Grand Bend Wind Farm

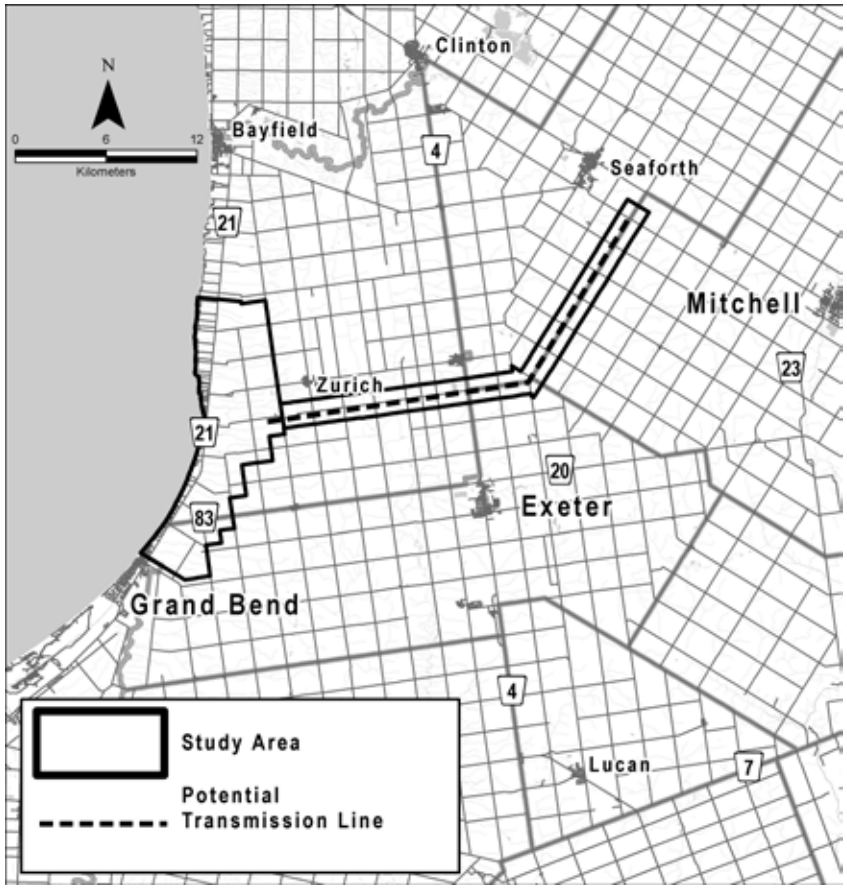
Public Information Centre #2

Fall 2012

NORTHLAND POWER

MEEGAN BURNSIDE

Welcome



Please…..

- Sign In.
- Ask us any questions you may have about the project or the results / scope of study.
- There is an opportunity at any time during the REA process for interested persons to provide comments.
- Complete a comment sheet and place it in the box or mail back to the address shown on the form by December 21, 2012.
- Note: boards, comment sheets and all supporting documentation are available on the Project website http://grandbend.northlandpower.ca

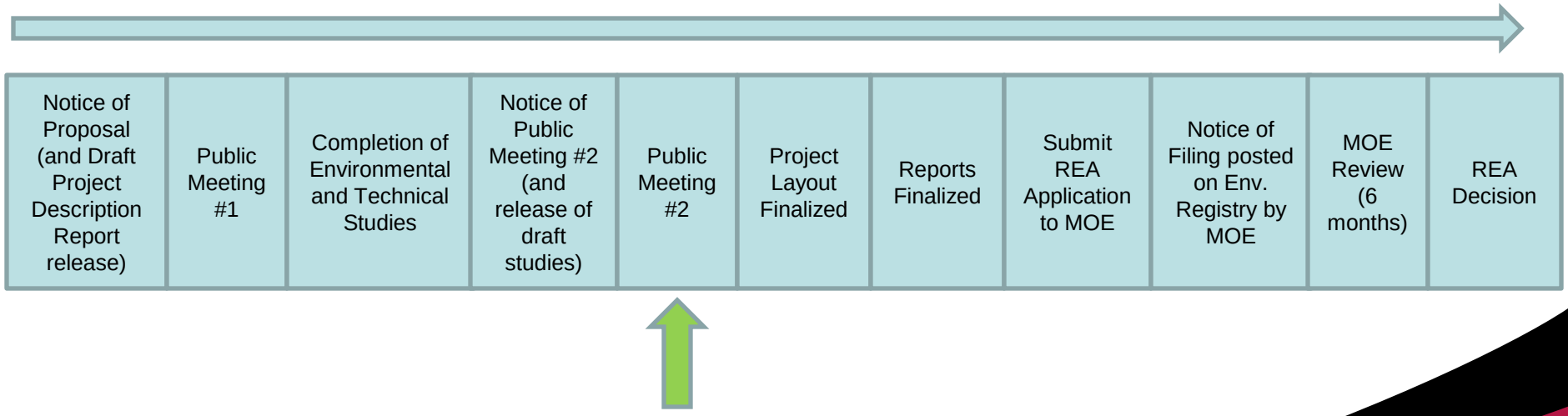
Purpose of Today's Meeting

- To present the proposed turbine locations and collector / transmission line routing for the Project
- To present findings of the base line studies and discuss the Draft REA Reports
- To present the Proposed Environmental Impacts and Preliminary Mitigation Measures
- Identify Next Steps in the process
- Listen to your questions and comments
- Collect and consider your feedback

Representatives from Northland Power and their independent consultants are available to answer your questions and take your comments

Renewable Energy Approvals (REA) An Overview

The Project is subject to the REA process, subject to the provisions of the Environmental Protection Act and Ontario Regulation 359/09. The REA process entails consideration of environmental aspects, natural heritage features and water bodies as well as heritage and archaeological resources. In addition, the REA process includes, public, agency and First Nation consultations. Throughout the REA process, Northland Power will do everything in its power to ensure that negative environmental impacts are reduced and/or eliminated.



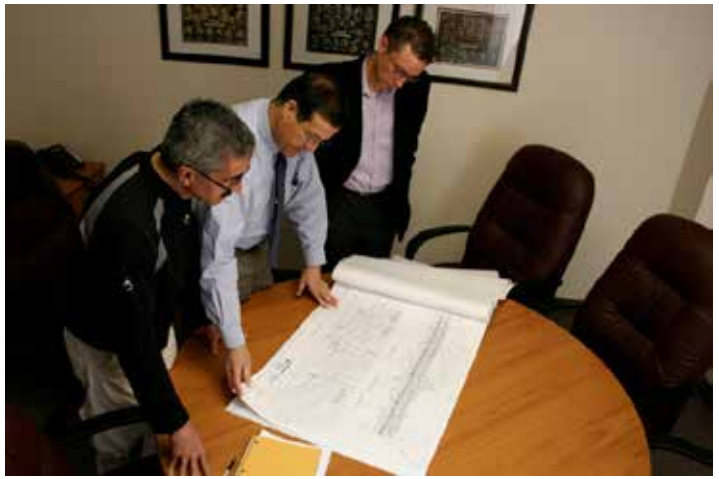
Contact Information

- If you have any questions or concerns regarding the proposed project, Please feel free to contact:

Jim Mulvale
Northland Power Inc.
30 St. Clair Avenue West, 17th Floor
Toronto, Ontario M4V 3A1
647-288-1272

Lyle Parsons, B.E.S.
Neegan Burnside Ltd.
292 Speedvale Ave. West, Unit 20
Guelph ON N1H 1C4
519-823-4992

Fiona Christiansen, M.Sc
Stantec Consulting Ltd.
70 Southgate Drive, Suite 1
Guelph ON N1G 4P5
519-836-6050



Project Specific E-mail Address and Free Phone Telephone Hotline:

grandbendwind@neeganburnside.com

1-800-696-8093

General Project and Site Information

Grand Bend Wind Limited Partnership
Wholly Owned Subsidiary
of Northland Power Inc

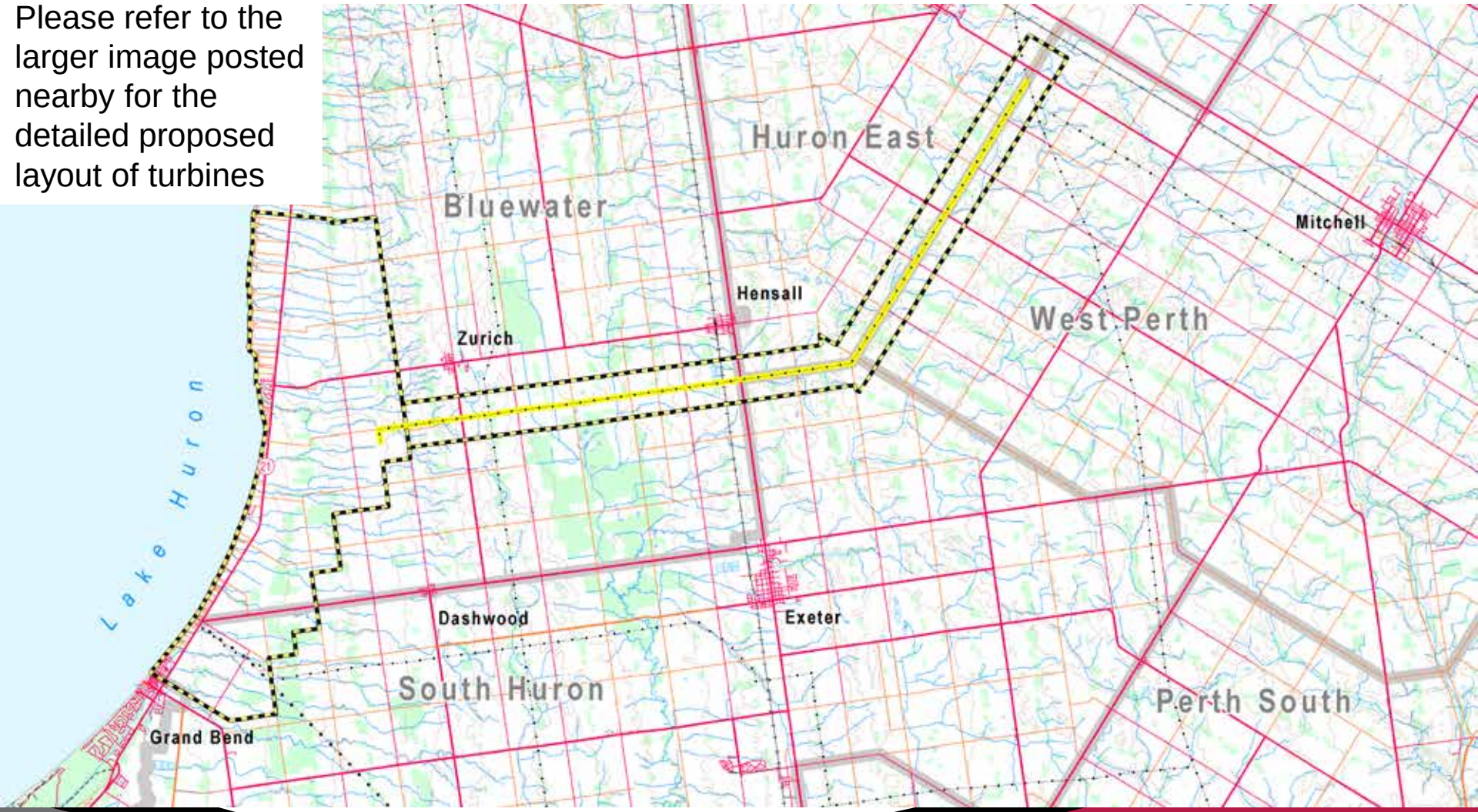
- Since its inception in 1987, Northland Power has developed facilities generating a total of approximately 1,004 MW of electricity.
- Sustainability is a core value at Northland Power:
  - Ø **Health and Safety** – Northland's first priority is to ensure their people have the knowledge, tools and time to work safely.
  - Ø **Financial** – Northland only pursues projects that meet strict return thresholds and have creditworthy customers. Thus they have only paid stable monthly dividends since 1997.
  - Ø **Operational** – Northland maintain and reinvest constantly in their operating assets for maximum efficiency and economic life.
  - Ø **Environmental** – Northland Power was founded on the belief that clean and green energy is vital to the future of our planet. Construction and operational practices are engineered to meet the highest environmental standards, even in jurisdictions where lower standards are legislated.
  - Ø **Community** – Northland invests continuously in its host communities to ensure they remain vibrant, healthy places to live.

Project Overview

- The Grand Bend Wind Limited Partnership is proposing to develop a 100 MW wind facility north of Grand Bend, Ontario.
- The Project will include up to 48 turbines, turbine access roads, an underground electrical collection system, new transmission lines within municipal road right of ways and connection to the provincial power grid.
- All turbines are located to the east of Highway 21. The closest turbine is 650 m from the Highway. The majority of the turbines are over 1,000 m from the Highway. All turbines are over 550 m from any noise receptor.
- The Project is located on private land within the County of Huron, spanning the lower-tier Municipalities of Bluewater and South Huron. Portions of the transmission line traverse the municipality of Huron East and municipality of West Pert in Perth County

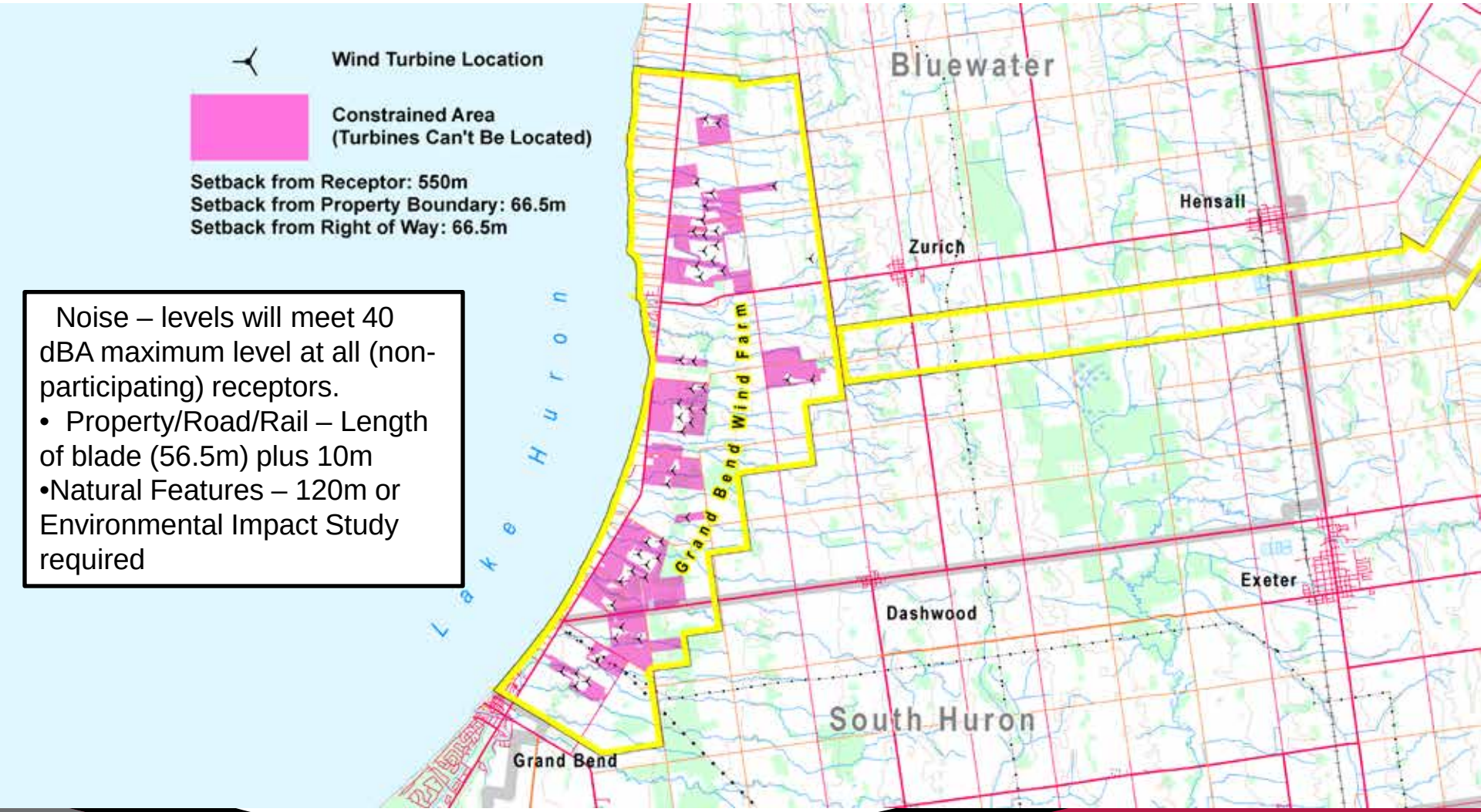
Project Study Area

Please refer to the larger image posted nearby for the detailed proposed layout of turbines



Note: All turbine layouts comply with regulated setbacks

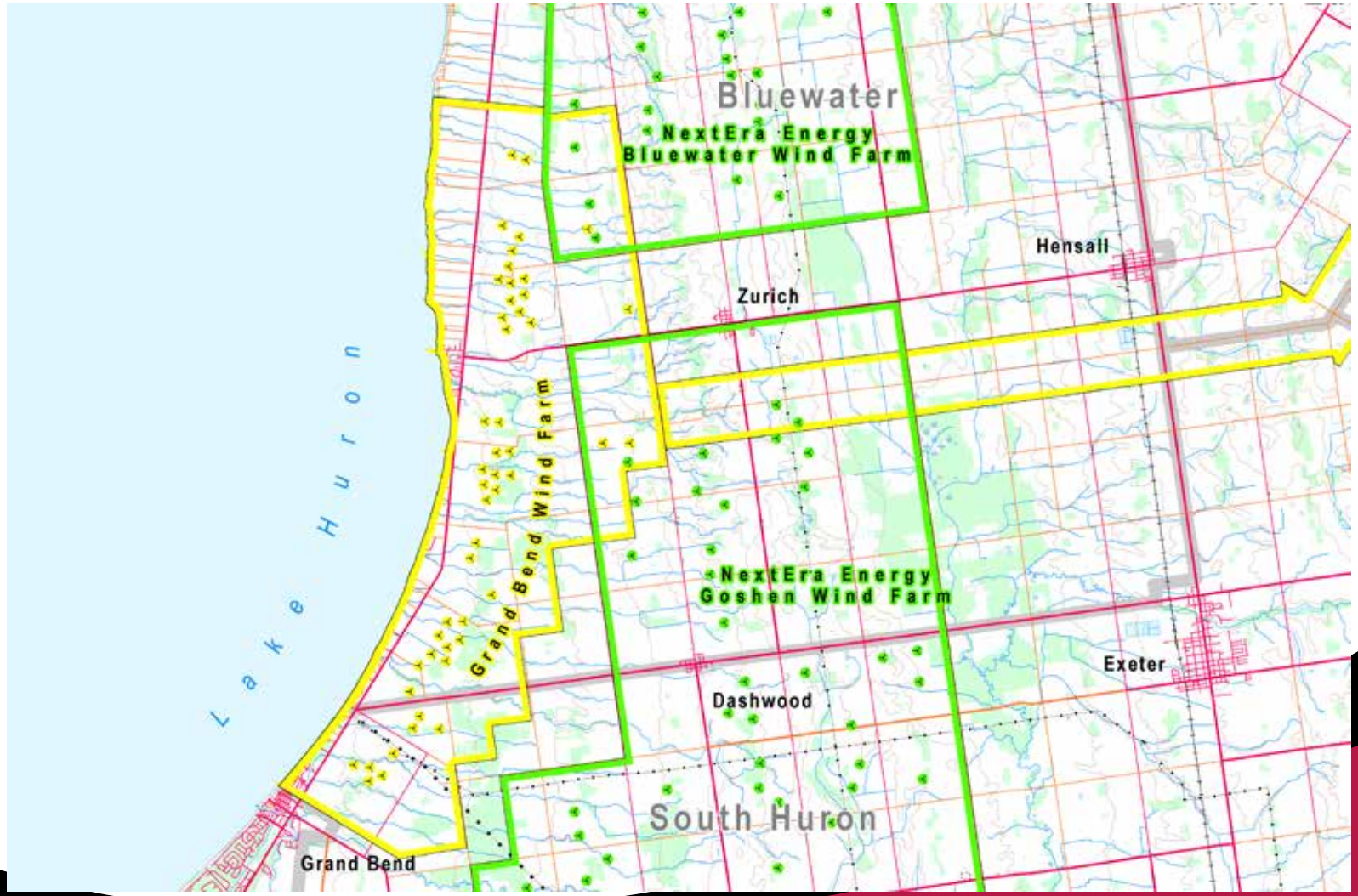
Regulated Setbacks



Noise – levels will meet 40 dBA maximum level at all (non-participating) receptors.

- Property/Road/Rail – Length of blade (56.5m) plus 10m
- Natural Features – 120m or Environmental Impact Study required

Other Projects in Immediate Vicinity



Draft REA Reports

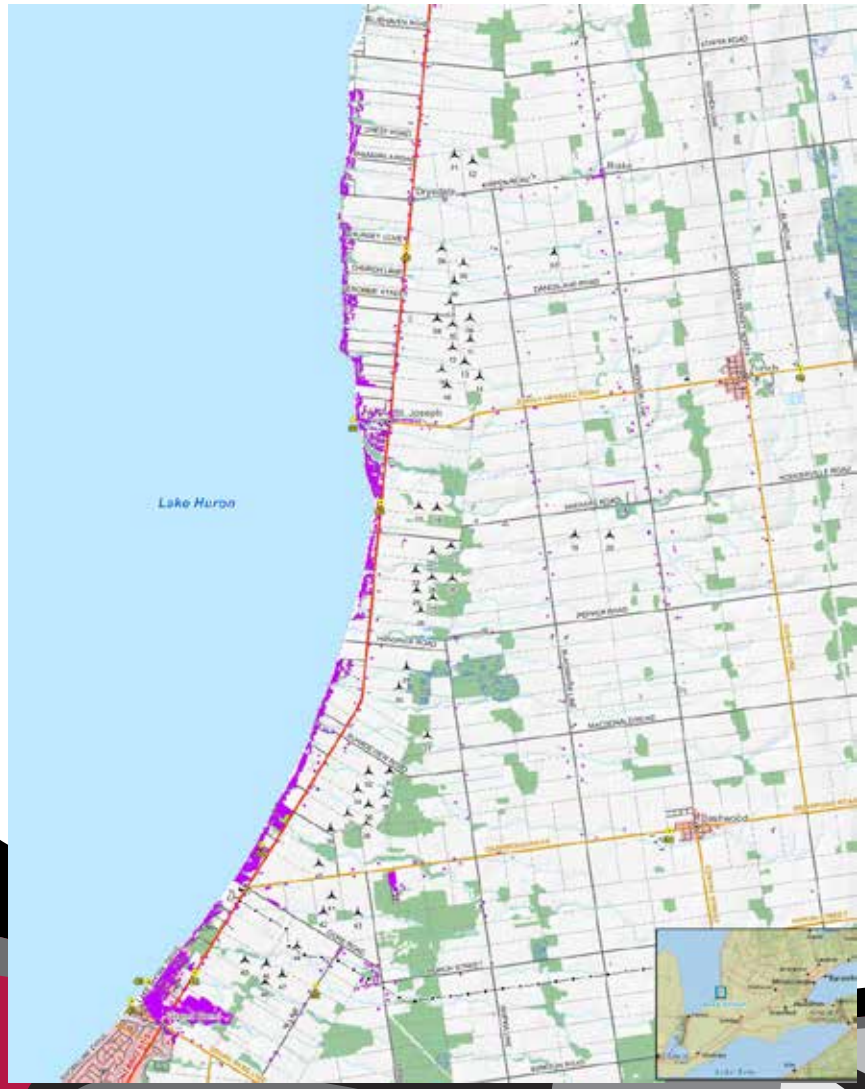
The following reports are available for review at this meeting and online (http://grandbend.northlandpower.ca), as well as local municipal and county offices.

- Draft Water Assessment and Water Body Report
- Draft Site Investigation Report
- Draft Records Review Report
- Draft Project Description Report
- Draft Evaluation of Significance Report
- Draft Environmental Impact Study Report
- Environmental Effects Monitoring Report
- Draft Wind Turbine Specification Report
- Draft Telecom Impact Study Report
- Draft Noise Assessment Report
- Draft Design and Operations Report
- Draft Decommissioning Plan Report
- Cultural Heritage Assessment Report
- Draft Construction Plan Report
- Archeological Assessment Report
- Project Update Report

Project Schedule

Project Activity	Anticipated Schedule
Issue First Draft Project Description Report	Completed January 2012 ✓
REA Technical Studies	Completed 2012 Additional Studies to be completed prior to construction. ✓
Public Information Centre #1	Completed Spring 2012 ✓
Issue Draft REA Reports to the Public	September 2012 ✓
Public Information Centre #2	Fall 2012 ✓
REA Submission/Approval	January 2013
Additional Permitting and Approvals Completed	Ongoing 2012 through 2013
Start of Construction	Fall 2013
Commercial Operation Date (“COD”)	Fall 2014
Project Operation	2014- 2035
New Contract or Decommissioning	Approximately 20 years after COD

Noise and Visual Considerations



Your Questions…

How loud is a wind turbine, and how does varying wind speed effect its sound?

How tall are the wind turbines and how far away can they be seen?

Will the turbines affect local tourism?

Will the turbines be equipped with blinking lights operating at all times?

What is shadow flicker and how does it occur?

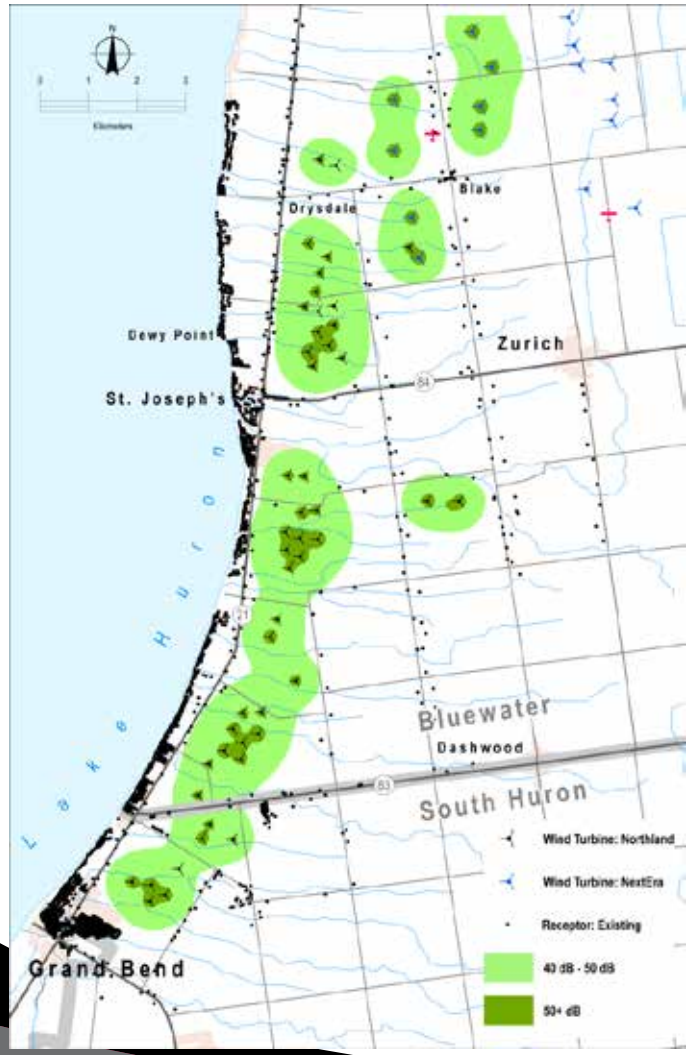
Sound and Visual Assessment: Our Reply…

Source: URS Corporation, 2008

Wind Turbine Noise Characteristics

- Emission: the PWL (sound power level) produced by the wind turbine (100-105 dBA).
- Immission: the sound pressure level heard by a noise receptor (less than 40 dBA).
- You can stand directly beneath an operating turbine and carry on a conversation without raising your voice.
- As wind speeds increase:
  - the turbine emission will increase, but only up to its maximum sound power level (PWL) rating (100 – 105 dBA).
  - the ambient (background) noise levels at the receptor may increase due wind effects, which may mask and effectively lessen the perceived sound of the turbines.
  - at all wind speeds, the immission level at all non-participating noise receptors will not exceed 40 dBA.

Sound and Visual Assessment: Our Reply…



Grand Bend Wind Farm Noise Model

- 46 Siemens 2.3MW SWT2.3 turbine locations modeled with sound power levels (PWLs) between 100-105 dBA.
- Noise contributions from two alternate turbine locations (T-10, T-44) have also been considered and evaluated, in the event these locations are used.
- These 46 turbine locations and PWLs meet noise limits (maximum 40 dBA, the hourly background sound level established in accordance with the requirements of MOE NPC-232/ 233) at all non-participating receptors.
- The noise model includes noise emitted from the transformer substation, and the turbines from NextEra's Bluewater Wind Energy Centre.

Visual Assessment: Our Reply…

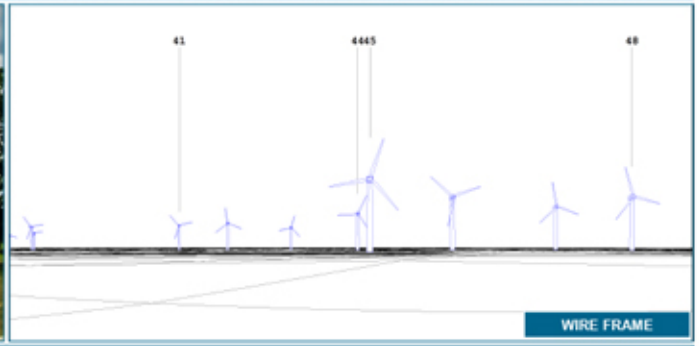
Wind Turbine Visual Characteristics

- The Grand Bend Wind Farm turbines have the following height profile:
  - 99.5m hub height (measured from the ground to the centre of the rotor)
  - 113m rotor diameter (the hub is at the centre of the rotor).
  - Therefore the total height from the ground to the blade tip when a blade is aligned vertically is 156m.
- While the extent to which the turbines can be seen depends on the location of the observer, the topography, and presence of visual obstacles, visual simulations are available.

Other Visual Considerations

- The turbines are required to have lighting in accordance with Transport Canada requirements for air traffic safety.
  - Subject to NavCan / Transport Canada approval Northland will install a radar system that will control the obstruction lighting, such that the lights will only be on when a plane is detected. Based on the data available, it is estimated that the lighting will be on less than 10% of night time hours.
- Turbine “shadow flicker” occurs during certain times of the day and year when the turbine blades are located between the sun and a receptor.
  - Complaints after construction will be addressed on an individual basis.
- All turbines are located east of Bluewater Highway (#21) and should not negatively affect local tourism.
- Visual simulations have been provided in the Draft Design and Operations Report and are available for viewing at this PIC.

Visual Simulation: Our Reply…



Note:
* The Wire Frame Technical drawing does not take into consideration vegetation. It is possible that wind turbines are visible on the wire frame drawing but not on the visual simulation.

TECHNICAL DATA

PHOTOGRAPH - VIEW POINT

Photograph Number:		IMG_4196
Coordinates (UTM 17 NAD83) :	439227 E	4796736 N
Altitude with respect to mean sea level:		185 m
Date Photograph was taken :		July 27th, 2012
Direction :		75 degrees T.N.
Focal Length :		6 mm
View span :		56 degrees
Altitude of photograph with respect to ground :		1.8 m

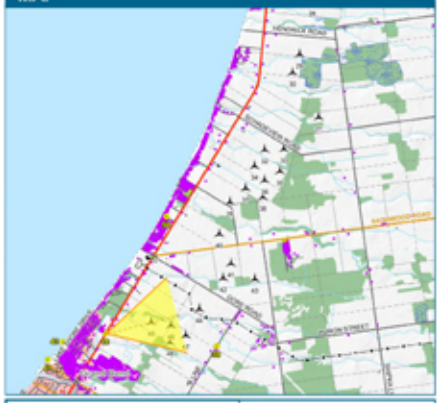
WIND TURBINES USED

Model :	SWT-2.3-113
Height of nacelle—mid point :	99.5 m
Rotor Diameter :	113 m

SIMULATION

Visual Simulation No. :	
Configuration No. :	
Total number of wind turbines for the project:	48
Total number of visible wind turbines in visual simulation:	2
Closest visible wind turbine :	No. 45 @ 1.0 km
Furthest visible wind turbine :	No. 46 @ 1.3 km

MAP



Prepared for : NORTHLAND POWER

Prepared by : GL Garrad Hassan

Date : November 23rd, 2012
Version 01

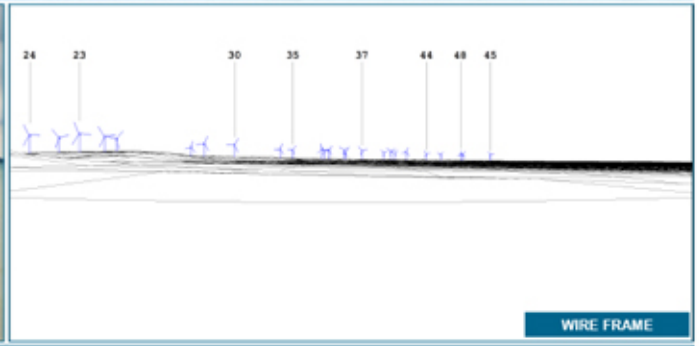
VISUAL SIMULATION

As viewed from Oakwood Golf Course

Grand Bend Wind Farm

Visual Simulation: Our Reply…

NORTHLAND POWER



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TECHNICAL DATA

PHOTOGRAPH - VIEW POINT

Photograph Number:		IMG_3996
Coordinates (UTM 17 NAD83) :	442175 E	4806991 N
Altitude with respect to mean sea level:		180 m
Date Photograph was taken :		July 26th, 2012
Direction :		180 degrees T.N.
Focal Length :		6 mm
View span :		56 degrees
Altitude of photograph with respect to ground :		1.8 m

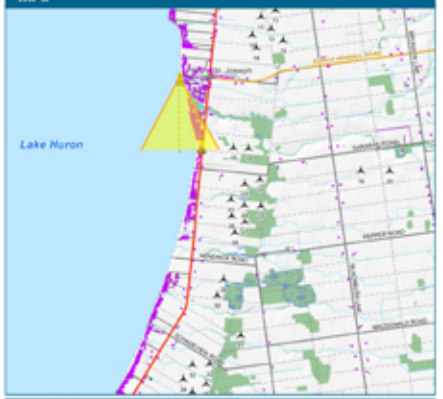
WIND TURBINES USED

Model :	SWT-2.3-113
Height of nacelle—mid point :	99.5 m
Rotor Diameter :	113 m

SIMULATION

Visual Simulation No. :	[illegible]
Configuration No. :	[illegible]
Total number of wind turbines for the project:	48
Total number of visible wind turbines in visual simulation:	21
Closest visible wind turbine :	No. 23 @ 3.0 km
Furthest visible wind turbine :	No. 48 @ 10.6 km

MAP



Prepared for : NORTHLAND POWER

Prepared by : GL Garrad Hassan

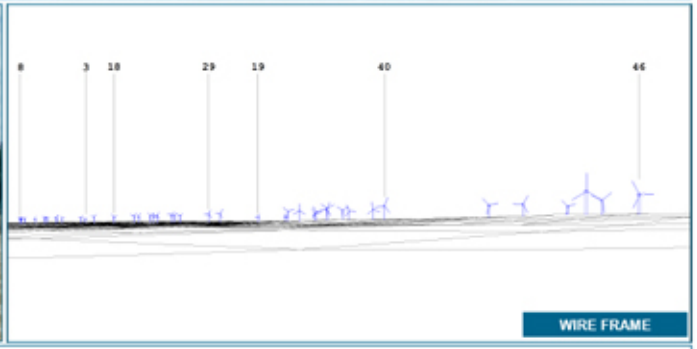
Date : November 23rd, 2012
Version 01

VISUAL SIMULATION

As viewed from St. Joseph's Beach

Grand Bend Wind Farm

Visual Simulation: Our Reply…



Note:
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TECHNICAL DATA

PHOTOGRAPH - VIEW POINT

Photograph Number:		IMG_4151
Coordinates (UTM 17 NAD83) :	438057 E	4796210 N
Altitude with respect to mean sea level:		179 m
Date Photograph was taken :		July 27th, 2012
Direction :		51 degrees T.N.
Focal Length :		6 mm
View span :		56 degrees
Altitude of photograph with respect to ground :		1.8 m

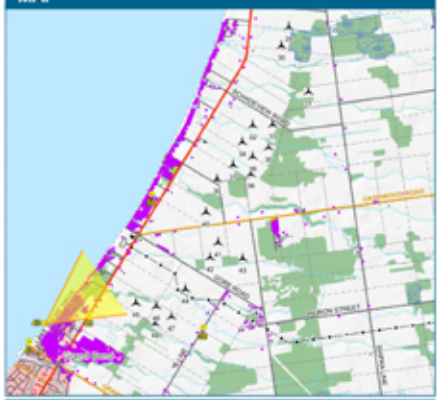
WIND TURBINES USED

Model :	SWT-2.3-113
Height of nacelle—mid point :	99.5 m
Rotor Diameter :	113 m

SIMULATION

Visual Simulation No. :	[illegible]
Configuration No. :	[illegible]
Total number of wind turbines for the project:	48
Total number of visible wind turbines in visual simulation:	24
Closest visible wind turbine :	No. 29 @ 8.0 km
Furthest visible wind turbine :	No. 3 @ 15.9 km

MAP



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Prepared by : GL Garrad Hassan

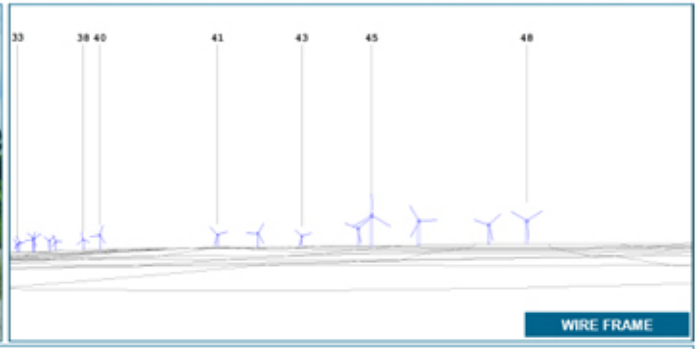
Date : November 23rd, 2012
Version 01

VISUAL SIMULATION

As viewed from Lambton Shores – Grand Bend Beach

Grand Bend Wind Farm

Visual Simulation: Our Reply…



Note:
* The Wire Frame Technical drawing does not take into consideration vegetation. It is possible that wind turbines are visible on the wire frame drawing but not on the visual simulation.

TECHNICAL DATA

PHOTOGRAPH - VIEW POINT

Photograph Number:		IMG_4167
Coordinates (UTM 17 NAD83) :	438366 E	4796568 N
Altitude with respect to mean sea level:		180 m
Date Photograph was taken :		July 27th, 2012
Direction :		76 degrees T.N.
Focal Length :		6 mm
View span :		56 degrees
Altitude of photograph with respect to ground :		1.8 m

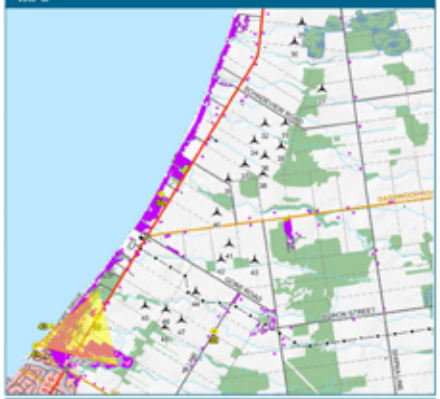
WIND TURBINES USED

Model :	SWT-2.3-113
Height of nacelle—mid point :	99.5 m
Rotor Diameter :	113 m

SIMULATION

Visual Simulation No. :	[illegible]
Configuration No. :	[illegible]
Total number of wind turbines for the project:	48
Total number of visible wind turbines in visual simulation:	0
Closest visible wind turbine :	N/A
Furthest visible wind turbine :	N/A

MAP



Prepared for : NORTHLAND POWER

Prepared by : GL Garrad Hassan

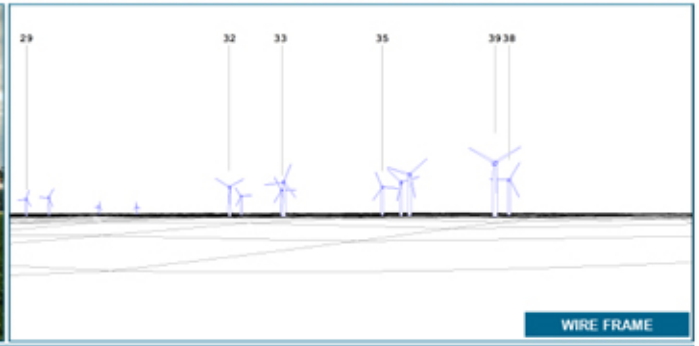
Date : November 23rd, 2012
Version 01

VISUAL SIMULATION

As viewed from Lambton Shores – Grand Bend Beach

Grand Bend Wind Farm

Visual Simulation: Our Reply…



Note:
* The Wire Frame Technical drawing does not take into consideration vegetation. It is possible that wind turbines are visible on the wire frame drawing but not on the visual simulation.

TECHNICAL DATA

PHOTOGRAPH - VIEW POINT

Photograph Number:		IMG_4086
Coordinates (UTM 17 NAD83) :	440458 E	4791100 N
Altitude with respect to mean sea level:		188 m
Date Photograph was taken :		July 27th, 2012
Direction :		66 degrees T.N.
Focal Length :		6 mm
View span :		56 degrees
Altitude of photograph with respect to ground :		1.8 m

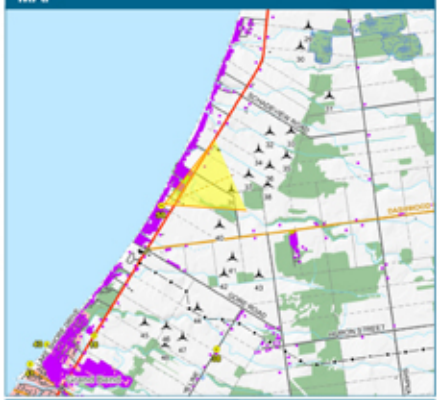
WIND TURBINES USED

Model :	SWT-2.3-113
Height of nacelle—mid point :	99.5 m
Rotor Diameter :	113 m

SIMULATION

Visual Simulation No. :	[illegible]
Configuration No. :	[illegible]
Total number of wind turbines for the project:	48
Total number of visible wind turbines in visual simulation:	7
Closest visible wind turbine :	No. 39 @ 1.3 km
Furthest visible wind turbine :	No. 33 @ 2.8 km

MAP



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Prepared by : GL Garrad Hassan

Date : November 23rd, 2012
Version 01

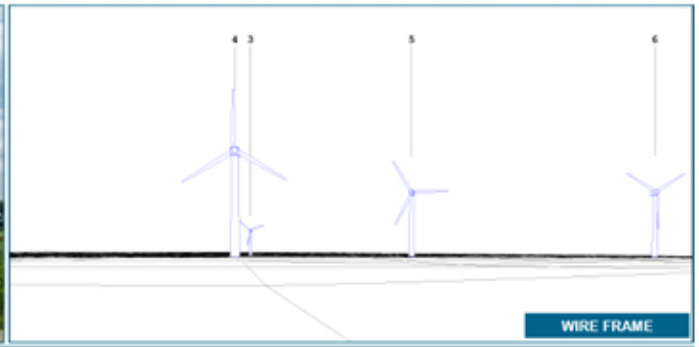
VISUAL SIMULATION

As viewed from Elmwood Road, 200 m west of Bluewater Highway

Grand Bend Wind Farm

Visual Simulation: Our Reply…

NORTHLAND POWER



Note:
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TECHNICAL DATA

PHOTOGRAPH - VIEW POINT

Photograph Number:		IMG_3871
Coordinates (UTM 17 NAD83) :	443144 E	4810153 N
Altitude with respect to mean sea level:		198 m
Date Photograph was taken :		July 26th, 2012
Direction :		100 degrees T.N.
Focal Length :		6 mm
View span :		56 degrees
Altitude of photograph with respect to ground :		1.8 m

WIND TURBINES USED

Model :	SWT-2.3-113
Height of nacelle—mid point :	99.5 m
Rotor Diameter :	113 m

SIMULATION

Visual Simulation No. :	PH06-60328-10R8-IMG3871_L0C46-E4K3144_N4810153-L21-T01-D100-HLR01.WFV
Configuration No. :	L21-60328-10R8-20120730-HLR.WPL
Total number of wind turbines for the project:	48
Total number of visible wind turbines in visual simulation:	4
Closest visible wind turbine :	No. 4 @ 0.7 km
Furthest visible wind turbine :	No. 3 @ 2.7 km

MAP

Prepared for : NORTHLAND POWER

Prepared by : GL Garrad Hassan

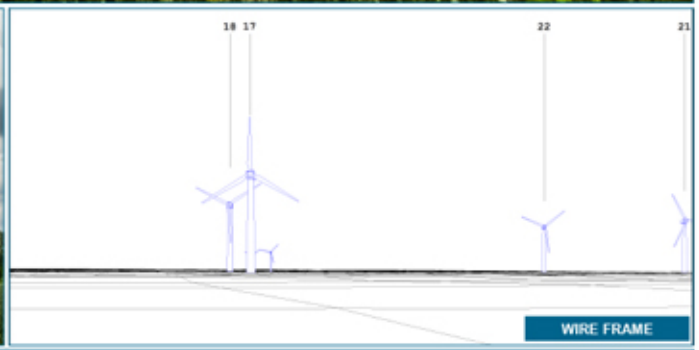
Date : November 23rd, 2012
Version 01

VISUAL SIMULATION

As viewed from the intersection of Highway 21 and Sunset Cove

Grand Bend Wind Farm

Visual Simulation: Our Reply…



Note:
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TECHNICAL DATA

PHOTOGRAPH - VIEW POINT

Photograph Number:		IMG_4223
Coordinates (UTM 17 NAD83) :	442671 E	4805458 N
Altitude with respect to mean sea level:		195 m
Date Photograph was taken :		July 27th, 2012
Direction :		106 degrees T.N.
Focal Length :		6 mm
View span :		56 degrees
Altitude of photograph with respect to ground :		1.8 m

WIND TURBINES USED

Model :	SWT-2.3-113
Height of nacelle—mid point :	99.5 m
Rotor Diameter :	113 m

SIMULATION

Visual Simulation No. :	PHOT-602281GRB-IMG4223_LOC445-5442671_N4805458-L21-T01-D1064LR01.WFV
Configuration No. :	L21-602281GRB-20120730-NLR.WPL
Total number of wind turbines for the project:	48
Total number of visible wind turbines in visual simulation:	4
Closest visible wind turbine :	No. 17 @ 0.7 km
Furthest visible wind turbine :	No. 22 @ 1.5 km

MAP

Prepared for : NORTHLAND POWER

Prepared by : GL Garrad Hassan

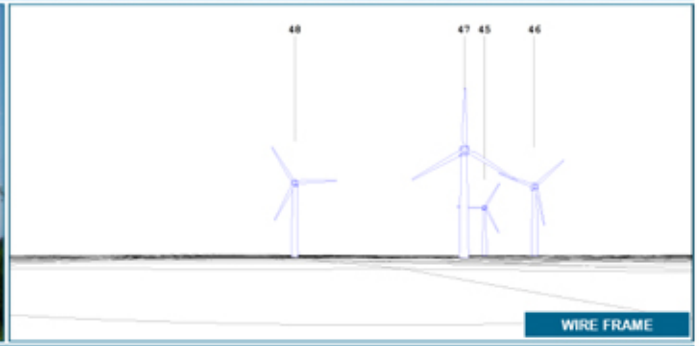
Date : November 23rd, 2012
Version 01

VISUAL SIMULATION

As viewed from Bluewater Highway, 100 m south of King Street

Grand Bend Wind Farm

Visual Simulation: Our Reply…



Note:
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TECHNICAL DATA

PHOTOGRAPH - VIEW POINT

Photograph Number:		IMG_4213
Coordinates (UTM 17 NAD83) :	441473 E	4796483 N
Altitude with respect to mean sea level:		191 m
Date Photograph was taken :		July 27th, 2012
Direction :		280 degrees T.N.
Focal Length :		6 mm
View span :		56 degrees
Altitude of photograph with respect to ground :		1.8 m

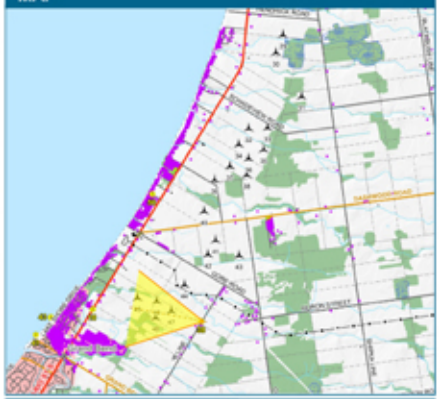
WIND TURBINES USED

Model :	SWT-2.3-113
Height of nacelle—mid point :	99.5 m
Rotor Diameter :	113 m

SIMULATION

Visual Simulation No. :	[illegible]
Configuration No. :	[illegible]
Total number of wind turbines for the project:	48
Total number of visible wind turbines in visual simulation:	4
Closest visible wind turbine :	No. 47 @ 0.7 km
Furthest visible wind turbine :	No. 45 @ 1.4 km

MAP



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Prepared by : GL Garrad Hassan

Date : November 23rd, 2012
Version 01

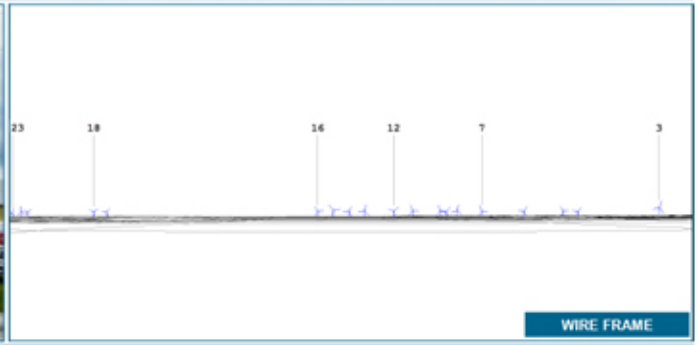
VISUAL SIMULATION

As viewed from B Line, 1 km south of Gore Road

Grand Bend Wind Farm

Visual Simulation: Our Reply…

NORTHLAND POWER



Note:
* The Wire Frame Technical drawing does not take into consideration vegetation. It is possible that wind turbines are visible on the wire frame drawing but not on the visual simulation.

TECHNICAL DATA

PHOTOGRAPH - VIEW POINT

Photograph Number:		IMG_3973
Coordinates (UTM 17 NAD83) :	450446 E	4807922 N
Altitude with respect to mean sea level:		260 m
Date Photograph was taken :		July 26th, 2012
Direction :		270 degrees T.N.
Focal Length :		6 mm
View span :		56 degrees
Altitude of photograph with respect to ground :		1.8 m

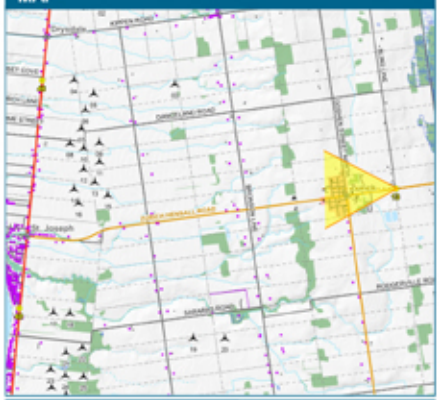
WIND TURBINES USED

Model :	SWT-2.3-113
Height of nacelle—mid point :	99.5 m
Rotor Diameter :	113 m

SIMULATION

Visual Simulation No. :	[illegible]
Configuration No. :	[illegible]
Total number of wind turbines for the project:	48
Total number of visible wind turbines in visual simulation:	0
Closest visible wind turbine :	N/A
Furthest visible wind turbine :	N/A

MAP



Prepared for : NORTHLAND POWER

Prepared by : GL Garrad Hassan

Date : November 23rd, 2012
Version 01

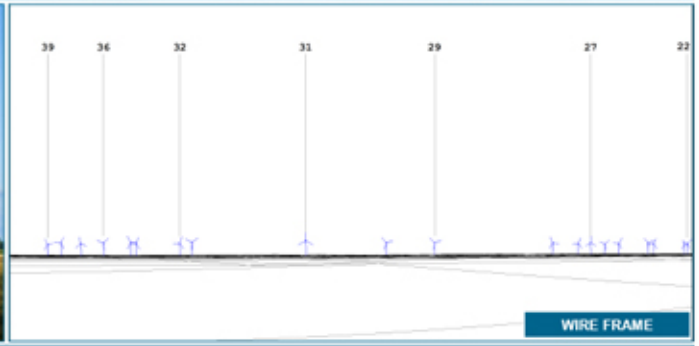
VISUAL SIMULATION

As viewed from the intersection of Zurich Hensall Road and Blind Line

Grand Bend Wind Farm

Visual Simulation: Our Reply…

NORTHLAND POWER



Note:
* The Wire Frame Technical drawing does not take into consideration vegetation. It is possible that wind turbines are visible on the wire frame drawing but not on the visual simulation.

TECHNICAL DATA

PHOTOGRAPH - VIEW POINT

Photograph Number:		IMG_4127
Coordinates (UTM 17 NAD83) :	448018 E	4799365 N
Altitude with respect to mean sea level:		223 m
Date Photograph was taken :		July 27th, 2012
Direction :		295 degrees T.N.
Focal Length :		6 mm
View span :		56 degrees
Altitude of photograph with respect to ground :		1.8 m

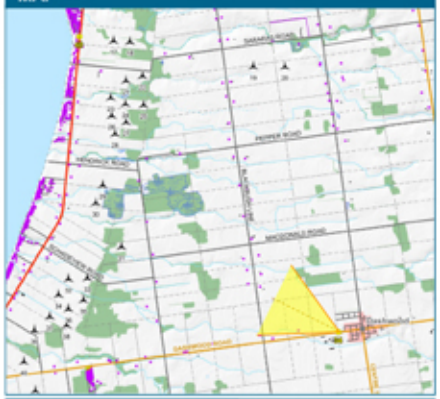
WIND TURBINES USED

Model :	SWT-2.3-113
Height of nacelle—mid point :	99.5 m
Rotor Diameter :	113 m

SIMULATION

Visual Simulation No. :	
Configuration No. :	
Total number of wind turbines for the project:	48
Total number of visible wind turbines in visual simulation:	14
Closest visible wind turbine :	No. 31 @ 4.8 km
Furthest visible wind turbine :	No. 22 @ 6.6 km

MAP



Prepared for : NORTHLAND POWER

Prepared by : GL Garrad Hassan

Date : November 23rd, 2012
Version 01

VISUAL SIMULATION

As viewed from Dashwood Road, 500 m west of Centre Street

Grand Bend Wind Farm

Natural Environment

Your Questions…

How was the natural environment assessed?

Will birds and bats be affected? Will there be effects on Tundra Swans?

How will the environment be protected?

Natural Environment: Our Reply…

Identification of Significant Features:

- Baseline conditions were documented in 2011 and 2012.
- Features assessed according to provincial criteria to determine significance.
- For features found to be provincially significant, an Environmental Impact Study was completed.

Results:

Significant features present include:

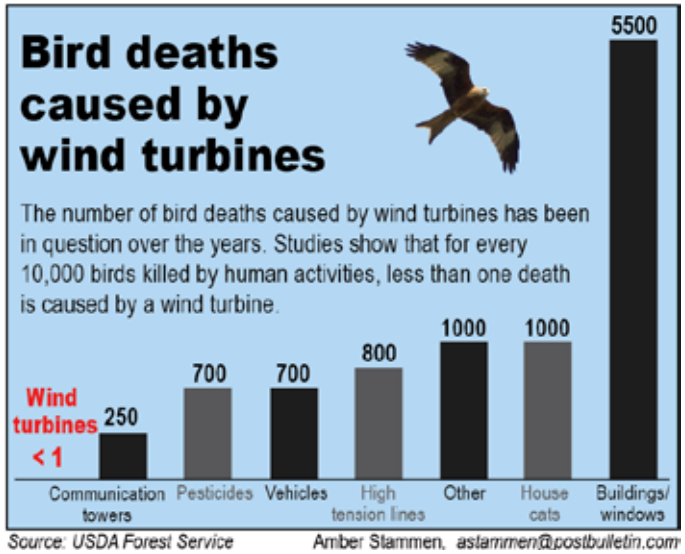
- 1 Valleyland
- 24 Wetlands
- 32 Woodlands
- 7 types of significant wildlife habitat are/may be present:
  - Turtle nesting/overwintering areas, deer yarding areas, amphibian breeding habitat, bat maternal colonies, habitat for rare species, general wildlife habitat.

Effects Assessment:

- For each significant feature:
  - Potential effects were identified,
  - Performance objectives were developed.
  - Mitigation measures were proposed to avoid or minimize effects,
  - A monitoring program was developed to ensure mitigation is successful,
  - Contingency plans were developed to address any unexpected effects.

Birds and Bats: Our Reply…

Bird and Bat Collisions



Average mortality in Ontario is:

- 2.5 birds/turbine/per year, and
- 4-14 bats/turbine/year.

Critical Thresholds

(as defined by the MNR)

Birds:

- 14 birds/turbine/year
- 0.2 raptors/turbine/year (all raptors)
- 0.1 raptors/turbine/year (provincially tracked raptors)

Or, single event of:

- >10 birds at any one turbine
- >33 birds at multiple turbines

Bats:

- 10 bats/turbine/year

Monitoring

- Monitoring will be undertaken 2x per week for 3 years
- + additional years if effects are observed and if contingency plans are enacted.

"At current mortality levels, wind power projects are not a sustainability concern for most of Ontario's bird populations"
MNR, 2011

Tundra Swans: Our Reply…

- Tundra Swans are a relatively common species in Ontario and are the most common type of swan in North America.
- They are not protected under the Endangered Species Act.
- During spring migration, Tundra Swans stopover in flooded fields to feed on waste corn and grains.

Thedford Flats

- Located south of Grand Bend, approx. 9.5 km from the nearest turbine.
- Area provides flooded fields every spring and a supply of waste corn.
- Similar conditions are not present within 120m of the project.
- Most fields in the area are tile drained and no longer hold water in the spring.

"There are no primary threats facing this site because the swans are taking advantage of an artificial situation. If the farmers increase the drainage, change the pump-draining schedule, or stop planting corn, swan use would diminish". IBA Canada

Potential Environmental Impacts / Additional Studies

Project Phase	Potential Effects	Proposed Mitigation/Additional Studies
Construction/ Decommissioning	· Vegetation Removal.	· Environmental Inspector to stake significant features to ensure no vegetation removal occurs within them. · Any vegetation removed will be replaced with native trees, shrubs and grasses.
	· Encroachment of equipment into sensitive areas. · Erosion and sedimentation within significant features. · Harm to wildlife which may move through the work zone.	· Sediment/tree protection fencing to be installed along edges of significant features to prevent movement of soil into the feature and prevent wildlife from moving into construction areas.
	· Soil and water contamination due to accidental spills of oil, gas, lubricants.	· Preparation of a plan for safe storage and use of hazardous materials. · Preparation of a spill response plan. · Contact with MOE if any spills occur.
Operation	· Bird and bat mortality due to collisions with turbine components.	· Monitoring will occur to quantify mortality. · Contingency measures will be enacted if mortality is significant (e.g. turbine feathering, periodic shut-downs). · Additional monitoring to confirm success of contingency measures.

See reporting for further detail.

Your Questions about Potential Health Effects

Dr. Loren D. Knopper, B.Sc., M.Sc., Ph.D.,
of Intrinsik Environmental Sciences Inc.
is here to respond to your questions.

Health and Wind Power

Many studies have been conducted world-wide to examine the relationship between wind turbines and possible human health effects (e.g., audible/inaudible noise, shadow flicker, electromagnetic fields (EMF)).

Audible / Inaudible Noise: Ontario's Chief Medical Officer of Health (May 2010) conducted a review of the scientific literature related to wind turbines and public health. The review concluded that:

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

Shadow flicker: Scientific evidence suggests that shadow flicker from wind turbines does not pose a risk of photo-induced seizures; modern wind turbines simply don't rotate at a speed that has been linked to this condition (generally less than 20 rpm vs. over 60 rpm).

EMF: Health Canada (2010) has stated: *"You do not need to take action regarding daily exposures to electric and magnetic fields at extremely low frequencies. There is no conclusive evidence of any harm caused by exposures at levels found in Canadian homes and schools, including those located just outside the boundaries of power line corridors"*.

Impacts/Additional Studies

Overall, health and medical agencies agree that when sited properly, wind turbines are not causally related to adverse effects*.

Reports of annoyance by people living around wind turbines appear to be more related to variables like personal attitude and whether a person can see a turbine from their home and not a turbine-specific variable like noise.

> *"Ontario doctors, nurses, and other health professionals support energy conservation combined with wind and solar power – to help us move away from coal"**.*

Scientists and medical experts around the world continue to publish research in this area. In fact, Health Canada will be undertaking a study of wind turbine projects across the country, with results expected in 2014. It is important to note that Health Canada has not called for a moratorium on new wind projects across Canada while they undertake their research. Through our health consultants, Northland is committed to keeping informed on this issue.

*Chatham-Kent Public Health Unit, 2008; Australian Government, National Health and Medical Research Council, 2010; Australian Government, 2011; Massachusetts Department of Environmental Protection (MassDEP) and Massachusetts Department of Public Health (MDPH), 2012.

**Ontario College of Family Physicians, Registered Nurses Association of Ontario, Canadian Association of Physicians for the Environment, Physicians for Global Survival, the Asthma Society of Canada, and the Lung Association.

Your Questions about Property Value

Property Value

Your Question…

- What is being done to protect the housing market in the area of the turbines?

Our Reply…

- Multiple studies have consistently found no evidence that wind energy projects are negatively impacting property values:
  - A 2010 study conducted in Chatham-Kent, Ontario, found there was no statistically relevant relationship between the presence of a wind project and negative effects on property value, (Effect on Real Estate Values in the Municipality of Chatham-Kent – Canning Consultants Inc and John Simmons Realty Services Ltd., Feb 2010).
  - A similar analysis by the US Department of Energy's Lawrence Berkeley National Laboratory found that proximity to wind energy facilities does not have a pervasive or widespread effect on the value of nearby homes, the study covered a time span from before the wind farms were announced to well after construction and operation, (The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonistic Analysis – Ben Hoen, Ryan Wiser, Peter Cappers, Mark Thayer and Gautam Sethi, Dec 2009).
  - A 2010 study looking a property values near the 396MW Twin Groves Wind Farm in Illinois found prices were negatively affected before the wind farm was built, but rebounded after it was in place, (Wind Farm Proximity and Property Values: Pooled Hedonistic Regression Analysis of Property Values in Central Illinois – Jennifer L Hinman, May 2010).

Some of these studies can be found on the Project website:
http://grandbend.northlandpower.ca

Electricity Distribution

Source: http://www.rev2g.com/index-6.html

Your Questions…

How will stray voltage be addressed?

Will the transmission line be built on new or existing hydro poles?

How will tree removal be addressed along the transmission line?

Stray Voltage: Our Reply…

What is stray voltage?

- Occurrence of electrical potential between two objects that should ideally not have any voltage difference between them.
- Commonly caused by failure of wire insulation, or improper design.

Mitigation Measures for Stray Voltage

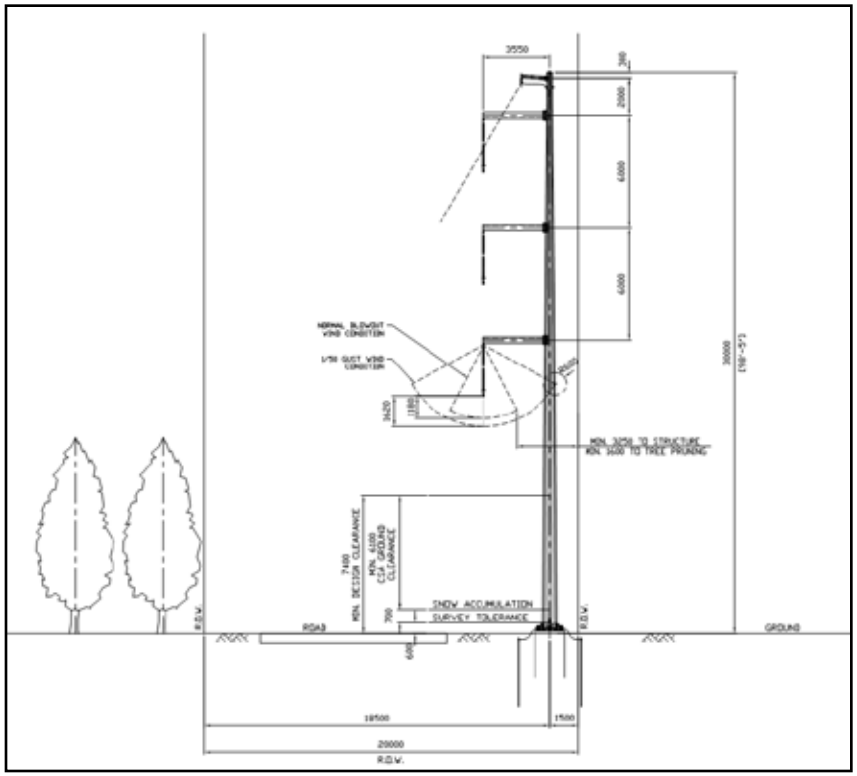
- Design will meet or exceed Hydro One, Independent Electricity System Operator (IESO), Ontario Energy Board (OEB), Ontario Grid Control Centre (OGCC), and Electrical Safety Authority (ESA) requirements.
- Electrical components will be tested and commissioned to ensure safe operation prior to project operation.
- Electrical system will be monitored during operation to ensure continued safe operation.
- Protection and control devices will be installed, and will automatically shut down operations if unsafe conditions are detected.

Above: Typical cross-section of 115 kV and 380 kV cables.
Source: http://en.wikipedia.org/wiki/File:Hochspannungskabel_110kV_400kV.JPG

Impact on Livestock

- Through proper design and mitigation outlined above, no effects on livestock are anticipated.
- The proposed collector and transmission lines will be safely operated in the same manner as the existing distribution and transmission lines in the area.

Transmission Line Route: Our Reply…



Conceptual Pole Design supplied by Northland.

Collection vs. Transmission Systems

- All collector lines will be installed underground from the turbines to the transformer substation. A 230kV transmission line will be installed from the substation to the connection point with the provincial grid near Road 183 and Front Rd. / 32 Line in Huron East. Northland is examining the feasibility of locating some of this transmission line underground.

Existing vs. New Utility Poles

- Portions of the transmission line are on roads that currently have utility poles within the right-of-way (ROW).
- The proposed transmission line will operate at a higher voltage than the existing distribution lines.
- New utility poles will be required to achieve the regulated heights and setbacks associated with the proposed transmission line.
- Discussions will take place with Hydro One regarding the joint use of utility poles.

Transmission Line Route: Our Reply…

Both photos show existing infrastructure along the transmission route.

Tree Considerations

- The transmission line will be designed to minimize impact on existing trees and wooded areas.
- Minor tree clearing is anticipated in regions where technical constraints do not allow for an alternate route. Tree removal and replacement in woodlots will be performed in accordance with a Tree Preservation Plan.

Local Airstrip Mitigation

- The proposed 230 kV transmission line passes a private property with an airstrip along Rodgerville Rd.
- This section of the transmission line will modified to maintain safe operation of the airstrip.

Potential Environmental Impacts and Proposed Mitigation

Project Activity	Potential Effects	Proposed Mitigation Strategy

Vegetation clearing along the 230 kV transmission line to meet safety requirements for vegetation around overhead transmission lines.	· Limited vegetation removal along the edge of significant woodlands along the 230 kV overhead transmission line.
	· Could have minor effect on the size of the feature.
		· The detailed design will attempt to avoid the need for vegetation removal within woodlands to the extent possible through adjustments to utility pole locations and heights, side of road considerations, below ground installation, etc.
		· Only where technical factors do not permit a feasible alternative will vegetation removal occur within woodlands.
		· No vegetation removal will occur in portions of the woodlands that are also identified as wetlands.
		· A Tree Preservation Plan will be developed during the detailed design phase in order to identify trees which may need to be removed or trimmed during construction of the transmission line. Trees requiring removal will be replaced at a ratio determined through the Tree Preservation Plan based on the age, size, species and health of the tree. The Tree Preservation Plan will also include recommendations for minor adjustments to utility pole locations in order to minimize tree loss to the extent possible.
		· Where features will be protected, the boundaries of the features are to be delineated in the field by a qualified environmental technician based on the following definitions:
		  · Woodlands: Edge of the drip line
		  · Wetlands: Ontario Wetland Evaluation System methodology
		· Silt and/or tree protection fencing will be installed along the staked boundaries.
		· Vegetated buffers will be left in place to the extent possible.
		· Where vegetation removal is unavoidable, removal will be timed to avoid periods of habitat use especially during the breeding bird season for migratory birds (May 1 – July 30). If vegetation removal is to be undertaken within this timeframe, a survey of active nests is required. If active nests are found in an area where vegetation must be cleared, construction activities in the affected areas will be suspended during breeding bird period.
		· Any cleared areas will be re-vegetated using a native seed mix and/or native shrub and tree plantings as determined through the Tree Preservation Plan.

Design, Construction, Operation and Decommissioning

Source: Siemens Press Picture

Your Questions…

Turbine Selection and Siting

Drainage Considerations

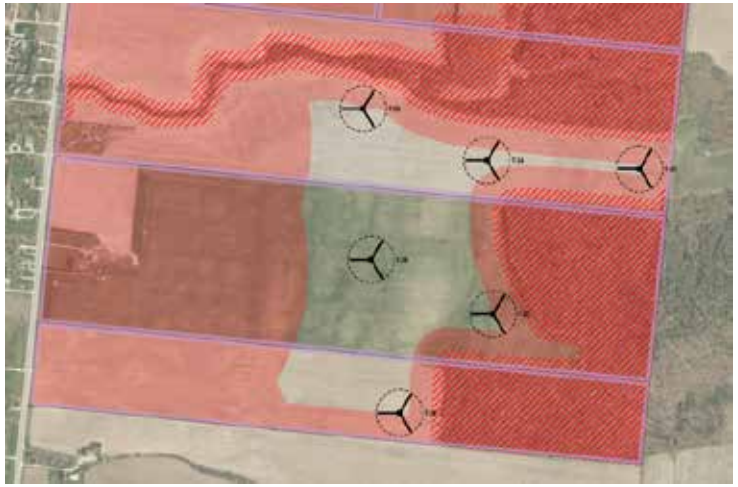
Project Schedule

Decommissioning

Design Considerations: Our Reply…

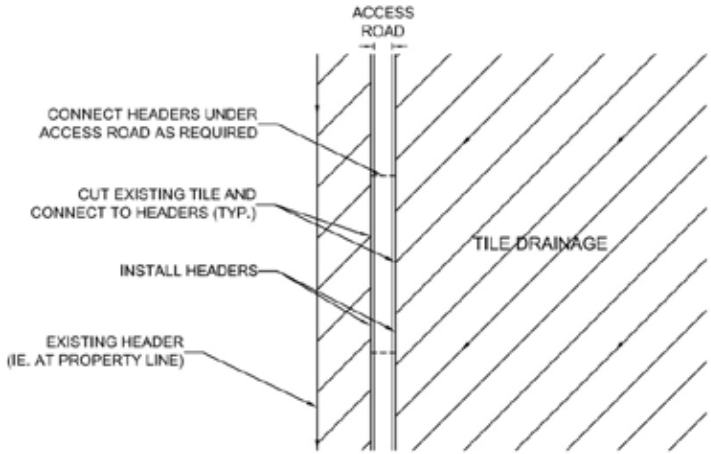
Turbine Selection and Siting

- Turbine models are generally selected based on generating capacity, physical characteristics, and sound profile.
- Turbine siting was based on:
    - Wind resource
    - Proximity to main power distribution system lines
    - Avoidance of interference with telecommunications network infrastructure
    - Local topography and access constraints
    - Coordination with landowners to reduce impact on farming operations
    - Regulated setbacks from:
        - noise receptors (550m / 40 dBA)
        - significant natural environment features
        - property lines
        - public road right-of-ways
        - rail right-of-ways

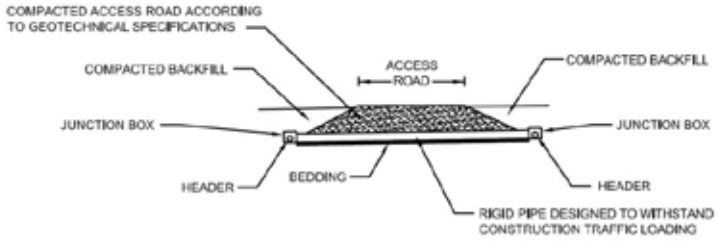


Example of various turbine siting constraints (represented by areas shaded in red).

Agricultural Drainage Considerations: Our Reply…



REPRESENTATIVE ACCESS ROAD
TILE DRAIN MODIFICATIONS



REPRESENTATIVE HEADER
CONNECTION UNDER ACCESS ROAD

During Construction

- Access roads will be constructed in a manner to allow surface drainage to flow across roads and maintain existing drainage patterns.
- Tile drainage modifications on agricultural land will be made at the start of construction by a licensed drainage contractor.
- Tile drainage modifications will be designed and constructed in a manner that allows for proper agricultural drainage during construction and operation of the facility.

During Operation

- Upon completion of turbine construction, temporary work areas along the access roads and at the turbine installation areas will be restored for agricultural use.
- Tile drainage will be reinstated in temporary construction areas.
- Soil compaction will also be remediated to mitigate impacts on agricultural land.

Decommissioning: Our Reply…

Source: Siemens Press Picture

Project Schedule

- Construction is scheduled to begin in Fall 2013 and be completed in Fall 2014.
- The project is scheduled to be in operation for at least 20 years from 2014 – 2034.
- After 20 years of operation, the project may:
  - Continue operation with the same equipment
  - Continue operation with new equipment
  - Discontinue operation and remove equipment (decommissioning).

Decommissioning

- If operations are discontinued at any point, the project will be decommissioned. Northland is responsible for decommissioning and related costs.
- Decommissioning generally involves the following steps:
  - Identify and sell infrastructure in-place that can be used for future use (eg. transmission line, selected access roads).
  - Remove all unused infrastructure using reverse engineering.
  - Salvage or dispose of infrastructure at approved facilities.
  - Restore lands to original use where applicable.
- For removal of turbines, access roads will need to be re-constructed in a similar manner as required during construction to facilitate transportation.
- Further details are available in the Decommissioning Plan Report.

We're Listening…

Based on your feedback and as a result of our investigations, we've made project changes to address concerns:

- Selection of the northern transmission route to avoid environmentally sensitive areas, more densely populated areas, and reduce its length
- Modified transmission line design to avoid impact on private airstrip
- Underground 230 kV transmission line under consideration.
- Selection of radar technology to reduce duration of blinking lights
- Movement of turbine T-21 to avoid telecommunications interference
- Movement of access road servicing T-29 to avoid wetland
- Consideration of alternative location for Parts and Storage building to make use of existing commercial land in the community.