



Grand Bend Wind Farm
Project Description Report

Grand Bend Wind Limited Partnership
Northland Power Inc., as agent



NEEGAN BURNSIDE

February 2013



Grand Bend Wind Farm Project Description Report

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Prepared for:

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February 2013

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Record of Revisions

Revision	Date	Description
0	January 30, 2012	Initial Submission to MOE
0	February 2012	Submission to Municipalities and Aboriginal Communities
1	August 27, 2012	Initial Draft Submission to Municipal and Aboriginal Communities as well as Selected Government Agencies
2	February 13, 2013	Application for Renewable Energy Approval

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1.0 Introduction

1.1 Project Overview

Grand Bend Wind Limited Partnership, with Northland Power Inc. (“Northland”) as agent, are 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 Study Area is provided in **Appendix A, Figure 1**.

The basic project components will include up to 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 parts and storage (office/maintenance) building, a new transmission line within municipal road right-of ways (“ROWS”) along Sararas Road, Rodgerville Road, and Road 183 with connection to the provincial power grid at the 230 kV transmission line south of the Seaforth Transformer Station. During construction temporary components will include access roads and work/storage areas at the turbine locations and 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**.

Table 1.1 Project Description Report Requirements

Content		Reference This Report Section #
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 D
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, Northland Power Inc. as agent.

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 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 as defined by the consultation requirements of O.Reg. 359/09 is shown in **Appendix A, Figure 1**, and is generally bound by:

- Lake Huron to the west;
- Main Street East/Grand Bend Line to the south;
- Bronson Line to the east;
- Staffa Road to the north; and,
- a transmission line along Sararas Road, Rodgerville Road, and Road 183 with connection to the provincial power grid southeast of Seaforth.

An alternative transmission line route was initially included as part of the Project Study Area along Dashwood Road, Thames Road, and Highway 23, with connection to the

provincial grid south of Mitchell. Upon further consultation and studies, this route was not selected for the following reasons:

- it impacted higher densities of population and a greater number of residents, including the communities of Dashwood, Exeter, and residential areas such as the Birchbark trailer park;
- it posed greater potential negative impacts on the environment, including large sections of the Provincially Significant Hay Swamp, which may provide habitat for several species at risk; and,
- it would require a longer and costlier transmission line to be constructed.

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, electrical transmission facilities, and 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 clearly identified on private lands prior to construction. All construction and installation activities will be conducted within these designated areas; this includes construction equipment and personnel. Similarly, all installation activities related to collector and transmission 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-2s**. The figures include temporary work and storage areas on private land required to construct the project. Further details on project infrastructure are provided in the Site Plan of the Design and Operations Report under a separate cover. Additional information relating to Project siting and land information is provided in Sections 3.3, 3.4, and **Appendix D** of this Report.

2.3 Energy Source, Nameplate Capacity and Facility Class

The Project type, capacity and class is presented in **Table 2.2**.

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Table 2.2 Energy Source, Nameplate Capacity and Facility Class

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

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”).

Wind turbines capture the kinetic energy imparted by the wind, which is converted into electricity. Wind turbines are comprised of four basic parts:

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

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 by an electrical generator in the nacelle into useable 60 Hz electricity.

Apart from emergency standby generators, no supplementary fuel sources would be used to generate electricity for the Project. Emergency standby diesel generators will be installed at the transformer substation and switchyard, and will only be operated in the following circumstances as described in O.Reg. 359/09, s7(1):

1. for the purposes of testing or maintenance of the standby generator or the start up or shut down of the facility, and:
 - i. the standby generator has not operated for more than 60 hours in the past 12 months for those purposes, and,
 - ii. the standby generator is operated only on weekdays between the hours of 7 a.m. and 7 p.m for those purposes.
2. due to:
 - i. a serious risk to the health or safety of a person,
 - ii. a serious risk of harm to the natural environment, plant life or animal life, or,
 - iii. a serious risk of injury or damage to property.

2.4 Contact Information

Applicant

The Applicant for the project is Grand Bend Wind Limited Partnership, with Northland Power Inc. as agent. The principle contact is:

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Name: Jim Mulvale, P.Eng., Manager, Environmental, Health and Safety
Company: Northland Power Inc.
Address: 30 St. Clair Avenue West, 12th Floor
Toronto, ON M4A 3A1
Email: jim.mulvale@northlandpower.ca
Telephone: (647) 288-1273

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., Project Manager
Company: Neegan Burnside Ltd.
Address: 292 Speedvale Avenue West, Unit 20
Guelph, ON N1H 1C4
Email: lyle.parsons@neeganburnside.com
Telephone: (519) 925-1790

The project specific e-mail address and telephone hotline for this project is as follows:
grandbendwind@northlandpower.ca
1-800-696-8093

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 Renewable Energy Approval. 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
Federal		
Aeronautical Obstruction Clearance	Transport Canada- Aviation Division	Turbine lighting.

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Permit/Authorization	Responsible Agency	Description
Land Use Clearance	NavCanada	Aeronautical safety related to airports and flight approach/take-off areas.
Provincial		
Endangered Species Act Permit	Ministry of Natural Resources ("MNR")	Permit is required if there is potential to harm species at risk or their habitat.
Aggregate Resources Act Licenses and Permits	MNR	Required if the source of aggregates for the Project will come from a new pit.
Authorization under the Oil, Gas and Salt Resources Act	MNR	Engineers report required for two decommissioned petroleum wells within 75 m of project infrastructure.
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.
Oversize / Overweight Load Permits	Ministry of Transportation ("MTO")	Use of non-standard vehicles to transport large Project components.
Encroachment and Entrance Permits	MTO	Required for intersection improvements, entrances off Highway 21, and collector/transmission line work.
Municipal		
Building Permit for turbines and Parts and Storage Building	Municipality of Bluewater; Municipality of Huron South	Compliance with Ontario Building Code.
Ontario Water Resources Act – New Well Construction	County of Huron	Compliance with new well construction regulations.
Road User Agreement	Municipality of Bluewater; Municipality of Huron South; Municipality of Huron East;	Required for use of municipal road allowances for collection and transmission line siting. Agreement is likely to include details on collector/transmission line design and installation methodology, traffic management, and restoration requirements (i.e., impacted roads, trees, vegetation, etc.).

Permit/Authorization	Responsible Agency	Description
	County of Huron; Municipality of West Perth; and, Perth County	
Drainage Act – Municipal Drain Improvements	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.
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. Municipal road transportation may be addressed through Road User Agreement.
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.
Sign Permit	Municipality of Bluewater; Municipality of Huron South; Municipality of Huron East; County of Huron; Municipality of West Perth; and, Perth County	If required and as necessary.

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Permit/Authorization	Responsible Agency	Description
Demolition Permit	Municipality of Bluewater; Municipality of Huron South; Municipality of Huron East; County of Huron; Municipality of West Perth; and, Perth County	If required prior to the demolition of the Project.
Other Agencies		
Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses Permit	Ausable Bayfield Conservation Authority	Work within floodplains, water crossings, river or stream valleys, hazardous lands and within or adjacent to wetlands.
Utility Occupancy License and Right of Entry Permit	Rail America - Goderich-Exeter Railway (GEXR)	Required for crossing of GEXR railway with transmission line.
Utility Crossing Approval	Lake Huron and Elgin Area Water Supply Systems	Required for crossing of trunk watermain with collector line.

2.6 Federal Involvement

Federal authorizations and clearances are noted in **Table 2.3**. At this time, as the physical activities of the Project are not listed as a “designated project” under the updated *Canadian Environmental Assessment Act (CEAA), 2012*, it is not anticipated that CEAA approval will be required.

3.0 Project Information

3.1 Facility Components

3.1.1 Wind Turbine Generators

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

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

At present the Siemens SWT-2.3-113 is the preferred turbine platform. Different models on this platform will be used based on maximum power and noise characteristics. Please see the Wind Turbine Specifications Report under a separate cover for additional details. Nominal specifications of this turbine platform are presented in **Table 3.1**. Subject to availability and costing, an alternative turbine type may be considered.

Table 3.1 Siemens SWT-2.3-113 Specifications

Manufacturer	Siemens
Model	SWT-2.3-113
Nameplate Capacity	2.3 MW
Hub Height	99.5 m
Blade Length	55 m
Rotor diameter	113 m
Rotor sweep area	10,000 m ²
Speed Range	6-13 rpm
Nominal Noise Level	100-105 dBA (see <u>Wind Turbine Specifications Report</u>)
Frequency	60 Hz

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

Turbine coordinates are presented in **Appendix C**.

3.1.2 Electrical Facility Components

In addition to the turbines, the Project will also include the following electrical components:

- one or two meteorological towers that will collect data during Project operation;
- step-up transformers adjacent to each turbine at the base of the tower, converting 690 V to 36 kV electricity;
- 36 kV electrical collector lines from each turbine to the adjacent municipal road right-of-way ("ROW");
- 36 kV electrical collector lines to be located within municipal ROWs, connecting the turbines to the transformer substation;
- a transformer substation approximately 54 m x 91 m at the location shown on **Figure 2e of Appendix A**, converting 36 kV to 230 kV electricity;
- a 230 kV transmission line connecting the transformer substation to the existing 230 kV Hydro One transmission system northeast of the transformer substation;
- a 230 kV switchyard at the connection point to the existing 230 kV Hydro One transmission system, south of the Seaforth Transformer Station; and,
- communications lines along the 36 kV collector lines and 230 kV transmission line.

3.1.3 Parts and Storage Building

A Parts and Storage building for Project operation and maintenance is proposed on privately held lands near the intersection of Sararas Road and Blackbush Line in the Municipality of Bluewater. Refer to **Figure 2e of Appendix A** for the proposed location of the building. The building will be approximately 15 m x 36 m (540 m²) and will include a parking lot, well and septic system to service the building.

Northland is also investigating the possibility of locating the Parts and Storage building near the village of Zurich.

3.1.4 Turbine Access Roads

Existing provincial, county, 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 were utilized where possible. New laneways will be constructed to provide access to the individual turbine sites. Construction access laneways will vary from 5 to 11 m wide during construction, depending on the passing

lane and crane crawling requirements of the laneway. Permanent access laneways may be reduced in size to approximately 5 m wide, with the exception of entrances off municipal roads and all turning areas which require wider turning radii.

3.1.5 Watercourse Crossings

In locations where access roads intersect a watercourse, culverts will be required. Detailed design of these culverts and a permit from the Ausable Bayfield Conservation Authority (ABCA) will be required prior to construction.

Collector line and transmission line watercourse crossings will be installed according to the applicable Fisheries and Oceans Canada Operational Statements and procedures approved by the ABCA. It is anticipated that a combination of Punch & Bore, Horizontal Directional Drilling, Isolated or Dry Open-cut, and Overhead Line Construction methods will be employed. For further details on these methods, refer to the Construction Plan Report, or the Operational Statements available online at www.dfo-mpo.gc.ca/regions/central/habitat/os-ao/provinces-territoires-territoires/on/index-eng.htm.

3.1.6 Temporary Construction Facilities

Lands to be temporarily used during the construction of the Project include temporary construction access roads, and staging/work areas on private land and within the public right-of-way. 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 one exception might be the Construction Compound, which might be serviced by the use of a new temporary electrical connection from the local distribution system. The Construction Compound will be prepared at a central location of the Project (refer to **Figure 2h** of **Appendix A**) to temporarily host construction trailers, equipment, materials, vehicles, communications infrastructure, and provide an area for on-site fabrication of Project infrastructure.

Portions of the temporary construction areas (i.e., access roads, turbine installation areas and the Construction Compound) are on private land for agricultural use. The remaining areas (i.e., site entrances and collector / transmission lines) are within the municipal right-of-way, which is used as a transportation corridor.

Once construction is complete in each area, lands used for temporary construction activities will be restored. The land required for access roads and site entrances may be reduced in size to accommodate smaller maintenance vehicles. Restoration on private land will typically include the removal of aggregate and replacement of topsoil as required to restore the agricultural use of land. For areas within the municipal right-of-

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way, culverts installed during construction will be modified to suit permanent site entrances, and the entire corridor will be restored to the pre-development composition of topsoil, vegetation, and drainage features.

Further details on temporary construction facilities and restoration methods are described in the Construction Plan Report under a separate cover.

3.2 Project Activities

Project activities will generally include:

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

A schedule of Project activities is presented in **Table 3.2**.

Table 3.2 Project Schedule

Project Activity	Anticipated Schedule
Issue First Draft Project Description Report	January 2012
REA Technical Studies	2011 through 2012
Public Information Centre #1 (four locations)	April 2012
Issue Draft REA Reports to the Public	September 2012
Public Information Centre #2	November-December 2012
REA Submission	January/February 2013
Additional Permitting and Approvals Completed	Ongoing 2012 through 2013
Start of Construction	September 2013
Commercial Operation Date ("COD")	November 2014
Project Operation	2014 - 2035
New Contract or Decommissioning	Approximately 20 years after COD

A list of project activities associated with construction, operation and decommissioning is presented in **Table 3.3**. Further details of these activities are described in the Construction Plan Report, Design and Operations Report, and Decommissioning Plan Report for the Project, under separate covers.

Table 3.3 Project Activities

Phase	Project Activities
Construction Phase	<p>Local Road Improvements:</p> <ul style="list-style-type: none"> • Survey for layout and delineation of natural features to be protected; • Install/extend culverts; • Construct temporary lane modifications to facilitate turning requirements of turbine delivery trucks; and, • After delivery of turbine components, restore intersections to pre-construction condition.
	<p>Turbine Sites:</p> <ul style="list-style-type: none"> • Geotechnical Investigation (pre-construction); • Survey for layout and delineation of work areas; • Site clearing and grading; • Installation of culverts and agricultural drainage system modifications; • Preparation of turbine installation areas (crane pads, turbine laydown areas, truck turnarounds) • Construction of turbine foundations • Construction of access roads • Component transportation to work areas; • Turbine tower, Nacelle and Rotor assembly; • Connection of wind turbines to electrical collection system; • Completion of permanent access roads; and, • Restoration of temporary work areas.
	<p>Construction and Operations Facilities:</p> <ul style="list-style-type: none"> • Preparation of Construction Compound; • Construction of Parts and Storage Building; and, • After construction, restore Construction Compound to pre-construction condition.
	<p>Collection System:</p> <ul style="list-style-type: none"> • Survey for layout and delineation of natural features to be protected; • Private land and public right-of-way clearing, as required; • Installation of 36 kV electrical collection system including step-up transformers at turbine bases on private land during tile drain modifications and/or access road construction; • Installation of 36 kV electrical collection system within public road right-of-way; • Construct Transformer Substation; and,

Phase	Project Activities
	<ul style="list-style-type: none"> • Restoration of temporary work areas. <p>Transmission Line and Interconnection:</p> <ul style="list-style-type: none"> • Survey for layout and delineation of natural features to be protected; • Public right-of-way clearing, as required; • Installation of transmission lines; • Installation of switchyard at connection point with Hydro One transmission line (provincial grid); • Commissioning of the project; and, • Restoration of temporary work areas.
<p>Operation and Maintenance Phase</p>	<p>Turbine Sites:</p> <ul style="list-style-type: none"> • Periodic vehicle access for maintenance; • Remote condition monitoring and meter calibrations; and, • Grounds keeping. <p>Operations Facility:</p> <ul style="list-style-type: none"> • Condition monitoring and meter calibrations; and, • Storage of parts and servicing of equipment. <p>Collection System:</p> <ul style="list-style-type: none"> • Remote condition monitoring and meter calibrations; and, • Testing and maintenance of electrical equipment. <p>Transmission Line:</p> <ul style="list-style-type: none"> • Ongoing clearing of vegetation within public right-of-way if installed above ground; • Remote condition monitoring and meter calibrations; • Testing and maintenance of electrical equipment; and, • Maintenance and replacement of transmission components, as required.
<p>Decommissioning Phase</p>	<p>Local Road Improvements:</p> <ul style="list-style-type: none"> • Survey for layout and delineation of natural features to be protected; • Install/extend culverts; • Construct temporary lane modifications to facilitate turning requirements of turbine transportation trucks; and, • After removal of turbine components, restore intersections to pre-construction condition.

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Phase	Project Activities
	Turbine Sites: <ul style="list-style-type: none"> • Removal of tower and turbine infrastructure; • Removal of foundation to not less than 1.0 m below grade; • Turbine site grading and restoration (dependent on new proposed use); and, • Removal of all waste from the site.
	Access Roads: <ul style="list-style-type: none"> • 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).
	Operations Facility: <ul style="list-style-type: none"> • Demolition of Parts and Storage Building and restoration of land to pre-development condition.
	Collection System: <ul style="list-style-type: none"> • Removal of collection lines and restoration of terrain.
	Transmission System: <ul style="list-style-type: none"> • Removal of transmission line and conductors; • Removal of transformer substation components; • Removal of switchyard at connection point; • Removal of poles if installed above ground; • Restoration of all disturbed areas; and, • Removal of all waste from the site.

3.3 Map of Project Location

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

- results of wind resource data;
- site access;
- existing land use;
- environmental and socio-economic information;
- results from the noise assessment;
- interconnection feasibility; and,
- O.Reg. 359/09 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 Renewable Energy Approval 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;
- temporary Construction Compound
- turbine installation areas;
- electrical collector system;
- parts and Storage building;
- transformer substation; and,
- connection switchyard.

Portions of the Project located on municipal lands include:

- electrical collection and transmission lines within provincial, county, and municipal right-of-ways; and,
- temporary 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.

4.0 Potential Negative Environmental Effects

Potential negative effects associated with the Project are identified in **Tables 4.1 to 4.6** below. These effects were identified through various investigations as part of the Renewable Energy Approval process. Each potential negative environmental effect is identified and assessed for performance objectives, mitigation strategies, monitoring, and contingency measures. For details relating to the natural heritage, water, archaeological, and cultural heritage features of the Study Area, refer to the Natural Heritage Assessment Environmental Impact Study, Water Assessment and Water Body Report, and The 2012 Heritage Assessment of the Proposed Grand Bend Wind Farm under separate covers as part of the application for Renewable Energy Approval.

A key component of the Renewable Energy Approval 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 default setbacks for which studies can be completed which identify potential negative environmental effects and, subject to implementing appropriate mitigation measures, less restrictive setback requirements may be employed. In some instances in the proposed design, Project components are identified within the defined default setbacks. In these instances, additional assessment studies have been conducted in the reports mentioned above.

Potential negative effects and proposed mitigation measures are summarized in **Tables 4.1 to 4.5**.

Table 4.1 Environmental Effects Monitoring Plan – Environmental Impact Study General Features

Project Activity	Potential Effects (D=Direct) (I=Indirect)	Mitigation Strategy	Residual Effect (magnitude/frequency/duration)	Performance Objective	Monitoring Plan and Contingency Measures
Installation and removal of 36kV collector lines, 230 kV transmission line, communication lines	<ul style="list-style-type: none"> Sediment and erosion impacts associated with open cut trenching and directional drilling/punch and bore activities (I). 	<ul style="list-style-type: none"> All work zones should be clearly marked to indicate that no work should occur outside the work zone. To ensure that work zones are not within significant natural features, the boundaries of significant natural features are to be delineated in the field by a qualified environmental technician based on the following definitions: <ul style="list-style-type: none"> Wetlands: OWES methodology (50% wetland vegetation rule); Woodlands: Edge of the drip line; and, SWH: As per criteria detailed in the EOS report. Implementation of the erosion and sediment control measures will conform to industry best management practices and recognized standard specifications such as Ontario Provincial Standards Specifications (OPSS). Sediment and erosion control measures will be implemented prior to construction and maintained during the construction phase in accordance with the erosion and sediment control plan developed during detailed design. All sediment and erosion control measures will be inspected prior to construction and maintained during the construction phase to prevent entry of sediment into natural features. If the sediment and erosion control measures are not functioning properly, no further work in the affected areas will occur until the sediment and/or erosion problem is addressed. All disturbed areas of the construction site will be stabilized and re-vegetated as soon as conditions allow. Sediment and erosion control measures will be left in place until all areas of the construction site have been stabilized. Trenching along straight sections will be within the disturbed portion of the municipal road ROW. 	<ul style="list-style-type: none"> Limited duration, frequency, geographic extent. No residual effect anticipated. 	<ul style="list-style-type: none"> No erosion and sediment impacts on natural features including wildlife habitats. 	<ul style="list-style-type: none"> A plan for addressing impacts associated with “frac-out” during directional drilling will be prepared in accordance with the Operational Statement. Erosion and sediment control measures will be regularly inspected to ensure they are functioning and are maintained as required. If erosion and sediment control measures are not functioning properly, alternative measures will be implemented and prioritized above other construction activities.

Project Activity	Potential Effects (D=Direct) (I=Indirect)	Mitigation Strategy	Residual Effect (magnitude/frequency/duration)	Performance Objective	Monitoring Plan and Contingency Measures
		<ul style="list-style-type: none"> Directional drilling and/or punch and bore options will be undertaken in accordance with the Department of Fisheries and Oceans' Operational Statement. Horizontal directional drilling and/or punch and bore operations will be designed with launching and receiving pits that will minimize tree loss and disturbance of natural vegetation wherever possible. Launch and receiving pits will be designed by the drilling contractor in accordance with the operational statement, and will not extend beyond the disturbed portion of the municipal road ROW. To the extent possible, pits will be located at least 30m from significant natural features as delineated by a qualified Environmental Inspector. In some instances, pits may need to be less than 30m (but no less than 5m) from a natural feature. This will be determined during detailed design and will be documented in the sediment and erosion control plan. 			
All Construction and Decommissioning Activities	<ul style="list-style-type: none"> Accidental encroachment of equipment, stockpiles etc. into natural areas (I). 	<ul style="list-style-type: none"> All work zones (as detailed in Figures 2a – 2s in Appendix A) should be clearly marked to indicate that no work should occur outside the work zone. Silt fencing will be installed in accordance with an erosion and sediment control plan which will be prepared during detailed design to further protect significant natural features adjacent to work areas. To ensure that work zones are not within significant natural features, the boundaries of significant natural features are to be delineated in the field by a qualified environmental technician based on the following definitions: <ul style="list-style-type: none"> Wetlands: OWES methodology (50% wetland vegetation rule); Woodlands: Edge of the drip line; and, SWH: As per criteria detailed in the EOS report. 	<ul style="list-style-type: none"> Limited duration, frequency, geographic extent. No residual effect anticipated. 	<ul style="list-style-type: none"> No disturbance to natural areas. 	<ul style="list-style-type: none"> An Environmental Inspector will perform regular inspection to ensure that mitigation is implemented and all silt fencing is maintained and functioning properly. If they are not functional, they should be repaired immediately. If accidental encroachment occurs the offending material or equipment will be immediately removed and restoration of the area conducted as needed.

Project Activity	Potential Effects (D=Direct) (I=Indirect)	Mitigation Strategy	Residual Effect (magnitude/frequency/duration)	Performance Objective	Monitoring Plan and Contingency Measures
All Construction and Decommissioning Activities	<ul style="list-style-type: none"> Potential soil compaction (D). 	<ul style="list-style-type: none"> Heavy equipment and material stockpiles will be limited to marked construction areas. To ensure that work zones are not within significant natural features, the boundaries of significant natural features are to be delineated in the field by a qualified environmental technician based on the following definitions: <ul style="list-style-type: none"> Wetlands: OWES methodology (50% wetland vegetation rule); Woodlands: Edge of the drip line; and, SWH: As per criteria detailed in the EOS report. Temporary construction staging areas and construction roads which have been compacted will be rehabilitated upon completion of construction. 	<ul style="list-style-type: none"> Limited duration, frequency, geographic extent. No residual effect anticipated. 	<ul style="list-style-type: none"> Minimize the geographical extent of soil compaction to the extent possible. Rehabilitate any compacted soils within temporary construction areas. 	<ul style="list-style-type: none"> An Environmental Inspector will perform regular inspection to ensure that equipment and stockpiles do not extend beyond construction areas. Northland and the contractor will work with participating landowners to ensure that soils in construction areas are rehabilitated to restore agricultural uses..
All Construction and Decommissioning Activities	<ul style="list-style-type: none"> Mortality of wildlife inadvertently moving through construction zones (I). 	<ul style="list-style-type: none"> Silt fencing will be properly installed and maintained in accordance with the erosion and sediment control plan to keep wildlife out of work areas. Speed limit signage will be posted along construction travel routes to ensure that construction vehicles respect appropriate speeds. 	<ul style="list-style-type: none"> Limited duration, frequency, geographic extent. No residual effect anticipated. 	<ul style="list-style-type: none"> No wildlife mortality. 	<ul style="list-style-type: none"> An environmental inspector will regularly monitor fenced areas to ensure that fencing is properly keyed/toed in to the ground to ensure that wildlife cannot gain access under fenced area. If wildlife inadvertently moves into a construction area, the Environmental Inspector will move the species outside of the work area, if possible, using gloves and a bucket or plastic tub, as appropriate. If any species at risk are encountered that are not identified on relevant permits, all work will cease within the immediate work area and the Ministry of Natural Resources will be contacted.
Site Restoration	<ul style="list-style-type: none"> Introduction of invasive species into natural areas (I). 	<ul style="list-style-type: none"> All disturbed areas of the construction site will be re-vegetated as soon as conditions allow. Where re-vegetation is required in the municipal road allowance, as a result of transmission line installation, standard roadside seed mixes, which do not contain invasive species, will be used. 	<ul style="list-style-type: none"> Limited duration, frequency, geographic extent. No residual effect anticipated. 	<ul style="list-style-type: none"> No introduction of invasive species. 	<ul style="list-style-type: none"> An Environmental Inspector will perform regular inspection to ensure that mitigation is implemented. If extensive invasion of non-native species is identified as a result of the Project, contingency measures may include an applicable herbicide application. An herbicide application plan will be developed as required.
Turbine assembly	<ul style="list-style-type: none"> Effects on groundwater levels/seepage areas and wetlands due to dewatering for construction of turbine foundations (I). 	<ul style="list-style-type: none"> Any discharge from dewatering will be outlet to a vegetated or agricultural area at least 30m from a significant natural feature or watercourse utilizing a sediment filter bag. 	<ul style="list-style-type: none"> Limited duration, frequency, geographic extent. No residual effect anticipated. 	<ul style="list-style-type: none"> No effect on groundwater levels. 	<ul style="list-style-type: none"> An Environmental Inspector should be on-site during any dewatering within 120m of natural features. The Monitor should ensure that the filter bag is working appropriately and ensure that no sediment is entering significant natural features or watercourse. In the event of sediment discharge, all operations should stop immediately until the problem can be

Project Activity	Potential Effects (D=Direct) (I=Indirect)	Mitigation Strategy	Residual Effect (magnitude/frequency/duration)	Performance Objective	Monitoring Plan and Contingency Measures
					resolved. <ul style="list-style-type: none"> If significant changes in water levels/seepage areas are noted, operations should cease until water levels recover.
All Construction and Decommissioning Activities	<ul style="list-style-type: none"> Spills from equipment fueling, oiling, greasing of project components (I). 	<ul style="list-style-type: none"> All materials and equipment used for the purpose of site preparation and project construction shall be operated and stored in a manner that prevents any deleterious substances (petroleum products, silt, etc.) from entering natural features. Any stockpiled materials will be stored away from the feature. Refueling and maintenance of construction equipment should occur a minimum of 30 m from a natural feature. Hazardous material transportation and application will occur in designated areas according to operational procedures. Proper spill containment equipment will be used and maintained on site. 	<ul style="list-style-type: none"> Limited duration, frequency, geographic extent. No residual effect anticipated. 	<ul style="list-style-type: none"> Minimize potential for indirect effects from accidental spills. 	<ul style="list-style-type: none"> As appropriate, spills will be reported to the MOE Spills Action Centre.
All Construction and Decommissioning Activities	<ul style="list-style-type: none"> Impacts of construction noise on wildlife (I). 	<ul style="list-style-type: none"> Environmental noise will be reduced through the standard operating practices. A traffic plan will be developed and implemented by the Construction Contractor. Work within 120 m of Amphibian Breeding Habitats (GCSWH-ABH & GCSWH-ABH(WE)) will not occur after dusk during the breeding season (April, May and June). Work within 120m of bird habitats (GCSWH-WRN, GCSWH-WASBB, GCSWH-WNA, GCSWH-WSSA, GCSWH-SESBB, GCSWH-SCC) will not occur in the early morning hours (between dawn and 1.5 hours after dawn) during the breeding season (May 15 to July 30). 	<ul style="list-style-type: none"> Limited duration, frequency, geographic extent. No residual effect anticipated. 	<ul style="list-style-type: none"> Minimize effects of noise. 	<ul style="list-style-type: none"> The Environmental Inspector will ensure that all operational plans and construction timing associated with noise reduction are being followed. If work must occur in these areas during the noted time periods due to an emergency or critical phase of construction, work may be permitted if conditions for amphibian breeding are not ideal. Specifically, work may occur if temperatures are below 6°C, there has been no rain in the previous 24 hours or wind speeds are higher than 3 on the Beaufort Scale. The Environmental Inspector will track weather conditions and determine if suitable amphibian breeding conditions are or are not present. Similarly, emergency work may occur in the vicinity of bird habitats if conditions are not suitable for bird breeding (i.e. if temperatures are below 10°C, if there is rain or fog or if winds are greater than 3 on the Beaufort Scale). The Environmental Inspector will track weather conditions and determine if suitable bird breeding conditions are or are not present.
All Construction and Decommissioning Activities	<ul style="list-style-type: none"> Dust effects on wildlife habitat (I). 	<ul style="list-style-type: none"> As appropriate, dust from the work areas will be controlled through suppressants (e.g., water). 	<ul style="list-style-type: none"> Limited duration, frequency, geographic extent. No residual effect anticipated. 	<ul style="list-style-type: none"> Minimize effects from dust on wildlife habitats. 	<ul style="list-style-type: none"> Dust emissions will be monitored daily during construction to ensure dust control watering frequency and rates are adequate.

Table 4.2 Environmental Effects Monitoring Plan – Environmental Impact Study Significant Features

Affected Environmental Feature(s)	Project Activity	Potential Effects (D=Direct) (I=Indirect) Potential effect on the size, diversity, health, connectivity, functionality and resilience of the natural feature.	Mitigation Strategy	Residual Effect (magnitude/frequency/duration)	Performance Objective	Monitoring Plan and Contingency Measures
CONSTRUCTION AND DECOMMISSIONING						
All Significant Features	<ul style="list-style-type: none"> All Construction and Decommissioning Activities 	<ul style="list-style-type: none"> General construction and decommissioning effects. Refer to effects listed under Generalized Significant Wildlife Habitat. 	<ul style="list-style-type: none"> Refer to mitigation listed under Generalized Significant Wildlife Habitat. 	<ul style="list-style-type: none"> Refer to Residual Effects listed under Generalized Significant Wildlife Habitat. 	<ul style="list-style-type: none"> Refer to Performance Objectives listed under Generalized Significant Wildlife Habitat. 	<ul style="list-style-type: none"> Refer to monitoring and contingency measures listed under Generalized Significant Wildlife Habitat.
<p>Significant Woodlands, Provincially Significant Wetlands, Wetlands Assumed Significant, Deer Yarding Areas</p> <p>W-038, W-039, W-079, W-081, W-086, W-088, W-094, W-102, W-103, W-123, W-128</p> <p>Wetland Complex B WE-013, WE-014, WE-015, WE-017, WE-020, WE-026</p> <p>Individual Wetlands WE-022, WE-027, WE-029, WE-030, WE-031, WE-033, WE-034, WE-038</p> <p>DYA-001, DYA-002</p>	<ul style="list-style-type: none"> Installation and removal of 36 kV and 230 kV transmission line and communication lines along straight road sections. 	<ul style="list-style-type: none"> Inadvertent loss of, or disturbance to, vegetation within the wetlands/deer yards through encroachment of equipment or stockpiles (I). Movement of exposed sediment into the features (I). The effects identified above could have minor effect on the size of woodlands and wetlands and on the function of the wetland as surface water storage. 	<ul style="list-style-type: none"> Cables will be installed using open trenching methods within the disturbed municipal road ROW. Significant features will be clearly marked with sediment and/or tree protection fencing to ensure the equipment and material stockpiles do not encroach into any significant woodlands, wetlands or deer yards adjacent to the ROW. The boundaries of the features are to be delineated in the field by a qualified environmental technician based on the following definitions: <ul style="list-style-type: none"> Woodlands: Edge of the drip line Wetlands: OWES methodology (50% wetland vegetation rule) Silt and/or tree protection fencing will be installed along the boundaries of significant features. 	<ul style="list-style-type: none"> Limited duration, frequency, geographic extent. No residual effect anticipated. 	<ul style="list-style-type: none"> No vegetation loss or disturbance associated with sediment and erosion on woodlands or wetlands. 	<ul style="list-style-type: none"> An Environmental Inspector will regularly monitor operations to ensure that activities do not encroach into significant natural features.
<p>Significant Woodlands, Provincially Significant Wetlands, Wetlands Assumed Significant, Deer Yarding Areas</p> <p>W-038, W-039, W-079, W-081, W-086, W-088, W-094, W-102, W-103, W-123, W-128</p> <p>Wetland Complex B WE-013, WE-014, WE-015, WE-017, WE-020, WE-026</p> <p>Individual Wetlands WE-022, WE-027, WE-029, WE-030, WE-031, WE-033,</p>	<ul style="list-style-type: none"> Installation and removal of 230 kV transmission line and communication lines at watercourse and bridge crossings and road bends. 	<ul style="list-style-type: none"> Inadvertent loss of, or disturbance to, vegetation within the wetlands/deer yards through encroachment of launch or receiving pits into or adjacent to significant features D). Movement of exposed sediment into the features (I). The effects identified above could have minor effect on the size of woodlands and wetlands and on the function of the wetland as surface water storage. 	<ul style="list-style-type: none"> Lines will be installed using directional drilling, punch and bore, or open-cut techniques at watercourse, bridge, road, and utility crossings. Significant woodlands and wetlands will be clearly demarcated with sediment and/or tree protection fencing to ensure the equipment and material stockpiles do not encroach into the features. The boundaries of the features are to be delineated in the field by a qualified environmental technician based on the following definitions: <ul style="list-style-type: none"> Wetlands: OWES methodology (50% wetland vegetation rule) Woodlands: Edge of the drip line SWH: As per criteria detailed in the EOS report Silt and/or tree protection fencing will be installed along the boundaries of the natural features. Vegetated buffers will be left in place to the extent 	<ul style="list-style-type: none"> Duration is expected to be moderate (10 to 15 years until replacement trees have matured); however magnitude, frequency and geographic scope are very limited. No residual effect anticipated. May also be residual effect associated with frac-out during directional drilling; likelihood is low, limited duration, 	<ul style="list-style-type: none"> No vegetation loss or disturbance associated with sediment and erosion on woodlands or wetlands. 	<ul style="list-style-type: none"> An Environmental Inspector will regularly monitor operations to ensure that activities do not encroach into wetland areas. If directional drilling is used, an Environmental Inspector will be on-site during drilling activities. Erosion and sediment control measures will be regularly inspected to ensure they are functioning and are maintained as required. If erosion and sediment control measures are not

Affected Environmental Feature(s)	Project Activity	Potential Effects (D=Direct) (I=Indirect) Potential effect on the size, diversity, health, connectivity, functionality and resilience of the natural feature.	Mitigation Strategy	Residual Effect (magnitude/frequency/duration)	Performance Objective	Monitoring Plan and Contingency Measures
WE-034, WE-038 DYA-001, DYA-002			<p>possible.</p> <ul style="list-style-type: none"> Any cleared areas adjacent to significant features will be re-vegetated using a native seed mix and/or native shrub and tree plantings Trenching along straight sections will be within the disturbed portion of the municipal road ROW. Directional drilling and/or punch and bore options will be undertaken in accordance with the Department of Fisheries and Oceans' Operational Statement. Horizontal directional drilling and/or punch and bore operations will be designed with launching and receiving pits that will minimize tree loss and disturbance of natural vegetation wherever possible. Launch and receiving pits will be designed by the drilling contractor in accordance with the operational statement, and will not extend beyond the disturbed portion of the municipal road ROW. To the extent possible, pits will be located at least 30 m from significant natural features as delineated by a qualified Environmental Inspector. In some instances, pits may need to be less than 30 m (but no less than 5 m) from a natural feature. This will be determined during detailed design and will be documented in the sediment and erosion control plan. 	frequency and geographic extent.		<p>functioning properly, alternative measures will be implemented and prioritized above other construction activities.</p> <ul style="list-style-type: none"> An emergency frac-out plan will be prepared and implemented by the Contractor. The Environmental Inspector will hold the Contractor accountable to implementation of the emergency frac-out plan. Undertake monthly site inspections during the Site Preparation stage to ensure that trees are not damaged during construction activities.
Significant Wetlands Wetland Complex A WE-008, WE-009, WE-010, WE-011 Individual Wetlands WE-001, WE-002,	Turbine Assembly	<ul style="list-style-type: none"> Localized effects on wetland water levels due to dewatering for construction of turbine foundations (I). Water from the dewatering process could be outlet into a wetland causing scour within the wetland and deposition of sediment from the pumped water (I). The effects identified above could affect habitat for aquatic species if standing water is drawn down. Sedimentation could affect wetland functions associated with surface water storage and flood control. 	<ul style="list-style-type: none"> Dewatering will be minimized to the extent possible. Any discharge from dewatering will be outlet to an agricultural or vegetated area at least 30m from a significant natural feature or watercourse utilizing a sediment filter bag. Significant natural features boundaries are to be delineated in the field by a qualified environmental technician based on the following definitions: <ul style="list-style-type: none"> Wetlands: OWES methodology (50% wetland vegetation rule) Woodlands: Edge of the drip line SWH: As per criteria detailed in the EOS report. 	<ul style="list-style-type: none"> Limited duration, frequency, geographic extent. No residual effect anticipated. 	<ul style="list-style-type: none"> No effect on wetland water levels. No sediment discharge into wetlands. 	<ul style="list-style-type: none"> An Environmental Monitor should be on-site during any dewatering within 120m of wetlands. The Monitor should ensure that the filter bag is working appropriately. In the event of sediment discharge, all operations in the affected area should stop immediately until the problem can be resolved. Although no effects on water levels is anticipated, the Environmental Monitor should also monitor water levels in the vicinity of dewatering activities during

Affected Environmental Feature(s)	Project Activity	Potential Effects (D=Direct) (I=Indirect) Potential effect on the size, diversity, health, connectivity, functionality and resilience of the natural feature.	Mitigation Strategy	Residual Effect (magnitude/frequency/duration)	Performance Objective	Monitoring Plan and Contingency Measures
						the dewatering process. If significant changes in water levels are noted, operations should cease until water levels recover.
Significant Woodlands W-04, W-020, W-21, W-23, W-026, W-29, W-30, W-31, W-34, W-036, W-37, W-042, W-053,	<ul style="list-style-type: none"> • Construction and removal of access roads adjacent to the following woodlands: <ul style="list-style-type: none"> – W-053 (access road to T-16); – W-042 (access road to T-18); – W-036 (access road to T-25 and T-28); – W-026 (access road to T-31); and, – W-020 (access road to T-40). • Installation of 36 kV collector lines adjacent to the following woodlands: <ul style="list-style-type: none"> – W-04 and W-037 (collector line along Sararas Road); – W-029, W-030, W-034, W-031 (collector line along Shipka Road); – W-023 and W-026 along Schadeview Road; – W-020 along Turnbull's Road; and, – W-021 along the 	<ul style="list-style-type: none"> • Inadvertent loss of, or disturbance to, vegetation along the edge of woodlands during construction of adjacent access roads and below ground collector lines (I). • The effects identified above could have minor effect on the size of woodlands and their function in providing edge habitat for a variety of species including Red-headed woodpecker (Special Concern species). 	<ul style="list-style-type: none"> • Construction areas are to correspond to those areas detailed on Figures 2a – 2s, Appendix A • Access road and collector lines will be no closer than the dripline of each significant woodland edge. • The significant woodland edge should be demarcated by a silt fence and/or tree protection fencing. • Below ground collector lines will be located within the access road allowance and will not extend into wooded areas. • Additional, taller tree protection fencing (tree hoarding) should be installed in these areas to protect tree limbs from equipment in adjacent areas. • Any tree roots which extend into the construction area should be cut and re-packed into soil to avoid desiccation. 	<ul style="list-style-type: none"> • Limited duration, frequency, geographic extent. • No residual effect anticipated. 	<ul style="list-style-type: none"> • No disturbance to woodlots. 	<ul style="list-style-type: none"> • Silt fencing and/or tree protection fencing will be installed as per the construction areas detailed in Figures 2a – 2s, Appendix A. Further to this silt fencing and/or tree protection fencing will be installed no closer than the dripline and monitored regularly by an Environmental Inspector to ensure they are functioning and are maintained as required. • If the silt fencing and tree hoarding are not functioning properly, alternative measures will be implemented and prioritized above other construction activities.

Affected Environmental Feature(s)	Project Activity	Potential Effects (D=Direct) (I=Indirect) Potential effect on the size, diversity, health, connectivity, functionality and resilience of the natural feature.	Mitigation Strategy	Residual Effect (magnitude/frequency/duration)	Performance Objective	Monitoring Plan and Contingency Measures
	field edge between T-37 and T-39.					
Turtle Nesting Area, Turtle Overwintering Habitat* and Amphibian Breeding Habitat ABH-001 TNA-002 TWA-003*	All Construction and Decommissioning Activities	<ul style="list-style-type: none"> Accidental mortality due to wildlife moving through the construction zone (I). The effect identified above may affect individual animals but unlikely to affect population health or resiliency. No effect on habitat functionality. 	<ul style="list-style-type: none"> During construction wildlife fencing (sediment fencing) will be installed around all work areas within 120m of these habitats prior to any earth movement, stockpiling or other activities on the site. Fencing must be keyed in correctly and monitored for proper installation and maintenance by the contractor. The boundary of the construction compound will be fenced to limit the ability for wildlife to enter the area. Construction areas are to correspond to those areas detailed on Figures 2a – 2s, Appendix A. Work within 120 m of Amphibian Breeding Habitats (ABH-001) will not occur after dusk during the breeding season (April, May and June). 	<ul style="list-style-type: none"> Limited duration, frequency, geographic extent. No residual effect anticipated. 	<ul style="list-style-type: none"> No accidental mortality. No reduced amphibian breeding due to noise impacts. 	<ul style="list-style-type: none"> The contractor will be responsible for ensuring fencing is maintained and inspected regularly for signs of wildlife in the work zone while work is occurring these areas. The Environmental Inspector will be on-site as required to ensure proper maintenance of wildlife fencing. If any turtles are found within the TNA-002 and TWA-003 adjacent work zones, the Environmental Inspector should relocate them to the nearest habitat area outside of the work zone. When relocating snapping turtles, care should be taken to avoid injury by wearing gloves and placing turtles into a bucket or large plastic tub for relocation. Sediment/wildlife fencing within 120 m of Amphibian Breeding Habitat (ABH-001) should also be inspected by the Environmental Inspector at least once a week during the breeding season (April, May and June) to ensure they are functioning and are maintained as required. If the sediment/wildlife fencing is not functioning properly, alternative measures will be implemented and prioritized

Affected Environmental Feature(s)	Project Activity	Potential Effects (D=Direct) (I=Indirect) Potential effect on the size, diversity, health, connectivity, functionality and resilience of the natural feature.	Mitigation Strategy	Residual Effect (magnitude/frequency/duration)	Performance Objective	Monitoring Plan and Contingency Measures
						above other construction activities. <ul style="list-style-type: none"> Contractor and Environmental Inspector to monitor work schedules to ensure that no work occurs within the restricted timing window.
Amphibian Breeding Habitat ABH-001	Construction of turbines T-21, T-22, T-23, T-24 and T-25, their access roads and all associated components	<ul style="list-style-type: none"> Inhibition of amphibian breeding patterns and reproductive success due to disruptions of breeding calling patterns from turbine construction noise (I). The effect identified above could affect the size and diversity of the amphibian population in this pond. 	<ul style="list-style-type: none"> Construction of turbines T-21, T-22, T-23, T-24 and T-25, their access roads and all associated components should not occur after dusk during the breeding season (April, May and June). 	<ul style="list-style-type: none"> Limited duration, frequency, geographic extent. No residual effect anticipated. 	<ul style="list-style-type: none"> No significant decrease in amphibian populations. 	<ul style="list-style-type: none"> Contractor and Environmental Inspector to monitor work schedules to ensure that no work occurs within the restricted timing window. If work must occur in these areas during the noted time periods due to an emergency or critical phase of construction, work may be permitted if conditions for amphibian breeding are not ideal. Specifically, work may occur if temperatures are below 6°C, there has been no rain in the previous 24 hours or wind speeds are higher than 3 on the Beaufort Scale. The Environmental Inspector will track weather conditions and determine if suitable amphibian breeding conditions are or are not present.
Species of Conservation Concern* SCC-001, SCC-002, SCC-003, SCC-004, SCC-005, SCC-006, SCC-007, SCC-008, SCC-009, SCC-010, SCC-011, SCC-012, SCC-013, SCC-014, SCC-015, SCC-016, SCC-017	Site Preparation All Decommissioning Activities	<ul style="list-style-type: none"> Inadvertent loss of, or disturbance to, vegetation within significant habitat areas as a result of unauthorized encroachment into the habitat (I). Movement of exposed sediment into the habitat (I). The effects identified above could have minor effect on the size of habitat and could affect individuals 	<ul style="list-style-type: none"> Significant habitats will be clearly demarcated with sediment and/or tree protection fencing to ensure the equipment and material stockpiles do not encroach into any features. Significant habitats to be demarcated by a qualified Environmental Inspector based on the boundary of the finest applicable ELC unit. Construction areas are to correspond to those areas detailed on Figures 2a – 2s, Appendix A. 	<ul style="list-style-type: none"> Limited duration, frequency, geographic extent. No residual effect anticipated. 	<ul style="list-style-type: none"> No disturbance to significant habitat areas. 	<ul style="list-style-type: none"> An Environmental Inspector will perform regular inspection to ensure that mitigation is implemented and all silt fencing and/or tree protection fencing is maintained and functioning properly. If they are not functional, they should be repaired immediately.

Affected Environmental Feature(s)	Project Activity	Potential Effects (D=Direct) (I=Indirect) Potential effect on the size, diversity, health, connectivity, functionality and resilience of the natural feature.	Mitigation Strategy	Residual Effect (magnitude/frequency/duration)	Performance Objective	Monitoring Plan and Contingency Measures
		if sediment washes out or buries vegetation.				<ul style="list-style-type: none"> If accidental encroachment occurs the offending material or equipment will be immediately removed and restoration of the area conducted as needed.
Bat Maternity Colonies* BMC-001, BMC-002, BMC-003, BMC-004, BMC-005, BMC-006, BMC-007, BMC-008, BMC-009, BMC-010, BMC-011, BMC-012,	All Construction and Decommissioning Activities	<ul style="list-style-type: none"> Disturbance due to construction activity and noise could result in bats avoiding habitat (I). Inadvertent loss of, or disturbance to, vegetation within significant habitat areas as a result of unauthorized encroachment into the habitat (I). The effect could impact the use of the habitat by bats. 	<ul style="list-style-type: none"> No construction will occur immediately adjacent to significant bat maternity colony habitats within the timing window of May 1 to July 30. Significant habitats will be clearly demarcated with sediment and/or tree protection fencing to ensure the equipment and material stockpiles do not encroach into any features. Significant habitats to be demarcated by a qualified Environmental Inspector based on the boundary of the finest applicable ELC unit. Construction areas are to correspond to those areas detailed on Figures 2a – 2s, Appendix A. 	<ul style="list-style-type: none"> Limited duration and magnitude. No residual effect anticipated. 	<ul style="list-style-type: none"> No disturbance to significant bat maternity colonies. 	<ul style="list-style-type: none"> An Environmental Inspector will perform regular inspection to ensure that work does not occur within specified timing windows. An Environmental Inspector will perform regular inspection to ensure that mitigation is implemented and all silt fencing and/or tree protection fencing is maintained and functioning properly. If they are not functional, they should be repaired immediately. If accidental encroachment occurs the offending material or equipment will be immediately removed and restoration of the area conducted as needed.
OPERATION						
Bat Maternity Colonies* BMC-001, BMC-002, BMC-003, BMC-004, BMC-005, BMC-006, BMC-007, BMC-008, BMC-009, BMC-010, BMC-011, BMC-012,	Wind Turbine Operation	<ul style="list-style-type: none"> Bats may avoid habitat areas once turbines are operational (I). The effect noted above could reduce the available habitat for bats and could therefore reduce populations in the area. 	<ul style="list-style-type: none"> Develop contingency measures as required. 	<ul style="list-style-type: none"> Duration of the effect could be experienced throughout entire operating period of the turbines. Effect most significant during spring season. Potential for residual effects exists. 	<ul style="list-style-type: none"> Minimize impacts to Bat Maternity Colony habitat. No significant reduction in use by bats. 	<ul style="list-style-type: none"> Contingency measures may include additional monitoring to determine cause of decline, possible turbine shut-down or blade feathering during breeding season. Contingency measures will be developed and confirmed with the MNR as required, subject to the level of effect identified. Additional three years of monitoring if mitigation is applied. Refer to EEMP for more

Affected Environmental Feature(s)	Project Activity	Potential Effects (D=Direct) (I=Indirect) Potential effect on the size, diversity, health, connectivity, functionality and resilience of the natural feature.	Mitigation Strategy	Residual Effect (magnitude/frequency/duration)	Performance Objective	Monitoring Plan and Contingency Measures
Amphibian Breeding Habitat ABH-001	Wind Turbine Operation	<ul style="list-style-type: none"> Inhibition of amphibian breeding patterns and reproductive success due to disruptions of breeding calling patterns from turbine noise (I). The effect identified above could affect the size and diversity of the amphibian population in this pond. 	<ul style="list-style-type: none"> Post-construction monitoring will be undertaken and contingency measures developed as required. 	<ul style="list-style-type: none"> Duration of the effect could be experienced throughout entire operating period of the turbines. Effect most significant during spring breeding season. Potential for residual effects exists. 	<ul style="list-style-type: none"> Minimize impacts to amphibian breeding. Baseline amphibian calling index to be maintained at 3 for both spring peeper and grey tree frog. 	information. <ul style="list-style-type: none"> Conduct an Amphibian Monitoring Program for two years following construction of the wind farm. Amphibian surveys to be undertaken in accordance with Marsh Monitoring Program Manual (Bird Studies Canada, 1994). Surveys will be conducted between one-half hour after sunset and midnight during each of the following three periods: <ul style="list-style-type: none"> April 15-30; May 15-30; and, June 15-30. Contingency measures will be developed and confirmed with the MNR as required, subject to the level of mortality identified. Additional two years of monitoring if significant effects are observed. Refer to EEMP for more information.
Turtle Nesting Area and Turtle Overwintering Habitat* TNA-002 TWA-003*	Planned and Unplanned Maintenance	<ul style="list-style-type: none"> Maintenance vehicles may collide with migrating turtles crossing Turnbull's Road or the turbine access road to T-40 (D). 	Turtle crossing signs will be erected along Turnbull's Road to remind drivers to be mindful of turtles in the area.	<ul style="list-style-type: none"> Effect most significant during spring and fall migration periods. Potential for residual effects exists. 	<ul style="list-style-type: none"> Minimize turtle/vehicle collisions. 	<ul style="list-style-type: none"> Maintenance crews will report any turtle collisions to Northland and/or their consultant. Findings will be reported to the MNR for the first two years of operation. Contingency measures will be developed with the MNR as required, subject to the level of mortality identified. Refer to EEMP for more information

Affected Environmental Feature(s)	Project Activity	Potential Effects (D=Direct) (I=Indirect) Potential effect on the size, diversity, health, connectivity, functionality and resilience of the natural feature.	Mitigation Strategy	Residual Effect (magnitude/frequency/duration)	Performance Objective	Monitoring Plan and Contingency Measures
All Significant Features	Planned and Unplanned Maintenance	<ul style="list-style-type: none"> Maintenance activities may have impacts associated with spills and the accidental release of hazardous materials. General effects such as those described under listed under Generalized Significant Wildlife Habitat may occur if earth movement is required. Refer to effects listed under Generalized Significant Wildlife Habitat. Maintenance activities are not anticipated to affect size, diversity, health, connectivity or function of natural features. 	<ul style="list-style-type: none"> Procedures will be in place for the handling of hazardous materials, disposal of waste and management of dust and noise. Any maintenance requiring earth movement will use the same mitigation measures described under Generalized Significant Wildlife Habitat. 	<ul style="list-style-type: none"> Refer to Residual Effects listed under Generalized Significant Wildlife Habitat. No residual effect anticipated. 	<ul style="list-style-type: none"> Refer to Performance Objectives listed under Generalized Significant Wildlife Habitat. 	<ul style="list-style-type: none"> Refer to monitoring and contingency measures listed under Generalized Significant Wildlife Habitat.
Individual Birds and Bats	Wind Turbine Operation	<ul style="list-style-type: none"> Impacts due to collisions with turbines or mortality due to pressure variations during operation (D). The effect identified above has the potential to affect the population size and health if mortality exceeds limits set out by the province. 	<ul style="list-style-type: none"> Refer to mitigation provided in the separate EEMP for birds and bats. 	<ul style="list-style-type: none"> Refer to the separate EEMP for birds and bats. 	<ul style="list-style-type: none"> Refer to the separate EEMP for birds and bats. 	<ul style="list-style-type: none"> Refer to the separate EEMP for birds and bats.

* Wildlife habitat treated as significant. These are features which may be significant and which are being treated as such until habitat use study can confirm the relative use of each habitat. If it is found that wildlife are not using the habitat in significant numbers, then the mitigation identified will not be required.

Table 4.3 Environmental Effects Monitoring Plan – Environmental Impact Study Significant / Provincially Significant Features Potentially Affected During Operation

Feature(s)	Distance to Project Locations (components)	Potential Negative Environmental Effects	Mitigation Strategy	Performance Objective	Environmental Effects Monitoring Plan					Contingency Measure
					Methodology	Monitoring Locations	Frequency and Duration of Sample Collection	Technical and Statistical Value of Data	Reporting Requirements	
BMC-001* BMC-002* BMC-003* BMC-004* BMC-005* BMC-005* BMC-006* BMC-007* BMC-008* BMC-009* BMC-010* BMC-011* BMC-012*	2 m to 119 m	Habitat displacement or avoidance Note: Post-construction mortality of bats and detailed monitoring plan is addressed in the Environmental Effects Monitoring Plan as part of the Design and Operations Report.	Infrastructure sited outside of the significant wildlife habitat feature	Continued use of the habitat by the species (Little brown bat, Eastern Small-footed bat, Northern Long-eared bat or Tricolored Bat, Silver-haired Bat) that currently inhabits the feature. White nose syndrome may have an impact on the abundance of bats, specifically Northern long-eared and Little Brown bats.	Apply same methodology followed during pre-construction monitoring (exit count surveys coupled with acoustic monitoring using broadband bat detector to identify species). See Appendix B for detailed survey methods.	At snags/tree cavities to be identified and monitored during pre-construction surveys.	Pre-construction Survey (baseline): June 2013 Post-construction Survey: <ul style="list-style-type: none">June 2015June 2016June 2017	Determine if there is a displacement or avoidance effect caused by turbines located in proximity to bat maternity colonies	Annual Reports submitted to MNR. Estimated Report Submission Dates: <ul style="list-style-type: none">Summer 2013 (preconstruction data)Summer 2015 (yr 1 post-construction)Summer 2016 (yr 2 post-construction)Summer 2017 (yr 3 post-construction)	Upon submission of annual post-construction monitoring reports to MNR it will be determined in consultation with MNR whether contingency measures are required and the contingency measures to be undertaken.
ABH-001	33 m to 103 m	Habitat displacement or avoidance.	Strategy to site turbines outside of habitat.	Minimize impacts to amphibian breeding. Baseline amphibian calling index to be maintained at 3 for both spring peeper and grey tree frog.	Conduct an Amphibian Monitoring Program for two years following construction of the wind farm. Amphibian surveys to be undertaken in accordance with Marsh Monitoring Program Manual (Bird Studies Canada, 1994). See Appendix E for detailed survey methods	At survey station monitored during EOS surveys in ABH-001. See Figure E in Appendix E of the Natural Heritage Assessment Environmental Impact Study .	Surveys will be conducted between one-half hour after sunset and midnight during each of the following three periods in 2015 and 2016: <ul style="list-style-type: none">April 15-30;..... May 15-30; and,..... June 15-30.	Determine if there is a displacement or avoidance effect caused by turbines located in proximity to amphibian breeding habitat.	Annual Reports submitted to MNR. Estimated Report Submission Dates: <ul style="list-style-type: none">Summer 2015 (yr 1 post-construction)Summer 2016 (yr 2 post-construction).	Upon submission of annual post-construction reports to MNR it will be determined in consultation with MNR whether contingency measures are required. Contingency measures may include additional monitoring to determine cause of decline, possible turbine shut-down or blade feathering during breeding season. Additional two years of monitoring if significant effects are observed.

Feature(s)	Distance to Project Locations (components)	Potential Negative Environmental Effects	Mitigation Strategy	Performance Objective	Environmental Effects Monitoring Plan					Contingency Measure
					Methodology	Monitoring Locations	Frequency and Duration of Sample Collection	Technical and Statistical Value of Data	Reporting Requirements	
TNA-002 TWA-003*	2 m to 113	Collisions between turtles and maintenance vehicles.	Vehicle drivers will be given training and awareness related to this location and will be told to monitor speeds and driving conditions in this area. Drivers will be given a log book with which to enter information about any collisions with turtles or other wildlife. Signage will be erected to notify drivers of turtle crossing area.	Minimize vehicle/turtle collisions.	<p>Drivers will record any turtle or other wildlife collisions in log book.</p> <p>Conduct turtle nesting and overwintering monitoring for two years following construction of the wind farm.</p> <p>See Appendix C for detailed survey methods.</p>	<p>Records will be kept of any collision on any roadway in the vicinity of the Project Location.</p> <p>Signage will be posted in close proximity to TNA-003 and TWA-002 on Turnbull's Road.</p> <p>Two-year monitoring at TNA-002 and TWA-003* survey stations.</p> <p>See Figure E in Appendix C of the Natural Heritage Assessment Environmental Impact Study.</p>	<ul style="list-style-type: none"> Records of collisions will be kept only if collisions occur. <p>Two years of habitat monitoring will be conducted on three separate occasions in late March, mid-April and early-May on days without rain or fog.</p>	<p>Determine if there is significant mortality related to turtle/vehicle collisions during first two years of operations.</p> <p>Determine if there is any change in the use of the habitat.</p>	<p>Annual summary of logs submitted to MNR. Estimated Report Submission Dates:</p> <ul style="list-style-type: none"> Summer 2015 (yr 1 post-construction) Summer 2016 (yr 2 post-construction). 	<p>Upon submission of annual post-construction monitoring reports to MNR it will be determined in consultation with MNR whether contingency measures are required and the contingency measures to be undertaken.</p>

*pre-construction survey required to verify significance of this feature. If significant the following mitigation measures, monitoring plan and contingency measures will be implemented

Table 4.4 Environmental Effects Monitoring Plan – Water Assessment and Water Body Features

Affected Environmental Feature(s)	Project Phase	Potential Effects	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures
<p>Aquatic Species and Aquatic Habitat</p> <p>Watercourse Crossings:</p> <p>CR-013, CR-018, CR-023, CR-031, CR-032, CR-041</p>	<p>Construction Decommissioning</p>	<ul style="list-style-type: none"> Potential direct effects to aquatic habitat quality from sedimentation during construction activities (i.e., culverts for access roads). Effects to riparian vegetation during construction. Effects to fish during in-water works. Potential failure of slopes – impacts to bed/banks of stream during culvert construction. 	<ul style="list-style-type: none"> Minimize indirect effects from dust, sedimentation and erosion. Minimize direct effects to fish and fish habitat during construction. 	<ul style="list-style-type: none"> Erosion and sediment control measures (i.e., silt fence, straw bales, wooden stakes, sand bags, filters, pumps, snow fencing) will be installed and will be maintained during the construction work phase and until the site has been stabilized. Implementation of the erosion and sediment control measures will conform to industry best management practices and recognized standard specifications such as Ontario Provincial Standards Specifications (OPSS). Minimize footprint for culvert crossings at access roads. Culvert construction will take place outside fish and fish habitat timing windows, and will be designed and installed according to the requirements of the Ausable Bayfield Conservation Authority. Directional drilling and/or punch and bore operations will be designed with launching and receiving pits with appropriate setbacks from watercourses wherever possible. Dewatering from open excavations will take place on tile-drained agricultural land to promote infiltration and settling of suspended solids prior to entering a watercourse. Fish salvage will be conducted by a qualified biologist under a Scientific Collection Permit from MNR and all fish captured within the work area will be released downstream unharmed. Operational Statements (OS) provided by DFO will be used where appropriate to ensure that no impact to fish and fish habitat will occur during construction (i.e., punch and bore, directional drilling, open-cut watercourse crossings and isolated dam and pump). 	<ul style="list-style-type: none"> Regular weekly site inspection will occur by designated Environmental Monitor for sediment and erosion control measures. Severe weather conditions may require additional site visits depending on the proximity of the watercourse. The level of monitoring and reporting would be based on the severity of the spill and may be discussed with the MOE Spills Action Center and MNR. <p>Contingency Measures</p> <ul style="list-style-type: none"> Environmental Monitor will be responsible for “stop works” if mitigation measures are not incorporated into the construction activities or performance objectives are not achieved. Changes to the mitigation measures to best suit the current conditions will be adopted to achieve overall performance objective.
<p>Aquatic Species and Aquatic Habitat</p>	<p>Construction Operation Decommissioning</p>	<ul style="list-style-type: none"> Potential contamination from accidental spills. 	<ul style="list-style-type: none"> Minimize potential for indirect effects from accidental spills. 	<ul style="list-style-type: none"> Hazardous material transportation and application will occur in designated areas according to operational procedures. Proper spill containment equipment will be used and maintained on site. No fuelling within 30 m of any watercourse. No fuel storage within 30 m of any watercourse. A spill containment kit will be available during construction for every location that heavy equipment is operated. 	<ul style="list-style-type: none"> Regular site inspections will occur by designated Environmental Monitors for in-water works and work adjacent to sensitive areas. The level of monitoring and reporting would be based on the severity of the spill and may be discussed with the MOE Spills Action Center and MNR. <p>Contingency Measures</p> <ul style="list-style-type: none"> Additional sediment and erosion control measure (silt fence, erosion control blankets, etc.) will be on site a ready for use if original measures are not suitable. Refer to Spill Contingency Plan. Contaminated soil will be removed and disposed of at an approved facility.

Affected Environmental Feature(s)	Project Phase	Potential Effects	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures
Surface Water/Soils	Construction Operation Decommissioning	<ul style="list-style-type: none"> Short-term degradation of soil/water quality and fisheries habitat due to accidental spills or releases. 	<ul style="list-style-type: none"> Minimize indirect effects from dust, sedimentation and erosion. Minimize potential for indirect effects from accidental spills. 	<ul style="list-style-type: none"> Erosion and sediment control measures (i.e., silt fence, straw bales, wooden stakes, sand bags, filters, pumps, snow fencing) will be installed and will be maintained during the construction work phase and until the site has been stabilized. Implementation of the erosion and sediment control measures will conform to industry best management practices and recognized standard specifications such as Ontario Provincial Standards Specifications (OPSS). Culvert construction will take place outside fish and fish habitat timing windows, and will be designed and installed according to the requirements of the Ausable Bayfield Conservation Authority. Directional drilling and/or punch and bore operations will be designed with launching and receiving pits with appropriate setbacks from watercourses wherever possible. Dewatering from open excavations will take place on tile-drained agricultural land to promote infiltration and settling of suspended solids prior to entering a watercourse. Hazardous material transportation and application will occur in designated areas according to operational procedures. Proper spill containment equipment will be used and maintained on site. 	<ul style="list-style-type: none"> Regular site inspection will occur by designated Environmental Monitors. The level of monitoring and reporting would be based on the severity of the occurrence and may be discussed with the MOE Spills Action Center and MNR. <p>Contingency Measures</p> <ul style="list-style-type: none"> Contaminated soil will be removed and disposed of at an approved facility.
Groundwater	Construction Operation Decommissioning	<ul style="list-style-type: none"> Potential direct impacts to groundwater quality and quantity due to water taking at Parts and Storage Building. Water quality impacts due to potential fuel and oil spills. Dewatering operations during construction are not expected to impact groundwater quantity or quality. Refer to the Construction Plan Report for further details. 	<ul style="list-style-type: none"> Minimize impacts to groundwater quality and quantity. No spills. 	<ul style="list-style-type: none"> Confirmation of water supply needs and capacity for the Part and Storage Building will be verified at the detailed design phase. If required, detailed design and implementation plans will include measures for water storage and/or water treatment. An Emergency Response and Communications Plan will be developed during detailed design to ensure proper mitigation and notification procedures are in place regarding groundwater quality during Project operation. 	<ul style="list-style-type: none"> Regular site inspection will occur by designated Environmental Monitors. The level of monitoring and reporting would be based on the severity of the occurrence and may be discussed with the MOE Spills Action Center and MNR. <p>Contingency Measures</p> <ul style="list-style-type: none"> 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.

Table 4.5 Environmental Effects Monitoring Plan – Land Use and Socio-Economic Features

Affected Environmental Feature(s)	Project Phase	Potential Effects	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures
Provincial Land Use Plans	Construction, Operation, and Decommissioning	<ul style="list-style-type: none"> The Project is not protected 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. 	N/A	N/A	N/A
Petroleum, Oil and Gas Resources	Construction, Operation, and Decommissioning	<ul style="list-style-type: none"> Fires and explosions from disturbance of existing oil and gas resources. Methane and sour gas releases from disturbance of existing oil and gas resources. 	<ul style="list-style-type: none"> No fires or explosions from existing oil and gas resources as a result of Project activities. No methane and sour gas releases from existing oil and gas resources as a result of Project activities. 	<ul style="list-style-type: none"> Project infrastructure has been sited with a clearance of over 75 m from existing active wells. For Project infrastructure located within 75 m of abandoned wells, a visual search will be conducted to confirm the condition of the abandoned well. If required, the abandoned well will be properly decommissioned prior to construction within 75 m of the abandoned well. An engineer's report will be prepared outlining risks, mitigation, and emergency response procedures for wells within 75 m of Project activities. 	<ul style="list-style-type: none"> Contingency Measures Existing well records indicate 2 abandoned wells are located within 75 m of an access road and the collector line. The wells have been decommissioned and are not likely to be affected by Project activities. If a fire, explosion, or release of sour gas occurs during Project activities, the Emergency Response Plan will be implemented.
Existing Land Uses - Agriculture and Rural Resources	Construction, Operation, and Decommissioning	<ul style="list-style-type: none"> Loss of lands required for the lease period and farming practices. Potential impacts to drainage systems. Potential impact from soil compaction. Potential impact to crop production and yields. 	<ul style="list-style-type: none"> Minimize disturbance to agricultural lands, drainage systems, soil compaction and crop production. 	<ul style="list-style-type: none"> Siting of Project components in discussion with landowners. Compensation provided to the landowners who have Land Lease Agreements. Construction methods have been included that will avoid impacts to drainage systems and soil compaction thereby minimizing impacts to normal crop production and yields. 	<ul style="list-style-type: none"> During construction the environmental inspector will monitor the drainage and soil remediation measures to be implemented. A landowner complaint procedure will be established. Following construction all site areas will be monitored by qualified professionals for a two year period to ensure that drainage systems are functioning properly and normal crop production is not reduced. <p>Contingency Measures</p> <ul style="list-style-type: none"> Additional drainage system repairs as required. Additional soil compaction relief measures as required. Crop compensation, if necessary, to landowners.
Game and Fisheries Resources	Construction, Operation, and Decommissioning	<ul style="list-style-type: none"> Disturbance to game species from noise and maintenance activities. 	<ul style="list-style-type: none"> Minimize disturbance. 	<ul style="list-style-type: none"> Keep equipment in good working condition and regularly maintained to minimize noise. Minimize impacts to aquatic resources see protection and mitigation measures under water bodies and natural heritage. Schedule construction periods to avoid impacts. 	<ul style="list-style-type: none"> Complaint response protocol will be followed.

Affected Environmental Feature(s)	Project Phase	Potential Effects	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures
Provincial and Local Infrastructure and Local Traffic	Construction, Operation, and Decommissioning	<ul style="list-style-type: none"> Negligible increase in traffic during operational phases. Traffic impacts during construction phases. Impacts to structures (i.e., culverts, bridges, watermain, gas, sewers) due to construction traffic loading. 	<ul style="list-style-type: none"> Minimize traffic disturbance. Prevent damage to structures. 	<ul style="list-style-type: none"> The Contractor will implement a traffic management plan. Road user agreement anticipated with local municipalities. Permits will be obtained for applicable oversize / overweight loads. Public notification of non-conventional load movements (if required). Escort vehicles will be used as appropriate. Roads will be maintained and any additional repairs necessary will be completed immediately following construction to pre-development conditions or better. 	<ul style="list-style-type: none"> Complaint response protocol will be followed. Monitor road conditions weekly during construction and decommissioning. <p>Contingency Measures</p> <ul style="list-style-type: none"> Road maintenance, repair crews and materials to be on standby for repairs as required.
Telecommunication Networks	Construction and Operation	<ul style="list-style-type: none"> Potential interference to communication systems, including radar, cellular and broadcasting systems. 	<ul style="list-style-type: none"> Minimize disturbance. 	<ul style="list-style-type: none"> Possible adjustment of turbine locations Curtailment of operations during selected periods Possible location adjustment of turbines, transmission or telecommunication systems or radar installation. During construction, position crane on north side of T-21 to avoid interference with nearby microwave tower. During construction, position crane on east or south side of T-04 to avoid interference with microwave tower. 	<ul style="list-style-type: none"> Additional studies to confirm non interference. Ongoing communication with impacted agencies to resolve any outstanding issues.
Aeronautical Systems	Construction and Operation	<ul style="list-style-type: none"> Aeronautical obstruction. 	<ul style="list-style-type: none"> Minimize hazards. 	<ul style="list-style-type: none"> Turbine lighting must conform to Transport Canada standards. Lights would be selected with the minimal allowable flash duration, narrow beam and would be synchronized Nav Canada would be responsible for updating all aeronautical charts with the turbine locations. Consideration of radar detection system to eliminate night lights except when aircraft are in the vicinity of the wind farm. Radar detection system would likely require 2 radar stations in the vicinity of the Project location. 	<ul style="list-style-type: none"> Routine maintenance and repair.
Viewscape / Aesthetics	Construction and Operation	<ul style="list-style-type: none"> Change in viewscape as a result of Project infrastructure. 	<ul style="list-style-type: none"> Minimize disturbance to viewscape. 	<ul style="list-style-type: none"> Northland will consider a tree planting program in selected locations to assist local residents who wish to block views and shadow flicker effects of the wind farm from their properties. Many views of the wind farm cannot be mitigated and changes to the local viewscape cannot be avoided. 	<ul style="list-style-type: none"> A formal complaints procedure will be established. Communication links to service will be provided. Follow-up action and investigation as required.
Air, Odour, Dust	Construction, Operation, and Decommissioning	<ul style="list-style-type: none"> Air and dust emissions from operation and maintenance vehicles. No odour effects anticipated. 	<ul style="list-style-type: none"> Minimize emissions. 	<ul style="list-style-type: none"> The Contractor would implement good site practices with regard to air which may include: <ul style="list-style-type: none"> multi-passenger vehicles would be utilized to the extent practical; company and contractor personnel would avoid idling of vehicles when not necessary; equipment and vehicles would be turned off when not in use unless required for activities and/or effective operation of the equipment or vehicle; equipment and vehicles would be maintained in good working order with functioning mufflers and emission control systems as available; and all vehicles would be fitted with catalytic converters as required. The Contractor would implement good site practices with regard to dust which may include: <ul style="list-style-type: none"> protecting stockpiles of friable material with a barrier; dust suppression (e.g., water) of source areas; and, covering loads of friable materials during transport. 	<ul style="list-style-type: none"> Complaint Response Protocol will be followed.

Affected Environmental Feature(s)	Project Phase	Potential Effects	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures
Environmental Noise	Construction and Operation	<ul style="list-style-type: none"> 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). Noise emitted from operation/maintenance vehicles. 	<ul style="list-style-type: none"> Minimize noise impacts to meet MOE standards. 	<ul style="list-style-type: none"> Noise levels have been extensively modeled with performance standards established to meet MOE requirements at all facilities Turbines can be adjusted for noise, power levels and operational schedules. Sound limitations have been developed for equipment to be used at the transformer substation to satisfy the 40 dBA limit at all non-participating noise receptors. Construction equipment to be maintained with normal noise attenuation. Schedule construction work to minimize noise impacts. 	<ul style="list-style-type: none"> Noise levels will be monitored in the field as required Complaints protocol will be established with follow-up investigations and action, as required. <p>Contingency Measures</p> <ul style="list-style-type: none"> Adjustments to turbine noise levels and scheduled operations as required.
Public Safety – Turbine Blade and Structure Failure	Construction and Operation	<ul style="list-style-type: none"> Collapse of turbine tower and/or blade detachment. 	<ul style="list-style-type: none"> No failure of components. 	<ul style="list-style-type: none"> Adherence to setbacks from receptors. Design, install, operate and maintain turbines according to applicable industry standards. Use of lightening protection system. 	<ul style="list-style-type: none"> Regular maintenance and monitoring activities. Emergency Response Plan will be followed.
Public Safety – Ice Fall and Shed	Operation	<ul style="list-style-type: none"> Accumulation of ice on turbine blades. 	<ul style="list-style-type: none"> Limit ice accumulation. 	<ul style="list-style-type: none"> Adherence to setbacks from receptors. Design of turbine to reduce ice accumulation. Automatic turbine shutdown due to weight imbalances. 	<ul style="list-style-type: none"> Regular maintenance and monitoring activities. Emergency Response Plan will be followed.
Public Safety – Stray Voltage and Infra Sound	Operation	<ul style="list-style-type: none"> Potential impacts on public health. 	<ul style="list-style-type: none"> No stray voltage. 	<ul style="list-style-type: none"> Electric and Magnetic Fields - the Project will operate within the range of voluntary standards in North America and as the potential effects themselves from Electric and Magnetic Fields remain inconclusive, no adverse effects on human health are expected from operation of the Project. Research to date has not shown any biological health effects at levels of Low Frequency Noise normally associated with operational turbines. Infrasound is generally much lower than Low Frequency Noise. Infrasonic levels created by wind turbines are often similar to the ambient levels prevalent in the natural environment due to wind. There is no evidence of adverse health effects caused by infrasound. 	<ul style="list-style-type: none"> Complaints Response Protocol will be followed.
Public Safety – Extreme Weather Events	Construction, Operation, and Decommissioning	<ul style="list-style-type: none"> Potential damage to Project infrastructure. 	<ul style="list-style-type: none"> No damage or structural failure. 	<ul style="list-style-type: none"> Project components have been designed to withstand the effects from extreme events. Design, install, operate and maintain turbines according to applicable industry standards. Failsafe devices are capable of shutting down the turbine blades in the event of excessive wind conditions, imbalance or malfunction of other turbine components. 	<ul style="list-style-type: none"> Regular maintenance and monitoring activities. Emergency procedures and protocols to be established.
Contaminated Lands – Disposal of wastes	Construction, Operation, and Decommissioning	<ul style="list-style-type: none"> Nuisance refuse dispersed to adjacent properties. Potential contamination to soil, groundwater and/ or surface water resources on or off the Project site. 	<ul style="list-style-type: none"> Proper disposal of waste materials. 	<p>The Contractor would implement a site-specific waste collection and disposal management plan which may include site practices such as:</p> <ul style="list-style-type: none"> systematic collection of waste and on-site storage in weather protected areas; all waste materials and recycling will be transported off site by private waste material collection contractors licensed with a Certificate of Approval – Waste Management System; contractors will be required to remove excess materials from the site (such as extra cable, scrap metals, pallets, etc.); appropriate handling and disposal of all wastes classes according to current provincial standards and guidelines; disposal of contaminated material (if encountered) to a registered waste facility according to current regulatory standards; labelling and proper storage of liquid wastes (e.g., used oil, drained hydraulic fluid, and used solvents) in a secure area that will ensure containment of the material in 	<ul style="list-style-type: none"> Monitoring by the Environmental Inspector to ensure compliance during construction and decommissioning phases. Routine staff waste management procedures and inspection during operational phases.

Affected Environmental Feature(s)	Project Phase	Potential Effects	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures
				the event of a spill; <ul style="list-style-type: none"> • any spill that does occur, which could potentially cause an adverse environmental effect, should be reported to the MOE's Spills Action Centre (SAC); • prohibition of dumping or burying wastes within the Project areas; • should contaminated soil be encountered during the course of excavations the contaminated material will be disposed of in accordance with the current appropriate provincial legislation, specifically Ontario Regulation 153/04; • disposal of non-hazardous waste at a registered facility; • disposal of sanitary wastes will be the responsibility of the contracted third party and they will ensure disposal in accordance with appropriate legislation, standards and policies; and, • implementation of an on-going waste management program consisting of reduction, reuse and recycling of material. 	

Project Description Report
February 2013

5.0 Conclusion


The Grand Bend Wind Farm can be constructed, operated, maintained, and decommissioned without causing significant adverse environmental effects. This will be achieved through proper implementation of the mitigation, monitoring, and contingency measures outlined in this report. Further details of these measures are outlined in the Natural Heritage Assessment Environmental Impact Study, Water Assessment and Water Body Report, and The 2012 Heritage Assessment of the Proposed Grand Bend Wind Farm issued under separate covers as part of the application for Renewable Energy Approval.

Burnside has prepared the Grand Bend Wind Farm Project Description Report for Northland in accordance with O.Reg. 359/09. This report has been prepared by Burnside for the sole benefit of Northland, and may not be re-produced by any third party without the express written consent of Northland.

Respectfully submitted,

Neegan Burnside Ltd.


Written by:

Signature  Date February 2013
Chris Shilton, P.Eng, LEED®AP
Project Engineer

Reviewed by:

Signature  Date February 2013
Lyle Parsons, BES
Project Manager

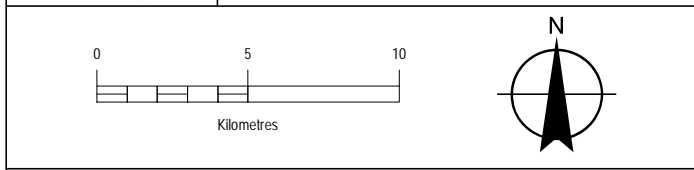
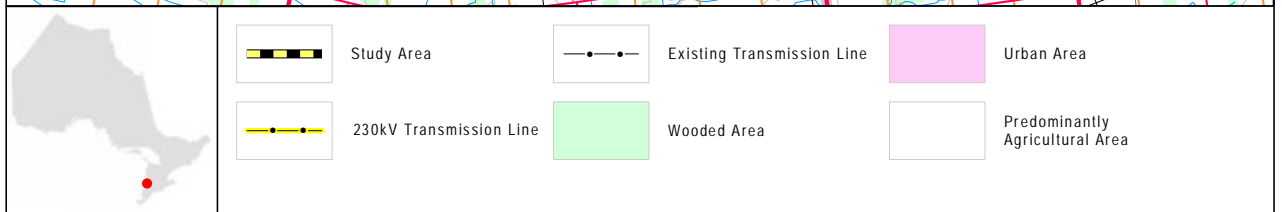
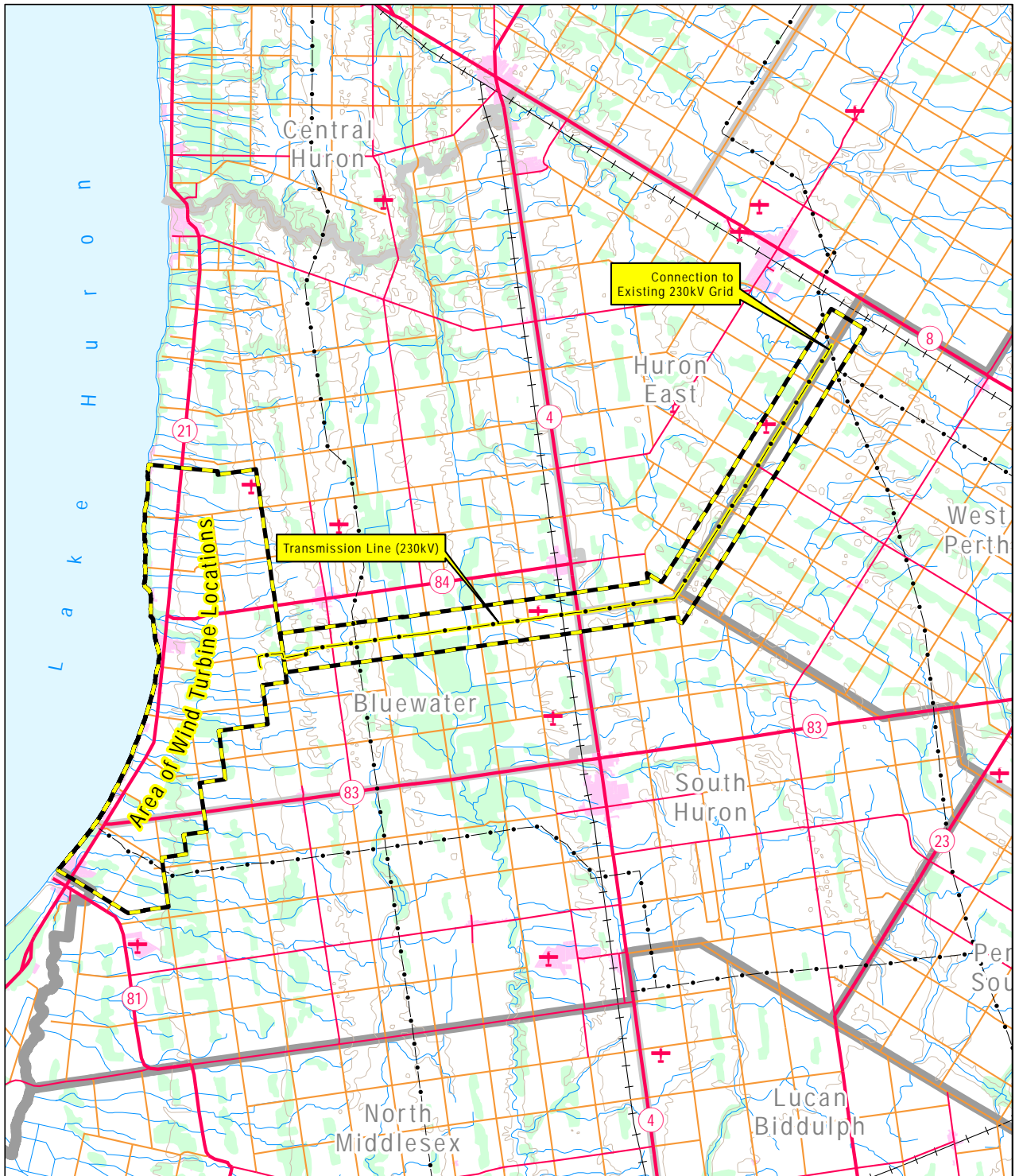
Approved by:

Signature  Date February 2013
Jim Mulvale, P.Eng.
Manager, Environmental, Health and Safety
Northland Power Inc.

Appendix A
Figures

THIS MAP IS DESIGNED FOR A 7" X 11" MAP POCKET

Cut Along Line
Cut Along Line
Cut Along Line



**Grand Bend Wind Farm
Project Description Report**

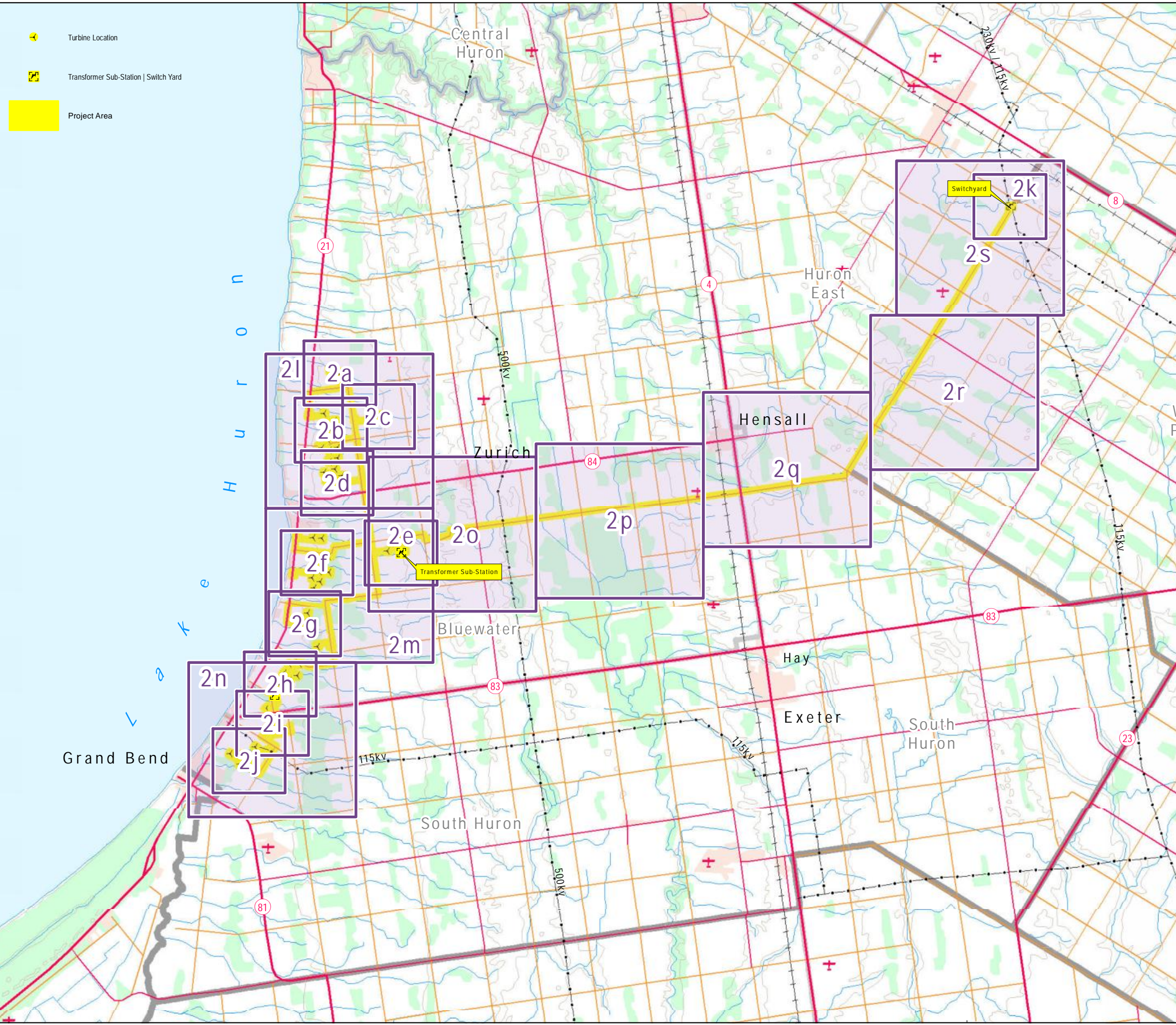
Project Study Area



Prepared	P. Stubbert	Checked	C. Shilton	Figure Number
Scale	1:250,000	Project	PIA019991	1

Figure 2 Key Map

Grand Bend Wind Farm
Project Description
Report



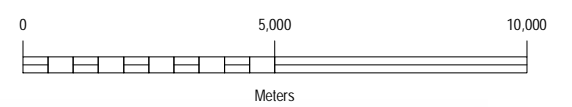
- Turbine Location
- Transformer Sub-Station | Switch Yard
- Project Area

DATA SOURCES:
1. Ministry of Natural Resources, © Queen's Printer for Ontario
2. Natural Resources Canada © Her Majesty the Queen in Right of Canada

Scale: 1:150,000
Date: 10 January 2013
Project Number: PIA019991

Prepared: P. Stubbert

Checked By: L. Parsons



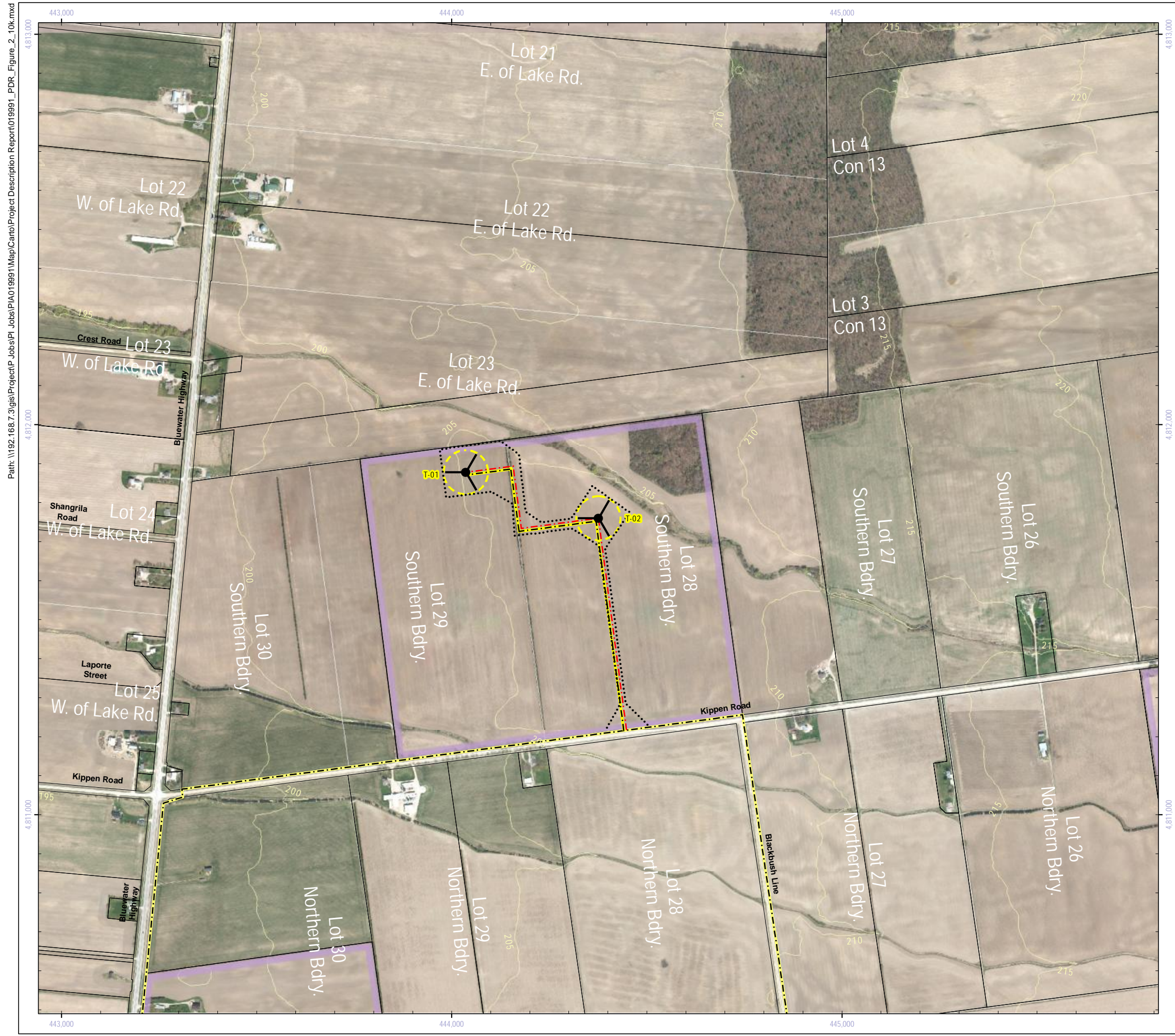
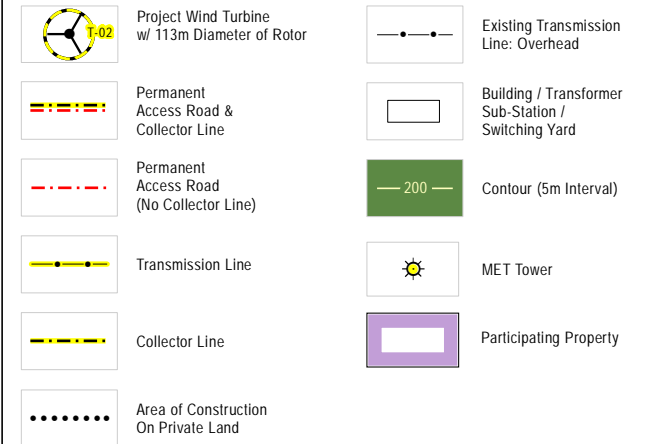


Figure 2a Project Location

Grand Bend Wind Farm Project Description Report

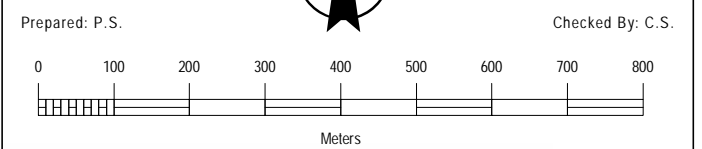
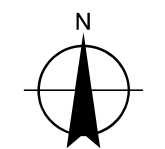


Siemens SWT-2.3-113 Turbine:
Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

- NOTES:
- Reference the Figure 1 Key Map for location in the overall project area.
 - For details see the Draft REA documents.

- DATA SOURCES:
- County of Huron (including Imagery: 2010)
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Scale: 1:10,000
Date: 21 January 2013
Project Number: PIA019991



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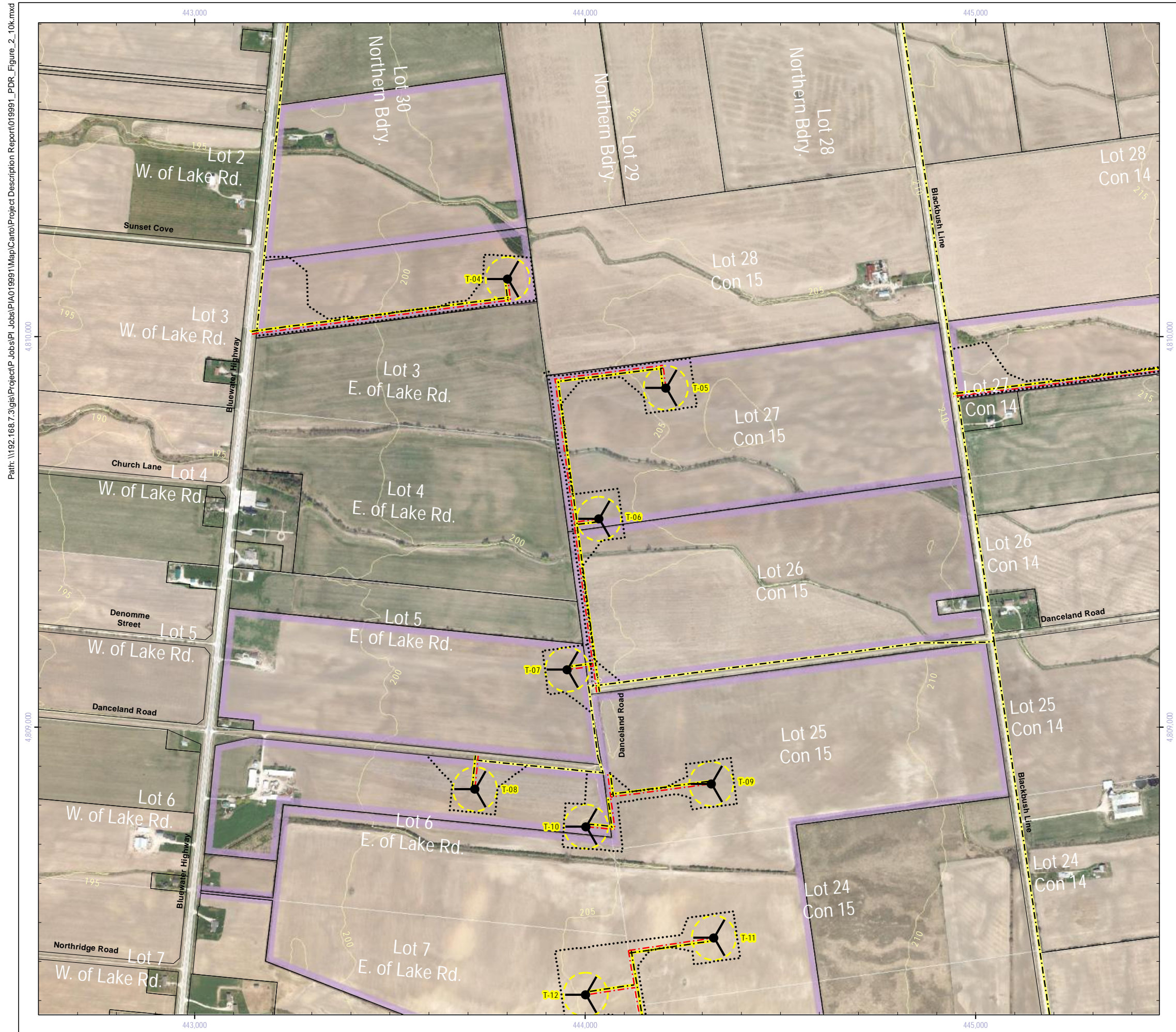


Figure 2b
Project Location
 Grand Bend Wind Farm
Project Description Report

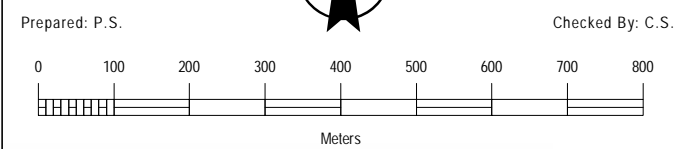
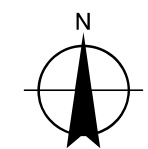
	Project Wind Turbine w/ 113m Diameter of Rotor		Existing Transmission Line: Overhead
	Permanent Access Road & Collector Line		Building / Transformer Sub-Station / Switching Yard
	Permanent Access Road (No Collector Line)		Contour (5m Interval)
	Transmission Line		MET Tower
	Collector Line		Participating Property
	Area of Construction On Private Land		

Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

- NOTES:
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Scale: 1:10,000
 Date: 21 January 2013
 Project Number: PIA019991



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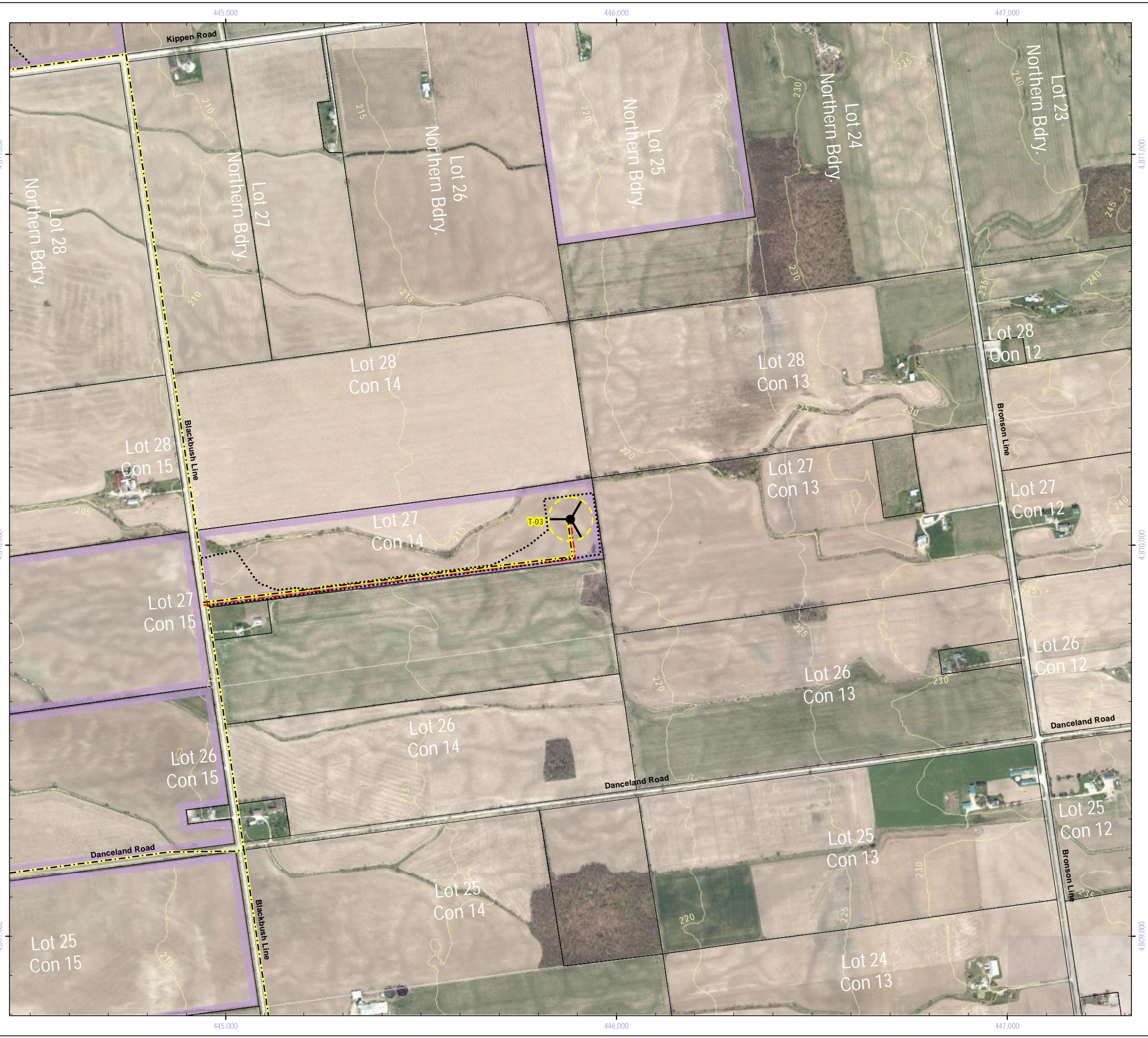


Figure 2c
Project Location
 Grand Bend Wind Farm
Project Description Report

	Project Wind Turbine w/ 113m Diameter of Rotor		Existing Transmission Line: Overhead
	Permanent Access Road & Collector Line		Building / Transformer Sub-Station / Switching Yard
	Permanent Access Road (No Collector Line)		Contour (5m Interval)
	Transmission Line		MET Tower
	Collector Line		Participating Property
	Area of Construction On Private Land		

Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

- NOTES:
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 - For details see the Draft REA documents.

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Scale: 1:10,000
 Date: 21 January 2013
 Project Number: PIA019991

Prepared: P.S. Checked By: C.S.

Meters

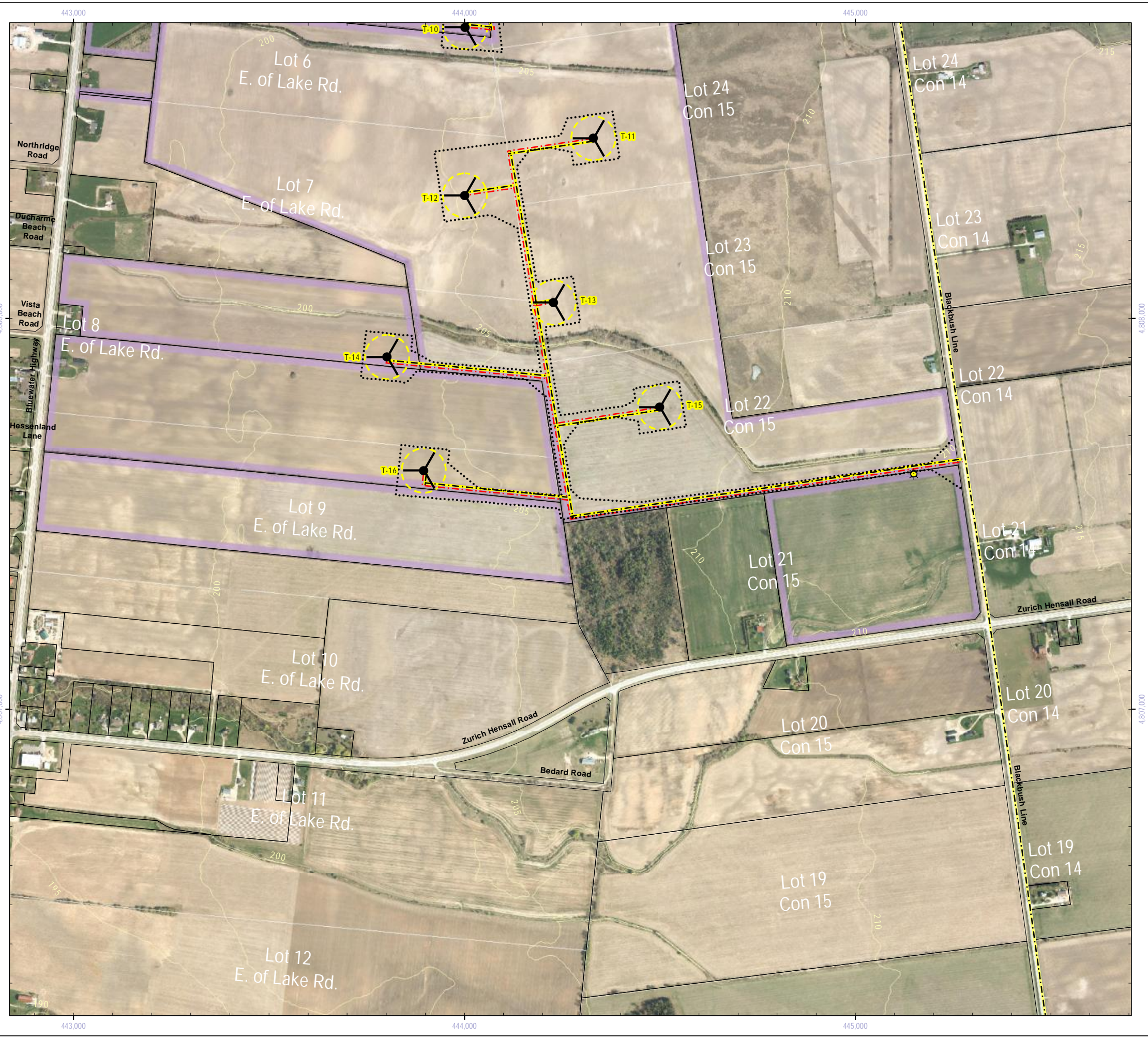


Figure 2d Project Location

Grand Bend Wind Farm Project Description Report

	Project Wind Turbine w/ 113m Diameter of Rotor		Existing Transmission Line: Overhead
	Permanent Access Road & Collector Line		Building / Transformer Sub-Station / Switching Yard
	Permanent Access Road (No Collector Line)		Contour (5m Interval)
	Transmission Line		MET Tower
	Collector Line		Participating Property
	Area of Construction On Private Land		

Siemens SWT-2.3-113 Turbine:
Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

NOTES:
1. Reference the Figure 1 Key Map for location in the overall project area.
2. For details see the Draft REA documents.

DATA SOURCES:
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Scale: 1:10,000
Date: 21 January 2013
Project Number: PIA019991

Prepared: P.S. Checked By: C.S.

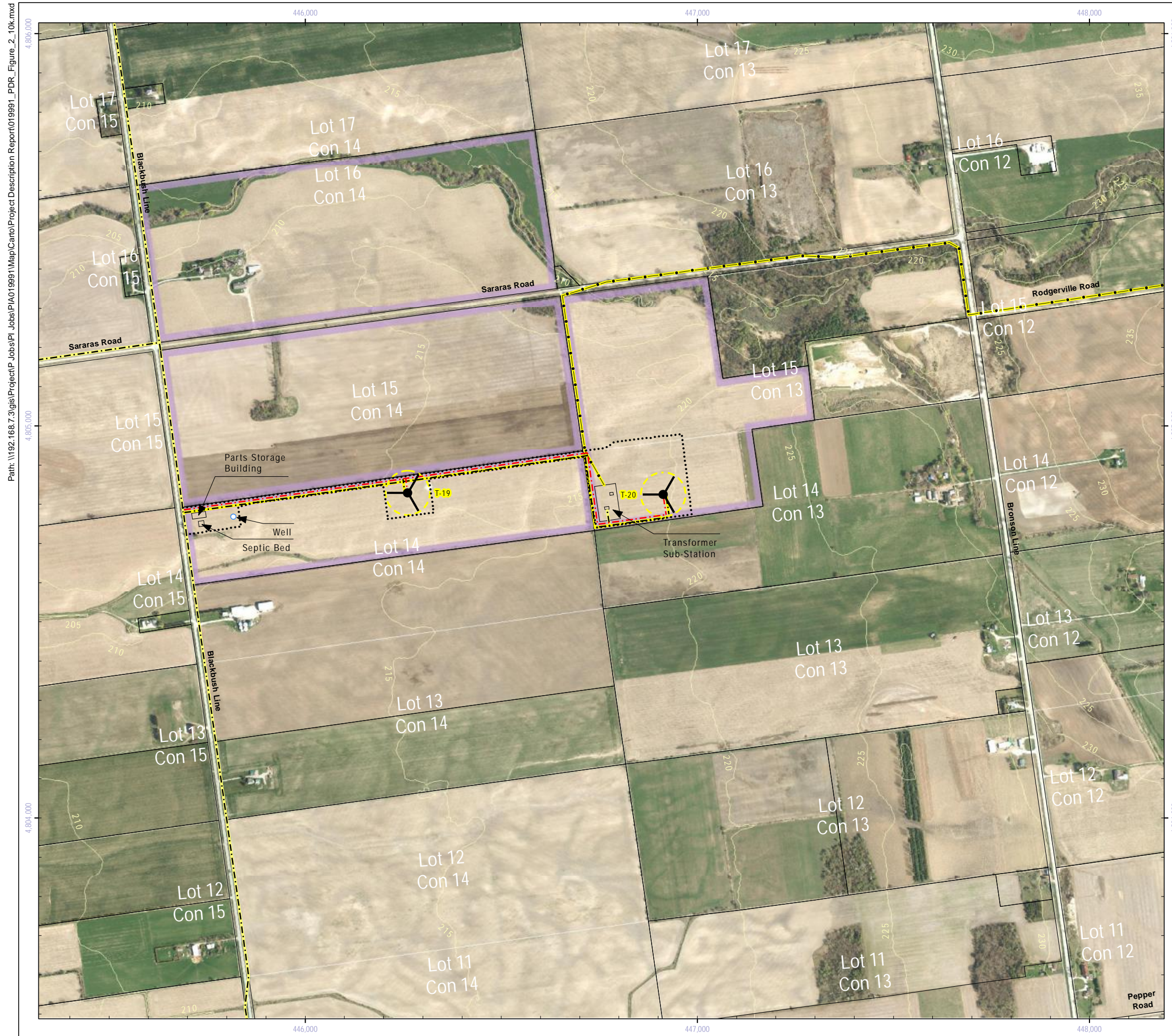


Figure 2e
Project Location
 Grand Bend Wind Farm
Project Description Report

	Project Wind Turbine w/ 113m Diameter of Rotor		Existing Transmission Line: Overhead
	Permanent Access Road & Collector Line		Building / Transformer Sub-Station / Switching Yard
	Permanent Access Road (No Collector Line)		Contour (5m Interval)
	Transmission Line		MET Tower
	Collector Line		Participating Property
	Area of Construction On Private Land		

Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

- NOTES:
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Scale: 1:10,000
 Date: 21 January 2013
 Project Number: PIA019991

Prepared: P.S. Checked By: C.S.

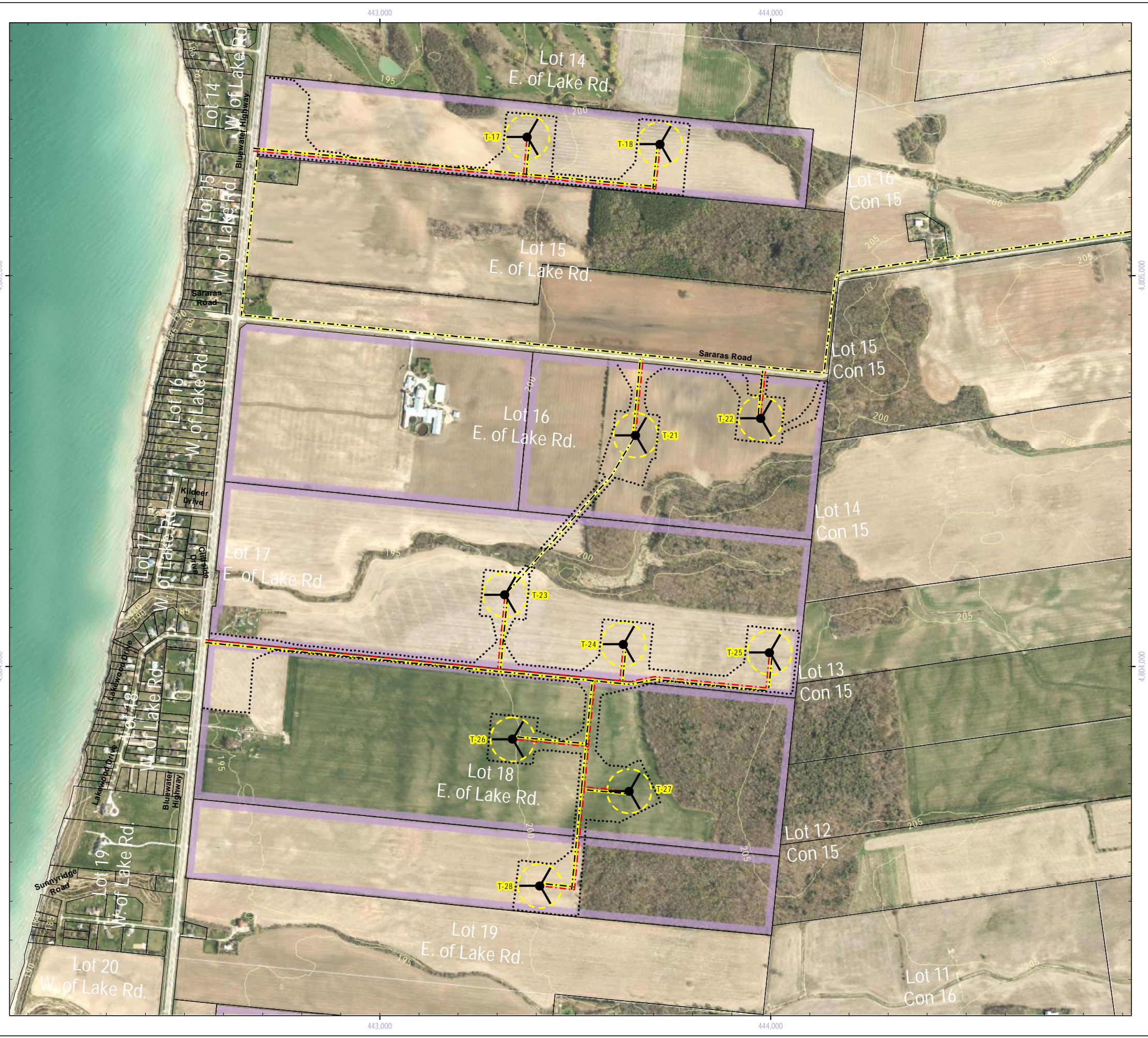


Figure 2f
Project Location
 Grand Bend Wind Farm
Project Description Report

	Project Wind Turbine w/ 113m Diameter of Rotor		Existing Transmission Line: Overhead
	Permanent Access Road & Collector Line		Building / Transformer Sub-Station / Switching Yard
	Permanent Access Road (No Collector Line)		Contour (5m Interval)
	Transmission Line		MET Tower
	Collector Line		Participating Property
	Area of Construction On Private Land		

Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

- NOTES:
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 Date: 21 January 2013
 Project Number: PIA019991

Prepared: P.S. Checked By: C.S.



Figure 2g
Project Location
 Grand Bend Wind Farm
Project Description Report

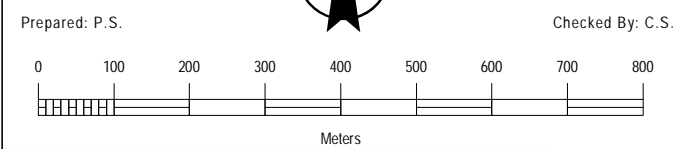
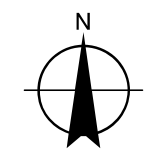
- | | | | |
|--|--|--|---|
| | Project Wind Turbine w/ 113m Diameter of Rotor | | Existing Transmission Line: Overhead |
| | Permanent Access Road & Collector Line | | Building / Transformer Sub-Station / Switching Yard |
| | Permanent Access Road (No Collector Line) | | Contour (5m Interval) |
| | Transmission Line | | MET Tower |
| | Collector Line | | Participating Property |
| | Area of Construction On Private Land | | |

Siemens SWT-2.3-113 Turbine:
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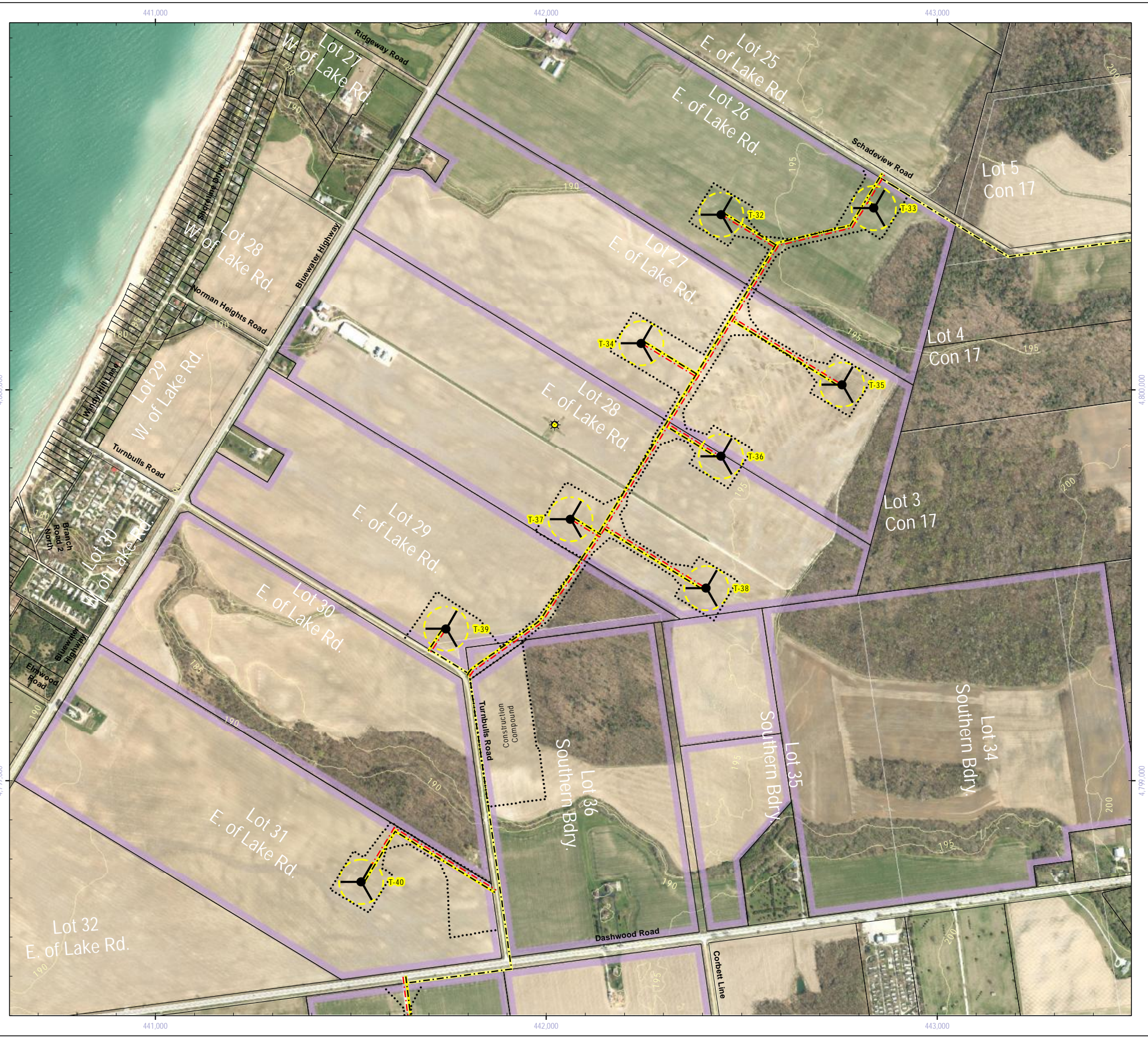


Figure 2h
Project Location
 Grand Bend Wind Farm
 Project Description Report

	Project Wind Turbine w/ 113m Diameter of Rotor		Existing Transmission Line: Overhead
	Permanent Access Road & Collector Line		Building / Transformer Sub-Station / Switching Yard
	Permanent Access Road (No Collector Line)		Contour (5m Interval)
	Transmission Line		MET Tower
	Collector Line		Participating Property
	Area of Construction On Private Land		

Siemens SWT-2.3-113 Turbine:
 Base Diameter 4.2m | Hub Height 99.5m | Blade Length 55m

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 2. For details see the Draft REA documents.

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 Date: 21 January 2013
 Project Number: PIA019991

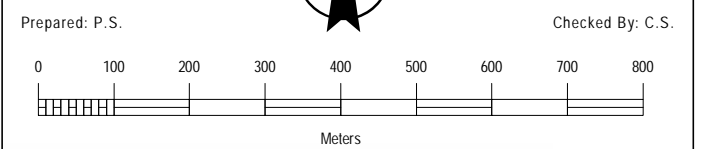
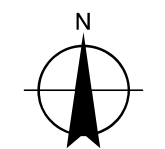




Figure 2i
Project Location
 Grand Bend Wind Farm
Project Description Report

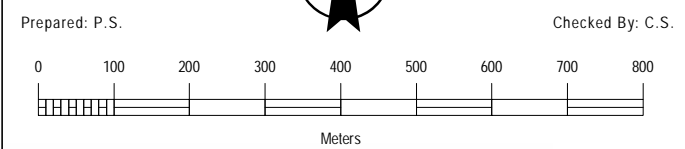
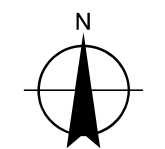
	Project Wind Turbine w/ 113m Diameter of Rotor		Existing Transmission Line: Overhead
	Permanent Access Road & Collector Line		Building / Transformer Sub-Station / Switching Yard
	Permanent Access Road (No Collector Line)		Contour (5m Interval)
	Transmission Line		MET Tower
	Collector Line		Participating Property
	Area of Construction On Private Land		

Siemens SWT-2.3-113 Turbine:
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 Project Number: PIA019991



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Figure 2j
Project Location
 Grand Bend Wind Farm
Project Description Report

	Project Wind Turbine w/ 113m Diameter of Rotor		Existing Transmission Line: Overhead
	Permanent Access Road & Collector Line		Building / Transformer Sub-Station / Switching Yard
	Permanent Access Road (No Collector Line)		Contour (5m Interval)
	Transmission Line		MET Tower
	Collector Line		Participating Property
	Area of Construction On Private Land		

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 - For details see the Draft REA documents.

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 Date: 21 January 2013
 Project Number: PIA019991

Prepared: P.S. Checked By: C.S.



Figure 2k
Project Location
 Grand Bend Wind Farm
Project Description Report

	Project Wind Turbine w/ 113m Diameter of Rotor		Existing Transmission Line: Overhead
	Permanent Access Road & Collector Line		Building / Transformer Sub-Station / Switching Yard
	Permanent Access Road (No Collector Line)		Contour (5m Interval)
	Transmission Line		MET Tower
	Collector Line		Participating Property
	Area of Construction On Private Land		

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 Date: 21 January 2013
 Project Number: PIA019991

Prepared: P.S. Checked By: C.S.

Meters



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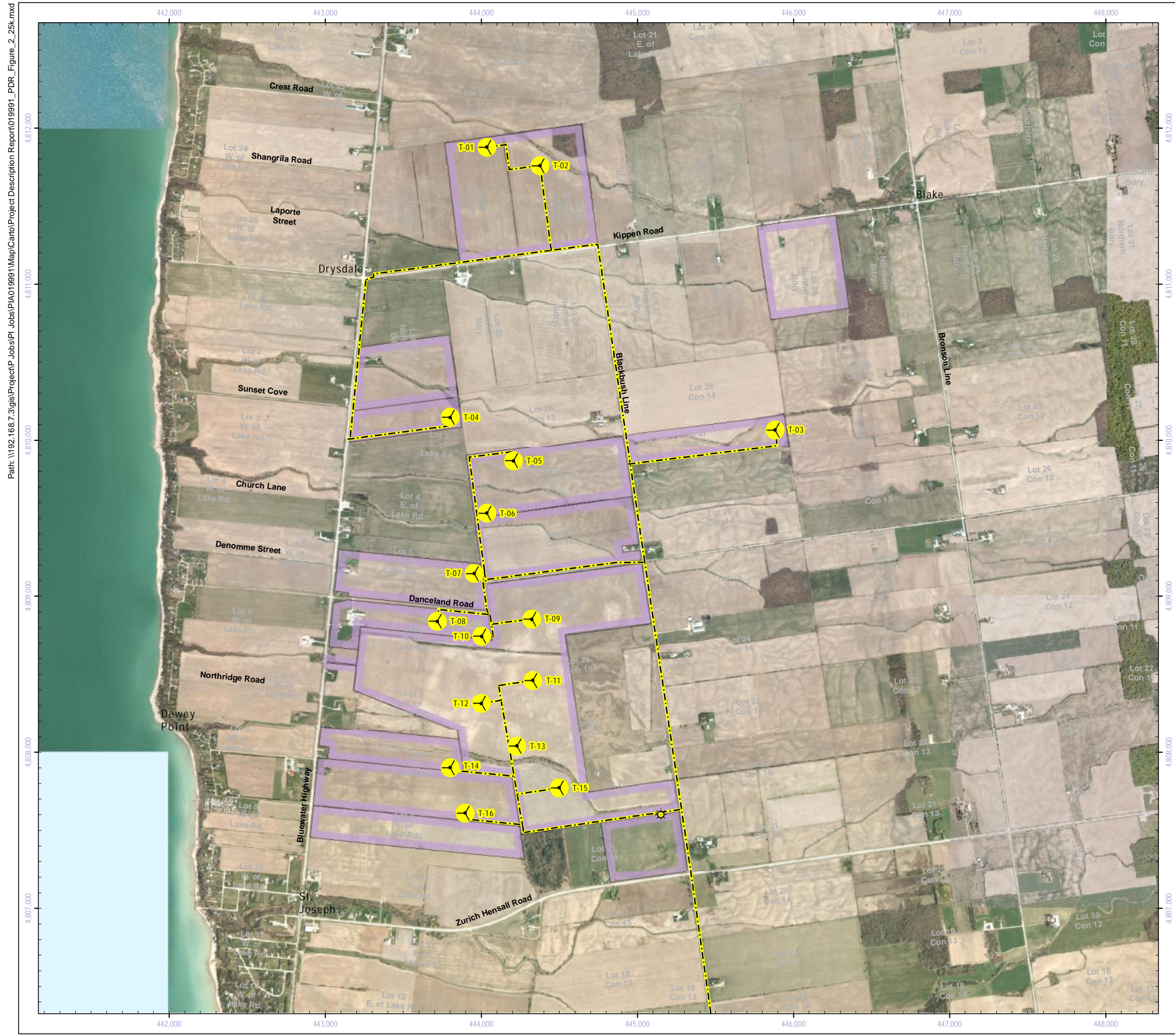









Figure 21
Project Layout
 Grand Bend Wind Farm
Project Description Report

-  Project Wind Turbine
-  Transformer Sub-Station or Switchyard
-  MET Tower
-  Transmission Line
-  Collector Line
-  Existing Transmission Line: Overhead
-  Participating Property

NOTES:

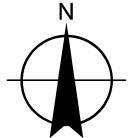
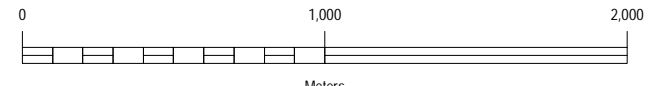
1. Reference the Figure 1 Key Map for location in the overall project area.
2. For details see the Draft REA documents.

DATA SOURCES:

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Scale: 1:25,000
 Date: 17 January 2013
 Project Number: PIA019991

Prepared: P. Stubbert Checked By: C. Shilton











Meters

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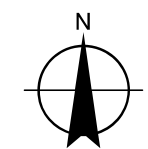
Figure 2m
Project Layout
 Grand Bend Wind Farm
Project Description Report

-  Project Wind Turbine
-  Transformer Sub-Station or Switchyard
-  MET Tower
-  Transmission Line
-  Collector Line
-  Existing Transmission Line: Overhead
-  Participating Property

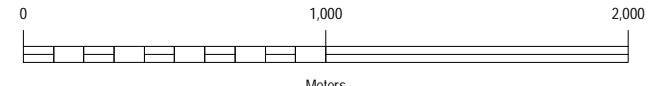
NOTES:
 1. Reference the Figure 1 Key Map for location in the overall project area.
 2. For details see the Draft REA documents.

DATA SOURCES:
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Scale: 1:25,000
 Date: 17 January 2013
 Project Number: PIA019991



Prepared: P. Stubbert Checked By: C. Shilton



Meters



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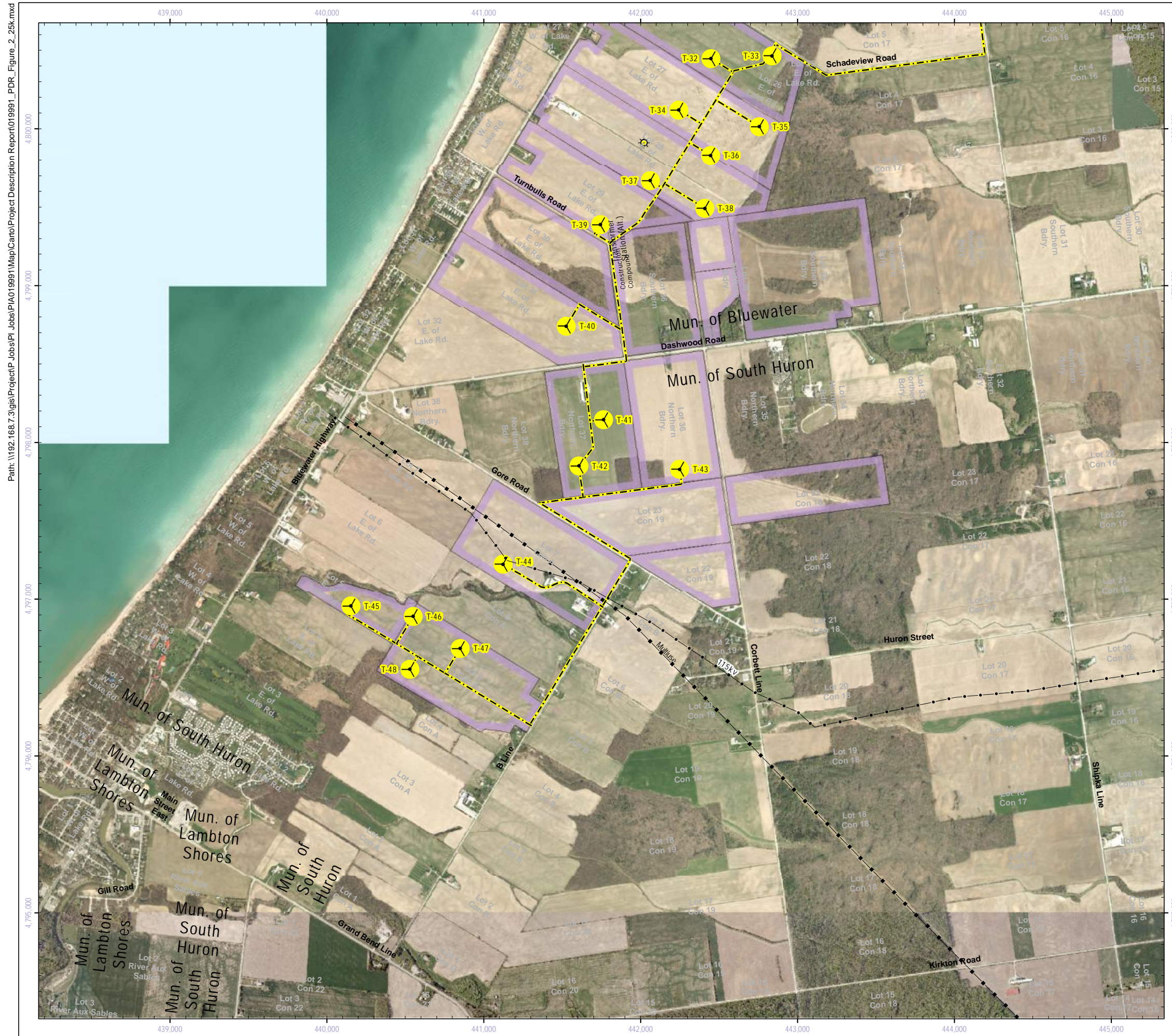









Figure 2n
Project Layout
 Grand Bend Wind Farm
Project Description Report

-  Project Wind Turbine
-  Transformer Sub-Station or Switchyard
-  MET Tower
-  Transmission Line
-  Collector Line
-  Existing Transmission Line: Overhead
-  Participating Property

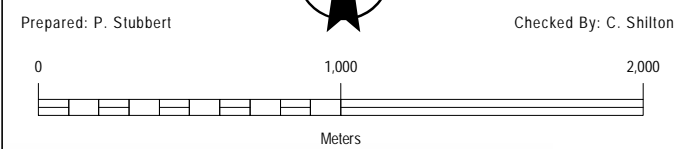
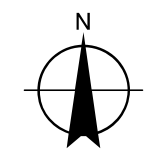
NOTES:

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- For details see the Draft REA documents.

DATA SOURCES:

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 Project Number: PIA019991



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Figure 20
Project Layout
 Grand Bend Wind Farm
Project Description Report

-  Project Wind Turbine
-  Transformer Sub-Station or Switchyard
-  MET Tower
-  Transmission Line
-  Collector Line
-  Existing Transmission Line: Overhead
-  Participating Property

NOTES:

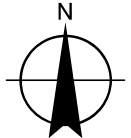
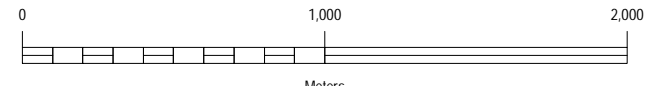
- Reference the Figure 1 Key Map for location in the overall project area.
- For details see the Draft REA documents.

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Scale: 1:25,000
 Date: 17 January 2013
 Project Number: PIA019991

Prepared: P. Stubbert Checked By: C. Shilton











Meters

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Figure 2p
Project Layout
 Grand Bend Wind Farm
Project Description Report

-  Project Wind Turbine
-  Transformer Sub-Station or Switchyard
-  MET Tower
-  Transmission Line
-  Collector Line
-  Existing Transmission Line: Overhead
-  Participating Property

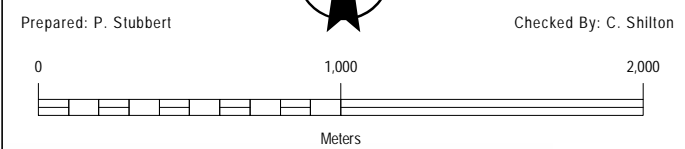
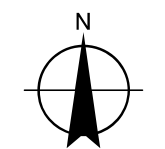
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

Scale: 1:25,000
 Date: 17 January 2013
 Project Number: PIA019991



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Figure 2q
Project Layout
 Grand Bend Wind Farm
Project Description Report

-  Project Wind Turbine
-  Transformer Sub-Station or Switchyard
-  MET Tower
-  Transmission Line
-  Collector Line
-  Existing Transmission Line: Overhead
-  Participating Property

NOTES:

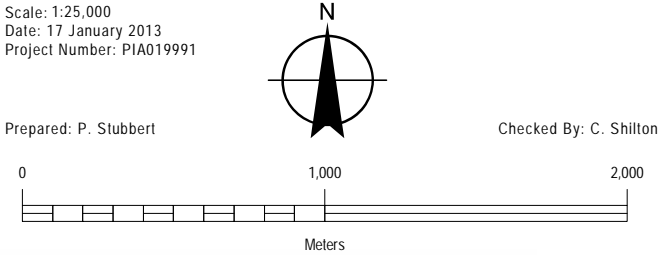
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Scale: 1:25,000
 Date: 17 January 2013
 Project Number: PIA019991

Prepared: P. Stubbert
 Checked By: C. Shilton



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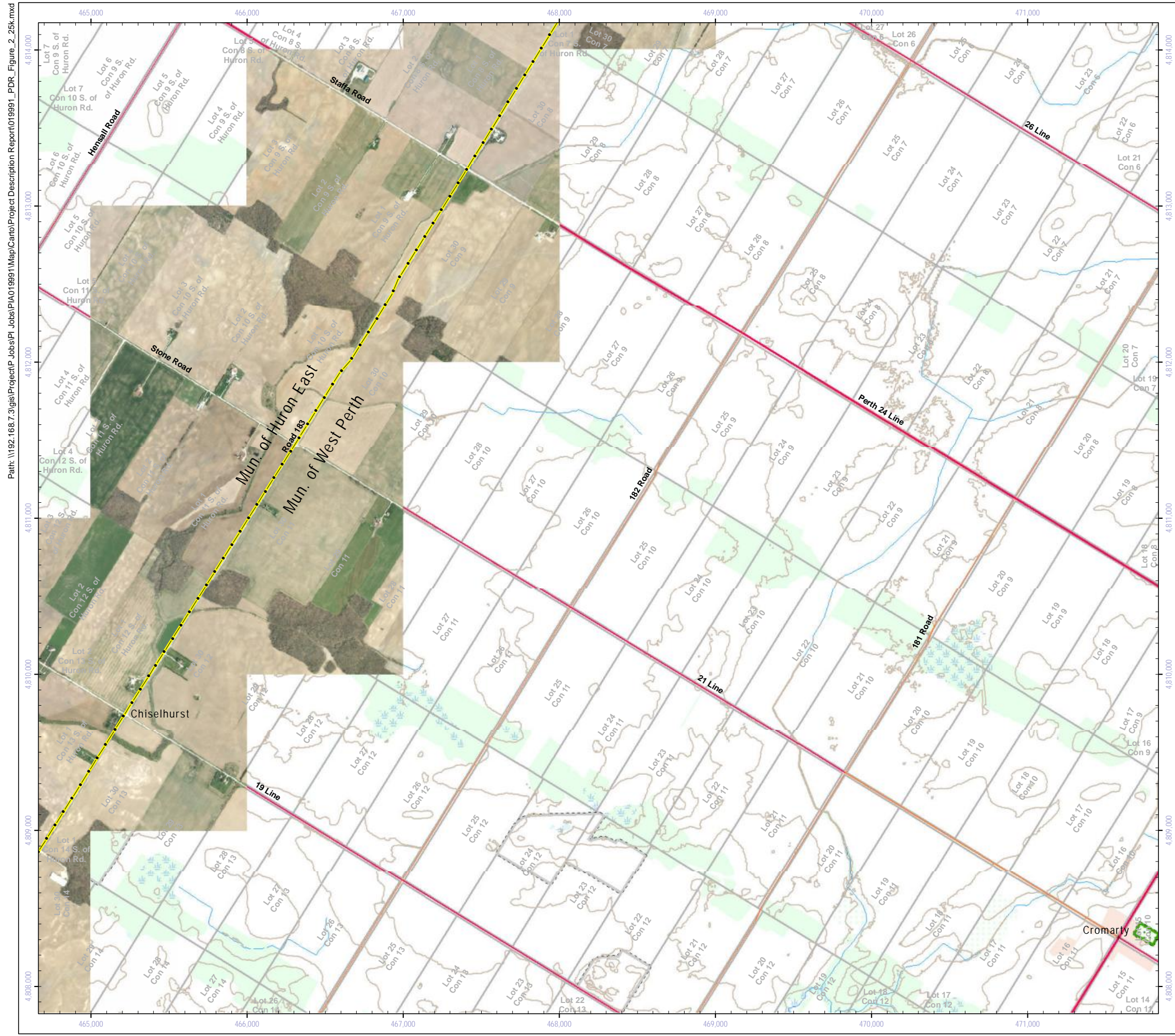









Figure 2r
Project Layout
 Grand Bend Wind Farm
Project Description Report

-  Project Wind Turbine
-  Transformer Sub-Station or Switchyard
-  MET Tower
-  Transmission Line
-  Collector Line
-  Existing Transmission Line: Overhead
-  Participating Property

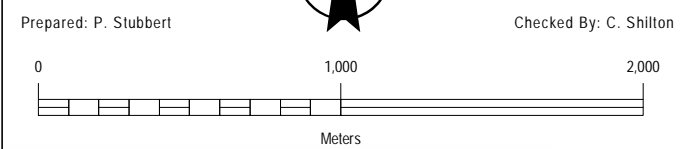
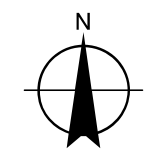
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Figure 2s Project Layout

Grand Bend Wind Farm Project Description Report

-  Project Wind Turbine
-  Transformer Sub-Station or Switchyard
-  MET Tower
-  Transmission Line
-  Collector Line
-  Existing Transmission Line: Overhead
-  Participating Property

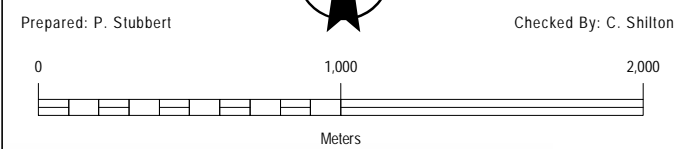
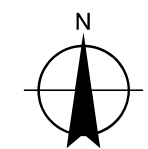
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NEEGANBURNSIDE

Appendix B
Turbine Specifications



SIEMENS



SWT - 2.3 - 113

Turning moderate wind into maximum results

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 m²
- 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

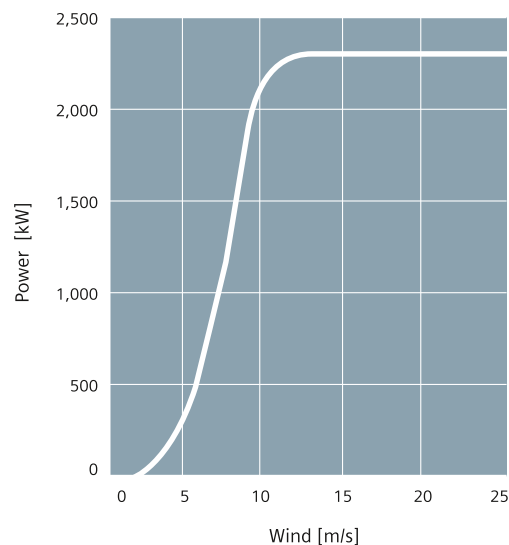
Aerodynamic brake

- 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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7330 Brande, Denmark
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Phone: +49 180 524 70 00
Fax: +49 180 524 24 71
(Charges depending on provider)
E-mail: support.energy@siemens.com

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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.

Appendix C
Turbine Coordinates

Project Description Report
February 2013

Table C1 Proposed Grand Bend Wind Farm Turbine Locations

Turbine Number	Easting	Northing
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	444001	4808315
T-13	444228	4808041
T-14	443802	4807902
T-15	444500	4807773
T-16	443896	4807611
T-17	443376	4805355
T-18	443717	4805337
T-19	446261	4804829
T-20	446913	4804825
T-21	443654	4804592
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	443540	4801110
T-32	442448	4800448
T-33	442838	4800465
T-34	442243	4800119
T-35	442757	4800013
T-36	442447	4799830
T-37	442062	4799669

Project Description Report
February 2013

Turbine Number	Easting	Northing
T-38	442409	4799492
T-39	441744	4799389
T-40	441527	4798742
T-41	441764	4798145
T-42	441607	4797850
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

Project Description Report
February 2013

Table D1 Legal Description of Participating Properties

Component	Legal Description
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

Project Description Report
February 2013

Component	Legal Description
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
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
Construction Compound	CON S BDY PT LOT 35 PT LOT;36 PT RD ALLOWANCE BETWEEN;LOT 35 & LOT 36
Switchyard	CON 3 HRS LOT 1 PT LOT 2

