



Samsung Renewable Energy Inc. and  
Pattern Energy

Post-Construction  
Bird and Bat Monitoring Plan  
For  
South Kent Wind Project



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June 13, 2012

Project Report

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## Samsung Renewable Energy Inc. and Pattern Energy South Kent Wind Project

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## **1. Introduction**

### **1.1 Project Description**

Samsung Renewable Energy and Pattern Energy (hereinafter referred to as the “Proponent”) are jointly proposing to develop the South Kent Wind Project, (hereinafter referred to as the “Project”), which will be located within the Municipality of Chatham-Kent in southwestern Ontario. The Project is located south of Highway 401 between the towns of Tilbury and Ridgeway (Figures 1.1 to 1.3) to the west and east, respectively.

This wind energy generating facility is proposed to be 270 MW in size, consisting of 124 operational wind turbines, as well as supporting infrastructure, including access roads, construction and truck turnaround areas, and buried and/or overhead collection/transmission lines. The collection/transmission system will include approximately 34 km of 230 kV transmission line and two (2) substations to enable step-up of the voltage from 34.5 kV to 230 kV to connect to Chatham Switching Station (SS).

Post-construction monitoring is required for all Class 4 wind facilities. This report details the proposed post-construction monitoring plan for the Project. Information obtained from this phase of monitoring serves to verify predicted operational impacts, such as by determining the corrected mortality estimates, and also serves to evaluate the effectiveness of implemented mitigation measures, if required. Mortality estimates are impacted by two variables: (i) searcher efficiency, or the number of carcasses identified by the various searchers, which will vary with visibility (e.g., visibility class) and between individuals, and (ii) carcass removal, or the rate of removal of the carcasses by scavengers, which will vary depending on location and visibility.

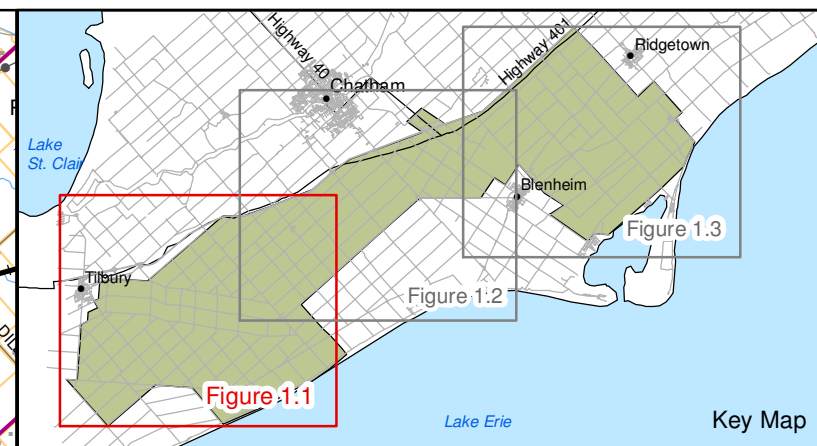
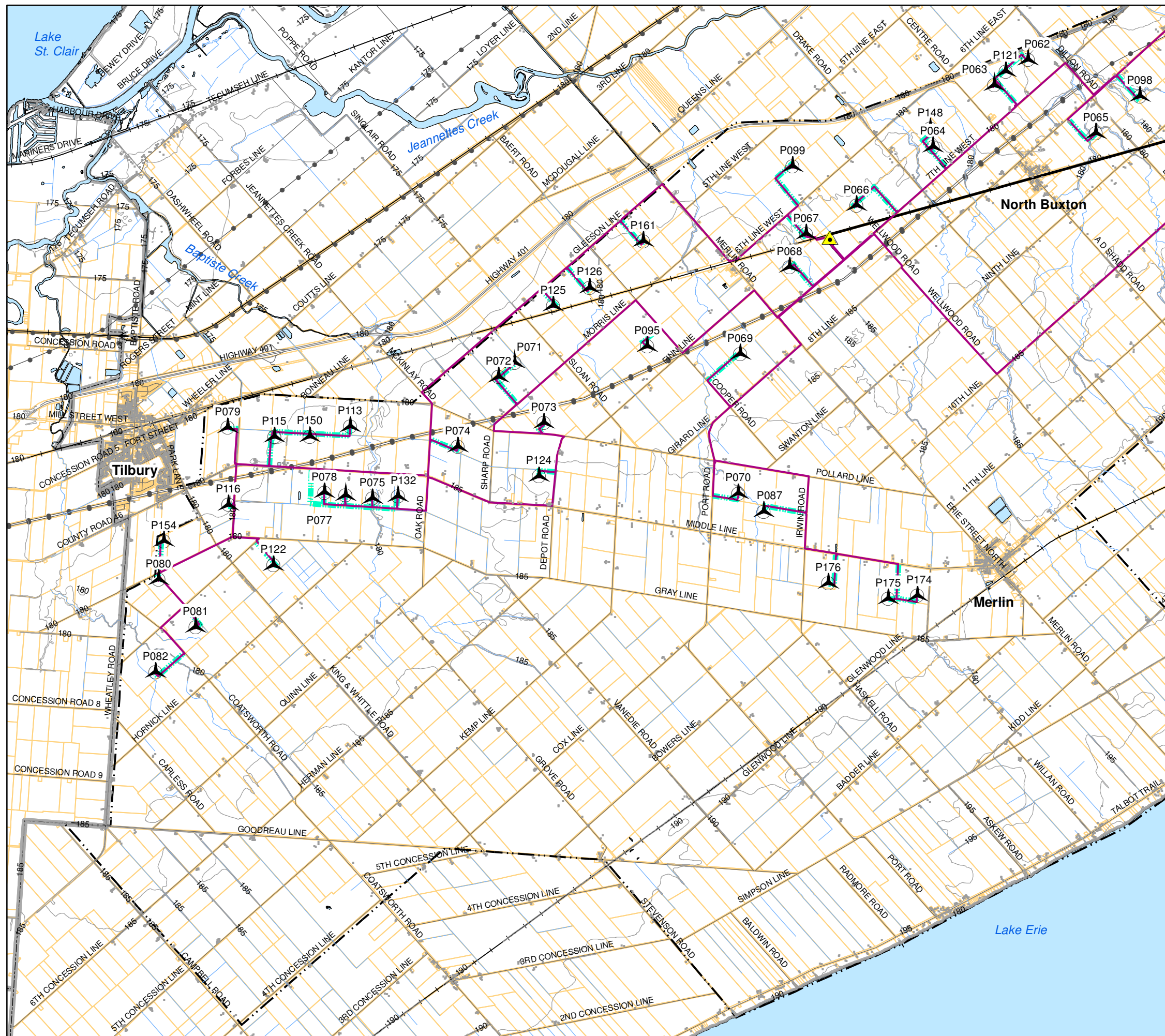
This report describes the post-construction monitoring methods including scavenger efficiency trials, corrected mortality estimates and searcher efficiency trials, thresholds for triggering mitigation, and proposed mitigation measures, if required. As well, reporting methodology and frequency are described.

### **1.2 Guidance Documents**

Specific guidelines for post-construction monitoring are laid out in the following guidance documents:

- Birds and Bird Habitat – Guidelines for Wind Power Projects (MNR, 2011a)
- Bat and Bat Habitats – Guidelines for Wind Power Projects (MNR, 2011b).





**Legend**

- Building
- Roads
- Rail
- Hydro Line
- Topographic Contour (5m Interval)
- Intermittent Watercourse
- Watercourse
- Parcel
- Project Area
- Waterbody

**Project Components**

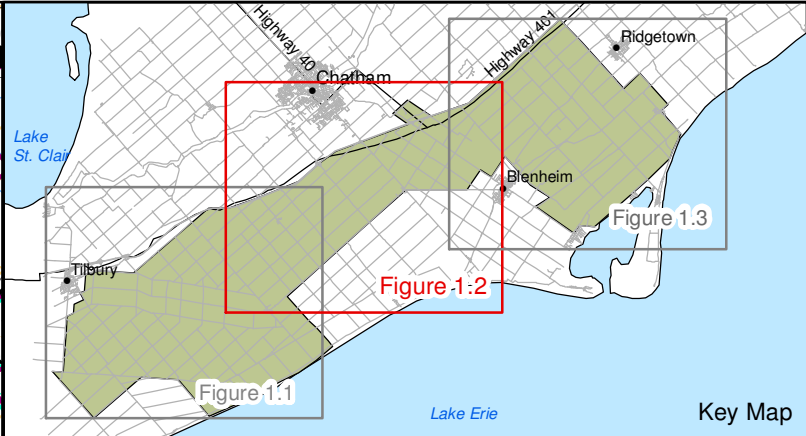
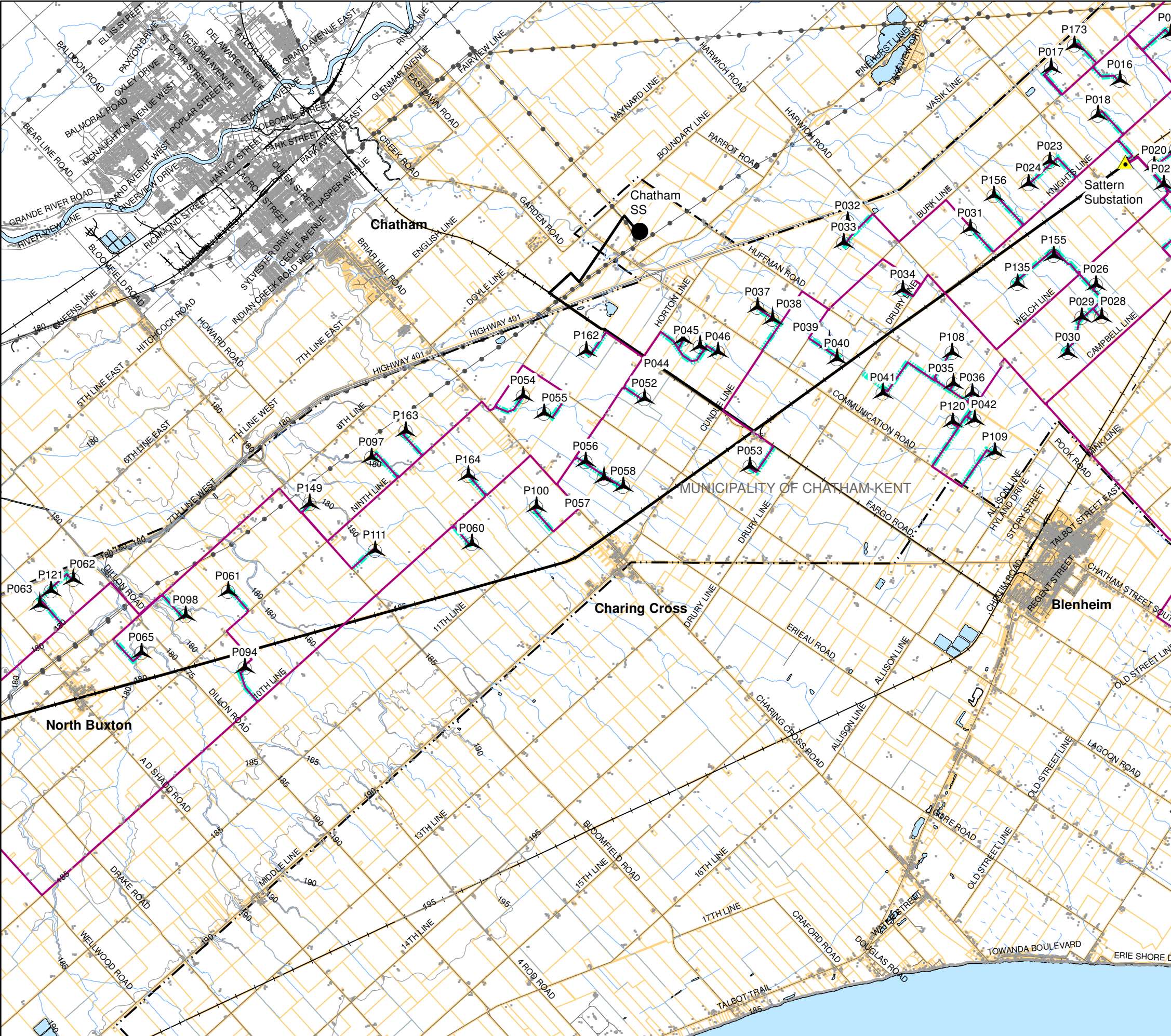
- Proposed Turbine
- Substation
- 230 kV Distribution Line
- Access Road
- Cabling

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Notes:  
1. Base and environmental data downloaded from LIO with permission.  
2. Spatial referencing UTM NAD83.  
3. Parcel data obtained from Teranet, Feb. 2011.



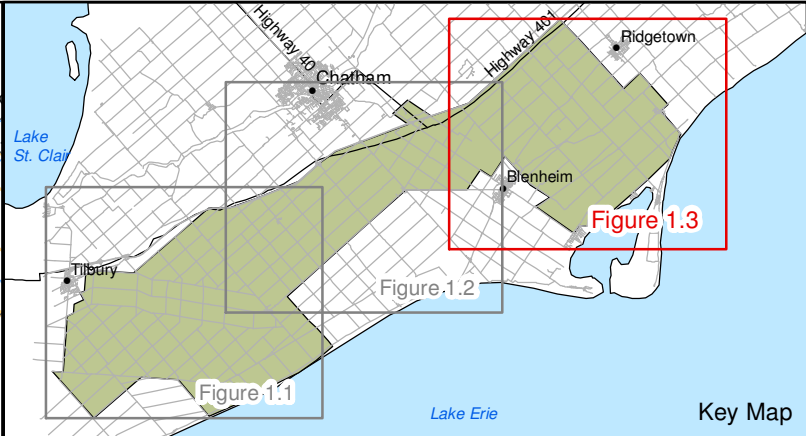
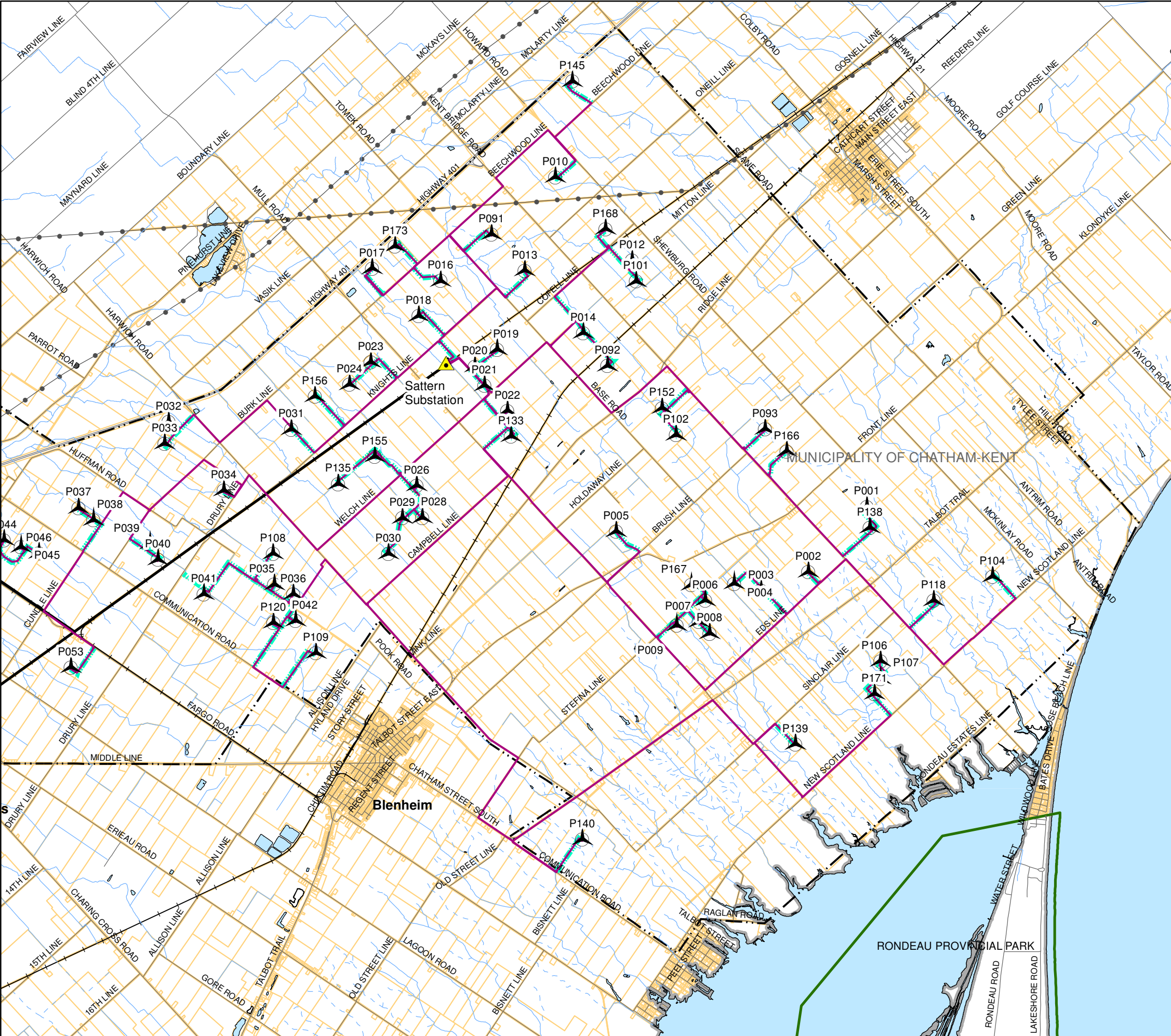


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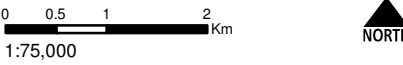


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## 2. Post-Construction Monitoring Methods

The following documents the methods for post-construction monitoring for mortality searches and disturbance effects monitoring.

### 2.1 Disturbance Effects Monitoring

#### 2.1.1 *Bat Maternity Roost Habitats*

Following confirmation of the presence of bat maternity roosts in 2012, 3 years of post construction monitoring will be conducted at the identified significant bat maternity roosts within 120 m of the wind turbines. Surveys will assess use of the project area by bats as outlined within Table 4.11 of the Natural Heritage Environmental Impact Study for the Project (Hatch, 2012).

Protocols for monitoring are based on MNR guidelines (MNR, 2011b), and will include:

- Visual surveys (in person or through the use of infrared camera) conducted during the month of June.
- Observers will choose a viewing station with a clear aspect of cavity opening or crevice (multiple observers may be required if multiple openings are present in one snag).
- Cavity opening or crevice will be monitored from 30 minutes before dusk until 60 minutes after dusk for evidence of bats exiting.
- A bat detector (make and model to be determined) will be used in conjunction with visual surveys to determine species.
- The confirmed roost tree(s) from pre-construction monitoring within the habitat will be monitored during the month of June to determine the continued use of the habitat by bats. Other cavity trees within the habitat in proximity to the confirmed roost tree(s) may also be surveyed due to roost trees being ephemeral and the likelihood that bats will use other roosts nearby. Once continued habitat use has been established, monitoring is complete within the habitat.

MNR and the Proponent will review the post-construction monitoring results against preconstruction monitoring data to assess if an ecologically significant effect on bats is occurring and whether such effect is attributable to the wind project or other external factors. Without the use of control sites, data suggesting disturbance or avoidance by bats should be viewed with caution as many confounding factors, including weather and disease, can influence activity from year to year. These discussions will determine if and when appropriate contingency measures should be implemented. The best available science will be considered when determining appropriate mitigation.

#### 2.1.2 *Open Country Bird Breeding Habitat (P029-Open Field)*

Should feature P029-Open Field be determined to be significant following 2012 pre-construction habitat use surveys, 3 years of post-construction monitoring will be conducted at the habitat. Surveys will assess use of the project area by breeding birds as outlined within Table 4.11 of the Natural Heritage Environmental Impact Study for the Project (Hatch, 2012).



Protocols for monitoring are based on MNR guidelines (MNR, 2011a), and will include:

- Six (6) point count stations will be placed throughout the habitat, and will be located no closer than 250 m from each other.
- A standardized transect survey will also be conducted between point count sites.
- Three open country breeding bird point count surveys will be conducted at each location in June and early July, each no less than ten days apart, following the Birds and Bird Habitat Guidelines (OMNR 2011). Surveys will be carried out between dawn (one half hour before sunrise) and three hours after sunrise.
- Surveys will be conducted for 10 minutes with binoculars to allow enough time to thoroughly scan the area for indication of open country breeding birds.
- Optimal weather conditions for these surveys are clear, calm, sunny days with little to no precipitation.
- The following information will be recorded:
  - ◆ Level of effort (including date, start and end time, time spent, etc)
  - ◆ Weather conditions (wind speed, temperature, cloud cover, precipitation, etc)
  - ◆ Name of observer(s) conducting field work
  - ◆ Complete list of all bird species observed with highest breeding evidence
  - ◆ Complete list of all other wildlife species observed
  - ◆ Description of general behaviour at time of observation
  - ◆ Description of habitats or areas scanned during the survey
  - ◆ A GPS point of the survey location will be documented on the first visit to be mapped for consistency between visits.

MNR and the Proponent will review the post-construction monitoring results against preconstruction monitoring data to assess if an ecologically significant effect on birds within the open country breeding bird habitat is occurring and whether such effect is attributable to the construction or operation of the wind project or other external factors. Without the use of control sites, data suggesting disturbance or avoidance by birds should be viewed with caution as many confounding factors, including weather and disease, can influence activity from year to year. These discussions will determine if and when appropriate contingency measures should be implemented. The best available science will be considered when determining appropriate mitigation.

### **2.1.3 Area Sensitive Bird Breeding Habitat (P022-W1)**

Should feature P022-W1 be determined to be significant following pre-construction habitat use surveys, 3 years of post-construction monitoring will be conducted within the habitat. Surveys will assess use of the project area by breeding birds as outlined within Table 4.11 of the Natural Heritage Environmental Impact Study for the Project (Hatch, 2012).

Protocols for monitoring are based on MNR guidelines (MNR, 2011a), and will include:

- Three (3) point count stations will be placed throughout the habitat, and will be located no closer than 250 m from each other.
- A standardized transect will also be conducted between point count sites.
- Three area-sensitive breeding bird point count surveys will be conducted at each location in June and early July, each no less than ten days apart, following the Birds and Bird Habitat Guidelines (OMNR 2011). Surveys will be carried out between dawn (one half hour before sunrise) and three hours after sunrise.
- Point counts will be conducted within the habitat at the best vantage point, following the guidelines outlined in the Birds and Bird Habitats guidelines (OMNR 2011).
- These surveys will be conducted for 10 minutes with binoculars to allow enough time to thoroughly scan the area for indication of area sensitive breeding birds. Optimal weather conditions for these surveys are clear, calm, sunny days with little to no precipitation.
- Following the Birds and Bird Habitats guidelines, the following information will be recorded during each survey:
  - ◆ Level of effort (including date, start and end time, time spent, etc)
  - ◆ Weather conditions (wind speed, temperature, cloud cover, precipitation, etc)
  - ◆ Name of observer(s) conducting field work
  - ◆ Complete list of all bird species observed with highest breeding evidence
  - ◆ Complete list of all other wildlife species observed
  - ◆ Description of general behaviour at time of observation
  - ◆ Description of habitats or areas scanned during the survey
  - ◆ A GPS point of the survey location will be documented on the first visit to be mapped for consistency between visits.

MNR and the Proponent will review the post-construction monitoring results against preconstruction monitoring data to assess if an ecologically significant effect on birds within the area sensitive bird breeding habitat is occurring and whether such effect is attributable to the construction or operation of the wind project or other external factors. Without the use of control sites, data suggesting disturbance or avoidance by birds should be viewed with caution as many confounding factors, including weather and disease, can influence activity from year to year. These discussions will determine if and when appropriate contingency measures should be implemented. The best available science will be considered when determining appropriate mitigation.



## 2.2 Mortality Monitoring

Post-construction bird and bat mortality surveys may identify specific species, specific periods of high mortality, or specific turbines/turbine groups linked to mortality. This knowledge can be used to identify and scope subsequent monitoring needs, evaluate the success of mitigation measures, establish protocols for operational mitigation and inform adaptive management.

The following details the proposed program for mortality searches:

- 3 years of mortality monitoring following construction of the Project (as required by MNR 2010/2011). This may be extended if significant bird or bat mortality is recorded (see Section 3.1), or additional mitigation measures are implemented (see Sections 3.2 and 3.3).
- The specific individuals conducting the monitoring remain to be determined, however monitoring will be overseen by a person qualified in the identification of bird and bat species.
- As there are more than 10 turbines associated with the Project, monitoring will be conducted at 30% of the wind turbines (as required by MNR 2011a/b), hereinafter referred to as the “subset”. Given that there are 124 turbines proposed for the Project, the subset will include 38 of these, the exact locations will be determined at a later date in conjunction with MNR.
- Turbines in the subset will be searched twice per week (every 3 to 4 days) concurrently for both birds and bats, from May 1 through October 31.
- During the month of November, turbines within the subset will be searched once per week for raptor mortality.
- Project turbines not included within the subset will be searched once per month from May 1 through October 31 for evidence of raptor mortalities.
- The methodologies for searches of turbines both within and outside of the subset are outlined below:
  - ♦ Weather conditions will be noted during each survey and documented. If adverse weather conditions are encountered on the day of the proposed survey that would prevent the survey from being completed, the survey will be postponed until the next available day with favourable weather conditions.
  - ♦ All carcasses will be photographed.
  - ♦ Searches conducted using grid transects of 5 to 6 m apart and will cover to a maximum of 50 m from the base of the turbine.
  - ♦ The data collected is to include the following:
    - species
    - sex
    - date
    - time
    - location (including GPS coordinates)

- carcass condition (e.g., intact or scavenged)
  - searcher
  - any injuries
  - distance and direction to nearest wind turbine
  - ground cover (including visibility class)
  - estimated number of days since death and,
  - distance to plot centre.
- ♦ GIS coordinates will be determined at the start of post-construction monitoring to delineate the 50 m search area, and once per month to delineate the extent of the search area within each visibility class (see below).
  - ♦ The area searched will consist of the gravel pad at the base of the turbine, roads extending from it, and any areas of ground nearby that are either covered with short vegetation or are bare. In respect of these other areas of ground:
    - As turbines are to be placed in agricultural lands that will remain in active production, the full 50 m radius circle extending from the base of the turbine is expected to be capable of being searched for a portion of the year, (such as in the spring before crop growth). It is expected that visibility will vary with Class 1 (>90% bare ground with <15 cm tall vegetation) being present for both the spring and fall, and Class 2 (>25% bare ground <15 cm tall vegetation) to Class 3 (<25% bare ground, >30 cm tall vegetation) being present at various times (corresponding to the crop growing season).
    - Once completed, the percentage of area searched (a correction factor), is calculated as outlined by MNR (2011a/b), where percent of area searched = actual area searched/ $\pi(50)^2$

Once surveys are complete, the minimum estimated bird and bat mortality is calculated following the formulas, with correction factors, as outlined by MNR (2011a/b). These calculations being

- Corrected Mortality Estimates (C) = number of carcasses found/ (Searcher Efficiency x Carcass Removal x percentage of area search).

## 2.3 Control Trials

In order to account for variations in searcher efficiency and carcass removal, trials are required in order to determine the correction factors that need to be applied to the estimate of bird and bat mortality (as outlined by MNR 2011a/b).

Both bird and bat carcasses will be used for these trials<sup>1</sup>. As these trials will commence at the start of the monitoring period, carcasses will be obtained from an external source to permit trials. During

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<sup>1</sup> The following species of bats will not be used during searcher efficiency and carcass removal trials because of White-nose Syndrome contamination risks (MNR 2011):

- *Myotis septentrionalis*
- *Myotis lucifugus*



operations, carcasses will be collected from the Project site and kept in a freezer for use in later trials. If no bat carcasses are available, carcasses of small brown mammals will be used.

### 2.3.1 *Searcher Efficiency Trials*

The efficiency of each searcher will vary. To adequately adjust for this variability, a blind test will be conducted on each searcher, as outlined below:

- Each searcher will be tested at least once per season (i.e., spring – May/June, summer – July/August, fall – September/October), or once a month if the vegetation community changes within the survey area such that the visibility class changes.
- 10 trial carcasses of both birds and bats per searcher per visibility class are to be used across the entire season (i.e., the trial period) and not in a single event in order to minimize the potential that the observer recognizes that a test is underway. Note: If no bat carcasses are available, carcasses of small brown mammals will be used.
- The tester will ensure that the participants are unaware of this test.
- Carcasses to be marked with a blacklight pen, or tissue clips or other such means that would not be detected by the observer, and placed the evening before a search day across the range of visibility classes within the search area. If blacklight pens are used, then every carcass will be checked following completion of that day's surveys.
- Carcasses will be thawed prior to placement. They will be handled with gloves and stored in a cooler during transport.
- Any carcasses missed during the survey will then be retrieved following the carcass search.

Once completed, the searcher efficiency correction factor is calculated as outlined by MNR (2011a/b). This calculation being

- $Se = \text{number of test carcasses found} / (\text{number of test carcasses placed} - \text{number of test carcasses scavenged})$ .

A weighted average (considering the efficiency at each turbine location) is calculated by

- Overall Efficiency of searcher ( $Se_o$ ) =  $Se_1 (\text{number of turbines searched by searcher} / \text{total number of turbines}) + Se_2 (\text{number of turbines searched by searcher} / \text{total number of turbines}) + \dots$

### 2.3.2 *Carcass Removal Trials*

The rate of removal of the carcasses (i.e., scavenger removal) will vary depending on turbine location and season. In order to control for this variability, control trials will be conducted as outlined below.

- Trials to occur once each month (May through October) for bats and birds (MNR 2011a/b).
- Weather conditions during the trial will be recorded.

- 
- *Myotis leibii*
  - *Perimyotis subflavus*
  - *Eptesicus fuscus*.

- Carcasses will be checked twice per week during mortality searches (see Section 2.2).
- 10 to 20 trial carcasses of both birds and bats, with at least one third of all bat carcasses being bats, are to be used for each trial.
- Carcasses will be marked by tissue clips, then placed prior to the start of searches across the range of visibility classes within the search area. Carcasses are then monitored during carcass searches to determine if scavenged, continuing until all the carcasses have been removed or have sufficiently decomposed (generally 2 weeks).
- Carcasses will be thawed prior to placement. They will be handled with gloves and stored in a cooler during transport.

Once completed, the carcass removal correction factor is calculated as outlined by MNR (2011a/b). This calculation being

- $Sc = \text{number of carcasses that remain on site visit 1} + \text{number of carcasses that remain on site visit 2} + \text{number of carcasses that remain on site visit 3} / (\text{total number of carcasses} + \text{number of carcasses that remain on site visit 1} + \text{number of carcasses that remain on site visit 2})$ .

## 2.4 Reporting

The results of monitoring surveys, including raw data, will be provided to the Ministry of the Environment in an annual Environmental Effects Monitoring Report (MNR, 2011a/b).

This report will detail the findings of the monitoring trials as outlined throughout this report. Fatalities will be measured by fatalities/turbine/year.

Regular contact will be maintained with the relevant agencies throughout the monitoring period, and if any single mortality event threshold are observed these will be reported immediately.

### 2.4.1 Species at Risk Reporting

If a carcass of a species listed as Endangered or Threatened under the *Endangered Species Act, 2007 (ESA)* or the *Species at Risk Act (SARA)* is identified during the course of monitoring MNR Aylmer District Species at Risk biologists and/or EC will be notified within 24 hours of the observation. A permit under ESA or SARA will be required for possession and transportation of any carcass of a species listed as Endangered or Threatened under ESA or SARA. If no permit is presently available, carcasses will remain in place and MNR/EC notified of exact locations for collection.

If an injured individual of a species listed as Endangered or Threatened under the *ESA* or *SARA* is identified during the course of monitoring, MNR Aylmer District Species at Risk biologists will be contacted immediately for further direction.





### 3. Operational Mitigation

If during the surveys, threshold mortality events or significant annual bird or raptor mortality events are identified, then operational mitigation will be implemented.

This section outlines the mortality thresholds and mitigation measures for birds and bats.

#### 3.1 Mortality Thresholds for Birds and Bats

Table 3.1 provides the significant mortality thresholds for birds and bats in both annual and single events as defined by MNR.

**Table 3.1 Mortality Thresholds**

Species	Threshold	
	Annual (i.e., all surveys combined)	Single Event (i.e., during one survey date)
Birds	Any one of the following: <ul style="list-style-type: none"> <li>• 14 birds/turbine/year</li> <li>• 0.2 raptors (all species)/turbine/year</li> <li>• 0.1 raptors (species of conservation concern)/turbine/year</li> </ul>	Any one of the following: <ul style="list-style-type: none"> <li>• 10 birds at any one turbine</li> <li>• 33 or more birds (including raptors) at multiple locations</li> </ul>
Bats	10 (bats/turbine/year)	None Specified

If the mortality thresholds outlined in Table 3.1 are exceeded, mitigation measures may be implemented through an adaptive management program. An adaptive management program allows mitigation measures to be implemented in the event that unanticipated significant adverse environmental effects are observed. Significant adverse environmental effects will be assessed through review of the annual report. Potential adaptive management strategies could include:

- an additional 2 years of mortality monitoring from the date of the significant event for bats, operational mitigation (see Section 3.2) from July 15 through September 30 from sunset to sunrise for the duration of the Project
- for birds, if annual mortality levels exceed thresholds, an appropriate response plan will be developed with MNR in accordance with the MNR Bird Guidelines (2011)
  - ♦ for turbines within 120 m of identified significant wildlife habitats for birds, immediate operational mitigation (Section 3.3) may be required,
  - ♦ for turbines outside 120 m of identified significant wildlife habitats for birds, operational mitigation (Section 3.3) may be implemented during the high risk seasons
- following implementation of operational mitigation, if required, up to 3 years of effectiveness mortality monitoring may be implemented at turbines subject to the operational mitigation if relevant.
- The best available science and information should be considered when determining appropriate mitigation and monitoring design.

### 3.2 Mitigation Measures for Bats

If mortality thresholds outlined in Table 3.1 are exceeded, operational mitigation will include:

- changing the wind turbine cut-in speed to 5.5 m/s, or
- feathering of the wind turbine blades when wind speeds are below 5.5 m/s.

Operational mitigation measures will be employed from sunset to sunrise, from July 15 through September 30 for the duration of the Project in accordance with MNR's Bat Guidelines (2011). In addition to the above mitigation, consultation with MNR and use of the best available science will be considered

Furthermore, turbine maintenance will be coordinated, as practicable, with periods of high bat activity and/or mortality to reduce operational impacts.

### 3.3 Mitigation Measures for Birds

If the mortality thresholds for birds outlined in Table 3.1 are exceeded, operational mitigation during periods of higher mortality risk may be included for birds as follows:

- shutdown of specific turbines
- feathering of blades.

In addition to the above, post-construction mitigation considerations in MNR's Significant Wildlife Habitat Technical Guide (MNR, 2000) and Environment Canada guidance document: 'Wind turbines and birds: a guidance document for environmental assessment' (EC-CWS, 2007), as well as the latest scientific information will be considered.



#### **4. Conclusion**

The post-construction monitoring plan outlined herein is designed to meet the information requirements of the Ministry of Natural Resources.

Information collected during the post-construction monitoring will enable a determination of whether significant bird or bat mortality events are occurring.



## 5. References

Environment Canada – Canadian Wildlife Service (EC-CWS). 2007. Wind Turbines and birds: a guidance document for environmental assessment. Environment Canada – Canadian Wildlife Service, Gatineau, Quebec.

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