



North Kent Wind Community Liaison Committee Open House

CLC Meeting #3

Country View Golf Course
25393 St Clair Rd, Dover Centre

May 16, 2018



Agenda

- Review of CLC Meeting #2
- North Kent Wind Project Summary
- Construction Update
- Operations and Maintenance
- Water Well Updates
- Vibration Monitoring
- Wells and Vibration
- Q&A
- Next Meeting



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Review of CLC Meeting #2

- CLC Meeting #2 – November 16, 2017
- Meeting summary available at northkentwind.com/community-liaison-committee



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North Kent Wind Project Summary



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Project Overview

- North Kent Wind is a joint venture limited partnership owned by affiliates of Pattern Development, Samsung Renewable Energy, Bkejwanong First Nation and Entegrus
- 100 MW wind power project
- 20-year power purchase agreement from the IESO
- Energy equivalent to the annual electricity needs of 35,000 Ontario homes
- Estimated \$5 million over 20 years in taxes, with \$3 million directly to Chatham-Kent
- Over \$500,000 in local building permit fees
- 12 month construction period with average of 200 workers on-site



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Project Study Area and Layout

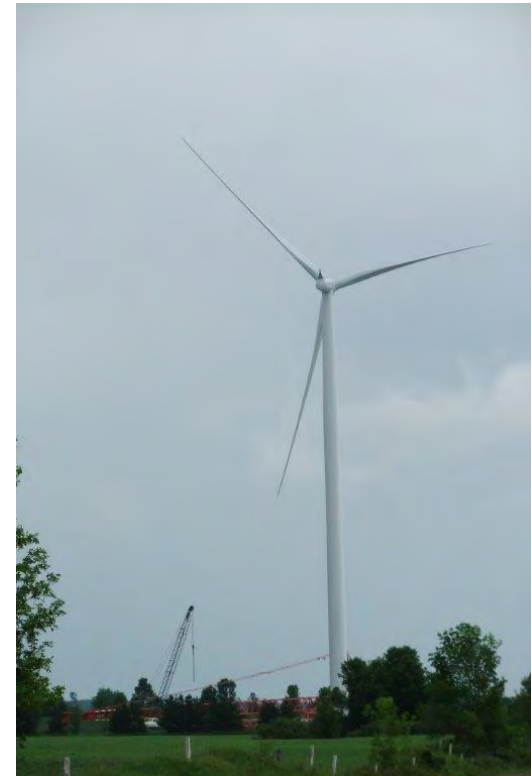


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Wind Turbines

- Turbine Manufacturer: Siemens Energy
- Number of Turbines: 34
- Turbine model: Siemens SWT-3.2-113
- Rated wind speed: 12 to 13 m/s
- Hub height: 99.5 m
- Blade length: 55 m
- Turbine blades manufactured in Tillsonburg
- Turbine towers manufactured in Windsor



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Local Economic Benefits

- Over 20 years, North Kent Wind will inject more than \$40 million of direct spending into the Chatham-Kent economy
- North Kent Wind has provided many economic benefits to Chatham-Kent, including job creation, business for local contractors, and financial benefits, including equity ownership, property taxes and community benefits contribution

Job Creation

- **During construction:** 150 workers were onsite (50% from Chatham-Kent, 100% from Ontario) plus local contractors and subcontractors to conduct civil work and mechanical assembly
- **During operations:** 10 on-site, full-time operations jobs plus local vendors to provide maintenance services for communications, the Operations & Maintenance building, roads, substation and truck fleets



Construction Update



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Construction Timeline

Construction Task	Start	Finish
Site Clearing	Feb, 2017	May, 2017
Access Roads	May, 2017	August, 2017
Substation & Switchyard	May, 2017	November, 2017
Underground Collection System	May, 2017	December, 2017
Operations & Maintenance Facility	June, 2017	November, 2017
Turbine Foundations	June, 2017	November, 2017
Turbine Deliveries	October, 2017	December, 2017
Turbine Installation	October, 2017	January, 2018
Turbine Commissioning	November, 2017	February, 2018
Land Restoration	May, 2018	July, 2018



Construction Completion

- Construction on the wind facility began in **February, 2017**. Since then, 34 Siemens Turbines and all 96 km of the underground collector system have been installed
- Now that construction is complete, crews will restore the areas used to construct during construction. Restoration has begun. You can expect to see the following activities over the next few months:
 - Inspection and repair of municipal roads impacted by the Project
 - Site restoration activities
 - Shortening of wide entrances used for wind turbine generator deliveries
 - Seeding of Municipal Right of Way and repairing any damaged lawns
 - Drain tile repairs
 - Repairs to farm entrances



Restoration Schedule

- Restoration for North Kent began on May 1st to coincide with Municipal Road Bans being removed
- All restoration work is scheduled to be completed by the end of July
- It takes approximately 3 days to complete the work required at each Wind Turbine location
- This includes construction debris removal, topsoil reinstating, turn radius and entrance reductions, tile fixes and final road grading



Project Photos



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Project Photos



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Project Photos



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Operations and Maintenance



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Facility Operations

- Commercial operations, facility maintenance and asset management are provided by Pattern Operators. 24/7 facility support is provided by Siemens Control Center and Pattern Energy Operations



Facility Maintenance

- **Preventive maintenance:** 80 hours are dedicated to turbine performance each year to avoid failures, reduce production loss and eliminate safety concerns. Assessments are performed on a weekly and monthly cycle, metrological tower maintenance is performed annually and road maintenance is budgeted evenly throughout the year to maintain turbine access roads
- **Corrective maintenance:** corrective maintenance occurs when a turbine fault leads to unscheduled downtime and a loss in production while equipment is inspected and being repaired. Health, safety and environmental issues are all considered when repairing malfunctioning equipment



Examples of Types of Local Contractors Used for Wind Facility Operations and Maintenance

- Communications maintenance
- HVAC contractor
- Hardware supplier
- Collection system and substation repairs
- Waste control and removal
- Solid waste disposal
- Weed control and abatement
- O&M building maintenance
- Road maintenance
- High voltage equipment testing
- Substation maintenance
- Electrical supply
- Truck fleet leasing and maintenance
- Crane services and rentals
- Janitorial services

Operations Team

Site Team:

- Jonathan Miranda - Facility Manager
- Ryan Turner - Assistant Facility Manager
- Lana Downer - Site Logistics Coordinator

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Water Well Updates



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Background

- Beginning with the Renewable Energy Approval (REA) process that requires comprehensive analysis of the project area, we conducted assessments to help ensure our activity would not affect groundwater quality at nearby wells
- Some individuals still had concerns about impacts to water wells and appealed the Project's REA. In response to those concerns, North Kent Wind retained scientific experts to study the issues raised no plausible mechanism for sediment for impact

REA Requirements

- North Kent Wind's REA included requirements to obtain baseline water quality information and test vibration monitoring data prior to starting construction
- Surveys were mailed to nearly 600 private property owners, responses were received from about 400, and detailed assessments were completed for nearly 200 water wells



REA Requirements (cont'd)

- A program to monitor vibrations from construction activity was developed, which included monitoring surface and subsurface vibrations from test pile-driving prior to beginning construction
- Combined, this information is used during complaint investigations and helps ensure existing groundwater resources are protected

Complaint Investigations

- Third-party experts are mobilized to investigate any complaints and North Kent Wind shares the results with the well owner, the MOECC, the Municipality, and on the project website, with the well owners' identities redacted
- Analysis involves collecting well-water samples at the residence by a qualified, licensed expert in assessing wells and groundwater, reviewing vibration monitoring data, and comparing water samples from the well to baseline water samples taken prior to construction when available



Complaint Investigations (cont'd)

- Completed investigations concluded that:
 - Groundwater quality and quantity issues reported by property owners are not a result of piling or construction activities
 - Water quality at the wells was relatively consistent to the baseline data collected prior to construction
 - In some cases, water quality or quantity concerns appeared related to well construction, the condition of existing well pumping and treatment equipment, or ongoing maintenance

We will continue to accept and respond to complaints received during the Operations Phase of the Project.



Vibration Monitoring

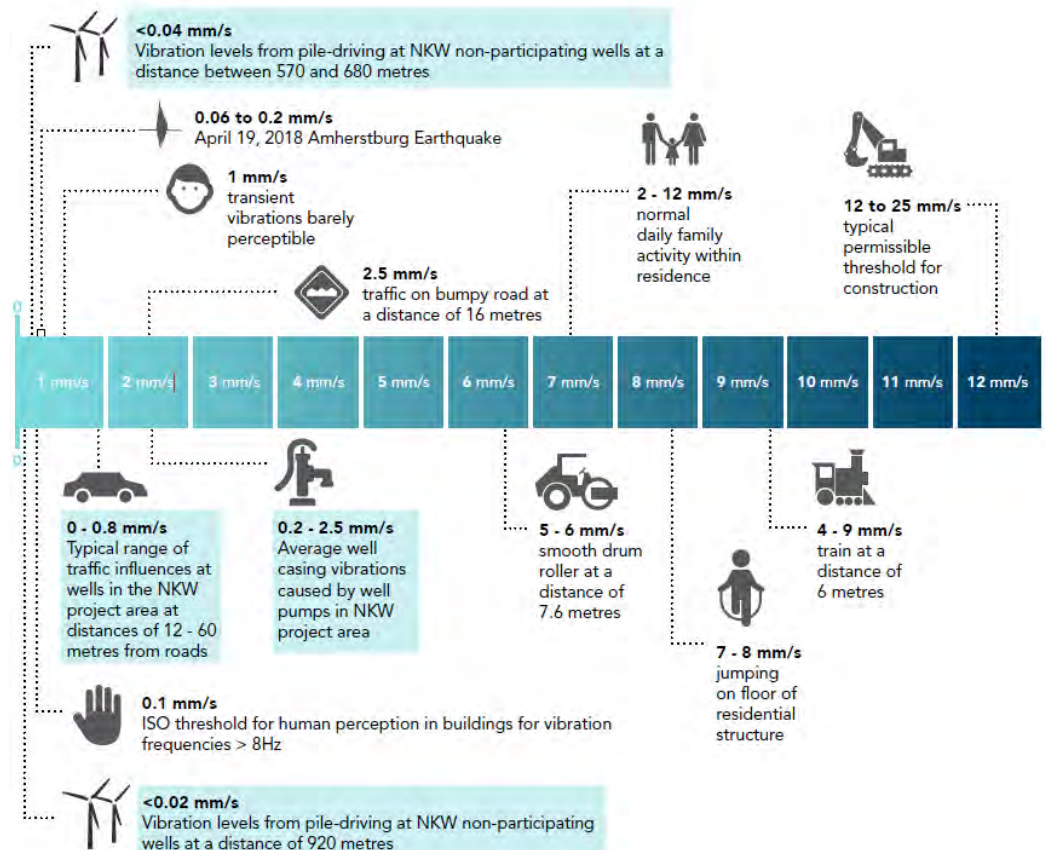


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Construction Pile Driving Vibration Monitoring Results (Phase 2)

- Pile-driving occurred between June and November, 2017 at 500 metres or more away from water wells. Since construction, vibrations have been monitored in the rock and on steel well casings near operating turbines (Phase 3)
- The vibration monitoring program concluded that the vibrations at water wells were so minor that vibrations could not cause damage to well infrastructure or suspension of sediment



Operational Vibration Monitoring Program (Phase 3)

Phase 3: December 2017 through 2021

Long-term ground vibration monitoring is ongoing at four turbine sites. In-ground instruments at one test pile site have been supplemented at three other turbines with the following:

- Vibration monitoring equipment mounted to top of new steel water well casings, similar to most water wells in the area and well casing monitoring during construction
- Instruments cemented into bedrock below bottom of casings
- Vibration monitoring equipment has also been mounted on the foundations of four turbines
- One turbine also includes vibration monitoring sensors mounted inside the tower

These systems are regularly collecting large amounts of data. Over the next three years, this data will be examined periodically to evaluate the character of vibrations in comparison to turbine operations, meteorological conditions and any water well complaints.



Operational Vibration Monitoring Program (Phase 3)



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Wells and Vibration



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Wells in the Area

- MOECC Water Well Information System (WWIS) Chatham-Kent: Dover/Dresden Area >430 wells
- >30% abandoned – supply & quality problems
- When water quality at drilling recorded >16% “cloudy”
- Many “cloudy” wells could not be cleared
- >80% of casings 4” diameter
- >70% drilled into Kettle Point Formation
- ≈90% drilled using cable tool
- >40% drilled before 1970, >80% before 1990
- (O. Reg. 903)
- most had no screen when completed
- open hole lengths 0 to 2 m
- 80% of pumping rates 2 to 12 U.S. gpm

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Map: Well records
This map allows you to search and view well record information from reported wells in Ontario.
Full dataset is available in the Open Data catalogue.

You may search by Well ID, Well Tag # or see help for advanced options.

Search Clear

Search current map display only

Please click on blue dots to find the well records.

Map Satellite Chatham-Kent, ON, Canada

Recommended for you

How to use a Ministry of the Environment map

Technical documentation: Metadata record



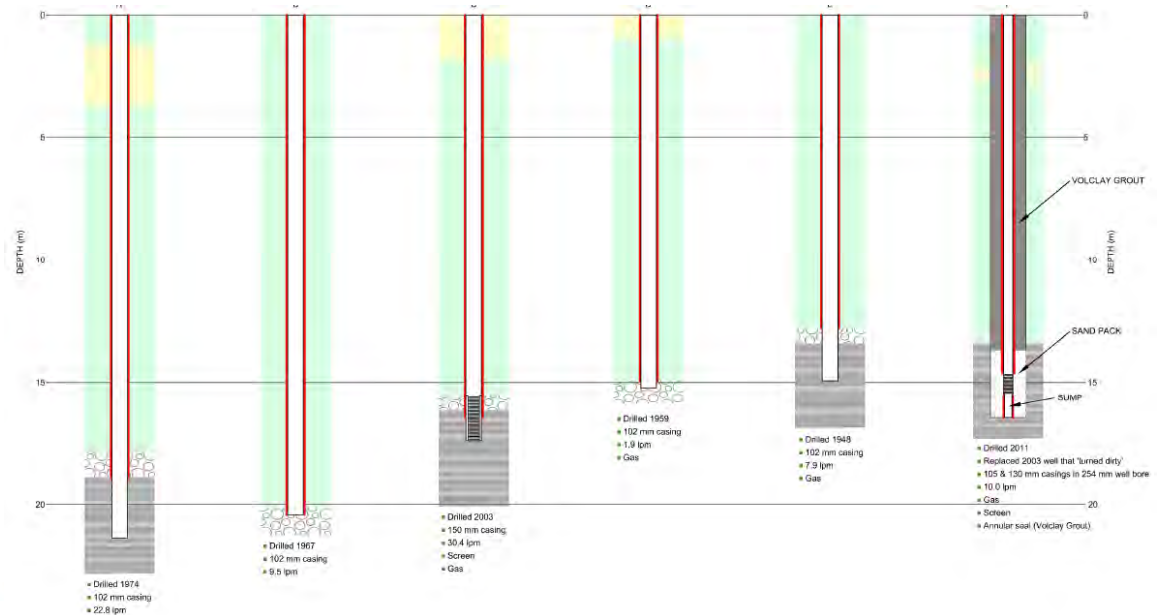
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Wells in the Area

Examples

- Old wells often without screens
- Some new wells with screens & sumps
- Drilled in black Kettle Point Formation & glacial till
- Well “turned dirty” and abandoned in 2011
- Gas observed



Possible Causes of Well Problems

- There are many possible causes for well conditions at root of complaints:
 - Gas in groundwater
 - Well construction and operational causes:
 - No screens – allows long-term accumulation of sediment in well
 - Periods of heavy use on low-yield wells
 - Pump intakes near well bottom
 - Iron & sulfate-reducing bacteria
 - Corrosion of well components
 - Well construction, operation and maintenance
 - Ground vibrations from pile driving at distances of >500 m as a cause for complaints is not reasonable
 - Measuring systems and results generally validated by recent earthquake



Q&A



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Next Meeting

- Meeting #4 – Decommissioning and Updates (Fall 2018)
 - Provisions for decommissioning
 - Update on operations and maintenance
 - Update on monitoring
 - CLC wrap-up

What else would you like to cover?





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