



Intelligent energy for a greener planet

**Grand Bend Wind Limited Partnership  
Grand Bend Wind Farm  
Community Liaison Committee (CLC)**



Intelligent energy for a greener planet

# Grand Bend Wind Farm Community Liaison Committee (CLC) Meeting #2

October 17, 2016

# Grand Bend Wind Farm

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## Agenda

- Welcome and Introductions
- Re-Cap of CLC Meeting #1
- Project Construction
- Project Operations
- Project Environmental
- CLC Member Q&A
- Next Steps

## Re-Cap of CLC Meeting #1 : CLC Purpose

1. To act as a liaison facilitating two way communications between GBWF and the members of the public with respect to issues relating to the construction, installation, use, operation, maintenance and decommissioning or retirement of the Facility;
2. To provide a forum for GBWF to provide regular updates on matters relating to the wind farm, as the project progresses or as issues arise.
3. To encourage input from the public to identify opportunities for improvements or mitigation measures, enabling both parties to work together to resolve or minimize concerns.

# Grand Bend Wind Farm (GBWF)



## Re-Cap of CLC Meeting #1: Grand Bend Wind L.P.

Grand Bend Wind Limited Partnership (GBWLP) is a 50-50 partnership between Northland Power Inc. (NPI) and Giiwedin Noodin FN Energy Corporation. The Limited Partnership is a single purpose company owning Grand Bend Wind Farm (GBWF)

Giiwedin Noodin FN Energy Corporation was formed by Aamjiwnaang First Nation (Sarnia) and Bkejwanong Traditional Territory (Walpole Island FN).

NPI is a Toronto based company and has been developing, constructing and operating facilities since 1988. NPI operates natural gas-fired thermal stations in Ontario (5) and Saskatchewan (2); operates 13 ground mount solar farms in Ontario; and operates wind farms in Germany (2), Quebec (2) and Ontario (2). NPI also has two large off-shore wind farms under construction in the North Sea (Holland/Germany)

## Project: Construction

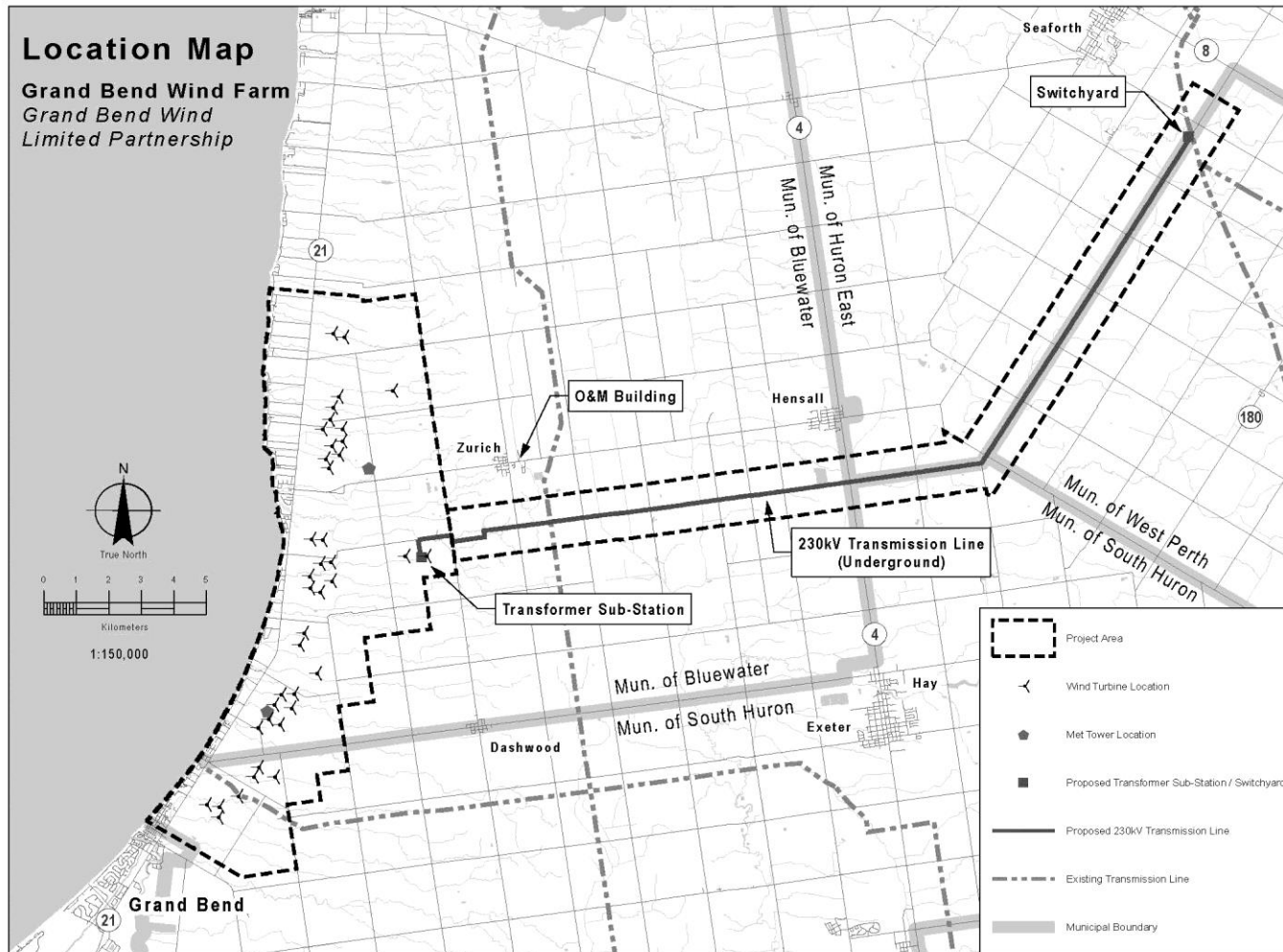
The GBWF's Engineer, Procure and Construct (EPC) contractor is a joint venture between AMEC/Foster Wheeler (design) and Black & McDonald (construct) (ABMD). ABMD have partnered on other wind farm developments, so they are experienced in over-seeing the complex nature of a wind farm's construction, including:

- Construction of the access roads, water crossings and crane pads
- Excavation and forming of the turbine tower foundations
- Erection of the wind turbine tower segments, nacelle and blades
- Installation of the buried collector line circuits and transmission line
- Construction of the main transformer station and remote switching station
- Coordinating the transportation and handling of the large tower pieces
- Connecting all control signals and alarms to the O&M Building in Zurich



# Grand Bend Wind Farm (GBWF)

## Wind Farm Site Map



# Grand Bend Wind Farm (GBWF)



## Project Construction

### Project Milestones

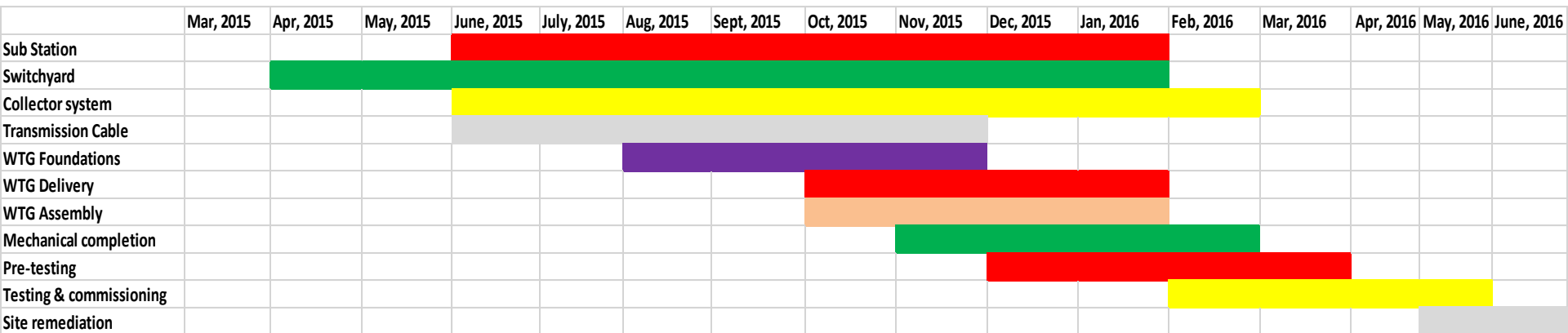
- Project released for construction to ABMD on February 9, 2015
- First Wind Turbine Generator (WTG) components delivered Oct 8, 2015
- Installation of lower turbine segments started Oct 13, 2015
- First WTG completed – T02 - was fully erected Nov 24/15
- Switching Station energized on Dec 18, 2015
- Buried 230 kV T-Line and Main Sub-station energized by Jan 15, 2016
- Initial energization of first collector circuit started Jan 25, 2016
- All wind turbines fully (mechanically) erected – end of March 2016
- Project declares it is ready for “Commercial Operations” – April 19, 2016
- IESO accepts Commercial Ops. declaration – June 1, 2016



# Grand Bend Wind Farm (GBWF)



## Project Construction



# Grand Bend Wind Farm (GBWF)

## Project Construction cont'd

### "Quick Facts"

Siemens 3.0MW-113m, hub height 99.5m,  
de-rated nameplate capacity 2.483 MW

- Nacelle weight 78 t
- Rotor weight 67 t
- Tower sections 5
- Blade length 55m
- Direct drive (quieter)



# Grand Bend Wind Farm (GBWF)

## Project Construction cont'd



### Wind Turbine Foundations (Qty – 40)

- ~ 21 m Across flats
  - ~ 3 m Tall
  - ~ 450 cu.m. of concrete
  - ~ 50 m ton rebar
  - ~ 600 cu.m. of backfill
- Started Aug 26 – Finished Nov 4





# Grand Bend Wind Farm (GBWF)

## Project Construction cont'd



### Collector System

- ~ 75 km of trenched collector lines
- 4 independent circuits
- 10 wind turbines per circuit
- 34.5 kvolts
- Started July – Finished Nov 2015



# Grand Bend Wind Farm (GBWF)

## Project Construction cont'd



### Transmission Line (underground)

- ~ 31 km of trenched transmission lines
- 21 splices
- 4 splicing crews
- 230 kvolts
- Started June – Finished Nov 2015



# Grand Bend Wind Farm (GBWF)

## Project Construction cont'd

### 230 kV Transformer (MPT) Sub-station

- Shunt Reactor delivery Sept 28/2015
- MPT delivery Oct 20/2015
- 230 kV terminations completed Oct 15/2015
- P&C Bldg delivery Oct 1/2015
- GIS Bldg delivery Sept 10/2015
- SST /grounding transformers delivery Dec 4/2015
- Spill containment for oil filled equipment Nov/2015



# Grand Bend Wind Farm (GBWF)

## Project Construction cont'd

### 230 kv Switch Yard (connection point)

- HONI tie-in July 23/2015
- P&C Bldg delivery Aug 11/2015
- HONI disconnect switch test Aug 27/2015
- Backfeed ready Jan 14/2016
- Injection to HONI grid Jan 28/2016
- Spill containment for oil filled equipment Nov/2015





# Grand Bend Wind Farm (GBWF)



## Project Construction cont'd

Wind Farm projects are comprised of a few major construction steps, which are repeated at each turbine location:

- Site preparation (clearing the land, access roads, crane pads)
- Turbine foundations (excavations, rebar, concrete pour)
- Turbine tower lower segment erection
- Turbine tower upper segment erection (including nacelle, rotor, blades)
- Wiring the turbine, equipment walk-down, commissioning

And in parallel completing the:

- Collector Line and Transmission Line installation
- Sub-station and Switching station installation and energization process

# Grand Bend Wind Farm (GBWF)



## Project Construction cont'd

Discussion on some of the main construction activities since the 2015 Dec CLC Meeting:

### Installation

- Turbine tower lower segment erection
- Turbine tower upper segment erection (including nacelle, rotor, blades) [photos]

### Commissioning

- Wiring the turbine, equipment walk-down, commissioning
- Energizing the switching station, T-Line, sub-station coordination with HONI/IESO

### Remediation

- Repairs to municipals roads, removing temporary access roads, return to “as found” condition, and meet environmental permit requirements

# Grand Bend Wind Farm (GBWF)



## Project Construction cont'd



# Grand Bend Wind Farm (GBWF)

## Project Construction cont'd

Projects of this size and nature (spread out wind farm) pose a challenge through the construction stage. Some of the notable challenges include:

### Landowner Concerns

- Tile drain damage and resultant repairs on participating properties
- Some Contractor's subs driving across fields damaging crops
- Some mailboxes damaged from the collector line excavation equipment
- A water supply line was cut to one house during collector line installation
- Rocks left over from construction activities
- Soybean Cyst Nematode concern



## Project Construction cont'd

Projects of this size and nature (spread out wind farm) pose a challenge through the construction stage. Some of the notable challenges include:

### Municipal Concerns

- Road Dust
- Heavy Equipment on roads not approved for use (Heavy Haul Routes)
- Damage to roadways (subject to repair per the road users agreement)
- Occasional missing traffic spotters/control signs
- Infrastructure (collector switches) too close to the edge of the road edge
- Ditches not shaped properly preventing proper drainage
- Some of the gravel removed from the roads' surface
- Accelerated damage to paved roads at heavy traffic areas (Blackbush Line and turn off to main substation)

We thank the landowners, public and municipality for their cooperation & patience

# Grand Bend Wind Farm (GBWF)

## Project: Operations & Maintenance (O&M)





# Grand Bend Wind Farm (GBWF)



## Project: Operations & Maintenance (O&M)

The GBWF O&M building is located at 2 Parkside Avenue, in Zurich, Ontario

Operations is overseen by NPI, with Site Supervisor Ben Becking and Assistant Site Supervisor David Furlano present at site. They are fully trained on safe operation of our wind farm and any public concerns should be directed to either of them.

The Maintenance activities at GBWF are being performed by Siemens technicians for the turbines and GBWF operations staff for the balance of plant. Having the turbine maintenance provided by Siemens ensures that our fleet of equipment is getting the top level of service.





# Grand Bend Wind Farm (GBWF)

## Project: Operations & Maintenance (O&M)

In addition to the local NPI Operations team, the GBWF is monitored 24/7 by NPI's renewables control center (RCC) located in Kingston, Ontario.

The RCC is able to respond to any concerns or dispatch instructions of the IESO/HONI and can remotely shutdown or start turbines, or open breaker isolation switches. The RCC also monitors the McLean's Mtn Wind Farm and NPI's ground mount solar sites.

The GBWF control system feeds real time operating information back to the O&M building, where NPI Operations staff and Siemens technicians can monitor performance and troubleshoot alarms/problems. Many of the key operational parameters are accessible on screens, as shown.



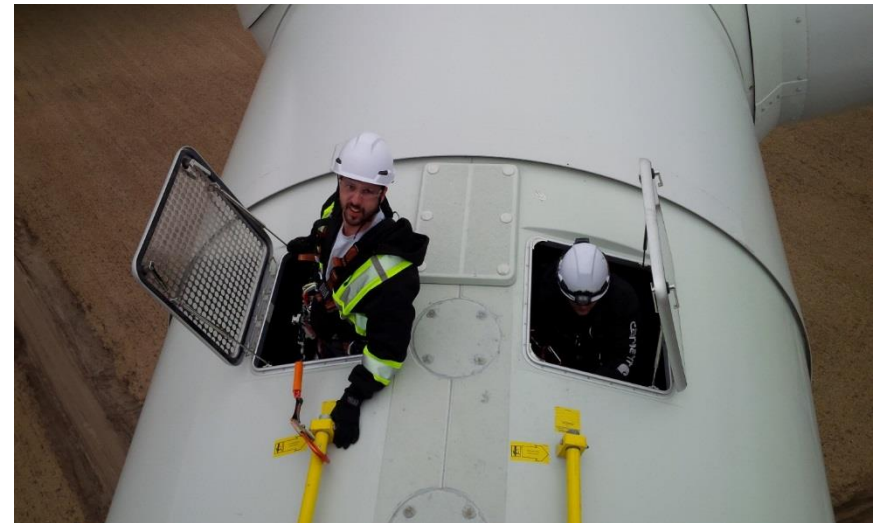
# Grand Bend Wind Farm (GBWF)

## Project: Operations & Maintenance (O&M)

The NPI Operations team's initial involvement in the GBWF project was assisting with the early stages of commissioning and performing tower walk downs.

The best opportunity to glean key design and installation information is to be present while the contractor and equipment supplier are at site and have the equipment opened up. NPI's David Furlano pictured below.

The NPI Operations team also oversaw some of the O&M Building renovation work and manage the on-going relationships we have with the landowners, farmers and the local community.



## Project Operations & Maintenance cont'd

### Operations and Maintenance Challenges

- The IESO instituted new electricity reliability rules (NERC compliance) effective July 1, 2016. As a new facility, GBWF had to comply with many of these NERC rules as soon as it was generating electricity for the grid. This created a tremendous amount of extra preparations at the same time as the facility commissioning, already a very busy time.
- Some of our equipment (faulty padmount transformers, ground faults in the buried collector system) has had to be repaired due to issues resulting from construction and early operation. These issues are being resolved quickly and should decrease in frequency.
- There have been several instances of copper theft both at the GBWF and the other wind farms in the area. The OPP has been notified and is investigating. If anyone is aware of suspicious activities around Grand Bend Wind Farm infrastructure, please contact our Operations team or the OPP immediately.

## Project Operations & Maintenance cont'd

### Public Concerns to date:

- The GBWF has received complaints regarding turbine noise. GBWF is confident that our wind turbines meet our environmental permit requirements and we are currently just starting the noise measurement studies specified in the permits.
- The GBWF received complaints about the turbine's navigational lighting being on all the time. GBWF installed radar-based aircraft detection systems to hold the lights "off". Prolonged discussions with Transport Canada delayed their use. Fly-over tests are being completed to verify the radar's operation and we hope to fully use the system in the near future.



# Grand Bend Wind Farm (GBWF)



## Project: Operations & Maintenance (O&M)

### Municipal Concerns

- One issue was brought up by the municipality regarding pieces of hardware liberating from turbine blades. Our turbine supplier Siemens provided assurance to the municipality, that their design and manufacturing processes ensure that this does not happen. To date, Siemens has had no issues with hardware coming off their turbines

We thank the public and the municipalities for communicating their concerns, so that our team can address them promptly.

# Grand Bend Wind Farm (GBWF)



## Project: Environmental

- Implementing the GBWF construction environmental program was a “team” effort:
- NPI corporate EH&S provided over-sight on the compliance matters;
- NPI Construction employed a full-time, on-site environmental monitor, who was supported by 2-3 intern environmental monitors constantly monitoring construction practices versus our commitments and permit obligations;
- ABMD had their own Environmental Coordinator on-site, who was responsible to ensure that day-to-day the construction teams understood what environmental constraints were involved in each activity, and ensure that appropriate mitigation measures are employed to prevent any environmental incidents from occurring;
- NPI also retained specialists from Neegan Burnside (or their sub-consultants) to review specialized environmental situations/activities.

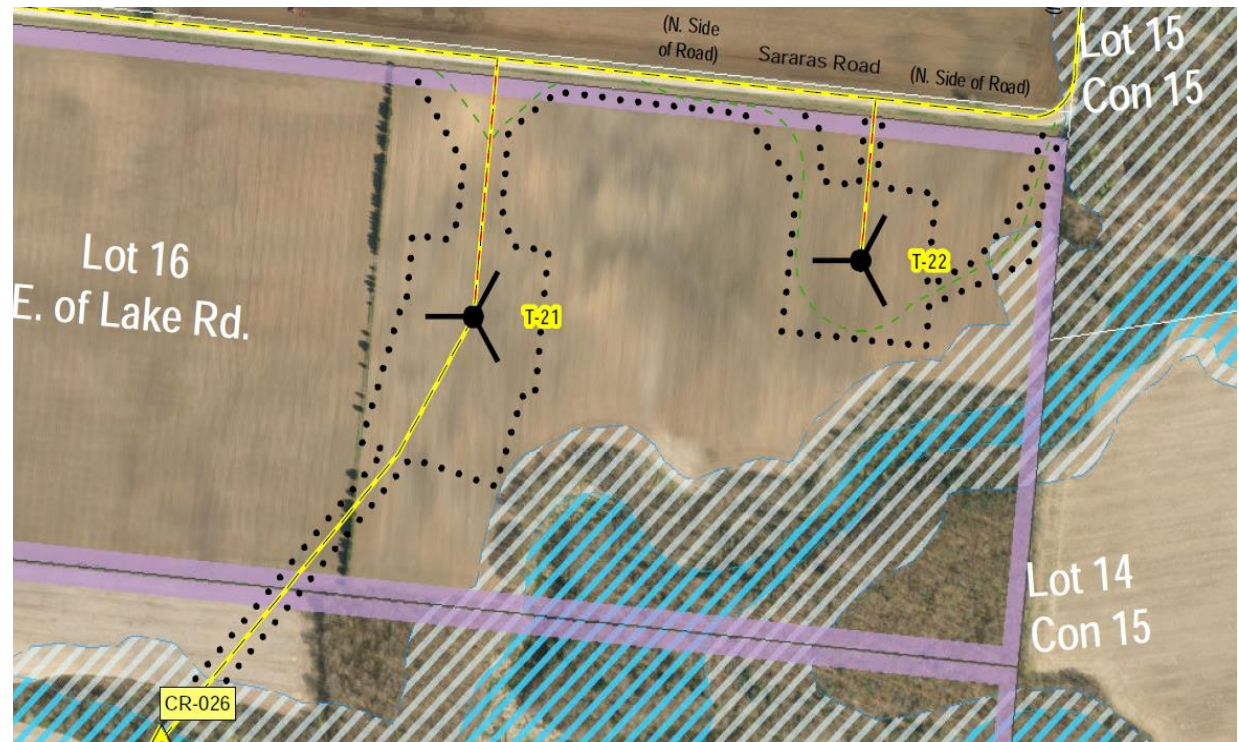


# Grand Bend Wind Farm (GBWF)

## Project Environmental

Numerous constraints exist at each turbine location. Precise steps had to be followed to comply with the environmental restrictions.

- Each turbine area was staked to identify work area limits (MOE, MNR, ABCA, or Archaeological)
- Erosion and sediment controls were put in place
- Top soil was removed and stored to minimize runoff
- Drainage tiles were cut and redirected
- Precautions were taken to prevent the spread of the Soybean cyst nematode
- Environmental Monitors were present witnessing work activities





# Grand Bend Wind Farm (GBWF)



## Project: Environmental

### Challenging Environmental Issues:

- Managing the ABCA regulated areas where buried lines are located;
- “Frack-outs” occurring during directional drill for buried lines;
- Archeology assessments were needed if the routes of the buried lines changed, or any artifacts were found;
- Access road culvert Installations through ditches/tributaries, timing restrictions (cold or warm water fish) made the this difficult to schedule;
- Some minor hydraulic line failures on vehicles which required clean-up
- The odd contractor driving outside of the permitted work space

# Grand Bend Wind Farm (GBWF)

## Project Environmental

As Construction ends, remediation is a key environmental focus

- Attention is being paid to returning as much farm land back to agricultural use (removing NPI temporary access roads and lay down areas)
- Remediating the municipal road allowances where buried works were installed



# Grand Bend Wind Farm (GBWF)



## Project Environmental

### Roadside Buried Infrastructure Remediation



## Project Environmental

As the GBWF transitions into Operations there are many environmental requirements that must be adhered to over the course of the facility's operating life:

- Normal inspections must be conducted for the detection of leaks/spills/releases
- Noise or other complaints must be tracked and reported to the MOE&CC
- The facility must be operated within the limits approved in the REA permit

Additionally, there are studies which must be conducted over the first few years of operation, as agreed to with the MOE&CC/MNR&F

- Noise audits of the turbines (3 assessments in total)
- Noise audit of the transformer substation
- Three years of bird and bat mortality counts
- Two years of natural habitat restoration/use assessment

# Grand Bend Wind Farm (GBWF)



## Project Environmental

NPI manages the routine environmental monitoring requirements that must be adhered to over the course of the facility’s operating life, as were agreed to during the facility permitting, including:

Routine Mandated Inspections / Monitoring	Frequency
Transformer leak inspections	Monthly
General Spills/Containment Inspections	2 / year
Storm water run-off, drainage pattern inspections	2 /year
Storm water erosion inspections	2 / year (min) Conduct Post-Storm Until Vegetation Grows
Spill kit present / checked	As Required
Noise variation (versus at Commencement of Operations (COD))	As Required
Water course - maintaining set-backs	As Required
Bird / Bat mortality checks at turbine visits	As Required
Species at Risk, keeping setbacks, etc.	If needed
Activities to be Recorded/Trigger Reporting	Frequency
Test Water in Transformer Spill Containment (Oil < 15 mg/l)	Quarterly
Vegetation mowing caution/restriction at Site perimeter	Each Event
Hazardous waste disposal in accordance with Hazardous Waste Information Network (HWIN)	Each Event
Aboriginal Consultations during Operations	Each Event
MOE&CC / Agency Inspections recorded	Each Event
Environmental Consultant visits / inspections	Each Event
Evidence of accidental “Takes” animals/reptiles/birds/bats	Each Event



# Grand Bend Wind Farm



## Committee Member Q&A

- Opportunity for questions from the CLC Members, and
- We welcome questions from Municipal officials, participating Landowners, members of the public



# Grand Bend Wind Farm

## Next Steps

- Next meeting Spring 2017
- Future Topics to include: Operations; Maintenance; Env. Reporting - Noise
- Encourage dialogue should you have any questions or concerns – please call us!

