

**Grand Bend Wind Farm  
Project Description Report**

*Prepared By:*

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*Prepared for:*

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Grand Bend Wind Limited Partnership

February 13, 2012

File No: PIA 019991

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### Record of Revisions

Revision	Date	Description
0	January 30, 2012	Initial Submission to MOE
1	February 2012	Submission to Municipalities and Aboriginal Communities

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## 1.0 Introduction

### 1.1 Project Overview

Grand Bend Wind Limited Partnership, c/o Northland Power Inc. (“Northland”) is proposing to develop, construct and operate a 100 MW wind facility located north of Grand Bend, Ontario. An application for approval is being prepared under Ontario Regulation 359/09 of the *Environmental Protection Act*. The project is classified as a Class 4 Wind facility under the Regulation. The Grand Bend Wind Farm (“the Project”) is located in Huron County, spanning the lower-tier municipalities of Bluewater and Huron South. Portions of the transmission line also traverse the municipality of Huron East and municipality of West Perth in Perth County. The project location and study area is provided in **Appendix A, Figure 1**.

The basic project components will include approximately 48 turbines (Siemens SWT-2.3-113 direct drive wind turbine generators with a total name plate capacity of 100 MW), turbine access roads, a 36 kV electrical collection system, substation, a new transmission line within municipal road right-of ways (“ROWS”) along Rodgerville Road, Line 17 and Road 183 with connection to the provincial power grid at the 230 kV transmission line south of the Seaforth Transformer Station. An alternative transmission line connection to the grid is also under consideration west of Mitchell. During construction temporary components will include crane pads and work/storage areas at the turbine locations and construction of the transmission connections.

Under O.Reg. 359/09, a Project Description Report (“PDR”) must be prepared as part of the application package. The PDR is intended to provide an overview of the project and act as the central document in the Renewable Energy Approval application.

The Project Description Report is intended to be revised and updated throughout the Renewable Energy Approval process. Please refer to Record of Revisions table at the front of this document for revision references.

### 1.2 Project Description Report Requirements

This Project Description Report has been prepared in accordance with O.Reg. 359/09 and the guidance provided in Chapter 4 of the Technical Guide to Renewable Energy Approvals (MOE, 2011). Project Description Reports are required to include the information listed below in **Table 1.1**.

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**Table 1.1 Project Description Report Requirements**

Content		Report Section Reference
1.	Any energy sources to be used to generate electricity at the renewable energy generation facility	2.3
2.	The facilities, equipment or technology that will be used to convert the renewable energy source or any other energy source to electricity.	3.1 and Appendix A
3.	If applicable, the class of the renewable energy generation facility.	2.3
4.	The activities that will be engaged in as part of the renewable energy project.	3.2
5.	The nameplate capacity of the renewable energy generation facility.	2.3
6.	The ownership of the land on which the project location is to be situated.	3.4 and Appendix C
7.	If the person proposing to engage in the project does not own the land on which the project location is to be situated, a description of the permissions that are required to access the land and whether they have been obtained.	3.4
8.	Any negative environmental effects that may result from engaging in the project.	4.0
9.	An unbound, well marked, legible and reproducible map that is an appropriate size to fit on a 215 mm by 280 mm page, showing the project location and the land within 300 m of the project location.	Appendix A

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## 2.0 General Information

### 2.1 Name of Project and Applicant

The project and applicant name are provided in **Table 2.1**

**Table 2.1 Project and Applicant Name**

Name of Project	Grand Bend Wind Farm
Name of Applicant	Grand Bend Wind Limited Partnership c/o Northland Power Inc.

Northland Power Inc. (“Northland”) develops and operates clean and green power generation projects, mainly in the provinces of Ontario, Quebec and Saskatchewan. Since its inception in 1987, Northland has developed facilities generating a total of approximately 1,004 MW of electricity.

Northland Power was founded on the belief that clean and green energy is vital to the future of our planet. Construction and operational practices are engineered to meet the highest environmental standards, even in jurisdictions where lower standards are legislated. In addition, Northland makes ongoing investments in its host communities to ensure they remain vibrant, healthy places to live.

Additional information including a copy of this Project Description Report can be found on Northland’s website at: <http://grandbend.northlandpower.ca/>

### 2.2 Project Location

The proposed Project is located in Huron County, spanning the lower-tier municipalities of Bluewater and Huron South as well as a portion of Huron East and the municipality of West Perth in Perth County. The Project Study Area, shown in **Appendix A, Figure 1**, is bounded by:

- The Bluewater Highway (Highway 21) to the west;
- Main Street East/Grand Bend Line to the south;
- Blackbush and Shipka Lines with a small section of the study area in the central section of the project extending to Bronson Line and to the east; and,
- Staffa Road to the north; and
- Including two potential transmission line routes, as described below.

The preferred transmission line route is along Sararas/Rodgerville Road to Line 17, Road 183 and connecting to the 230 kV Hydro One transmission line just south of the Seaforth Transformer Station (“TS”). The second alternative route would follow

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Dashwood Road, Thames Road, Highway 23 and connect to the 230 kV Hydro One Transmission line east of Mitchell. Alternative potential transformer locations and storage building areas are indicated as well.

O. Reg. 359/09 defines the Project Location as:

*“a part of land and all or part of any building or structure in, on or over which a person is engaging in or proposes to engage in the project and any air space in which a person is engaging in or proposes to engage in the project”.*

For the purposes of this Project, the Project Location includes the footprint of the facility components, plus any temporary work and storage locations. The boundary of the Project Location is used for defining setback and site investigation distances according to O.Reg. 359/09. The buildable area, which includes the footprint of the facility components, plus any temporary work and storage locations, will be staked on private lands. All construction and installation activities will be conducted within these designated areas; this includes construction vehicles and personnel. Similarly, all installation activities related to collector lines within the municipal road allowance will be contained within the boundaries of the road allowance.

A detailed map of the Project Location and its vicinity is presented in **Appendix A, Figures 2a-i**.

### 2.3 Energy Source, Nameplate Capacity and Facility Class

Project information is presented in **Table 2.2**.

**Table 2.2 Energy Source, Nameplate Capacity and Facility Class**

Energy Source	Wind
Nameplate Capacity	100 MW
Facility Class	Class 4, Wind Facility

Wind turbines capture kinetic energy in wind which is converted into electricity. Wind turbines are comprised of four basic parts:

- foundation
- tower;
- blades; and
- nacelle.



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As wind moves over the turbine's blades it causes "lift". This lift force causes the blade assembly to rotate. The rotational energy resulting from the movement of the blades is converted in the nacelle to useable 60 Hz electricity.

No supplementary fuel sources would be used to generate electricity for the Project.

A Feed-in Tariff ("FIT") Contract has been awarded for the project by the Ontario Power Authority ("OPA") (FIT Contract # "F-002178-WIN-130-601).

## 2.4 Contact Information

### Applicant

The Applicant for the project is Grand Bend Wind Limited Partnership. c/o Northland Power Inc. ("Northland"). The principle contact is:

Name: Carol-Ann Fletcher, P.Eng  
Company: Northland Power Inc.  
Address: 30 St. Clair Avenue West, 12<sup>th</sup> Floor  
Toronto, ON M4A 3A1  
Email: [carol-ann.fletcher@northlandpower.ca](mailto:carol-ann.fletcher@northlandpower.ca)  
Telephone: (647) 288-1272

### Consultant

Neegan Burnside Ltd. ("Neegan Burnside") was retained by Northland as the lead project consultant. Neegan Burnside is a majority owned Aboriginal firm providing engineering and environmental consulting services.

The principle project consultant representing the applicant is:

Name: Lyle Parsons, B.E.S.  
Company: Neegan Burnside Ltd.  
Address: 292 Speedvale Avenue West, Unit 20  
Guelph, ON N1H 1C4  
Email: [lyle.parsons@neeganburnside.com](mailto:lyle.parsons@neeganburnside.com)  
Telephone: (519) 925-1790

The project specific e-mail address and telephone hotline for this project is as follows:  
[grandbendwind@neeganburnside.com](mailto:grandbendwind@neeganburnside.com)  
1-800-696-8093

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## 2.5 Other Approvals/Authorizations Required

At the federal, provincial and municipal level multiple permits, licenses and authorizations may be required to facilitate the development of the Project, in addition to the REA. The ultimate applicability of all permits and authorizations will be determined based on the Project's detailed design.

Potential approvals are listed in **Table 2.3**.

**Table 2.3 Other Project Approvals**

Permit/Authorization	Responsible Agency	Description
<b>Federal</b>		
Aeronautical Obstruction Clearance	Transport Canada-Aviation Division	Turbine lighting
Land Use Clearance	NavCanada	Aeronautical safety related to airports and flight approach/take-off areas
<b>Provincial</b>		
Endangered Species Act Permit	Ministry of Natural Resources ("MNR")	Permit is required if there is potential to harm species at risk or their habitat.
Approval of Connection	Independent Electricity System Operator ("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	HONI	Recovery of costs to grid operator of changes to allow connection
System Impact Assessment	IESO	Integration of project with IESO-controlled transmission system
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 Interference or obstruction of the highway
Change of Access	MTO	Compliance with provincial highway traffic and

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Permit/Authorization	Responsible Agency	Description
and Heavy/Oversize Load Transportation Permit		road safety regulations
Wide or Excess Load Permit	MTO	Transportation of large or heavy items on provincial highways
<b>Municipal</b>		
Building Permit for turbines	Municipality of Bluewater; Municipality of Huron South	Compliance with building codes
Plumbing and Septic Permits	Municipality of Bluewater; Municipality of Huron South	Compliance with building codes
Municipal Consent-agreement on the use of municipal road allowances	Municipality of Bluewater; Municipality of Huron South; Municipality of Huron East; County of Huron; Municipality of West Perth; and, Perth County	Required for use of municipal road allowances for collection and transmission line siting.
Drainage Act	Municipality of Bluewater; Municipality of Huron South; County of Huron	Required for alterations to municipal drains.
Entrance Permit	Municipality of Bluewater; Municipality of Huron South; County of Huron	Access road entrances/exits from county and lower-tier municipal roads
Shared Use Agreement	Municipality of Bluewater; Municipality of Huron South; Municipality of Huron East; County of Huron; Municipality of West Perth; and, Perth County	Shared use of poles in Municipal road allowance
Traffic Management Plan	Municipality of Bluewater; Municipality of Huron South;	Adherence to road safety and suitability, including adherence to load restrictions on municipal roads

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Permit/Authorization	Responsible Agency	Description
	Municipality of Huron East; County of Huron; Municipality of West Perth; and, Perth County	
Cost Recovery Agreement	Municipality of Bluewater; Municipality of Huron South; Municipality of Huron East; County of Huron; Municipality of West Perth; and, Perth County	To recover internal municipal costs in connection with the Project such as: building permits, road repairs, etc.
Oversize/Overweight Load Transportation Permit	Municipality of Bluewater; Municipality of Huron South; Municipality of Huron East; County of Huron; Municipality of West Perth; and, Perth County	Transportation of heavy and/or large items on county and lower-tier municipal roads
Road Condition Survey	Municipality of Bluewater; Municipality of Huron South; County of Huron	Assessment of pre and post construction conditions of roads to be used for material delivery and construction equipment movement
Sign Permit	Municipality of Bluewater; Municipality of Huron South; Municipality of Huron East; County of Huron; Municipality of West Perth; and, Perth County	As necessary
Demolition Permit	Municipality of Bluewater; Municipality of Huron South; Municipality of Huron East; County of Huron; Municipality of West	If required prior to the demolition of the Project

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Permit/Authorization	Responsible Agency	Description
	Perth; and, Perth County	
<b>Other Agencies</b>		
Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses Permit	Ausable Bayfield Conservation Authority/Upper Thames Conservation Authority	Work within floodplains, water crossings, river or stream valleys, hazardous lands and within or adjacent to wetlands.

## 2.6 Federal Involvement

Federal authorizations and clearances are noted in **Table 2.3**. This Project may trigger a federal Environmental Assessment (CEAA Screening) under the *Canadian Environmental Assessment Act* as federal funding may be provided. Federal agencies will be contacted during the consultation process to confirm federal involvement.

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### 3.0 Project Information

#### 3.1 Facility Components

##### 3.1.1 Wind Turbine Generators

The project is proposed to consist of approximately 48 turbines with a total electricity generation capacity of 100 MW. Several turbine types have been considered, including the following:

- Siemens SWT-2.3-113;
- GE;
- Gamesa;
- Enercon;
- and
- Vestas.

At present the Siemens SWT-2.3-113 turbine is the preferred model. Turbine specifications are presented in **Table 3.1**. Subject to availability and costing, an alternative turbine type may be utilized.

**Table 3.1 Siemens SWT-2.3-113 Specifications**

Manufacturer	Siemens
Model	SWT-2.3-113
Nameplate Capacity	2.3 MW
Hub Height	99.5m
Blade Length	55m
Rotor diameter	113m
Rotor sweep area	10,000m <sup>3</sup>
Speed Range	6-13 rpm
Nominal Noise Level	105 dBA
Frequency	60 Hz

The turbines consist of tower foundations, towers, rotor blades and nacelle which houses the gearbox/electrical generator components. Additional specifications from the manufacturer are provided in **Appendix B**.

Turbine coordinates based on the preliminary layout are presented in **Appendix C**. Turbine locations are subject to change as additional information becomes available.

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### 3.1.2 Electrical Facility Components

The project will also include the following components:

- Step-up transformers adjacent to each turbine at the base of the tower;
- 36 kV underground electrical power lines from each turbine to the nearest municipal road right-of-way ("ROW"); and,
- 36 kV electrical power lines to be located within municipal ROWs and connecting to the transformer sub-station via one of the alternative routes;
- 115 or 230 KV transmission line from the sub-station to the existing 115 Kv or 230 kV Hydro One transmission system to the east of the Project Study Area;
- Connection to the 115 or 230 KV Hydro One power grid at one of the following two alternatives:
  - south of Seaforth TS location (preferred); or,
  - west of Mitchell.

### 3.1.3 Transformer Substation

A 30 m X 30 m (approx. size) substation will be constructed at one of the two alternative locations shown on **Figure 2**.

### 3.1.4 Service Building

A service and parts storage building will be located close to one of the transformer locations proposed. The building will be approximately 50' x 120' and include a parking area as shown on **Figure 2**. This building will be serviced with water/wastewater (well and septic).

### 3.1.5 Turbine Access Roads

Existing provincial and municipal roads will be used to transport project-related components, equipment and personnel to the Study Area during construction and as required during operation. The Project would be situated exclusively on privately owned land and municipal road allowances. Access to these lands will be required for installation and operation of the wind turbines and lease agreements have previously been signed with each of the landowners involved. Some agricultural laneways are present in the vicinity of the Project and will be utilized where possible. New laneways will be constructed as required and in consultation with landowners to provide access to the individual turbine sites. Construction access laneways will be approximately 10 m wide during construction. Permanent access laneways may be reduced in size to approximately 6 m wide with the exception of entrances off municipal roads and all turning areas which require wider turning radii.

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### 3.1.6 Water Crossings

Where underground collector lines cross watercourses or other sensitive natural areas, the buried gathered lines will be installed using directional drill techniques in suitably sized plastic conduits at a sufficient depth below the watercourse to prevent any possibility of accidental damage due to dredging or over excavation. Signs indicating the presence and location of the cables will also be placed on either side of the watercourse or other areas involved. All water crossings will require permit approval from the Ausable Bayfield Conservation Authority and/or the Upper Thames Conservation Authority. The final configuration and route for the collector lines will be determined as part of the REA process. All temporary crossings would comply with the DFO's Ontario Operation Statement '*Temporary Stream Crossings*' where possible.

### 3.1.7 Temporary Construction Facilities

Lands to be temporarily used during the construction of the Project include staging areas for access roads and underground cable construction, delivery truck turnaround areas, staging areas at each turbine location, and crane laydown areas. Any temporary structures used during construction will not be serviced with electrical or water hook-ups, and will be placed within delineated construction work areas.

The existing land use at all Project areas is agricultural. Following construction activities, all locations will be restored to pre-impact conditions. Restoration work will start following installation of each wind turbine and removal of all construction materials and equipment from each turbine site.

**Turbine Staging Areas** – At this time, plans are for turbine components to be delivered directly to the staging areas for each turbine. The components will be temporarily stored within these staging areas until assembled; there will be no central laydown area. Turbine staging areas will be initiated in conjunction with turbine assembly, and will be rehabilitated to pre-construction condition following the end of the construction phase. Turbine staging areas would be actively used to varying degrees during all construction activities at the specific turbine site areas.

**Access Road Staging Areas** - A staging area will be required for construction of the access road.

**Delivery Truck Turnaround Areas** - These turnaround areas will be the same width as access roads, with additional space as required for turning radii, and will be constructed in the same manner. There is a similar turnaround requirement for staging areas.



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**Access Road Entrances** - Access road entrances require a wider turning radius for construction/delivery vehicles.

**Crane Laydown Areas** – An area will be identified within which crane components will be assembled.

**Crane Pads** - Crane pads will consist of concrete pads on which the construction crane will sit. A crane pad would be located at each turbine location at the end of each access road to be used during turbine assembly. Pads will generally be constructed at the same time as the access roads. Concrete will be removed subsequent to construction and land beneath will be rehabilitated as required.

### 3.2 Project Activities

Project activities will generally include:

- Project approvals;
- Construction;
- Operation and maintenance; and,
- Decommissioning (or re-powering).

A preliminary schedule of Project Activities is presented in **Table 3.2**.

**Table 3.2 Project Schedule**

<b>Project Activity</b>	<b>Anticipated Schedule</b>
Issue First Draft Project Description Report	January 2012
REA Technical Studies	Ongoing 2011 through 2012
Public Information Centre #1	Spring 2012
Issue Draft REA Reports to the Public	Late summer 2012
Public Information Centre #2	Fall 2012
REA Submission/Approval	Fall 2012/Spring 2013
Additional Permitting and Approvals Completed	Ongoing 2012 through 2013
Start of Construction	Fall 2013
Commercial Operation Date ("COD")	Fall 2014
Project Operation	2014- 2025
New Contract or Decommissioning	Approximately 20 years after COD

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A detailed list of project activities associated with construction, operation and new contract/decommissioning is presented in **Table 3.3**.

**Table 3.3 Project Activities**

Phase	Project Activities
Construction Phase	<p>Turbine Sites:</p> <ul style="list-style-type: none"> <li>• Delineation of temporary work areas;</li> <li>• Completion of necessary site clearing and grading;</li> <li>• Construction of access roads, including installation of culverts, where required;</li> <li>• Component transportation to work areas;</li> <li>• Installation of crane pads;</li> <li>• Installation of tower foundations;</li> <li>• Tower/turbine erection;</li> <li>• Connection of wind turbines to electrical collection system;</li> <li>• Remediation of temporary work areas;</li> <li>• Completion of permanent access roads and decommissioning of portions of temporary access roads;</li> <li>• Site landscaping (final grading, topsoil replacement, fence installation, tile drain replacement etc.)</li> </ul>
	<p>Collection System:</p> <ul style="list-style-type: none"> <li>• ROW clearing, as required;</li> <li>• Installation of 36 kV electrical collection system within private land easements and municipal ROWs;</li> <li>• Step-up transformer substation and operations building.</li> </ul>
	<p>Transmission Line and Interconnection:</p> <ul style="list-style-type: none"> <li>• ROW clearing, as required;</li> <li>• Installation of overhead and underground transmission lines;</li> <li>• Installation of switch gear at connection point with Hydro One transmission line (provincial grid);</li> <li>• Commissioning of the project.</li> </ul>

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<b>Phase</b>	<b>Project Activities</b>
Operation and Maintenance Phase	Turbine Sites: <ul style="list-style-type: none"> <li>• Periodic vehicle access for maintenance;</li> <li>• Remote condition monitoring and meter calibrations;</li> <li>• Grounds keeping.</li> </ul>
	Collection System: <ul style="list-style-type: none"> <li>• Testing and maintenance of electrical equipment.</li> </ul>
	Transmission Line: <ul style="list-style-type: none"> <li>• Ongoing clearing of vegetation within ROW;</li> <li>• Testing and maintenance of electrical equipment;</li> <li>• Maintenance and replacement of poles and other transmission components, as required.</li> </ul>
Decommissioning Phase	Turbine Sites: <ul style="list-style-type: none"> <li>• Removal of tower and turbine infrastructure;</li> <li>• Removal of foundation to not less than 3 ft below grade;</li> <li>• Turbine site grading and rehabilitation (dependent on new proposed use);</li> <li>• Removal of all waste from the site.</li> </ul>
	Access Roads: <ul style="list-style-type: none"> <li>• Access roads will be left at landowner's request or graded to restore topography and soils (to the extent possible) and vegetated (dependent on new proposed use).</li> </ul>
	Collection Lines: <ul style="list-style-type: none"> <li>• Removal of below ground collection lines and restoration of terrain.</li> </ul>
	Transmission Line and Substation: <ul style="list-style-type: none"> <li>• Removal of overhead transmission line and conductors;</li> <li>• Removal of substation components;</li> <li>• Removal of poles;</li> <li>• Removal of all waste from the site.</li> </ul>

### 3.3 Map of Project Location

A draft project layout maps are presented in **Appendix A, Figures 2a-i**. The layout was developed based on:

- Results of wind resource data;
- Site access;
- Existing land use;
- Environmental and socio-economic information;
- Results from the preliminary noise assessment;

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- Interconnection feasibility; and,
- REA setback requirements.

The layout presented is considered to be draft and is subject to revisions based on input received from government agencies, aboriginal communities, the public and landowners through the REA consultation process as well as additional environmental data collected during field studies.

### 3.4 Land Ownership

The project will be located predominantly on private and municipal lands (private lands are predominantly in active agricultural use) as described below.

Portions of the project located on private lands include:

- Turbines;
- Temporary and permanent access roads;
- Turbine construction areas;
- Electrical collector system;
- Operation and maintenance building;
- Transformer sub-station; and,
- Connection station

Portions of the project located on municipal lands include:

- Overhead and underground electrical collection and transmission lines within provincial and municipal ROWs; and,
- Overhead and underground electrical collection and transmission line construction areas

The legal descriptions of land parcels on which the project will be located are presented in **Appendix D**.

The permissions that are required to access the land have been obtained by the project proponent in the form of land lease agreements.

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#### 4.0 Potential Negative Environmental Effects

Potential negative effects associated with the project are identified in the sections below. As the REA process progresses, each potential effect will be studied in greater detail to identify the significance, magnitude and duration of each effect. Mitigation will be developed to minimize effects to the extent possible. Finally, a post-construction monitoring program will be developed to identify and address any unexpected impacts that may result from the project.

A key component of the REA process is the establishment of common setbacks for all renewable energy facilities in the Province. The Project was designed to meet the mandatory setbacks within O. Reg. 359/09 in all cases. Within the regulation there are some setbacks for which studies that identify potential negative environmental effects and mitigation measures can be conducted in lieu of meeting the setback requirements. In some instances in the proposed design, Project components are proposed within the defined setbacks. In these instances, additional assessments will be conducted.

Potential negative effects, proposed mitigation measures and additional studies currently underway or proposed in the near future have been summarized in **Table 4.1**.

**Table 4.1 Potential Project Effects, Mitigation, Additional Studies and Residual Effects**

<b>Environmental Component</b>	<b>Potential Effects</b>	<b>Proposed Mitigation/Additional Studies</b>	<b>Anticipated Residual Effect</b>
Heritage/Archaeology	<ul style="list-style-type: none"> <li>• Disturbance to archaeological and cultural heritage resources during construction or decommissioning activities.</li> <li>• No anticipated effects during operation/maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• A Stage 1 Archaeological Assessment and consultation with agencies regarding Heritage Resources is currently underway.</li> <li>• Additional Archaeological and Cultural Assessments will be undertaken (by a licensed archaeologist) if it is determined that there is potential for resources to be present.</li> <li>• Consultation will be undertaken with relevant First Nations and Métis communities.</li> <li>• Should any unknown/unexpected artifacts or human remains be encountered during construction the construction contractor will stop work and the Ministry of Culture will be notified.</li> </ul>	<ul style="list-style-type: none"> <li>• Appropriate clearance will be obtained by the Ministry of Tourism and Culture.</li> <li>• No residual effects anticipated</li> </ul>
Woodlands and Natural Vegetation	<ul style="list-style-type: none"> <li>• Potential introduction of invasive species during construction.</li> <li>• Vegetation loss during construction, although project is primarily located in agricultural areas</li> <li>• No direct impact on Significant Woodlands anticipated during</li> </ul>	<ul style="list-style-type: none"> <li>• Field studies are ongoing to confirm the presence, significance, sensitivity and abundance of woodlands and natural vegetation, including:                             <ul style="list-style-type: none"> <li>○ Vegetation inventories;</li> <li>○ Ecological Land Classification; and,</li> <li>○ Species at Risk surveys.</li> </ul> </li> <li>• An Environmental Impact Study will be completed to identify potential impacts and recommend mitigation measures to minimize</li> </ul>	<ul style="list-style-type: none"> <li>• Appropriate clearances will be obtained from the MNR.</li> <li>• Impact anticipated to be short term in duration and of limited</li> </ul>

Environmental Component	Potential Effects	Proposed Mitigation/Additional Studies	Anticipated Residual Effect
	<p>construction.</p> <ul style="list-style-type: none"> <li>Indirect impacts on vegetation as a result of dust during operation.</li> </ul>	<p>impacts.</p> <ul style="list-style-type: none"> <li>If required, a permit or permits under the <i>Ontario Endangered Species Act</i> will be obtained.</li> <li>Consultation will be undertaken with relevant First Nations and Métis communities.</li> <li>Dust control measures (such as wetting of surfaces with water) will be implemented</li> </ul>	<p>geographic extent.</p> <ul style="list-style-type: none"> <li>No residual effects anticipated</li> </ul>
Wetlands	<ul style="list-style-type: none"> <li>No direct impacts on wetlands anticipated during construction.</li> <li>Potential impacts to the hydrological regime due to changes in surface water runoff and groundwater drawdown as a result of construction activities.</li> <li>Indirect impacts on vegetation as a result of dust during operation.</li> </ul>	<ul style="list-style-type: none"> <li>Field studies are ongoing to confirm the presence and potential significance of wetlands.</li> <li>An Environmental Impact Study will be completed to identify potential impacts and recommend mitigation measures to minimize impacts.</li> <li>Mitigation measures will be developed to ensure that above and below ground water flow to wetlands is not altered as a result of the project.</li> <li>Consultation will be undertaken with relevant First Nations and Métis communities.</li> <li>Dust control measures (such as wetting of surfaces with water) will be implemented</li> </ul>	<ul style="list-style-type: none"> <li>Appropriate clearances will be obtained from the MNR.</li> <li>No residual effects anticipated</li> </ul>
Life Science Areas of	<ul style="list-style-type: none"> <li>No impacts anticipated</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>

Environmental Component	Potential Effects	Proposed Mitigation/Additional Studies	Anticipated Residual Effect
Natural and Scientific Interest (ANSIs")			
Terrestrial Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> <li>• Disruption (disturbance and direct mortality) to terrestrial species and their breeding, feeding and migration habitats during construction and operation, including:                             <ul style="list-style-type: none"> <li>– birds;</li> <li>– bats;</li> <li>– mammals;</li> <li>– amphibians;</li> <li>– reptiles;</li> <li>– insects; and,</li> <li>– species at risk.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Field studies are ongoing to confirm the presence, significance, sensitivity and abundance of wildlife and wildlife habitat, including:                             <ul style="list-style-type: none"> <li>○ various bird surveys;</li> <li>○ bat habitat surveys;</li> <li>○ dens, tracks and scat surveys;</li> <li>○ amphibian call surveys;</li> <li>○ turtle and snake surveys;</li> <li>○ incidental observations; and,</li> <li>○ targeted species at risk surveys.</li> </ul> </li> <li>• An Environmental Impact Study will be completed to identify potential impacts and recommend mitigation measures to minimize impacts.</li> <li>• If required, a permit or permits under the <i>Ontario Endangered Species Act</i> will be obtained.</li> <li>• Consultation will be undertaken with relevant First Nations and Métis communities.</li> </ul>	<ul style="list-style-type: none"> <li>• Appropriate clearances will be obtained from the MNR.</li> <li>• Potential mortality (bird and bat) is anticipated to be intermittent and of short duration.</li> <li>• No residual effects anticipated</li> </ul>
Provincial Parks, Conservation Reserves or Valleylands	<ul style="list-style-type: none"> <li>• These features are not present within 120m of the Project Location. No effects are anticipated.</li> </ul>	<ul style="list-style-type: none"> <li>• No mitigation is currently proposed.</li> <li>• If the Project Location changes, effects on these features will be reviewed and mitigation developed, as required.</li> </ul>	<ul style="list-style-type: none"> <li>• No residual effects anticipated</li> </ul>



Environmental Component	Potential Effects	Proposed Mitigation/Additional Studies	Anticipated Residual Effect
Surface Water	<ul style="list-style-type: none"> <li>• Erosion during construction could affect water quality due to increased sediment load.</li> <li>• Water quality impacts due to potential fuel and oil spills during construction and operation.</li> </ul>	<ul style="list-style-type: none"> <li>• Work is ongoing to characterize watercourses in the Project Area.</li> <li>• Mitigation measures will be developed to minimize potential impacts associated with erosion and spills.                             <ul style="list-style-type: none"> <li>○ Erosion and sediment control measures would be implemented during all construction activities.</li> <li>○ Measures would be inspected regularly.</li> <li>○ Materials removed or stockpiled would be contained in a manner to ensure sediment does not enter a watercourse.</li> <li>○ All spills that could potentially have an adverse environmental effect, are outside the normal course of events, or are in excess of the prescribed regulatory levels would be reported to the MOE's Spills Action Centre.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• No residual effects anticipated</li> </ul>
Groundwater	<ul style="list-style-type: none"> <li>• Dewatering during construction of turbine foundations, if needed (not expected to exceed 50,000L/day).</li> <li>• Potential to encounter non-documented shallow dug</li> </ul>	<ul style="list-style-type: none"> <li>• Work is ongoing to characterize groundwater in the Project Area and identify any wells which could potentially be affected.</li> <li>• Mitigation measures will be developed to minimize potential impacts associated with dewatering and spills.</li> </ul>	<ul style="list-style-type: none"> <li>• Potential spills would be spatially limited and of short duration. An emergency response plan</li> </ul>

Environmental Component	Potential Effects	Proposed Mitigation/Additional Studies	Anticipated Residual Effect
	<p>wells during construction.</p> <ul style="list-style-type: none"> <li>Water quality impacts due to potential fuel and oil spills during construction and operation.</li> </ul>		<p>will address spills.</p> <ul style="list-style-type: none"> <li>No residual effects anticipated</li> </ul>
Soils	<ul style="list-style-type: none"> <li>Soil compaction from construction equipment.</li> <li>Loss of soils due to erosion during construction.</li> <li>Soil quality impacts due to potential fuel and oil spills during construction and operation.</li> </ul>	<ul style="list-style-type: none"> <li>Soils compacted in temporary construction areas will be rehabilitated as soon as possible after construction.</li> <li>Soils compacted as a result of ongoing operations will be rehabilitated in accordance with an approved decommissioning plan.</li> <li>Mitigation measures will be developed to minimize potential impacts associated with erosion and spills.</li> </ul>	<ul style="list-style-type: none"> <li>No residual effects anticipated</li> </ul>
Aquatic Species and Aquatic Habitat	<ul style="list-style-type: none"> <li>Potential impacts to fish habitat due to the installation of culverts along access roads during construction activities.</li> <li>Potential sedimentation during construction.</li> </ul>	<ul style="list-style-type: none"> <li>Work is ongoing to characterize watercourses in the Project Area.</li> <li>Detailed fish habitat assessments will be undertaken in areas where culverts are proposed.</li> <li>Permits will be obtained from the Conservation Authority and/or Department of Fisheries and Oceans, as required for all culverts or other infrastructure within watercourse or within the Conservation Authority Regulation Limit. Appropriate DFO</li> </ul>	<ul style="list-style-type: none"> <li>No residual effects anticipated</li> </ul>

Environmental Component	Potential Effects	Proposed Mitigation/Additional Studies	Anticipated Residual Effect
		<p>Operational statements will be followed.</p> <ul style="list-style-type: none"> <li>• Mitigation measures will be developed to minimize potential impacts associated with erosion, spills and dewatering.</li> </ul>	
Air, Odour, Dust	<ul style="list-style-type: none"> <li>• Increases in air-borne dust and particulate matter, increased emissions from construction vehicles during construction and decommissioning.</li> <li>• Positive effects include a reduction in greenhouse gasses by utilizing renewable energy.</li> <li>• Positive effects of reducing air emissions from coal fired electrical energy generation.</li> </ul>	<ul style="list-style-type: none"> <li>• The Contractor would implement good site practices with regard to air/odour which may include:                             <ul style="list-style-type: none"> <li>○ Multi-passenger vehicles would be utilized to the extent practical;</li> <li>○ Company and contractor personnel would avoid idling of vehicles when not necessary for construction activities;</li> <li>○ Equipment and vehicles would be turned off when not in use unless required for activities and/or effective operation of the equipment or vehicle;</li> <li>○ Equipment and vehicles would be maintained in good working order with functioning mufflers and emission control systems as available;</li> <li>○ All vehicles would be fitted with catalytic converters as required;</li> </ul> </li> <li>• The Contractor would implement good site practices with regard to dust which may</li> </ul>	<ul style="list-style-type: none"> <li>• Increased emissions will be short term in duration and of limited geographic extent.</li> <li>• No residual effects anticipated</li> </ul>

Environmental Component	Potential Effects	Proposed Mitigation/Additional Studies	Anticipated Residual Effect
		include: <ul style="list-style-type: none"> <li>○ Protecting stockpiles of friable material with a barrier;</li> <li>○ Dust suppression (e.g. water) of source areas;</li> </ul> Covering loads of friable materials during transport.	
Noise	<ul style="list-style-type: none"> <li>• Noise effects from the operation of construction machinery and transport of materials into the project area;</li> <li>• Noise associated with the operation of turbines and transformer station (all turbines are expected to meet the 40 dBA limit for non-participating noise receptors);</li> <li>• Noise effects associated with decommissioning and dismantling activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Mitigation measures will be developed to minimize noise impacts during construction and decommissioning. For example, all engines associated with construction equipment would be equipped with mufflers and/or silencers in accordance with MOE and/or MTO guidelines and regulations. To the greatest extent possible, activities that could create excessive noise would be restricted to regular construction hours and adhere to any local noise by-laws.</li> <li>• Setbacks from noise receptors will be applied to ensure that the 40 dBA limit is met at non-participating residences and to the extent possible at participating residences.</li> <li>• Operational Plans will include an appropriate maintenance schedule to ensure that turbines function properly in order to reduce noise due to malfunctioning equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• Noise is anticipated to be short term in duration and of limited geographic extent.</li> <li>• No residual effects anticipated</li> </ul>
Telecommunications	<ul style="list-style-type: none"> <li>• Potential interference to</li> </ul>	<ul style="list-style-type: none"> <li>• A detailed broadcast, radar and</li> </ul>	<ul style="list-style-type: none"> <li>• No residual</li> </ul>

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Environmental Component	Potential Effects	Proposed Mitigation/Additional Studies	Anticipated Residual Effect
	communication systems, including radar, cellular and broadcasting systems.	telecommunications study will be undertaken which will identify mitigation measures, as appropriate.	effects anticipated
Agricultural Resources	<ul style="list-style-type: none"> <li>• Removal of a small portion of active agricultural land from production during construction and adjustments to agricultural operations during operations;</li> <li>• Potential temporary disturbance or disruption to tile drainage infrastructure during construction;</li> <li>• Potential temporary disturbance to livestock fencing during construction.</li> </ul>	<ul style="list-style-type: none"> <li>• Northland Power will work with all participating landowners to identify access road routing that will minimize fragmentation of agricultural lands.</li> <li>• Landowners will also be consulted regarding impacts to private infrastructure, such as tile drainage and fencing such that any problems will be addressed, mitigated and restored, as required.</li> <li>• If required, mitigation measures will be implemented for wet soil shutdown practices, decompaction, topsoil replacement and sedimentation/erosion control.</li> </ul>	<ul style="list-style-type: none"> <li>• Effect is anticipated to be short term in duration and of limited geographic extent.</li> <li>• No residual effects anticipated</li> </ul>
Petroleum, Oil and Gas Resources	<ul style="list-style-type: none"> <li>• A review of the MNR's oil, gas and petroleum library indicated that there are no resources within 75m of the Project Area.</li> <li>• No effects are anticipated.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>
Viewscape and Aesthetics	<ul style="list-style-type: none"> <li>• Change in viewscape due to construction and operation.</li> <li>• Temporary disruption to enjoyment of use of property</li> </ul>	<ul style="list-style-type: none"> <li>• Visual assessment</li> <li>• Studies will identify appropriate mitigation, if required.</li> </ul>	<ul style="list-style-type: none"> <li>• A changed visual landscape will be present</li> </ul>

Environmental Component	Potential Effects	Proposed Mitigation/Additional Studies	Anticipated Residual Effect
	<p>due to short term effects of dust, noise or traffic.</p>		<p>throughout the life of the project</p>
<p>Economy/Real Estate Values</p>	<ul style="list-style-type: none"> <li>• Perceived effects on adjacent property values during construction and operation.</li> <li>• Positive impacts to local economy associated with local labour and equipment procurement during construction and operation.</li> </ul>	<ul style="list-style-type: none"> <li>• Ongoing consultation will be maintained with the public and adjacent landowners to identify concerns and resolve significant issues.</li> <li>• Northland Power would make all reasonable efforts, to the extent possible, to source required services and materials from local suppliers where these items are available in sufficient quantity and quality and at competitive prices.</li> </ul>	<ul style="list-style-type: none"> <li>• No residual effects anticipated</li> </ul>
<p>Provincial and Local Infrastructure</p>	<ul style="list-style-type: none"> <li>• Temporary pressure on local services and inconvenience to local residents during construction.</li> <li>• Traffic delays on municipal and provincial roads due to construction activities within the ROWs and as a result of construction-related traffic (i.e. movement of heavy equipment and turbine components);</li> <li>• Damage to roads as a result of the movement of heavy</li> </ul>	<ul style="list-style-type: none"> <li>• Traffic Management Plans will be developed to manage the delivery of equipment and large machinery to minimize local traffic disruptions to the extent possible.</li> <li>• A Road Condition Survey will be conducted. Any damage to local or provincial infrastructure as a result of construction or decommissioning activities will be repaired as quickly as possible.</li> <li>• Consultation will take place with the MTO and municipalities regarding the need to upgrade or widen any roads in order to allow for the delivery of equipment.</li> <li>• Any upgrades and/or subsequent</li> </ul>	<ul style="list-style-type: none"> <li>• Effects are anticipated to be short term and of limited geographic extent.</li> <li>• No residual effects anticipated</li> </ul>

Environmental Component	Potential Effects	Proposed Mitigation/Additional Studies	Anticipated Residual Effect
	equipment and turbine components during construction.	rehabilitation and maintenance/repair will be negotiated with the appropriate authorities.	
Waste	<ul style="list-style-type: none"> <li>• Disposal of wastes associated with construction, operations and decommissioning.</li> </ul>	<ul style="list-style-type: none"> <li>• The Contractor would implement a site-specific waste collection and disposal management plan</li> </ul>	<ul style="list-style-type: none"> <li>• No residual effects anticipated</li> </ul>
Public Health and Safety	<ul style="list-style-type: none"> <li>• Safety issues related to the operation of heavy equipment during construction.</li> <li>• Accidents/Spills or malfunctions associated with project components and electrical systems.</li> <li>• Threats from ice fall and throw and catastrophic failure.</li> <li>• Low frequency noise/infrasound.</li> <li>• Stray voltage.</li> </ul>	<ul style="list-style-type: none"> <li>• A Health and Safety Plan will be developed by the construction contractor and operator.</li> <li>• A Response Plan to outline a procedure for responding to emergencies will also be developed, as required under O. Reg. 359/09. This will include specific details with respect to communication with the public and agencies during emergencies.                             <ul style="list-style-type: none"> <li>○ Standard containment facilities and emergency response materials would be maintained on-site as required.</li> <li>○ Refuelling, equipment maintenance, and other potentially contaminating activities would occur in designated areas.</li> <li>○ As appropriate spills would be reported immediately to the MOE Spills Action Centre.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• No residual effects anticipated</li> </ul>
Provincial Land Use	<ul style="list-style-type: none"> <li>• The Project is not protected</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

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<b>Environmental Component</b>	<b>Potential Effects</b>	<b>Proposed Mitigation/Additional Studies</b>	<b>Anticipated Residual Effect</b>
Plans	under the Greenbelt Plan, Lake Simcoe Protection Plan, Niagara Escarpment Plan or Oak Ridges Moraine Conservation Plan. No impacts under provincial plans or policies are anticipated.		

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## 5.0 Next Steps

This Project Description Report represents the initial step in the Renewable Energy Approval Process. This document will be used to solicit initial comments and questions from the public, government agencies and Aboriginal communities.

This document and any comments received will form the foundation for future studies, layout changes and mitigation which will be developed as the project progresses. A revised Project Description Report will be issued at future project milestones and will be made available to the public.

Respectfully submitted,

**Neegan Burnside Ltd.**

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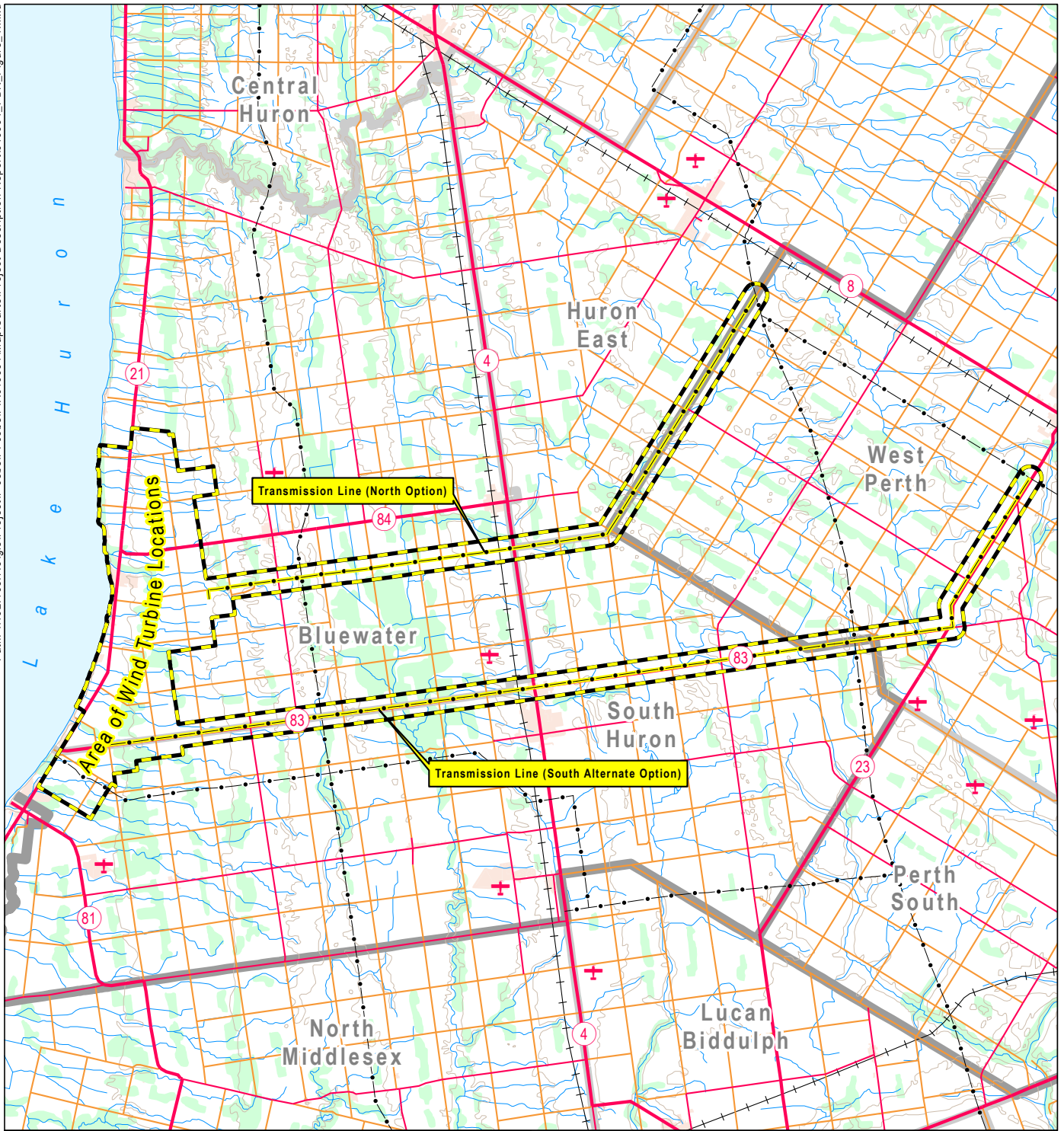
Approved by:




Gordon Potts, P.Eng.  
Northland Power Inc.

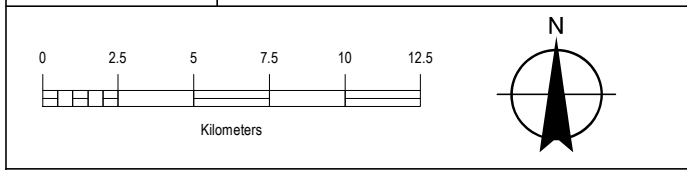
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**Appendix A**  
**Figures**

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-  Study Area Boundary
-  Potential Overhead Transmission Line From Transformer Station to Existing Line
-  Existing Transmission Line

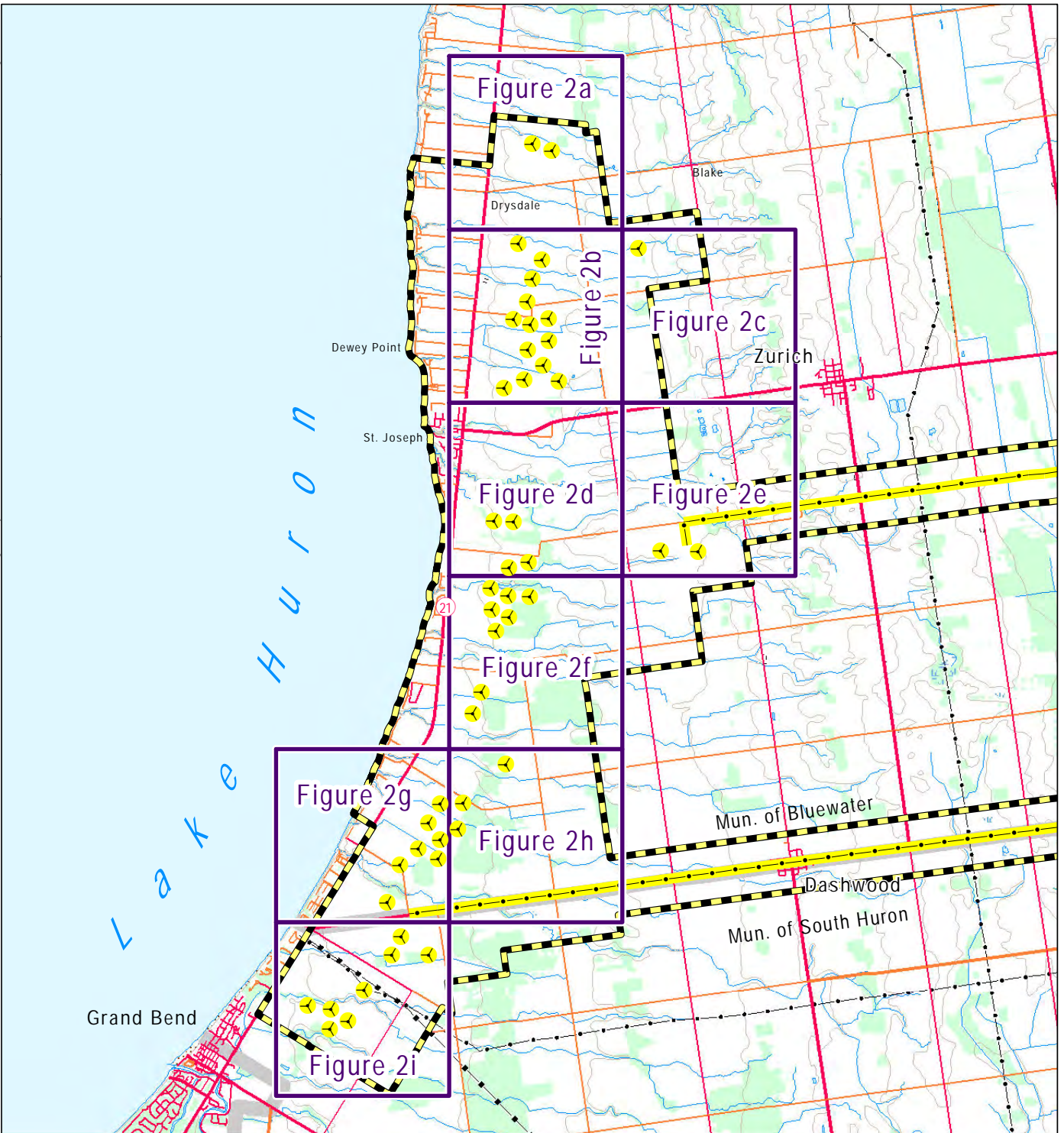






**Grand Bend Wind Farm**  
 Grand Bend Wind Limited Partnership  
 c/o Nortland Power Inc.

**Project Location**

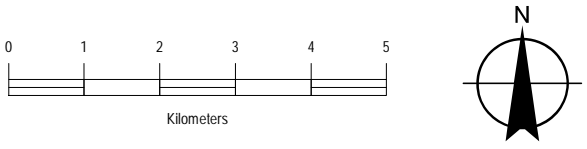


Prepared	P. Stubbert	Checked	L. Parsons	Figure Number <b>1</b>
Scale	1:250,000	Project	PIA019991	



-  Study Area Boundary
-  Potential Overhead Transmission Line From Transformer Station to Existing Line
-  Existing Transmission Line
-  Wind Turbine Location (Yellow Dashed Line represents 56m Blade Radius)

Note: Reference Figures 2a to 2i for more detail.



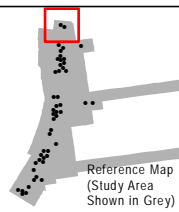
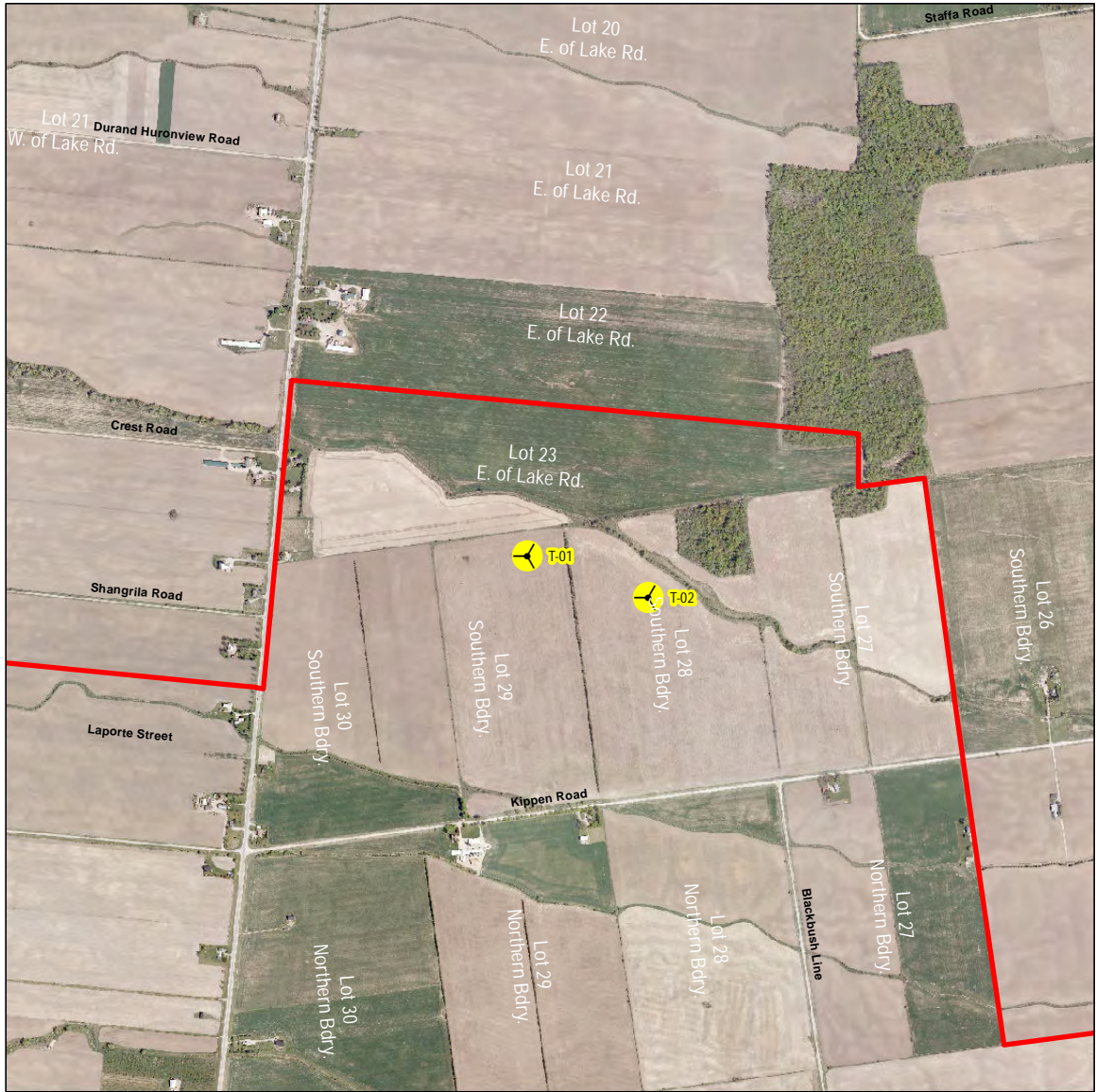
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Project Location Key Map

Prepared	P. Stubbert	Checked	L. Parsons
Scale	1:100,000	Project	PIA019991

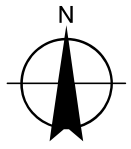
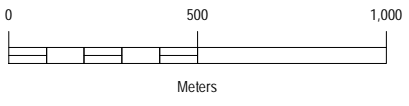
Figure Number  
**2**





-  Wind Turbine Location (symbol does not represent blade diameter)
-  Potential Overhead Transmission Line From Transformer Station to Existing Line
-  Study Area Boundary

Note: 1. See Figure 2 for complete map index.  
 2. Each mapped area is 3km x 3km.  
 3. Turbine numbering on this map will appear different than in maps/documents issued prior to 27 January, 2012.



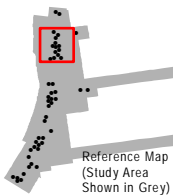
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 Grand Bend Wind Limited Partnership  
 c/o Nortland Power Inc.

**Project Layout**



Prepared	P. Stubbert	Checked	L. Parsons
Scale	1:20,000	Project	PIA019991

Figure Number  
**2a**



Wind Turbine Location  
(symbol does not represent blade diameter)



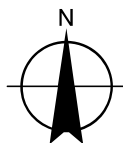
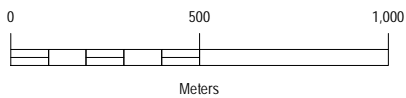
Study Area Boundary



Potential Overhead  
Transmission Line  
From Transformer Station to Existing Line

Note: 1. See Figure 2 for complete map index.  
2. Each mapped area is 3km x 3km.

3. Turbine numbering on this map will appear different than in maps/documents issued prior to 27 January, 2012.

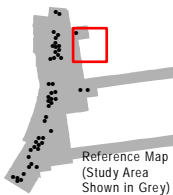
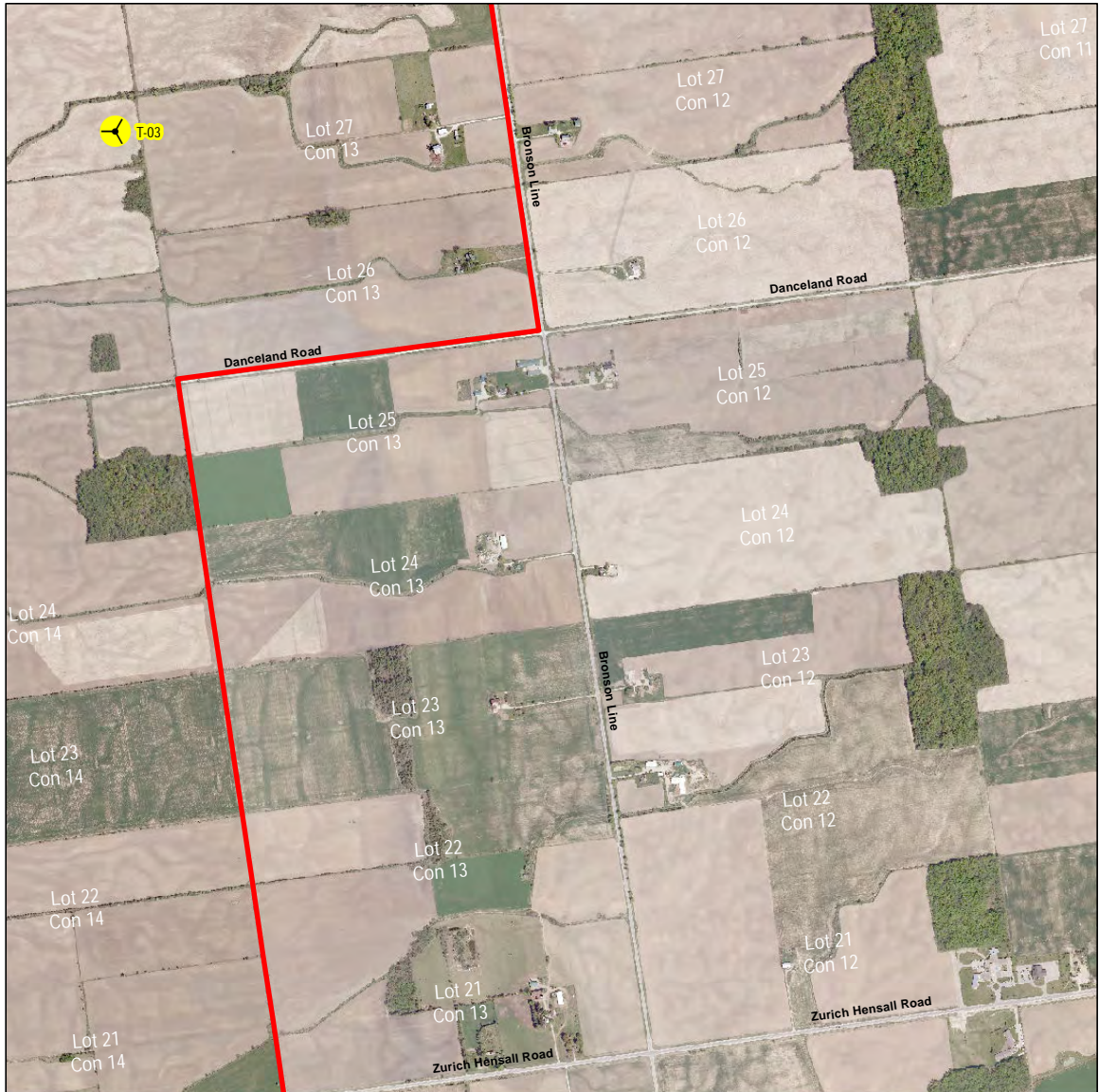


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**Project Layout**



Prepared	P. Stubbert	Checked	L. Parsons	Figure Number <b>2b</b>
Scale	1:20,000	Project	PIA019991	



Wind Turbine Location  
(symbol does not represent blade diameter)



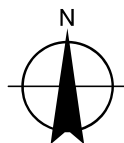
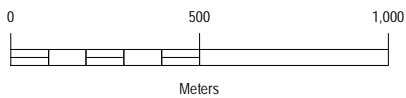
Study Area Boundary



Potential Overhead  
Transmission Line  
From Transformer Station to Existing Line

Note: 1. See Figure 2 for complete map index.  
2. Each mapped area is 3km x 3km.

3. Turbine numbering on this map will appear different than in maps/documents issued prior to 27 January, 2012.



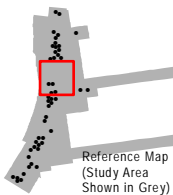
**Grand Bend Wind Farm**  
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**Project Layout**



Prepared	P. Stubbert	Checked	L. Parsons
Scale	1:20,000	Project	PIA019991

Figure Number  
**2c**



Wind Turbine Location  
(symbol does not represent blade diameter)



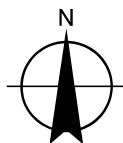
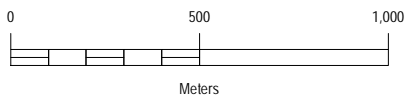
Study Area Boundary



Potential Overhead  
Transmission Line  
From Transformer Station to Existing Line

Note: 1. See Figure 2 for complete map index.  
2. Each mapped area is 3km x 3km.

3. Turbine numbering on this map will appear different than in maps/documents issued prior to 27 January, 2012.



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c/o Nortland Power Inc.

Project Layout

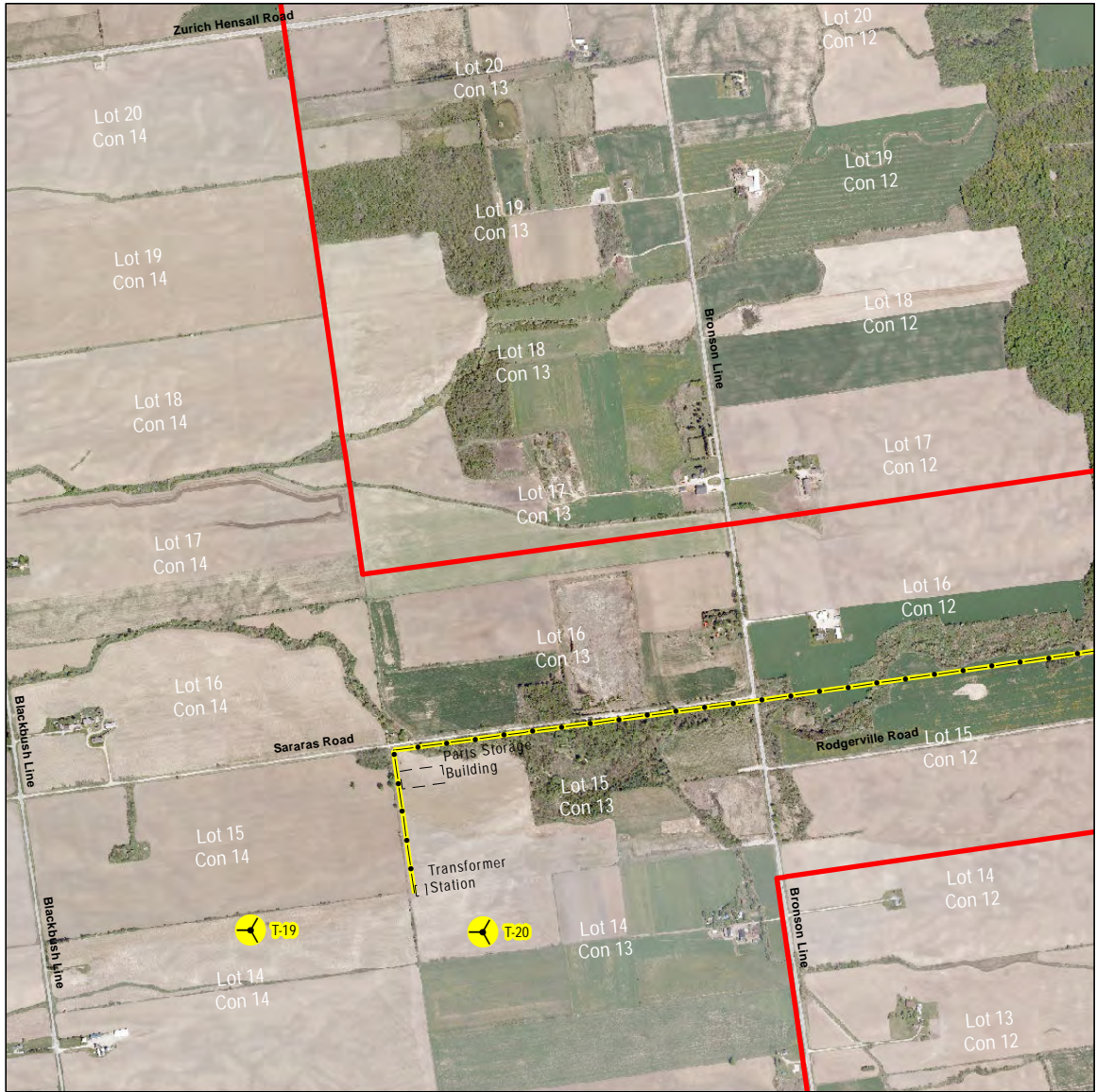


Prepared	P. Stubbert	Checked	L. Parsons
Scale	1:20,000	Project	PIA019991

Figure Number

2d





Wind Turbine Location  
(symbol does not represent blade diameter)



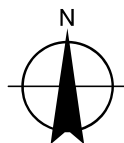
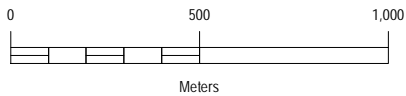
Study Area Boundary



Potential Overhead  
Transmission Line  
From Transformer Station to Existing Line

Note: 1. See Figure 2 for complete map index.  
2. Each mapped area is 3km x 3km.

3. Turbine numbering on this map will appear different than in maps/documents issued prior to 27 January, 2012.



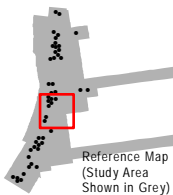
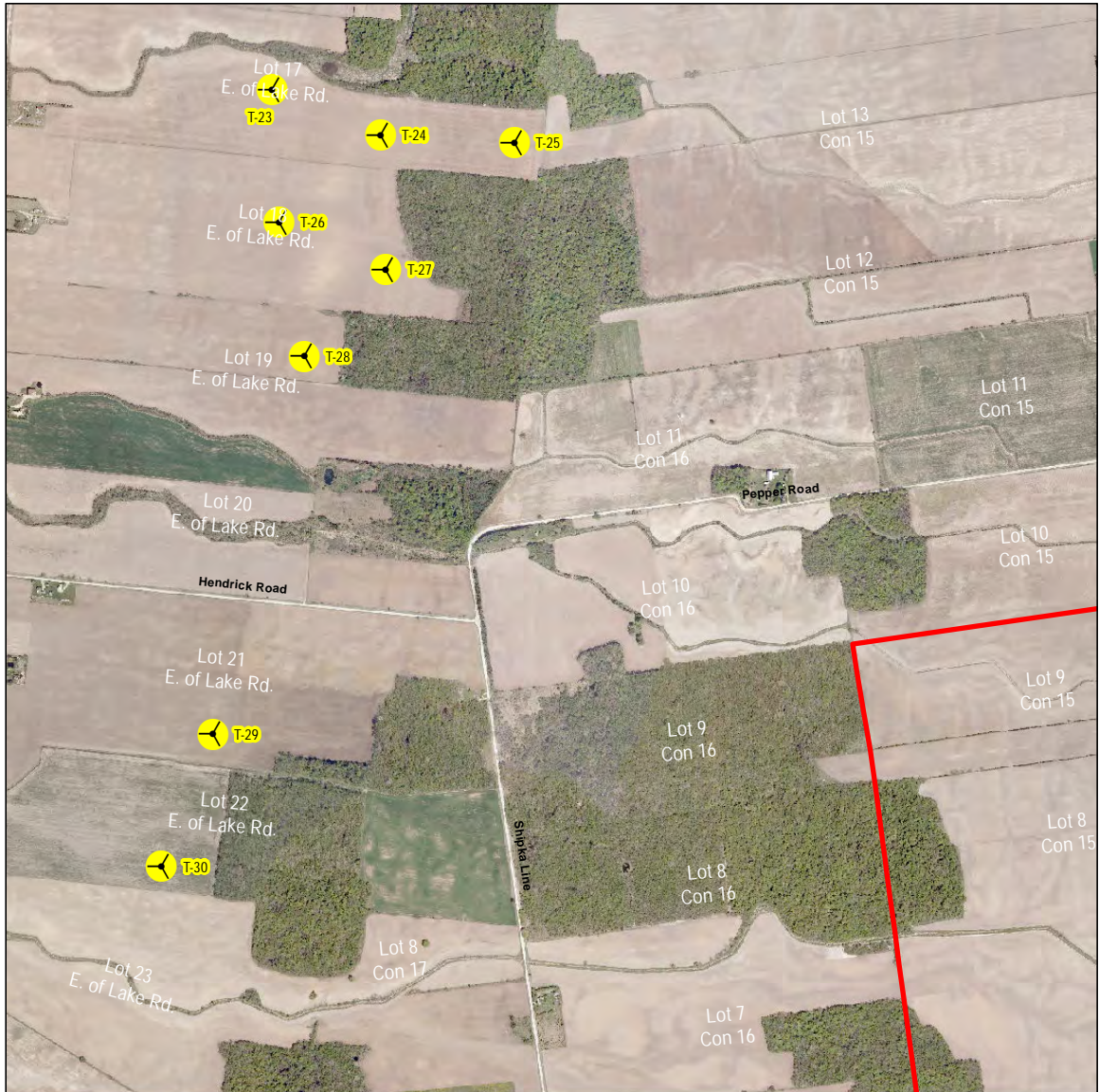
**Grand Bend Wind Farm**  
Grand Bend Wind Limited Partnership  
c/o Nortland Power Inc.

**Project Layout**



Prepared	P. Stubbert	Checked	L. Parsons
Scale	1:20,000	Project	PIA019991

Figure Number  
**2e**



Wind Turbine Location  
(symbol does not represent blade diameter)



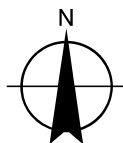
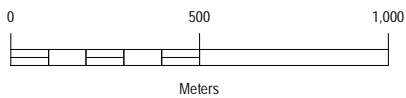
Study Area Boundary



Potential Overhead  
Transmission Line  
From Transformer Station to Existing Line

Note: 1. See Figure 2 for complete map index.  
2. Each mapped area is 3km x 3km.

3. Turbine numbering on this map will appear different than in maps/documents issued prior to 27 January, 2012.



**Grand Bend Wind Farm**  
Grand Bend Wind Limited Partnership  
c/o Nortland Power Inc.

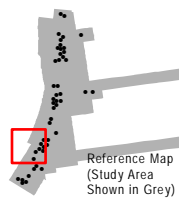
**Project Layout**






Prepared	P. Stubbert	Checked	L. Parsons
Scale	1:20,000	Project	PIA019991

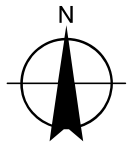
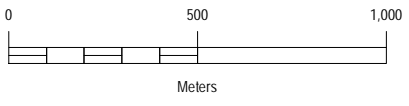
Figure Number

2f



-  Wind Turbine Location (symbol does not represent blade diameter)
-  Potential Overhead Transmission Line From Transformer Station to Existing Line
-  Study Area Boundary

Note: 1. See Figure 2 for complete map index.  
 2. Each mapped area is 3km x 3km.  
 3. Turbine numbering on this map will appear different than in maps/documents issued prior to 27 January, 2012.

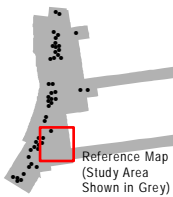
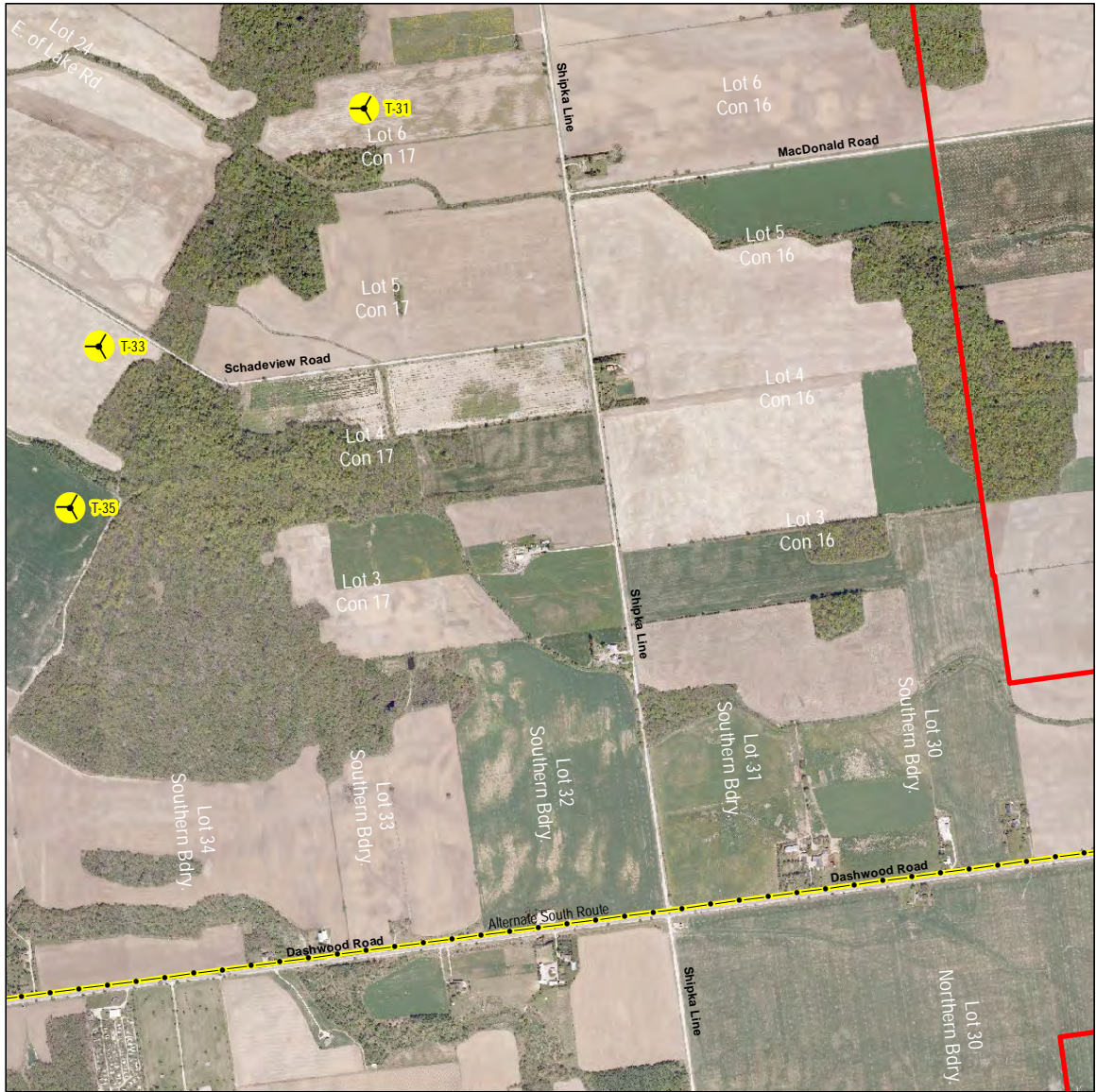


**Grand Bend Wind Farm**  
 Grand Bend Wind Limited Partnership  
 c/o Nortland Power Inc.

**Project Layout**



Prepared	P. Stubbert	Checked	L. Parsons	Figure Number <b>2g</b>
Scale	1:20,000	Project	PIA019991	



Wind Turbine Location  
(symbol does not represent blade diameter)



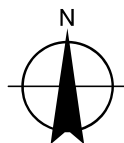
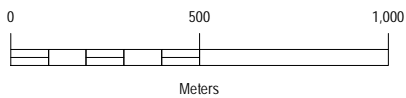
Study Area Boundary



Potential Overhead  
Transmission Line  
From Transformer Station to Existing Line

Note: 1. See Figure 2 for complete map index.  
2. Each mapped area is 3km x 3km.

3. Turbine numbering on this map will appear different than in maps/documents issued prior to 27 January, 2012.

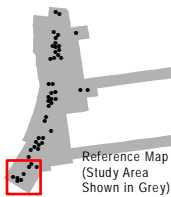


**Grand Bend Wind Farm**  
Grand Bend Wind Limited Partnership  
c/o Nortland Power Inc.

**Project Layout**



Prepared	P. Stubbert	Checked	L. Parsons	Figure Number <b>2h</b>
Scale	1:20,000	Project	PIA019991	



Wind Turbine Location  
(symbol does not represent blade diameter)



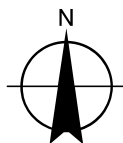
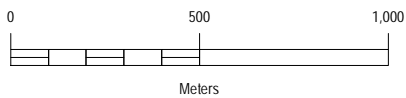
Study Area Boundary



Potential Overhead  
Transmission Line  
From Transformer Station to Existing Line

Note: 1. See Figure 2 for complete map index.  
2. Each mapped area is 3km x 3km.

3. Turbine numbering on this map will appear different than in maps/documents issued prior to 27 January, 2012.



**Grand Bend Wind Farm**  
Grand Bend Wind Limited Partnership  
c/o Nortland Power Inc.

**Project Layout**



Prepared	P. Stubbert	Checked	L. Parsons	Figure Number <b>2i</b>
Scale	1:20,000	Project	PIA019991	

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**Appendix B**  
**Turbine Specifications**

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SIEMENS



# SWT - 2.3 - 113

Turning moderate wind into maximum results

[www.siemens.com/energy](http://www.siemens.com/energy)

Answers for energy.

# At the leading edge of evolution

The new Siemens SWT-2.3-113 wind turbine is the ultimate choice for low to moderate wind conditions. The revolutionary direct drive generator and the new, optimized Quantum Blade are paired to extract as much energy as possible from the wind.

Efficient. Quiet. Robust and reliable. The Siemens SWT-2.3-113 is the new benchmark wind turbine for low to medium wind speeds. As a result of more than 30 years of research and development, it is designed to harvest more energy out of moderate wind conditions than anyone thought possible.

## Proven design

The SWT-2.3-113 is built around the same revolutionizing direct drive generator as the SWT-3.0-101. The direct drive turbine offers exceptional reliability and efficiency – with only 50% of the parts normally required for a conventional wind turbine. By using the same proven design and sharing the majority of components with its larger sibling, production costs and lead times can be kept down.

## Unique aerodynamics

The Quantum Blade combines exceptional aerodynamic performance with patented manufacturing technology. Based on innovative aerodynamic solutions in the root and tip sections, the Quantum Blade offers maximum efficiency at low to medium wind speeds.

## Maximum availability

Simplicity is the ultimate sophistication. With the simple and robust direct drive concept with 50% fewer parts, the SWT-2.3-113 wind turbine is designed for maximum availability. Furthermore, the spacious nacelle and the ergonomic working conditions facilitate serviceability and contribute to minimizing downtime for scheduled maintenance.



“

You cannot change the wind.  
It may be strong, it may be light.  
This leaves it up to us to extract  
as much energy as we can from it.

*Anne Schannong Vinther, Quality Engineer*



# Innovation for efficiency

Siemens direct drive technology and the new Quantum Blade represent groundbreaking wind turbine design and technology. The result of these two key innovations is a turbine with maximum efficiency and reliability, which helps to enable a solid return on investment.

## Maximized performance with 50% fewer parts

The Siemens direct drive design incorporates a permanent magnet generator with fewer moving parts than ever before.

The simple permanent magnet design offers increased efficiency directly by minimizing energy losses and indirectly by reducing maintenance needs. The outer rotor arrangement leads to a more compact and lightweight generator, making transportation and installation easier and faster.

## The B55 Quantum Blade

The new generation of Siemens wind turbine blades is lighter than previous designs but retains the superior

strength known from earlier generations of blades. Thanks to unique airfoils and redesigned tip and root sections, the blade offers superior performance at low to medium wind speeds. The root section uses Siemens "flatback" profiles to minimize root leakage and provide higher lift. The tip has also undergone a fine-tuning process to give enhanced lift and acoustic performance.

## One-piece moulding

Like other Siemens blades, the new Quantum Blades are manufactured in Siemens proprietary IntegralBlade® process. Each blade is moulded in one single production step from fiberglass-reinforced epoxy resin, resulting in a stronger, lighter blade without any joints.



## Lower noise

With a low 105 dB noise level, the SWT-2.3-113 is one of the quietest wind turbines on the market. As a result, this turbine type has an extremely high ratio of energy output per noise affected area, resulting in fewer disturbances to people and wildlife.

## Superior grid compliance

The Siemens NetConverter® is designed for maximum flexibility in the turbine's response to voltage and frequency variations, fault ride-through capability and output adjustment. The advanced wind farm control system provides state-of-the-art fleet management.

# Technical specification

## Rotor

- Type: 3-bladed, horizontal axis
- Position: Upwind
- Diameter: 113 m
- Swept area: 10,000 m<sup>2</sup>
- Speed range: 6–13 rpm
- Power regulation: Pitch regulation with variable speed
- Rotor tilt: 6 degrees

## Blade

- Type: Self-supporting
- Blade length: 55 m
- Tip chord: 0.63 m
- Root chord: 4.2 m
- Aerodynamic profile: NB 1-7, SWPNA1\_XX12, FFAxxx
- Material: GRE
- Surface gloss: Semi-mat, <30 / ISO2813
- Surface colour: Light grey, RAL 7035

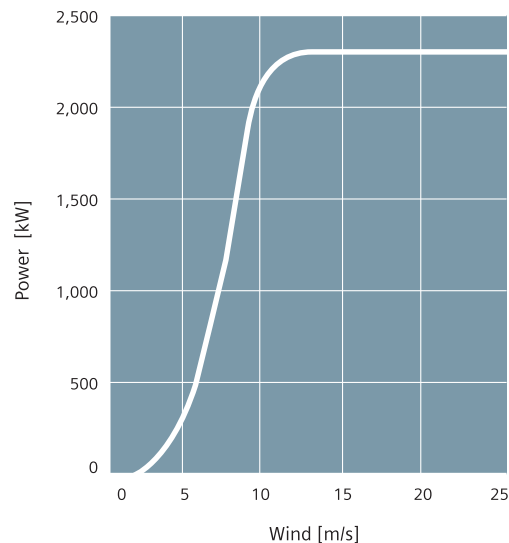
## Aerodynamic brake

- Type: Full span pitching
- Activation: Active, hydraulic

## Load-supporting parts

- Hub: Nodular cast iron
- Main shaft: Cast
- Nacelle bed plate: Cast

## Sales power curve



## Mechanical brake

- Type: Hydraulic disc brake
- Position: Generator rear end
- Number of callipers: 3

## Canopy

- Type: Totally enclosed
- Surface gloss: Silk mat, 30–40 / ISO2813
- Colour: Light grey, RAL 7035

## Generator

- Type: Synchronous, PMG
- Nominal power: 2,300 kW

## Grid terminals (LV)

- Nominal power: 2,300 kW
- Voltage: 690 V
- Frequency: 50 Hz or 60 Hz

## Yaw system

- Type: Active
- Yaw bearing: Externally geared
- Yaw drive: 8 (optional 10) electric gear motors
- Yaw brake: Passive friction brake

## Controller

- Type: Microprocessor
- SCADA system: WPS
- Controller designation: SWTC, STC-1, SCS-1

## Tower

- Type: Cylindrical and/or tapered tubular
- Hub height: 99.5 m or site-specific
- Corrosion protection: Painted
- Surface gloss: Silk mat, 30–40 / ISO2813
- Colour: Light grey, RAL 7035

## Operational data

- Cut-in wind speed: 3 m/s
- Nominal power at: 12–13 m/s
- Cut-out wind speed: 25 m/s
- Maximum 3 s gust: 59.5 m/s (IEC version)

## Weights (approximately)

- Rotor: 66,700 kg
- Nacelle: 73,000 kg
- Tower: Site-specific

### 1 Quantum Blade

- Unique design and manufacturing process
- IntegralBlade® one-piece moulding for maximum strength
- Optimized aerodynamics for low to medium wind conditions
- Increased length for higher energy yield
- Blade root – designed for minimized root leakage and increased lift

### 2 Direct drive generator

- Permanent magnet design
- Totally enclosed, easy to handle and lightweight design
- Optimum reliability and efficiency

### 3 Nacelle

- Solid, compact and lightweight structure
- Spacious, ergonomic design – maximum serviceability
- 50% fewer parts compared to geared turbines

### 4 Cooling

- Simple and robust LiquidLink® water cooling system
- Top-mounted passive cooling radiators
- High-efficient two-stage cooling as function of power



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Renewable Energy Division

Order No. E50001-W310-A174-V1-4A00

Printed in Germany

Dispo 34804, c4bs No. 7491

fb 3867 WÜ WS 04113.0

Printed on elementary chlorine-free  
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The information in this document contains  
general descriptions of the technical options  
available, which may not apply in all cases.

The required technical options should therefore  
be specified in the contract.

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**Appendix C**  
**Turbine Coordinates**

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**Table C-1. Turbine Coordinates.**

<b>Turbine</b>	<b>Easting</b>	<b>Northing</b>
T-01	444036	4811878
T-02	444376	4811760
T-03	445882	4810067
T-04	443802	4810147
T-05	444206	4809869
T-06	444035	4809533
T-07	443954	4809147
T-08	443718	4808841
T-09	444323	4808855
T-10	444002	4808745
T-11	444330	4808461
T-12	443961	4808315
T-13	444228	4808041
T-14	443896	4807794
T-15	444500	4807773
T-16	443551	4807655
T-17	443376	4805355
T-18	443717	4805337
T-19	446261	4804829
T-20	446913	4804825
T-21	443635	4804535
T-22	443974	4804635
T-23	443320	4804183
T-24	443623	4804057
T-25	443997	4804036
T-26	443339	4803814
T-27	443638	4803681
T-28	443409	4803439
T-29	443154	4802383
T-30	443011	4802014
T-31	443579	4801132
T-32	442448	4800448
T-33	442838	4800465
T-34	442243	4800119
T-35	442757	4800013
T-36	442447	4799830
T-37	442062	4799669
T-38	442409	4799492
T-39	441744	4799389



<b>Turbine</b>	<b>Easting</b>	<b>Northing</b>
T-40	441527	4798742
T-41	441764	4798145
T-42	441607	4797840
T-43	442249	4797830
T-44	441123	4797225
T-45	440154	4796958
T-46	440550	4796892
T-47	440850	4796687
T-48	440529	4796554

---

**Appendix D**  
**Legal Description of Participating**  
**Properties**

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**Table D-1. Legal Description of Participating Properties.**

<b>Turbine</b>	<b>Legal Description</b>
T-01	CON S BDY LOT 28 PT LOT 29
T-02	CON S BDY LOT 28 PT LOT 29
T-03	CON 14 N PT LOT 27
T-04	CON LRE N PT LOT 3
T-05	CON 15 LOT 27
T-06	CON 15 LOT 27
T-07	CON LRE S PT LOT 5
T-08	CON LRE N PT LOT 6
T-09	CON 15 LOT 25 PT LOT 22 TO;24PT C LRE PT LOT 6 TO 8PT
T-10	CON LRE N PT LOT 6
T-11	CON 15 LOT 25 PT LOT 22 TO;24PT C LRE PT LOT 6 TO 8PT
T-12	CON 15 LOT 25 PT LOT 22 TO;24PT C LRE PT LOT 6 TO 8PT
T-13	CON 15 LOT 25 PT LOT 22 TO;24PT C LRE PT LOT 6 TO 8PT
T-14	CON LRE S PT LOT 8 N PT LOT;9
T-15	CON 15 LOT 25 PT LOT 22 TO;24PT C LRE PT LOT 6 TO 8PT
T-16	CON LRE S PT LOT 8 N PT LOT;9
T-17	CON LRE S PT LOT 14
T-18	CON LRE S PT LOT 14
T-19	CON 14 N PT LOT 14
T-20	CON 13 PT LOT 14 PT LOT 15;AS RP 22R1423 PART 1
T-21	CON LRE E PT LOT 16
T-22	CON LRE E PT LOT 16
T-23	CON LRE PT LOT 17
T-24	CON LRE PT LOT 17
T-25	CON LRE PT LOT 17
T-26	CON LRE PT LOT 18
T-27	CON LRE PT LOT 18
T-28	CON LRE N PT LOT 19
T-29	CON LRE PT LOT 21 N PT LOT;22
T-30	CON LRE PT LOT 22
T-31	CON 17 N PT LOT 6
T-32	CON LRE PT LOT 26
T-33	CON LRE PT LOT 26
T-34	CON LRE PT LOT 27
T-35	CON LRE PT LOT 27
T-36	CON LRE PT LOT 28
T-37	CON LRE PT LOT 28
T-38	CON LRE PT LOT 28
T-39	HAY CON LRE PT LOT 29 AND PT;RD ALLOW

<b>Turbine</b>	<b>Legal Description</b>
T-40	CON LRE PT LOT 31
T-41	CON N BDY LOT 37
T-42	CON N BDY LOT 37
T-43	CON N BDY LOT 36
T-44	CON A LOT 7
T-45	CON LRE PT LOT 5 AS RP 22R;1730 PART 1 SUBJT TO;EASEMENT
T-46	CON A PT LOTS 4 AND 5 RP;22R1730 PART 1
T-47	CON A PT LOTS 4 AND 5 RP;22R1730 PART 1
T-48	CON A PT LOTS 4 AND 5 RP;22R1730 PART 1