

# Welcome!



**Thank you for coming to the North Kent Wind  
Community Liaison Committee Open House.**

Following the open house portion of the meeting, there will be a brief presentation followed by a Q&A period with a panel of experts. All meeting materials will be available on the North Kent Wind website after the meeting.

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# Project Owners

**North Kent Wind is a joint venture limited partnership owned by affiliates of Pattern Development, Samsung Renewable Energy, Bkejwanong First Nation and Entegrus.**

## **Pattern Development (35%)**

Pattern Development is a leading developer of renewable energy and transmission assets. With a global footprint spanning Canada, the United States, Mexico, Chile, and Japan, Pattern Development's highly-experienced team has brought more than 5,000 MW of renewable power projects to market. Our mission is to transition the world to renewable energy by developing high-quality facilities in an environmentally responsible manner and with respect for the communities where we operate. Our affiliate, Pattern Energy, is a publicly listed independent power company that owns and operates renewable energy in Canada, the United States, Puerto Rico, and Chile and uses proven, best-in-class technology. Combined, we have expertise in all project stages: resource analysis, site development, power marketing, finance, construction, facility operations, and asset management.

## **Samsung Renewable Energy (35%)**

Samsung Renewable Energy is creating clean, renewable energy for generations to come. Together with our partners, Samsung made a \$5-billion investment in Ontario to create the world's largest cluster of wind and solar power. Our investments have created 900 direct renewable energy manufacturing jobs and 9,000 high-skilled jobs in Ontario. Samsung and its partners provided much-needed jobs in communities throughout Ontario, including manufacturing facilities in Windsor, Tillsonburg, Toronto and London. Built on Samsung C&T's commercial and technical expertise and the success of its renewable energy projects in several countries – including the United States and Europe – Samsung is creating real jobs, through real investment, benefitting real people.

## **Bkejwanong First Nation (15%)**

Bkejwanong First Nation, also known as Walpole Island, is located near Wallaceburg, Ontario at the mouth of the St. Clair River. It encompasses six islands that have been occupied by the Ojibwe, Potawatomi and Odawa peoples for thousands of years. Walpole Island has never been set apart as a reserve, giving it the distinction of being unceded territory. The First Nation is committed to a sustainable future within its Traditional Territory, which includes being heavily involved in the renewable energy sector over the past decade. This has culminated in equity participation in four wind energy projects totaling 350 MW.

## **Entegrus Renewable Energy Inc. (15%)**

Entegrus Renewable Energy Inc. ("EREI") is a wholly owned subsidiary of Entegrus Inc. that was incorporated to make investments in wind developments in the Municipality of Chatham-Kent on behalf of its shareholders. The Entegrus group of companies directly operates and maintains electricity distribution systems for over 40,000 customers in Southwestern Ontario, provides general administrative services, namely in the areas of customer care, billing, call center operations and collection services for companies focused on electricity supply, transmission and distribution, and water supply. Entegrus is committed to maintaining safe, reliable operations while providing high levels of service to its customers, partners and the communities it serves.

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# Project Overview

**North Kent Wind supports the community, contributes to the tax base, and has created many job opportunities.**

- 100 MW wind power project
- 20-year power purchase agreement from 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**
- Estimated \$500,000 in local building permit fees
- During construction: 150 workers were onsite (50% from Chatham-Kent, 100% from Ontario) plus local contractors and subcontractors to conduct civil work (grading, excavation and concrete) and mechanical assembly
- During operations: 10 onsite, full time operations jobs plus local vendors to provide maintenance services for communications, the Operations & Maintenance building, roads, substation and truck fleets

## Benefits to Chatham-Kent Economy

**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.



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# Project Location



According to Ontario Regulation 359/09, the Project Location is "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 airspace in which a person is engaging in or proposes to engage in the Project."

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# Construction Completion and Restoration

## Construction Timeline

Construction Task	Start	Finish
Site Clearing	Feb, 2017	May, 2017
Access Roads	May, 2017	Aug, 2017
Substation & Switchyard	May, 2017	Nov, 2017
Underground Collection System	May, 2017	Dec, 2017
Operations & Maintenance Facility	June, 2017	Nov, 2017
Turbine Foundations	June, 2017	Nov, 2017
Turbine Deliveries	Oct, 2017	Dec, 2017
Turbine Installation	Oct, 2017	Jan, 2018
Turbine Commissioning	Nov, 2017	Feb, 2018
Land Restoration	May, 2018	July, 2018

## Where Are We Now?

Construction of the wind facility began in February 2017. Since then, 34 Siemens Turbines and all 96 km of the underground collector system have been installed.

The facility was commissioned in February, 2018 and the site is now fully operational.

## What's Next?

Now that construction is complete, crews will restore the areas used to construct during construction. This work has already begun and is expected to be completed by late-July.

To complete this work, 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 (i.e. construction debris removal, topsoil reinstating)
- 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



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# Operations and Maintenance

**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.

The Operations and Maintenance of the North Kent Wind Facility employs a number of local contractors, including:

- 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



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# Evaluation of Potential Water Well Impacts

The review of published research, experience in other jurisdictions, and engineering, hydrogeologic and radiological evaluations completed prior to construction led to the following conclusions:

- Influence of ground vibrations from pile-driving on well water conditions, if any, is likely to be insignificant.
- There is no plausible mechanism for sediment to be transported tens or hundreds of metres underground from turbine foundation pile locations to water supply wells.
- Water quality in the vicinity of the wind energy project is unlikely to be affected.
- Water well quality is most influenced by regional natural water quality and near-well conditions (within a few metres), well construction details, well and pump conditions, and pump operations.

*"We can conclude to a reasonable degree of scientific certainty that the construction and operation of the turbines at the planned setback distances will not cause harm to groundwater quality either at the wells or in the broader subsurface groundwater environment."*

- Golder Associates



# Operational Vibration Monitoring Program (Phase 3)

## Phase 3: December 2017 through 2021

Long-term ground vibration monitoring has and will continue to be undertaken at four turbine sites. In-ground instruments at one of the test pile turbine sites have been supplemented by new instruments at three other turbines consisting of the following:

- Sensitive vibration monitoring equipment securely mounted to the top of new steel water well casings. This equipment penetrates to the bedrock, which is similar to most water wells in the area and the well casing monitoring undertaken during construction
- Instruments cemented into the bedrock below the bottom of these casings.

Vibration monitoring equipment has also been mounted on the concrete foundations of the four turbines. One turbine also includes vibration monitoring sensors mounted inside of 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 and meteorological conditions.**





# Preconstruction Water Well Survey

North Kent Wind conducted a survey of private water wells prior to construction. The preconstruction water well survey included:

- Contacting all owners of active water wells within the Project Study Area and within 1 km of project infrastructure to obtain information about their water well and confirm interest in participating in a groundwater survey.
- Establishing the history of the water well through an interview with the resident(s) of each property.
- Collecting a raw (untreated) groundwater sample from each well and submitting the sample to a laboratory accredited by the Standards Council of Canada and the Canadian Association of Laboratory Accreditation for analysis of a defined set of water quality parameters subject to permission from the landowner.

## Summary of Water Well Survey Results

Identifier	Number
Total Number of Properties	959
Total Number of Private Property Owners	581
Total Number of Survey Responses Received:	393
➤ Total Number of Known Properties with Active Water Supply Wells	210
➤ Total Number of Detailed Well Assessments Completed	189



# Complaint Investigation Process

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

When a complaint is received directly by North Kent Wind or upon receipt notification directly from MOECC, the following actions take place:

**STEP 1:** MOECC is notified within 1 business day of receiving the notice (when North Kent Wind receives the complaint directly).

**STEP 2:** A qualified expert is retained to conduct an investigation and strives to visit the property owner within 2 business days (pending landowner availability) of receiving the notice.

**STEP 3:** The qualified expert will interview the property owner and collect a raw (untreated) groundwater sample for the laboratory.

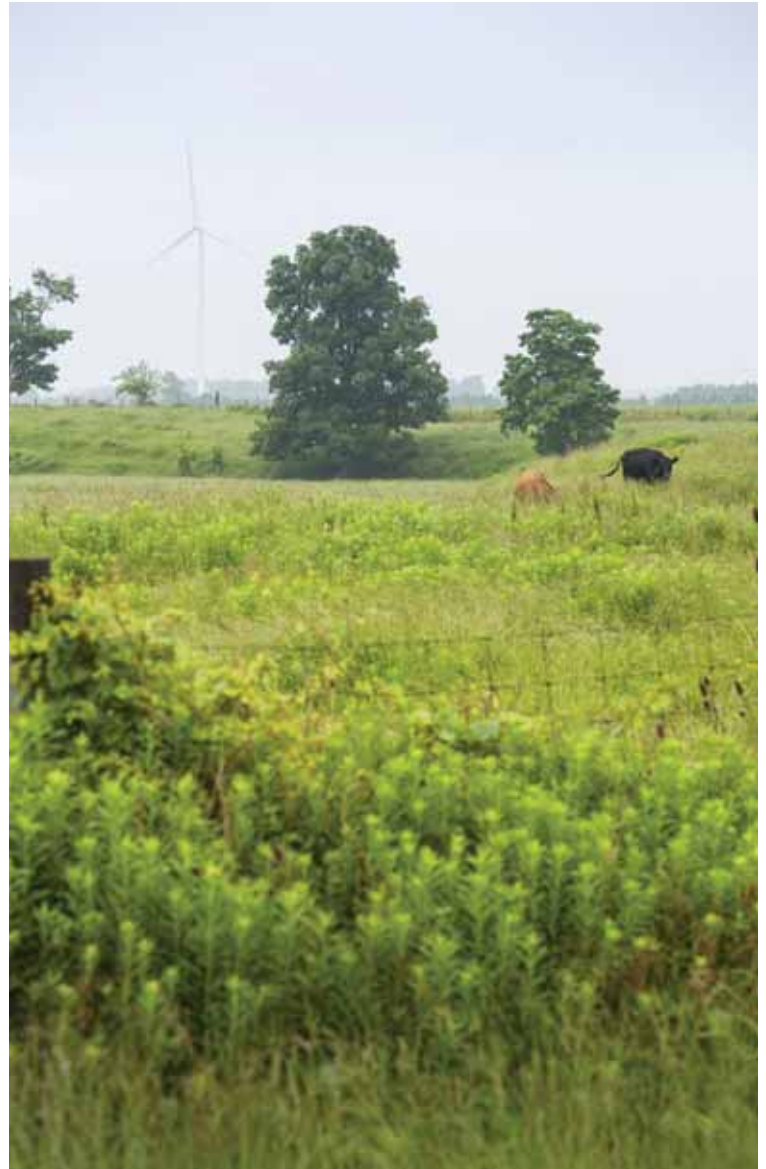
**STEP 4:** The water sample is delivered immediately to a laboratory accredited by the Standards Council of Canada and the Canadian Association for Laboratory Accreditation (CALA). The laboratory analysis requires 3-5 business days to complete.

**STEP 5:** The lab results are compared against baseline water quality data (from the same well), where available.

**STEP 6:** Vibration monitoring results are interpreted by scientific and engineering specialists. This analysis takes time due to the large amount of minute vibration data collected, including vibrations from well operations and traffic.

**STEP 7:** Other data assessed includes well construction details, well use information, turbine construction activity, and the local hydrogeological setting.

**STEP 8:** A formal report is prepared and submitted to the MOECC, which considers monitored vibration results as part of the investigation.



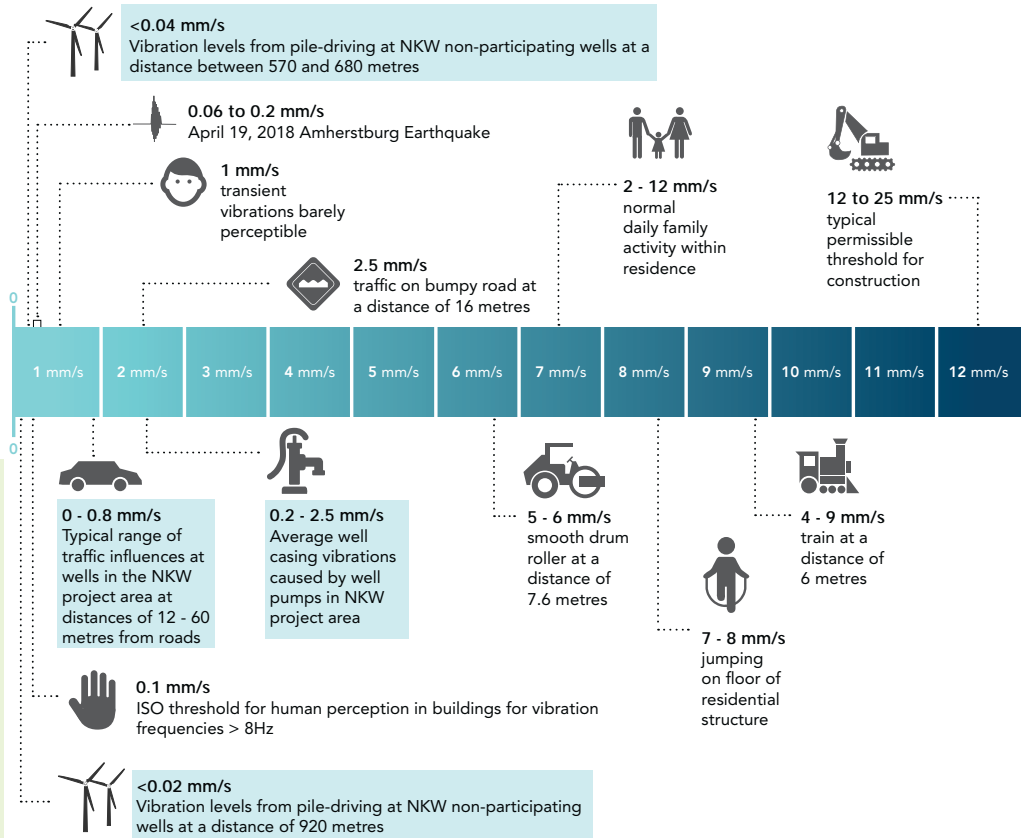
# Vibration Monitoring Results

Pile-driving activities occurred in 2017 between June and November at distances of more than 500 metres away from water wells located on properties of non-participating residences. Since construction, vibrations have been monitored in the rock and on steel well casings near operating turbines.

Our extensive vibration monitoring program concluded that the level of vibration at those water wells was so low, it was not scientifically plausible that vibrations could cause damage to well infrastructure or re-suspension of sediment existing within wells.

## Vibration Measurements

Vibrations are commonly measured by the velocity of movement in millimetres per second (mm/s). Published examples of vibrations caused by common conditions are shown. Measurements taken in the project area are highlighted.



## Accuracy of Vibration Monitoring – The Amerstburg Earthquake

On April 19, 2018, there was a 4.1 magnitude earthquake with an epicenter near Amherstburg, Ontario. Our vibration measurements during this earthquake were consistent with independent data. This data also showed that the magnitude of the vibrations at wells during the earthquake were 1.5 to 8 times larger than during pile driving.

# Possible Causes of Well Problems

An investigation into the complaints received by North Kent Wind concluded that vibrations from construction were insufficient to affect water wells. There are many other possible causes for poor well conditions.

## Natural Causes

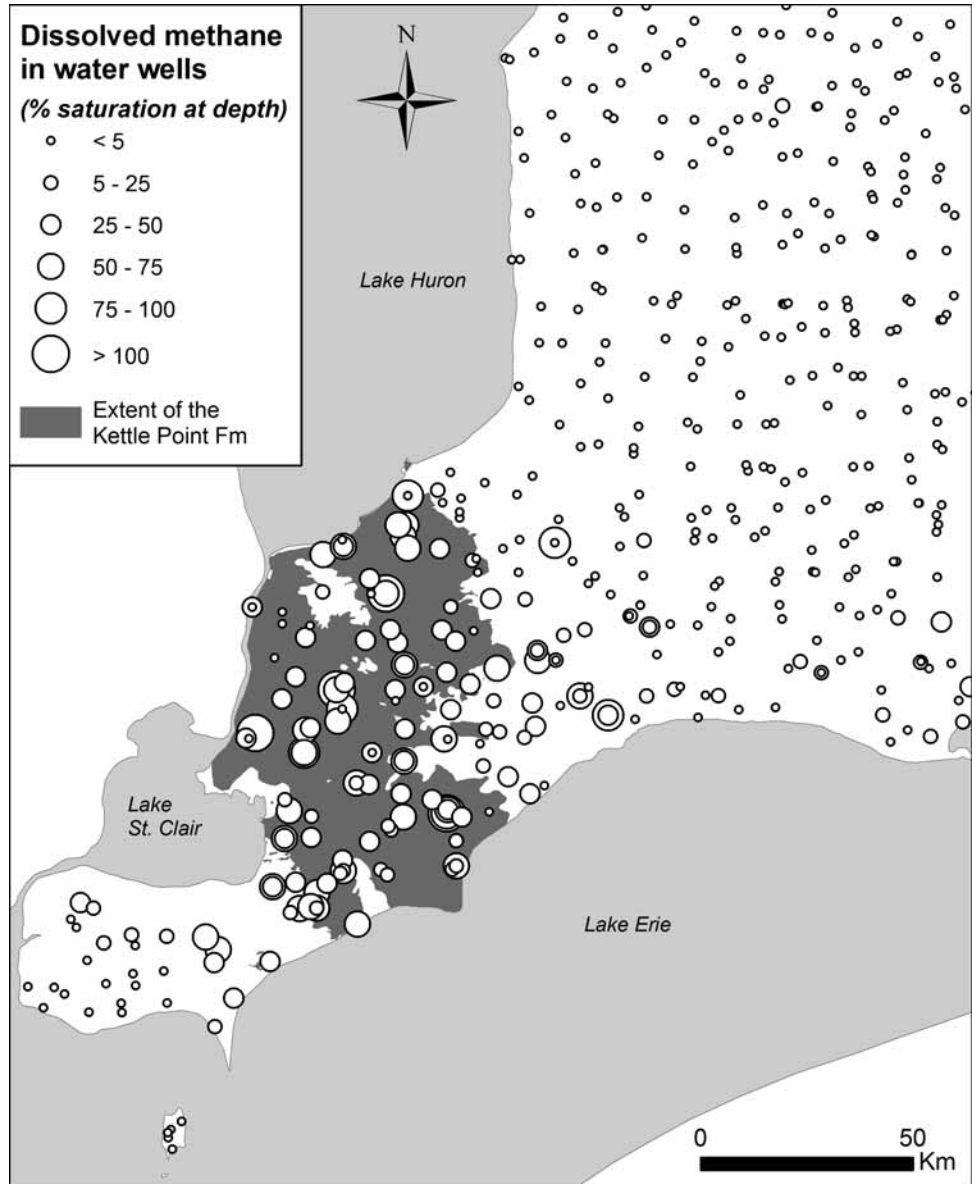
- Subsurface gas

Gas (methane) is a known water well problem in Chatham-Kent. Gas invasion can lead to disturbances that cause sediment in the bottom of the well to become suspended in the water.

(Source: The Groundwater Association)

## 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



Source: Beland Otis, C. 2013. Gas assessment of the Devonian Kettle Point Formation, Ontario Geological Survey, Open File Report 6279, 63p.

# Provides Clean and Safe Power

In 1998, the Ontario Medical Association declared air pollution a public health crisis in Ontario with coal-fired power plants being major contributors to the smog problem. The Province committed to phasing out coal-fired generation in 2002, and the development of wind energy helped Ontario meet that goal in 2014. Today, wind turbines are harnessing the wind across the Province and generating clean, homegrown energy without producing any harmful emissions and without using water to operate.

## North Kent Wind Compared to Coal-Fired Generation

### Emissions Avoided

Carbon Dioxide: 300,000 tonnes/year (60,000 car equivalent)

Sulfur Dioxide: 1,500 tonnes/year

Nitrogen Oxides: 450 tonnes/year

Mercury: 5 kg/year

### Water Conserved

720,000,000 litres/year (enough to supply 9,000 people/year)

*Sources: Emissions offset calculations use estimated electricity production for a 100 MW North Kent Wind project compared to emission rates from the Nanticoke coal plant as indicated in the Ministry of the Environment's 2001 report Coal Fired Electricity Generation in Ontario. Car comparison assumes typical passenger vehicles produce 5.1 metric tons of CO<sub>2</sub> per year. Water savings compared to coal-fired generation assumes 2,048 litres/MWh. People supplied figure based on Environment Canada's 2011 Municipal Water Use Report with 225 litres/day Ontario per capita water consumption.*



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