maintenance yards, construction laydown areas, site offices and access roads (hereinafter, collectively called the “**Works**”) as may be necessary or convenient in connection therewith for the generation, transmission, distribution and conveyance of electrical energy produced by the Project, together with the rights of ingress to and egress from the Demised Lands upon those portions of the Property immediately adjacent to the Demised Lands for all emergency, temporary construction or periodic maintenance purposes incidental to this grant, effective from the date hereof and for the Term hereof.

#### 1. The Works

The rights and privileges hereby granted shall include, without limiting the generality of the foregoing, the right to erect, install, re-install, construct, operate, maintain, inspect, patrol, remove, replace, reconstruct, enlarge, relocate, alter and repair on the Demised Lands at all times the Works, as the Lessee may deem necessary for the full enjoyment of any or all of the rights and privileges herein granted.

#### 2. General Rights of the Lessee

The Lessee, its tenants, directors, officers, employees, agents, consultants, contractors, assigns, and affiliates together with their vehicles, tools, equipment, apparatus and materials of whatsoever nature and kind, shall have the full, free and uninterrupted right to enter upon, use and occupy the Demised Lands for all purposes connected with, or incidental to, the rights and privileges herein granted including, without limitation:

- (a) the right to load, unload and store material, apparatus and equipment, including, but not limited to, heavy equipment, upon the Demised Lands;
- (b) to make and keep the Demised Lands free from bush, trees, growths and water and to enter on the Lessor’s abutting lands (including, without limitation, the Property), to remove or trim any trees immediately adjacent to the Demised Lands which, in the reasonable opinion of the Lessee are required for the prudent and efficient operation of the Works, which determination will not be made without prior consultation with the Lessor; and
- (c) the right and privilege for audio, visual, view, light, flicker, noise, shadow, air turbulence, wake, electrical and radio frequency interference, and any other effects attributable to the Lessee’s activities located on the Demised Lands, the Property or on adjacent and neighbouring properties. Where the Lessee reasonably considers it necessary by reason of the nature or condition of the Demised Lands or the circumstances then existing, the Lessee shall have the right to go on, across and exit from all or any part of the Lessor’s abutting lands (including, without limitation, the Property) whether by the Lessor’s access routes or otherwise for the purposes of

gaining access to the Demised Lands and for the purpose of constructing, reconstructing, repairing, replacing, relocating or protecting its Works; provided however, in exercising such rights, the Lessee shall abide by all reasonable safety precautions.

3. **Term**

The term of this Ground Lease shall commence on the date hereof (the “**Commencement Date**”) and shall run for a period of twenty-one (21) years less-one-day (the “**Initial Term**”), subject to the option to renew set forth in Section 4.

4. **Option to Extend**

If the Lessee is not then in material default under this Ground Lease, the Lessee shall have the option to extend the Initial Term for a further period of twenty-nine (29) years (the “**Extension Term**”). The extension shall be automatic without the requirement of any further action by the Lessee, unless the Lessee shall give prior written notice to the Lessor of its intent not to renew the Initial Term at least six (6) months prior to the end of the Initial Term, and the Extension Term shall be upon the same terms and conditions of this Ground Lease except that there shall be no further right of extension. The Initial Term and the Extension Term are collectively referred to as the “**Term**”.

5. **Compensation**

In consideration of the rights granted to the Lessor hereunder, the Lessee shall pay to the Lessor the amounts set forth in Exhibit “D” attached hereto.

6. **Studies and Tests**

The rights granted to the Lessee in this Ground Lease shall include, without limiting the generality of the foregoing, the right to conduct all engineering, legal surveys and make soil tests, soil compaction, environmental and archaeological studies and audits in, under, on or over the Demised Lands as the Lessee in its sole discretion considers appropriate and at the Lessee’s sole cost and expense.

7. **Siting of Works**

- (a) The Lessee shall use all reasonable efforts to ensure that the siting and location of the Works minimizes disruption to the ordinary business operations of the Lessor who carries on business on the remainder of its lands adjacent to the Demised Lands and the Lessee shall consult with the Lessor to determine suitable locations for the Works. Notwithstanding the Lessee’s requirement to consult with the Lessor with respect to siting the Works and to act fairly and reasonably in so consulting, the ultimate determination of the siting of the Works shall be in the Lessee’s sole discretion and the means of access to the Works shall be determined by the Lessee in its discretion, which discretion shall be exercised reasonably and in consultation with the Lessor.
- (b) The Lessee shall, where possible, but subject always to regulatory requirements, bury the transmission and distribution lines or cables forming part of the Works. The Lessor acknowledges and agrees that the transmission and distribution lines or cables forming part of the Works may be, in part, buried underground. In this regard, the Lessor covenants and agrees that it shall not conduct any digging or excavation on or in the immediate vicinity of the Demised Lands without first obtaining the prior written consent from the Lessee, such consent not to be unreasonably withheld, so that the Lessee can confirm that any such digging or excavation will not damage or materially interfere with the operation of the Works.
- (c) The Lessor acknowledges that certain aspects inherent to the operation of the Works may result in some nuisance, such as visual impacts, possible increased noise levels and other possible effects of electrical generation and transmission including, without limitation, potential interference with radio, television, telephone, mobile telephone, or other electrical devices. The Lessee will attempt to minimize any impacts to the Lessor, and abide by all regulations pertaining to the

permitting and design of the Works. The Lessor understands and has been informed by the Lessee that the Works on the Demised Lands may result in some nuisance, and hereby accepts such nuisance and waives its right to object to such nuisance.

**8. Construction of Works**

The rights granted to the Lessee in this Ground Lease shall include, without limiting the generality of the foregoing, the right of the Lessee to:

- (a) construct temporary or permanent access routes or rights-of-way over the Demised Lands without interfering with existing drainage ditches and drainage flow, or installing culverts where required, and the Lessor specifically consents to the construction of such roads, provided that the Lessee shall be required to consult with the Lessor to determine the least intrusive route for any such access routes or rights-of-way and shall use reasonable efforts to comply with the Lessor's reasonable requests regarding the siting and use of such roads, provided further that Lessor shall have the right to install new drainage ditches and/or tile drainage systems through or under such roads or, if necessary, install culverts to drain the Property;
- (b) excavate or dig into and under the Demised Lands for the purposes of situating, stabilizing or anchoring the Works as required, in the Lessee's sole and reasonable discretion; and
- (c) temporarily store any equipment, apparatus, materials and vehicles, including heavy equipment vehicles of whatsoever nature and kind upon the Demised Lands during the construction of the Works.

**9. Maintenance of Works**

The Lessee, its tenants, employees, agents, consultants and contractors will exercise their rights hereunder in a proper and workmanlike manner so as to do as little injury as is reasonably possible to the Demised Lands and will keep and maintain the Works in good repair. Without limiting the generality of the foregoing, the Lessee will conduct inspections of the Works, on a periodic basis and complete any maintenance which the Lessee, in its reasonable opinion, determines is required in order to ensure that the Works, maintain a clean and uncluttered appearance and are, at all times, operating in a safe manner.

**10. Modification of Works**

The Lessee, without paying any additional consideration, shall be entitled to erect upon the Demised Lands such Works as it may deem necessary for the purpose of reconstructing, relocating and replacing its equipment, accessories and appurtenances thereto, within, upon or over the Demised Lands; provided, however, the Lessee will, as soon as practicable under the circumstances, take down, dismantle and remove all Works that are no longer required for its reconstructed, relocated or replaced equipment, accessories and appurtenances thereto and will fill up all holes caused by such removal and restore the surface of the Demised Lands as far as may be reasonable and possible.

**11. Removal of Debris upon Completion of Construction**

Upon completion of the initial construction of the Works, the Lessee shall level the Demised Lands unless otherwise agreed to by the Lessor, and shall remove all debris from the Demised Lands and restore the same to its former state except that the Works themselves shall not constitute debris and the Lessee shall not be required to remove same and restore the Demised Lands associated therewith for a total distance of two (2) metres from any part of the Works or transformer boxes.

**12. Access**

The Lessee shall not fence the Demised Lands or any portion thereof except in accordance with an agreement with the Lessor and the Lessor shall have free access to, and use of, the Demised Lands and the Lessee hereby grants to the Lessor a licence to use the Demised Lands, including the right to sub-licence the Demised Lands to a third party for agricultural purposes;

provided, however, that such access and use in favour of the Lessor or any third party sub-licencee shall not, in any way, interfere with the Lessee in the exercise of any of the rights granted by this Ground Lease or any Works of the Lessee situate within, upon or over the Demised Lands. The Lessor shall not, without the Lessee's consent in writing, change or permit the existing configuration, grade or elevation of the Demised Lands to be changed or permit any excavation or opening which may disturb the existing surface of the Demised Lands provided, however, the Lessor shall be permitted, pursuant to the licence or sub-licence referred to above, to conduct normal agricultural practices upon the Demised Lands without the consent of the Lessee. The Lessor covenants that it will not erect any building or structure on the Demised Lands. The Lessee may install gates in every fence now or constructed in the future across the Demised Lands, such gates to be of sufficient width to admit passage of the Lessor's agricultural vehicles. The Lessee shall, if requested by the Lessor, furnish such gates with a lock.

In addition to the Lessor's right to sub-licence the Demised Lands to a third party for agricultural purposes as set out in this Section 12, the Lessor shall also be permitted to lease the remainder of the Property to any third party for agricultural purposes provided that such lease and use in favour of the third party shall not, in any way, interfere with the Lessee in the exercise of any of the rights granted by this Ground Lease.

13. **Notice for Access**

The Lessee shall give the Lessor not less than seventy-two (72) hours' prior written notice before the Demised Lands are initially accessed for the purposes of constructing and installing the Works and thereafter no prior notice of any kind shall be required to be given to the Lessor.

14. **Damage to Lessor's Property**

The Lessee shall be liable for physical and tangible damage done to the Demised Lands and any tile drains, fences, livestock, crops, merchantable timber, shelter belts, windbreaks, ornamental or special use trees which may be installed, growing or running upon the Demised Lands or other lands owned by the Lessor (including, without limitation, the Property) by reason of the exercise by the Lessee of any or all the rights granted by this Ground Lease (excepting damage caused to the Property by the Lessor's own act or that of its directors, officers, employees, agents, consultants, contractors and assigns and excepting damage caused to the Demised Lands directly upon or beneath the Works, for which separate and sufficient compensation is paid by the Lessee to the Lessor pursuant to the consideration payments contemplated in this Ground Lease) and, in the event that the Parties cannot agree at any time on the amount of damage payable to the Lessor hereunder, the Lessor shall provide written notice to the Lessee outlining the basis for the Lessor's assertion of damage to the Demised Lands, the exact nature of damage, the source of the assertion that the alleged damage is the result of the exercise by the Lessee of the rights granted by this Ground Lease and satisfactory evidence of the damage including documentation showing the extent of the damage and the financial impact of such damage.

Within thirty (30) days of such documentation and evidence being provided to the Lessee, the Lessee and the Lessor hereby agree to meet to discuss the nature and extent of the damage and whether the damage occurred as a result of the Lessee's exercise of its rights pursuant to this Ground Lease. The Lessee and the Lessor hereby agree to use good faith efforts and act reasonably, to come to a determination as to whether and to what extent any compensation should be paid by the Lessee to the Lessor for the alleged damage. If any compensation is agreed to be paid to the Lessor, the Lessee shall provide payment to the Lessor within thirty (30) days of such agreement. If the Parties are not able to come to an agreement within thirty (30) days of their first meeting on the issue, either Party may, by giving notice to the other Party (the "**Notice of Arbitration**"), refer the matter to arbitration and the matter shall be determined in accordance with Section 39. All accrued and undischarged obligations under this Section 14 shall survive the expiration or termination of this Ground Lease.

15. **Environmental Responsibility of the Parties**

For the purposes of this Section:

- (a) the term "**Environmental Law**" shall mean and refer to any statute, law, decree, ordinance or regulation which relates to or deals with human health or the

environment, including, without limitation, all regulations promulgated by a regulatory body pursuant to any such statute, law, ordinance or regulation; and

- (b) the terms “**Hazardous Substance**” and “**Hazardous Substances**” shall mean and refer to asbestos, radon, urea-formaldehyde, polychlorinated biphenyls (“PCBs”), or substances containing PCBs, nuclear fuel or materials, radioactive materials, explosives, known carcinogens, petroleum products and bi-products and any substance defined as hazardous or toxic or as a contaminant or pollutant in, or the release or disposal of which is regulated by any Environmental Law.

The Lessor represents and warrants that (a) to the best its knowledge and belief, no Hazardous Substances are now or have ever been located, produced, treated, stored, transported, incorporated, discharged, emitted, released, deposited or disposed of in, upon, under, over or from the Demised Lands; (b) as of the date of execution of this Ground Lease, no threats exist of a discharge, release or emission of Hazardous Substances in, upon, under, over or from the Demised Lands into the environment; (c) neither the Demised Lands nor any part thereof is currently in violation of any Environment Law, no notice of any such violation or any alleged violation thereof has ever been issued or given by any governmental entity or agency; and (d) there are not presently, nor during the Lessor’s ownership of the Demised Lands have there ever been, any actions, suits, proceedings or damage settlements relating in any way to Hazardous Substances in, upon, under, over or from the Demised Lands.

The Lessee shall be responsible for and save harmless the Lessor, its directors, officers, employees, agents, consultants, contractors and assigns from any and all costs, actions, suits, claims, demands and expenses, including legal (on a substantial indemnity basis), investigative and consulting fees and disbursements, which at any time, or from time to time may be asserted against, imposed upon or incurred by the Lessor or any of them, in connection with Hazardous Substances of any kind in contravention of Environmental Laws directly caused in, on, under or upon the Demised Lands as a result of operations conducted by or on behalf of the Lessee under this Ground Lease and for all remedial action that may be required to be taken to comply with Environmental Laws.

The Lessor shall be responsible for and save harmless the Lessee, its directors, officers, employees, agents, consultants, contractors and assigns from any and all costs, actions, suits, claims, demands and expenses, including legal (on a substantial indemnity basis), investigative and consulting fees and disbursements, which at any time, or from time to time may be asserted against, imposed upon or incurred by the Lessee or any of them, in connection with Hazardous Substances upon the Demised Lands that the Lessor knew or ought to have known based on information available to the Lessor at the time of the Lessor’s acquisition of the Demised Lands or as of the date of execution of this Ground Lease, excluding only the Lessee’s responsibility under this Section 15. All accrued and undischarged obligations under this Section 15 shall survive the expiration or termination of this Ground Lease.

16. **Mutual Indemnities**

- (a) The Lessee shall indemnify and hold harmless the Lessor against all actions, suits, claims, demands and expenses made or suffered by any person or persons, in respect of loss, injury, damage or obligation to compensate, arising out of or in connection with or as a result of:
  - (i) the negligence or willful misconduct of the Lessee;
  - (ii) any breach by the Lessee of the terms and conditions of this Ground Lease;  
or
  - (iii) the Works or the operation of the Works,

provided that the Lessee shall not be liable under this Section to the extent to which such loss, damage or injury is caused or contributed to by the negligence or default of the Lessor, its directors, officers, employees, agents, consultants, contractors and assigns. For greater certainty, the Lessee shall not be liable to the Lessor for the actions of the Lessor, its agents, employees, or representatives who enter upon the Demised Lands.

- (b) The Lessor shall indemnify and hold harmless the Lessee against all actions, suits, claims, demands and expenses made or suffered by any person or persons, in respect of loss, injury, damage or obligation to compensate, arising out of or in connection with, or as a result of the negligence or willful misconduct of the Lessor, as well as in respect of any loss, injury or damage arising out of or in connection with, any breach by the Lessor of the terms and conditions of this Ground Lease; provided that the Lessor shall not be liable under this Section to the extent to which such loss, damage or injury is caused or contributed to by the negligence or default of the Lessee, its directors, officers, employees, agents, consultants, contractors and assigns. For greater certainty, the Lessor shall not be liable to the Lessee for the actions of (i) the Lessee, its agents, employees, or representatives who enter upon the Demised Lands, or (ii) any trespasser or unauthorized person who enters upon the Demised Lands.
- (c) All accrued and undischarged obligations under this Section shall survive the expiration or termination of this Ground Lease.
- (d) Notwithstanding the foregoing, neither of the Parties shall be liable for any special, indirect or consequential damages including lost profits, lost revenues, failure to realize expected savings, or other commercial or economic losses of any kind.
- (e) The Lessee, prior to commencing any construction on the Demised Lands, shall obtain and maintain comprehensive general liability insurance of at least Five Million Five Hundred Thousand Dollars (\$5,500,000.00), naming the Lessor therein as an additional insured and the Lessee shall provide proof of the same to the Lessor upon written request by the Lessor.

**17. Ownership of Works**

Notwithstanding any rule of law or equity, all property and equipment placed or operated on the Demised Lands by or on behalf of the Lessee, including, without limitation, the Works, shall, at all times, remain the personal property of the Lessee even though attached to the Demised Lands as applicable.

**18. Removal of Works**

If the Works are no longer required by the Lessee, or should the Demised Lands and this Ground Lease be surrendered by the Lessee, or this Ground Lease is terminated by the Lessee (the "**Termination of Lessee Activities**"), the Lessee shall, within twelve (12) months of the Termination of Lessee Activities, take down, dismantle and remove all Works, including any materials which may lie up to four (4) feet beneath the surface of the Demised Lands, and fill up all holes caused by such removal and restore the surface of the Demised Lands to substantially the same condition as the Demised Lands were prior to entry thereon and use thereof by the Lessee. All accrued and undischarged obligations under this Section 18 shall survive the expiration or termination of this Ground Lease.

**19. Default**

If either Party makes any default in any term or condition of this Ground Lease, this Ground Lease shall not terminate but the defaulting Party shall be obliged to commence to remedy any such default within thirty (30) days after notice thereof in writing has been given to it by the non-defaulting Party and thereafter to diligently complete the remedy. Notwithstanding any other provision of this Lease, in the event the Lessee fails to discharge its obligations in Section 18 relating the removal of Works within twelve (12) months of the Termination of Lessee Activities then the Lessor shall be entitled to compensation under the decommissioning bond, pursuant to Section 44 of this Ground Lease, made available by the Lessee to the Lessor in addition to exercising any other remedies hereunder or at law.

**20. Termination by Lessee**

The Lessee may, if it so chooses, at any time during the Term, elect to terminate all rights and obligations hereunder upon thirty (30) days' prior written notice to the Lessor without incurring any liability or paying any compensation to the Lessor for the period subsequent to the date this Ground Lease is terminated. Upon the Lessee so electing to terminate its rights

hereunder, the Lessee shall, at the sole cost and expense of the Lessee, remove and discharge any instrument or encumbrance registered against title to the Demised Lands and related to its interest in the Demised Lands.

21. **Notices**

Any notice or other writing required or permitted to be given under this Ground Lease or for the purposes of this Ground Lease (referred to in this Section as a "notice") to the other Party shall be sufficiently given if delivered personally, or if sent by prepaid registered mail or if transmitted by fax or other form of recorded communication tested prior to transmission to such other Party:

In the case of notice to the Lessee, to:

Samsung Renewable Energy Inc.  
9th Floor, 55 Standish Court.  
Mississauga ON L5R 4B2  
Attention:

Telephone:

Facsimile:

In the case of the Lessor, to:

•

Attention: •

Telephone: •

Facsimile: •

or at such other address as the Party to whom such writing is to be given shall have last notified to the Party giving the same in the manner provided in this Section. Any notice personally delivered to the Party to whom it is addressed as provided in this Section shall be deemed to have been given and received on the day it is so delivered at such address, provided that if such day is not a Business Day then the notice shall be deemed to have been given and received on the Business Day next following such day. Any notice mailed to the address and in the manner provided for in this Section shall be deemed to have been given and received on the fifth Business Day next following the date of its mailing in Ontario. Any notice transmitted by fax shall be deemed to have been given and received on the first Business Day after its transmission.

22. **Ownership**

The Lessor represents that it is the absolute owner in fee simple of the Demised Lands with a good and marketable title thereto subject only to the encumbrances listed in Exhibit "C". The Lessor shall notify the Lessee promptly and in writing of any change in ownership and the Lessee shall be entitled to continue to send notices to the existing Lessor until satisfied of the status of the change of ownership of the Demised Lands. The Lessor covenants and agrees that it shall endeavour to obtain an assumption agreement in favour of the Lessee from any transferee of the Lessor's interest in the Demised Lands, pursuant to which such transferee agrees to be bound by the terms of this Ground Lease. The Lessor acknowledges that this Ground Lease shall have priority over any subsequent encumbrance, lease, mortgage or any other right or interest granted by the Lessor with respect to the Property. In the event that any mortgage, charge, financial encumbrance or other encumbrance that might interfere with the Lessee's right to use the Demised Lands pursuant to this Ground Lease is registered against title to the Demised Lands in priority to this Ground Lease (each, a "**Prior Encumbrance**"), the Lessor covenants and agrees, at the request and expense of the Lessee, to provide reasonable assistance to the Lessee to obtain from the holder of such Prior Encumbrance either: (i) an executed registerable postponement of such

Prior Encumbrance to and in favour of this Ground Lease; or (ii) an executed non-disturbance agreement or mutual co-existence agreement which is acceptable to the Lessee, acting reasonably.

**23. Taxes**

The Lessor covenants and agrees with the Lessee to pay all rates and taxes as they fall due that may be assessed and levied against the Lessor from time to time as a result of its interest in the Demised Lands, including any additional rates or taxes levied due solely to the Lessor having entered into this Ground Lease and/or being entitled to receive any payments pursuant to this Ground Lease.

The Lessee covenants and agrees to pay any additional rates and taxes that may be assessed and levied against the Demised Lands from time to time as a result of the Lessee's interest in the Demised Lands and the Works or in connection with its operations thereon, either to the municipality, if separately assessed, or to the Lessor if part of the Lessor's tax assessment. The Lessor agrees to advise the Lessee of any such rates or taxes in a timely manner and to remit all such taxes paid by the Lessee to the Lessor to the applicable municipality. Notwithstanding the foregoing, the Lessor shall be solely liable for paying or remitting, as the case may be, any income tax, corporate tax, harmonized sales taxes and any other applicable sales or value added tax relating to payments received by the Lessor pursuant to this Ground Lease. All accrued and undischarged obligations under this Section 23 shall survive the expiration or termination of this Ground Lease.

The Lessee may contest the amount of any taxes, assessments or charges for which the Lessee is responsible under this Ground Lease. In such event the Lessee may institute such proceedings as the Lessee considers necessary in connection therewith and if the Lessee contests any such tax, assessment or charge, the Lessee may pay the same under protest or withhold or defer payment; provided that any such withholding or deferral of payment does not interfere with or affect the interest of the Lessor in the Demised Lands. In connection with the contest by the Lessee of any taxes, assessments or charges, the Lessor agrees to provide reasonable assistance to the Lessee provided that all costs related to such contest are borne by the Lessee.

**24. Interest in Land**

This Ground Lease, and the rights created thereby, is and shall be of the same force and effect, to all intents and purposes, as a covenant running with the Demised Lands and these presents, including all of the covenants and conditions herein contained, shall extend, be binding upon and enure to the benefit of the Lessor and the Lessee, and their respective executors, administrators, successors and assigns, as the case may be.

**25. Number and Gender**

Wherever the singular or masculine is used throughout this Ground Lease, the same shall be construed as being plural or feminine or a body corporate where the context might reasonably require. In the event of any conflict between metric and imperial expression of measurement in this Ground Lease, the metric expression of measurement shall govern.

**26. Family Law Act**

The Lessor represents and warrants that, as of the date of this Ground Lease, if the Lessor is an individual the Lessor is either: (a) not a spouse within the meaning of the *Family Law Act*, R.S.O. 1990, c.F.3, as amended, or (b) if a spouse within the meaning of the *Family Law Act*, R.S.O. 1990, c.F.3, as amended, then this Ground Lease has been consented to in writing by such Lessor's spouse as is evidenced by the signature of the Lessor's spouse on the Consent attached as Exhibit "E", or (c) if a spouse within the meaning of the *Family Law Act*, R.S.O. 1990, c.F.3, as amended, the Lessor's spouse is not a registered owner of the Property, which is not ordinarily occupied by the Lessor and his/her spouse, who is not separated from the Lessor, as their family residence and if the Lessor is a corporation, the Demised Premises have never been occupied by any of the directors, officers or shareholders of the Lessor or the spouses of such directors, officers or shareholders and there are no shares in existence entitling the holders of such shares to occupation of the buildings. Accordingly, the Demised Premises does not comprise a family residence within the meaning of the *Family Law Act*.

27. **Registration**

The Lessee shall be entitled, at its cost and expense, to register this Ground Lease or a Notice in respect thereof and to deposit any required reference plans in the applicable Land Registry Office having jurisdiction over the Demised Lands, and the Lessor agrees to execute, at no cost to the Lessee, all necessary instruments, plans and documentation for that purpose.

28. **Quiet Possession**

The Lessee shall have quiet possession of the rights granted hereunder. The Lessee in performing and observing the covenants and conditions contained in this Ground Lease, shall peacefully hold and enjoy the rights hereby granted without hindrance, molestation or interruption on the part of the Lessor, or of any person, firm or corporation claiming by, through, under or in trust for the Lessor.

29. **Further Assurances**

Each of the Lessor and the Lessee shall, if so requested by the other, execute such further documents of title and any other required assurances in respect of the Demised Lands as may be required to perfect the Lessee's rights granted pursuant to this Ground Lease and the Lessee's interest in the Demised Lands. The Lessor further agrees to execute and deliver or cause to be executed and delivered any further legal instruments, including, without limitation, any required consents, and perform any acts which are or may become necessary to effectuate the purposes of this Ground Lease and to complete the transactions contemplated hereunder. All reasonable costs associated with the requirements under this Section shall be borne by the Lessee.

30. **Non-waiver**

No waiver of a breach of any of the covenants of this Ground Lease shall be construed to be a waiver of any succeeding breach of the same or any other covenant.

31. **Approvals**

The Lessor covenants and agrees to execute all applications, consents, permissions, agreements, postponements, site plan control agreements, partial discharges, set back waivers, agreements or documentation contemplated by Ontario Regulation 359/09 under the *Environmental Protection Act* (Ontario) or related to any renewable energy approval and any other documents which the Lessee may require in connection with obtaining any rezoning, governmental approvals, consents, permits or variances (collectively, "**Approvals**") and in connection with entering into by the Lessee of any agreements with such governmental and public authorities as may be necessary to give due force and effect to and in furtherance of the Lessee's applications, and the Lessor shall produce all other documents and information which may be required in connection with such applications. All applications for Approvals, shall be made by the Lessee, at its sole cost and expense and any costs to the Lessor associated with such Approvals shall be borne by the Lessee. The Lessee agrees that the obligation of the Lessor pursuant to this paragraph shall be restricted to execution of documents and production of documents and information and shall not impose upon the Lessor any financial obligation whatsoever.

32. **Income Tax Act**

Prior to the Commencement Date, the Lessor shall deliver to the Lessee a certificate issued under the provisions of Section 116 of the *Income Tax Act* (Canada) or satisfactory evidence by way of statutory declaration that the Lessor is not then a non-resident of Canada within the meaning of the *Income Tax Act* (Canada). The Lessor further covenants and agrees to notify the Lessee in writing prior to any change in the residency status of the Lessor.

33. **Harmonized Sales Taxes ("HST") and Other Applicable Taxes**

The Lessee covenants and agrees that if the Lessor is a registrant pursuant to the *Excise Tax Act* (Canada) (the "**ETA**"), the Lessee shall be liable for and shall pay to the Lessor, only to the extent applicable, an amount equal to the current rate of HST expressed as a percentage of the consideration set forth above representing HST payable under the ETA in connection with the granting of the rights pursuant to this Ground Lease. The Lessor on receipt of the aforementioned amount representing HST shall remit such amount to the appropriate governmental authorities

pursuant to and in accordance with the provisions of the ETA. The foregoing provisions shall also apply, *mutatis mutandis*, to any other applicable sales or value added taxes payable on the consideration set forth above.

34. **Entire Agreement**

This Ground Lease and the Exhibits attached hereto constitute the entire agreement between the Parties pertaining to the subject matter hereof, and supersede all prior and contemporaneous agreements, understandings, negotiations and discussions between the Parties whether oral or written.

There are no representations, warranties, collateral agreements, conditions or other agreements between the Lessor and the Lessee in connection with the subject matter hereof except as specifically set forth herein. No supplement, modification, waiver or termination of this Ground Lease shall be binding unless in writing and executed by both the Lessor and Lessee. No waiver of any provision of this Ground Lease shall constitute a waiver of any other provision nor shall such waiver constitute continuing waiver unless otherwise expressly provided herein.

35. **No Affect on Statutory Rights**

Nothing in this Ground Lease shall adversely affect the Lessee's ability to exercise any rights or powers authorized under any instrument issued by the Ontario Energy Board pursuant to the *Ontario Energy Board Act*, 1998 (and any other successor legislation).

36. **Assignment**

- (a) **Assignment by Lessee.** The Lessee shall at all times have the right to transfer, sell, encumber, convey or otherwise assign all of its rights and interests in this Ground Lease and the Demised Lands without the Lessor's consent. Without limiting the generality of the foregoing, the Lessee may transfer, sell, encumber, convey or otherwise assign all of the Lessee's rights and interest in the Demised Lands, in the Works and in this Ground Lease (i) to any affiliate of the Lessee, and (ii) as security, to one or more lenders, mortgagees, beneficiaries of deeds of trust, or other holders of a beneficial interest in a Mortgage ("**Mortgagees**") in connection with financing (including refinancing) of the Project consisting, in part, of the Works and the development of the Demised Lands. The Lessee shall notify the Lessor in writing promptly upon any assignment of this Ground Lease as provided for herein. Upon assignment of this Ground Lease in whole, the Lessee shall be released from all further future liability hereunder save and except for any accrued liability. No assignment by the Lessee (except in the case of an assignment of this Ground Lease to its lender(s)) shall be effective unless and until the assignee executes an assumption agreement with respect to this Ground Lease agreeing to be bound by the terms hereof to the same extent as if it had been an original party hereto.
- (b) **Other Grants by Lessee.** The Lessee shall have the absolute right to grant subleases or licences in, all or one or more portions of the Demised Lands at any time, and from time to time; provided that the Lessee shall only grant such subleases or licences after providing the Lessor with thirty (30) days advance written notice and the Lessor either consenting thereto or, in default, not responding within the said thirty (30) day period. No sublease or licence granted pursuant to this Section 36(b) shall relieve the Lessee of any of its obligations under this Ground Lease.
- (c) **Assignment by Lessor.** This Ground Lease may be assignable by the Lessor to a successor in title only, upon the assignee executing an assumption agreement with respect to this Ground Lease agreeing to be bound by the terms hereof to the same extent as if the assignee had been an original party hereto. Upon such an assignment by the Lessor of this Ground Lease in whole, the Lessor shall be released from all further future liability hereunder save and except for any accrued liability.

37. **Consent to Mortgage**

- (a) **Consent.** The Lessee may from time to time, without the prior written consent of the Lessor, encumber the Lessee's interest in this Ground Lease and the Demised Lands by one or more charge/mortgages, deeds of trust or other real or personal property security instruments (each a "**Mortgage**"), provided that any Mortgage and all rights acquired under it shall be subject to each and all of the covenants, conditions and restrictions stated in this Ground Lease and to all rights and interests of the Lessor and further provided, that the Lessee shall promptly upon the execution and registration on title to the Demised Lands of any Mortgage deliver a true copy thereof to the Lessor. Nothing contained in such Mortgages shall release or be deemed to relieve the Lessee from full and faithful observance and performance of the terms, covenants and conditions herein contained to be observed and performed by the Lessee or from any liability for the non-observance or non-performance of any of the terms and conditions hereof, nor be deemed to constitute a waiver of any rights of the Lessor hereunder, except as expressly provided for herein.
- (b) **Statement by Lessor.** At the request of the Lessee or a Mortgagee, the Lessor (a) shall execute, acknowledge and deliver to such Lessee or Mortgagee, a written statement declaring: (i) either that the Ground Lease is unmodified and in full force and effect, or the manner in which the Ground Lease had been modified and whether the Ground Lease as so modified is in full force and effect; (ii) the dates to which the Lessee's monetary obligations hereunder have been paid in advance; (iii) whether the Lessee is or is not then in default hereunder; and (iv) whether any past defaults have been fully cured, and (b) shall enter into any reasonable non-disturbance agreements and/or leasehold mortgagee agreements with any Mortgagee which requests such an agreement providing that the Lessor shall recognize the rights of such Mortgagee and not disturb its possession of the Demised Lands so long as the Lessee is not in default of any of the provisions of this Ground Lease. Any such agreement shall be prepared by the Mortgagee and shall contain provisions identical or similar to those described in Section 38.

38. **Protection of Mortgagee**

Any Mortgagee of any interest of the Lessee hereunder shall for so long as its Mortgage is in existence and until the lien thereof has been extinguished be entitled to the following protection:

- (a) **No Amendment.** The Lessor shall not agree to any amendment or modification of the Ground Lease which would materially adversely affect the Mortgagee's interest in the Ground Lease, or agree to any mutual termination or accept any surrender of this Ground Lease, nor shall any such amendment, termination, modification or surrender be effective, without the prior written consent of the Mortgagee.
- (b) **Notice of Default.** In the event of any default by the Lessee under this Ground Lease, the Lessor shall deliver to the Mortgagee(s) written notice of the Lessee's default at the same time such notice is delivered to the Lessee and shall afford the Mortgagee(s) an opportunity to cure such default within the period(s) specified in Section 19.
- (c) **Right to Perform.** The Mortgagee shall have the right at any time to pay any compensation due hereunder and to perform or cause to be performed any other obligation of the Lessee at or within the time such payment or performance is required under this Ground Lease. Nothing in this Ground Lease shall be construed to obligate the Mortgagee to cure any default of the Lessee.
- (d) **Right to Cure.** The Mortgagee shall be entitled to remedy any default under this Ground Lease in the manner and on the same terms as granted to the Lessee in Section 19 of this Ground Lease. If any default by the Lessee under this Ground Lease cannot be cured without the Mortgagee obtaining possession of all or part of the Demised Lands, then any such default shall be deemed remedied if a Mortgagee: (i) within sixty (60) days after receiving a notice from the Lessor, acquires possession of all or part of the Lessee's interest in the Demised Lands, or

begins appropriate judicial proceedings to obtain the same; (ii) diligently prosecutes any such proceedings to completion; and (iii) after gaining possession of all or part of the Lessee's interest in the Demised Lands performs all other obligations as and when the same are due in accordance with the terms of this Ground Lease. If a Mortgagee is prohibited by any court or by operation of any bankruptcy or insolvency laws from commencing or prosecuting the proceedings described above, the sixty (60) day period specified above for commencing proceedings shall be extended for the period of such prohibition.

- (e) Foreclosure. If the Lessee's First Mortgagee (meaning the Mortgagee whose Mortgage is registered first on title in time) becomes the assignee of this Ground Lease by means of foreclosure or assignment or quit claim in lieu thereof, such First Mortgagee shall be personally liable under this Ground Lease only for the period the First Mortgagee remains a Lessee hereunder, and for greater certainty, such Mortgagee or any party who acquires the Lessee's interest in the Demised Lands from such Mortgagee shall not be liable to perform the obligations imposed on the Lessee by this Ground Lease which are incurred or occurring after such Mortgagee or other party no longer has ownership or possession of the Demised Lands, provided that any subsequent assignee or the Lessee shall assume and agree to be bound by all the terms and conditions of this Ground Lease.
- (f) Termination of Ground Lease. If this Ground Lease shall terminate prior to the expiration of the Term for any reason, including without limitation, as a result of the bankruptcy or insolvency of the Lessee or by operation of law, the Lessor shall enter into a new lease in registerable form with the Mortgagee which holds the most senior lien against the Lessee's leasehold estate and demands such new lease within Thirty (30) days following receipt of the Lessor's notice. Such new lease shall contain the same terms and provisions as this Ground Lease. The Lessor's obligation to enter into a new lease as provided herein is conditioned upon the cure of any and all defaults under this Ground Lease other than defaults, if any, that are unique to the defaulting Lessee which cannot be cured by the payment of money or the acts of the curing Mortgagee.
- (g) Assignment Following Foreclosure or Termination. In the event (i) that any Mortgagee acquires the Lessee's leasehold estate hereunder following a final order of foreclosure of; or exercise of the power of sale contained in, any Mortgage or by an assignment or quit claim in lieu thereof; or (ii) any Mortgagee enters into a new lease, such Mortgagee shall have the absolute right to assign or transfer this Ground Lease or any such new lease to any person or entity without the Lessor's consent, provided notice of such assignment is given to the Lessor. The liability of such Mortgagee under this Ground Lease or any such new lease shall cease upon the assignment, provided that the assignee agrees to perform each and every obligation of the Lessee under this Ground Lease or such new lease. The right of such Mortgagee to assign this Ground Lease or any such new lease as provided herein is conditioned upon the cure of any and all defaults under this Ground Lease as of the time of such assignment other than defaults, if any, that are unique to the defaulting Lessee which cannot be cured by the payment of money or the acts of the curing Mortgagee.
- (h) No Merger. In the event the Lessee acquires fee ownership of the Demised Lands, or in the event of the Lessee's voluntary surrender of the leasehold estate, there shall be no merger of the leasehold estate created by this Ground Lease with the fee without the prior written consent of all Mortgagees.
- (i) No Obligation. Any Mortgagee that does not directly hold an interest in the Demised Lands, or whose interest is held solely for security purposes, shall have no obligation or liability under this Ground Lease prior to the time the Mortgagee succeeds to the Lessee's interest in the Demised Lands and the rights of the Lessee under this Ground Lease. A Mortgagee shall be liable to perform obligations under this Ground Lease only for and during the period it has succeeded to the interest of the Lessee in the Demised Lands. Further, in the event that a Mortgagee elects to (a) perform the Lessee's obligations under this Ground Lease, (b) continue operations on the Demised Lands, (c) acquire any portion of the Lessee's right, title

or interest in all or any of the Demised Lands, or (d) enter into a new lease as provided for above, then such Mortgagee shall not have any personal liability to the Lessor in connection therewith, and the Lessor's sole recourse upon a default by such Mortgagee shall be limited to such Mortgagee's interest in the Demised Lands.

39. **Arbitration**

All matters in dispute between the Lessor and the Lessee pursuant to this Ground Lease shall be determined by arbitration in accordance with this Section.

The terms and provisions of this Ground Lease shall be interpreted and enforced in accordance with the laws of the Province of Ontario and the laws of Canada applicable therein. In the event of a dispute with respect to any matter within the purview of this Ground Lease such dispute shall be finally settled in Toronto, Ontario under the *Arbitration Act*, 1991, S.O. 1991, c.17, and any amendments thereto or substitutions therefor from time to time in force, by one or more arbitrators appointed in accordance with the said Act. The Parties agree that the Lessee shall pay the fees and expenses of the arbitrator(s), and the Lessor's legal expenses in accordance with Section 43(c), but all other costs of the arbitration shall be subject to any arbitration award dealing with costs. All accrued and undischarged obligations under this Section 39 shall survive the expiration or termination of this Ground Lease.

40. **Planning Act**

This Ground Lease and the provisions hereof, which create or are intended to create an interest in the Demised Lands or the Property, shall be effective to create such an interest only if the subdivision control provisions of the *Planning Act* (Ontario) are complied with. The Lessee hereby declares that the Demised Lands being acquired by the Lessee pursuant to this Ground Lease are for the purposes of a renewable energy generation facility or renewable energy project in accordance with Section 50(3)(d.1) of the *Planning Act* (Ontario).

41. **Exclusivity**

The Lessee has the exclusive right (i) to use and possess the Demised Lands in connection with its Project; (ii) to investigate, inspect, survey, and conduct tests of the Demised Lands, including, but not limited to, meteorological, environmental, archaeological and geotechnical tests and studies; (iii) to use and convert all of the wind resources on the Demised Lands and the Property; (iv) to undertake such other activities on the Demised Lands, and on portions of the Property immediately adjacent to the Demised Lands temporarily or in an emergency, that may be related to its Project, including, without limitation, the storage of materials and equipment during the installation, construction and periodic maintenance of the Works and other improvements and during the development and operation of communications systems; and (v) to conduct periodic site tours of the Demised Lands for business visitors and other commercially interested parties, and in connection with the foregoing, the Lessor will not grant any similar rights to any other person in respect of the Demised Lands and the Property.

42. **Confidentiality**

The Lessor covenants and agrees that: (i) any information which it has access to or which comes into its possession relating to the Lessee's activities, including any wind assessment data or the terms and conditions of this Ground Lease (the "**Confidential Information**") shall be held in the strictest confidence by the Lessor, and that the Lessor shall not disclose any Confidential Information to any third party except as may be required by law, or on the same confidential basis as provided herein and then only to the legal and financial advisors of the Lessor who have a bona fide and actual need to know same; (ii) it will not use any such Confidential Information, other than as may be required or permitted to perform any of its obligations under this Ground Lease; and (iii) it will not exploit (whether for commercial or other purposes) or otherwise use any such Confidential Information. The Lessor acknowledges that a breach of any of the provisions contained herein would cause the Lessee to suffer loss which could not be adequately compensated for by damages and that the Lessee may, in addition to any other remedy or relief, enforce the performance of the provisions of this Section 42 by injunction or specific performance upon application to a court of competent jurisdiction without proof of actual damage. Upon the expiration or earlier termination of this Ground Lease, all Confidential Information will continue to be kept confidential by the Lessor.

43. **Legal Expenses**

The Lessee shall pay fifty (50%) percent of the Lessor's legal expenses associated with:

- (a) the execution and delivery of this Ground Lease and any further legal instruments referred to herein;
- (b) the performance of any function further to this Ground Lease requested by the Lessee to the Lessor that would typically require legal counsel;
- (c) the arbitration of any matter in dispute between the Parties pursuant to this Ground Lease; and
- (d) the review of correspondence from the Lessee to the Lessor regarding this Ground Lease that would reasonably require input by legal counsel;

subject to Lessee's receipt of Lessor's written request for payment with copies of the underlying legal invoices; such legal invoices reflecting commercially reasonable rates and billing time given the task at hand and subject to the Lessee having the ability, in its sole discretion, to have the invoices reviewed by an Assessment Officer of the Ontario Superior Court of Justice (or equivalent thereof). Notwithstanding the foregoing, the Lessee's total payment for all of the Lessor's legal expenses, including fees and disbursements, pursuant to this Section 43 shall not exceed Ten Thousand Dollars (\$10,000.00). All accrued and undischarged obligations under this Section 43 shall survive the expiration or termination of this Ground Lease.

44. **Security for Restoration Obligations**

As security for the performance of the Lessee's obligations to remove the Works and restore the Demised Lands as provided for in Section 18 herein (the "**Restoration Obligations**") the Lessee shall, prior to commencing construction of the Works, provide to the Lessor an irrevocable decommissioning bond in favour of the Lessor in a sufficient amount for the projected costs of performance of the Restoration Obligations but not exceeding Sixty Thousand Dollars (\$60,000). Increased every year during the aforesaid portion of the Term by an amount equal to the percentage change in the CPI during the previous year, which decommissioning bond shall be assignable to any transferee of the Lessor's interest in the Demised Lands. In the event the Lessee does not perform the Restoration Obligations as required by Section 18, the Lessor shall be entitled to perform them, in whole or in part at the Lessee's cost and expense but only after the expiry of the one (1) year period following the Termination of Lessee Activities, all without prejudice to any other rights or remedies available to the Lessor. In performing the Restoration Obligations the Lessor shall be entitled to effect the removal of the Works or any part thereof in any commercially reasonable manner that the Lessor may choose including by disassembly and or disposition of all or any part of the Works with the proceeds of any dispositions to which the Lessor is entitled, if any, being credited against the Lessor's costs incurred in performing the Restoration Obligations.

The Lessor shall only be entitled to compensation under the decommissioning bond to reimburse the Lessor for the costs that the Lessor has incurred in performing, in whole or in part, the Restoration Obligations, which costs, for greater certainty, shall include all reasonable transaction and legal costs and fees associated with the performance of the Restoration Obligations. The Lessor shall account to the Lessee for the application of all amounts on the decommissioning bond including the costs incurred in performing the Restoration Obligations and the proceeds of any dispositions of the Works to which the Lessor is entitled, if any, and the Lessor shall remit any unapplied amounts from the decommissioning bond to the Lessee forthwith after completion of the Restoration Obligations. In the event that the Lessor does not perform the Restoration Obligations in whole or in part within the one (1) year period provided for herein, the Lessor shall forthwith release the decommissioning bond or the proceeds thereof, as the case may be, to the Lessee.

The Lessee, upon Lessor's written request, which may only be made once within six (6) months after the 20th year of the Term and once again within six (6) months after the 40th year of the Term, shall review the sufficiency of the decommissioning bond provided by the Lessee as security for the Restoration Obligations. Further to the review, the amount of the decommissioning bond will be adjusted to be equal to the revised projected costs of performance

of the Restoration Obligations with the cap of Sixty Thousand Dollars (\$60,000), increased every year during the aforesaid portion of the Term by an amount equal to the percentage change in the CPI during the previous year. In the event that the Lessor disagrees with the adequacy of the amount of the decommissioning bond provided by the Lessee as security for the Restoration Obligations using, as a working assumption, that the Restoration Obligations will be performed at the expiration of the Term, then the determination of the sufficiency of security shall be determined by arbitration in accordance with Section 39. All accrued and undischarged obligations under this Section 44 shall survive the expiration or termination of this Ground Lease.

**45. Force Majeure - Delays**

If the Lessor and the Lessee are prevented from performing any act required by this Ground Lease due to any acts of God, strike, lock-out, labour trouble, inability to secure materials, restrictive governmental laws or regulations, or for any other reason beyond the control of the Party required to perform the act, the time for the performance of the act shall be extended for a period equivalent to the period of delay.

**46. Time of Essence**

Time is of the essence in regard to this Ground Lease and to all the terms, conditions, promises, representations, warrants, duties, obligations, and agreements contained in this Ground Lease.

**47. Counterparts**

This Ground Lease may be executed and recorded in one or more counterparts, each of which shall be deemed an original and all of which, when taken together, shall constitute one and the same document.

**IN WITNESS WHEREOF** each of the Lessor and the Lessee have executed this Ground Lease on the date first above written.

**LESSEE:**

**SAMSUNG RENEWABLE ENERGY INC.**

Per: \_\_\_\_\_

Name:

Title:

"I have the authority to bind the corporation."

**LESSOR:**

\_\_\_\_\_  
Witness:

\_\_\_\_\_  
Name:

\_\_\_\_\_  
Witness

\_\_\_\_\_  
Name:

**EXHIBIT "A" TO GROUND LEASE**  
**DESCRIPTION OF PROPERTY**

Comprising • acres

**EXHIBIT "B" TO GROUND LEASE**  
**DESCRIPTION OF DEMISED LANDS**

Comprising • acres

**EXHIBIT "C" TO GROUND LEASE  
ENCUMBRANCES ON DEMISED LANDS**

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## EXHIBIT "D" TO GROUND LEASE

### COMPENSATION

1. Pre-Commercial Operation Compensation. Subject to Section 20 of this Ground Lease: on the last day of every annual period beginning on the date of this Ground Lease, the Lessee shall pay to the Lessor an annual amount equal to [●] per acre for each acre of the Property, plus all goods and services tax applicable thereon (the "**Pre-Commercial Operation Compensation**"). On the date the Lessee commences selling electricity generated from any of the wind turbines located within the Project to a third party purchaser ("**Commercial Operation Commencement Date**"), the Lessee shall pay the Lessor the pro-rated portion of the Pre-Commercial Operation Compensation for the period beginning on the anniversary date of the date of this Ground Lease immediately prior to the Commercial Operation Commencement Date, and ending on the Commercial Operation Date, which pro-rated portion shall be calculated on a per diem basis for that particular year based on a period of three hundred and sixty-five (365) days and such pro-rated Pre-Commercial Operation Compensation payment made on the Commercial Operation Commencement Date will represent the final Pre-Commercial Operation Compensation payment.
2. Commercial Operation Compensation. On each anniversary of the Commercial Operation Commencement Date during the Term and on the date of expiration or termination of the Term, the Lessee shall pay to the Lessor an annual payment of [●], plus all goods and services tax applicable thereon (the "**Commercial Operation Compensation**").

In addition, the Commercial Operation Compensation under this Section 2 of Exhibit "D" herein for each year of the aforesaid portion of the Term shall increase every year during the aforesaid portion of the Term by an amount equal to the percentage change in the CPI during the previous year, if any, and shall be paid to the Lessor after the end of each year of the aforesaid portion of the Term.

Notwithstanding the foregoing, any Commercial Operation Compensation payment made on the date of expiration or termination of the Term shall be a pro-rated payment calculated on a per diem basis for that particular portion of the Term beginning on the most recent anniversary of the Commercial Operation Commencement Date and ending on the date of expiration or termination of the Term based on a period of three hundred and sixty-five (365) days.

All references to "CPI" within this Exhibit "D" shall mean the Consumer Price Index for "All-items", for the Province of Ontario as published by Statistics Canada (or by a successor or governmental agency, including a provincial agency), or if such index is no longer published, an index published in substitution therefore as designated by the Lessee. If the base year for the index (or substituted or replacement index) is changed, the Lessee will make the necessary conversion

All amounts owing by the Lessee pursuant to this Exhibit shall be made by the Lessee to the Lessor by courier or hand delivery of cash or cheque, unless otherwise expressly agreed between the Parties.

**EXHIBIT "E" TO GROUND LEASE**

**CONSENT OF SPOUSE**

I, \_\_\_\_\_, being married to • do hereby give my consent to the transactions contemplated by the Ground Lease dated • in respect of the lands legally described as follows:

•

DATED this    day of \_\_\_\_\_, 20\_\_.

WITNESS:

SPOUSE OF LESSOR

\_\_\_\_\_  
Name:

\_\_\_\_\_  
Name:

Address:

Address:

EB-2011-0063

Filed: 2011-02-28

Exhibit B

Tab 3

Schedule 3

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**FORM OF EASEMENT – HALDIMAND ROW**

### **Easement in Gross**

(Section 42.1 of the *Electricity Act*, 1998: An easement in favour of a generator, transmitter or distributor for the purpose of generation, transmission or distribution does not have to be appurtenant or annexed to or for the benefit of any specific parcel of land to be valid.)

## SCHEDULE

WHEREAS the Transferor is the registered owner of an estate in fee simple of all that certain parcel or tract of land and premises, situate, lying and being in the Township of \_\_\_\_\_, in the County of \_\_\_\_\_, in the Province of Ontario and being composed of \_\_\_\_\_  
\_\_\_\_\_. Now known as P.I.N. \_\_\_\_\_. (hereinafter called the "Transferor's Lands");

AND WHEREAS the Transferor has agreed to transfer, sell, grant and convey to the Transferee an "Easement and Right-of-Way" over that portion of the Transferor's Lands lying and being in the Township of \_\_\_\_\_, in the County of \_\_\_\_\_, being \_\_\_\_\_  
\_\_\_\_\_. Now known as part of P.I.N. \_\_\_\_\_ (hereinafter called the "Easement Lands");

AND WHEREAS the Mortgagee, if any, is the registered holder of a charge affecting the Easement Lands and such other additional Party, if any, has a claim or interest herein;

Interest/Estate Transferred

1. The Transferor (and the Mortgagee or other Party hereto, if any) hereby transfers, sells, grants and conveys to the Transferee, to use and enjoy for the benefit of the Transferee, the right, liberty, privilege and free and unencumbered easement in, on, over, under and/or through the Easement Lands, for the surveying, laying down, construction, usage, operation, maintenance, inspection, alteration, removal, renewal, replacement, enlargement, reconstruction, repair, and expansion of:

- i) electric transmission or distribution facilities, including all necessary poles, cables and wires (both buried and aerial), conduits, conduit structures, markers, manholes, fixtures, and equipment and all appurtenances thereto as the Transferee may from time to time or at any time hereafter deem requisite for the purpose of electric transmission or distribution services, and to attach other wires, cables, equipment and accessories and to permit the attachment of the wires, cables, equipment and accessories of any other company or commission for the purpose only of supplying such services, and to erect and set the necessary guy and brace poles and anchors and to attach thereto and to trees the necessary guy wires (hereinafter, collectively, referred to as the "electric transmission or distribution facilities"); and
- ii) roads to access and service the electric transmission or distribution facilities, wind turbines, overhead and underground electrical transmission and communication lines, electric transformers, energy storage facilities, telecommunications equipment, power generation facilities to be operated in conjunction with large wind turbine installations, electrical substations, roads, meteorological towers and wind measurement equipment, control buildings, maintenance yards, and related facilities and equipment, whether located on the Transferor's Lands or on any neighbouring or other lands;

together with the free and unimpeded right for ingress and egress at any time and all times over, along, under and through the Easement Lands and the Transferor's Lands for the Transferee, its servants, agents, employees, those engaged in its business, contractors, and subcontractors, on foot and/or with vehicles, supplies, machinery and

equipment necessary or incidental to the exercise and enjoyment of the rights, privileges and easement hereby granted (hereinafter referred to as the "Easement and Right-of-Way").

THE TERMS AND CONDITIONS ABOVE-MENTIONED WHICH THE TRANSFeree AND TRANSFEROR (AND THE MORTGAGEE OR ANY OTHER PARTY HERETO, IF ANY) SHALL OBSERVE AND BE BOUND BY ARE AS FOLLOWS:

1. This Easement and Right-of-Way shall be effective from the \_\_\_\_ day of \_\_\_\_\_, 20\_\_ and the rights, privileges and easement hereby granted shall continue for a period of twenty-one (21) years less-a-day; provided, further, that if the Transferee is exempt from the provisions of the Planning Act or has complied with such provisions by obtaining any required consents from the local Land Division Committee or Committee of Adjustment pursuant to clause 14 herein, the rights, privileges and easement hereby granted shall continue for an additional period of twenty-nine (29) years such that the total period for this Easement and Right-of-Way shall be fifty (50) years less-a-day or until the Transferee shall execute and deliver a release and abandonment thereof.
2. The Transferee shall have the right at any time and from time to time to remove by blasting or otherwise any boulder or rock, and to sever, fell, remove or control the growth of any roots, trees, stumps, brush or other vegetation on or under the Easement Lands.
3. The rights of the Transferee herein shall be of the same force and effect as a covenant running with the Transferor's Lands and the rights hereunder shall be for the benefit of the Transferee.
4. In the event the Transferee exercises its right to install additional electric transmission or distribution facilities on the Easement Lands or conduct any operations, subsequent to the year of installation of any prior electric transmission or distribution facilities, the Transferee shall be provided with, if so required, a temporary work area approximately ten (10.0) metres in perpendicular width, adjacent to and parallel with the Easement Lands. The Transferee shall compensate the Transferor for the use of such temporary work area at a rate of Five Hundred Dollars (\$500.00) per acre (hereinafter called "the said Sum"); provided however, that either party hereto may request a review of the said Sum at any time following the fifth year from the effective date of this Easement and Right-of-Way. The said Sum shall be tendered to the Transferor within Ninety (90) days following the completion of any such installation or operation.
5. The Transferee shall have the absolute and unfettered right to assign or transfer its rights hereunder in whole or in part and shall not be bound to give notice thereof to any party.
6. If the Transferor is not the sole owner of the Easement Lands, this Easement and Right-of-Way shall bind the Transferor to the full extent of its interest therein and shall also extend to any after-acquired interest in the Easement Lands but all monies payable or paid to the Transferor hereunder shall be paid to the Transferor only in the proportion that its interest in the Easement Lands bears to the entire interest therein. The Transferor hereby agrees that all provisions herein are reasonable and valid and if any provision herein is determined to be unenforceable, in whole or in part, it shall be severable from all other provisions and shall not affect or impair the validity of all other provisions.
7. The Transferee shall make to the Transferor (or the person or persons entitled thereto) due compensation

for all damages and injuries caused by or attributable to the operations of the Transferee. The Transferee shall also pay due compensation for any physical damages to the said Easement Lands resulting from the installation of any electric transmission or distribution facilities during the term of this Easement and Right-of-Way. Any gates, fences and tile drains interfered with by the Transferee shall be restored by the Transferee at its expense as closely as is reasonably practicable to the condition in which they existed immediately prior to such interference by the Transferee, and in the case of tile drains, such restoration shall be performed in accordance with good drainage practice.

8. As soon as it is reasonably practicable after the construction of the said electric transmission or distribution facilities, the Transferee shall remove all debris therefrom and in all respects restore the said Easement Lands to their former state so far as is practical, save and except for items in respect of which compensation is due under Clause 7 hereof.
9. The Transferor, shall have the right to fully use and enjoy the said Easement Lands, except as may be necessary for any of the purposes hereby granted to the Transferee, provided that without the prior written consent of the Transferee, the Transferor shall not excavate, drill, install, erect or permit to be excavated, drilled, installed or erected in, on, over or through the said Easement Lands any pit, well, foundation, pavement, building or other structure or installation. Notwithstanding the foregoing, the Transferee upon request shall consent to the Transferor erecting or repairing fences, constructing or repairing his tile drains and domestic sewer pipes, water pipes and utility pipes and constructing or repairing his lanes, roads, driveways, pathways, and walks across, on and in the said Easement Lands or any portion or portions thereof, provided that before commencing any of the work referred to in this Clause the Transferor shall:  
(a) give the Transferee at least ten (10) clear days notice in writing pointing out the work desired so as to enable the Transferee to have a representative inspect the site and/or be present at any time or times during the performance of the work, (b) follow the instructions of such representative as to the performance of such work without damage to the said electric transmission or distribution facilities, (c) exercise a high degree of care in carrying out any such work and, (d) perform any such work in such a manner so as not to endanger or damage the said electric transmission or distribution facilities.
10. Notwithstanding any rule of law or equity, any electric transmission or distribution facilities constructed by the Transferee together with all works, appurtenances, attachments, apparatus, appliances, markers, fixtures and equipment shall be deemed to be the property of the Transferee even though the same may have become annexed or affixed to the Transferor's Lands.
11. The Transferee shall have the right to abandon the electric transmission or distribution facilities, or any part thereof, during the term of this Easement and Right-of-Way. Furthermore, the Transferee shall have the right to remove the electric transmission or distribution facilities, or any part thereof, whether active or not, which may be located beneath the surface of the Easement Lands, but nothing contained herein shall require the Transferee so to do. Notwithstanding the foregoing, any such abandonment shall at all times comply with all prevailing Regulations.
12. The Transferor hereby covenants that:
  - a) it has the right to convey this Easement and Right-of-Way to the Transferee;

- b) the Transferee shall have quiet enjoyment of the rights, privileges, easement and right-of-way hereby granted;
  - c) the Transferor or its heirs, executors, administrators, successors and assigns will execute such further assurances of this Easement and Right-of-Way and do such other acts (at the Transferee's expense) as may be reasonably required; and
  - d) the Transferor has not done, omitted or permitted anything whereby the Easement Lands are or may be encumbered (except as the records of the appropriate land registry office disclose).
13. The Transferee shall indemnify the Transferor and any other party hereto, such as the Mortgagee and/or Party having a claim or interest herein, against all action, suits, claims and demands by any person or persons whomsoever in respect of any loss, injury, damage or obligation to compensate arising out of, or connected with, the work carried on by the Transferee on the Easement Lands, or in respect of any breach of any of the terms and conditions of this Easement and Right-of-Way insofar as the same relates to and affects the said Easement Lands.
14. If, in the sole discretion of the Transferee, compliance with the provisions of the Planning Act should be required then the Transferor hereby appoints the Transferee to execute such consents or authorizations as may be necessary for the Transferee to obtain any necessary consents from the local Land Division Committee or Committee of Adjustment and agrees to co-operate in any such applications for consent.
15. Any payment required to be made to the Transferor hereunder may be made by the Transferee sending a cheque by prepaid post to the Transferor at its address for service of notices as herein provided or by depositing to the Transferor's credit in the \_\_\_\_\_ at \_\_\_\_\_ (or in such other place as the Transferor may designate from time to time).
16. Any notice required or permitted to be given hereunder shall be in writing and shall be effectively given if: (i) personally delivered, (ii) sent by prepaid courier service, or (iii) sent by telecopier or other similar means of electronic communication addressed as follows:

To the Transferor:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Attention: \_\_\_\_\_

Fax: \_\_\_\_\_

To the Transferee: Samsung Renewable Energy Inc.  
9<sup>th</sup> Floor, 55 Standish Court  
Mississauga, ON L5R 4B2

Attention: Mr. Gun-Young Yoo  
Telephone: 647 330-7784  
Facsimile: 82-2-2145-2919

Any notice so given is deemed conclusively to have been given and received when personally delivered or sent by prepaid courier service, telecopier or other electronic communication. Either party hereto may change any particulars of its address for notice by notice to the other in the manner aforesaid.

17. This Easement and Right-of-Way including all rights, privileges, benefits and easement hereby granted and all covenants and conditions herein contained, shall extend to, be binding upon and enure to the benefit of the heirs, executors, administrators, successors and assigns of the Parties hereto respectively; and, wherever the singular or masculine is used it shall, where necessary, be construed as if the plural, or feminine or neuter had been used, as the case may be.

AND, the Mortgagee and/or Party having a claim or interest herein, all, if any, covenant that the Transferee shall have quiet possession of the rights, privileges and easement hereby granted.

IN WITNESS WHEREOF the parties hereto have executed and delivered these presents as of the day and year first above written.

SIGNED, SEALED AND DELIVERED  
in the presence of

\_\_\_\_\_  
Witness

) **TRANSFEROR**

)

)

)

)

)

)

)

)

**TRANSFEEEE**

**SAMSUNG RENEWABLE ENERGY INC.**

\_\_\_\_\_  
Per:

*"I have the authority to bind the corporation."*

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Filed: 2011-02-28  
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## ORC OPTION AGREEMENT

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## **NOTICE OF PROPOSAL**

# NOTICE OF PROPOSAL TO ENGAGE IN A RENEWABLE ENERGY PROJECT AND NOTICE OF PUBLIC OPEN HOUSE

## To be held by Samsung Renewable Energy Inc. regarding a Proposal to Engage in a Renewable Energy Project GRAND RENEWABLE ENERGY PARK

Samsung Renewable Energy Inc. (Samsung) is planning to develop and construct a wind and solar energy project as part of the Grand Renewable Energy Park, in Haldimand County.

Samsung is planning to engage in this renewable energy project in respect of which the issuance of renewable energy approvals is required. The proposal to engage in this renewable energy project and the project itself are subject to the provisions of the *Environmental Protection Act (Act)* Part V.0.1 and Ontario Regulation 359/09 (Regulation) which covers Renewable Energy Approvals (REA). This notice is being distributed in accordance with section 15 of the Regulation prior to an application being submitted and assessed by the Ministry of the Environment.

Samsung has retained Stantec Consulting Ltd. to complete studies required for the REA application in accordance with the requirements of the Act and Regulation.

### Project Description:

Pursuant to the Act and Regulation, the wind aspect of the project is considered to be a Class 4 wind facility and, if approved, would have a name plate capacity of 140 MW and consist of approximately 63 wind turbines (depending upon the turbine manufacturer and model selected). The solar aspect of the project is considered to be a Class 3 solar facility and, if approved, would have a nameplate capacity of 100 MW and consist of approximately 700 acres of land. Both projects would also include electrical collection lines, a 30 km transmission line, substation, and other ancillary facilities such as access roads. The project location is shown in the map below.

A Draft Project Description Report titled *Grand Renewable Energy Park Draft Project Description* has been prepared, which provides additional project information and details. A copy has been made available during regular business hours at the Haldimand County Administration Office (45 Munsee Street North, Cayuga). The Draft Project Description Report is also available for review on the project website at [www.SamsungRenewableEnergy.ca](http://www.SamsungRenewableEnergy.ca).

### Public Open House:

Stakeholder participation is an important part of Samsung's consultation process. One of the goals is to understand what is important to local community members and to incorporate their priorities into the project design. To facilitate this process,

Samsung is inviting the community to attend a Public Open House. The Public Open House will provide the community with an opportunity to meet the project team, learn more about the proposed project and the REA process, and to provide comments and questions regarding the project. The upcoming Public Open House will include display boards of the study area, REA process and preliminary environmental constraints in the Project area.

Samsung anticipates hosting a final open house for the project in late 2010 to share our project layout, the results of our environmental studies, and to receive additional feedback from the community. Draft Project Reports, including a project layout will be made available to the public at least 60 days before the final project open house.

Samsung welcomes your input at our upcoming public open house scheduled for:

### Public Open House Information:

**Date:** July 8, 2010  
**Time:** 5 p.m. to 9 p.m.  
**Location:** Cayuga Kinsmen Community Centre  
15 Thorburn Street  
Cayuga, Ontario

### For more information:

Contact our study team to learn more about the proposed project, public meetings, to communicate questions or comments, or to be added to our project distribution list.

Project website: [www.SamsungRenewableEnergy.ca](http://www.SamsungRenewableEnergy.ca).

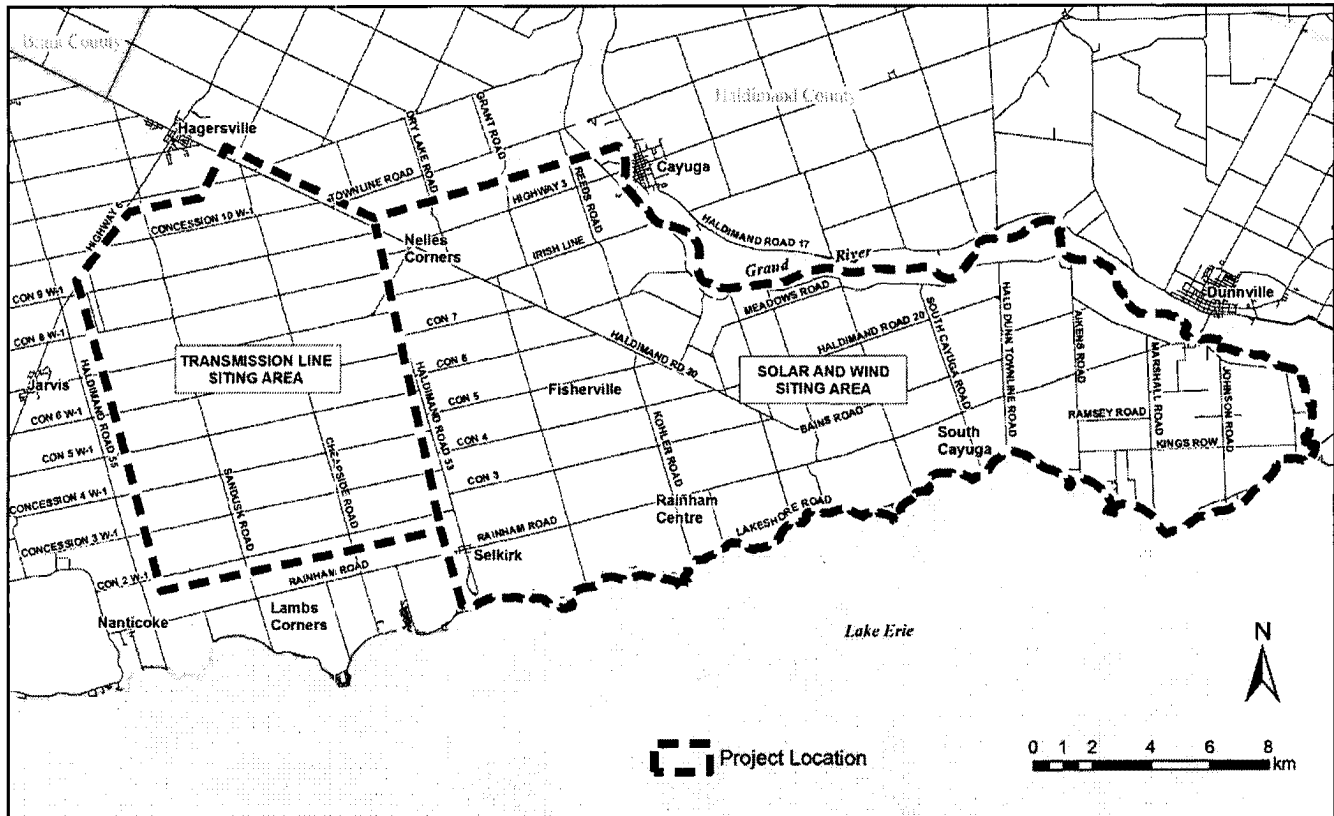
Project Email: [GrandRenewable@SamsungRenewableEnergy.ca](mailto:GrandRenewable@SamsungRenewableEnergy.ca)

Project Telephone: 1-877-536-6050 or 1-519-836-6050 (collect)

Mail:

Adam Rosso  
Manager, Business Development  
Samsung Renewable Energy Inc.  
55 Standish Court  
Mississauga, ON L5R 4B2

Rob Nadolny  
Senior Project Manager  
Stantec Consulting Ltd.  
70 Southgate Drive, Suite 1  
Guelph, ON N1G 4P5



## **DESIGN SPECIFICATIONS**

- 70) This section provides a general description of the major equipment and infrastructure associated with the Proposed Facility. A single line diagram of the Proposed Facility, including the proposed tap connection to the IESO-controlled grid, is included at Exhibit B-4-2.

### ***Collector Substation***

- 71) The Collector Substation will be built to accumulate the power circuits from the Wind Project and Solar Project outlined above. A single line diagram of the Collector Substation is at Exhibit B-4-3. The accumulated power of approximated 250 MW at 34.5 kV will arrive via both underground cable collector circuits and overhead pole line conductor circuits. The power will be transformed from a 34.5 kV collection voltage to a 230 kV transmission voltage.
- 72) The Collector Substation will consist of a prepared area of approximately 85 m by 85 m in size. It will be built on a prepared base of engineered fill and crushed stone to a depth of 600 mm. A grounding grid will be built within the crushed stone and extend to 1 m beyond the 2.4 m high perimeter chain link fence for the substation.
- 73) Within the Collector Substation will be located a prefabricated modular electrical building (EHouse) wherein all the incoming underground 34.5 kV collector circuits will terminate on interior switchgear. The EHouse will be founded on concrete foundations that are constructed below grade to below frost depth. Cable vaults will be installed beneath the EHouse to facilitate cable entry.
- 74) Dynamic Reactive Power Capacitors and control will be located within the Collector Substation. The capacitors will be 34.5 kV rated and there will be up to 6 capacitor banks installed in separate concrete containment foundations, founded below grade to below the frost line. The containment will be large enough to hold any insulating fluid that may leak from the capacitors. The dynamic controller will be a Statcom controller located adjacent to the capacitors within the substation and on its own concrete foundation founded below grade to below the frost line.
- 75) There are two power transformers within the Collector Substation that will be used to step up the power to 230 kV. The transformer used to step up the power generated by the Wind Project is rated 100/133/166 MVA, while the transformer used to step up the power generated by the Solar Project is rated 65/86/108 MVA. Each transformer is mounted on a concrete base foundation within an oil containment facility that would capture all of the oil insulating fluid within each transformer in the event of a leak. A sound attenuation wall will

be constructed around the perimeter of the two power transformers to minimize the escape of transformer noise into the surrounding environment. The sound attenuation wall will be constructed with a minimum density of 20 kg/m<sup>2</sup> that will break the line of sight with any noise receptors.

- 76) Each of the 230 kV outputs of the two transformers are delivered via a 3 phase air bus (aluminum pipe) to a 1200 Amp 230 kV circuit breaker, isolation disconnect switch and Capacitive Voltage Transformers (CVT). The 230 kV outputs from the final isolation disconnect switches are coupled and connected to a 230 kV termination gantry complete with 230 kV lightning arrestors. The 230 kV termination gantry facilitates the connection of the Collector Substation to the overhead transmission tower adjacent to the Collector Substation. Each of the 230 kV devices located within the Collector Substation are founded on concrete foundations that extend below finished grade to below the frost line.
- 77) An access road for the Collector Substation and main access to the Solar Project site area will be constructed from Regional Road 20. The gravel surface of the access road is approximately 8 m wide with grassed swale drainage ditches of variable top width on either side, for stormwater runoff conveyance and treatment. The depth of the roadbed will generally consist of 750 mm of granular material. During construction it will be used to transport all the materials for construction of the Collector Substation including the two heavy power transformers and for maintenance purposes during operation.

### ***Transmission Line***

- 78) From the Collector Substation Transmission Line, consisting of single, 3 conductor aluminium circuit will be constructed to connect the power generated by the Wind Project and the Solar Project to the IESO-controlled grid that is accessible at a location south of Hagersville, Ontario.
- 79) The Transmission Line will be constructed overhead using bare aluminium conductors. They are vertically isolated from ground via 230 kV insulators and monopole structures measuring 28 m in height. Exhibit B-4-5 contains the cross section of a typical pole used to string the electrical circuits of the Transmission Line. The monopole structures will be erected on concrete foundations located within the existing Regional Road 20 right-of-way. The structures will be spaced approximately 200 m apart except where significant changes in line direction occur along the route. In these cases, the spacing will be closer to reduce the overhead line tension to a practical construction limit. There will also be closer spacing of the structures at the Collector Substation, the Transition Stations around Nelles Corners and the Interconnection Station near the transmission corridor east of Hagersville.

### ***Transition Stations***

- 80) To facilitate the transitioning of the overhead Transmission Line to underground cable east of Nelles Corners and to overhead line from underground cable west of Nelles Corners, two Transitioning Stations will be required to be constructed. The first Transition Station is located just east of Nelles Corners (intersection of Regional Road 20 and Highway 3), where the overhead Transmission Line will make a transition to underground cable housed within the concrete encased ductbank or be buried directly underground. The 230 kV ductbank or direct buried cable will be constructed a minimum of 1.2 m below grade and be backfilled with thermal fill to dissipate heat of cable power losses throughout the ground. The ductbank or the direct buried cable will be nominally 700 m long and will be constructed entirely within the Haldimand ROW, which roadway runs through the village of Nelles Corners. The second Transition Station is located to the west of Nelles Corners. The underground cable is required as the overhead Transmission Line would violate safety clearances over the built infrastructure of Nelles Corners.
- 81) The Transitioning Stations will contain an A-frame galvanized steel lattice type structure, complete with 230 kV lightning arrestors. The structure will be anchored to a concrete foundation that is founded to a depth of ground below the frost line. Each Transitioning Station will consist of a prepared area of 20 m by 20 m in size. It will be built on a prepared base of engineered fill and crushed stone to a depth of 600 mm. A grounding grid will be built within the crushed stone and extend to 1 m beyond the 2.4 m high perimeter chain link fence for each station.

#### ***Interconnection Station***

- 82) A single line diagram of the Interconnection Station is located at Exhibit B-4-4. The Transmission Line will terminate at the Interconnection Station located on the north side of Regional Road 20, just east of the Transmission Corridor east of Hagersville. The Interconnection Station will be enclosed by a chain link fence measuring 40 m wide x 40 m long x 2.4 m high. The Interconnection Station will contain two termination gantries complete with 230 kV lightning arrestors. One will be used for the termination of the Transmission Line and the other will be used to facilitate Hydro One's connection of the power collection circuit to the existing transmission circuit originating at the Nanticoke Power Generating Station. Each gantry will be anchored to a concrete foundation that is founded to a depth of ground below the frost line. The Interconnection Station will consist of a prepared area of 40 m by 40 m in size. It will be built on a prepared base of engineered fill and crushed stone to a depth of 600 mm. A grounding grid will be built within the crushed stone and extend to 1 m beyond the 2.4 m high perimeter chain link fence.
- 83) In addition, a 230 kV isolation switch and 230 kV-1200 amp circuit breaker will be installed on a concrete foundations between the two termination gantry structures. The foundation

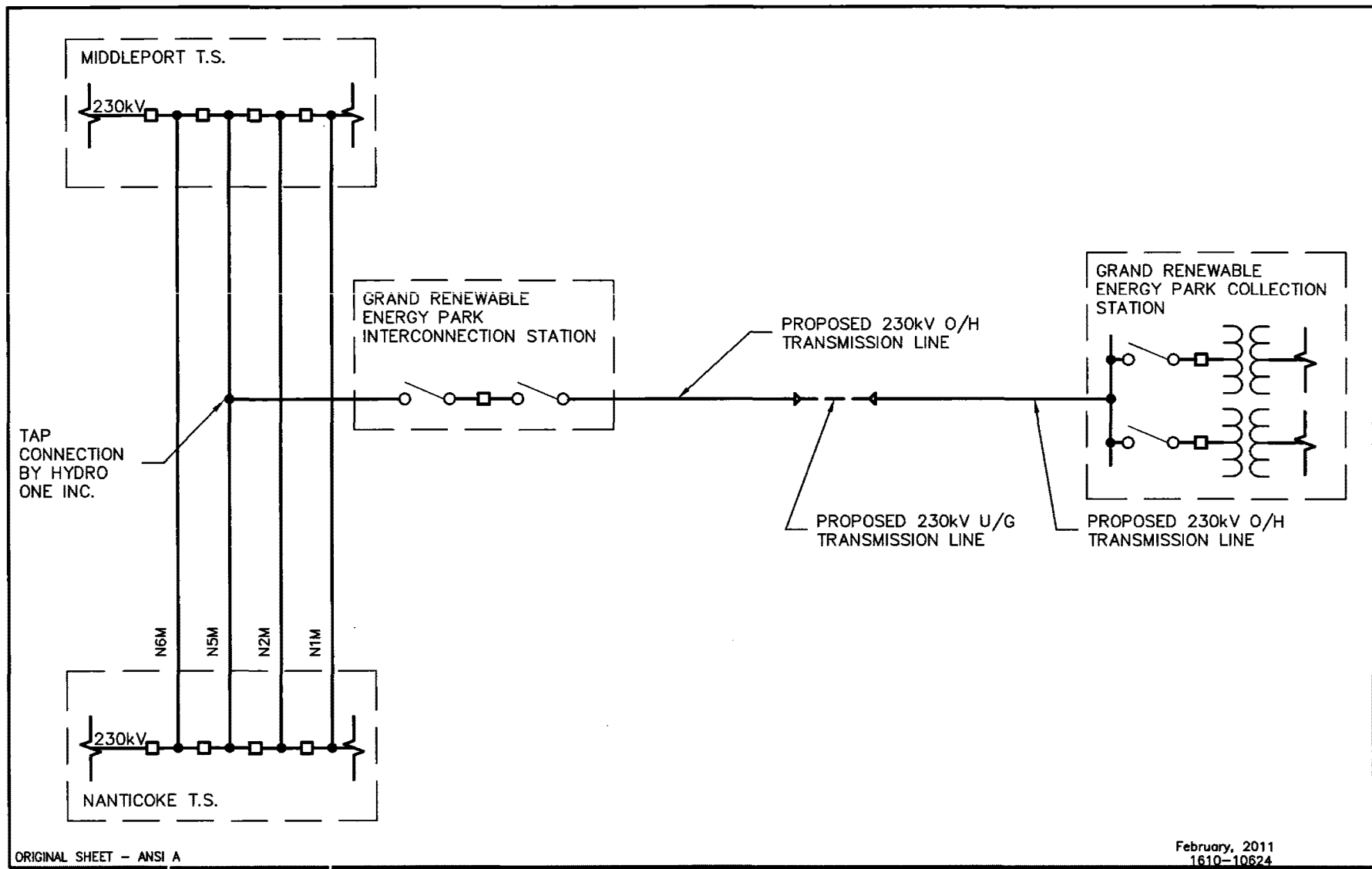
will extend below grade to below the frost line. A small EHouse will be installed within the fenced enclosure for the Interconnection Station. The EHouse will be founded on concrete foundations that are constructed below grade to below frost depth. Cable vaults will be installed beneath the EHouse to facilitate control cable entry.

### ***Operations and Maintenance***

- 84) During normal operation overhead transmission lines require regular periodic inspections and vegetation management. Normally, very little intervention is required. Inspections can be done using a helicopter or plane if necessary. When a closer inspection is required ground vehicles are used. Fault locator systems with GPS are also available.
- 85) Any materials found in substandard condition are replaced during a planned power outage. Where line maintenance techniques are used, no power outage live is required. Access roads are maintained in good condition so that response crews can reach the line without delay. The response crews work around the clock and in all weathers. Transmission facilities owners have special emergency structures and spare materials ready to be used for emergency service restoration so that the power outage time is kept to a minimum. Maintenance requirements for underground cable systems are minimal. Inspection of termination fittings for early signs of tracking in exposed, contaminated environments is essential. ROW maintenance is minimal.

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Filed: 2011-02-28  
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**SINGLE LINE DIAGRAM OF PROPOSED FACILITIES**



ORIGINAL SHEET - ANSI A



**Stantec**

**Stantec**  
49 Frederick Street  
Kitchener, Ontario Canada  
N2H 6M7  
Tel. 519.579.4410  
Fax. 519.579.8896  
www.stantec.com

Client/Project

SAMSUNG RENEWABLE  
ENERGY INC.

GRAND RENEWABLE ENERGY PARK

Figure No.

Title

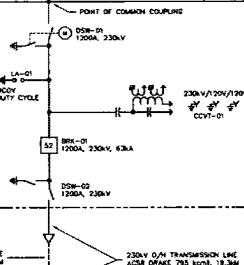
230kV CONNECTION  
SINGLE LINE DIAGRAM

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Filed: 2011-02-28  
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## **SINGLE LINE DIAGRAM – COLLECTOR SUBSTATION**

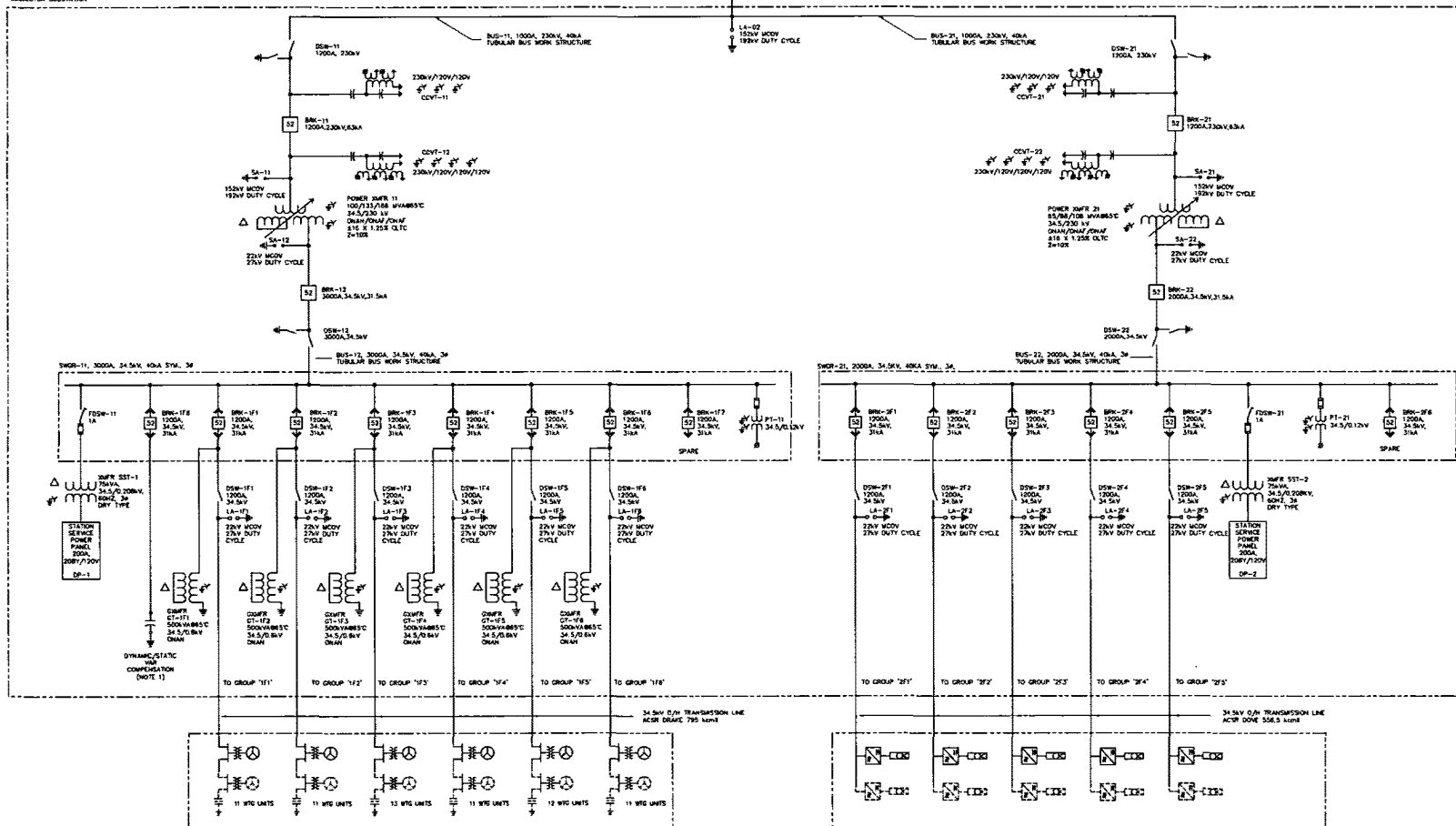
# GRAND RIVER ENERGY PARK INTERCONNECTION STATION

HYBRID LINE 230KV OVERHEAD LINE CIRCUIT FROM WINDFARM TO INTERCONNECTION STATION



230KV U/E TRANSMISSION LINE  
ALICE 120KV/120V, 0.7MVA

## COLLECTOR SUBSTATION



Stantec  
48 Frederick Street  
Kitchener, ON Canada  
N2H 6A7  
Tel. 519.579.4410  
Fax. 519.579.8896  
www.stantec.com

### Copyright Reserved

The Contractor shall verify and be responsible for all dimensions, DO NOT scale the drawing. Any errors or omissions shall be reported to Stantec within 10 days.  
The Contractor shall be responsible for all design and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.

### Legend

- CIRCUIT BREAKER, 230KV
- DISCONNECT SWITCH, (MANUALLY OPERATED)
- LIGHTNING ARRESTOR (SURGE ARRESTOR)
- CIRCUIT BREAKER, 34.5KV, DRAW-OUT
- CAPACITIVE COUPLING VOLTAGE TRANSFORMER
- UNDERGROUND POWER CABLE

### Notes

1. REQUIREMENT FOR DYNAMIC/STATIC VAR COMPENSATION TO BE CONFIRMED BY CONNECTION ASSESSMENT.

|                        |                             |      |       |          |          |
|------------------------|-----------------------------|------|-------|----------|----------|
| 3                      | UPDATE 230KV WINDFARM STAYS | BY   | TT    | 11.01.25 |          |
| 2                      | UPDATE 230KV LENGTH         | BY   | TT    | 11.01.21 |          |
| 1                      | GENERAL UPDATES             | BY   | WV    | 10.10.21 |          |
| Revision               |                             | By   | Appr. | 11.01.25 |          |
|                        |                             |      |       |          |          |
|                        |                             |      |       |          |          |
|                        |                             |      |       |          |          |
|                        |                             |      |       |          |          |
| A. PRELIMINARY REVIEW  |                             | BY   | WV    | 10.10.21 |          |
| Issued                 |                             | By   | Appr. | 11.01.25 |          |
|                        |                             |      |       |          |          |
| Draw Name: 10024-1-000 |                             | BY   | TT    | 10.10.21 |          |
|                        |                             | Draw | Check | Design   | 11.01.25 |
| Permit-Steel           |                             |      |       |          |          |

PRELIMINARY  
NOT FOR CONSTRUCTION

Client/Project  
SAMSUNG RENEWABLE ENERGY INC

GRAND RENEWABLE ENERGY PARK

HALDIMAND COUNTY, Ontario

Title  
230KV INTERCONNECTION STATION  
230/34.5KV COLLECTOR STATION  
SINGLE LINE DIAGRAM

|             |        |
|-------------|--------|
| Project No. | Scale  |
| 181010024   | NTS    |
| Drawing No. | Sheet  |
| 181010024   | 1 of 1 |

E100

3

EB-2011-TBD  
Filed: 2011-02-28  
Exhibit B  
Tab 4  
Schedule 4  
Pages: 1

**SINGLE LINE DIAGRAM - INTERCONNECTION STATION**



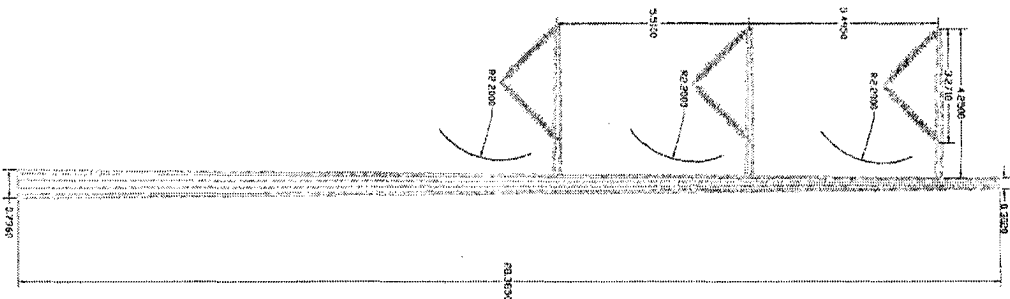
- Title 230kV INTERCONNECTION STATION  
SINGLE LINE DIAGRAM

EB-2011-0063  
Filed: 2011-02-28  
Exhibit B  
Tab 4  
Schedule 5  
Pages: 3

## **CROSS SECTION OF TANGENT STEEL POLE**



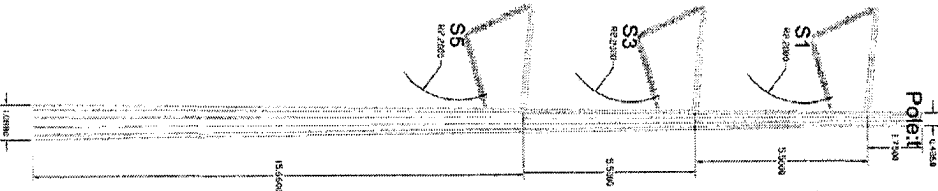
Tangent Steel Pole (0°-2°)



Tangent Pole ( 0-2 )  
12F - Top Dia. 302mm Taper 18.66mm/m Steel Pole  
Allowable Yield Stress 448 MPa.  
Approximate Dimensions in Meter.

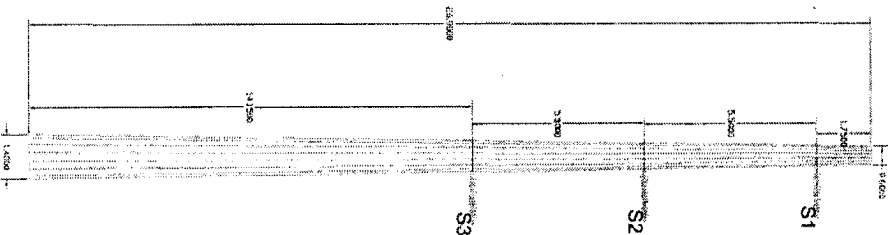


Angle Pole ( 15-30 )  
12F - Top Dia. 406mm Taper 25 mm/m Steel Pole  
Allowable Yield Stress 448 MPa.  
Approximate Dimensions in Meter.





Angle 45-90 / Terminal Pole  
16F - Top Dia. 600mm Steel Pole  
Allowable Yield Stress 448 MPa.  
Approximate Dimensions in Meter.



### **CONNECTION PROJECT IMPACTS ON TRANSMISSION SYSTEM**

- 86) The Applicant submitted an application for an SIA to the IESO on June 23, 2010. The draft SIA is expected on or about March 23, 2011. The Applicant will file copies of each of the draft and final SIA with the Board upon publication by the IESO.
- 87) The Applicant has also applied to Hydro One for a CIA. The draft CIA is expected on or about April 23, 2011. The final CIA is expected on or about May 13, 2011. The Applicant will file copies of each of the draft and final CIA with the Board upon publication by Hydro One.
- 88) The Applicant will adhere to all recommendations in the SIA and CIA, respectively.
- 89) Based on discussions with the IESO and Hydro One, it is not anticipated that connection of the GREP via the Proposed Facility will necessitate network reinforcement in order to proceed. The power generated by the GREP will be transmitted via the Transmission Line to the point of common connection with the IESO-controlled transmission grid near Hagersville on Hydro One's N5M Circuit.

EB-2011-0063  
Updated: 2011-04-13  
Exhibit B  
Tab 5  
Schedule 2.  
Pages: 74

## **DRAFT SYSTEM IMPACT ASSESSMENT**



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# System Impact Assessment Report

*GRAND RENEWABLE ENERGY PARK PROJECT*

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## CONNECTION ASSESSMENT & APPROVAL PROCESS

**Draft Report**

**CAA ID 2010-399**

*Applicant: Samsung Renewable Energy Inc.*

Market Facilitation Department

March 23, 2010

**REPORT**



|                         |                                 |
|-------------------------|---------------------------------|
| <b>Document ID</b>      | IESO_REP_0717                   |
| <b>Document Name</b>    | System Impact Assessment Report |
| <b>Issue</b>            | 1.0                             |
| <b>Reason for Issue</b> | Draft for comments              |
| <b>Effective Date</b>   | March 23, 2010                  |

## **System Impact Assessment Report**

Grand Renewable Energy Park Project

### **Acknowledgement**

The IESO wishes to acknowledge the assistance of Hydro One in completing this assessment.

### **Disclaimers**

#### **IESO**

This report has been prepared solely for the purpose of assessing whether the connection applicant's proposed connection with the IESO-controlled grid would have an adverse impact on the reliability of the integrated power system and whether the IESO should issue a notice of approval or disapproval of the proposed connection under Chapter 4, section 6 of the Market Rules.

Approval of the proposed connection is based on information provided to the IESO by the connection applicant and the transmitter(s) at the time the assessment was carried out. The IESO assumes no responsibility for the accuracy or completeness of such information, including the results of studies carried out by the transmitter(s) at the request of the IESO. Furthermore, the connection approval is subject to further consideration due to changes to this information, or to additional information that may become available after the approval has been granted. Approval of the proposed connection means that there are no significant reliability issues or concerns that would prevent connection of the proposed facility to the IESO-controlled grid. However, connection approval does not ensure that a project will meet all connection requirements. In addition, further issues or concerns may be identified by the transmitter(s) during the detailed design phase that may require changes to equipment characteristics and/or configuration to ensure compliance with physical or equipment limitations, or with the Transmission System Code, before connection can be made.

This report has not been prepared for any other purpose and should not be used or relied upon by any person for another purpose. This report has been prepared solely for use by the connection applicant and the IESO in accordance with Chapter 4, section 6 of the Market Rules. The IESO assumes no responsibility to any third party for any use, which it makes of this report. Any liability which the IESO may have to the connection applicant in respect of this report is governed by Chapter 1, section 13 of the Market Rules. In the event that the IESO provides a draft of this report to the connection applicant, you must be aware that the IESO may revise drafts of this report at any time in its sole discretion without notice to you. Although the IESO will use its best efforts to advise you of any such changes, it is the responsibility of the connection applicant to ensure that it is using the most recent version of this report.

### **HYDRO ONE**

#### **Special Notes and Limitations of Study Results**

The results reported in this study are based on the information available to Hydro One, at the time of the study, suitable for a System Impact Assessment of a new generation or load connection proposal.

The short circuit and thermal loading levels have been computed based on the information available at the time of the study. These levels may be higher or lower if the connection information changes as a result

of, but not limited to, subsequent design modifications or when more accurate test measurement data is available.

This study does not assess the short circuit or thermal loading impact of the proposed connection on facilities owned by other load and generation (including OPG) customers.

In this study, short circuit adequacy is assessed only for Hydro One breakers and does not include other Hydro One facilities. The short circuit results are only for the purpose of assessing the capabilities of existing Hydro One breakers and identifying upgrades required to incorporate the proposed connection. These results should not be used in the design and engineering of new facilities for the proposed connection. The necessary data will be provided by Hydro One and discussed with the connection proponent upon request.

The ampacity ratings of Hydro One facilities are established based on assumptions used in Hydro One for power system planning studies. The actual ampacity ratings during operations may be determined in real-time and are based on actual system conditions, including ambient temperature, wind speed and facility loading, and may be higher or lower than those stated in this study.

The additional facilities or upgrades which are required to incorporate the proposed connection have been identified to the extent permitted by a System Impact Assessment under the current IESO Connection Assessment and Approval process. Additional facility studies may be necessary to confirm constructability and the time required for construction. Further studies at more advanced stages of the project development may identify additional facilities that need to be provided or that require upgrading.

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# GRAND RENEWABLE ENERGY PARK PROJECT

## IESO SYSTEM IMPACT ASSESSMENT

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### SIA Findings

Samsung Renewable Energy Inc. is developing a new 254 MW (154 MW wind and 100 MW solar) power generation system, Grand Renewable Energy Park (GREP), in Haldimand County, Nanticoke, Ontario. The project is one of the renewable energy developments resulted from the agreement between Ontario government and the Korean consortium. The new generation facility is expected to start commercial operation in December 2012.

#### Summary

This assessment examined the impact of injecting 254 MW of wind and solar power generation to the provincial grid, via the 230kV circuit N5M, on the reliability of the IESO-controlled grid.

The following conclusions and recommendations were made:

#### Conclusions and Recommendations

##### *Conclusions:*

The analysis concluded that:

- (1) The proposed wind farm does not have a material adverse impact on the reliability of the IESO-controlled grid.
- (2) The proposed project does not cause new violations of existing circuit breaker interrupting capabilities on the IESO-controlled grid.
- (3) The main step up transformers (166 MVA and 108 MVA) may limit the full output for the wind and solar farms.
- (4) The 230 kV over-head line, underground cable and 230 kV breakers don't have required maximum continuous voltage rating of at least 250 kV.
- (5) The reactive capability of the solar inverters and wind turbine generators along with the impedance between the wind turbine generators and the IESO-controlled grid results in a reactive power deficiency at the connection point.
- (6) No overloads were identified, but the pre-contingency flows on the 230 kV circuits Q23BM/Q25BM approach the continuous ratings, and post-contingency flows on the 230 kV circuits Q23BM/Q25BM, R14T/R17T and R19TH/R21TH approach Long Term Emergency ratings.
- (7) For all contingency cases tested with the proposed GREP in service, the voltage decline criteria are met.

- (8) With the proposed project in service, none of the recognized contingencies cause any material adverse impact to the transient performance of the IESO-controlled grid.
- (9) Based on the information provided by the applicant, the fault ride through capabilities of the wind turbines and solar inverters are adequate.

#### *Recommendations:*

- (1) It is recommended that the main step up transformers have higher ratings than proposed in GREP project. If system requires full reactive output the active power of the wind farm/solar farm may need to be reduced as a result of transformer restriction.
- (2) Since the Wind Farm Management System (WFMS) must coordinate the voltage control process, it is recommended that all WTGs control the PCC voltage to a reference value, reactive power compensation devices are automatically controlled/switched to regulate the overall WTGs' reactive power generation to around zero output, while the WF main transformer ULTC is adjusted to regulate the collector bus voltage such that it is within normal range. Once the WFMS description document is provided to the IESO, we will assess if the voltage control philosophy is acceptable.

## **IESO's Requirements for Connection**

### **Transmitter Requirements**

The following requirements are applicable for Hydro One for the incorporation of GREP project:

- (1) The transmitter changes the relay settings of N5M terminal stations to account for the effect of the wind farm.

Modifications to protection relays after this SIA is finalized must be submitted to IESO as soon as possible or at least six (6) months before any modifications are to be implemented. If those modifications result in adverse impacts, the connection applicant and the transmitter must develop mitigation solutions.

### **Applicant Requirements**

**Specific Requirements:** The following specific requirements are applicable to the applicant for the incorporation of GREP project. Specific requirements pertain to the level of reactive compensation needed, operation restrictions, Special Protection System, upgrading of equipment and any project specific items not covered in the general requirements:

- (1) The wind/solar farm is required to have the capability to inject or withdraw reactive power continuously (i.e. dynamically) at a connection point up to 33% of its rated active power at all levels of active power output.  
Based on the equivalent parameters for the generation system provided by the connection applicant, the IESO's simulations resulted in the following:

- dynamic compensation of -33 /+48 Mvar (i.e. SVC) installed at the solar collector bus to compensate for the dynamic reactive power capability of the facility will satisfy the dynamic reactive power requirement.
- a static compensation device of 50 Mvar in steps no larger than 10 Mvar, installed at the wind collector bus to compensate for the losses within the facility will satisfy the static reactive power requirement. The capacitors will need to be auto-switched via the Wind Farm Management System.

The connection applicant is required to provide the model for the dynamic reactive power compensation device to the IESO.

The connection applicant has the obligation to ensure that GREP GS has the capability to meet the MR requirement at the connection point and be able to confirm this capability during the commission tests.

- (2) The applicant is required to provide a copy of the functionalities of the Wind Farm Management System (WFMS) to the IESO.
- (3) Based on the Protection Impact Assessment performed by Hydro One, to overcome relaying difficulties, both the wind generation and solar generation step-up transformers are required to have the primary windings (high voltage) ungrounded. The proponent agreed that the transformers configuration will be Y/y-grounded/delta for the 230/34.5/13.8 kV transformers.

**General Requirements:** The proposed connection must comply with all the applicable requirements from the Transmission System Code (TSC), IESO Market Rules and standards and criteria. The most relevant requirements are summarized below and presented in more detail in Section 2 of this report.

- (1) The new generator must satisfy the Generator Facility Requirements in Appendix 4.2 of the Market Rules.
- (2) All 230kV equipment must have a maximum continuous voltage rating and the ability to interrupt fault current at a voltage of at least 250 kV.
- (3) Any revenue metering equipment that is installed must comply with Chapter 6 of the Market Rules.
- (4) Equipment must sustain increase fault levels due to future system enhancements. Should future system enhancements result in fault levels exceeding equipment capability, the applicant is required to replace equipment at its own expense with higher rated equipment, up to 63 kA as per the Transmission System Code for the 230 kV system.
- (5) The 230 kV breakers must meet the required interrupting time of less than or equal to 3 cycles as per the Transmission System Code.
- (6) The connection equipment must be designed such that adverse effects due to failure are mitigated on the IESO-controlled grid.
- (7) The connection equipment must be designed for full operability in all reasonably foreseeable ambient temperature conditions.

- (8) The facility must satisfy telemetry requirements as per Appendices 4.15 and 4.19 of the Market Rules. The determination of telemetry quantities and telemetry testing will be conducted during the IESO Facility Registration/Market entry process.
- (9) Protection systems must satisfy requirements of the Transmission system code and specific requirements from the transmitter. New protection systems must be coordinated with existing protection systems.
- (10) Protective relaying must be configured to ensure transmission equipment remains in service for voltages between 94% of minimum continuous and 105% of maximum continuous values as per Market Rules, Appendix 4.1.
- (11) Although the SIA has found that a Special Protection Scheme (SPS) is not required for GREP project, provisions must be made in the design of the protections and controls at the facility to allow for the installation of Special Protection Scheme equipment. Should a future SPS be installed to improve the transfer capability in the area or to accommodate transmission reinforcement projects, GREP will be required to participate in the SPS system and to install the necessary protection and control facilities to affect the required actions.
- (12) Protection systems within the generation facility must only trip appropriate equipment required to isolate the fault. After the facility begins commercial operation, if an improper trip of the 230 kV circuit N5M occurs due to events within the facility, the facility may be required to be disconnected from the IESO-controlled grid until the problem is resolved.
- (13) The autoreclosure of the new 230kV breakers at GREP main transformers must be blocked. Upon its opening for a contingency, it must be closed only after the IESO approval is granted. The IESO will require reduction of power generation prior to the closure of breaker, followed by gradual increase of power to avoid a power surge.
- (14) The generator must operate in voltage control mode. The generation facility shall regulate automatically voltage at a point whose impedance (based on rated apparent power and rated voltage) is not more than 13% from the highest voltage terminal based within  $\pm 0.5\%$  of any set point within  $\pm 5\%$  of rated voltage. If the AVR target voltage is a function of reactive output, the slope  $\Delta V / \Delta Q_{\max}$  shall be adjustable to 0.5%.
- (15) A disturbance monitoring device must be installed. The applicant is required to provide disturbance data to the IESO upon request.
- (16) Mathematical models and data, including any controls that would be operational, must be provided to the IESO through the IESO Facility Registration/Market Entry process at least seven months before energization from the IESO-controlled grid. That includes both PSS/E and DSA software compatible mathematical models representing the new equipment for further IESO, NPCC and NERC analytical studies. The *connection applicant* may need to contact the software manufacturers directly, in order to have the models included in their packages. If the data or assumptions supplied for the registration of the facilities materially differ from those that were used for the assessment, then some of the analysis might need to be repeated. During the commissioning period, a set of IESO specified tests must be performed. The commissioning report must be submitted to the IESO within 30 days of the conclusion of commissioning. Field test results should be verifiable using the PSS/E models used for this SIA.

- (17) The registration of the new facilities will need to be completed through the IESO's Market Entry process before IESO final approval for connection is granted and any part of the facility can be placed in-service. During the IESO's Market Entry process, the connection applicant will be required to demonstrate to the IESO that all requirements identified in this SIA report have been satisfied.
- (18) As part of the IESO Facility Registration/Market Entry process, the *connection applicant* must provide evidence to the IESO confirming that the equipment installed meets the Market Rules requirements and matches or exceeds the performance predicted in this assessment. Until this evidence is provided and found acceptable to the IESO, the Facility Registration/Market Entry process will not be considered complete and the *connection applicant* must accept any restrictions the IESO may impose upon this project's participation in the IESO administered market or connection to the IESO-controlled grid. Failure to provide evidence may result in disconnection from the IESO-controlled grid.
- (19) During the commissioning period, a set of IESO specified tests must be performed. The commissioning report must be submitted to the IESO within 30 days of the conclusion of commissioning. Field test results should be verifiable using the PSS/E models used for this SIA
- (20) The proposed facility must be compliant with applicable reliability standards set by the North American Electric Reliability Corporation (NERC) and the North East Power Coordinating Council (NPCC) prior to energization to the IESO controlled grid.

## **Notification of Conditional Approval**

From the information provided, our review concludes that the proposed changes will not result in a material adverse effect on the reliability of the IESO-controlled grid.

It is recommended that a *Notification of Conditional Approval* be issued for GREP subject to the implementation of the requirements listed in this report.

# 1. Project Description

---

Samsung Renewable Energy Inc. has proposed to develop a 254 MW wind and solar generation system located in Haldimand County, Nanticoke, Ontario, known as Grand Renewable Energy Park (GREP).

The project is one of the renewable energy developments resulted from the agreement between Ontario government and the Korean consortium. The new generation facility is expected to start commercial operation in December 2012.

GREP will be connected to Hydro One's 230 kV circuit N5M via a new 230 kV switching station adjacent to the transmission corridor. The new switching station will be about 19.5 km away from Nanticoke TS. GREP substation will be located about 20 km from the new switching station.

The GREP is comprised of a combination of a 100 MW solar farm and a 154 MW wind farm. Each of the generators (69 individual 2.3MW Siemens WTGs and the 200 SMA 500HE-US solar inverters) will have step up transformers to 34.5 kV and be connected to one of two collector substations, one for the wind and one for solar. The wind collect substation will have six collector feeders while the solar will have five.

The wind and solar 34.5 kV electrical distribution systems will be kept separate but located on a common site. The wind collector bus will be connected to a 100/133/150 MVA, 230/34.5 kV transformer while the solar collector bus will be connected to a 65/86/108 MVA, 230/34.5 kV transformer. Both transformers will be connected to the 230 kV circuit N5M through the 20 km tap line (19.3 km overhead circuit and 0.7 km underground cable).

The wind turbines will be Siemens SWT 2.3 VS wind turbine generators with a rated power output of 2.22 MW each. Two back-to-back AC/DC links and a 2.6 MVA, 0.06 pu reactance (on 2.6 MVA base), 0.69/34.5 kV transformer connects each generator to one of the six 34.5 kV collector circuits C1, C2, C3, C4, C5 or C6.

The solar inverters will be SMA 500HE-US rated 500 kW. The set-up transformer will be an outdoor oil filled pad-mounted transformer 1000 kVA rated 34.5kV wye to two 500 kVA rated 208 V delta connected secondaries (Dual secondary windings). The proposed impedance is 5% on each HV-LV winding.

Each collector circuit will have the following number of generators:

| Collector Station    | Wind |      |      |      |      |      | Solar |    |    |    |    |
|----------------------|------|------|------|------|------|------|-------|----|----|----|----|
| Circuit ID           | C1   | C2   | C3   | C4   | C5   | C6   | C1    | C2 | C3 | C4 | C5 |
| Number of generators | 11   | 11   | 13   | 11   | 12   | 11   | 40    | 40 | 40 | 40 | 40 |
| Maximum MW           | 24.4 | 24.4 | 28.9 | 24.4 | 26.6 | 24.4 | 20    | 20 | 20 | 20 | 20 |

**– End of Section –**

## 2. General Requirements

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### *Generators*

Each generator must satisfy the Generator Facility requirements in Appendix 4.2 of Market Rules.

The Market Rules (appendix 4.2) require that the generation facility directly connecting to the IESO-controlled grid must have the capability to operate continuously between 59.4Hz and 60.6Hz and for a limited period of time in the region above straight lines on a log-linear scale defined by the points (0.0s, 57.0Hz), (3.3s, 57.0Hz), and (300s, 59.0Hz).

The generators shall respond to frequency increase by reducing the active power with an average droop based on maximum active power adjustable between 3% and 7% and set at 4% . Regulation deadband shall not be wider than  $\pm 0.06\%$ . A sustained 10% change of rated active power after 10 s in response to a constant rate of change of frequency of 0.1%/s during interconnected operation shall be achievable.

The generators shall respond to frequency decline by temporary boosting their active power output by recovering energy from the rotating blades. It is not required for wind facilities to “spill” wind to provide a sustained response to frequency decline.

The generators must be able to ride through routine switching events and design criteria contingencies assuming standard fault detection, auxiliary relaying, communication, and rated breaker interrupting times unless disconnected by configuration.

The generation facility directly connecting to the IESO-controlled grid must have the minimum capability to supply continuously all levels of active power output for 5% deviations in terminal voltage. Rated active power is the smaller output at either rated ambient conditions (e.g. temperature, head, wind speed, solar radiation) or 90% of rated apparent power. To satisfy steady-state reactive power requirements, active power reductions to rated active power are permitted. the generation facility must have the capability to inject or withdraw reactive power continuously (i.e. dynamically) at a *connection point* up to 33% of its rated active power at all levels of active power output except where a lesser continually available capability is permitted by the *IESO*.

If necessary, shunt capacitors must be installed to offset the reactive power losses within the facility in excess of the maximum allowable losses. If generators do not have dynamic reactive power capabilities as described above, dynamic reactive compensation devices must be installed to make up the deficient reactive power.

### *Connection Equipment (Breakers, Disconnects, Transformers, Buses)*

1. Appendix 4.1, reference 2 of the Market Rules states that under normal conditions voltages are maintained within the range of 220 kV to 250 kV. Thus, the IESO requires that the 230 kV equipment in Ontario must have a maximum continuous voltage rating of at least 250 kV. Fault interrupting devices must be able to interrupt fault current at the maximum continuous voltage of 250 kV.

If revenue metering equipment is being installed as part of this project, please be aware that revenue metering installations must comply with Chapter 6 of the IESO Market Rules for the Ontario electricity market. For more details the applicant is encouraged to seek advice from their Metering Service Provider (MSP) or from the IESO metering group.

2. The Transmission System Code (TSC), Appendix 2 establishes maximum fault levels for the transmission system. For the 230 kV system, the maximum 3 phase symmetrical fault level is 63 kA and the single line to ground (SLG) symmetrical fault level is 80 kA (usually limited to 63 kA).

The TSC requires that new equipment be designed to sustain the fault levels in the area where the equipment is installed. If any future system enhancement results in an increased fault level higher than the equipment's capability, the connection applicant is required to replace the equipment at their own expense with higher rated equipment capable of sustaining the increased fault level, up to the TSC's maximum fault level of 63 kA for the 230 kV system.

3. The Transmission System Code (TSC), Appendix 2 states that the maximum rated interrupting time for 230 kV breakers must be  $\leq 3$  cycles. The connection applicant shall ensure that the new breakers meet the required interrupting time as specified in the TSC.

4. The connection equipment must be designed so that the adverse effects of failure on the IESO-controlled grid are mitigated.

5. The connection equipment must be designed so that it will be fully operational in all reasonably foreseeable ambient temperature conditions.

#### *IESO Monitoring and Telemetry Data*

In accordance with the telemetry requirements for a generation facility (see Appendices 4.15 and 4.19 of the Market Rules) the connection applicant must install equipment at this project with specific performance standards to provide telemetry data to the IESO. The data is to consist of certain equipment status and operating quantities which will be identified during the IESO Market Entry Process.

As part of the IESO Facility Registration/Market Entry process, the connection applicant must also complete end to end testing of all necessary telemetry points with the IESO to ensure that standards are met and that sign conventions are understood. All found anomalies must be corrected before IESO final approval to connect any phase of the project is granted.

#### *Protection Systems*

1. Protection systems must be designed to satisfy all the requirements of the Transmission System Code as specified in Schedules E, F and G of Appendix 1 (version B) and any additional requirements identified by the transmitter. New protection systems must be coordinated with existing protection systems.

2. Protective relaying must be set to ensure that transmission equipment remains in-service for voltages between 94% of the minimum continuous and 105% of the maximum continuous values

in the Market Rules, Appendix 4.1.

3. The Applicant is required to have adequate provision in the design of protections and controls at the facility to allow for installation of Special Protection Scheme (SPS). Should a future SPS be installed to improve the transfer capability in the area or to accommodate transmission reinforcement projects, the applicant will be required to participate in the SPS system and to install the necessary protection and control facilities to affect the required actions.

4. Any modifications made to protection relays by the transmitter after this SIA is finalized must be submitted to the IESO as soon as possible or at least six (6) months before any modifications are to be implemented on the existing protection systems. If those modifications result in adverse impacts, the connection applicant and the transmitter must develop mitigation solutions.

Send documentation for protection modifications triggered by new or modified primary equipment (i.e. new or replacement relays) to [connection.assessments@ieso.ca](mailto:connection.assessments@ieso.ca).

For protection modifications that are not associated with new or modified equipment (i.e. protection setting modifications) please send documentation to [protection.settings@ieso.ca](mailto:protection.settings@ieso.ca).

5. Protection systems within the generation facility must only trip the appropriate equipment required to isolate the fault. After the facility begins commercial operation, if an improper trip of the 230 kV circuit N5M occurs due to events within the facility, the facility may be required to be disconnected from the IESO-controlled grid until the problem is resolved.

6. The autoreclosure of the new 230 kV breakers at the connection point must be blocked. Upon its opening for a contingency, it must be closed only after the IESO approval is granted. The IESO will require reduction of power generation prior to the closure of the breaker followed by gradual increase of power to avoid a power surge.

#### *Miscellaneous*

1. The generators must operate in the voltage control mode. Operation of the facility in power factor control or reactive power control is not acceptable.

2. The connection applicant is required to install at the facility a disturbance recording device with clock synchronization that meets the technical specifications provided by Hydro One. The device will be used to monitor and record the response of the facility to disturbances on the 230 kV system in order to verify the dynamic response of generators. The quantities to be recorded, the sampling rate and the trigger settings will be provided by Hydro One.

#### *Facility Registration/Market Entry Requirements*

1. The registration of the new facilities will need to be completed through the IESO's Market Entry process before IESO final approval for connection is granted and any part of the facility can be placed in-service. During the IESO's Market Entry process, the connection applicant will be required to demonstrate to the IESO that all requirements identified in this SIA report have been satisfied.

The connection applicant must complete the IESO Facility Registration/Market Entry process in a timely manner before IESO final approval for connection is granted. Models and data, including any controls that would be operational, must be provided to the IESO. This information should be submitted at least seven months before energization to the IESO-controlled grid, to allow the IESO to incorporate this project into IESO work systems and to perform any additional reliability studies.

As part of the IESO Facility Registration/Market Entry process, the connection applicant must provide evidence to the IESO confirming that the equipment installed meets the Market Rules requirements and matches or exceeds the performance predicted in this assessment. This evidence shall be either type tests done in a controlled environment or commissioning tests done on-site. In either case, the testing must be done not only in accordance with widely recognized standards, but also to the satisfaction of the IESO. Until this evidence is provided and found acceptable to the IESO, the Facility Registration/Market Entry process will not be considered complete and the connection applicant must accept any restrictions the IESO may impose upon this project's participation in the IESO administered market or connection to the IESO-controlled grid.

During the commissioning period, a set of IESO specified tests must be performed. The commissioning report must be submitted to the IESO within 30 days of the conclusion of commissioning. Field test results should be verifiable using the PSS/E models used for this SIA. Failure to provide evidence may result in disconnection from the IESO-controlled grid.

If the submitted models and data differ materially from the ones used in this assessment, then further analysis of the project will need to be done by the IESO.

#### *Reliability Standards*

Prior to connecting to the IESO controlled grid, the proposed facility must be compliant with the applicable reliability standards set by the North American Electric Reliability Corporation (NERC) and the North East Power Coordinating Council (NPCC). A list of applicable standards, based on the proponent's/connection applicant's market role/OEB licence can be found here:

<http://www.ieso.ca/imoweb/ircp/reliabilityStandards.asp>

In support of the NERC standard EOP-005, the proponent/connection applicant may need to meet the restoration participant criteria. Please refer to section 3 of Market Manual 7.8 (Ontario Power System Restoration Plan) to determine its applicability to the proposed facility.

The IESO monitors and assesses market participant compliance with these standards as part of the IESO Reliability Compliance Program. To find out more about this program, visit the webpage referenced above or write to [ircp@ieso.ca](mailto:ircp@ieso.ca).

Also, to obtain a better understanding of the applicable reliability obligations and find out how to engage in the standards development process, we recommend that the proponent/ connection applicant join the IESO's Reliability Standards Standing Committee (RSSC) or at least subscribe to their mailing list at [rssc@ieso.ca](mailto:rssc@ieso.ca). The RSSC webpage is located at: [http://www.ieso.ca/imoweb/consult/consult\\_rssc.asp](http://www.ieso.ca/imoweb/consult/consult_rssc.asp).

**– End of Section –**

## 3. Review of Connection Proposal

### 3.1 Proposed Connection Arrangement

The proposed connection arrangement is shown in Figure 1.

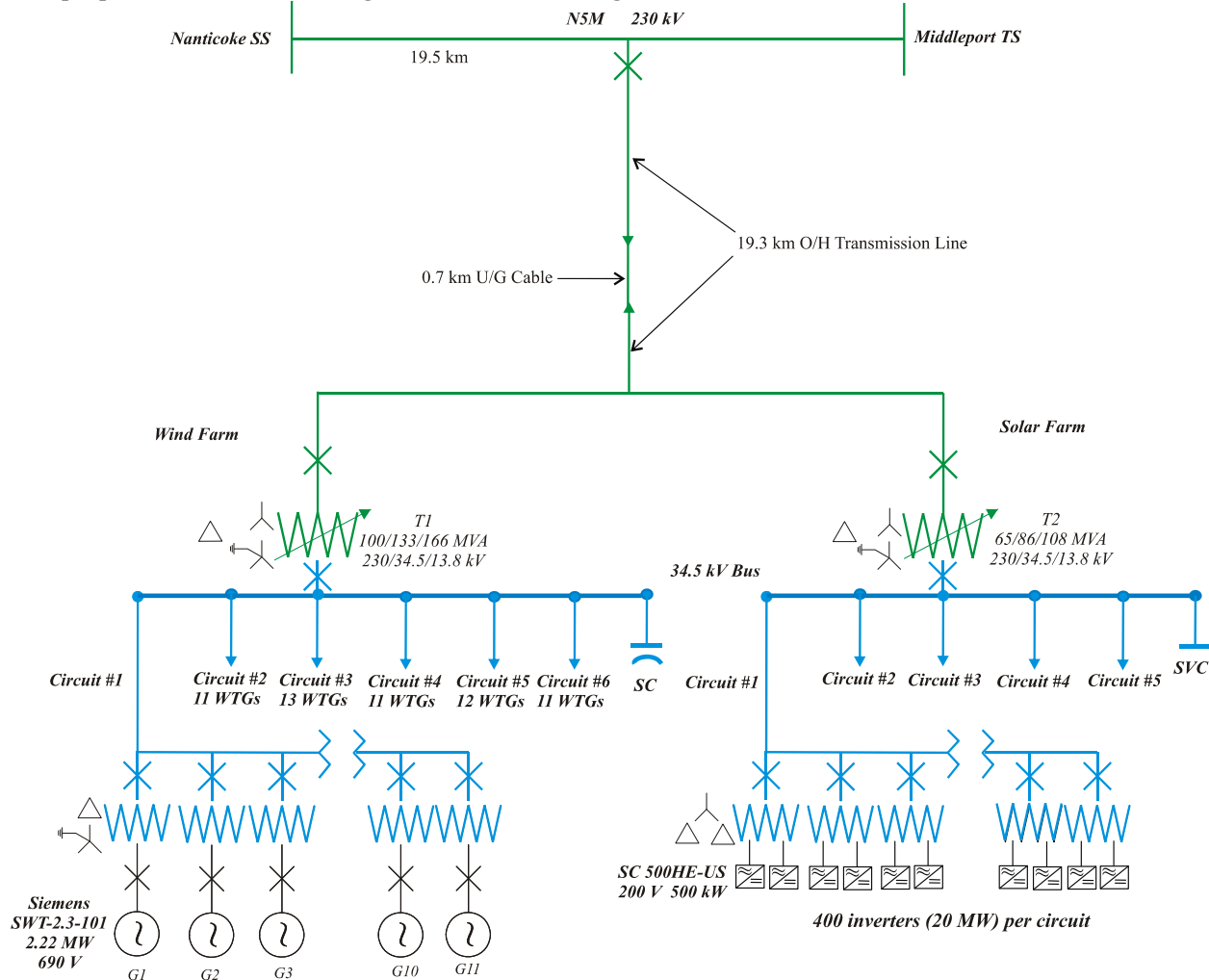


**Figure 1: Proposed Connection Arrangement**

The initial proposed main step-up transformer configuration was Y-grounded/Y-grounded/Delta as shown in Figure 1. Based on the study results from the Protection Impact Assessment it is required to leave the HV winding ungrounded. This will be discussed in Chapter 4.

### 3.2 Existing System

GREP is proposed to connect to the existing Hydro One 230 kV circuit N5M between Nanticoke SS and Middleport TS. The graphs below display the MW flow out N1M, N2M and N5M at Nanticoke SS and 230 kV voltages at Nanticoke SS and Middleport TS. These are hourly average samples from Jan 1 to Dec 31, 2010 obtained from IESO real-time data. For MW flow graphs, positive values mean flow out of the station.

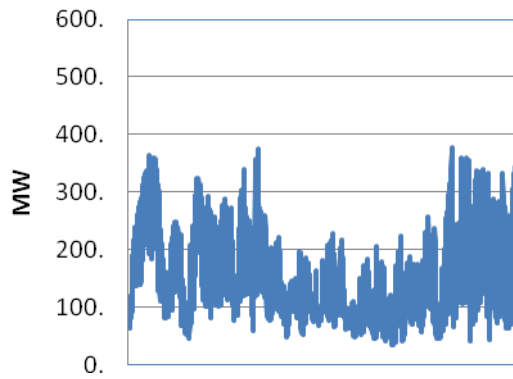


**Figure 2: MW flow on N1M at Nanticoke SS**

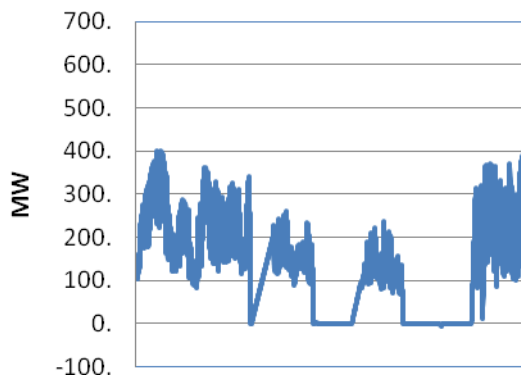


**Figure 3: MW flow on N2M at Nanticoke SS**

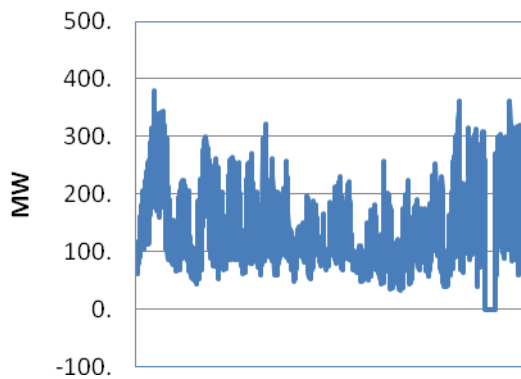


**Figure 4: MW flow on N5M at Nanticoke SS**

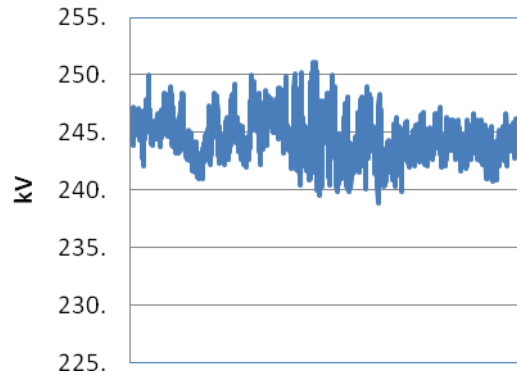


**Figure 5: 230 kV Voltage at Nanticoke SS**

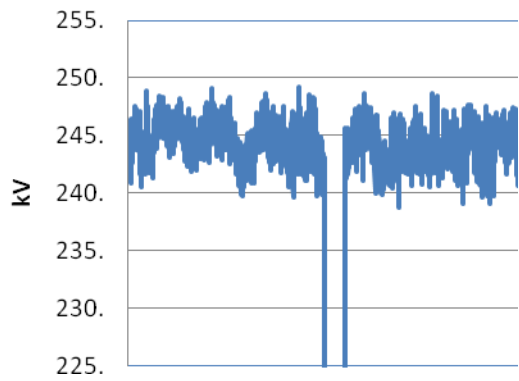


**Figure 6: 230 kV Voltage at Middleport TS**

The following can be observed.

|               |                      |       |
|---------------|----------------------|-------|
| Nanticoke SS  | Average voltage (kV) | 244.8 |
|               | N1M MW (max flow)    | 520.2 |
|               | M2M MW (max flow)    | 618.0 |
|               | N5M MW (max flow)    | 448.6 |
| Middleport TS | Average voltage (kV) | 244.9 |

## 4. Data Verification

### 4.1 Tap Line

Specifications of the 230 kV tap line provided by the connection applicant are listed below.

|                                  | Overhead Line         | Underground Cable |
|----------------------------------|-----------------------|-------------------|
| Voltage (kV)                     | 240                   | 245               |
| Rating (A)                       | 905                   | 850               |
| Length (km)                      | 19.3                  | 0.7               |
| Impedance ( $\Omega/\text{km}$ ) | $0.0738 + j0.4843$    | $j0.0262$         |
| Charging                         | 0.2960 M $\Omega$ -km | 0.1554 pF/km      |

It should be noted that the max voltage rating for the underground cable is 245 kV which does not meet Market Rules requirements, i.e., all 230 kV equipment must have a maximum continuous voltage rating of at least 250 kV.

### 4.2 Generator

A generator connecting to the IESO-controlled grid must have the capability to perform the following unless specified otherwise.

- Supply continuously all levels of active power output for 5% deviations in terminal voltage. Rated active power is the smaller output at either rated ambient conditions (e.g. temperature, head, wind speed, solar radiation) or 90% of rated apparent power. To satisfy steady-state reactive power requirements, active power reductions to rated active power are permitted.
- Inject or withdraw reactive power continuously (i.e. dynamically) at a connection point up to 33% of its rated active power at all levels of active power output except where a lesser continually available capability is permitted by the IESO.

The details of the generator data used in this assessment are given below:

Siemens SWT-2.3- 60 Hz variable speed wind turbine

|              |                           |
|--------------|---------------------------|
| Voltage      | 0.69 kV                   |
| Rating       | 2.3 MW                    |
| Power Factor | 0.9 leading – 0.9 lagging |

SMA 500HE-US solar inverter

|              |        |
|--------------|--------|
| Voltage      | 0.2 kV |
| Rating       | 500 kW |
| Power Factor | 1      |

### 4.3 Transformer

Specifications for the 34.5/230 kV step-up transformers are listed below.

|                     | Wind                            | Solar                           |
|---------------------|---------------------------------|---------------------------------|
| Transformation (kV) | 240/34.5/13.8                   | 240/34.5/13.8                   |
| Rating (MVA)        | 100/133/166                     | 60/86/108                       |
| Impedance           | 0.18+j8.998% (100MVA base)      | 0.182+j7.748% (60 MVA base)     |
| Configuration       | Y-grounded/Y-grounded/ $\Delta$ | Y-grounded/Y-grounded/ $\Delta$ |
| Tapping             | $\pm 16 \times 1.25\%$ ULTC     | $\pm 16 \times 1.25\%$ ULTC     |

The capacities of wind farm and solar farm are 154 MW and 100 MW, respectively. The main step up transformers (166 MVA and 108 MVA) may limit the full output. It is recommended that the main step up transformers have higher ratings than proposed.

It should be noted that based on the Protection Impact Assessment performed by Hydro One, to overcome relaying difficulties it is required to leave the HV windings on both the wind generation and solar generation step-up transformers ungrounded. The proponent agreed that the transformers configuration will be Y/Y-grounded.

## 4.4 Circuit Breakers and Switches

Specifications of the isolation devices provided by the connection applicant are listed below.

| Breakers and switches                     | LV        | HV   |
|-------------------------------------------|-----------|------|
| Rated line-to-line voltage (kV)           | 34.5      | 245  |
| Interrupting time (ms)                    | N/A       | 33   |
| Rated continuous current (A)              | 2000/1200 | 1200 |
| Rated short circuit breaking current (kA) | 31        | 63   |

It should be noted that the max voltage rating for the HV breakers is 245 kV which does not meet Market Rules requirements, i.e., all 230 kV equipment must have a maximum continuous voltage rating of at least 250 kV.

## 4.5 Collector System

The 34.5 kV collector system equivalent circuit impedance including the pad mount transformers provided by the connection applicant are listed as follows:

| Feeder # | Wind                     |       |                 | Solar                    |       |                 |
|----------|--------------------------|-------|-----------------|--------------------------|-------|-----------------|
|          | Equivalent Impedance(pu) |       | Charging (Mvar) | Equivalent Impedance(pu) |       | Charging (Mvar) |
|          | R                        | X     |                 | R                        | X     |                 |
| 1        | 0.051                    | 0.139 | N/A             | 0.018                    | 0.014 | N/A             |
| 2        | 0.032                    | 0.077 | N/A             | 0.024                    | 0.020 | N/A             |
| 3        | 0.062                    | 0.220 | N/A             | 0.031                    | 0.025 | N/A             |
| 4        | 0.100                    | 0.431 | N/A             | 0.037                    | 0.031 | N/A             |

|   |       |       |     |       |       |     |
|---|-------|-------|-----|-------|-------|-----|
| 5 | 0.036 | 0.104 | N/A | 0.037 | 0.031 | N/A |
| 6 | 0.127 | 0.601 | N/A |       |       |     |

Per unit data are based on 100 MVA & 34.5 kV.

**– End of Section –**

## 5. Fault Level Assessment

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Fault level studies were completed by Hydro One to examine the effects of the GREP on fault levels at existing facilities in the area. Studies were performed to analyze the fault levels with and without GREP and other proposed projects in the surrounding area. Studies were carried out with the following facilities and system assumptions:

Niagara, South West, West Zones:

- All hydraulic generation
- 6 Nanticoke
- 2 Lambton
- Brighton Beach (J20B/J1B)
- Greenfield Energy Centre (Lambton SS)
- St. Clair Energy Centre (L25N & L27N)
- East Windsor Cogen (E8F & E9F) + existing Ford generation
- TransAlta Sarnia (N6S/N7S)
- Imperial Oil (N6S/N7S)
- Thorold GS (Q10P)

Central, East Zones:

- All hydraulic generation
- 6 Pickering units
- 4 Darlington units
- 4 Lennox units
- GTAA (44 kV buses at Bramalea TS and Woodbridge TS)
- Sithe Goreway GS (V41H/V42H)
- Portlands GS (Hearn SS)
- Kingston Cogen
- TransAlta Douglas (44 kV buses at Bramalea TS)

Northwest, Northeast Zones:

- All hydraulic generation
- 1 Atikokan
- 2 Thunder Bay
- NP Iroquois Falls
- AP Iroquois Falls
- Kirkland Lake
- 1 West Coast (G2)
- Lake Superior Power

- Terrace Bay Pulp STG1 (embedded in Neenah paper)

**Bruce Zone:**

- 8 Bruce units (Bruce G1 and Bruce G2 maximum capacity @ 835 MW)
- 4 Bruce B Standby Generators

**All constructed wind farms including:**

- Erie Shores WGS (WT1T)
- Kingsbridge WGS (embedded in Goderich TS)
- Amaranth WGS – Amaranth I (B4V) & Amaranth II (B5V)
- Ripley WGS (B22D/B23D)
- Prince I & II WGS (K24G)
- Underwood (B4V/B5V)
- Kruger Port Alma (C24Z)
- Wolf Island (injecting into X4H)

**New Generation Facilities:**

*Committed wind generation:*

- Greenwich Wind Farm (M23L and M24L)
- Gosfield Wind Project (K2Z)
- Kruger Energy Chatham Wind Project (C24Z)
- Raleigh Wind Energy Centre (C23Z)
- Talbot Wind Farm (W45LC)
- Greenfield South GS (R24C)

*Other committed generation projects:*

- Halton Hills GS (T38B/T39B)
- Oakville Generating Station (B15C/B16C)
- York Energy Centre (B82V/B83V)
- Island Falls (H9K)
- Becker Cogeneration (M2W)
- Wawatay G4 (M2W)
- Beck 1 G9: increase capacity to 68.5 MVA (Beck #1 115 kV bus)
- Lower Mattagami Expansion
- All renewable generation projects awarded FIT contracts

**Transmission System Configuration**

**Existing system with the following upgrades:**

- Bruce x Orangeville 230 kV circuits up-rated
- Burlington TS: Rebuild 115 kV switchyards
- Leaside TS to Birch JCT: Build new 115 kV circuit. Birch to Bayfield: Replace 115 kV cables.
- Uprate circuits D9HS, D10S and Q11S

- Hurontario SS in service with R19T+V41H open from R21T+V42H (230 kV circuits V41H and V42H extended and connected from Cardiff TS to Hurontario SS). Hurontario SS to Jim Yarrow 2x3km 230 kV circuits in-service
- Cherrywood TS to Claireville TS: Unbundle the two 500 kV super-circuits (C551VP & C550VP)
- Allanburg x Middleport 230 kV circuits (Q35M and Q26M) installed
- Claireville TS: Reterminate circuit 230 kV V1RP to Parkway V71P Reterminate circuit 230 kV V72R to Cardiff(V41H)
- One 250 Mvar (@ 250 kV) shunt capacitor bank installed at Buchanan TS
- LV shunt capacitor banks installed at Meadowvale
- Modeling of Michigan system with short circuit equivalent provided by International Transmission Company (ITC).
- 1250 MW HVDC line ON-HQ in service
- Tilbury West DS second connection point for DESN arrangement using K2Z and K6Z
- Second 500kV Bruce-Milton double-circuit line in service. Double-circuit line from the Bruce Complex to Milton TS with one circuit originating from Bruce A and the other from Bruce B
- Windsor area transmission reinforcement:
- 230 kV transmission line from Sandwich JCT (C21J/C22J) to Lauzon TS
- New 230/27.6 DESN, Leamington TS, that will connect C21J and C22J and supply part of the existing Kingsville TS load
- Replace Keith 230/115 kV T11 and T12 transformers
- 115 kV circuits J3E and J4E upgrades
- Woodstock Area transmission reinforcement:
  - o Karn TS in service and connected to M31W & M32W at Ingersol T
  - o W7W/W12W terminated at LFarge CTS
  - o Woodstock TS connected to Karn TS
- Nanticoke and Detweiler SVCs
- Series capacitors at Nobel SS in each of the 500 kV circuits X503 & X504E to provide 50% compensation for the line reactance
- Lakehead TS SVC
- Porcupine TS & Kirkland Lake TS SVC
- Porcupine TS: Install 2x125 Mvar shunt capacitors
- Essa TS : Install 250 Mvar shunt capacitor
- Hanmer TS: Install 149 Mvar shunt capacitor
- Pinard TS: Install 2x30 Mvar LV shunt capacitors
- Upper Mattagami expansion
- Fort Frances TS: Install 22 Mvar moveable shunt capacitor
- Dryden TS: Install shunt capacitors
- Lower Mattagami Expansion – H22D line extension from Harmon to Kipling.

### ***System Assumptions***

- Lambton TS 230 kV operated open
- Claireville TS 230 kV operated open
- Leaside TS 230 kV operated open
- Leaside TS 115 kV operated open
- Middleport TS 230 kV bus operated open
- Hearn SS 115 kV bus operated open – as required in the Portlands SIA
- Napanee TS 230 kV operated open
- Cherrywood TS north & south 230kV buses operated open
- Cooksville TS 230 kV bus operated open

- Richview TS 230 kV bus operated open
- Burlington 115 kV bus operated open
- Allanberg 115 kV bus operated open
- All capacitors in service
- All tie-lines in service and phase shifters on neutral taps
- Maximum voltages on the buses

The following table summarizes the fault levels near Nanticoke area before and after GREP and other projects and corresponding breaker ratings.

|                | Before GREP and other new projects<br>i/s |       |                |       | After GREP and other new<br>projects i/s |       |                |       | Lowest Breaker<br>Ratings (kA)<br>(at max operational<br>voltage) |      |
|----------------|-------------------------------------------|-------|----------------|-------|------------------------------------------|-------|----------------|-------|-------------------------------------------------------------------|------|
| Bus            | 3-phase Fault<br>(kA)                     |       | L-G Fault (kA) |       | 3-phase Fault<br>(kA)                    |       | L-G Fault (kA) |       |                                                                   |      |
|                | Sym.                                      | Asym. | Sym.           | Asym. | Sym.                                     | Asym. | Sym.           | Asym. |                                                                   |      |
| Beach 230      | 37.7                                      | 44.4  | 35.9           | 45.7  | 37.8                                     | 44.6  | 36.0           | 45.8  | 41.1                                                              | 46.2 |
| Beach 115      | 26.7                                      | 32.7  | 32.3           | 41.5  | 26.7                                     | 32.7  | 32.3           | 41.5  | 39.3                                                              | 45.5 |
| Burlington 230 | 51.5                                      | 61.8  | 43.6           | 55.7  | 51.8                                     | 62.1  | 43.7           | 55.8  | 63                                                                | 75.6 |
| Burlington 115 | 25.4                                      | 32.1  | 26.8           | 35.1  | 25.4                                     | 32.1  | 28.5           | 37.8  | 39.3                                                              | 45.5 |
| Middleport 230 | 46.7                                      | 58.7  | 43.8           | 57.4  | 47.1                                     | 59.3  | 44.2           | 57.9  | 60                                                                | 70.4 |
| Buchanan 230   | 31.7                                      | 37.1  | 27.0           | 34.3  | 31.8                                     | 37.2  | 27.1           | 34.4  | 39.4                                                              | 46.2 |
| Buchanan 115   | 25.0                                      | 29.8  | 27.8           | 34.9  | 25.1                                     | 29.8  | 29.1           | 36.7  | 39.3                                                              | 45.5 |
| Nanticoke 230  | 40.9                                      | 58.2  | 40.1           | 59.5  | 42.3                                     | 60.1  | 42.4           | 62.8  | 54.3                                                              | 65.6 |
| Detweiler 230  | 22.4                                      | 26.1  | 19.5           | 24.8  | 22.7                                     | 26.5  | 19.7           | 25.0  | 40                                                                | 42.1 |
| Detweiler 115  | 23.7                                      | 27.3  | 26.6           | 34.3  | 24.1                                     | 27.8  | 27.0           | 33.1  | 39.3                                                              | 45.5 |
| Beck 230       | 56.6                                      | 77.7  | 62.0           | 85.9  | 56.7                                     | 77.8  | 62.1           | 86.0  | 69.5                                                              | 91   |
| Beck 115       | 24.1                                      | 29.3  | 28.7           | 36.5  | 24.1                                     | 29.3  | 28.7           | 36.5  | 36                                                                | 39   |
| Allanburg 115  | 25.6                                      | 30.0  | 27.9           | 33.6  | 25.6                                     | 30.1  | 27.9           | 33.6  | 39.3                                                              | 45.5 |

The results show that there are slightly increases in fault levels in the surrounding area of the GREP project, due to the proposed project. It can be concluded that the proposed project will not cause any new violations of existing circuit breaker interrupting capabilities on the IESO-controlled grid.

– End of Section –

## 6. System Impact Studies

This connection assessment was carried out to identify the effect of the proposed facility on thermal loading of transmission interfaces in the vicinity, the system voltages for pre/post contingencies, the ability of the facility to control voltages, and the transient performance of the system.

### 6.1 Assumptions and Background

A base case with a peak demand of 25,912 MW was the starting point for this study, along with the following assumptions and modifications:

#### System Conditions

Ontario demand was scaled to summer 2013 values as shown in the following table:

| Demand: 25,912 MW |      |      |        |      |         |         |      |        |      |
|-------------------|------|------|--------|------|---------|---------|------|--------|------|
| NW                | NE   | Essa | Ottawa | East | Toronto | Niagara | SW   | Bruce* | West |
| 604               | 1221 | 1541 | 1840   | 1491 | 10099   | 949     | 5052 | 133    | 3061 |

All transmission system elements were in service.

The following table summarizes some of the major in-service generation for each scenario.

| Generation Station | Units In-service |
|--------------------|------------------|
| Atikokan           | 1                |
| Nanticoke          | 5                |
| Thunder Bay        | 1                |
| Lambton            | 0                |
| Bruce              | 7                |
| Pickering          | 4                |
| Lennox             | 0                |
| Darlington         | 4                |
| Halton Hills       | 3                |
| Thorold            | 2                |
| York Energy Centre | 2                |
| Portlands          | 0                |
| Sithe Goreway      | 0                |
| West Coast         | 1                |

According to the schedule for Nanticoke GS shut off there will be only four units by the end of 2013. This study assumed five units and this assumption does not have any negative impact on the study results.

#### Dispatch Philosophy

Where possible, the following philosophy was used to dispatch units:

- Hydraulic units were put in-service at 90% of their maximum continuous rating

- Nuclear units were put in-service at 100% of their maximum continuous rating
- NUGS units were put in-service at 100% of their maximum continuous rating
- Gas units were put in-service at 100% of their maximum continuous rating
- Wind was placed at 100% of its maximum continuous rating.

### Interface Flows

The base case was adjusted to stress the transmission lines from Nanticoke to Toronto. The following table lists the interface flows for the study scenario.

| <b>FABC</b> | <b>BLIP</b> | <b>FETT</b> | <b>QFW</b> |
|-------------|-------------|-------------|------------|
| 4200        | -1500       | 4500        | 1300       |

The interfaces are defined as follows:

| <b>Interface</b> | <b>Definition</b>                |
|------------------|----------------------------------|
| FABC             | Flow Away From the Bruce Complex |
| BLIP             | Buchanan Longwood Input          |
| FETT             | Flow East to Toronto             |
| QFW              | Queenston Flow West              |

## 6.2 Protection Impact Assessment

A Protection Impact Assessment (PIA) was completed by Hydro One to examine the impact of the new generators on the existing transmission system protections. The existing protections for N5M at Nanticoke TS and Middleport TS were described in the PIA report and the proposed connection arrangements and protections were analyzed.

For the line to ground fault at Middleport 230 kV bus the Nanticoke terminal exhibits zero sequence current reversal and very high L-G apparent impedance in reverse direction. The step-up transformers being grounded on the HV side at the GREP facility are the main contributor to the current reversal at the Nanticoke bus. To overcome the relaying difficulties it is required to leave the HV windings on both the wind generation and solar generation step-up transformers ungrounded.

The proponent agreed to choose the Y/Y-grounded/Delta as the configuration of the step-up transformer.

The IESO concluded that the proposed protection adjustments have no material adverse impact on the IESO-controlled grid. The PIA report is attached in Appendix D.

## 6.3 Special Protection System (SPS)

Although the SIA has found that a Special Protection Scheme (SPS) is not required for GREP project, provisions must be made in the design of the protections and controls at the facility to allow for the installation of Special Protection Scheme equipment. Should a future SPS be installed to improve the transfer capability in the area or to accommodate transmission reinforcement projects, GREP project, will be required to participate in the SPS system and to install the necessary protection and control facilities to

affect the required actions.

## 6.4 Reactive Power Compensation

Market Rules (MR) require that generators inject or withdraw reactive power continuously (i.e. dynamically) at a connection point up to 33% of its rated active power at all levels of active power output except where a lesser continually available capability is permitted by the IESO.

A generating unit with a power factor range of 0.90 lagging and 0.95 leading at rated active power connected via a main output transformer with an impedance not greater than 13% based on generator rated apparent power provides the required range of dynamic power at the connection point.

Typically, the impedance between the WTG and the connection point is larger than 13%. However, provided the WTG has the capability to provide a reactive power range of 0.90 lagging power factor and 0.95 leading power factor at rated active power, the IESO accepts the WF to compensate for the full reactive power requirement range at the connection point with switchable shunt admittances (e.g. capacitors and reactors). Where the WTG technology has no capability to supply the full dynamic reactive power range at its terminal, the shortfall has to be compensated with dynamic reactive power devices (e.g. SVC).

This section of the SIA indicates how the WF can meet the MR requirements regarding reactive power capability, but the connection applicant is free to deploy any other solutions which result in compliance with the MR.

It is the connection applicant's responsibility to ensure that the WF has the capability to meet the MR requirement at the connection point and be able to confirm this capability during the commission tests.

### 6.4.1 Dynamic Reactive Power Compensation

The following summarizes the IESO required level of dynamic reactive power and the available capability of SWT-2.3 from Siemens document "Reactive Power Capability" (Document PG-R3-30-0000-0113-05).

|                    | Active Power | Reactive Power Capability/Turbine                                        |
|--------------------|--------------|--------------------------------------------------------------------------|
| IESO Required      | 1.0 pu       | $Q_{\text{gen}} = 2.22 \times \tan[\cos^{-1}(0.9)] = 1.08 \text{ Mvar}$  |
|                    |              | $Q_{\text{abs}} = 2.22 \times \tan[\cos^{-1}(0.95)] = 0.72 \text{ Mvar}$ |
| SWT-2.3 Capability | 1.0 pu       | $Q_{\text{gen}} = 2.3 \times \tan[\cos^{-1}(0.9)] = 1.11 \text{ Mvar}$   |
|                    |              | $Q_{\text{abs}} = 2.3 \times \tan[\cos^{-1}(0.9)] = 1.11 \text{ Mvar}$   |

The SWT-2.3 generators can deliver the IESO required dynamic reactive power to the generator terminal at rated power and at rated voltage. Thus, the IESO has determined that there is no need to install any additional dynamic reactive power compensation device.

The following table summarizes the IESO's adequate level of reactive power from each generator and the available capability of SMA 500HE-US wind turbine generators, at rated terminal voltage and rated power.

|                   | Rated Voltage | Rated Active Power | Reactive Power Capability                                         |
|-------------------|---------------|--------------------|-------------------------------------------------------------------|
| IESO Requirements | 200 V         | 500 kW             | $Q_{\max} = 500 \times \tan[\cos^{-1}(0.9)] = 242\text{kvar}$     |
|                   |               |                    | $Q_{\min} = -500 \times \tan[\cos^{-1}(0.95)] = -164\text{ kvar}$ |
| SMA 500HE-US      | 200 V         | 500 kW             | $Q_{\max} = 0\text{ kvar}$                                        |
|                   |               |                    | $Q_{\min} = 0\text{ kvar}$                                        |

The SMA 500HE-US has no dynamic reactive capability at full real power output and therefore cannot deliver the required dynamic reactive power. For 200 inverters the requirement is  $200 \times 0.242 = 48\text{ Mvar}$  &  $-200 \times 0.164 = -33\text{Mvar}$ .

A dynamic reactive power device with a capability of **-33/+48 Mvar** installed at the solar collector bus to compensate for the dynamic reactive power capability of the facility will meet the dynamic reactive power requirement.

The connection applicant is required to provide the model for the dynamic reactive power compensation device to the IESO.

## 6.4.2 Static Reactive Power Compensation

In addition to the dynamic reactive power requirement identified above, the Wind Farm and Solar Farm have to compensate for the reactive power losses within the facility to ensure that it has the capability to inject or withdraw reactive power up to 33% of its rated active power at the connection point. As mentioned above, the IESO accepts this compensation to be made with switchable shunt admittances.

Load flow studies were performed to calculate the need for static reactive compensation, based on the equivalent parameters for the GREP provided by the connection applicant.

The reactive power capability in lagging p.f. of the generation facility was assessed under the following assumptions:

- typical voltage of 242 kV at the connection point;
- maximum active power output from the equivalent WTG;
- maximum reactive power output (lagging power factor) from the equivalent WTG, unless limited by the maximum acceptable WTG terminal voltage;
- maximum acceptable WTG voltage is 1.05, as per WTG voltage capability;

The reactive power capability in leading p.f. of the generation facility was assessed under the following assumptions:

- typical voltage of 242 kV at the connection point;
- minimum (zero) active power output from the equivalent WTG;
- maximum reactive power consumption (leading power factor) from the equivalent WTG, unless limited by the minimum acceptable WTG terminal voltage;
- minimum acceptable WTG voltage is 0.9, as per WTG voltage capability;

The IESO's reactive power calculation used the equivalent electrical model for the WTG and collector feeders as provided by the connection applicant. It is very important that the WF has a proper internal design to ensure that the WTG are not limited in their capability to produce active and reactive power due to terminal voltage limits or other facility's internal limitations. For example, it is expected that the transformation ratio of the WTG step up transformers will be set in such a way that it will offset the voltage profile along the collector, and all the WTG would be able to contribute to the reactive power production of the WF in a shared amount.

Based on the equivalent parameters for the WF provided by the connection applicant, an amount of 50 Mvar of static reactive power compensation installed at the WF collector bus will meet the static reactive power requirements at the connection point.

The connection applicant has the obligation to ensure that the WF design and the reactive power compensation system takes into account the real electrical parameters and real limitations within the WF facility.

Similar studies were performed for the solar farm and it was found there is no need for the static reactive power compensation at the solar farm after the required dynamic reactive compensation device is installed.

### 6.4.3 Static Reactive Power Switching

A switching study was carried out to investigate the effect of the new LV shunt devices on the voltage changes. It was assumed that the largest capacitor step size is 50 Mvar. To reflect the reasonable restrictive system conditions, the voltage change study assumed that one transmission element (N2M) is out of service.

| Capacitor at LV kV bus | LV bus voltage | ICG connection point |
|------------------------|----------------|----------------------|
| Pre-switching          | 34.5 kV        | 246.7 kV             |
| Post-switching         | 35.8 kV        | 248.0 kV             |
| $\Delta V$             | 3.8%           | 0.5%                 |

The IESO requires the voltage change on a single capacitor switching to be no more than 4 % at the any point in the ICG. The results show that switching a single capacitor of 50 Mvar produces less than 4 % voltage change at the connection point. However, it is necessary to supply the static reactive compensation in small enough steps to have operational flexibility over the entire range of active power output from the wind turbines. The amount of static reactive power compensation should be shared between at least five switchable shunt capacitors.

The IESO has no restrictions on voltage changes within the WF facility; however, if the equipment within the proposed facility is sensitive to voltage changes, small enough shunt capacitor size steps have to be designed to cater to the facility needs.

## 6.5 Wind Farm Management System

If the generation facility connects to the IESO-controlled grid, the IESO requires that the facility assists in maintaining adequate voltages in the high voltage system. It is expected that the wind farm controls the voltage at a point as close as possible to the connection point to values specified by the IESO. This requires

that wind farms possess the ability to supply sufficient dynamic reactive power to the high voltage system during voltage declines.

The generation facility shall regulate automatically voltage at a point whose impedance (based on rated apparent power and rated voltage) is not more than 13% from the highest voltage terminal based within  $\pm 0.5\%$  of any set point within  $\pm 5\%$  of rated voltage. If the AVR target voltage is a function of reactive output, the slope  $\Delta V / \Delta Q_{\max}$  shall be adjustable to 0.5%.

The Wind Farm Management System (WFMS) must coordinate the voltage control process. The IESO recommend the following two voltage control philosophies:

*Option #1*

- (1) All WTGs control the PCC voltage to a reference value. A control slope is applied for reactive power sharing among the WTGs as well as with adjacent generators.
- (2) Capacitor banks are automatically switched in/out to regulate the overall WTGs' reactive generation to around zero output.
- (3) WF main transformer ULTC is adjusted to regulate the collector bus voltage (LT bus voltage) such that it is within normal range;

*Option #2*

- (1) The capacitor banks are automatically switched in/out according to the WF active power output. A sample capacitor switching scheme is shown in the following table.

| P - overall WF active power output | Capacitor banks to be switched on |
|------------------------------------|-----------------------------------|
| $0 < P < P_1$                      | (No capacitor)                    |
| $P_1 < P < P_2$                    | $C_1$                             |
| $P_2 < P < P_3$                    | $C_1 + C_2$                       |
| .....                              | .....                             |
| $P_N < P < P_{\max}$               | $C_1 + C_2 + \dots + C_N$         |

- (2) All WTGs control the PCC voltage to a reference value. A control slope is applied for reactive power sharing among the WTGs as well as with adjacent generators.
- (3) WF main transformer ULTC is adjusted to regulate the collector bus voltage (LT bus voltage) such that it is within normal range;

The proponent has chosen Option #1 and must submit a description of the functionalities of the WFMS, including the coordination between the automatic capacitor switching and generator reactive power production to control the voltage at a desired point. This document also must contain the settings of the automatic capacitor switching scheme. If the WFMS is unavailable, the IESO requires each generator controls its own terminal voltage.

## 6.6 Thermal Analysis

The assessment examined the effect the proposed facility would have on the thermal loadings of the Southwest-Center area 500/230 kV transmission elements.

The *Ontario Resource and Transmission Assessment Criteria* requires that all line and equipment loadings be within their continuous ratings with all elements in service, and within their long-term emergency ratings with any element out of service. Lines and equipment may be loaded up to their short-term emergency ratings immediately following the contingencies to effect re-dispatch, perform switching, or implement control actions to reduce the loading to the long-term emergency ratings.

Hydro One provided the Continuous, Long Term Emergency and Short Term Emergency planning thermal ratings for various circuits under summer weather conditions. The algorithm for deriving these ratings is as follows:

- *Ambient conditions:* 35°C temperature , 4 km/hr wind speed, daytime
- *Continuous:* Rating obtained at the lesser of conductor temperature of 93 °C or sag temperature
- *Long Term Emergency:* Rating obtained at the lesser conductor temperature of 127°C or sag temperature
- *Short Term Emergency:* Rating obtained at the sag temperature with a pre-contingency loading of 100% of the continuous rating.

The following table summarizes the ratings for various circuits monitored for the thermal analysis. For circuits with several sections having different ratings, the ratings for the most limiting section are chosen.

| Element | Monitored Element |                  | Rating (A) |                     |                      |
|---------|-------------------|------------------|------------|---------------------|----------------------|
|         | From              | To               | Continuous | Long Term Emergency | Short Term Emergency |
| N580M   | NANTICOKE_TS500   | MIDDLEPT 500     | 2820       | 3660                | 3930                 |
| N581M   | NANTICOKE_TS500   | MIDDLEPT 500     | 2820       | 3660                | 3930                 |
| M585M   | MIDDLEPT8185500   | MILTON_SS 500    | 2820       | 3620                | 3880                 |
| V586M   | MIDDLEPT8185500   | CLAIREVILLE 500  | 2820       | 3620                | 3880                 |
| M572T   | MILTON_SS 500     | TRAFALG_M 500    | 2820       | 3620                | 3880                 |
| M573T   | MILTON_SS 500     | TRAFALG_M 500    | 2820       | 3620                | 3880                 |
| M570V   | MILTON_SS 500     | CLAIREVILLE 500  | 2820       | 3660                | 4010                 |
| M571V   | MILTON_SS 500     | CLAIREVILLE 500  | 2820       | 3660                | 4010                 |
| N1M     | NANTICOKE_TS220   | MIDDLEPT_DK1 220 | 1350       | 1350                | 1350                 |
| N2M     | NANTICOKE_TS220   | MIDDLEPT_DK1 220 | 1350       | 1350                | 1350                 |
| N5M     | NANTICOKE_TS220   | MIDDLEPT_DK2 220 | 1350       | 1350                | 1350                 |
| N6M     | NANTICOKE_TS220   | MIDDLEPT_DK2 220 | 1350       | 1350                | 1350                 |
| Q23BM   | MIDDLEPT_DK2220   | BURLINGTON 220   | 1060       | 1300                | 1470                 |
| Q25BM   | MIDDLEPT_DK2220   | BURLINGTON 220   | 1060       | 1400                | 1900                 |
| M27B    | MIDDLEPT_DK1220   | BURLINGTON 220   | 1060       | 1400                | 1900                 |
| M28B    | MIDDLEPT_DK1220   | BURLINGTON 220   | 1060       | 1300                | 1470                 |
| T36B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 1110       | 1350                | 1570                 |
| T37B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 1110       | 1350                | 1570                 |
| T38B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 1110       | 1350                | 1570                 |
| T39B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 1110       | 1350                | 1570                 |

|       |                 |                  |      |      |      |
|-------|-----------------|------------------|------|------|------|
| R14T  | TRAFALGAR_TS220 | RICHVIEW_AH1 220 | 1110 | 1420 | 1660 |
| R17T  | TRAFALGAR_TS220 | RICHVIEW_AH1 220 | 1110 | 1420 | 1660 |
| R19TH | TRAFALGAR_TS220 | RICHVIEW_AH2 220 | 1110 | 1420 | 1660 |
| R21TH | TRAFALGAR_TS220 | RICHVIEW_AH2 220 | 1110 | 1420 | 1660 |

The following table summarizes the pre-contingency amps and loading as a percentage of the continuous ratings, with the GREP project in service.

| Element | Monitored Element |                  | Pre-Contingency Load Flow |                   |
|---------|-------------------|------------------|---------------------------|-------------------|
|         | From              | To               | Amps                      | % of Cont. Rating |
| N580M   | NANTICOKE_TS500   | MIDDLEPT 500     | 1028                      | 36.5              |
| N581M   | NANTICOKE_TS500   | MIDDLEPT 500     | 1004                      | 35.6              |
| M585M   | MIDDLEPT8185500   | MILTON_SS 500    | 835                       | 29.6              |
| V586M   | MIDDLEPT8185500   | CLAIREVILLE 500  | 773                       | 27.4              |
| M572T   | MILTON_SS 500     | TRAFALG_M 500    | 611                       | 21.7              |
| M573T   | MILTON_SS 500     | TRAFALG_M 500    | 596                       | 21.1              |
| M570V   | MILTON_SS 500     | CLAIREVILLE 500  | 584                       | 20.7              |
| M571V   | MILTON_SS 500     | CLAIREVILLE 500  | 584                       | 20.7              |
| N1M     | NANTICOKE_TS220   | MIDDLEPT_DK1 220 | 705                       | 52.2              |
| N2M     | NANTICOKE_TS220   | MIDDLEPT_DK1 220 | 709                       | 52.5              |
| N5M     | NANTICOKE_TS220   | MIDDLEPT_DK2 220 | 739                       | 54.7              |
| N6M     | NANTICOKE_TS220   | MIDDLEPT_DK2 220 | 582                       | 43.1              |
| Q23BM   | MIDDLEPT_DK2220   | BURLINGTON 220   | 1038                      | 97.9              |
| Q25BM   | MIDDLEPT_DK2220   | BURLINGTON 220   | 1045                      | 98.6              |
| M27B    | MIDDLEPT_DK1220   | BURLINGTON 220   | 684                       | 64.5              |
| M28B    | MIDDLEPT_DK1220   | BURLINGTON 220   | 684                       | 64.5              |
| T36B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 466                       | 42.0              |
| T37B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 467                       | 42.1              |
| T38B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 412                       | 37.1              |
| T39B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 412                       | 37.1              |
| R14T    | TRAFALGAR_TS220   | RICHVIEW_AH1 220 | 910                       | 82.0              |
| R17T    | TRAFALGAR_TS220   | RICHVIEW_AH1 220 | 914                       | 82.3              |
| R19TH   | TRAFALGAR_TS220   | RICHVIEW_AH2 220 | 861                       | 77.6              |
| R21TH   | TRAFALGAR_TS220   | RICHVIEW_AH2 220 | 859                       | 77.4              |

As shown, all pre-contingency flows were found to be within the continuous ratings. However, it should be noted that the flows on Q23BM/Q25BM from Neale Jct to Burlington Jct were approaching continuous ratings.

The following list of contingencies was studied as part of the thermal analysis:

| ID | Loss of Circuit | ID | Loss of Circuit | ID | Loss of Circuit |
|----|-----------------|----|-----------------|----|-----------------|
| C1 | N580M           | C2 | M585M           | C3 | V586M           |

|     |                              |     |                      |     |                             |
|-----|------------------------------|-----|----------------------|-----|-----------------------------|
| C4  | M572T                        | C5  | M570V                | C6  | N1M (Nanticoke-Summerhaven) |
| C7  | N1M (Summerhaven-Middleport) | C8  | N2M (Nanticoke-PDNW) | C9  | N2M (PDNW-Middleport)       |
| C10 | N5M                          | C11 | N6M                  | C12 | Q23BM                       |
| C13 | M27B                         | C14 | T36B                 | C15 | R14T                        |
| C16 | R19TH                        | C17 | N1M+N2M              | C18 | N5M+N6M                     |
| C19 | Q23BM+Q25BM                  | C20 | M27B+M28B            | C21 | T36B+T37B                   |
| C22 | T38B+T39B                    | C23 | R14T+R17T            | C24 | R19T+R21T                   |

The following tables summarize the post-contingency loading as a percentage of the Long Term Emergency rating for contingencies C1 - C24.

| Element | Monitored Element |                  | % of Long Term Emergency Rating |    |    |    |    |    |    |    |
|---------|-------------------|------------------|---------------------------------|----|----|----|----|----|----|----|
|         | From              | To               | C1                              | C2 | C3 | C4 | C5 | C6 | C7 | C8 |
| N580M   | NANTICOKE_TS500   | MIDDLEPT 500     | 0                               | 37 | 13 | 28 | 29 | 29 | 30 | 27 |
| N581M   | NANTICOKE_TS500   | MIDDLEPT 500     | 42                              | 13 | 37 | 27 | 27 | 29 | 29 | 28 |
| M585M   | MIDDLEPT8185500   | MILTON_SS 500    | 34                              | 0  | 32 | 21 | 21 | 24 | 24 | 23 |
| V586M   | MIDDLEPT8185500   | CLAIREVILLE 500  | 7                               | 30 | 0  | 21 | 23 | 21 | 22 | 21 |
| M572T   | MILTON_SS 500     | TRAFALG_M 500    | 17                              | 14 | 16 | 0  | 18 | 17 | 17 | 17 |
| M573T   | MILTON_SS 500     | TRAFALG_M 500    | 17                              | 14 | 16 | 21 | 18 | 16 | 17 | 17 |
| M570V   | MILTON_SS 500     | CLAIREVILLE 500  | 22                              | 9  | 22 | 20 | 0  | 16 | 16 | 16 |
| M571V   | MILTON_SS 500     | CLAIREVILLE 500  | 22                              | 9  | 22 | 20 | 27 | 16 | 16 | 16 |
| N1M     | NANTICOKE_TS220   | MIDDLEPT_DK1 220 | 69                              | 58 | 54 | 54 | 53 | 22 | 22 | 52 |
| N2M     | NANTICOKE_TS220   | MIDDLEPT_DK1 220 | 69                              | 59 | 54 | 54 | 53 | 45 | 65 | 0  |
| N5M     | NANTICOKE_TS220   | MIDDLEPT_DK2 220 | 62                              | 57 | 60 | 56 | 55 | 59 | 63 | 55 |
| N6M     | NANTICOKE_TS220   | MIDDLEPT_DK2 220 | 51                              | 45 | 48 | 44 | 43 | 47 | 50 | 43 |
| Q23BM   | MIDDLEPT_DK2220   | BURLINGTON 220   | 88                              | 92 | 85 | 84 | 80 | 82 | 82 | 80 |
| Q25BM   | MIDDLEPT_DK2220   | BURLINGTON 220   | 82                              | 86 | 79 | 79 | 75 | 76 | 77 | 75 |
| M27B    | MIDDLEPT_DK1220   | BURLINGTON 220   | 45                              | 54 | 57 | 52 | 49 | 46 | 45 | 49 |
| M28B    | MIDDLEPT_DK1220   | BURLINGTON 220   | 48                              | 59 | 62 | 56 | 53 | 50 | 48 | 52 |
| T36B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 36                              | 46 | 44 | 40 | 36 | 34 | 33 | 35 |
| T37B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 36                              | 47 | 44 | 40 | 35 | 34 | 33 | 35 |
| T38B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 32                              | 42 | 40 | 36 | 31 | 30 | 29 | 31 |
| T39B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 32                              | 42 | 40 | 36 | 31 | 30 | 29 | 31 |
| R14T    | TRAFALGAR_TS220   | RICHVIEW_AH1 220 | 67                              | 68 | 71 | 54 | 67 | 64 | 63 | 64 |
| R17T    | TRAFALGAR_TS220   | RICHVIEW_AH1 220 | 67                              | 68 | 71 | 54 | 68 | 64 | 64 | 64 |
| R19TH   | TRAFALGAR_TS220   | RICHVIEW_AH2 220 | 63                              | 65 | 68 | 48 | 65 | 67 | 60 | 61 |
| R21TH   | TRAFALGAR_TS220   | RICHVIEW_AH2 220 | 63                              | 64 | 68 | 48 | 64 | 60 | 60 | 60 |

| Element | Monitored Element |                  | % of Long Term Emergency Rating |     |     |     |     |     |     |     |
|---------|-------------------|------------------|---------------------------------|-----|-----|-----|-----|-----|-----|-----|
|         | From              | To               | C9                              | C10 | C11 | C12 | C13 | C14 | C15 | C16 |
| N580M   | NANTICOKE_TS500   | MIDDLEPT 500     | 30                              | 27  | 28  | 28  | 27  | 28  | 28  | 28  |
| N581M   | NANTICOKE_TS500   | MIDDLEPT 500     | 29                              | 28  | 30  | 28  | 29  | 29  | 28  | 28  |
| M585M   | MIDDLEPT8185500   | MILTON_SS 500    | 24                              | 21  | 23  | 24  | 24  | 23  | 23  | 23  |
| V586M   | MIDDLEPT8185500   | CLAIREVILLE 500  | 22                              | 21  | 22  | 22  | 22  | 22  | 22  | 22  |
| M572T   | MILTON_SS 500     | TRAFALG_M 500    | 17                              | 17  | 17  | 18  | 17  | 18  | 16  | 16  |
| M573T   | MILTON_SS 500     | TRAFALG_M 500    | 17                              | 16  | 17  | 18  | 17  | 17  | 16  | 16  |
| M570V   | MILTON_SS 500     | CLAIREVILLE 500  | 16                              | 14  | 16  | 16  | 16  | 16  | 17  | 17  |
| M571V   | MILTON_SS 500     | CLAIREVILLE 500  | 16                              | 15  | 16  | 16  | 16  | 16  | 17  | 17  |
| N1M     | NANTICOKE_TS220   | MIDDLEPT_DK1 220 | 65                              | 55  | 58  | 54  | 49  | 51  | 52  | 52  |
| N2M     | NANTICOKE_TS220   | MIDDLEPT_DK1 220 | 19                              | 54  | 61  | 54  | 49  | 52  | 52  | 52  |
| N5M     | NANTICOKE_TS220   | MIDDLEPT_DK2 220 | 62                              | 0   | 65  | 59  | 56  | 54  | 55  | 55  |
| N6M     | NANTICOKE_TS220   | MIDDLEPT_DK2 220 | 52                              | 50  | 0   | 40  | 45  | 43  | 43  | 43  |
| Q23BM   | MIDDLEPT_DK2220   | BURLINGTON 220   | 82                              | 73  | 76  | 0   | 85  | 78  | 79  | 79  |
| Q25BM   | MIDDLEPT_DK2220   | BURLINGTON 220   | 77                              | 68  | 71  | 92  | 79  | 73  | 74  | 73  |
| M27B    | MIDDLEPT_DK1220   | BURLINGTON 220   | 45                              | 48  | 50  | 56  | 0   | 48  | 48  | 48  |
| M28B    | MIDDLEPT_DK1220   | BURLINGTON 220   | 49                              | 52  | 54  | 60  | 67  | 52  | 52  | 51  |
| T36B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 33                              | 30  | 33  | 30  | 32  | 0   | 33  | 33  |
| T37B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 33                              | 30  | 33  | 30  | 32  | 46  | 33  | 33  |
| T38B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 29                              | 26  | 29  | 26  | 28  | 37  | 29  | 29  |
| T39B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 29                              | 26  | 29  | 26  | 28  | 37  | 29  | 29  |
| R14T    | TRAFALGAR_TS220   | RICHVIEW_AH1 220 | 63                              | 61  | 63  | 62  | 63  | 63  | 0   | 73  |
| R17T    | TRAFALGAR_TS220   | RICHVIEW_AH1 220 | 64                              | 61  | 64  | 62  | 63  | 63  | 99  | 74  |
| R19TH   | TRAFALGAR_TS220   | RICHVIEW_AH2 220 | 60                              | 57  | 60  | 58  | 59  | 59  | 69  | 0   |
| R21TH   | TRAFALGAR_TS220   | RICHVIEW_AH2 220 | 60                              | 57  | 60  | 58  | 59  | 59  | 69  | 86  |

| Element | Monitored Element |                  | % of Long Term Emergency Rating |     |     |     |     |     |     |     |
|---------|-------------------|------------------|---------------------------------|-----|-----|-----|-----|-----|-----|-----|
|         | From              | To               | C17                             | C18 | C19 | C20 | C21 | C22 | C23 | C24 |
| N580M   | NANTICOKE_TS500   | MIDDLEPT 500     | 33                              | 28  | 29  | 26  | 27  | 28  | 27  | 28  |
| N581M   | NANTICOKE_TS500   | MIDDLEPT 500     | 31                              | 31  | 28  | 30  | 28  | 29  | 28  | 28  |
| M585M   | MIDDLEPT8185500   | MILTON_SS 500    | 25                              | 22  | 27  | 25  | 23  | 25  | 23  | 24  |
| V586M   | MIDDLEPT8185500   | CLAIREVILLE 500  | 22                              | 21  | 24  | 24  | 21  | 23  | 21  | 23  |
| M572T   | MILTON_SS 500     | TRAFALG_M 500    | 18                              | 17  | 18  | 18  | 17  | 17  | 17  | 13  |
| M573T   | MILTON_SS 500     | TRAFALG_M 500    | 17                              | 17  | 18  | 18  | 17  | 17  | 17  | 13  |
| M570V   | MILTON_SS 500     | CLAIREVILLE 500  | 16                              | 14  | 17  | 16  | 16  | 17  | 16  | 20  |
| M571V   | MILTON_SS 500     | CLAIREVILLE 500  | 16                              | 14  | 17  | 16  | 16  | 17  | 16  | 20  |
| N1M     | NANTICOKE_TS220   | MIDDLEPT_DK1 220 | 22                              | 64  | 55  | 44  | 52  | 50  | 52  | 51  |
| N2M     | NANTICOKE_TS220   | MIDDLEPT_DK1 220 | 19                              | 65  | 55  | 41  | 53  | 51  | 53  | 51  |
| N5M     | NANTICOKE_TS220   | MIDDLEPT_DK2 220 | 75                              | 0   | 47  | 59  | 55  | 53  | 55  | 54  |
| N6M     | NANTICOKE_TS220   | MIDDLEPT_DK2 220 | 72                              | 0   | 35  | 48  | 44  | 42  | 43  | 42  |
| Q23BM   | MIDDLEPT_DK2220   | BURLINGTON 220   | 87                              | 67  | 0   | 92  | 80  | 75  | 80  | 75  |
| Q25BM   | MIDDLEPT_DK2220   | BURLINGTON 220   | 81                              | 63  | 0   | 86  | 75  | 70  | 75  | 45  |
| M27B    | MIDDLEPT_DK1220   | BURLINGTON 220   | 39                              | 51  | 65  | 0   | 49  | 45  | 49  | 45  |
| M28B    | MIDDLEPT_DK1220   | BURLINGTON 220   | 41                              | 55  | 70  | 0   | 53  | 48  | 53  | 29  |
| T36B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 30                              | 28  | 27  | 28  | 0   | 53  | 35  | 29  |
| T37B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 30                              | 28  | 27  | 28  | 0   | 53  | 35  | 25  |
| T38B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 26                              | 24  | 23  | 24  | 31  | 0   | 31  | 25  |
| T39B    | BURLINGTON 220    | TRAFALGAR_TS 220 | 26                              | 24  | 23  | 24  | 31  | 0   | 31  | 25  |
| R14T    | TRAFALGAR_TS220   | RICHVIEW_AH1 220 | 62                              | 60  | 61  | 61  | 64  | 66  | 0   | 93  |
| R17T    | TRAFALGAR_TS220   | RICHVIEW_AH1 220 | 62                              | 60  | 61  | 61  | 64  | 66  | 0   | 93  |
| R19TH   | TRAFALGAR_TS220   | RICHVIEW_AH2 220 | 58                              | 56  | 57  | 57  | 61  | 62  | 92  | 0   |
| R21TH   | TRAFALGAR_TS220   | RICHVIEW_AH2 220 | 58                              | 56  | 57  | 57  | 60  | 62  | 91  | 0   |

As shown, all post-contingency flows were found to be within the Long Term Emergency ratings. However, it should be noted that circuits Q23BM/Q25BM, R14T/R17T and R19TH/R21TH would be approaching LTE ratings when their companion circuit is out of service.

Appendix B shows the diagrams for thermal study simulations.

It should be noted that the concerns on the pre-contingency and post-contingency flow existed before GREP's connection to the IESO-Controlled grid. GREP will make the situation slightly worse but the flows are still below ratings.

## 6.7 Voltage Analysis

The assessment of the voltage performance in the Nanticoke area was done in accordance with the IESO's *Ontario Resource and Transmission Assessment Criteria*. The criteria states that with all facilities in

service pre-contingency, 230 kV, 115 kV, 44-13.8kV system voltage declines following a contingency shall be limited to 10% before and after transformer tap changer action, and absolute maximums and minimums of 250-207kV, 127-108kV and 112%-88% of nominal, respectively. The 44-13.8kV system voltages are further limited to 5% voltage decline after tap changer action.

The voltage decline studies were performed with the GREP facility connected to the circuit N5M. A constant MVA load model was used in both immediate post-contingency state and in post-ULTC state. Generally GREP will help system voltage performance. The worst case due to the addition of GREP is loss of GREP with full output and one unit at Nanticoke GS is out of service. The study results for this case are summarized in the following table.

| Monitored Busses | Pre-Cont Voltage (kV) | Loss of GREP |      |           |      |
|------------------|-----------------------|--------------|------|-----------|------|
|                  |                       | Pre-ULTC     |      | Post-ULTC |      |
|                  |                       | kV           | %    | kV        | %    |
| Nanticoke 230    | 246.5                 | 245.4        | -0.4 | 245.3     | -0.5 |
| Summerhaven 230  | 246.9                 | 245.9        | -0.4 | 245.8     | -0.4 |
| Port Dover 230   | 246.7                 | 245.7        | -0.4 | 245.6     | -0.4 |
| GREP 230         | 248.0                 | -            | -    | -         | -    |
| Middleport 230   | 246.6                 | 245.7        | -0.4 | 245.6     | -0.4 |
| Burlington 230   | 245.0                 | 244.2        | -0.3 | 244.0     | -0.4 |

The study results indicate that both declines of pre-ULTC and post-ULTC values are within the IESO's criteria of 10%.

In conclusion, addition of the GREP project does not result in material adverse impact on the voltage performance of the IESO-controlled grid.

## 6.8 Transient Analysis

Transient stability analysis was performed considering faults in Nanticoke and Middleport area with the proposed GREP project in-service. All contingencies studied were three-phase faults cleared with normal fault clearing times. Double circuit contingencies were simulated as three phase faults occurring on two both circuits simultaneously. It should be noted that the simulations for double circuit contingencies are more onerous than required in Ontario Resource and Transmission Assessment Criteria so the study results are more conservative and acceptable. The contingencies that were studied for dynamic analysis are listed in the table below.

| ID  | Contingency | Location   |
|-----|-------------|------------|
| SC1 | N1M         | Nanticoke  |
| SC2 | N2M         | Middleport |
| SC3 | N5M         | Nanticoke  |
| SC4 | N6M         | Nanticoke  |
| SC5 | M27B        | Middleport |
| SC6 | N1M+N2M     | Nanticoke  |
| SC7 | N5M+N6M     | Nanticoke  |

|     |             |            |
|-----|-------------|------------|
| SC8 | M27B+M28B   | Middleport |
| SC9 | Q23BM+Q25BM | Middleport |

The transient simulation plots are shown in Appendix C. The transient simulation results suggest that none of the simulated contingencies caused transient instability or undamped oscillations. All results show gradual attenuation of the oscillations.

In conclusion, addition of the GREP project does not result in material adverse impact on the transient performance of the IESO-controlled grid.

## 6.9 Low-voltage ride through capability

The new generating facility is required to ride through routine switching events and design criteria contingencies assuming standard fault detection, auxiliary relaying, communication, and rated breaker interrupting times, unless disconnected by configuration.

As any other generators, the Siemens WTG and SMA Sunny Central PV inverters are expected to trip only for contingencies which remove the generator by configuration or abnormal conditions such as severe and sustained under-voltage, over-voltage, under-frequency, over-frequency etc. The severity of under-voltage seen by generator terminals is to be temporarily mitigated by the LVRT capability. The LVRT feature is implemented by injection of additional reactive current by the grid side AC/DC converter to maintain generator terminal voltage in the event of a disturbance in the power system that causes the terminal voltage to drop.

The implementation of LVRT should not require any instant modification to under-voltage protection settings. In PSS/E model for MK II, the LVRT feature accompanies a change of under-voltage settings as shown below (From Siemens document “UserInputData-SMK223\_InputData\_SWT-2.3-101\_VS\_60 Hz\_V1.3.xls”).

| <i>Voltage range</i> | <i>Event</i>              |
|----------------------|---------------------------|
| 1.00 – 0.85 pu       | No trip                   |
| 0.85 – 0.4 pu        | Relay 1 trips in 3.05 sec |
| 0.4 – 0.15 pu        | Relay 2 trips in 1.65 sec |
| 0.15 – 0.0 pu        | Relay 3 trips in 0.90 sec |

In PSS/E model for SMA, the LVRT feature accompanies a change of under-voltage settings as shown below (From SMA document “Modeling of SMA’s Sunny Central Photovoltaic Inverters for Power Flow and Stability Studies with PSS/E Version 30.3”).

| <i>Voltage range</i> | <i>Event</i>               |
|----------------------|----------------------------|
| 1.00 – 0.85 pu       | No trip                    |
| 0.85 – 0.45 pu       | Relay 1 trips in 2 sec     |
| 0.45 – 0.0 pu        | Relay 2 trips in 0.165 sec |

In order to examine the need for low voltage ride through (LVRT) capability, the three phase faults on N1M and N6M at Nanticoke SS (SC1 and SC4) with normal clearing time were simulated. These particular contingencies are electrically much closer to the new generation facility than other contingencies at Middleport TS. Thus, they could potentially have a greater impact on the terminal voltage of WTG and PV inverters.

The variation of the terminal voltage of the new generation facility is plotted in Figure 7 below. It can be seen that the duration during which the generator terminal voltage drops below 0.3 pu is about 0.116 sec. Therefore, the fault ride through capabilities of the wind turbines and PV inverters are adequate.

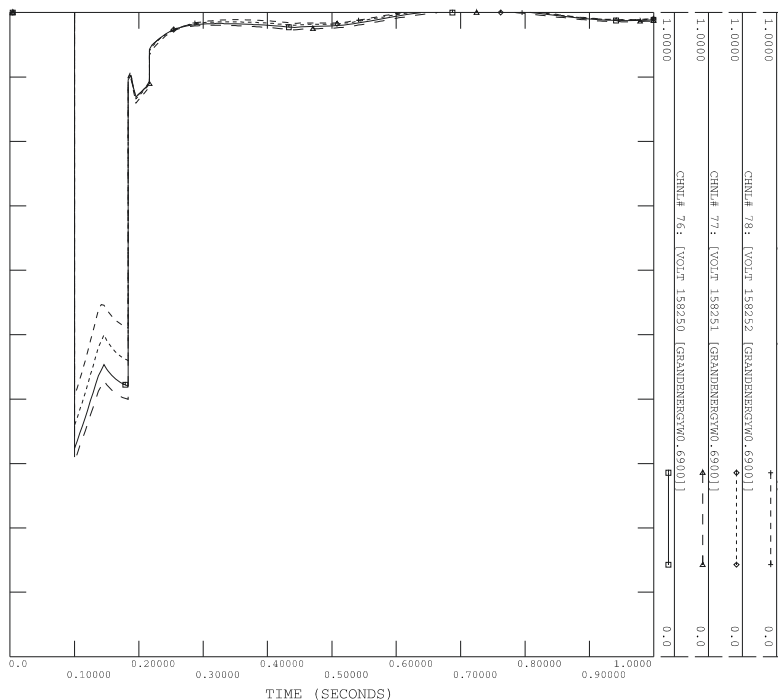


**Figure 7: Terminal Voltage of Wind Generator during LLLG Faults at Nanticoke SS**

The LVRT capability must be demonstrated during commissioning by monitoring several variables under a set of IESO specified field tests and the results should be verifiable using the PSS/E model.

**– End of Report –**

## **Appendix A Market Rules: Appendix 4.2**

## Appendix 4.2 – Generation Facility Requirements

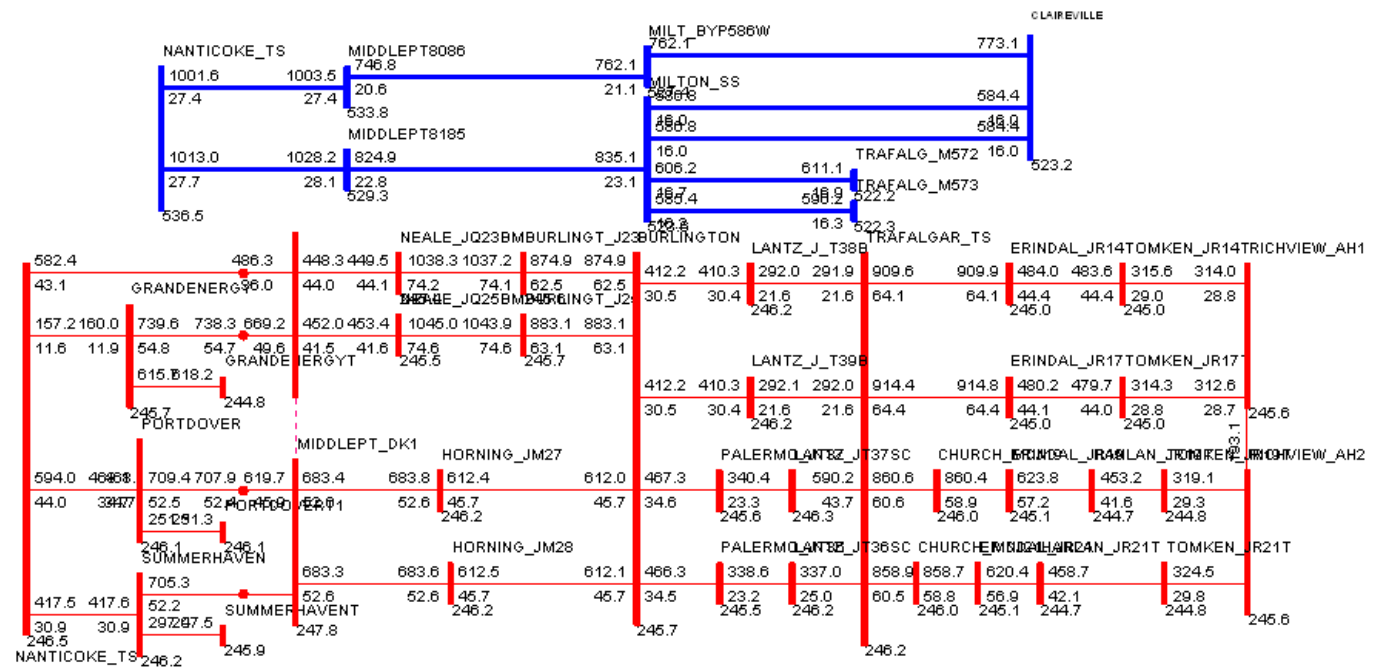
The performance requirements set out below shall apply to *generation facilities* subject to a *connection assessment* finalized after March 6, 2010. Performance of alternative technologies will be compared at the point of connection to the *IESO-controlled grid* with that of a conforming conventional synchronous *generation unit* with an equal apparent power rating to determine whether a requirement is satisfied.

Each *generation facility* that was authorized to connect to the *IESO-controlled grid* prior to March 6, 2010 shall remain subject to the performance requirements in effect for each system at the time of its authorization to connect to the *IESO-controlled grid* was granted or as agreed to by the *market participant* and the *IESO* (i.e. the “original performance requirements”). These requirements shall prevail until the main elements of an associated system (e.g. governor control mechanism, main exciter) are replaced or substantially modified. At that time, the replaced or substantially modified system shall meet the applicable performance requirements set out below. All other systems, not affected by replacement or substantial modification, shall remain subject to the original performance requirements.

| Category                             | <b><i>Generation facility directly connected to the IESO-controlled grid, generation facility greater than 50 MW, or generation unit greater than 10 MW shall have the capability to:</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Off-Nominal Frequency             | Operate continuously between 59.4 Hz and 60.6 Hz and for a limited period of time in the region above straight lines on a log-linear scale defined by the points (0.0 s, 57.0 Hz), (3.3 s, 57.0 Hz), and (300 s, 59.0 Hz).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 2. Speed/Frequency Regulation        | Regulate speed with an average droop based on maximum active power adjustable between 3% and 7% and set at 4% unless otherwise specified by the <i>IESO</i> . Regulation deadband shall not be wider than $\pm 0.06\%$ . Speed shall be controlled in a stable fashion in both interconnected and island operation. A sustained 10% change of rated active power after 10 s in response to a constant rate of change of speed of 0.1%/s during interconnected operation shall be achievable. Due consideration will be given to inherent limitations such as mill points and gate limits when evaluating active power changes. Control systems that inhibit governor response shall not be enabled without <i>IESO</i> approval. |
| 3. Low Voltage Ride Through          | Ride through routine switching events and design criteria contingencies assuming standard fault detection, auxiliary relaying, communication, and rated breaker interrupting times unless disconnected by configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Category                             | <b><i>Generation facility directly connected to the IESO-controlled grid shall have the capability to:</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 4. Active Power                      | Supply continuously all levels of active power output for 5% deviations in terminal voltage. Rated active power is the smaller output at either rated ambient conditions (e.g. temperature, head, wind speed, solar radiation) or 90% of rated apparent power. To satisfy steady-state reactive power requirements, active power reductions to rated active power are permitted.                                                                                                                                                                                                                                                                                                                                                 |
| 5. Reactive Power                    | Inject or withdraw reactive power continuously (i.e. dynamically) at a <i>connection point</i> up to 33% of its rated active power at all levels of active power output except where a lesser continually available capability is permitted by the <i>IESO</i> . A conventional synchronous unit with a power factor range of 0.90 lagging and 0.95 leading at rated active power connected via a main output transformer impedance not greater than 13% based on generator rated apparent power is acceptable.                                                                                                                                                                                                                  |
| 6. Automatic Voltage Regulator (AVR) | Regulate automatically voltage within $\pm 0.5\%$ of any set point within $\pm 5\%$ of rated voltage at a point whose impedance (based on rated apparent power and rated voltage) is not more than 13% from the highest voltage terminal. If the AVR target voltage is a function of reactive output, the slope $\Delta V / \Delta Q_{\max}$ shall be adjustable to 0.5%. The equivalent time constants shall not be longer than 20 ms for voltage sensing and 10 ms for the forward path to the exciter output. AVR reference compensation shall be adjustable to within 10%                                                                                                                                                    |

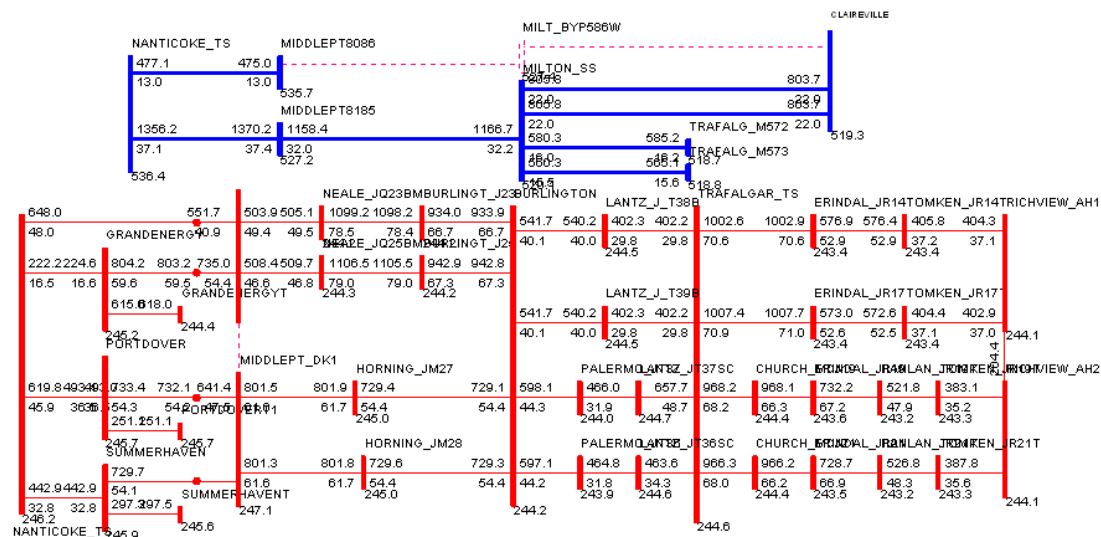
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  | of the unsaturated direct axis reactance on the unit side from a bus common to multiple units.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 7. Excitation System             | Provide (a) Positive and negative ceilings not less than 200% and 140% of rated field voltage at rated terminal voltage and rated field current; (b) A positive ceiling not less than 170% of rated field voltage at rated terminal voltage and 160% of rated field current; (c) A voltage response time to either ceiling not more than 50 ms for a 5% step change from rated voltage under open-circuit conditions; and (d) A linear response between ceilings. Rated field current is defined at rated voltage, rated active power and required maximum continuous reactive power. |
| 8. Power System Stabilizer (PSS) | Provide (a) A change of power and speed input configuration; (b) Positive and negative output limits not less than $\pm 5\%$ of rated AVR voltage; (c) Phase compensation adjustable to limit angle error to within $30^\circ$ between 0.2 and 2.0 Hz under conditions specified by the IESO, and (d) Gain adjustable up to an amount that either increases damping ratio above 0.1 or elicits exciter modes of oscillation at maximum active output unless otherwise specified by the IESO. Due consideration will be given to inherent limitations.                                 |
| 9. Phase Unbalance               | Provide an open circuit phase voltage unbalance not more than 1% at a <i>connection point</i> and operate continuously with a phase unbalance as high as 2%.                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 10. Armature and Field Limiters  | Provide short-time capabilities specified in IEEE/ANSI 50.13 and continuous capability determined by either field current, armature current, or core-end heating. More restrictive limiting functions, such as steady state stability limiters, shall not be enabled without IESO approval.                                                                                                                                                                                                                                                                                           |
| 11. Performance Characteristics  | Exhibit <i>connection point</i> performance comparable to an equivalent synchronous <i>generation unit</i> with characteristic parameters within typical ranges. Inertia, unsaturated transient impedance, transient time constants and saturation coefficients shall be within typical ranges (e.g. $H > 1.2$ Aero-derivative, $H > 1.2$ Hydraulic less than 20 MVA, $H > 2.0$ Hydraulic 20 MVA or larger, $H > 4.0$ Other synchronized units, $X'd < 0.5$ , $T'do > 2.0$ , and $S1.2 < 0.5$ ) except where permitted by the IESO.                                                   |

## **Appendix B Diagrams for Load Flow Results**

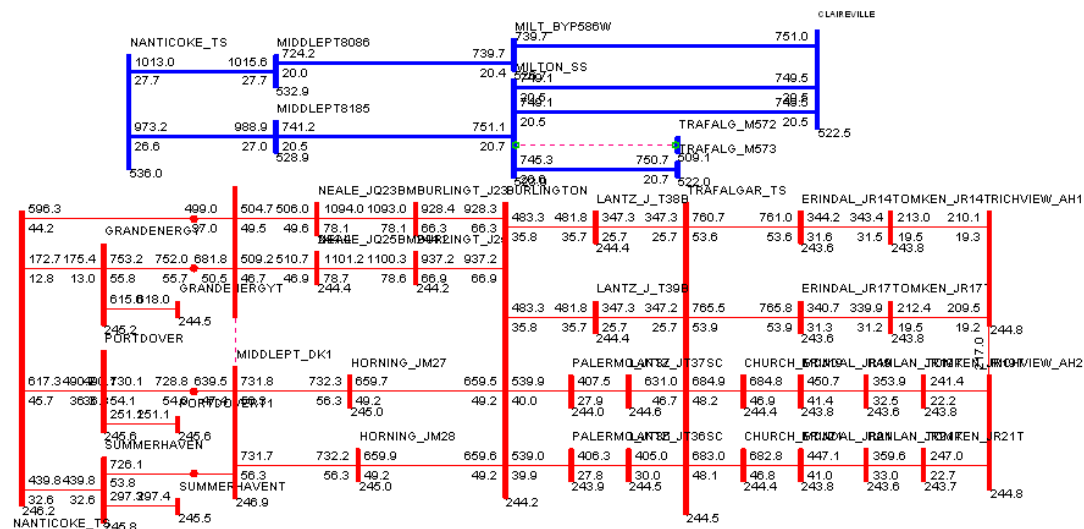


Load Flow Diagram 1: Pre-contingency

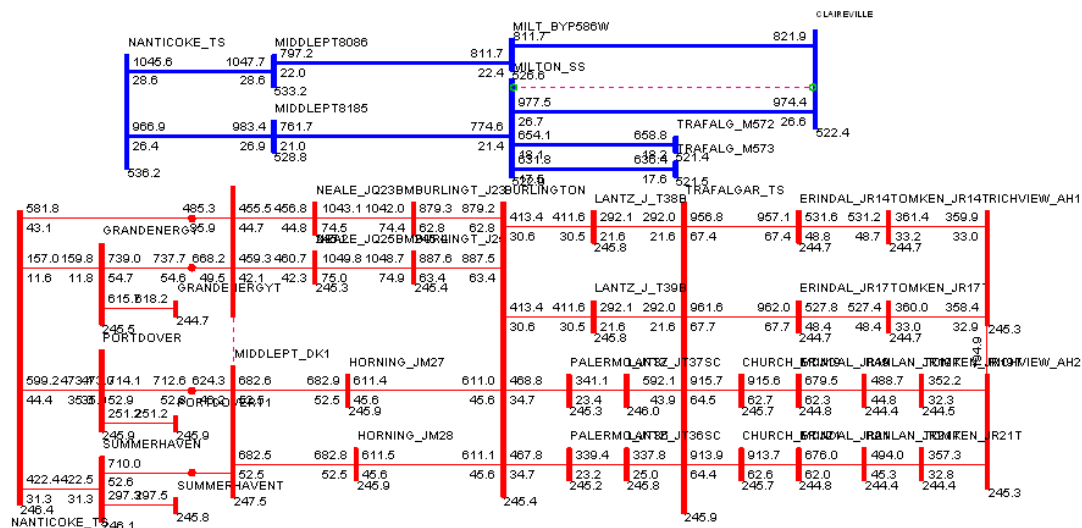




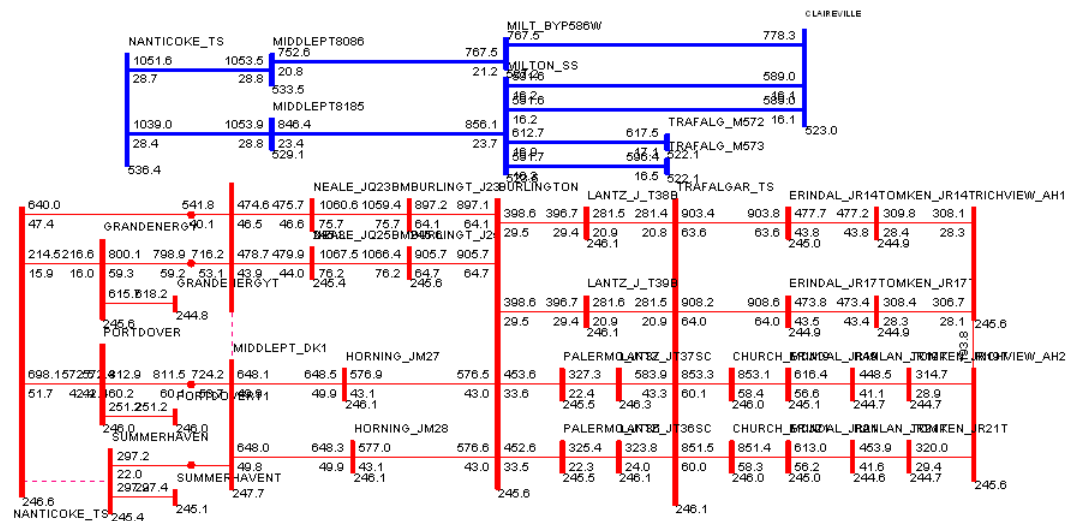
Load Flow Diagram 4: Loss of V586M



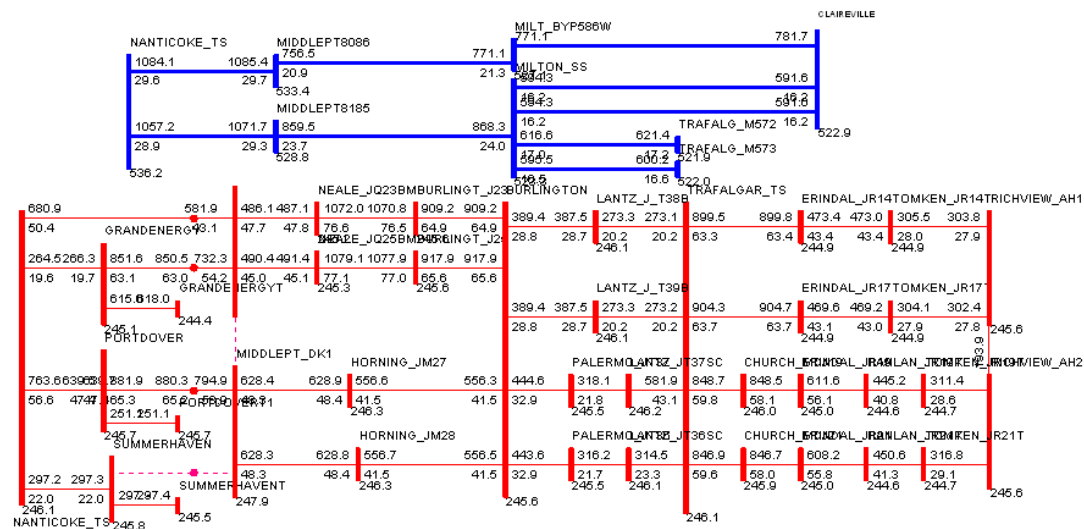
Load Flow Diagram 5: Loss of M572T



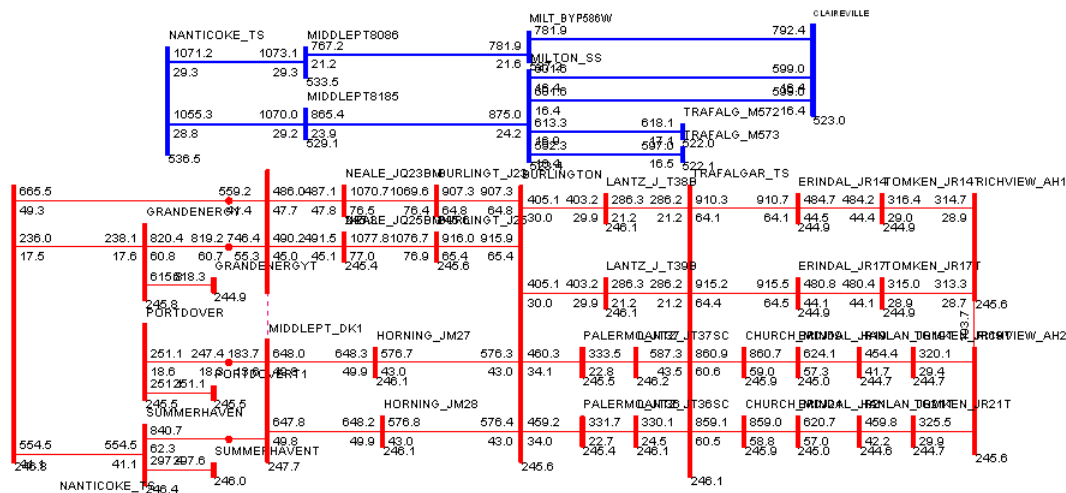
Load Flow Diagram 6: Loss of M570V



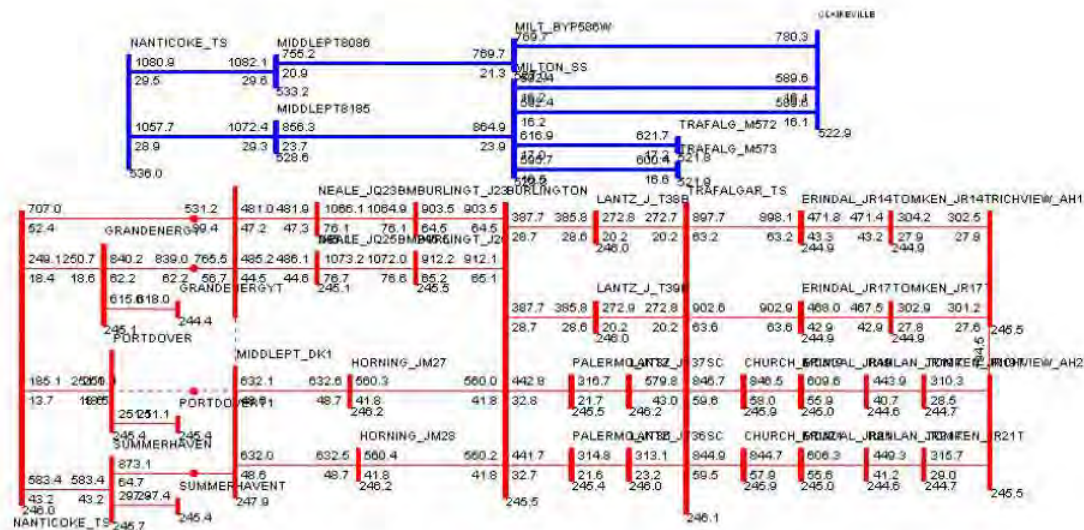
Load Flow Diagram 7: Loss of N1M (N.-Summerhaven)



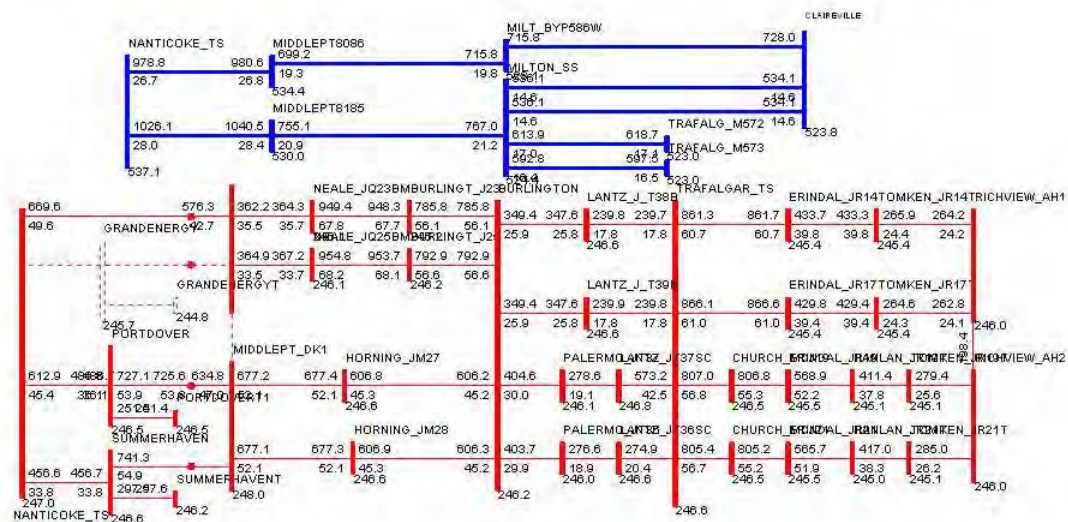
Load Flow Diagram 8: Loss of N1M (Summerhaven-M.)



Load Flow Diagram 9: Loss of N2M (N.-PDNW)

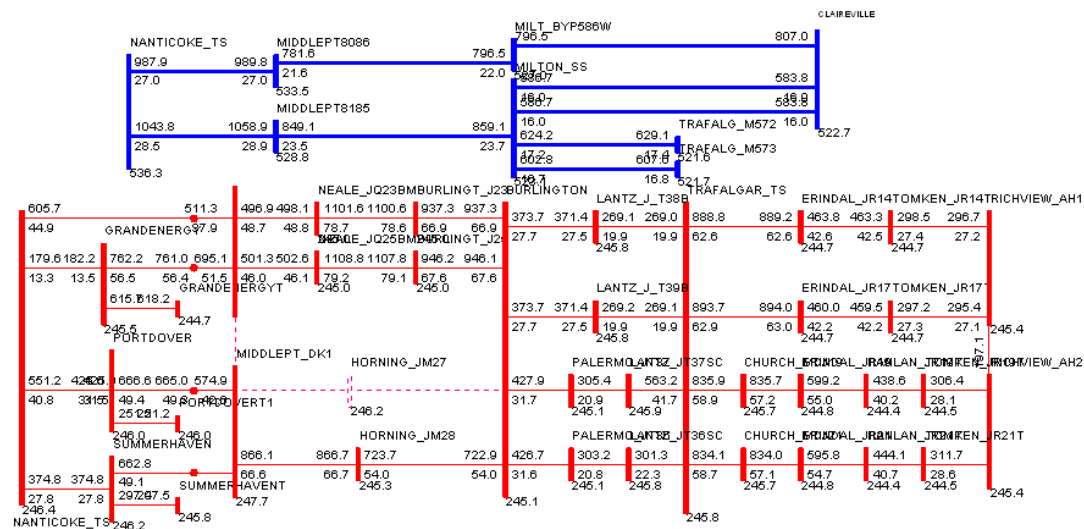


Load Flow Diagram 10: Loss of N2M (PDNW-M.)

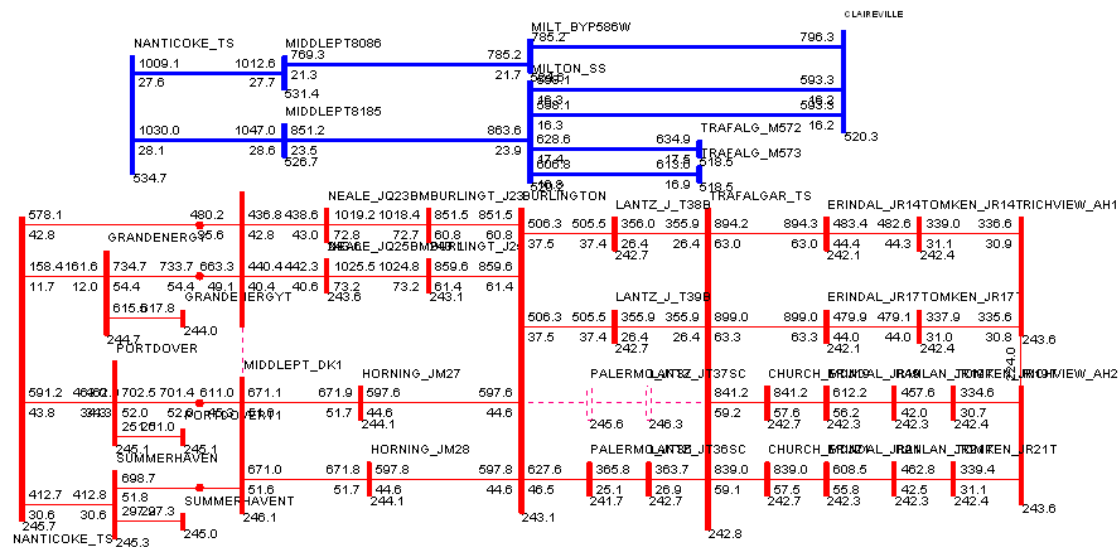


Load Flow Diagram 11: Loss of N5M

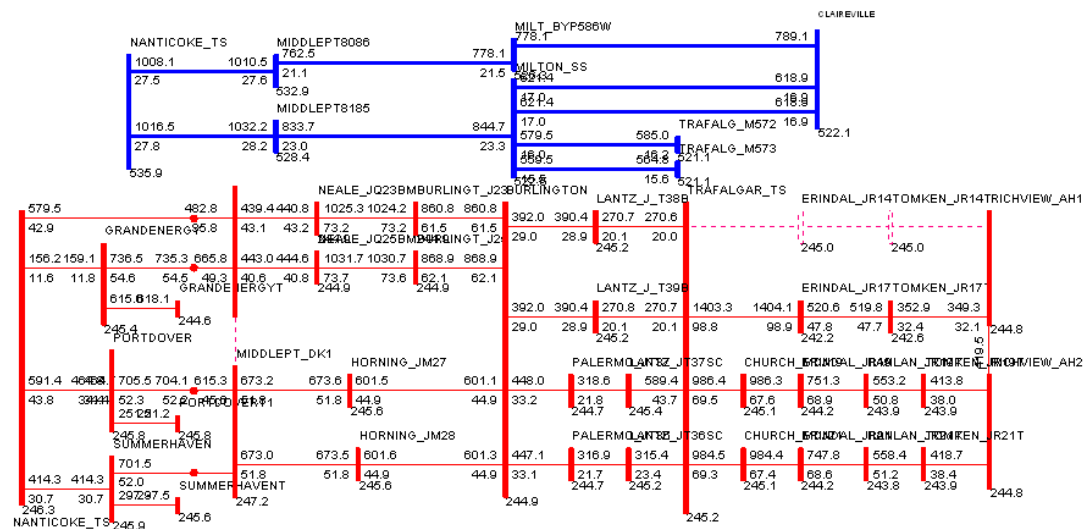




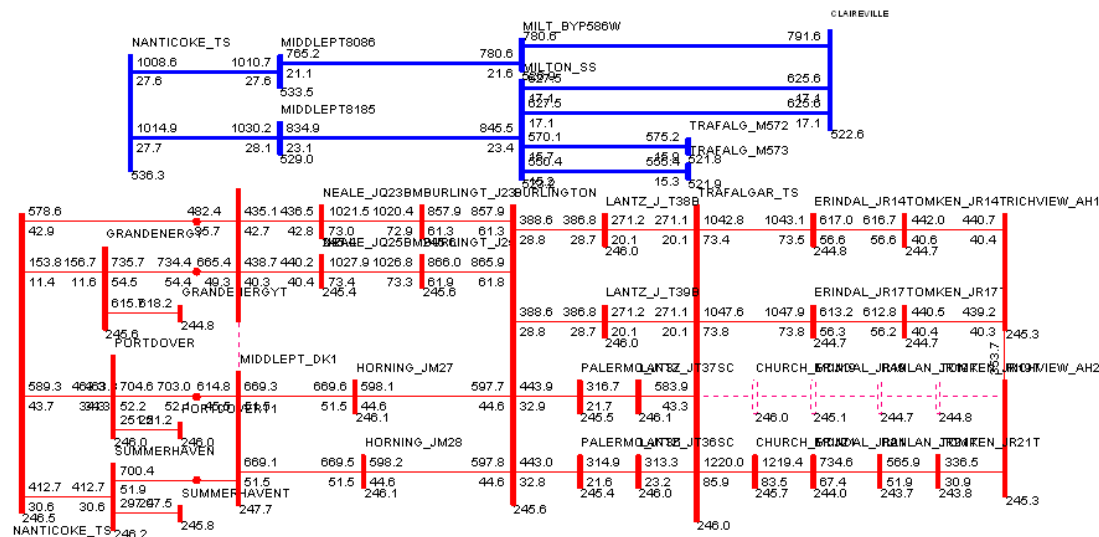
Load Flow Diagram 14: Loss of M27B



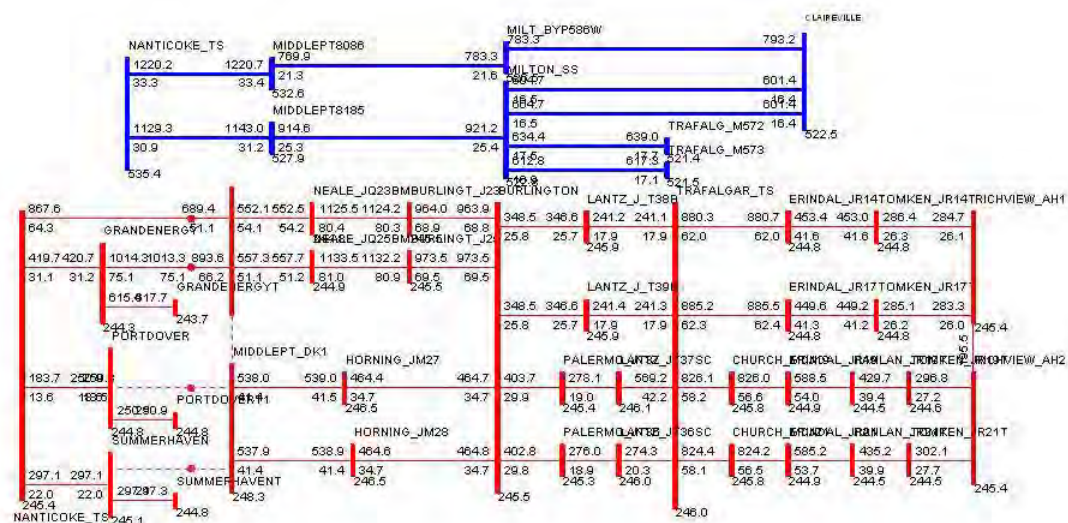
Load Flow Diagram 15: Loss of T37B



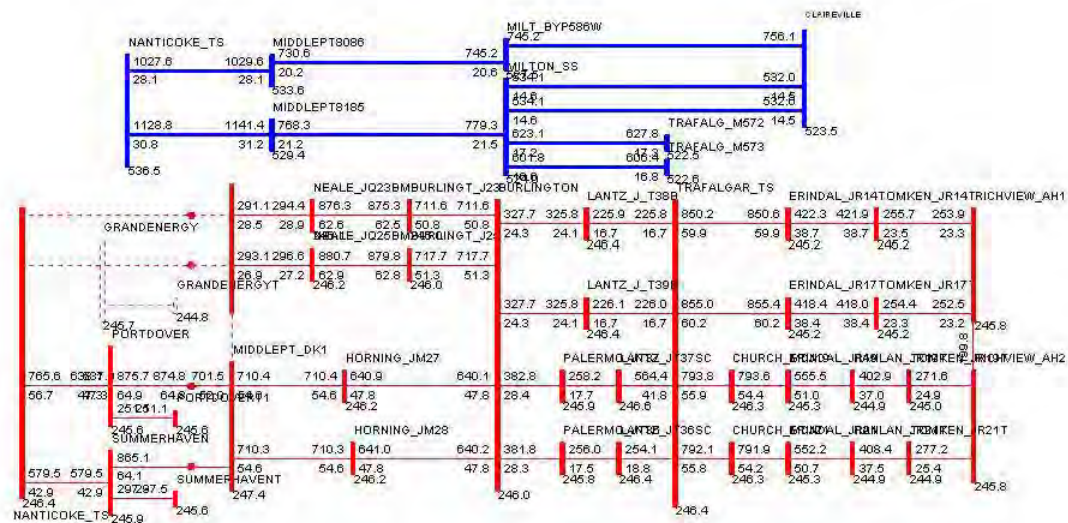
Load Flow Diagram 16: Loss of R14T



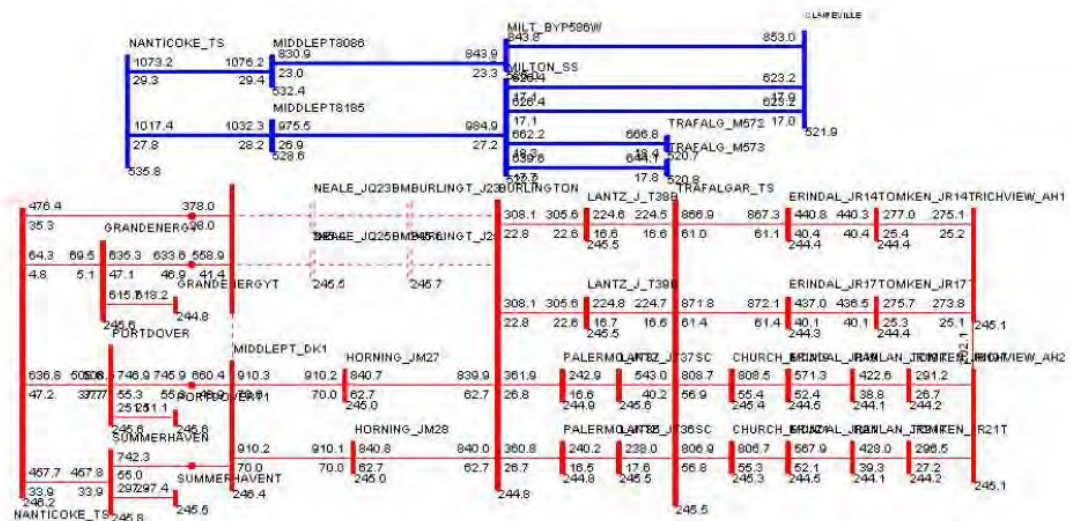
Load Flow Diagram 17: Loss of R19TH



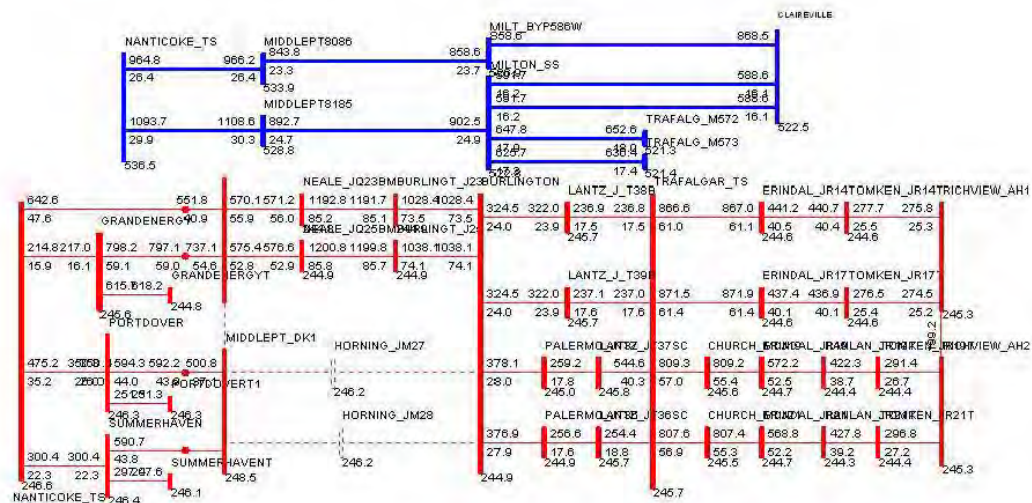
Load Flow Diagram 18: Loss of N1M/N2M



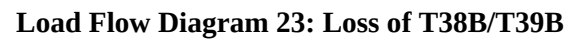
Load Flow Diagram 19: Loss of N5M/N6M

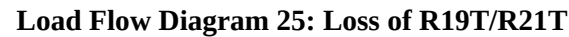
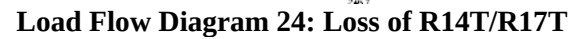


Load Flow Diagram 20: Loss of Q23BM/Q25BM

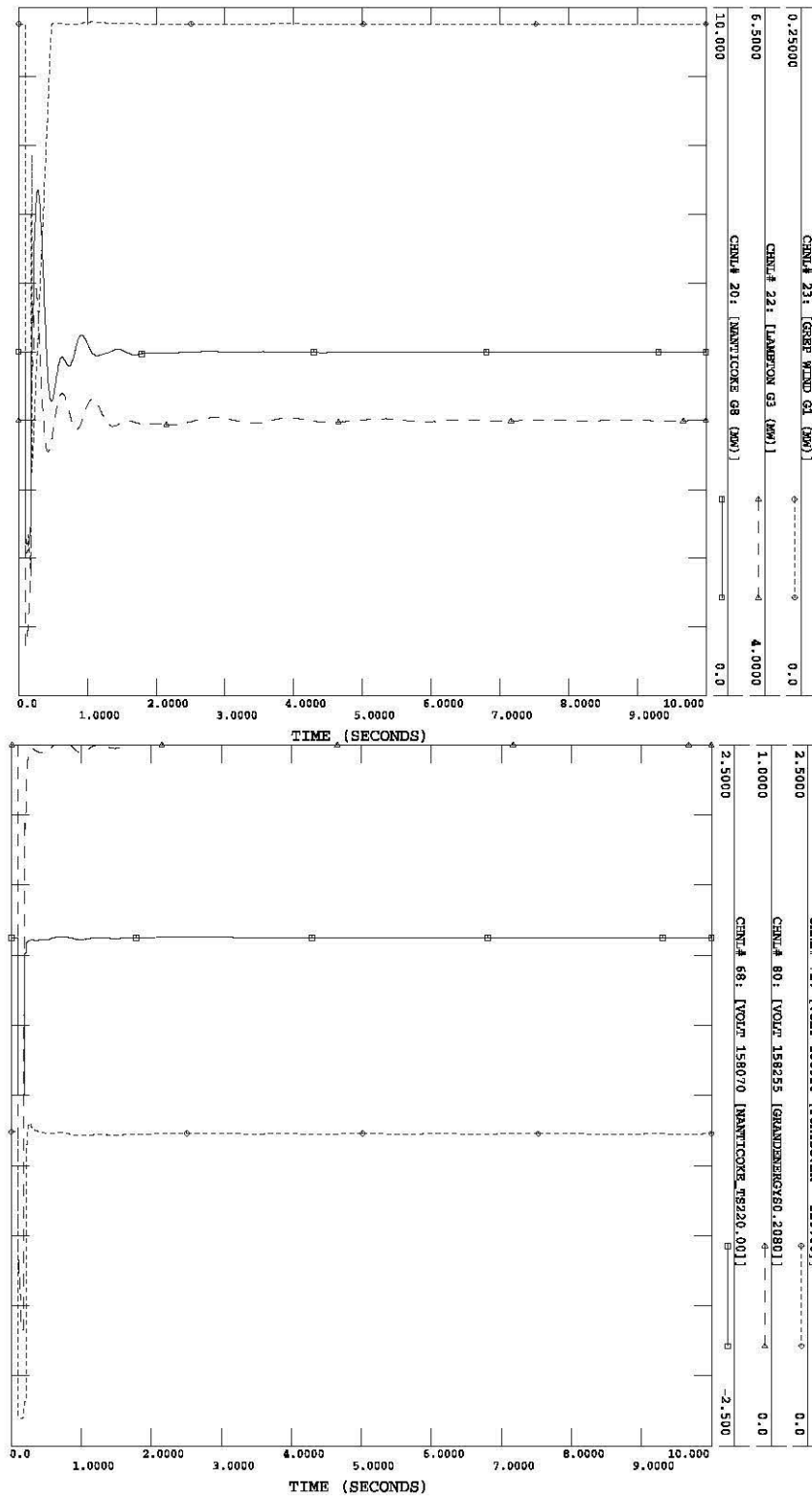


Load Flow Diagram 21: Loss of M27B/M28B

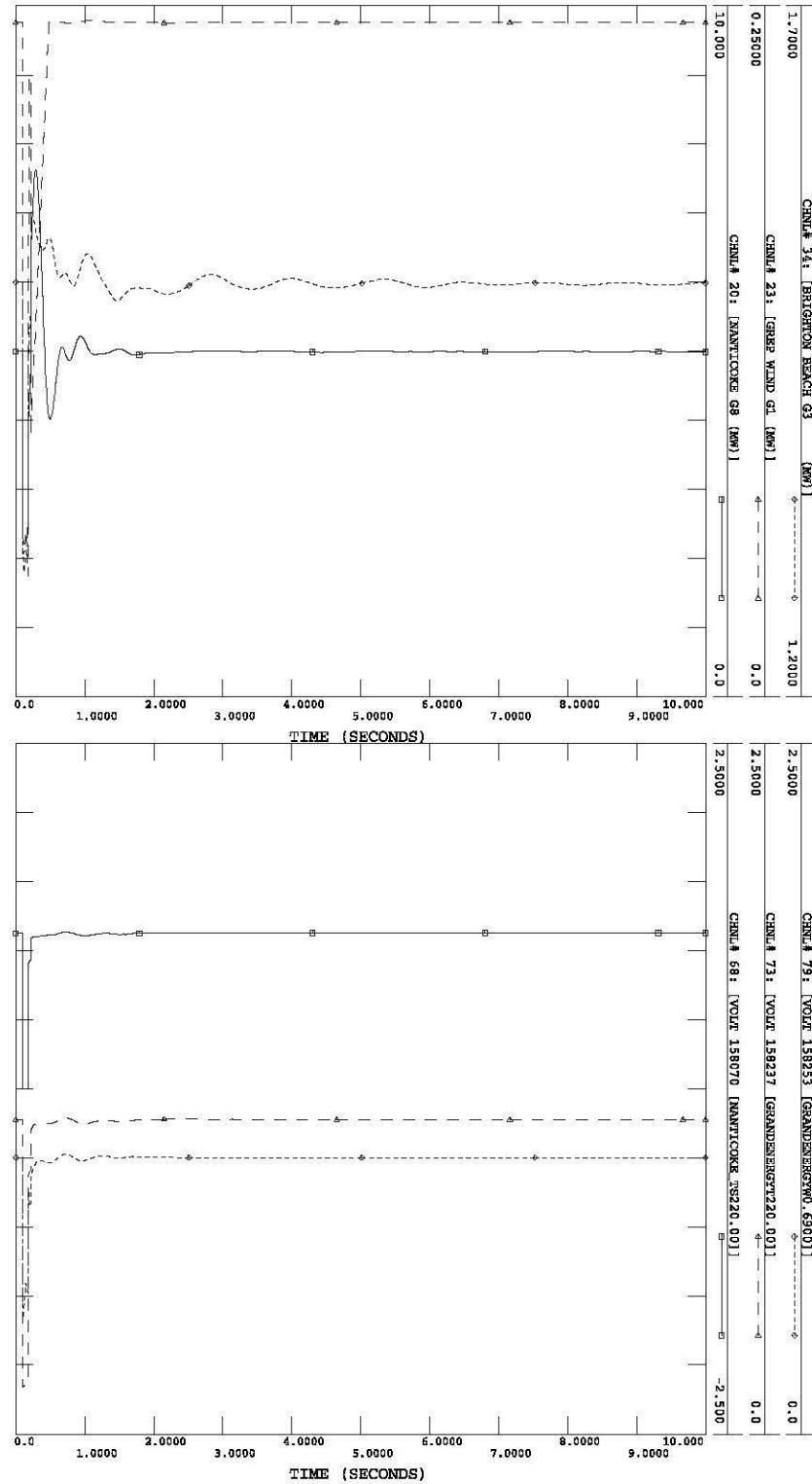




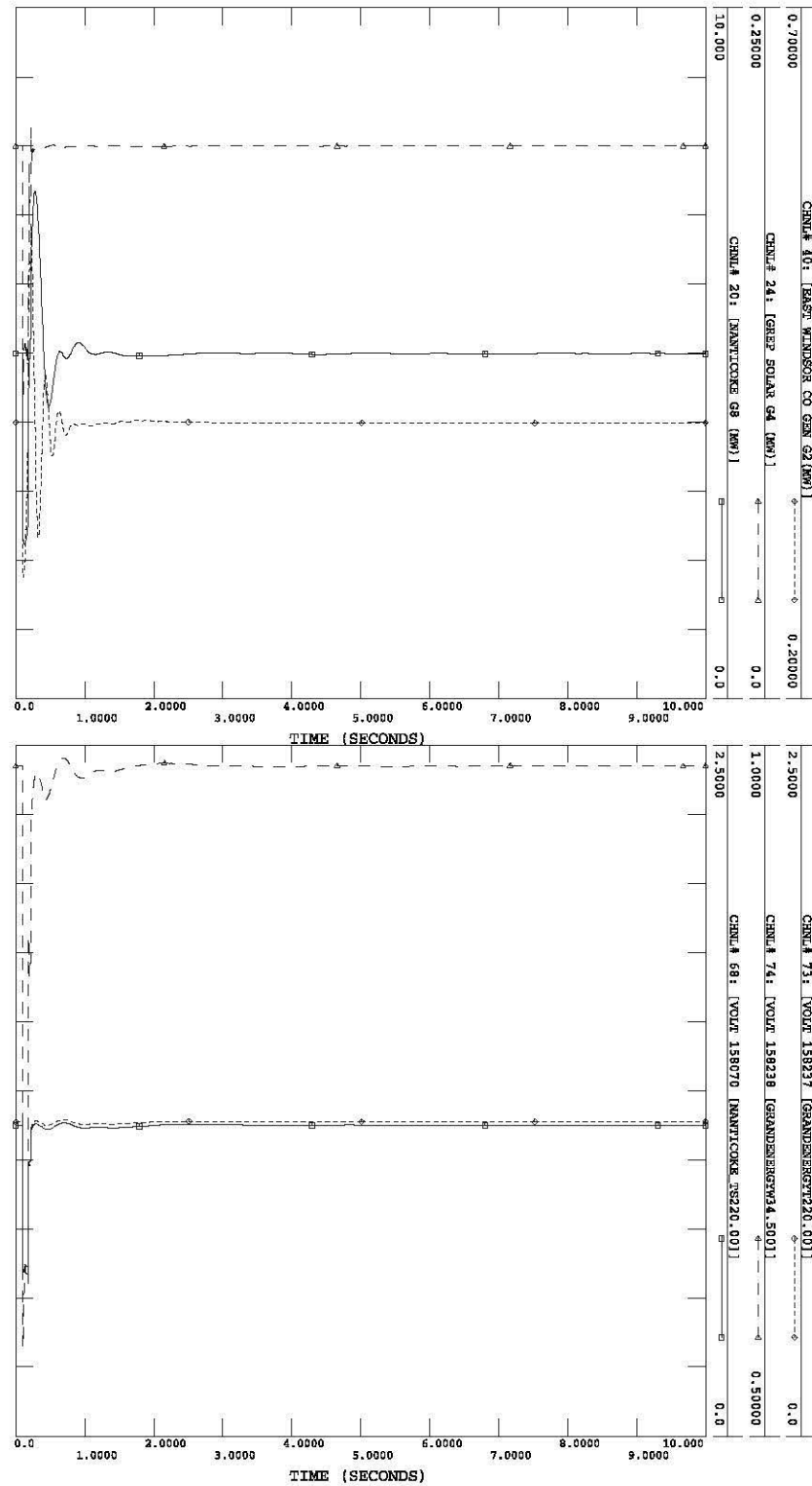
## **Appendix C Diagrams for Transient Simulation Results**

**SC1: LLLG Fault on N1M at Nanticoke**

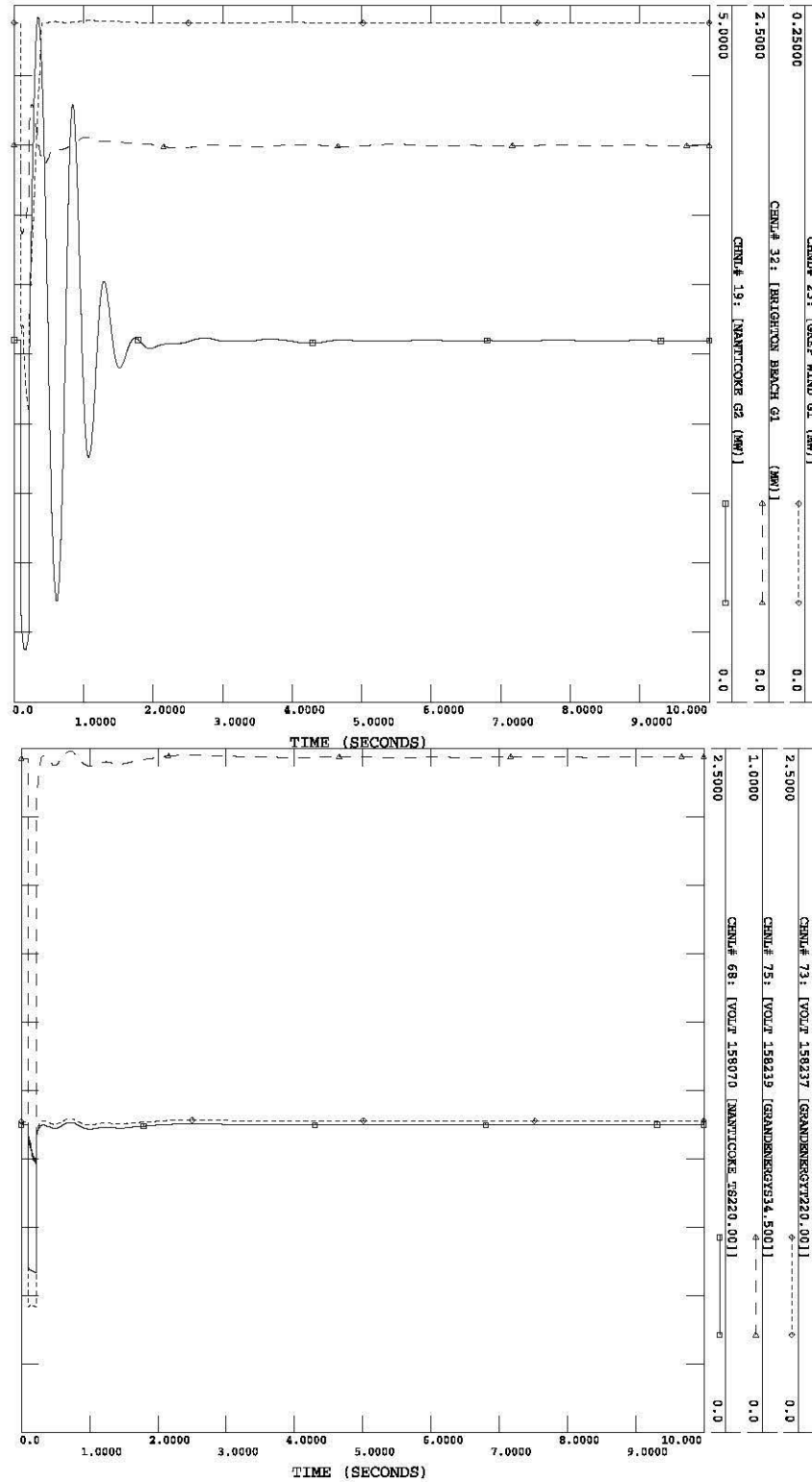
## SC2: LLLG Fault on N2M at Middleport

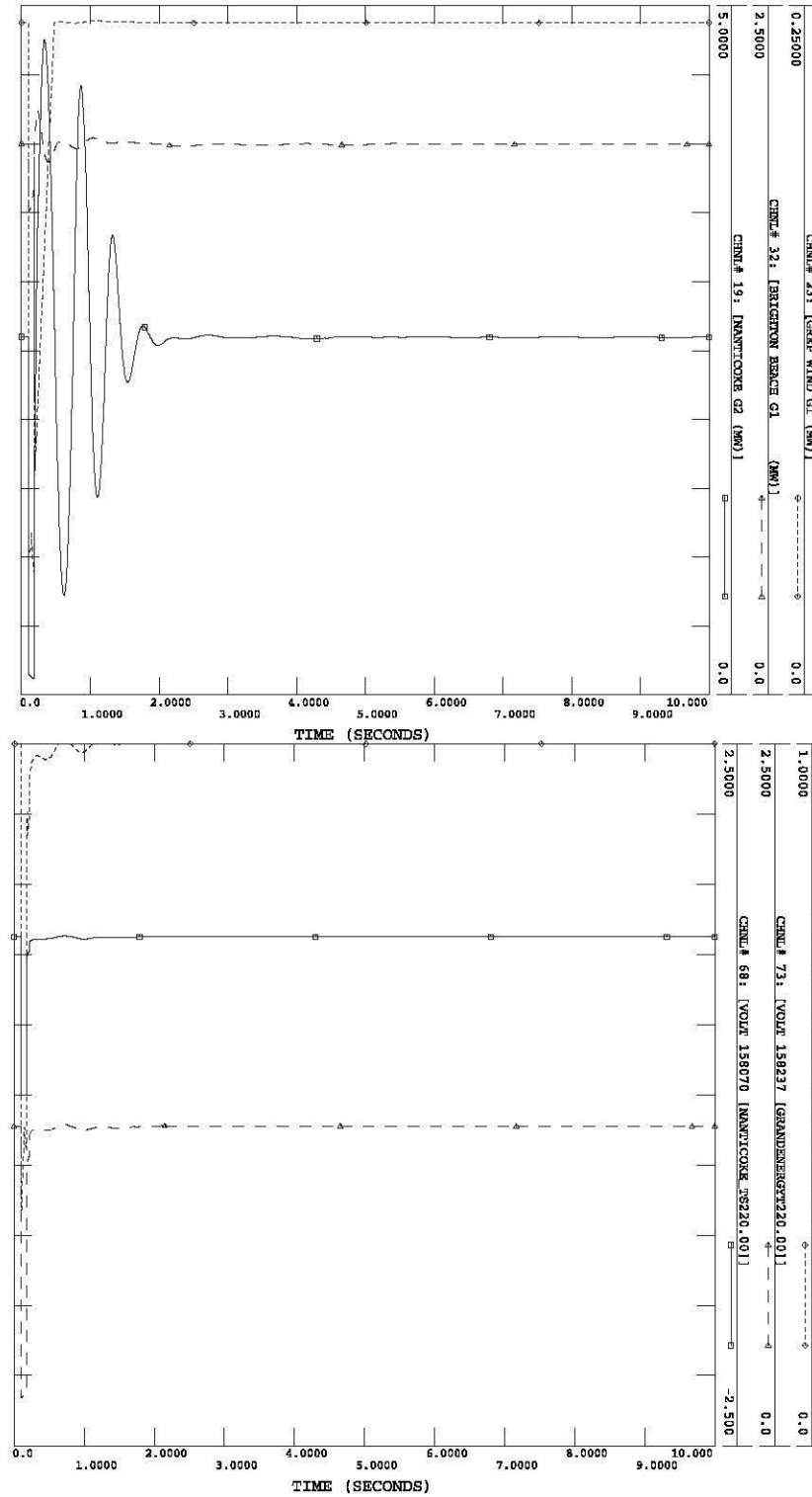


## SC3: LLLG Fault on N5M at Nanticoke

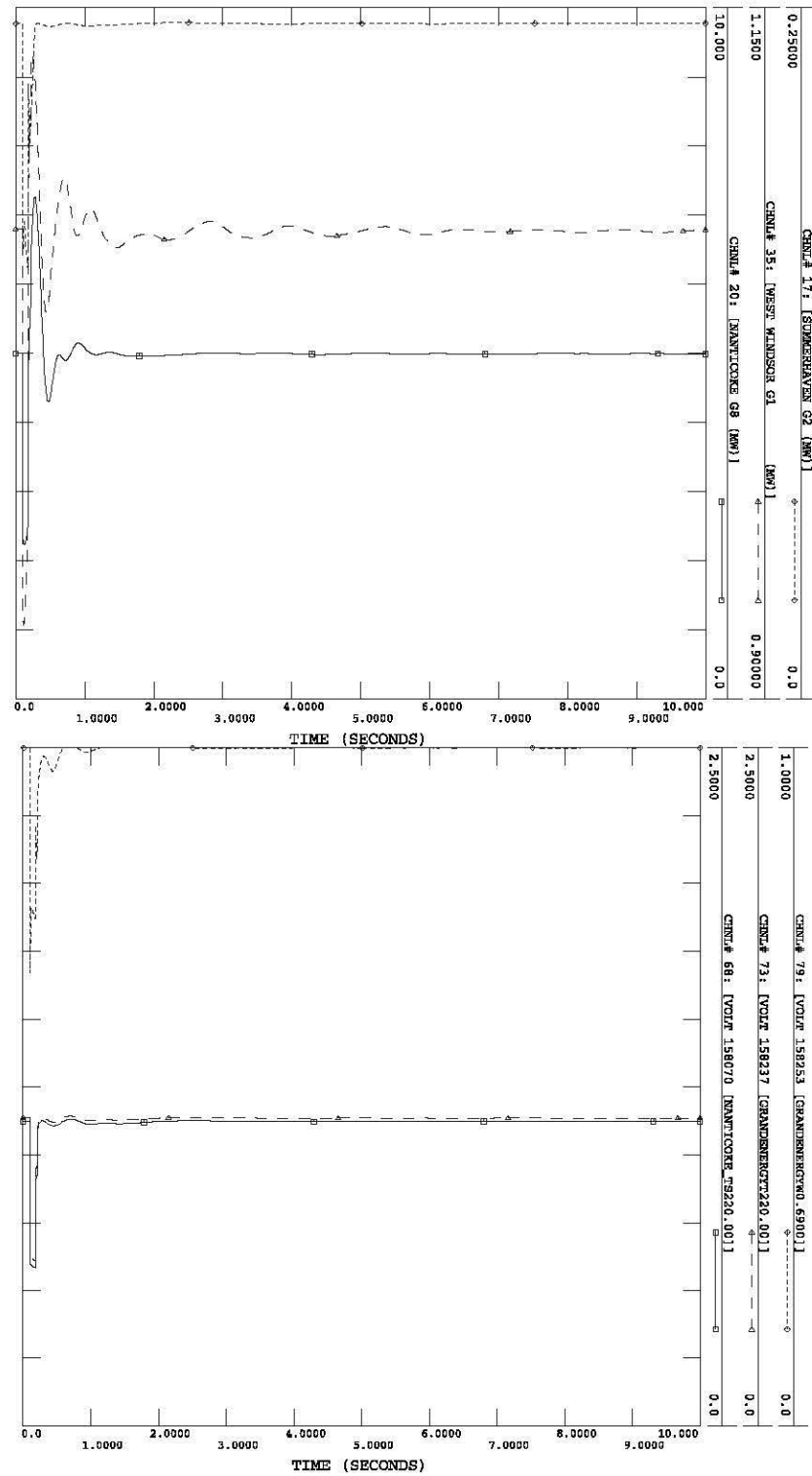


## SC4: LLLG Fault on N6M at Nanticoke

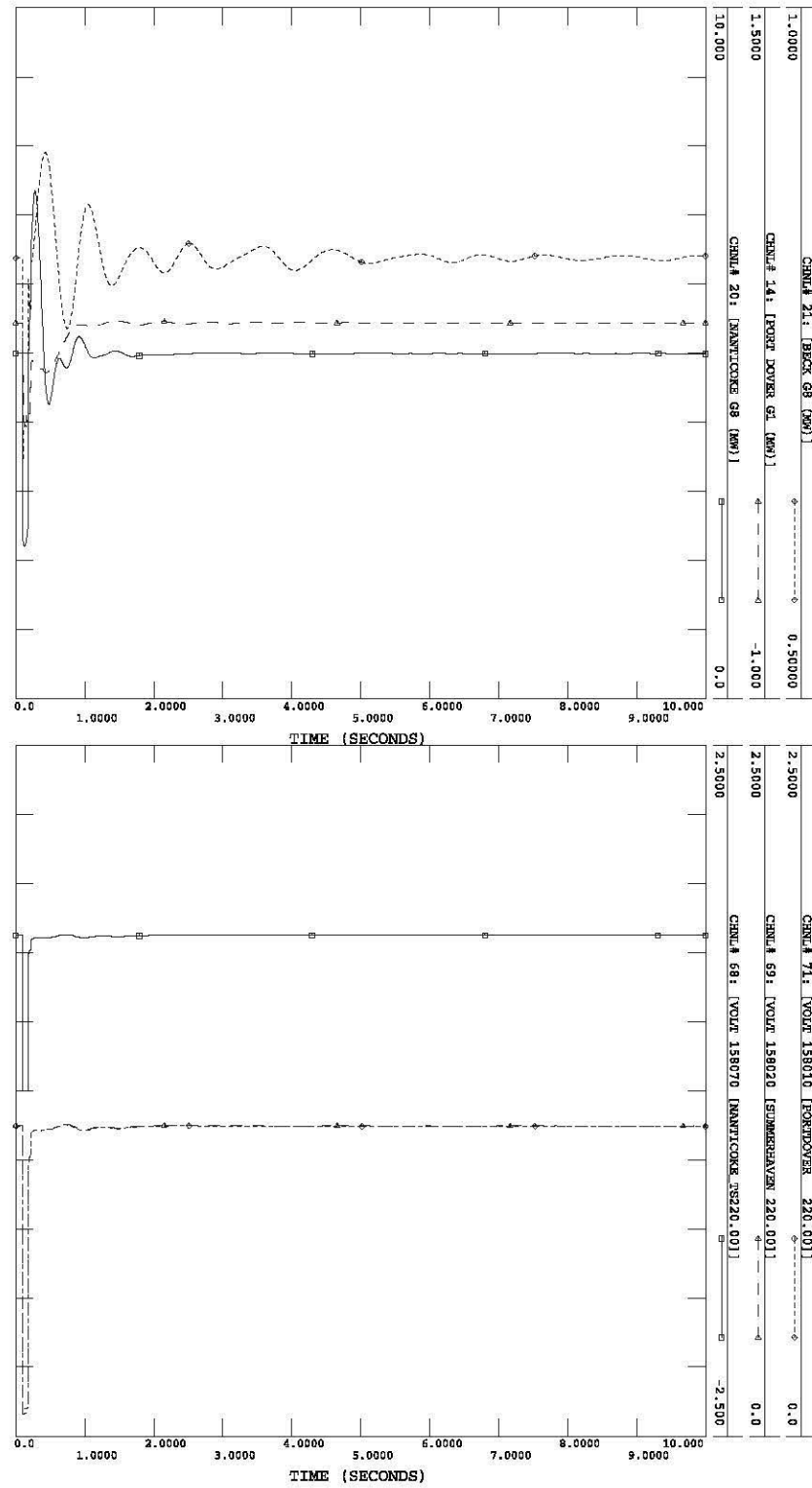


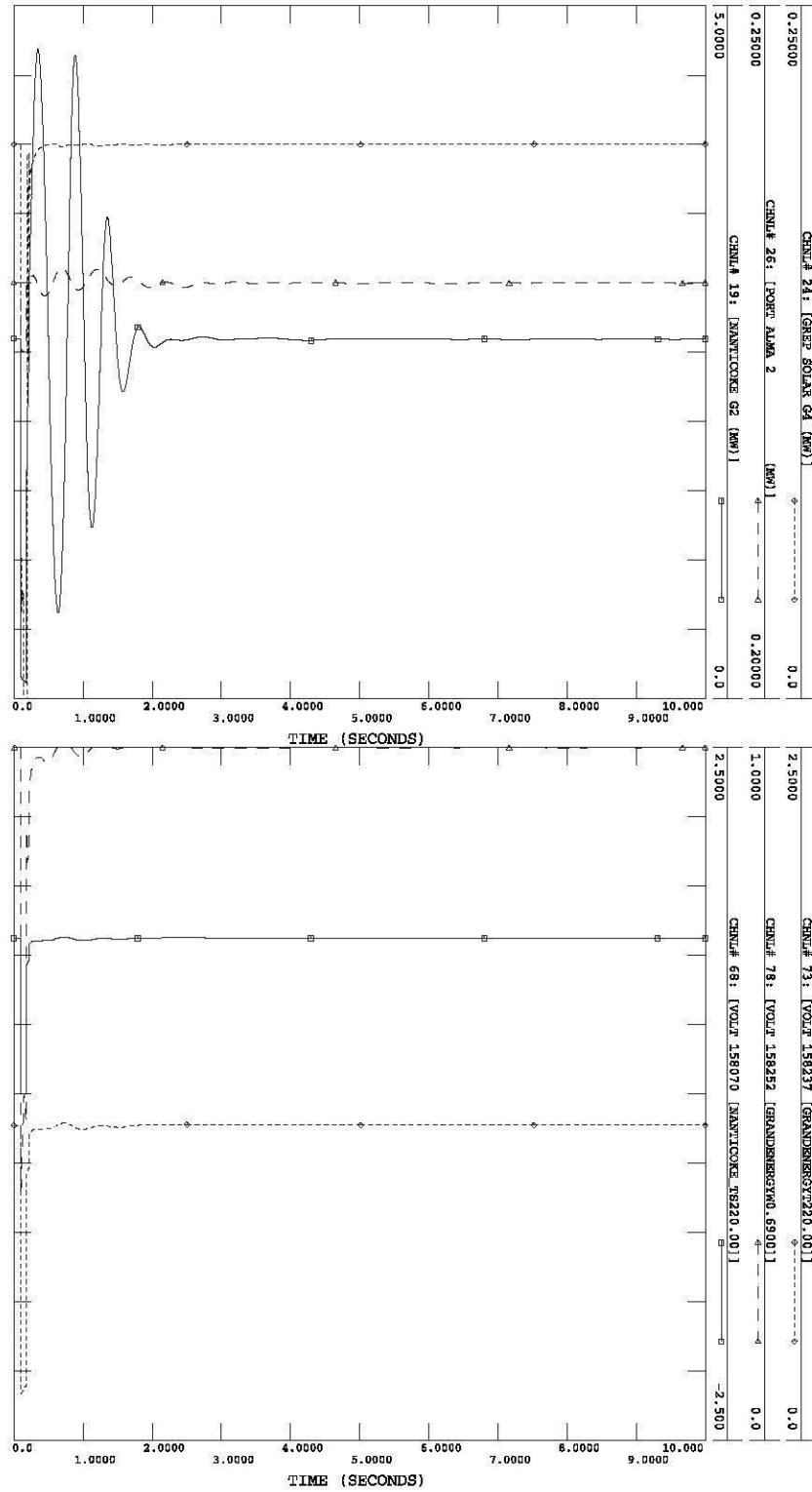
**SC5: LLLG Fault on M27B at Middleport**

## SC6: LLLG Fault on N1M/N2M at Nanticoke

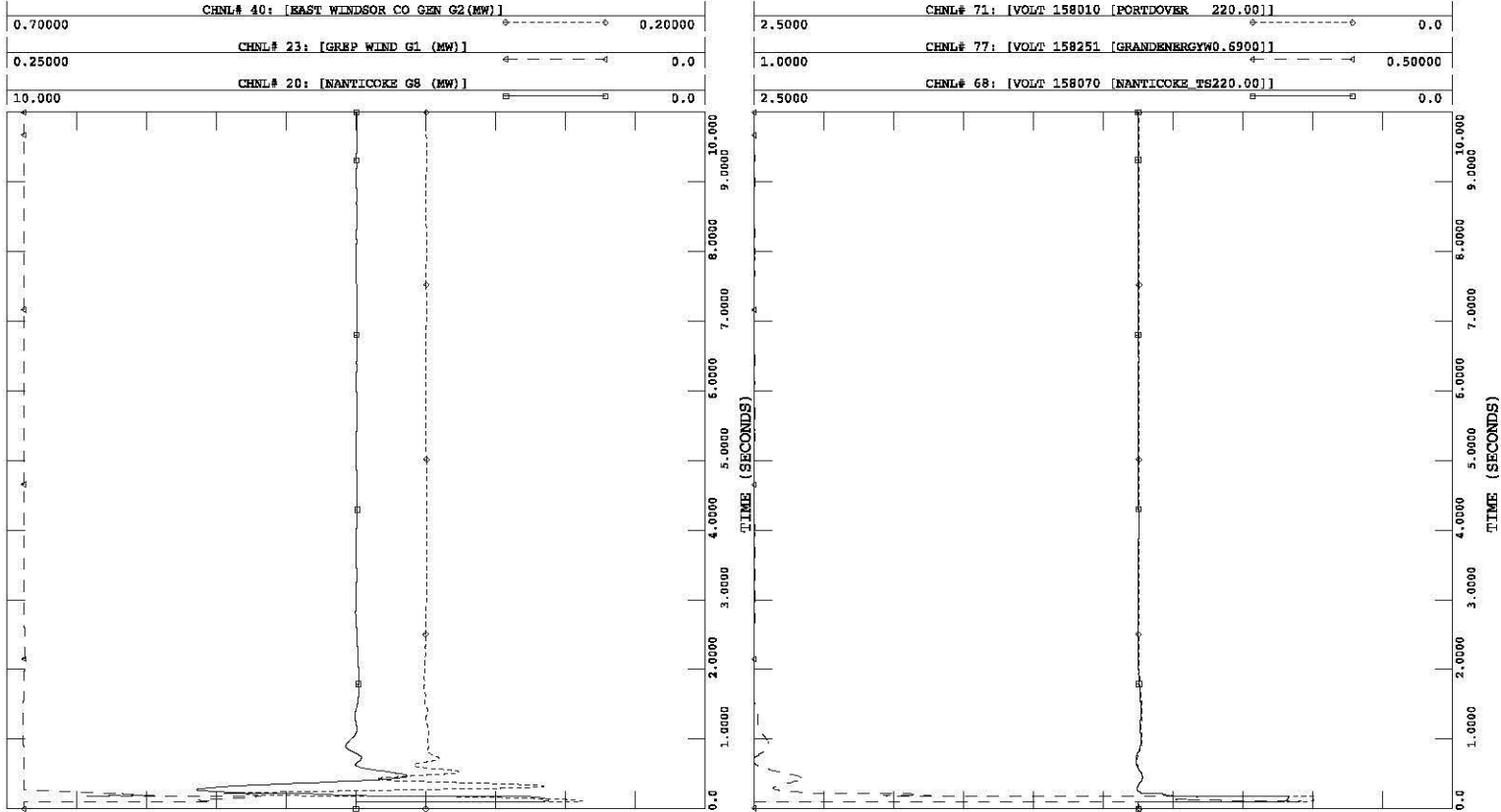


## SC7: LLLG Fault on N5M/N6M at Nanticoke



**SC8: LLLG Fault on M27B/M28B at Middleport**

SC9: LLLG Fault on Q23BM/Q25BM at Middleport



## **Appendix D Protection Impact Assessment**

Hydro One Networks Inc.  
483 Bay Street  
Toronto, Ontario  
M5G 2P5



Protection Impact Assessment

Samsung Grand Renewable Energy Park

140 MW Wind + 100 MW Solar Project

Date: Mar 08, 2011  
P&C Planning Group Project # PCT-116-PIA

Prepared by:

Hydro One Networks Inc.

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## Disclaimer

This Protection Impact Assessment has been prepared solely for the IESO for the purpose of assisting the IESO in preparing the System Impact Assessment for the proposed connection of the proposed generation facility to the IESO-controlled grid. This report has not been prepared for any other purpose and should not be used or relied upon by any person, including the connection applicant, for any other purpose.

This Protection Impact Assessment was prepared based on information provided to the IESO and Hydro One by the connection applicant in the application to request a connection assessment at the time the assessment was carried out. It is intended to highlight significant impacts, if any, to affected transmission protections early in the project development process. The results of this Protection Impact Assessment are also subject to change to accommodate the requirements of the IESO and other regulatory or legal requirements. In addition, further issues or concerns may be identified by Hydro One during the detailed design phase that may require changes to equipment characteristics and/or configuration to ensure compliance with the Transmission System Code legal requirements, and any applicable reliability standards, or to accommodate any changes to the IESO-controlled grid that may have occurred in the meantime.

Hydro One shall not be liable to any third party, including the connection applicant, which uses the results of the Protection Impact Assessment under any circumstances, whether any of the said liability, loss or damages arises in contract, tort or otherwise.

## EXECUTIVE SUMMARY

It is feasible for Samsung Grand Renewable Energy Park to connect the proposed 140 MW and 100 MW generation to circuit N5M at the location as shown in Figure 1 as long as the proposed changes are made:

### Proposals:

#### Connection

The winding configurations for both the wind generation and solar generation transformers must be changed to one of the following:

Leave the HV windings on both the wind generation and solar generation step-up transformers ungrounded; or  
Connect both the wind generation and solar generation step-up transformers Delta on the HV side and Wye grounded on the LV side; or  
Connect both the wind generation and solar generation step-up transformers Wye grounded on the HV side and Zig-Zag on the LV side.

#### Protection Scheme

The Protective relay scheme for circuit N5M will be required to be changed to a line differential scheme and changes to the reclosing scheme at Middleport TS will be also required.

#### Telecom Scheme

The new protection telecommunication scheme will be required.

#### Protection Settings

Protection Setting changes will be required.

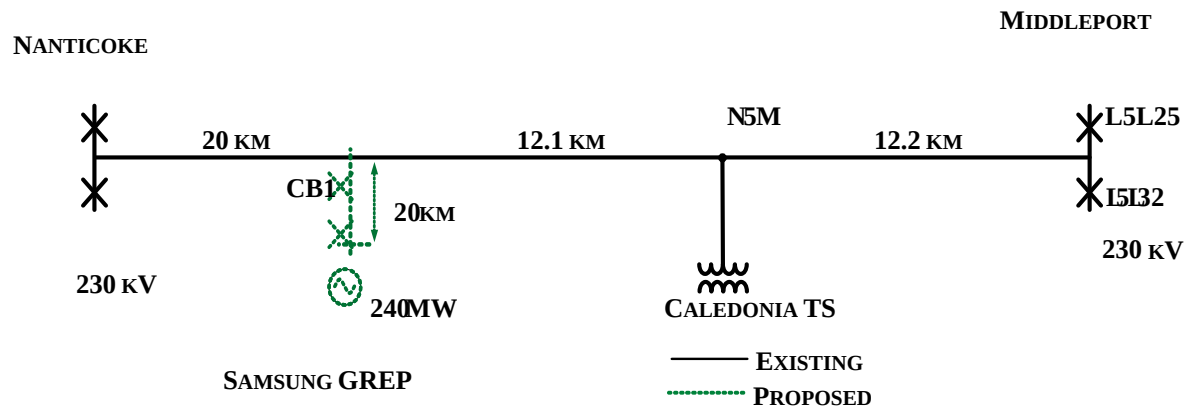


**Figure 1:** Samsung Grand Renewable Energy Park Connection to HONI Transmission System.

### Protection and Relay Settings Changes

#### **Current Reversal at Nanticoke TS**

The fault study was conducted to determine the suitability of the connection of GREP facility to circuit N5M to ensure line protection viability.

To arrive at the maximum apparent impedance as seen at the Nanticoke bus, the equivalent bus impedance was maximized. The generation was removed at Nanticoke bus in the study to reflect future plans to mothball Nanticoke GS. Also, a contingency of an outage of one autotransformer at Nanticoke TS was incorporated. The step-up transformers and the generators were modeled as per data submitted by GREP.

**The three phase fault** at Middleport 230 kV bus resulted in the apparent impedance on circuit N5M at Nanticoke TS equal to two times the line impedance. The required relay setting of zone 2 to cover the line apparent impedance should be acceptable.

**For the line to ground fault** at Middleport 230 kV bus the Nanticoke terminal exhibits zero sequence current reversal and very high L-G apparent impedance in the reverse direction. For this condition only the line protection at Middleport TS will provide fault coverage. The proposed configuration of the step-up transformers (Yg-D-Yg) at the GREP facility is the main contributor to the current reversal at the Nanticoke bus. The generation reduction at GREP facility will not reduce the L-G apparent impedance at Nanticoke bus. This is due to the increase of the positive sequence current at Nanticoke bus and the vectorial relation between the positive and zero sequence currents.

To overcome the above relaying difficulties the following options are recommended for the configuration of the step-up transformers at GREP facility:

- 1) Leave the HV windings on both the wind generation and solar generation step-up transformers ungrounded.

2) Connect both the wind generation and solar generation step-up transformers Delta on the HV side and Wye grounded on the LV side.

3) Connect both the wind generation and solar generation step-up transformers Wye grounded on the HV side and Zig-Zag on the LV side.

In options 1 and 2 the ground source on the HV side of each step-up transformer is removed. As a result there is no current reversal at Nanticoke bus and the L-G apparent impedance is significantly reduced.

In option 3 the zero sequence path of the step-up transformer for the HV L-G faults is very large (1-2 pu). Therefore, the impact on current distribution at Nanticoke bus is minimal and there is no current reversal.

### **Modifications to the protections at Nanticoke TS**

To avoid the zone 1 line protection at each terminal station to operate for faults on the GREP tap provision of the three-terminal line current differential protection for N5M circuit along with dual routing fiber optic cabling for communication to all line terminals including GREP would be necessary.

The existing DESN station Caledonia TS will be included in the line differential zone Nanticoke – Middleport– GREP Wind Farm SS. The pickup settings of the differential relay should be set to accommodate this load. To prevent operation of the differential protection for faults on the LV side at Caledonia station, the line differential protection should be supervised by the distance element. If this is not possible, blocking channels from Caledonia TS will have to be incorporated. In this case, the operation of line differential protection will be time delayed to allow for receipt of the blocking signal.

### **Modifications to the protections at Middleport TS and Caledonia TS**

Line protection modifications similar to Nanticoke TS.

Reclosing of the breakers at Middleport TS should not be permitted until it has been established that the GREP station HV line breaker or both collector substation HV breakers have successfully opened. This can be implemented in one of two ways. A GEO signal can be sent from the GREP station to Middleport TS to interlock the reclosing circuit. This signal can be also broadcasted to Nanticoke and Caledonia stations. Alternatively, synchrocheck reclosing can be applied for the Middleport breakers, excluding the lead breaker that recloses on undervoltage and time. Synchrocheck autoreclosing should be also applied at Caledonia TS.

### **Telecommunications**

Dual separate and independent fiber connections from the GREP wind farm to Nanticoke TS and Middleport TS will be required for the new line differential protection.

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## **DRAFT CUSTOMER IMPACT ASSESSMENT**



483 Bay Street  
Toronto, Ontario  
M5G 2P5

**CUSTOMER IMPACT ASSESSMENT**

**GRAND RENEWABLE ENERGY PARK  
254 MW WIND AND SOLAR GENERATION FACILITY  
GENERATION CONNECTION  
- DRAFT -**

Revision: Rev 0  
Date: 6 April 2011

Issued by: Transmission System Development Division  
Hydro One Networks Inc.

Prepared by:

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## Disclaimer

This Customer Impact Assessment was prepared based on information available about the connection of the proposed Grand Renewable Energy Park. It is intended to highlight significant impacts, if any, to affected transmission customers early in the project development process and thus allow an opportunity for these parties to bring forward any concerns that they may have. Subsequent changes to the required modifications or the implementation plan may affect the impacts of the proposed connection identified in Customer Impact Assessment. The results of this Customer Impact Assessment are also subject to change to accommodate the requirements of the IESO and other regulatory or municipal authority requirements.

Hydro One shall not be liable to any third party which uses the results of the Customer Impact Assessment under any circumstances whatsoever for any indirect or consequential damages, loss of profit or revenues, business interruption losses, loss of contract or loss of goodwill, special damages, punitive or exemplary damages, whether any of the said liability, loss or damages arises in contract, tort or otherwise. Any liability that Hydro One may have to Samsung Renewable Energy Inc. in respect of the Customer Impact Assessment is governed by the Agreement between Samsung Renewable Energy Inc. and Hydro One dated January 5, 2011.

**Hydro One Networks Inc.** (Hydro One) Customer Impact Assessment (CIA) assesses the impact of the proposed generation connection on existing customers in the affected area.

*This study does not evaluate the overall impact of the Grand Renewable Energy Park on the bulk system. The impact of the new generator on the bulk system is the subject of the System Impact Assessment issued by the Independent Electricity System Operator (IESO).*

*The study does not evaluate the impact of the Grand Renewable Energy Park on the network Protection and Control facilities. Protection and Control aspects will be reviewed during the preparation of the Connection cost Estimate and will be reflected in the Connection and Cost Recovery Agreement.*

## **1.1 Generating Station Connection**

The GREP project proposes to connect to Hydro One circuit N5M. Circuit N5M connects Nanticoke TS and Middleport TS and supplies customer load at Caledonia TS, a 230/27.6kV transformer station. The study area is shown in Figure 2.

**CUSTOMER IMPACT ASSESSMENT**  
**SAMSUNG RENEWABLE ENERGY INC. – GRAND RENEWABLE ENERGY PARK**  
**254 MW WIND AND SOLAR GENERATION FACILITY**

## **1 INTRODUCTION**

Samsung Renewable Energy Inc. is to develop the 254MW Grand Renewable Energy Park ("GREP") in Haldimand County, Ontario. The facility consists of 154MW of wind generation and 100MW of solar generation.

The wind generation will include of 69 Siemens SWT-2.3VS, 60Hz, 2.3MW wind turbine generators (WTG); each WTG will be limited to 2.221MW. The solar generation will include 200, 500kW SC 500HE-US solar inverters. The generating station will connect to a new, customer owned 230kV transmission line approximately 20km long, which will then connect to Hydro One's transmission system on 230kV circuit N5M approximately 19.5km north of Nanticoke TS along Hydro One's right-of-way, near Regional Road 20 as shown in Figure 1.



**Figure 1: GREP connection to Hydro One's network**

As part of the Connection Assessment and Approval (CAA) process, the IESO will carry out a System Impact Assessment (SIA) of the proposed wind generation connection.



**Table 1: WTG Feeder Circuits**

| Number of WTGs                   | 11   | 11   | 13   | 11   | 12   | 11   |
|----------------------------------|------|------|------|------|------|------|
| Max. Generation per circuit (MW) | 24.4 | 24.4 | 28.9 | 24.4 | 26.7 | 24.4 |

**Table 2: Solar Feeder Circuits**

| Number of Solar Inverters        | 40 | 40 | 40 | 40 | 40 |
|----------------------------------|----|----|----|----|----|
| Max. Generation per circuit (MW) | 20 | 20 | 20 | 20 | 20 |

The IESO requires the installation of a dynamic reactive power device with a capability of -33/+48Mvar at the solar collector buses as well as a static reactive power device of +50Mvar at the wind collector buses. The static reactive compensation is to be shared between at least five switchable shunt capacitors<sup>1</sup>.

Each Siemens SWT-2.3 WTG is rated at 2.556MVA, +/- 0.9 power factor but limited to 2.221MW output. Each SC 500HE-US solar inverter operates at unity power factor when operating at full (500kW) output.

The 20km customer transmission line will connect the GREP 230/34.5kV collector substation to Hydro One's N5M circuit. The customer's connection line will be approximately 19.3km of overhead line, and 0.7km of underground cable, with breakers as shown in Figure 3

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<sup>1</sup> IESO Grand Renewable Energy Park Project System Impact Assessment, CAA ID 2010-399

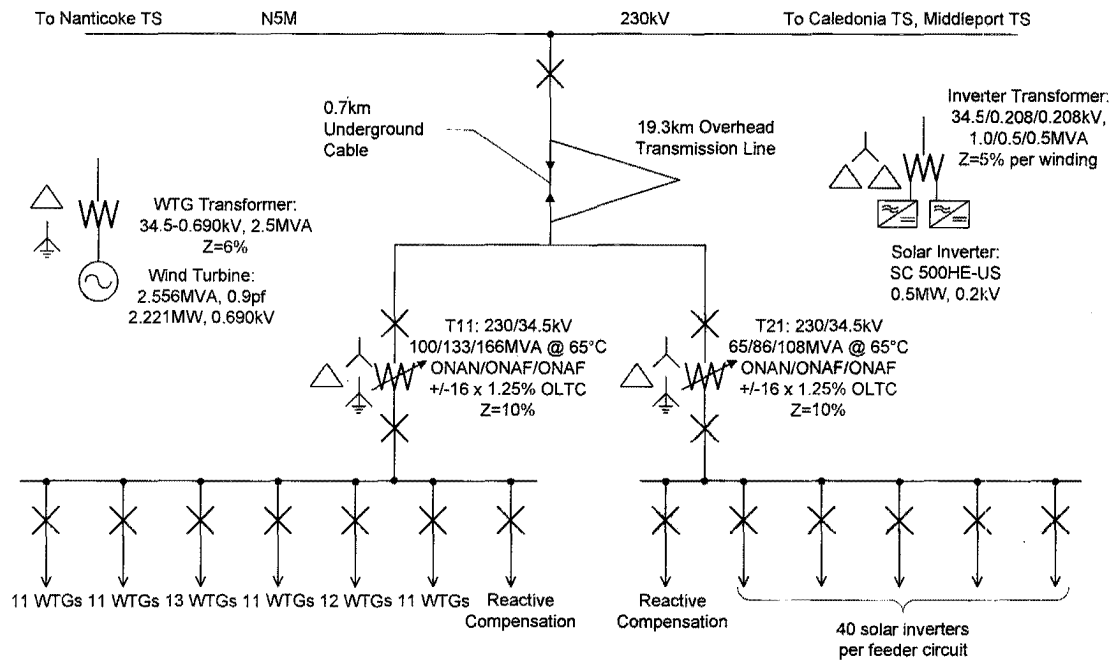


**Figure 3: GREP connection to N5M**

## 1.2 Study Scope

The CIA Study is a requirement of the Ontario Energy Board (OEB) to assess the potential impacts of the proposed GREP Project on the existing transmission connected customer(s). The following areas are reviewed:

- Supply capacity/reliability
- Voltage and thermal performance
- Short circuit analysis
- Preliminary outage impact assessment

## 1.3 Customer Connections

The focus of this study was on customers supplied by stations directly connected to circuit N5M and other 230kV circuits originating from Nanticoke TS, as well as the Caledonia 115kV system (circuits C9 and C12). Affected customers are shown in Table 3.

**Table 3: Transmission Customers connected in the study area**

| Station                           | Customer                                                   |
|-----------------------------------|------------------------------------------------------------|
| Imperial Oil Nanticoke CGS        | Imperial Oil Limited - Nanticoke                           |
| U.S. Steel Canada - Nanticoke CTS | U.S. Steel Canada Inc.                                     |
| Jarvis TS                         | Haldimand County Hydro Inc.<br>Hydro One Networks Inc.     |
| Nanticoke GS                      | Ontario Power Generation Inc. [Nanticoke GS]               |
| Caledonia TS                      | Haldimand County Hydro Inc.<br>Hydro One Networks Inc.     |
| Bloomsburg MTS                    | Norfolk Power Distribution Inc.                            |
| Norfolk TS                        | Norfolk Power Distribution Inc.<br>Hydro One Networks Inc. |

## **2 METHODOLOGY AND CRITERIA**

### **2.1 Planning Criteria**

The IESO's Ontario Resource and Transmission Assessment Criteria (ORTAC) forms the basis for the planning criteria used in this CIA.

#### **2.1.1 Voltage Change Limits**

With all planned facilities in service pre-contingency, system voltage changes in the period immediately following a contingency shall not result in a voltage decline greater than 10% for pre-transformer tap-changer action (including station loads less than 50kV) and 10% post-transformer tap-changer action (5% for station loads less than 50kV). In addition, the steady state voltage at station loads less than 50kV are to remain within 6% of the nominal voltage.

#### **2.1.2 Short Circuit Limitations**

Appendix 2 of the transmission system code (TSC) specifies the maximum symmetrical three phase and single line to ground short circuit levels. These limits are summarized in Table 4.

**Table 4: Transmission System Code Short Circuit Limits**

|               |                   |                   |
|---------------|-------------------|-------------------|
| 230           | 63                | 80 <sup>(1)</sup> |
| 115           | 50                | 50                |
| 27.6 (4-wire) | 17 <sup>(2)</sup> | 12 <sup>(2)</sup> |
| 13.8          | 21 <sup>(2)</sup> | 10 <sup>(2)</sup> |

Notes:

- (1) Usually limited to 63kA
- (2) Effective September 1, 2010, Hydro One requires a 5% margin on the acceptable TSC limits at voltage levels of <50kV to account for other sources of fault current on the distribution system such as unmodeled synchronous motors and data inaccuracies.

## **2.2 Study Assumptions**

Summer 2010 peak loading conditions were assumed in this study.

Hydro One is aware of the following additional two transmission connected renewable generation projects that intend to connect in the study area:

- Summerhaven Wind Energy Centre (connection to circuit N1M) – 124MW
- Port Dover and Nanticoke Wind Project (connection to circuit N2M) – 105MW

The results of this CIA include the impact of these other two generation projects.

Nanticoke GS has historically operated with up to 8 units in-service. Two of these units were closed on September 30, 2010. The following future bulk system conditions were assumed in this study:

- Nanticoke GS: 2 units in-service at 240kV, 4 units in-service at 500kV
- Nanticoke TS: 350Mvar SVC at the 500kV bus
- New Bruce to Milton 500kV double circuit transmission line in-service

### **3 STUDY RESULTS**

The proposed GREP Project is not expected to adversely impact the transmission connected customers in the area. The findings of this CIA are summarized below.

#### **3.1 Supply Capacity/Reliability**

The proposed point of connection on circuit N5M has enough capacity to incorporate the plant's full capacity.

The proposed point of connection will not adversely affect supply reliability to customers connected to this line.

#### **3.2 Voltage and Thermal Performance**

The thermal and voltage study considered the impact of the GREP interconnection on the local transmission system. The study included the following contingencies:

- Loss of GREP
- N1M north and south of Summerhaven Connection
- N2M north and south of the Port Dover and Nanticoke Wind Project Connection
- Double circuit loss of N1M and N2M for circuit sections on a common tower
- N5M, N6M, N5M and N6M
- N21J, N22J, N21J and N22J
- N580M, N581M
- N582L
- Loss of Nanticoke TS 500/230kV autotransformer

The analysis reviewed the effect of contingencies both before and after tap changer action. Both Norfolk TS and Bloomsburg MTS are supplied by the Caledonia 115kV circuits C9 and C12. The loads at these two stations were assumed to be voltage dependent in the before tap changer analysis; constant power loads were assumed in all other cases.

In all of the contingencies studied, the post-contingency voltage changes in the affected area met the criteria outlined in Section 2.1.1. Detailed results are shown in Appendix A. None of the above contingencies resulted in thermal overloads on the affected circuits.

#### **3.3 Short Circuit Analysis**

The short circuit analysis reviews the short circuit levels at customer buses with GREP in-service. The incremental short circuit contribution from GREP on customer buses is summarized in Appendix B. All customers are required to check to ensure that the equipment and grounding system at their stations meet the expected increase in fault level.

### 3.3.1 Impact at Stations Previously Mitigated for Fault Level

Where, Customer Impact Assessment studies conducted for projects that have either previously connected or plan to connect prior to the connection date planned for this project have identified stations at less than 50 kV where the fault level is within 5% of the values in Appendix 2 of the Transmission System Code (TSC); Hydro one requires connecting proponents who elevate fault levels within the 5% margin to contribute to the cost of installing mitigating measures to reduce the fault level below 95% of the TSC limit. Hydro One applies a 5% margin to maximum short circuit levels in the TSC to manage uncertainties in the calculation of expected short circuit levels. The TSC requires that any customer that benefits from such an installation that connects within five calendar years of the in-service date of the mitigation measure also contribute towards the cost of the measure, and that any such payments be refunded to the original contributing customer(s). This Section of this CIA report is to report on the impact that this project has at those previously mitigated stations to see if this project is required to financially contribute to the cost for any of those measures.

**Table 5: GREP impact on 3 phase fault levels at stations previously mitigated for fault levels**

| Station              | 3 Phase Fault Level (kA) Prior to GREP | 3 Phase Fault Level (kA) With GREP | Change (kA) |
|----------------------|----------------------------------------|------------------------------------|-------------|
| Windsor Walker TS #1 | 17.57                                  | 17.57                              | 0.00        |
| Martindale Z         | 14.91                                  | 14.91                              | 0.00        |
| <b>Caledonia TS</b>  | <b>16.51</b>                           | <b>16.53</b>                       | <b>0.02</b> |
| Kingsville TS        | 16.90                                  | 16.90                              | 0.00        |

\* Includes future generation projects expected to be in-service prior to GREP

**Table 6: GREP impact on single line to ground (SLG) fault levels at stations previously mitigated for fault levels**

| Station              | SLG Fault Level (kA) Prior to GREP | SLG Fault Level (kA) With GREP | Change (kA) |
|----------------------|------------------------------------|--------------------------------|-------------|
| Windsor Walker TS #1 | 3.50                               | 3.50                           | 0.00        |
| Martindale Z         | 19.78                              | 19.78                          | 0.00        |
| Caledonia TS         | 9.91                               | 9.91                           | 0.00        |
| Kingsville TS        | 11.91                              | 11.91                          | 0.00        |

\* Includes future generation projects expected to be in-service prior to GREP

*The results of the fault level studies in the tables above show that the GREP Project has a measureable ( $\geq 0.01\text{kA}$ ) impact at the fault level at Caledonia TS and hence has to make a contribution towards the cost of the mitigation measures installed for this problem.*

### **3.4 Preliminary Outage Impact Assessment**

The work required to connect GREP to circuit N5M will involve outages to this circuit and these outages will be coordinated with existing transmission customers. With appropriate construction and outage planning, it is expected that the connection of GREP can be performed with minimal supply impact to the existing transmission customers.

## **4 CONCLUSIONS AND RECOMMENDATIONS**

This CIA study has reviewed the impact of the GREP Project on the existing transmission customers in the vicinity of the proposed connection. The results show that this project does not adversely affect existing customers in the area. The short circuit results show that the GREP Project is required to make a contribution towards the cost of short circuit mitigation measures required at Caledonia TS because it elevates fault levels within the .5% margin.

All customers are required to check to ensure that the equipment and grounding system at their stations meet the expected increase in fault level.

## **APPENDIX A**

### **Voltage Study Results**

Voltage change was modeled both before and after under load tap changer action was reviewed. The Summerhaven, Port Dover and Nanticoke Wind and Grand Renewable Energy Park Projects were assumed in-service. The following contingencies were studied:

- Loss of GREP
- N1M North and South of Summerhaven connection
- N2M North and South of Port Dover and Nanticoke Wind connection
- N1M North and N2M North
- N1M North and N2M South
- N1M South and N2M South
- N5M, N6M, N5M and N6M
- N21J, N22J, N21J and N22J
- N580M, N581M
- N582L
- Loss of Nanticoke TS 500/230kV autotransformer

Buses where the voltage change was greater than 2% are shown in the following tables.

**Contingency N1M North of Summerhaven Connection**

| Bus                   | Pre-Contingency Voltage (kV) | Post-Contingency Voltage (kV) | % Change | Pre-Contingency Voltage (kV) | % Change |
|-----------------------|------------------------------|-------------------------------|----------|------------------------------|----------|
| Caledonia TS (27.6kV) | 232.5                        | 225.1                         | -3.2%    | 230.8                        | -0.8%    |

**Contingency N2M North of Port Dover Nanticoke Wind Connection**

| Bus                     | Pre-Contingency Voltage (kV) | Post-Contingency Voltage (kV) | % Change | Pre-Contingency Voltage (kV) | % Change |
|-------------------------|------------------------------|-------------------------------|----------|------------------------------|----------|
| Caledonia C9 (115kV)    | 123.8                        | 120.7                         | -2.5%    | 119.5                        | -3.5%    |
| Bloomsburg MTS (27.6kV) | 27.8                         | 25.2                          | -9.5%    | 28.2                         | 1.1%     |
| Norfolk TS (27.6kV)     | 28.7                         | 26.4                          | -8.0%    | 28.8                         | 0.5%     |

**Contingency N1M North of Summerhaven, N2M North of Port Dover Nanticoke Wind**

| Caledonia C9 (115kV)    | 123.8 | 120.2 | -2.9% | 119.5 | -3.4% |
|-------------------------|-------|-------|-------|-------|-------|
| Bloomsburg MTS (27.6kV) | 27.8  | 25.1  | -9.9% | 28.1  | 1.1%  |
| Caledonia TS (27.6kV)   | 29.2  | 28.1  | -3.7% | 29.3  | 0.5%  |
| Norfolk TS (27.6kV)     | 28.7  | 26.2  | -8.4% | 28.8  | 0.4%  |

**Contingency N1M North of Summerhaven, N2M South of Port Dover Nanticoke Wind**

| Caledonia TS (27.6kV) | 29.2 | 28.2 | -3.4% | 29.3 | 0.3% |
|-----------------------|------|------|-------|------|------|

**Contingency N6M**

| Caledonia C12 (115kV)   | 123.9 | 120.6 | -2.7% | 119.3 | -3.7% |
|-------------------------|-------|-------|-------|-------|-------|
| Bloomsburg MTS (27.6kV) | 27.8  | 25.1  | -9.7% | 28.0  | 0.5%  |
| Norfolk TS (27.6kV)     | 28.7  | 26.1  | -9.1% | 28.7  | 0.1%  |

**Contingency N5M**

| Caledonia TS (27.6kV) | 29.2 | 28.2 | -3.4% | 29.3 | 0.3% |
|-----------------------|------|------|-------|------|------|

**Contingency N5M, N6M**

| Caledonia C12 (115kV)   | 124.0 | 120.2 | -3.0% | 119.3 | -3.7% |
|-------------------------|-------|-------|-------|-------|-------|
| Bloomsburg MTS (27.6kV) | 28.2  | 25.4  | -9.9% | 28.4  | 0.8%  |
| Caledonia TS (27.6kV)   | 29.2  | 28.1  | -3.8% | 29.2  | 0.2%  |
| Norfolk TS (27.6kV)     | 28.6  | 26.0  | -9.3% | 28.7  | 0.1%  |

**Contingency N21J**

|                        | 2019-2020 | 2020-2021 | 2021-2022 | 2022-2023 | 2023-2024 |
|------------------------|-----------|-----------|-----------|-----------|-----------|
| Jarvis TS (27.6kV)     | 29.0      | 28.2      | -2.6%     | 29.3      | 1.0%      |
| US Steel A1A2 (13.8kV) | 14.5      | 14.1      | -2.5%     | 14.5      | -0.4%     |
| US Steel B1B2 (13.8kV) | 14.5      | 14.1      | -2.5%     | 14.5      | -0.4%     |

**Contingency N22J**

|                        | 2019-2020 | 2020-2021 | 2021-2022 | 2022-2023 | 2023-2024 |
|------------------------|-----------|-----------|-----------|-----------|-----------|
| Jarvis TS (27.6kV)     | 29.0      | 28.3      | -2.4%     | 29.0      | -0.1%     |
| US Steel A1A2 (13.8kV) | 14.5      | 14.2      | -2.5%     | 14.5      | -0.4%     |
| US Steel B1B2 (13.8kV) | 14.5      | 14.2      | -2.5%     | 14.5      | -0.4%     |

## **APPENDIX B**

### **Short Circuit Analysis**

| Bus # | Bus Name                 | Max kV | Before GREP (kA) |        |           |        | After GREP (kA) |        |           |        | Incremental (kA) |       |           |       | Limiting Breaker Rating (kA) |       |
|-------|--------------------------|--------|------------------|--------|-----------|--------|-----------------|--------|-----------|--------|------------------|-------|-----------|-------|------------------------------|-------|
|       |                          |        | 3 Phase          |        | 1- $\phi$ |        | 3 Phase         |        | 1- $\phi$ |        | Asym             |       | 1- $\phi$ |       | Sym                          | Asym  |
|       |                          |        | Sym              | Asym   | Sym       | Asym   | Sym             | Asym   | Sym       | Asym   | Sym              | Asym  | Sym       | Asym  |                              |       |
| 5954  | Bloomsburg JQ            | 29.0   | 6.765            | 7.511  | 5.656     | 6.887  | 6.766           | 7.512  | 5.656     | 6.888  | 0.001            | 0.001 | 0.000     | 0.001 | (2)                          | (2)   |
| 5415  | Bloomsburg T2            | 127.1  | 3.238            | 3.453  | 1.966     | 2.033  | 3.239           | 3.454  | 1.967     | 2.033  | 0.001            | 0.001 | 0.001     | 0.000 | -                            | -     |
| 5411  | Bloomsburg T1            | 127.0  | 3.239            | 3.454  | 1.962     | 2.028  | 3.240           | 3.455  | 1.962     | 2.028  | 0.001            | 0.001 | 0.000     | 0.000 | -                            | -     |
| 5968  | Caledonia BY             | 29.0   | 16.514           | 21.641 | 9.908     | 13.927 | 16.532          | 21.673 | 9.912     | 13.935 | 0.018            | 0.032 | 0.004     | 0.008 | 22.00                        | 23.10 |
| 6271  | Imperial Oil Nanticoke   | 29.0   | 13.128           | 17.705 | 1.280     | 1.460  | 13.131          | 17.708 | 1.280     | 1.460  | 0.003            | 0.003 | 0.000     | 0.000 | (2)                          | (2)   |
| 5145  | Imperial Oil Nanticoke   | 250.0  | 29.561           | 37.712 | 26.079    | 31.783 | 29.790          | 37.974 | 26.198    | 31.905 | 0.229            | 0.262 | 0.119     | 0.122 | -                            | -     |
| 6083  | Jarvis BY <sup>(1)</sup> | 29.0   | 14.346           | 18.294 | 9.170     | 12.686 | 14.349          | 18.299 | 9.171     | 12.688 | 0.003            | 0.005 | 0.001     | 0.002 | 22.00                        | 23.10 |
| 5105  | Nanticoke                | 250.0  | 41.883           | 59.462 | 41.869    | 62.010 | 42.386          | 60.171 | 42.203    | 62.506 | 0.503            | 0.709 | 0.334     | 0.496 | (2)                          | (2)   |
| 5003  | Nanticoke                | 550.0  | 30.904           | 42.977 | 33.138    | 47.973 | 31.037          | 43.179 | 33.240    | 48.137 | 0.133            | 0.202 | 0.102     | 0.164 | (2)                          | (2)   |
| 6164  | Norfolk BY               | 29.0   | 8.566            | 8.566  | 7.826     | 8.529  | 8.568           | 8.568  | 7.827     | 8.530  | 0.002            | 0.002 | 0.001     | 0.001 | 9.60                         | 9.95  |
| 6230  | US Steel A               | 14.2   | 19.695           | 26.173 | 0.752     | 0.752  | 19.702          | 26.183 | 0.752     | 0.752  | 0.007            | 0.010 | 0.000     | 0.000 | (2)                          | (2)   |
| 6231  | US Steel B               | 14.2   | 19.695           | 26.173 | 0.752     | 0.752  | 19.702          | 26.183 | 0.752     | 0.752  | 0.007            | 0.010 | 0.000     | 0.000 | (2)                          | (2)   |
| 5279  | US Steel D1              | 250.0  | 22.491           | 28.904 | 18.735    | 22.401 | 22.635          | 29.071 | 18.802    | 22.468 | 0.144            | 0.167 | 0.067     | 0.067 | -                            | -     |
| 5280  | US Steel D2              | 250.0  | 22.491           | 28.904 | 18.765    | 22.429 | 22.635          | 29.071 | 18.832    | 22.497 | 0.144            | 0.167 | 0.067     | 0.068 | -                            | -     |

Notes:

(1) Includes current limiting reactors being installed at Jarvis TS

(2) Customer to check and verify breaker rating

(3) Contact parting times used are as follows: 230kV and higher buses: 25ms, Norfolk BY 27.6kV: 50ms, all other buses: 33ms

(4) Includes future generation projects expected to be in-service prior to GREP

### CONSTRUCTION AND IN-SERVICE SCHEDULE

90) The construction schedule for the GREP and the Proposed Facility is contained below.

| Task                                                       | Start          | Finish        |
|------------------------------------------------------------|----------------|---------------|
| <b>OEB Process</b>                                         |                |               |
| Initiate Land Discussion                                   |                | October 2010  |
| Submit Section 92 Leave to Construction Application to OEB |                | February 2011 |
| Obtain REA Approval                                        |                | August 2011   |
| Obtain Section 92 Approval                                 |                | August 2011   |
|                                                            |                |               |
| <b>GREP</b>                                                |                |               |
| Detailed Engineering                                       | April 2011     | November 2011 |
| Surveying, Delivery of Construction Material               | May 2011       | August 2011   |
| Installation of tower foundation/Road                      | September 2011 | July 2012     |
| Tower/Turbine delivery and erection                        | May 2012       | December 2012 |
| Solar panel delivery and installation                      | January 2012   | November 2012 |
| Installation collector lines                               | November 2011  | December 2012 |
| Installation of building                                   | March 2012     | August 2012   |
| Project Testing                                            | January 2013   | February 2013 |
| Commercial Operation                                       | March 2013     | March 2013    |
|                                                            |                |               |
| <b>Proposed Facility</b>                                   |                |               |
| Detailed Engineering                                       | April 2011     | August 2011   |
| Tender and Award Structural Steel                          | April 2011     | May 2011      |
| Fabrication of Structural Steel                            | June 2011      | August 2012   |
| Delivery of Structural Steel                               | November 2011  | August 2012   |
| Construction                                               | September 2012 | December 2012 |
| Restoration                                                | January 2013   | March 2013    |

91) The Applicant will follow the progress of permits and approvals in order to ensure timely issuance thereof. The Applicant will ensure that a construction environment management plan and contingency management plan are both in place prior to construction of the Proposed Facility. Such plans will be the controlling plans for all construction activities and allow for efficient project management. Given the relatively simple design of the Proposed

Facility, it is not anticipated that adverse weather conditions will cause significant delay, if such adverse weather conditions arise. The Applicant, through its affiliates, has access to many experienced engineering, procurement and construction and project management engineers.

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Filed: 2011-02-28  
Exhibit B  
Tab 6  
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Pages: 1

## **GANTT CHART**

| ID | Task Name                                               | Start        | Finish       | 0   | Qtr 4, 2010 | Qtr 1, 2011 | Qtr 2, 2011 | Qtr 3, 2011 | Qtr 4, 2011 | Qtr 1, 2012 | Qtr 2, 2012 | Qtr 3, 2012 | Qtr 4, 2012 | Qtr 1, 2013 |     |     |     |     |     |     |     |     |
|----|---------------------------------------------------------|--------------|--------------|-----|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|
|    |                                                         |              |              | Sep | Oct         | Nov         | Dec         | Jan         | Feb         | Mar         | Apr         | May         | Jun         | Jul         | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar |
| 1  |                                                         |              |              |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 2  |                                                         |              |              |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 3  | <b>OEB Process</b>                                      | Sun 31/10/10 | Wed 31/08/11 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 4  | Initiate landowner discussions                          | Sun 31/10/10 | Sun 31/10/10 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 5  | Submit Section 92 Leave to Construct Application to OEB | Mon 28/02/11 | Mon 28/02/11 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 6  | Obtain REA Approval                                     | Mon 15/08/11 | Mon 15/08/11 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 7  | Obtain Section 92 Approval                              | Wed 31/08/11 | Wed 31/08/11 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 8  |                                                         |              |              |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 9  |                                                         |              |              |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 10 |                                                         |              |              |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 11 | <b>GREP</b>                                             | Fri 01/04/11 | Fri 01/03/13 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 12 | Detailed Engineering                                    | Fri 01/04/11 | Wed 30/11/11 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 13 | Surveying/Delivery of Construction Material             | Sun 01/05/11 | Wed 31/08/11 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 14 | Installation of tower foundation/Road                   | Thu 01/09/11 | Tue 31/07/12 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 15 | Tower/Turbine delivery and erection                     | Tue 01/05/12 | Fri 30/11/12 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 16 | Solar panel delivery and installation                   | Sun 01/01/12 | Fri 30/11/12 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 17 | Installation collector lines                            | Tue 01/11/11 | Sun 30/12/12 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 18 | Installation of building                                | Thu 01/03/12 | Fri 31/08/12 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 19 |                                                         |              |              |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 20 | Project Testing                                         | Tue 01/01/13 | Thu 28/02/13 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 21 | Commercial Operation                                    | Fri 01/03/13 | Fri 01/03/13 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 22 |                                                         |              |              |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 23 |                                                         |              |              |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 24 |                                                         |              |              |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 25 | <b>Proposed Facility</b>                                | Fri 01/04/11 | Fri 01/03/13 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 26 | Detailed Engineering                                    | Fri 01/04/11 | Wed 31/08/11 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 27 | Tender and Award Structural Steel                       | Fri 01/04/11 | Tue 31/05/11 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 28 | Fabrication of Structural Steel                         | Wed 01/06/11 | Wed 15/08/12 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 29 | Delivery of Structural Steel                            | Tue 01/11/11 | Fri 31/08/12 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 30 | Construction                                            | Sat 01/09/12 | Mon 31/12/12 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 31 | Restoration                                             | Tue 01/01/13 | Fri 01/03/13 |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |
| 32 |                                                         |              |              |     |             |             |             |             |             |             |             |             |             |             |     |     |     |     |     |     |     |     |

## PERMITS AND APPROVALS

### ***Environmental Assessment***

92) The Applicant is in the process of completing the EEA Application. According to subsection 6.(3) of the REA Regulation, the Wind Project is classified as a Class 4 wind facility and the Solar Project is classified as a Class 3 solar facility. The draft Project Description Report is one component of the REA application for the Project, and has been prepared in accordance with Item 10, Table 1 of the REA Regulation, and the MOE's draft *Technical Bulletin One: Guidance for preparing the Project Description Report* (March 2010). A copy of the draft Project Description Report is found at Exhibit B-7-2. Copies of the entire REA Application will be made available to the public at <http://www.samsungrenewableenergy.ca>. Hard copies will also be available for review at 45 Munsee St., Cayuga, Ontario, N0A 1E0.

### ***Permits and Approvals***

93) Further to the REA approval process there are a number of additional federal, provincial and municipal approvals that are being sought in order to commence construction of the project. A list of the anticipated environmental approvals is in Tables 1 to 3 below.

| <b>Table 1 Key Federal Permits and Authorizations</b> |                                      |                                              |
|-------------------------------------------------------|--------------------------------------|----------------------------------------------|
| <b>Permit / Authorization</b>                         | <b>Administering Agency</b>          | <b>Rationale</b>                             |
| Aeronautical Obstruction Clearance                    | Transport Canada – Aviation Division | Turbine lighting and marking                 |
| Land Use Clearance                                    | NavCanada                            | Aeronautical safety mapping and designations |
| Navigational Clearance                                | Transport Canada – Marine Division   | Crossing a navigable watercourse             |

| <b>Table 2 Key Provincial Permits and Authorizations</b> |                                |                                                                   |
|----------------------------------------------------------|--------------------------------|-------------------------------------------------------------------|
| <b>Key Permit / Authorization</b>                        | <b>Administering Agency</b>    | <b>Rationale</b>                                                  |
| Approval of Connection                                   | IESO                           | Electrical interconnect with IESO regulated network               |
| Connection Assessment                                    | IESO                           | Integration of project with IESO-controlled transmission system   |
| Customer Impact Assessment                               | Hydro One Networks Inc. (HONI) | Integration of project with Hydro One and effects to customers    |
| Connection Cost Recovery Agreement (CCRA)                | HONI                           | Recovery of costs to grid operator of changes to allow connection |

| <b>Table 2 Key Provincial Permits and Authorizations</b>                                       |                                                                          |                                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Key Permit / Authorization</b>                                                              | <b>Administering Agency</b>                                              | <b>Rationale</b>                                                                                                                                                                                                                                                                                              |
| System Impact Assessment                                                                       | IESO                                                                     | Integration of project with IESO-controlled transmission system                                                                                                                                                                                                                                               |
| Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses Permit | Grand River Conservation Authority and Long Point Conservation Authority | Work within floodplains, water crossings, river or stream valleys, hazardous lands and within or adjacent to wetlands. Projects requiring review, Fisheries Act authorization and/or assessment under the Canadian Environmental Assessment Act are forwarded to the Department of Fisheries and Oceans (DFO) |
| Certificate of Inspection                                                                      | Electrical Safety Authority (ESA)                                        | A record that electrical work complies with the requirements of the Ontario Electrical Safety Code.                                                                                                                                                                                                           |
| Generator's License                                                                            | Ontario Energy Board (OEB)                                               | Generation of electrical power for sale to grid                                                                                                                                                                                                                                                               |
| Leave to Construct                                                                             | OEB                                                                      | Authorization to construct power transmission lines                                                                                                                                                                                                                                                           |
| Notice of Project                                                                              | Ministry of Labour                                                       | Notify the Ministry of Labour before construction begins.                                                                                                                                                                                                                                                     |
| Special vehicle configuration permit                                                           | Ministry of Transportation (MTO)                                         | Use of non-standard vehicles to transport large components                                                                                                                                                                                                                                                    |
| Transportation Plan                                                                            | MTO                                                                      | Adherence to road safety and suitability                                                                                                                                                                                                                                                                      |
| Highway Entrance Permit                                                                        | MTO                                                                      | Entrance permit for new or upgraded road entrances onto a provincial highway<br>Interference or obstruction of the highway                                                                                                                                                                                    |
| Change of Access and Heavy/Oversize Load Transportation Permit                                 | MTO                                                                      | Compliance with provincial highway traffic and road safety regulations                                                                                                                                                                                                                                        |
| Wide or excess load permit                                                                     | MTO                                                                      | Transportation of large or heavy items on provincial highways                                                                                                                                                                                                                                                 |

| <b>Table 3 Key Municipal Permits and Authorizations</b> |                                                                               |
|---------------------------------------------------------|-------------------------------------------------------------------------------|
| <b>Key Permit / Authorization</b>                       | <b>Rationale</b>                                                              |
| Municipal Consent, Work with the R.O.W                  | Required for works in municipal road allowances                               |
| Consent/Severance Application                           | Required if easements over private lands required                             |
| Road Cut Permit                                         | May be required for access roads off of county roads or works to county roads |
| Pre-Condition Survey                                    | Assessment of pre-construction conditions for engineering staff               |
| Building Permit                                         | Compliance with building codes                                                |
| Entrance Permit                                         | Entrance from county roads                                                    |
| Transportation Plan                                     | Adherence to road safety and suitability                                      |
| Additional Plans related to                             | Required supporting information/plans required by Haldimand County            |

| <b>Table 3      Key Municipal Permits and Authorizations</b>                                                                                        |                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <b>Key Permit / Authorization</b>                                                                                                                   | <b>Rationale</b> |
| general engineering (e.g. siltation control, lot grading, plan of services, etc.), water, wastewater, storm water, transportation, and geotechnical |                  |

- 94) In addition to the above noted permits, the Applicant will be required to register as a market participant with the IESO. Applications for each such approval will be made in due course.

EB-2011-0063  
Filed: 2011-02-28  
Exhibit B  
Tab 7  
Schedule 2  
Pages: 19

## **PROJECT DESCRIPTION REPORT**



**GRAND RENEWABLE ENERGY PARK  
- DRAFT PROJECT DESCRIPTION  
REPORT – VERSION 2**

***DRAFT***

File No. 160960577  
June 2010

Prepared for:

**Samsung Renewable Energy Inc.  
55 Standish Court  
Mississauga, ON L5R 4B2**

Prepared by:

**Stantec Consulting Ltd.  
Suite 1 - 70 Southgate Drive  
Guelph ON N1G 4P5**

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**DRAFT**

## 1.0 Overview

This document provides a preliminary description of the proposed Grand Renewable Energy Park (the Project). This Project Description Report has been written in accordance with Ontario Regulation 359/09 (Renewable Energy Approvals under Part V.0.1 of the Act) under the *Environmental Protection Act*. The information provided herein, and its location within the document is as follows:

**Table 1.1 Project Description Report Contents**

| <b>Content</b>                                                                                                                                                                                                               | <b>Location within Project Description Report</b> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| 1. Any energy sources to be used to generate electricity at the renewable energy generation facility.                                                                                                                        | Section 2.1                                       |
| 2. The facilities, equipment or technology that will be used to convert the renewable energy source or any other energy source to electricity.                                                                               | Section 2.2                                       |
| 3. If applicable, the class of the renewable energy generation facility.                                                                                                                                                     | Section 2.3                                       |
| 4. The activities that will be engaged in as part of the renewable energy project.                                                                                                                                           | Section 2.4                                       |
| 5. The name plate capacity of the renewable energy generation facility.                                                                                                                                                      | Section 2.5                                       |
| 6. The ownership of the land on which the project location is to be situated                                                                                                                                                 | Section 2.6                                       |
| 7. Any negative environmental effects that may result from engaging in the project.                                                                                                                                          | Section 3.0 and Appendix C                        |
| 8. An unbound, well marked, legible and reproducible map that is an appropriate size to fit on a 215 millimetre by 280 millimetre page, showing the project location and the land within 300 metres of the project location. | Appendix A                                        |

### 1.1 GENERAL INFORMATION

The Project is known as the Grand Renewable Energy Park and consists of a 140 MW (nameplate capacity) wind project and a 100 MW (nameplate capacity) solar project. The Project will be entirely located within Haldimand County in south-western Ontario. A map showing the location of the project is provided in **Appendix A**.

The Project area consists of flat, gently rolling farmland. It is generally bounded by i) Haldimand Concession 11 W-1 to the North; ii) Haldimand Road 55 to the West; iii) the Grand River to the East; and iv) Lake Erie to the South. Settlements in the general vicinity of the Project include Selkirk, Fisherville, South Cayuga, and Byng. Selkirk Provincial Park and James N. Allan Provincial Park are also located in the general vicinity of the Project. The Canada Land Inventory (CLI) classifications for the Project Location have also been identified within **Appendix A**.

## **1.2 CONTACTS**

The proponent for the Project is Samsung Renewable Energy Inc. ("Samsung"). Samsung's office and contact for the Project is:

Name: Adam Rosso  
Title: Manager, Business Development  
Company: Samsung Renewable Energy Inc.  
Address: 55 Standish Court  
Mississauga, ON L5R 4B2

The lead consultant for preparation of the Renewable Energy Approval (REA) application is Stantec Consulting Ltd. ("Stantec"). Stantec provides professional consulting services in planning, engineering, architecture, interior design, landscape architecture, surveying, environmental sciences, project management, and project economics for infrastructure and facilities projects. The consultant's office and Project contact is:

Name: Rob Nadolny  
Title: Senior Project Manager  
Company: Stantec Consulting Ltd.  
Address: Suite 1 - 70 Southgate Drive  
Guelph, ON N1G 4P5

Project Email: GrandRenewable@SamsungRenewableEnergy.ca  
Project Telephone: (877) 536-6050 or 519-836-6050 (collect)

## **1.3 AUTHORIZATIONS REQUIRED**

### **1.3.1 Provincial**

According to subsections 4.(3) and 6.(3) of the Regulation, the proposed solar project is a Class 3 Solar Facility and the wind project is a Class 4 Wind Facility. As agreed upon with the Ministry of the Environment, one REA Application will be submitted for the Project consisting of information related to both the wind and solar projects. In return, two separate Renewable Energy Approvals are being sought, one for the wind project and one for the solar project.

At the provincial level there are multiple permits and approvals that may be required to facilitate the development of the Project, in addition to the REA. Their ultimate applicability will be determined during the REA process and based upon the Project's detailed design. The following is a list of key permits and approvals that may be required; however additional permits may also be required.

**Table 1.2 Key Provincial Permits and Authorizations**

| Key Permit / Authorization                                                                     | Administering Agency                                                     | Rationale                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Approval of Connection                                                                         | IESO                                                                     | Electrical interconnect with IESO regulated network                                                                                                                                                                                                                                                                         |
| Connection Assessment                                                                          | IESO                                                                     | Integration of project with IESO-controlled transmission system                                                                                                                                                                                                                                                             |
| Customer Impact Assessment                                                                     | Hydro One Networks Inc. (HONI)                                           | Integration of project with Hydro One and effects to customers                                                                                                                                                                                                                                                              |
| Connection Cost Recovery Agreement (CCRA)                                                      | HONI                                                                     | Recovery of costs to grid operator of changes to allow connection                                                                                                                                                                                                                                                           |
| System Impact Assessment                                                                       | IESO                                                                     | Integration of project with IESO-controlled transmission system                                                                                                                                                                                                                                                             |
| Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses Permit | Grand River Conservation Authority and Long Point Conservation Authority | Work within floodplains, water crossings, river or stream valleys, hazardous lands and within or adjacent to wetlands. Projects requiring review, <i>Fisheries Act</i> authorization and/or assessment under the <i>Canadian Environmental Assessment Act</i> are forwarded to the Department of Fisheries and Oceans (DFO) |
| Certificate of Inspection                                                                      | Electrical Safety Authority (ESA)                                        | A record that electrical work complies with the requirements of the Ontario Electrical Safety Code.                                                                                                                                                                                                                         |
| Generator's License                                                                            | Ontario Energy Board (OEB)                                               | Generation of electrical power for sale to grid                                                                                                                                                                                                                                                                             |
| Leave to Construct                                                                             | OEB                                                                      | Authorization to construct power transmission lines                                                                                                                                                                                                                                                                         |
| Notice of Project                                                                              | Ministry of Labour                                                       | Notify the Ministry of Labour before construction begins.                                                                                                                                                                                                                                                                   |
| Special vehicle configuration permit                                                           | Ministry of Transportation (MTO)                                         | Use of non-standard vehicles to transport large components                                                                                                                                                                                                                                                                  |
| Transportation Plan                                                                            | MTO                                                                      | Adherence to road safety and suitability                                                                                                                                                                                                                                                                                    |
| Highway Entrance Permit                                                                        | MTO                                                                      | Entrance permit for new or upgraded road entrances onto a provincial highway<br>Interference or obstruction of the highway                                                                                                                                                                                                  |
| Change of Access and Heavy/Oversize Load Transportation Permit                                 | MTO                                                                      | Compliance with provincial highway traffic and road safety regulations                                                                                                                                                                                                                                                      |
| Wide or excess load permit                                                                     | MTO                                                                      | Transportation of large or heavy items on provincial highways                                                                                                                                                                                                                                                               |

### 1.3.2 Municipal

Several permits and authorizations may also be required from Haldimand County (Table 1.3).

**Table 1.3 Key Municipal Permits and Authorizations**

| Key Permit / Authorization             | Rationale                                                                     |
|----------------------------------------|-------------------------------------------------------------------------------|
| Municipal Consent, Work with the R.O.W | Required for works in municipal road allowances                               |
| Consent/Severance Application          | Required if easements over private lands required                             |
| Road Cut Permit                        | May be required for access roads off of county roads or works to county roads |
| Pre-Condition Survey                   | Assessment of pre-construction conditions for engineering staff               |

**Table 1.3 Key Municipal Permits and Authorizations**

| Key Permit / Authorization                                                                                                                                                      | Rationale                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Building Permit                                                                                                                                                                 | Compliance with building codes                                     |
| Entrance Permit                                                                                                                                                                 | Entrance from county roads                                         |
| Transportation Plan                                                                                                                                                             | Adherence to road safety and suitability                           |
| Additional Plans related to general engineering (e.g. siltation control, lot grading, plan of services, etc.), water, wastewater, storm water, transportation, and geotechnical | Required supporting information/plans required by Haldimand County |

### 1.3.3 Federal Involvement

It is expected that a Federal Screening report will not be required for the Project, as it is not anticipated that it will cause a 'trigger' under the *Canadian Environmental Assessment Act* (CEAA), such as a Harmful Alteration, Disruption or Destruction of fish habitat under the *Fisheries Act*, or application for project funding under a future program similar to *ecoEnergy for Renewable Power*. However, the agency consultation program for the Project will include all federal departments and agencies typically interested in wind power projects (e.g., Department of National Defense, Environmental Canada, Transport Canada, etc.). All required federal permits and approvals required for the Project will be determined during the REA process, but may include those listed in Table 1.4.

**Table 1.4 Key Federal Permits and Authorizations**

| Permit / Authorization             | Administering Agency                 | Rationale                                    |
|------------------------------------|--------------------------------------|----------------------------------------------|
| Aeronautical Obstruction Clearance | Transport Canada – Aviation Division | Turbine lighting and marking                 |
| Land Use Clearance                 | NavCanada                            | Aeronautical safety mapping and designations |
| Navigational Clearance             | Transport Canada – Marine Division   | Crossing a navigable watercourse             |

## **2.0 Project Information**

---

### **2.1 ENERGY SOURCES**

The Grand Renewable Energy Park will utilize wind and sunlight as sources of energy for the Project.

### **2.2 LAND OWNERSHIP**

The Project will be located on privately owned and Ontario Realty Corporation (ORC) managed lands within Haldimand County. The land that will be utilized by the Project is shown in the Project map (**Appendix A**). The legal description of the parcels of land that will be used for Project will be provided as part of the REA application.

### **2.3 PROJECT COMPONENTS**

This section provides a general description of the major equipment and infrastructure associated with operation of the Project. The preliminary project description provided in this document will be refined and finalized as Samsung proceeds through the REA process.

#### **2.3.1 Wind Turbine Generators**

The specific make and model of wind turbines to be used as part of the wind component of the Project are being finalized. They are expected to be approximately 2.2 to 2.3 MW each (nameplate capacity) for a total of 140 MW (nameplate capacity) and comprising of approximately 63 turbines. Hub height will be approximately 100 metres, with a rotor diameter of approximately 101 metres.

A more detailed description of the turbines is provided in **Appendix B**.

#### **2.3.2 Solar Panels**

The panels to be used as part of the solar component of the solar component of the Project are being finalized. They will consist of photovoltaic (PV) panels installed on fixed ground-mounted racking structures. The solar portion of the Project will have a nameplate capacity of 100 MW.

A more detailed description of the panels will be provided at a later date once the solar components are finalized.

#### **2.3.3 Electrical Interconnection**

Depending on the turbine model, a transformer (approximately 1.5 cubic metres) may be sited within approximately 3 m of the base of each tower. The transformer will be connected to the wind project's collection system, which will transport electricity to the Project's transformer substation.

Similar to the wind turbine generators, the electrical output of the solar panels will be transformed to distribution voltage levels and connected to the Project's substation via the solar project's collector system.

The substation will transform the distribution voltage of the Project's collection system to 230 kV such that it can be tied in to the provincial electricity grid operated by Hydro One Networks Inc. The substation will be operated, monitored and controlled 24-hours a day via a telecommunication system. To facilitate the Project's connection to the provincial grid, a new 30 km long (approximate) 230 kV transmission line will be constructed as part of the project. The configuration and route for the power line will be determined as part of the REA process.

### **2.3.4 Access Laneways**

Existing provincial and municipal roads will be used to transport project-related components, equipment and personnel to the project area. The Project will be installed on a combination of private and ORC-managed lands. Access to these lands will be required for installation and operation of the wind turbines and solar panels. Because of the current farming activity in the area, numerous agricultural laneways are present in the vicinity of the Project. These existing laneways will be utilized where possible. New laneways will be constructed as required to provide access to the individual turbine sites and solar PV panels. Permanent access laneways will be approximately 4 metres wide.

### **2.3.5 Operations and Maintenance Building**

Associated with the Project will be an operations and maintenance building. This facility will provide warehouse and workshop spaces, administrative office and telecommunications areas, equipment storage and security facilities as required.

## **2.4 PROJECT SCHEDULE**

The table below provides an overview of the projected dates associated with the Project.

**Table 2.1 Project Schedule Overview**

| <b>Milestone</b>                | <b>Approximate Date</b>                 |
|---------------------------------|-----------------------------------------|
| Initiate Public REA Process     | June 2010                               |
| REA technical studies           | Ongoing through to December 2010        |
| Public Open House #1            | July 2010                               |
| Draft REA Reports to Public     | October 2010                            |
| Public Open House #2            | December 2010                           |
| REA Approval                    | April 2011                              |
| Start of Construction           | April 2011                              |
| Commercial Operation Date (COD) | December 2012 – March 2013              |
| Repowering/Decommissioning      | 2037 (approximately 25 years after COD) |

## 2.5 PROJECT ACTIVITIES

A general overview of the activities during construction, operation, and decommissioning phases of the Project are provided below.

**Table 2.2 Key Project Activities**

| <b>Project Phase</b>   | <b>Activities</b>                                                                                   |
|------------------------|-----------------------------------------------------------------------------------------------------|
| <b>Construction</b>    | <b>Turbine and Solar Sites</b>                                                                      |
|                        | Delineation of temporary work areas                                                                 |
|                        | Access road construction                                                                            |
|                        | Completion of necessary site grading                                                                |
|                        | Installation of tower and panel foundations                                                         |
|                        | Installation of crane pads                                                                          |
|                        | Tower/turbine erection and panel installation                                                       |
|                        | Installation of step-up transformer and required wiring                                             |
|                        | Installation of collector lines, usually parallel to access roads                                   |
|                        | Reclamation of temporary work areas                                                                 |
|                        | Site landscaping (final grading, topsoil replacement, etc.)                                         |
|                        | <b>Substation Site</b>                                                                              |
|                        | Preparation of laydown area                                                                         |
|                        | Installation of substation and connection with grid                                                 |
|                        | Construction of operations and maintenance building                                                 |
|                        | Reclamation of temporary work areas                                                                 |
|                        | <b>Off-Site Activities</b>                                                                          |
|                        | Installation of collector lines and transmission line in municipal road right of way                |
| <b>Operation</b>       | <b>Turbine and Solar Sites</b>                                                                      |
|                        | Preventative maintenance                                                                            |
|                        | Unplanned maintenance                                                                               |
|                        | Meter calibrations                                                                                  |
|                        | Grounds keeping                                                                                     |
|                        | <b>Substation Site</b>                                                                              |
|                        | Preventative maintenance for substation                                                             |
|                        | Unplanned maintenance for substation                                                                |
|                        | Remote wind farm condition monitoring                                                               |
|                        | Operations and maintenance building maintenance                                                     |
|                        | <b>Off-Site Activities</b>                                                                          |
|                        | Electrical line maintenance                                                                         |
| <b>Decommissioning</b> | <b>Turbine and Solar Sites</b>                                                                      |
|                        | Removal of turbine and solar panel infrastructure                                                   |
|                        | Removal of step-up transformer                                                                      |
|                        | Site grading (dependent upon new proposed use)                                                      |
|                        | Possible removal of access roads dependent upon agreement with property owner                       |
|                        | Possible excavation and removal of collector lines depending upon agreement with property owner     |
|                        | <b>Off-Site Activities</b>                                                                          |
|                        | Possible removal of collector system and transmission line in municipal right of way (remove wires) |

**Table 2.2 Key Project Activities**

| Project Phase | Activities                                                                                  |
|---------------|---------------------------------------------------------------------------------------------|
|               | and poles)                                                                                  |
|               | Disconnection of substation from provincial grid                                            |
|               | Removal of substation                                                                       |
|               | Removal of operation and maintenance building, dependent upon agreement with property owner |

### 2.5.1 Waste Generation and Emissions

#### **Waste Generation**

During construction, waste material produced by the Project is expected to consist of construction material (e.g., excess fill/soil, scrap lumber, banding, plastic wrap removed from palletized goods, etc.) and a minor amount of domestic waste. Similar waste material may be generated during decommissioning.

During operation, the Operation and Maintenance Building will produce waste materials typical of an office setting, including recyclables and domestic waste. In addition, there will be waste generated as a result of ongoing maintenance activities (e.g., used lubricants and oils).

All wastes will be handled and recycled or disposed of in accordance with regulatory requirements. Further details on waste management and disposal will be developed during the REA process.

#### **Emissions**

During construction, dust and acoustic emissions will be generated as a result of operating heavy equipment and due to construction related traffic and various construction activities (e.g., excavation, grading, etc.). Similar emissions may be expected during decommissioning.

During operation, air emissions will be restricted to the operation of maintenance vehicles and the heating of the operation and maintenance building. Acoustic emissions from the Project (turbines, transformers and substation) will be assessed in detail during the REA process. All emissions will be managed within the limits set by regulatory requirements.

### 2.5.2 Hazardous Materials

Hazardous materials on-site are limited to fuel, lubricating oils, and other fluids associated with project construction, maintenance and operation. These materials are contained within Project components and/or the maintenance/control building. Typical containment facilities and emergency response materials will be maintained on-site as required. Disposal of any hazardous materials will be in accordance with regulatory requirements. The process for final disposal of any hazardous waste will be developed during the REA process.

### **2.5.3 Sewage and Stormwater Management**

Sanitary waste generated by the construction crew will be collected via portable toilets and wash stations supplied by the construction contractor. Disposal of these wastes will be the responsibility of the contracted party and will be done in accordance with regulatory requirements.

To support the operations and maintenance building, a septic system and water well will likely need to be installed. This system will be designed to the standard specifications for the area as defined by the MOE and/or County. More detailed information on the water well and septic system will be provided later in the REA process.

Stormwater management works may be required in association with the Operations and Maintenance building and substation. The specific requirement for these works will be assessed during the REA process.

### **2.5.4 Water-taking Activities**

Depending on groundwater levels, some dewatering activities may be required during turbine foundation excavation; however withdrawal amounts are anticipated to be below 50,000 l/d. More information on water-taking activities will be provided later in the REA process.

### **3.0 Description of Potential Environmental Effects**

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The effects of constructing, operating, and maintaining a renewable energy facility is well understood and can be typically mitigated through well known and accepted techniques and practices. For example, siting infrastructure outside of wetlands and away from residential (sound) receptors reduces the potential for negative environmental effects.

A screening of environmental features was undertaken on potential issues and effects relevant to the Project (see **Appendix C**). Based upon the above screening of environmental features, experience gained as part Project planning, and the requirements of the REA process, the following Project-specific issues and potential effects have been identified and are expected to be further analysed as part of the REA application process:

- Heritage and Archaeological Resources
- Natural Heritage Resources
- Water Bodies
- Air, Odour, Dust
- Environmental Noise
- Land Use and Resources
- Provincial and Local Infrastructure
- Public Health and Safety

Detailed descriptions of the potential effects, mitigation measures, and net effects to these features during the construction, operation, and decommissioning phases of the Project will be provided in the REA application and summarized in the final Project Description Report.

#### **3.1 PROJECT RELATED SETBACKS**

A key component of the REA process is the establishment of common setbacks for all renewable energy facilities in the Province. Where Project related infrastructure will be located within the setbacks, additional analysis (i.e., Environmental Impact Study) will be provided in the REA application and summarized in the final Project Description Report. Based on information available at the time of writing, setbacks to be utilized have been mapped on the Project Location Map (**Appendix A**); however some of the setbacks (e.g., non-participating receptors, significant wildlife habitat, etc.) have not yet been mapped as site investigations and other analyses have not yet been completed to confirm the locations of the features.

Key setbacks which will be applied throughout the design of the Project are as follows:

| Feature                                           | Setback Distance                                      | Study Alternative When Within Setback                                                                                                                                                                                                                     |
|---------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Non-participating receptor                        | 550 m (from turbine base)                             | An Environmental Noise Impact Assessment will be completed for the Project according to MOE Noise Guidelines.                                                                                                                                             |
| Public road right-of-way and railway right-of-way | Turbine blade length + 10 m (from turbine base)       | N/A                                                                                                                                                                                                                                                       |
| Property line                                     | Turbine height (excluding blades) (from turbine base) | Does not apply to parcels of land if the abutting parcel of land is a participant in the Project or if it is demonstrated that the wind turbine will not result in adverse impacts on nearby business, infrastructure, properties or land use activities. |
| Provincially significant southern wetland         | 120 m                                                 | Development not permitted within feature.<br><br>Development and site alteration may be possible within setback area; EIS required.                                                                                                                       |
| Provincially significant ANSI (Earth Science)     | 50 m                                                  | Development and site alteration may be possible within natural feature and setback area; EIS required.                                                                                                                                                    |
| Provincially significant ANSI (Life Science)      | 120 m                                                 | Development and site alteration may be possible within natural feature and setback area; EIS required.                                                                                                                                                    |
| Significant valleyland                            | 120 m                                                 | Development and site alteration may be possible within natural feature and setback area; EIS required.                                                                                                                                                    |
| Significant woodland                              | 120 m                                                 | Development and site alteration may be possible within natural feature and setback area; EIS required.                                                                                                                                                    |
| Significant wildlife habitat                      | 120 m                                                 | Development and site alteration may be possible within natural feature and setback area; EIS required.                                                                                                                                                    |

| Feature                          | Setback Distance                              | Study Alternative When Within Setback                                                                                                                                                                                                           |
|----------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lake                             | 120 m from the average annual high water mark | Development and site alteration may be possible within setback area; additional report required. No turbine, solar panel or transformer located within a lake or within 30 m of the average annual high water mark.                             |
| Permanent or intermittent stream | 120 m from the average annual high water mark | Development and site alteration may be possible within setback area; additional report required. No turbine, solar panel or transformer located within a permanent or intermittent stream or within 30 m of the average annual high water mark. |
| Seepage area                     | 120 m                                         | Development and site alteration may be possible within setback area; additional report required. No turbine, solar panel or transformer located within 30 m of a seepage area.                                                                  |

## **4.0 Closure**

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This report has been prepared by Stantec Consulting Ltd. for the sole benefit of Samsung, and may not be used by any third party without the express written consent of Samsung and Stantec Consulting Ltd. The data presented in this report are in accordance with Stantec's understanding of the Project as it was presented at the time of the Report.

**STANTEC CONSULTING LTD.**

***DRAFT***

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**Mark Kozak**  
Project Manager

***DRAFT***

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**Rob Nadolny**  
Senior Project Manager

## **Appendix A**

### **Project Location and Study Area**

# **Appendix B**

## **Turbine Specifications**

## **Appendix C**

# **Environmental Features Screening Checklist**

## **COMMUNITY AND STAKEHOLDER CONSULTATION / ENGAGEMENT**

- 95) Consultation, transparency and disclosure have been key components of Project planning and development activities, mainly through direct mailings, newspaper ads, and a public open house. Additional information about the Project was conveyed through direct stakeholder contacts, as well as a telephone line, a Project website and email address, and written correspondence. With respect to the Proposed Facility, the Applicant, via SRE, consulted with the community regarding alternative routing for the Transmission Corridor as part of the first public open house. Three alternatives were shown and feedback was solicited. Feedback from the community was taken into consideration in choosing the preferred route.
- 96) As part of the REA Application process, the Applicant has conducted extensive consultation with interested stakeholders regarding both the GREP and the Proposed Facility. The Project was officially announced to stakeholders through a Notice of Proposal and Notice of Public Open House which was published in June 2010. As part of the initial Notice, a draft Project Description Report (see Exhibit B-7-2) was released to the public for review which detailed preliminary information about the Project. A public open house was held on July 8, 2010 in Cayuga. Members of the public and aboriginal communities were invited to attend so that they could view preliminary information about the Project and speak directly to members of the study team. Following the open house, comments have been provided (via email, phone, comment cards, etc.) by stakeholders which are currently being addressed by the Applicant. Details of stakeholder concerns regarding the Project may be found at Exhibit B-8-2.
- 97) Several Draft Reports are required pursuant to the REA process. The Draft Documents will be released to aboriginal communities and the public in March 2011. A second public meeting is planned for May 2011 (at least 60 days following the release of the Draft Documents). Following the second public meeting, the Draft Documents will be finalized and the REA Application will be submitted to the MOE for approval. As part of the final REA Application the Consultation Report will be prepared, which will summarize all of the consultation activities and comments received by agencies, aboriginal communities, and the public throughout the REA process. Copies of all notices and comments will also be provided within the Consultation Report. A copy of the Consultation Report will be filed with the Board upon completion as Exhibit B-8-3.
- 98) The Applicant expects to receive a decision from the MOE regarding the Wind Project/Proposed Facility REA by September 2011.

### ***Aboriginal Consultation***

- 99) The Applicant, via its consultants, Stantec Consulting, has implemented a Consultation and Aboriginal Engagement Program (the "**Program**"), which fulfills the requirements outlined in the REA Regulation. The OEB's Draft Aboriginal Consultation Policy, issued for comment in June 2007, and in particular the said policy's filing requirements entitled *Appendix A – Information to be Filed with Applications Where there May be an Adverse Effect on an existing or asserted Aboriginal or Treaty Right*, is also being considered during implementation of the Program.
- 100) As part of the overall aboriginal engagement process the Applicant identified aboriginal communities that may have an interest in the Project. The Applicant, via its consultant Stantec, has engaged with such communities since the onset of the early stages of Project development. Consultation has included telephone conversations, meetings and presentations.
- 101) Certain aboriginal communities have also been provided with the draft Project Description Report. Stantec Consulting has requested that those aboriginal communities provide feedback with respect to any adverse impacts that the Project may have on their constitutionally protected aboriginal or treaty rights and suggested measures for mitigating those adverse impacts. The Applicant continues to engage with interested aboriginal communities regarding the Project in order to identify and address any concerns that may arise. The Consultation Report submitted pursuant to the REA (and to be filed as Exhibit B-8-3) will include an in-depth analysis and summary as to aboriginal consultation and how the Applicant met all prescribed consultation requirements under the REA Regulation. In addition to the Consultation Report, a summary of the aboriginal engagement will be filed as Exhibit B-8-4 and updated accordingly.

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## **STAKEHOLDER COMMENTS**

| Grand Renewable Energy Park - Stakeholder Comment Summary Table |              |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                  |                  |
|-----------------------------------------------------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Date                                                            | Contact Type | Comment                                                                                                                                                                                                                    | Study Team Response                                                                                                                                                                                                                                                                              | Date of Response |
| June 9/10                                                       | Phone        | Will turbines be on the beach/off-shore? If a person is not signed-up (lease agreement) will they have project infrastructure on their property?                                                                           | Turbine/solar siting has not been completed however turbines will not be on the beach/offshore. If a person does not have a lease agreement, they will not have infrastructure on their property.                                                                                                | June 10/10       |
| June 9/10                                                       | Phone        | Will my land be expropriated as it is within the siting area?                                                                                                                                                              | No, lands will not be expropriated for this Project. The project location identifies the area which will be studied as part of the REA process.                                                                                                                                                  | June 10/10       |
| June 10/10                                                      | Phone        | Will my property be expropriated/used for the project as it is within the project location?                                                                                                                                | No, lands will not be expropriated for this Project. The project location identifies the area which will be studied as part of the REA process. More detailed information including site layouts will be available at the Second Public Open House.                                              | June 10/10       |
| June 10/10                                                      | Phone        | Will turbines be on the lakeshore/offshore? Will a layout be available at the Open House?                                                                                                                                  | Turbines will not be located directly on the lakeshore or off-shore. A turbine layout will be available at the Second Public Open House.                                                                                                                                                         | June 10/10       |
| June 11/10                                                      | Phone        | How close can a turbine be to a residential home?                                                                                                                                                                          | A minimum of 550 m from a non-participating receptor.                                                                                                                                                                                                                                            | June 11/10       |
| June 11/10                                                      | Phone        | How close is the boundary to the Grand River? Will it be solar or wind closer to the east boundary of the Project?                                                                                                         | Boundary is the Grand River and it is used to show the area to be studied as part of the REA process. Turbine and solar layout is not yet available.                                                                                                                                             | June 11/10       |
| June 11/10                                                      | Phone        | Where will the T-Line be sited? Will expropriation take place to install the T-Line?                                                                                                                                       | T-Line routes are currently being assessed. The T-Line will be within the T-Line Siting Area and will connect to the existing Hydro One line which runs southeast of Hwy 6. Expropriation for the T-Line is not a preferred option and will be avoided to the extent possible.                   | June 11/10       |
| June 14/10                                                      | Phone        | 125 acres on Johnson sideroad. Request information specifically regarding that area.                                                                                                                                       | Project siting is still being completed and it is currently unknown what project infrastructure will be located near Johnson Road. Also passed contact information along to Samsung as the landowner may potentially be interested in leasing land for the Project.                              | June 15/10       |
| June 14/10                                                      | Phone        | Request specific project mapping for the solar and wind siting area.                                                                                                                                                       | Left message. The map within the notice is the most up to date Project location map. A more detailed version of the map is available on the website within the Draft Project Description Report.                                                                                                 | June 15/10       |
| June 17/10                                                      | Phone        | Please add me to the mailing list                                                                                                                                                                                          | N/A - Has been added to the project mailing list                                                                                                                                                                                                                                                 | N/A              |
| June 18/10                                                      | Phone        | Are wind turbines going to be located offshore? Also concerned about turbine noise.                                                                                                                                        | Left message. Turbines will not be located offshore for this project and all turbines must be sited a minimum of 550 m from non-participating receptors.                                                                                                                                         | June 21/10       |
| June 21/10                                                      | Phone        | Are wind turbines going to be located offshore? How close will turbines be to my property?                                                                                                                                 | Turbines will not be located directly on the lakeshore or off-shore. All turbines must be located a minimum of 550 m from non-participating receptors.                                                                                                                                           | June 21/10       |
| July 6/10                                                       | Phone        | Did not receive a notice. Where will the turbines be located                                                                                                                                                               | Confirmed that her property was included in the mail out. Turbines and solar panels will be located throughout the solar and wind siting area.                                                                                                                                                   | July 7/10        |
| July 15/10                                                      | Phone        | Have a signed option with Samsung and wanted to clarify constraints on their property. There is a small creek and PSW on the property and neighbour has an agreement as well. Will a turbine be suitable for the property? | Stantec is conducting natural heritage assessments to identify constraints. PSW's have regulated setbacks which must be adhered to. Once field studies and other assessments are completed, turbine locations will be determined.                                                                | July 15/10       |
| July 15/10                                                      | Phone        | Interested in leasing land close to the Grand River. What information was shown at the Open House? Are turbine locations confirmed? What are the health effects?                                                           | Passed land information on to Samsung for consideration. Provided the link to the website and reviewed the display boards over the phone. Turbine locations are not confirmed. Reviewed the Open House board related to health effects and the studies that are being reviewed by Stantec.       | July 20/10       |
| July 16/10                                                      | Phone        | What stage is the project at?                                                                                                                                                                                              | Left message. Currently conducting the REA for the Project with construction planned for April 2011.                                                                                                                                                                                             | July 20/10       |
| July 29/10                                                      | Phone        | Property located between County Road 50 and the Girl Guide Camp has been left by the previous owner and is not being maintained (large weeds are growing).                                                                 | Will follow-up with Samsung to confirm if the property has been leased by Samsung from the ORC. If it is a Samsung leased property, Samsung will try to gain property access as soon as possible so that maintenance can occur.                                                                  | August 3/10      |
| Jan 24/11                                                       | Phone        | What type of power (AC or DC) is transmitted from the towers. Are any structures located along the lakeshore                                                                                                               | Collector lines will be buried within private lands and will operate at a voltage of 34.5 kV. Electrical transmission components may be located along the lakeshore.                                                                                                                             | Jan 24/11        |
| Jan 24/11                                                       | Phone        | Why are turbines grouped together in some places and not in others? Questions about the Ian Hanna legal case. Concerned over bird and bat impacts and potential increases in bugs if birds and bats are killed.            | Various factors determine the locations of turbines including leasing opportunities, receptor locations, natural features, etc. The Ian Hanna case may have an impact on the industry as a whole depending on the outcome. Bird and bat studies are being conducted to assess potential impacts. | Jan 24/11        |

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## CONSULTATION REPORT

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## **ABORIGINAL ENGAGEMENT – INTERIM SUMMARY**

# Grand Renewable Energy Park

## Interim Aboriginal Community Engagement Summary Table

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This Interim Summary is intended to provide information regarding preliminary Aboriginal Engagement activities during the REA process for the Grand Renewable Energy Project (the Project). At the conclusion of the REA process, a Consultation Report will be prepared according to the requirements of O.Reg.359/09 and submitted as part of the REA application to the Ministry of the Environment. The Consultation Report will detail the methods and results of all REA-related consultation activities for the Project.

The Applicant, either independent of or via its consultant Stantec, has engaged with the following communities and intends to continue engaging these communities throughout the Project's REA process, permitting and construction phases:

1. Six Nations of the Grand River – Elected Council
2. Six Nations of the Grand River – Haudenosaunee Confederacy Council
3. Mississaugas of the New Credit First Nation
4. Métis Nation of Ontario
5. Oneida Nation of the Thames
6. Wahta Mohawks
7. Mohawks of the Bay of Quinte
8. Mohawks of Akwesasne

The first four communities were identified as having potential interest in the Project at the outset of the REA process in spring 2010, and have therefore been engaged since the onset of the early stages of Project development. In Fall 2010, the Ministry of the Environment provided the Applicant with the Aboriginal Communities List as required by O.Reg.359/09. The Aboriginal Communities List identified an additional four communities that must be consulted regarding the Project; these communities have been engaged in the Project since Fall 2010.

Engagement with the Aboriginal communities has included telephone conversations, letters, and meetings. All communities have been provided, or will be provided during the REA process, with key notification and consultation material regarding the Project, which has included to date:

- Notice to Engage in a Renewable Energy Project and Notice of Public Open House
- Draft Project Description Report (2 versions)

- Display boards presented at the July 2010 Public Open House
- Preliminary wind turbine layout mapping
- December 2010 Project newsletter

As required by O.Reg.359/09, all interested aboriginal communities are provided with the opportunity to provide feedback with respect to any adverse impacts that the Project may have on their constitutionally protected aboriginal or treaty rights and suggested measures for mitigating those adverse impacts.

The Applicant will continue to provide Project information and mandatory notification to all Aboriginal communities throughout the REA process, and will consider all feedback received from the communities, particularly related to any identified potential adverse impacts that the Project may have on aboriginal or treaty rights and suggested mitigation measures.

The Applicant intends to have ongoing engagement activities with all interested Aboriginal communities throughout the REA process and all phases of the Project, including operation.

The following interim summary table summarizes the key engagement activities conducted as part of the Project's REA process to date.

| Aboriginal Community                                               | Date          | Type    | Information Provided/Requested                                                                        | Aboriginal Community Response |
|--------------------------------------------------------------------|---------------|---------|-------------------------------------------------------------------------------------------------------|-------------------------------|
| Métis Nation of Ontario                                            | June 4, 2010  | Letter  | Stantec provided a Draft Project Description Report and Notice to Engage/Public Open House.           |                               |
| Mississaugas of the New Credit First Nation                        | June 4, 2010  | Letter  | Stantec provided a Draft Project Description Report and Notice to Engage/Public Open House.           |                               |
| Six Nations of the Grand River – Elected Council                   | June 4, 2010  | Letter  | Stantec provided a Draft Project Description Report and Notice to Engage/Public Open House.           |                               |
| Six Nations of the Grand River – Haudenosaunee Confederacy Council | June 7, 2010  | Letter  | Stantec provided a Draft Project Description Report and Notice to Engage/Public Open House.           |                               |
| Mississaugas of the New Credit First Nation                        | June 16, 2010 | Meeting | Introductory meeting held to provide a general project overview and protocols for future discussions. |                               |

| Aboriginal Community                                               | Date          | Type   | Information Provided/Requested                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Aboriginal Community Response                                                                            |
|--------------------------------------------------------------------|---------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Métis Nation of Ontario                                            | June 24, 2010 | Letter | Stantec provided Version 2 of the Draft Project Description Report which provided additional information regarding the Project.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | MNO confirmed that MNO Region 9 has an interest in the Project (June 29, 2010)                           |
| Mississaugas of the New Credit First Nation                        | June 24, 2010 | Letter | Stantec provided Version 2 of the Draft Project Description Report which provided additional information regarding the Project.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                          |
| Six Nations of the Grand River – Elected Council                   | June 24, 2010 | Letter | Stantec provided Version 2 of the Draft Project Description Report which provided additional information regarding the Project.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                          |
| Six Nations of the Grand River – Haudenosaunee Confederacy Council | June 24, 2010 | Letter | Stantec provided Version 2 of the Draft Project Description Report which provided additional information regarding the Project.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                          |
| Métis Nation of Ontario                                            | June 29, 2010 | Phone  | <p>MNO will likely recommend a small initial meeting to determine how to meet with the Métis community, what issues to address throughout the engagement process (e.g. economic development), and how their comments will be addressed in the REA.</p> <p>MNO will want to draw up some kind of very brief, written understanding on how they'll be engaged in the project.</p> <p>MNO will not be able to attend the open house.</p> <p>MNO confirmed that initially, a small meeting is envisioned, with perhaps one representative from each community council and one representative from the Lands, Resources and Consultation Branch. This group can decide how to engage the community.</p> |                                                                                                          |
| Mississaugas of the New Credit First Nation                        | June 29, 2010 | Letter | The Applicant offered to hold a Community Information Session prior to the Public Open House on July 8, 2010. The Applicant also offered to host a Community Information Session the following week if more convenient.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | MNCFN declined the invitations on July 2, 2010, however a representative attended the Public Open House. |

| Aboriginal Community                             | Date          | Type        | Information Provided/Requested                                                                                                                                                                                                                                               | Aboriginal Community Response                                                                                                                                      |
|--------------------------------------------------|---------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Six Nations of the Grand River – Elected Council | June 29, 2010 | Letter      | The Applicant offered to hold a Community Information Session prior to the Public Open House on July 8, 2010. The Applicant also offered to host a Community Information Session the following week if more convenient.                                                      | Six Nations declined the offer; however, a representative attended the Public Open House.                                                                          |
| Mississaugas of the New Credit First Nation      | June 29, 2010 | Letter      | The Applicant extended an offer for community members to participate in site investigations related to Stage II Archaeological Assessments and natural heritage investigations.                                                                                              | MNCFN declined the offer (September 21, 2010).                                                                                                                     |
| Six Nations of the Grand River – Elected Council | June 29, 2010 | Letter      | The Applicant extended an offer for community members to participate in site investigations related to Stage II Archaeological Assessments and natural heritage investigations.                                                                                              | Six Nations declined the offer, but requested that a Six Nations archaeological monitor be on site during the Stage II Archaeological Assessments (July 27, 2010). |
| Six Nations of the Grand River – Elected Council | July 13, 2010 | Transmittal | Stantec provided a copy of the display boards from the July 8, 2010 public open house.                                                                                                                                                                                       |                                                                                                                                                                    |
| Mississaugas of the New Credit First Nation      | July 14, 2010 | Transmittal | Stantec provided a copy of the display boards from the July 8, 2010 public open house.                                                                                                                                                                                       |                                                                                                                                                                    |
| Mississaugas of the New Credit First Nation      | July 26, 2010 | Letter      | The Applicant sent a letter describing proposed content for an Engagement Protocol and information related to the REA process.                                                                                                                                               |                                                                                                                                                                    |
| Six Nations of the Grand River – Elected Council | July 27, 2010 | Phone       | Stantec called to ask the process that is normally followed to have community members participate in, or monitor, the archaeology and natural heritage field work.<br>Six Nations expects that a monitor be present on site every day of the Stage 2 archaeology field work. |                                                                                                                                                                    |

| Aboriginal Community                             | Date               | Type    | Information Provided/Requested                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Aboriginal Community Response |
|--------------------------------------------------|--------------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Six Nations of the Grand River – Elected Council | August 25, 2010    | Phone   | <p>Stantec called regarding Six Nations participation in natural heritage field work. Six Nations responded that they aren't well set up to be able to take advantage of this opportunity. They are thankful for the offer, but don't have the resources to know who in the community would want to participate. It was agreed that the Applicant would proceed as though there will be no participation by Six Nations, but that if they find people, and there is still field work ongoing, the Applicant will re-examine the opportunity.</p> <p>It was also agreed that a technical meeting would be held to discuss the REA process and information requested from the Six Nations.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                               |
| Six Nations of the Grand River – Elected Council | September 10, 2010 | Meeting | <p>Stantec gave a presentation that provided an overview of the REA process to technical staff. Stantec provided study area maps for the Project, showing the wind turbine and solar siting area, and the transmission line siting area. A high level overview of the project was provided by the Applicant. A hard copy of the Project Description Report (version 2) was provided to each attendee. Stantec provided an overview of the regulatory requirements that the Applicant must fulfill regarding the engagement of aboriginal communities.</p> <p>Six Nations was aware of a lot of deer hunting in the area that should be considered.</p> <p>Stantec asked about methods for engaging the general community in the project, and if a Community Information Session would be useful.</p> <p>Six Nations responded that they were unaware of an effective method for getting the community involved. It is unlikely that many people would come to a Community Information Session. Notices can be put in people's mailboxes, but it has not been an effective method to inform people. Six Nations noted that reports should be made available at the EcoCentre. The Applicant and Stantec said that this would be done.</p> |                               |

| Aboriginal Community                             | Date              | Type   | Information Provided/Requested                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Aboriginal Community Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------|-------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Six Nations of the Grand River – Elected Council | October 5, 2010   | Letter | <p>Stantec provided a letter as a follow-up to the September 10, 2010 meeting with Six Nations technical staff. Stantec requested information from the community related to potential effects the Project may have on constitutionally protected aboriginal or treaty rights and any information they may have which should be considered in the preparation of the REA reports.</p>                                                                                                                                                                                                                                                                           | <p>Six Nations replied on October 12, 2010 indicating they are reviewing the request. Reconfirmed that all discussions that have occurred or are about to occur does not constitute consultation in any way. All discussions are simply information gathering sessions for meaningful consultation in the future. Communications and records of correspondence that are part of these discussions are not “records of consultation” and shall not be disclosed to third parties as records of consultation without consent.</p> |
| Mohawks of Akwesasne                             | November 15, 2010 | Letter | <p>Noted that the community was not included on the correspondence and information circulated regarding the Project prior to receiving the Aboriginal Communities List from the MOE and therefore wanted to provide the Project information sent to date.</p> <p>Stantec provided a copy of the Notification of the Project, the Project Description Report (V2) and a copy of the display panels from the first public open house.</p> <p>Offered to meet with community representatives to discuss the Project and enclosed Project materials.</p> <p>Offered to hold a Community Information Session to introduce the Project to the general community.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Aboriginal Community        | Date              | Type   | Information Provided/Requested                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Aboriginal Community Response |
|-----------------------------|-------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Oneida Nation of the Thames | November 15, 2010 | Letter | <p>Noted that the community was not included on the correspondence and information circulated regarding the Project prior to receiving the Aboriginal Communities List from the MOE and therefore wanted to provide the Project information sent to date.</p> <p>Stantec provided a copy of the Notification of the Project, the Project Description Report (V2) and a copy of the display panels from the first public open house.</p> <p>Offered to meet with community representatives to discuss the Project and enclosed Project materials.</p> <p>Offered to hold a Community Information Session to introduce the Project to the general community.</p> |                               |

| Aboriginal Community         | Date              | Type   | Information Provided/Requested                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Aboriginal Community Response |
|------------------------------|-------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Mohawks of the Bay of Quinte | November 15, 2010 | Letter | <p>Noted that the community was not included on the correspondence and information circulated regarding the Project prior to receiving the Aboriginal Communities List from the MOE and therefore wanted to provide the Project information sent to date.</p> <p>Stantec provided a copy of the Notification of the Project, the Project Description Report (V2) and a copy of the display panels from the first public open house.</p> <p>Offered to meet with community representatives to discuss the Project and enclosed Project materials.</p> <p>Offered to hold a Community Information Session to introduce the Project to the general community.</p> |                               |

| Aboriginal Community    | Date              | Type   | Information Provided/Requested                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Aboriginal Community Response |
|-------------------------|-------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Wahta Mohawks           | November 15, 2010 | Letter | <p>Noted that the community was not included on the correspondence and information circulated regarding the Project prior to receiving the Aboriginal Communities List from the MOE and therefore wanted to provide the Project information sent to date.</p> <p>Stantec provided a copy of the Notification of the Project, the Project Description Report (V2) and a copy of the display panels from the first public open house.</p> <p>Offered to meet with community representatives to discuss the Project and enclosed Project materials.</p> <p>Offered to hold a Community Information Session to introduce the Project to the general community.</p> |                               |
| Métis Nation of Ontario | November 22, 2010 | Phone  | <p>The Applicant communicated to MNO that they would be pleased to meet with members of the MNO community to discuss the Project and Project materials that have been sent to date.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                               |

| Aboriginal Community                                               | Date             | Type   | Information Provided/Requested                                                                                                                                                                                                                                                                                                                                                                            | Aboriginal Community Response |
|--------------------------------------------------------------------|------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Six Nations of the Grand River – Haudenosaunee Confederacy Council | January 7, 2011  | Letter | Stantec provided a status update on the Project including notification that a Project layout had been publicly released (copy provided). Stantec requested information from the community related to potential effects the Project may have on constitutionally protected aboriginal or treaty rights and any information they may have which should be considered in the preparation of the REA reports. |                               |
| Mississaugas of the New Credit First Nation                        | January 18, 2011 | Letter | Stantec provided a status update on the Project including notification that a Project layout had been publicly released (copy provided). Stantec requested information from the community related to potential effects the Project may have on constitutionally protected aboriginal or treaty rights and any information they may have which should be considered in the preparation of the REA reports. |                               |
| Métis Nation of Ontario                                            | January 18, 2011 | Letter | Stantec provided a status update on the Project including notification that a Project layout had been publicly released (copy provided). Stantec requested information from the community related to potential effects the Project may have on constitutionally protected aboriginal or treaty rights and any information they may have which should be considered in the preparation of the REA reports. |                               |

| Aboriginal Community                             | Date             | Type   | Information Provided/Requested                                                                                                                                                                                                                                                                                                                                                                            | Aboriginal Community Response |
|--------------------------------------------------|------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Mississaugas of the New Credit First Nation      | February 7, 2011 | Letter | The Applicant offered to meet with the Chief and Council to discuss the project, ways to engage the community and discuss any potential impacts the community has identified that the Project may have on constitutionally protected aboriginal or treaty rights and any information they may have which should be considered in the preparation of the REA reports.                                      |                               |
| Six Nations of the Grand River – Elected Council | February 7, 2011 | Letter | Stantec provided a status update on the Project including notification that a Project layout had been publicly released (copy provided). Stantec requested information from the community related to potential effects the Project may have on constitutionally protected aboriginal or treaty rights and any information they may have which should be considered in the preparation of the REA reports. |                               |

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## GRAND RENEWABLE ENERGY PARK

# **WELCOME**

**to the Public Open House**  
**for the**  
**Grand Renewable Energy Park**

**Cayuga Kinsmen Community Centre**  
**5:00pm - 9:00pm**

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# GRAND RENEWABLE ENERGY PARK



## WELCOME

Thank you for coming. We are happy to share our enthusiasm for this clean, renewable energy project with you. We also understand that you have questions about the project and how it will be built in our community. As such, we invite you to view the display boards, speak to members of the Study Team and leave us with your questions and comments.

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# GRAND RENEWABLE ENERGY PARK



## Who are we?

Samsung C & T, Korea Electric Power Corporation (KEPCO) and Pattern Energy plan to build and operate the world's largest renewable energy cluster in Southern Ontario. Samsung C&T is proud to be part of a project in Haldimand County that will bring clean energy, investment and new jobs to Haldimand County and the Province of Ontario.

Samsung C&T is affiliated with the larger Samsung Group. It is Samsung C&T's two business divisions, Trading & Investment Group and Engineering and Construction Group, that will be developing, building and operating the Wind and Solar Power Cluster here in Ontario. Both divisions have achieved many milestones over the years in preparation for such an opportunity. Among them, launching Korea's first solar energy project and building the world's largest skyscraper, the Buri Khalifa in Dubai.



We were chosen by the Ontario Government due to our intention to invest and create jobs in Ontario, but also because we have a proven track record of constructing projects of similar scale from planning and financing through to execution. We fully intend to take advantage of Ontario's talented workforce and hire locally.

Our partners include:

### KEPCO



KEPCO (Korea Electric Power Corporation) is an electrical utility company based in Korea which has a generation capacity of 64,500 MW, making it one of the world's top power utilities. Today, KEPCO is taking the lead in green energy by developing low-carbon power generation and smart grid technologies.

### Pattern Energy



Pattern Energy is an independent, fully integrated energy company that develops, constructs, owns and operates clean energy and transmission assets in the United States, Canada and Latin America. We have:

- More than 500 MW in operation or under construction within first 9 months
- 4 GW of wind projects in development
- Annual growth of 300 - 500 MW
- 5 large-scale transmission projects in development



We believe in working with our communities to build lasting relationships, stimulate local economies, and protect the environment. Samsung C&T Corporation's Sustainable Management has been established to encompass the economic, environmental, and social issues of our stakeholders after accommodating the perspectives from inside and outside the company.

| Disclosure on management approach |                                                                                                                                                                                                                                                                                                     |                                                                                                                                                          |                                                                                                                                                                   |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   | Economic issues                                                                                                                                                                                                                                                                                     | Environmental issues                                                                                                                                     | Social issues                                                                                                                                                     |
| Shareholders                      | <ul style="list-style-type: none"> <li>- Business performance and financial sheets</li> <li>- Current status of project businesses</li> <li>- Current status of resource development projects</li> <li>- Restructuring business (the sale of distribution business)</li> <li>- Dividends</li> </ul> | <ul style="list-style-type: none"> <li>- Green technology development</li> <li>- Current status of new and renewable energy projects</li> </ul>          | <ul style="list-style-type: none"> <li>- Ethical management</li> <li>- Managing brands</li> </ul>                                                                 |
| Customers                         | <ul style="list-style-type: none"> <li>- Goods and services offered</li> </ul>                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>- Green technology development</li> <li>- Green buildings (residential environment, energy efficiency)</li> </ul> | <ul style="list-style-type: none"> <li>- Customer satisfaction and cases</li> </ul>                                                                               |
| Staff members                     | <ul style="list-style-type: none"> <li>- Wages and pension support</li> <li>- Restructuring business (the sale of distribution business)</li> </ul>                                                                                                                                                 | <ul style="list-style-type: none"> <li>- Environmental education</li> </ul>                                                                              | <ul style="list-style-type: none"> <li>- Training</li> <li>- Welfare services, health and safety</li> <li>- Labor relations, safeguarding human rights</li> </ul> |
| Partner companies                 | <ul style="list-style-type: none"> <li>- Supporting the green business of partner companies</li> </ul>                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>- Green procurement systems</li> </ul>                                                                            | <ul style="list-style-type: none"> <li>- Managing and supporting partner companies</li> </ul>                                                                     |
| Society                           | <ul style="list-style-type: none"> <li>- Current status of donations</li> <li>- Headquarters relocation</li> </ul>                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>- Protecting the environment in the neighborhood</li> </ul>                                                       | <ul style="list-style-type: none"> <li>- CSR activities</li> </ul>                                                                                                |
| Environment                       | <ul style="list-style-type: none"> <li>- Risks and opportunities of climate change (emissions trading, new and renewable energy projects)</li> </ul>                                                                                                                                                | <ul style="list-style-type: none"> <li>- Energy usages</li> <li>- Managing construction waste</li> </ul>                                                 | <ul style="list-style-type: none"> <li>- Protecting the local environment</li> </ul>                                                                              |
| Civil society                     | <ul style="list-style-type: none"> <li>- Transparency and soundness</li> </ul>                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>- Preserving biodiversity</li> </ul>                                                                              | <ul style="list-style-type: none"> <li>- Corporate social responsibility</li> </ul>                                                                               |
| Government                        | <ul style="list-style-type: none"> <li>- Tax payments</li> </ul>                                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>- Complying with environment codes</li> </ul>                                                                     | <ul style="list-style-type: none"> <li>- Ethical management and compliance to laws</li> </ul>                                                                     |
|                                   | Delivering Value                                                                                                                                                                                                                                                                                    | Eco-Value Creation                                                                                                                                       | Social Responsibility                                                                                                                                             |

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# GRAND RENEWABLE ENERGY PARK

## What is the agreement between Samsung C&T and the Ontario Government?

On January 21, 2010, Ontario Premier Dalton McGuinty and Ontario Minister of Energy and Infrastructure, Brad Duguid were joined by Samsung C&T President and CEO Sung-ha Chi and Executive VP of KEPCO Chan-Ki Jung to officially announce and sign the green energy investment agreement for the Ontario Alternative Energy Cluster, deemed to be the largest of its kind in the world.

According to the agreement, Samsung and its partners will establish and operate a series of wind and solar power clusters over the next five years. The entire project will have a combined power-generating capacity of 2.5GW by 2016, increasing Ontario's installed capacity of renewable power generation.

The first phase of the project will be built in the Haldimand County and the Municipality of Chatham-Kent. This will help achieve the Government of Ontario's goal of shutting down all of the province's coal-fired power plants by 2014.



## Grand Renewable Energy Park - Project Overview

### Wind Energy

- Approximately 63 wind turbines (depending on make and model) and a name plate capacity of 140 MW.
- Turbines will be located a minimum of 550 m from non-participating receptors.
- Co-developed by Samsung C&T, KEPCO and Pattern Energy.

### Solar Energy

- Name plate capacity of 100 MW.
- Solar photovoltaic panels will be mounted on ground-based racking systems.
  - Located on approximately 900 acres of land.
  - Project developed by Samsung C&T.

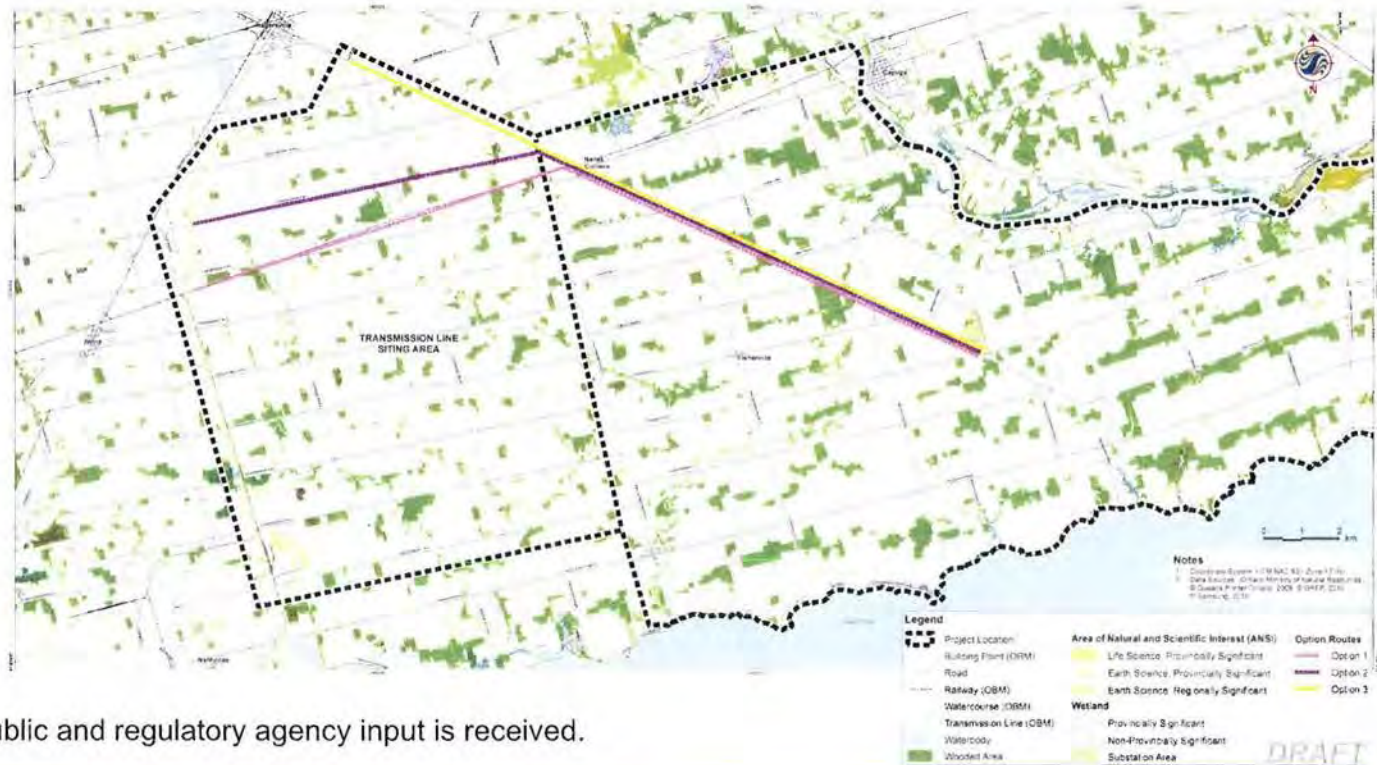
### Common Elements

- The wind and solar components of the Project will be located on privately owned and Ontario Realty Corporation (ORC) managed lands within Haldimand County.
- Project will also include electrical collection lines, an approximate 20 km long 230 kV transmission line, an electrical substation, and other ancillary facilities such as access roads.
- The 230 kV transmission line will be located within the project boundary with several different route and design options currently being assessed.



## Proposed Transmission Line

- To connect the Grand Renewable Energy Park to the provincial electricity grid, a substation and 230 kV transmission line are needed.
  - The transmission line will be located within the project boundary. It will be approximately 20 km in length, and will transport the energy generated by the wind turbines and solar panels to the existing electricity grid.
  - Several design options are currently being considered for the transmission line, which may include a combination of:
    - Overhead steel poles;
    - Lattice towers; and/or,
    - Underground cable.
  - Three alternative routes have been identified to-date that parallel existing rights-of-way. The preferred route for the transmission line will be determined after further study and analysis and public and regulatory agency input is received.
- 
- The map displays the Grand Renewable Energy Park, outlined by a dashed black line. A central area is labeled 'TRANSMISSION LINE SITING AREA'. Three alternative routes for the transmission line are shown: a solid red line, a solid blue line, and a dashed black line. The map includes a legend with the following items:
- Project Location:** Dashed black line
  - Road:** Solid black line
  - Railway (CBM):** Dashed black line
  - Watercourse (CBM):** Solid black line
  - Transmission Line (CBM):** Solid black line
  - Waterbody:** Solid black line
  - Area of Natural and Scientific Interest (ANSI):**
    - Life Science: Provincially Significant (Yellow)
    - Earth Science: Provincially Significant (Green)
    - Earth Science: Regionally Significant (Light Green)
  - Wetland:**
    - Provincially Significant (Dark Green)
    - Non-Provincially Significant (Light Green)
  - Option Route:**
    - Option 1 (Red)
    - Option 2 (Blue)
    - Option 3 (Black)
- Notes:**
- Coordinate System: UTM NAD 83 Zone 17 N
  - Data Source: Ontario Ministry of Natural Resources
  - Scale: 1:50,000
  - Map Date: 2008
  - Map Title: Grand Renewable Energy Park



## Project Location and Environmental Features



*DRAFT*

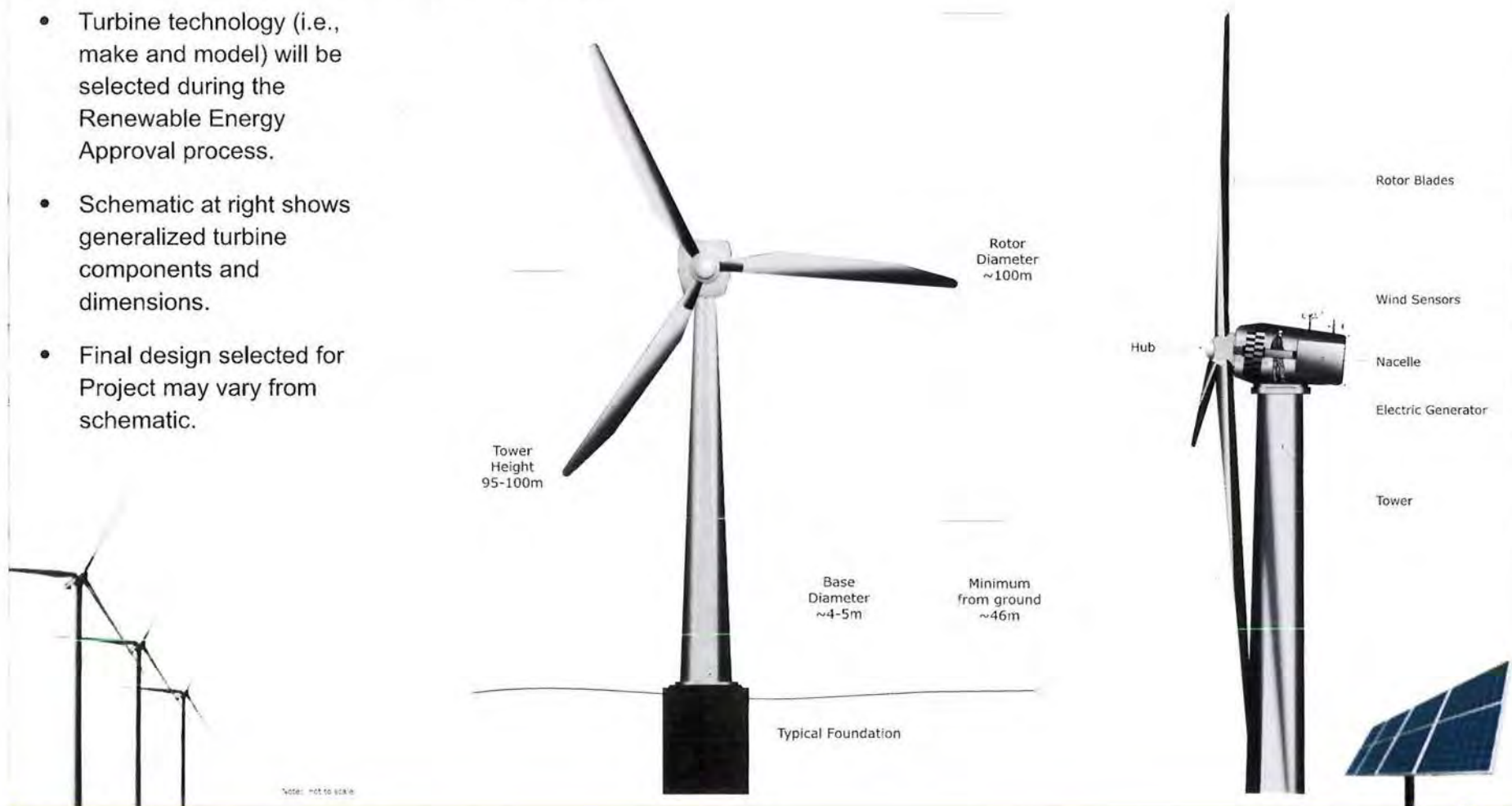
## Canada Land Inventory (CLI) for Agricultural Capability



DRAFT

## Typical Wind Turbine Schematic

- Turbine technology (i.e., make and model) will be selected during the Renewable Energy Approval process.
- Schematic at right shows generalized turbine components and dimensions.
- Final design selected for Project may vary from schematic.



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# GRAND RENEWABLE ENERGY PARK

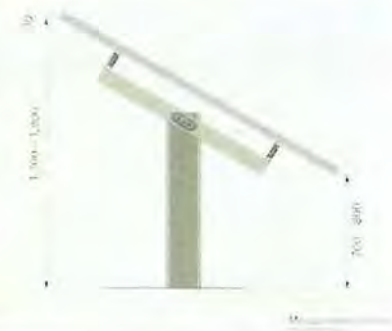
## Typical Solar Panel Schematic and Photos

- Solar panels will utilize crystalline solar cells mounted on ground-based racking systems.
- Solar panel and mounting (i.e., single post, double post, or ballast mount) technology will be selected during the Renewable Energy Approval process.
- Schematics and photos at right show a variety of panel types and mounting designs.
  - Final design selected for Project may vary from those shown.

**System set-up**

Racking Structure

Photovoltaic Panels

**Profile view**

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# GRAND RENEWABLE ENERGY PARK

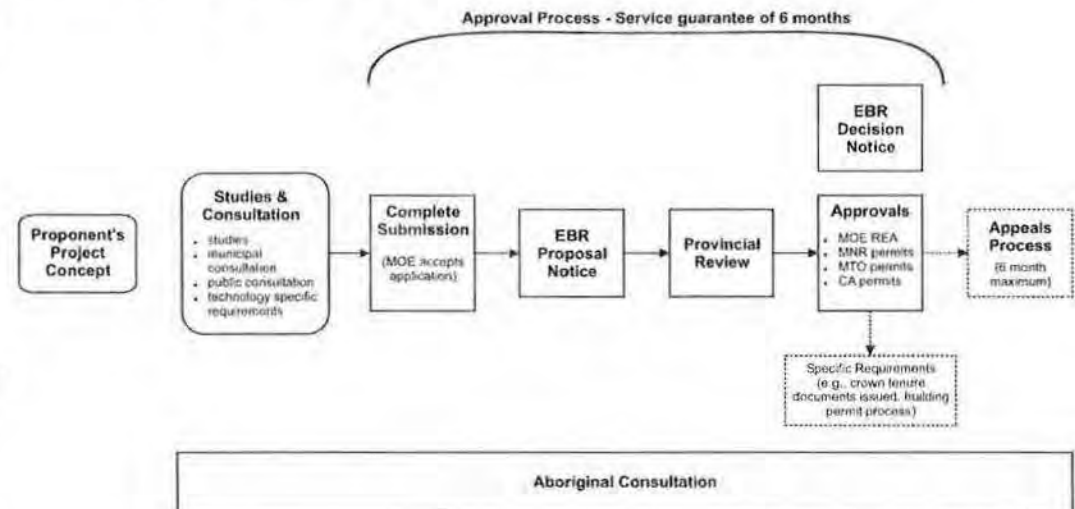
## Green Energy Policy in Ontario

- The *Green Energy and Green Economy Act* (GEA) received Royal Assent in the Ontario Legislature on May 14, 2009. According to the Government of Ontario, this legislation is part of Ontario's plan to become a leading green economy in North America. The GEA will:
  - Spark growth in clean and renewable sources of energy such as wind, solar, hydro, biomass and biogas in Ontario.
  - Create the potential for savings and better managed household energy expenditures through a series of conservation measures.
  - Create 50,000 jobs for Ontarians in its first three years.
- Samsung C&T is developing the Grand Renewable Energy Park in response to the policies and programs flowing from the GEA.



## Renewable Energy Approval Process - An Overview

- We are completing the detailed studies, analysis and work required to obtain a Renewable Energy Approval (REA) for the Project.
- The REA is issued under Ontario Regulation 359/09 (Renewable Energy Approvals under Part V.0.1 of the Act) under the *Environmental Protection Act*.
- The wind aspect of the Project is considered to be a Class 4 wind facility and the solar aspect of the Project is considered to be a Class 3 solar facility. These Classes of project have specific study and information requirements under the REA process.



Source: MOE.

- The REA process is a stringent environmental approvals process that Samsung needs to satisfy before building the project.
- The REA approval will specify how the project will be designed, built, operated and decommissioned so that the local community and environment are protected.
- Additional approval and permitting requirements from agencies such as the Ministry of Natural Resources, Ministry of Culture, and the Grand River Conservation Authority will also be addressed as part of the REA application. Permits and plans (e.g., Building Permit, Entrance Permit) will also be sought from Haldimand County prior to Project construction.



## Renewable Energy Approval Process - Setbacks

- A key component of the REA process is the establishment of common setbacks for all renewable energy facilities in the Province.
- Where Project related infrastructure will be located within the setback distances, additional analysis (i.e., Environmental Impact Study) will be provided in the REA application and summarized in the final Project Description Report.
- Key setbacks which will be applied throughout the design of the Project are as follows:

| Feature                                           | Setback Distance                                      | Study Alternative When Within Setback                                                                                                                                                                                                                     |
|---------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Non-participating receptor                        | 550 m (from turbine base)                             | N/A                                                                                                                                                                                                                                                       |
| Public road right-of-way and railway right-of-way | Turbine blade length + 10 m (from turbine base)       | N/A                                                                                                                                                                                                                                                       |
| Property line                                     | Turbine height (excluding blades) (from turbine base) | Does not apply to parcels of land if the abutting parcel of land is a participant in the Project or if it is demonstrated that the wind turbine will not result in adverse impacts on nearby business, infrastructure, properties or land use activities. |
| Provincially significant southern wetland         | 120 m                                                 | Development not permitted within feature. Development and site alteration may be possible within setback area; EIS required.                                                                                                                              |
| Provincially significant ANSI (Earth Science)     | 50 m                                                  | Development and site alteration may be possible within natural feature and setback area; EIS required.                                                                                                                                                    |
| Provincially significant ANSI (Life Science)      | 120 m                                                 |                                                                                                                                                                                                                                                           |
| Significant valleyland                            | 120 m                                                 |                                                                                                                                                                                                                                                           |
| Significant woodland                              | 120 m                                                 |                                                                                                                                                                                                                                                           |
| Significant wildlife habitat                      | 120 m                                                 |                                                                                                                                                                                                                                                           |
| Lake                                              | 120 m from the average annual high water mark         | Development and site alteration may be possible within setback area; additional report required. No turbine, solar panel or transformer located within a lake or within 30 m of the average annual high water mark.                                       |
| Permanent or intermittent stream                  | 120 m from the average annual high water mark         | Development and site alteration may be possible within setback area; additional report required. No turbine, solar panel or transformer located within a permanent or intermittent stream or within 30 m of the average annual high water mark.           |
| Seepage area                                      | 120 m                                                 | Development and site alteration may be possible within setback area; additional report required. No turbine, solar panel or transformer located within 30 m of a seepage area.                                                                            |



## Renewable Energy Approval Process - Required Reports

The following reports will be prepared and submitted as part of the REA application:

- Project Description Report (a Draft is already posted on the project website)
- Construction Plan Report
- Design and Operations Report (includes Environmental Noise Impact Assessment for the wind and substation component of the Project)
- Natural Heritage Assessment
- Environmental Impact Study (if necessary)
- Consultation Report
- Archaeological and Heritage Report
  - Water Report
  - Noise Study Report (solar component only)
  - Wind Turbine Specifications Report
  - Decommissioning Plan Report

All reports, with the exception of the Consultation Report, will be made available in draft form for public review and comment at least 60 days prior to the Final Public Open House planned for late 2010. Notification of the release of the draft reports will be provided.



## Renewable Energy Approval Process - Additional Technical Studies

Environmental studies are being completed to fully understand the local environment and will be utilized in the development of the Project design.

The technical studies will include, but may not be limited to, in-depth analysis of the following features:

- Wildlife and wildlife habitat including Species at Risk and Significant Wildlife Habitat
- Bird breeding, wintering and migration
- Waterbodies and aquatic resources
- Woodlands, vegetation and other significant natural features
  - Wetlands and Areas of Natural and Scientific Interest
  - Archaeological and heritage resources
    - Land use and socio-economic features

All of the technical studies will be provided within the REA Required Reports in draft form for public review and comment at least 60 days prior to the Final Public Open House planned for late 2010.



## Other Key Required Project Approvals

Building a project such as the Grand Renewable Energy Park requires years of careful planning and work and many project approvals are required. Some of the key approvals that are expected to be required for the project are listed below. More are listed in our Draft Project Description Document.

| Key Permit / Authorization                                                                                                                                                      | Administering Agency                                                     | Rationale                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Key Provincial Permits and Authorizations</b>                                                                                                                                |                                                                          |                                                                                                                                                                                                                                                                                                                             |
| Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses Permit                                                                                  | Grand River Conservation Authority and Long Point Conservation Authority | Work within floodplains, water crossings, river or stream valleys, hazardous lands and within or adjacent to wetlands. Projects requiring review, <i>Fisheries Act</i> authorization and/or assessment under the <i>Canadian Environmental Assessment Act</i> are forwarded to the Department of Fisheries and Oceans (DFO) |
| Leave to Construct                                                                                                                                                              | OEB                                                                      | Authorization to construct power transmission lines                                                                                                                                                                                                                                                                         |
| Special vehicle configuration permit                                                                                                                                            | Ministry of Transportation (MTO)                                         | Use of non-standard vehicles to transport large components                                                                                                                                                                                                                                                                  |
| Transportation Plan                                                                                                                                                             | MTC                                                                      | Adherence to road safety and suitability                                                                                                                                                                                                                                                                                    |
| Highway Entrance Permit                                                                                                                                                         | MTC                                                                      | Entrance permit for new or upgraded road entrances onto a provincial highway<br>Interference or obstruction of the highway                                                                                                                                                                                                  |
| Change of Access and Heavy/Oversize Load Transportation Permit                                                                                                                  | MTO                                                                      | Compliance with provincial highway traffic and road safety regulations                                                                                                                                                                                                                                                      |
| Wide or excess load permit                                                                                                                                                      | MTO                                                                      | Transportation of large or heavy items on provincial highways                                                                                                                                                                                                                                                               |
| <b>Key Federal Permits and Authorizations</b>                                                                                                                                   |                                                                          |                                                                                                                                                                                                                                                                                                                             |
| Aeronautical Obstruction Clearance                                                                                                                                              | Transport Canada – Aviation Division                                     | Turbine lighting and marking                                                                                                                                                                                                                                                                                                |
| Land Use Clearance                                                                                                                                                              | NavCanada                                                                | Aeronautical safety mapping and designations                                                                                                                                                                                                                                                                                |
| Navigational Clearance                                                                                                                                                          | Transport Canada – Marine Division                                       | Crossing a navigable watercourse                                                                                                                                                                                                                                                                                            |
| <b>Key Permits and Authorizations from Haldimand County</b>                                                                                                                     |                                                                          |                                                                                                                                                                                                                                                                                                                             |
| Municipal Consent, Work with the R.O.W                                                                                                                                          |                                                                          | Required for works in municipal road allowances                                                                                                                                                                                                                                                                             |
| Consent/Severance Application                                                                                                                                                   |                                                                          | Required if easements over private lands required                                                                                                                                                                                                                                                                           |
| Road Cut Permit                                                                                                                                                                 |                                                                          | May be required for access roads off of county roads or works to county roads                                                                                                                                                                                                                                               |
| Pre-Condition Survey                                                                                                                                                            |                                                                          | Assessment of pre-construction conditions for engineering staff                                                                                                                                                                                                                                                             |
| Building Permit                                                                                                                                                                 |                                                                          | Compliance with building codes                                                                                                                                                                                                                                                                                              |
| Entrance Permit                                                                                                                                                                 |                                                                          | Entrance from county roads                                                                                                                                                                                                                                                                                                  |
| Transportation Plan                                                                                                                                                             |                                                                          | Adherence to road safety and suitability                                                                                                                                                                                                                                                                                    |
| Additional Plans related to general engineering (e.g. siltation control, lot grading, plan of services, etc.), water, wastewater, storm water, transportation, and geotechnical |                                                                          | Required supporting information/plans required by Haldimand County                                                                                                                                                                                                                                                          |



## Project Schedule Overview

- Initiate Public REA Process - June 2010
- Perform REA Technical Studies - Ongoing through to December 2010
- Public Open House #1 - July 8, 2010
- Draft REA Reports to Public - October 2010
- Public Open House #2 - December 2010
- REA Approval - April 2011
- Start of Construction - April 2011
- Commercial Operation Date (COD) - December 2012 to March 2013
  - Repowering/Decommissioning - 2037  
(approximately 25 years after COD)



Imagery Source: CanWEA



# GRAND RENEWABLE ENERGY PARK

## Community Benefits

- During its lifespan, the Project is estimated to create hundreds of direct construction jobs and dozens of permanent operations and maintenance jobs.
- Tax payments to Haldimand County estimated to be more than \$10 million.
- A sustainable income for participating members of the Project from the local community.
- No emissions of greenhouse gases or air pollutants from operation of the project.
  - Displaces the need for new projects that generate greenhouse gas emissions.
  - Assist in Ontario's goal to create over 50,000 "green collar" jobs.
  - Provide a new supply of safe, clean and reliable electricity.



Imagery Source: CaniWEA



*Interesting Fact: Solar energy, with 48% annual growth, is the fastest growing energy source. In fact, the demand is growing so fast that there is a world shortage of solar panels.*



## Job Creation

- Over the five years, the Alternative Energy Cluster project is estimated to generate approximately 16,000 jobs in the local community and throughout Ontario (roughly half in manufacturing, the other half in service industries). Samsung C&T will encourage suppliers to locate near the clusters with the aim of surpassing this number.
  - Samsung C&T will continue to encourage and provide opportunities to qualified suppliers to set up facilities in Ontario. Working together with the provincial government, Samsung and its partners will work diligently to bring manufacturing facilities to Ontario, and the establishment of a strong supply chain in Ontario will ensure the successful growth of renewable energy industry.
  - Currently Samsung and its partners are working tirelessly on facilitating the establishment of a blade factory, tower factory, inverter factory, and solar factory.
- 



## Public Health and Safety

- Public health and safety will be considered during all stages of the Project (i.e. construction, operation and decommissioning).
- To date, much study has been done on the effects of environmental noise on human health.
- A recent summary of scientific literature related to wind turbines and public health, as compiled by Ontario's Chief Medical Officer of Health, revealed the following:

"...while some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects. The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct health effects, although some people may find it annoying".

*The Potential Health Impact of Wind Turbines - Chief Medical Officer of Health Report,  
Dr. Arlene King May 2010*

Additional information from the report includes:

- The report includes an assessment of sound/noise, low frequency sound, infrasound, vibration, electric and magnetic fields, shadow flicker, ice throw and ice shed, and structural hazards.
- Ontario used the most conservative sound modelling available nationally and internationally, which is supported by experiences in the province and in other jurisdictions.
- Low frequency sound and infrasound from current generation upwind model turbines are well below the pressure sound levels at which known health effects occur. Further, there is no scientific evidence to date that vibration from low frequency wind turbine noise causes adverse health effects.



## Environmental Noise Impact Assessment

- An Environmental Noise Impact Assessment will be completed for the Project to ensure it complies with the Ontario Ministry of the Environment's strict regulatory requirements.
- Ontario uses the most conservative sound modelling available nationally and internationally, which is supported by experiences in the province and in other jurisdictions (*The Potential Health Impact of Wind Turbines - Chief Medical Officer of Health Report, Dr. Arlene King May 2010*).
- The assessment will consider other operational and proposed wind facilities within a 3 km radius of noise receptors. This will ensure a conservative (cautious) approach is being used which considers cumulative noise effects.
- The Ministry of the Environment sound limit permitted at receptors fluctuates with wind speeds; however the typical receptor sound limit is 40 dBA for wind projects.



## Property Values

- "In the study area, where wind farms were clearly visible, there was no empirical evidence to indicate that rural residential properties realized lower sale prices than similar residential properties within the same area that were outside of the viewshed of a wind turbine."

*Canning, G., and L. J. Simmons. (February 2010). Wind Energy Study Effect of Real Estate Values in the Municipality of Chatham-Kent. Canning Consultants Inc. & John Simmons Realty Services Ltd. Prepared for the Canadian Wind Energy Association.*

- "Research collected data on almost 7,500 sales of single family homes situated within 10 miles of 24 existing wind facilities in nine different U.S. states. The conclusions of the study are drawn from eight different hedonic pricing models, as well as both repeat sales and sales volume models.

The various analyses are strongly consistent in that none of the models uncovers conclusive evidence of the existence of any widespread property value impacts that might be present in communities surrounding wind energy facilities. Specifically, neither the view of the wind facilities nor the distance of the home to those facilities is found to have any consistent, measureable, and statistically significant effect on home sales prices.

Although the analysis cannot dismiss the possibility that individual homes or small numbers of homes have been or could be negatively impacted, it finds that if these impacts do exist, they are either too small and/or too infrequent to result in any widespread, statistically observable impact."

*Hoen, B., Wiser, R., Cappers, P., Thayer, M., and G. Sethi. (December 2009). The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Hedonic Analysis. Ernest Orlando Lawrence Berkeley National Laboratory. Prepared for the Office of Energy Efficiency and Renewable Energy.*



## Environmental Benefits

The following are some of the environmental benefits of solar and wind power:

- It is pollution free
- It doesn't contribute to smog or acid rain
- It utilizes a completely renewable resource
- Generating electricity from sun light and wind leaves behind no hazardous or toxic wastes and does not contribute to climate change

Environmental Impact of Electricity Sources Summary Table

|                          | Wind | Solar              | Nuclear | Coal | Natural Gas |
|--------------------------|------|--------------------|---------|------|-------------|
| Global Warming Pollution | None | None               | None    | Yes  | Yes         |
| Air Pollution            | None | None               | None    | Yes  | Limited     |
| Mercury                  | None | None               | None    | Yes  | None        |
| Mining / Extraction      | None | None               | Yes     | Yes  | Yes         |
| Waste                    | None | None               | Yes     | Yes  | None        |
| Water Use                | None | Limited (cleaning) | Yes     | Yes  | Yes         |
| Habitat Impacts          | Yes  | Yes                | Yes     | Yes  | Yes         |

Derived from Source: AWEA/fact sheets/Wind Energy and Wildlife/If not wind, then..?

- *Interesting Fact: If you took all the energy generated by humans and planet earth in a day, it only amounts to 1/10,000th of the sun's energy that reaches the earth.*



The Samsung logo, consisting of the word "SAMSUNG" in white capital letters inside a dark blue oval.

SAMSUNG RENEWABLE ENERGY INC.

# GRAND RENEWABLE ENERGY PARK

## We Want to Hear From You!

Please share your questions and comments with us by filling out a questionnaire. Please feel free to take extra questionnaires with you and share them with your friends and family.

You can also contact the study team by:

- Email: [GrandRenewable@SamsungRenewableEnergy.ca](mailto:GrandRenewable@SamsungRenewableEnergy.ca)
- Phone: 1-877-536-6050 (toll free)
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You may also visit us on the project website at **[www.SamsungRenewableEnergy.ca](http://www.SamsungRenewableEnergy.ca)**. Copies of the display boards from this Public Open House and the Draft Project Description Report are available on the website.



## OTHER MATTERS

- 102) A number of standards apply to the development of the Proposed Facility. Standards typically refer to design criteria or guidelines published by governmental or regulatory agencies having jurisdiction over laws, codes, rules, or regulations at project sites in the Province of Ontario. With regard to the Proposed Facility the latest revision of the following standards for *civil* works are applicable: Ontario Provincial Standard Specifications (OPSS); Canadian Standards Association (CSA); and, American Society for Testing and Materials (ASTM). With regard to the Proposed Facility the latest revision of the following standards for *electrical* works are applicable: CSA C22.3 No. 1 – 10 Overhead Systems; CSA C22.3 No. 7-1- Underground Systems; Ontario Electrical Safety Code 24th Edition; and Ontario Energy Board Transmission System Code.